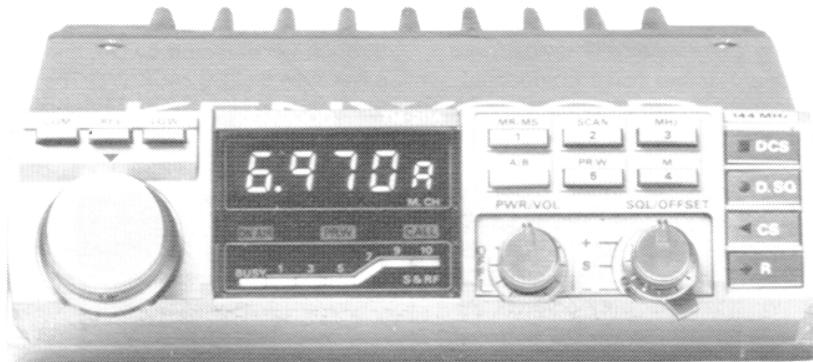


# KENWOOD

# SERVICE MANUAL

## TM-211A/E OPTION TU-3A

### VHF FM TRANSCEIVER



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## CIRCUIT DESCRIPTION

### RX SECTION

The input signal from the antenna passes through the LPF (Low Pass Filter) of the final unit (X45-1360-01), the transmit/receive diode switch D3 MI308, and goes into the front end on the A-unit (X44-1590-11). The front end consists of an RF amplifier comprising of a gallium arsenide FET RF amplifier Q1 : 3SK97 (Q2) \*J, ANTENNA coils L1 and L2 and a 2 MHz band width helical resonator L3.

After obtaining both good sensitivity and 2-signal characteristics through the front end, the signal is applied to the first mixer Q2 : 3SK74 (L), where it is mixed with the PLL output 133.305 - 135.295 MHz (T,W), 131.305 ~ 138.300 MHz (K,M), and the output becomes the first IF signal at 10.695 MHz. After passing through the 2-stage MCF (Monolithic Crystal Filter), the first IF signal is amplified by Q3 : 2SK192A (GR) \* N, mixed with the local oscillator (10.24 MHz) Q25 : 2SC2668 (Y), and becomes the second IF signal at 455 kHz. The 10.240 MHz second local oscillator frequency is also used by the PLL (Phase locked loop) for the comparator reference signal. The second IF signal passes through the ceramic filter (CFV455F), IF amplified by (Q5, 6 : 2SC2787 (L), Q7 : 2SC2668 (Y)) and IC1 :  $\mu$ PC577H, and detected by ceramic discriminator (CFY-455S).

The detected output from the discriminator is divided into the audio frequency component and a noise component. The audio frequency component is de-emphasised and, preamplified by Q32 : 2SC2458 (Y) before delivery to be amplified by IC3 : MB3712 which drives the speaker.

The noise component is extracted through (Band Pass Filter), amplified by noise amplifier Q27, 28 : 2SC3113 (B), and rectified by D10, 11 to achieve the squelch signal. The squelch control signal is then used to control SQUELCH SWITCH Q29 : 2SC2458 (Y), which in turn controls AF preamplifier Q32. Q30,31 : 2SC3113 (B) are DC amplifier for the busy indicator. Q33 : 2SC2458 (Y) prevents transient "clicks" when the priority watch function operates and also mute the receiver audio during DCS system code squelch operation.

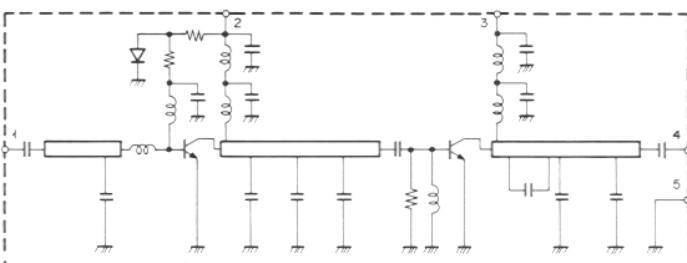
Item	Raling
Nominal center frequency	455 kHz
3 dB band-width	$\pm 4.2$ kHz or more (from 455 kHz)
6 dB band-width	$\pm 6$ kHz or more (from 455 kHz)
60 dB band-width	$\pm 12$ kHz or less (from 455 kHz)
Ripple (within $455 \pm 4.2$ kHz)	3 dB less
Loss	6 dB or less
Guaranteed attenuation	50 dB or more (within 455 $\pm 100$ kHz)
Input/output impedance	1.5 k $\Omega$

**Table 1 Characteristics of Ceramic Filter (L72-0342-05) CFV455 (A-unit : L7)**

### TX SECTION

The signal from the microphone is amplified by microphone limiting amplifier Q9 : 2SC1775 (E) and Q40 : 2SO2458 (Y) IC4 (1/2) :  $\mu$ PC4558C on the B-unit (X53-1380-11). Then LPF (low-pass filter) IC4 (1/2) :  $\mu$ PC4558C filters the higher audio frequencies to phase modulates the transmitting PLL loop of the A unit (X44-1590-11). Q12 : 2SC2458(Y) is used to cut the microphone input at transmission of the F2 control signal which is generated at both PTT (Push to talk) DCS system is used. Q11 : 2SC2458 amplifies a part of the microphone output and forms a microphone visual check function circuit. The phase modulated FM signal is amplified by the VCO buffer Q14 : 2SC2668 (Y) on the A-unit (X44-1590-00) before being amplified by drivers Q1 : 2SC2347 and Q2 : 2SC2538-22-A, on the B-unit (X53-1380-11) to yield the output for the final unit (X45-1360-01). The signal fed to the Final unit is amplified by the power hybrid Q1 : M57737. The signal is then passed through the transmit/receive diode D1 and before going through a 3-stage LPF and then fed to the antenna.

The APC (Automatic Power Control) circuit performs HI/LOW power control section and SWR protection. The output from the detected by power amplifier is sampled through C8 detected by D4, and applied to differential amplifier Q5, 6 : 2SC2458 (Y). The protection circuit detects the reflected wave from the antenna terminal, and the detected signal is applied to the differential amplifier Q5 ,6 through the B-unit DC amplifier Q8 : 2SC2458 (Y). The differential amplifier controls Q4 : 2SA1015 (Y) and Q3 : 2SD880 (Y), which varies the voltages to Q1 pin 2 on the final unit and Q2 collector voltage on B-unit, there by controlling the transmission output.



**Power Module M57737 Equivalent Circuit  
(Final Unit Q1)**

Item	Symbol	Tc(°)	Condition	Rating	Unit
Operating	Vcc	25		17	V
DC current	Icc	25		7	A
Power input	Pin (max)	25	Zg=Zl=50 $\Omega$ , Vcc1 $\leq$ 12.5V	0.4	W
Power output	Po (max)	25	Zg=Zl=50 $\Omega$	20	W
Operating case temp.	To (op)		-30 ~ +110	°C	
Strage temp.	Tstg		-40 ~ +110	°C	

**Power Module M57737 Maximum Ratings**

## CIRCUIT DESCRIPTION

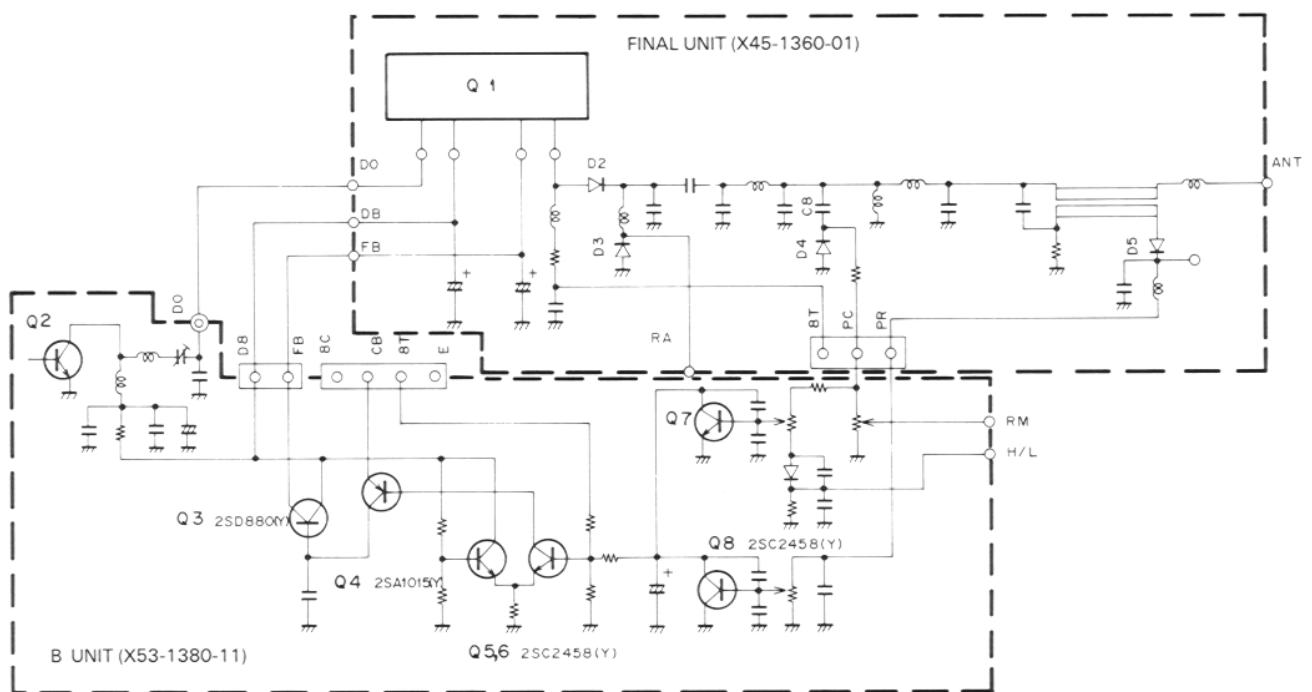


Fig. 1 APC, Protection Circuit

### PLL SECTION

The PLL block diagram is given in Fig. 2. The PLL circuit uses two VCO within one PLL system for an independent RX VCO and TX VCO.

#### ● OSC circuit

Receiving and transmitting oscillators are selected by supplying 8R and 8T voltages at reception and transmission. The multiplier Q22 : 2SC2668 (Y) (T,W) is common to both oscillators. A 40.8267 MHz (T,W), 59.740 MHz (K,M) heterodyne signal is generated by Q24 : 2SC2688 (Y) for reception. A 44.3917 MHz (T,W), 43.3917 MHz (K,M) heterodyne signal is generated by Q23 : 2SC2668 (Y) for transmission. For either transmission or reception, this frequency is tripled [to 122.48 MHz for reception, 133.175 MHz for transmission (T,W)] before being input to the mixer Q21 : 2SC2668 (Y). Also this frequency is doubled [to 119.48 MHz for reception and tripled to 130.175 MHz (K,M)] before being input to the mixer Q21 : 2SC26681 (Y).

#### ● VCO circuit

The VCO circuit oscillates 133.305 - 135.295 MHz (T,W), 131.305 ~ 138.300 MHz (K,M) by Q8 : 2SK192A (GR)\*N for reception, and 144.00 - 145.995 MHz (T,W), 142.00 ~ 148.995 MHz (K,M) by Q12 : 2SK192A (GR)\*N for transmission. These frequencies are applied to mixer Q21 through buffer amplifier Q13 : 2SC2668 (Y), which is common to transmission and reception. Q9 : 2SC2458 (Y) connected to Q8 source works to stop Q8 oscillation momentarily when changing from receiving mode to transmitting mode.

The RX VCO signal is amplified by Q11 : 2SC2668 (Y)

through buffer amplifier Q10 : 2SC2668 (Y) and is applied to the first IF mixer. The TX VCO signal is amplified by Q14 : 2SC2668 (Y) and applied to the drive circuit on the B-unit. The local oscillator signals are tripled in RX : 122.48 MHz, TX : 133.175 MHz (T,W), also local oscillator signal are doubled in RX : 119.48 MHz, tripled in TX 130.175 MHz and the VCO outputs RX : 133.305 - 135.300 MHz (T,W), 131.305 ~ 138.300 MHz (K,M), TX : 144.00 - 145.995 MHz (T,W), 142.00 ~ 148.995 MHz (K,M) output by the RX VCO and TX VCO are mixed by Q21, to become PLL IF signal 10.825 - 12.815 MHz (T,W), 11.825 ~ 18.82 MHz (K,M). This is amplified by Q20 : 2SC2668 (Y) and input to the Phase Detector IC : MC145155P\*J(IC2).

IC2 amplifies the second IF local oscillator signal (10.24 MHz) from Q26 : 2SC2668 (Y) and divides this by 1/2048. This yields a 5 kHz reference comparison signal. Simultaneously, the PLL IF signal 10.825 - 12.815 MHz (T,W), 11.825 ~ 18.82 MHz (K,M) is divided down to 5 kHz comparison signal by a ratio of N = 2165 - 2563 (T,W), N = 2365 ~ 3764 (K,M) from the control data supplied by the microprocessor ( $\mu$ PD7508G-620-00). Finally the PLL IF signal phase is compared with the reference signal for VCO control. The phase compared output signal is passed through LPF Q17, 18 : 2SC2458 (Y) and Q19 : 2SC2458 (L) (L), and is applied as the VCO control voltage to voltage variable diode D5 : 1SV50 during reception, and D6 : 1SV50 during transmission, to control the oscillator frequency of each VCO.

