KENWOOD

SERVICE MANUAL

TS-711A/E, TS-811A/B/E AC-10, CD-10, TU-5, VS-1

144MHz/430MHz ALL MODE TRANSCEIVER

Photo is TS-711A.

CONTENTS

CIRCUIT DESCRIPTION

MODEL / UNIT	TS-711A (K,M1,M2,X)	TS-711E (T,W)	TS-811A (K)	TS-811B (M,X) TS-811E (T,W)
SWITCH UNIT	X41-1580-11	X41-1580-61	X41-1580-01	X41-1580-01 (M,X) X41-1580-62 (T,W)
AVR UNIT	X43-1490-11	X43-1490-11	X43-1490-11	X43-1490-11
RF UNIT	X44-1620-11	X44-1620-01	X44-1650-11	X44-1650-01
FINAL UNIT	X45-1380-11	X45-1380-11	X45-1390-11	X45-1390-01 (M,X) X45-1390-61 (T,W)
IF UNIT	X48-1400-11	X48-1400-00	X48-1400-01	X48-1400-01
AF UNIT	X49-1180-00	X49-1180-00	X49-1180-00	X49-1180-00
PLL UNIT	X50-1990-11	X50-1990-00	X50-1990-12	X50-1990-01
HET UNIT	–	–	X50-2010-10	X50-2000-00
TONE UNIT	–	X52-1290-60	–	X52-1290-60 (T,W)
CONTROL UNIT	X53-1410-11 (K,M1) X53-1410-21 (M2,X)	X53-1410-51 (T) X53-1410-61 (W)	X53-1410-12 (K)	X53-1410-22 (M,X) X53-1410-52 (T) X53-1410-62 (W)
DISPLAY UNIT	X54-1820-11	X54-1820-11	X54-1820-11	X54-1820-11

Table 1 TS-711A/E, TS-811A/B/E PC Board chart

TS-711A/E

Destination	Frequency (MHz)	VFO step (kHz)	TX OFFSET DISPLAY	Repeater shift (kHz)	Tone circuit
K,M1,M2	144.000~ 147.995	5	– S +	±600	Option
T	144.000~ 145.995	12.5	– S +	±600	1750Hz Tone Burst
W	144.000~ 145.995	12.5	– S +	±600	1750Hz Tone
X	144.000~ 147.995	5	– S +	±600	Option

TS-811A/B/E

Destination	Frequency (MHz)	VFO step (kHz)	TX OFFSET DISPLAY	Repeater shift (kHz)	Tone circuit
K	430.000~ 450.000	25	– S +	±5	Option
M,X	430.000~ 440.000	25	– S +	±5	1750Hz Tone Burst
T	430.000~ 440.000	12.5	– S +	±1.6	1750Hz Tone
W	430.000~ 440.000	12.5	– S +	+7.6 –1.6	Option

Table 2 Frrequency configuration of destination

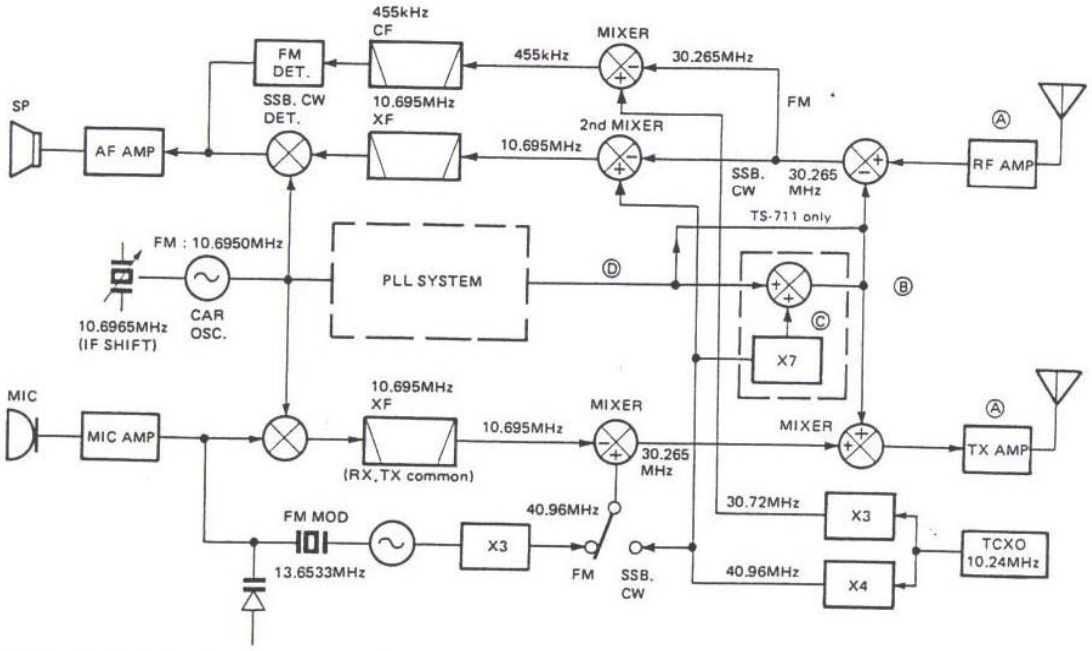
MODE	STEP / CH.Q		K,M1,M2	T,W
		OFF	ON	
FM	OFF	10Hz	5kHz	12.5kHz
	ON	100Hz	5kHz	5kHz
SSB	OFF	10Hz	5kHz	5kHz
CW	ON	100Hz	1kHz	1kHz

Table 3 Frequency step function's chart

TS-711/TS-811 FREQUENCY CONFIGURATION

Fig. 1 represents the frequency configuration. Reception uses a double conversion superheterodyne system, in which the second IF (Intermediate Frequency) differs according to the mode. Here, the signal from the antenna is mixed with the PLL (Phase Locked Loop) local OSC (Oscillator) signal in the first mixer common to the respective modes and is then converted to the first IF at 30.265MHz. At this point, the first IF is separated between SSB/CW and FM modes. In SSB/CW, it is mixed with a 40.96MHz local OSC signal (4 times the TCXO frequency) in the second mixer (Q34) and is converted to the second IF at 10.695MHz. Then, this IF is product detected with a 10.6965MHz carrier. In the FM mode, it is mixed with the 30.72MHz local OSC signal (3 times the TCXO frequency) in the second mixer (Q36) and is converted to the second IF at 455kHz. Then, this IF is detected. In SSB/CW transmission, the SSB/CW signal at 10.695MHz is mixed with the 40.96MHz local OSC signal (4 times the TCXO frequency) in the balanced mixer (Q6/Q7) and is converted to a 30.265MHz signal. It is then mixed with the 113.735–115.725MHz PLL signal to the transmission frequency. In case TS-811, PLL signal (113.015–123.005 MHz) mixed with the 296.720MHz (A), 286.720MHz (B,E) HET signal to the transmission frequency. In the FM mode, a 13.6533MHz X'tal OSC signal, used in place of the 40.96 MHz local OSC signal, is modulated and multiplied by 3 to a 40.96MHz local OSC signal.

CIRCUIT DESCRIPTION



Model	TS-711 (K,M1,M2,X)	TS-711 (T,W)	TS-811 (K)	TS-811 (M,X) TS-811 (T,W)
Ⓐ	144.000 – 147.995MHz	144.000 – 145.995MHz	430.000 – 449.995MHz	430.000 – 439.995MHz
Ⓑ	113.735 – 117.730MHz	113.735 – 115.730MHz	399.735 – 409.730MHz	399.735 – 419.730MHz
Ⓒ	–	–	296.720MHz	286.720MHz
Ⓓ	113.735 – 117.730MHz	113.735 – 115.730MHz	113.015 – 123.005MHz	113.015 – 123.005MHz

Fig. 1 Frequency-related block diagram

RF UNIT
(X44-1620-XX) : TS-711, (X45-1650-XX) : TS-811

- **Reception system**

The signal input from the RA terminal enters the RF amplifier (Q1) through the ATT circuit (−20dB) TS-711 only. The RF amplifier uses GaAs FET : 3SK129. The input uses a 2-pole helical and the output a 3-pole helical, thus obtaining the desired bandwidth and skirt attenuation. The input signal is converted in the receiving mixer, Q2 : C-MOS FET : 3SK122 (in the TS-811, GaAs FET : 3SK129), to the first IF at 30.265MHz. Then, the first IF is convertes to the RIF level signal through the 2-stage MCF (Monolithic Crystal Filter) and is output to the IF unit.

- **Transmission system (TS-711)**

The lower IF signal (30.265MHz) from the IF unit is mixed with the HET signal in the FET balanced mixer (Q3, Q4 : 2SK192A(GR)*N) and converted to the transmission frequency. From this transmission signal, any spurious component is eliminated by the 5-stage VCT (Varactor Tuned) circuit in which the PLL unit CV (Correction Voltage) is used.

Further, the transmission signal is amplified up to the drive output level of for the output transceiver 0.3W for the output transceiver in amplifier Q6. This output is fed to the final module.

- **Transmission system (TS-811)**

The lower IF signal (30.625MHz) from the IF unit is mixed with the HET signal in the Schottky-type DBM (Double Balanced) mixer and is converted to the transmission frequency. From this signal, any spurious component is eliminated by the 2-stage band-pass amplifier with small Hi-Q helical coils. In particular, the second-stage band-pass amplifier has helical coils connected in series, thus providing acute BPF characteristics.

Further, the transmission signal is amplified up to the drive output level of for the output transceiver 0.35W for the output transceiver in amplifier Q4. This output is fed to the final module. VR1 at Q4 controls Q4's idling current The idling current is set to about 15mA for this stage.

Item	Rating
Nominal center frequency	30.265MHz
Pass bandwidth	±6.5kHz or more at 3dB
Attenuation bandwidth	±32kHz or less at 40dB
Ripple	1.5dB or less
Loss	3dB or less
Guaranteed attenuation	60dB or more within ±1MHz Spurious level : 40dB or more
Input and output impedance	1.4kΩ ± 10%/1pF ± 10%

Table 4 MCF (L71-0248-05)
(RF unit L4 TS-711, L16 TS-811)

CIRCUIT DESCRIPTION

IF UNIT (X48-1400-XX)

- **Reception system**

The reception system is generally divided into SSB/CW and FM modes.

1) SSB/CW mode

The RIF signal (30.265MHz) from the RF unit (X44-1620-11 : TS-711, X45-1650-XX : TS-811) is mixed with the 40.96MHz output from Q2 at Q34 : 3SK73(Y) and is converted to the 10.695MHz second IF. Then, this signal is amplified via the noise blanker gate circuit and SSB filter L12 by IF amplifiers Q20–22 : 3SK73(GR) (to which AGC is applied), and is then mixed with the carrier OSC signal by product detector (D10–13 : IN60) to obtain a demodulated audio output.

For AGC, the IF output of Q22 is taken through AGC buffer Q24 : 2SC2458(Y). Q23 controls the AGC voltage. Part of the output of AGC buffer Q24 is connected as the SSB squelch release signal with SSB squelch mixer Q40 : 2SC2668(Y,O) via Q39.

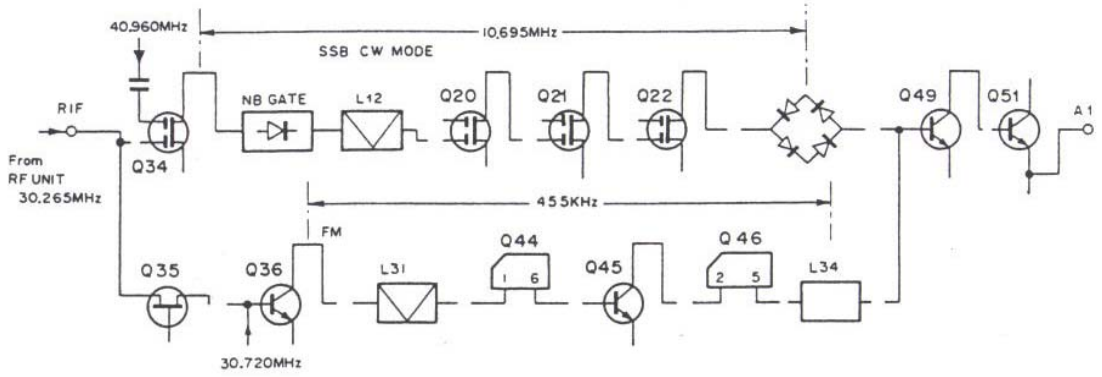
Q25 is the AGC time constant selection circuit. Q26 and Q27 from the S-meter amplifier.

2) FM mode

The RIF is input to mixer Q36 : 2SC2668(Y) via gate-grounded amplifier Q35 : 2SK125. For the local OSC signal, 30.72MHz is obtained by multiplying the PLL 10.24MHz reference by 3-times (Q38). There, the RIF signal is converted to the 455kHz second IF. This output is amplified via ceramic filter L31 in the IF amplifiers, consisting of Q44 : TA7302P, Q45 : 2SC2668(Y) and Q46 : μPC577H, and is then demodulated by ceramic discriminator L34 : CFY455S.

The demodulated signal is filter separated between the AF pre-amplifier Q49 : 2SC2458(Y) and the squelch noise amplifier Q53 : 2SC2458(Y), Q54 : 2SC3113(B). The "busy" lamp is controlled by the squelch circuit and the center detection circuit Q47 : μPC4558C. To supress ignition noise, a "killer" circuit using Q62 is added and is controlled by Q61.

RX SECTION



TX SECTION

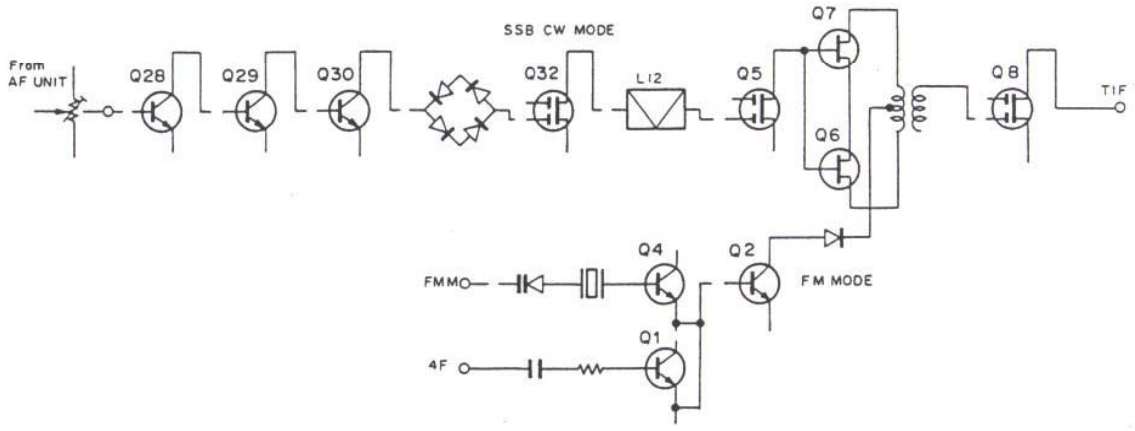


Fig. 2 IF unit block diagram

CIRCUIT DESCRIPTION

3) Noise blanker

Q41 noise amplifier the second IF output, obtained by mixing the 30.265MHz first IF at Q36. It is switched by Q43. Q37 is a switching circuit to blank PLL reset noise which would otherwise occurs every 20kHz.

4) SSB squelch

This acts as a noise squelch. The SSB squelch release signal, taken from AGC buffer Q24, is input to buffer Q39 through squelch sensitivity pot VR6. This output is mixed with 10.24MHz in the SSB squelch mixer Q40 and converted to 455kHz. This signal is then input to the FM IF amplifier. Thereafter, the FM squelch circuit is used to provide SSB squelch.

In the SSB mode, Q56 in the squelch circuit operates to set the attack and slow release time constants.

- **Transmission system**

1) SSB and CW mode

The audio signal from the AF unit is amplified in the microphone amplifier Q28–30 : 2SC2458C and sent to the balanced modulator, D16 : ND487C1-3R. In CW mode, the modulator is unbalanced by DC, and this carrier signal output from the modulator is used. The double sideband output is filtered by SSB X'tal filter L12 amplified by FET Q5 : 3SK73(GR), and mixed with the 40.96MHz output from Q2 in balanced mixer Q6, Q7 : 2SK161(GR) for conversion to the TIF (Transmit IF) signal at 30.265 MHz. Then, the TIF signal is amplified by FET Q8 : 3SK73(GR) and sent to the RF unit. In CW mode, keying controlled by Q32 and Q8 gate biases using –6V and Q13 switching.

2) FM mode

The carrier signal output from the unbalanced SSB modulator is used. Different from the SSB/CW mode is that the local OSC signal used in FM for balanced mixers Q6, Q7 is supplied by X'tal OSC L4 (13.657MHz), which in FM mode operates at 13.6533MHz, pulled by varicap D3. This OSC output is tripled 40.96MHz. In the FM mode, ±5kHz frequency deviation is obtained after tripling the direct modulated X'tal OSC output.

3) Power control

Fig. 3 shows the power control circuit configuration. The final output is detected, and the ALC (Automatic Level Control) voltage is controlled by Q4 in the Display unit (X54-1820-11). The ALC voltage is applied to the second gates of FETs Q5 and Q8, by which the TIF level is adjusted and then APC (Automatic Power Control) is applied. In addition, the power control, in which two pots are used. controls the G2 voltage of generator buffer Q32, to counter excessive ALC at low power.

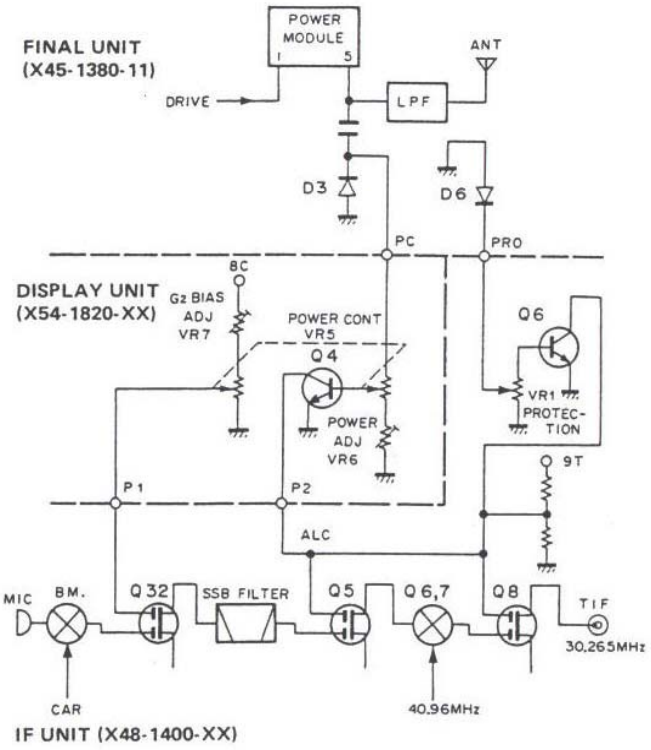


Fig. 3 Power control cinfiguration (TS-711)

Item	Symbol	Condition	Rating			Unit
			Max.	St.	Min.	
Foward Voltage (DC)	VF1	IF=50mA			0.7	V
Foward Voltage (DC)	VF2	IF=1.0mA		0.2	0.3	V
Foward Voltage Difference	ΔVF2				0.02	V
Terminal Capacitance	Ct	VR=0 f=1.0MHz		0.9	1.2	pF
Terminal Capacitance Difference	ΔCt				0.2	pF

Table 5 ND487C1-3R Electric characteristic (IF unit D16)

CIRCUIT DESCRIPTION

AF UNIT (X49-1180-00)

- **Microphone amplifier**

The signal from the microphone is amplified by Q1 : 2SC2459(GR), which is common to both FM and SSB modes. In FM mode, the signal is subject to 6dB/oct pre-emphasis by Q4 (1/2) : NJM4558S and is amplified by OP amplifier Q4 (2/2). Then, it is high-cut by active LPF (Low Pass Filter) Q9 for –24dB/oct via amplitude limiter D8 : MC911 and applied as modulation to the X'tal OSC in the IF unit.

In the SSB mode, the output from amplifier Q1 is impedance-converted by emitter-follower Q3 : 2SC2458(Y) and provided as modulation for the balanced modulator in the IF unit through the microphone gain control on the front panel. The input signal to pin AN1 of accessory terminal ACC2, in the SSB/CW mode is mixed with the output of microphone amplifier Q3 and is then input to the microphone gain control. In the FM mode, it is input to amplifier Q4, but not through the pre-emphassis circuit. Further, Q2 is controlled by the signal input to ACC2 pin MM to turn OFF amplifier Q1 for microphone muting.

- **Processor**

When the processor SW is ON, the processor circuit consisting of Q5, Q6 and Q7 is connected through transistor switch Q8. Q5 is an amplifier circuit with ALC. The NFB (Negative Feedback) signal from Q5 pin 3 is amplified by Q7, detected by D5 and input for ALC at pin 6. Then, the input is controlled by ALC output pin 5.

Q6, an FET switch, adjusts the SSB level to that which has been previously adjusted in the FM mode.

- **Other circuits**

Q11 is the AF PA. Transistor Q10 is an AF amplifier through which the signal is supplied to ACC2. Q12 is the CW side-tone OSC circuit. Q13–Q16 forms the CW semi-break-in circuit

FINAL UNIT
(X45-1380-11) : TS-711, (X45-1390-XX) : TS-811

The drive signal from the RF unit is amplified up to 25W by power hybrid Q1 : M57727 (TS-711), Q2 : M57745 (TS-811). It is then supplied to the antenna through the ANT switch and the LPF for removal of harmonic component content.

In addition, ALC detection, RF meter, reflected Power detection and fan temperature detection circuits are provided. The RF meter circuit is a peak holding circuit in which voltage doubler detection is used. The final PA hybrid is protected in two ways. Reflected power (VSWR) is detected from the antenna circuit and lowers the drive voltage by control of the ALC reference voltage to prevent damage to the final PA hybrid for the second protection circuit, thermistor TH1 detects the Final unit temperature to control the fan and prevent abnormal heating in the Final unit PA.

AVR UNIT (X43-1490-11)

The AVR (Automatic Voltage Regulator) unit consists of the rectifier and filter section and the AVR circuit section. The AVR circuit section has 13.8V, 8V and 9V AVR circuits and a temperature protection circuit. There is also a fan drive circuit.

The 13.8V AVR circuit consists of Q1–Q4 and pass transistor, Q5 : 2SD717. Transistor Q1, which controls Q5 emitter, supplies power (pin B8) which is separately rectified and filtered.

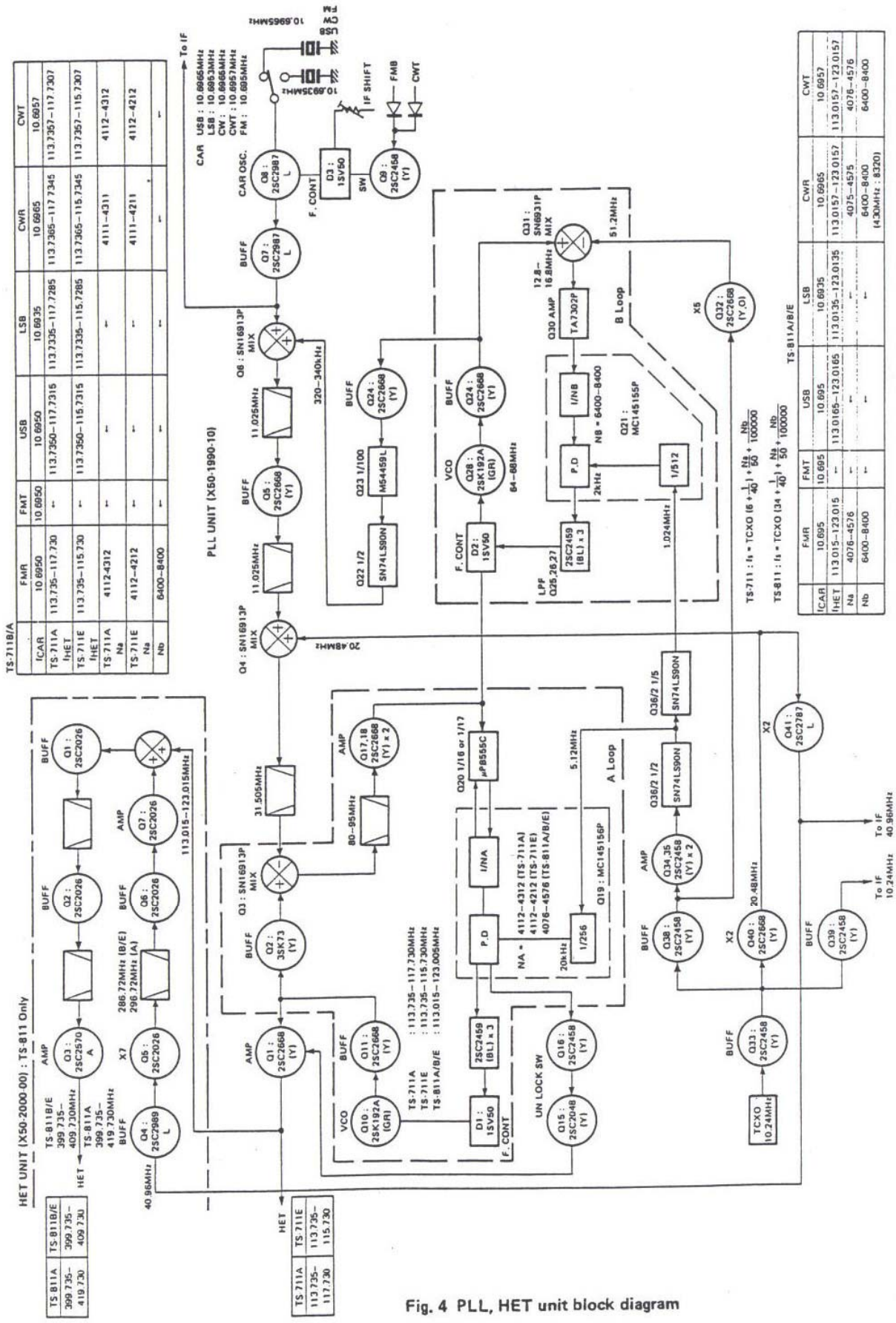
The fan is switched by comparator Q10 (1/2) and Q11 after heat detection by thermistor TH1 in the Final unit. The temperature protection circuit functions to stop transmission if the transformer heats abnormally due to excessive continuous transmission, etc. during AC operation. The detection circuit, like the fan, turns OFF the AVR 9T (9V, transmit) output.

PLL UNIT (X50-1990-XX)

The PLL unit has a double loop configuration an ouput in 10Hz steps and uses a 10.24MHz TCXO (Temperature Compensates Crystal Oscillator) (±3ppm) as the reference OSC. 10Hz step operaiton is achieved by dividing the output of the 2kHz comparison PLL (loop B) by a 1/200 divider. Digital tuning in 10Hz steps is obtained by mixing that division signal with the output of the 20kHz comparison PLL (loop A). In addition, the carrier OSC, which is located in the PLL unit, is configures to an IF shift.

Loop B is a mixing type PLL. The VCO output operates from 64–68MHz (Q28 : 2SK192A (GR)*N)) in loop B and, is mixed in Q31 : SN16931P with a 51.2MHz signal This infection signal is derived by multiplying 10.24MHz 5 times in Q32 : 2SC2668(Y,O) via buffer amplifier Q29 : 2SC2668(Y) and then converting to 12.8–16.8MHz.

CIRCUIT DESCRIPTION



TS-711B/A		FMR	FMT	USB	LSB	CWR	CWT
	fCAR	10.6950	10.6950	10.6950	10.6935	10.6965	10.6957
TS-711A	fHET	113.735–117.730	↔	113.7350–117.7315	113.7335–117.7285	113.7365–117.7345	113.7357–117.7307
TS-711E	fHET	113.735–115.730	↔	113.7350–115.7315	113.7335–115.7285	113.7365–115.7345	113.7357–115.7307
TS-711A	Na	4112–4312	↔	↔	↔	4111–4311	4112–4312
TS-711E	Na	4112–4212	↔	↔	↔	4111–4211	4112–4212
	Nb	6400–8400	↔	↔	↔	↔	↔

TS-811A/B/E		FMR	FMT	USB	LSB	CWR	CWT
	fCAR	10.695	10.695	10.695	10.6935	10.6965	10.6957
TS-811A	fHET	113.015–123.015	↔	113.0165–123.0165	113.0135–123.0135	113.0157–123.0157	113.0157–123.0157
TS-811B/E	Na	4076–4576	↔	↔	↔	4075–4575	4076–4576
	Nb	6400–8400	↔	↔	↔	6400–8400 (4.30MHz : 8320)	6400–8400

TS-811A	TS-811B/E
399.735–419.730	399.735–409.730

TS-711A	TS-711E
113.735–117.730	113.735–115.730

Fig. 4 PLL, HET unit block diagram

Then, the resultant signal is amplified in Q30 : TA7302 and divided at a frequency division coefficient of from 6400–8400 so that a 2kHz output is obtained. Further, 10.24 MHz is also divided by 1/10 at Q36 and again divided by 1/5, and the resultant signal is phase compared with the 2kHz reference signal at Q21 : MC145155P*K.

The PD (Phase Detector) output is converted to a DC Correction Voltage by a 3 transistor stage LPF (Q25–27 2SC2459(BL)) to control the VCO (Q28).

Additionally, part of the 64–68MHz VCO output which passed through buffer amplifier Q29 is subject to 1/2000 division by divider IC Q23 : M5449L for 1/1000 division, and Q22 : SN74LS90N for 1/2 division through buffer Q24 : 2SC260(Y,O). The output of Q22 therefore becomes 320–340kHz at a 10kHz step rate. This output and the output of the carrier OSC are input to mixer Q6 : SN16913P. A 11.025MHz output is taken through a ceramic filter and a buffer Q5 : 2SC2668(Y). Then, this 11.025MHz output is mixed at Q4 : SN16913P with a 20.48MHz signal which is obtained by multiplying 10.24 MHz by two at Q40 : 2SC2668(Y) so that an output of 31.505MHz is obtained. Then this 31.505MHz output is input to mixer Q3 : SN16913P as the loop A local OSC signal. Loop A is a dual modulus type PLL with a 20kHz comparison frequency. Prescaler Q20 : μPB555 operates at either a 1/16 or 1/17 division ratio. The VCO output 113.735–115.735MHz TS-711E, 113.735–117.735MHz TS-711A (Q10 : 2SK129A(GR)* N) in loop A is separated into the HET (Heterodyne) output and the input to mixer Q3 : SN16913P through buffer Q11 : 2SC2668(Y). Mixer Q3 output (80–90MHz) is amplified in a 2 transistor stage amplifier (Q17, Q18 : 2SC2668(Y)) through a 80–95 MHz BPF and is input to prescaler Q20.

The prescaler, connected with PLL IC Q19, forms a swallow counter to divide this input at a frequency division coefficent NA = 4112–4212 (TS-711E), NA = 4112–4312 (TS-711A) to 20kHz. This signal is phasecompared with the 20kHz reference signal obtained by dividing 10.24MHz by two, and 1/256 division of 5.12MHz. The PD output is DC converted by a 3 transistor LPF stage (Q12, 13, 14) to control the VCO (Q10). HET output is obtained by amplifying the VCO output (Q10) by transistor Q1 : 2SC2668(Y).

Comparison frequency derivation :

- **Loop A**

The TCXO 10.24MHz output is amplified by two transistor stages (Q34, 35 : 2SC2458(Y)) via buffers (Q33, 38 : 2SC2458(Y)), is divided by Q36/2 to 5.12MHz, which in turn is input to PLL IC Q19. This input is divided 1/256 by the divider contained inside Q19 to 20kHz, which is the comparison frequency.

- **Loop B**

The 5.12MHz output in loop A is further divided 1/5 by divider Q36/2 to 1.024MHz. This signal is then input to PLL IC Q21 and is divided 1/512 by the divider contained inside Q21 to 2kHz, which is the comparison signal.

For unlock detection, the output of PLL IC Q19 pin 9 in loop A is used. The power supply to buffer Q1 is switched by transistors Q15 and Q16.

The carrier X'tal OSC is switched by diode switches D4 and D5. The bias voltage for D4 is applied from the 8C (8V DC common supply) line, and is independent of the mode. However, in the LSB mode, D4 and D5 can be selected by the ratios of R37/R38 and R40/R39.

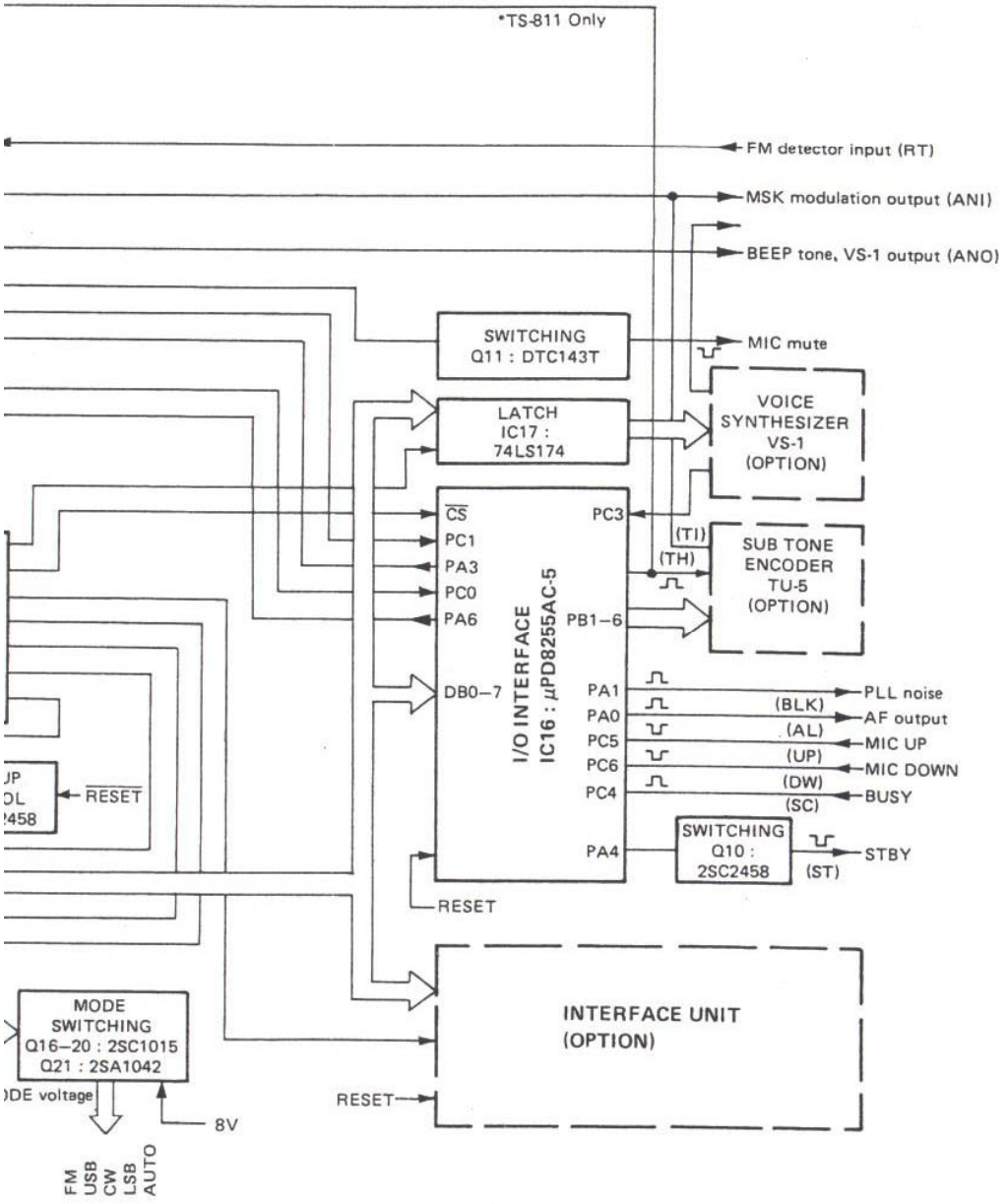
Item	Rating
Center frequency of 3dB bandwidth	11.025MHz ± 50kHz
3dB attenuation bandwidth	Within 150 ± 40kHz
20dB attenuation bandwidth	380kHz or less
Insertion loss $20 \cdot \log\left(\frac{E1}{2 \cdot E2}\right)$	8dB or less
Spurious (Within 9–12MHz)	38dB or more
Input and output impedance	330Ω

Table 6 Ceramic filter (L72-0346-05) (PLL unit L8,10)

HET UNIT
(X50-2000-00) : TS-811 M,X,T,W only
(X50-2010-10) : TS-811 K type only

The HET unit gives the HET output by mixing the PLL VCO output and the local OSC signal, which is obtained by a 7 times multiplication of the 40.96MHz local OSC from the PLL unit. 40.96MHz from the PLL unit is amplified up to 0.5V (rms) by amplifier Q4. To remove unwanted harmonic components, it is low pass filtered by amplifier Q7 through a Hi-Q tuning circuit (stage Q6) to become the local OSC signal for HET section.

This signal is mixed with the PLL signal (113.015–123.015 MHz) in the Schottky barrier DBM (Double Balanced) diode mixer : ND-487 and converted to the actual HET signal of from 399.735–409.735MHz (TS-811B/E), 399.735–419.730MHz (TS-811A). After passing a 2-stage bandpass amplifier with small helical coils to obtain the necessary band-width, it is amplified up to the HET signal level by broad band amplifier Q3.


*TS-811 Only
FM detector input (RT)
MSK modulation output (ANI)
BEEP tone, VS-1 output (ANO)
SWITCHING
Q11 : DTC143T
MIC mute
LATCH
IC17 :
74LS174
VOICE
SYNTHESIZER
VS-1
(OPTION)
CS
PC1
PA3
PC0
PA6
DB0–7
I/O INTERFACE
IC16 : μPD8255AC-5
PC3
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PC6
PC4
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(AL)
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(DW)
(SC)
PLL noise
AF output
MIC UP
MIC DOWN
BUSY
SWITCHING
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2SC2458
STBY
(ST)
RESET
RESET
MODE
SWITCHING
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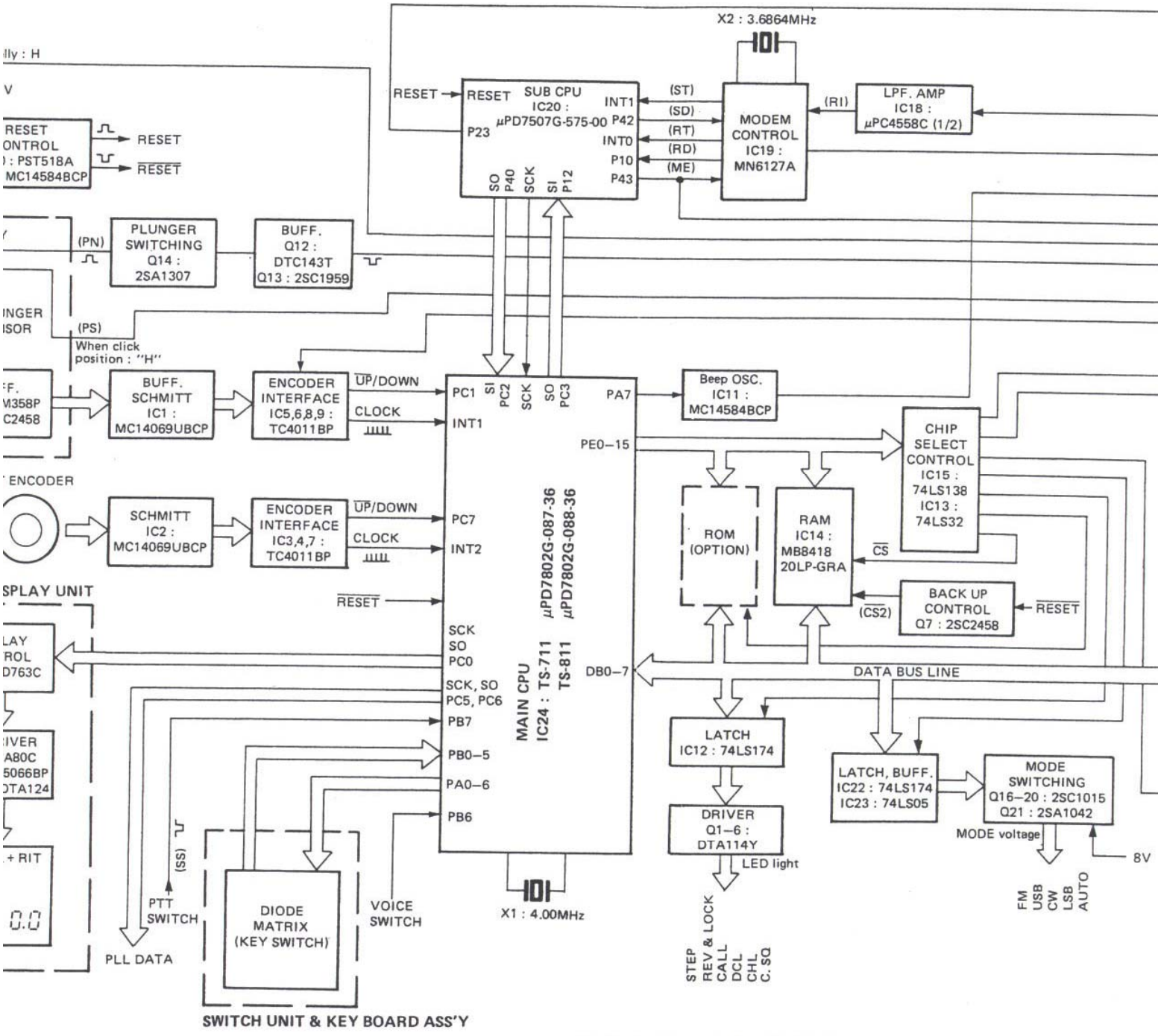


Fig. 5 Digital control block diagram

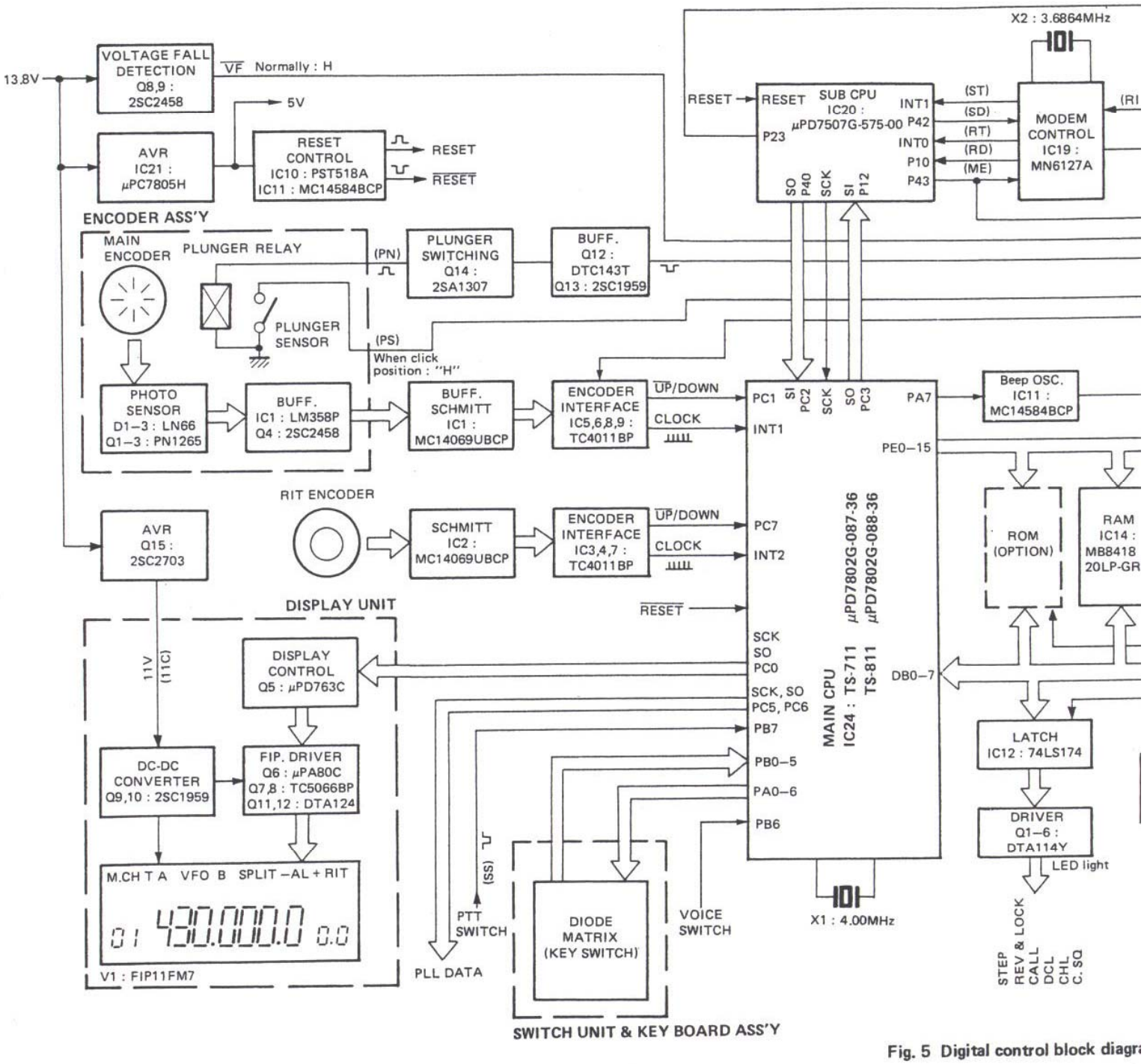


Fig. 5 Digital control block diagra

CIRCUIT DESCRIPTION

CONTROL UNIT (X53-1410-XX)

- **Basic configuration**

Fig. 5 shows the block diagram of the digital control section. The microprocessor, which has an 8-bit (ROM, 6-kbyte) main CPU IC24 : μPD7802G-087-36 (TS-711), μPD7802G-088-36 (TS-811) and a 4-bit (ROM, 2-kbyte) sub CPU IC20 : μPD7507G-575-00, uses a CMOS RAM IC14 : MB847C-20LP-GRA with a capacity of 8 bits x 2kbytes as the external memory IC, the I/O icterface IC IC16 : μPD8255AC-5 for I/O port extension and three 6-bit D-flip-flop ICs IC12, 17, 22 : 74LS174. In addition, it is provided with 24 pin IC socket for the external ROM for optional personal computer interface.

These ICs, connected in parallel with the data bus in the main CPU, exchange data with the main CPU synchronizes by timing signals $\overline{WR}$ or $\overline{RD}$ from the main CPU, or the $\overline{CS}$ signal from IC15. IC15, a 3 to 8 bit line decoder decodes inputs to address lines PE13–15 in the main CPU to generate the chip select signal ($\overline{CS}$). In addition, IC13 takes an OR logic between signals $\overline{CS}$ and $\overline{WR}$ to supply the clock pulse to IC12, IC 17 and IC22, all of which are used as latches.

The main CPU controls the frequency, mode, offset, tone, display, memory, dial click mechanism, DCL system, voice synthesis, etc. and accepts interface with the sub CPU or an external personal computer.

The sub CPU, (common to the TM-211, -411, TR-2600, and TR-3600) interfaces with the main CPU or the MODEM, IC IC19, to handle digital signal code conversion and control tone ON/OFF and other such operation.

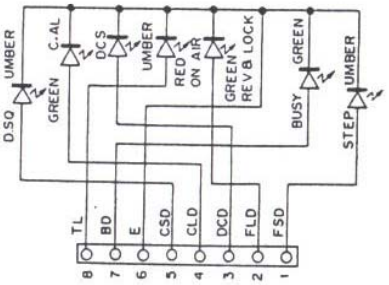
Pin No.	Name	In/Out	Function	Logic
1	PA3	O	Output for plunger switching	⊓⊔
2	PA2	O	Unused (NC)	
3	PA1	O	PLL noise blanking pulse output (BLK)	⊔⊓
4	PA0	O	AF output mute (AL)	⊔⊓
5	$\overline{RD}$	I	Read strobe input	⊓⊔
6	$\overline{CS}$	I	Chip select input	⊓⊔
7	GND		GND	
8	A1	I	Address bus (A1)	
9	A0	I	Address bus (A0)	
10	PC7	I	Unused (L)	
11	PC6	I	MIC DOWN switch input ($\overline{UP}$)	⊓⊔
12	PC5	I	MIC UP switch input ($\overline{DOWN}$)	⊓⊔
13	PC4	I	Busy input (SC)	⊔⊓
14	PC0	I	Plunger sensor input (PS) : "H" at click	⊔⊓
15	PC1	I	Low supply voltage detection input : "L" at less than about 9.5V	⊓⊔
16	PC2	I	Unused (L)	
17	PC3	I	Voice busy input (BY)	⊔⊓
18	PB0	O	Unused (NC)	
19	PB1	O	Sub-tone frequency data output (T1)	
20	PB2	O	Sub-tone frequency data output (T2)	
21	PB3	O	Sub-tone frequency data output (T3)	
22	PB4	O	Sub-tone frequency data output (T4)	
23	PB5	O	Sub-tone frequency data output (T5)	
24	PB6	O	Sub-tone frequency data output (T6)	
25	PB7	O	Unused (NC) : only in area T,W for TS-711/811, 1750Hz continuous tone control output (TH)	⊔⊓
26	Vcc		Power supply pin (+5V)	
27	D7	I/O	Data bus (D7)	
28	D6	I/O	Data bus (D6)	
29	D5	I/O	Data bus (D5)	
30	D4	I/O	Data bus (D4)	
31	D3	I/O	Data bus (D3)	
32	D2	I/O	Data bus (D2)	
33	D1	I/O	Data bus (D1)	
34	D0	I/O	Data bus (D0)	
35	RESET	I	Reset input	⊔⊓
36	$\overline{WR}$	I	Write strobe input	⊓⊔
37	PA7	O	Unused (NC)	
38	PA6	O	Encoder pulse select output "H" at click	⊔⊓
39	PA5	O	Unused (NC)	
40	PA4	O	Standby (transmission) output : "H" in transmission	⊔⊓

Table 7 Function of μPD8255AC-5 (Control unit IC16)

CIRCUIT DESCRIPTION

- **Key switch section**

The key switches on the front panel are arranged in a diode matrix (**Fig. 6**) and their signals are input to the main CPU in a key scan system. The switches, LEDs, RIT encoder, etc. on the front panel are electrically connected in the switch unit and sent to the control unit over simple wiring.



LED : LN01201C (RED)
LN01301C (GREEN)
LN01401C (UMBER)

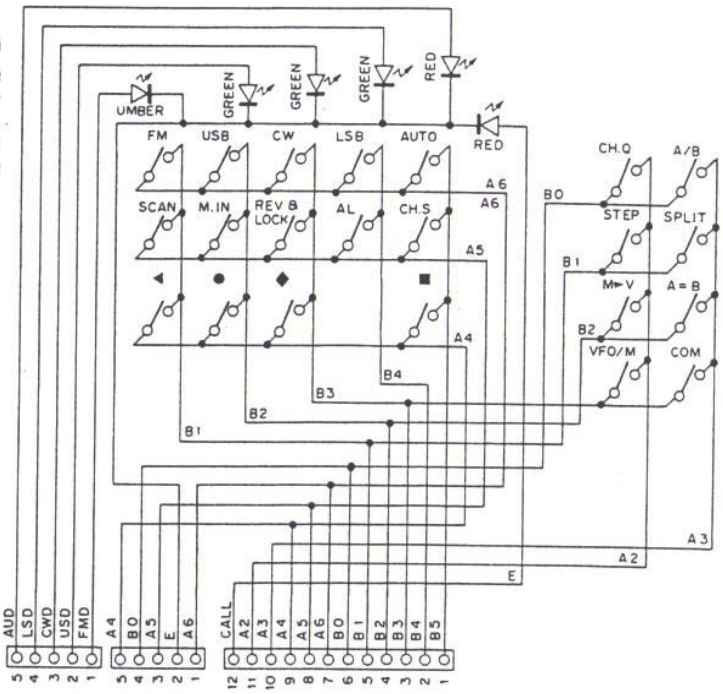
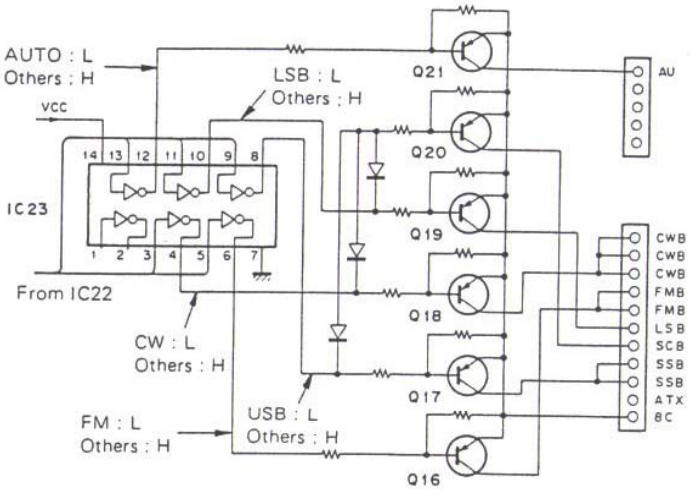


Fig. 6 Keyboard ass'y schematic diagram

- **Display/mode control section**

The fluorescent display section, a using custom IC : FIP11FM7, serially transfers the data corresponding to the display contents from the main CPU. The data transferred is 79 bits at power ON and 71 bits whenever the display contents change. The data is output by use of 3 pins SCK (clock), SO (data) and PCO (enable) from the main CPU when pin PCO is "L". After emission of all data bits, pin PCO is made "H". The "CALL", "STEP", "REV & LOCK", "DCL", "CHL", "C" and "SQ" LEDs each light by switching the latch output (active "L") of IC12 : 74LS174 via digital transistors Q1–Q6. Mode LED's light with the voltage for that mode. The voltage for each mode is produced by switching 8V by Q16–21 with the latch output (active "H") of IC22 : 74LS174 configured as an open-collector output by IC23 : 74LS05.



Normally Tr Q16–21 (base) voltage level is "H" and collector voltage level is "L". When MODE switch is turned to FM position, Q16 base is turned low to high level. Then, Tr Q16 is turned ON (collector is high level).

Fig. 7 MODE switching circuit

CIRCUIT DESCRIPTION

- **DCS system control section**

The processing of the digital control signal used in the DCS system is performed by the sub CPU (IC20 : μPD7507G-575-00), the MODEM process IC (IC19 : MN6127A) and IC18 : μPC4558C.

In transmission, first, the data (digital code, call sign, idle channel) for the control signal is transferred to the sub CPU from the main CPU. In the sub CPU, logic transforms that data to NRZ (None Return to Zero) code, which is then output to IC19. It is subject to MSK (Minimum Shift Keying) modulation at IC19. Subsequently, that output is input to Q4 in the AF unit via pin ANI and is applied as FM modulation. In reception, the signal which was subject to FM detection at discriminator L34 in the IF unit is input to IC18 from pin RT. IC18, an active filter, cuts off the high frequency component of this signal and also amplifies it up to the proper input level for IC19, and it is then output to IC19.

At IC19, it is subject to MSK demodulation to NRZ code and is output to the sub CPU, in which it receives the reverse logic operation to that in transmission and is transferred to the main CPU. For the functions of IC pins used in this transfer, see **Fig. 8** and **Table 8, 9.**

Pin No.	Name	In/Out	Function	Logic	Pin No.	Name	In/Out	Function	Logic
1	NC				27	NC			
2	P73	I	Unused (L)		28	P42	O	Transmission data output to IC19	⎍⎍
3	RESET	I	Reset input	⎍⎍					
4	NC				29	NC			
5	CL1		CR connection pin for clock pulse OSC		30	P43	O	IC19 enable output	⎍⎍
					31	Vss		GND	
6	NC				32	X1		Unused (NC)	
7	VDD	I	Power supply pin (+5V)		33	VDD		Unused (NC)	
8	NC				34	X2		Unused (L)	
9	CL2		CR connection pin for clock pulse OSC		35	NC			
					36	P20	O	Unused (NC)	
10	INT1	I	Clock pulse input for data transmission to IC19 (ST)	⎍⎍	37	P21	O	Unused (NC)	⎍⎍
					38	P22	O	Unused (NC)	
11	INT0	I	Clock pulse input for data reception from IC19 (RT)	⎍⎍	39	P23			
					40	NC			
12	$\overline{SCK}$	O	Serial clock pulse output (for main CPU)	⎍⎍	41	P10	I	Reception data input from IC19	⎍⎍
					42	P11	I	Unused (H)	
13	NC				43	P12	I	Communication request input from main CPU (IC20)	⎍⎍
14	NC								
15	SO	O	Serial data output (for main CPU)		44	P13	I	88.5Hz tone control input (connected to P23)	⎍⎍
16	SI	I	Serial data input (for main CPU)						
17	P60	I	Unused (L)		45	NC			
18	P61	I	Unused (L)		46	P30	O	Unused (NC)	
19	P62	I	Unused (L)		47	P31	O	Unused (NC)	
20	P63	I	Unused (L)		48	P32	O	Unused (NC)	
21	P50	O	Unused (NC)		49	P33	O	Unused (NC)	
22	P51	O	Unused (NC)		50	P70	I	Setting of interface function for IC19, IC20 and IC24 (H)	
23	P52	O	Unused (NC)						
24	P53	O	Unused (NC)		51	P71	I	Setting of interface function for IC19, IC20 and IC24 (L)	
25	P40	O	Communication request output to main CPU (IC20)	⎍⎍					
					52	P72	I	Setting of interface function for IC19, IC20 and IC24 (H)	
26	P41	O	Unused (NC)						

Table 8 Function of μPD7507G-575-00 (Control unit IC20)

CIRCUIT DESCRIPTION

Pin No.	Name	In/Out	Function	Logic	Pin No.	Name	In/Out	Function	Logic
1	PE15	O	Address output for chip select (IC15), address bus		30	X2	–	Ceramic OSC connection pin	
					31	X1	–	Ceramic OSC connection pin	
2	0 OUT				32	Vss	–	GND	
3	DB7	I/O	Data bus (D7)		33	PA0	O	Key matrix output	⊓⊔
4	DB6	I/O	Data bus (D6)		34	PA1	O	Key matrix output ($\overline{A1}$)	⊓⊔
5	DB5	I/O	Data bus (D5)		35	PA2	O	Key matrix output ($\overline{A2}$)	⊓⊔
6	DB4	I/O	Data bus (D4)		36	PA3	O	Key matrix output ($\overline{A3}$)	⊓⊔
7	DB3	I/O	Data bus (D3)		37	PA4	O	Key matrix output ($\overline{A4}$)	⊓⊔
8	DB2	I/O	Data bus (D2)		38	PA5	O	Key matrix output ($\overline{A5}$)	⊓⊔
9	DB1	I/O	Data bus (D1)		39	PA6	O	Key matrix output ($\overline{A6}$)	⊓⊔
10	DB0	I/O	Data bus (D0)		40	PA7		Beep OSC control signal output	
11	INT2	I	RIT clock pulse	⊓⊔	41	PB0	I	Key matrix input ($\overline{A0}$)	⊓⊔
12	INT1	I	Main encoder clock pulse	⊓⊔	42	PB1	I	Key matrix input ($\overline{A1}$)	⊓⊔
13	INT0	I	Interruption input for interface with personal computer (RDY)	⊓⊔	43	PB2	I	Key matrix input ($\overline{A2}$)	⊓⊔
					44	PB3	I	Key matrix input ($\overline{A3}$)	⊓⊔
14	$\overline{WAIT}$		Unused (connected to Vcc)		45	PB4	I	Key matrix input ($\overline{A4}$)	⊓⊔
15	M1		Unused (NC)		46	PB5	I	Key matrix input ($\overline{A5}$)	⊓⊔
16	$\overline{WR}$	O	Write strobe output for IC14, IC16 and IC13 ($\overline{WR}$)		47	PB6	I	Key matrix input ($\overline{A6}$)	⊓⊔
					48	PB7	I	Standby (P.T.T.) input ($\overline{SS}$)	⊓⊔
17	$\overline{RD}$	O	Read strobe output for IC14 and IC16 ($\overline{RD}$)		49	PE0	O	Address output for external RAM (IC14) and external ROM (option) — Address bus	
					50	PE1	O		
18	PC7	I	RIT $\overline{UP}$/DOWN		51	PE2	O		
19	PC6	O	2nd PLL (B loop) data latch (EB)	⊓⊔	52	PE3	O		
20	PC5	O	1st PLL (A loop) data latch (EA)	⊓⊔	53	PE4	O		
21	PC4	O	Unused (NC)		54	PE5	O		
22	PC3	O	Communication request output to sub CPU (IC20)	⊓⊔	55	PE6	O		
					56	PE7	O		
23	PC2	I	Communication request input from sub CPU (IC20)	⊓⊔	57	PE8	O		
					58	PE9	O		
24	PC1	I	Main encoder UP/DOWN		59	PE10	O		
25	PC0	O	Enable output for display LSI (Q5 in display unit) ($\overline{ED}$)	⊓⊔	60	PE11	O		
					61	PE12	O	Unused (NC)	
26	$\overline{SCK}$	I/O	Serial clock pulse I/O (Output for PLL, output for display IC, input for sub CPU)	⊓⊔	62	PE13	O	Address output for chip select (IC15)	
					63	PE14	O		
27	SI	I	Serial data input (for sub CPU)	⊓⊔					
28	SO	O	Serial data input (for sub CPU, PLL and display IC)	⊓⊔	64	Vcc	–	Power supply pin (+ 5V)	
29	$\overline{RESET}$	I	Reset pulse input	⊓⊔					

Table 9 Function of μPD7802G-087-36 (Control unit IC24) TS-711
Function of μPD7802G-088-36 (Control unit IC24) TS-811

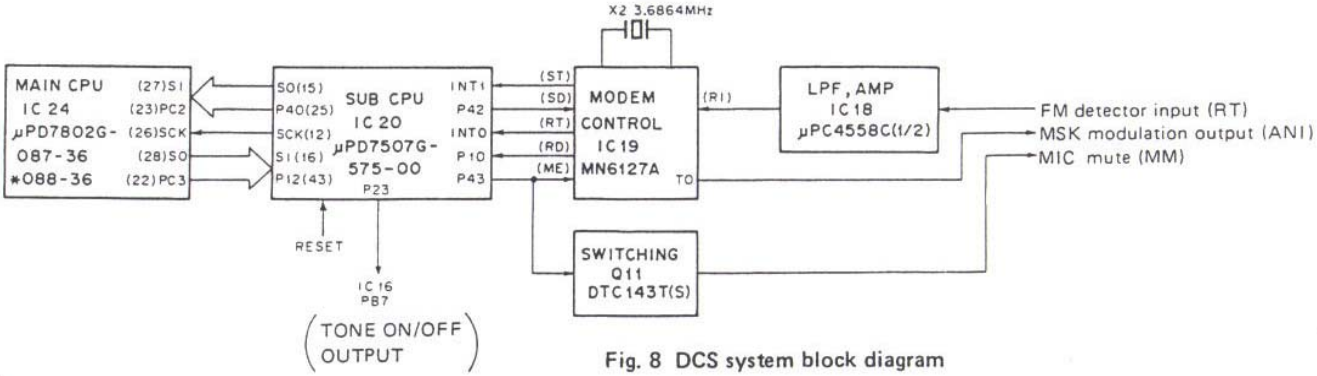


Fig. 8 DCS system block diagram

CIRCUIT DESCRIPTION

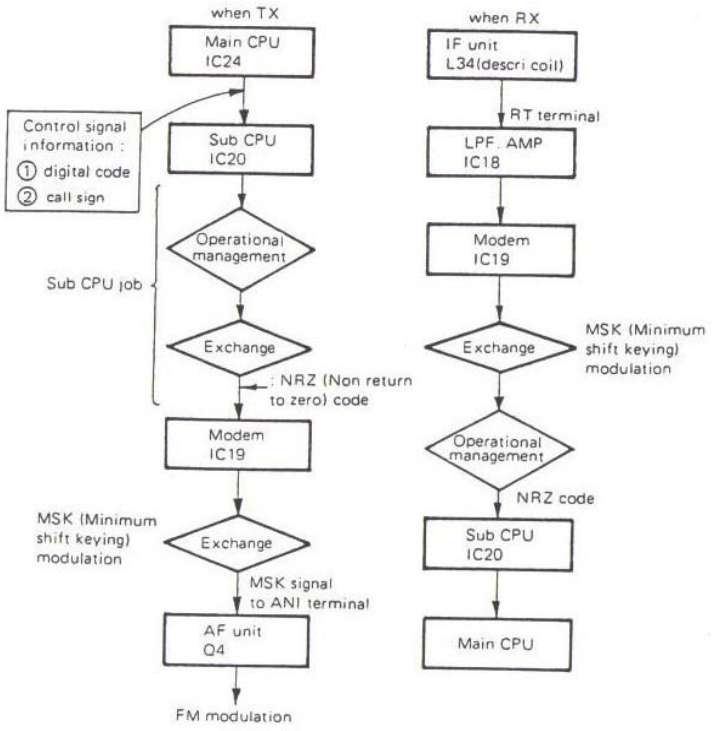


Fig. 9 DCS system flow chart

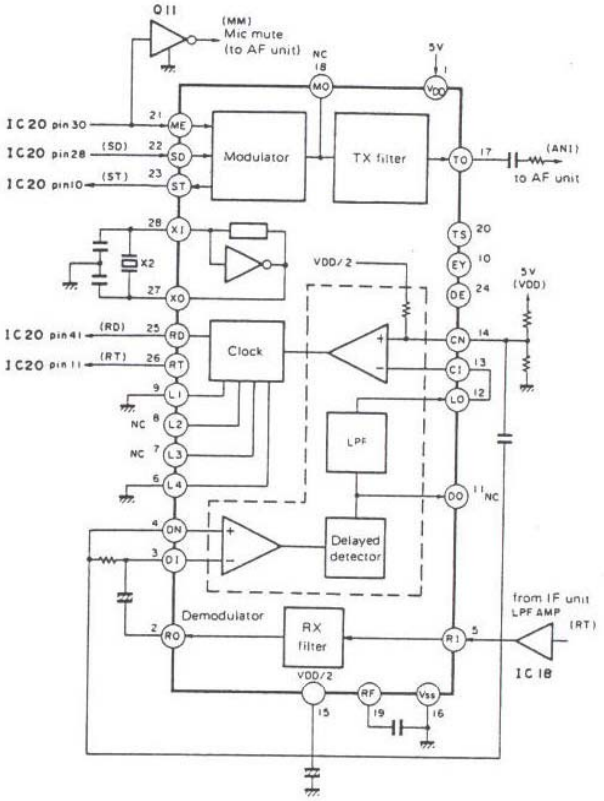


Fig. 10 Modem IC MN6127A block diagram (Control unit IC19)

- **Reset and backup**

A custom IC (IC10 : PST518A) (**Fig. 11**) is used to output the pre-determined reset pulse at power ON or momentary power failure. At IC10, the voltage in the 5V line is detected. When it becomes less than 4.2V, the open-collector output is turned ON. thus, "H" (RESET) and "L" ($\overline{\text{RESET}}$) pulses of about 10msec are generated through a Schmitt trigger when resetting and applied to the reset pin of each IC. At power OFF, when Q8 and Q9 detect the supply line voltage (13.8V) is less than about 9.5V, the CPU returns the transciever to the reception mode to stop all other processes. In addition, when the voltage at the 5V line becomes less than 4.2V, Q7 (normally ON) turns OFF to establish IC14 in the standby (backup) state.

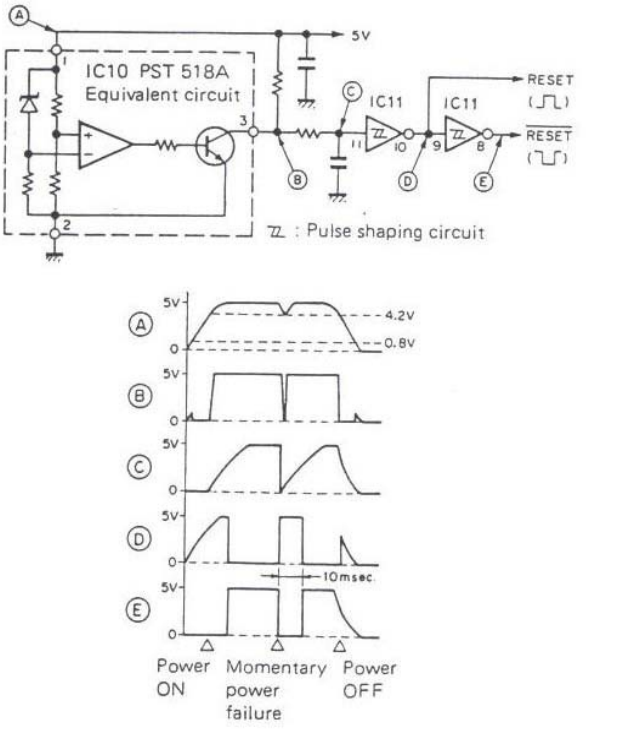


Fig. 11 Reset circuit and waveforms at respective points

CIRCUIT DESCRIPTION

- **"Beep" tone oscillator and voice synthesis control section**

For the "beep" tone output (including Morse Annunciation), its corresponding ON/OFF signal is output from the main CPU PA7 (pin 40) and is generates in oscillation circuit IC11 : MC14584BCP. It is then mixed with the audio output of the voice synthesizer (VS-1) and is input to the AF unit from pin ANO.

The control output (PSO-4, SR) of the voice synthesizer unit (option VS-1) is output from IC17 latch and the control input (BY) is input to IC16 PC3.

- **Encoder section**

Fig. 12 shows the configuration of the encoder section. The control pulse of the main dial "click" detent mechanism is as shown in **Fig.13**. When operating the [CH.Q], [CS], [VFO/M], [M►V], [SELECT], etc., keys, the CPU performs its associated process, judges whether or not the dial is detented, and inputs the status signal of the sensor (pin PS) to IC16 PCO (pin 14). For example, when the dial retent is activates, as when the dial is already detented when pin PS is "H", the process ends. However, when pin PS is "L", a 100msec pulse is emitted from PA3 IC16 pin 17, thereupon the plunger drive pulse (PN) is emitted through the switching operation of Q12 : DTC143T(S), Q13 : 2SC2459(Y) or Q14 : 2SA1307(Y). After 100msec, the sensor status is checked. If it is "H", the process ends. However, it is found not "H", the process series is repeated. If it does not become "H" after this is repeated 7 times, the CPU stops the process, judging that the plunger ;section has a malfunction.

Out of waveforms EN1, EN2 and EN3 in the encoder, waveforms EN1 and EN2 are connected to four waveforms EN1, EN2, $\overline{EN1}$ and $\overline{EN2}$ in IC1 : MC14069UBCP. These four waveforms are combined with their respective differentiation waveforms and multiplied 4 times in IC5 and IC6 : TC4011. Output $\overline{UP}$/DOWN and a clock pulse are generates in IC8 and IC9 : TC4011 and are entered to the main CPU PC1 (pin 24) and INT1 (pin 12). In the detent mode, the Schmitt trigger differentiation waveform output of EN3 is selected in IC9 and is taked as the clock pulse. RIT encoder waveform chatter is absorbed at Schmitt trigger IC2, and waveforms E1 and E2 are combined with their inversion waveforms and differentiation waveforms. They are then multiplied 4 times at IC4 and IC7, from which signal UP/DOWN and clock pulse outputs are produced and entered to PC7 and INT2 of the main CPU.

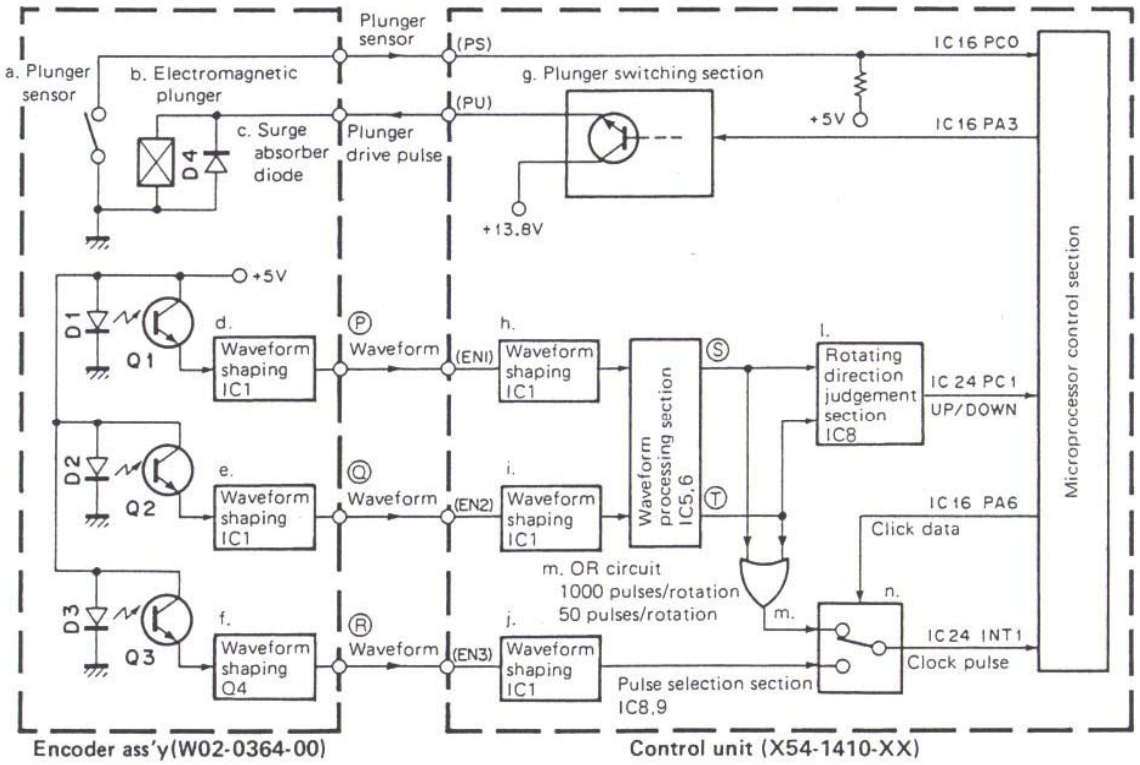
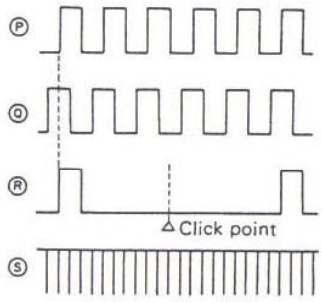


Fig. 12 Configuration of encoder processing section

CIRCUIT DESCRIPTION



Ⓟ, Ⓠ . . . . 250 pulses/rotation
Waveforms Ⓟ and Ⓠ have a phase difference of 90° from each other.
At counterclockwise rotation : Ⓠ has a delay of 90° from Ⓟ .
At clockwise rotation : Ⓠ has an advance of 90° from Ⓟ .

Ⓡ . . . . . 50 pulses/rotation
With 50 clicks per rotation, one pulse is equal to one click.

Ⓢ . . . . . At clockwise rotation, 1000 pulses/rotation

Ⓣ . . . . . At counterclockwise rotation, 1000 pulses/rotation

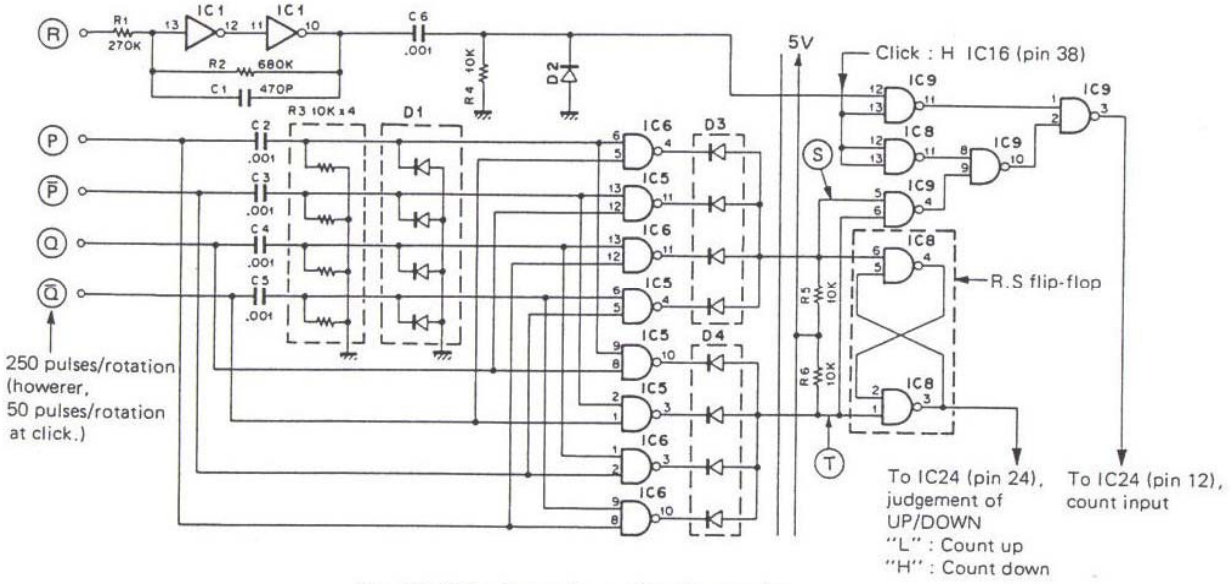


Fig. 13 Output waveform of main encoder

- **Other I/O sections**

a. Standby (ST) output :

The P.T.T. switch ON/OFF signal (ST) from pin SS is taken in PB7 of the main CPU. In transmission, Q10 (open-collector) is thus switched with IC16 PA4 (pin 40) "H".

In auto-transmission in the DCL system, the ON/OFF control for Q10 is also generated in the main CPU to control transmission and reception along with a personal computer.

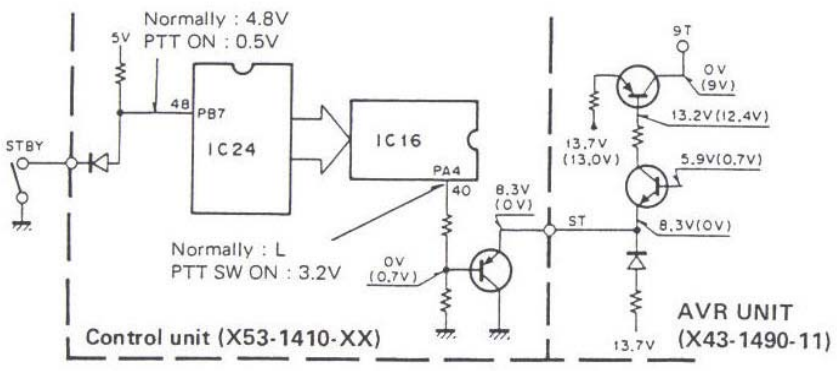


Fig. 14 STBY output circuit

CIRCUIT DESCRIPTION

b. PLL select switching noise blanking output :
When the data in PLL loop A (in 20kHz steps) changes, the timing pulse (BLK) in synchronization with the data output is output from IC16 PA1 (pin 3). Q37 in the IF unit switches to momentarily mute the PLL select switching noise.

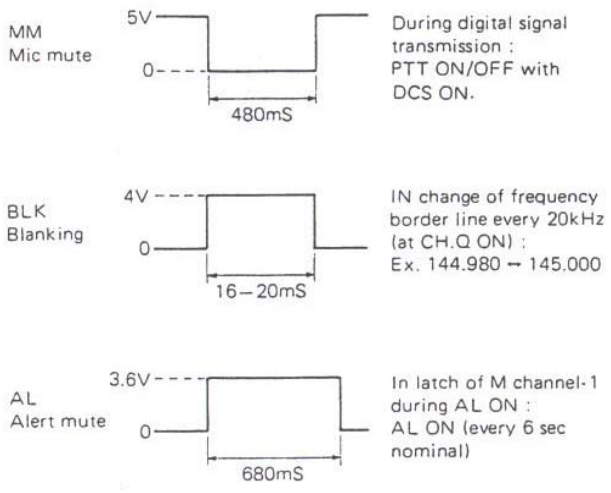
c. Busy (SC) input :
In scan mode operation, the SC signal corresponding to busy lamp status is input to IC16 PC4 (pin 13) to select between "open" or "busy".

d. Microphone UP/DOWN switch :
These are input to IC16 PC5 or PC6 after chatter filtering. (The following are for DCL system control.)

e. Microphone mute (MM) output :
This signal cuts off microphone audio during digital signal transmission. This signal, which is output to IC19 from P43 of the sub CPU, controls Q11 (open-collector) to switch Q2 in the AF unit.

f. Audio mute (AL) output :
This mutes the audio output by making IC16 PA0 "H" in code squelch operation, during retrieval of an idle channel or in memory channel check during alert operation.

Connector ④



Connector ⑨

RT . . . . In reception of standard modulation signal (1kHz ± 3kHz deviation, 60dBμ) → 100mVp-p (36mVrms)
ANI . . . In transmission of digital signal, PTT ON/OFF at DCS ON → 80mVp-p.
BZ . . . . In output of beep sound, M.IN pressed → 22mVp-p.
TO . . . . In output of 88.5Hz tone (0.6kHz deviation) → 420mVrms.

Fig. 15 Waveforms at ④ and ⑨ I/O pins (With harness connected)

Encoder ass'y (W02-0364-00)

- **Encoder section**

An IR (Infrared) output is taken through a 250 slit/rotation disk is detected at phototransistors Q1 and Q2. These detection signals are each waveform-shaped at comparator IC1 and emitted to pins EN1 and EN2. Then, they are adjusted by VR1 and VR2 so that they have a precise phase difference of 90° from each other with a precise duty cycle of 50%.
An IR output which is taken through 50 slit/rotation disk is detected at phototransistor Q3. The detection signal is amplified at Q4 and emitted to pin EN3. Signal EN3 is extracted without adjustment. Fig. represents each output waveform.

- **Detent : electromagnetic plunger section**

Whenever the plunger relay is turned ON and then OFF by the Control unit control pulse (pin PN), the detent mode changes to the slew (continuous tuning) mode or vice versa. Normally, the plunger relay is OFF. In addition, the plunger sensor switch is OFF (open) at the detent mode and ON (closed) at the slew mode.

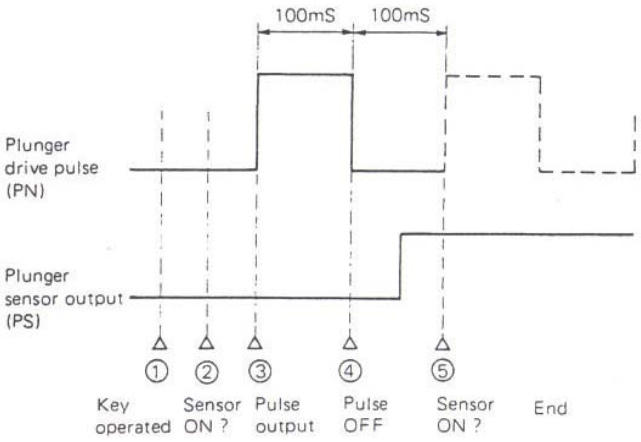


Fig. 16 Relationship between plunger drive pulse and sensor

CIRCUIT DESCRIPTION

DISPLAY UNIT (X54-1820-11)

- **Display section**

When display data is transferred on its 3 lines : DD (data) CD (clock) and ED (enable) from the control unit, they are input to the display control IC Q5 : μPD763C. Q5 outputs both digit signals (T0–T11) and segment signals (Sa–Sg, I0,I1) for dynamic display lighting. (**Table 10**). The digit and segment signals are driven by Q7 and Q8, and by Q6, Q11 and Q12 so display tube (V1) lights. Q7, Q8, Q6 and Q11 switch about –23V and + 5V. Specifically, Q12 switches about –23V and + 11V, as it drives the red character segments. In addition, Q9 and Q10, which are a DC-DC converter oscillator circuit, produce negative voltages for the display tube and AGC circuits.