## CIRCUIT DESCRIPTION

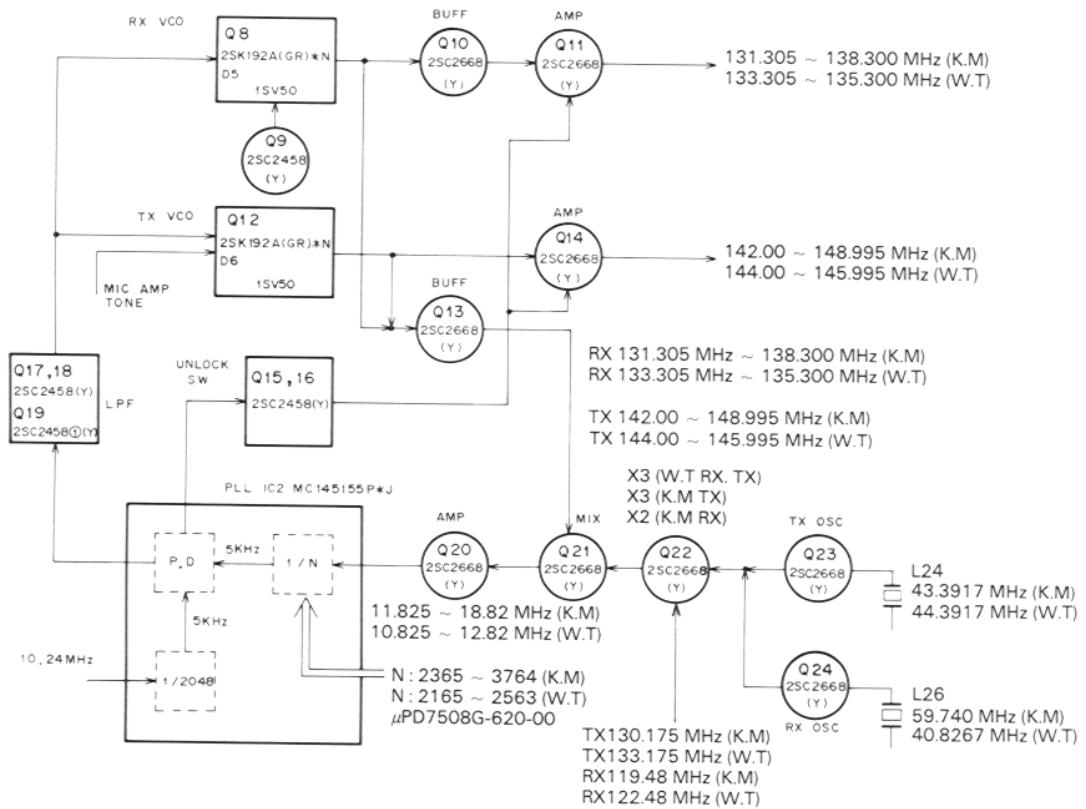
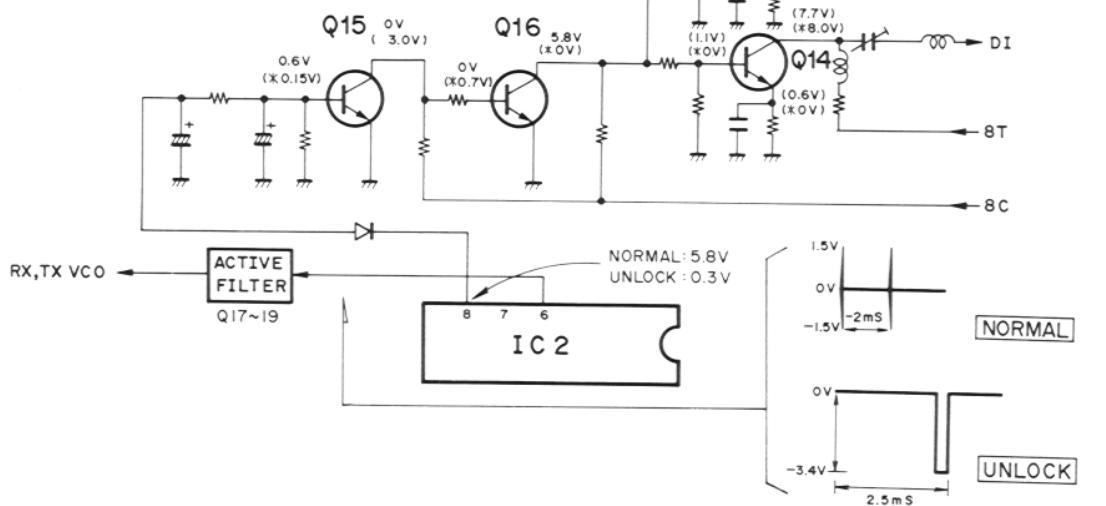


Fig. 2 PLL circuit block diagram

### UNLOCK CIRCUIT

If the PLL loop unlocks, IC2 pin 8 becomes low level (typically 5.8V locked and 0.3V unlocked). Q15 : 2SC2458 (Y) turns off (typically 0.6V and 0V base and collector, and 0.15V and 3V unlocked), Q16 : 2SC2458 (Y) turns on (typically 0V and 5.8V base and collector, and 0.7V and 0V unlocked). Therefore no bias is applied to Q11 and Q14 (0V base and emitter unlocked), and the output is stopped, preventing emission of illegal output.



## CIRCUIT DESCRIPTION

### CONTROL CIRCUIT

#### ● Display

The display system consists of 5 LED digit dynamically driven. The LED segment drive signals are output as a "L" at ports P40 ~ P43, P50 ~ P53 of ( $\mu$ PD7508G-620-00) of B-unit (X53-1380-11). This drives digital transistor Q1 - 8: DTA143X on the display unit. The digit signal is output as a "L" at ports P30 ~ P33 and P60, and drives Q9 - Q13 : 2SA1150 (Y) on the display unit. Displays of over range, the MHz decimal, PR.W, CAL and standby are also made by dynamically lighted.

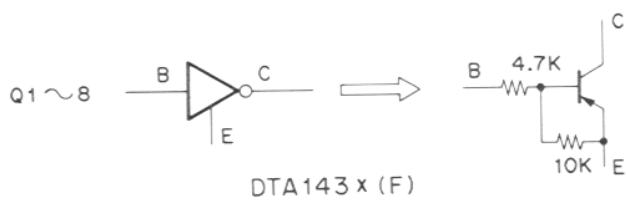


Fig. 3 Digital TR DTA143X(F)

#### ● Encoder

The mechanical encoder is outputs 25 pulses with 50 clicks to one cycle. Any chatter in the encoder output is eliminated by Schmitt trigger circuit IC5 : (M-C14069UBCP or TC4069UBP) on the B-unit (X53-1380-11). This output is directly applied to microprocessor ports P10 and P11. The direction UP or DOWN of encoder is internally judged by microprocessor software.

#### ● Switch signal

Scanned key scan output pulses are applied to the input port extending IC1 : LC7800 on the display unit (X54-1810-11). The output data is generated from O<sub>0</sub> ~ O<sub>3</sub> and is applied to IC1 :  $\mu$ PD7508G-620-00 P70 ~ P73 on the B-unit (X53-1380-11).

#### ● Beep Tone

The tone sound is generated by a stable multivibrator IC6 : TC4001BP (1/2) on the B-unit. The switching signal is generated from P22. The tone frequency is determined by R47 and C62.

#### ● Memory Back-up circuit

The back-up circuit detects voltage drop at the INT0 terminal of microprocessor IC1 :  $\mu$ PD7508G-620-00 on the B-unit, and goes into back-up mode. In the back-up mode, system clock oscillation is stopped, the output port goes low and the input/output port goes into the input/output state. When the INT0 terminal voltage increases, back-up mode is reset, the normal operational state is regained, and PLL data is once again output.

#### ● Reset circuit

After supplying V<sub>DD</sub> voltage to microprocessor IC1 :  $\mu$ PD7508G-620-00, apply V<sub>DD</sub> to the RESET terminal for approximately 0.5 second to reset that IC. For resetting the DCS system microprocessor IC2 :  $\mu$ PD7507G-575-00, IC1 P30 and P32 are applied to IC2 RESET terminal via IC6 NOR gate.

#### ● TU-3A (Option)

IC2 P23 goes high and enables the first tone with the COM switch ON, and IC2 P22 goes high to enable the second tone with the shift switch ON.

## CIRCUIT DESCRIPTION

### ● DCS system key

All four system operation keys (DCS, DSQ, CS and R) are input to IC1 (LC7000) ports on the display unit.

The outputs ( $O_0 \sim O_3$ ) are connected to IC1 on the display unit. By operating these four keys, a Low is output from IC2 P50 ~ P53 on the B-unit (based on the microprocessor software), and these signals are driven by Q14 ~ Q16 and Q20 to light on the display unit LEDs D5 ~ D8.

### ● Digital squelch operation

(A) : A-unit, (B) : unit

Transmission

With the microphone PTT switch ON, data (call sign, digital code and information) is sent from IC1 (B) to IC2 (B) and from IC2 (B) to IC3 (B). As a result, ST becomes "L" and after about 150m sec., ME IC3 (B) pin 21 becomes "H" (simultaneously microphone amplifier input is cut) and MSK signals of 1.2 kHz and 1.8 kHz are applied to the microphone amplifier, thereby modulating the transmitting carrier.

Reception

When the [D.SQ] key is pressed to on, AC (audio cut) becomes "H". When the collect MSK signal is received, the signal runs through the receiving circuit at (A), and goes to IC3 (B) after being sent from the discrete output (RX terminal) through IC7 (B) active filter. The data (call sign, digital code and information) modulation from IC3 is sent to IC2 (B). The data is further sent from IC2 (B) to IC1 (B) and when the digital codes coincide, AC goes "L" and the squelch opens. If the code alert state is being set then, the beep sounds continuously in addition to the squelch opening.

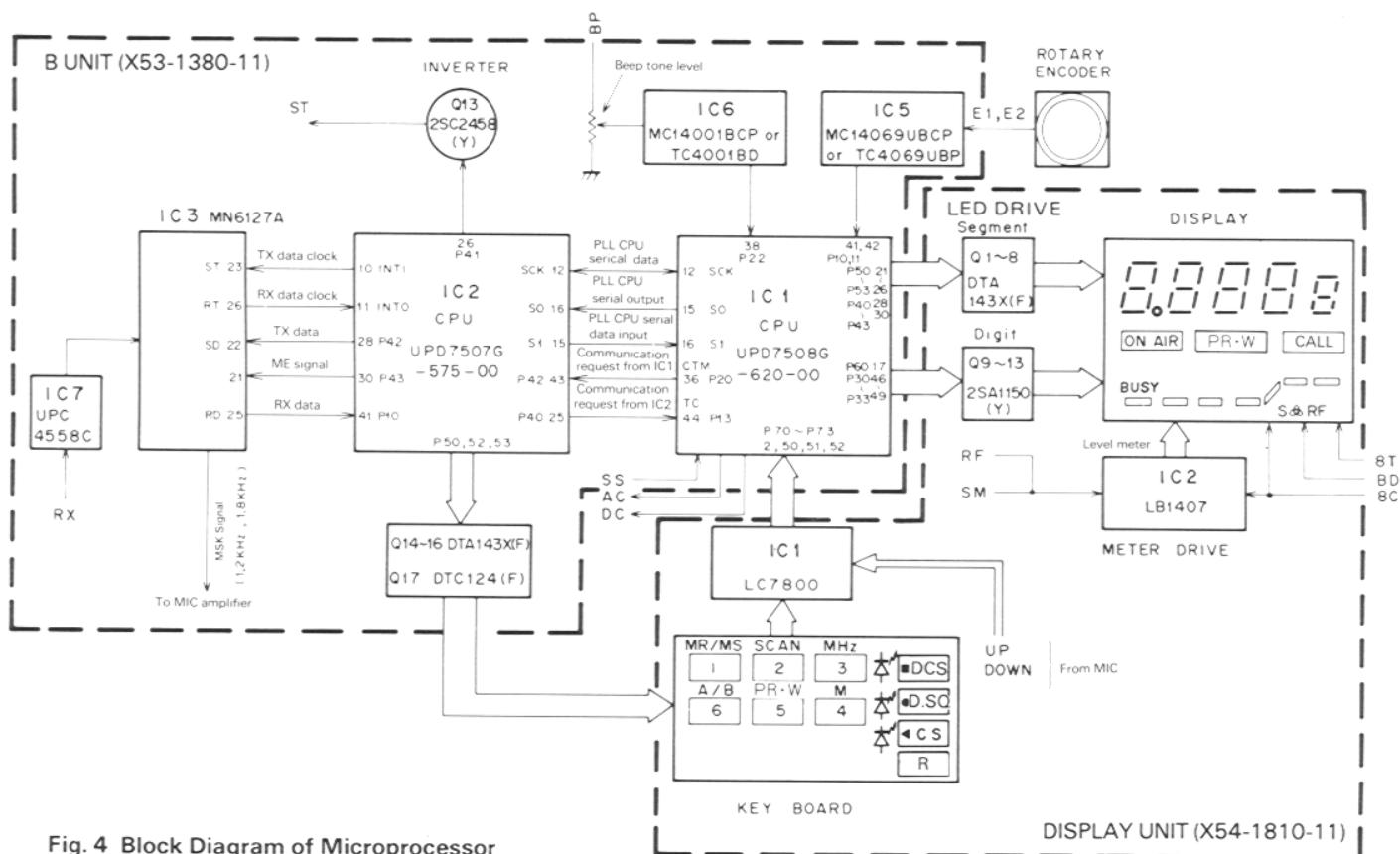


Fig. 4 Block Diagram of Microprocessor

## CIRCUIT DESCRIPTION

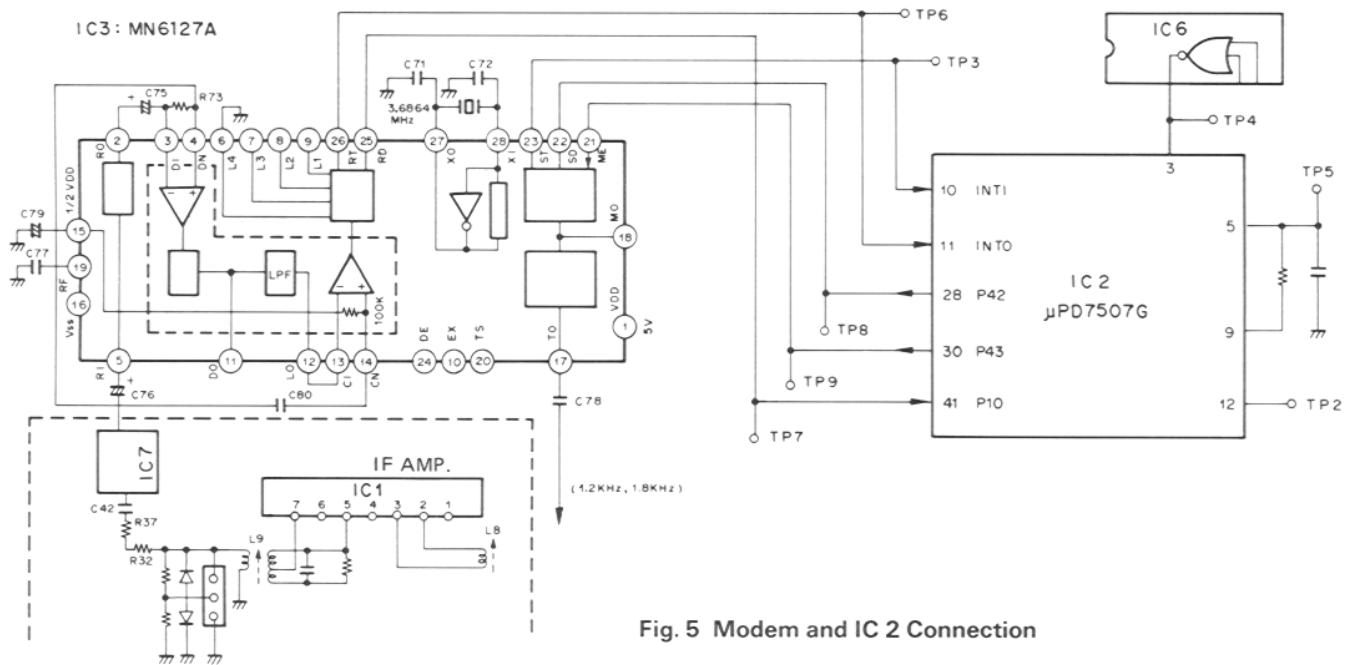
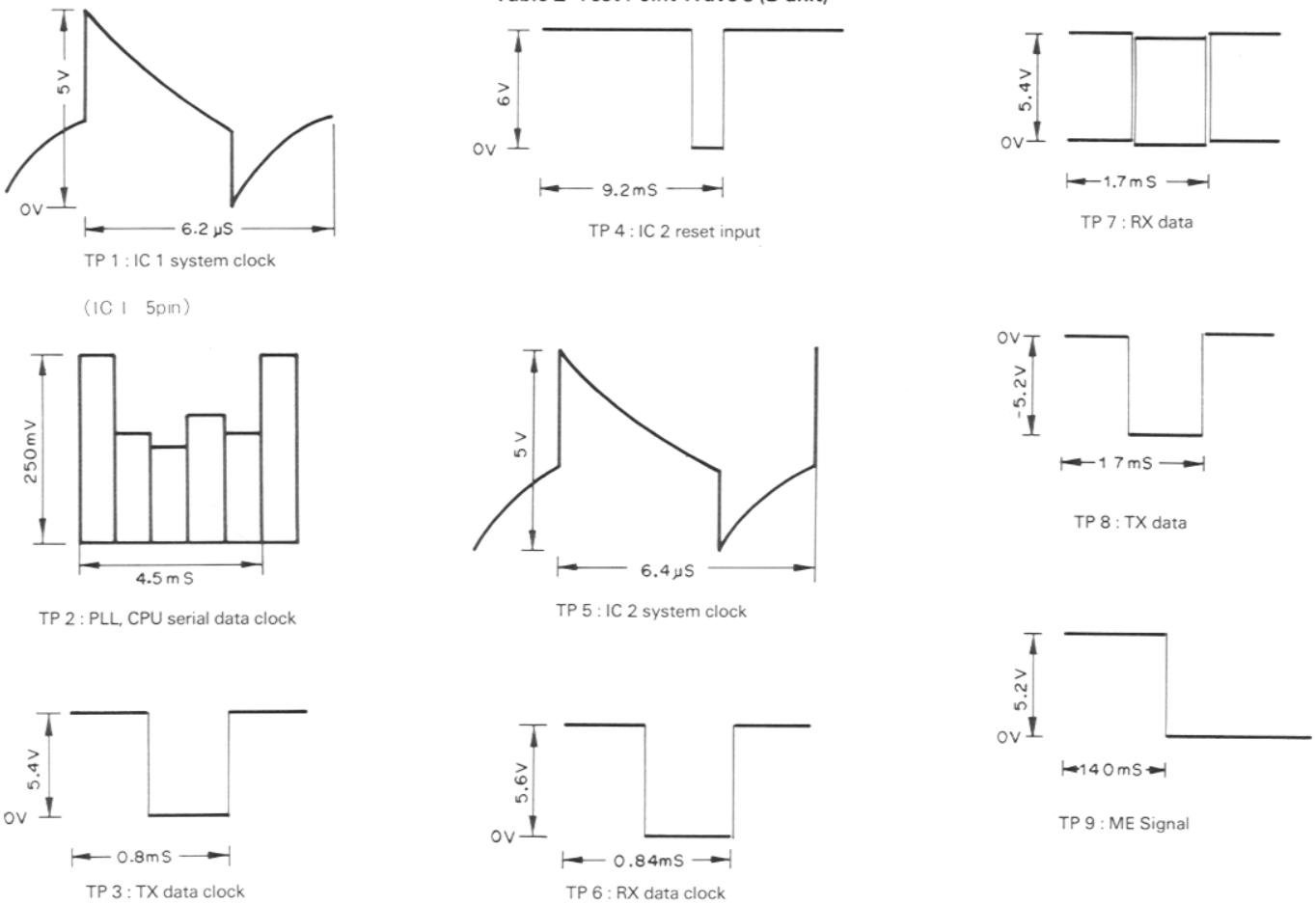


Table 2 Test Point Wave's (B unit)



## CIRCUIT DESCRIPTION

Terminal No.	Name	In-put	Out-put	Functions	Terminal No.	Name	In-put	Out-put	Functions
1	NC				27	NC			
2	P73	○		LC7800 output signal (O <sub>1</sub> ) input	28	P42		○	LED Segment output (b)
3	RESET	○		Reset input	29	NC			
4	NC				30	P43		○	LED Segment output (a)
5	CL 1			Clock OSC C,R connection terminal	31	Vss			GND
6	NC				32	X 1			GND
7	V DD			Lithium battery connection terminal	33	V DD			+B power terminal (+ 5 V)
8	NC				34	X 2			
9	CL 2			Clock OSC C.R connection terminal	35	NC			
10	INTI			GND	36	P20		○	IC 2 to communication require CTM output
11	P00/INTO	○		Back Up detected input	37	P21		○	PLL serial data output
12	P01/SCK	○		PLL,CPU Serial data	38	P22		○	BEEP signal output
13	NC				39	P23		○	AUDIO CUT signal output
14	NC				40	NC			
15	P02/S0	○		PLL,CPU, Serial data output	41	P10	○		Encoder E1 input
16	P03/S1	○		PLL, CPU, Serial data input	42	P11	○		Encoder E2 input
17	P60	○		LED digit output (1K)	43	P12	○		STBY sinal input
18	P61			ATX Signal output	44	P13		○	IC 2 from communication require MTC input
19	P62	○		BUSY signal input	45	NC			
20	P63	○		BUSY CONTOROL signal output	46	P30		○	LC7800 select (SD) and LED digit output (CH)
21	P50	○		LED segment output (P)	47	P31		○	LC7800 select (SC) and LED digit output (IM)
22	P51	○		LED segment output (g)	48	P32		○	LC7800 select (SB) and LED digit output (100K)
23	P52	○		LED segment output (f)	49	P33		○	LC7800 select (SA) and LED digit output (10K)
24	P53	○		LED segment output (e)	50	P70	○		LC7800 output signal (O <sub>6</sub> ) input
25	P40	○		LED segment output (d)	51	P71	○		LC7800 output signal (O <sub>1</sub> ) input
26	P41		○	LED segment output (c)	52	P72	○		LC7800 output signal (O <sub>2</sub> ) input

**Table 3 μPD-71508G-620-00 terminal functions**

Terminal No.	Name	In-put	Out-put	Functions	Terminal No.	Name	In-put	Out-put	Functions
1	NC				27	NC			
2	P73			(H)	28	P42		○	TX data output
3	RESET	○		Reset input	29	NC			
4	NC				30	P43		○	ME signal output
5	CL 1			Clock OSC CR connection terminal	31	Vss			GND
6	NC				32	X 1			GND
7	V DD				33	V DD			+B power terminal (+ 5 V)
8	NC				34	X 2			
9	CL 2			Clock OSC CR connection terminal	35	NC			
10	INT 1	○		TX data clock signal input	36	P20			
11	P00/INTO	○		RX data clock input (RT)	37	P21			
12	P01/SCK	○		PLL,CPU Serial data	38	P22			
13	NC				39	P23			
14	NC				40	NC			
15	P02/S0	○		PLL,CPU, Serial data output	41	P10	○		RX data input (RD)
16	P03/S1	○		PLL, CPU, Serial data input	42	P11			(H)
17	P60			(H)	43	P12	○		IC1 from communication require MTC input
18	P61			(H)	44	P13			GND
19	P62			TIME SCAN(N), CARRIER SCAN(H)	45	NC			
20	P63			ALERT (L), PRIORITY WATCH(H)	46	P30			
21	P50	○		DCL LED output	47	P31			
22	P51				48	P32			
23	P52	○		CSQ LED output	49	P33			
24	P53	○		CS LED output	50	P70			(H)
25	P40	○		IC1 to communication require MTC output	51	P71			(H)
26	P41	○		STBY signal output	52	P72			(H)

**Table 4 μPD7507G-575-00 terminal functions**

## CIRCUIT DESCRIPTION

Terminal name	Function	Terminal name	Function	Terminal name	Function
AC	AF Cut	LCM	C SQ Light	UP	MIC UP Swich
AI	AF Input	LCS	CS Light	a	LED Segment a Data
AO	AF Output	MI	MIC	b	LED Segment b Data
ANT	Antenna	MO	Modulation	c	LED Segment c Data
ATX	Anti-TX	MR	MIC MR Switch	d	LED Segment d Data
B	+ 13.8V	P	LED Dott a Data	e	LED Segment e Data
BD	Busy Drive	PC	Power Control	f	LED Segment f Data
BP	Beep Tone Output	PRO	Protection	g	LED Segment g Data
CB	Common + B	P70	$\mu$ -Proc port 70	1K	LED Digit 1K Data
CK	PLL Clock	P71	$\mu$ -Proc port 71	10K	LED Digit 10K Data
DA	PLL Data	P72	$\mu$ -Proc port 72	100K	LED Digit 100K Data
DB	Drive + B	P73	$\mu$ -Proc port 73	1M	LED Digit 1M Data
DI	Drive Input	P74	$\mu$ -Proc port 74	CH	LED Digit CH Data
DO	Drive Output	RA	RF Antenna	5C	+ 5V Common
DW	MIC Down Switch	RM	RF Meter	5L	+ 5V LED
E	GND	RX	Discri Output	8C	+ 8V Common
E1	Encoder 1	SB	Switched + B	8M	+ 8V at MIC
E2	Encoder 2	SM	Signal Meter	8R	+ 8V in RX
EN	PLL enable	SP	Speaker	8T	+ 8V in TX
FB	Final + B	SQ1	Squelch 1	RT	Repeater Tone +B
H/L	High/Low	SQ2	Squelch 2	TB	Tone +B
LAS	DCL Light	SS	Stand by Switch	TO	Tone out
LRE	RESET Light	ST	Stand by		

Table 5 Terminal functions

A : 65	B : 66	C : 67	D : 68
E : 69	F : 70	G : 71	H : 72
I : 73	J : 74	K : 75	L : 76
M : 77	N : 78	O : 79	P : 80
Q : 81	R : 82	S : 83	T : 84
U : 85	V : 86	W : 87	X : 88
Y : 89	Z : 90	/ : 47	Space : 32
0 : 48	! : 49	2 : 50	3 : 51
4 : 52	5 : 53	6 : 54	7 : 55
8 : 56	9 : 57		