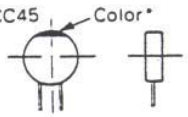
Pin No.	Name	In/Out	Function	Logic	Pin No.	Name	In/Out	Function	Logic
1	X2		IFT connect pin for clock pulse OSC		15	I0	O	Segment signal Character	⎍
					16	I1	O	Segment signal Decimal point	⎍
2	T0	O	Digit signal RIT 10^0 Hz digit	⎍	17	Sa	O	Segment signal a	⎍
3	T1	O	Digit signal RIT 10^1 Hz digit	⎍	18	Sb	O	Segment signal b	⎍
4	T2	O	Unused (NC)	⎍	19	Sc	O	Segment signal c	⎍
5	T3	O	Digit signal 10^2 Hz digit	⎍	20	Sd	O	Segment signal d	⎍
6	T4	O	Digit signal 10^0 kHz digit	⎍	21	Se	O	Segment signal e	⎍
7	T5	O	Digit signal 10^1 kHz digit	⎍	22	Sf	O	Segment signal f	⎍
8	T6	O	Digit signal 10^2 kHz digit	⎍	23	Sg	O	Segment signal g	⎍
9	T7	O	Digit signal 10^0 MHz digit	⎍	24	$\overline{CS}$	I	Chip select input	⎎
10	T8	O	Digit signal 10^1 MHz digit	⎍	25	$\overline{SCK}$	I	Serial clock pulse input	⎎
11	T9	O	Digit signal 10^2 MHz digit	⎍	26	SI	I	Serial display data input	⎍
12	T10	O	Digit signal M.CH 10^0 digit	⎍	27	Vcc		Power supply pin (+5V)	
13	T11	O	Digit signal M.CH 10^1 digit	⎍	28	X1		For clock pulse OSC	
14	GND		GND						

Table 10 Function of μPD763C (Display unit Q5)

PARTS LIST

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

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



- **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

- **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**

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

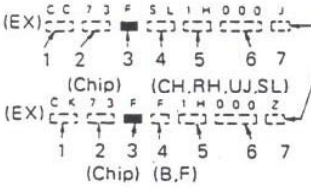
Less than 10 pF

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

- **Rating voltage**

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

- **Chip capacitors**



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

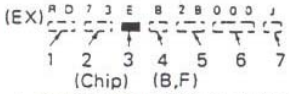
Dimension

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

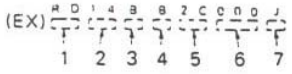
Dimension

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

- **Chip resistor (Carbon)**



- **Carbon resistor (Normal type)**



Rating wattage

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

Dimension

MODEL / UNIT	TS-711A (K,M1,M2,X)	TS-711E (T,W)	TS-811A (K)	TS-811B (M,X) TS-811E (T,W)
SWITCH UNIT	X41-1580-11	X41-1580-61	X41-1580-01	X41-1580-01 (M,X) X41-1580-62 (T,W)
AVR UNIT	X43-1490-11	X43-1490-11	X43-1490-11	X43-1490-11
RF UNIT	X44-1620-11	X44-1620-01	X44-1650-11	X44-1650-01
FINAL UNIT	X45-1380-11	X45-1380-11	X45-1390-11	X45-1390-01 (M,X) X45-1390-61 (T,W)
IF UNIT	X48-1400-11	X48-1400-00	X48-1400-01	X48-1400-01
AF UNIT	X49-1180-00	X49-1180-00	X49-1180-00	X49-1180-00
PLL UNIT	X50-1990-11	X50-1990-00	X50-1990-12	X50-1990-01
HET UNIT	–	–	X50-2010-10	X50-2000-00
TONE UNIT	–	X52-1290-60	–	X52-1290-60 (T,W)
CONTROL UNIT	X53-1410-11 (K,M1) X53-1410-21 (M2,X)	X53-1410-51 (T) X53-1410-61 (W)	X53-1410-12 (K)	X53-1410-22 (M,X) X53-1410-52 (T) X53-1410-62 (W)
DISPLAY UNIT	X54-1820-11	X54-1820-11	X54-1820-11	X54-1820-11

SEMICONDUCTOR (TS-711A/E)

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

Item	Re-marks	Part No.
Diode		1N60
		1S1587
		1SS101
		1SS133
		1SV50
		1SV123
	N	DAP401
		MA856
		MC911
		MC921
		MC931
		MI308
		MI407
		ND487C1-3R
		U05B
		V06B
Vari-cap		1S2208
Varistor		VD1223
Zener diode		MTZ6.2JA
		MTZ6.2J(A,B)
		MTZ7.5JA
		MTZ8.2J(B,C)
		MTZ9.1JB
		MTZ12JB
LED		LN66(R)
		LN01201C
		LN01301C
		LN01401C
Disply tube		FIP11FM7
Thermister		112-102-2
		112-103-2
		112-351-2
		SDT1000F

Item	Re-marks	Part No.
Resistor block		S10VB20
Photo TR		PN126S(R)
Digital TR		DTA114Y(S)
	N	DTA124EF
		DTC114E(S)
		DTC143T(S)
TR		2SA1012(Y)
		2SA1015(Y)
		2SA1048(Y)
		2SA1115(E)
	N	2SA1307(Y)
		2SC1815(Y)
		2SC1959(Y)
		2SC2240(GR)
		2SC2358-22-A
		2SC2458(Y)
		2SC2459(BL)
		2SC2459(GR)
		2SC2538-22-A
		2SC2668(Y)
		2SC2668(Y,O)
		2SC2703(O,Y)
		2SC2787(L)
		2SC3113(B)
	N	2SD717(O,Y)
FET		2SK30A(GR)
		2SK30A(O)
		2SK125
		2SK161(GR)
		2SK192A(GR)*N
		3SK73(GR)
		3SK73(Y)
		3SK122(L)
	N	3SK129(Q,R)
Power module		M57727

Item	Re-marks	Part No.
IC		BU4011B
		LM358P
	N	M5L8255AP-5
		M54459L
		MB3713
	N	MB8418-20LP-GRA
		MC14069UBCP
		MC14584BCP
		MC145155P*K
		MC145156P
		MN6127A
		NJM78L05A
		NJM4558S
		NE555P
		NJM78L05A
		NJM4558S
	N	PST518A
		SN74LS05N
		SN74LS32N
		SN74LS90N
		SN74LS138N
		SN74LS174N
		SN16913P
		TA7302P
		TC4011BP
		TC4069UBP
		TC5066BP
		~~TMP82~~ ミスプリ
	N	TMP8255AP-5
		μPA80C
		μPB555C
		μPC78M08H
		μPC577H(E,F)
		μPC1158H2
		μPC4558C
		μPC7805H
	N	μPD763C
	N	μPD7507G-575-00
	N	μPD7802G-087-36
	N	μPD8255AC-5

ENCODER ASS'Y (W02-0364-00)

PART. NO	Re-marks	NAME & DESCRIPTION	Q'TY	REFERENCE. NO
CE04CW0J330M		ELECTRO 33 6.3V	1	C1
LM358P		IC	1	IC1
LN66(R)		LED	3	D1, 2, 3
RD14BB2C102J		RES. CARBON 1kΩ	2	R5, 10
RD14BB2C105J		RES. CARBON 1MΩ	2	R8, 13
RD14BB2C181J		RES. CARBON 180Ω	3	R1, 2, 3
RD14BB2C182J		RES. CARBON 1.8kΩ	4	R6, 7, 11, 12
RD14BB2C222J		RES. CARBON 2.2kΩ	1	R15
RD14BB2C472J		RES. CARBON 4.7kΩ	4	R4, 9, 14, 16
R12-2413-05		TRIM. POT. 5kΩ	2	VR1, 2
R92-0150-05		SHORT JUMPER	2	
PN126S		PHOTO TR	3	Q1, 2, 3
V06B		DIODE	1	D1
2SC2458(Y)		TR	1	Q4

TS-711A/E PARTS LIST

TS-711A/E GENERAL

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	021	022	051	061	071	REFERENCE.NO
A01-0979-02	N	CASE(A) UPPER	1	1	1	1	1	1	
A01-0980-02	N	CASE(B) LOWER	1	1	1	1	1	1	
A20-2524-03	N	FRONT PANEL	1	1	1	1	1	1	
B05-0708-04		SP GRILE	1	1	1	1	1	1	
B10-0668-04	N	FRONT GLASS	1	1	1	1	1	1	
B30-0817-15		LAMP 14V 80MA	1	1	1	1	1	1	
B31-0655-05	N	METER	1	1	1	1	1	1	
B39-0407-04		SPACER	2	2	2	2	2	2	
B40-3524-04	N	MODEL NAME PLATE TS-711A	1	1	1				
B40-3525-04	N	MODEL NAME PLATE TS-711E				1	1		
B40-3524-04	N	MODEL NAME PLATE TS-711A						1	
B41-0134-04	N	CAUTION LABEL		1	1	1	1	1	
B42-2356-04	N	SWITCH LABEL DCS	1	1	1	1	1	1	
B42-1739-04		VOLTAGE INDICATING PLATE 120V	1						
B42-1740-04		VOLTAGE INDICATING PLATE 220V		1	1				
B42-1741-04		VOLTAGE INDICATING PLATE 240V				1			
B42-1740-04		VOLTAGE INDICATING PLATE 220V					1		
B42-1741-04		VOLTAGE INDICATING PLATE 240V						1	
B42-2364-04	N	CURRENT INDICATING PLATE 6A	1	1	1	1	1	1	
B43-1022-04	N	BADGE	1	1	1				
B43-1023-04	N	BADGE				1			
B43-1024-04	N	BADGE					1		
B43-1022-04	N	BADGE						1	
B46-0410-00		WARRANTY CARD	1						
B50-4148-00	N	INSTRUCTION MANUAL	1	1	1				
B50-4149-00	N	INSTRUCTION MANUAL				1			
B50-4148-00	N	INSTRUCTION MANUAL					1	1	
C91-0496-05		CERAMIC FOR AC 470P	2	2	2	2	2	2	
C91-0647-05		CERAMIC FOR AC 0.01	1	1	1	1	1	1	
D09-0306-04	*	ENCODER DISC ROTOR	1	1	1	1	1	1	
D09-0307-04	*	ENCODER DISC STATOR	1	1	1	1	1	1	
D40-0627-05	N	DETECTOR MECHANISM UNIT	1	1	1	1	1	1	
E07-1351-05	N	13P PLUG (ACC)	1	1	1	1	1	1	
E07-0852-05		VOLTAGE SELECTOR PLUG		1	1	1	1	1	
E08-0474-05	N	4P SOCKET DC	1	1	1	1	1	1	
E09-0472-05	N	4P PLUG DC	1	1	1	1	1	1	
E12-0001-15		PHONE PLUG (ACS)	1	1	1	1	1	1	
E12-0401-15		PHONE PLUG (ACS)	1	1	1	1	1	1	
E18-0351-05		3P AC SOCKET	1	1	1	1	1	1	
E29-0463-05		1P JUNCTION CONNECTOR	1	1	1	1	1	1	
E30-1643-15		AC CABLE (ACS)	1	1	1				
E30-1644-15		AC CABLE (ACS)				1			
E30-1645-05		AC CABLE (ACS)					1		
E30-1647-05		AC CABLE (ACS)						1	
E31-3049-05	N	CABLE WITH TERMINAL	1	1	1	1	1	1	
E31-3091-05	N	CABLE WITH TERMINAL HET	1	1	1	1	1	1	
E31-3064-00	N	WIRE'S KIT (ACS)	1	1	1	1	1	1	
F05-2023-05		FUSE 2A	1						
F05-1023-05		FUSE 1A		1	1	1	1	1	
F05-2023-05		FUSE 2A		1	1				
F07-0858-03	N*	HEAT SINK COVER	1	1	1	1	1	1	
F10-1206-04		SHIELDING PLATE	1	1	1	1	1	1	

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	021	022	051	061	071	REFERENCE.NO
F15-0655-04	N*	BLINDING PLATE	1	1	1	1	1	1	
F20-0521-04		INSULATING PLATE	1	1	1	1	1	1	
G01-0818-04		COILED SPRING	5	5	5			5	
G01-0818-04		COILED SPRING				4	4		
G02-0505-05		KNOB FITTING SPRING	3	3	3	3	3	3	
G13-0649-04		CUSHION FOR METER	2	2	2	2	2	2	
G13-0642-04		CUSHION FOR PLL	1	1	1	1	1	1	
G53-0510-04		PACKING FOR PANEL	1	1	1	1	1	1	
H01-4573-04	N	CARTON(INSIDE)	1	1	1				
H01-4574-04	N	CARTON(INSIDE)				1			
H01-4621-04	N	CARTON(INSIDE)					1		
H01-4573-04	N	CARTON(INSIDE)						1	
H03-2200-04	N	CARTON(OUTSIDE) TS-711A	1	1	1				
H03-2230-04	N	CARTON(OUTSIDE) TS-711E				1	1		
H03-2200-04	N	CARTON(OUTSIDE) TS-711A						1	
H10-2596-02	N*	PACKING FIXTURE	1	1	1	1	1	1	
H10-2597-02	N*	PACKING FIXTURE	1	1	1	1	1	1	
H12-1315-04		BUFFER	1	1	1	1	1	1	
H20-1425-03	N	PROTECTION COVER	1	1	1	1	1	1	
H25-0029-04	*	BAG(ACS) 60X110	1	1	1	1	1	1	
H25-0105-04	*	BAG 150X350	1	1	1	1	1	1	
H25-0103-04		BAG 125X250		1	1	1	1	1	
J02-0323-05		FOOT CASE(B)	4	4	4	4	4	4	
J02-0407-04		FOOT CASE(B)	1	1	1	1	1	1	
J02-0403-04		FOOT CASE(SIDE)	4	4	4	4	4	4	
J21-2573-04		FOOT HARDWARE	2	2	2	2	2	2	
J29-0407-04		SW GUIDE A (TACT KNOB)	5	5	5			5	
J29-0407-04		SW GUIDE A (TACT KNOB)				4	4		
J31-0141-04		COLLAR MIC	1	1	1	1	1	1	
J42-0442-05	N	HOLE BUSH ACC1	1	1	1	1	1	1	
J61-0404-05		FASTNER FOR DC PLUG	1	1	1	1	1	1	
J61-0408-05		VINYL TIE	6	6	6	6	6	6	
K01-0410-05		HANDLE CASE(B)	1	1	1	1	1	1	
K21-0768-04		MAIN KNOB	1	1	1	1	1	1	
K23-0776-04	N	ROUND KNOB RIT	1	1	1	1	1	1	
K23-0710-04		KNOB	3	3	3	3	3	3	
K27-0467-04		KNOB UP/DOWN	2	2	2	2	2	2	
K29-0771-04		MAIN TUING KNOB	1	1	1	1	1	1	
K29-0741-04		KNOB	3	3	3	3	3	3	
K29-0758-04		KNOB POWER	1	1	1	1	1	1	
K29-3001-04		KNOB NB	5	5	5	5	5	5	
K29-3032-04	N	TACT KNOB RIT.TONE	5	5	5			5	
K29-3032-04	N	TACT KNOB RIT.TONE				4	4		
L01-8226-05	N	POWER TRANSFORMER	1	1	1	1	1	1	
N09-0646-04		SCREW M4X4	2	2	2	2	2	2	
N16-0040-46		SPRING WASHER	1	1	1	1	1	1	
N30-2604-46		PAN HD SCREW	2	2	2	2	2	2	
N30-3004-46		PAN HD SCREW	2	2	2	2	2	2	
N30-3010-46		PAN HD SCREW				1	1		
N30-3006-46		PAN HD SCREW	2	2	2	2	2	2	
N32-2604-46		FLAT HD SCREW	6	6	6	6	6	6	

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	021	022	051	061	071	REFERENCE.NO
N32-2606-46		FLAT HD SCREW	6	6	6	6	6	6	
N32-3004-46		FLAT HD SCREW	2	2	2	2	2	2	
N32-3006-46		FLAT HD SCREW	2	2	2	2	2	2	
N33-3006-41		ROUND FLAT SCREW	4	4	4	4	4	4	
N33-3006-45		ROUND FLAT SCREW	4	4	4	4	4	4	
N35-2604-46		BIND SCREW	11	11	11	11	11	11	
N35-3004-41		BIND SCREW	18	18	18	18	18	18	
N35-3008-46		BIND SCREW	2	2	2	2	2	2	
N87-2605-46		TAPPING SCREW	38	38	38	38	38	38	
N87-3006-46		TAPPING SCREW	10	10	10	10	10	10	
N87-3010-41		TAPPING SCREW	6	6	6	6	6	6	
N87-4006-46		TAPPING SCREW	3	3	3	3	3	3	
N87-3006-41		TAPPING SCREW	4	4	4	4	4	4	
N87-4008-46		TAPPING SCREW	1	1	1	1	1	1	
N88-2606-46		FLAT TAPPING SCREW	2	2	2	2	2	2	
N88-3006-46		FLAT TAPPING SCREW	2	2	2	2	2	2	
N89-3006-45		BIND TAPPING SCREW	4	4	4	4	4	4	
SDT1000F		THERMISTER	1	1	1	1	1	1	
S29-2409-05	N	VOLTAGE SELECTOR SWITCH	1	1	1	1	1	1	
S31-1415-05	N	SLIDE SWITCH	1	1	1	1	1	1	
S40-2450-05	N	PUSH SWITCH	1	1	1	1	1	1	
S50-1406-05		TACT SWTCH(UP,DOWN)		2	2	2	2	2	
S59-0428-05	N	KEYBOARD ASS'Y DCS	1	1	1	1	1	1	
T03-0027-15		SPEAKER	1	1	1	1	1	1	
T91-0331-05		MICROPHONE (M,W)		1	1				
T91-0335-05		MICROPHONE (T)				1			
T91-0331-05		MICROPHONE (M,W)					1	1	
T94-0049-05	N	PLANGER	1	1	1	1	1	1	
W02-0364-00	N	ENCODER ASS'Y	1	1	1	1	1	1	
W09-0326-05		LITHIUM BATTERY	1	1	1	1	1	1	
X41-1580-11	N	SWITCH UNIT	1	1	1				
X41-1580-61	N	SWITCH UNIT				1	1		
X41-1580-11	N	SWITCH UNIT						1	
X43-1490-11	N	AVR UNIT	1	1	1	1	1	1	
X44-1620-11	N	RF UNIT	1	1	1				
X44-1620-01	N	RF UNIT				1	1		
X44-1620-11	N	RF UNIT						1	
X45-1380-11	N	FINAL UNIT	1	1	1	1	1	1	
X48-1400-11	N	IF UNIT	1	1	1				
X48-1400-00	N	IF UNIT				1	1		
X48-1400-11	N	IF UNIT						1	
X49-1180-00	N	AF UNIT	1	1	1	1	1	1	
X50-1990-11	N	PLL UNIT	1	1	1				
X50-1990-00	N	PLL UNIT				1	1		
X50-1990-11	N	PLL UNIT						1	
X52-1290-60	N	TONE UNIT				1	1		
X53-1410-11	N	CONTROL UNIT	1	1					
X53-1410-21	N	CONTROL UNIT			1				
X53-1410-51	N	CONTROL UNIT				1			
X53-1410-61	N	CONTROL UNIT					1		
X53-1410-21	N	CONTROL UNIT						1	
X54-1820-11	N	DISPLAY UNIT	1	1	1	1	1	1	

SWITCH UNIT (X41-1580-XX) (-11 : K,M1,M2,X -61 : T,W)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	061	062	REFERENCE.NO
C91-0757-05		CERAMIC 0.001 50V	5	5		C , 1, 2, 3, 4, 7
C91-0757-05		CERAMIC 0.001 50V			7	
E06-1351-05	N	ROUND TYPE CONNECTOR 13P	1	1		
E40-5041-05	N*	MINI CONNECTOR 5P	2	2		
E40-5042-05	N*	MINI CONNECTOR 8P	1	1		
E40-5043-05	N*	MINI CONNECTOR 12P	1	1		
E40-0273-05	*	MINI CONNECTOR 2P	1	1		
E40-0573-05	*	MINI CONNECTOR 5P	1	1		
E40-0673-05	*	MINI CONNECTOR 6P	2	2		
E40-0873-05	*	MINI CONNECTOR 8P	1	1		
E40-0973-05	*	MINI CONNECTOR 9P	1	1		
E40-1373-05	*	MINI CONNECTOR 13P	1	1		
RS14AB3A100J		METAL FILM 10 OHM 1W	1	1		R , 3
S40-2440-15		PUSH SW	4	4		S , 3, 10, 11, 12
S40-2441-15		PUSH SW	1	1		S , 4
S50-2402-05		TACT SWITCH	2	2		S , 5, 6
S50-1412-05		TACT SWITCH	5			S , 1, 2, 7, 8, 9
S50-1412-05		TACT SWITCH		4		S , 1, 2, 7, 9
W02-0365-05	N	ROTARY ENCODER(RIT)	1	1		
1SS133		DIODE	8	8		D , 1, 2, 3, 4, 5, 6, 7 , 8

TS-711A/E PARTS LIST

AVR UNIT (X43-1490-11)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	REFERENCE.NO
CE04W1C100M		ELECTRO 10 16V	4	C , 8, 9, 12, 20
CE04W1C101M		ELECTRO 100 16V	1	C , 10
CK45B1H102K		CERAMIC 1000P 50V	10	C , 5, 7, 11, 14, 15, 17, 18 , 24, 25, 26
C90-2004-05	N	ELECTRO 15000 25V	2	C , 1, 2
C90-2005-05	N	ELECTRO 1000 25V	2	C , 3, 4
C90-0817-05		ELECTRO 1000 16V	1	C , 22
C90-0820-05		ELECTRO 470 16V	3	C , 19, 21, 23
C91-0117-05		CERAMIC 0.01 50V	1	C , 16
C91-1008-05		CERAMIC 0.022 50V	1	C , 13
C91-0119-05		CERAMIC 0.047 50V	1	C , 6
DTC114ES		DIGITAL TR	1	Q , 12
E08-0373-05	*	MINI CONNECTOR 3P	1	
E31-3063-05	*	INSIDE CONNECTING WIRE	1	
E40-5044-05	N*	MINI CONNECTOR 2P	1	
E40-5045-05	N*	MINI CONNECTOR 6P	1	
E40-0273-05	*	MINI CONNECTOR 2P	2	
E40-0473-05	*	MINI CONNECTOR 4P	1	
E40-0673-05	*	MINI CONNECTOR 6P	1	
E40-0773-05	*	MINI CONNECTOR 7P	1	
E40-0973-05	*	MINI CONNECTOR 9P	1	
F20-0078-05		INSULATING PLATE	2	
F29-0014-05		INSULATING WASHER	2	
J13-0055-05		FUSE HOLDER	2	
J19-0306-05		HOLDER	1	
L15-0016-05		LOW-FREQUENCY COIL	2	L , 1, 2
MTZ6.2J(A,B)		ZENER DIODE 6.2V	1	D , 6
MTZ8.2J(B,C)		ZENER DIODE 8.2V	1	D , 5
NJM4558S		IC	1	Q , 10
R12-1429-05		TRIM.POT. 500 OHM	1	VR , 1
R12-1428-05		TRIM.POT. 1K OHM	1	VR , 2
R92-0674-05	N	RESISTOR BLOCK 10 OHM 2W	2	R , 16, 17
S10VB20		RESISTOR BLOCK	1	D , 1
UPC78M08H		IC	1	Q , 8
U05B		DIODE	1	D , 4
VD1223		VARISTOR	1	D , 7
V06B		DIODE	2	D , 2, 3
1SS133		DIODE	2	D , 8, 9
2SA1012(Y)		TR	2	Q , 1, 5
2SA1048(Y)		TR	1	Q , 7
2SC1959(Y)		TR	3	Q , 2, 9, 11
2SC2458(Y)		TR	3	Q , 3, 4, 6

RF UNIT (X44-1620-XX) (-01 : T,W -11 : K,M1,M2,X)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 001	011	REFERENCE.NO
CC45CH1H0R5C		CERAMIC 0.5P 50V	1	1	C , 40
CC45CH1H120J		CERAMIC 12P 50V	2		C , 27, 28
CC45CH1H120J		CERAMIC 12P 50V		1	C , 27
CC45CH1H080D		CERAMIC 8P 50V	1	1	C , 38
CC45CH1H150J		CERAMIC 15P 50V	2	2	C , 8, 56
CC45CH1H100D		CERAMIC 10P 50V	4		C , 12, 23, 24, 49
CC45CH1H100D		CERAMIC 10P 50V		1	C , 12
CC45CH1H220J		CERAMIC 22P 50V	1	1	C , 44
CC45CH1H330J		CERAMIC 33P 50V	4	4	C , 14, 20, 21, 22
CC45SL1H101J		CERAMIC 100P 50V	1	1	C , 1, 47
CC45CH1H010C		CERAMIC 1P 50V	2		C , 9, 36
CC45CH1H010C		CERAMIC 1P 50V		1	C , 9
CC45CH1H020C		CERAMIC 2P 50V	2	2	C , 37, 41
CC45CH1H030C		CERAMIC 3P 50V	2	2	C , 10, 34
CC45CH1H060D		CERAMIC 6P 50V	1	1	C , 13
CC45CH1H080D		CERAMIC 8P 50V	2	2	C , 33, 42
CC73ECH1H070D		CHIP CAP. 7P 50V	1	1	C , 30
CE04W1C100M		ELECTRO 10 16V	1	1	C , 54
CK73EB1H102K		CHIP CAP. 1000P 50V	5	5	C , 7, 29, 35, 43, 55
C05-0030-15		TRIMMER 20P	1	1	TC , 2
C05-0031-15		TRIMMER 10P	1	1	TC , 1
E04-0154-05		RF COAX. CONNECTOR RA,HET,DO	3	3	
L31-0180-05		TUNING COIL	1	1	L , 15
L31-0267-05		TUNING COIL	2	2	L , 16, 17
L34-0886-05		TUNING COIL	1	1	L , 14
L34-2035-05		TUNING COIL	1	1	L , 6
L34-2038-05		TUNING COIL	3	3	L , 3, 5, 10
L34-0893-05		COIL 3 4T	2	2	L , 19, 21
L34-0894-05		COIL 3 5T	2	2	L , 18, 20
L34-0908-05		COIL 3 9.5T	1	1	L , 11
L40-1092-14		INDUCTOR 1 UH	1	1	L , 22
L40-1011-14		INDUCTOR 100 UH	2	2	L , 7, 8
L40-4711-13		INDUCTOR 470 UH	1	1	L , 23
L40-1001-13		INDUCTOR 10 UH	1	1	L , 24
L40-1091-03		INDUCTOR 1 UH	1	1	L , 9
L71-0248-05	N	MCF 30.265MHZ	1	1	L , 4
L79-0642-05	N	HELICAL BLOCK	1		L , 1
L79-0643-05	N	HELICAL BLOCK		1	L , 1
L79-0498-15		HERICAL	1		L , 2
L79-0499-05		HELICAL		1	L , 2
MA856		DIODE	2	2	D , 1, 2
S51-1420-05		RELAY	1	1	RL , 1
1SS133		DIODE	1	1	D , 9
1SS133		DIODE	1	1	D , 8
1SV123		DIODE	5	5	D , 3, 4, 5, 6, 7
2SC2538-22-A		TR	1	1	Q , 6
2SK192A(GR)*N		FET	2	2	Q , 3, 4
3SK129(Q,R)	N	FET	1	1	Q , 1
3SK122(L)		FET	2	2	Q , 2, 5

FINAL UNIT (X45-1380-11)

PART.NO	NOTE	NAME & DESCRIPTION	011	REFERENCE.NO
CC45CH1H0R5C		CERAMIC 0.5P 50V	1	C , 6
CC45CH1H010C		CERAMIC 1P 50V	2	C , 2, 9
CC45CH1H180J		CERAMIC 18P 50V	1	C , 15
CC45SL2H060D		CERAMIC 6P 500V	1	C , 10
CC45SL2H100D		CERAMIC 10P 500V	2	C , 31, 32
CC45SL2H220J		CERAMIC 22P 500V	5	C , 3, 5, 7, 8, 33
CE04W1C220M		ELECTRO 22 16V	1	C , 23
CE04W1C101M		ELECTRO 100 16V	1	C , 25
CS15E1VR47M		TANTALUM 0.47 35V	1	C , 26
C90-0871-05		ELECTRO 220 16V	2	C , 29, 30
C90-0838-05		ELECTRO 1 50V	1	C , 13
C90-0861-05		ELECTRO 22 16V	1	C , 28
E04-0161-05	N	UHF RECEPTACLE	1	
E29-0440-14		GND WAFER	1	
E31-2061-05		JUMPER WIRE DD	1	
E31-3061-05	*	WIRE WITH CONNEFAN	1	
F09-0405-34		FAN	1	
F20-0078-05		INSULATING PLATE	1	
F29-0014-05		INSULATING WASHER	1	
G02-0549-04	N	SPRING FOR MOTOR	1	
L34-0452-05		VHF COIL 3 6T	2	L , 4, 6
L34-0823-05		VHF COIL 5 3T	1	L , 9
L34-0894-05		COIL 3 5T	1	L , 3
L34-0908-05		COIL 3 9.5T	2	L , 2, 5
L34-1019-05		COIL 3 2.5T	1	L , 1
L40-1092-14		INDUCTOR 1 UH	1	L , 7
L40-1092-16		INDUCTOR 1 UH	1	L , 8
MI308		DIODE	1	D , 2
MI407		DIODE	1	D , 1
M57727		POWER MODULE	1	Q , 1
N14-0509-05		NUT	1	
R12-0541-05		TRIM.POT. 100 OHM	1	VR , 2
R12-5517-05		TRIM.POT. 100 OHM	1	VR , 1
SDT1000F		THERMISTER	1	TH , 1
T42-0302-05		DC MOTOR	1	
1SS101		DIODE	1	D , 3
1S1587		DIODE	4	D , 4, 5, 6, 7
2SA1012(Y)		TR	1	Q , 2
2SA1048(Y)		TR	1	Q , 4
2SC1815(Y)		TR	1	Q , 3
2SD717(O,Y)	N	TR.	1	Q , 5

IF UNIT (X48-1400-XX) (-00 : T,W -11 : K,M1,M2,X)

PART.NO	NOTE	NAME & DESCRIPTION	000	001	011	REFERENCE.NO
CC45CH1H150J		CERAMIC 15P 50V	5		5	C , 52, 57, 90,121,190
CC45SL1H220J		CERAMIC 22P 50V	3		3	C , 1,118,185
CC45CH1H100D		CERAMIC 10P 50V	1		1	C ,119
CC45SL1H470J		CERAMIC 47P 50V	3		3	C , 69,106,107
CC45CH1H0R5C		CERAMIC 0.5P 50V	2		2	C , 7, 31
CC45CH1H180J		CERAMIC 18P 50V	1		1	C , 18
CC45SL1H121J		CERAMIC 120P 50V	1		1	C ,165
CC45CH1H220J		CERAMIC 22P 50V	1		1	C ,114
CC45CH1H0R5C		CERAMIC 0.5P 50V	2		2	C , 8,115
CC45SL2H470J		CERAMIC 47P 500V	1		1	C ,122
CC45CH1H330J		CERAMIC 33P 50V			1	C , 37
CC45CH1H020C		CERAMIC 2P 50V	1		1	C ,103
CC45CH1H330J		CERAMIC 33P 50V	2			C , 3, 37
CC45CH1H330J		CERAMIC 33P 50V			1	C , 3, 37
CC45CH1H030C		CERAMIC 3P 50V	1		1	C , 92
CC45CH1H121J		CERAMIC 120P 50V	1		1	C , 15
CC45CH1H050C		CERAMIC 5P 50V	2		2	C , 32, 65
CC45SL1H470J		CERAMIC 47P 50V	4		4	C , 64,101,108,126
CC45SL1H221J		CERAMIC 220P 50V	1		1	C , 16
CC45CH1H070D		CERAMIC 7P 50V	2		2	C , 30, 91
CC45CH1H100D		CERAMIC 10P 50V	7		7	C , 19, 24, 25, 48, 61, 74, 97
CC45UJ1H020C		CERAMIC 2P 50V	1		1	C , 14
CC45UJ1H100D		CERAMIC 10P 50V	1		1	C , 13
CE04W1H010M		ELECTRO 1 50V	9			C , 38, 77, 80, 82, 83,157,163 ,172,174
CE04W1H010M		ELECTRO 1 50V			10	C , 11, 38, 77, 80, 82, 83,157 ,163,172,174
CE04W1H2R2M		ELECTRO 2.2 50V	1		1	C ,187
CE04W1E4R7M		ELECTRO 4.7 25V	6		6	C , 81,155,162,181,182,188
CE04W1C100M		ELECTRO 10 16V	3		3	C , 99,130,173
CE04W1C220M		ELECTRO 22 16V	1		1	C ,180
CE04W1A470M		ELECTRO 47 10V	3		3	C , 79,171,183
CE04W1A221M		ELECTRO 220 10V	1		1	C ,182
CK45B1H331K		CERAMIC 330P 50V	1		1	C ,131
CK45B1H471K		CERAMIC 470P 50V	1		1	C ,179
CK45B1H102K		CERAMIC 1000P 50V	8		8	C , 4, 5, 9, 12, 42, 94,135 ,140
CK45B1H331K		CERAMIC 330P 50V	2		2	C , 70, 87
CK45B1H471K		CERAMIC 470P 50V	4			C , 47,110,153,177
CK45B1H471K		CERAMIC 470P 50V			5	C , 47,110,145,153,177
CK45B1H102K		CERAMIC 1000P 50V	12			C , 6, 23, 45, 98,136,145,156 ,159,168,186,189,193
CK45B1H102K		CERAMIC 1000P 50V			11	C , 6, 23, 45, 98,136,156,159 ,168,186,189,193
CK45F1H103Z		CERAMIC 0.01 50V	1		1	C , 88
CK45F1H103Z		CERAMIC 0.01 50V	6		6	C , 29, 43, 85, 89,138,144
CQ92M1H332K		MYLAR 3300P 50V	1		1	C ,175
CQ92M1H103K		MYLAR 0.01 50V	1		1	C ,176
CQ92M1H153K		MYLAR 0.015 50V	1		1	C ,160
CQ92M1H223K		MYLAR 0.022 50V	1		1	C ,169
CQ92M1H473K		MYLAR 0.047 50V	2		2	C , 78,161
CQ92M1H683K		MYLAR 0.068 50V	2		2	C ,166,170
CS15E1V0R1M		TANTALUM 0.1 35V	2		2	C ,178,191
CS15E1VR47M		TANTALUM 0.47 35V	1		1	C , 39
CS15E1E010M		TANTALUM 1 25V	2		2	C , 71,133
CS15E1C2R2M		TANTALUM 2.2 16V	1		1	C , 44
C05-0030-15		TRIMMER 20P	1		1	TC , 2

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 000	001	011	REFERENCE.NO
C05-0031-15		TRIMMER 10P	2		2	TC , 1, 3
C91-0667-05		CERAMIC 0.0047 50V	1		1	C ,167
C91-0117-05		CERAMIC 0.01 50V	6		6	C , 2, 10, 17, 67,112,137
C91-1008-05		CERAMIC 0.022 50V	11		11	C , 33, 49, 56, 62, 63,102,123 ,125,146,149,150
C91-0117-05		CERAMIC 0.01 50V	12		12	C , 26, 27, 35, 36, 46, 68, 86 ,111,116,117,139,154
C91-1008-05		CERAMIC 0.022 50V	32		32	C , 20, 21, 22, 34, 50, 53, 54 , 55, 58, 60, 72, 73, 75, 76 , 84, 93, 95, 96,100,104
C91-1008-05		CERAMIC 0.022 50V				C ,105,127,128,129,132,134,141 ,143,147,148,151,158
C91-0119-05		CERAMIC 0.047 50V	3		3	C ,109,113,142
C91-0457-05		CERAMIC 0.022 50V	2		2	C , 28, 66
C91-0457-05		CERAMIC 0.022 50V	4		4	C , 51, 59,120,124
C91-0085-05	N	CERAMIC 0.022 50V	1		1	C ,192
C91-0667-05		CERAMIC 0.0047 50V	2		2	C ,164,184
C91-0119-05		CERAMIC 0.047 25V			1	C , 40
DTC114ES		DIGITAL TR	1		1	Q , 19
E04-0154-05		RF COAX. CONNECTOR RA,MET,DO			2	
E23-0512-05		TERMINAL 1P	4		4	
E40-0273-05	*	MINI CONNECTOR 2P	6		6	
E40-0473-05	*	MINI CONNECTOR 4P	1		1	
E40-0573-05	*	MINI CONNECTOR 5P	4		4	
E40-0673-05	*	MINI CONNECTOR 6P	1		1	
E40-0773-05	*	MINI CONNECTOR 7P	1		1	
E40-0973-05	*	MINI CONNECTOR 9P	2		2	
G02-0535-04			2		2	
L30-0281-15		IFT	4		4	L , 13, 14, 15, 18
L30-0289-05		IFT	5		5	L , 6, 7, 20, 21, 22
L30-0503-05		IFT	3		3	L , 25, 27, 33
L30-0504-05		IFT	1		1	L , 32
L33-0681-05	N	CHOKE COIL 6.8 UH	1		1	L , 5
L34-2231-05	N	TUNING COIL 30MHZ	1		1	L , 8
L34-2038-05		TUNING COIL	4		4	L , 9, 10, 11, 24
L34-2041-05		TUNING COIL	3		3	L , 1, 2, 3
L34-2045-05		TUNING COIL	3		3	L , 23, 28, 29
L40-1501-03		INDUCTOR 15 UH	1		1	L , 26
L40-1511-03		INDUCTOR 150 UH	2		2	L , 17, 19
L40-1021-03		INDUCTOR 1 MH	3		3	L , 16, 35, 36
L40-1011-16		INDUCTOR 100 UH	1		1	L , 38
L40-1011-17		INDUCTOR 100 UH	1		1	L , 30
L71-0249-05	N	XTAL FILTER 10F22S	1		1	L , 12
L72-0342-05		CERAMIC FILTER CFV455F	1		1	L , 31
L77-1254-05	N	XTAL 13.6570MHZ	1		1	L , 4
L79-0446-05		CERAMIC DISCRI CFY455S	1		1	L , 34
MC911		DIODE	2		2	D , 27, 28
MC931		DIODE	5		5	D , 9, 24, 29, 32, 38
ND487C1-3R		DIODE	1		1	D , 16
R12-0421-05		TRIM.POT. 100 OHM	1		1	VR , 8

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 000	001	011	REFERENCE.NO
R12-1429-05		TRIM.POT. 500 OHM	1		1	VR , 6
R12-1430-05		TRIM.POT. 3K OHM	1		1	VR , 2
R12-3443-05		TRIM.POT. 10K OHM	3		3	VR , 1, 4, 7
R12-3450-05	N	TRIM.POT. 20K OHM	1		1	VR , 9
R12-7408-05	N	TRIM.POT. 500KOHM	2		2	VR , 3, 5
TA7302P		IC	2		2	Q , 41, 44
UPC577H(E,F)		IC	1		1	Q , 46
UPC455BC		IC	1		1	Q , 47
1N60		DIODE	4		4	D , 10, 11, 12, 13
1SS133		DIODE	6		6	D , 1, 5, 18, 30, 33, 39
1SS133		DIODE	17		17	D , 2, 4, 6, 7, 8, 15, 17 , 21, 22, 23, 25, 26, 31, 34 , 35, 36, 37
1S1587		DIODE	1		1	D , 14
1S1587		DIODE	2		2	D , 19, 20
1S2208		VOLTAGE VARIABL	1		1	D , 3
112-102-2		THERMISTER	2		2	D , 2, 3
112-103-2		THERMISTER	1		1	D , 1
2SA1048(Y)		TR	9		9	Q , 11, 12, 13, 15, 16, 17, 18 , 27, 60
2SA245B(Y)		TR				Q , 55, 56, 58, 59, 61, 62
2SC3113(B)		TR	2		2	Q , 54, 57
2SC268B(Y,O)		TR	2		2	Q , 1, 2
2SC268B(Y)		TR	5		5	Q , 4, 36, 38, 40, 48
2SC2240(GR)		TR			1	Q , 29
2SC245B(Y)		TR	26			Q , 3, 9, 14, 23, 24, 28, 29 , 30, 31, 33, 37, 39, 42, 43 , 48, 49, 50, 51, 52, 52
2SC245B(Y)		TR			23	Q , 3, 9, 14, 23, 24, 28, 30 , 31, 33, 37, 39, 42, 43, 48 , 49, 50, 51, 52, 53, 55
2SC245B(Y)		TR				Q , 56, 58, 59
2SK125		FET	1		1	Q , 35
2SK30A(O)		FET	3		3	Q , 10, 25, 26
2SK161(GR)		FET	2		2	Q , 6, 7
3SK73(GR)		FET	6		6	Q , 5, 8, 20, 21, 22, 32
3SK73(Y)		FET	1		1	Q , 34

AF UNIT (X49-1180-00)

PART.NO	NOTE	NAME & DESCRIPTION			000	REFERENCE.NO
CC45SL1H390J		CERAMIC	39P	50V	1	C , 32
CC45SL1H101J		CERAMIC	100P	50V	3	C , 2, 3, 45
CE04W1E4R7M		ELECTRO	4.7	25V	2	C , 20, 21
CE04W1C100M		ELECTRO	10	16V	7	C , 6, 8, 9, 10, 17, 40, 52
CE04W1C220M		ELECTRO	22	16V	1	C , 7
CE04W1A470M		ELECTRO	47	10V	5	C , 5, 22, 25, 46, 56
CE04W1A101M		ELECTRO	100	10V	1	C , 47
CE04BW1HR47M		ELECTRO	0.47	50V	1	C , 27
CE04W1H010M		ELECTRO	1	50V	18	C , 4, 11, 13, 14, 15, 16, 18
						, 19, 26, 28, 29, 35, 37, 38
CE04BW1H010M		ELECTRO	1	50V	2	, 41, 42, 48, 53 C , 23, 24
CK45B1H471K		CERAMIC	470P	50V	1	C , 43
CK45B1H561K		CERAMIC	560P	50V	1	C , 31
CK45B1H102K		CERAMIC	1000P	50V	5	C , 36, 39, 44, 61, 63
CK45B1H152K		CERAMIC	1500P	50V	1	C , 33
CQ92M1H332K		MYLAR	3300P	50V	1	C , 12
CQ92M1H103K		MYLAR	0.01	50V	1	C , 34
CQ92M1H123K		MYLAR	0.012	50V	4	C , 54, 55, 57, 58
CQ92M1H104K		MYLAR	0.1	50V	1	C , 50
CS15E1V0R1M		TANTALUM	0.1	35V	1	C , 59
CS15E1C3R3M		TANTALUM	3.3	16V	1	C , 60
C90-0882-05		ELECTRO	220	25V	1	C , 51
C90-0820-05		ELECTRO	470	16V	1	C , 49
E40-0373-05	*	MINI CONNECTOR 3P			1	
E40-0473-05	*	MINI CONNECTOR 4P			1	
E40-0573-05	*	MINI CONNECTOR 5P			2	
E40-0673-05	*	MINI CONNECTOR 6P			1	
E40-0773-05	*	MINI CONNECTOR 7P			1	
E40-0973-05	*	MINI CONNECTOR 9P			1	
MB3713		IC			1	Q , 11
MC911		DIODE			2	D , 2, 8
MC921		DIODE			1	D , 11
NJM4558S		IC			2	Q , 4, 9
N30-3004-46		PAN HD SCREW			1	
R12-3443-05		TRIM.POT.	10K OHM		2	VR , 1, 3
R12-4413-05		TRIM.POT.	50K OHM		1	VR , 4
R12-5420-05		TRIM.POT.	100KOHM		1	VR , 2
UPC1158H2		IC			1	Q , 5
1N60		DIODE			1	D , 5
1SS133		DIODE			1	D , 10
1SS133		DIODE			6	D , 1, 3, 4, 6, 7, 9
2SA1048(Y)		TR			2	Q , 2, 13
2SC2458(Y)		TR			8	Q , 3, 7, 8, 10, 12, 14, 15
						, 16
2SC2459(GR)		TR			1	Q , 1
2SK30A(GR)		FET			1	Q , 6

PLL UNIT (X50-1990-XX) (-00 : T,W -11 : K,M1,M2,X)

PART.NO	NOTE	NAME & DESCRIPTION			000	001	011	012	REFERENCE.NO
CC45CH1H060D		CERAMIC	6P	50V	1		1		C , 91
CC45CH1H010C		CERAMIC	1P	50V	1		1		C ,125
CC45CH1H070D		CERAMIC	7P	50V	1		1		C ,110
CC45SL1H470J		CERAMIC	47P	50V	5		5		C , 14, 32, 89,161,170
CC45CH1H050C		CERAMIC	5P	50V	2		2		C , 66,152
CC45CH1H060D		CERAMIC	6P	50V	1		1		C ,120
CC45CH1H100D		CERAMIC	10P	50V	2		2		C ,137,158
CC45CH1H180J		CERAMIC	18P	50V	4		4		C , 30, 81,119,164
CC45CH1H080D		CERAMIC	8P	50V	2		2		C , 96,155
CC45SL1H101J		CERAMIC	100P	50V	2		2		C ,146,160
CC45CH1H150J		CERAMIC	15P	50V	2		2		C , 95,165
CC45SL1H221J		CERAMIC	220P	50V	1		1		C ,104
CC45CH1H100D		CERAMIC	10P	50V	1		1		C ,135
CC45UJ1H270J		CERAMIC	27P	50V	1		1		C ,118
CC45SL1H331J		CERAMIC	330P	50V	1		1		C , 46
CC45CH1H150J		CERAMIC	15P	50V	1		1		C , 65
CC45CH1H180J		CERAMIC	18P	50V	2		2		C , 52, 54
CC45CH1H0R5C		CERAMIC	0.5P	50V	3		3		C ,144,162,169
CC45CH1H220J		CERAMIC	22P	50V	2		2		C ,136,148
CC45CH1H220J		CERAMIC	22P	50V	4		4		C , 1, 9, 20, 22
CC45CH1H030C		CERAMIC	3P	50V	4		4		C , 21, 44,124,151
CC45CH1H270J		CERAMIC	27P	50V	1		1		C , 43
CC45CH1H040C		CERAMIC	4P	50V	1		1		C , 64
CC45CH1H270J		CERAMIC	27P	50V	3		3		C , 10, 50,121
CC45CH1H330J		CERAMIC	33P	50V	2		2		C ,128,129
CC45CH1H330J		CERAMIC	33P	50V	3		3		C , 3, 40, 85
CC45CH1H050C		CERAMIC	5P	50V	1		1		C ,147
CC45CH1H680J		CERAMIC	68P	50V	1		1		C , 45
CC45SL1H390J		CERAMIC	39P	50V	4		4		C , 82, 84, 86, 88
CC45CH1H050C		CERAMIC	5P	50V	1				C ,147
CC45SL1H470J		CERAMIC	47P	50V	4		4		C , 4, 84, 87,127
CC73ECH1H010C		CHIP CAP.	1P	50V			1		C , 61
CC73ECH1H080D		CHIP CAP.	8P	50V	1		1		C , 63
CC73ECH1H070D		CHIP CAP.	7P	50V	1				C , 62
CC73ECH1H100D		CHIP CAP.	10P	50V			1		C , 62
CC73ECH1H160J		CHIP CAP.	16P	50V	1		1		C , 60
CE04W1E4R7M		ELECTRO	4.7	25V	1		1		C , 58
CE04W1A470M		ELECTRO	47	10V	5		5		C , 77,107,113,116,150
CE04W1A101M		ELECTRO	100	10V	3		3		C , 69, 99,122
CK45B1H102K		CERAMIC	1000P	50V	10		10		C , 8, 11, 13, 57, 94, 97,102 ,117,145,166
CK45F1H103Z		CERAMIC	0.01	50V	4		4		C , 47,138,143,156
CK45B1H681K		CERAMIC	680P	50V	2		2		C ,101,103
CK45B1H102K		CERAMIC	1000P	50V	12		12		C , 2, 6, 7, 12, 59, 68, 70 , 71, 92,131,167,177
CQ92M1H222K		MYLAR	2200P	50V	1		1		C , 74
CQ92M1H822K		MYLAR	8200P	50V	1		1		C ,114
CQ92M1H223K		MYLAR	0.022	50V	1		1		C , 75
CQ92M1H473K		MYLAR	0.047	50V	1		1		C , 56
CQ92M1H683K		MYLAR	0.068	50V	1		1		C ,111
CS15E1VR22M		TANTALUM	0.22	35V	1		1		C , 49
CS15E1VR47M		TANTALUM	0.47	35V	1		1		C , 78
CS15E1E010M		TANTALUM	1	25V	2		2		C , 72, 73
C05-0062-05		TRIMMER	6P		1		1		TC , 2
C05-0030-15		TRIMMER	20P		1		1		TC , 1
C05-0067-05		TRIMMER	25P		2		2		TC , 3, 4
C91-0117-05		CERAMIC	0.01	50V	15		15		C , 5, 19, 23, 24, 29, 33, 34

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 000	001	011	012	REFERENCE.NO
							, 39, 51, 76, 79, 90, 96,123 ,154
C91-0117-05		CERAMIC 0.01 50V	7		7		C , 41, 48, 53,108,115,126,149
C91-1008-05		CERAMIC 0.022 50V	21		21		C , 15, 17, 25, 26, 27, 28, 35 , 36, 37, 38, 55, 80,105,106 ,112,132,133,134,140, 53
C91-1008-05		CERAMIC 0.022 50V					C ,176
C91-1008-05		CERAMIC 0.022 50V	15		15		C , 16, 18, 31, 42, 98,100,109 ,130,139,141,142,157,159,163
							,168
E04-0154-05		RF COAX. CONNECTOR RA,HET,DO			1		
E23-0512-05		TERMINAL 1P	9		9		
E40-0473-05	*	MINI CONNECTOR 4P	1		1		
E40-0673-05	*	MINI CONNECTOR 6P	1		1		
E40-0873-05	*	MINI CONNECTOR 8P	1		1		
F11-0818-14		SHIELD CASE(VCO TOP CASE)	1		1		
L30-0289-05		IFT	1		1		L , 44
L30-0281-15		IFT	2		2		L , 9, 13
L32-0624-05		OSCILLATING COI	1		1		L , 21
L32-0639-05		OSCILLATING COIL 50MHZ	1		1		L , 33
L33-0647-05		CHOKE COIL 18 UH	1		1		L , 14
L33-0668-05		INDUCTOR 3.3 UH	1		1		L , 20
L34-0894-05		COIL 3 5T	2		2		L , 25, 26
L34-0908-05		COIL 3 9.5T	3		3		L , 24, 27, 35
L34-1033-05		COIL 3 8.5T	3		3		L , 1, 2, 3
L34-0683-05		TUNING COIL	1		1		L , 4
L34-0749-05		TUING COIL	2		2		L , 45, 46
L34-2041-05		TUNING COIL	2		2		L , 47, 48
L34-2232-05	N	TUNING COIL 51.2MHZ	2		2		L , 39, 40
L34-3064-05		TUNING COIL	2		2		L , 5, 7
L34-3066-05		TUING COIL	1		1		L , 6
L40-6891-03		INDUCTOR 68 UH	3		3		L , 37, 38, 43
L40-1011-17		INDUCTOR 100 UH	2		2		L , 32, 34
L40-1511-03		INDUCTOR 150 UH	2		2		L , 12, 15
L40-3311-03		INDUCTOR 330 UH	2		2		L , 30, 31
L40-1021-03		INDUCTOR 1 MH	3		3		L , 11, 16, 18
L40-1092-16		INDUCTOR 1 UH	1		1		L , 22
L40-1011-14		INDUCTOR 100 UH	2		2		L , 23, 36
L40-4711-13		INDUCTOR 470 UH	1		1		L , 42
L72-0346-05	N	CERAMIC FILTER SFE11.025MJ-A	2		2		L , 8, 10
L77-0950-05		XTAL 10.6965MHZ	1		1		L , 17
L77-0951-05		XTAL 10.6935MHZ	1		1		L , 19
L77-1255-05	N	TCXO 10.240MHZ	1		1		L , 41
L79-0644-05	N	BPF BPJB3	2		2		L , 28, 29
MA856		DIODE	2		2		D , 4, 5
MC145155P-K		IC	1		1		Q , 21
MC145156P		IC	1		1		Q , 19
MC921		DOUBLE DIODE	2		2		Q , 6, 8
MC921		DIODE	1		1		D , 7
MS4459L		IC	1		1		Q , 23
NJM78L05A		IC	1		1		Q , 37

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 000	001	011	012	REFERENCE.NO
R12-1405-05		TRIM.POT. 1K OHM	3		3		VR , 1, 2, 3
SN16913P		IC	4		4		Q , 3, 4, 6, 31
SN74LS90N		IC	2		2		Q , 22, 36
TA7302P		IC	1		1		Q , 30
UPB555C		IC	1		1		Q , 20
1SV50		DIODE	3		3		D , 1, 2, 3
2SA1048(Y)		TR	1		1		Q , 15
2SC2459(BL)		TR	3		3		Q , 12, 14, 25
2SC2459(BL)		TR	3		3		Q , 13, 26, 27
2SC2458(Y)		TR	4		4		Q , 9, 34, 35, 39
2SC2458(Y)		TR	3		3		Q , 16, 33, 38
2SC2787(L)		TR	3		3		Q , 7, 8, 41
2SC2668(Y,O)		TR	1		1		Q , 24
2SC2668(Y,O)		TR	1		1		Q , 32
2SC2668(Y)		TR	6		6		Q , 5, 11, 17, 18, 29, 40
2SC2668(Y)		TR	1		1		Q , 1
2SK192A(GR)-N		FET	2		2		Q , 10, 28
3SK73(Y)		FET	1		1		Q , 2

TONE UNIT (X52-1290-60) (T,W)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 060	REFERENCE.NO
CK45B1H102K		CERAMIC 1000P 50V	1	C
CQ92M1H472K		MYLAR 4700P 50V	1	C
CQ92M1H103K		MYLAR 0.01 50V	1	C
CQ92M1H333K		MYLAR 0.033 50V	1	C
C90-0847-05		ELECTRO 47 10V	1	C
C91-0433-05		CAPACITOR 0.01	1	C
C91-0117-05		CERAMIC 0.01 50V	1	C
E40-0417-05			1	
NE555P		IC	1	IC , 1
RD14BB2C472J		RES. CARBON 4.7KOHM 1/6W	1	R
RD14BB2C123J		RES. CARBON 12K OHM 1/6W	1	R
RD14BB2C333J		RES. CARBON 33K OHM 1/6W	1	R
RD14BB2C473J		RES. CARBON 47K OHM 1/6W	1	R
RN14BK2B9102F		METAL FILM 91K 1/8W	1	R
R12-3521-05		TRIM.POT. 20K	1	VR , 1

CONTROL UNIT (X53-1410-XX) (-11 : K,M1 -21 : M2,X -51 : T -61 : W)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	012	021	022	051	052	061	062	REFERENCE.NO
CC45CH1H150J		CERAMIC 15P 50V	2		2		2		2		C , 52, 53
CC45CH1H270J		CERAMIC 27P 50V	1		1		1		1		C , 73
CC45CH1H270J		CERAMIC 27P 50V	1		1		1		1		C , 72
CC45CH1H330J		CERAMIC 33P 50V	1		1		1		1		C , 54
CC45SL1H121J		CERAMIC 120P 50V	1		1		1		1		C , 44
CE04W1C221M		ELECTRO 220 16V	2		2		2		2		C , 65, 69
CE04W1A471M		ELECTRO 470 10V	1		1		1		1		C , 66
CE04W1HR47M		ELECTRO 0.47 50V	1		1		1		1		C , 19
CF92V1M104J		POLYESTER 0.1 50V	2		2		2		2		C , 47, 79
CK45B1H182K		CERAMIC 1800P 50V	1		1		1		1		C , 37
CQ92M1H182K		MYLAR 1800P 50V	1		1		1		1		C , 21
CQ92M1H102K		MYLAR 1000P 50V	1		1		1		1		C , 43
CQ92M1H682K		MYLAR 6800P 50V	1		1		1		1		C , 46
CS15E1A100M		TANTALUM 10 10V	1		1		1		1		C , 22
C90-0838-05		ELECTRO 1 50V	1		1		1		1		C , 45
C90-0846-05		ELECTRO 33 10V	2		2		2		2		C , 48, 50
C90-0847-05		ELECTRO 47 10V	1		1		1		1		C , 42
C90-0837-05		ELECTRO 0.1 50V	1		1		1		1		C , 41
C91-0457-05		CERAMIC 0.022 50V	8		8		8		8		C , 7, 8, 16, 30, 31, 70, 71 , 84
C91-0457-05		CERAMIC 0.022 50V	2		2		2		2		C , 26, 64
C91-0753-05		CERAMIC 470P 50V	4		4		4		4		C , 1, 9, 10, 36
C91-0117-05		CERAMIC 0.01 50V	1		1		1		1		C , 86
C91-0757-05		CERAMIC 0.001 50V	21		21		21		21		C , 2, 3, 4, 5, 6, 11, 12 , 13, 14, 29, 32, 35, 38, 39 , 40, 68, 79, 80, 81, 82
C91-0757-05		CERAMIC 0.001 50V									C , 83
C91-0753-05		CERAMIC 470P 50V	1		1						C , 56
C91-0757-05		CERAMIC 0.001 50V	4		4		4		4		C , 27, 28, 77, 78
C91-0769-05		CERAMIC 0.01 50V	5		5		5		5		C , 17, 25, 63, 74, 75
DAP401	N	DIODE	6		6		6		6		D , 1, 3, 4, 5, 6, 7
DTA114YS		DIGITAL TR	3		3		3		3		Q , 1, 3, 5
DTA114YS	N	DIGITAL TR	3		3		3		3		Q , 2, 4, 6
DTC143TS		DIGITAL TR	2		2		2		2		Q , 11, 12
E02-0122-05	N	IC SOCKET 24PIN	1		1		1		1		
E23-0512-05		TERMINAL 1P	2		2		2		2		
J32-0761-04		STUD & BOSS (STICK TYPE)	1		1		1		1		
L77-1206-05	N	XTAL 3.6864MHZ	1		1		1		1		X , 2
L78-0009-05	N	CERAMIC OSC 4MHZ	1		1		1		1		X , 1
MB8418-20LP-GRA	N	IC 8BIT X2(RAM)	1		1		1		1		IC , 14
MC14584BCP		IC	1		1		1		1		IC , 11
MC14069UBCP		IC	2		2		2		2		IC , 1, 2
MN6127A		IC	1		1		1		1		IC , 19
MTZ12JB		ZENER DIODE 12V	1		1		1		1		D , 17
MTZ9.1JB		ZENER DIODE 9.1V	1		1		1		1		D , 11
M5L8255AP-5	N	IC									IC , 16
N30-3006-46		PAN HD SCREW	2		2		2		2		
N30-3010-46		PAN HD SCREW	1		1						
N87-2606-46		TAPPING SCREW	2		2		2		2		
PST518A	N	IC	1		1		1		1		IC , 10

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	012	021	022	051	052	061	062	REFERENCE.NO
R12-4416-05	N	TRIM.POT 50K	1		1		1		1		VR , 1
R90-0515-05		RESISTOR BLOCK 10K	2		2		2		2		R , 3, 15
R90-0521-05		RESISTOR BLOCK 47K X7	1		1		1		1		R , 89
R90-0532-05		RESISTOR BLOCK 27K X5	1		1		1		1		R , 83
R90-0534-05		RESISTOR BLOCK 10K X5	1		1		1		1		R , 38
R90-0578-05	N	RESISTOR BLOCK 5.1K X10	1		1		1		1		R , 70
SN74LS05N		IC	1		1		1		1		IC , 23
SN74LS32N		IC	1		1		1		1		IC , 23
SN74LS138N		IC	1		1		1		1		IC , 15
SN74LS174N		IC	3		3		3		3		IC , 12, 17, 22
TC40118P		IC OR BU40118P	7		7		7		7		IC , 3, 4, 5, 6, 7, 8, 9
TC4069UBP		IC									IC , 1, 2
TMP8255AP-5	N	IC	1		1		1		1		IC , 16
UPC4558C		IC	1		1		1		1		IC , 18
UPC7805H		IC	1		1		1		1		IC , 21
UPD7802G-087-36	N	MICRO-PROCESSOR	1		1		1		1		IC , 24
UPD8255AC-5	N	IC									IC , 16
UPD7507G-575-00		MICRO-PROCESSOR FOR DCS	1		1		1		1		IC , 20
1SS133		DIODE	19		19		19		19		D , 2, 8, 9, 10, 13, 14, 15 , 18, 19, 20, 21, 22, 23, 24 , 25, 26, 27, 28, 29
1SS133		DIODE	4								D , 30, 31, 33, 35
1SS133		DIODE			3						D , 30, 33, 35
1SS133		DIODE					5				D , 16, 30, 33, 34, 35
1SS133		DIODE							6		D , 16, 30, 31, 33, 34, 35
2SA1307(Y)	N	TR	1		1		1		1		Q , 14
2SA1015(Y)		TR	2		2		2		2		Q , 18, 20
2SA1048(Y)		TR	1		1		1		1		Q , 21
2SA1115(E)		TR									Q , 21
2SA1015(Y)		TR	3		3		3		3		Q , 16, 17, 19
2SC1959(Y)		TR	1		1		1		1		Q , 13
2SC2458(Y)		TR	4		4		4		4		Q , 7, 8, 9, 10
2SC2703(O,Y)		TR	1		1		1		1		Q , 15

DISPLAY UNIT (X54-1820-11)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	REFERENCE.NO
CC45SL1H101J		CERAMIC 100P 50V	1	C , 20
CE04W1V100M		ELECTRO 10 35V	2	C , 12, 13
CE04W1C100M		ELECTRO 10 16V	2	C , 10, 14
CE04W1C330M		ELECTRO 33 16V	1	C , 8
CE04W1A470M		ELECTRO 47 10V	1	C , 5
CK45B1H102K		CERAMIC 1000P 50V	8	C , 1, 2, 3, 15, 16, 17, 18 , 19
CQ92M1H103K		MYLAR 0.01 50V	1	C , 11
CQ92M1H223K		MYLAR 0.022 50V	1	C , 4
C91-0769-05		CERAMIC 0.01 50V	1	C , 6
C91-1008-05		CERAMIC 0.022 50V	2	C , 7, 9
DTA124EF	N	DIGITAL TR	2	Q , 11, 12
E06-0858-05		8P METAL SOCKET	1	
E11-0401-05		EARPHONE JACK EXT.SP	1	
E11-0407-05		EARPHONE JACK	1	
E11-0413-05		PHONE JACK PHONES	1	
E11-0422-05	N	KEY JACK KEY	1	
E31-3052-15	N	TAPE CABLE 10X25MM	1	
E31-3053-15	N	TAPE CABLE 12X25MM	1	
E31-3054-05	N	TAPE CABLE 4X50MM	1	
E31-3055-05	N	TAPE CABLE 11X50MM	1	
E31-3056-05	N	TAPE CABLE 12X50MM	1	
FIP11FM7		DISPLY TUBE	1	V , 1
L19-0323-05		TRANSFORMER	1	T , 1
L30-0504-05		IFT	1	L , 2
L40-1511-14		INDUCTOR 150 UH	1	L , 3
L40-1011-04		INDUCTOR 100 UH	1	L , 1
MC931		DIODE	2	D , 3, 4
MTZ6.2JA		DIODE	1	D , 2
MTZ7.5JA		DIODE	1	D , 5
R12-2413-05		TRIM.POT.(5K)	1	VR , 6
R12-3446-05		TRIM.POT.(30K)	1	VR , 3
R12-5420-05		TRIM.POT. 100KOHM	1	VR , 7
R12-7403-05		TRIM.POT. 500KOHM	1	VR , 8
R19-3420-05		POTENTIOMETER	1	VR , 4
R19-9409-05	N	POTENTIOMETER	1	VR , 2
R24-9404-05	N	POTENTIOMETER	1	VR , 5
R90-0520-05		RESISTOR BLOCK 47K OHM X5	1	R , 25
R90-0522-05		RESISTOR BLOCK 47K OHM X6	1	R , 24
R90-0579-05	N	RESISTOR BLOCK 47K OHM X11	1	R , 23
TC50668P		IC	2	Q , 7, 8
UPA80C		IC	1	Q , 6
UPD763C	N	IC	1	Q , 5
1N60		DIODE	1	D , 1
112-351-2		THERMISTOR	1	TH , 1
2SC1959(Y)		TR	2	Q , 9, 10
2SC2458(Y)		TR	1	Q , 4

SEMICONDUCTOR (TS-811A/B/E)

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

Item	Re-marks	Part No.
Diode		1N60
		1S1587
		1SS97
		1SS101
		1SS133
		1SV50
	N	DAP401
		MA856
		MC911
		MC921
		MC931
		MI308
		MI407
		ND487C1-3R
		U05B
		V06B
Vari-cap		1S2208
Varistor		MV13
		VD1223
Zener diode		MTZ6.2JA
		MTZ6.2J(A,B)
		MTZ7.5JA
		MTZ8.2J(B,C)
		MTZ9.1JB
		MTZ12JB
Disply tube		FIP11FM7
LED		LN66(R)
		LN01201C
		LN01301C
		LN01401C
Thermister		112-102-2
		112-103-2
		112-351-2
		SDT1000F

Item	Re-marks	Part No.
Resistor block		S10VB20
Photo TR		PN126S(R)
Digital TR		DTA114Y(S)
		DTA124EF
		DTC114E(S)
		DTC143T(S)
TR	N	2SA933S(Q)
		2SA1012(Y)
		2SA1015(Y)
		2SA1048(Y)
		2SA1115(E)
	N	2SA1307(Y)
		2SC1740S(Q)
		2SC1815(Y)
		2SC1959(Y)
		2SC2026
		2SC2240(GR)
		2SC2458(Y)
		2SC2459(BL)
		2SC2459(GR)
		2SC2570A
		2SC2668(Y)
		2SC2668(Y,O)
		2SC2703(O,Y)
		2SC2762
		2SC2787(L)
		2SC3113(B)
	N	2SD717(O,Y)
FET		2SK30A(GR)
		2SK30A(O)
		2SK125
		2SK161(GR)
		2SK192A(GR)*N
		3SK73(GR)
		3SK73(Y)
		3SK129(S,T)

Item	Re-marks	Part No.
Power module		M57745
IC		BU4011B
		LM358P
		M54459L
	N	M5L8255AP-5
		MB3713
	N	MB8418-20LP-GRA
		MC14069UBCP
		MC14584BCP
		MC145155P*K
		MC145156P
		MN6127A
		NE555P
		NJM78L05A
		NJM4558S
	N	PST518A
		SN74LS05N
		SN74LS32N
		SN74LS90N
		SN74LS138N
		SN74LS174N
		SN16913P
		TA7302P
		TC4011BP
		TC4069UBP
		TC5066BP
	N	TMP8255AP-5
		μPA80C
		μPB555C
		μPC78M08H
		μPC577H(E,F)
		μPC1158H2
		μPC4558C
		μPC7805H
	N	μPD763C
		μPD7507G-575-00
	N	μPD7802G-088-36
	N	μPD8255AC-5

ENCODER ASS'Y (W02-0364-00)

PART. NO	Re-marks	NAME & DESCRIPTION	Q'TY	REFERENCE. NO
CE04CW0J330M		ELECTRO 33 6.3V	1	C1
LM358P		IC	1	IC1
LN66(R)		LED	3	D1, 2, 3
RD14BB2C102J		RES. CARBON 1kΩ	2	R5, 10
RD14BB2C105J		RES. CARBON 1MΩ	2	R8, 13
RD14BB2C181J		RES. CARBON 180Ω	3	R1, 2, 3
RD14BB2C182J		RES. CARBON 1.8kΩ	4	R6, 7, 11, 12
RD14BB2C222J		RES. CARBON 2.2kΩ	1	R15
RD14BB2C472J		RES. CARBON 4.7kΩ	4	R4, 9, 14, 16
R12-2413-05		TRIM. POT. 5kΩ	2	VR1, 2
R92-0150-05		SHORT JUMPER	2	
PN126S		PHOTO TR	3	Q1, 2, 3
V06B		DIODE	1	D1
2SC2458(Y)		TR	1	Q4

TS-811A/B/E PARTS LIST

TS-811A/B/E GENERAL

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	021	051	061	071	REFERENCE.NO
A01-0979-02	N	CASE(A) UPPER	1	1	1	1	1	
A01-0980-02	N	CASE(B) LOWER	1	1	1	1	1	
A20-2529-03	N	PANEL	1	1	1	1	1	
B05-0708-04	*	SP GRILE	1	1	1	1	1	
B10-0668-04		FRONT GLASS	1	1	1	1	1	
B30-0817-15		LAMP 14V 80MA	1	1	1	1	1	
B31-0655-05		METER	1	1	1	1	1	
B39-0407-04		SPACER	2	2	2	2	2	
B40-3565-04		MODEL NAME PLATE TS-811A	1					
B40-3549-14	N	MODEL NAME PLATE TS-811B		1				
B40-3550-14		MODEL NAME PLATE TS-811E			1	1		
B40-3549-14	N	MODEL NAME PLATE TS-811B					1	
B41-0140-04		CAUTION LABEL FUSE 3A	1					
B42-1739-04		VOLTAGE INDICATING PLATE 120V	1					
B42-1740-04		VOLTAGE INDICATING PLATE 220V		1				
B42-1741-04		VOLTAGE INDICATING PLATE 240V			1			
B42-1740-04		VOLTAGE INDICATING PLATE 220V				1		
B42-1741-04		VOLTAGE INDICATING PLATE 240V					1	
B42-2400-04	N	CURRENT INDICATING PLATE 8.5A	1					
B42-2375-14	N	CURRENT INDICATING PLATE 8.0A		1	1	1	1	
B42-2356-04		SWITCH LABEL DCS	1	1	1	1	1	
B43-1044-04	N	BADGE TS-811A	1					
B43-1039-04	N	BADGE TS-811B		1				
B43-1041-04	N	BADGE TS-811E TRIO			1			
B43-1040-04	N	BADGE TS-811E				1		
B43-1039-04	N	BADGE TS-811B					1	
B46-0410-00		WARRANTY CARD	1					
B50-4195-00	N	INSTRUCTION MANUAL (K)	1					
B50-4161-00	N	INSTRUCTION MANUAL (M,W,X)		1				
B50-4162-00	N	INSTRUCTION MANUAL (T)			1			
B50-4161-00	N	INSTRUCTION MANUAL (M,W,X)				1	1	
C91-0496-05		CERAMIC FOR AC 470P	2	2	2	2	2	
C91-0647-05		CERAMIC FOR AC 0.01	1	1	1	1	1	
D09-0306-04		ENCODER DISC ROTOR	1	1	1	1	1	
D09-0307-04		ENCODER DISC STATOR	1	1	1	1	1	
D40-0627-05		DETECTOR MECHANISM UNIT	1	1	1	1	1	
E07-1351-05	N	13P PLUG (ACC)	1	1	1	1	1	
E07-0852-05		VOLTAGE SELECTOR PLUG		1	1	1	1	
E08-0474-05		4P SOCKET DC	1	1	1	1	1	
E09-0472-05		4P PLUG DC	1	1	1	1	1	
E12-0001-15		PHONE PLUG (ACS)	1	1	1	1	1	
E12-0401-15		PHONE PLUG (ACS)	1	1	1	1	1	
E18-0351-05		3P AC SOCKET	1	1	1	1	1	
E29-0463-05		1P JUNCTION CONNECTOR	1	1	1	1	1	
E30-1643-15		AC CABLE (ACS)	1	1				
E30-1644-15		AC CABLE (ACS)			1			
E30-1645-05		AC CABLE (ACS)				1		
E30-1647-05		AC CABLE (ACS)					1	
E31-3049-05		CABLE WITH TERMINAL	1	1	1	1	1	
E31-3092-05	N*	CABLE WITH TERMNET	1	1	1	1	1	
E31-3051-05			1	1	1	1	1	
E31-3064-00	*	WIRE'S KIT (ACS)	1	1	1	1	1	
E40-0774-05	*	PIN ASS'Y	1	1	1	1	1	

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	021	051	061	071	REFERENCE.NO
F05-3022-05		FUSE 3A	1					
F05-2023-05		FUSE 2A		1	1	1	1	
F05-3022-05		FUSE 3A		1				
F07-0858-03		HEAT SINK COVER	1	1	1	1	1	
F10-1206-04	*	SHIELDING PLATE	5					
F10-1206-04		SHIELDING PLATE		6	6	6	6	
F11-0870-12	*	CONTROL CASE	1	1	1	1	1	
F15-0655-04	*	BLINDING PLATE	1	1	1	1	1	
F20-0521-04		INSULATING PLATE	1	1	1	1	1	
F29-0041-05	*	CAPACITOR COVER	1	1	1	1	1	
G01-0818-04		COILED SPRING	5	5			5	
G01-0818-04		COILED SPRING			4	4		
G02-0505-05		KNOB FITTING SPRING	3	3	3	3	3	
G02-0550-04		GND SPRING	1					
G13-0649-04	*	CUSHION FOR METER	2	2	2	2	2	
G13-0642-04	*	CUSHION FOR PLL	1	1	1	1	1	
G53-0510-04	*	PACKING FOR PANEL	1	1	1	1	1	
H01-4636-04	N	CARTON(INSIDE) TS-811A	1					
H01-4594-04	N	CARTON(INSIDE) TS-811B		1				
H01-4595-04	N	CARTON(INSIDE) TS-811E TRIO			1			
H01-4624-04	N	CARTON(INSIDE) TS-811E				1		
H01-4594-04	N	CARTON(INSIDE) TS-811B					1	
H03-2241-04	N	CARTON(OUTSIDE) TS-811A	1					
H03-2217-04	N	CARTON(OUTSIDE) TS-811B		1				
H03-2234-04	N	CARTON(OUTSIDE) TS-811E			1	1		
H03-2217-04	N	CARTON(OUTSIDE) TS-811B					1	
H10-2596-02	*	PACKING FIXTURE	1	1	1	1	1	
H10-2597-02	*	PACKING FIXTURE	1	1	1	1	1	
H12-1315-04		BUFFER	1	1	1	1	1	
H20-1425-03		PROTECTION COVER	1	1	1	1	1	
H25-0029-04		BAG(ACS) 60X110	1	1	1	1	1	
H25-0105-04		BAG 150X350	1	1	1	1	1	
H25-0103-04		BAG 125X250		1	1	1	1	
J02-0323-05		FOOT CASE(B)	4	4	4	4	4	
J02-0407-04		FOOT CASE(B)	1	1	1	1	1	
J02-0403-04		FOOT CASE(SIDE)	4	4	4	4	4	
J21-2573-04	*	FOOT HARDWARE	2	2	2	2	2	
J29-0407-04		SW GUIDE A (TACT KNOB)	5	5			5	
J29-0407-04		SW GUIDE A (TACT KNOB)			4	4		
J31-0141-04		COLLAR MIC	1	1	1	1	1	
J42-0442-05		HOLE BUSH ACC1	1	1	1	1	1	
J61-0404-05		FASTNER FOR DC PLUG	1	1	1	1	1	
J61-0408-05		VINYL TIE	1	1	1	1	1	
J61-0408-05		VINYL TIE	6	6	6	6	6	
K01-0410-05		HANDLE CASE(B)	1	1	1	1	1	
K21-0768-04		MAIN KNOB	1	1	1	1	1	
K23-0776-04		ROUND KNOB RIT	1	1	1	1	1	
K23-0710-04		KNOB	3	3	3	3	3	
K27-0467-04		KNOB UP/DOWN	2	2	2	2	2	
K29-0758-04		KNOB POWER	1	1	1	1	1	
K29-3001-04		KNOB NB	5	5	5	5	5	
K29-3032-04		TACT KNOB RIT.TONE	5	5			5	

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY												REFERENCE.NO
			011	021	051	061	071								
K29-3032-04		TACT KNOB RIT.TONE			4	4									
K29-0771-04		MAIN TUING KNOB	1	1	1	1	1								
K29-0741-04		KNOB	3	3	3	3	3								
L01-8266-05	N	POWER TRANSFORMER	1	1	1	1	1								
N09-0646-04		SCREW M4X4	2	2	2	2	2								
N16-0040-46		SPRING WASHER	1	1	1	1	1								
N30-2604-46		PAN HD SCREW	2	2	2	2	2								
N30-3004-46		PAN HD SCREW	2	2	2	2	2								
N30-3010-46		PAN HD SCREW			1	1									
N30-3006-46		PAN HD SCREW	2	2	2	2	2								
N32-2604-46		FLAT HD SCREW	6	6	6	6	6								
N32-2606-46		FLAT HD SCREW	6	6	6	6	6								
N32-3004-46		FLAT HD SCREW	2	2	2	2	2								
N32-3006-46		FLAT HD SCREW	2	2	2	2	2								
N33-3006-41		ROUND FLAT SCREW	4	4	4	4	4								
N33-3006-45		ROUND FLAT SCREW	4	4	4	4	4								
N35-2604-46		BIND SCREW	11	11	11	11	11								
N35-3004-41		BIND SCREW	18	18	18	18	18								
N35-3008-46		BIND SCREW	2	2	2	2	2								
N87-2605-46		TAPPING SCREW	47												
N87-2605-46		TAPPING SCREW		46	46	46	46								
N87-3006-46		TAPPING SCREW	10	10	10	10	10								
N87-4006-46		TAPPING SCREW	3	3	3	3	3								
N87-3010-41		TAPPING SCREW	6	6	6	6	6								
N87-3006-41		TAPPING SCREW	4	4	4	4	4								
N87-4008-46		TAPPING SCREW	1	1	1	1	1								
N88-2606-46		FLAT TAPPING SCREW	2	2	2	2	2								
N88-3006-46		FLAT TAPPING SCREW	2	2	2	2	2								
N89-3006-45		BIND TAPPING SCREW	4	4	4	4	4								
SDT1000F		THERMISTER	1	1	1	1	1								
S29-2409-05		VOLTAGE SELECTOR SWITCH	1	1	1	1	1								
S31-1415-05		SLIDE SWITCH	1	1	1	1	1								
S40-2450-05		PUSH SWITCH	1	1	1	1	1								
S50-1406-05		TACT SWTCH(UP,DOWN)		2	2	2	2								
S59-0428-05		KEYBOARD ASS'Y DCS	1	1	1	1	1								
T03-0027-15		SPEAKER	1	1	1	1	1								
T91-0331-05		MICROPHONE (M,W)		1											
T91-0335-05		MICROPHONE (T)			1										
T91-0331-05		MICROPHONE (M,W)				1	1								
T94-0049-05		PLANGER	1	1	1	1	1								
W02-0364-00		ENCODER ASS'Y	1	1	1	1	1								
W09-0326-05		LITHIUM BATTERY	1	1	1	1	1								
X41-1580-01		SWITCH UNIT	1	1											
X41-1580-62		SWITCH UNIT			1	1									
X41-1580-01		SWITCH UNIT					1								
X43-1490-11		AVR UNIT	1	1	1	1	1								
X44-1650-11	N	RF UNIT	1												
X44-1650-01	N	RF UNIT		1	1	1	1								
X45-1390-11	N	FINAL UNIT	1												
X45-1390-01	N	FINAL UNIT		1											
X45-1390-61	N	FINAL UNIT			1	1									

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY												REFERENCE.NO
			011	021	051	061	071								
X45-1390-01	N	FINAL UNIT					1								
X48-1400-01	N	IF UNIT	1	1	1	1	1								
X49-1180-00		AF UNIT	1	1	1	1	1								
X50-1990-12	N	PLL UNIT	1												
X50-1990-01	N	PLL UNIT		1	1	1	1								
X50-2010-10	N	HET UNIT	1												
X50-2000-00	N	HET UNIT		1	1	1	1								
X52-1290-60		TONE UNIT			1	1									
X53-1410-12	N	CONTROL UNIT	1												
X53-1410-22	N	CONTROL UNIT		1											
X53-1410-52	N	CONTROL UNIT			1										
X53-1410-62	N	CONTROL UNIT				1									
X53-1410-22	N	CONTROL UNIT					1								
X54-1820-11	N	DISPLAY UNIT	1	1	1	1	1								

SWITCH UNIT (X41-1580-XX) (-01 : K,M,X -62 : T,W)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 001	061	062	REFERENCE.NO
C91-0757-05		CERAMIC 0.001 50V			7	
E06-1351-05	N	ROUND TYPE CONNECTOR 13P	1		1	
E40-5041-05	*	MINI CONNECTOR 5P	2		2	
E40-5042-05	N*	MINI CONNECTOR 8P	1		1	
E40-5043-05	N*	MINI CONNECTOR 12P	1		1	
E40-0273-05	*	MINI CONNECTOR 2P	2		2	
E40-0573-05	*	MINI CONNECTOR 5P	1		1	
E40-0673-05	*	MINI CONNECTOR 6P	2		2	
E40-0873-05	*	MINI CONNECTOR 8P	1		1	
E40-0973-05	*	MINI CONNECTOR 9P	1		1	
E40-1373-05	*	MINI CONNECTOR 13P	1		1	
RS14AB3A100J		METAL FILM 10 OHM 1W	1		1	R , 3
S40-2440-15		PUSH SW	4		4	S , 3, 10, 11, 12
S40-2441-15		PUSH SW	1		1	S , 4
S50-2402-05		TACT SWITCH	2		2	S , 5, 6
S50-1412-05		TACT SWITCH	5			S , 1, 2, 7, 8, 9
S50-1412-05		TACT SWITCH			4	S , 1, 2, 7, 9
W02-0365-05	N	ROTARY ENCODER(RIT)	1		1	
1SS133		DIODE	8		8	D , 1, 2, 3, 4, 5, 6, 7 , 8

AVR UNIT (X43-1490-11)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	REFERENCE.NO
CE04W1C100M		ELECTRO 10 16V	4	C , 8, 9, 12, 20
CE04W1C101M		ELECTRO 100 16V	1	C , 10
CK45B1H102K		CERAMIC 1000P 50V	10	C , 5, 7, 11, 14, 15, 17, 18 , 24, 25, 26
C90-2004-05	N	ELECTRO 15000 25V	2	C , 1, 2
C90-2005-05	N	ELECTRO 1000 25V	2	C , 3, 4
C90-0817-05		ELECTRO 1000 16V	1	C , 22
C90-0820-05		ELECTRO 470 16V	3	C , 19, 21, 23
C91-0117-05		CERAMIC 0.01 50V	1	C , 16
C91-1008-05		CERAMIC 0.022 50V	1	C , 13
C91-0119-05		CERAMIC 0.047 50V	1	C , 6
DTC114ES		DIGITAL TR	1	Q , 12
E08-0373-05	*	MINI CONNECTOR 3P	1	
E31-3063-05	*	INSIDE CONNECTING WIRE	1	
E40-5044-05	N*	MINI CONNECTOR 2P	1	
E40-5045-05	N*	MINI CONNECTOR 6P	1	
E40-0273-05	*	MINI CONNECTOR 2P	2	
E40-0473-05	*	MINI CONNECTOR 4P	1	
E40-0673-05	*	MINI CONNECTOR 6P	1	
E40-0773-05	*	MINI CONNECTOR 7P	1	
E40-0973-05	*	MINI CONNECTOR 9P	1	
F20-0078-05		INSULATING PLATE	2	
F29-0014-05		INSULATING WASHER	2	
J13-0055-05		FUSE HOLDER	2	
J19-0306-05		HOLDER	1	
L15-0016-05		LOW-FREQUENCY COIL	2	L , 1, 2
MTZ6.2J(A,B)		ZENER DIODE 6.2V	1	D , 6
MTZ8.2J(B,C)		ZENER DIODE 8.2V	1	D , 5
NJM4558S		IC	1	Q , 10
R12-1429-05		TRIM.POT. 500 OHM	1	VR , 1
R12-1428-05		TRIM.POT. 1K OHM	1	VR , 2
R92-0674-05	N	RESISTOR BLOCK 10 OHM 2W	2	R , 16, 17
S10VB20		RESISTOR BLOCK	1	D , 1
UPC78M08H		IC	1	Q , 8
U05B		DIODE	1	D , 4
VD1223		VARISTOR	1	D , 7
V06B		DIODE	2	D , 2, 3
1SS133		DIODE	2	D , 8, 9
2SA1012(Y)		TR	2	Q , 1, 5
2SA1048(Y)		TR	1	Q , 7
2SC1959(Y)		TR	3	Q , 2, 9, 11
2SC2458(Y)		TR	3	Q , 3, 4, 6

RF UNIT (X44-1650-XX) (-01 : M,T,W,X -11 : K)

PART.NO	NOTE	NAME & DESCRIPTION	001	011	REFERENCE.NO
CC45SL1H101J		CERAMIC 100P 50V	2	2	C , 29, 30
CC45CH1H0R5C		CERAMIC 0.5P 50V	1	1	C , 16
CC45CH1H050C		CERAMIC 5P 50V	2	2	C , 10, 28
CC45CH1H060D		CERAMIC 6P 50V	2	2	C , 38, 42
CC45CH1H100D		CERAMIC 10P 50V	4	4	C , 5, 36, 40, 41
CC45CH1H120J		CERAMIC 12P 50V	1	1	C , 17
CC45CH1H330J		CERAMIC 33P 50V	1	1	C , 3
CC73ECH1H030C		CHIP CAP. 3P 50V	1	1	C , 15
CC73ECH1H330J		CHIP CAP. 33P 50V	2	2	C , 1, 2
CC73ESL1H101J		CHIP CAP. 100P 50V	3		C , 6, 12, 19
CC73ESL1H101J		CHIP CAP. 100P 50V		3	C , 3, 12, 19
CE04W1C100M		ELECTRO 10 16V	1	1	C , 26
CK45B1H102K		CERAMIC 1000P 50V	14	14	C , 4, 8, 13, 18, 22, 23, 27 , 31, 32, 34, 35, 37, 39, 43
CK73EB1H102K		CHIP CAP. 1000P 50V	9	9	C , 7, 9, 11, 14, 20, 21, 24 , 25, 33
C05-0031-15		TRIMMER 10P	1	1	TC , 2
C05-0308-05		TRIMMER 4PF	2	2	TC , 1, 3
E04-0154-05		RF COAX. CONNECTOR RA,HET,DO	4	4	
E31-2064-05		CONNECTING WIRE (A)	1	1	
E31-2089-05		CONNECTING WIRERA	1	1	
L19-0309-05		WIDE BAND TRANSFORMER	2	2	L , 2, 3
L34-0824-05		COIL 3.5 2.5T	1	1	L , 8
L34-0825-05		COIL 2.5T	1	1	L , 18
L34-0908-05		COIL 3 9.5T	2	2	L , 4, 19
L34-1052-05		COIL 1.5T	2	2	L , 9, 11
L34-1083-05		COIL 1.25T	1	1	L , 10
L34-2038-05		TUNING COIL	2	2	L , 15, 17
L40-1091-03		INDUCTOR 1 UH	1	1	L , 1
L40-1092-14		INDUCTOR 1 UH	1	1	L , 12
L71-0248-05		MCF 30.265MHZ	1	1	L , 16
L79-0649-05	N	HELICAL	3		L , 5, 6, 7
L79-0658-05	N	HELICAL BLOCK 430-450MHZ		3	L , 5, 6, 7
L79-0619-05		HELICAL	1		L , 13
L79-0659-05	N	HELICAL BLOCK		1	L , 13
L79-0620-05		HELICAL	1		L , 14
L79-0660-05	N	HELICAL BLOCK		1	L , 14
L92-0110-05		FERRITE CORE	1	1	L , 20
MA856		DIODE	2		D , 4, 5
MA856		DIODE		1	D , 4
MV13		VARISTOR	1	1	D , 2
ND487C1-3R		DIODE	1	1	D , 1
R12-0433-05		POTENTIOMETER 200 OHM	1	1	VR , 1
1SS133		DIODE	1	1	D , 3
1SS97		DIODE		1	D , 5
2SC2086		TR	2	2	Q , 1, 2
2SC2458(Y)		TR	1	1	Q , 5
2SC2570A		TR	1	1	Q , 3
2SC2762		TR	1	1	Q , 4
3SK129(S.T)		FET	2	2	Q , 6, 7

FINAL UNIT (X45-1390-XX) (-01 : M,X -11 : K -61 : T,W)