Table 6 ASCII chart  
ASCII (American Standard Code for Information Interchange)

b 1	b16	b32	b48	b64	b80			
b 0	000	NULL	$\textcircled{1} DC_0$	b	0	@	P	
b 1	0001	SOM	$DC_1$	!	I	A	Q	
b 2	0010	EOA	$DC_2$	"	2	B	R	
b 3	0011	EOM	$DC_3$	#	3	C	S	
b 4	0100	EOT	$DC_4$ (Stop)	S	4	D	T	
b 5	0101	WRU	ERR	%	5	E	U	
b 6	0110	RU	SYNC	&	6	F	V	
b 7	0111	BELL	LEM	,	7	G	W	
b 8	1000	$FE_0$	$S_0$	(	8	H	X	
b 9	1001	HT SK	$S_1$	)	9	I	Y	
b10	1010	LF	$S_2$	*	:	J	Z	
b11	1011	$V_{TAB}$	$S_3$	+	;	K	[	
b12	1100	FF	$S_4$	(Comma)	<	L	/	
b13	1101	CR	$S_5$	-	=	M	)	
b14	1110	SO	$S_6$	★	>	N	↑	
b15	1111	SI	$S_7$	/	?	O	←	
								ACK
								②
								ESC
								DEL

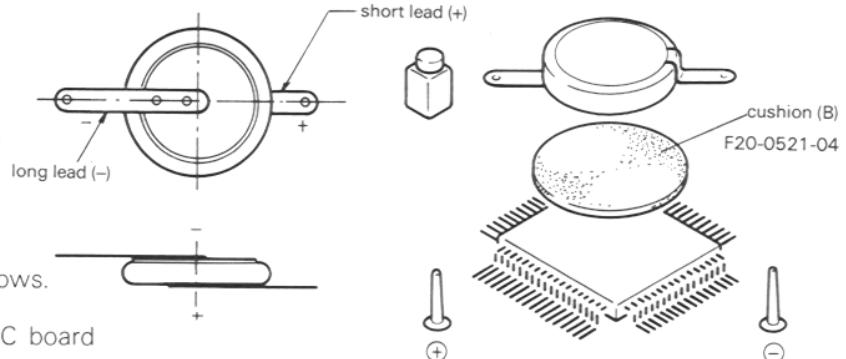
Example: b64+b1=A

## CIRCUIT DESCRIPTION

## Lithium Battery (W09-0323-05)

## Specifications

Model	CR2032
Nominal Voltage	3V
Nominal capacitor	170mAh
Discharge Stop Voltage	2.0V
Dimensions	Diameter 20.0 mm Height 3.2 mm
Weight	3 g



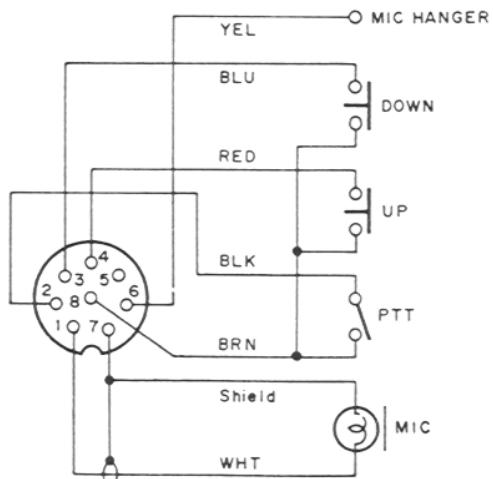
## Replacement procedure

When replace the back-up battery read as follows.

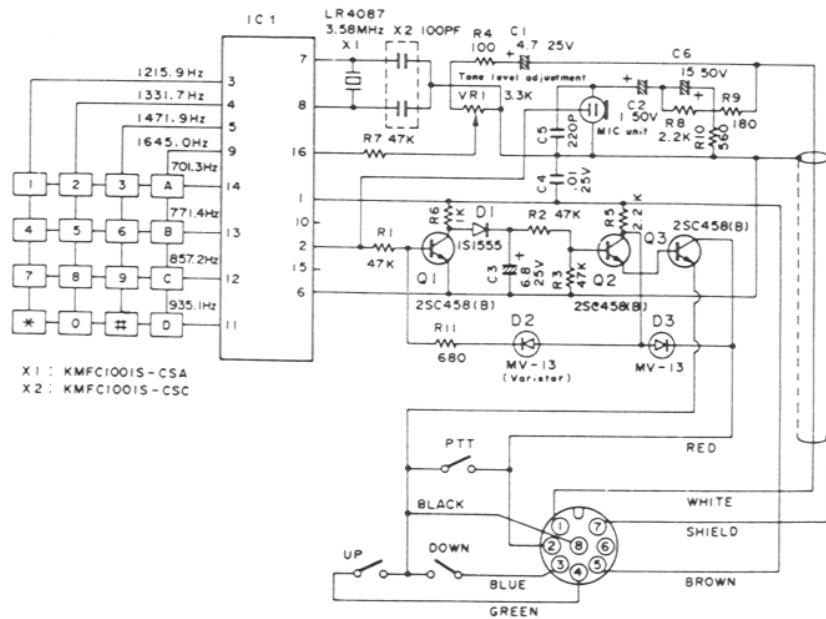
1. Remove the lower case.
2. Take care not to damage parts on the PC board since they are soldered battery.
3. Remount cell again (conform to cell pole)
4. After power switch is on, push the reset switches on.

## ACCESSORY MICROPHONE

(T91-0331-05) M, W type  
(T91-0335-05) T type



(T91-0332-05) K type



## PARTS LIST

### CAPACITORS

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

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

### Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color *	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750
2nd Word	G	H	J	K	L		
ppm/°C	±30	±60	±120	±250	±500		

Example CC45TH = -470 ± 60 ppm/°C

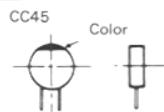
### Tolerance

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

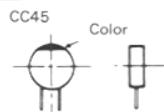
Less than 10pF

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

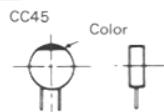
Abbreviation		Abbreviation	
Cap C E MC	Capacitor Ceramic Electrolytic Mica	ML S T	Mylar Styren Tantalum



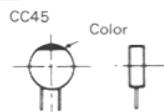
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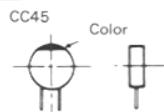
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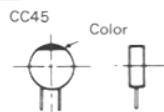
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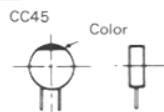
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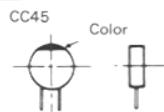
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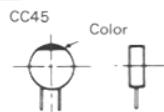
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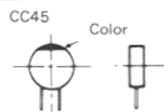
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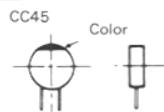
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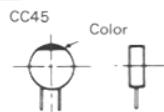
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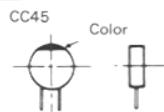
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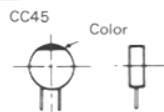
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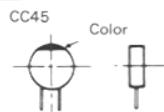
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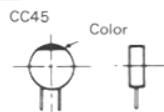
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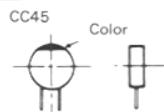
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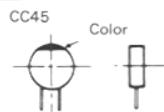
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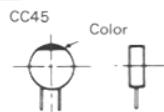
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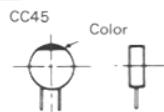
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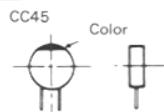
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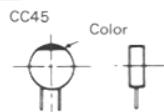
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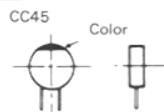
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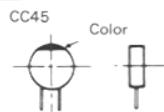
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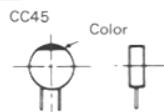
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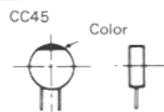
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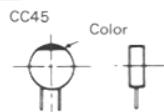
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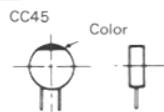
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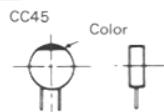
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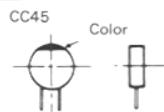
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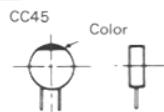
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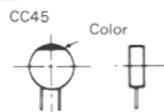
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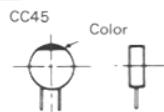
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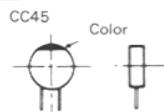
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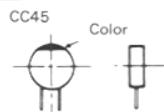
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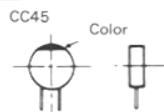
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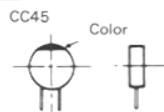
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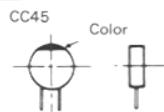
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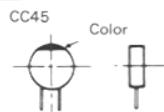
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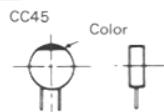
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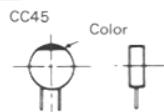
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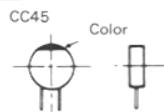
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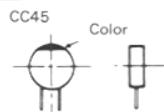
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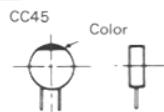
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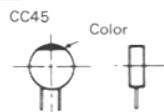
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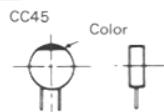
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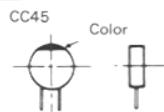
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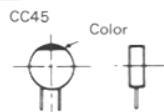
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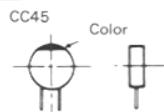
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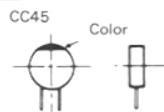
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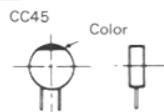
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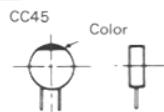
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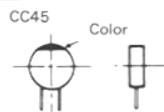
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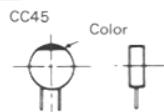
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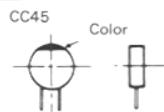
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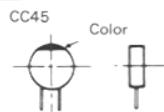
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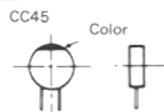
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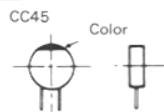
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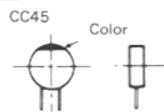
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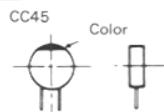
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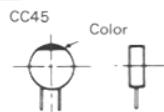
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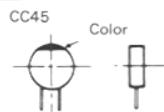
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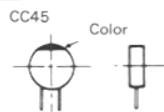
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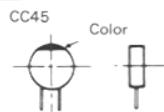
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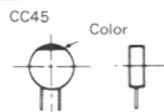
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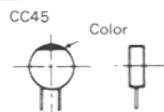
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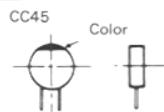
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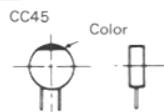
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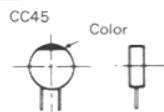
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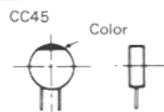
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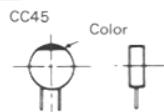
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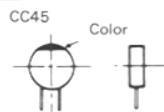
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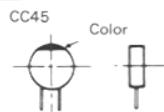
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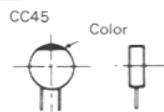
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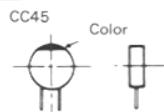
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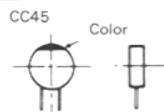
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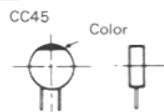
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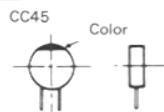
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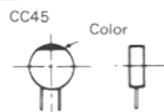
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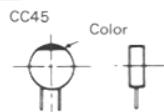
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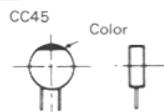
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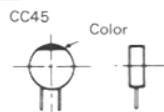
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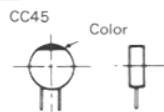
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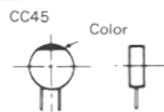
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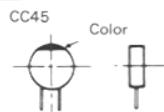
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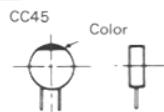
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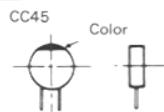
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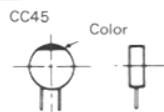
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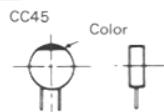
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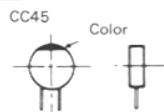
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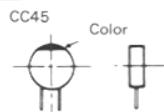
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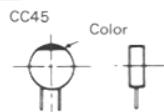
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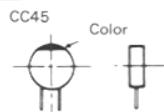
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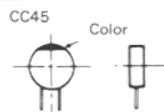
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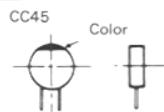
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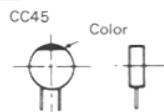
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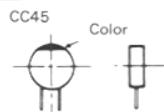
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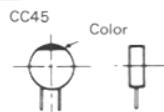
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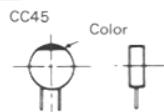
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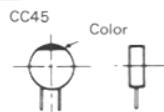
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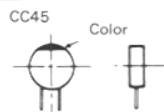
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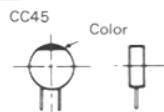
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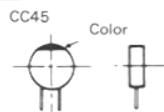
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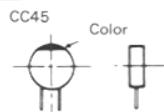
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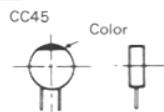
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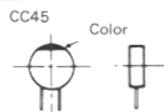
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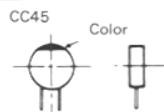
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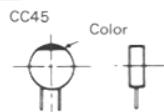
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Color