PART.NO	NOTE	NAME & DESCRIPTION	001	011	061	REFERENCE.NO
CC45CH1H050C		CERAMIC 5P 50V	1	1	1	C , 16
CC45SL2H050C		CERAMIC 5P 500V	1			C , 35
CC45CH1H0R5C		CERAMIC 0.5P 50V		1	1	C , 35
CC45SL2H030C		CERAMIC 3P 500V	3	3	3	C , 2, 4, 32
CC45SL2H040C		CERAMIC 4P 500V	1			C , 9
CC45SL2H070D		CERAMIC 7P 500V	1	1	1	C , 11
CC45SL2H120J		CERAMIC 12P 500V	1	1	1	C , 6
CC45SL1H101J		CERAMIC 100P 50V	1	1	1	C , 36
CC73FCH1H0R5C		CHIP CAP. 0.5P 50V	1	1	1	C , 34
CE04W1E220M		ELECTRO 22 25V	2	2	2	C , 24, 26
CK45B1H102K		CERAMIC 1000P 50V	7			C , 12, 14, 15, 22, 23, 25, 28
CK73EB1H102K		CHIP CAP. 1000P 50V	6	6	6	C , 17, 18, 19, 20, 21, 33
CM73F2H160J		CHIP MICA 16P 500V	1	1	1	C , 10
CM73F2H150J		CHIP MICA 15P 500V	1	1	1	C , 5
CM73F2H220J		CHIP MICA 22P 500V	1	1	1	C , 7
CM73F2H040C		CHIP MICA 4P 500V	1	1	1	C , 1
CS15E1VR47M		TANTALUM 0.47 35V	1	1	1	C , 27
C90-1253-05		ELECTROLYTIC 220 10V	1	1	1	C , 29
C90-0871-05		ELECTRO 220 16V	2	2	2	C , 30, 31
C90-0838-05		ELECTRO 1 50V	1	1	1	C , 13
E04-0161-05		UHF RECEPTACLE	1	1		
E04-0162-05	N	N TYPE RECEPTAC			1	
E29-0440-14		GND WAFER	1	1	1	
F01-0917-05		HEAT SINK	1	1	1	
F09-0405-34		FAN	1	1	1	
F20-0078-05		INSULATING PLATE	1	1	1	
F29-0014-05		INSULATING WASHER	1	1	1	
G02-0549-04		SPRING FOR MOTOR	1	1	1	
L34-1113-05		CHOKE COIL 1.5T	1	1	1	L , 5
L34-0908-05		COIL 3 9.5T	1	1	1	L , 2
L34-1032-05		COIL 3 3.5T	1	1	1	L , 4
L34-1019-05		COIL 3 2.5T	1	1	1	L , 3
L34-1040-05		COIL 1T	2	2	2	L , 1, 6
L40-1092-14		INDUCTOR 1 UH	1	1	1	L , 7
MI308		DIODE	1	1	1	D , 2
MI407		DIODE	1	1	1	D , 1
M57745	N	POWER MODULE	1	1	1	Q , 1
R12-0541-05		TRIM.POT. 100 OHM	1	1	1	VR , 2
R12-5517-05		TRIM.POT. 100 OHM	1	1	1	VR , 1
SDT1000F		THERMISTER	1	1	1	TH , 1
T42-0302-05		DC MOTOR	1	1	1	
1SS101		DIODE	4	4	4	D , 4, 5, 6, 9
1SS133		DIODE	1	1	1	D , 7
2SA1012(Y)		TR	1	1	1	Q , 2
2SA1048(Y)		TR	1	1	1	Q , 4
2SC1815(Y)		TR	1	1	1	Q , 3
2SD717		TR.	1	1	1	Q , 5

IF UNIT (X48-1400-01)

PART.NO	NOTE	NAME & DESCRIPTION			DISTINCTION & QUANTITY 001	011	REFERENCE.NO
CC45CH1H150J		CERAMIC	15P	50V	5		C , 52, 57, 90,121,190
CC45SL1H220J		CERAMIC	22P	50V	3		C , 1,118,185
CC45CH1H100D		CERAMIC	10P	50V	1		C ,119
CC45SL1H470J		CERAMIC	47P	50V	3		C , 69,106,107
CC45CH1H0R5C		CERAMIC	0.5P	50V	2		C , 7, 31
CC45CH1H180J		CERAMIC	18P	50V	1		C , 18
CC45SL1H121J		CERAMIC	120P	50V	1		C ,165
CC45CH1H220J		CERAMIC	22P	50V	1		C ,114
CC45CH1H0R5C		CERAMIC	0.5P	50V	2		C , 8,115
CC45SL2H470J		CERAMIC	47P	500V	1		C ,122
CC45CH1H020C		CERAMIC	2P	50V	1		C ,103
CC45CH1H330J		CERAMIC	33P	50V	2		C , 3, 37
CC45SL1H101J		CERAMIC	100P	50V	1		C ,194
CC45CH1H030C		CERAMIC	3P	50V	1		C , 92
CC45CH1H121J		CERAMIC	120P	50V	1		C , 15
CC45CH1H050C		CERAMIC	5P	50V	1		C , 65
CC45SL1H470J		CERAMIC	47P	50V	4		C , 54,101,108,126
CC45SL1H221J		CERAMIC	220P	50V	1		C , 16
CC45CH1H070D		CERAMIC	7P	50V	1		C , 91
CC45CH1H100D		CERAMIC	10P	50V	7		C , 19, 24, 25, 48, 61, 74, 97
CC45CH1H080D		CERAMIC	8P	50V	1		C , 30
CC45UJ1H020C		CERAMIC	2P	50V	1		C , 14
CC45UJ1H100D		CERAMIC	10P	50V	1		C , 13
CE04W1H010M		ELECTRO	1	50V	10		C , 11, 38, 77, 80, 82, 83,157 ,163,172,174
CE04W1H2R2M		ELECTRO	2.2	50V	1		C ,187
CE04W1E4R7M		ELECTRO	4.7	25V	6		C , 81,155,162,181,182,188
CE04W1C100M		ELECTRO	10	16V	3		C , 99,130,173
CE04W1C220M		ELECTRO	22	16V	1		C ,180
CE04W1A470M		ELECTRO	47	10V	3		C , 79,171,183
CE04W1A221M		ELECTRO	220	10V	1		C ,182
CK45B1H331K		CERAMIC	330P	50V	1		C ,131
CK45B1H471K		CERAMIC	470P	50V	1		C ,179
CK45B1H102K		CERAMIC	1000P	50V	8		C , 4, 5, 9, 12, 42, 94,135 ,140
CK45B1H331K		CERAMIC	330P	50V	2		C , 70, 87
CK45B1H471K		CERAMIC	470P	50V	4		C , 47,110,153,177
CK45F1H103Z		CERAMIC	0.01	50V	1		C , 88
CK45F1H103Z		CERAMIC	0.01	50V	6		C , 29, 43, 85, 89,138,144
CQ92M1H332K		MYLAR	3300P	50V	1		C ,175
CQ92M1H103K		MYLAR	0.01	50V	1		C ,176
CQ92M1H153K		MYLAR	0.015	50V	1		C ,160
CQ92M1H223K		MYLAR	0.022	50V	1		C ,169
CQ92M1H473K		MYLAR	0.047	50V	2		C , 78,161
CQ92M1H683K		MYLAR	0.068	50V	2		C ,166,170
CS15E1V0R1M		TANTALUM	0.1	35V	1		C ,178
CS15E1VR47M		TANTALUM	0.47	35V	1		C , 39
CS15E1E010M		TANTALUM	1	25V	2		C , 71,133
CS15E1C2R2M		TANTALUM	2.2	16V	1		C , 44
C05-0030-15		TRIMMER	20P		1		TC , 2
C05-0031-15		TRIMMER	10P		2		TC , 1, 3
C91-0667-05		CERAMIC	0.0047	50V	1		C ,167
C91-0117-05		CERAMIC	0.01	50V	6		C , 2, 10, 17, 67,112,137
C91-1008-05		CERAMIC	0.022	50V	11		C , 33, 49, 56, 62, 63,102,123 ,125,146,149,150
C91-0117-05		CERAMIC	0.01	50V	12		C , 26, 27, 35, 36, 46, 68, 86 ,111,116,117,139,154

PART.NO	NOTE	NAME & DESCRIPTION			DISTINCTION & QUANTITY 001	011	REFERENCE.NO
C91-1008-05		CERAMIC	0.022	50V	32		C , 20, 21, 22, 34, 50, 53, 54 , 55, 58, 60, 72, 73, 75, 76 , 84, 93, 95, 96,100,104
C91-0119-05		CERAMIC	0.047	50V	3		C ,109,113,142
C91-0457-05		CERAMIC	0.022	50V	2		C , 28, 66
C91-0457-05		CERAMIC	0.022	50V	4		C , 51, 59,120,124
C91-0085-05	N	CERAMIC	0.022	50V	1		C ,192
C91-0667-05		CERAMIC	0.0047	50V	2		C ,164,184
C91-0119-05		CERAMIC	0.047	25V		1	C , 40
DTC114ES		DIGITAL TR			1		Q , 19
E04-0154-05		RF COAX. CONNECTOR RA,HET,DO			2		
E23-0512-05		TERMINAL	1P		4		
E40-0273-05		MINI CONNECTOR	2P		6		
E40-0473-05	*	MINI CONNECTOR	4P		1		
E40-0573-05	*	MINI CONNECTOR	5P		4		
E40-0673-05	*	MINI CONNECTOR	6P		1		
E40-0773-05	*	MINI CONNECTOR	7P		1		
E40-0973-05	*	MINI CONNECTOR	9P		2		
G02-0535-04					3		
L30-0281-15		IFT			4		L , 13, 14, 15, 18
L30-0289-05		IFT			5		L , 6, 7, 20, 21, 22
L30-0503-05		IFT			3		L , 25, 27, 33
L30-0504-05		IFT			1		L , 32
L33-0681-05	N	CHOKE COIL	6.8 UH		1		L , 5
L34-2231-05	N	TUNING COIL	30MHZ		1		L , 8
L34-2038-05		TUNING COIL			4		L , 9, 10, 11, 24
L34-2041-05		TUNING COIL			3		L , 1, 2, 3
L34-2045-05		TUNING COIL			3		L , 23, 28, 29
L40-1501-03		INDUCTOR	15 UH		1		L , 26
L40-1511-03		INDUCTOR	150 UH		2		L , 17, 19
L40-1021-03		INDUCTOR	1 MH		3		L , 16, 35, 36
L40-1011-16		INDUCTOR	100 UH		1		L , 38
L40-1011-17		INDUCTOR	100 UH		1		L , 30
L40-1011-14		INDUCTOR	100 UH		1		L , 37
L71-0249-05	N	XTAL FILTER	10F22S		1		L , 12
L72-0342-05		CERAMIC FILTER	CFV455F		1		L , 31
L77-1254-05	N	XTAL	13.6570MHZ		1		L , 4
L79-0446-05		CERAMIC DISCRI	CFY455S		1		L , 34
MC911		DIODE			2		D , 27, 28
MC931		DIODE			4		D , 9, 24, 29, 32
ND487C1-3R		DIODE			1		D , 16
R12-0421-05		TRIM.POT.	100 OHM		1		VR , 8
R12-1429-05		TRIM.POT.	500 OHM		1		VR , 6
R12-1430-05		TRIM.POT.	3K OHM		1		VR , 2
R12-3443-05		TRIM.POT.	10K OHM		3		VR , 1, 4, 7
R12-3450-05	N	TRIM.POT.	20K OHM		1		VR , 9
R12-7408-05	N	TRIM.POT.	500KOHM		2		VR , 3, 5
TA7302P		IC			2		Q , 41, 44

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 001	011	REFERENCE.NO
UPC577H(E,F)		IC	1		Q , 46
UPC4558C		IC	1		Q , 47
1N60		DIODE	4		D , 10, 11, 12, 13
1SS133		DIODE	6		D , 1, 5, 18, 30, 33, 39
1SS133		DIODE	17		D , 2, 4, 6, 7, 8, 15, 17 , 21, 22, 23, 25, 26, 31, 34 , 35, 36, 37
1S1587		DIODE	1		D , 14
1S1587		DIODE	2		D , 19, 20
1S2208		VOLTAGE VARIABL	1		D , 3
112-102-2		THERMISTER	2		D , 2, 3
112-103-2		THERMISTER	1		D , 1
2CS2458(Y)					Q , 56, 58, 59
2SA1048(Y)		TR	9		Q , 11, 12, 13, 15, 16, 17, 18 , 27, 60
2SC3113(B)		TR	2		Q , 54, 57
2SC2668(Y,O)		TR	2		Q , 1, 2
2SC2668(Y)		TR	5		Q , 4, 36, 38, 40, 48
2SC2240(GR)		TR	1		Q , 29
2SC2458(Y)		TR	23		Q , 3, 9, 14, 23, 24, 28, 30 , 31, 33, 37, 39, 42, 43, 48 , 49, 50, 51, 52, 53, 55
2SK125		FET	1		Q , 35
2SK30A(O)		FET	3		Q , 10, 25, 26
2SK161(GR)		FET	2		Q , 6, 7
3SK73(GR)		FET	6		Q , 5, 8, 20, 21, 22, 32
3SK73(Y)		FET	1		Q , 34

AF UNIT (X49-1180-00)

PART.NO	NOTE	NAME & DESCRIPTION			DISTINCTION & QUANTITY 000	REFERENCE.NO
CC45SL1H390J		CERAMIC	39P	50V	1	C , 32
CC45SL1H101J		CERAMIC	100P	50V	3	C , 2, 3, 45
CE04W1E4R7M		ELECTRO	4.7	25V	2	C , 20, 21
CE04W1C100M		ELECTRO	10	16V	7	C , 6, 8, 9, 10, 17, 40, 52
CE04W1C220M		ELECTRO	22	16V	1	C , 7
CE04W1A470M		ELECTRO	47	10V	5	C , 5, 22, 25, 46, 56
CEJ4W1A101M		ELECTRO	100	10V	1	C , 47
CE04BW1HR47M		ELECTRO	0.47	50V	1	C , 27
CE04W1H010M		ELECTRO	1	50V	18	C , 4, 11, 13, 14, 15, 16, 18 , 19, 26, 28, 29, 35, 37, 38 , 41, 42, 48, 53
CE04BW1H010M		ELECTRO	1	50V	2	C , 23, 24
CK45B1H471K		CERAMIC	470P	50V	1	C , 43
CK45B1H561K		CERAMIC	560P	50V	1	C , 31
CK45B1H102K		CERAMIC	1000P	50V	5	C , 36, 39, 44, 61, 63
CK45B1H152K		CERAMIC	1500P	50V	1	C , 33
CQ92M1H332K		MYLAR	3300P	50V	1	C , 12
CQ92M1H103K		MYLAR	0.01	50V	1	C , 34
CQ92M1H123K		MYLAR	0.012	50V	4	C , 54, 55, 57, 58
CQ92M1H104K		MYLAR	0.1	50V	1	C , 50
CS15E1V0R1M		TANTALUM	0.1	35V	1	C , 59
CS15E1C3R3M		TANTALUM	3.3	16V	1	C , 60
C90-0882-05		ELECTRO	220	25V	1	C , 51
C90-0820-05		ELECTRO	470	16V	1	C , 49
E40-0373-05	*	MINI CONNECTOR 3P			1	
E40-0473-05	*	MINI CONNECTOR 4P			1	
E40-0573-05	*	MINI CONNECTOR 5P			2	
E40-0673-05	*	MINI CONNECTOR 6P			1	
E40-0773-05	*	MINI CONNECTOR 7P			1	
E40-0973-05	*	MINI CONNECTOR 9P			1	
MB3713		IC			1	Q , 11
MC911		DIODE			2	D , 2, 8
MC921		DIODE			1	D , 11
NJM4558S		IC			2	Q , 4, 9
N30-3004-46		PAN HD SCREW			1	
R12-3443-05		TRIM.POT.	10K OHM		2	VR , 1, 3
R12-4413-05		TRIM.POT.	50K OHM		1	VR , 4
R12-5420-05		TRIM.POT.	100KOHM		1	VR , 2
UPC1158H2		IC			1	Q , 5
1N60		DIODE			1	D , 5
1SS133		DIODE			1	D , 10
1SS133		DIODE			6	D , 1, 3, 4, 6, 7, 9
2SA1048(Y)		TR			2	Q , 2, 13
2SC2458(Y)		TR			8	Q , 3, 7, 8, 10, 12, 14, 15 , 16
2SC2459(GR)		TR			1	Q , 1
2SK30A(GR)		FET			1	Q , 6

TS-811A/B/E PARTS LIST

PLL UNIT (X50-1990-XX) (-01 : M,T,W,X -12 : K)

PART.NO	NOTE	NAME & DESCRIPTION			DISTINCTION & QUANTITY 001	011	012	REFERENCE.NO
CC45CH1H060D		CERAMIC	6P	50V	1			C , 9, 91
CC45CH1H060D		CERAMIC	6P	50V			1	C , 91
CC45CH1H010C		CERAMIC	1P	50V	1		1	C ,125
CC45CH1H070D		CERAMIC	7P	50V	1		1	C ,110
CC45SL1H470J		CERAMIC	47P	50V	4		4	C , 14, 32, 89,161
CC45CH1H050C		CERAMIC	5P	50V	2		2	C , 66,152
CC45CH1H060D		CERAMIC	6P	50V	1		1	C ,120
CC45CH1H100D		CERAMIC	10P	50V	2		2	C ,137,158
CC45CH1H180J		CERAMIC	18P	50V	3			C , 30, 81,119
CC45CH1H180J		CERAMIC	18P	50V			4	C , 30, 81,119,164
CC45CH1H080D		CERAMIC	8P	50V	2		2	C , 96,155
CC45SL1H101J		CERAMIC	100P	50V	2		2	C ,146,160
CC45CH1H150J		CERAMIC	15P	50V	1		1	C , 95
CC45SL1H221J		CERAMIC	220P	50V	1		1	C ,104
CC45CH1H100D		CERAMIC	10P	50V	1		1	C ,135
CC45UJ1H270J		CERAMIC	27P	50V	1		1	C ,118
CC45SL1H331J		CERAMIC	330P	50V	1		1	C , 46
CC45CH1H150J		CERAMIC	15P	50V	1		1	C , 65
CC45CH1H180J		CERAMIC	18P	50V	2		2	C , 52, 54
CC45CH1H0R5C		CERAMIC	0.5P	50V	3			C ,144,162,169
CC45CH1H0R5C		CERAMIC	0.5P	50V			2	C ,144,162
CC45CH1H220J		CERAMIC	22P	50V	2		2	C ,136,148
CC45CH1H220J		CERAMIC	22P	50V	4			C , 20, 22,165,171
CC45CH1H220J		CERAMIC	22P	50V			3	C , 20, 22,171
CC45CH1H030C		CERAMIC	3P	50V	4		4	C , 21, 44,124,151
CC45CH1H270J		CERAMIC	27P	50V	1		1	C , 43
CC45CH1H040C		CERAMIC	4P	50V	1		1	C , 64
CC45CH1H270J		CERAMIC	27P	50V	3		3	C , 10, 50,121
CC45CH1H330J		CERAMIC	33P	50V	2		2	C ,128,129
CC45CH1H330J		CERAMIC	33P	50V	3		3	C , 3, 40, 85
CC45CH1H050C		CERAMIC	5P	50V	1			C ,147
CC45CH1H050C		CERAMIC	5P	50V			2	C , 9,147
CC45CH1H680J		CERAMIC	68P	50V	1		1	C , 45
CC45SL1H390J		CERAMIC	39P	50V	4		4	C , 82, 84, 86, 88
CC45SL1H470J		CERAMIC	47P	50V	4		4	C , 4, 84, 87,127
CC45CH1H120J		CERAMIC	12P	50V	1		1	C ,174
CC45SL1H050C		CERAMIC	5P	50V	1		1	C ,178
CC45SL1H330J		CERAMIC	33P	50V	1		1	C ,179
CC73ECH1H080D		CHIP CAP.	8P	50V	1		1	C , 63
CC73ECH1H220J		CHIP CAP.	22P	50V	1		1	C , 1
CC73ECH1H070D		CHIP CAP.	7P	50V	1		1	C , 62
CC73ECH1H160J		CHIP CAP.	16P	50V	1		1	C , 60
CE04W1E4R7M		ELECTRO	4.7	25V	1		1	C , 58
CE04W1A470M		ELECTRO	47	10V	5		5	C , 77,107,113,116,150
CE04W1A101M		ELECTRO	100	10V	3		3	C , 69, 99,122
CK45B1H102K		CERAMIC	1000P	50V	10		10	C , 8, 11, 13, 57, 94, 97,102 ,117,145,166
CK45F1H103Z		CERAMIC	0.01	50V	4		4	C , 47,138,143,156
CK45B1H331K		CERAMIC	330P	50V	1		1	C ,175
CK45B1H681K		CERAMIC	680P	50V	2		2	C ,101,103
CK45B1H102K		CERAMIC	1000P	50V	9			C , 2, 6, 7, 12, 59, 68, 70 , 71, 92,131,167
CK45B1H102K		CERAMIC	1000P	50V			9	C , 6, 7, 12, 59, 68, 70, 92 ,131,167
CQ92M1H222K		MYLAR	2200P	50V	1		1	C , 74
CQ92M1H822K		MYLAR	8200P	50V	1		1	C ,114
CQ92M1H223K		MYLAR	0.022	50V	1		1	C , 75

PART.NO	NOTE	NAME & DESCRIPTION			DISTINCTION & QUANTITY 001	011	012	REFERENCE.NO
CQ92M1H473K		MYLAR	0.047	50V	1		1	C , 56
CQ92M1H683K		MYLAR	0.068	50V	1		1	C ,111
CS15E1VR22M		TANTALUM	0.22	35V	1		1	C , 49
CS15E1VR47M		TANTALUM	0.47	35V	1		1	C , 78
CS15E1E010M		TANTALUM	1	25V	2		2	C , 72, 73
C05-0062-05		TRIMMER	6P		1		1	TC , 2
C05-0030-15		TRIMMER	20P		1		1	TC , 1
C05-0067-05		TRIMMER	25P		2		2	TC , 3, 4
C91-0117-05		CERAMIC	0.01	50V	15		15	C , 5, 19, 23, 24, 29, 33, 34 , 39, 51, 76, 79, 90, 96,123 ,154
C91-0117-05		CERAMIC	0.01	50V	7		7	C , 41, 48, 53,108,115,126,149
C91-1008-05		CERAMIC	0.022	50V	23		23	C , 15, 17, 25, 26, 27, 28, 35 , 36, 37, 38, 55, 80,105,106 ,112,132,133,134,140,153
C91-1008-05		CERAMIC	0.022	50V				C ,172,173,176
C91-1008-05		CERAMIC	0.022	50V		15		C , 16, 18, 31, 42, 98,100,109 ,130,139,141,142,157,159,163 ,168
C91-0498-05		CERAMIC	0.35P	50V			1	C ,169
E04-0154-05		RF COAX. CONNECTOR RA,MET,DO			1		1	
E23-0512-05		TERMINAL	1P		9		9	
E33-1641-00					1			
E40-0473-05	*	MINI CONNECTOR 4P			2		2	
E40-0673-05	*	MINI CONNECTOR 6P			1		1	
E40-0873-05	*	MINI CONNECTOR 8P			1		1	
F11-0818-14		SHIELD CASE(VCO TOP CASE)			1		1	
L30-0289-05		IFT			1		1	L , 44
L30-0281-15		IFT			2		2	L , 9, 13
L32-0624-05		OSCILLATING COI			1		1	L , 21
L32-0639-05		OSCILLATING COIL 50MHZ			1		1	L , 33
L33-0647-05		CHOKE COIL	18	UH	1		1	L , 14
L33-0668-05		INDUCTOR	3.3	UH	1		1	L , 20
L34-0894-05		COIL	3	5T	2		2	L , 25, 26
L34-0908-05		COIL	3	9.5T	3		3	L , 24, 27, 35
L34-1033-05		COIL	3	8.5T	3		3	L , 1, 2, 3
L34-0683-05		TUNING COIL			1		1	L , 4
L34-0749-05		TUING COIL			2		2	L , 45, 46
L34-2041-05		TUNING COIL			2		2	L , 47, 48
L34-2232-05	N	TUNING COIL	51.2MHZ		2		2	L , 39, 40
L34-3064-05		TUNING COIL			2		2	L , 5, 7
L34-3066-05		TUING COIL			1		1	L , 6
L40-6891-03		INDUCTOR	68	UH	3		3	L , 37, 38, 43
L40-1011-17		INDUCTOR	100	UH	2		2	L , 32, 34
L40-1511-03		INDUCTOR	150	UH	2		2	L , 12, 15
L40-3311-03		INDUCTOR	330	UH	2		2	L , 30, 31
L40-1021-03		INDUCTOR	1	MH	3		3	L , 11, 16, 18
L40-1092-16		INDUCTOR	1	UH	1		1	L , 22
L40-1011-14		INDUCTOR	100	UH	2		2	L , 23, 36
L40-4711-13		INDUCTOR	470	UH	1		1	L , 42
L40-1011-13		INDUCTOR	100	UH	1		1	L , 49
L72-0346-05	N	CERAMIC FILTER	SFE11.025MJ-A		2		2	L , 8, 10
L77-0950-05		XTAL	10.6965MHZ		1		1	L , 17
L77-0951-05		XTAL	10.6935MHZ		1		1	L , 19

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 001	011	012	REFERENCE.NO
L77-1255-05	N	TCXO 10.240MHZ	1		1	L , 41
L79-0644-05	N	BPF BPJ83	2		2	L , 28, 29
MA856		DIODE	2		2	D , 4, 5
MC145155P*K		IC	1		1	Q , 21
MC145156P		IC	1		1	Q , 19
MC921		DOUBLE DIODE	2		2	Q , 6, 8
MC921		DIODE	1		1	D , 7
M54459L		IC	1		1	Q , 23
NJM78L05A		IC	1		1	Q , 37
R12-1405-05		TRIM.POT. 1K OHM	3		3	VR , 1, 2, 3
SN16913P		IC	4		4	Q , 3, 4, 6, 31
SN74LS90N		IC	2		2	Q , 22, 36
TA7302P		IC	1		1	Q , 30
UPB555C		IC	1		1	Q , 20
1SV50		DIODE	3		3	D , 1, 2, 3
2SA1048(Y)		TR	1		1	Q , 15
2SC2459(BL)		TR	3		3	Q , 12, 14, 25
2SC2459(BL)		TR	3		3	Q , 13, 26, 27
2SC2458(Y)		TR	4		4	Q , 9, 34, 35, 39
2SC2458(Y)		TR	3		3	Q , 16, 33, 38
2SC2787(L)		TR	3		3	Q , 7, 8, 41
2SC2668(Y,O)		TR	1		1	Q , 24
2SC2668(Y,O)		TR	1		1	Q , 32
2SC2668(Y)		TR	6		6	Q , 5, 11, 17, 18, 29, 40
2SC2668(Y)		TR	1		1	Q , 1
2SK192A(GR)*N		FET	2		2	Q , 10, 28
3SK73(Y)		FET	1		1	Q , 2

HET UNIT (X50-2000-00) (M,T,W,X)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 000	REFERENCE.NO
CC45CH1H0R5C		CERAMIC 0.5P 50V	2	C , 14, 27
CC45CH1H050C		CERAMIC 5P 50V	3	C , 3, 9, 38
CC45CH1H100D		CERAMIC 10P 50V	3	C , 15, 32, 44
CC45CH1H220J		CERAMIC 22P 50V	2	C , 23, 28
CC45SL1H101J		CERAMIC 100P 50V	5	C , 6, 11, 18, 34, 40
CC73ECH1H100D		CHIP CAP. 10P 50V	1	C , 2
CC73ECH1H220J		CHIP CAP. 22P 50V	1	C , 1
CC73ECH1H330J		CHIP CAP. 33P 50V	1	C , 43
CE04W1C100M		ELECTRO 10 16V	1	C , 12
CK45B1H471K		CERAMIC 470P 50V	2	C , 16, 22
CK45B1H102K		CERAMIC 1000P 50V	14	C , 4, 5, 7, 10, 17, 19, 21, 25, 26, 29, 33, 35, 39, 41
CK73EB1H102K		CHIP CAP. 1000P 50V	6	C , 8, 13, 20, 31, 36, 42
C05-0062-05		TRIMMER 6P	3	TC , 1, 2, 3
C05-0031-15		TRIMMER 10P	1	TC , 4
C91-0498-05		CERAMIC 0.35P 50V	1	C , 37
C91-0757-05		CERAMIC 0.001 50V	1	C , 30
C91-1008-05		CERAMIC 0.022 50V	1	C , 24
E04-0154-05		RF COAX. CONNECTOR RA.HET.DO	2	
E23-0512-05		TERMINAL 1P	5	TP , 1, 4, 5, 6, 7
E31-2064-05	*	CONNECTING WIRE (A)	1	
E31-3079-05	N*	LEAD WITH CONNECTOR	1	
E40-0211-05		MINI CONNECTOR 2P	1	TP , 3
L19-0309-05		WIDE BAND TRANSFORMER	2	L , 2, 3
L34-2041-05		TUNING COIL	2	L , 8, 9
L34-0824-05		COIL 3.5 2.5T	1	L , 6
L34-0893-05		COIL 3 4T	1	L , 14
L34-0908-05		COIL 3 9.5T	1	L , 1
L34-1015-05		COIL 3 4.5T	1	L , 12
L34-1016-05		COIL 3 4.5T	1	L , 11
L34-1114-05	N	COIL 3 4.5T	1	L , 13
L40-1092-14		INDUCTOR 1 UH	1	L , 7
L79-0650-05	N	HELICAL 290MHZ	1	L , 10
L79-0651-05	N	HELICAL 405MHZ	2	L , 4, 5
MV13		VARISTOR	1	D , 2
ND487C1-3R		DIODE	1	D , 1
2SC2026		TR	5	Q , 1, 2, 5, 6, 7
2SC2570A		TR	1	Q , 3
2SC2787(L)		TR	1	Q , 4

TS-811A/B/E PARTS LIST

HET UNIT (X50-2010-10) (K)

PART.NO	NOTE	NAME & DESCRIPTION	010	REFERENCE.NO
CC45CH1H0R5C		CERAMIC 0.5P 50V	2	C , 14, 27
CC45CH1H030C		CERAMIC 3P 50V	1	C , 46
CC45CH1H050C		CERAMIC 5P 50V	3	C , 4, 9, 65
CC45CH1H070D		CERAMIC 7P 50V	1	C , 38
CC45CH1H100D		CERAMIC 10P 50V	2	C , 44, 52
CC45CH1H120J		CERAMIC 12P 50V	1	C , 56
CC45CH1H150J		CERAMIC 15P 50V	1	C , 15
CC45CH1H220J		CERAMIC 22P 50V	4	C , 24, 29, 33, 60
CC45CH1H330J		CERAMIC 33P 50V	1	C , 48
CC45SH1H560J		CERAMIC 56P 50V	1	C , 50
CC45SL1H101J		CERAMIC 100P 50V	11	C , 3, 7, 12, 19, 35, 36, 40 , 41, 58, 62, 63
CC73ECH1H150J			2	C , 1, 2
CC73ECH1H330J		CHIP CAP. 33P 50V	1	C , 43
CC73ECH1H101J		CHIP CAP. 100P 50V	3	C , 6, 11, 18
CK45B1H471K		CERAMIC 470P 50V	2	C , 16, 21
CK45B1H102K		CERAMIC 1000P 50V	8	C , 23, 25, 28, 31, 39, 45, 49 , 53, 66
CK45B1H222K		CERAMIC 2200P 50V	2	C , 26, 54
CK73EB1H102K		CHIP CAP. 1000P 50V	16	C , 5, 8, 10, 13, 17, 20, 30 , 32, 34, 37, 42, 47, 57, 59 , 61, 64
C05-0030-15		TRIMMER 20P	1	C , 3
C05-0031-15		TRIMMER 10P	1	TC , 2
C05-0062-05		TRIMMER 6P	1	TC , 1
C91-0498-05		CERAMIC 0.35P 50V	1	C , 55
C91-0085-05		CERAMIC 0.022 50V	1	C , 67
C91-0757-05		CERAMIC 0.001 50V	1	C , 51
C91-1008-05		CERAMIC 0.022 50V	1	C , 22
E04-0154-05		RF COAX. CONNECTOR RA,HET,DD	2	
L19-0309-05		WIDE BAND TRANSFORMER	2	L , 2, 3
L33-0026-05		CHOKE COIL	1	L , 17
L34-2041-05		TUNING COIL	4	L , 8, 9, 18, 19
L34-0824-05		COIL 3.5 2.5T	1	L , 6
L34-0893-05		COIL 3 4T	1	L , 13
L34-0908-05		COIL 3 9.5T	1	L , 1
L34-1114-05		COIL 3 4.5T	1	L , 12
L40-1092-14		INDUCTOR 1 UH	3	L , 7, 23, 24
L40-1011-14		INDUCTOR 100 UH	2	L , 14, 22
L40-1092-16		INDUCTOR 1 UH	1	L , 16
L77-1270-05	N	XTAL 42.38857MHZ	1	L , 15
L79-0650-05		HELICAL 290MHZ	4	L , 10, 11, 20, 21
L79-0657-05	N	HELICAL 400-420MHZ	2	L , 4, 5
MV13		VARISTOR	1	D , 2
ND4B7C1-3R		DIODE	1	D , 1
112-102-2		THERMISTER	1	TH , 1
2SA933S(Q)	N	TR	3	Q , 10, 11, 12
2SC2026		TR	6	Q , 2, 3, 5, 6, 7, 15, 16
2SC2787(L)		TR	3	Q , 4, 13, 14
2SC2570A		TR	1	Q , 1
2SC1740S(Q)	N	TR	2	Q , 8, 9

TONE UNIT (X52-1290-60) (T,W)

PART.NO	NOTE	NAME & DESCRIPTION	060	REFERENCE.NO
CK45B1H102K		CERAMIC 1000P 50V	1	C
CQ92M1H472K		MYLAR 4700P 50V	1	C
CQ92M1H103K		MYLAR 0.01 50V	1	C
CQ92M1H333K		MYLAR 0.033 50V	1	C
C90-0847-05		ELECTRO 47 10V	1	C
C91-0433-05		CAPACITOR 0.01	1	C
C91-0117-05		CERAMIC 0.01 50V	1	C
E40-0417-05			1	
NE555P		IC	1	IC , 1
RD14BB2C472J		RES. CARBON 4.7KOHM 1/6W	1	R
RD14BB2C123J		RES. CARBON 12K OHM 1/6W	1	R
RD14BB2C333J		RES. CARBON 33K OHM 1/6W	1	R
RD14BB2C473J		RES. CARBON 47K OHM 1/6W	1	R
RN14BK2B9102F		METAL FILM 91K 1/8W	1	R
R12-3521-05		TRIM.POT. 20K	1	VR , 1

CONTROL UNIT (X53-1410-XX) (-12 : K -22 : M,X -52 : T -62 : W)

PART.NO	NOTE	NAME & DESCRIPTION	012	021	022	051	052	061	062	REFERENCE.NO
CC45CH1H150J		CERAMIC 15P 50V	2		2		2		2	C , 52, 53
CC45CH1H270J		CERAMIC 27P 50V	1		1		1		1	C , 73
CC45CH1H270J		CERAMIC 27P 50V	1		1		1		1	C , 72
CC45CH1H330J		CERAMIC 33P 50V	1		1		1		1	C , 54
CC45SL1H121J		CERAMIC 120P 50V	1		1		1		1	C , 44
CE04W1C221M		ELECTRO 220 16V	2		2		2		2	C , 65, 69
CE04W1A471M		ELECTRO 470 10V	1		1		1		1	C , 66
CE04W1HR47M		ELECTRO 0.47 50V	1		1		1		1	C , 19
CF92V1H104J		POLYESTER 0.1 50V	2		2		2		2	C , 47, 79
CK45B1H182K		CERAMIC 1800P 50V	1		1		1		1	C , 37
CQ92M1H182K		MYLAR 1800P 50V	1		1		1		1	C , 21
CQ92M1H102K		MYLAR 1000P 50V	1		1		1		1	C , 43
CQ92M1H682K		MYLAR 6800P 50V	1		1		1		1	C , 46
CS15E1A100M		TANTALUM 10 10V	1		1		1		1	C , 22
C90-0838-05		ELECTRO 1 50V	1		1		1		1	C , 45
C90-0846-05		ELECTRO 33 10V	2		2		2		2	C , 48, 50
C90-0847-05		ELECTRO 47 10V	1		1		1		1	C , 42
C90-0837-05		ELECTRO 0.1 50V	1		1		1		1	C , 41
C91-0457-05		CERAMIC 0.022 50V	8		8		8		8	C , 7, 8, 16, 30, 31, 70, 71 , 84
C91-0457-05		CERAMIC 0.022 50V	2		2		2		2	C , 26, 64
C91-0753-05		CERAMIC 470P 50V	4		4		4		4	C , 1, 9, 10, 36
C91-0117-05		CERAMIC 0.01 50V	1		1		1		1	C , 86
C91-0757-05		CERAMIC 0.001 50V	21		21		21		21	C , 2, 3, 4, 5, 6, 11, 12 , 13, 14, 29, 32, 35, 38, 39 , 40, 68, 79, 80, 81, 82
C91-0757-05		CERAMIC 0.001 50V								C , 83
C91-0753-05		CERAMIC 470P 50V	1		1					C , 56
C91-0757-05		CERAMIC 0.001 50V	4		4		4		4	C , 27, 28, 77, 78
C91-0769-05		CERAMIC 0.01 50V		12		12		12		C , 15, 18, 20, 23, 24, 33, 34
C91-0769-05		CERAMIC 0.01 50V	5		5		5		5	, 51, 55, 67, 76, 85 C , 17, 25, 63, 74, 75
DAP401	N	DIODE	6		6		6		6	D , 1, 3, 4, 5, 6, 7
DTA114YS		DIGITAL TR	3		3		3		3	Q , 1, 3, 5
DTA114YS	N	DIGITAL TR	3		3		3		3	Q , 2, 4, 6
DTC143TS		DIGITAL TR	2		2		2		2	Q , 11, 12
E02-0122-05	N	IC SOCKET 24PIN	1		1		1		1	
E23-0512-05		TERMINAL 1P	2		2		2		2	
J32-0761-04		STUD & BOSS (STICK TYPE)	1		1		1		1	
L77-1206-05	N	XTAL 3.6864MHZ	1		1		1		1	X , 2
L78-0009-05	N	CERAMIC OSC 4MHZ	1		1		1		1	X , 1
MB8418-20LP-GRA	N	IC 8BIT X2(RAM)	1		1		1		1	IC , 14
MC14584BCP		IC	1		1		1		1	IC , 11
MC14069UBCP		IC	2		2		2		2	IC , 1, 2
MN6127A		IC	1		1		1		1	IC , 19
MTZ12JB		ZENER DIODE 12V	1		1		1		1	D , 17
MTZ9.1JB		ZENER DIODE 9.1V	1		1		1		1	D , 11
M5L8255AP-5	N	IC								IC , 16
N30-3006-46		PAN HD SCREW	2		2		2		2	
N30-3010-46		PAN HD SCREW	1		1					
N87-2606-46		TAPPING SCREW	2		2		2		2	

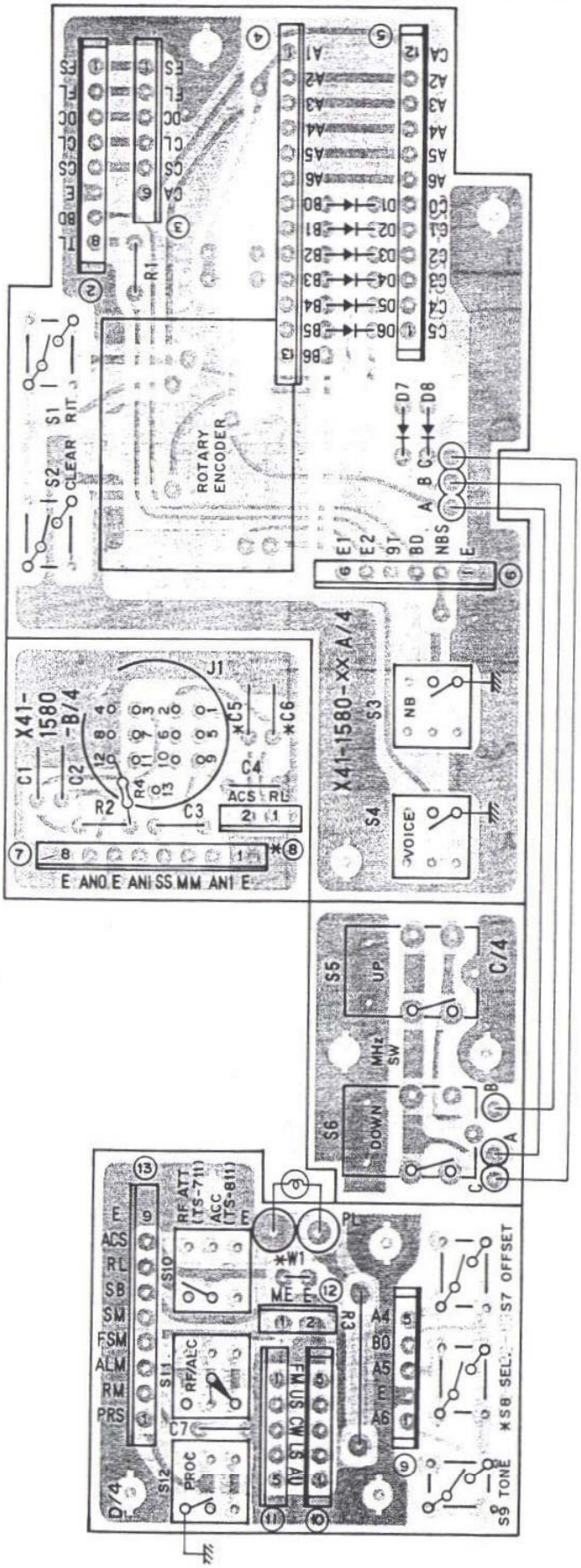
PART.NO	NOTE	NAME & DESCRIPTION	012	021	022	051	052	061	062	REFERENCE.NO
PST518A	N	IC	1		1		1		1	IC , 10
R12-4416-05	N	TRIM.POT 50K	1		1		1		1	VR , 1
R90-0515-05		RESISTOR BLOCK 10K	2		2		2		2	R , 3, 15
R90-0521-05		RESISTOR BLOCK 47K X7	1		1		1		1	R , 89
R90-0532-05		RESISTOR BLOCK 27K X5	1		1		1		1	R , 83
R90-0534-05		RESISTOR BLOCK 10K X5	1		1		1		1	R , 38
R90-0578-05	N	RESISTOR BLOCK 5.1K X10	1		1		1		1	R , 70
SN74LS05N		IC	1		1		1		1	IC , 23
SN74LS32N		IC	1		1		1		1	IC , 23
SN74LS138N		IC	1		1		1		1	IC , 15
SN74LS174N		IC	3		3		3		3	IC , 12, 17, 22
TC4011BP		IC OR BU4011BP	7		7		7		7	IC , 3, 4, 5, 6, 7, 8, 9
TC4069UBP		IC								IC , 1, 2
TMP8255AP-5	N	IC	1		1		1		1	IC , 16
UPC4558C		IC	1		1		1		1	IC , 18
UPC7805H		IC	1		1		1		1	IC , 21
UPD7802G-088-36		MICRO-PROCESSOR	1		1		1		1	
UPD8255AC-5	N	IC								IC , 16
UPD7507G-575-00		MICRO-PROCESSOR FOR DCS	1		1		1		1	IC , 20
1SS133		DIODE	19		19		19		19	D , 2, 8, 9, 10, 13, 14, 15 , 18, 19, 20, 21, 22, 23, 24 , 25, 26, 27, 28, 29
1SS133		DIODE	2							D , 33, 35
1SS133		DIODE			3					D , 12, 30, 35
1SS133		DIODE					5			D , 16, 30, 33, 34, 35
1SS133		DIODE							7	D , 16, 30, 31, 32, 33, 34, 35
2SA1307(Y)	N	TR	1		1		1		1	Q , 14
2SA1015(Y)		TR	2		2		2		2	Q , 18, 20
2SA1048(Y)		TR	1		1		1		1	Q , 21
2SA1115(E)		TR								Q , 21
2SA1015(Y)		TR	3		3		3		3	Q , 16, 17, 19
2SC1959(Y)		TR	1		1		1		1	Q , 13
2SC2458(Y)		TR	4		4		4		4	Q , 7, 8, 9, 10
2SC2703(D,Y)		TR	1		1		1		1	Q , 15

TS-811A/B/E PARTS LIST

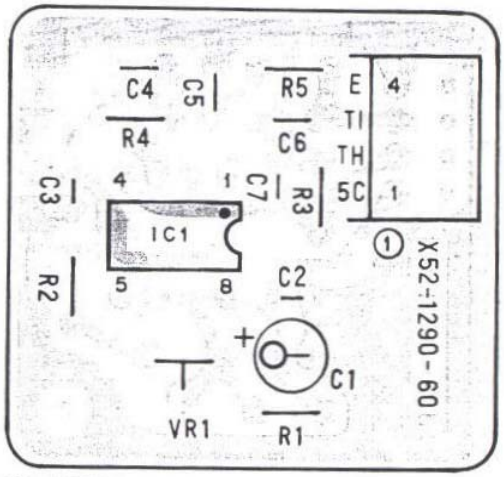
DISPLAY UNIT (X54-1820-11)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	REFERENCE.NO
CC45SL1H101J		CERAMIC 100P 50V	1	C , 20
CE04W1V100M		ELECTRO 10 35V	2	C , 12, 13
CE04W1C100M		ELECTRO 10 16V	2	C , 10, 14
CE04W1C330M		ELECTRO 33 16V	1	C , 8
CE04W1A470M		ELECTRO 47 10V	1	C , 5
CK45B1H102K		CERAMIC 1000P 50V	8	C , 1, 2, 3, 15, 16, 17, 18
				, 19
CQ92M1H103K		MYLAR 0.01 50V	1	C , 11
CQ92M1H223K		MYLAR 0.022 50V	1	C , 4
C91-0769-05		CERAMIC 0.01 50V	1	C , 6
C91-1008-05		CERAMIC 0.022 50V	2	C , 7, 9
DTA124EF	N	DIGITAL TR	2	Q , 11, 12
E06-0858-05		8P METAL SOCKET	1	
E11-0401-05		EARPHONE JACK EXT.SP	1	
E11-0407-05		EARPHONE JACK	1	
E11-0413-05		PHONE JACK PHONES	1	
E11-0422-05	N	KEY JACK KEY	1	
E31-3052-15	N	TAPE CABLE 10X25MM	1	
E31-3053-15	N	TAPE CABLE 12X25MM	1	
E31-3054-05	N	TAPE CABLE 4X50MM	1	
E31-3055-05	N	TAPE CABLE 11X50MM	1	
E31-3056-05	N	TAPE CABLE 12X50MM	1	
FIP11FM7		DISPLY TUBE	1	V , 1
L19-0323-05		TRANSFORMER	1	T , 1
L30-0504-05		IFT	1	L , 2
L40-1511-14		INDUCTOR 150 UH	1	L , 3
L40-1011-04		INDUCTOR 100 UH	1	L , 1
MC931		DIODE	2	D , 3, 4
MTZ6.2JA		DIODE	1	D , 2
MTZ7.5JA		DIODE	1	D , 5
R12-2413-05		TRIM.POT.(5K)	1	VR , 6
R12-3446-05		TRIM.POT.(30K)	1	VR , 3
R12-5420-05		TRIM.POT. 100KOHM	1	VR , 7
R12-7403-05		TRIM.POT. 500KOHM	1	VR , 8
R19-3420-05		POTENTIOMETER	1	VR , 4
R19-9409-05	N	POTENTIOMETER	1	VR , 2
R24-9404-05	N	POTENTIOMETER	1	VR , 5
R90-0520-05		RESISTOR BLOCK 47K OHM X5	1	R , 25
R90-0522-05		RESISTOR BLOCK 47K OHM X6	1	R , 24
R90-0579-05	N	RESISTOR BLOCK 47K OHM X11	1	R , 23
TC5066BP		IC	2	Q , 7, 8
UPA80C		IC	1	Q , 6
UPD763C	N	IC	1	Q , 5
1N60		DIODE	1	D , 1
112-351-2		THERMISTOR	1	TH , 1
2SC1959(Y)		TR	2	Q , 9, 10
2SC2458(Y)		TR	1	Q , 4

SWITCH UNIT (X41-1580-XX) Component side view
(-01 : TS-811 K,M,X -11 : TS-711 K,M1,M2,X -61 : TS-711 T,W -62 : TS-811 T,W)



TONE UNIT (X52-1290-60) Component side view
(TS-711 T,W TS-811 T,W)



IC1 : NE555P

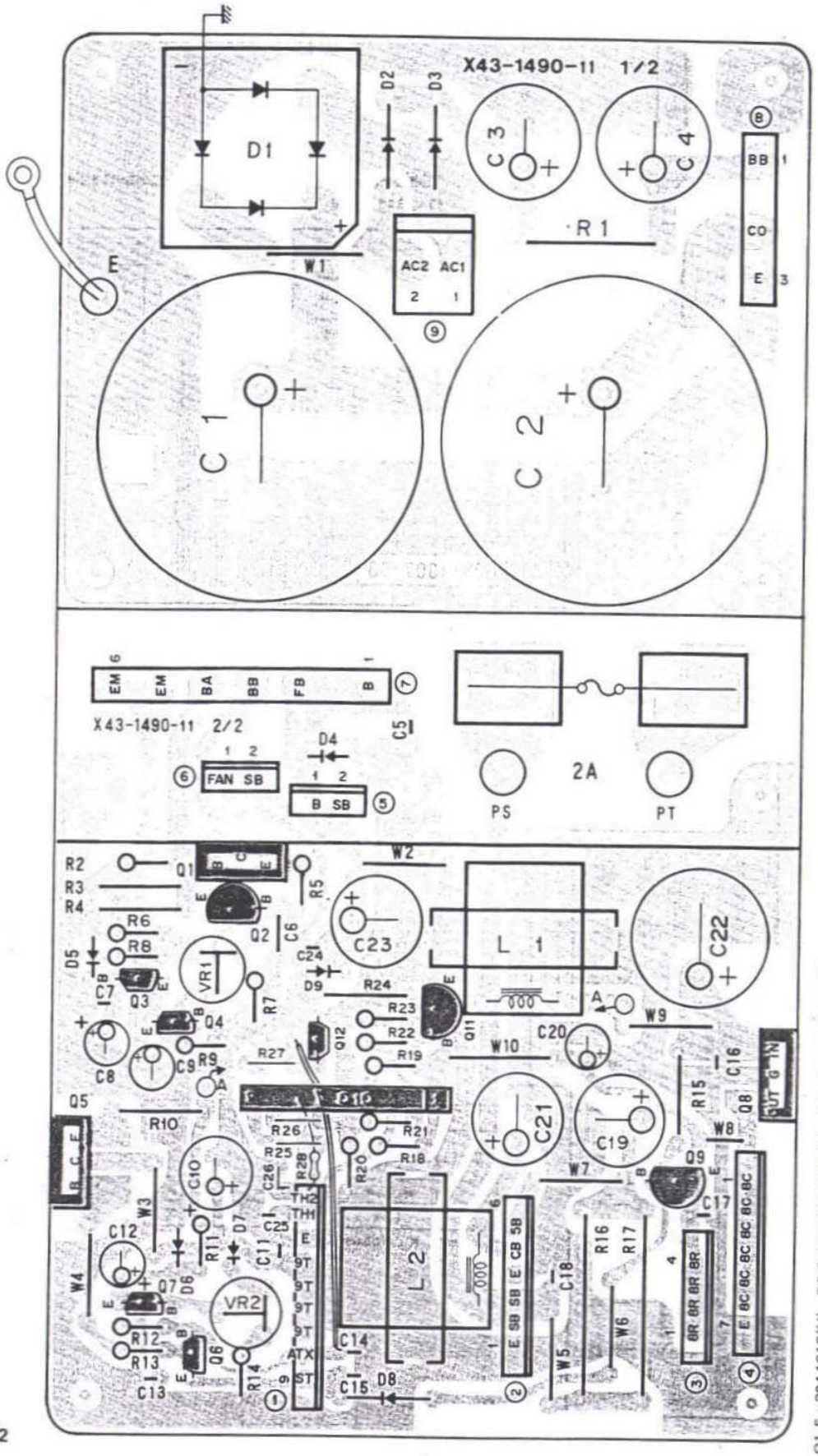
		⑧	SW8	C5,6	W1
TS-711	K,M1,M2,X	X	O	X	O
	T,W	X	X	X	O
TS-811	K,M,X	O	O	O	X
	T,W	O	X	O	X

O : Used X : Not used

D1–8 : 1SS133

TS-711/811 PC BOARD VIEW

AVR UNIT (X43-1490-11) Component side view



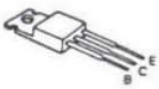
Q1,5 : 2SA1012(Y) Q2,9,11 : 2SC1959(Y) Q3,4,6 : 2SC2458(Y) Q7 : 2SA1048(Y) Q8 : μPC78M08H Q10 : NJM4558S Q12 : DTC114ES
D1 : S10VB20 D2,3 : V06B D4 : U05B D5 : MTZ8.2J(B,C) D6 : MTZ6.2J(A,B) D7 : VD1223 D8,9 : 1SS133

2SC1959

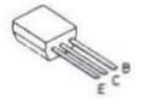
2SC2538-22-A

2SC2026
2SC2570A

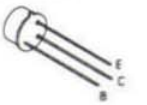
2SA1012



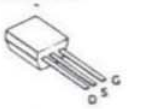
2SA1048
2SC2458



2SC2762

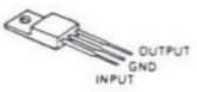


2SK192A



DTC114ES

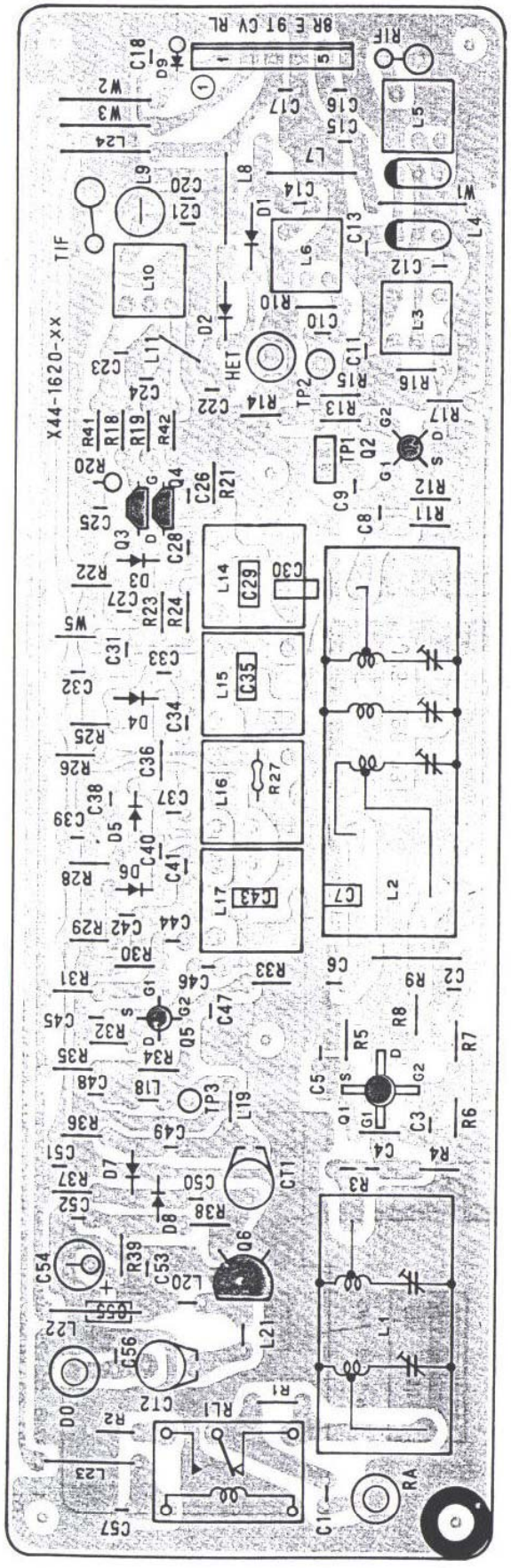
μPC78M08H



3SK122
3SK129

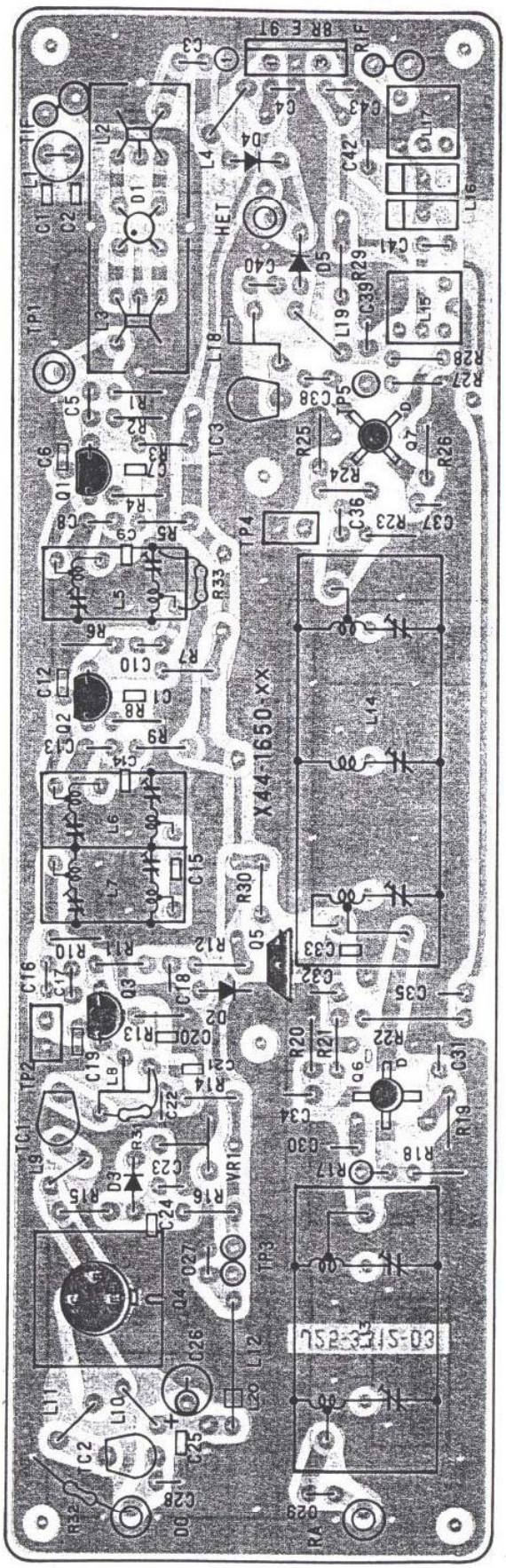
NJM4558S

RF UNIT (X44-1620-XX) Component side view
(-01 : TS-711 T,W -11 : TS-711 K,M1,M2,X)



Q1 : 3SK129(Q,R) Q2,5 : 3SK122(L) Q3,4 : 2SK192A(GR)•N Q6 : 2SC2538-22-A
D1,2 : MA856 D3–7 : 1SV123 D8,9 : 1SS133

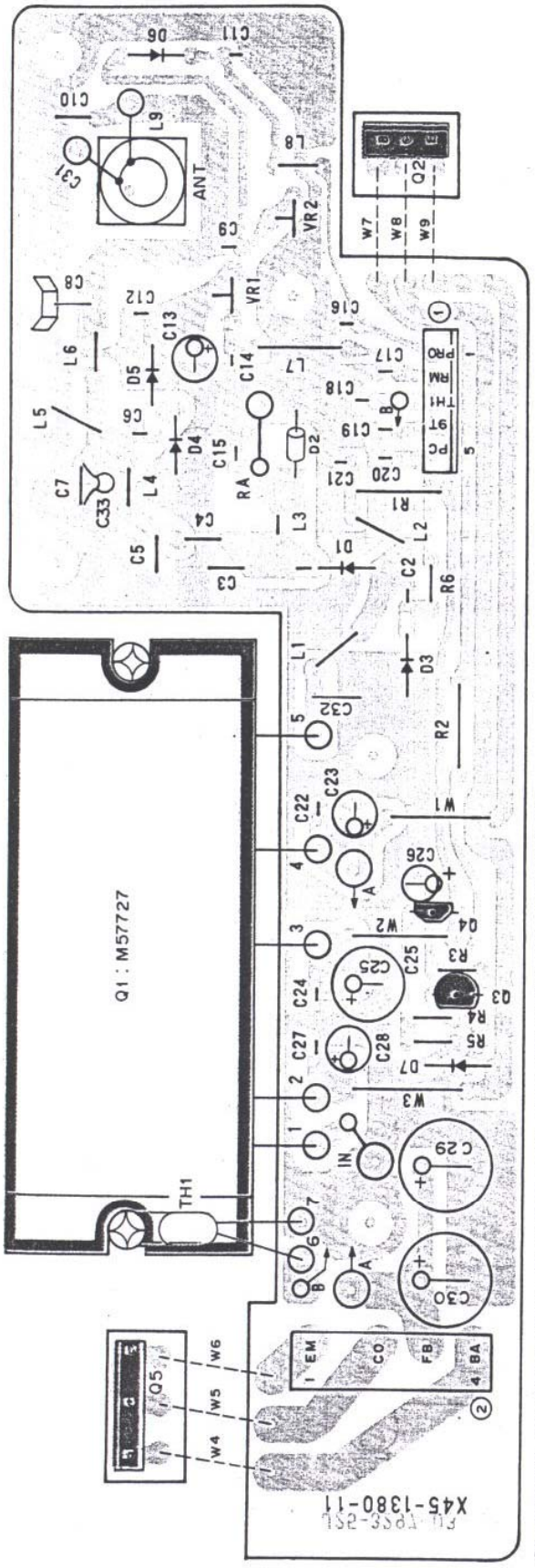
RF UNIT (X44-1650-XX) Component side view
(-01 : TS-811 M,T,W,X -11 : TS-811 K)



Q1,2 : 2SC2026 Q3 : 2SC2570A Q4 : 2SC2762 Q5 : 2SC2458(Y) Q6,7 : 3SK129(S,T)
D1 : ND487C1-3R D2 : MV13 D3 : 1SS133 D4 : MA856 D5 : MA856 (**M,T,W,X**), 1SS97 (**K**)

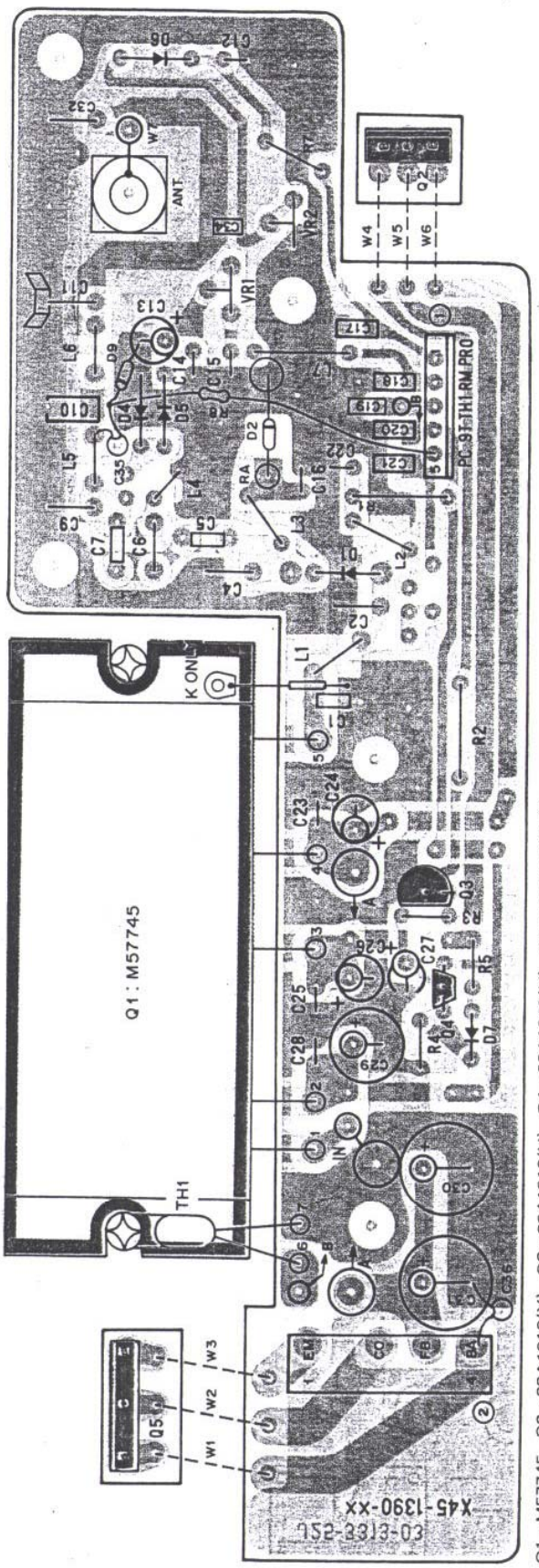
TS-711/811 PC BOARD VIEWS

FINAL UNIT (X45-1380-11) Component side view
(TS-711 K,M1,M2,T,W,X)



Q1 : M57727 Q2 : 2SA1012(Y) Q3 : 2SC1815(Y) Q4 : 2SA1048(Y) Q5 : 2SD717(O,Y)
D1 : MI407 D2 : MI308 D3 : 1SS101 D4–7 : 1S1587 TH1 : SDT1000F

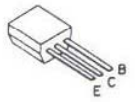
FINAL UNIT (X45-1390-XX) Component side view
(-01 : TS-811 M,X -11 : TS-811 K -61 : TS-811 T,W)



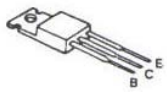
Q1 : M57745 Q2 : 2SA1012(Y) Q3 : 2SA1018(Y) Q4 : 2SA1048(Y) Q5 : 2SD717(O,Y)
D1 : MI407 D2 : MI308 D4–7,9 : 1SS101 TH1 : SDT1000F

2SC1815

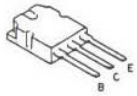
2SA1048
2SC2548
2SC2459



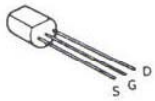
2SA1012



2SD717



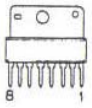
2SK30A



PN126S

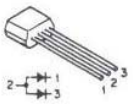
μPC1158H2

MB3713

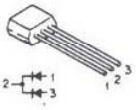


NJM4558S

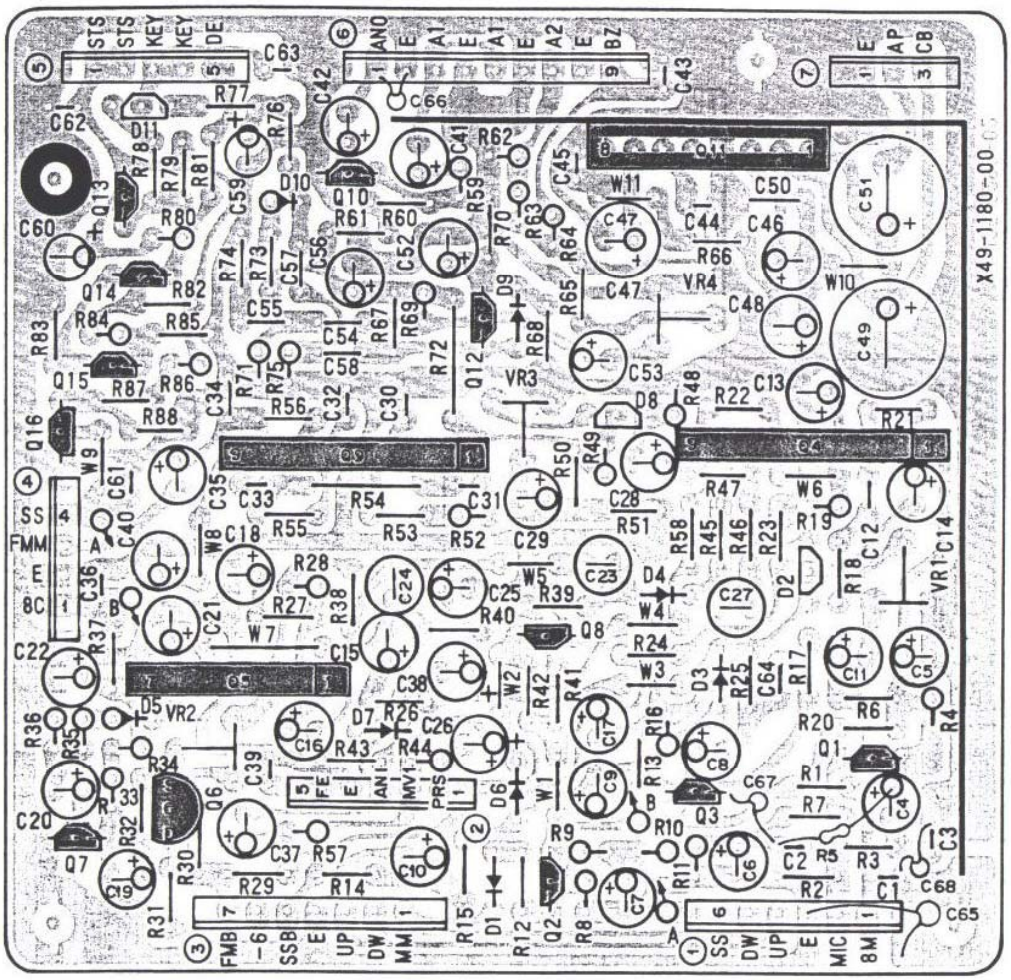
MC911



MC921

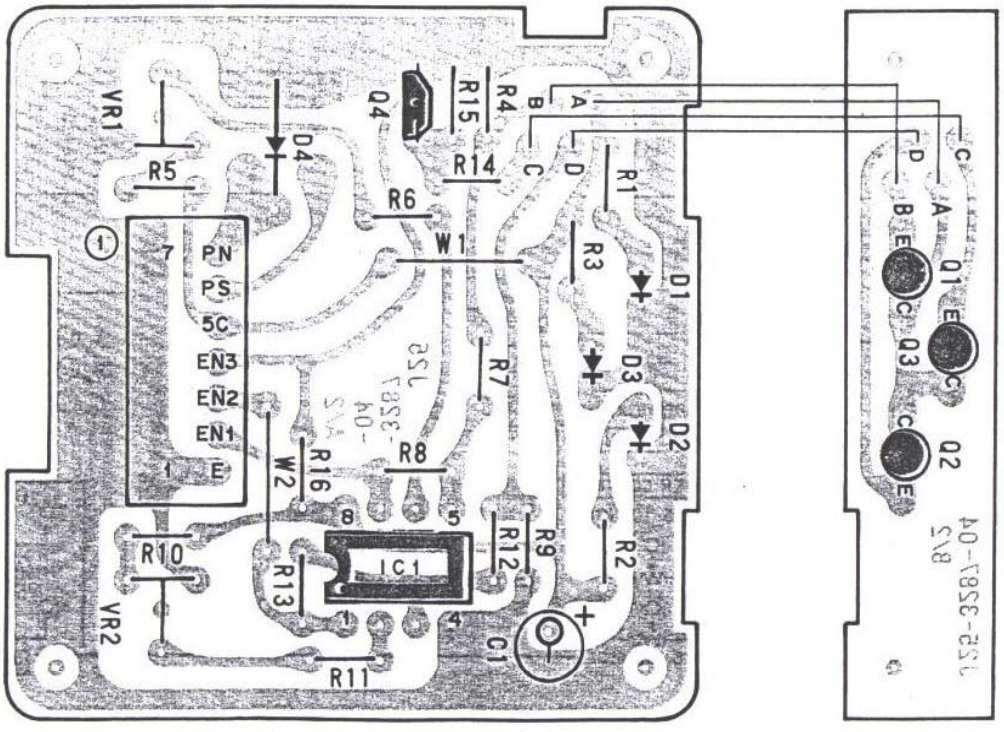


AF UNIT (X49-1180-00) Component side view



Q1 : 2SC2459(GR) Q2,13 : 2SA1048(Y) Q3,7,8,10,12,14–16 : 2SC2458(Y)
Q4,9 : NJM4558S Q5 : μPC1158H2 Q6 : 2SK30A(GR) Q11 : MB3713
D1,3,4,6,7,9,10 : 1SS133 D2,8 : MC911 D5 : 1N60 D11 : MC921

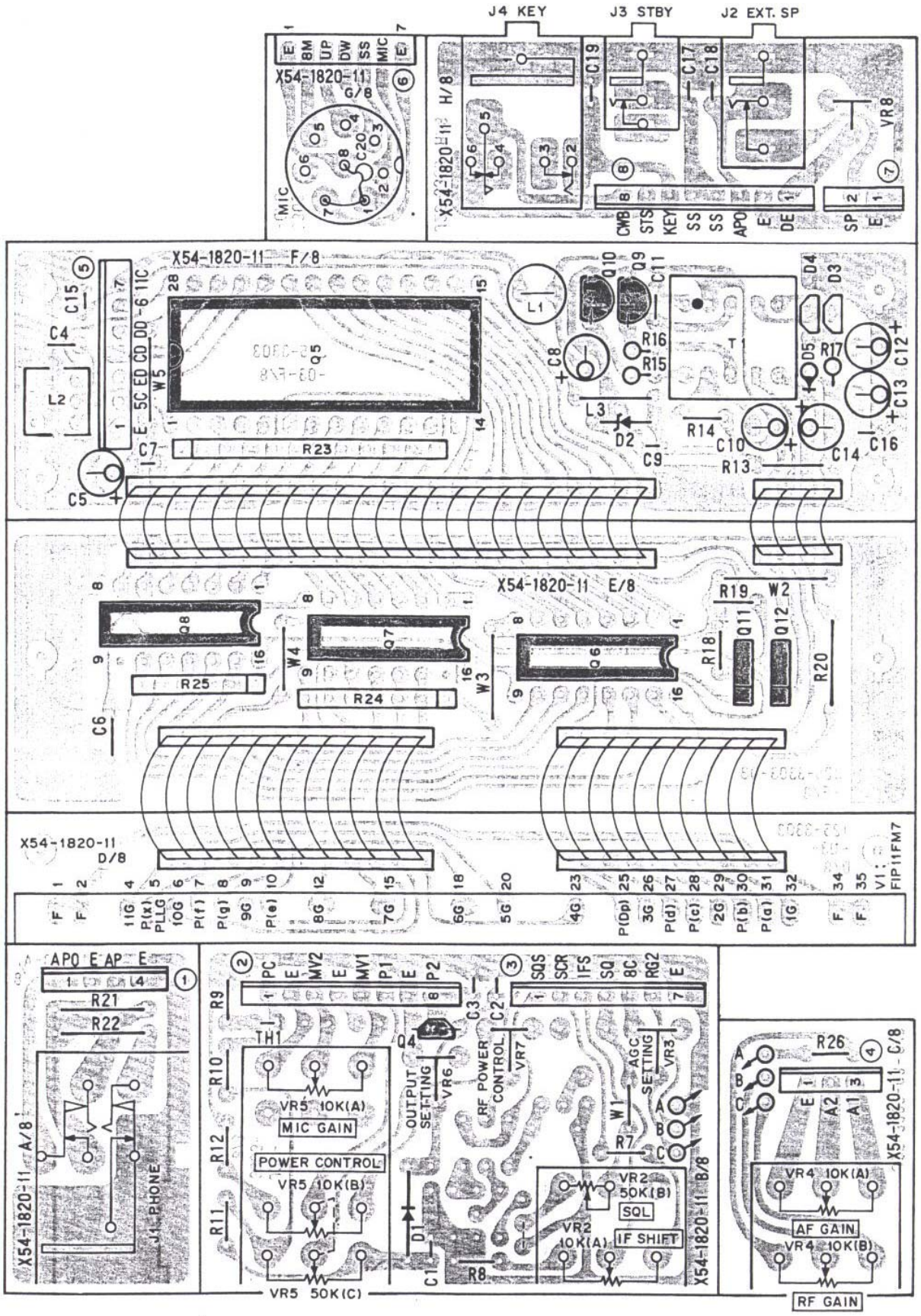
ENCODER ASS'Y (W02-0364-00) Component side view



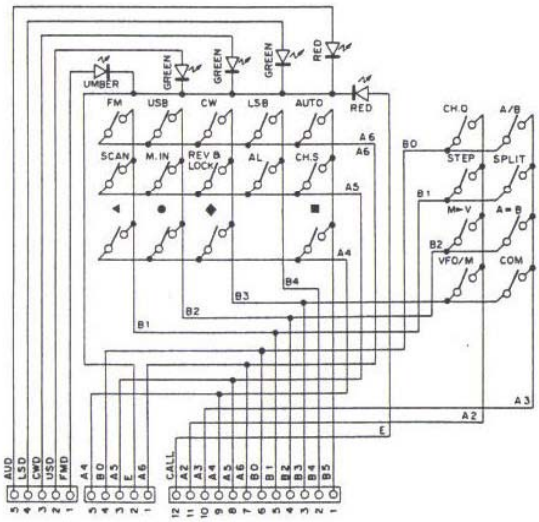
Q1–3 : PN126S(R) Q4 : 2SC2458(Y)
IC1 : LM358P
D1–3 : LN66(R) D4 : V06B

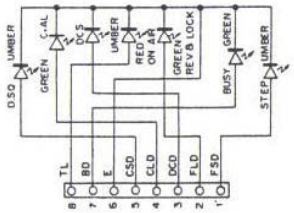
TS-711/811 PC BOARD VIEW

DISPLAY UNIT (X54-1820-11) Component side view



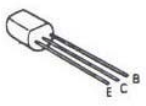
Q4 : 2SC2458(Y) Q5 : μPD763C Q6 : μPA80C Q7,8 : TC5066BP Q9,10 : 2SC1959(Y) Q11,12 : DTA124(F)
D1 : 1N60 D2 : MTZ6.2JA D3,4 : MC931 D5 : MTZ7.5JA TH1 : 112-351-2



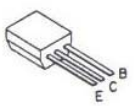


LED : LN01201C (RED)
LN01301C (GREEN)
LN01401C (UMBER)

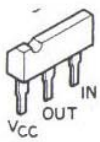
2SC1959



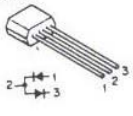
2SC2458



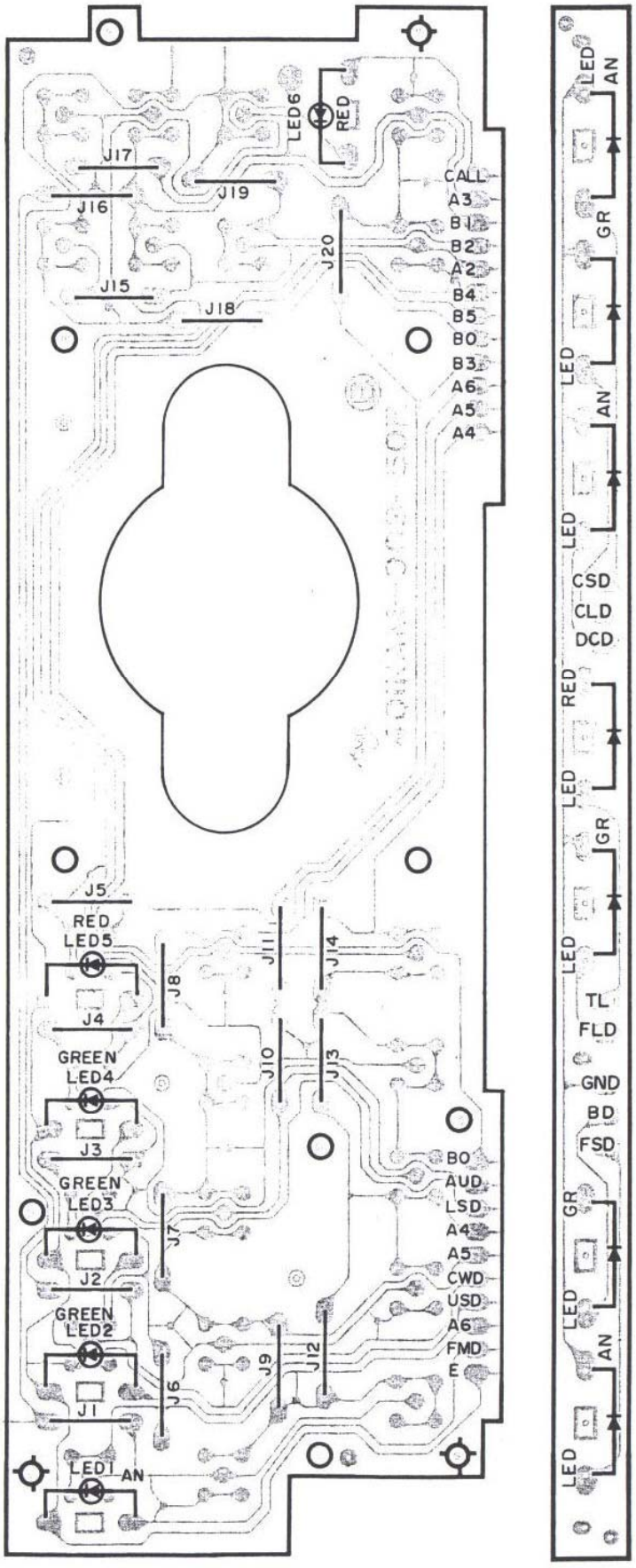
DTA124

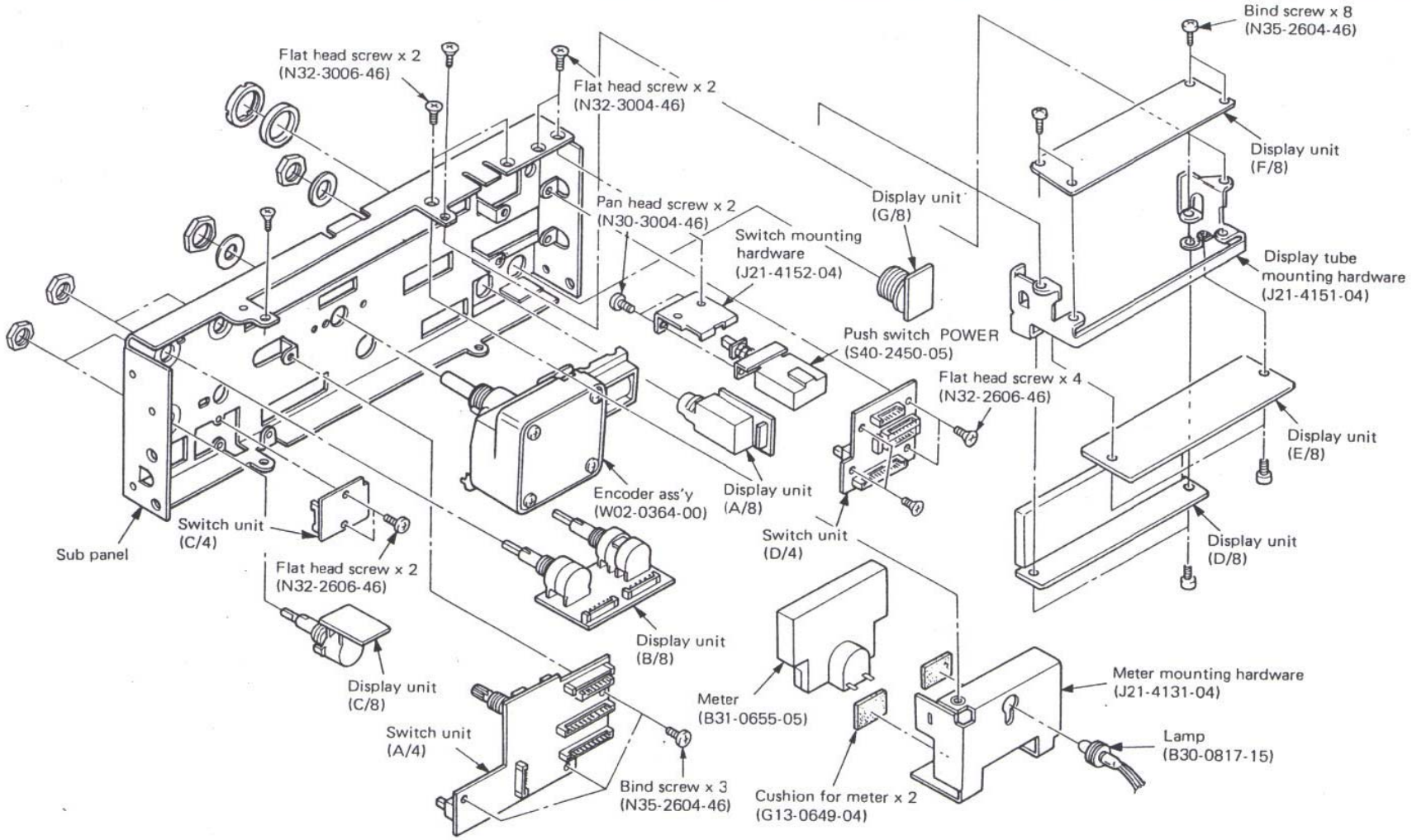


MC931



KEYBOARD ASS'Y (S59-0428-05) Foil side view



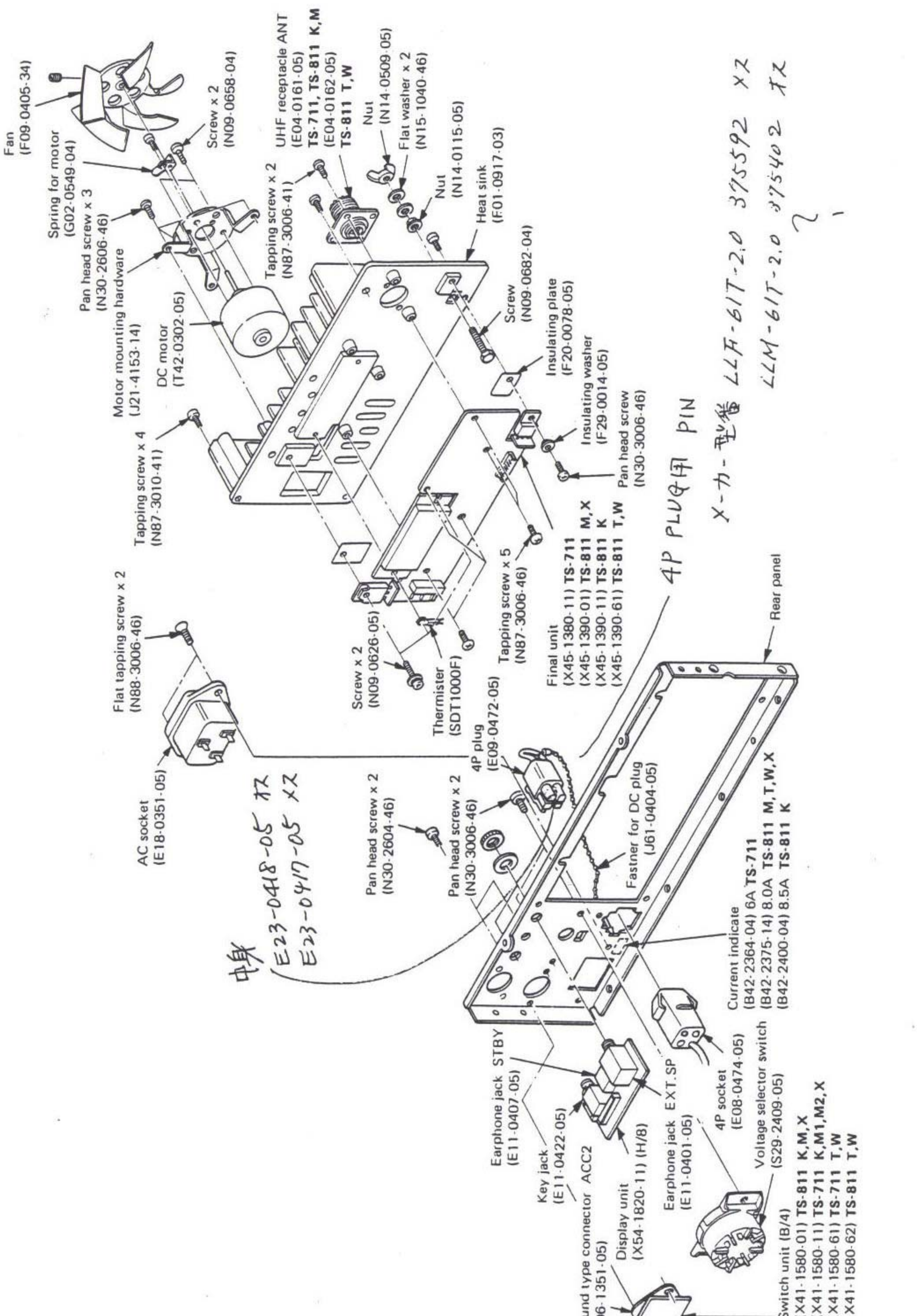


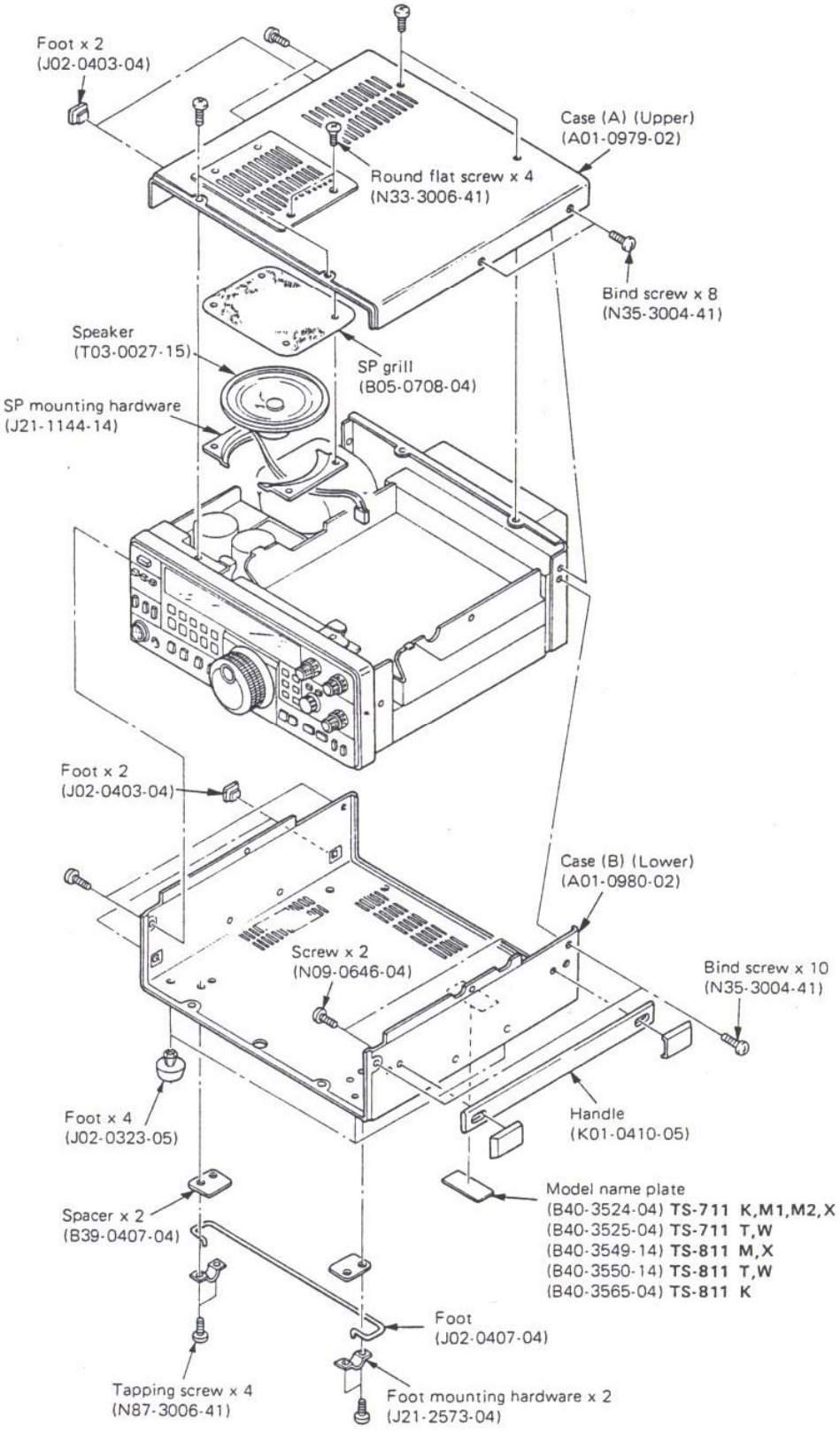
SWITCH UNIT (X41-1580-XX) (-01 : TS-811 K,M,X -11 : TS-711 K,M1,M2,X -61 : TS-711 T,W -62 : TS-811 T,W)

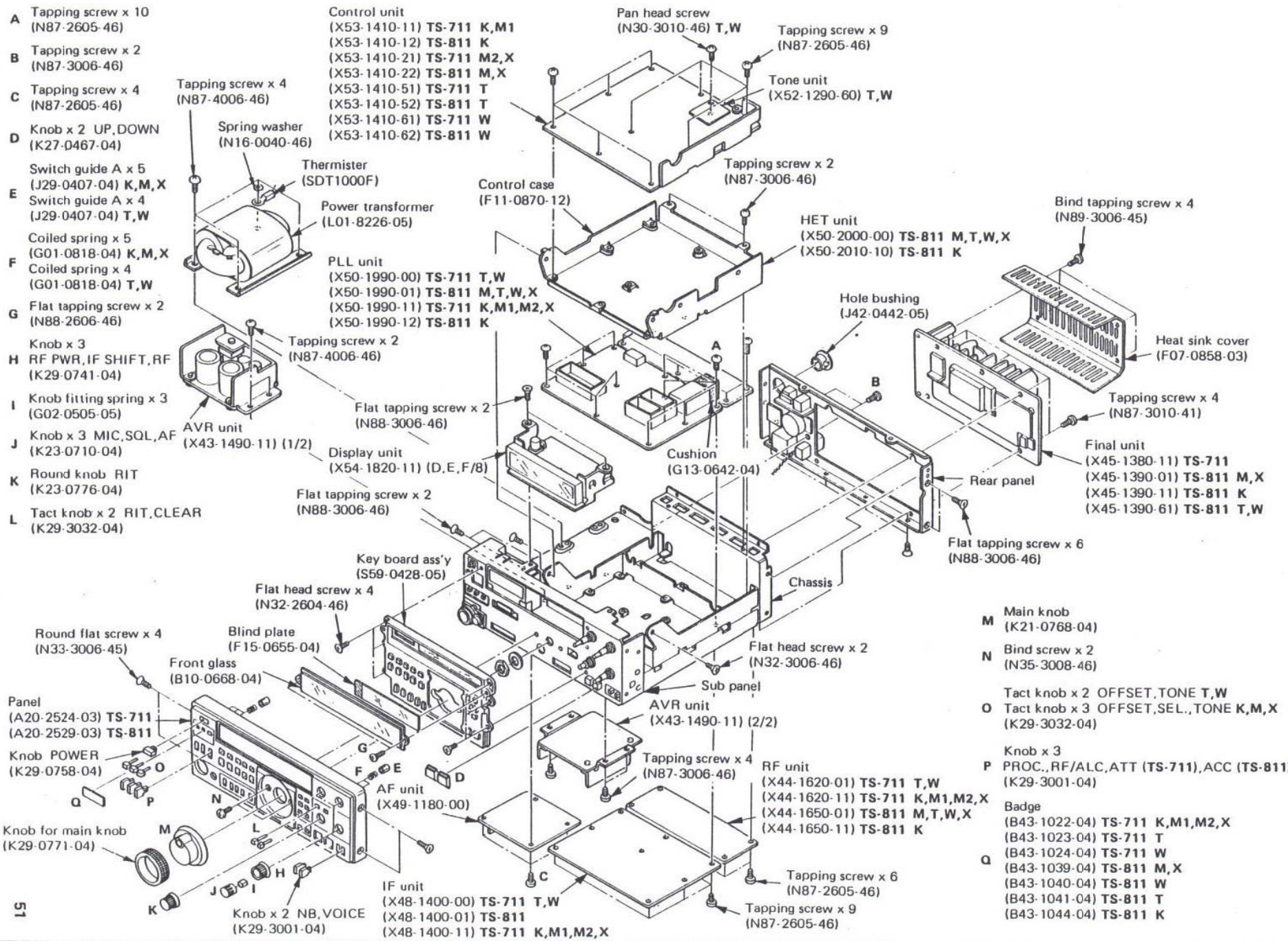
(A/4)			
S1,2	(S50-1412-05)	Tact switch	RIT,CLEAR
S3	(S40-2440-15)	Push switch	NB
S4	(S40-2441-15)	Push switch	VOICE
–	(W02-0365-05)	Rotary encoder	RIT
(C/4)			
S5,6	(S50-2402-05)	Tact switch	MHz (UP,DOWN)
(D/4)			
S7,9	(S50-1412-05)	Tact switch	OFFSET,TONE
S8	(S50-1412-05)	Tact switch	SELECTOR **K,M,X**
S10	(S40-2440-15)	Push switch	RF ATT (**TS-711**),ACC (**TS-811**)
S11,12	(S40-2440-15)	Push switch	RF/ALC,PROC.

DISPLAY UNIT (X54-1820-11)

(A/8)			
J1	(E11-0413-05)	Phone jack	PHONES
(B/8)			
VR2	(R19-9409-05)	Potentiometer	SQL/IF SHIFT
VR5	(R24-9409-05)	Potentiometer	MIC/RF PWR
(C/8)			
VR4	(R19-3420-05)	Potentiometer	AF/RF
(D/8)			
V1	(F1P11FM7)	Display tube	–
(G/8)			
–	(E06-0858-05)	8P metal socket	MIC


Fan
(F09-0405-34)
Spring for motor
(G02-0549-04)
Screw x 2
(N09-0658-04)
Pan head screw x 3
(N30-2606-46)
Motor mounting hardware
(J21-4153-14)
DC motor
(T42-0302-05)
UHF receptacle ANT
(E04-0161-05) TS-711, TS-811 K,M
(E04-0162-05) TS-811 T,W
Tapping screw x 2
(N87-3006-41)
Nut
(N14-0509-05)
Flat washer x 2
(N15-1040-46)
Nut
(N14-0115-05)
Heat sink
(F01-0917-03)
Screw
(N09-0682-04)
Insulating plate
(F20-0078-05)
Insulating washer
(F29-0014-05)
Pan head screw
(N30-3006-46)
Tapping screw x 4
(N87-3010-41)
Final unit
(X45-1380-11) TS-711
(X45-1390-01) TS-811 M,X
(X45-1390-11) TS-811 K
(X45-1390-61) TS-811 T,W
Tapping screw x 5
(N87-3006-46)
Flat tapping screw x 2
(N88-3006-46)
Screw x 2
(N09-0626-05)
Thermister
(SDT1000F)
Rear panel
AC socket
(E18-0351-05)
4P plug
(E09-0472-05)
Pan head screw x 2
(N30-2604-46)
Pan head screw x 2
(N30-3006-46)
Fastner for DC plug
(J61-0404-05)
Current indicate
(B42-2364-04) 6A TS-711
(B42-2375-14) 8.0A TS-811 M,T,W,X
(B42-2400-04) 8.5A TS-811 K
Earphone jack STBY
(E11-0407-05)
Key jack
(E11-0422-05)
ACC2
Display unit
(X54-1820-11) (H/8)
Earphone jack EXT.SP
(E11-0401-05)
4P socket
(E08-0474-05)
Voltage selector switch
(S29-2409-05)
Round type connector
(E06-1351-05)
Switch unit (B/4)
(X41-1580-01) TS-811 K,M,X
(X41-1580-11) TS-711 K,M1,M2,X
(X41-1580-61) TS-711 T,W
(X41-1580-62) TS-811 T,W


Foot x 2
(J02-0403-04)
Case (A) (Upper)
(A01-0979-02)
Round flat screw x 4
(N33-3006-41)
Bind screw x 8
(N35-3004-41)
Speaker
(T03-0027-15)
SP grill
(B05-0708-04)
SP mounting hardware
(J21-1144-14)
Foot x 2
(J02-0403-04)
Case (B) (Lower)
(A01-0980-02)
Screw x 2
(N09-0646-04)
Bind screw x 10
(N35-3004-41)
Foot x 4
(J02-0323-05)
Handle
(K01-0410-05)
Model name plate
(B40-3524-04) TS-711 K,M1,M2,X
(B40-3525-04) TS-711 T,W
(B40-3549-14) TS-811 M,X
(B40-3550-14) TS-811 T,W
(B40-3565-04) TS-811 K
Spacer x 2
(B39-0407-04)
Foot
(J02-0407-04)
Tapping screw x 4
(N87-3006-41)
Foot mounting hardware x 2
(J21-2573-04)


A Tapping screw x 10 (N87-2605-46)
B Tapping screw x 2 (N87-3006-46)
C Tapping screw x 4 (N87-2605-46)
D Knob x 2 UP,DOWN (K27-0467-04)
E Switch guide A x 5 (J29-0407-04) K,M,X
Switch guide A x 4 (J29-0407-04) T,W
F Coiled spring x 5 (G01-0818-04) K,M,X
Coiled spring x 4 (G01-0818-04) T,W
G Flat tapping screw x 2 (N88-2606-46)
H Knob x 3 RF PWR,IF SHIFT,RF (K29-0741-04)
I Knob fitting spring x 3 (G02-0505-05)
J Knob x 3 MIC,SQL,AF (K23-0710-04)
K Round knob RIT (K23-0776-04)
L Tact knob x 2 RIT,CLEAR (K29-3032-04)
Control unit
(X53-1410-11) TS-711 K,M1
(X53-1410-12) TS-811 K
(X53-1410-21) TS-711 M2,X
(X53-1410-22) TS-811 M,X
(X53-1410-51) TS-711 T
(X53-1410-52) TS-811 T
(X53-1410-61) TS-711 W
(X53-1410-62) TS-811 W
Tapping screw x 4 (N87-4006-46)
Spring washer (N16-0040-46)
Thermister (SDT1000F)
Power transformer (L01-8226-05)
PLL unit
(X50-1990-00) TS-711 T,W
(X50-1990-01) TS-811 M,T,W,X
(X50-1990-11) TS-711 K,M1,M2,X
(X50-1990-12) TS-811 K
Tapping screw x 2 (N87-4006-46)
AVR unit (X43-1490-11) (1/2)
Flat tapping screw x 2 (N88-3006-46)
Display unit (X54-1820-11) (D,E,F/8)
Flat tapping screw x 2 (N88-3006-46)
Key board ass'y (S59-0428-05)
Flat head screw x 4 (N32-2604-46)
Round flat screw x 4 (N33-3006-45)
Blind plate (F15-0655-04)
Front glass (B10-0668-04)
Panel
(A20-2524-03) TS-711
(A20-2529-03) TS-811
Knob POWER (K29-0758-04)
Knob for main knob (K29-0771-04)
Knob x 2 NB,VOICE (K29-3001-04)
IF unit
(X48-1400-00) TS-711 T,W
(X48-1400-01) TS-811
(X48-1400-11) TS-711 K,M1,M2,X
AF unit (X49-1180-00)
Pan head screw (N30-3010-46) T,W
Tapping screw x 9 (N87-2605-46)
Tone unit (X52-1290-60) T,W
Tapping screw x 2 (N87-3006-46)
Control case (F11-0870-12)
HET unit
(X50-2000-00) TS-811 M,T,W,X
(X50-2010-10) TS-811 K
Bind tapping screw x 4 (N89-3006-45)
Hole bushing (J42-0442-05)
Heat sink cover (F07-0858-03)
Tapping screw x 4 (N87-3010-41)
Final unit
(X45-1380-11) TS-711
(X45-1390-01) TS-811 M,X
(X45-1390-11) TS-811 K
(X45-1390-61) TS-811 T,W
Cushion (G13-0642-04)
Rear panel
Flat tapping screw x 6 (N88-3006-46)
Chassis
Flat head screw x 2 (N32-3006-46)
Sub panel
AVR unit (X43-1490-11) (2/2)
Tapping screw x 4 (N87-3006-46)
RF unit
(X44-1620-01) TS-711 T,W
(X44-1620-11) TS-711 K,M1,M2,X
(X44-1650-01) TS-811 M,T,W,X
(X44-1650-11) TS-811 K
Tapping screw x 6 (N87-2605-46)
Tapping screw x 9 (N87-2605-46)
M Main knob (K21-0768-04)
N Bind screw x 2 (N35-3008-46)
O Tact knob x 2 OFFSET,TONE T,W
Tact knob x 3 OFFSET,SEL.,TONE K,M,X (K29-3032-04)
P Knob x 3 PROC.,RF/ALC,ATT (TS-711),ACC (TS-811) (K29-3001-04)
Q Badge
(B43-1022-04) TS-711 K,M1,M2,X
(B43-1023-04) TS-711 T
(B43-1024-04) TS-711 W
(B43-1039-04) TS-811 M,X
(B43-1040-04) TS-811 W
(B43-1041-04) TS-811 T
(B43-1044-04) TS-811 K

ADJUSTMENT

REQUIRED TEST EQUIPMENT

1. **DC V.M**
   1) High input impedance
2. **RF VTVM (RF V.M)**
   1) Input impedance : 1MΩ min., 2pF max.
   2) Voltage range : F.S = 10mV ~ 300V
   3) Frequency range : Up to 450MHz
3. **Frequency Counter (f. counter)**
   1) Input sensitivity : Approx. 50mV
   2) Frequency range : Up to 450MHz
4. **DC Power Supply**
   1) Voltage : 10V ~ 17V, variable
   2) Current : 6A min.
5. **Power Meter**
   1) Measurement range Approx. : 30W, 3W, 1W
   2) Input impedance : 50Ω
   3) Frequency range : 450MHz
6. **AF VTVM (AF V.M)**
   1) Input impedance : 1MΩ min.
   2) Voltage range : F.S = 1mV ~ 30V
   3) Frequency range : 50Hz ~ 10kHz
7. **AF Generator (AG)**
   1) Output frquency : 100Hz ~ 10kHz
   2) Output voltage : 0.5mV ~ 1V
8. **Linear Detector**
   1) Frequency range : 450MHz
9. **Field Strength Meter**
   1) Frequency range : 450MHz
10. **Directional Coupler**
11. **Oscilloscope**
    1) High sensitivity oscilloscope with horizontal input terminal
12. **SSG**
    1) Frequency range : 144MHz and 430MHz bands
    2) Modulation : AM and FM MOD.
    3) Output level : −20dB to 100dB
13. **Dummy Load**
    1) 8Ω, 30W (approx.)
14. **Noise Generator**
    1) Must generate ignition-like noise containing harmonics beyond 450MHz.
15. **Sweep Generator**
    1) Sweep range : 1440MHz and 430MHz bands
16. **Tracking generator**

PREPARATION

1) Unless otherwise specified, knobs and switches should be set as follows **Table 11**.

POWER SW	ON	RF POWER	MAX
PROC. SW	OFF	SQUELCH VR	MIN
ALC/RF SW	RF	AF GAIN VR	MIN
ATT SW **TS-711A/E**	OFF	RF GAIN VR	MAX
ACC SW **TS-811A/B/E**	OFF	MIC GAIN VR	MIN
SELECT SW **K,M,X**	OFF	TONE SW	OFF
TONE SW	OFF	MODE SW	FM
IF SHIFT VR	CENTER		

Table 11

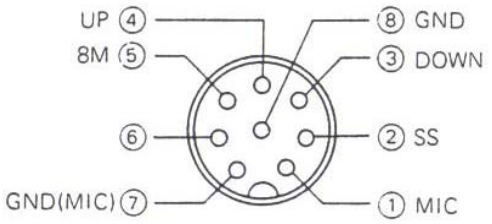


Fig. 17 MIC terminals (view from front panel side)

2) Use an insulated adjusting rod to adjust trimmers and coils.
3) To prevent damaging SSG, never set the stand by switch to SEND while adjusting the receiver section.
4) Be sure to turn the power switch OFF, before connecting the power cable to a power source.
5) SSG output levels are those at the time the output terminal is open.
6) Meter and display section should be set as follows **Fig. 18** or **19**.

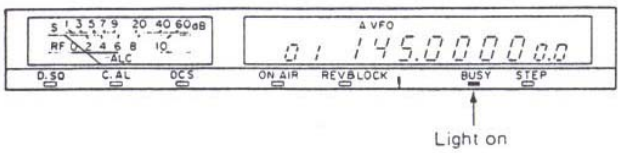


Fig. 18 Meter and display section (TS-711A/E)

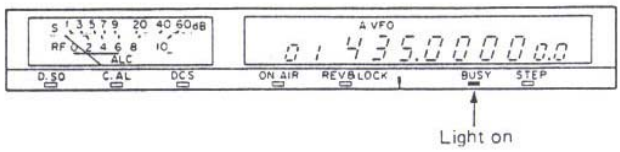


Fig. 19 Meter and display section (TS-811A/B/E)

TS-711 ADJUSTMENT

TS-711A/E TX/RX Section (Common)

CW : Clockwise, CCW : Counterclockwise

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Reset	1) Set the power SW on, while depressing the A=B key. Then release the A=B key.							VFO A 144.000 MODE : CW The "Beeper" sounds
2. Voltage adjustment (1)	1) Connect the AC power cable to the power terminal on the rear panel.							
13.8V, 9V AVR	2) POWER SW : ON	DVM	AVR	D4	AVR	VR1	13.8V	±0.1V
				9T		VR2	9.0V	±0.1V
(2) AGC voltage	1) RF GAIN : MAX	DVM	DISP (B/8)	RG2	DISP (B/8)	VR3	4.0V	±0.1V
(3) RF OUTPUT voltage	1) RF POWER : MIN STBY : SEND	DVM	IF	W28 (Jumper wire)	DISP (B/8)	VR7	2.0V	±0.05V
	2) RF POWER : MAX STBY : SEND						3.4V	±0.2V
3. PLL	1) SF level adjustment MODE SW : FM FREQ. : 145.0000	RF V.M	PLL	SF (③-1)	PLL	L44	Adjust the core for the MAX reading, then turn it outward until a reading of 0.4V is obtained.	0.4V±0.01V
	2) 20.48MHz level adjustment MODE SW : FM FREQ. : 145.0000			TP9		L45,46	MAX	0.4–0.5V
	3) 4F (40.96MHz) level adjustment MODE SW : FM FREQ. : 145.0000			4F (③-4)		L47,48	MAX	0.10–0.15V
	4) 51.2MHz level adjustment MODE SW : FM FREQ. : 145.0000			TP8		L39,40	MAX	0.10–0.15V
	5) B loop VCO adjustment MODE SW : FM FREQ. : 145.0000	DC V.M		TP7		L33	5.5V	±0.1V
	: 144.9999							2.0–3.5V
	6) 11.025MHz level adjustment MODE SW : FM FREQ. : 145.010	RF V.M		TP4		L9	MAX	0.15–0.18V
	7) 31.505MHz level adjustment MODE SW : FM FREQ. : 145.010			TP3		L5–7	Adjust the L5 and L7 for the MAX reading repeatedly.	0.1–0.15V
	8) A loop VCO adjustment MODE SW : FM FREQ. : 144.0000	DC V.M		TP6		TC2	6.3V **T,W** 5.1V **K,M1,M2,X**	±0.1V
	: 145.9999 **T,W**							5.2–6.0V
	: 148.0000 **K,M1,M2,X**							1.8–3.8V
4. PLL output	1) MODE SW : FM FREQ. : 145.9999 **T,W**	RF V.M	PLL	TP2	PLL	L4	MAX	0.14–0.15V
	: 146.0000 **K,M1,M2,X**			TP1		TC1	MAX	0.45–0.58V
5. CAR	1) MODE SW : USB IF SHIFT VR : Center	RF V.M	PLL	TP5	PLL	L13	Turn the core outward until a reading of 0.3V is obtained. Confirm the peak point.	0.3 ± 0.01V
	MODE SW : LSB						Confirm	0.3 ± 0.02V
	MODE SW : FM							0.3 ± 0.03V
	2) MODE SW : USB				PLL	TC3	10.69650MHz	±100Hz
	: LSB					TC4	10.69350MHz	±100Hz

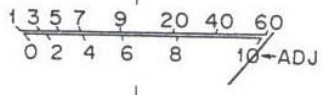
TS-711 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5. CAR	3) MODE SW : LSB	f.counter	PLL	TP5	PLL	VR1	10.69350MHz	±100Hz
	(SEND) : CW					VR2	10.69570MHz	±100Hz
	: FM					VR3	10.69500MHz	±100Hz
6. IF SHIFT check	1) MODE SW : USB (RX)	f.counter	PLL	TP5			Turn the IF SHIFT all the way CW and CCW.	±1.0kHz or greater Not work on FM mode.
	2) MODE SW : LSB (TX)							Does not change
7. TCXO f. adjustment (Temperature consequence crystal oscillator)	1) MODE SW : USB	f.counter	PLL	TP8	PLL	L41 (TCXO)	51.200000MHz	±10Hz

TS-711 A/E RX Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Helical	1) MODE SW : FM Connect the Sweep G. to the ANT terminal	Sweep G. Oscilloscope Detector	RF	TP1	RF	L1,2	Adjust the L1 and L2 as waveform as shown on right.	(K,M1,M2,X) 144 146 148 (T,W) 144 145 146
2. 4F level adjustment (40.96MHz)	1) MODE SW : FM RX	RF V.M	IF	D1 (cathode)	IF	L1–3	MAX (0.9V)	0.8V or greater
3. IF GAIN (1) (FM MODE)	1) MODE SW : FM VFO : 145.0000 SSG : 10dBμ SSG MOD : 1kHz SSG DEV : 5kHz	SSG Oscilloscope AF V.M S-meter			RF	L3,5,6	Adjust the each coil for MAX S-meter reading repeatedly.	Maintain the SSG output level to about the "3" S-meter reading.
					IF	L24, 28,29		
						L33	MAX AF V.M reading.	
4. IF GAIN (2) (CW MODE)	1) MODE SW : CW VFO : 145.0000 SSG : –10dBμ VR6 : TP VR6	SSG Oscilloscope AF V.M			IF	L23	Adjust the L23 CCW to the –2dB point from MAX. AF V.M reading.	
						L13–15, L20–22,	Adjust the L13–15, L20–22, for MAX S-meter reading repeatedly.	Maintain the SSG output level to about the "3" S-meter reading.
	2) MODE SW : FM VFO : 145.0000 SSG : 10dBμ				RF	L3,5	MAX	
	3) MODE SW : CW VCO : 145.0000 SSG : –10dBμ				IF	L23	Adjust the L23 CCW to the –2dB point from MAX AF V.M reading.	
5. S-meter (1) (CW, SSB)	1) MODE SW : CW SSG output : OFF				IF	VR4	Adjust to the "0" S-meter reading on RF meter scale.	

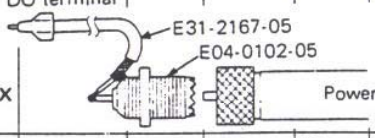
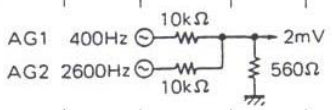
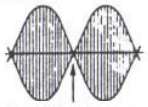
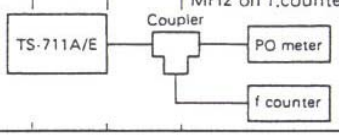
TS-711 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5. S-meter (1) (CW, SSB)	2) SSG : 20dBμ Adjust the SSG frequency to the MAX S-meter reading.	SSG AF V.M Oscillo-scope			IF	VR5	"S-9"	
	3) SSG : 0dBμ					L14	Adjust the L14 CCW to the "S-3" reading.	Adjust the L14 to MAX, if S-meter does not read the "S-3".
	4) SSG : 20dBμ					VR5	"S-9"	
6. S-meter (2) (FM)	1) MODE SW : FM VFO : 145.0000 SSG : 36dBμ SSG MOD : 1kHz SSG DEV : 5kHz	SSG AF V.M Oscillo-scope			IF	VR9	"S-10"	
7. Carrier balance	1) MODE SW : USB RF GAIN : MIN (After confirm RF GAIN : MAX)	RF V.M	IF	TP3	IF	TC2	Adjust to the dip point.	
8. NB	1) MODE SW : CW VFO : 145.0000 SSG : 10dBμ	DC V.M	IF	TP4	IF	L25,27	MIN	
9. SSG squelch	1) MODE SW : CW VFO : 145.0000 SSG : 0dBμ SQ VR : MAX Adjust the SSG frequency to MAX AF V.M reading.	SSG Oscillo-scope AF V.M			IF	VR6	Adjust the VR6 slowly and stop at the threshold point.	SQ open : SSG 0–6dB
	2) SSG output : OFF						Adjust the SQ VR to the threshold point.	
	3) SSG : −10dBμ							SQ open
10. SSB/CW S/N	1) MODE SW : LSB VFO : 144.0000 SSG : −10dBμ **K,M1,M2,X** : −12dBμ **T,W**	SSG AF V.M Oscillo-scope						S/N 10dB or greater
11. FM S/N	1) MODE SW : FM SSG : −7dBμ **K,M1,M2,X** : −8dBμ **T,W** VFO : 144.0000 : 145.0000 **T,W** : 145.9999 : 144.0000 : 146.0000 **K,M1,M2,X** : 148.0000	SSG AF V.M Oscillo-scope						20dB or greater

TS-711 A/E TX Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method.	
1. Setting	1) Disconnect the coax. cable from the TIF terminal in the IF unit.							
2. IF output	1) RF POWER : MAX MODE SW : CW STBY : SEND IF unit VR7 : Center	RF V.M	IF	TP1	IF	L6–11,18	Adjust the each coil for the MAX RF V.M reading repeatedly.	(0.3–0.4V)
3. CW CAR level	1) MODE SW : CW STBY : SEND	RF V.M	IF	D18	IF	L8	MAX	0.3V or less
	Connect the coax. cable to the TIF terminal after adjust.			TP1		VR7	0.38V	±0.01V

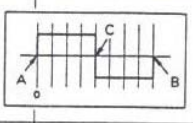
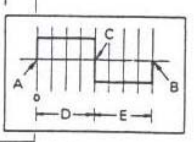
TS-711 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
4. Drive output	1) Disconnect the coax. cable from the D0 terminal in the RF unit. Then connect the 1W power meter MODE SW : CW STBY : SEND VFO : 145.0000 **T,W** : 146.0000 **K,M1,M2,X**	0.6W Power-meter 	RF	D0	RF	L10, 14–17 TC1,2	Adjust the each coil for the MAX output repeatedly. Connect the coax. cable to the D0 terminal after adjust. (adjust the L15 from peak to center position of coil)	0.25W or greater
5. Output power	1) MODE SW : CW STBY : SEND VFO : 145.0000 **T,W** : 146.0000 **K,M1,M2,X**	Power-meter (30W or 50W)			IF	VR1	Adjust to the mechanical center.	38W or greater
					DISP (B/8)	VR6	26W	±1W
6. ALC meter	1) POWER CONTROL : MAX MIC GAIN VR : MIN MODE SW : USB ALC/RF SW : ALC FREQ. : 145.000 STBY : SEND	ALC meter			IF	VR2	Adjust to the mechanical zero point.	RF meter "8"
	2) MODE SW : CW STBY : SEND				RF	TC2	Adjust for the MAX ALC meter reading.	
					IF	VR3	RF "8"	
7. RF meter	1) MODE SW : CW FREQ. : 145.000 ALC/RF SW : RF	RF meter			Final	VR1	RF "8"	RF meter "8"
8. Protection	1) MODE SW : CW	DC V.M	IF	PRO (⑫-5)	Final	VR2	MIN	
	2) Connect the ANT terminal to GND.	DC A.M			IF	VR1	3.5A	±0.1A
9. Carrier suppression	1) MODE SW : USB, LSB MIC GAIN : MIN POWER CONTROL : MAX	RF V.M Power-meter Oscillo-scope			IF	VR8 TC3	MIN or USB and LSB.	50dB or more
10. SSB frequency response	1) MODE SW : USB, LSB MIC GAIN : Center AG output : Two-tone 2mV, 400Hz, 2600Hz STBY : SEND MIC GAIN VR : 25W	Power-meter (30 or 50W) Oscillo-scope 			PLL	TC3 (USB) TC4 (LSB)		Adjust to within –9dB level at the 400Hz and the 2.6kHz from the 1.5kHz **Note** : Confirm the carrier suppression after this adjustment.  Adjust to the sharp cross point.
	2) AG output : Single tone 2mV, 1.5kHz MIC GAIN VR : 25W						Adjust for the equal output power at 400Hz, 2600Hz as measured on watt-meter.	
	3) MODE SW : CW STBY : SEND	f.counter	PLL	TP5	PLL	VR2	10.69570MHz	±10Hz
	4) MODE SW : FM					VR3	10.6950MHz	±10Hz
11. FM FREQ.	1) Front panel CH.Q : ON DISPLAY : 145.000 MODE SW : FM STBY : SEND	Power-meter f.counter	DISP (D/8)	Display tube (V1)	IF	TC1	Adjust to 145.000 MHz on f.counter. 	±10Hz

TS-711 ADJUSTMENT

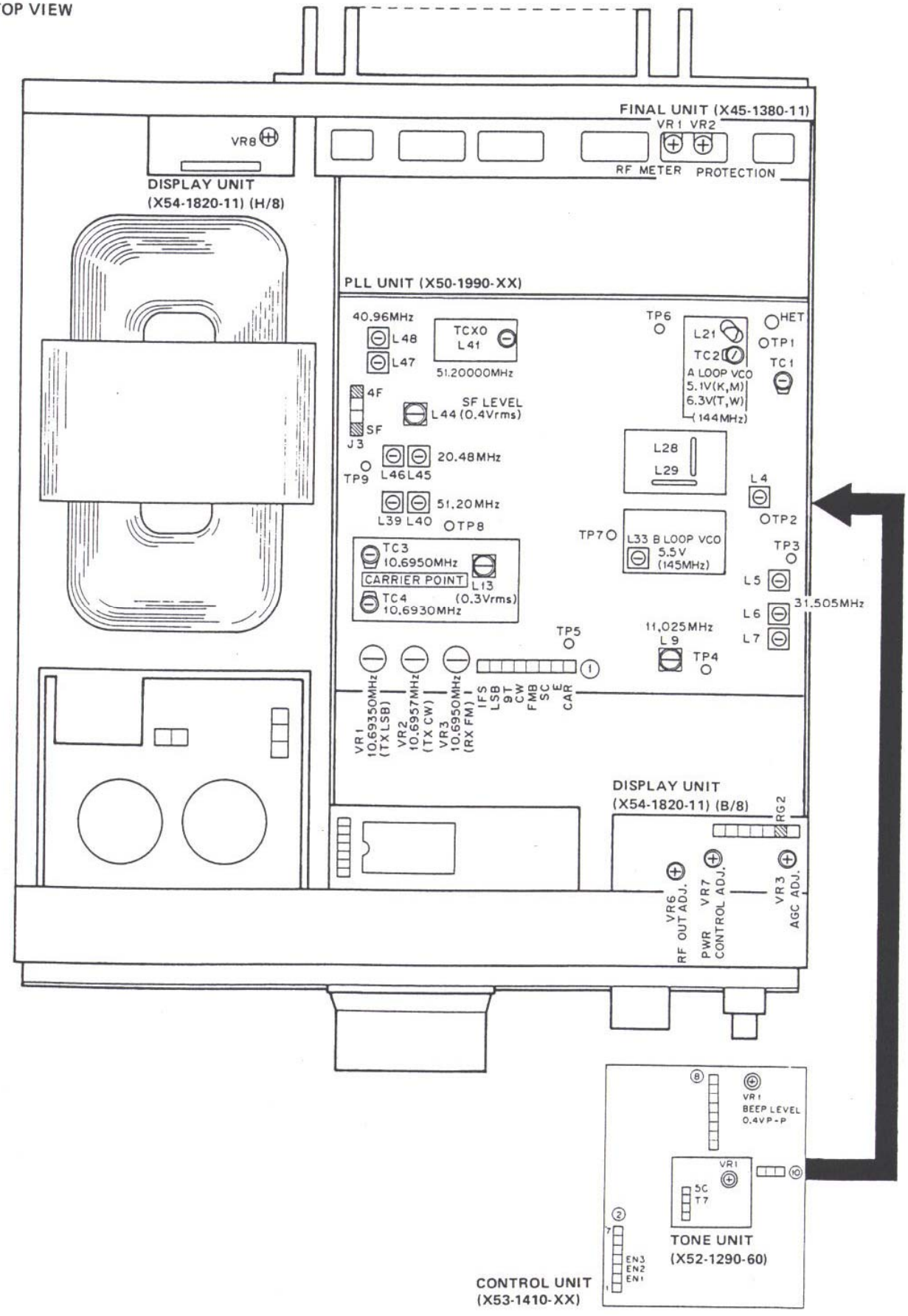
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
12. Deviation	1) PROC : OFF MODE SW : FM FREQ. : 145.000 STBY : SEND AG output : 1kHz, 20mV (30mV **K**)	AG Linear detector		ANT (Directional coupler)	AF	VR3	4.6kHz	±0.1kHz
	2) AG output : 1kHz, 2mV (3mV **K**)					VR2	3kHz	±0.1kHz
13. Speech processor	1) PROC : ON MODE SW : FM FREQ. : 145.000 STBY : SEND AG output : 1kHz, 20mV (30mV **K**)	AG Linear detector			AF	VR2	4.1kHz	±0.1kHz
	2) PROC : OFF							
14. SSB MIC sensitivity	1) MODE SW : USB MIC GAIN VR : Center AG output : 1kHz, 3mV	AG Power-meter					Confirm	15W or greater
15. CW sidetone breakin	1) MODE SW : CW AF GAIN VR : Center Connect KEY to KEY jack.	AF V.M Oscillo-scope			AF	VR4	Key down 0.63V	±0.1V Confirm sidetone output.
					Rear panel	VR8	Turn the VR8 and check breakin. function.	Delay time : VR8 MIN : Short time MAX : longer time
16. Beep tone	1) SQL VR : Center AF GAIN VR : Center M. IN : 1 push	AF V.M Oscillo-scope			CONT	VR1	0.4V/P-P	±0.1V Confirm tone output.
17. TONE (T)	1) MODE SW : FM TONE SW : ON STBY : SEND	Linear detector f. counter			TONE	VR1	Shorted wire between "TH" and "SC" on TONE unit. 1750Hz	DEV : ±2.5kHz ±5kHz
18. TONE (W)	1) MODE SW : FM TONE SW : push (hold)				TONE	VR1	1750Hz	DEV : ±2.5kHz ±5kHz

TS-711 A/E ENCODER Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Encoder	1) Remove the VFO knob and motor-drive the encoder at approx. 300rpm.	Oscillo-scope	CONT	EN3 (②-4)				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 CW : Clockwise CCW : Counter clockwise			EN1 (②-2)	Encoder	VR1		After adjusting with the VFO control turned CW, check that intevals D and E are also indentical when the VFO control is turned CCW.
	3) EN2 duty ratio adjustment : Turn in the both directions.			EN2 (②-3)		VR2	Adjust until intervals D and E are equal to each other with point C placed at the center.	

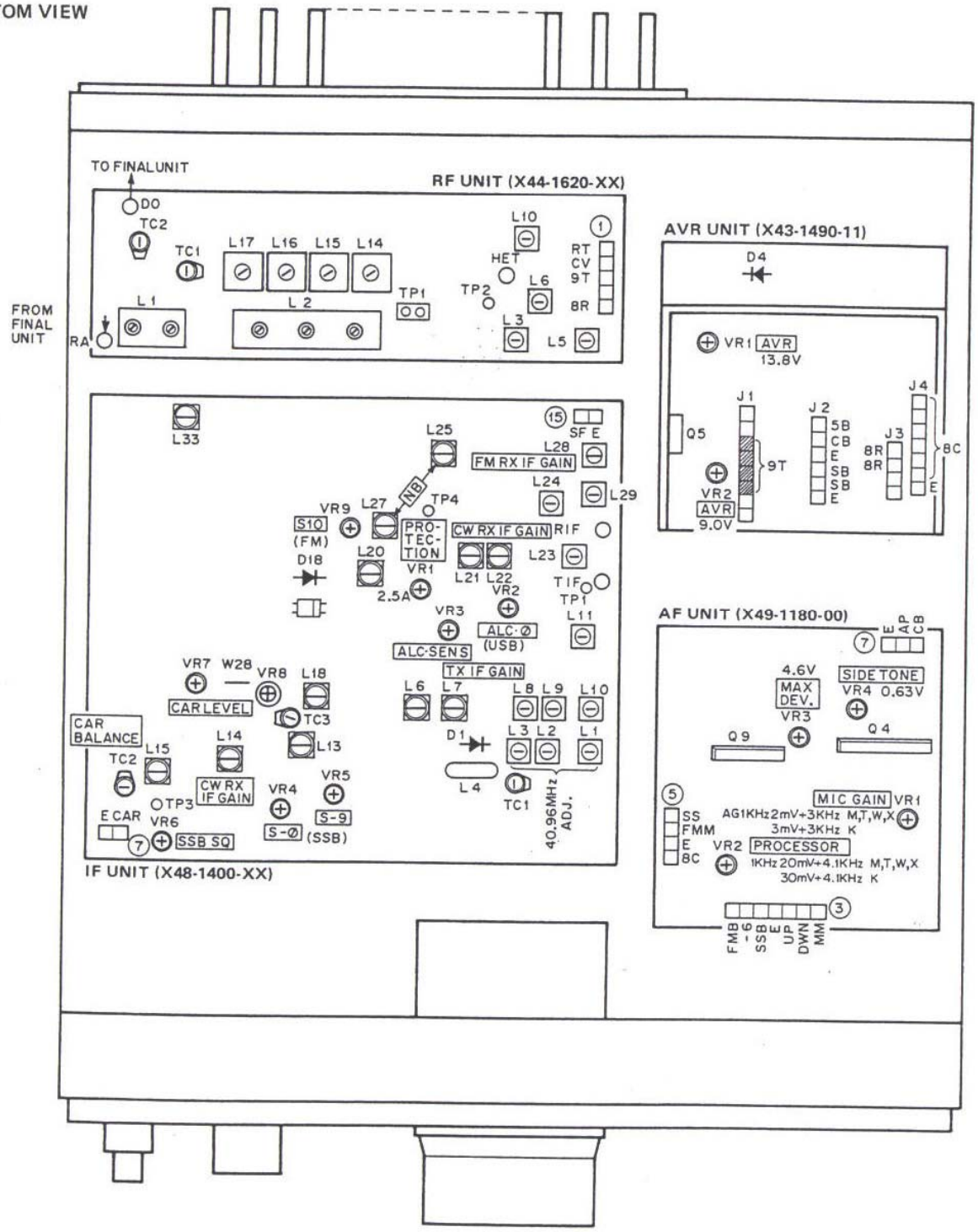
TS-711 ADJUSTMENT

TOP VIEW



TS-711 ADJUSTMENT

BOTTOM VIEW



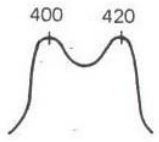
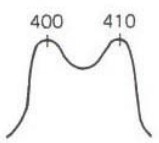
TS-811 ADJUSTMENT

TS-811A/B/E TX/RX Section (Common)

CW : Clockwise, CCW : Counterclockwise

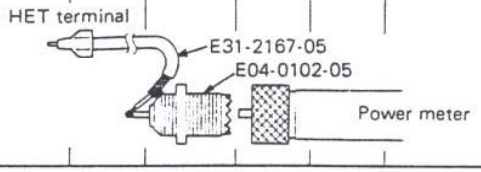
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Reset	1) Set the power SW on, while depressing the A=B key. Then release the A=B key.							VFO A 433.000 MODE : CW The "Beeper" sounds
2. Voltage adjustment (1) 13.8V, 9V AVR	1) Connect the AC power cable to the power terminal on the rear panel.							
	2) POWER SW : ON	DVM	AVR	D4	AVR	VR1	13.8V	±0.1V
				9T		VR2	9.0V	±0.1V
(2) AGC voltage	1) RF GAIN : MAX	DVM	DISP (B/8)	RG2	DISP (B/8)	VR3	4.0V	±0.1V
(3) RF OUTPUT voltage	1) RF POWER : MIN STBY : SEND	DVM	IF	W28 (Jumper wire)	DISP (B/8)	VR7	2.0V	±0.05V
	2) RF POWER : MAX STBY : SEND						3.4V	±0.2V
3. PLL	1) SF level adjustment MODE SW : FM FREQ. : 435.0000	RF V.M	PLL	SF (③-1)	PLL	L44	Adjust the core for the MAX reading, then turn it outward until a reading of 0.4V is obtained.	0.4V±0.01V
	2) 20.48MHz level adjustment MODE SW : FM FREQ. : 435.0000			TP9		L45,46	MAX	0.4–0.5V
	3) 4F (40.96MHz) level adjustment MODE SW : FM FREQ. : 435.0000			4F (③-4)		L47,48	MAX	0.10–0.15V
	4) 51.2MHz level adjustment MODE SW : FM FREQ. : 435.0000			TP8		L39,40	MAX	0.10–0.15V
	5) B loop VCO adjustment MODE SW : FM FREQ. : 430.0000	DC V.M		TP7		L33	5.5V	±0.1V
	: 439.9999							2.0–3.5V
	6) 11.025MHz level adjustment MODE SW : FM FREQ. : 435.010	RF V.M		TP4		L9	MAX	0.15–0.18V
	7) 31.505MHz level adjustment MODE SW : FM FREQ. : 435.010			TP3		L5–7	Adjust the L5 and L7 for the MAX reading repeatedly.	0.1–0.15V
	8) A loop VCO adjustment MODE SW : FM FREQ. :	DC V.M		TP6		TC2	6.5V	±0.1V
	: 430.0000							0.9–2.0V
	: 439.9999							
4. PLL output	1) MODE SW : FM FREQ. : 435.0000	RF V.M	PLL	TP2	PLL	L4	MAX	0.14–0.15V
			HET	TP1		TC1	MAX	0.2V or greater
5. CAR	1) MODE SW : USB (CAR level) IF SHIFT VR : Center	RF V.M	PLL	TP5	PLL	L13	Turn the core outward until a reading of 0.3V is obtained. Confirm the peak point.	0.3±0.01V
	MODE SW : LSB						Confirm	0.3±0.02V
	MODE SW : FM							0.3±0.03V
	2) MODE SW : USB				PLL	TC3	10.69650MHz	±100Hz
	: LSB					TC4	10.69350MHz	±100Hz

TS-811 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5. CAR	3) MODE SW : LSB (SEND)	f.counter	PLL	TP5	PLL	VR1	10.69350MHz	±100Hz
	: CW					VR2	10.69570MHz	±100Hz
	: FM					VR3	10.69500MHz	±100Hz
6. IF SHIFT check	1) MODE SW : USB (RX)	f.counter	PLL	TP5			Turn the IF SHIFT all the way CW and CCW.	±1.0kHz or greater Not work on FM mode.
	2) MODE SW : LSB (TX)							Does not change
7. TCXO f. adjustment (Temperature consequence crystal oscillator)	1) MODE SW : USB FREQ. : 439.000	f.counter	HET	TP7	PLL	L41 (TCXO)	286.720000MHz	±30Hz
	2)MODE : USB **K** FREQ. : 441.000				HET	TC3	296.720000MHz	±30Hz
8. HET **K** type	1) 40.96MHz-level adjustment FREQ. : 439.000	RF V.M	HET	TP4	HET	L8,9	MAX. Repeat 2–3 times.	0.4V or more
	2) 286.72MHz level adjustment			TP6		TC2 L10,11	MAX. Repeat 2–3 times. Then, adjust the TC2 for the MAX again.	
	3) 42.38857MHz level adjustment FREQ. : 441.000 IF unit TC3 : Center			TP7		L18,19	MAX. Repeat 2–3 times.	0.4V or more
	4) 296.72MHz level adjustment FREQ. : 439.000			TP6		L20,21		
	: 441.000					TC2	VFO frequency change to 439.000. Adjust same level.	0.3V or more
	5) Helical adjustment Disconnect the coax. cable from the HET terminal in in the PLL unit. Connect the sweep G. (OUT : 25dB) to TP2 in the HET unit, connect the detector to TP3 in the HET unit. HET unit TC1 : MAX After adjustment, connect the coax. cable to the HET terminal in the PLL unit.	Sweep G. Oscilloscope Detector		TP3		L4,5	Adjust the L4 and L2 as waveform as shown on right.	
9. HET **M,T,W,X** type	1) 40.96MHz level adjustment	RF V.M	HET	TP5	HET	L8,9	MAX. Repeat 2–3 times.	0.4V or more
	2) 286.72MHz level adjustment			TP7		TC2–4, L10	Adjust the TC4, TC2, and TC3. Repeat 2–3 times. Also adjust the TC2,3 again.	0.3V or more
	3) Helical adjustment Disconnect the coax. cable from the HET terminal in the PLL unit. Connect the Sweep G. (OUT : 25dB) to TP2 in the HET unit, connect the detector to TP3 in the HET unit. HET unit TC1 : MAX After adjustment, connect the coax. cable to the HET terminal in the PLL unit.	Sweep G. Oscilloscope Detector		TP3		L4,5	Adjust the L4 and L2 as waveform as shown on right.	

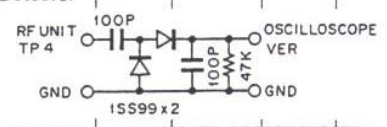
TS-811 ADJUSTMENT

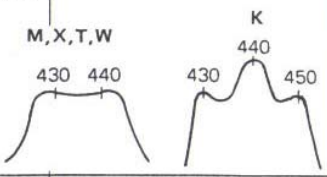
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
10. HET	1) PLL VCO OUT level adjustment FREQ. : 435.000	RF V.M	HET	TP1	PLL	TC1	MAX	0.3V or more
	2) HET OUT level adjustment Disconnect the coax. cable from the HET terminal in the HET unit. Connect the power meter to the HET terminal in the HET unit. (HET OUT terminal are connected 50Ω dummy.)			TP4	HET	TC1	MAX	(0.1–0.2V)



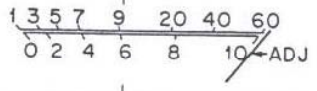
TS-811A/B/E RX Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Helical	1) MODE SW : FM Connect the Sweep G. to the ANT terminal	Sweep G. Oscillo-scope Detector	RF	TP4	RF	L13,14	Adjust the L13 and L14 as waveform as shown on right.	
2. 4F level adjustment (40.96MHz)	1) MODE SW : FM RX	RF V.M	IF	D1 (cathode)	IF	L1–3	MAX (0.9V)	0.8V or greater
			PLL	4FH				
3. IF GAIN (1) (FM MODE)	1) MODE SW : FM VFO : 435.0000 SSG : 10dBμ SSG MOD : 1kHz SSG DEV : 5kHz	SSG Oscillo-scope AF V.M S-meter			RF	L15,17 TC3	Adjust the each coil for MAX S-meter reading repeatedly.	Maintain the SSG output level to about the "3" S-meter reading.
					IF	L24, 28,29		
						L33	MAX AF V.M reading.	
4. IF GAIN (2) (CW MODE)	1) MODE SW : CW VFO : 435.0000 SSG : –10dBμ VR6 : TP, VR6	SSG Oscillo-scope AF V.M			IF	L23	Adjust the L23 CCW to the –2dB point from MAX. AF V.M reading.	
						L13–15, 20–22	Adjust the L13–15, L20–22, for MAX S-meter reading repeatedly.	Maintain the SSG output level to about the "3" S-meter reading.
	2) MODE SW : FM VFO : 435.0000 SSG : 10dBμ				RF	L15,17	MAX	
	3) MODE SW : CW VCO : 435.0000 SSG : –10dBμ				IF	L23	Adjust the L23 CCW to the –2dB point from MAX AF V.M reading.	
5. S-meter (1) (CW, SSB)	1) MODE SW : CW SSG output : OFF				IF	VR4	Adjust to the "0" S-meter reading on RF meter scale.	
	2) SSG : 20dBμ Adjust the SSG frequency to the MAX S-meter reading.	SSG AF V.M Oscillo-scope				VR5	"S-9"	
	3) SSG : 0dBμ					L14	Adjust the L14 CCW to the "S-3" reading.	Adjust the L14 to MAX, if S-meter does not read the "S-3".
	4) SSG : 20dBμ					VR5	"S-9"	

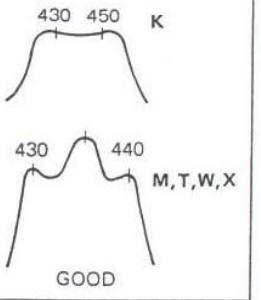




TS-811 ADJUSTMENT

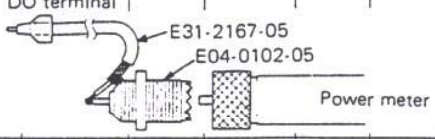
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
6. S-meter (2) (FM)	1) MODE SW : FM VFO : 435.0000 SSG : 30dBμ SSG MOD : 1kHz SSG DEV : 5kHz	SSG AF V.M Oscillo-scope			IF	VR9	"S-10" 	
7. Carrier balance	1) MODE SW : USB RF GAIN : MIN (After confirm RF GAIN : MAX)	RF V.M	IF	TP3	IF	TC2	Adjust to the dip point.	
8. NB	1) MODE SW : CW VFO : 435.0000 SSG : 10dBμ	DC V.M	IF	TP4	IF	L25,27	MIN	
9. SSG squelch	1) MODE SW : CW VFO : 435.0000 SSG : 0dBμ SQ VR : MAX Adjust the SSG frequency to MAX AF V.M reading.	SSG Oscillo-scope AF V.M			IF	VR6	Adjust the VR6 slowly and stop at the threshold point.	SQ open : SSG 0–6dB
	2) SSG output : OFF						Adjust the SQ VR to the threshold point.	
	3) SSG : −12dBμ							SQ open
10. SSB/CW S/N	1) MODE SW : LSB VFO : 430.0000 SSG : −10dBμ **K,M,X** : −12dBμ **T,W**	SSG AF V.M Oscillo-scope						S/N 10dB or greater
11. FM S/N	1) MODE SW : FM SSG : −7dBμ **K,M,X** : −8dBμ **T,W** VFO : 430.0000 : 435.0000 **T,W** : 439.0000 : 430.0000 : 449.9999 **K,M,X**	SSG AF V.M Oscillo-scope						20dB or greater

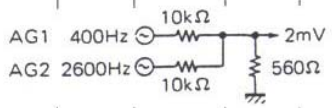
TS-811A/B/E TX Section

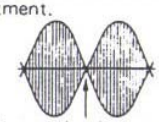
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Setting	1) Disconnect the coax. cable from the TIF terminal in the IF unit.							
2. Helical	1) Connect the sweep G. (OUT : 20dB) to TP1. RF unit TC1 : MAX  Disconnect the coax. cable from the HET terminal.	Sweep G. Oscillo-scope Detector	RF	TP2	L5–7			
3. IF output	1) RF POWER : MAX MODE SW : CW STBY : SEND IF unit VR7 : Center	RF V.M	IF	TP1	IF	L6–11,18	Adjust the each coil for the MAX RF V.M reading repeatedly.	(0.3–0.4V)
4. CW CAR level	1) MODE SW : CW STBY : SEND Connect the coax. cable to the TIF terminal after adjust.	RF V.M	IF	D18	IF	L8	MAX	0.3V or less
				TP1		VR7	0.38V	±0.01V

TS-811 ADJUSTMENT

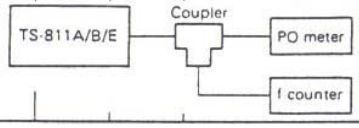
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5. Drive output	1) Disconnect the coax. cable from the D0 terminal in the RF unit. Then connect the 1W power meter MODE SW : CW STBY : SEND. VFO : 435.000 **M,T,W,X** : 438.000 **K**	0.6W Power-meter	RF	D0	RF	TC1,2	Adjust the each coil for the MAX output repeatedly. Connect the coax. cable to the D0 terminal after adjust. (adjust L15 peak to center position of coil)	0.30W or greater
6. Output power	1) MODE SW : CW STBY : SEND VFO : 439.9999 **M,T,W,X** : 449.9999 **K**	Power-meter (30W or 50W)			IF	VR1	Adjust to the mechanical center.	32W or greater
					DISP (B/8)	VR6	26W (Setting value)	±1W, 7.5A or less
7. ALC meter	1) POWER CONTROL : MAX MIC GAIN VR : MIN MODE SW : USB ALC/RF SW : ALC FREQ. : 145.000 STBY : SEND	ALC meter			IF	VR2	Adjust to the mechanical zero point.	RF meter "8"
	2) MODE SW : CW STBY : SEND				RF	TC2	Adjust for the MAX ALC meter reading.	
					IF	VR3	RF "8"	
8. RF meter	1) MODE SW : CW FREQ. : 435.000 ALC/RF SW : RF	RF meter			Final	VR1	RF "8"	RF meter "8"
9. Protection	1) MODE SW : CW	DC V.M	IF	PRO (⑫-5)	Final	VR2	MIN	
	2) Connect the ANT terminal to GND.	DC A.M			IF	VR1	4.0A	±0.1A
10. Carrier suppression	1) MODE SW : USB, LSB MIC GAIN : MIN POWER CONTROL : MAX	RF V.M Power-meter Oscillo-scope			IF	VR8 TC3	MIN or USB and LSB.	50dB or more
11. SSB frequency response	1) MODE SW : USB, LSB MIC GAIN : Center AG output : Two-tone 2mV, 400Hz, 2600Hz STBY : SEND MIC GAIN VR : 25W	Power-meter (30 or 50W) Oscillo-scope			PLL	TC3 (USB) TC4 (LSB)		Adjust to within −9dB level at the 400Hz and the 2.6kHz from the 1.5kHz **Note :** Confirm the carrier suppression after this adjustment.
	2) AG output : Single tone 2mV, 1.5kHz MIC GAIN VR : 25W					TC3 (USB) TC4 (LSB)	Adjust for equal output power at 400Hz, 2600Hz as measured on watt-meter.	
	3) MODE SW : CW STBY : SEND	f.counter	PLL	TP5	PLL	VR2	10.69570MHz	±10Hz
	4) MODE SW : FM					VR3	10.6950MHz	±10Hz
12. FM FREQ.	1) Front panel CH.Q : ON DISPLAY : 435.000 MODE SW : FM STBY : SEND	Power-meter f.counter	DISP (D/8)	Display tube (V1)	IF	TC1	Adjust to 145.000 MHz on f.counter.	±10Hz







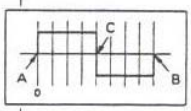
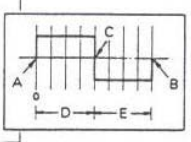
Adjust to the sharp cross point.



TS-811 ADJUSTMENT

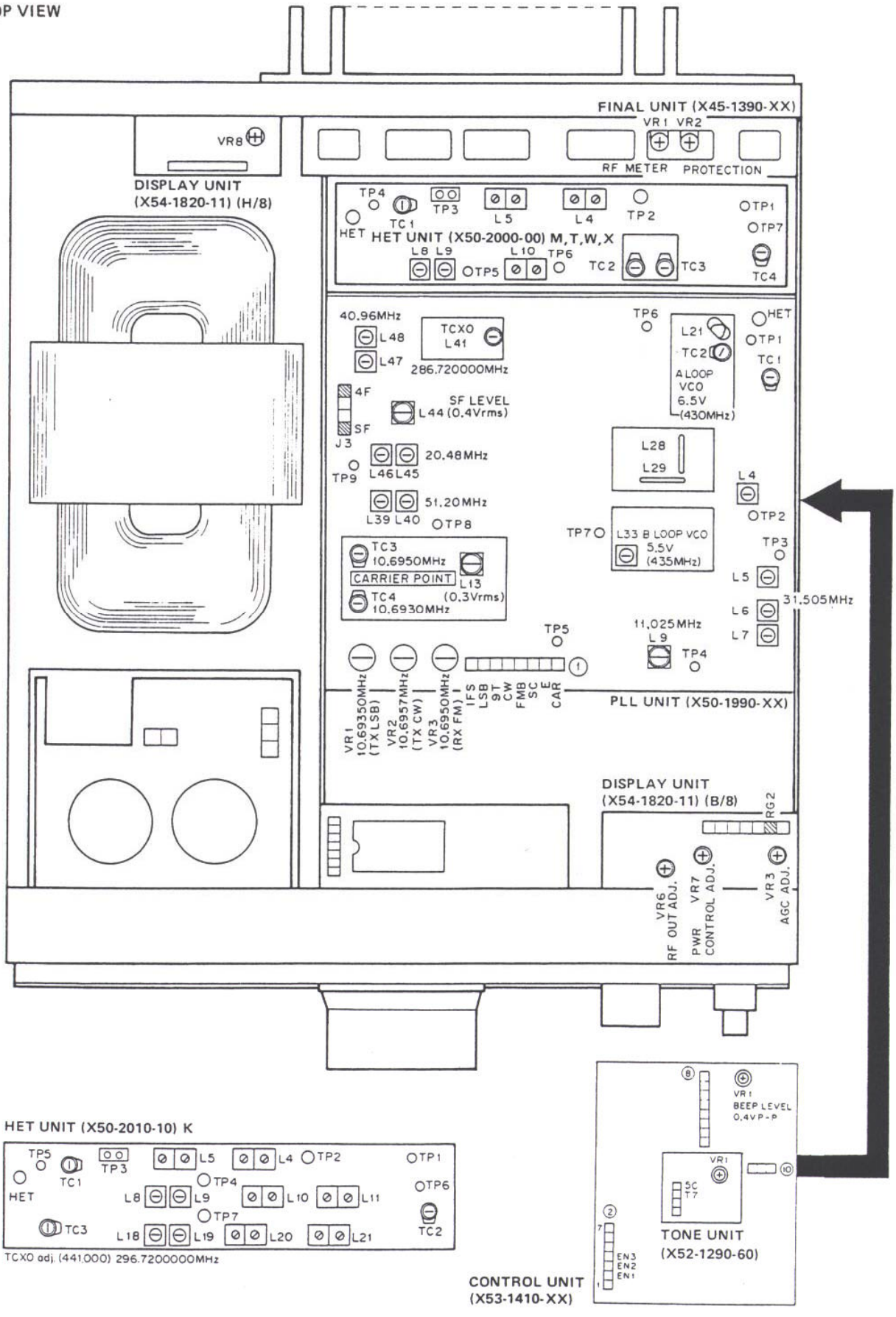
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
13. Deviation	1) PROC : OFF MODE SW : FM FREQ. : 435.000 STBY : SEND AG output : 1kHz, 20mV (30mV K)	AG Linear detector		ANT (Directional coupler)	AF	VR3	4.6kHz	±0.1kHz
	2) AG output : 1kHz, 2mV (3mV K)					VR2	3kHz	±0.1kHz
14. Speech processor	1) PROC : ON MODE SW : FM FREQ. : 435.000 STBY : SEND AG output : 1kHz, 20mV (30mV K)	AG Linear detector			AF	VR2	4.1kHz	±0.1kHz
	2) PROC : OFF							
15. SSB MIC sensitivity	1) MODE SW : USB MIC GAIN VR : Center AG output : 1kHz, 3mV	AG Power-meter					Confirm	15W or greater
16. CW side tone breakin	1) MODE SW : CW AF GAIN VR : Center Connect KEY to KEY jack.	AF V.M Oscillo-scope			AF	VR4	Key down 0.63V	±0.1V Confirm side tone output.
					Rear panel	VR8	Turn the VR8 and check break in function.	Delay time : VR8 MIN : Short time MAX : longer time
17. Beep tone	1) SQL VR : Center AF GAIN VR : Center M. IN : 1 push	AF V.M Oscillo-scope			CONT	VR1	0.4V/P-P	±0.1V Confirm tone output.
18. TONE (T)	1) MODE SW : FM TONE SW : ON STBY : SEND	Linear detector f. counter			TONE	VR1	Shorted wire between "TH" and "SC" on TONE unit. 1750Hz	DEV : ±2.5kHz ±5kHz
19. TONE (W)	1) MODE SW : FM TONE SW : push (hold)				TONE	VR1	1750Hz	DEV : ±2.5kHz ±5kHz

TS-811A/B/E ENCODER Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Encoder	1) Remove the VFO knob and motor-drive the encoder at approx. 300rpm.	Oscillo-scope	CONT	EN3 (②-4)				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 CW : Clockwise CCW : Counter clockwise			EN1 (②-2)	Encoder	VR1		After adjusting with the VFO control turned CW, check that intevals D and E are also indentical when the VFO control is turned CCW.
	3) EN2 duty ratio adjustment : Turn in the both directions.			EN2 (②-3)		VR2	Adjust until intervals D and E are equal to each other with point C placed at the center.	

TS-811 ADJUSTMENT

TOP VIEW



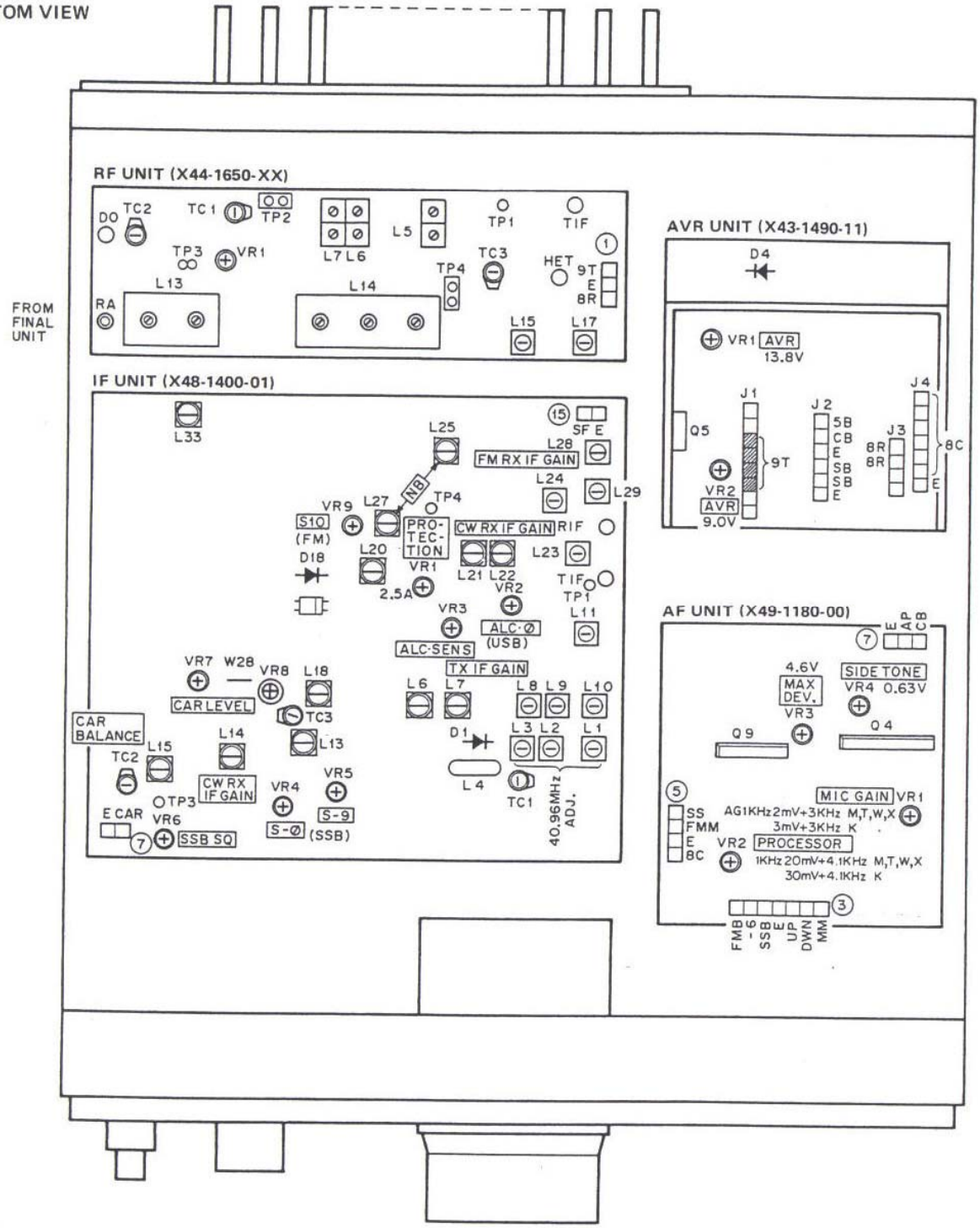
HET UNIT (X50-2010-10) K

TCXO adj. (441,000) 296.7200000MHz

CONTROL UNIT
(X53-1410-XX)

TS-811 ADJUSTMENT

BOTTOM VIEW



ADJUSTMENT

TS-711A/E, TS-811A/B/E

Microprocessor operation check

Item	Condition	Operation check
1. Reset	1) Set the Power SW ON, while depressing the A=B key. Then release the A=B key.	Display : A VFO 145.000 A VFO 433.000 MODE SW : CW LED light on. The "Beeper" sounds. Encoder is the click position.
2. MODE function (FM, USB, CW LSB, AUTO)	1) Change MODE (ex. : depress CW once) **Note :** If depress same MODE key then same morse code continuously	CW : "C" morse code —·—· Ex. : FM ··—· USB ··— CW —·—· LSB ·—·· AUTO ·—
3. Encoder	1) MODE SW : FM (push once) Turn the main dial knob to CW and CCW.	STEP LED: OFF — K,M1,M2,X: 5kHz — T,W: 12.5kHz STEP LED: ON — K,M1,M2,X: 5kHz — T,W: 5kHz
4. CH.Q (Channel quick)	1) Push the CH.Q key once.	The plunger sounds. Display : VFO A 144.000.0 → 100Hz order VFO B 434.000.0 → 100Hz order Release click function on VFO knob.
5. A/B	1) Push the A/B key once	The plunger sounds. (Release click function) Display : VFO B 144.000.0 VFO B 430.000.0 MODE SW : CW, AUTO LED light on.
	2) Push the A/B key again.	A VFO 145.000 A VFO 433.000
6. STEP	1) Push the STEP key once.	The "Beeper" sounds. STEP LED (orange) light on
	2) Turn the main dial CW and CCW.	Up and Down each 10kHz step. (VFO A, FM mode)
	3) Push the CH.Q key once. (click off condition)	Display shows 7 digits and become fast step as of STEP off.
	4) Push the STEP key again	STEP LED light off. (STEP function off) The "Beeper" sounds.
7. SPLIT	1) Push the SPLIT key once (VFO A and VFO B frequency works for both TX and RX) Transmitt	The "Beeper" sounds Display : SPLIT light on. Ex. : A VFO SPLIT 145.000 A VFO SPLIT 144.000.0 A VFO SPLIT 435.000 A VFO SPLIT 434.000.0
	2) Push the SPLIT key again	Display : SPLIT light off. (SPLIT function off)

Item	Condition	Operation check
8. A = B (VFO A and VFO B become same frequency)	1) Push the A=B key once.	The "Beeper" sounds. Ex. VFO A : 145.000 TS-711 VFO B : 144.000.0 TS-811 VFO A : 435.000 VFO B : 434.000.0
	2) Push the A/B key once	The "Beeper" sounds. Display changes to VFO B and shows same frequency as VFO A.
9. COM CH	1) Push the COM key once.	The "Beeper" sounds. COM LED : Light on Display : A 145.000 A 433.000 In case COM CH working, the main dial UP, DOWN, CH.Q, A/B STEP, SPLIT, SCAN and M.IN functions are not work.
10. MHz	1) Push the MHz SW (UP) one by one.	UP MHz order 1MHz each or push. The "Beeper" sounds each push.
	2) Push the MHz SW (UP) continuously.	UP MHz order continuously.
	3) Push the MHz SW (DOWN) one by one.	Down MHz order 1MHz each one push. The "Beeper" sounds each push.
	4) Push the MHz SW (DOWN) continuously.	Down MHz order continuously.
11. SCAN SCAN Step	1) MODE SW : SCAN push once.	The "Beeper" sounds. The dot point light winks. Start SCAN after 6 seconds.

	Display 5 digit	Display 5 digit STEP : ON	Display 6 digit	Display 6 digit STEP : ON
FM	20kHz step	10kHz step	5kHz step	5kHz step
CW, SSB	5kHz step	1kHz step	1kHz step	1kHz step

	2) STBY : SEND	Stop SCAN
	3) SCAN start : Push SCAN again.	The "Beeper" sounds. (SCAN stop)
12. Memory (Write)	1) Push the M.IN key once. (Desire frequency)	The "Beeper" sounds (Memorized frequency) Frequency has memorized with any mode.
	2) MODE SW : CH.S push once. Turn main dial CW. Ex. Set to	The "Beeper" sounds (Main dial works only on MHz order.) Changes only on M.CH display.
	3) MODE SW : CH. S push again.	The "Beeper" sounds (Main dial works as VFO knob)
	4) Memo in up to 40 channel following 1), 2), 3).	The "Beeper" sounds each M. IN, CH. S push.

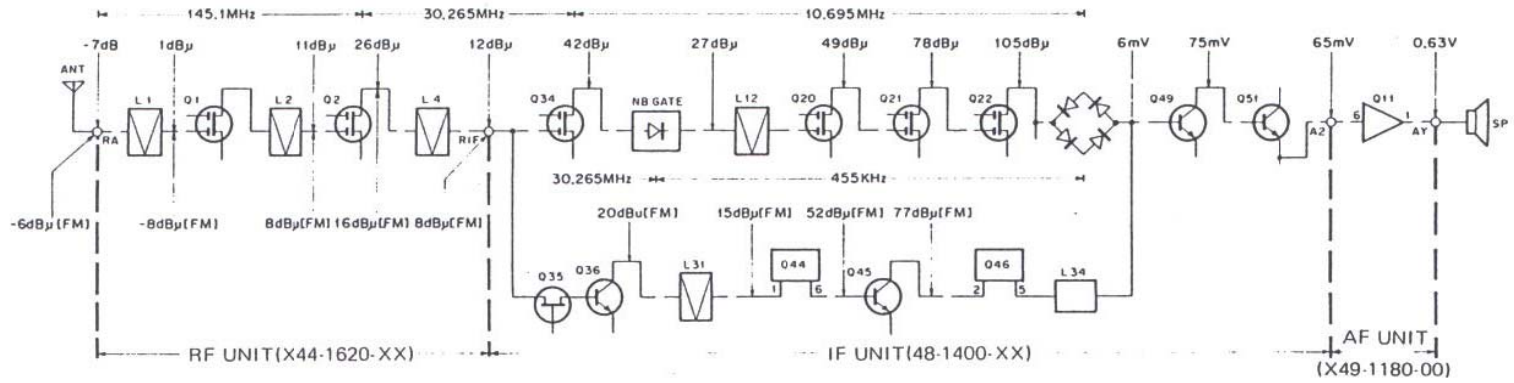
ADJUSTMENT

Item	Condition	Operation check
13. Memory (Recall)	1) Recall memorized frequency at item 12. Push the VFO/M key once.	The "Beeper" sounds. Display : MCH 01 144.030 MCH 01 433.030 Which is MEMO IN on CH1
	2) Tuning the main dial	Display shows memorized CH and frequency.
	3) Push the VFO/M key again.	The "Beeper" sounds Display shows VFO frequency.
14. M►V	1) Transfer MEMO frequency to VFO. Ex. MEMO frequency : 144.800 : 433.800 VFO A frequency : 144.000 : 434.000 Push the M►V key once.	1 Display MCH 01 144.800 MCH 01 433.800 The "Beeper" sounds. 2 Display VFO 144.000 VFO 434.000 Display has transfer 1 to 2
15. Frequency	1) MODE SW : REV & LOCK push once.	The "Beeper" sounds. REV & LOCK LED light on.
	2) Turn main dial CW and CCW.	Confirm the display does not change.
	3) MODE SW : REV & LOCK push again.	The "Beeper" sounds. REV & LOCK LED light off. (Freq. lock free)
16. Alert (AL)	1) MODE SW : AL push once	The "Beeper" sounds. Display shows AL.
	2) RX : 6 seconds each	Confirm the "Beeper" sounds.
	3) MODE SW : AL push again	The "Beeper" sounds AL sign disapear.

TS-711A/E, TS-811A/B/E DCS (Digital Code Squelch) system operation check

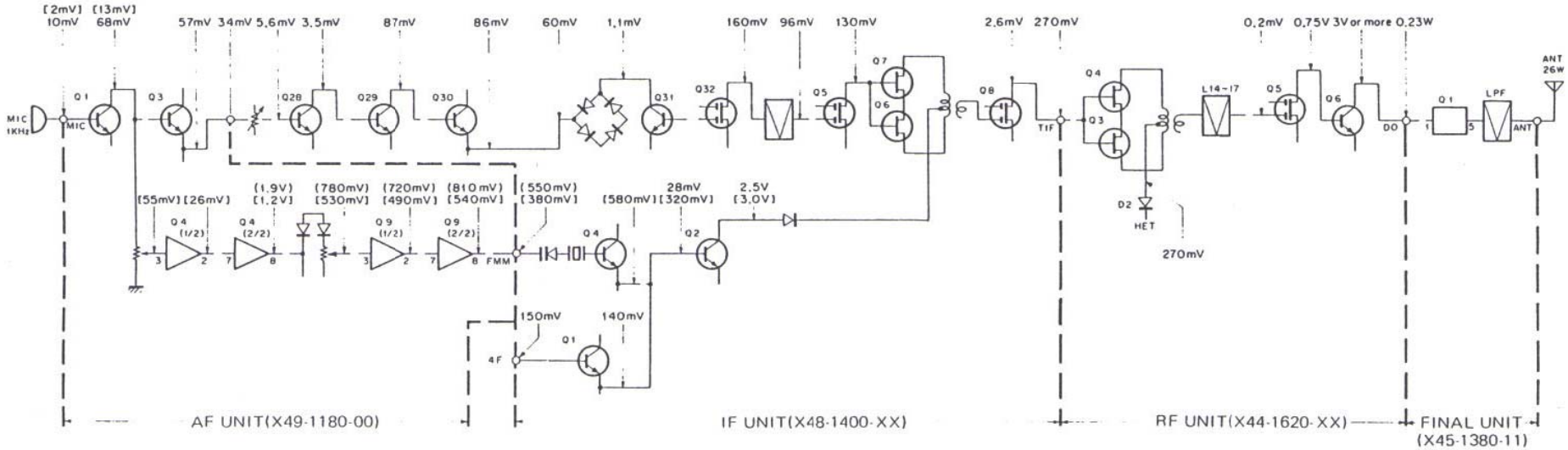
Item	Condition	Operation check
1. Digital code input	1) Display : any Push the CS key once.	The "Beeper" sounds. Display : C0 00000 (Digital code has 5 digits and can input 9 kind)
	2) Digital code input MODE SW : FM—CH.S has dual function as digital code and each key works ; FM : 1—CH.S : 0	1 FM 2 USB 3 CW 4 LSB 5 AUTO 6 SCAN 7 M.IN 8 REVB LOCK 9 A L 0 CH.S Each one input makes "Pi" sound and each 5 digit input makes "Pee" sound.
	3) Turn main dial one click CW, and input digital code following step 2).	Display : C1 00000
	4) Input digital code for C0~C9 turning main dial.	Confirm "Pee" sound at each 5 digit input.
	5) Push the D.SQ key when digital code has displayed.	C0. ←Dot light winks. If push the D.SQ key again, this dot has disapear.
2. Call sign input	1) Push the C.AL key while digital code has displayed. 2) Push the C.AL key again.	The "Beeper" sounds. C- 000000 (1st 2nd 3rd) C= 000000 (4th 5th 6th) Ex. : J A 1 Y K X ↑ ↑ ↑ ↑ ↑ ↑ 74 65 49 89 75 88
3. DCS system	1) Set monitor's radio to condition below. Digital code : 6 7 8 9 0 MODE SW : FM DCS : ON	
	2) MODE SW : FM VFO : 146.0000 Push the DCS key once.	DCS LED light on.
	3) Push the CS key once. Push the 6, 7, 8, 9, 0 key each time. Push the CS key once after checks.	CO 6 7 8 9 0
	4) Push the D.SQ key once. SQL VR : MIN	D.SQ LED light on. Squelch closed.
	5) Push the C.AL key once. Monitor : SEND Push the C.AL key once after check.	C. AL LED light on. Squelch opened. D. SQ LED light off. The "Beeper" sounds. (Monitor's radio : "Beeper" sounds heard during transmit.)
	6) STBY : SEND	"Beeper" sounds heard when TX.

RX SECTION



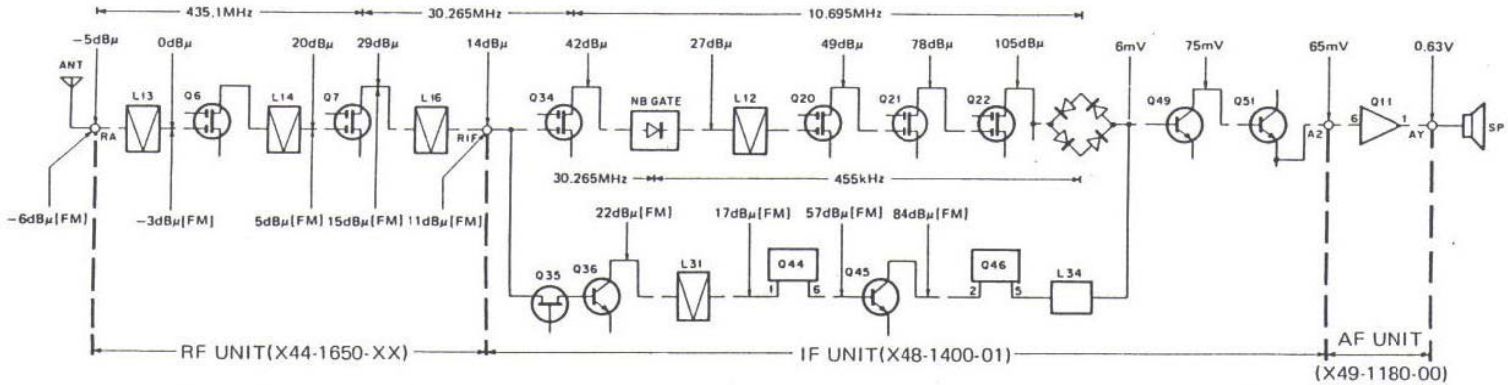
1. First, set the AF gain control for an audio output of 0.63V/8Ω for an SSG input signal at 145.1MHz/−6dBμ, applied to the antenna terminal, the AF gain control is now fixed. Thereafter, only the SSG signal level injected at each point is varied, as required to obtain the same audio output.
2. In the FM mode, the SSG signal level at each point required to obtain the same S/N ratio as that at initial input of the reference −6dBμ is taken.
3. In the stages after the product detector, the AF output level is measured.
4. Level measurement is made with a 0.01μF titanium oxide porcelain capacitor connected to the SSG output.
5. For level measurement at the RA terminal point, the SSG cable connection is changed to this terminal.