CC45



PARTS NO	NOTE	MAME & DESCRIPTION	DISTINCTION & QUANTITY
			011 021 051 061
A01-0782-03	N	CASSE(UPPER)	1 1 1
A01-0983-03	N	CASE(UPPER)	1 1 1
A01-0776-03	N	CASE(UPPER)	1 1 1
A01-0777-03	N	CASE(CLOWER)	1 1 1
A02-0377-08	*	SPEAKER'S CASE(UPPER) K,M,W	1 1 1
A02-0642-08	*	SPEAKER'S ASS'Y	1 1 1
A02-0377-08	*	SPEAKER'S CASE(UPPER) K,M,W	1 1 1
A02-0338-08	*	SPEAKER'S CASE(LOWER) K,M,W	1 1 1
A13-0640-22		MOUNTING BLACKET ASS'Y	1 1 1
A13-0554-05	N*	FRAME	1 1 1
A13-0655-04	N*	SUB FRAME(A)	1 1 1
A13-0656-14	N*	SUB FLAME(B)	1 1 1
A20-2512-03	N	PANEL ASS'Y K,M	1 1 1
A20-2513-03	N	PANEL ASS'Y T	1 1 1
A20-2514-03	N	PANEL ASS'Y W	1 1 1
A20-2521-04	N*	PANEL	1 1 1
A20-2528-04	N*	PANEL	1 1 1
A21-0765-13	*	ORNAMENTAL PANEL	1 1 1
B07-0649-04	N	SIDE ESCUTCHEON(L&R)	2 2 2
B10-0669-04	N*	FRONT GLASS	1 1 1
B40-3501-04	N*	MODEL NAME PLATE TM-211A	1 1 1
B40-3546-04	N*	MODEL NAME PLATE TM-211E	1 1 1
B43-1009-04	N	BADGE TM-211A	1 1 1
B43-1010-04	N	BADGE TM-211E(TRIO)	1 1 1
B43-1011-04	N	BADGE TM-211E	1 1 1
B43-1012-04	N	BADGE(B)	1 1 1
B46-0410-00		WARRANTY CARD	1 1 1
B50-4117-00	N	INSTRUCTION MANUAL TM-211A	1 1 1
B50-4118-00	N	INSTRUCTION MANUAL TM-211E	1 1 1
B50-4117-00	N	INSTRUCTION MANUAL TM-211A	1 1 1
B58-0662-00	N	CAUTION CARD	1 1 1
D19-0402-05	N	BALL	4 4 4
D29-0301-05	N	MOVING BEARING	2 2 2
D29-0302-04	N	BALL STOPPER	2 2 2
E30-1788-05	N	DC CABLE ASS'Y	1 1 1
E30-1729-08		CABLE WITH PLUG	1 1 1
F05-7025-05		FUSE 7A	1 1 1
F07-0853-02	N	PLASTIC COVER	2 2 2
F11-0859-04	N*	SHIELDING COVER	1 1 1
F19-0639-04	N*	SHIELDING MATERIAL	1 1 1
F20-0521-04		INSULATING PLATE	1 1 1
G01-0831-04	N*	COILED SPRING (DCS SW ETC.)	4 4 4
G01-0818-04	*	COILED SPRING	9 9 9
G02-0505-05		KNOB FITTING SPRING	2 2 2
G02-0542-04		GND SPRING (VCO CASE RIGHT)	1 1 1
G09-0420-04	N	FITTING SPRING	2 2 2
G11-0615-04	N	CUSHION	1 1 1
G13-0680-04		CUSHION ACS SP	1 1 1
G13-0683-04		CUSHION(MOUNTING ANGLE)	1 1 1
G13-0804-04		CUSHION(MOUNTING BLAKET)	2 2 2
G13-0809-04		CUSHION	1 1 1

PARTS, NO	NOTE	MAME & DESCRIPTION	DISTINCTION & QUANTITY
			011 021 051 061
H01-4550-03	N*	CARTON(CINSIDE) TM-211A	1 1 1
H01-4551-03	N*	CARTON(CINSIDE) TM-211E TRIO	1 1 1
H01-4591-03	N*	CARTON(CINSIDE) TM-211E	1 1 1
H10-2572-04	*	PACKING FIXTURE(TOP)	1 1 1
H10-2590-02	N*	PACKING FIXTURE	1 1 1
H12-1338-04	*	CUSHION(C)	2 2 2
H12-1360-04	N*	CUSHION	2 2 2
H25-0029-04	*	BAG(ACS)	60X110
H25-0049-03	*	PROTECTIVE BAG	60X200
H25-0103-04	*	BAG	125X250
H25-0116-04	*	PROTECTIVE BAG	1 1 1
H25-0708-04	*	BAG	1 1 1
J19-1402-04	N	CABLE FITTING HARDWARE	1 1 1
J21-2799-13		HARDWARE FIXTUR	1 1 1
J21-4132-03	N*	JOINT HARD WARE	1 1 1
J21-4149-04	N*	WIRE HOLDER	1 1 1
J29-0407-04	N	SW GUIDE A (TACT KNOB)	10 10 10
J32-0775-04		SW GUIDE X3	3 3 3
J32-0772-14		STUD & BOSS (STICK TYPE)	1 1 1
J32-0783-04	N*	ROUND BOSS(A UNIT)	1 1 1
J32-0784-04	N*	ROUND BOSS(B UNIT)	1 1 1
J39-0418-08	*	SPACER(ACS SP)	1 1 1
J61-0408-05		VINYL TIE	4 4 4
K21-0771-15		MAIN KNOB	1 1 1
K23-0769-15		KNOB RIT,AF,SQL	2 2 2
K29-3010-05		KNOB(B), OFFSET	1 1 1
K29-3003-05	N	PUSH KNOB(A)	1 1 1
K29-3004-05	N	PUSH KNOB(B)	1 1 1
K29-3005-05	N	PUSH KNOB(C)	1 1 1
K29-3006-05	N	PUSH KNOB(D)	1 1 1
K29-3007-05	N	PUSH KNOB(E)	1 1 1
K29-3008-05	N	PUSH KNOB(F)	1 1 1
K29-3009-05	N	PUSH KNOB(G)	1 1 1
K29-3033-03	N	KNOB(M)	1 1 1
K29-3034-03	N	KNOB(N)	1 1 1
K29-3020-03	N	PUSH KNOB(J)	1 1 1
K29-3022-03	N	KNOB(L)	1 1 1
LR4087	IC		1
N09-0008-04		SCREW (ACS. MOUNTING BLACKET)	4 4 4
N09-0632-05		SCREW (ACS. MOUNTING BLACKET)	4 4 4
N10-2040-41	N	HEX.NUT(ACS SP)	2 2 2
N14-0526-04	N	ROUND NUT(VOLUME)	2 2 2
N14-0510-04		NUT (ACS. MOUNTING BLAKET)	4 4 4
N15-1030-46		FLAT WASHER	1 1 1
N15-1050-46		WASHER(ACS.MOUNTING BLACKET)	4 4 4
N15-1060-46		WASHER(ACS.MOUNTING BLACKET)	4 4 4
N16-0026-46		SPRING WASHER	2 2 2
N16-0060-46		SPRING WASHER	4 4 4
N19-0631-05		FLAT WASHER	4 4 4
N30-0410-41		PAN HD SCREW	2 2 2
N32-2604-46		FLAT HD SCREW	6 6 6

PARTS. NO	NOTE	MAME & DESCRIPTION	DISTINCTION & QUANTITY
N32-2605-45		FLAT HD SCREW	4 4 4 4
N32-2605-46		FLAT HD SCREW	6 6 6 6
N32-3014-41		FLAT HD SCREW	4 4 4 4
N33-2004-41		ROUND FLAT SCREW	2 2 2 2
N33-2006-41		ROUND FLAT SCREW (CASE)	5 5 5 5
N35-2004-46		BIND SCREW	4 4 4 4
N35-2604-46		BIND SCREW	5 5 5 5
N35-2605-41		BIND SCREW	4 4 4 4
N35-2606-46		BIND SCREW	21 21 21 21
N87-4008-41		TAPPING SCREW	4 4 4 4
N88-4008-41		FLAT TAPPING SCREW	2 2 2 2
N89-2606-45		BIND TAPPING SCREW	2 2 2 2
N89-2005-46		BIND TAPPING SCREW	1 1 1 1
S50-1406-05		TACT SWTCH UP,DOWN	2 2 2 2
T07-0226-08		SPEAKER ASSY(ACS.)	1 1 1 1
T19-0101-05		SPEAKER ASSY(ACS. T TYPE)	1 1 1 1
T19-0102-05		SPEAKER ASSY(ACS.)	1 1 1 1
T19-0101-05		MICROPHONE (K)	1 1 1 1
T91-0332-15		MICROPHONE (M,W)	1 1 1 1
T91-0331-05		MICROPHONE (T)	1 1 1 1
T91-0331-05		MICROPHONE (M,W)	1 1 1 1
W09-0326-05		LITHIUM BATTERY	1 1 1 1
X44-1590-11	N*	A UNIT	1 1 1 1
X44-1590-51	N*	A UNIT	1 1 1 1
X45-1360-01	N*	FINAL UNIT	1 1 1 1
X52-1250-50	N*	TONE UNIT T	1 1 1 1
X52-1250-61	N*	TONE UNIT W	1 1 1 1
X53-1380-11	N*	B UNIT	1 1 1 1
X53-1380-51	N*	B UNIT	1 1 1 1
X53-1380-61	N*	B UNIT	1 1 1 1
X54-1810-11	N*	DISPLAY UNIT	1 1 1 1
X54-1810-51	N*	DISPLAY UNIT	1 1 1 1
X54-1810-61	N*	DISPLAY UNIT	1 1 1 1

UNIT	TM-211A	TM-211E
A UNIT	x44-1590-11	x44-1590-51
FINAL UNIT	x45-1360-01	x45-1360-01
TONE UNIT		x52-1250-50(T) x52-1250-61(W)
B UNIT	x53-1380-11	x53-1380-51(T) x53-1380-61(W)
DISPLAY	x54-1810-11	x54-1810-51(T) x54-1810-61(W)
UNIT		UNIT

PARTS. NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY		REFERENCE. NO
			011	051	
CC45CH1H150J		CERAMIC 15P 50V	1		C / 20
CC45CH1H150J		CERAMIC 15P 50V	1	1	C / 20,107,111
CC45CH1H05C		CERAMIC 0.5P 50V	1		C / 101
CC45CH1H220J		CERAMIC 22P 50V	1	1	C / 80
CC5CH1H270J		CERAMIC 27P 50V	1	1	C / 96
CC45CH1H010C		CERAMIC 1P 50V	2	2	C / 14, 76
CC45CH1H270J		CERAMIC 27P 50V	1	1	C / 97
CC45CH1H330J		CERAMIC 33P 50V	2	2	C / 2, 19
CC45CH1H020C		CERAMIC 2P 50V	1	1	C / 102
CC45TH1H100D		CERAMIC 10P 50V	1	1	C / 48
CC45CH1H05C		CERAMIC 0.5P 50V	1		C / 55
CC45RH1H120J		CERAMIC 12P 50V	1	1	C / 1
CC45CH1H030C		CERAMIC 3P 50V	2	2	C / 50, 54
CC45RH1H180J		CERAMIC 18P 50V	2	2	C / 4, 5
CC45CH1H05C		CERAMIC 0.5P 50V	1		C / 55
CC45U1H060D		CERAMIC 6P 50V	1		C / 111
CC45CH1H040C		CERAMIC 4P 50V	1	1	C / 58
CC45TH1H100D		CERAMIC 10P 50V	1	1	C / 69
CC45CH1H030C		CERAMIC 3P 50V	3		C / 71, 99,100
CC45CH1H030C		CERAMIC 3P 50V	6		C / 3, 71, 99,100,105,109
CC45CH1H050C		CERAMIC 5P 50V	1	1	C / 17
CC45CH1H050C		CERAMIC 5P 50V	2	2	C / 75,117
CC45CH1H040C		CERAMIC 4P 50V	1		C / 3
CC45SL1H670J		CERAMIC 47P 50V	2		C / 13,144
CC45SL1H101J		CERAMIC 100P 50V	5		C / 18, 90, 91,118,119
CC45SL1H101J		CERAMIC 100P 50V	1	1	C / 89
CC45CH1H070D		CERAMIC 7P 50V	3	3	C / 49,108,113
CC45SL1H121J		CERAMIC 120P 50V	1	1	C / 130
CC45CH1H060D		CERAMIC 6P 50V	2	2	C / 105,109
CC45CH1H100D		CERAMIC 10P 50V	2		C / 12, 72
CC45CH1H070D		CERAMIC 7P 50V	1	1	C / 70
CC45CH1H00	*	CERAMIC 8P 50V	1	1	C / 57
CC45CH1H00	*	CERAMIC 10P 50V	2		C / 121,124
CC45CH1H100D		CERAMIC 10P 50V	3		C / 68,121,124
CC45SL1H181J		CERAMIC 180P 50V	1	1	C / 115
CC45CH1H120J		CERAMIC 12P 50V	3	3	C / 46, 51,106
CC45CH1H090D		CERAMIC 9P 50V	1		C / 68
CC45CH1H180J		CERAMIC 18P 50V	1	1	C / 112
CC73FC1H020C		CHIP CAP.	2P	1	C / 160
CC73FC1H1R5C		CHIP CAP.	1.5P	1	C / 160
CEO4WA470M		ELECTRO 4.7	10V	3	C / 53,122,141
CEO4WA101M		ELECTRO 100	10V	3	C / 35, 74,153
CEO4WA121M		ELECTRO 220	10V	1	C / 147
CEO4CM0J470M		ELECTRO 4.7	6.3V	1	C / 139
CEO4CM1A330M		ELECTRO 33	10V	3	C / 137
CEO4CM1HR47M		ELECTRO 0.47	50V	1	C / 62, 88, 94
CEO4CM1H010M		ELECTRO 1	50V	2	C / 26
CEO4CM1H2R2M		ELECTRO 2.2	50V	1	C / 142,143
CF92V1H473J	N	POLYESTER 0.047	50V	1	C / 85
CF92V1H683J		POLYESTER 0.068	50V	1	C / 43
CK45BH102K		CERAMIC 1000P	50V	5	C / 11, 59, 64, 92,161
CK45BH102K		CERAMIC 1000P	50V	4	C / 11, 59, 64, 92