TX SECTION



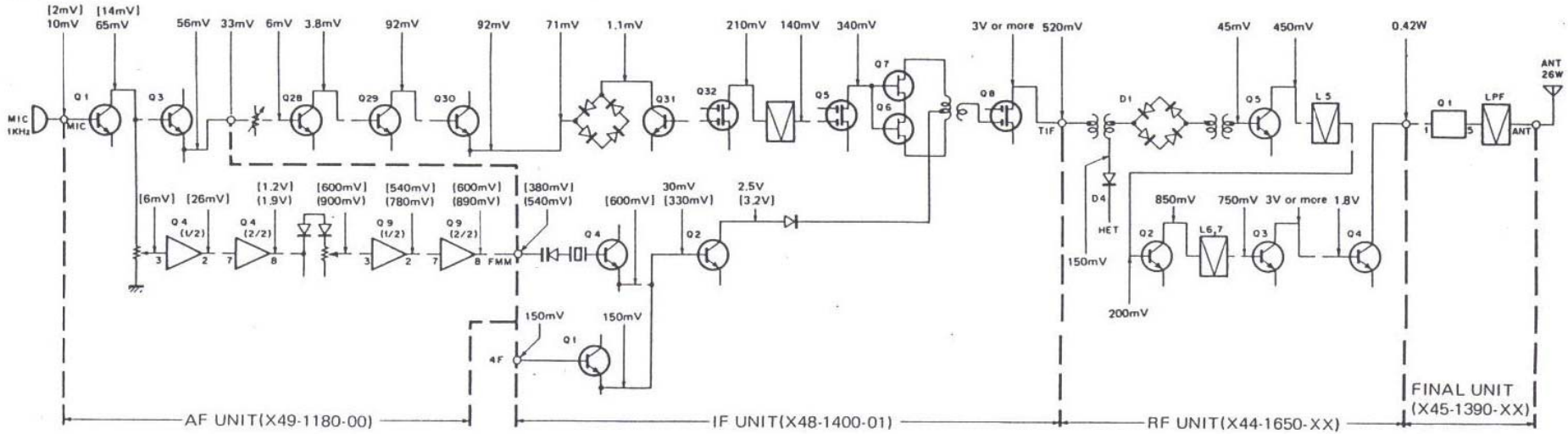
1. Frequency : 145.10MHz
2. For level measurement before pin DO in the RF unit, the coaxial cable connected to pin DO is disconnected.
3. In IF & RF sections, measurements are taken by an RF VTVM in the CW mode. In AF sections, it is taken by an AF VTVM in the USB mode. In this case, the values in [ ] are with the FM mode processor OFF, and those in ( ) are with the FM mode processor ON.
4. The audio input voltage in the USB mode, is a 1kHz signal tone which gives a nearly full-scale reading within the ALC range. In the FM mode, it is that which gives the standard modulation degree (±3kHz deviation).

RX SECTION



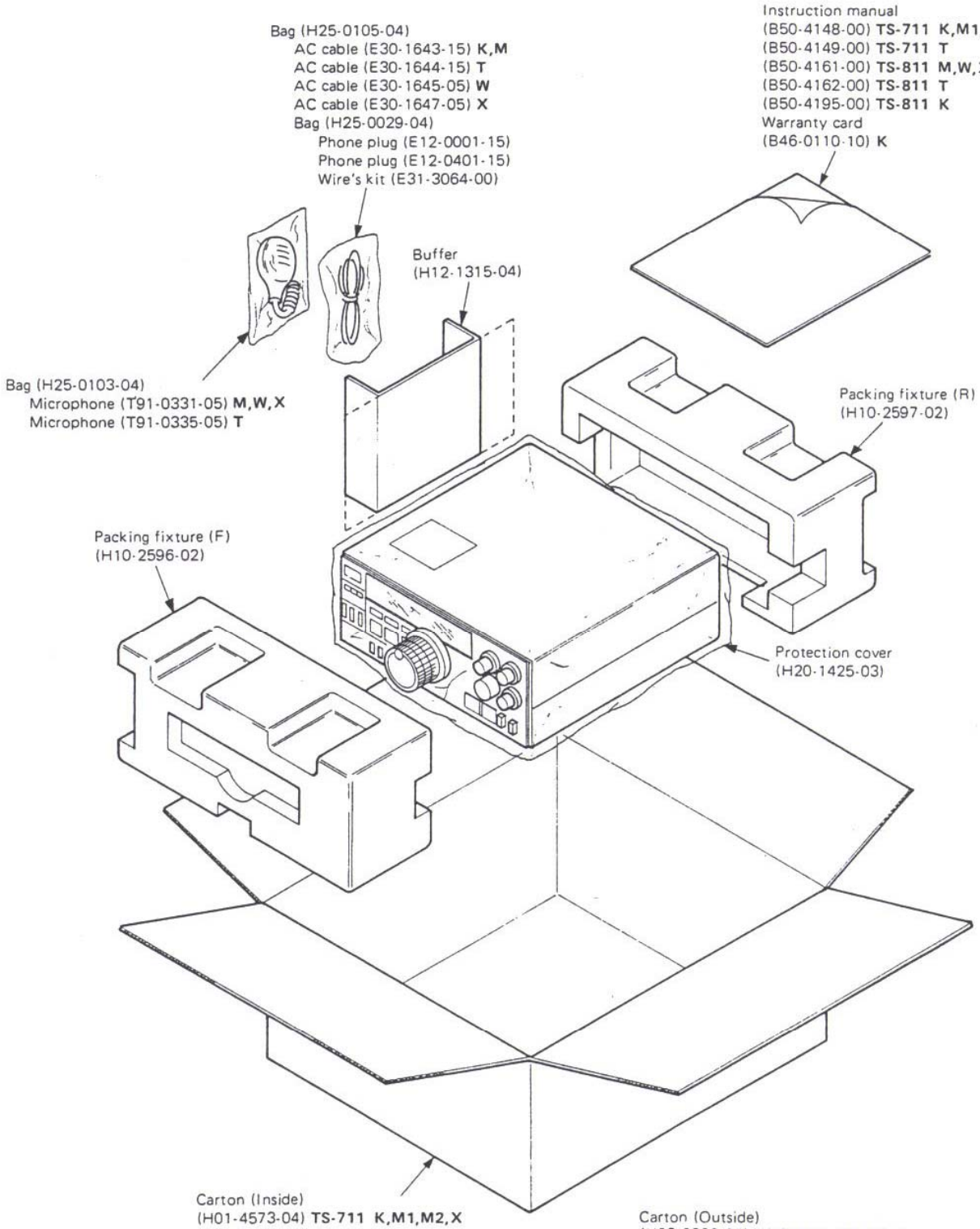
1. First, set the AF gain control for an audio output of 0.63V/8Ω for an SSG input signal at 435.1MHz/−6dBμ, applied to the antenna terminal, the AF gain control is now fixed. Thereafter, only the SSG signal level injected at each point is varied, as required to obtain the same audio output.
2. In the FM mode, the SSG signal level at each point required to obtain the same S/N ratio as that at initial input of the reference −6dBμ is taken.
3. In the stages after the product detector, the AF output level is measured.
4. Level measurement is made with a 0.01μF titanium oxide porcelain capacitor connected to the SSG output.
5. For level measurement at the RA terminal point, the SSG cable connection is changed to this terminal.

TX SECTION



1. Frequency : 435.10MHz
2. For level measurement before pin DO in the RF unit, the coaxial cable connected to pin DO is disconnected.
3. In IF & RF sections, measurements are taken by an RF VTVM in the CW mode. In AF sections, it is taken by an AF VTVM in the USB mode. In this case, the values in [ ] are with the FM mode processor OFF, and those in ( ) are with the FM mode processor ON.
4. The audio input voltage in the USB mode, is a 1kHz signal tone which gives a nearly full-scale reading within the ALC range. In the FM mode, it is that which gives the standard modulation degree (±3kHz deviation).

PACKING


Bag (H25-0105-04)
AC cable (E30-1643-15) K,M
AC cable (E30-1644-15) T
AC cable (E30-1645-05) W
AC cable (E30-1647-05) X
Bag (H25-0029-04)
Phone plug (E12-0001-15)
Phone plug (E12-0401-15)
Wire's kit (E31-3064-00)
Instruction manual
(B50-4148-00) TS-711 K,M1,M2,W,X
(B50-4149-00) TS-711 T
(B50-4161-00) TS-811 M,W,X
(B50-4162-00) TS-811 T
(B50-4195-00) TS-811 K
Warranty card
(B46-0110-10) K
Buffer
(H12-1315-04)
Bag (H25-0103-04)
Microphone (T91-0331-05) M,W,X
Microphone (T91-0335-05) T
Packing fixture (R)
(H10-2597-02)
Packing fixture (F)
(H10-2596-02)
Protection cover
(H20-1425-03)
Carton (Inside)
(H01-4573-04) TS-711 K,M1,M2,X
(H01-4574-04) TS-711 T
(H01-4621-04) TS-711 W
(H01-4594-04) TS-811 M,X
(H01-4595-04) TS-811 T
(H01-4624-04) TS-811 W
(H01-4636-04) TS-811 K
Carton (Outside)
(H03-2200-04) TS-711 K,M1,M2,X
(H03-2230-04) TS-711 T,W
(H03-2217-04) TS-811 M,X
(H03-2234-04) TS-811 T,W
(H03-2241-04) TS-811 K

TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal name	Terminal Function
SWITCH UNIT (X41-1580-XX)			
①			
②	1	FS	Frequency STEP LED
	2	FL	Frequency LOCK LED
	3	DC	DCL LED
	4	CL	CHL LED
	5	CS	CSQ LED
	6	E	GND (Earth)
	7	BD	Busy Display
	8	TL	TX LED
③	1	FS	Frequency STEP LED
	2	FL	Frequency LOCK OUT
	3	DC	DCL LED
	4	CL	CHL LED
	5	CS	CSQ LED
	6	CA	CALL LED
	7	BD	Busy Display
	8	TL	TX LED
④	1	A1	Port A1 } KEY SCAN output
	2	A2	Port A2
	3	A3	Port A3
	4	A4	Port A4
	5	A5	Port A5
	6	A6	Port A6
	7	B0	Port B0 } KEY SCAN input
	8	B1	Port B1
	9	B2	Port B2
	10	B3	Port B3
	11	B4	Port B4
	12	B5	Port B5
	13	B6	Port B6 VOICE Switch
⑤	1	C5	KEY Line C5
	2	C4	KEY Line C4
	3	C3	KEY Line C3
	4	C2	KEY Line C2
	5	C1	KEY Line C1
	6	C0	KEY Line C0
	7	A6	Port A6 } KEY SCAN output
	8	A5	Port A5
	9	A4	Port A4
	10	A3	Port A3
	11	A2	Port A2
	12	CA	CALL LED
⑥	1	E	GND (Earth)
	2	NBS	Noise Blanker Switch
	3	BD	Busy Display
	4	9T	TX 9V
	5	E2	RIT ENCODER PULSE 2
	6	E1	RIT ENCODER PULSE 1
⑦	1	E	GND (Earth)
	2	ANI	Analog input
	3	MM	MIC MUTE
	4	SS	Standby Switch
	5	ANI	Analog input
	6	E	GND (Earth)
	7	ANO	Analog output
	8	E	GND (Earth)
⑧	1	ACS	Accessory Switch } **TS-811 only**
	2	RL	Relay } **TS-811 only**

Connector No.	Terminal No.	Terminal name	Terminal Function
⑨	1	A6	Port A6 KEY SCAN output
	2	E	GND (Earth)
	3	A5	Port A5 KEY SCAN output
	4	B0	Port B0 KEY SCAN input
	5	A4	Port A4 KEY SCAN output
⑩	1	AU	AUTO LED
	2	LS	LSB LED
	3	CW	CW LED
	4	US	USB LED
	5	FM	FM LED
⑪	1	FM	FM LED
	2	US	USB LED
	3	CW	CW LED
	4	LS	LSB LED
	5	AU	AUTO LED
⑫	1	ME	Meter +
	2	E	GND (Earth)
⑬	1	PRS	Processor Switch
	2	RM	RF Meter
	3	ALM	ALC Meter
	4	FSM	FM S Meter
	5	SM	SSB S Meter
	6	SB	Switched B (13.8V)
	7	RL	Relay
	8	ACS	Accessory Switch **TS-811 only**
	9	E	GND (Earth)
AVR UNIT (X43-1490-11)			
①	1	TH1	Thermister 1
	2	TH2	Thermister 2
	3	E	GND (Earth)
	4	9T	TX 9V
	5	9T	TX 9V
	6	9T	TX 9V
	7	9T	TX 9V
	8	ATX	Anti-TX (No TX when 0V)
	9	ST	Standby output
②	1	5B	B for 5C
	2	CB	Common B
	3	E	GND (Earth)
	4	SB	Switched B (13.8V)
	5	SB	Switched B (13.8V)
	6	E	GND (Earth)
③	1	8R	RX 8V
	2	8R	RX 8V
	3	8R	RX 8V
	4	8R	RX 8V
④	1	8C	+ 8V
	2	8C	+ 8V
	3	8C	+ 8V
	4	8C	+ 8V
	5	8C	+ 8V
	6	8C	+ 8V
	7	E	GND (Earth)
⑤	1	B	+ B
	2	SB	Switched B (13.8V)
⑥	1	FAN	FAN Motor
	2	SB	Switched B (13.8V)

TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal name	Terminal Function
⑦	1	B	+ B
	2	FB	FINAL B (13.8V)
	3	BB	+B (22V)
	4	BA	AVR Transistor Base
	5	EM	AVR Transistor Emitter
	6	EM	AVR Transistor Emitter
⑧	1	BB	
	2	CO	AVR Transistor Collector
	3	E	GND (Earth)
⑨	1	B	+ B
	2	FB	FINAL B (13.8V)
	3	BB	+B (22V)
	4	BA	AVR Transistor Base
	5	EM	AVR Transistor Emitter
	6	EM	AVR Transistor Emitter
RF UNIT (X44-1620-XX) TS-711			
①	1	RL	Relay
	2	CV	Control Voltage
	3	9T	TX 9V
	4	E	GND (Earth)
	5	8R	RX 8V
RF UNIT (X44-1650-XX) TS-811			
①	1	9T	TX 9V
	2	E	GND (Earth)
	3	8R	RX 8V
FINAL UNIT (X45-1380-11) TS-711 (X45-1390-XX) TS-811			
①	1	PRO	Protection
	2	RM	RF Meter
	3	TH1	Thermister 1
	4	9T	TX 9V
	5	PC	Power control
②	1	EM	AVR Transistor Emitter
	2	CO	AVR Transistor Collector
	3	FB	FINAL B (13.8V)
	4	BA	AVR Transistor Base
IF UNIT (X48-1400-XX)			
①	1	4F	4th Frequency
	2	E	GND (Earth)
②	1	E	GND (Earth)
	2	FMM	FM MIC
	3	TO	Tone out (Tone input terminal)
	4	E	GND (Earth)
③	1	9T	TX 9V
	2	9T	TX 9V
	3	CWB	CW +B (8V)
	4	FMB	FM +B (8V)
	5	FMR	FM RX +B
	6	FCB	FM/CW +B
	7	8R	RX 8V
	8	8R	RX 8V
	9	SCB	SSB/CW +B (8V)
④	1	9T	TX 9V
	2	CWT	CW TX +B (8V)
	3	NC	Not connection
	4	FMB	FM +B (8V)
	5	8C	+8V

Connector No.	Terminal No.	Terminal name	Terminal Function
⑤	1	SCR	SSB/CW RX + B
	2	SCR	SSB/CW RX + B
	3	−6	−6V
	4	8C	+ 8V
	5	8C	+ 8V
	6	SM	SSB S Meter
⑥	1	SSB	SSB + B
	2	SSB	SSB + B
	3	RG2	RF Gain volume 2
	4	E	GND (Earth)
	5	SSQ	SSB Squelch
⑦	1	CAR	Carrier
	2	E	GND (Earth)
⑧	1	MV2	MIC Volume 2
	2	E	GND (Earth)
	3	FCB	FM CW + B
	4	P1	Power Control 1
	5	9T	TX 9V
⑨	1	RT	Modem Receive Output
	2	E	GND (Earth)
⑩	1	FSM	FM S Meter
	2	SC	Scan Control
	3	BD	Busy Display
	4	SQ	Squelch Volume
	5	8C	+ 8V
	6		
	7		
	8		
	9	AL	Alert Mute
⑪	1	KEY	KEY
	2	STS	Side Tone Switch
⑫	1	8C	+ 8V
	2	SSB	SSB + B
	3	ALM	ALC Meter
	4	P2	Power Control 2
	5	PRO	Protection
⑬	1	8R	RX 8V
	2	SCR	SSB/CW RX + B
	3	SSQ	SSB Squelch
	4	E	GND (Earth)
	5	FMR	FM RX + B
	6	BLK	Blanking Pulse
	7	NBS	Noise Blanker Switch
⑭	1	A1	Audio Volume 1
	2	E	GND (Earth)
⑮	1	SF	Standby Frequency
	2	E	GND (Earth)
AF UNIT (X49-1180-00)			
①	1	8M	MIC 8V
	2	MIC	MIC AF input
	3	E	GND (Earth)
	4	UP	MIC UP
	5	DW	MIC DOWN
	6	SS	Standby Switch
②	1	PRS	Processor Switch
	2	MV1	MIC Volume 1
	3	AN1	Analog input
	4	E	GND (Earth)
	5	FE	Floating earth

TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal name	Terminal Function
③	1	MM	MIC Mute
	2	DW	MIC DOWN
	3	UP	MIC UP
	4	E	GND (Earth)
	5	SSB	SSB + B
	6	−6	−6V
	7	FMB	FM + B (8V)
④	1	8C	+ 8V
	2	E	GND (Earth)
	3	FMM	FM MIC
	4	SS	Standby Switch
⑤	1	STS	Sidetone Switch
	2	STS	Sidetone Switch
	3	KEY	KEY
	4	KEY	KEY
	5	DE	Delay
⑥	1	ANO	Analog output
	2	E	GND (Earth)
	3	A1	Audio Volume 1
	4	E	GND (Earth)
	5	A1	Audio Volume 1
	6	E	GND (Earth)
	7	A2	Audio Volume 2
	8	E	GND (Earth)
	9	BZ	Beep out
⑦	1	E	GND (Earth)
	2	AP	Audio Power
	3	CB	Common B
PLL UNIT (X50-1990-XX)			
①	1	CAR	Carrier
	2	E	GND (Earth)
	3	8C	+ 8V
	4	FMB	FM + B (8V)
	5	CWT	CW TX + B (8V)
	6	9T	TX 9V
	7	LSB	LSB + B (8V)
	8	IFS	IF Shift Voltage
②	1	CP	PLL Clock
	2	DP	PLL Data
	3	EA	PLL A Enable
	4	EB	PLL B Enable
	5	E	GND (Earth)
	6	CV	Control Voltage
③	1	SF	Standard Frequency
	2	E	GND (Earth)
	3	E	GND (Earth)
	4	4F	4th Frequency
④	1	4FH	4th Frequency for HET unit (TS-811 only)
	2	E	GND (Earth) (TS-811 only)
	3	8C	+ 8V (TS-811 only)
	4	BS	Band Select **K only** (TS-811 only)
HET UNIT (X50-2000-00) TS-811 M,T,W,X (X50-2010-10) TS-811 K			
①	1	E	GND (Earth)
	2	4FH	4th Frequency from PLL unit
	3	8C	+ 8V
	4	BS	Band Select **K only**
TONE UNIT (X52-1290-60) T,W only			
①	1	5C	
	2	TH	Tone on : H (5V)
	3	TI	Tone input
	4	E	GND (Earth)

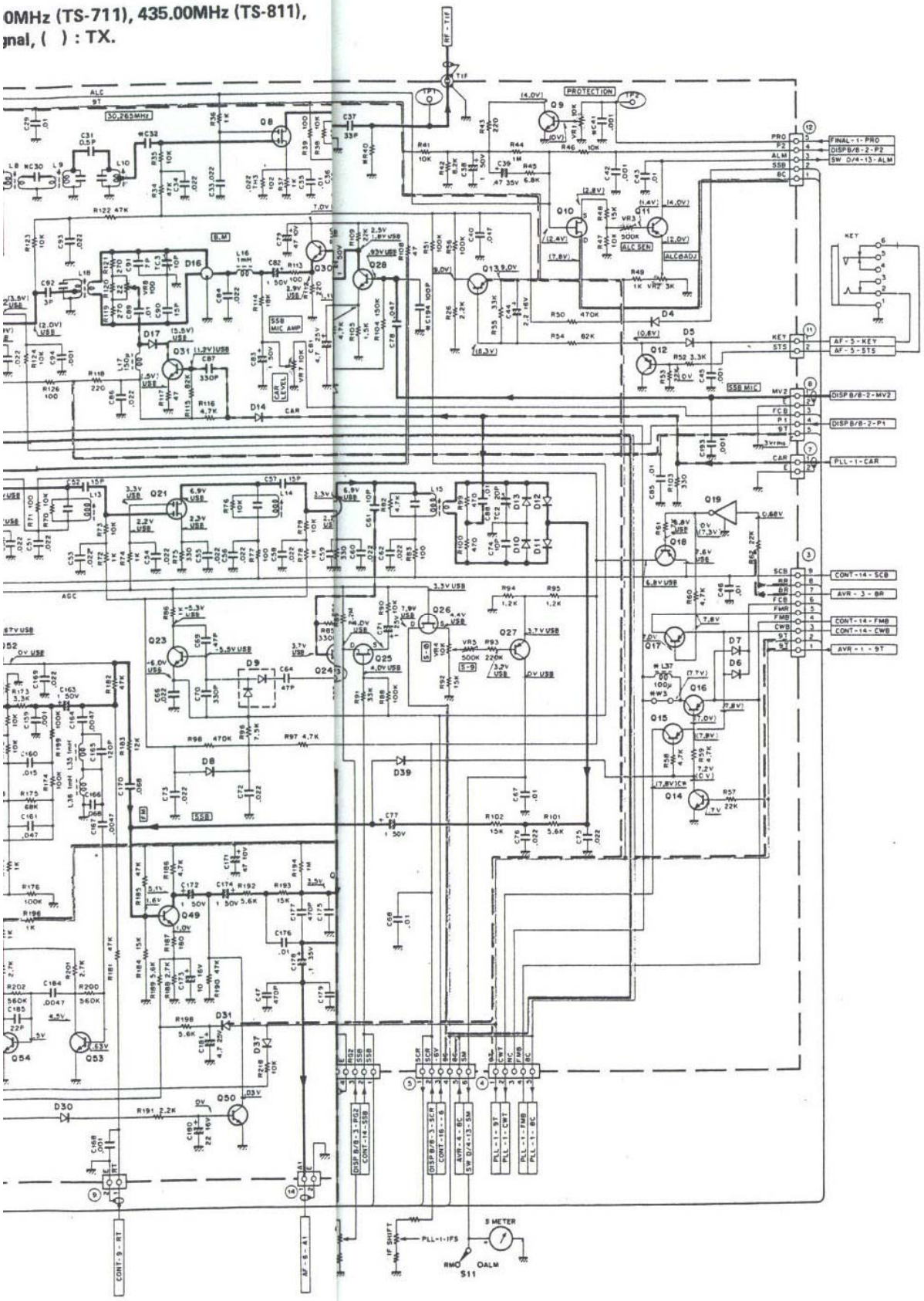
Connector No.	Terminal No.	Terminal name	Terminal Function	
CONTROL UNIT (X53-1410-XX)				
①	1	E	GND (Earth)	
	2	E2	RIT ENCODER PULSE 2	I
	3	E1	RIT ENCODER PULSE 1	I
②	1	E	GND (Earth)	
	2	EN1	MAIN ENCODER PULSE 1	I
	3	EN2	MAIN ENCODER PULSE 2	I
	4	EN3	MAIN ENCODER PULSE 3	I
	5	5C	Common 5V	O
	6	PS	PLANGER SENSOR	I
	7	PN	PLANGER SWING PULSE	O
③	1	FS	Frequency STEP LED	O
	2	FL	Frequency LOCK LED	O
	3	DC	DCL LED	O
	4	CL	CHL LED	O
	5	CS	CSQ LED	O
	6	CA	CALL LED	O
④	1	MM	MIC MUTE	O
	2	MM	MIC MUTE	O
	3	SQS	Squelch Select	O
	4	BLK	Blanking Pulse	O
	5	AL	Alert Mute	O
	6	DW	MIC DOWN	I
	7	UP	MIC UP	I
	8	SC	SCAN Control 5.4V (Busy : H)	I
⑤	1	E	GND (Earth)	
	2	WR	Write strobe	O
	3	RD	Read strobe	O
	4	CS	Chip Select	O
	5	C/D	Common/Data	O
	6	RDY	Receiver Ready	I
	7	SB	Switched B (13.8V)	I
⑥	1	D7	Data Bus 7	I/O
	2	D6	Data Bus 6	I/O
	3	D5	Data Bus 5	I/O
	4	D4	Data Bus 4	I/O
	5	D3	Data Bus 3	I/O
	6	D2	Data Bus 2	I/O
	7	D1	Data Bus 1	I/O
	8	D0	Data Bus 0	I/O
	9	RES	Reset	O
⑦	1	T1	Tone data 1 (K,M,X only)	O
	2	T2	Tone data 2 (K,M,X only)	O
	3	T3	Tone data 3 (K,M,X only)	O
	4	T4	Tone data 4 (K,M,X only)	O
	5	T5	Tone data 5 (K,M,X only)	O
	6	T6	Tone data 6 (K,M,X only)	O
	7	5C		O
	8	TH	Tone on : H (5V)	O
	9	TI	Tone input	I
	10	E	GND (Earth)	
⑧	1	PSQ	(VS-1)	O
	2	PS1	(VS-1)	O
	3	PS2	(VS-1)	O
	4	PS3	(VS-1)	O
	5	PS4	(VS-1)	O
	6	SR	(VS-1)	O
	7	BY	(VS-1)	I
	8	5C1	(VS-1)	O

TERMINAL FUNCTION

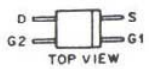
Connector No.	Terminal No.	Terminal name	Terminal Function	
⑨	1	TO	Tone out	O
	2	E	GND (Earth)	
	3	AN1	Analog input	O
	4	E	GND (Earth)	
	5	RT	Modem Receive Input	I
	6	E	GND (Earth)	
	7	BZ	Beep out	O
	8	E	GND (Earth)	
⑩	1	8C2	VS-1	O
	2	E		
	3	VO		I
⑪	1	5B	B for 5C	I
	2	E	GND (Earth)	
	3	ST	Standby out	O
	4	SB	Switched B	I
⑫	1	DD	PLL Data	O
	2	E	GND (Earth)	
	3	CP	PLL Clock	O
	4	EA	PLL A Enable	O
	5	EB	PLL B Enable	O
⑬	1	11C	Common 11V	O
	2	−6V	−6V	I
	3	DD	Display Data	O
	4	CD	Display Clock	O
	5	ED	Display Enable	O
	6	5C	Common 5V	O
	7	E	GND (Earth)	
⑭	1	CWB	CW + B (8V)	O
	2	CWB	CW + B (8V)	O
	3	CWB	CW + B (8V)	O
	4	FMB	FM + B (8V)	O
	5	FMB	FM + B (8V)	O
	6	LSB	LSB + B (8V)	O
	7	SCB	SSB/CW + B (8V)	O
	8	SSB	SSB + B (8V)	O
	9	SSB	SSB + B (8V)	O
	10	ATX	Anti-TX	O
	11	8C	Common 8V	O
⑮	1	AU	AUTO LED	O
	2	LS	LSB LED	O
	3	CW	CW LED	O
	4	US	USB LED	O
	5	FM	FM LED	O
⑯	1	−6	−6V	O
	2	−6	−6V	O
	3	SS	Standby Switch	I
	4	SS	Standby Switch	I
⑰	1	A1	Port A1 (KEY SCAN output)	O
	2	A2	Port A2	O
	3	A3	Port A3	O
	4	A4	Port A4	O
	5	A5	Port A5	O
	6	A6	Port A6	O
	7	B0	Port B0 (KEY SCAN input)	I
	8	B1	Port B1	I
	9	B2	Port B2	I
	10	B3	Port B3	I
	11	B4	Port B4	I
	12	B5	Port B5	I
	13	B6	Port B6 VOICE Switch	I

Connector No.	Terminal No.	Terminal name	Terminal Function
DISPLAY UNIT (X54-1820-11)			
①	1	APO	Audio Power out
	2	E	GND (Earth)
	3	AP	Audio Power
	4	E	GND (Earth)
②	1	PC	Power Control
	2	E	GND (Earth)
	3	MV2	MIC Volume 2
	4	E	GND (Earth)
	5	MV1	MIC Volume 1
	6	P1	Power Control 1
	7	E	GND (Earth)
	8	P2	Power Control 2
③	1	SQS	Squelch Select
	2	SCR	SSB/CW RX + B
	3	IFS	IF Shift Voltage
	4	SQ	Squelch Volume
	5	8C	+ 8V
	6	RG2	RF Gain Volume 2
	7	E	GND (Earth)
④	1	APO	Audio Power out
	2	E	GND (Earth)
	3	AP	Audio Power
	4	E	GND (Earth)
⑤	1	E	GND (Earth)
	2	5C	Common 5V
	3	ED	Display Enable
	4	CD	Display Clock
	5	DD	Display Data
	6	−6	−6V
	7	11C	Common 11V
⑥	1	E	GND (Earth)
	2	8M	MIC 8V
	3	UP	MIC UP
	4	DW	MIC DOWN
	5	SS	Standby Switch
	6	MIC	MIC AF input
	7	E	GND (Earth)
⑦	1	E	GND (Earth)
	2	SP	Speaker
⑧	1	DE	Delay
	2	E	GND (Earth)
	3	APO	Audio Power out
	4	SS	Standby Switch
	5	SS	Standby Switch
	6	KEY	KEY
	7	STS	Sidetone Switch
	8	CWB	CW + B (8V)
ENCODER ASS'Y (W02-0364-00)			
①	1	E	GND (Earth)
	2	EN1	MAIN ENCODER PULSE 1
	3	EN2	MAIN ENCODER PULSE 2
	4	EN3	MAIN ENCODER PULSE 3
	5	5C	Common 5V
	6	PS	PLANGER SENSOR
	7	PN	PLANGER SWING PULSE

0MHz (TS-711), 435.00MHz (TS-811),
gnal, ( ) : TX.

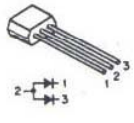


3SK73

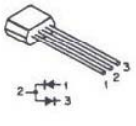


TA7302P
μPC577H

MC911



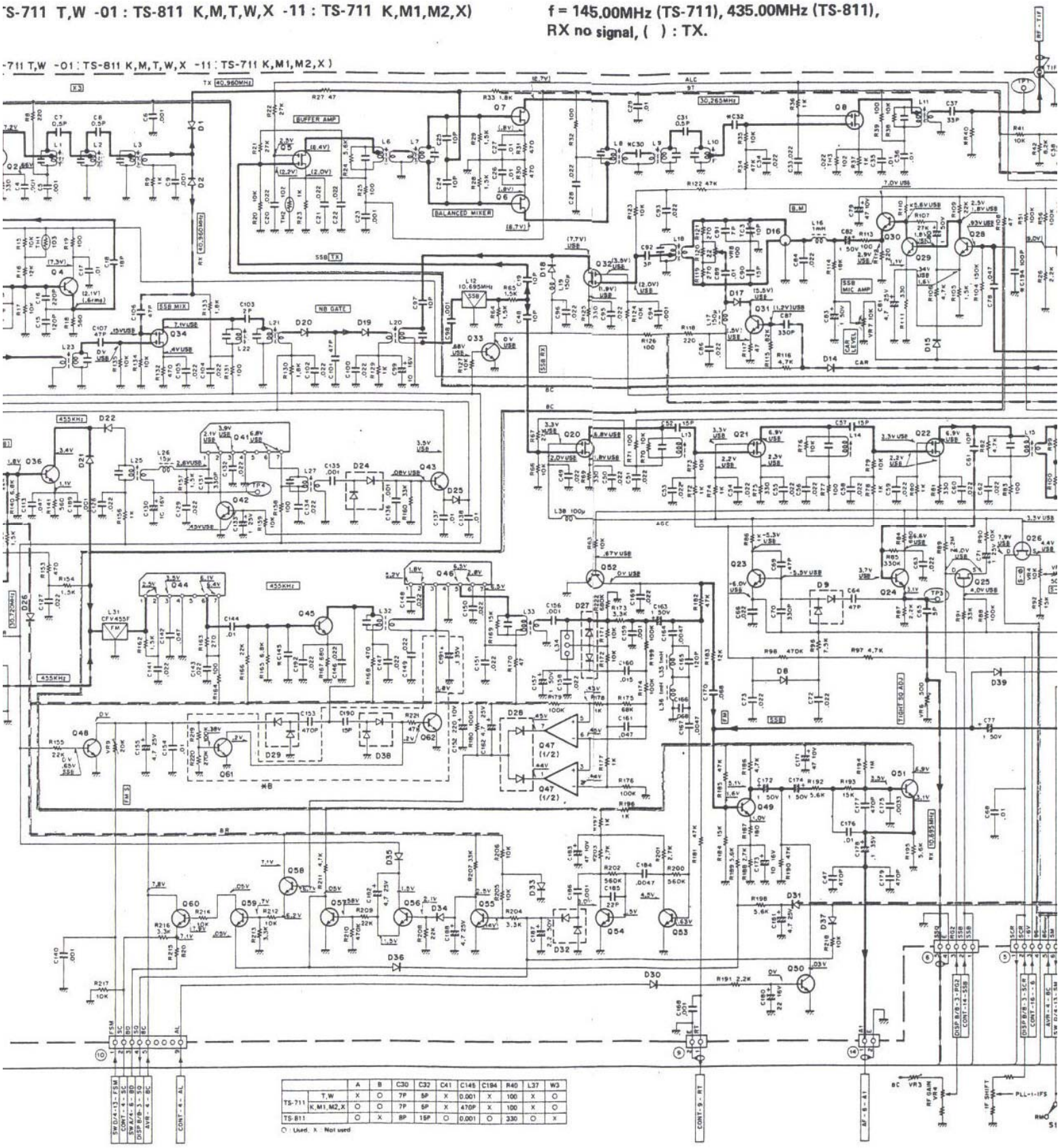
MC931



CIRCUIT DIAGR

TS-711 T,W -01 : TS-811 K,M,T,W,X -11 : TS-711 K,M1,M2,X)

f = 145.00MHz (TS-711), 435.00MHz (TS-811),
RX no signal, ( ) : TX.

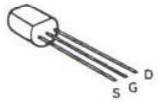


		A	B	C30	C32	C41	C145	C194	R40	L37	W3
TS-711	T,W	X	O	7P	5P	X	0.001	X	100	X	O
	K,M1,M2,X	O	O	7P	5P	X	470P	X	100	X	O
TS-811		O	X	8P	15P	O	0.001	O	330	O	X

O : Used, X : Not used

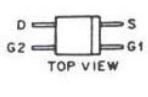
2SK161

2SK30A
2SK125



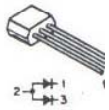
DTC114E

3SK73



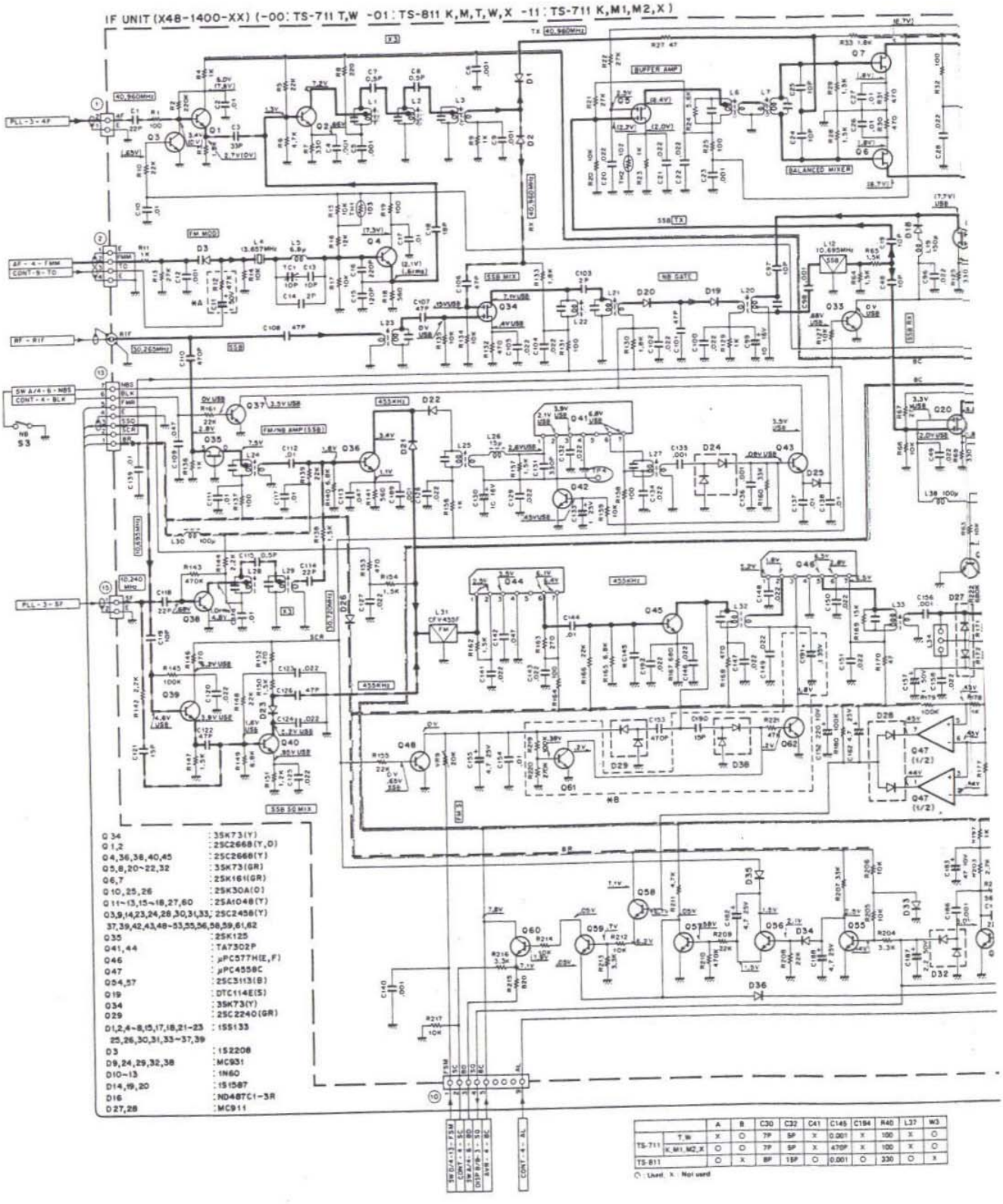
TA7302P
μPC577H

MC911

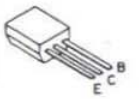


IF UNIT (X48-1400-XX) (-00 : TS-711 T,W -01 : TS-811 K,M,T,W,X -11 : TS-711 K,M1,M2,X)

f = 14
RX no

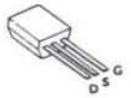


2SA1048
2SC2458
2SC2668
2SC3113



2SC2240

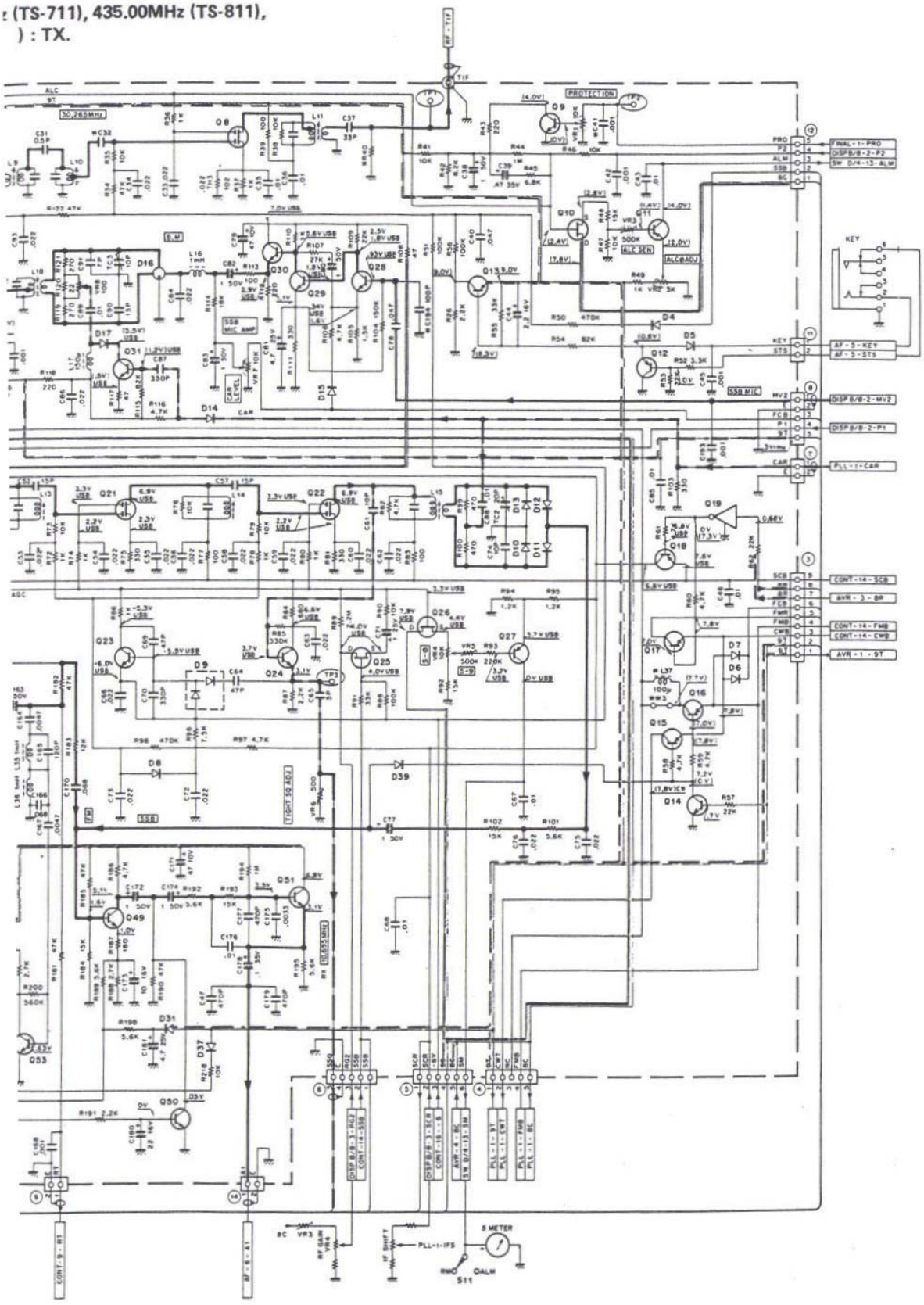
2SK161



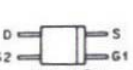
2SK30A
2SK125

DTC114E

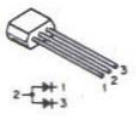
: (TS-711), 435.00MHz (TS-811),
) : TX.



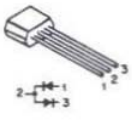
TA7302P
μPC577H



MC911



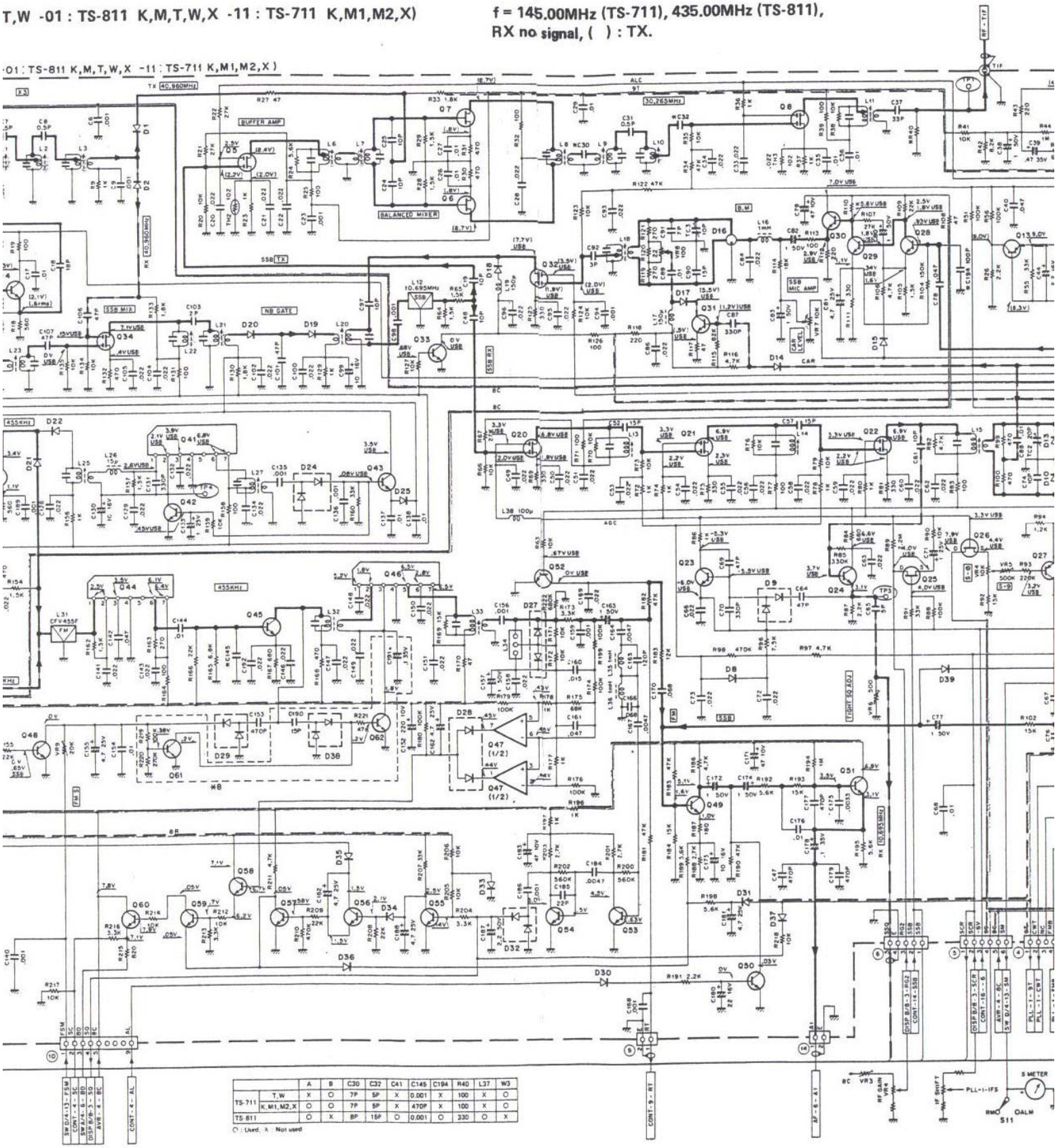
MC931



CIRCUIT DIAGRAM/

T,W -01 : TS-811 K,M,T,W,X -11 : TS-711 K,M1,M2,X)

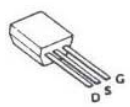
f = 145.00MHz (TS-711), 435.00MHz (TS-811),
RX no signal, ( ) : TX.



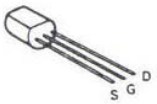
		A	B	C30	C32	C41	C145	C194	R40	L37	W3
TS-711	T,W	X	○	7P	5P	X	0.001	X	100	X	○
	K,M1,M2,X	○	○	7P	5P	X	470P	X	100	X	○
TS-811		○	X	8P	15P	○	0.001	○	330	○	X

○ : Used, X : Not used

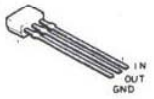
2SK161



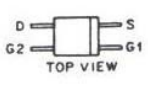
2SK30A
2SK125



DTC114E

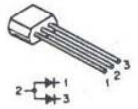


3SK73

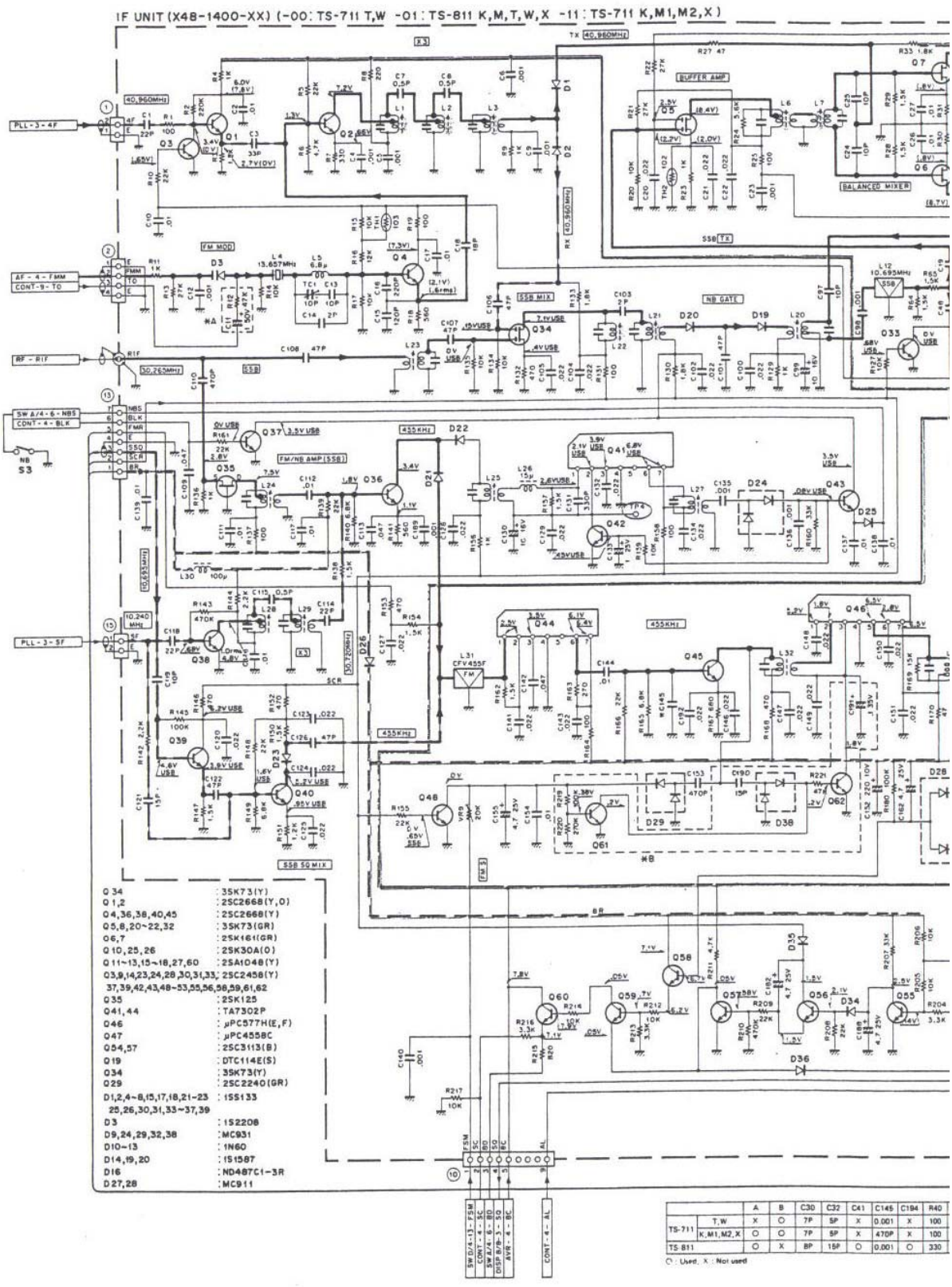


TA7302P
μPC577H

MC911



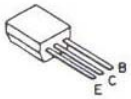
IF UNIT (X48-1400-XX) (-00 : TS-711 T,W -01 : TS-811 K,M,T,W,X -11 : TS-711 K,M1,M2,X)



		A	B	C30	C32	C41	C145	C194	R40
TS-711	T,W	X	○	7P	5P	X	0.001	X	100
	K,M1,M2,X	○	○	7P	5P	X	470P	X	100
TS-811		○	X	8P	15P	○	0.001	○	330

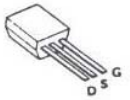
○ : Used, X : Not used

2SA1048
2SC2458
2SC2668
2SC3113

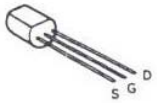


2SC2240

2SK161



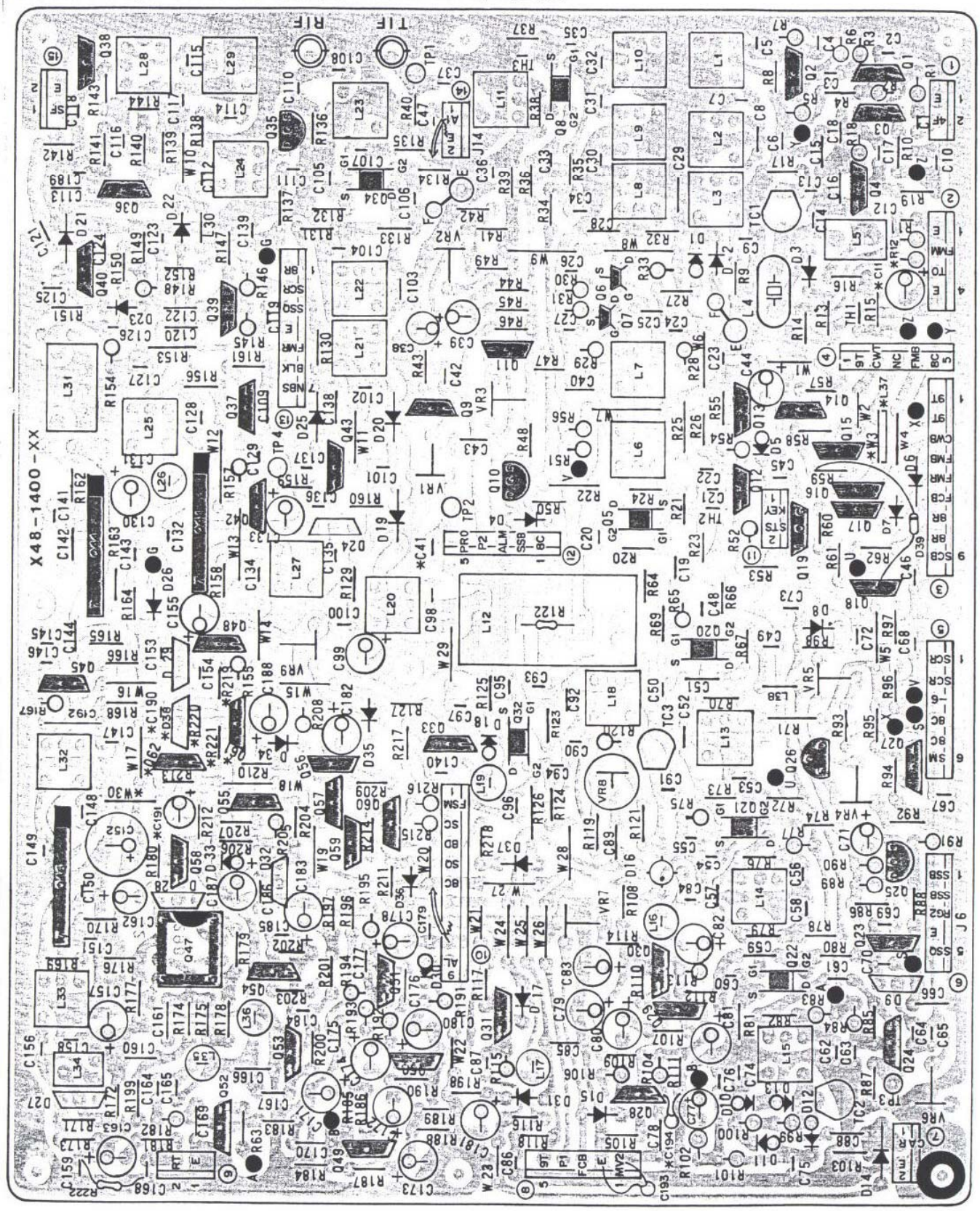
2SK30A
2SK125



DTC114E

A B C D E F

IF UNIT (X48-1400-XX) Component side view
(-00 : TS-711 T,W -01 : TS-811 K,M,T,W,X -11 : TS-711 K,M1,M2,X)

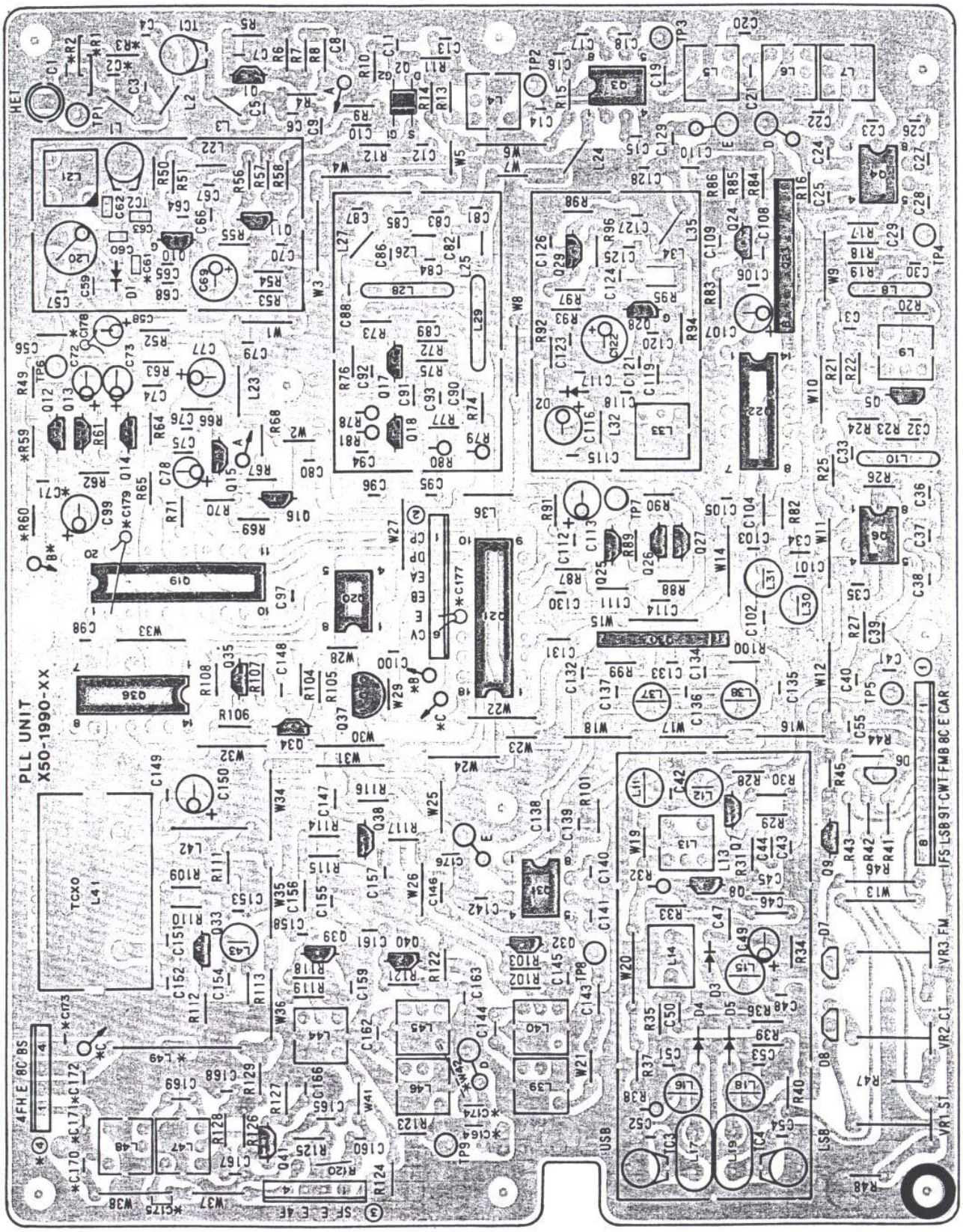


		Q61,62	D38	C11	C41	C190,191	C194	R12	R219–221	L37	W3,30
TS-711	T,W	○	○	×	×	○	×	×	○	×	○
	K,M1,M2,X	○	○	○	×	○	×	○	○	×	○
TS-811	K,M,T,W,X	×	×	○	○	×	○	○	×	○	×

○ : Used × : Not used

PLL UNIT (X50-1990-XX) Component side view

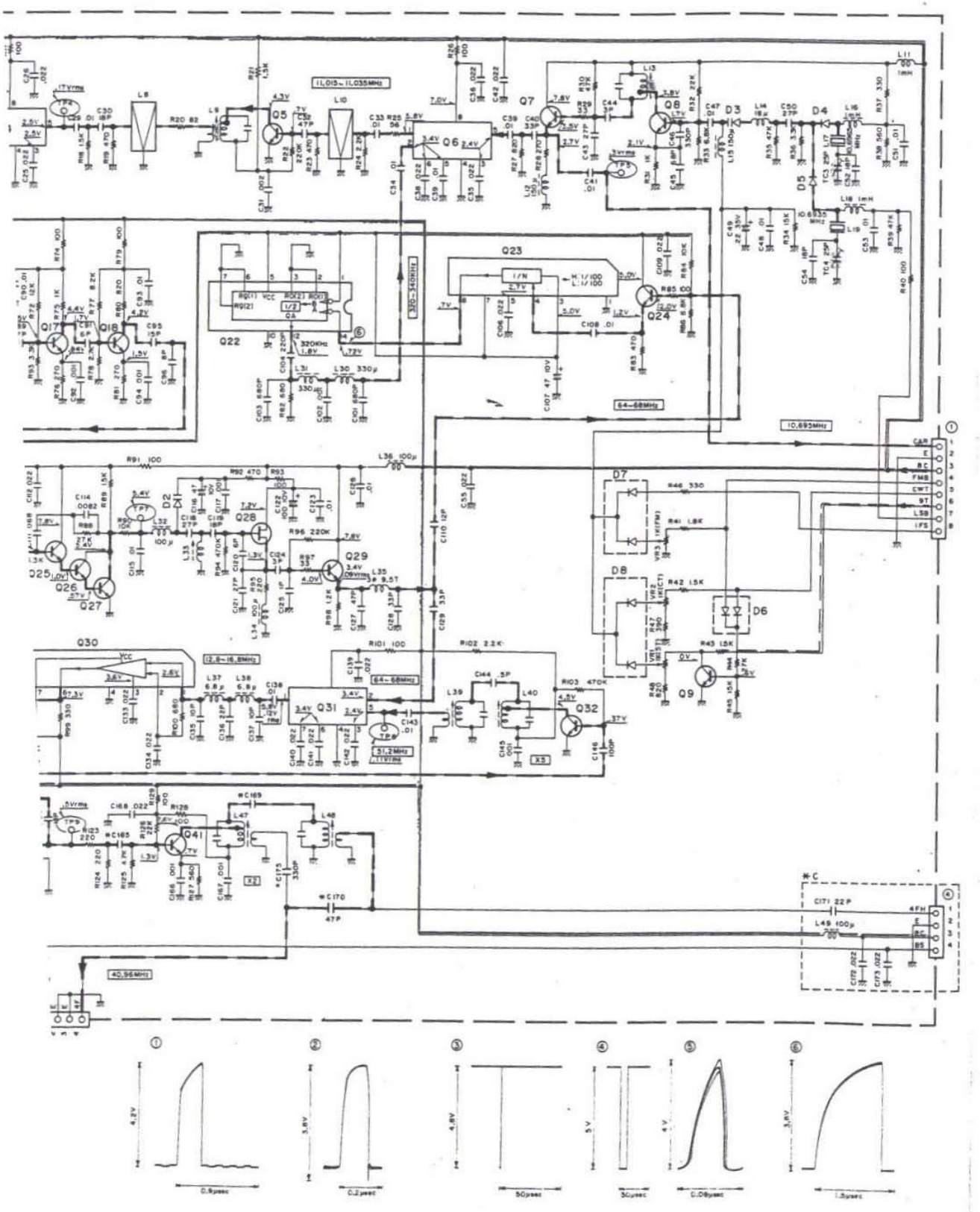
(-00 : TS-711 T,W -01 : TS-811 M,T,W,X -11 : TS-711 K,M1,M2,X -12 : TS-811 K)



		L49	R1	R2	R3	R59,60	C2	C61	C71	C164	C170	C171–175	C177	C178,179	W42	④	B	C
TS-711	T,W	X	O	X	O	O	O	X	O	O	O	X	O	X	X	X	O	X
	K,M1,M2,X	X	O	X	O	O	O	O	O	O	O	X	O	X	X	X	O	X
TS-811	M,T,W,X	O	X	O	X	X	X	X	X	X	X	O	X	O	O	O	X	O
	K	O	X	O	X	X	X	X	X	X	X	O	X	O	O	O	X	O

O : Used X : Not used

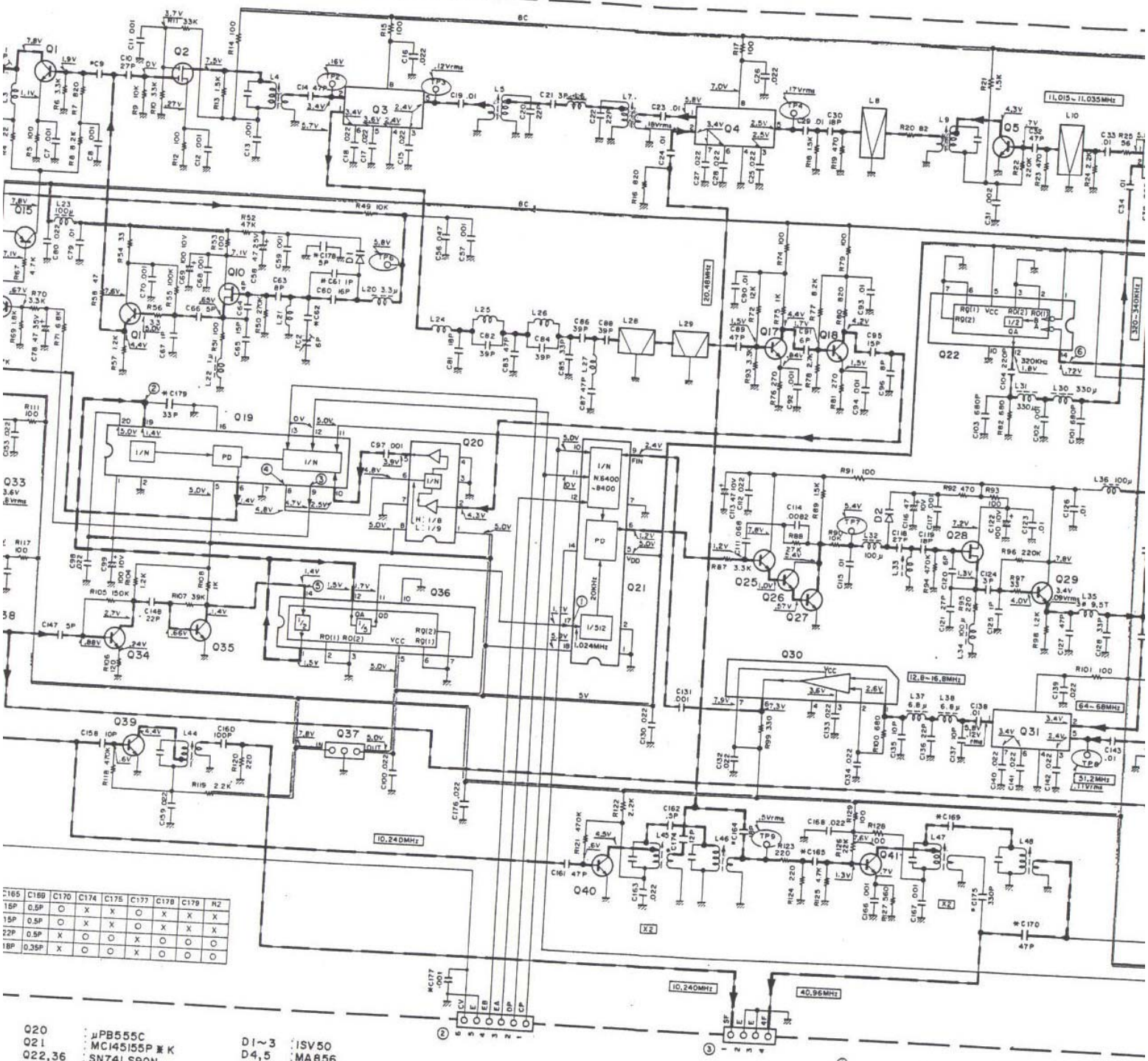
f = 145.00MHz (TS-711), 435.00MHz (TS-811), RX no signal, ( ) : TX.



UIT DIAGRAM/PC BOARD VIEW

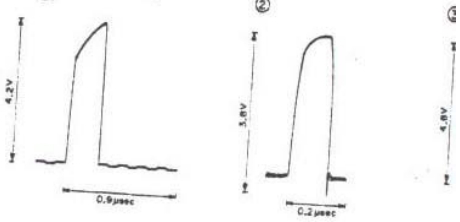
) : TS-711 T,W -01 : TS-811 M,T,W,X -11 : TS-711 K,M1,M2,X -12 : TS-811 K)

-711 T,W -01 : TS-811 M,T,W,X -11 : TS-711 K,M1,M2,X -12 : TS-811 K)

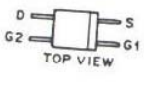


C165	C169	C170	C174	C175	C177	C178	C179	R2
15P	0.5P	O	X	X	O	X	X	X
15P	0.5P	O	X	X	O	X	X	X
22P	0.5P	X	O	O	X	O	O	O
18P	0.35P	X	O	O	X	O	O	O

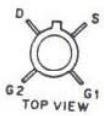
Q20	: μPB555C	D1~3	: ISV50
Q21	: MCI45155P※K	D4,5	: MA856
Q22,36	: SN74LS90N	D6~8	: MC921
Q23	: M54459L		
Q24,32	: 2SC2668(Y,O)		
Q30	: TA7302P		
Q37	: NJM78L05A		



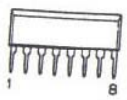
3SK73



2SK192A



M54459L



NJM78L05A

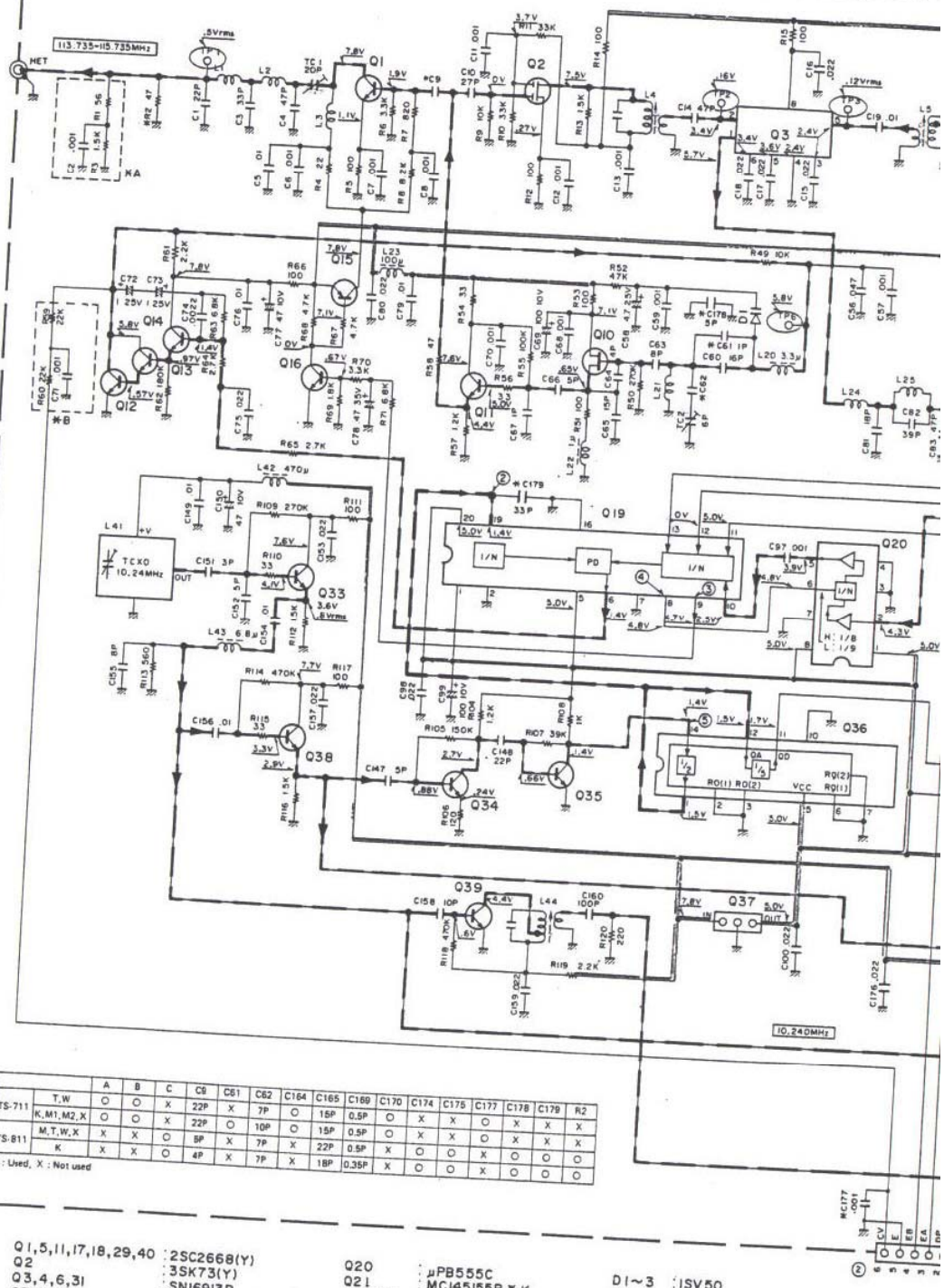
TA7302P

MC921

TS-711/811 CIRCUIT DIAGRAM/PC BOARD VIEW

PLL UNIT (X50-1990-XX) (-00 : TS-711 T,W -01 : TS-811 M,T,W,X -11 : TS-711 K,M1,M2,X

PLL UNIT (X50-1990-XX) (-00 : TS-711 T,W -01 : TS-811 M,T,W,X -11 : TS-711 K,M1,M2,X -12 : TS-811 K)



		A	B	C	C9	C61	C62	C164	C165	C169	C170	C174	C175	C177	C178	C179	R2
TS-711	T,W	O	O	X	22P	X	7P	O	15P	0.5P	O	X	X	O	X	X	X
	K,M1,M2,X	O	O	X	22P	O	10P	O	15P	0.5P	O	X	X	O	X	X	X
TS-811	M,T,W,X	X	X	O	8P	X	7P	X	22P	0.5P	X	O	O	X	O	O	O
	K	X	X	O	4P	X	7P	X	18P	0.35P	X	O	O	X	O	O	O

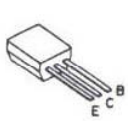
O : Used, X : Not used

Q1,5,11,17,18,29,40	2SC2668(Y)
Q2	3SK73(Y)
Q3,4,6,31	SN16913P
Q7,8,41	2SC2787(L)
Q9,16,33~35,38,39	2SC2458(Y)
Q10,28,	2SK192A(GR)※N
Q12~14,25~27	2SC2459(BL)
Q15	2SA1048(Y)
Q19	MC145156P

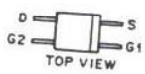
Q20	µPB555C
Q21	MC145155P※K
Q22,36	SN74LS90N
Q23	M54459L
Q24,32	2SC2668(Y,O)
Q30	TA7302P
Q37	NJM78L05A

D1~3	1SV50
D4,5	MA856
D6~8	MC921

2SA1048
2SC2458
2SC2459
2SC2668
2SC2787

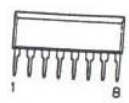


3SK73

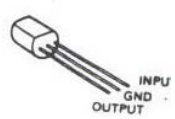


2SK192A

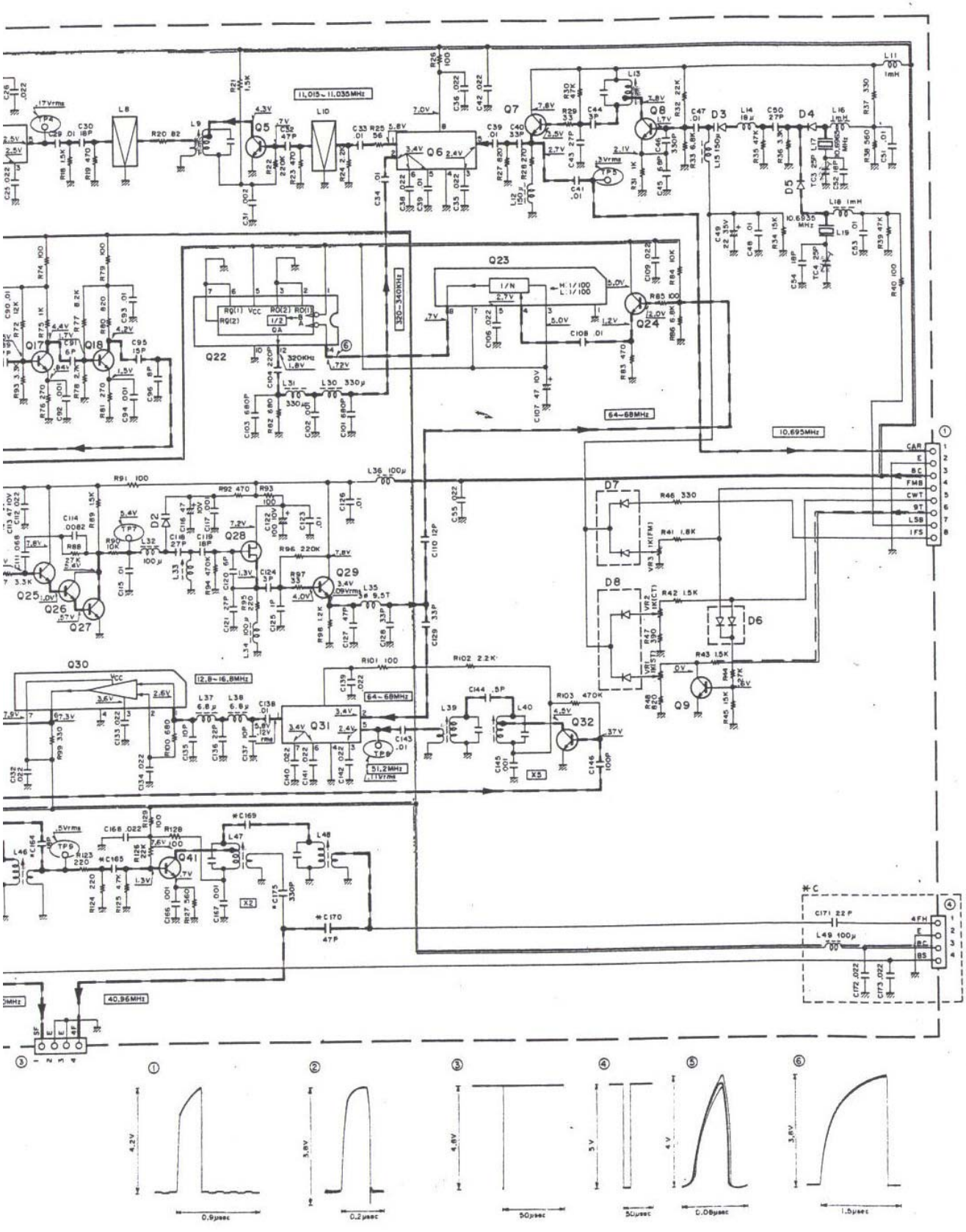
M54459L



NJM78L05A



f = 145.00MHz (TS-711), 435.00MHz (TS-811), RX no signal, ( ) : TX.

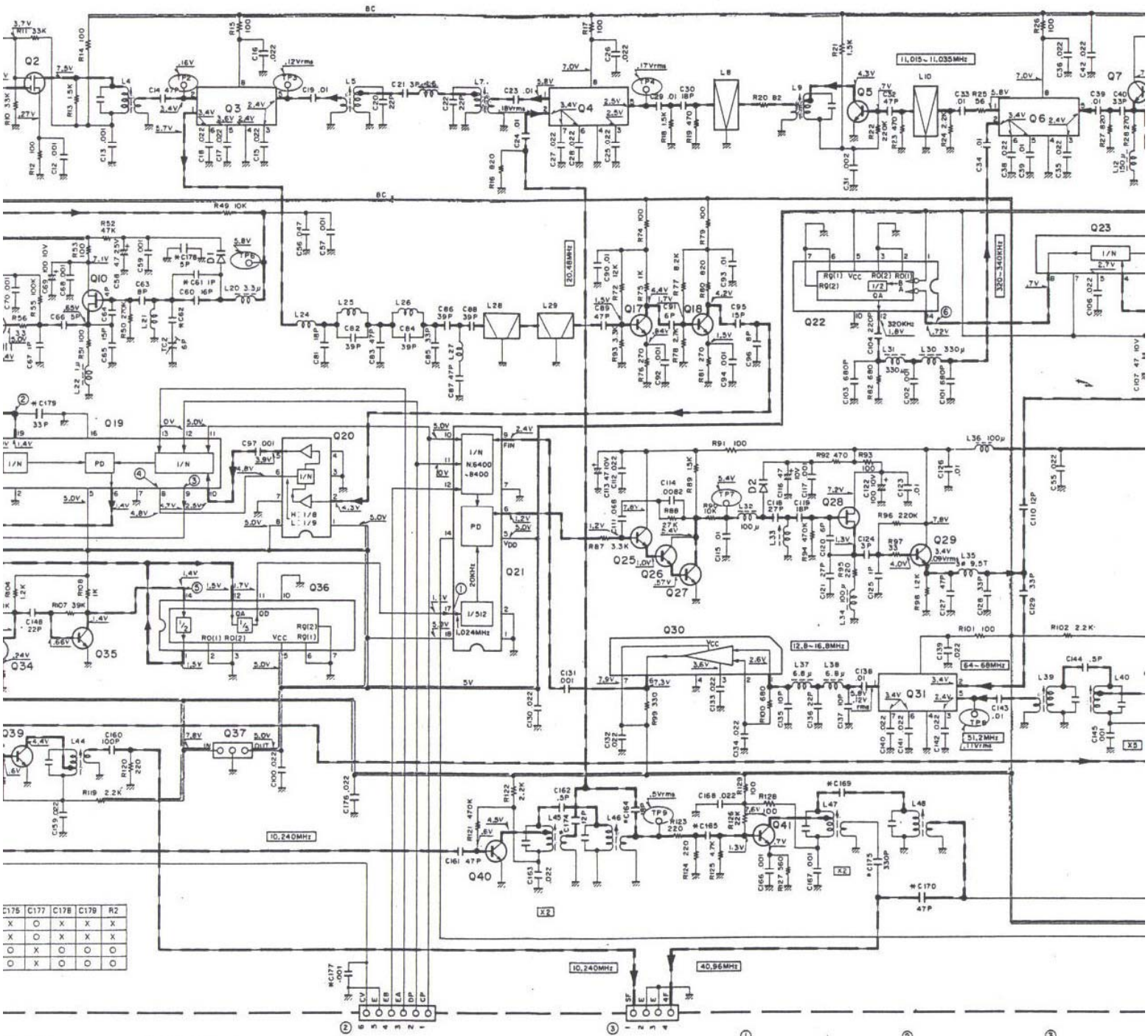


M/PC BOARD VIEW

: TS-811 M,T,W,X -11 : TS-711 K,M1,M2,X -12 : TS-811 K)

f = 145.00MHz (TS-

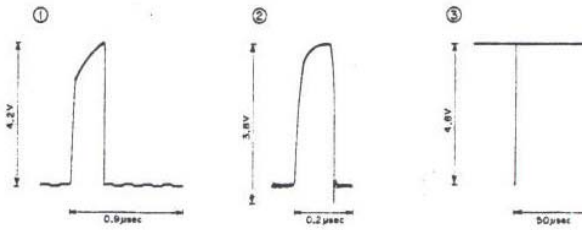
,T,W,X -11: TS-711 K,M1,M2,X -12: TS-811 K)



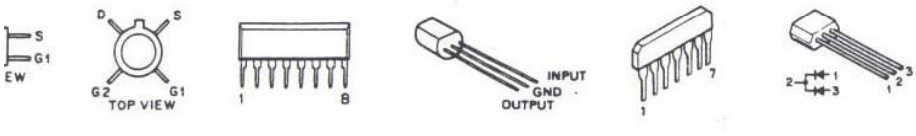
C175	C177	C178	C179	R2
X	O	X	X	X
X	O	X	X	X
O	X	O	O	O
O	X	O	O	O

PB555C
IC145155P ※K
N74LS90N
54459L
SC2668(Y,O)
A7302P
JM78L05A

D1~3 :ISV50
D4,5 :MA856
D6~8 :MC921



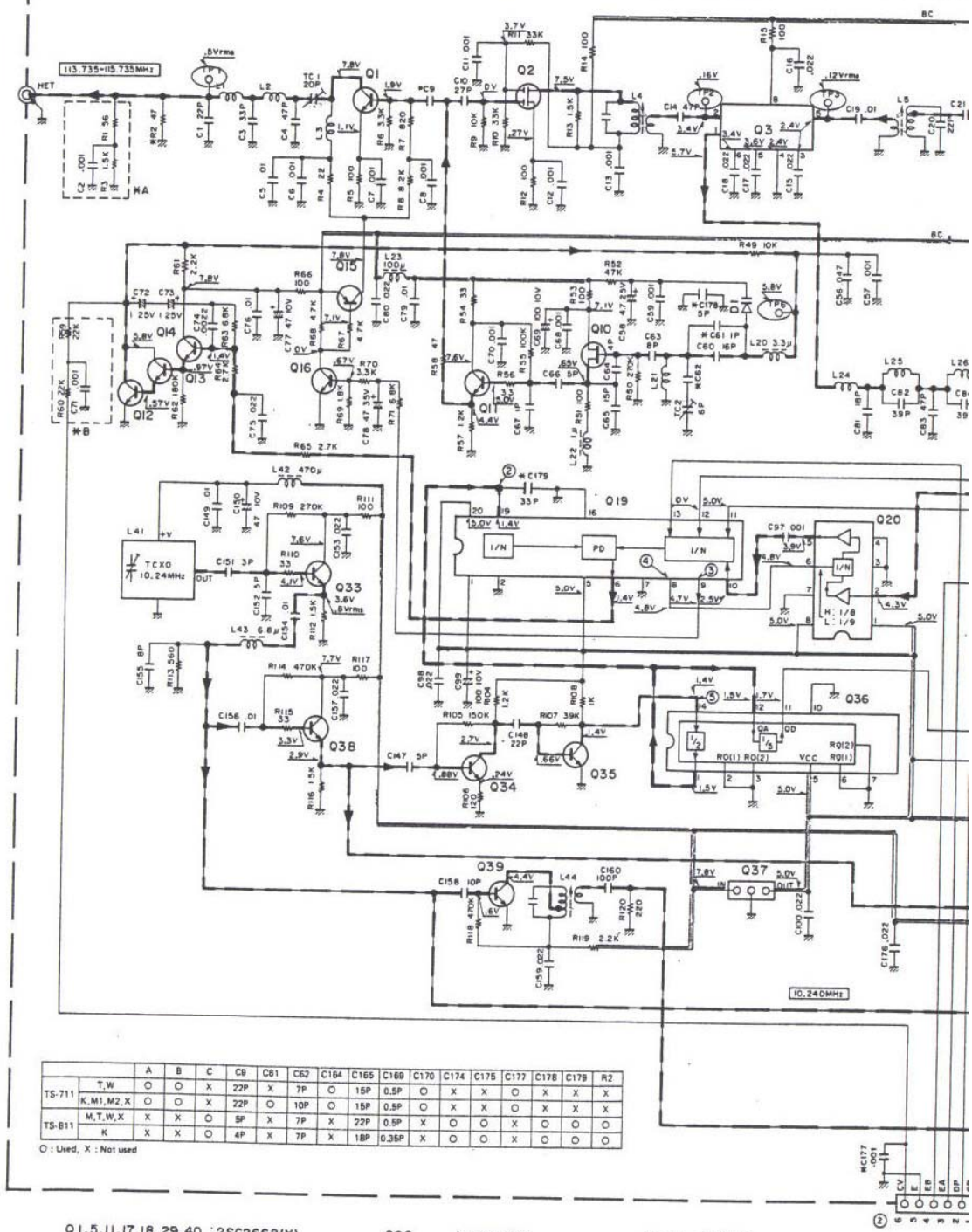
2SK192A M54459L NJM78L05A TA7302P MC921



TS-711/811 CIRCUIT DIAGRAM/PC BOARD VIEW

PLL UNIT (X50-1990-XX) (-00 : TS-711 T,W -01 : TS-811 M,T,W,X -11 : TS-711 K,M1,M2,X -12 :

PLL UNIT(X50-1990-XX)(-00:TS-711 T,W -01:TS-811 M,T,W,X -11:TS-711 K,M1,M2,X -12:TS-811 K)

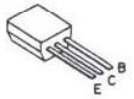


		A	B	C	C9	C61	C62	C164	C165	C169	C170	C174	C175	C177	C178	C179	R2
TS-711	T,W	O	O	X	22P	X	7P	O	15P	0.5P	O	X	X	O	X	X	X
	K,M1,M2,X	O	O	X	22P	O	10P	O	15P	0.5P	O	X	X	O	X	X	X
TS-811	M,T,W,X	X	X	O	5P	X	7P	X	22P	0.5P	X	O	O	X	O	O	O
	K	X	X	O	4P	X	7P	X	18P	0.35P	X	O	O	X	O	O	O

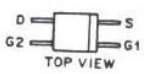
O : Used, X : Not used

Q1,5,11,17,18,29,40	:2SC2668(Y)	Q20	:μPB555C	D1~3	:1SV50
Q2	:3SK73(Y)	Q21	:MC145155P※K	D4,5	:MA856
Q3,4,6,31	:SN16913P	Q22,36	:SN74LS90N	D6~8	:MC921
Q7,8,41	:2SC2787(L)	Q23	:M54459L		
Q9,16,33~35,38,39	:2SC2458(Y)	Q24,32	:2SC2668(Y,O)		
Q10,28,	:2SK192A(GR)※N	Q30	:TA7302P		
Q12~14,25~27	:2SC2459(BL)	Q37	:NJM78L05A		
Q15	:2SA1048(Y)				
Q19	:MC145156P				

2SA1048
2SC2458
2SC2459
2SC2668
2SC2787

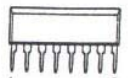


3SK73



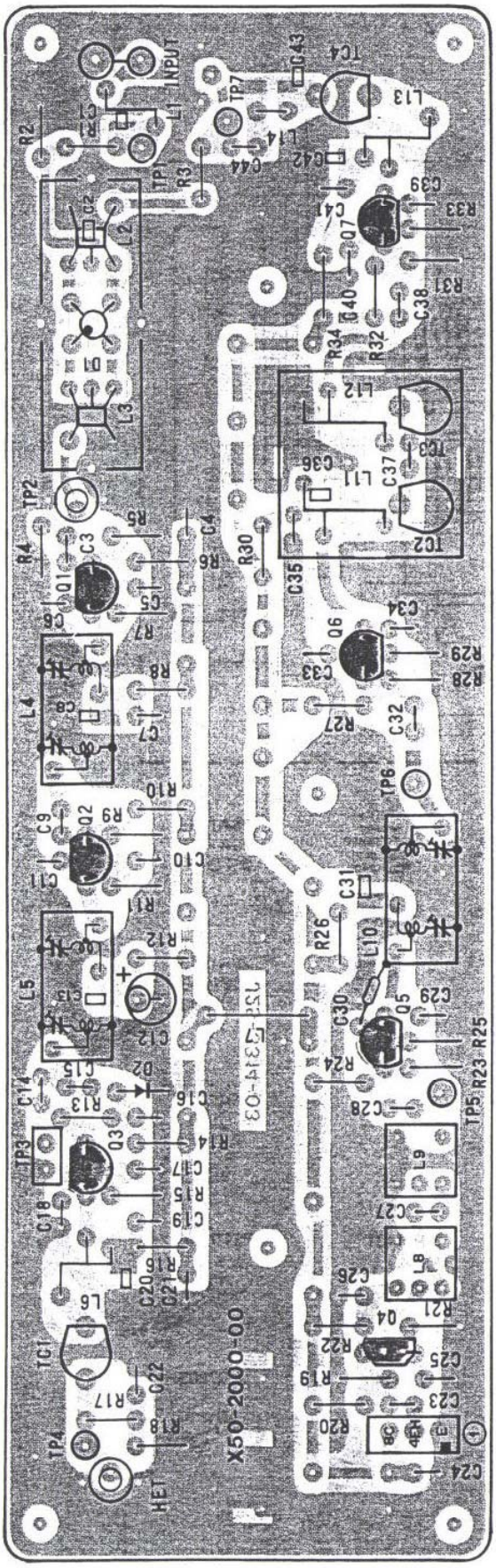
2SK192A

M54459L

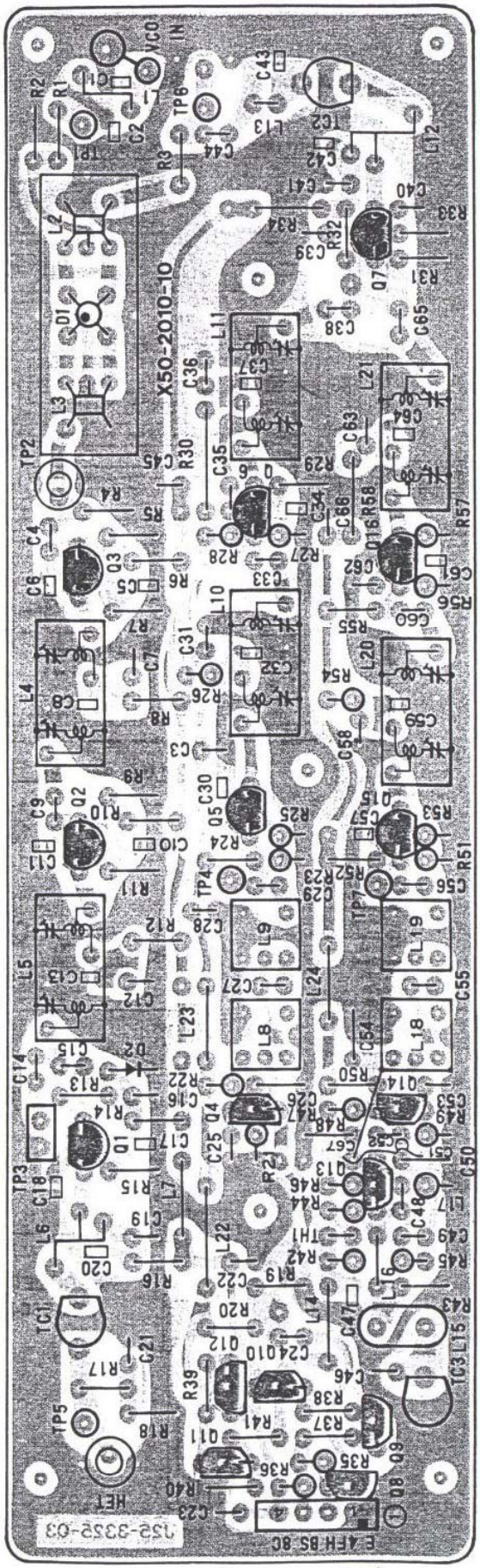


NJM78L05A

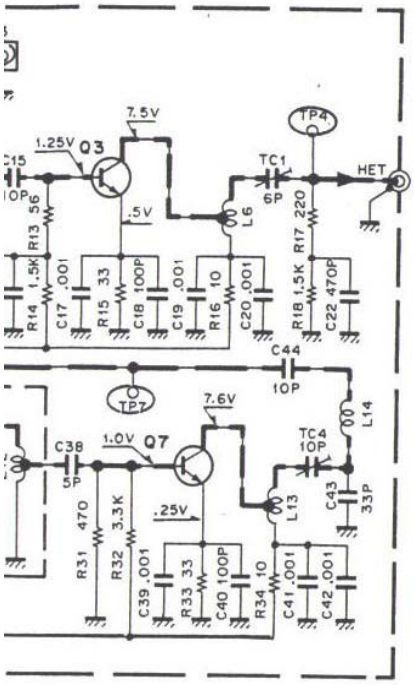
HET UNIT (X50-2000-00) Component side view
(TS-811 M,T,W,X)



HET UNIT (X50-2010-10) Component side view
(TS-811 K)



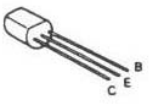
f = 435.00MHz, RX no signal, ( ) : TX.



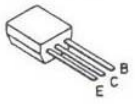
Q1,2,5~7 : 2SC2026
Q3 : 2SC2570A
Q4 : 2SC2787(L)

D1 : ND487C1-3R
D2 : MV13

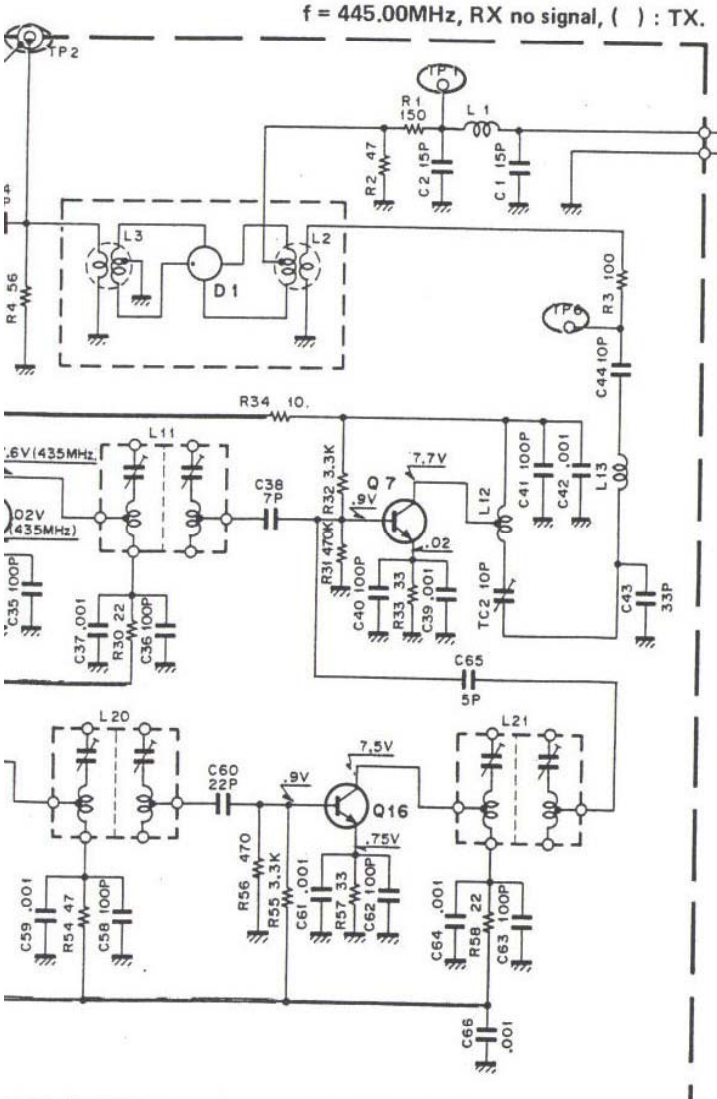
2SC2026
2SC2570A



2SA933S
2SC1740S
2SC2787



f = 445.00MHz, RX no signal, ( ) : TX.

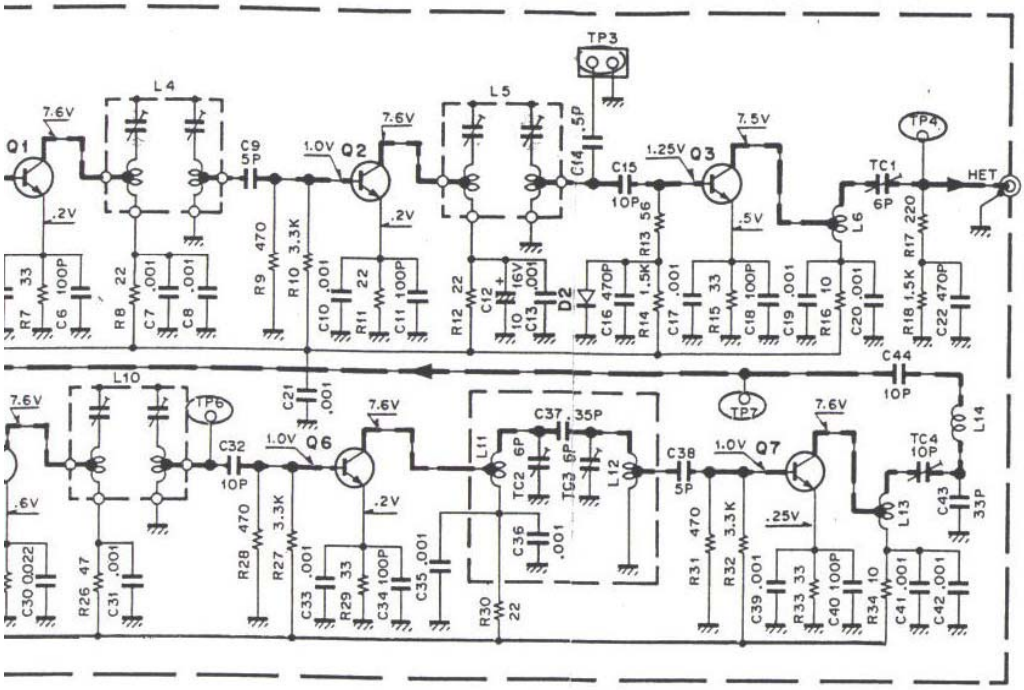


Q 1 : 2SC2570A
Q 2,3,5~7,15,16 : 2SC2026
Q 4,13,14 : 2SC2720
Q 8,9 : 2SC1740S(Q)
Q 10~12 : 2SA933S(Q)

D 1 : ND487C1-3R
D 2 : MV13

CIRCUIT DIAGRAMS/PC BOARD V

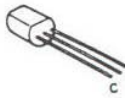
f = 435.00MHz, RX no signal, ( ) : TX.



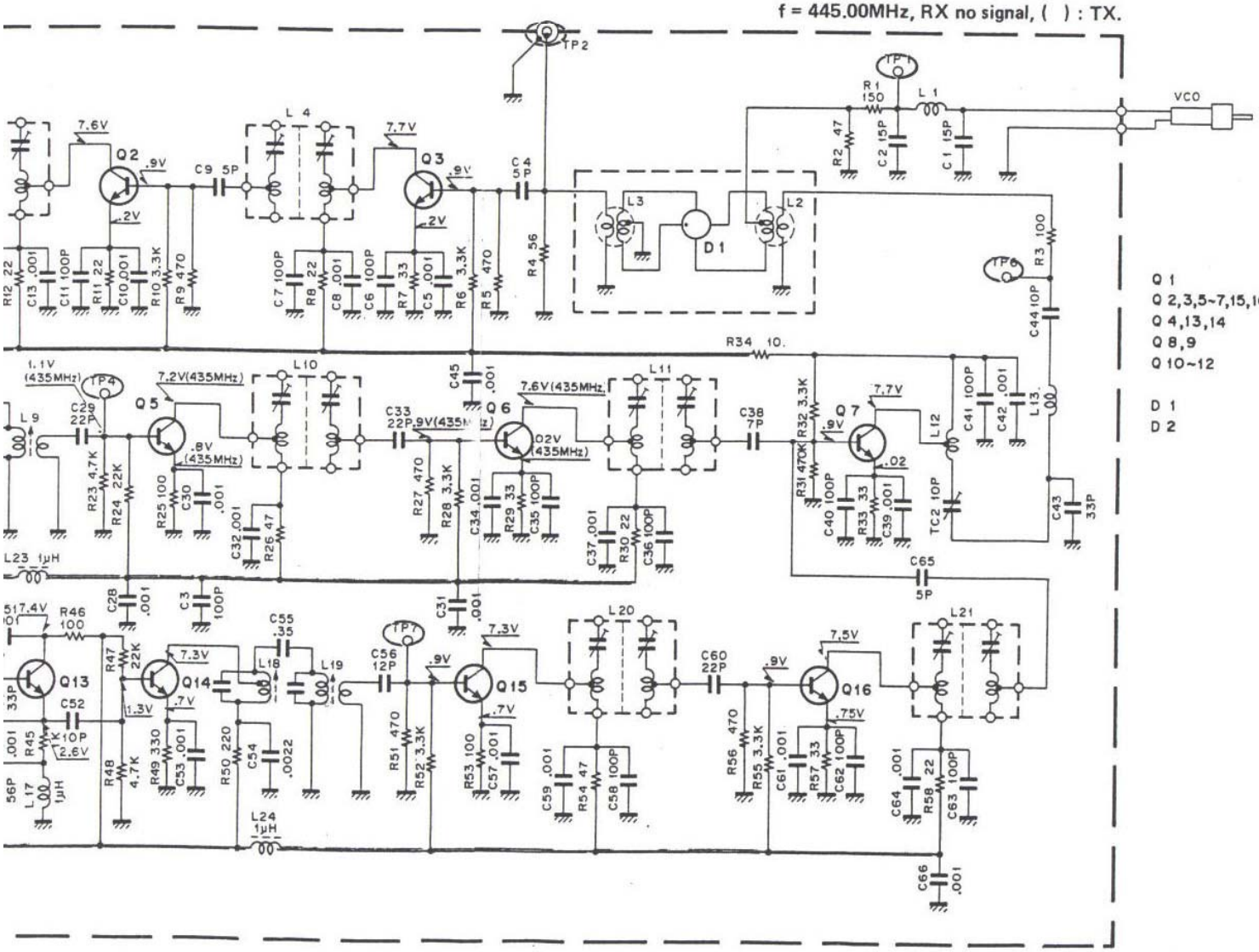
Q1,2,5~7 : 2SC2026
Q3 : 2SC2570A
Q4 : 2SC2787(L)

D1 : ND487C1-3R
D2 : MV13

2SC2026
2SC2570A



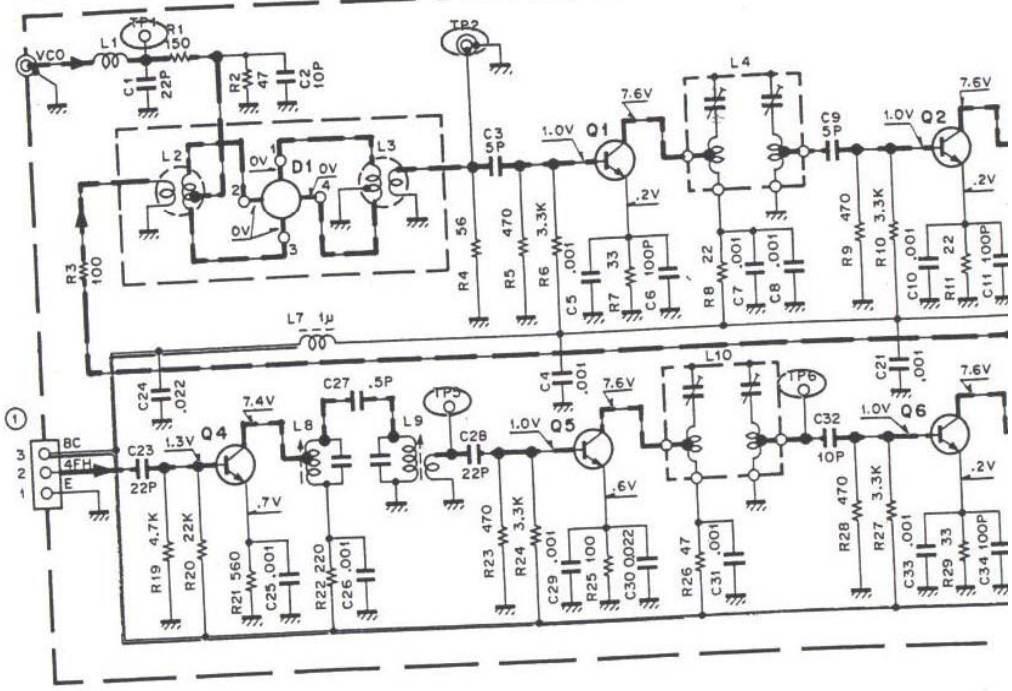
f = 445.00MHz, RX no signal, ( ) : TX.



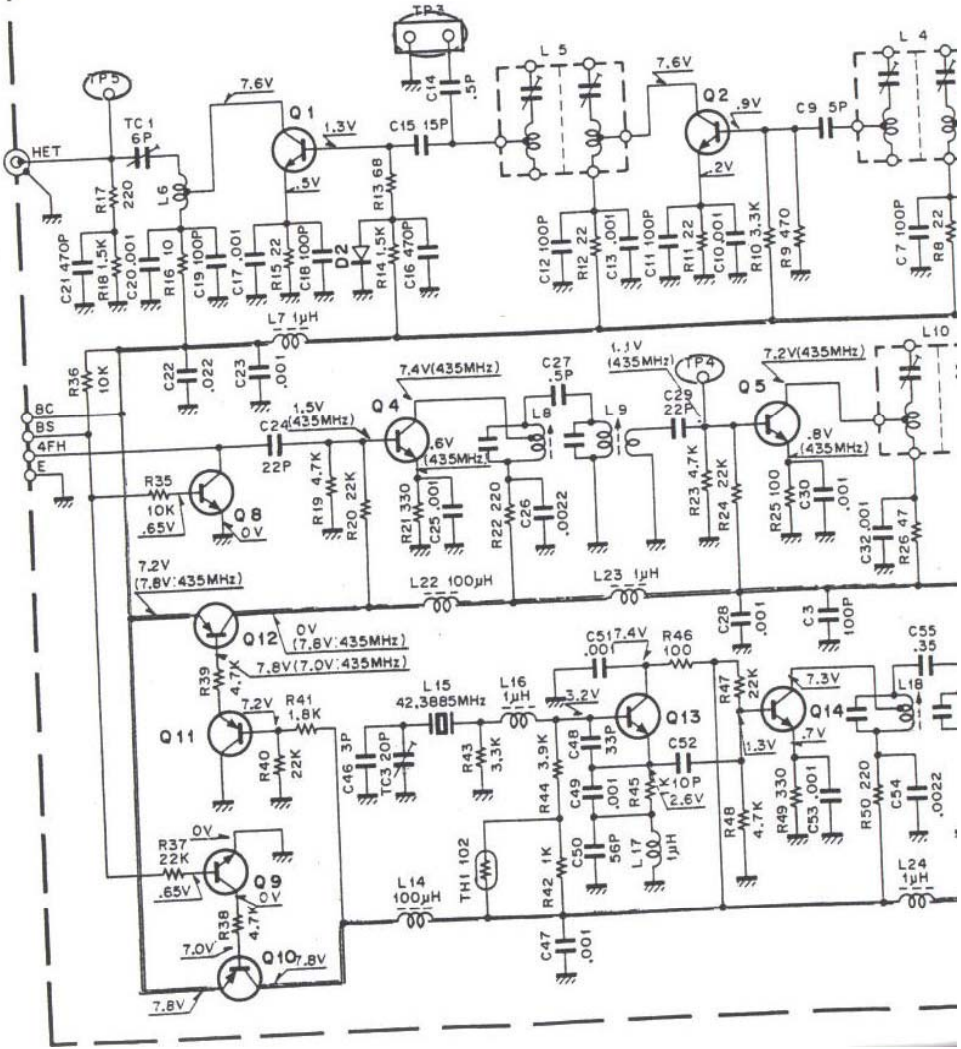
Q1 : 2SC2
Q 2,3,5~7,15,16 : 2SC2
Q 4,13,14 : 2SC2
Q 8,9 : 2SC1
Q 10~12 : 2SA9

D 1 : ND48
D 2 : MV13

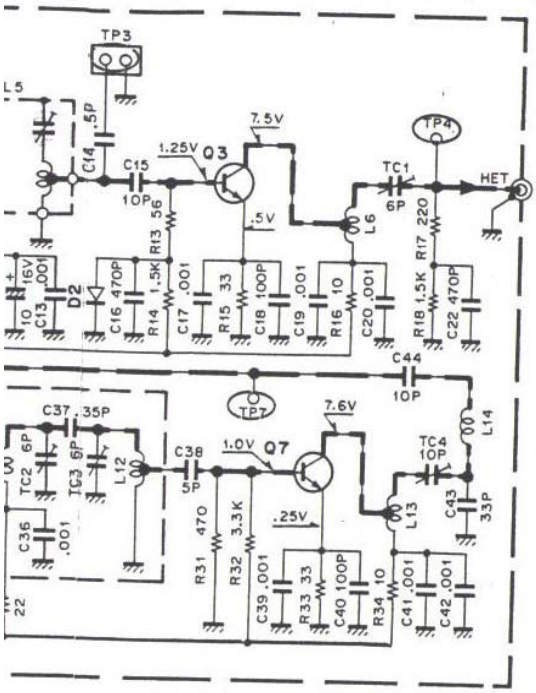
HET UNIT (X50-2000-00) (TS-811 M.T.W.X)



HET UNIT (X50-2010-10) (TS-811 K)



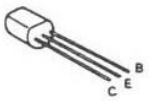
f = 435.00MHz, RX no signal, ( ) : TX.



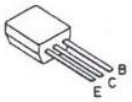
Q1,2,5~7 : 2SC2026
Q3 : 2SC2570A
Q4 : 2SC2787(L)

D1 : ND487C1-3R
D2 : MV13

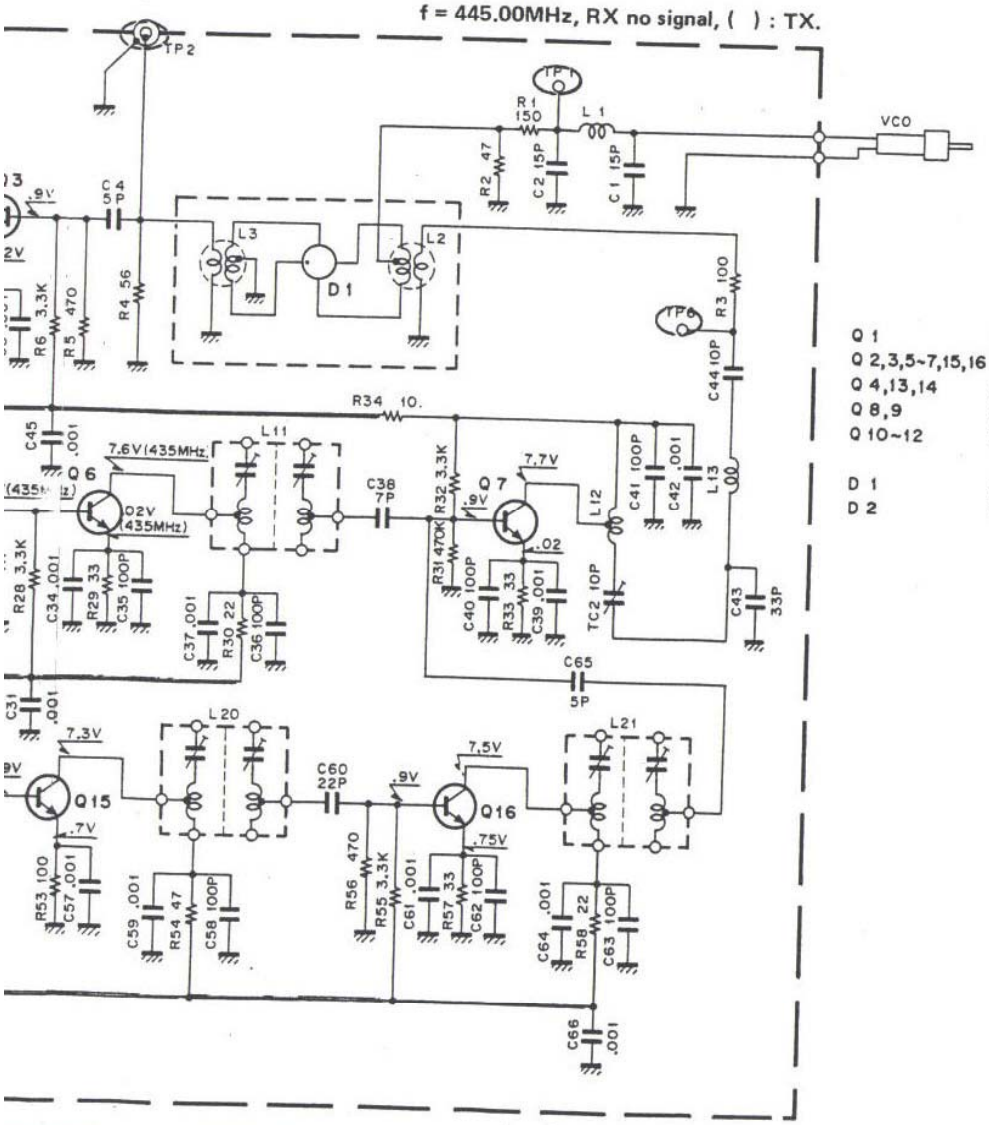
2SC2026
2SC2570A



2SA933S
2SC1740S
2SC2787



f = 445.00MHz, RX no signal, ( ) : TX.



Q1 : 2SC2570A
Q2,3,5~7,15,16 : 2SC2026
Q4,13,14 : 2SC2720
Q8,9 : 2SC1740S(Q)
Q10~12 : 2SA933S(Q)

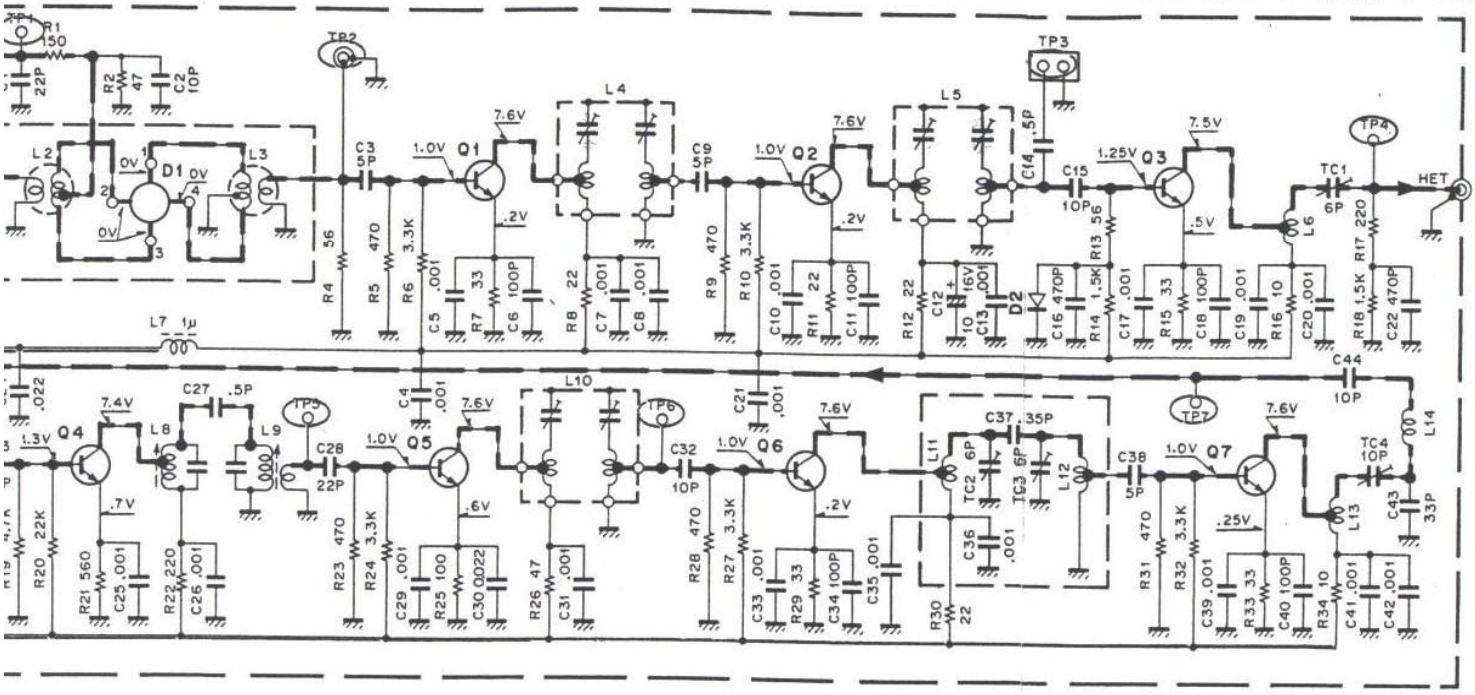
D1 : ND487C1-3R
D2 : MV13

C D E F G H

CIRCUI

T (X50-2000-00) (TS-811 M,T,W,X)

f = 435.00MHz, RX no signal, ( ) : TX.

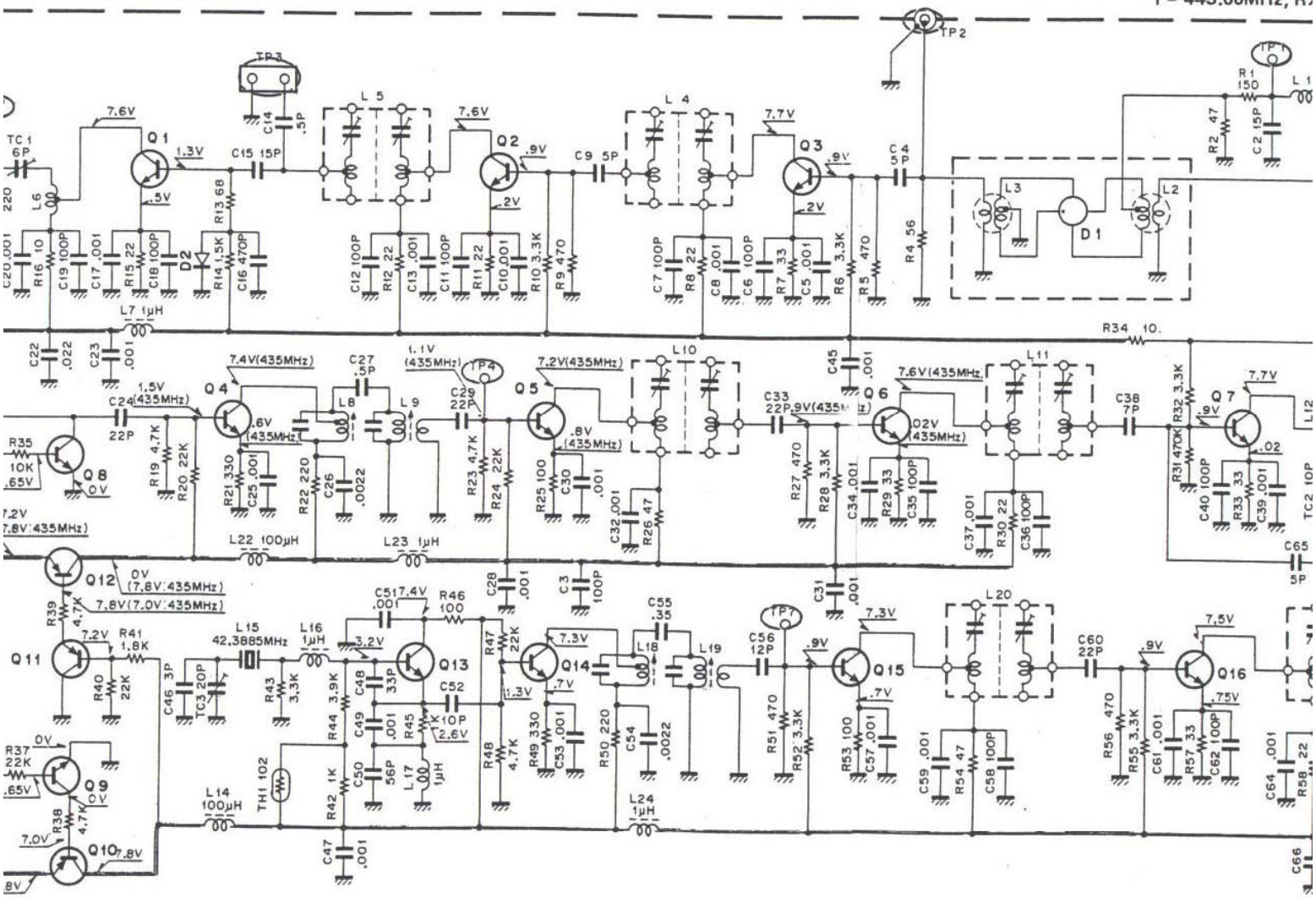


Q1,2
Q3
Q4

D1
D2

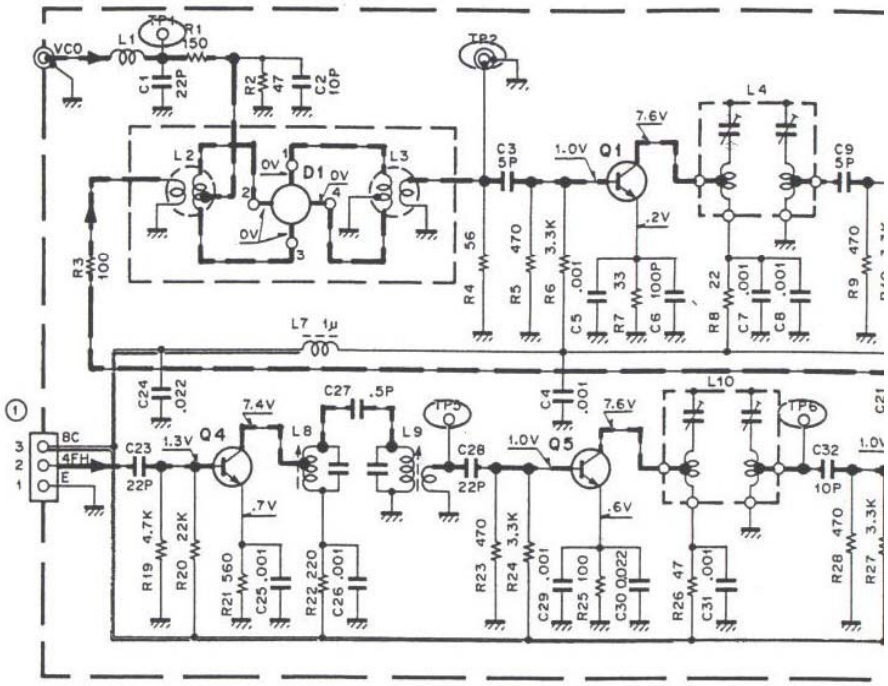
T (X50-2010-10) (TS-811 K)

f = 445.00MHz, RX

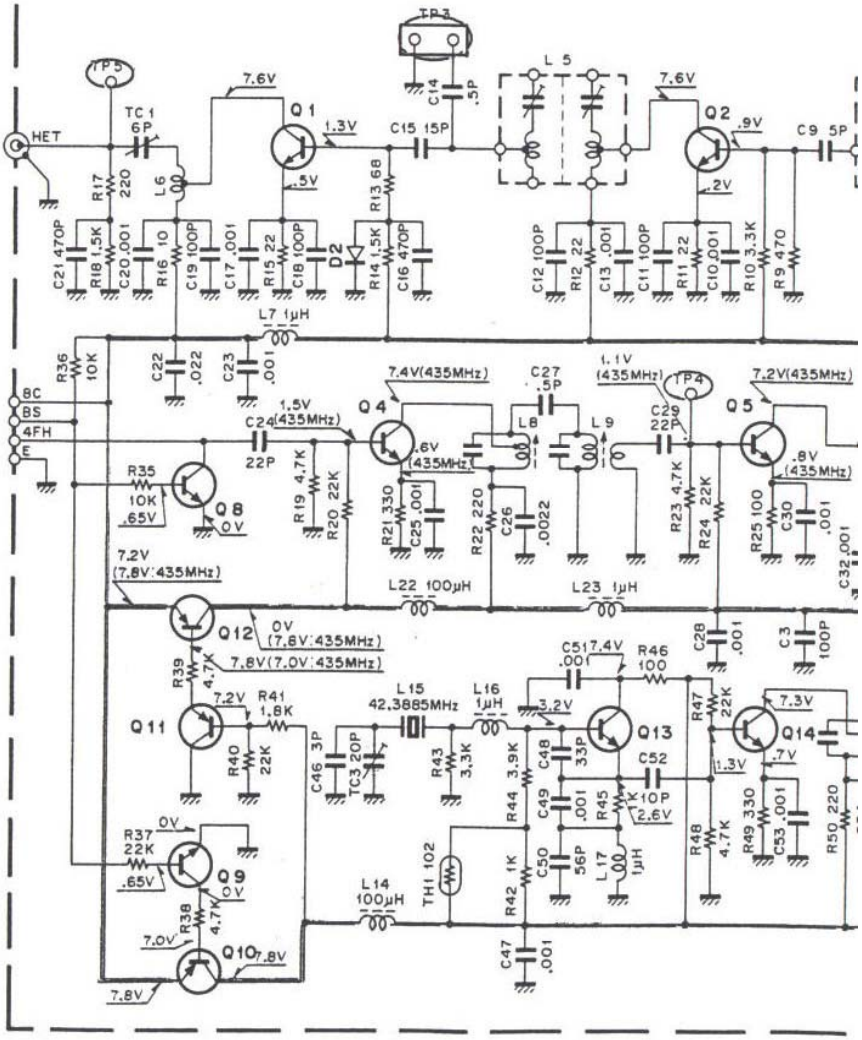


A B C D E

HET UNIT (X50-2000-00) (TS-811 M,T,W,X)

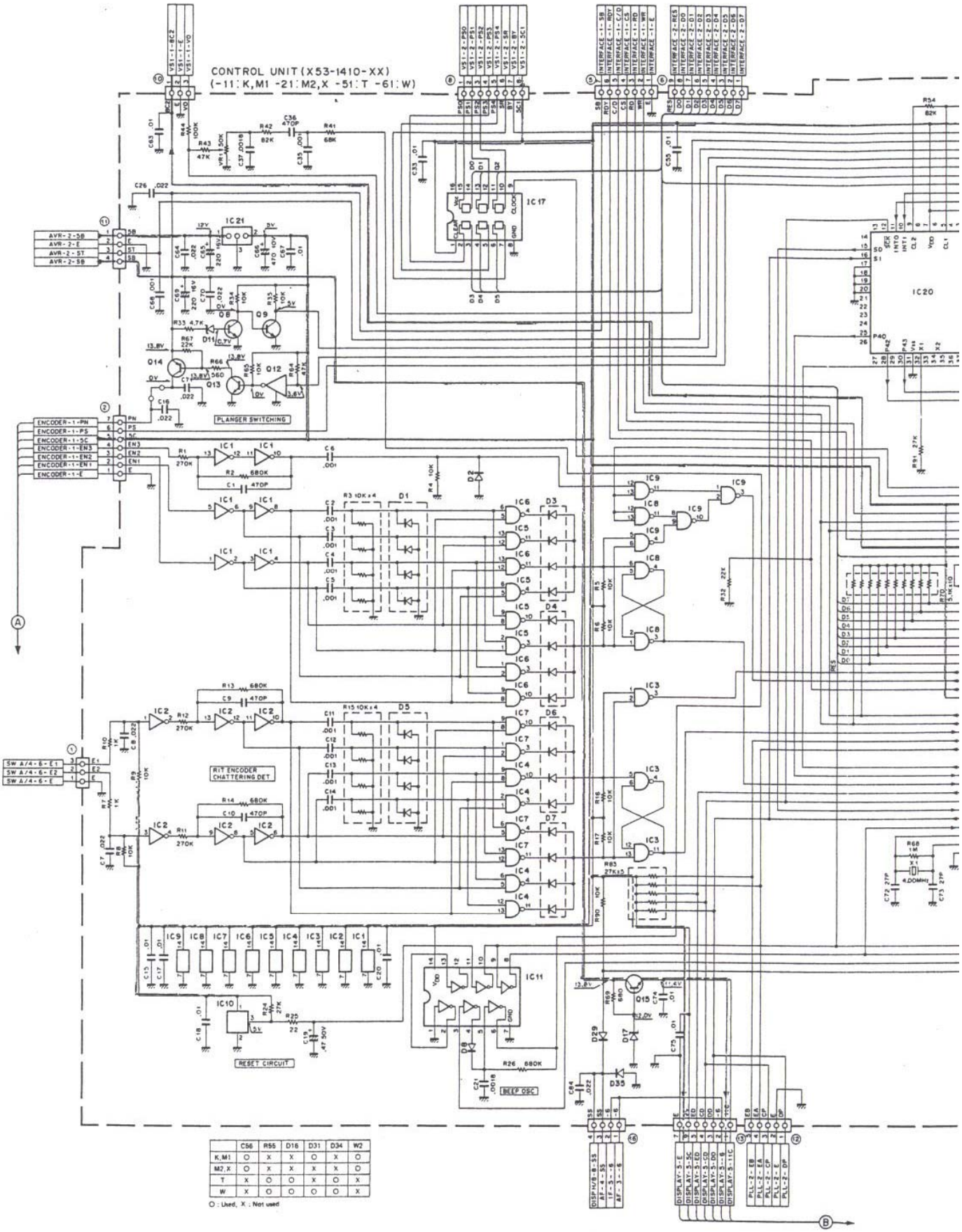


HET UNIT (X50-2010-10) (TS-811 K)



TS-711A/E CIRCUIT DIAGRAM

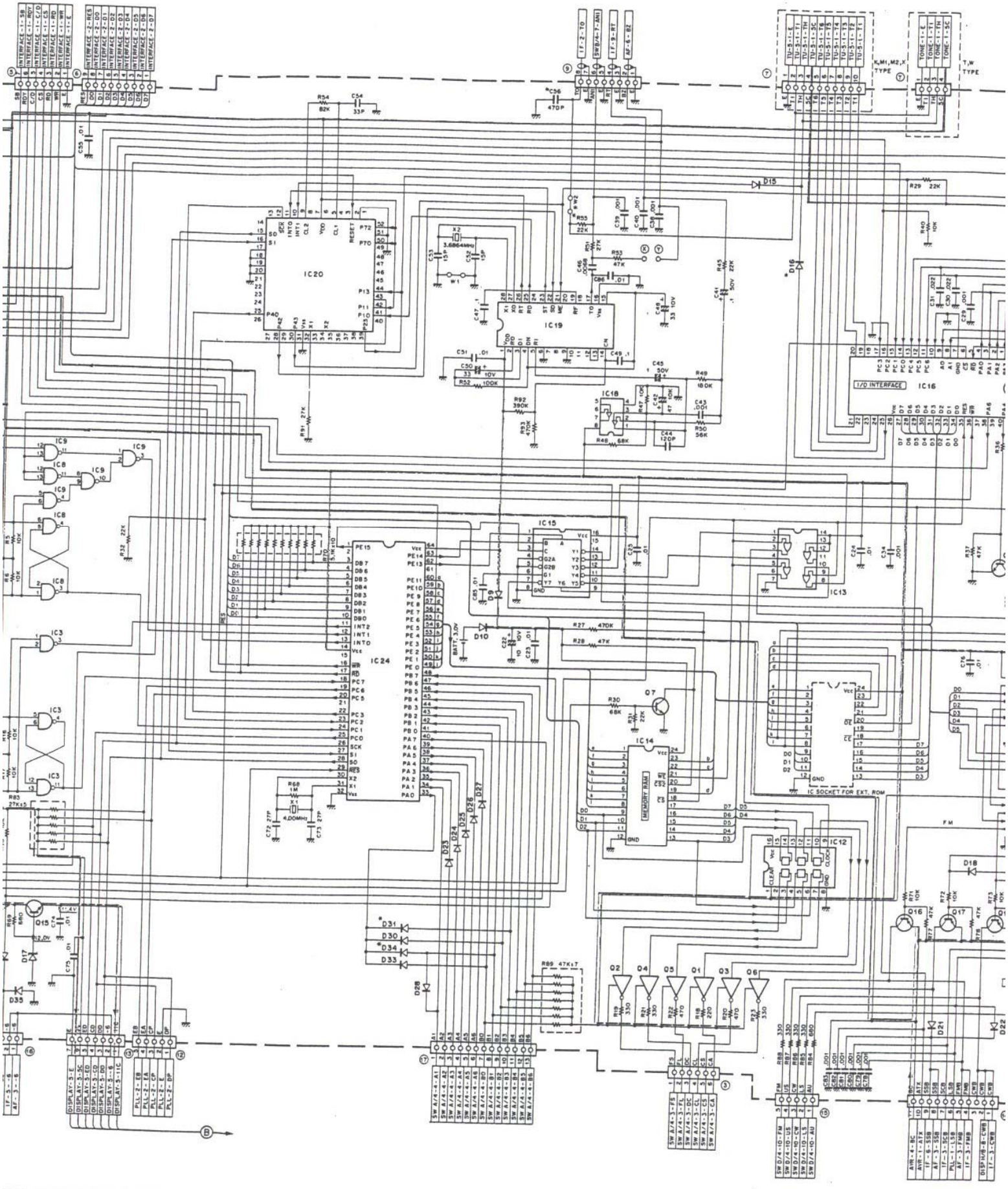
CONTROL UNIT (X53-141



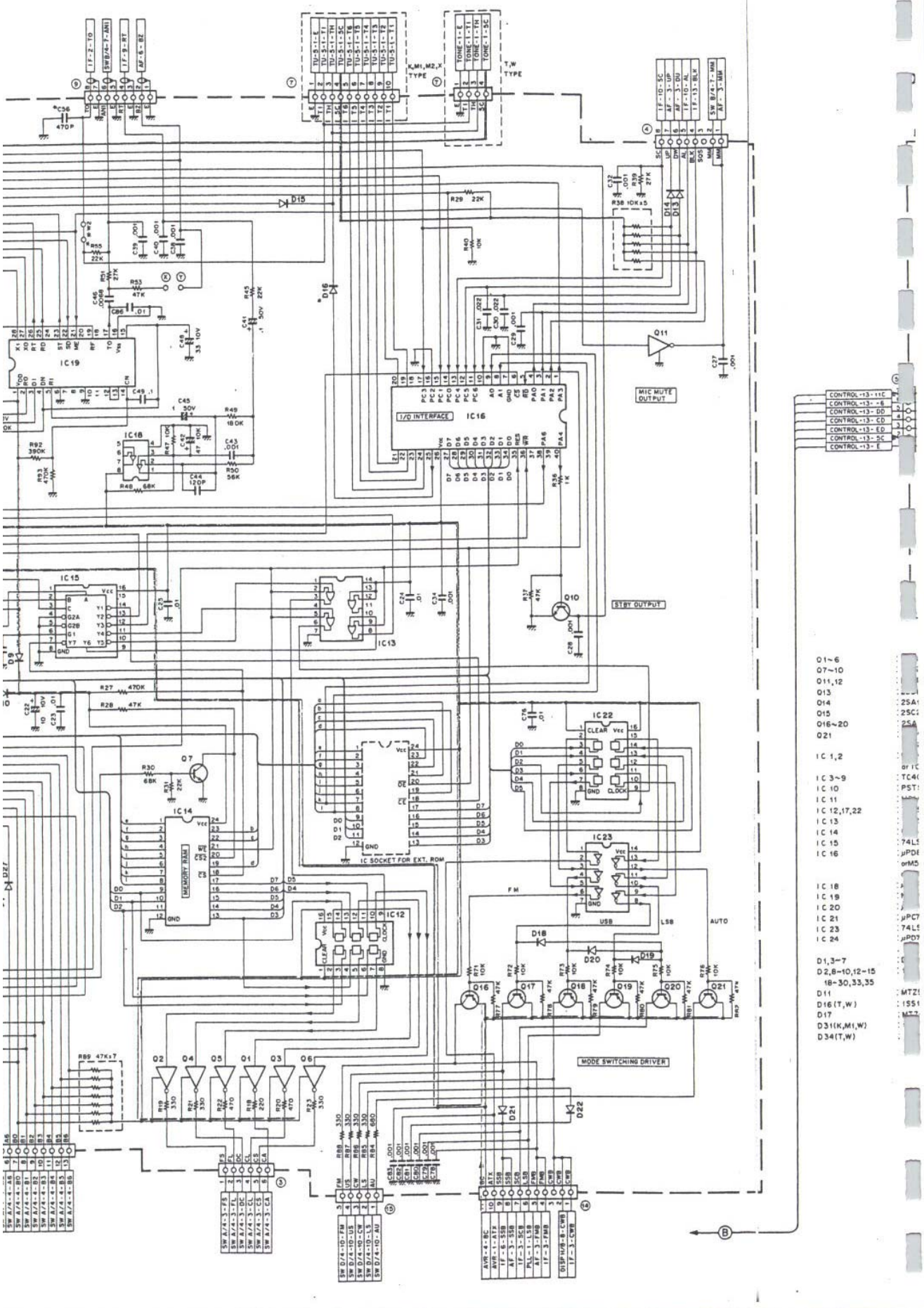
	C56	R55	D16	D31	D34	W2
K,M1	O	X	X	O	X	O
M2,X	O	X	X	X	X	O
T	X	O	O	X	O	X
W	X	O	O	O	O	X

O : Used, X : Not used

CONTROL UNIT (X53-1410-XX) (-11 : TS-711 K,M1 -21 : TS-711 M2,X -51 : TS-711 T -61 : TS-711 W)



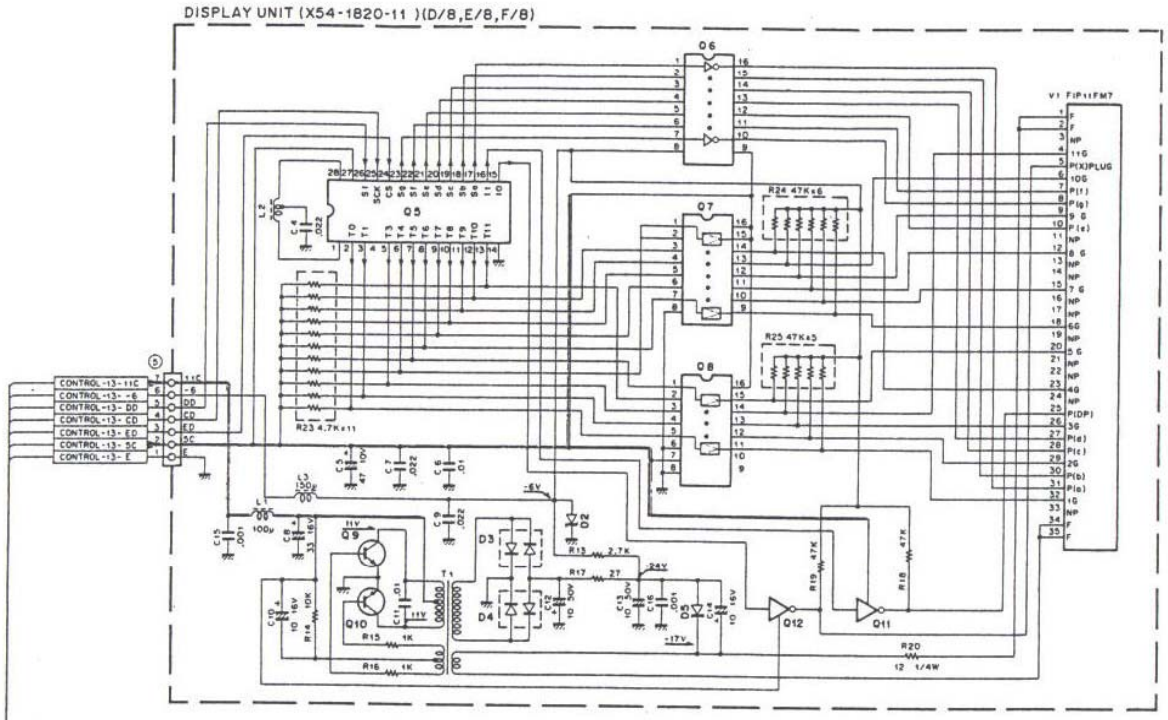
K,M1 -21 : TS-711 M2,X -51 : TS-711 T -61 : TS-711 W)

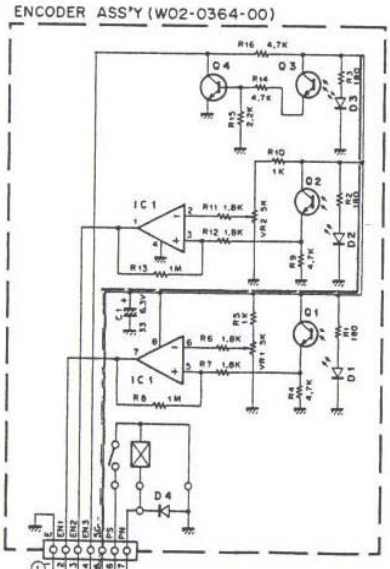


K L M N O P

f = 145.00MHz, RX no signal, ( ) : TX.

DISPLAY UNIT (X54-1820-11)



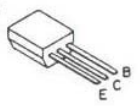


ENCODER ASS'Y
(W02-0364-00)

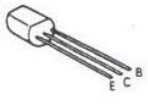
Q1~6	: DTA114Y(S)
Q7~10	: 2SC2458(Y)
Q11,12	: DTC143T(S)
D13	: 2SC1959(Y)
D14	: 2SA1307(Y)
D15	: 2SC2703(O,Y)
D16~20	: 2SA1015(Y)
Q21	: 2SA1048(Y) or2SA1115(E)
IC 1,2	: MC14069UBCP or TC4069UBP
IC 3~9	: TC4011BP or BU4011BP
IC 10	: PST518A
IC 11	: MC14584BCP
IC 12,17,22	: 74LS174
IC 13	: 74LS32
IC 14	: MB8418-20LP-GRA
IC 15	: 74LS138
IC 16	: μPD8255AC-5 orM5L8255AP-5 orTMP8255AP-5
IC 18	: μPC4558C
IC 19	: MN6127A
IC 20	: μPD7507G-575-00
IC 21	: μPC7805H
IC 23	: 74LS05
IC 24	: μPD7802G-087-36
D1,3~7	: DAP401
D2,8~10,12~15 16~30,33,35	: 1SS133
D11	: MTZ9.1JB
D16(T,W)	: 1SS133
D17	: MTZ~12JB
D31(K,M1,W)	: 1SS133
D34(T,W)	: 1SS133

Q5	: μPD763C
Q6	: μPA80C
Q7,8	: TC5066BP
Q9,10	: 2SC1959(Y)
Q11,12	: DTA124(F)
D2	: MTZ6.2JA
D3,4	: MC931
D5	: MTZ7.5JA
Q1,2,3	: PN1265(R)
Q4	: 2SC2458(Y)
IC1	: LM358P
D1,2,3	: LN66(R)
D4	: V06B

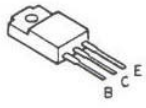
2SA1048
2SA1115
2SC2458



2SA1015
2SC1959
2SC2703

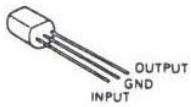


2SA1307



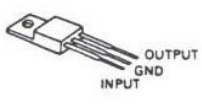
DTC143T

PST518A



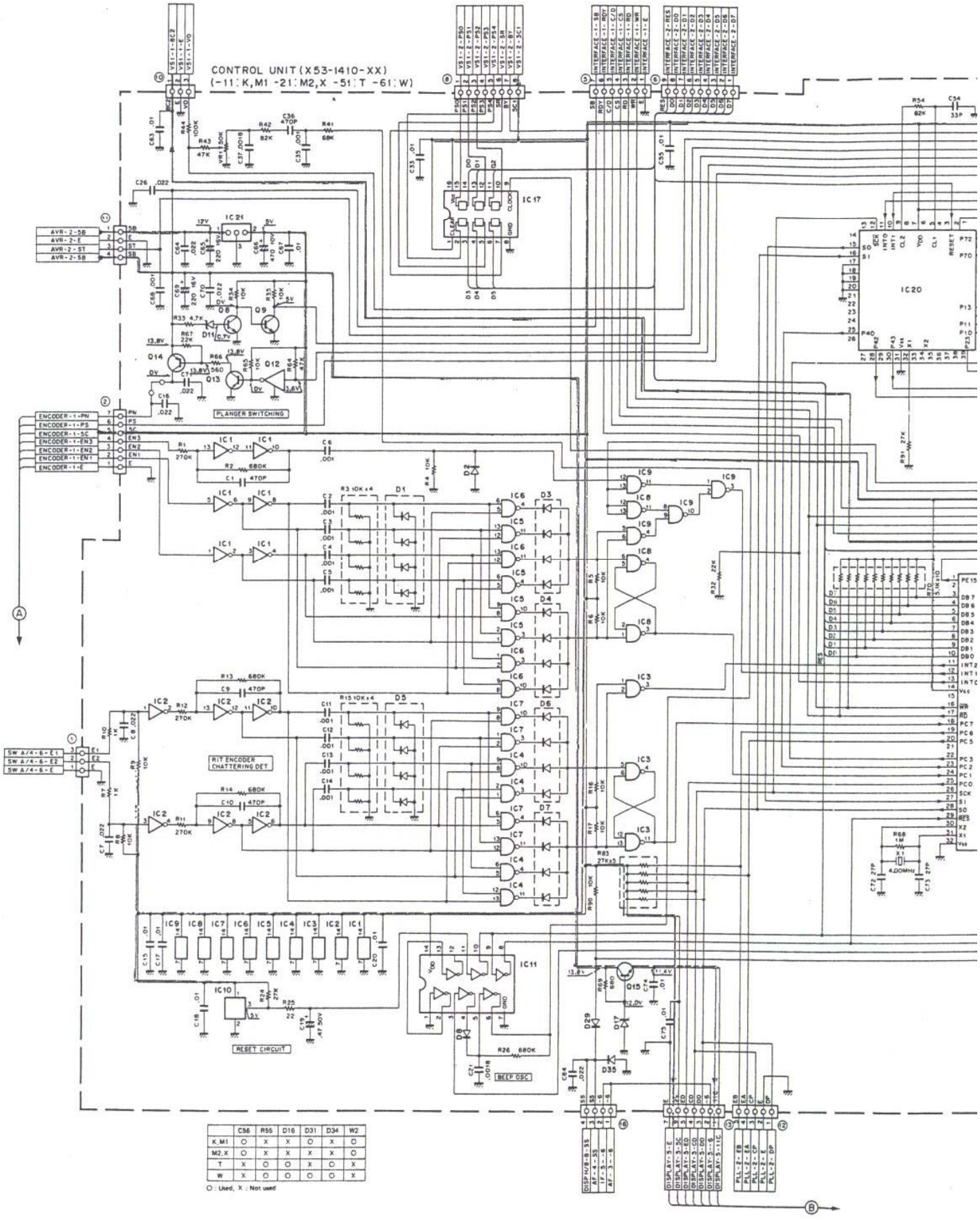
DTA114Y

μPC7805H



TS-711A/E CIRCUIT DIAGRAM

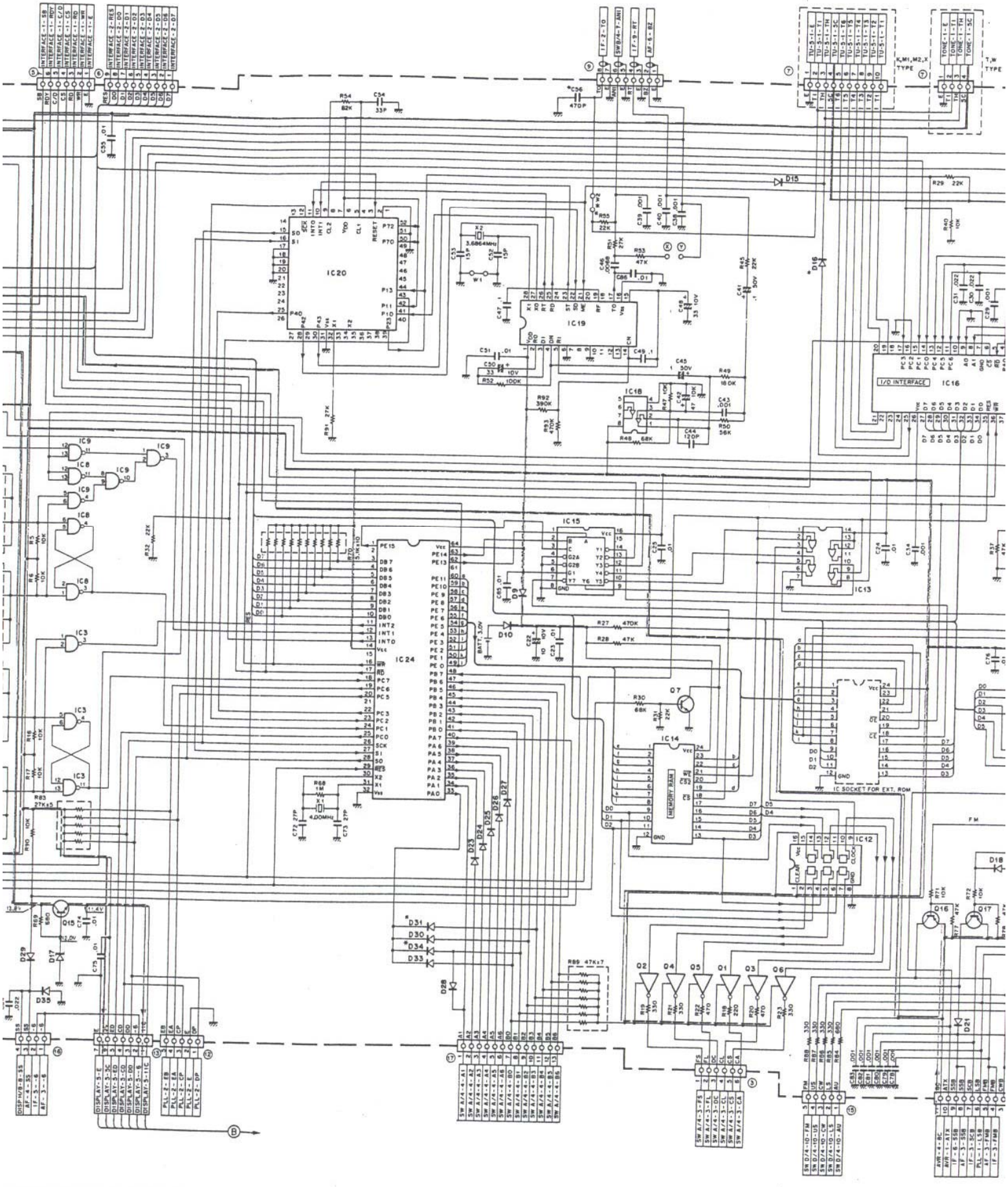
CONTROL UNIT (X53-1410-X)



	C56	R55	D16	D31	D34	W2
K,M1	O	X	X	O	X	O
M2,X	O	X	X	X	X	O
T	X	O	O	X	O	X
W	X	O	O	O	O	X

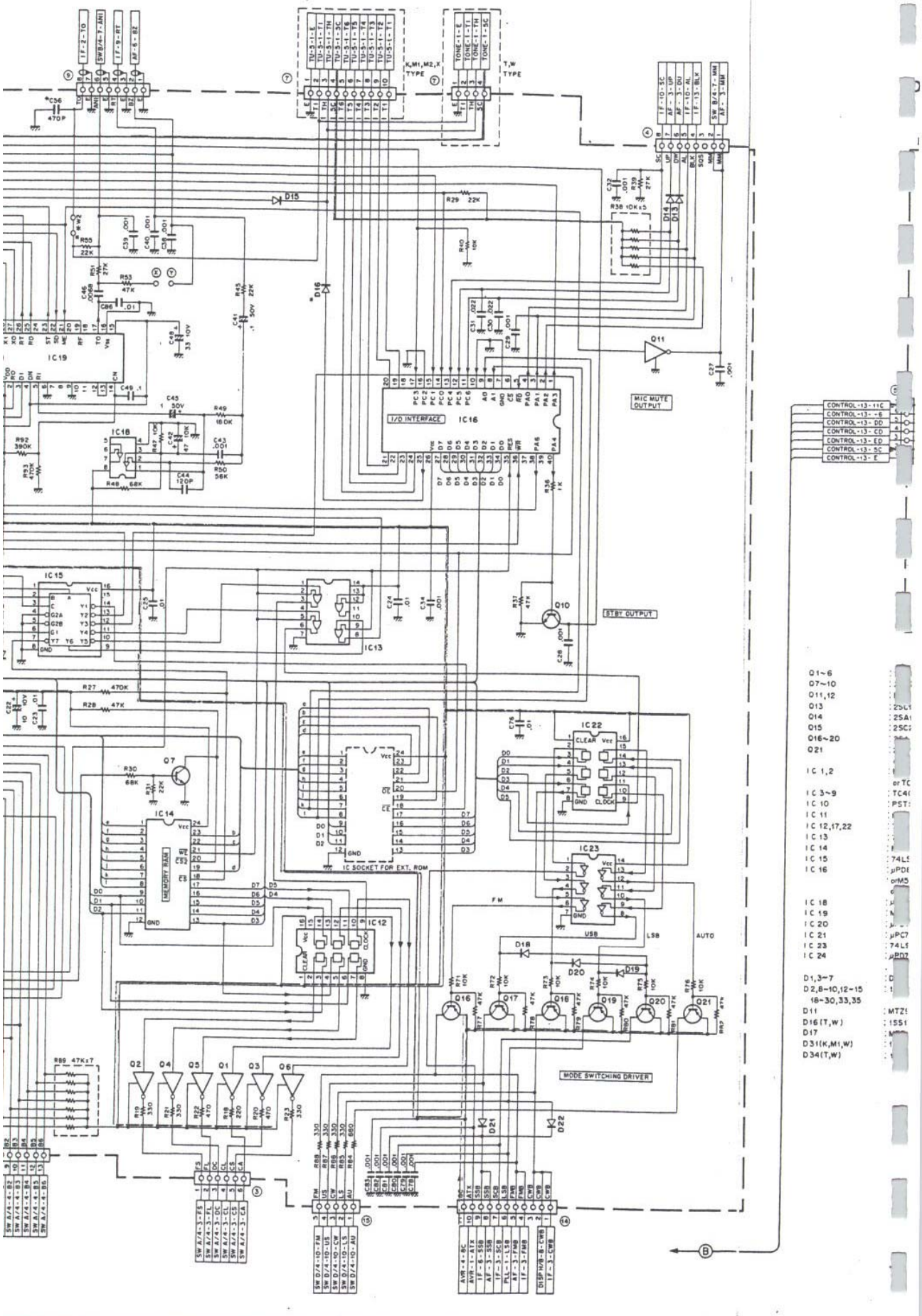
O : Used, X : Not used

CONTROL UNIT (X53-1410-XX) (-11 : TS-711 K,M1 -21 : TS-711 M2,X -51 : TS-711 T -61 : TS-711 W)



H I J K L

(,M1 -21 : TS-711 M2,X -51 : TS-711 T -61 : TS-711 W)



Q1~6 :
Q7~10 :
Q11,12 :
Q13 : 2SC1
Q14 : 2SA1
Q15 : 2SC2
Q16~20 :
Q21 :

IC 1,2 :
IC 3~9 : TC4(
IC 10 : PST
IC 11 :
IC 12,17,22 :
IC 13 :
IC 14 :
IC 15 : 74LS
IC 16 : μPDE

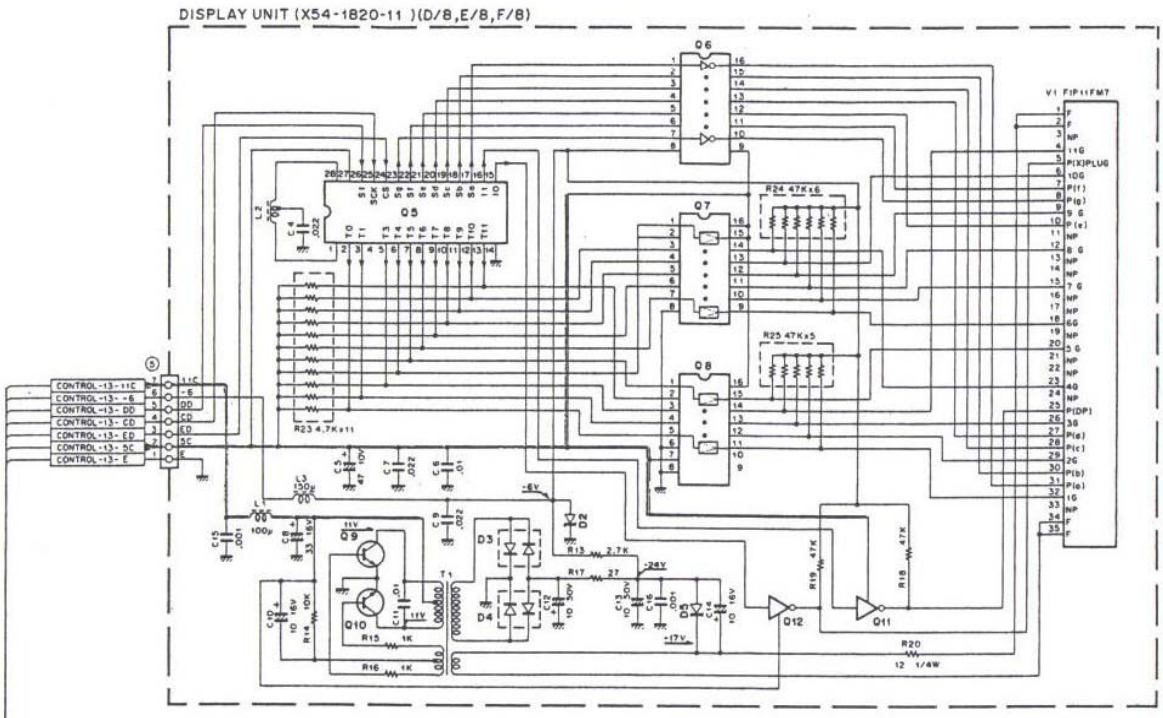
IC 18 :
IC 19 :
IC 20 :
IC 21 : μPC7
IC 23 : 74LS
IC 24 : μPD7

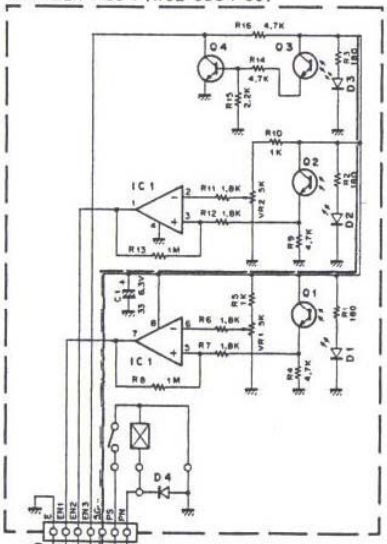
D1,3~7 :
D2,8~10,12~15 :
16~30,33,35 :
D11 : MTZ
D16(T,W) : 1SS
D17 :
D31(K,M1,W) :
D34(T,W) :

K L M N O P

f = 145.00MHz, RX no signal, ( ) : TX.