PARTS. NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY		REFERENCE. NO
			011	051	
CK45B1H471K		CERAMIC 470P 50V	3	3	C /114,149,151
CK45B1H102K		CERAMIC 1000P 50V	13	13	C / 6, 9, 27, 40, 41, 45, 60
CK45B1H471K		CERAMIC 470P 50V	4	4	C / 63, 78, 81, 148, 150, 156
CQ92M1H152K		MYLAR 1500P 50V	1	1	C / 30, 32, 95, 125
CQ92M1H222K		MYLAR 2200P 50V	1	1	C / 145
CQ92M1H235K		MYLAR 0.022 50V	2	2	C / 133, 135
CQ92M1H333K		MYLAR 0.033 50V	1	1	C / 140
CQ92M1H100K		MYLAR 0.1 50V	1	1	C / 146
CS15E1C2R4M		TANTALUM 2.2 16V	2	2	C / 86, 127
CS15E1E010M		TANTALUM 1 25V	2	2	C / 66, 128
CS15E1V01M		TANTALUM 0.1 35V	2	2	C / 65, 83
CS15E1VR22M		TANTALUM 0.22 35V	2	2	C / 84, 87
CS15E1VR08M		TANTALUM 0.68 35V	1	1	C / 129
C05-0030-15		TRIMMER 20P	2	2	TC / 2, 4
C05-0062-05		TRIMMER 6P	2	2	TC / 1, 3
C05-0067-05		TRIMMER 25P	2	2	TC / 5, 6
C90-0897-05	N	ELECTRO 470 10V	1	1	C / 159
C91-0667-05		CERAMIC 0.0047	1	1	C / 123
C91-0117-05		CERAMIC 0.01	6	6	C / 8, 16, 23, 44, 67, 79
C91-1008-05		CERAMIC 0.022	1	1	C / 42
C91-0667-05		CERAMIC 0.0047	2	2	C / 120, 131
C91-0117-05		CERAMIC 0.01	20	20	C / 10, 15, 25, 29, 52, 56, 61
C91-1008-05		CERAMIC 0.022	11	11	C / 73, 77, 82, 93, 103, 104, 110
F11-0862-06	N	SHIELDING CASE(A)	1	1	C / 116, 126, 154, 155, 157, 158
J31-0503-05		BEADS	1	1	C / 21, 22, 28, 31, 33, 34, 36
E04-0154-05	*	RF COAXIAL CABLE CONNECTOR RA INSIDE CONNECTING WIRE(A)	1	1	C / 37, 38, 39, 98
E31-2108-05	*	MINI CONNECTOR 2P	1	1	TP / 1
E40-0211-05	*	MINI CONNECTOR 2P	1	1	
E40-0273-05	*	MINI CONNECTOR 4P	1	1	
E40-0473-05	*	MINI CONNECTOR 4P	1	1	
E40-5016-05	N*	MINI CONNECTOR 3P	3	3	
E40-5017-05	N*	MINI CONNECTOR 3P	2	2	
E40-5018-05	N*	MINI CONNECTOR 4P	2	2	
E40-5020-05	N*	MINI CONNECTOR 6P	1	1	
F11-0862-06	N	SHIELDING CASE(A)	1	1	
L15-0306-05	N	LOW-FREQUENCY CHOKE COIL TOROIDAL COIL 30.5T	1	1	L / 30
L19-0352-15	N	IFT	2	2	L / 11, 15
L30-0005-05		IFT	2	2	L / 4, 6
L30-0503-05		IFT	1	1	L / 9
L31-0267-05	N	455KHZ	2	2	L / 8
L32-0664-05	N	OSCILLATING COI	2	2	L / 12, 16
L34-0683-05	N	TUNING COIL	3	5.5T	L / 21, 22
L34-1025-05		COIL	3	3	L / 14, 18, 19
L40-1092-14		INDUCTOR 1 UH	4	4	L / 13, 17, 23, 25
L40-3391-14		INDUCTOR 3.3 UH	1	1	L / 20
L40-1021-12		INDUCTOR 1 MH	1	1	L / 29
L40-1025-25		INDUCTOR 1 MH	1	1	L / 28
L71-0216-05		MCF 10.695MHZ	1	1	L / 5
L72-0342-05		CERAMIC FILTER CFV455F	1	1	L / 7

PARTS. NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY				REFERENCE. NO
			011	051			
L77-0858-15		XTAL 10.240MHZ	1	1			L ' 27
L77-1262-05	N	XTAL 59.740MHZ	1				L ' 26
L77-1224-05	N	XTAL 40.8266MHZ	1				L ' 26
L77-1263-05	N	XTAL 43.3917MHZ	1				L ' 24
L77-1225-05	N	XTAL 44.3917MHZ	1				L ' 24
L79-0446-05		CERAMIC DISCRI CFY455S	1				L ' 10
L79-0499-05		HELICAL	1				L ' 3
L79-0498-15		HERICAL	1				L ' 3
MB3712	IC		1	1			IC ' 3
MC145155P*J	IC		1	1			IC ' 2
M776.2JA	DIODE		1	1			D ' 8
M7710JC	ZENER DIODE	10V	2	2			D ' 16, 17
N30-3004-46		PAN HD SCREW	2	2			
R122-3443-05		TRIM POT.	10K OHM	1	1		VR ' 1
R922-0150-05		JUMPER WIRE		3			J ' 2, 3, 4
URC577H(E,F)	IC		1	1			IC ' 1
URC78M08H	IC		1	1			IC ' 4
1N60	DIODE		1	1			D ' 7
1SS99	DIODE		2	2			D ' 3, 4
1SV50	DIODE		9	9			D ' 5, 6
1S1555	DIODE						D ' 1, 2, 9, 10, 11, 12, 13 , 14, 15
2SC2458L(1)	N	TR	1	1			Q ' 19
2SC2458(Y)		TR	9	9			Q ' 9, 15, 16, 17, 18, 27, 32
2SC2668(Y)		TR	12	12			Q ' 33, 39
2SC2710(Y)	N	TR	2	2			Q ' 7, 10, 11, 13, 14, 20, 21
2SC2787(L)		TR	3	3			Q ' 22, 23, 24, 25, 26
2SC3113(B)		TR	4	4			Q ' 4, 5, 6
2SK192A(GR)*N		FET	3	3			Q ' 27, 28, 30, 31
3SK74(L)		FET	1	1			Q ' 3, 8, 12
3SK97(Q2)*J		FET	1	1			Q ' 1

## FINAL UNIT (X45-1360-01)

PARTS. NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY		REFERENCE. NO
			001		
CC45CH1H010C		CERAMIC 1P 50V	2		C ' 8, 10
CC45SL2H180J		CERAMIC 18P 500V	1		C ' 3
CC45SL2H150J		CERAMIC 15P 500V	2		C ' 4, 6
CC45SL2H350J		CERAMIC 33P 500V	1		C ' 9
CC45SL2H390J		CERAMIC 39P 500V	1		C ' 7
CC45SL2H101J		CERAMIC 100P 500V	1		C ' 5
CEO4CW/C100W		ELECTRO 10 16V	2		C ' 1, 2
CK45BA1H102K		CERAMIC 1000P 50V	6		C ' 12, 13, 14, 15, 16, 17
CM73EFH220J		CHIP MICA 22P 500V	1		C ' 11
E11-0401-05		EARPHONE JACK EXT. SP 1P	1		
E23-0512-05		TERMINAL 1P	1		
E30-1780-05		POWER CABLE	1		
E30-1782-15		8P MIC CABLE ASSY	1		
E31-2172-15		COAXIAL CABLE CONNECTOR M	1		
E31-2089-05		INSIDE CONNECTIRA	1		
E31-3028-05		CABLE WITH TERMDO	1		
F01-0910-05	N*	HEAT SINK	1		
F05-7025-05		FUSE 7A	1		
J19-1375-04		HOLDER	1		
J41-0024-15		BUSHING (PLASTIC)	2		
J61-0408-05		VINYL TIE	1		
L34-0499-05		VHF COIL 3 4T	3		
L34-0895-05		COIL 3 6T	1		L ' 3, 5, 6
L34-0908-05		COIL 3 9.5T	2		L ' 2
L40-1091-03		INDUCTOR 1 UH	1		L ' 1, 4
M1308		DIODE	1		L ' 7
M1407		DIODE	1		D ' 3
M57737		POWER MODULE	1		D ' 2
N00-0626-04		SCREW (OTHERS)	2		
N87-2606-41		TAPPING SCREW	6		Q , 1
RD14DB2H181J		RES. CARBON 180 OHM 1/2W	1		R ' 1
RD14BB2C223J		RES. CARBON 22K OHM 1/6W	1		R ' 2
R12-0541-05		TRIM.POT. 100 OHM	1		VR ' 1
U158		DIODE	1		D ' 1
1S1587		DIODE	2		D ' 4, 5



B UNIT (X53-1380-xx) -11; K,M -51; T -61; W

PARTS. NO	NOTE	MAME & DESCRIPTION	011	051	061	DISTINCTION & QUANTITY	REFERENCE. NO
F11-0860-04	N*	SHIELDING CASE (B)	1	1	1		
F11-0861-04	N*	SHIELDING COVER (B)	1	1	1		
F20-0516-05		INSULATING BOARD	1	1	1		
F29-0014-05		INSULATING WASHER	1	1	1		
G10-0628-04	N	CLOTH	1	1	1		
L34-0893-05		COIL	3	4T	2	2	L , 2, 4
L34-0894-05		COIL	3	5T	2	2	L , 1, 3
L77-1206-05	N	XITAL	3.6864MHZ	1	1		L , 5
L78M06		IC		1	1		IC , 8
MC14001BCP		IC		1	1		IC , 6
MC14069UBCP		IC		1	1		IC , 5
MN127A		IC		1	1		IC , 3
NJM78M06A	N	IC		1	1		IC , 8
NJ78L06A		IC		1	1		IC , 9
NO9-0623-04		SCREW (OTHERS)		1	1		
RS14AB3A100J		METAL FILM	10 OHM 1W	1	1		R , 43
R12-1430-05		TRIM.POT.	3K OHM	1	1		VR , 2
R12-2413-05		TRIM.POT. (5K)		1	1		VR , 5
R12-3443-05		TRIM.POT.	10K OHM	1	1		VR , 6
R12-3446-05	N	TRIM.POT. (30K)		1	1		VR , 3
R12-4413-05		TRIM.POT.	50K OHM	3	3		VR , 1, 4, 7
R90-0515-05		RESISTOR BLOCK 10K		2	2		R , 62, 65
S31-1411-05		SLIDE SWITCH (MONITOR SW)		1	1		S , 2
S59-0415-05		KEYBOARD SWITCH/RESET SW		1	1		S , 1
TC4001BP		IC					IC , 6
TC4069UBP		IC					IC , 5
UPC4558C		IC		2	2		IC , 7
UPD7508G-620-00	N	MICRO-PROCESSOR	1	1	1		IC , 1
UPD7507G-575-00	N	MICRO-PROCESSOR FOR DCS	1	1	1		IC , 2
1N4448		DIODE				D , 1, 2, 3, 4, 5, 6, 7	
1S1555		DIODE		12	12		D , 1, 2, 3, 4, 5, 6, 7
2SA1015(Y)		TR		1	1		Q , 4
2SA1115(E)		TR		1	1		Q , 19
2SC347		TR		1	1		Q , 1
2SC2538-22-A		TR		4	4		Q , 2
2SC2458(Y)		TR					Q , 5, 10, 11, 12
2SC2458(Y)		TR					Q , 5, 10, 11, 12, 18
2SC2603(E)		TR		5			Q , 5, 10, 11, 12
2SC2603(E)		TR					Q , 5, 10, 11, 12, 18
2SC2603(E)		TR					Q , 5, 10, 11, 12
2SC2603(E)		TR					Q , 5, 10, 11, 12
2SC2458(Y)		TR		4	4		Q , 4
2SC1775(E)		TR		1	1		Q , 7, 8, 13
2SD880(Y)		TR		1	1		Q , 9
							Q , 3

PARTS. NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY			REFERENCE. NO
			011	051	061	
CC45CH1H150J		CERAMIC 15P 50V	2	2	2	C / 71, 72
CC45CH1H220J		CERAMIC 22P 50V	1	1	1	C / 10
CC45SL1H121J		CERAMIC 120P 50V	1	1	1	C / 81
CC45SL1H101J		CERAMIC 100P 50V	1	1	1	C / 57
CC45CH1H330J		CERAMIC 33P 50V	2	2	2	C / 57
CC45SL1H101J		CERAMIC 100P 50V	3	3	3	C / 67, 69
CE04CM1H101J		ELECTRO 0.22 50V	1	1	1	C / 56, 58, 59
CE04CM1HR22M		ELECTRO 0.47 50V	1	1	1	C / 41
CE04CM1H67M		ELECTRO 0.1 50V	2	2	2	C / 76, 84
CE04CM1HOR1M		ELECTRO 4.7 16V	1	1	1	C / 38
CE04CM1C4R7M		ELECTRO 10 16V	4	4	4	C / 9, 34, 37, 82
CE04CM1C100M		ELECTRO 33 10V	1	1	1	C / 79
CE04CM1A330M		POLYESTER 0.1 50V	2	2	2	C / 77, 80
CF92VTH104J		CERAMIC 1500P 50V	1	1	1	C / 32
CK45B1H152K		CERAMIC 470P 50V	3	3	3	C / 44, 65, 66
CK45B1H471K		CERAMIC 680P 50V	1	1	1	C / 64
CK45B1H681K		CERAMIC 1000P 50V	20	20	20	C / 2, 3, 5, 7, 13, 14, 18
CK45B1H102K		CERAMIC 1000P 50V	6	6	6	C / 20, 21, 22, 23, 24, 25, 29
CK45B1H152K		CERAMIC 1500P 50V	1	1	1	C / 31, 54, 55, 86, 90, 91
CK7SEB1H103K		CHIP CAP.	0.01	50V	10	C / 35, 11, 15, 27, 30, 85, 113
CQ92M1H102K		MYLAR 1000P 50V	3	3	3	C / 100, 101, 102, 103, 104, 105, 106
CQ92M1H222K		MYLAR 2200P 50V	1	1	1	C / 107, 108, 109
CQ92M1H822K		MYLAR 8200P 50V	1	1	1	C / 39, 62, 83
CQ92M1H223K		MYLAR 0.022 50V	2	2	2	C / 45, 78
CQ92M1H273K		MYLAR 0.027 50V	1	1	1	C / 40
CQ92M1H333K		MYLAR 0.033 50V	1	1	1	C / 36
CS15E1VR33M		TANTALUM 0.33 35V	1	1	1	C / 43
CS15E1VOR1M		TANTALUM 0.1 35V	1	1	1	C / 33
CS15E1C3R3M		TANTALUM 3.3 16V	1	1	1	C / 16
CS15E1A100M		TANTALUM 10 10V	1	1	1	C / 88
C05-0030-15		TRIMMER 20P	2	2	2	TC / 1, 2
C90-0871-05		ELECTRO 220 16V	2	2	2	C / 48, 49
C90-0872-05		ELECTRO 33 16V	3	3	3	C / 53, 74, 75
C90-0873-05		ELECTRO 47 10V	2	2	2	C / 26, 28
C90-0875-05		ELECTRO 100 16V	3	3	3	C / 12, 51, 89
C91-0117-05		CERAMIC 0.01	8	8	8	C / 1, 4, 6, 8, 47, 52, 70
C91-0117-05		CERAMIC 0.0047	5	5	5	C / 73, 60, 61, 99, 110, 111
C91-0667-05		CERAMIC 0.022	2	2	2	C / 17, 19
C91-1008-05		DIGITAL TR	4	4	4	C / 50, 68
DTG124EF		DIGITAL TR	1	1	1	Q / 14, 15, 16, 20
E04-0159-05	N	MINI-PIN JACK(A) DI, DO	2	2	2	Q / 17
E31-3083-05	N*	CONNECTOR WITH WIRE	1	1	1	
E31-3084-05	N*	CONNECTOR WITH WIRE	1	1	1	
E40-3007-05	*	MINICONNECTOR 2P	1	1	1	
E40-5015-05	N*	MINI CONNECTOR 8P	2	2	2	
E40-5016-05	*	MINI CONNECTOR 2P	2	2	3	
E40-5016-05	*	MINI CONNECTOR 2P	2	2	3	
E40-5017-05	*	MINI CONNECTOR 3P	5	5	5	
E40-5018-05	*	MINI CONNECTOR 4P	5	5	5	
E40-5019-05	N*	MINI CONNECTOR 5P	1	1	1	

## DISPLAY UNIT (X54-1810-xx) -11: K,M -51: T -61: W

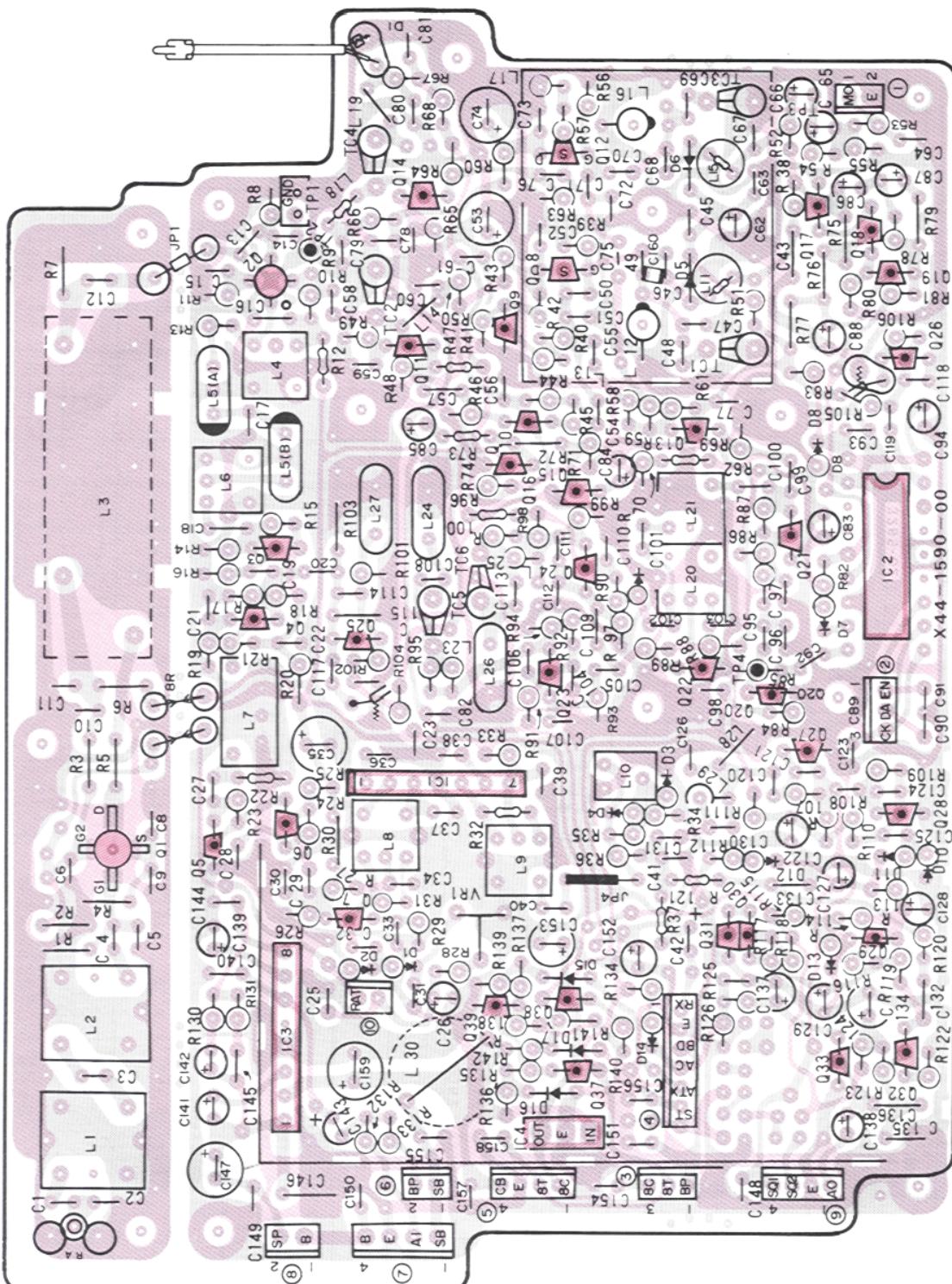
PARTS. NO	NOTE	NAME & DESCRIPTION	DISTINATION & QUANTITY			REFERENCE. NO
			011	021	051	
CK45B1H471K		CERAMIC 470P 50V	1	1	1	C ' 4
CK45B1H102K		CERAMIC 1000P 50V	6	6	6	C ' 1, 3, 5, 6, 7, 8
CS15E1E010M		TANTALUM 1 25V	1	1	1	C ' 2
DTA143XF		DIGITAL TR	8	8	8	Q ' 1, 2, 3, 4, 5, 6, 7
E23-0427-05		GND TERMINAL	2	2	2	
E23-0455-14		PLATE FOR GND	1	1	1	
E40-5016-05		MINI CONNECTOR 2P	1	1	1	
F15-0654-04	N*	LED MASK	4	4	4	
LB1407	N	IC	1	1	1	IC ' 2
LC7800	N	IC	1	1	1	IC ' 1
N15-1020-46		FLAT WASHER	1	1	1	
N89-2005-46		BIND TAPPING SCREW	1	1	1	
R05-3424-05	N	POT. 10K OHM WITH SWITCH	1	1	1	
R29-4401-05	N	POT.WITH SW.	1	1	1	
SLP444	N	LED	4	4	4	
S40-2443-05		PUSH SW RIT	2	2	2	
S40-2443-05		PUSH SW RIT				D ' 5, 6, 7, 8
S40-2443-05		PUSH SW •				S ' 11, 12
S40-2444-05		PUSH SW RPT.C	1	1	1	S ' 11, 13
S40-2444-05		PUSH SW RPT.C				S ' 13
S40-2444-05		PUSH SW RPT.C				S ' 12, 13
S50-1442-05		TACT SWITCH	6	6	6	S ' 1, 2, 3, 4, 5, 6
S50-1427-05	N	TACT SWITCH	4	4	4	S ' 7, 8, 9, 10
W02-0360-05	N	ROTARY ENCODER	1	1	1	
W02-0361-05	N	LED ASS'Y	1	1	1	
1N4448		DIODE				D ' 1, 4
1N4448		DIODE				D ' 2, 4
1N4448		DIODE				D ' 3, 4
1S1555		DIODE	2	2	2	D ' 1, 4
1S1555		DIODE				D ' 2, 4
1S1555		DIODE				D ' 3, 4
2SA1150(Y,0)	N	TR	5	5	5	Q ' 9, 10, 11, 12, 13