DISPLAY UNIT (X54-1820-11)



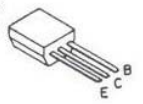


ENCODER ASS'Y
(W02-0364-00)

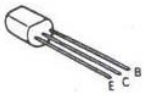
Q1~6	: DTA114Y(S)
Q7~10	: 2SC2458(Y)
Q11,12	: DTC143T(S)
Q13	: 2SC1959(Y)
Q14	: 2SA1307(Y)
Q15	: 2SC2703(O,Y)
Q16~20	: 2SA1015(Y)
Q21	: 2SA1048(Y) or 2SA1115(E)
IC 1,2	: MC14069UBCP or TC4069UBP
IC 3~9	: TC4011BP or BU4011BP
IC 10	: PST518A
IC 11	: MC145848CP
IC 12,17,22	: 74LS174
IC 13	: 74LS32
IC 14	: MB8418-20LP-GRA
IC 15	: 74LS138
IC 16	: µPD8255AC-5 or M5L8255AP-5 or TMP8255AP-5
IC 18	: µPC4558C
IC 19	: MN6127A
IC 20	: µPD7507G-575-00
IC 21	: µPC7805H
IC 23	: 74LS05
IC 24	: µPD7802G-087-36
D1,3~7	: DAP401
D2,8~10,12~15 18~30,33,35	: 1SS133
D11	: MTZ9.1JB
D16(T,W)	: 1SS133
D17	: MTZ~12JB
D31(K,M1,W)	: 1SS133
D34(T,W)	: 1SS133

Q5	: µPD763C
Q6	: µPA80C
Q7,8	: TC5066BP
Q9,10	: 2SC1959(Y)
Q11,12	: DTA124(F)
D2	: MTZ6.2JA
D3,4	: MC931
D5	: MTZ7.5JA
Q1,2,3	: PN1265(R)
Q4	: 2SC2458(Y)
IC1	: LM358P
D1,2,3	: LN66(R)
D4	: VO6B

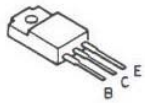
2SA1048
2SA1115
2SC2458



2SA1015
2SC1959
2SC2703

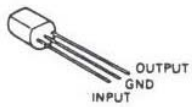


2SA1307



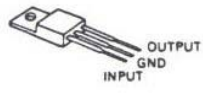
DTC143T

PST518A

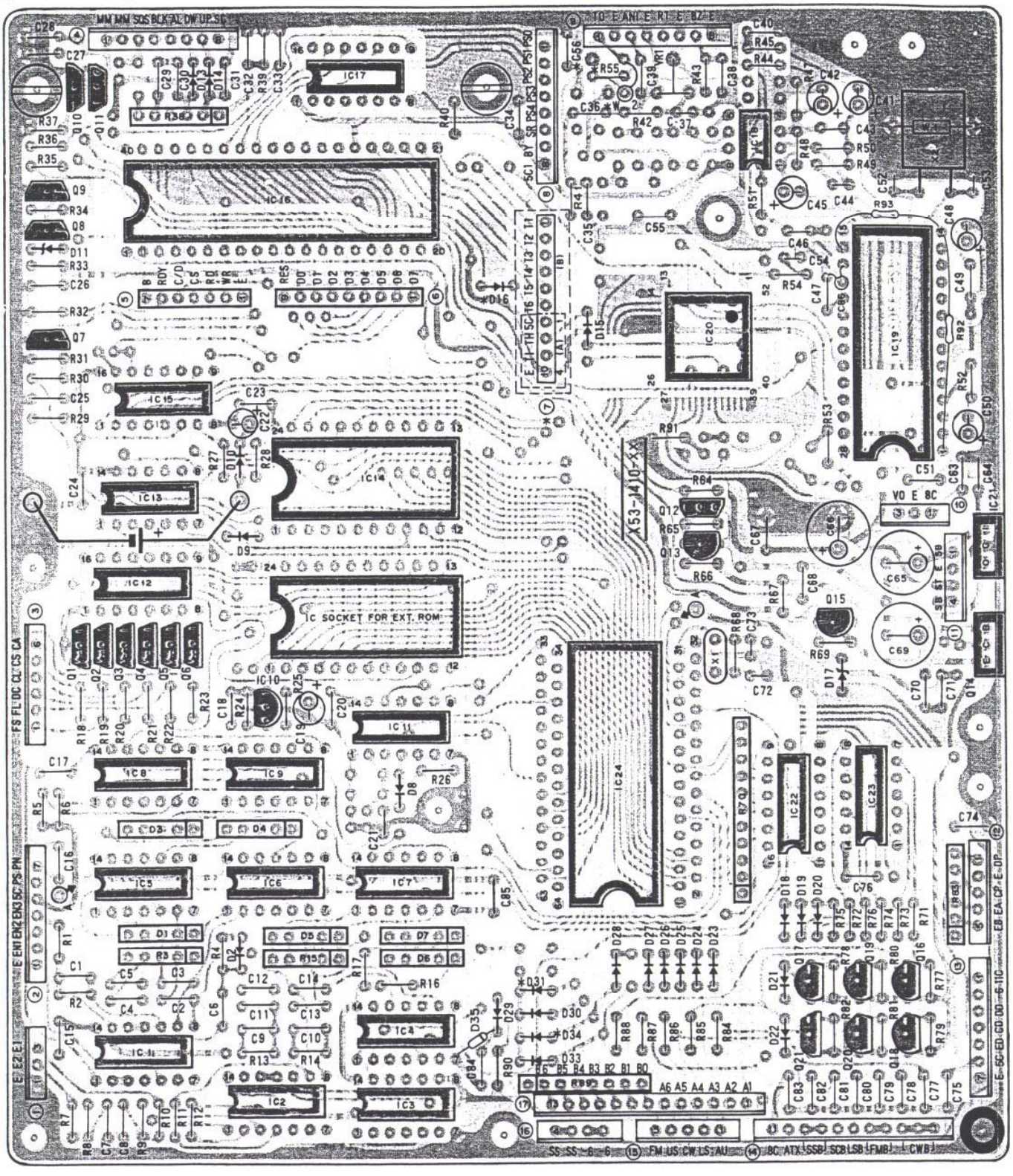


DTA114Y

µPC7805H



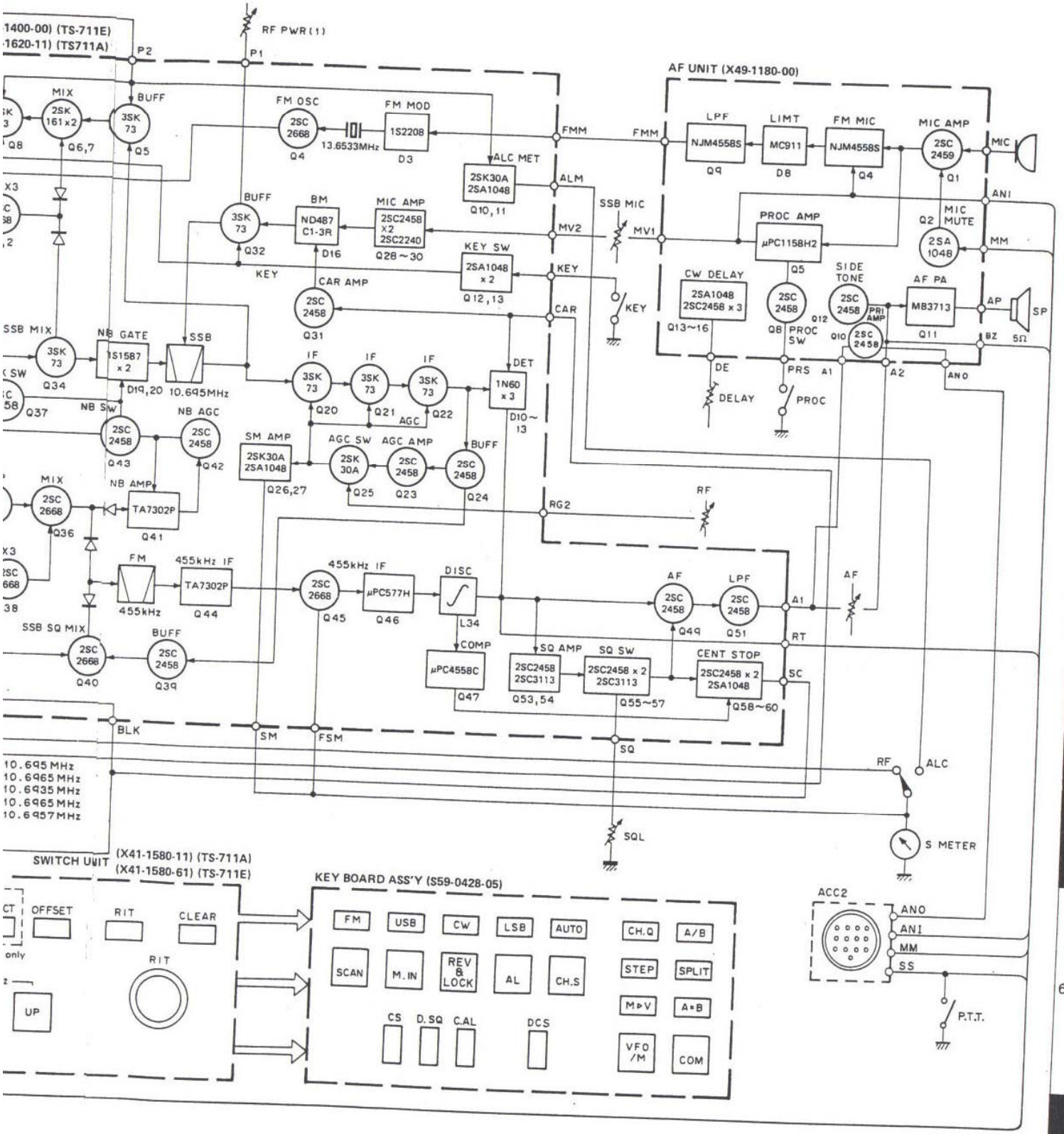
CONTROL UNIT (X53-1410-XX) Component side view
(-11 : TS-711 K,M1 -21 : TS-711 M2,X -51 : TS-711 T -61 : TS-711 W)

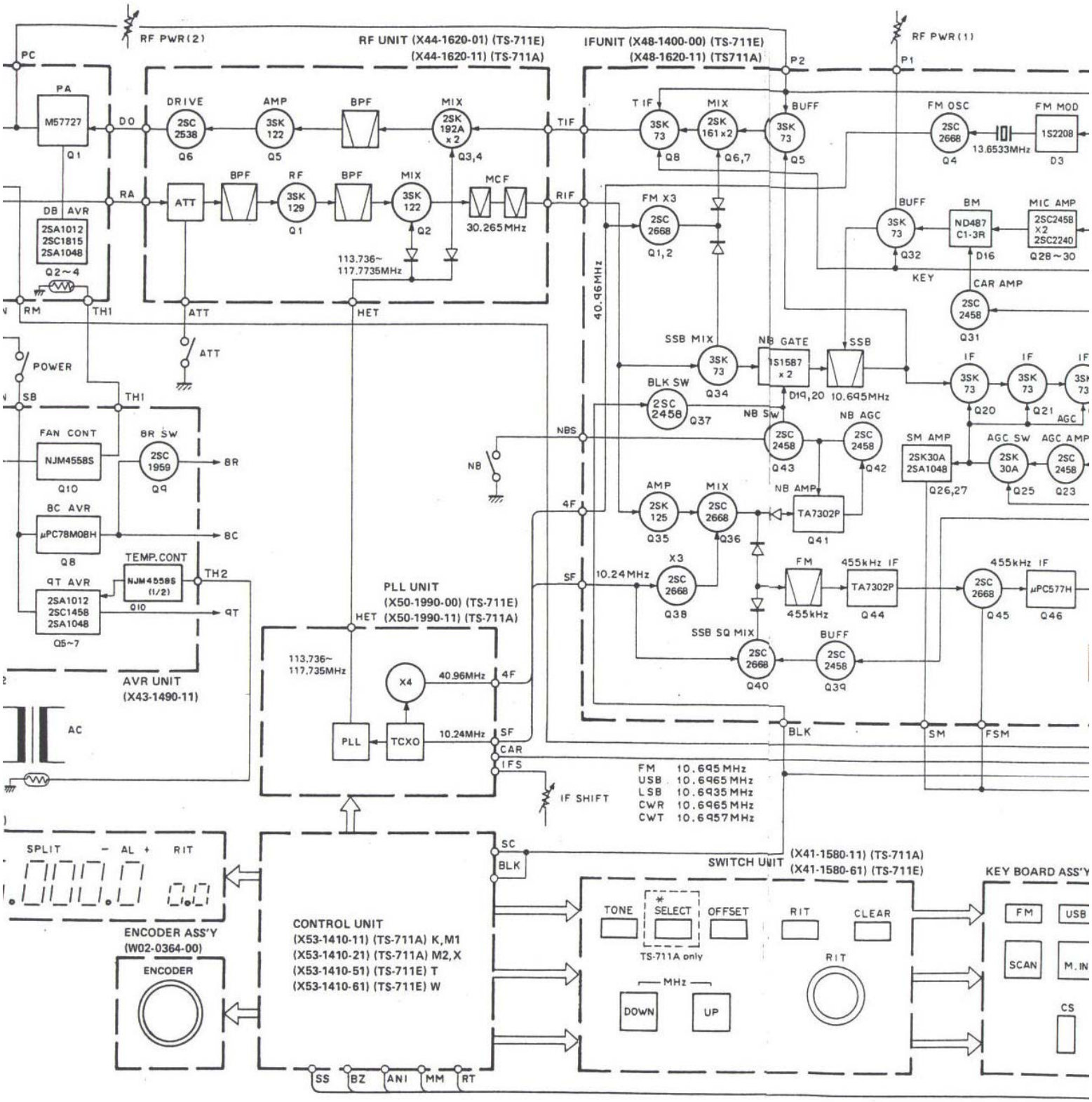


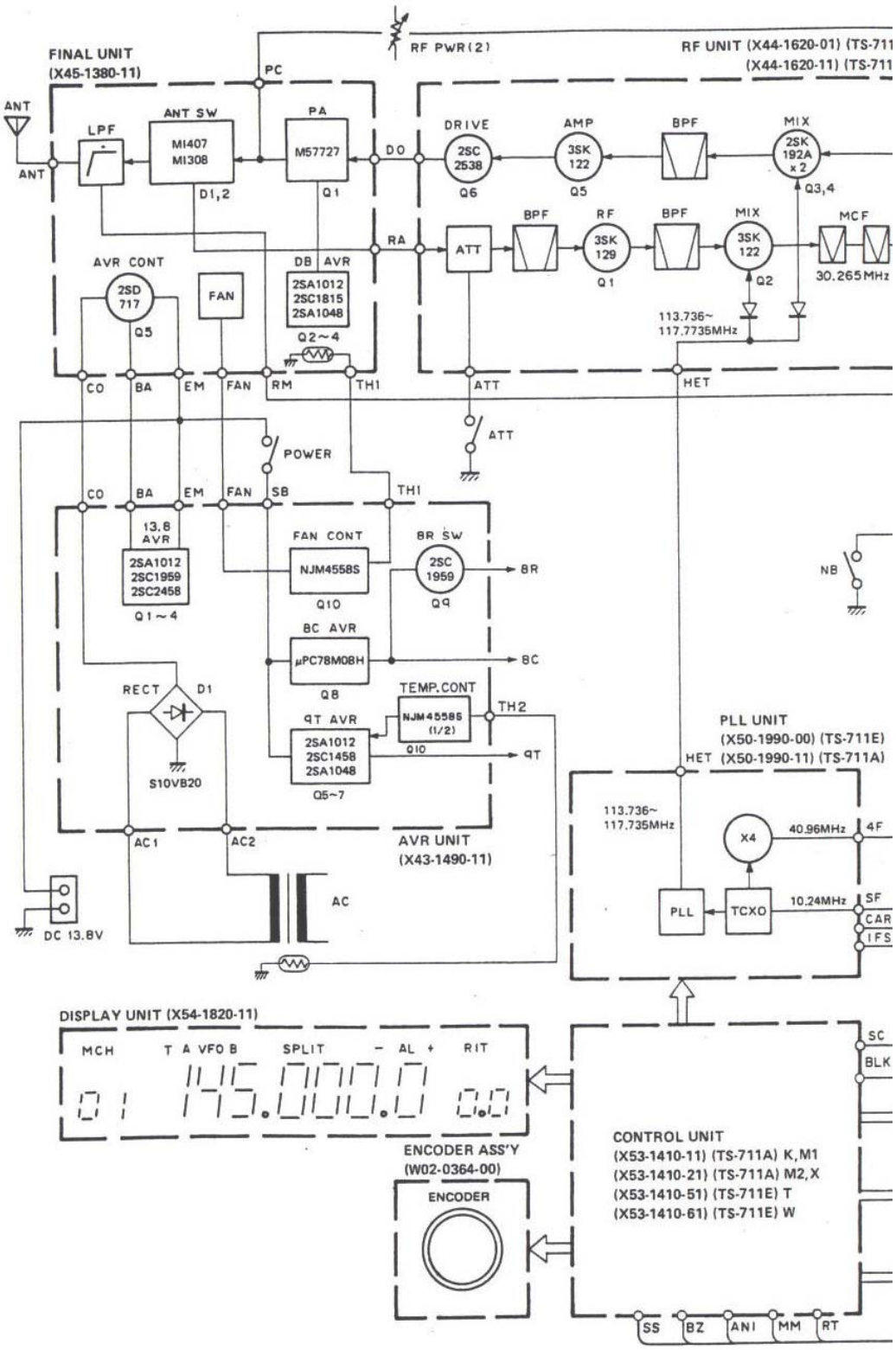
	C56	R55	D16	D31	D34	W2	⑦-(A)	⑦-(B)
K,M1	O	X	X	O	X	O	X	O
M2,X	O	X	X	X	X	O	X	O
T	X	O	O	X	O	X	O	X
W	X	O	O	O	O	X	O	X

O : Used X : Not used

PC BOARD VIEW/ BLOCK DIAGRAM TS-711A/E

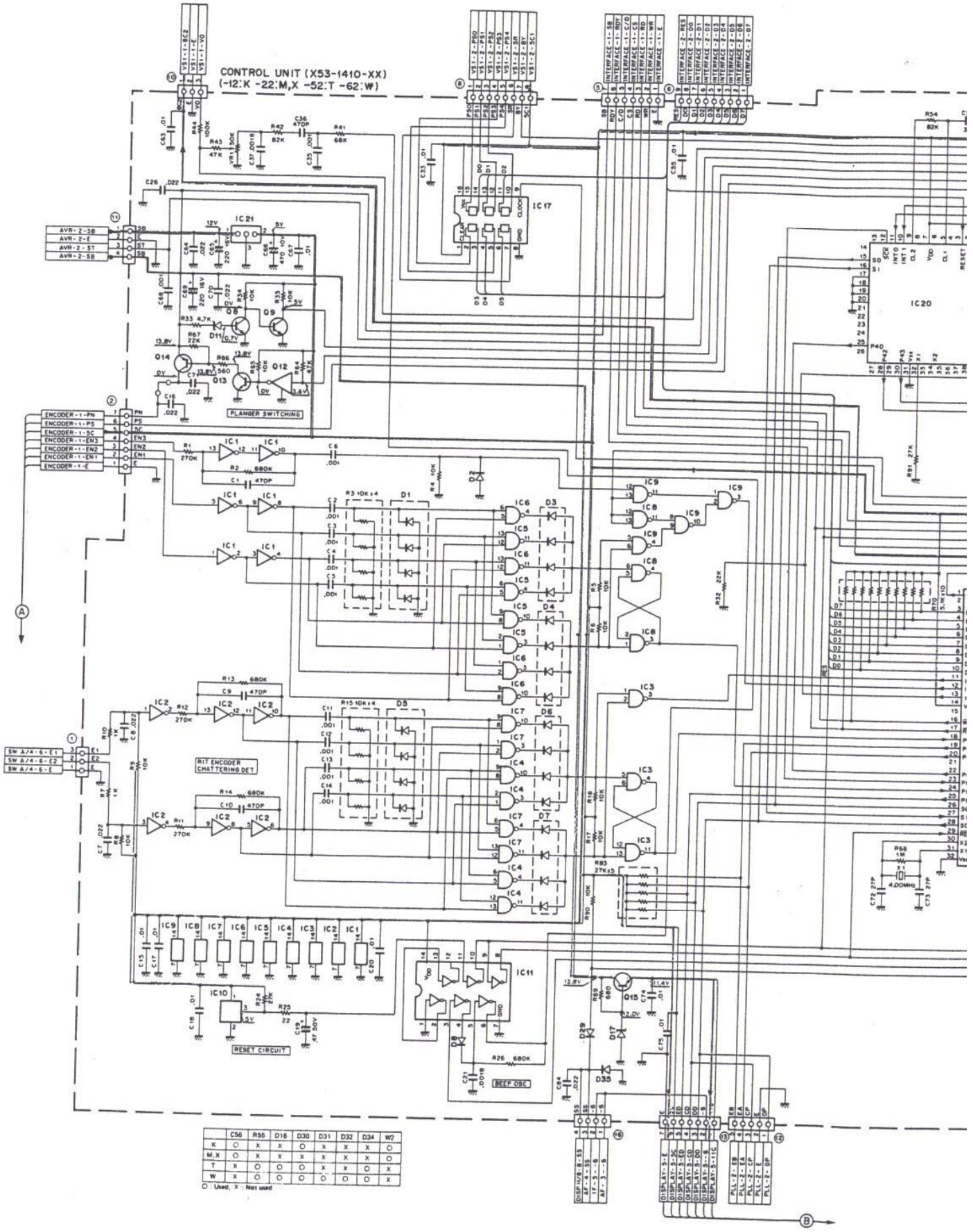



RF PWR(2)
RF UNIT (X44-1620-01) (TS-711E)
(X44-1620-11) (TS-711A)
IFUNIT (X48-1400-00) (TS-711E)
(X48-1620-11) (TS711A)
RF PWR(1)
PC
PA
M57727
Q1
DRIVE
2SC 2538
Q6
AMP
3SK 122
Q5
BPF
MIX
2SK 192A x2
Q3,4
DO
TIF
T IF
3SK 73
Q8
MIX
2SK 161x2
Q6,7
BUFF
3SK 73
Q5
P2
P1
FM OSC
2SC 2668
Q4
13.6533MHz
FM MOD
1S2208
D3
RA
ATT
BPF
RF
3SK 129
Q1
BPF
MIX
3SK 122
Q2
MCF
30.265MHz
RIF
113.736~
117.7735MHz
FM X3
2SC 2668
Q1,2
BUFF
3SK 73
Q32
BM
ND487
C1-3R
D16
MIC AMP
2SC2458 x2
2SC2240
Q28~30
KEY
CAR AMP
2SC 2458
Q31
DB AVR
2SA1012
2SC1815
2SA1048
Q2~4
RM
TH1
ATT
HET
40.96MHz
ATT
POWER
SB
TH1
SSB MIX
3SK 73
Q34
NB GATE
1S1587 x2
D19,20
SSB
10.695MHz
BLK SW
2SC 2458
Q37
NB SW
NB AGC
2SC 2458
Q43
2SC 2458
Q42
IF
3SK 73
Q20
IF
3SK 73
Q21
AGC
NBS
NB
4F
SM AMP
2SK30A
2SA1048
Q26,27
AGC SW
2SK 30A
AGC AMP
2SC 2458
Q25
Q23
FAN CONT
NJM4558S
Q10
8R SW
2SC 1959
Q9
8R
8C AVR
μPC78M08H
Q8
8C
AMP
2SK 125
Q35
MIX
2SC 2668
Q36
NB AMP
TA7302P
Q41
TEMP.CONT
NJM4558S (1/2)
Q10
TH2
QT AVR
2SA1012
2SC1458
2SA1048
Q5~7
QT
SF
10.24MHz
X3
2SC 2668
Q38
FM
455kHz
455kHz IF
TA7302P
Q44
455kHz IF
2SC 2668
Q45
μPC577H
Q46
SSB SQ MIX
2SC 2668
Q40
BUFF
2SC 2458
Q39
PLL UNIT
(X50-1990-00) (TS-711E)
(X50-1990-11) (TS-711A)
HET
113.736~
117.735MHz
X4
40.96MHz
4F
PLL
TCXO
10.24MHz
SF
CAR
IFS
IF SHIFT
AVR UNIT
(X43-1490-11)
AC
BLK
SM
FSM
FM 10.695MHz
USB 10.6965MHz
LSB 10.6935MHz
CWR 10.6965MHz
CWT 10.6957MHz
SPLIT
AL
RIT
ENCODER ASS'Y
(W02-0364-00)
ENCODER
CONTROL UNIT
(X53-1410-11) (TS-711A) K,M1
(X53-1410-21) (TS-711A) M2,X
(X53-1410-51) (TS-711E) T
(X53-1410-61) (TS-711E) W
SC
BLK
SWITCH UNIT (X41-1580-11) (TS-711A)
(X41-1580-61) (TS-711E)
KEY BOARD ASS'Y
TONE
SELECT
OFFSET
RIT
CLEAR
TS-711A only
MHz
DOWN
UP
RIT
FM
USB
SCAN
M.IN
CS
SS
BZ
ANI
MM
RT


A
B
C
D
FINAL UNIT
(X45-1380-11)
RF PWR(2)
RF UNIT (X44-1620-01) (TS-711
(X44-1620-11) (TS-711
ANT
LPF
ANT SW
MI407
MI308
D1,2
PA
M57727
Q1
PC
DO
RA
DRIVE
2SC
2538
Q6
AMP
3SK
122
Q5
BPF
MIX
2SK
192A
x2
Q3,4
ATT
BPF
RF
3SK
129
Q1
BPF
MIX
3SK
122
Q2
MCF
30.265MHz
113.736~
117.7735MHz
AVR CONT
2SD
717
Q5
FAN
DB AVR
2SA1012
2SC1815
2SA1048
Q2~4
CO
BA
EM
FAN
RM
TH1
ATT
HET
POWER
SB
13.8
AVR
2SA1012
2SC1959
2SC2458
Q1~4
FAN CONT
NJM4558S
Q10
BR SW
2SC
1959
Q9
BR
BC AVR
μPC78M08H
Q8
BC
RECT
D1
S10VB20
TEMP.CONT
NJM4558S
(1/2)
Q10
TH2
QT AVR
2SA1012
2SC1458
2SA1048
Q5~7
QT
AC1
AC2
AVR UNIT
(X43-1490-11)
AC
DC 13.8V
NB
PLL UNIT
(X50-1990-00) (TS-711E)
HET (X50-1990-11) (TS-711A)
113.736~
117.735MHz
X4
40.96MHz
4F
PLL
TCXO
10.24MHz
SF
CAR
IFS
DISPLAY UNIT (X54-1820-11)
MCH
T A VFO B
SPLIT
- AL +
RIT
ENCODER ASS'Y
(W02-0364-00)
ENCODER
CONTROL UNIT
(X53-1410-11) (TS-711A) K,M1
(X53-1410-21) (TS-711A) M2,X
(X53-1410-51) (TS-711E) T
(X53-1410-61) (TS-711E) W
SC
BLK
SS
BZ
ANI
MM
RT

TS-811A/B/E CIRCUIT DIAGRAM

CONTROL UNIT (X53-141

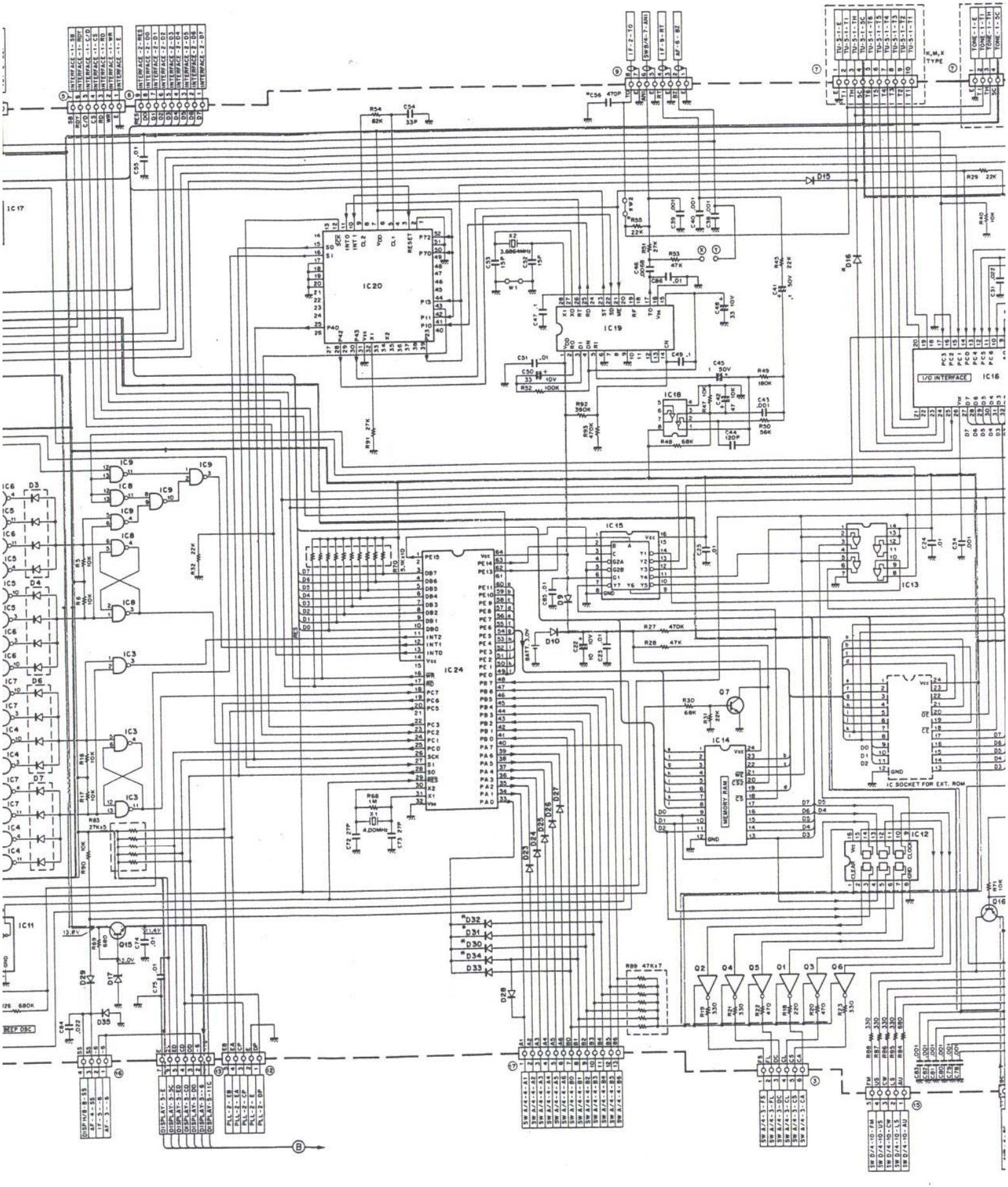


	C56	R55	D16	D30	D31	D32	D34	W2
K	○	x	x	○	x	x	x	○
M,X	○	x	x	x	x	x	x	○
T	x	○	○	○	x	x	○	x
W	x	○	○	○	○	○	○	x

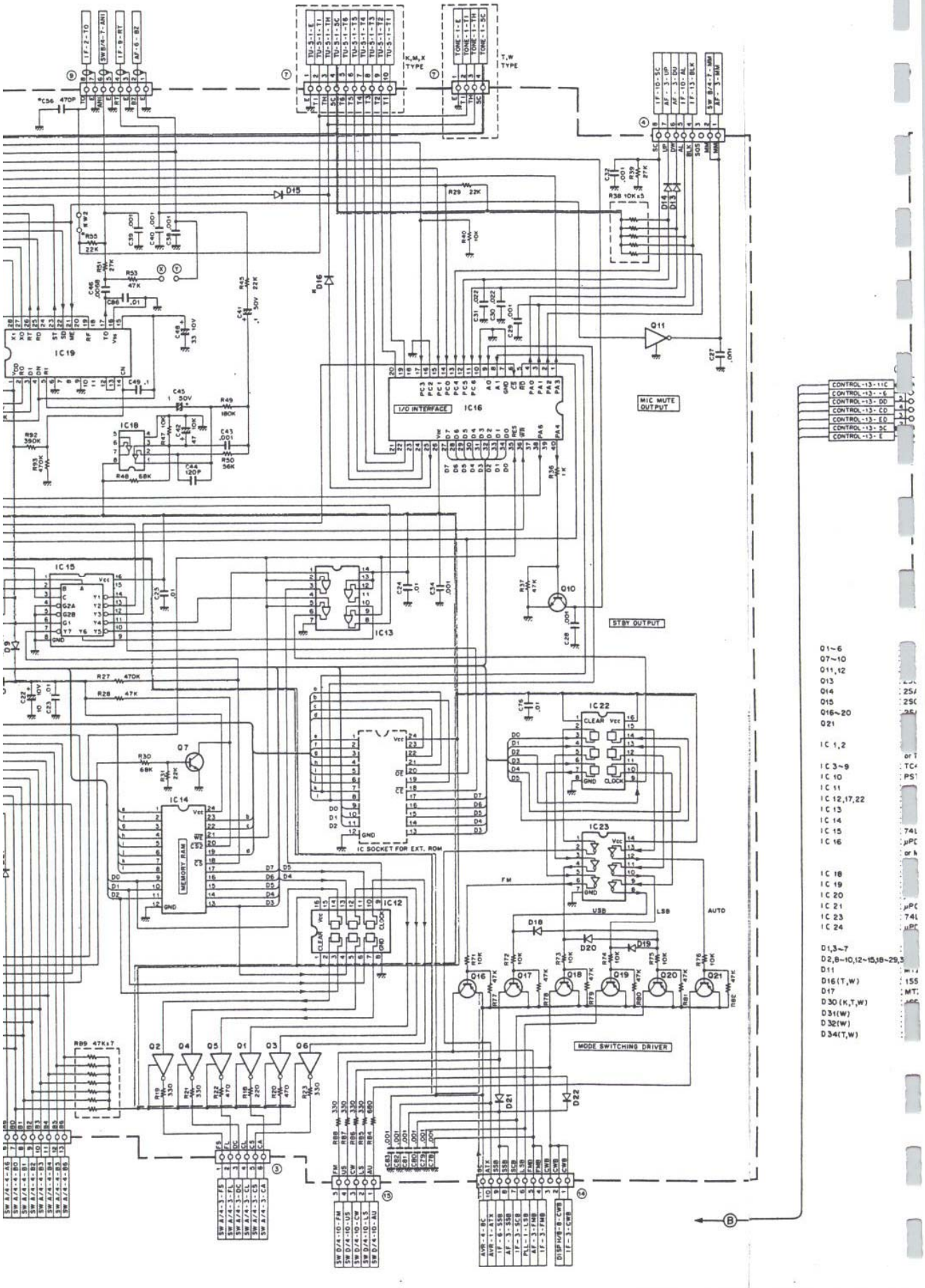
○ : Used, x : Not used

E F G H I J

CONTROL UNIT (X53-1410-XX) (-12 : TS-811 K -22 : TS-811 M,X -52 : TS-811 T -62 : TS-811 W)

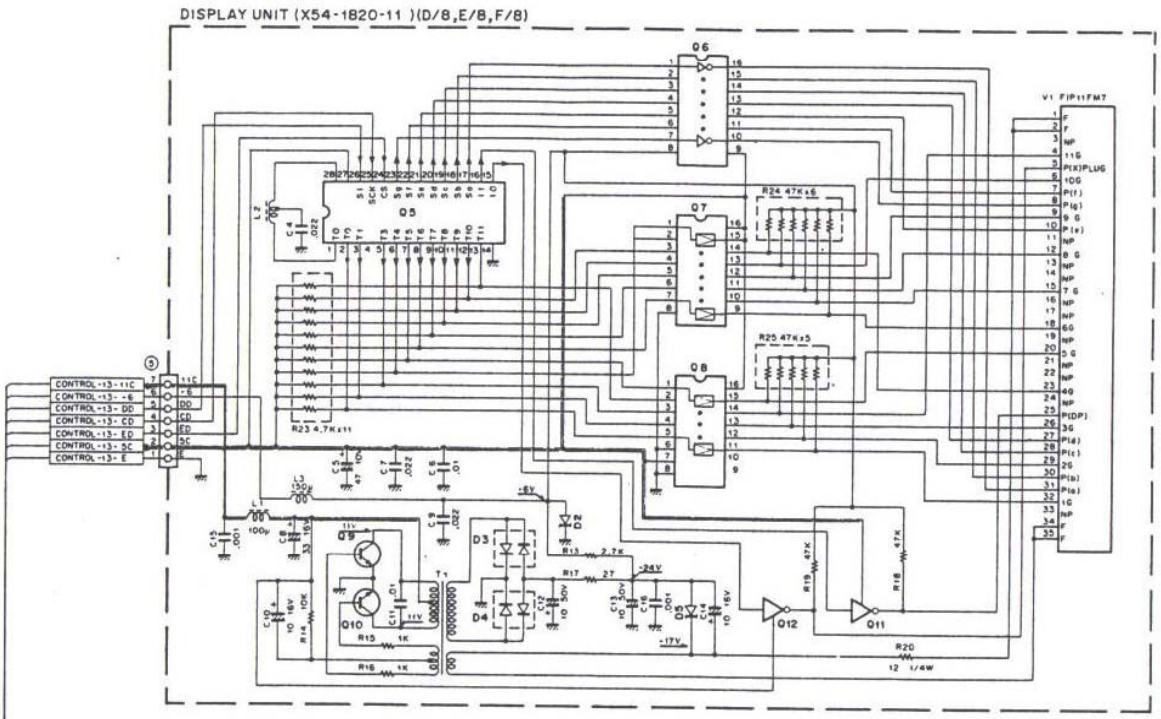


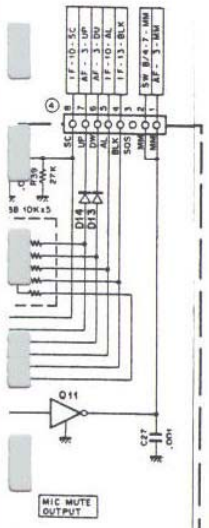
K -22 : TS-811 M,X -52 : TS-811 T -62 : TS-811 W)

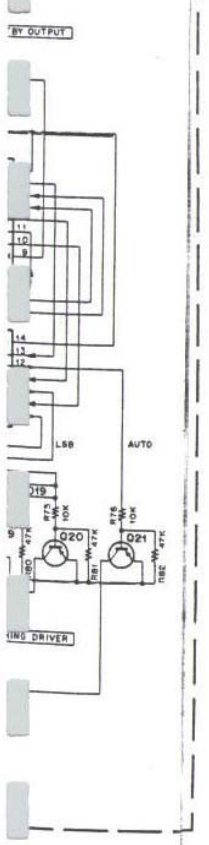


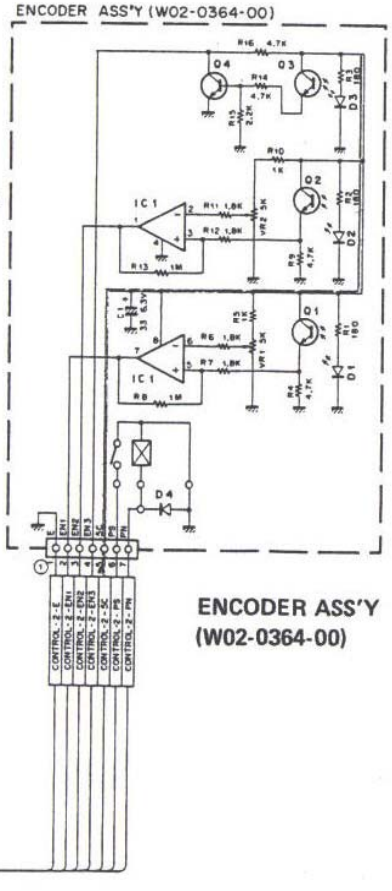
f = 435.00MHz, RX no signal, ( ) : TX.

DISPLAY UNIT (X54-1820-11)







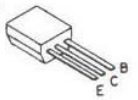


ENCODER ASS'Y
(W02-0364-00)

Q1~6	: DTA114Y(S)
Q7~10	: 2SC2458(Y)
Q11,12	: DTC143T(S)
Q13	: 2SC1959(Y)
Q14	: 2SA1307(Y)
Q15	: 2SC2703(O,Y)
Q16~20	: 2SA1015(Y)
Q21	: 2SA1048(Y) or 2SA1115(E)
IC 1,2	: MC14069UBCP or TC4069UBP
IC 3~9	: TC4011BP or BU4011BP
IC 10	: PST518A
IC 11	: MC145848CP
IC 12,17,22	: 74LS174
IC 13	: 74LS32
IC 14	: MB8418-20LP-GRA
IC 15	: 74LS138
IC 16	: μPD8255AC-5 or M5L8255AP-5 or TMP8255AP-5
IC 18	: μPC4558C
IC 19	: MN6127A
IC 20	: μPD7507G-575-00
IC 21	: μPC7805H
IC 23	: 74LS05
IC 24	: μPD7802G-088-36
D1,3~7	: DAP401
D2,8~10,12~15,18~29,33,35	: 1SS133
D11	: MTZ9.1JB
D16(T,W)	: 1SS133
D17	: MTZ-12JB
D30(K,T,W)	: 1SS133
D31(W)	: 1SS133
D32(W)	: 1SS133
D34(T,W)	: 1SS133

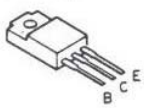
Q5	: μPD763C
Q6	: μPA80C
Q7,8	: TC5066BP
Q9,10	: 2SC1959(Y)
Q11,12	: DTA124(F)
D2	: MTZ6.2JA
D3,4	: MC931
D5	: MTZ7.5JA
Q1,2,3	: PN126S(R)
Q4	: 2SC2458(Y)
IC1	: LM358P
D1,2,3	: LN66(R)
D4	: V06B

2SA1048
2SA1115
2SC2458



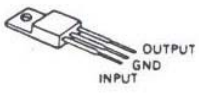
2SA1015
2SC1959
2SC2703

2SA1307



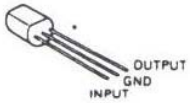
DTC143T

μPC7805H



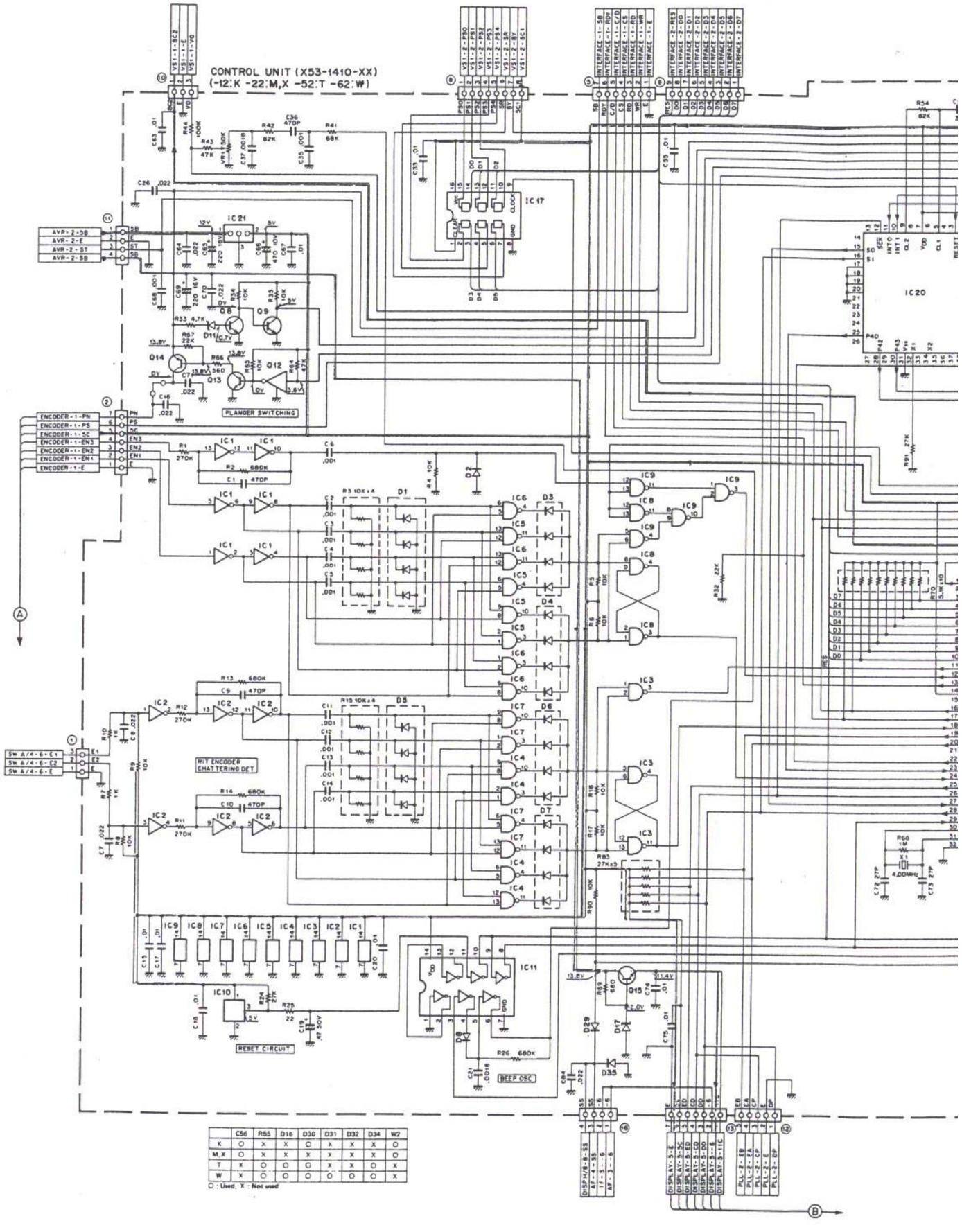
DTA114Y

PST518A



TS-811A/B/E CIRCUIT DIAGRAM

CONTROL UNIT (X53-1410

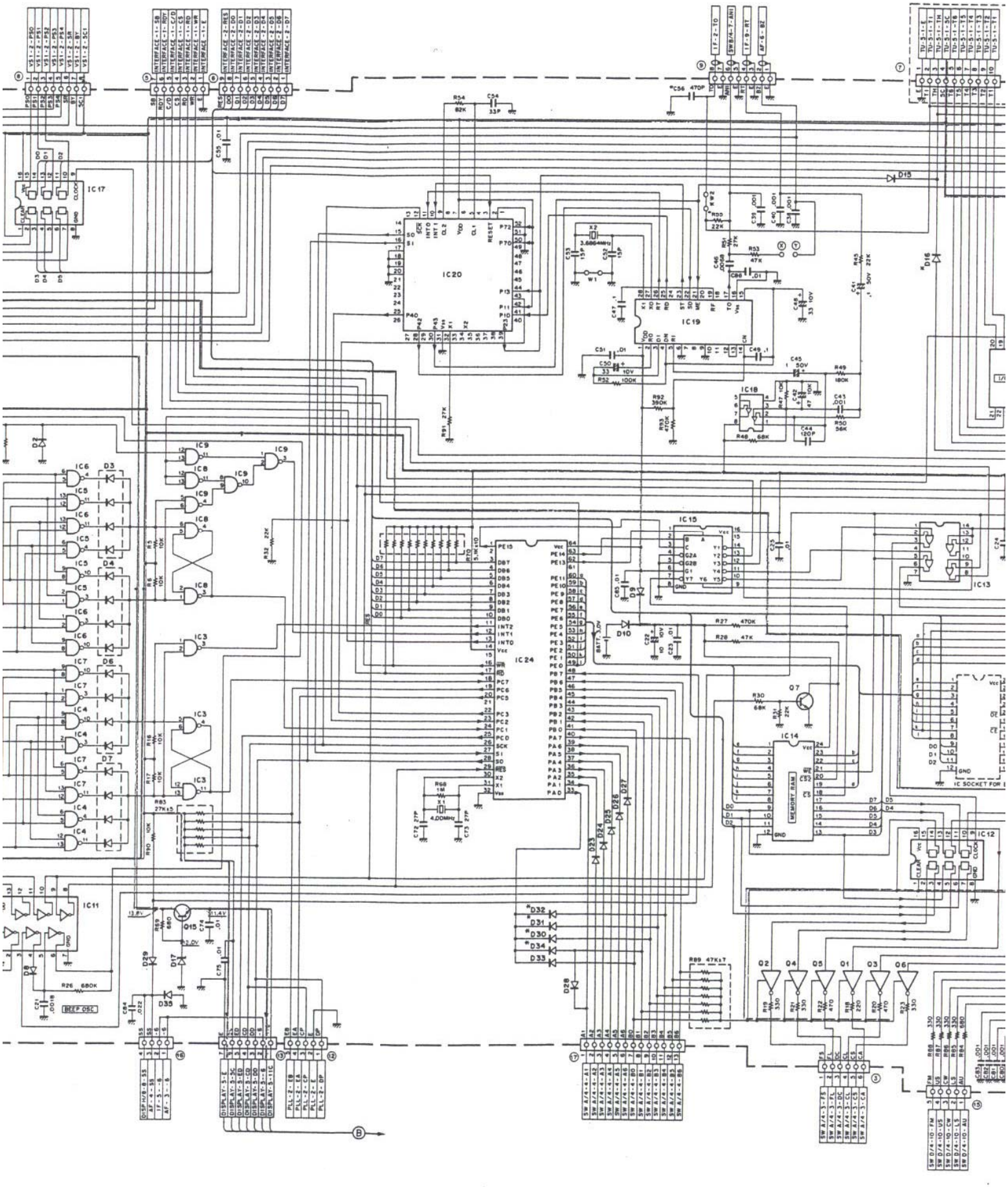


	C56	R55	D16	D30	D31	D32	D34	W2
K	○	x	x	○	x	x	x	○
M,X	○	x	x	x	x	x	x	○
T	x	○	○	○	x	x	○	x
W	x	○	○	○	○	○	○	x

○ : Used, X : Not used

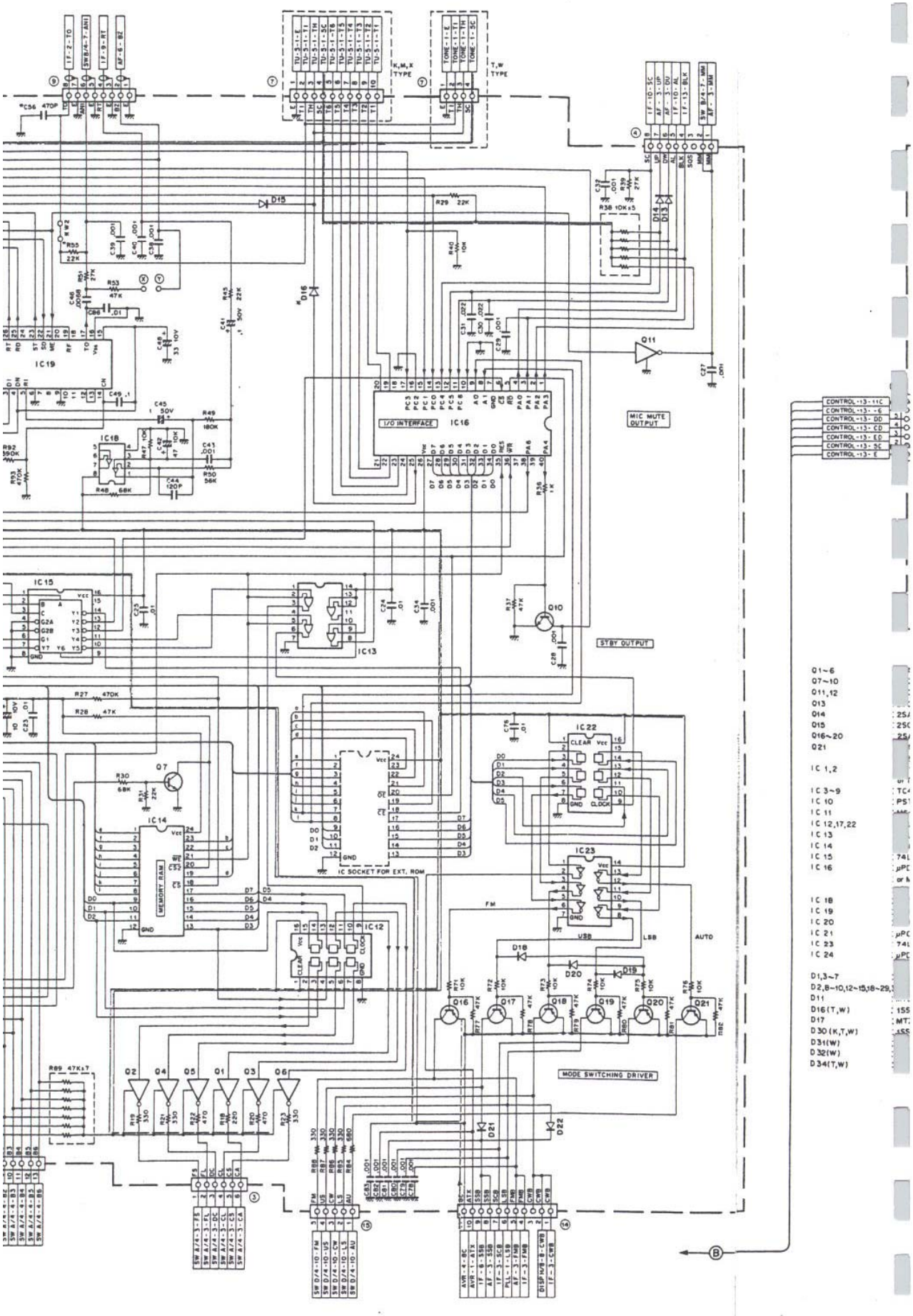
D E F G H I

CONTROL UNIT (X53-1410-XX) (-12 : TS-811 K -22 : TS-811 M,X -52 : TS-811 T -62 : TS-811 W



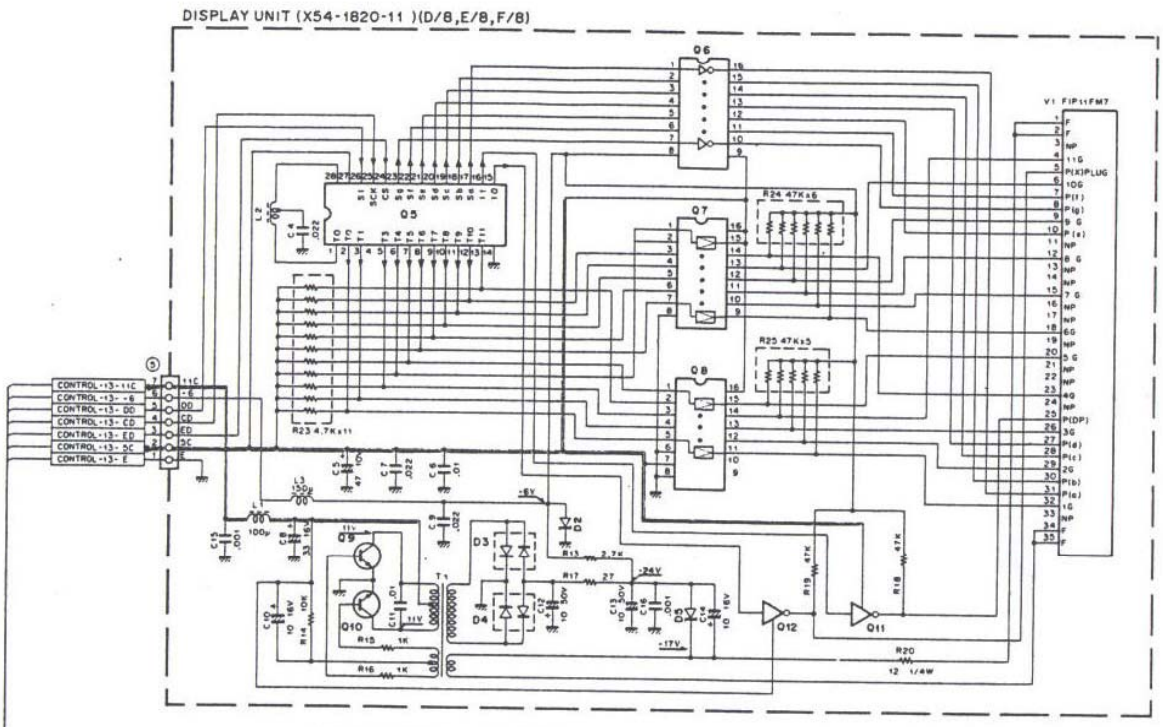
H I J K L

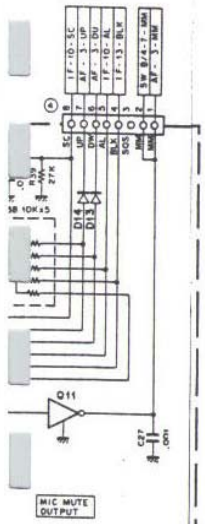
-22 : TS-811 M,X -52 : TS-811 T -62 : TS-811 W)

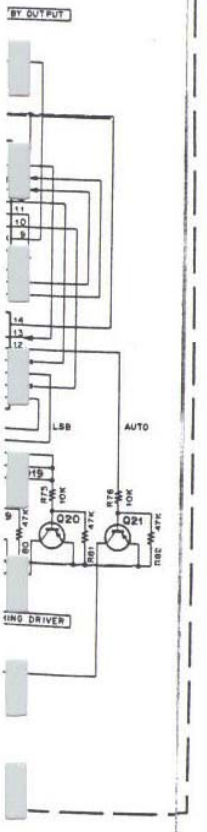


f = 435.00MHz, RX no signal, ( ) : TX.

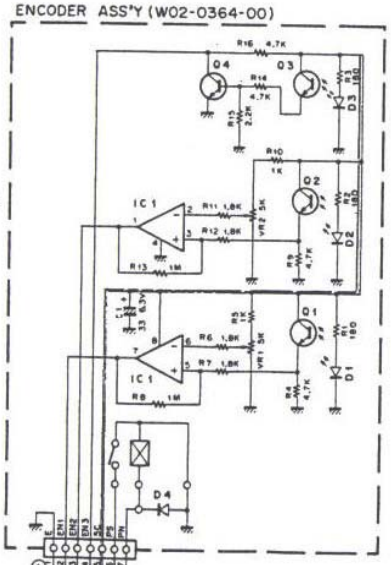
DISPLAY UNIT (X54-1820-11)







ENCODER ASS'Y (W02-0364-00)

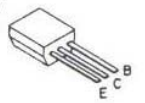


ENCODER ASS'Y
(W02-0364-00)

Q1~6	: DTA114Y(S)
Q7~10	: 2SC2458(Y)
Q11,12	: DTC143T(S)
Q13	: 2SC1959(Y)
Q14	: 2SA1307(Y)
Q15	: 2SC2703(O,Y)
Q16~20	: 2SA1015(Y)
Q21	: 2SA1048(Y) or 2SA1115(E)
IC 1,2	: MC14069UBCP or TC4069UBP
IC 3~9	: TC4011BP or BU4011BP
IC 10	: PST518A
IC 11	: MC14584BCP
IC 12,17,22	: 74LS174
IC 13	: 74LS32
IC 14	: MB8418-20LP-GRA
IC 15	: 74LS138
IC 16	: μPD8255AC-5 or M5L8255AP-5 or TMP8255AP-5
IC 18	: μPC4558C
IC 19	: MN6127A
IC 20	: μPD7507G-575-00
IC 21	: μPC7805H
IC 23	: 74LS05
IC 24	: μPD78026-088-36
D1,3~7	: DAP401
D2,8~10,12~15,18~29,33,35	: 1SS133
D11	: MTZ9.1JB
D16(T,W)	: 1SS133
D17	: MTZ-12JB
D30(K,T,W)	: 1SS133
D31(W)	: 1SS133
D32(W)	: 1SS133
D34(T,W)	: 1SS133

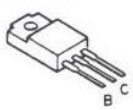
Q5	: μPD763C
Q6	: μPA80C
Q7,8	: TC50668P
Q9,10	: 2SC1959(Y)
Q11,12	: DTA124(F)
D2	: MTZ6.2JA
D3,4	: MC931
D5	: MTZ7.5JA
Q1,2,3	: PN1265(R)
Q4	: 2SC2458(Y)
IC1	: LM358P
D1,2,3	: LN66(R)
D4	: VD6B

2SA1048
2SA1115
2SC2458

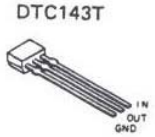


2SA1015
2SC1959
2SC2703

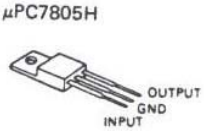
2SA1307



DTC143T

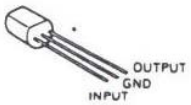


μPC7805H

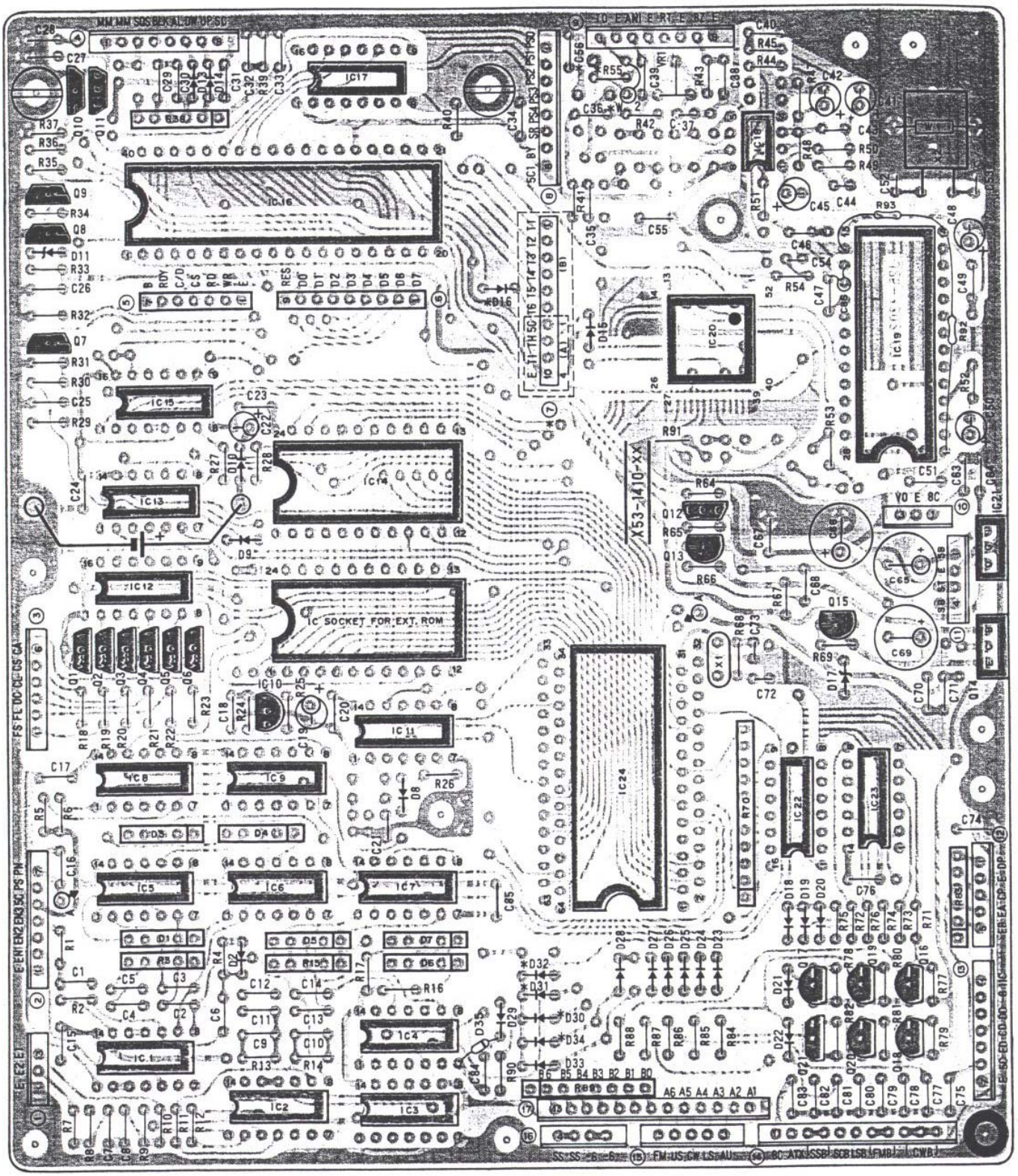


DTA114Y

PST518A



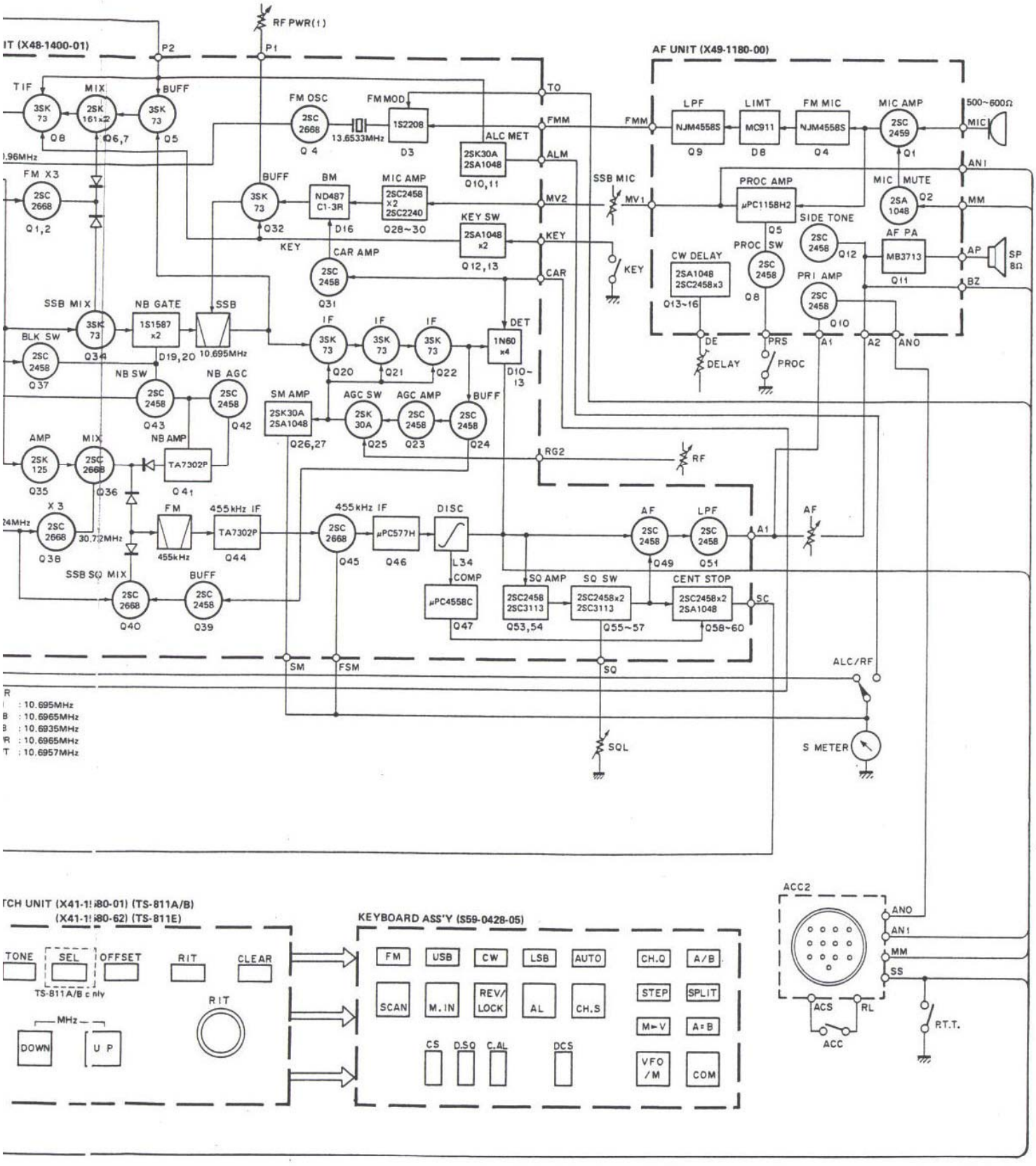
CONTROL UNIT (X53-1410-XX) Component side view
(-12 : TS-811 K -22 : TS-811 M,X -52 : TS-811 T -62 : TS-811 W)



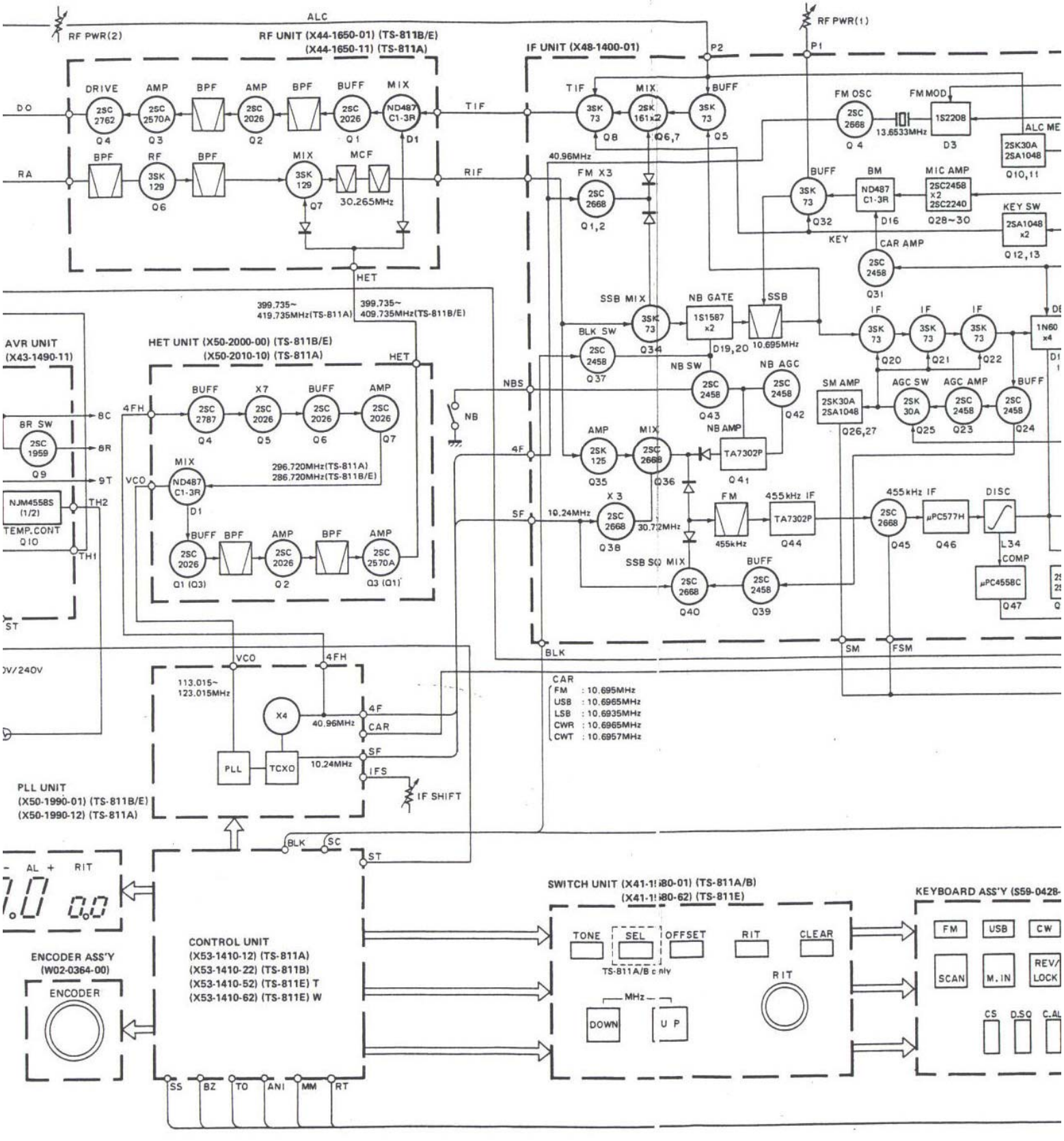
	C56	R55	D16	D30	D31	D32	D34	W2	⑦-(A)	⑦-(B)
K	O	X	X	O	X	X	X	O	X	O
M,X	O	X	X	X	X	X	X	O	X	O
T	X	O	O	O	X	X	O	X	O	X
W	X	O	O	O	O	O	O	X	O	X

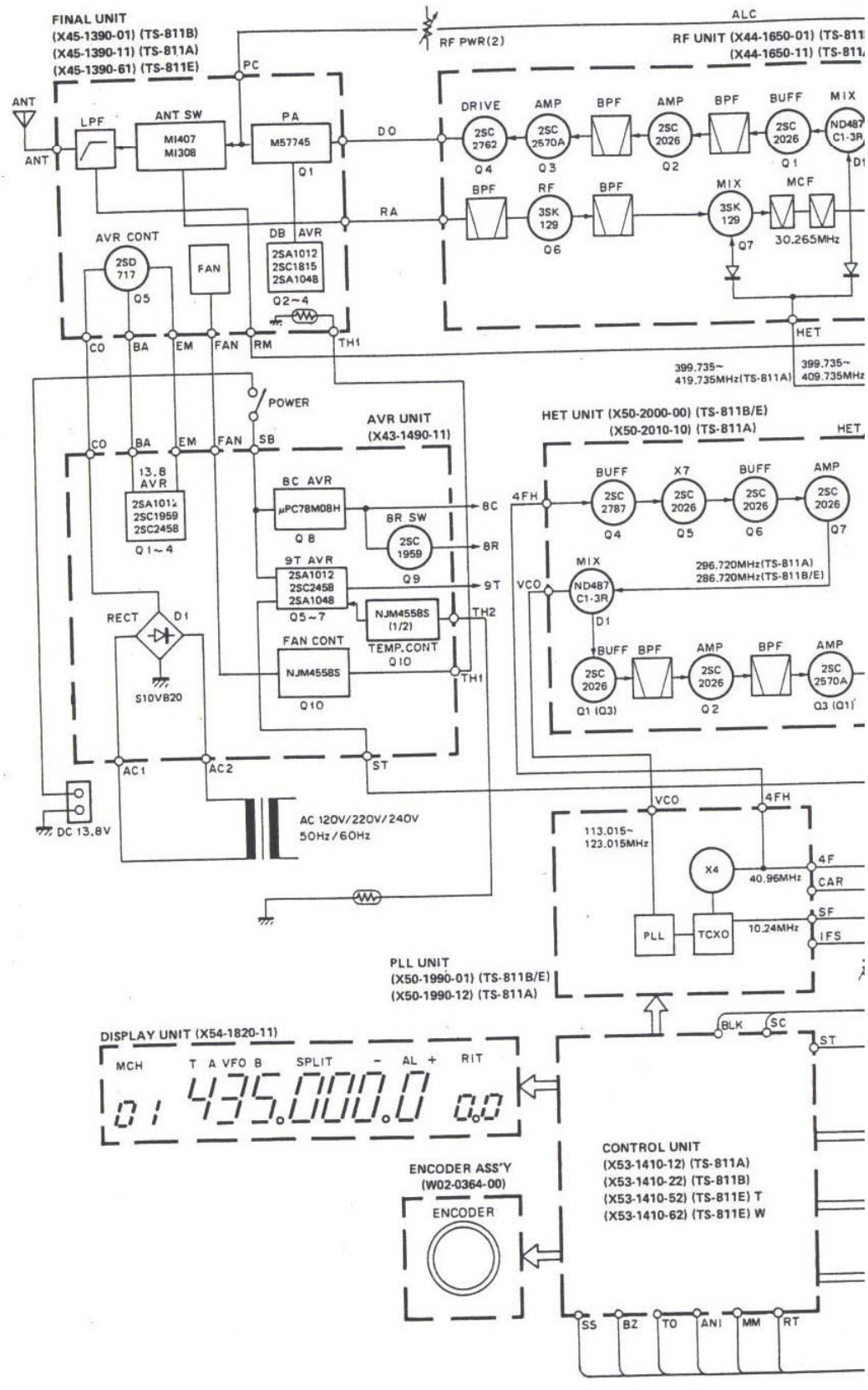
O : Used X : Not used

PC BOARD VIEW/BLOCK DIAGRAM TS-811A/B/E

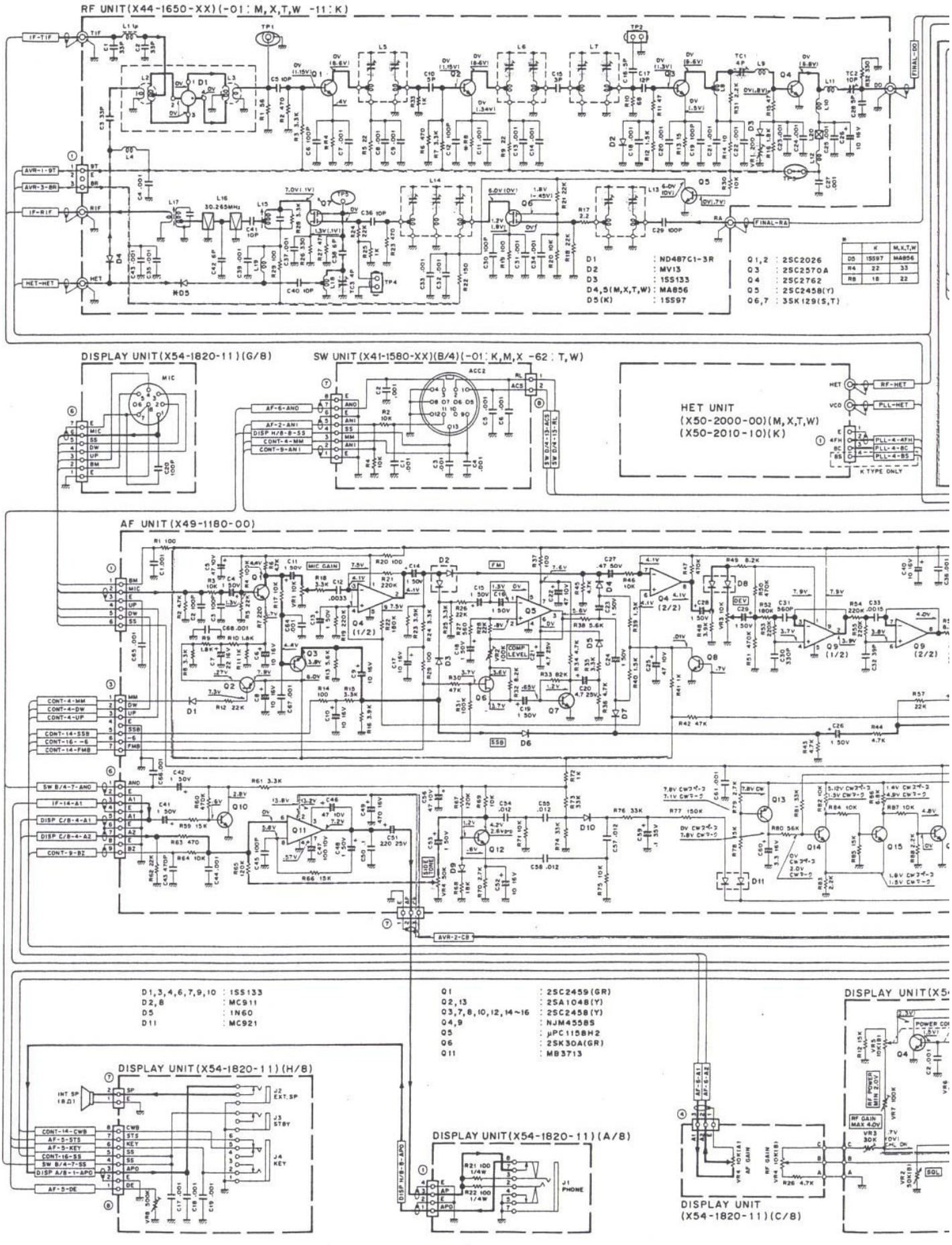


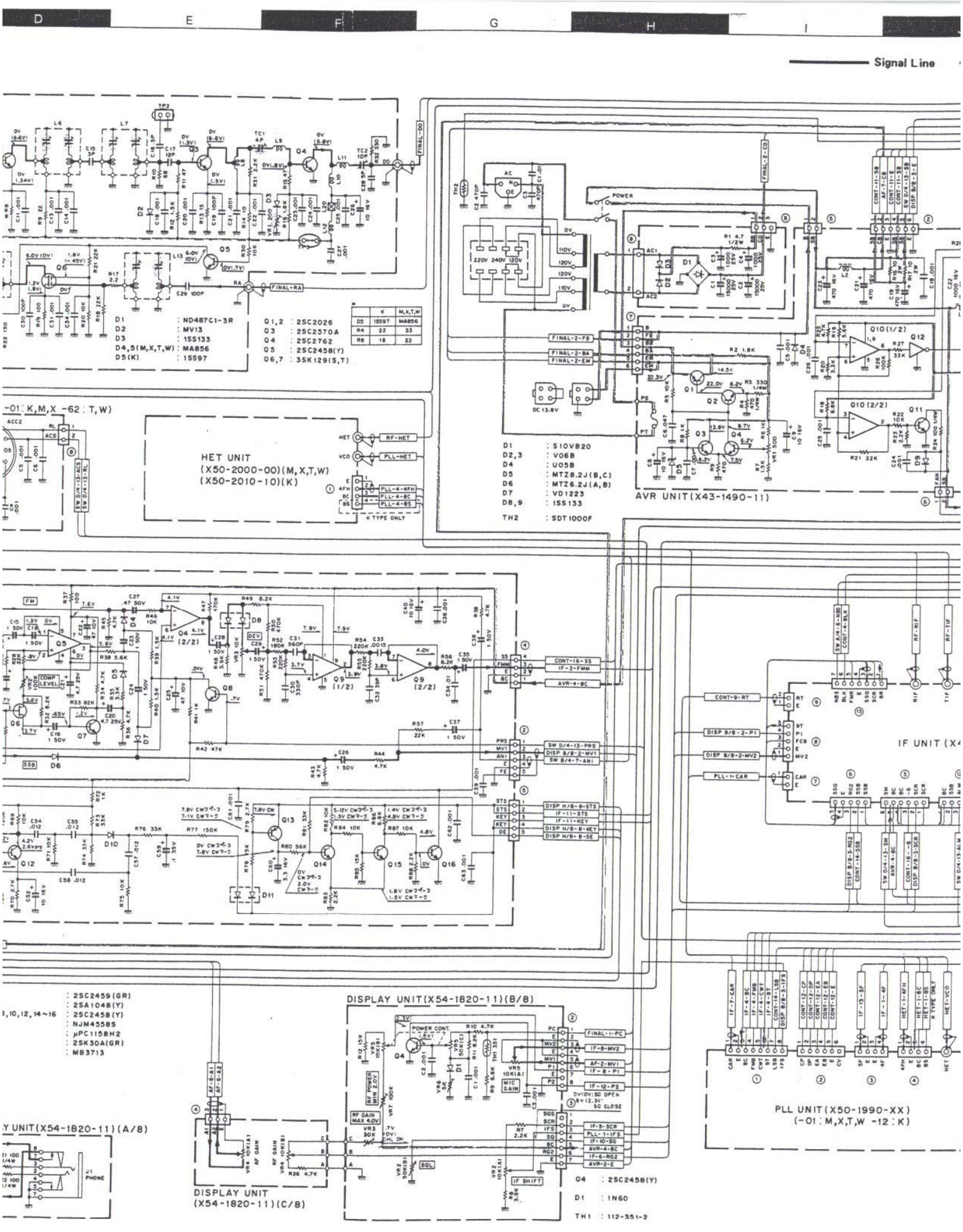
PC BOAR

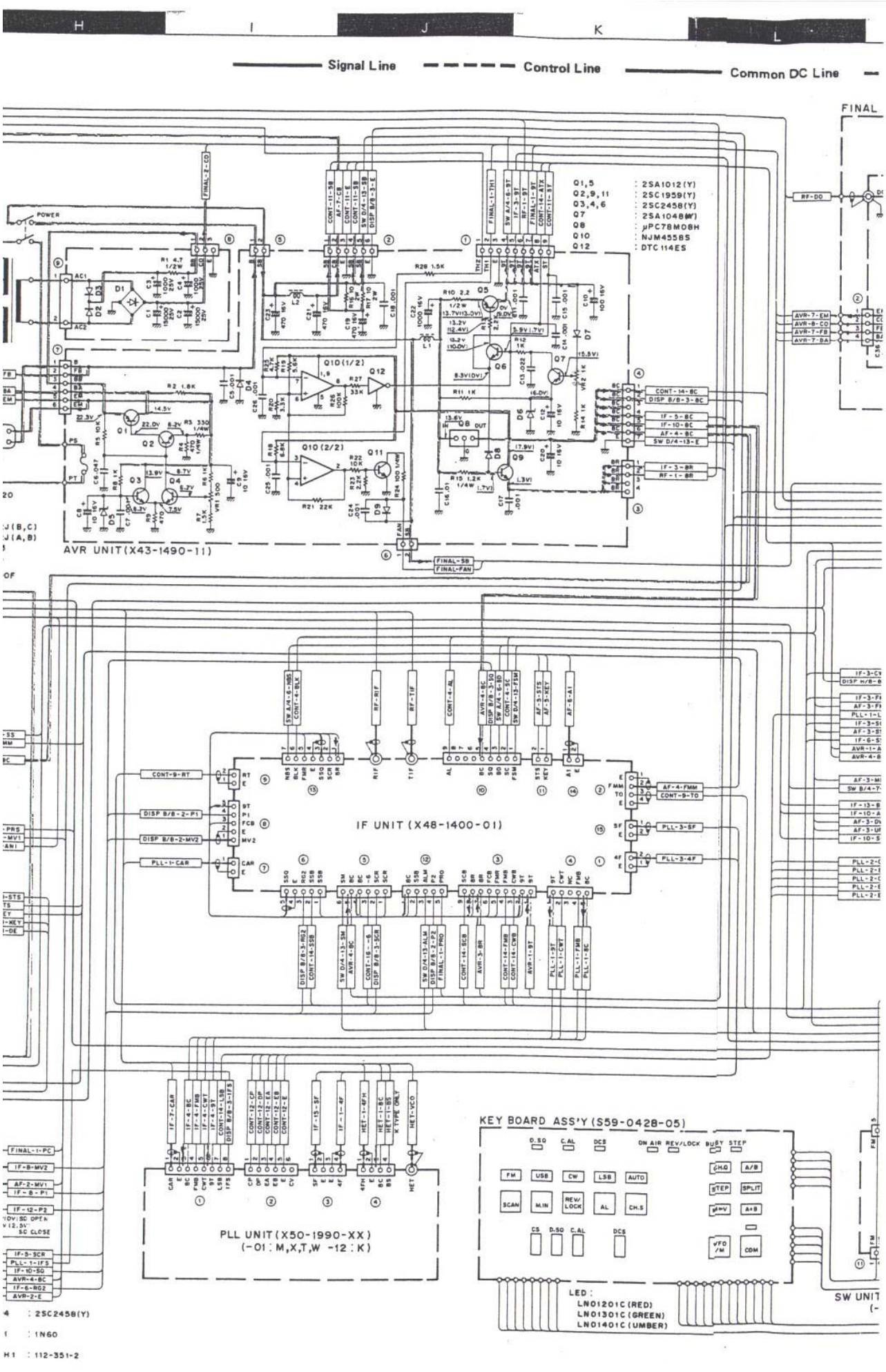

ALC
RF PWR(2)
RF UNIT (X44-1650-01) (TS-811B/E)
(X44-1650-11) (TS-811A)
IF UNIT (X48-1400-01)
RF PWR(1)
P2
P1
DRIVE
AMP
BPF
MIX
BUFF
TIF
RIF
MCF
30.265MHz
40.96MHz
FM X3
FM OSC
FM MOD
13.6533MHz
ALC METER
BM
MIC AMP
KEY SW
KEY
CAR AMP
SSB MIX
NB GATE
SSB
10.695MHz
BLK SW
NB SW
NB AGC
NB AMP
SM AMP
AGC SW
AGC AMP
IF
HET
399.735~
419.735MHz(TS-811A)
399.735~
409.735MHz(TS-811B/E)
AVR UNIT
(X43-1490-11)
HET UNIT (X50-2000-00) (TS-811B/E)
(X50-2010-10) (TS-811A)
4FH
X7
296.720MHz(TS-811A)
286.720MHz(TS-811B/E)
VCO
NBS
NB
4F
SF
10.24MHz
30.72MHz
455kHz
455kHz IF
DISC
COMP
BR SW
TEMP.CONT
TH1
TH2
8C
8R
9T
BLK
SM
FSM
CAR
FM : 10.695MHz
USB : 10.6965MHz
LSB : 10.6935MHz
CWR : 10.6965MHz
CWT : 10.6957MHz
PLL UNIT
(X50-1990-01) (TS-811B/E)
(X50-1990-12) (TS-811A)
113.015~
123.015MHz
X4
40.96MHz
PLL
TCXO
10.24MHz
IFS
IF SHIFT
CAR
SC
ST
SWITCH UNIT (X41-1[illegible]80-01) (TS-811A/B)
(X41-1[illegible]80-62) (TS-811E)
KEYBOARD ASS'Y (S59-0428-
TONE
SEL
OFFSET
RIT
CLEAR
TS-811A/B only
MHz
DOWN
UP
FM
USB
CW
SCAN
M.IN
REV/
LOCK
CS
D.SO
C.AL
CONTROL UNIT
(X53-1410-12) (TS-811A)
(X53-1410-22) (TS-811B)
(X53-1410-52) (TS-811E) T
(X53-1410-62) (TS-811E) W
ENCODER ASS'Y
(W02-0364-00)
ENCODER
SS
BZ
TO
ANI
MM
RT


FINAL UNIT
(X45-1390-01) (TS-811B)
(X45-1390-11) (TS-811A)
(X45-1390-61) (TS-811E)
RF PWR(2)
ALC
RF UNIT (X44-1650-01) (TS-811
(X44-1650-11) (TS-811
ANT
LPF
ANT SW
MI407
MI308
PA
M57745
Q1
PC
DO
RA
DRIVE
2SC 2762
Q4
AMP
2SC 2570A
Q3
BPF
AMP
2SC 2026
Q2
BPF
BUFF
2SC 2026
Q1
MIX
ND487 C1-3R
D1
BPF
RF
3SK 129
Q6
BPF
MIX
3SK 129
Q7
MCF
30.265MHz
HET
399.735~ 419.735MHz(TS-811A)
399.735~ 409.735MHz
AVR CONT
2SD 717
Q5
FAN
DB AVR
2SA1012
2SC1815
2SA1048
Q2~4
CO
BA
EM
FAN
RM
TH1
POWER
AVR UNIT
(X43-1490-11)
SB
13.8 AVR
2SA1012
2SC1959
2SC2458
Q1~4
BC AVR
μPC78M08H
Q8
8R SW
2SC 1959
Q9
9T AVR
2SA1012
2SC2458
2SA1048
Q5~7
NJM4558S (1/2)
TEMP.CONT
Q10
FAN CONT
NJM4558S
Q10
8C
8R
9T
TH2
TH1
RECT
D1
S10VB20
AC1
AC2
ST
DC 13.8V
AC 120V/220V/240V
50Hz/60Hz
HET UNIT (X50-2000-00) (TS-811B/E)
(X50-2010-10) (TS-811A)
4FH
BUFF
2SC 2787
Q4
X7
2SC 2026
Q5
BUFF
2SC 2026
Q6
AMP
2SC 2026
Q7
MIX
ND487 C1-3R
D1
VCO
296.720MHz(TS-811A)
286.720MHz(TS-811B/E)
BUFF
2SC 2026
Q1 (Q3)
BPF
AMP
2SC 2026
Q2
BPF
AMP
2SC 2570A
Q3 (Q1)
VCO
4FH
113.015~ 123.015MHz
X4
40.96MHz
4F
CAR
SF
IFS
PLL
TCXO
10.24MHz
PLL UNIT
(X50-1990-01) (TS-811B/E)
(X50-1990-12) (TS-811A)
DISPLAY UNIT (X54-1820-11)
MCH
T A VFO B
SPLIT
- AL +
RIT
01 435.000.0 0.0
BLK
SC
ST
CONTROL UNIT
(X53-1410-12) (TS-811A)
(X53-1410-22) (TS-811B)
(X53-1410-52) (TS-811E) T
(X53-1410-62) (TS-811E) W
ENCODER ASS'Y
(W02-0364-00)
ENCODER
SS
BZ
TO
ANI
MM
RT

TS-811A/B/E SCHEMATIC DIAGRAM

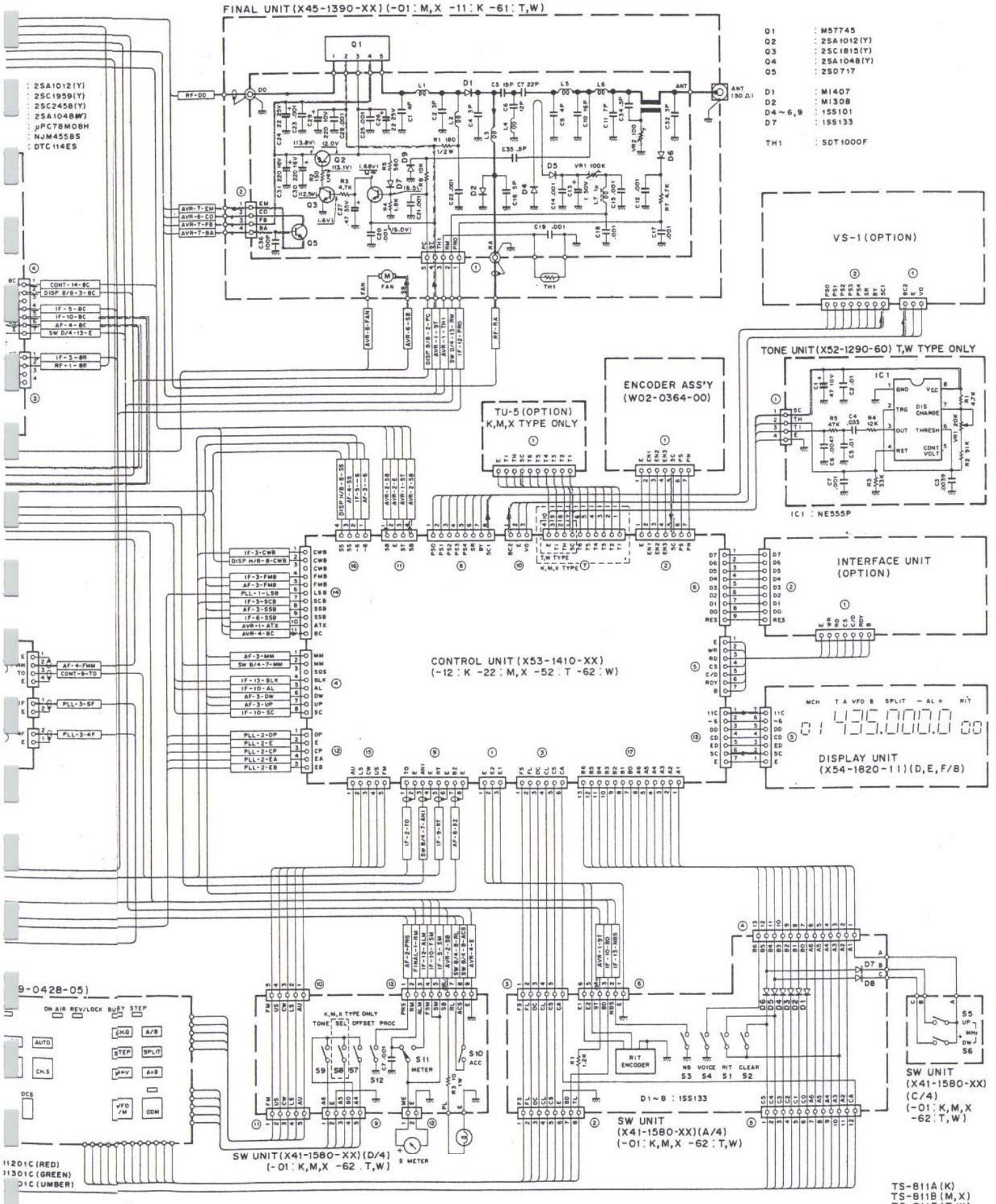



Signal Line
HET UNIT
(X50-2000-00)(M,X,T,W)
(X50-2010-10)(K)
AVR UNIT(X43-1490-11)
DISPLAY UNIT(X54-1820-11)(B/8)
DISPLAY UNIT
(X54-1820-11)(C/8)
PLL UNIT(X50-1990-XX)
(-01 : M,X,T,W -12 : K)
IF UNIT (X4
D1 : ND487C1-3R
D2 : MV13
D3 : 1SS133
D4,5(M,X,T,W) : MA856
D5(K) : 1SS97
Q1,2 : 2SC2026
Q3 : 2SC2570A
Q4 : 2SC2762
Q5 : 2SC2458(Y)
Q6,7 : 3SK129(S,T)
D1 : S10VB20
D2,3 : V06B
D4 : U05B
D5 : MTZ8.2J(B,C)
D6 : MTZ6.2J(A,B)
D7 : VD1223
D8,9 : 1SS133
TH2 : SDT1000F
Q04 : 2SC2458(Y)
D1 : 1N60
TH1 : 112-351-2

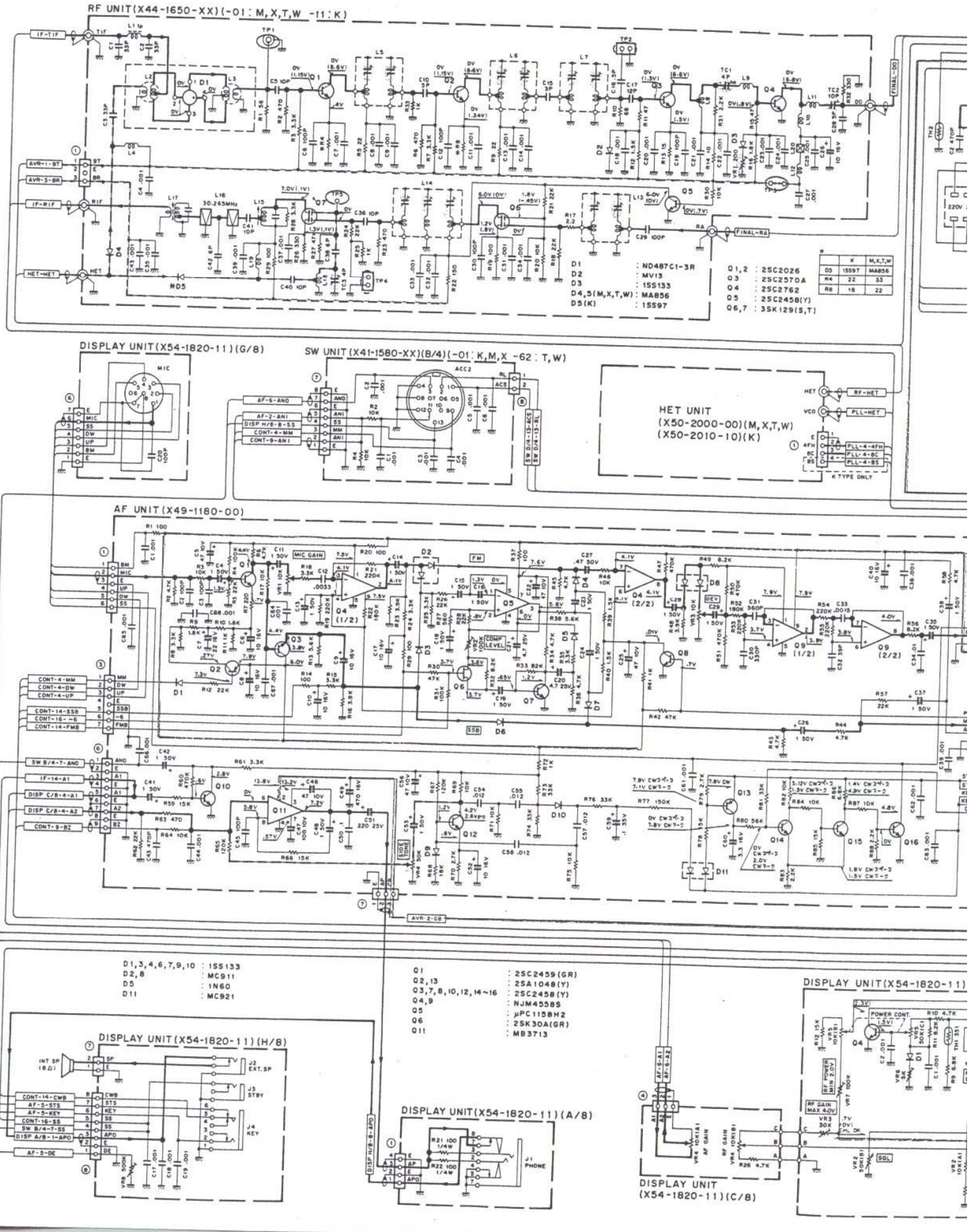

Signal Line
Control Line
Common DC Line
AVR UNIT(X43-1490-11)
IF UNIT (X48-1400-01)
PLL UNIT(X50-1990-XX)
(-01 : M,X,T,W -12 : K)
KEY BOARD ASS'Y (S59-0428-05)
Q1,5 : 2SA1012(Y)
Q2,9,11 : 2SC1959(Y)
Q3,4,6 : 2SC2458(Y)
Q7 : 2SA1048(W)
Q8 : μPC78M08H
Q10 : NJM4558S
Q12 : DTC114ES
FINAL
SW UNIT
LED :
LN01201C (RED)
LN01301C (GREEN)
LN01401C (UMBER)

Common DC Line — — — — 8R, 9T Line

Voltage measurement conditions f = 435.00MHz, RX no signal, ( ) : TX.

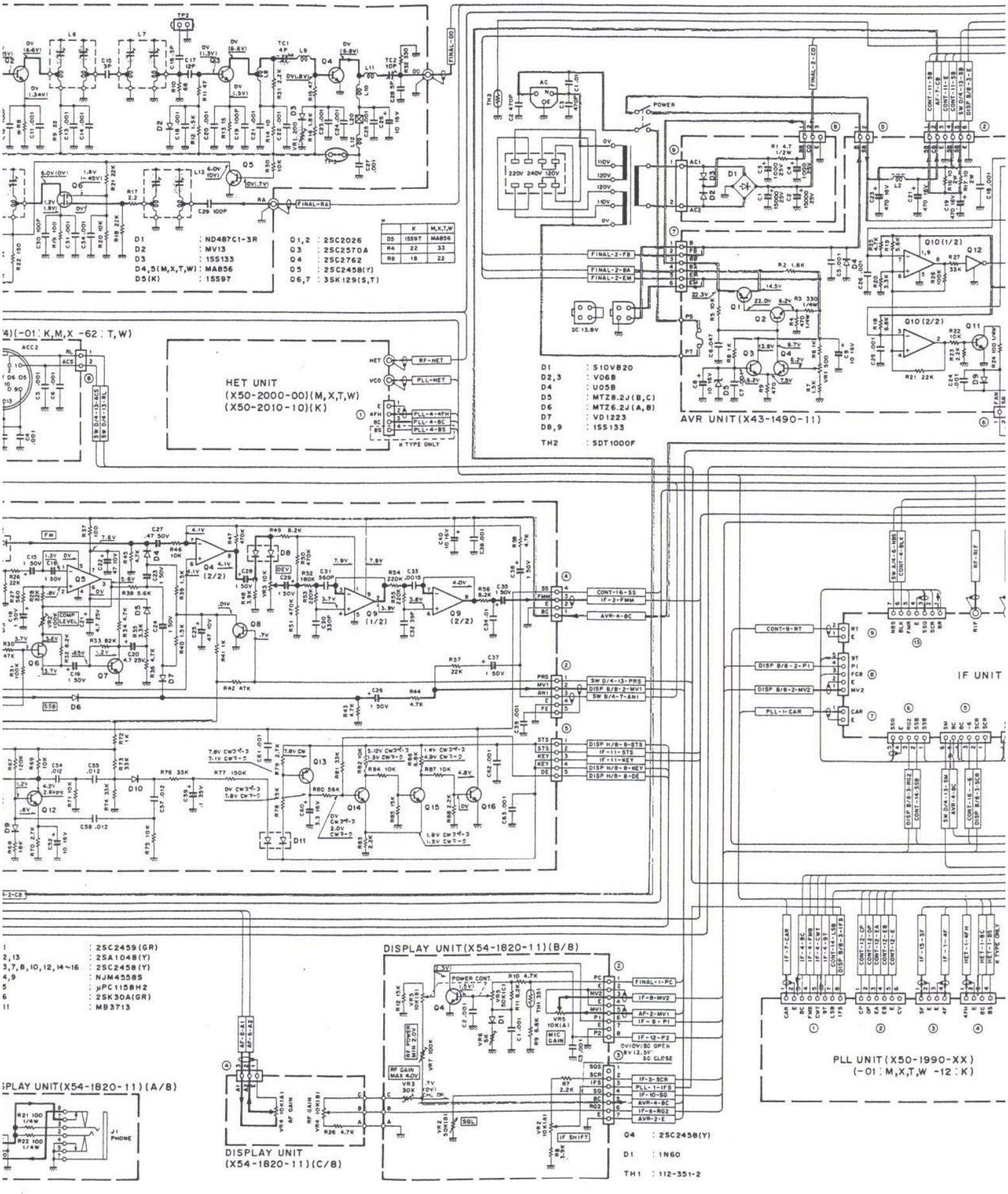


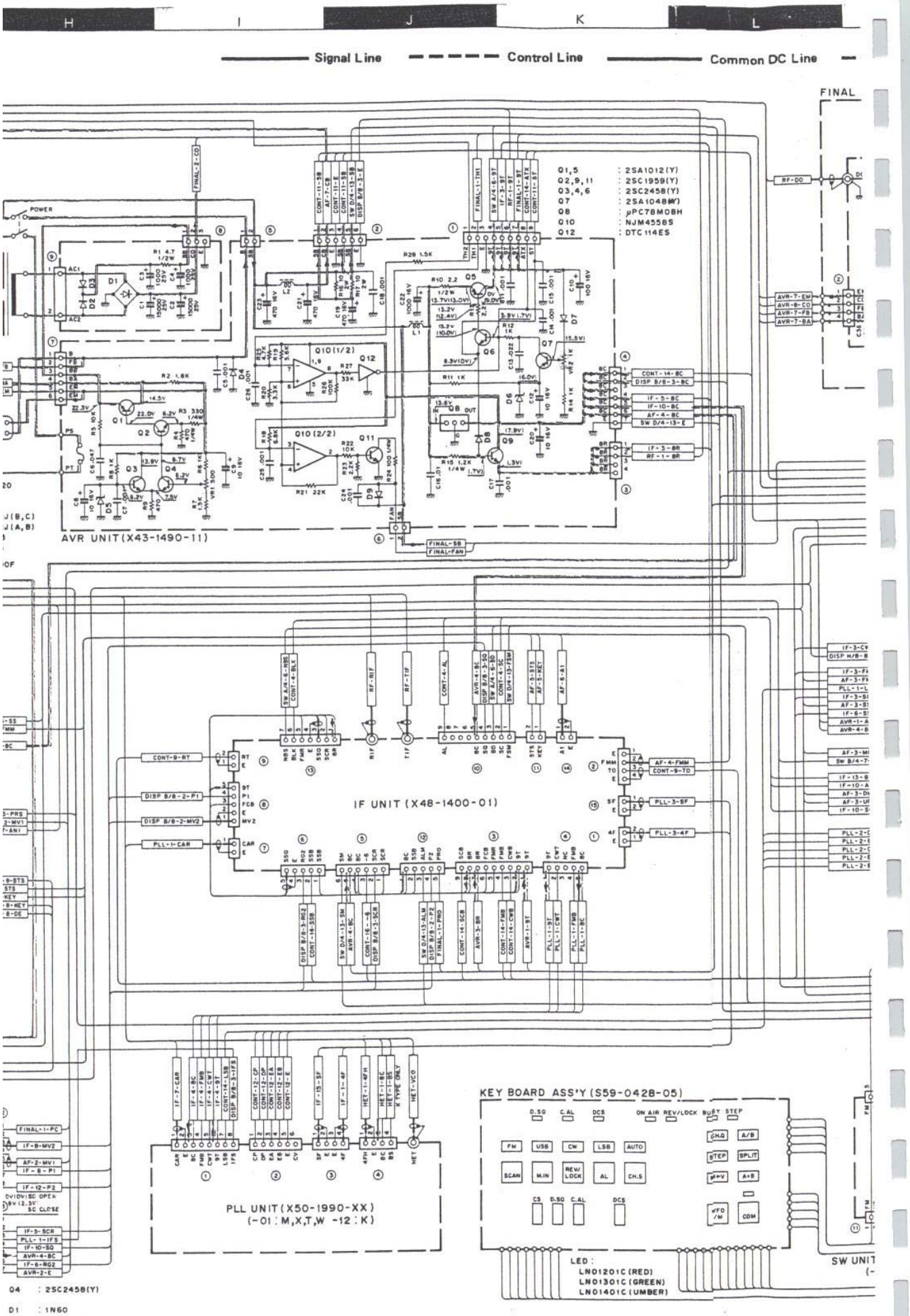
TS-811A/B/E SCHEMATIC DIAGRAM



D E F G H I

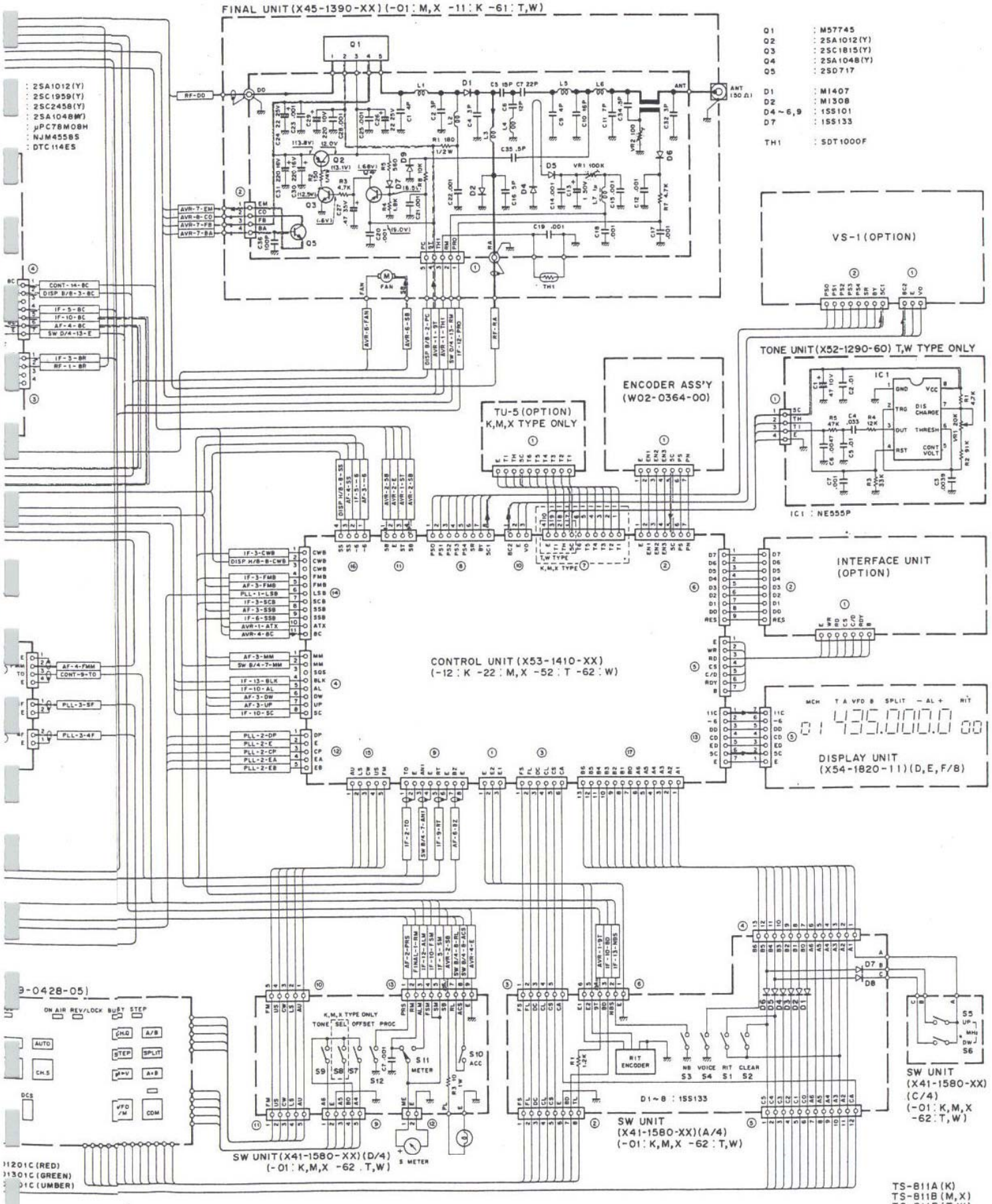
Signal Line




Signal Line
Control Line
Common DC Line
FINAL
Q1,5 : 2SA1012(Y)
Q2,9,11 : 2SC1959(Y)
Q3,4,6 : 2SC2458(Y)
Q7 : 2SA1048(W)
Q8 : μPC78M08H
Q10 : NJM4558S
Q12 : DTC114ES
AVR UNIT(X43-1490-11)
IF UNIT (X48-1400-01)
PLL UNIT(X50-1990-XX)
(-01 : M,X,T,W -12 : K)
KEY BOARD ASS'Y (S59-0428-05)
LED :
LN01201C (RED)
LN01301C (GREEN)
LN01401C (UMBER)
Q4 : 2SC2458(Y)
D1 : 1N60
TH1 : 112-351-2

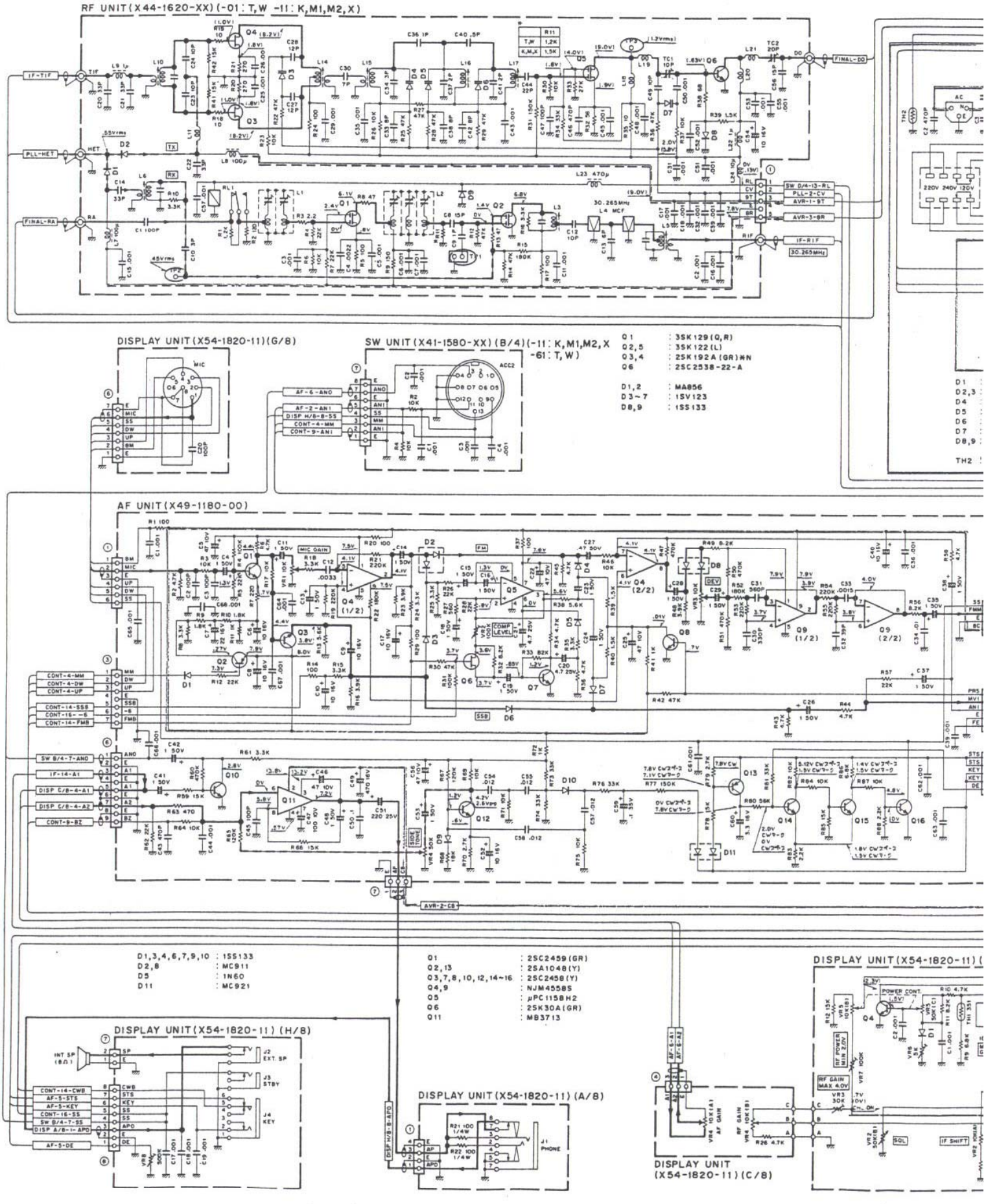
Common DC Line — — — — 8R, 9T Line

Voltage measurement conditions f = 435.00MHz, RX no signal, ( ) : TX.



Signal Line — Control Line — Common DC Line — 8R, 9T Line

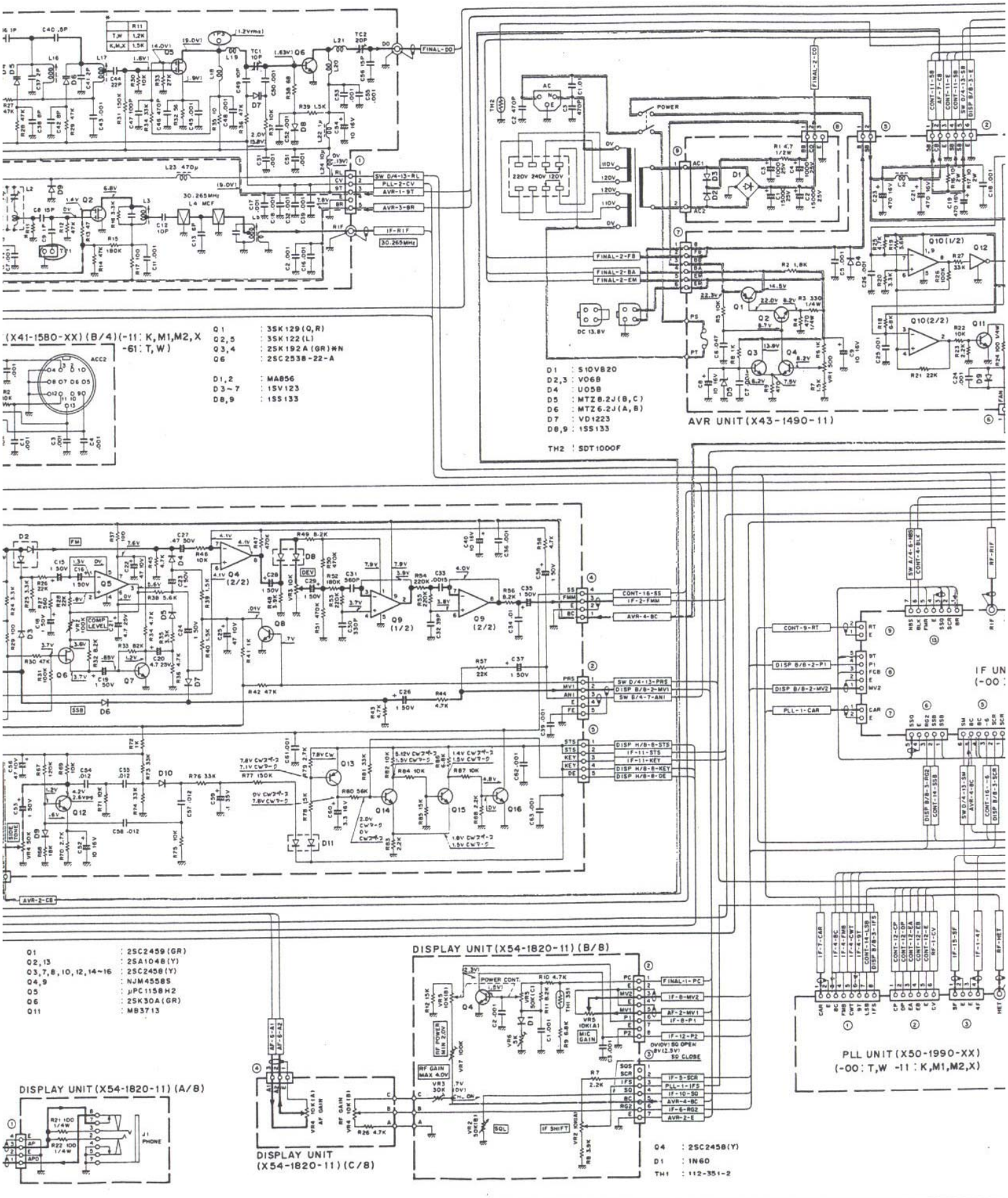
Voltage measu



D E F G H I

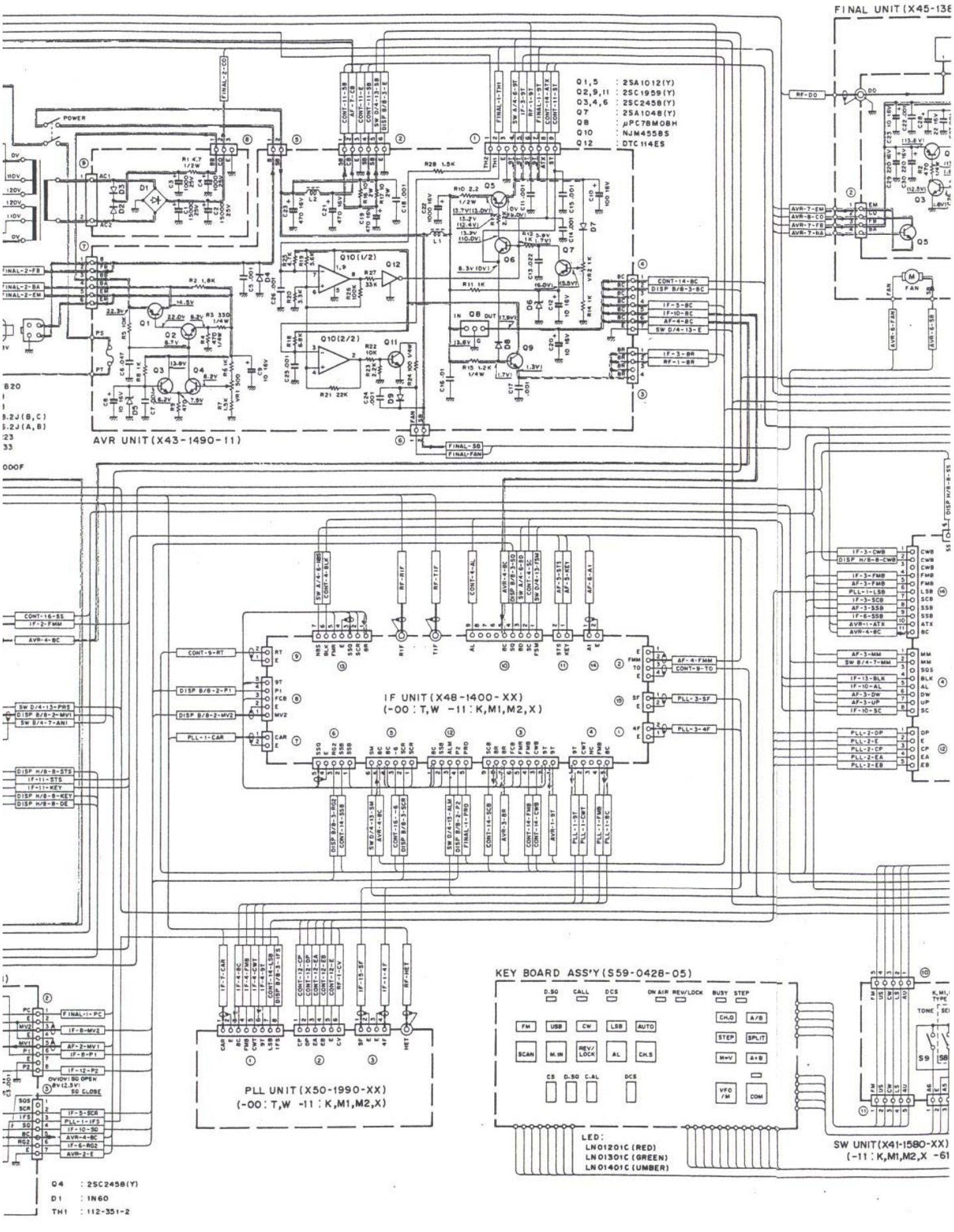
Common DC Line — — — — 8R, 9T Line

Voltage measurement conditions f = 145.00MHz, RX no signal, ( ) : TX.

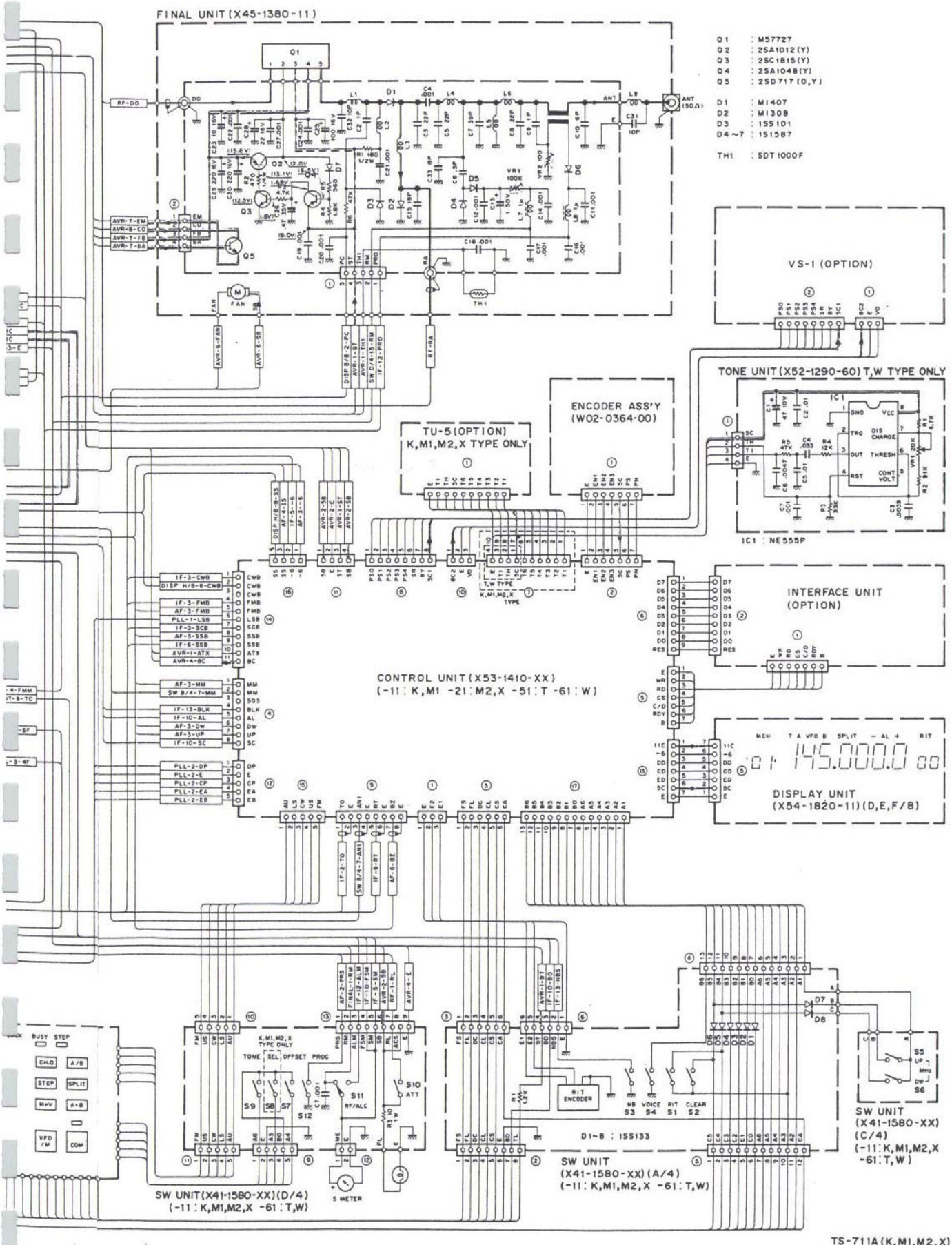


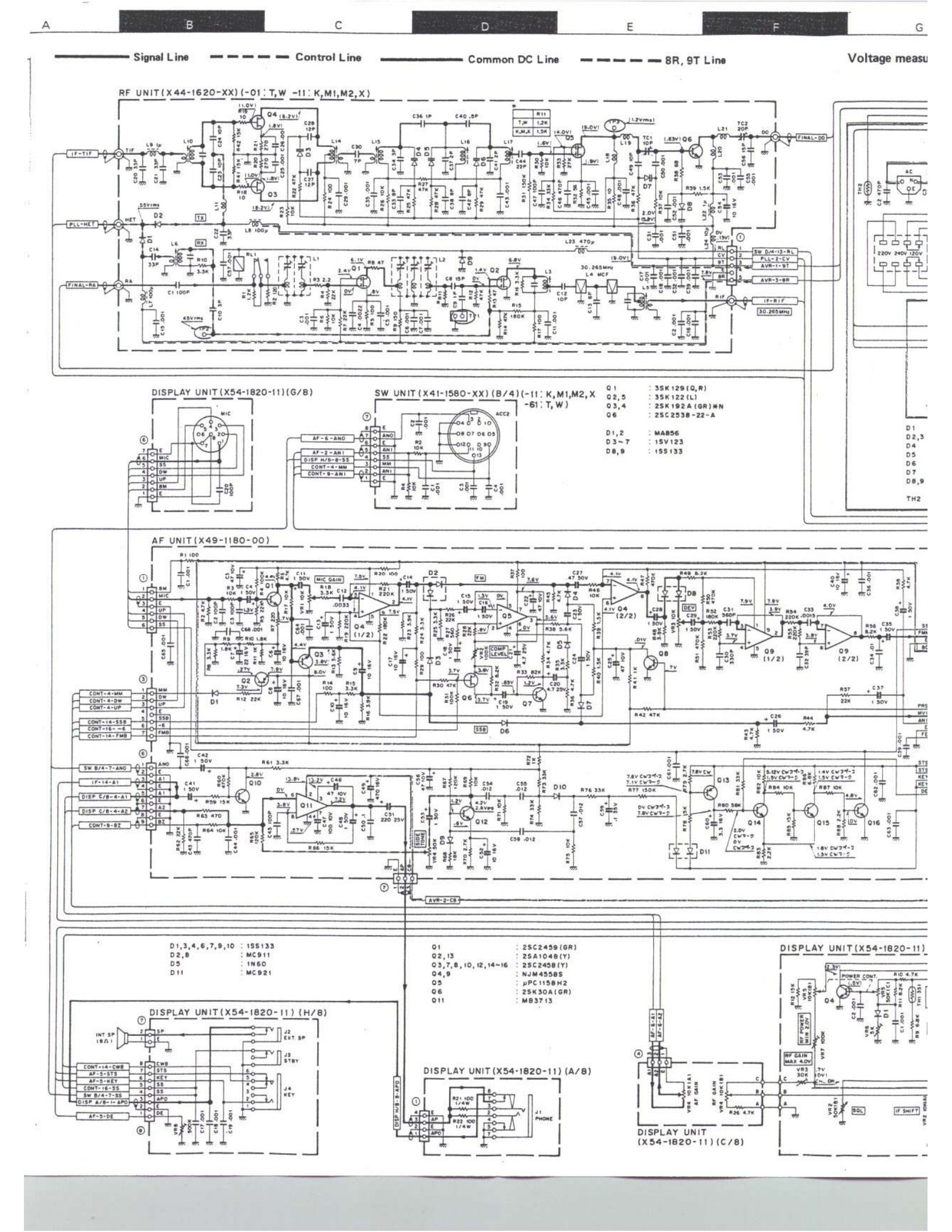
H I J K L

ent conditions f = 145.00MHz, RX no signal, ( ) : TX.



SCHEMATIC DIAGRAM TS-711A/E

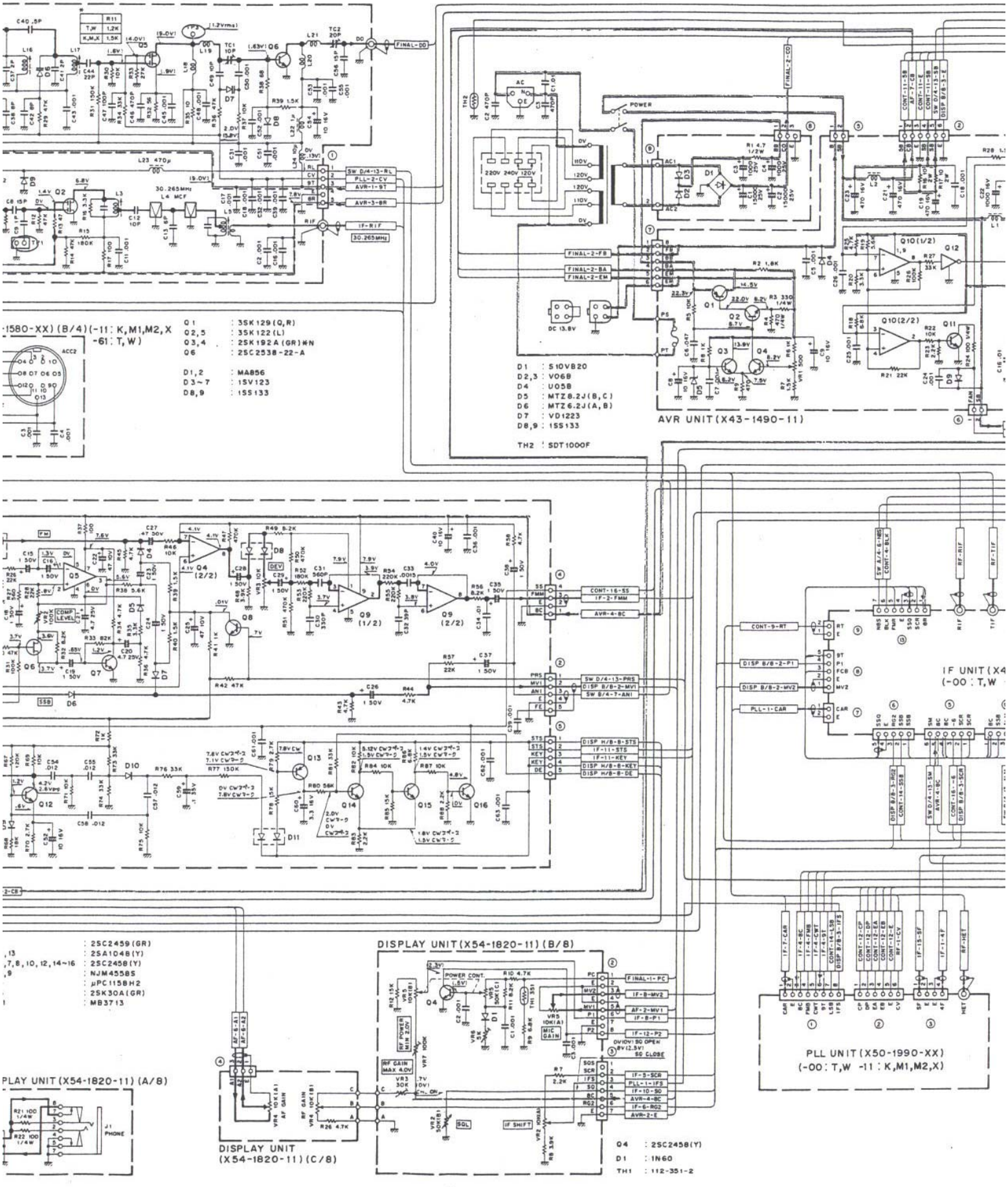



A
B
C
D
E
F
G
Signal Line
Control Line
Common DC Line
8R, 9T Line
Voltage measu
RF UNIT(X44-1620-XX)(-01:T,W -11:K,M1,M2,X)
DISPLAY UNIT(X54-1820-11)(G/8)
SW UNIT(X41-1580-XX)(B/4)(-11:K,M1,M2,X -61:T,W)
Q1 : 3SK129(Q,R)
Q2,5 : 3SK122(L)
Q3,4 : 2SK192A(GR)*N
Q6 : 2SC2538-22-A
D1,2 : MA856
D3~7 : 1SV123
D8,9 : 1SS133
AF UNIT(X49-1180-00)
D1,3,4,6,7,9,10 : 1SS133
D2,8 : MC911
D5 : 1N60
D11 : MC921
Q1 : 2SC2459(GR)
Q2,13 : 2SA1048(Y)
Q3,7,8,10,12,14~16 : 2SC2458(Y)
Q4,9 : NJM4558S
Q5 : μPC1158H2
Q6 : 2SK30A(GR)
Q11 : MB3713
DISPLAY UNIT(X54-1820-11)(H/8)
DISPLAY UNIT(X54-1820-11)(A/8)
DISPLAY UNIT(X54-1820-11)(C/8)
DISPLAY UNIT(X54-1820-11)

D E F G H I

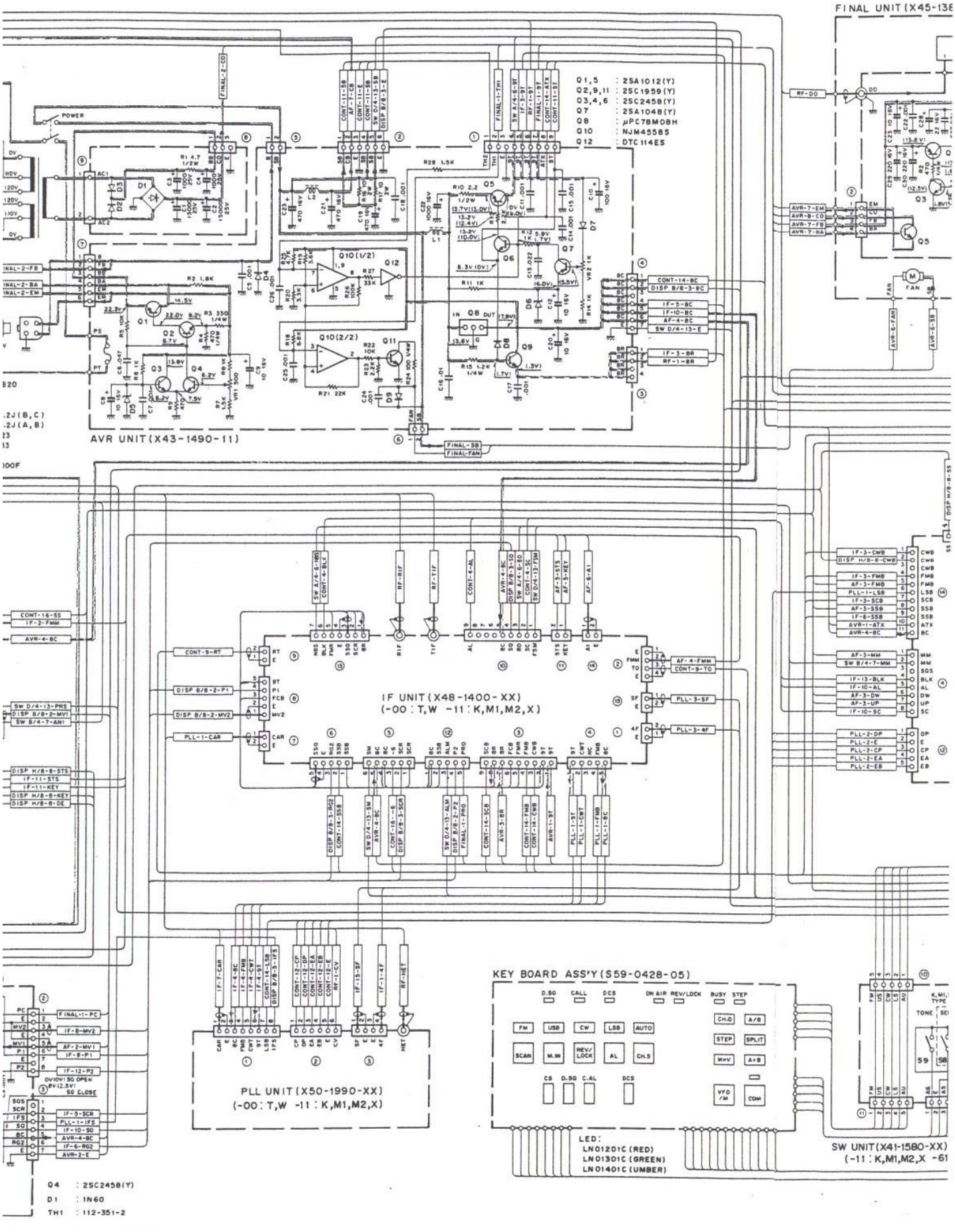
— Common DC Line — — — — 8R, 9T Line

Voltage measurement conditions f = 145.00MHz, RX no signal, ( ) : TX.

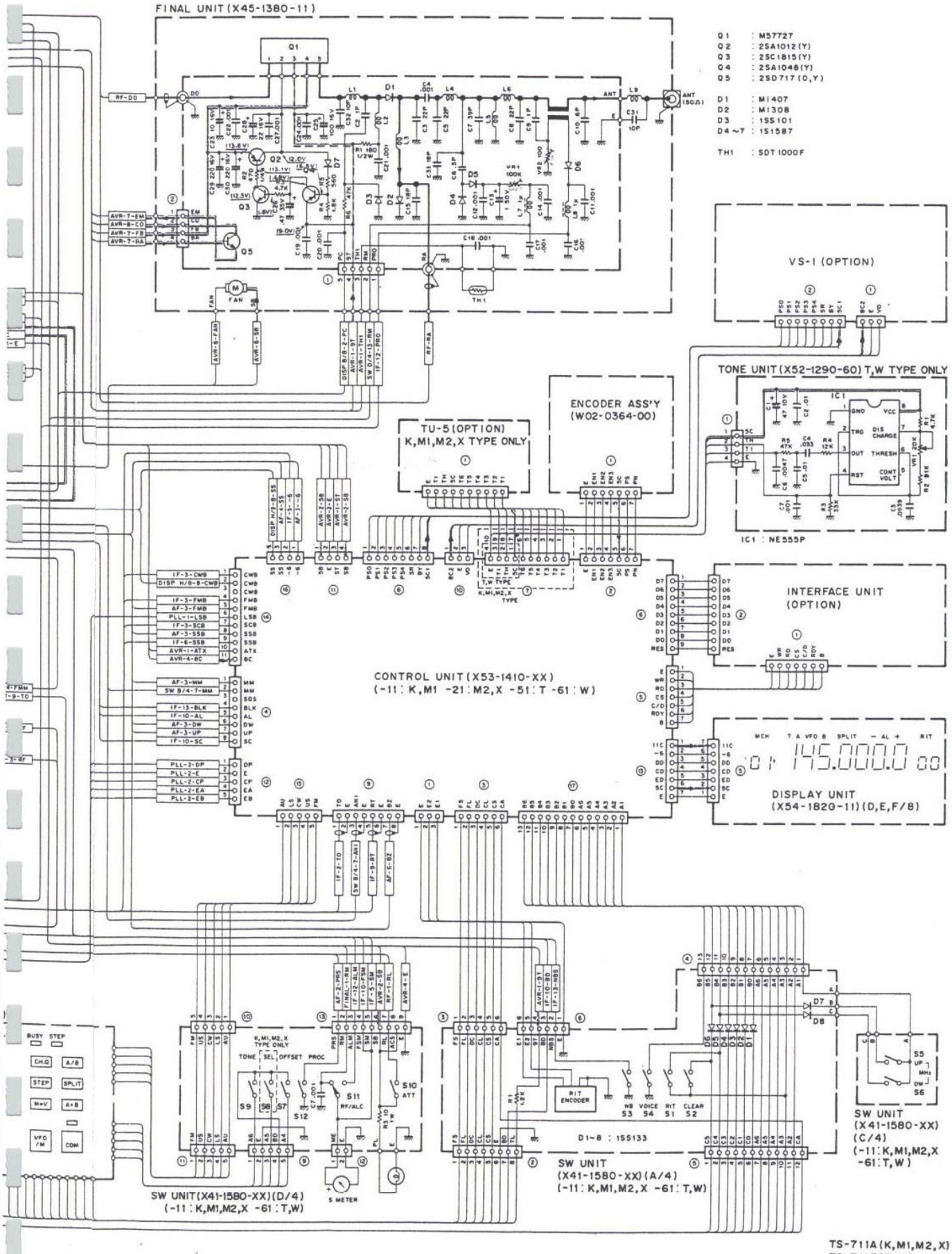


H I J K L

ent conditions f = 145.00MHz, RX no signal, ( ) : TX.



SCHEMATIC DIAGRAM TS-711A/E



CD-10 (CALL SIGN DISPLAY)

PARTS LIST

CD-10 GENERAL

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY 011	021	051	REFERENCE.NO
A02-0708-02	N	CASE	1	1		
A02-0709-02	N	CASE			1	
A13-0662-03	N*	BLACKET	1	1	1	
A20-2539-02	N	PANEL	1	1	1	
B10-0671-04	N	FRONT GLASS	1	1	1	
B11-0415-14		LCD LIGHT GUIDING PLATE	1	1	1	
B11-0425-04	N	LCD LIGHT GUIDING SHEET	1	1	1	
B40-3560-04	N	MODEL NAME PLATE	1	1	1	
B42-2393-04		CABLE LABEL	1	1	1	
B43-1042-04	N	BADGE	1	1		
B43-1043-04	N	BADGE			1	
B46-0411-00		USER & WARRANTY	1			
B50-8013-00	N	INSTRUCTION MANUAL	1	1		
B50-8014-00	N	INSTRUCTION MANUAL			1	
E07-0552-05	N	SP DIN PLUG	1	1	1	
E29-0460-05	N	EXCHANGE PLUG	1	1	1	
E30-1797-05	N	DC CABLE ASS'Y	1	1	1	
E30-1798-05	N	CABEL WITH PLUG	1	1	1	
E30-1799-05	N	CABLE WITH PLUG	1	1	1	
G01-0821-04		COIL SPRING X9	7	7	7	
G11-0614-04	N	RUBBER RING	2	2	2	
H01-4626-03	N	CARTON	1	1		
H01-4627-03	N	CARTON			1	
H12-1375-14	N*	BUFFER(B)	1	1	1	
H12-1372-13	N*	BUFFER	1	1	1	
H25-0112-04		PROTECTIVE BAG 180X250	1	1	1	
H25-0103-04		BAG 125X250	1	1	1	
H25-0029-04		BAG(ACS) 60X110	1	1	1	
H25-0049-03		PROTECTIVE BAG 60X200	1	1	1	
J02-0435-05	N	RUBBER FOOT ACS	1	1	1	
J02-0436-04	N	FRONT FOOT ACS	1	1	1	
J29-0407-04		SW GUIDE A (TACT KNOB)	4	4	4	
J29-0409-04		SW GUID X3	3	3	3	
J32-0785-04		ROUND BOSS M2X6	2	2	2	
K27-0440-04		PUSH KNOB (E)	3	3	3	
K27-0441-04		PUSH KNOB (F)	1	1	1	
K27-0445-05		SQUARE KNOB (A)	2	2	2	
K27-0446-05		SQUARE KNOB (B)	1	1	1	
N08-0513-04	N	DRESSED SCREW	2		2	
N09-0633-05		SCREW (OTHERS)	2	2	2	
N14-0115-05		NUT	2	2	2	
N15-1040-46		FLAT WASHER	2	2	2	
N16-0040-46		SPRING WASHER	2	2	2	
N30-2006-41		PAN HD SCREW	2	2	2	
N30-4041-46		PAN HD SCREW	2	2	2	
N35-2004-41		BIND SCREW	1	1	1	
N89-2005-46		BIND TAPPING SCREW	3	3	3	
X57-1120-00	N	CD UNIT	1	1	1	

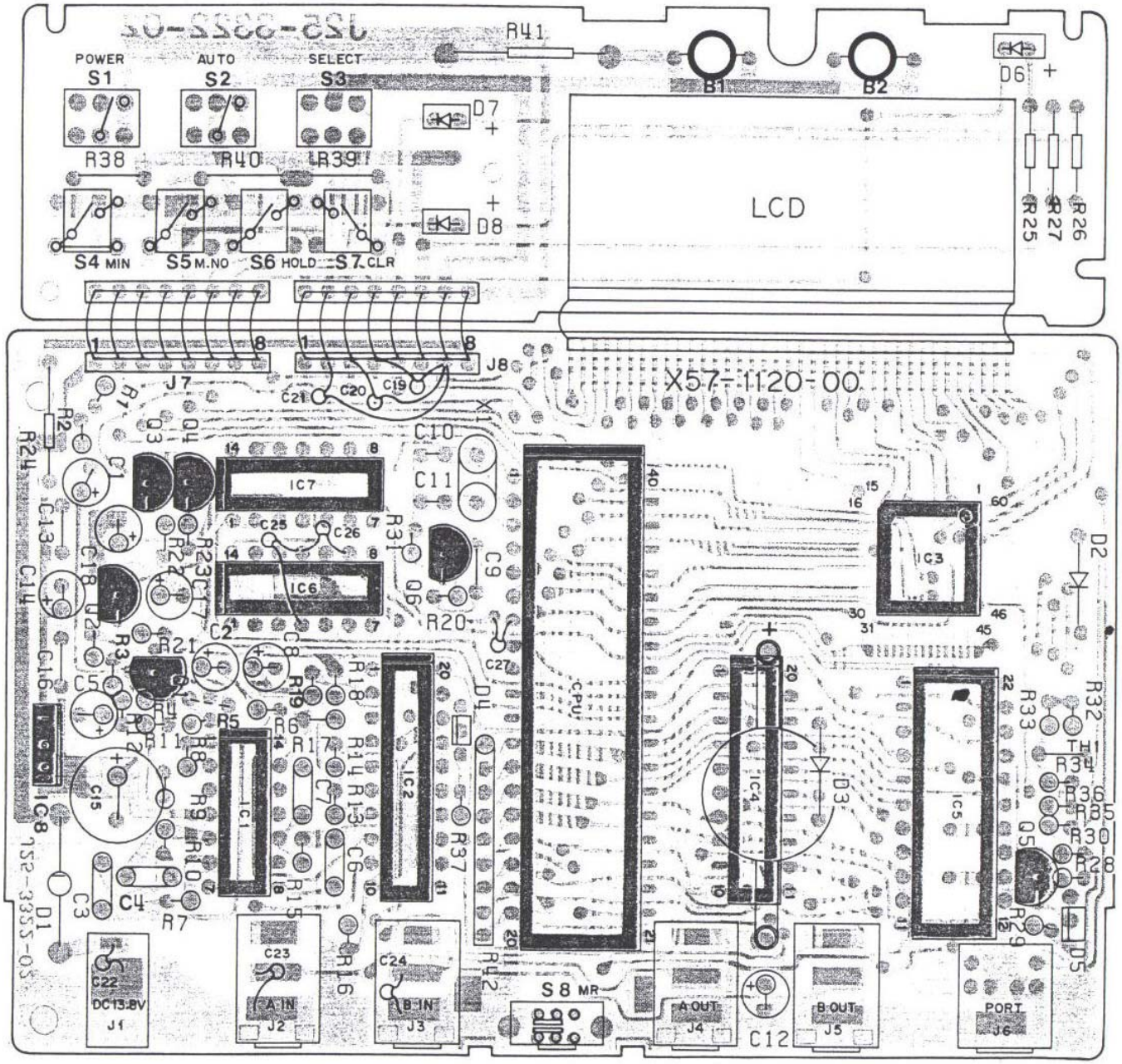
CD UNIT (X57-1120-00)

ｱｾﾝﾌﾞﾘﾅﾝﾊﾞｰ	ﾋﾞｺｳ	ﾒｲｼｮｳ & ﾅｲﾖｳ	ｼｭﾂ & ｽｳﾘｮｳ 000	ﾄｳｼｮｳﾏｰｸﾅﾝﾊﾞｰ
AN78N05	N	IC	1	IC , 8
B30-0833-05	N	LAMP	2	B , 1, 2
CC45CH1H220J		CERAMIC 22P 50V	1	C , 11
CC45CH1H470J		CERAMIC 47P 50V	1	C , 26
CE04W1A470M		ELECTRO 47 10V	3	C , 1, 5, 8
CE04W1A101M		ELECTRO 100 10V	1	C , 12
CE04W1A331M		ELECTRO 330 10V	1	C , 15
CE04W1E470M		ELECTRO 47 25V	1	C , 14
CE04W1H010M		ELECTRO 1 50V	3	C , 2, 17, 18
CK45F1H103Z		CERAMIC 0.01 50V	3	C , 9, 13, 16
CK45B1H102K		CERAMIC 1000P 50V	1	C , 27
CQ92M1H223K		MYLAR 0.022 50V	3	C , 3, 4, 7
CQ92M1H473K		MYLAR 0.047 50V	1	C , 6
C91-0131-05		CERAMIC 0.01 25V	7	C , 19, 20, 21, 22, 23, 24, 25
E03-0161-05	N	DC JACK	1	J , 1
E06-0555-05	N	SP SOCKET	1	J , 6
E11-0414-05		PHONE JACK	4	J , 2, 3, 4, 5
GL9PR24		LED RED	1	D , 6
LF7013J1	N	LCD	1	
LH5003	N	IC	1	IC , 3
L77-1268-05	N	XTAL 7.3728MHZ	1	X , 1
MA522(Q)		DIODE	1	D , 4
MA522(S)	N	DIODE	1	D , 5
R90-0557-05		MULTIPLE RESISTOR	1	R , 42
SG238D		DIODE	1	D , 8
SN74LS374N		IC	1	IC , 4
SN74LS73AN		IC	1	IC , 6
SR538D		DIODE	1	D , 7
S31-1417-05	N	SLIDE SWITCH	1	S , 8
S40-2443-05		PUSH SW	3	S , 1, 2, 3
S50-1426-05	N	TACT SWITCH	4	S , 4, 5, 6, 7
TC40H000P	N	IC	1	IC , 7
TC5501P	N	IC	1	IC , 5
TMP80C49AP-6701	N	CPU	1	CPU , 1
UPC451C		IC	1	IC , 1
UPD65003C-020		IC	1	IC , 2
V06B		DIODE	1	D , 1
W09-0326-05		LITHIUM BATTERY	1	
1S1555		DIODE OR 1N4448	2	D , 2, 3
112-503-2		THERMISTOR	1	TH , 1
2SC2240(GR)		TR	4	Q , 1, 2, 3, 4
2SC1815(Y)		TR	2	Q , 5, 6

CD-10 (CALL SIGN DISPLAY)

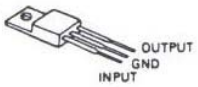
PC BOARD VIEW

CD UNIT (X57-1120-00) Component side view



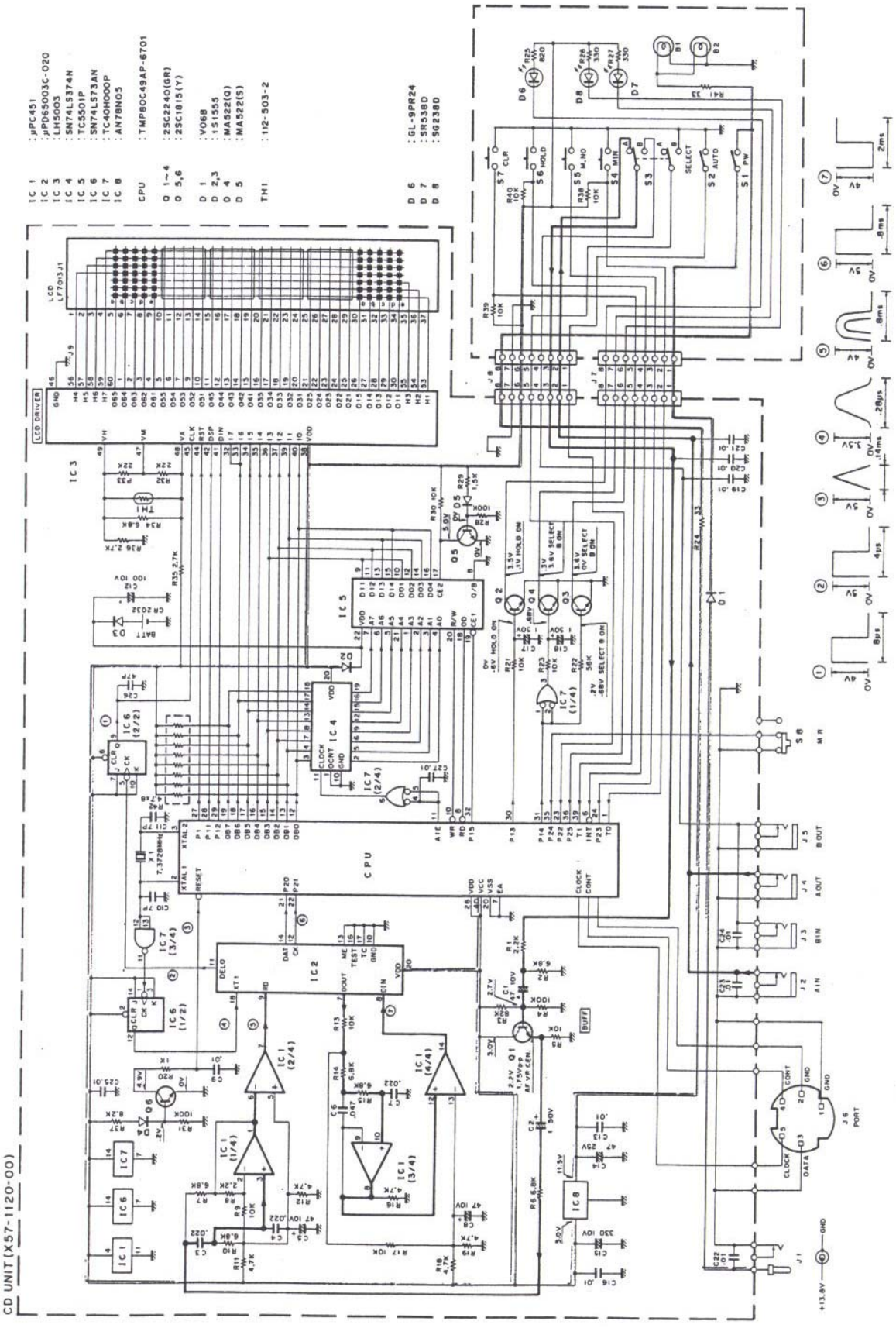
2SC2240
2SC1815

AN78N05



CD-10 (CALL SIGN DISPLAY)

SCHEMATIC DIAGRAM

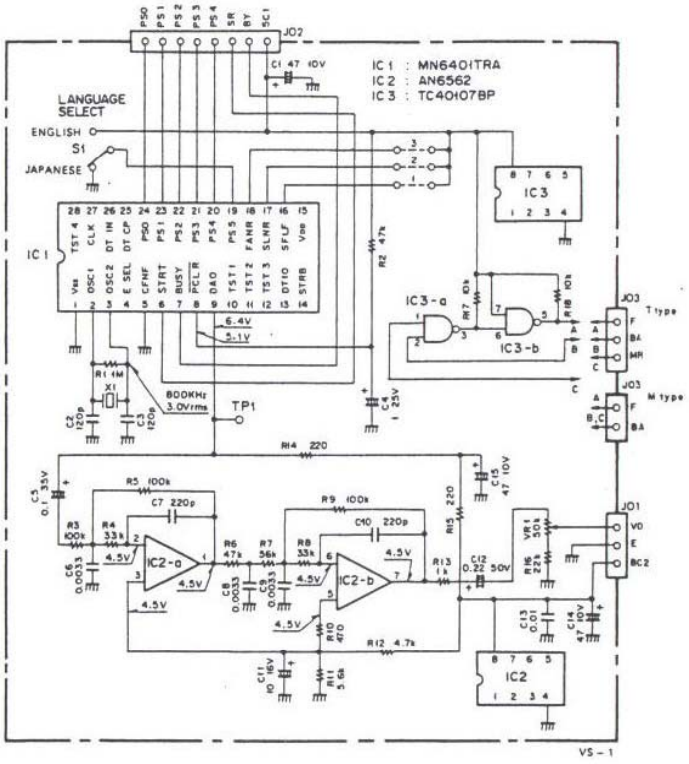


VS-1 (VOICE SYNTHESIZER)

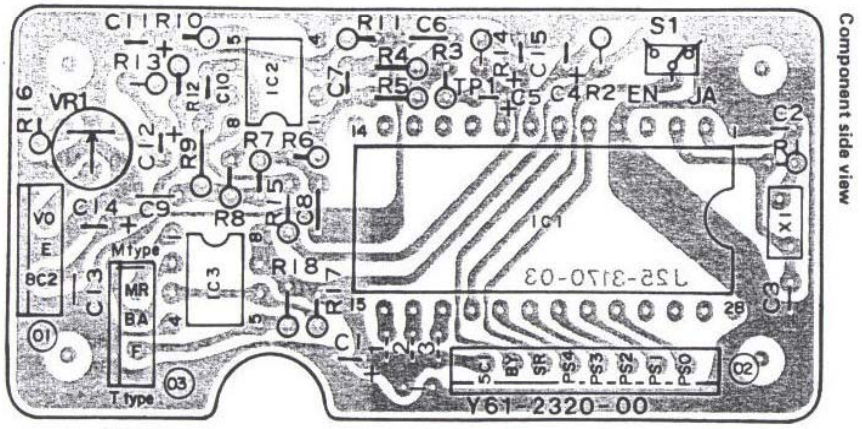
PARTS LIST

Part No.	Re-marks	Description	Ref. No.
B50-4035-00	N	Instruction manual	
CC45SL1H121J		C 120P x 2	C2,3
CE04W1A470M		E 47 10V	C1,14,15
CE04W1C100M		E 10 16V	C11
CE04W1HR22M		E 0.22 50V	C12
CK45B1H221K		C 220P x 2	C7,10
CQ92M1H332K		ML 0.0033 x 3	C6,8,9
CS15E1E010M		T 1 25V	C4
CS15E1V0R1M		T 0.1 35V	C5
C91-0131-05		C 0.01 (SP)	C13
E40-0273-05	Δ	Mini connector 2P **M**	
E40-0373-05	Δ	Mini connector 3P **M**	
E40-0373-05	Δ	Mini connector x 2 3P **T**	
E40-0873-05	Δ	Mini connector 8P	
H01-4481-03	NΔ	Packing carton (inside) **M**	
H01-4501-03	NΔ	Packing carton (inside) **T**	
H25-0029-04		Protective bag x 2	
L78-0006-05	N	Ceramic OSC	X1
N89-3006-46		Tapping screw x 4	
R12-4408-05		Trim. pot. 50kΩ	VR1
S31-1411-05	N	Slide switch	S1
AN6562	N	IC	IC2
MN6401TRA	N	IC	IC1
TC40107BP	N	IC	IC3

SCHEMATIC DIAGRAM



PC BOARD VIEW



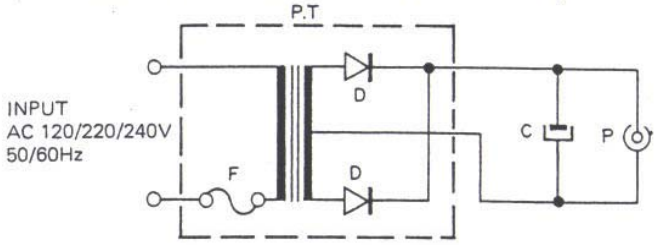
AC-10 (CD-10 FOR CHARGER)/TU-5 (TONE UNIT)

AC-10 SPECIFICATIONS

Input voltage	AC 120/220/240V
Frequency response	50/60Hz
Output voltage	DC 13.8V
Output current	200mA

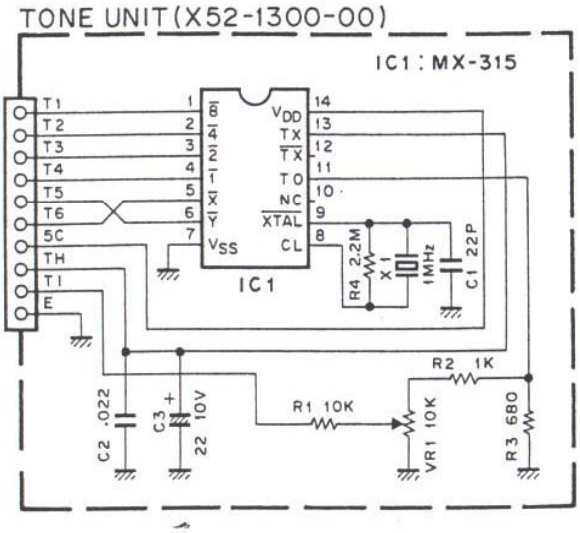
AC-10 SCHEMATIC DIAGRAM

(Y61-2680-XX) (-21 : K,M -51 : T -61 : W -71 : X)



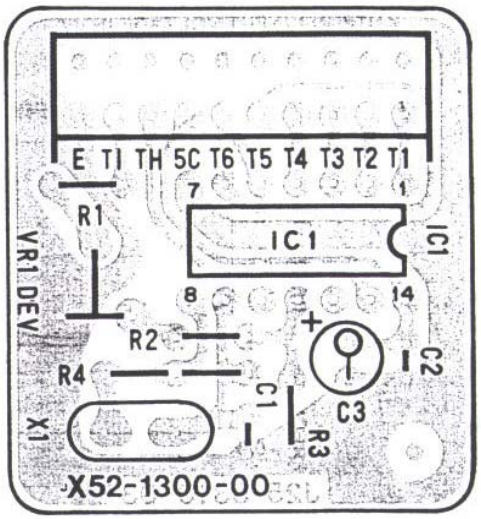
W09-0347-08 (K,M)	AC 120V	60Hz
W09-0348-08 (T)	AC 240V	60Hz
W09-0349-08 (W)	AC 220V	50/60Hz
W09-0350-08 (X)	AC 240V	50/60Hz

TU-5 SCHEMATIC DIAGRAM



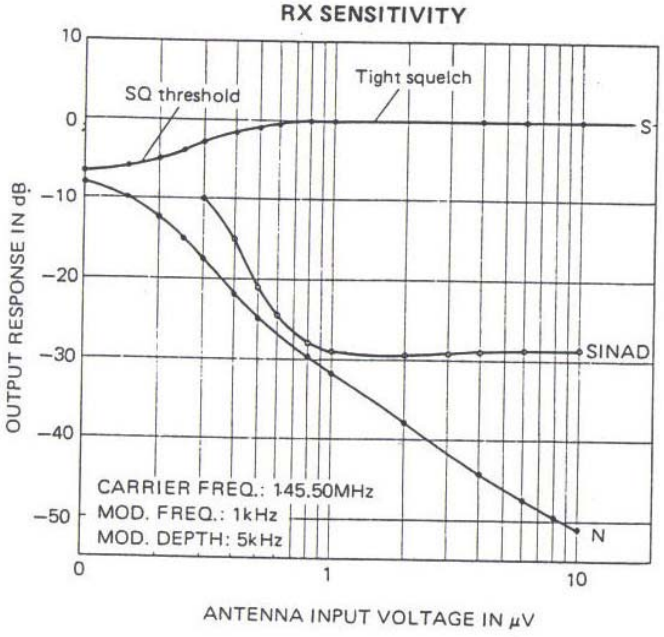
TU-5 PC BOARD VIEW

TONE UNIT (X52-1300-00) Component side view

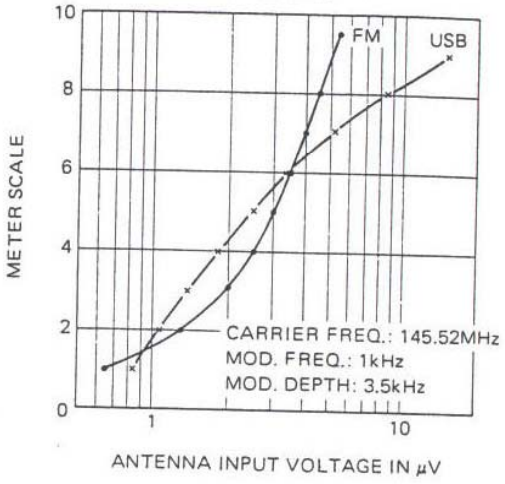


TS-711 REFERENCE DATA

RX SENSITIVITY

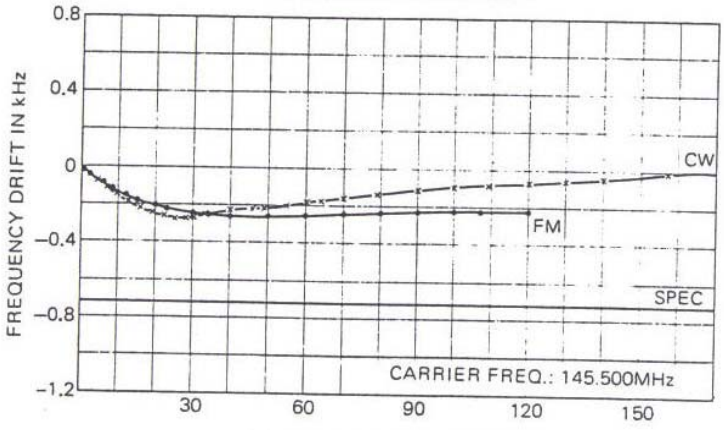


S METER

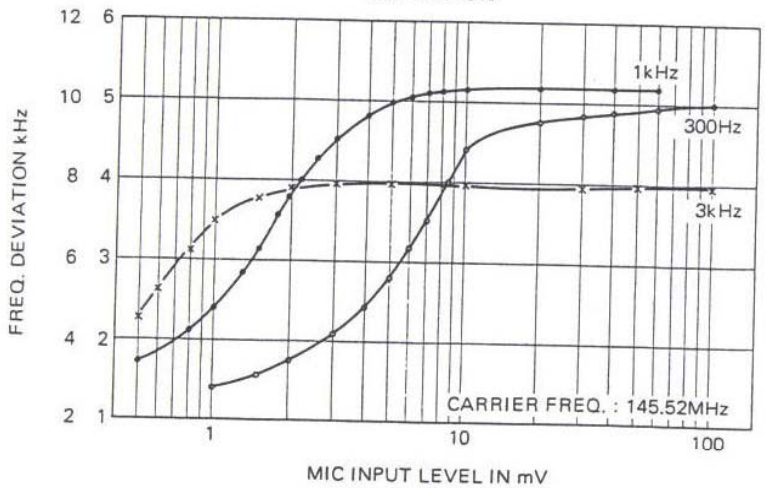


Model / Scale	FM	USB
S−9 +20	9μV	14μV
S−9 +40	16μV	1.3mV

FREQUENCY STABILITY

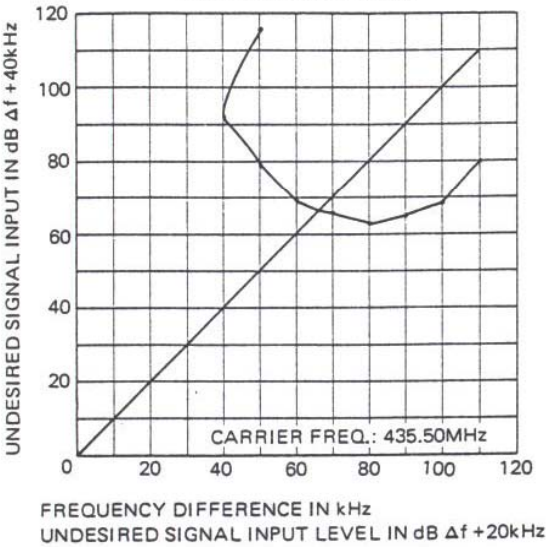


DEVIATION



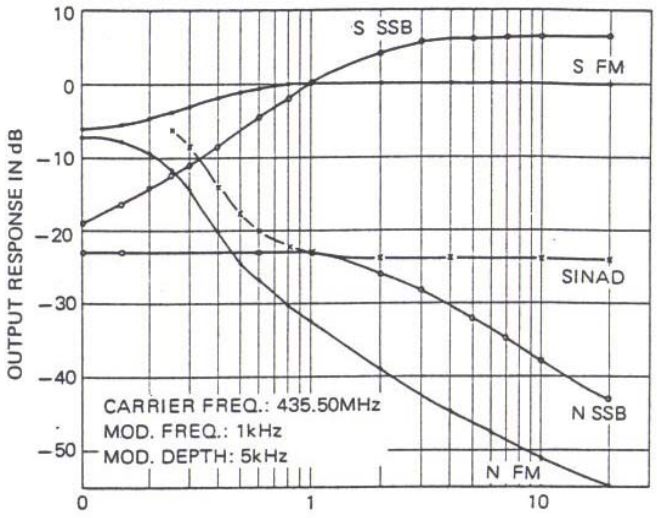
TS-811 REFERENCE DATA

INTER MODULATION



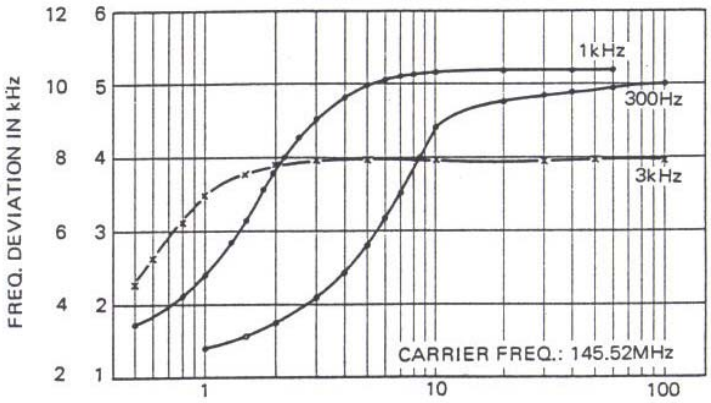
FREQUENCY DIFFERENCE IN kHz
UNDESIRED SIGNAL INPUT LEVEL IN dB Δf +20kHz

RX SENSITIVITY



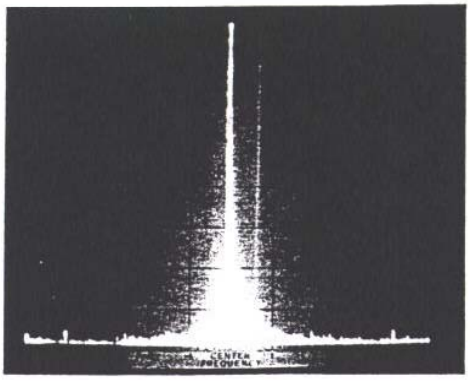
ANTENNA INPUT VOLTAGE IN μV

DEVIATION



MIC INPUT LEVEL IN mV

NEAR SPURIOUS RESPONSE



CARRIER FREQ.: 430.00MHz
RF POWER: 10.5W
SCAN WIDTH: 200kHz/DIV
BAND WIDTH: 1kHz
SCAN TIME: 0.5 SEC.
VIDEO FILTER: 10kHz
INPUT ATT.: −20dB
LOG REF LEVEL: −2.5dBm
10dB/DIV

TS-711 SPECIFICATION

[General]

Frequency range	144.0 ~ 148.0 MHz..... (TS-711A)
	144.0 ~ 146.0 MHz..... (TS-711E)
Radio wave mode	A3J (SSB), F2, F3 (FM), A1 (CW)
Antenna impedance	50 ohms
Operating temperature	−10°C ~ +50°C
Power voltage	AC120V/240V/220V, 50/60 Hz
	DC 13.8V (12V ~ 16V)
Grounding	Negative
Power consumption	170W, 6.5A (DC13.8V) at maximum transmission
	50W, 1.2A (DC13.8V) in receive mode without receiving signal
Frequency tolerance (−10°C ~ +50°C)	Within ± 3 ppM (SSB/CW)
	Within ± 5 ppM (FM)
Frequency stability	± 300 Hz 1 ~ 60 minutes after power on
	Within 50 Hz/every 30 minutes 60 minutes later (after power on)
Dimensions	W270 × H96 × D260 mm
	(W279 × H108 × D327 mm) – Projected parts measured.
Weight	7.1 kg (15.62 lb)

[Transmitter]

RF output power	25 watts (One minute transmission/three minutes reception)
	RF output variable from approx. 2W to maximum
Modulation	Balanced (SSB), Reactance (FM)
Spurious radiation	Less than −60 dB
Carrier surpression	Less than −40 dB
Side band surpression	Less than −40 dB
Maximum frequency deviation (FM)	± 5 kHz
Modulation distortion (FM60%)	Less than 3% (300 Hz ~ 3 kHz)
MIC impedance	500 ~ 600 Ω

[Receiver]

Circuitry		Double superheterodyne
Intermediate frequency		1st 30.265 MHz
		2nd 10.695 MHz (SSB/CW), 455 kHz (FM)
Receiver sensitivity	FM	12 dB SINAD less than 0.22 μV..... (TS-711A)
		12 dB SINAD less than 0.2 μV..... (TS-711E)
		S + N/N more than 50 dB at 1.0 mV input
	SSB/CW	S + N/N 10 dB less than 0.16 μV..... (TS-711A)
		S + N/N 10 dB less than 0.13 μV..... (TS-711E)
Receiver selectivity	FM	More than 12 kHz (−6 dB)
		Less than 24 kHz (−60 dB)
	SSB/CW	More than 2.2 kHz (−6 dB)
		Less than 4.8 kHz (−60 dB)
Spurious response		Better than 70 dB
Squelch sensitivity		Less than 0.16 μV (threshold)
Auto scan stop level		Less than 0.2 μV (threshold)
Audio output power		More than 2.0 watts across 8 ohms load (5% dist.)
Audio output impedance		8 ohms

[DCS control]

Code	NRZ equal-length code
Modulation	MSK modulation
Frequency deviation	± 2.5 kHz or more
	± 5 kHz or less
	± 3.5 kHz Standard
Mark frequency and deviation	1200 Hz ± 200PPM
Space frequency and deviation	1800 Hz ± 200 PPM
Code transmission speed and deviation	1200 bits/second ± 200 PPM

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

TS-811 SPECIFICATION

[General]	
Frequency range	430 ~ 440MHz (TS-811B/E)
	430 ~ 450MHz (TS-811A)
Radio wave mode	A3J (SSB), F2, F3 (FM), A1 (CW)
Antenna impedance	50 ohms
Operating temperature	−10°C ~ +50°C
Power voltage	AC120V/220V/240V, 50/60Hz
	DC 13.8V (12V ~ 16V)
Grounding	Negative
Power consumption	220W, 8.0A (DC 13.8V) at maximum transmission (TS-811B/E)
	240W, 8.5A (DC 13.8V) at maximum transmission (TS-811A)
	50W, 1.2A (DC 13.8V) in receive mode without receiving signal
Frequency tolerance (−10°C ~ +50°C)	Within ± 3PPM (SSB, CW ; 430 ~ 440MHz)
	Within ± 5PPM (SSB, CW ; 440 ~ 450MHz)
	Within ± 5PPM (FM)
Frequency stability (430 ~ 440MHz)	± 1200Hz 1 ~ 60 minutes after power on
	Within 50Hz/every 30 minutes 60 minutes later (after power on)
Dimensions	W 270 x H 96 x D 260 mm
	(W 279 x H 108 x D 327 mm) −projected parts measured.
Weight	7.2kg (15.6lb)
[Transmitter]	
RF output power	25 watts (One minute transmission/three minutes reception)
	RF output variable from approx. 2W to maximum
Modulation	Balanced (SSB), Reactance (FM)
Spurious radiation	Less than −60dB
Carrier surpression	Less than −40dB
Side band supression	Less than −40dB
Maximum frequency deviation (FM)	± 5kHz
Modulation distortion (FM 60%)	Less than 3% (300Hz ~ 3kHz)
MIC impedance	500 ~ 600Ω
[Receiver]	
Circuitry	Double superheterodyne
Intermediate frequency	1st 30.265MHz
	2nd 10.695MHz (SSB/CW), 455kHz (FM)
Receiver sensitivity FM	12dB SINAD less than 0.2μV (TS-811B/E)
	12dB SINAD less than 0.22μV (TS-811A)
	S + N/N more than 50dB at 1.0mV input
SSB/CW	S + N/N 10dB less than 0.13μV (TS-811B/E)
	S + N/N 10dB less than 0.14μV (TS-811A)
Receiver selectivity FM	More than 12kHz (−6dB)
	Less than 24kHz (−60dB)
SSB/CW	More than 2.2kHz (−6dB)
	Less than 4.8kHz (−60dB)
Spurious response	Better than 60dB
Squelch sensitivity	Less than 0.16μV (threshold)
Auto scan stop level	Less than 0.2μV (threshold)
Audio output power	More than 2.0 watts across 8 ohmes load (5% dist.)
Audio output impedance	8 ohms
[DCS control]	
Code	NRZ equal-length code
Modulation	MSK modulation
Frequency deviation	± 2.5kHz or more
	± 5kHz or less
	± 3.5kHz Standard
Mark frequency and deviation	1200Hz ± 200PPM
Space frequency and deviation	1800Hz ± 200PPM
Code transmission speed and deviation	1200 bits/second ± 200PPM

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

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