# TM-211A/E

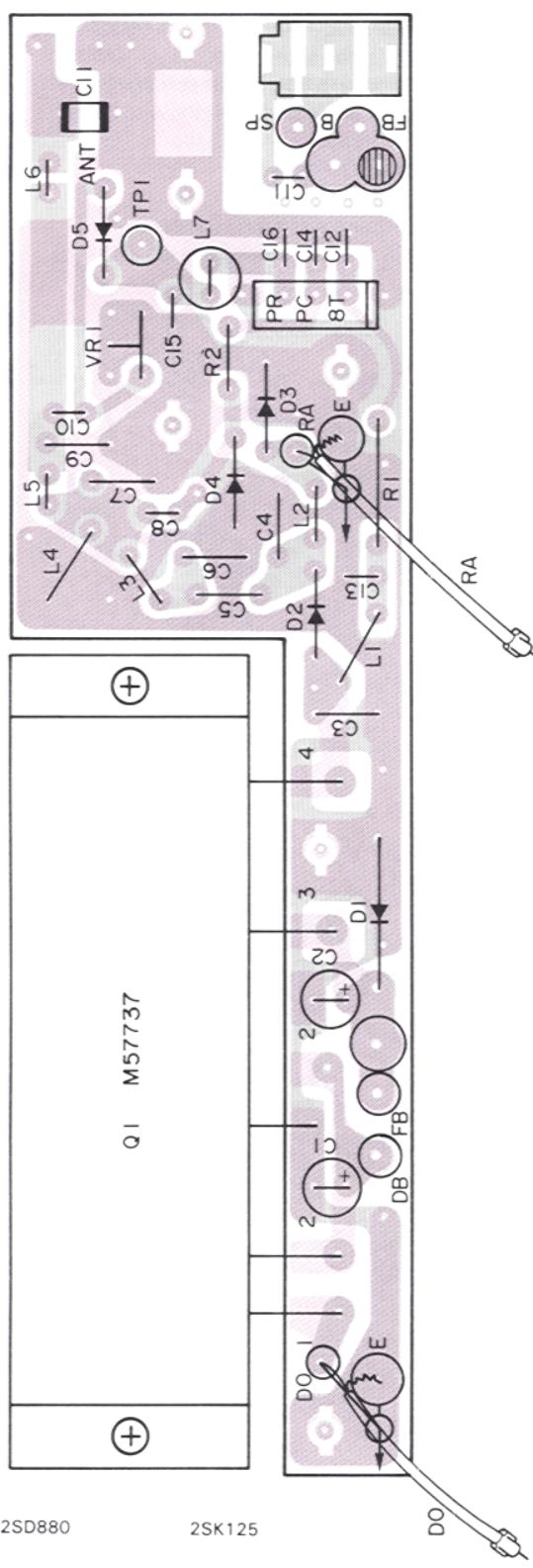
## PC BOARD VIEW

▼ A UNIT (X44-1590-11, -51) Component side view

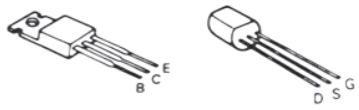
-11: K,M -51: T,W



▼ FINAL UNIT (X45-1360-01)  
Component side view

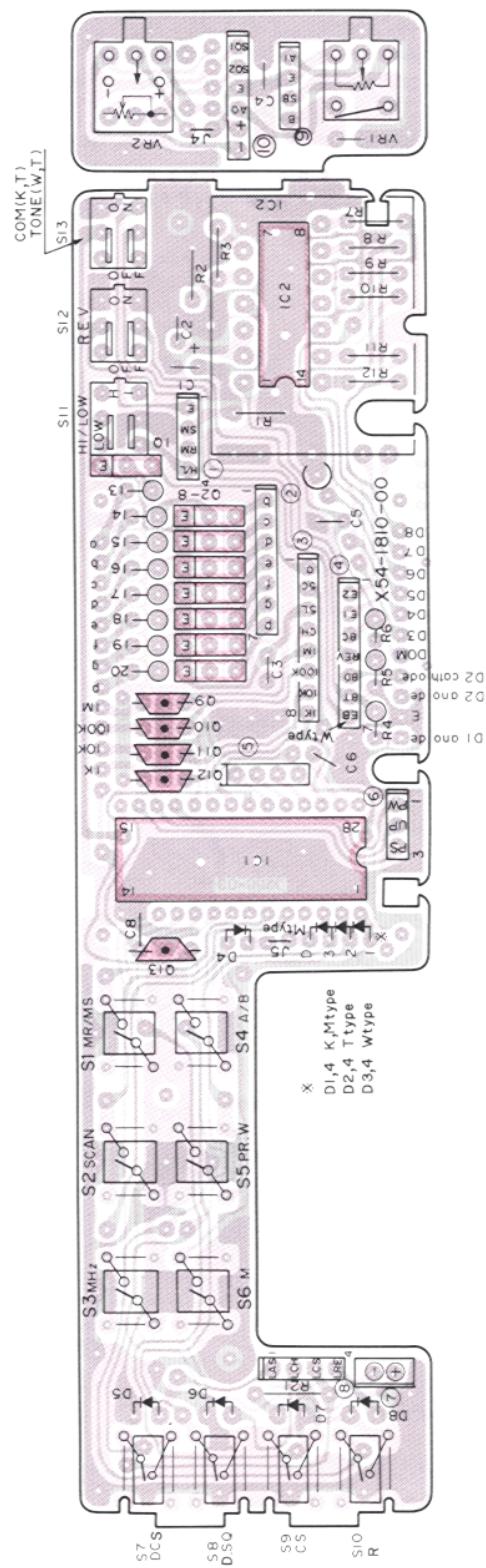


2SD880 2SK125



FINAL UNIT (X45-1360-01)  
Q1 : M57737, D1 : U15B,  
D2 : M1407, D3 : M1308,  
D4,5 : 1SS1587  
2SK192A

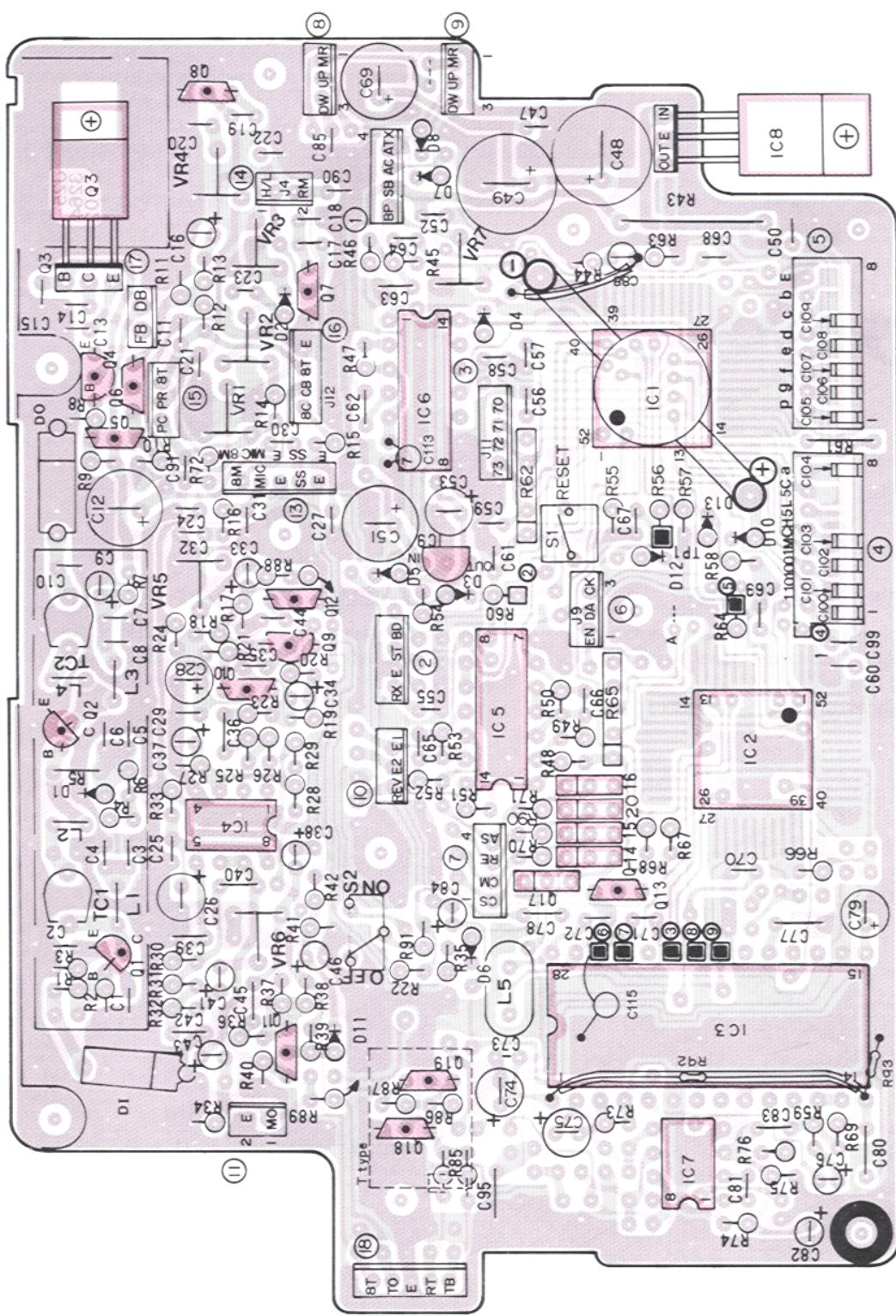
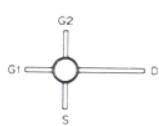
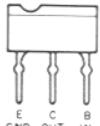
2SK192A



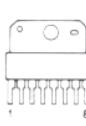
**DISPLAY UNIT (X54-1810-11)**  
IC1: LC7800, IC2: LB1407, Q1  
7 : SLP444

## ▼ B UNIT (X53-1380-11,-51,-61)

Component side view -11 : K.M -51 : T M : 19 -

3SK74  
3SK97DTC124  
DTA143X

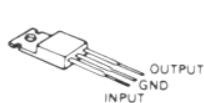
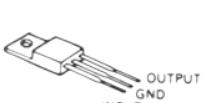
MB3712



μPC5777



μPC78M08H

NJM78M06A  
or L78M06  
NJM78ML06A

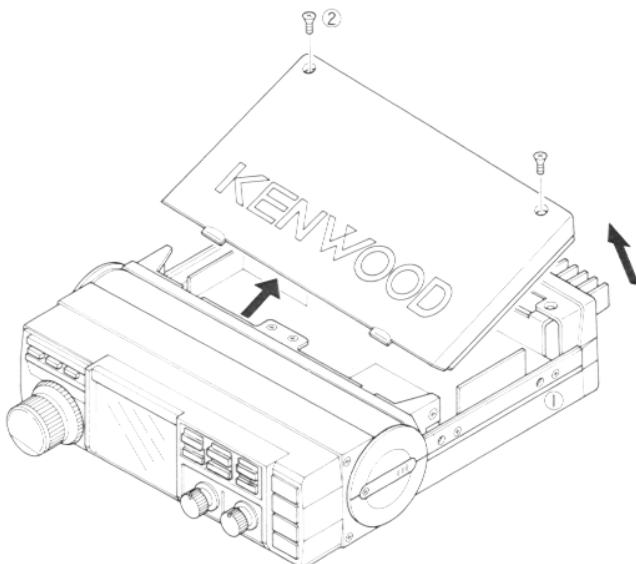
## B UNIT (X53-1380-11)

IC1:  $\mu$ PD7508G-611-00, IC2:  $\mu$ PC4558C, IC3: MN-6127A, IC4,7:  $\mu$ PC4558C, IC5: MC14069U or TC4069UBP  
 IC6: MC1400BCP or TC4001BP, IC8: NJM78M06 or L78M06, IC9: NJM78L06A, Q1: 2SC2026, Q2: 2SC2407(1), Q3: 2SD880(y)  
 Q4: 2SA1015(y), Q5,10 ~ 12,18: 2SC2458(y) or 2SC2603(E), Q6 ~ 9,13: 2SC1775(E), Q14 ~ 16: DTA143XF, Q17:DTC124(F),  
 Q19: 2SA1115(E), D1 ~ 8, 10 ~ 13: 1S1555 or 1N4448

## DISASSEMBLY

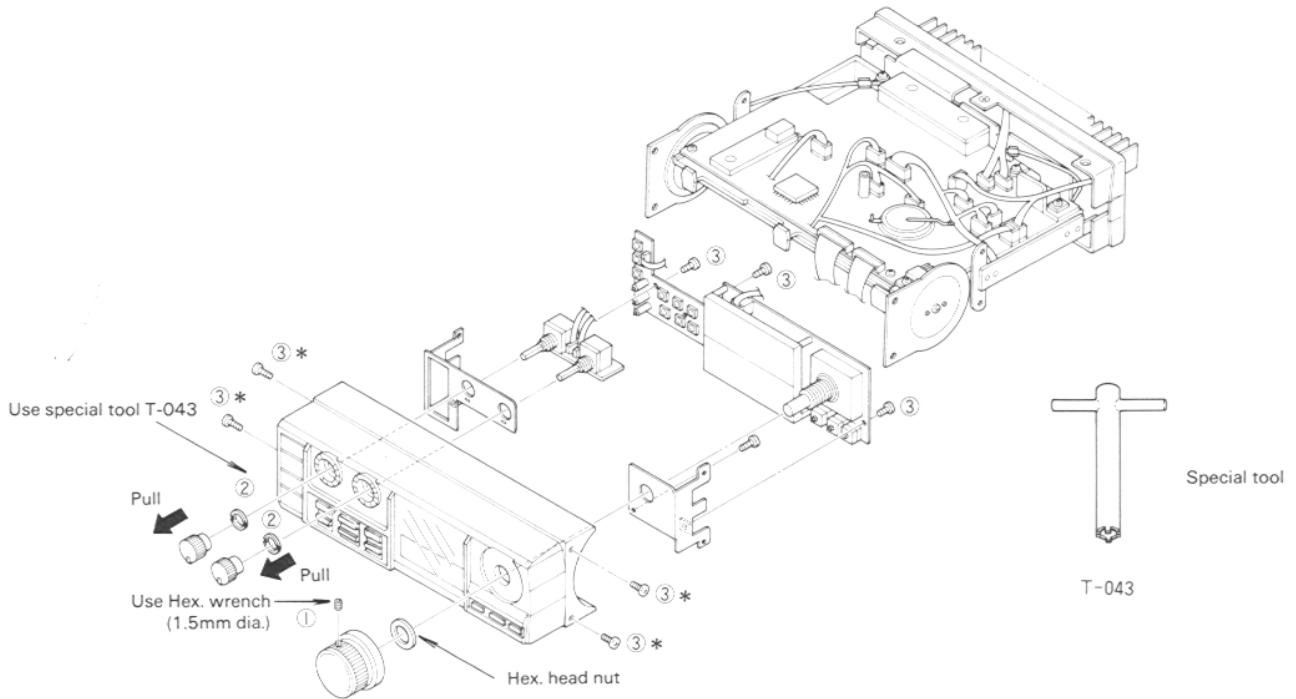
### DISASSEMBLY FOR UPPER CASE

- ① To loosen the side escutcheon's (L & R) screw (black 4 pieces).
- ② Remove upper case's screw (2 pieces).



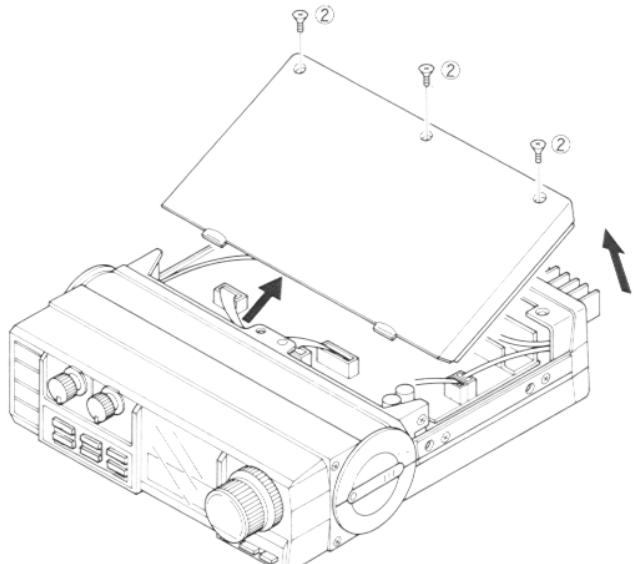
### DISASSEMBLY FOR DISPLAY UNIT

- ① Remove main dial by Hex. wrench, remove 11mm nut.
- ② To remove AF, SQ knob from front panel, remove nut by special tool (T-043).
- ③ Remove screw (3 pieces) on the DISPLAY UNIT.



### DISASSEMBLY FOR LOWER CASE

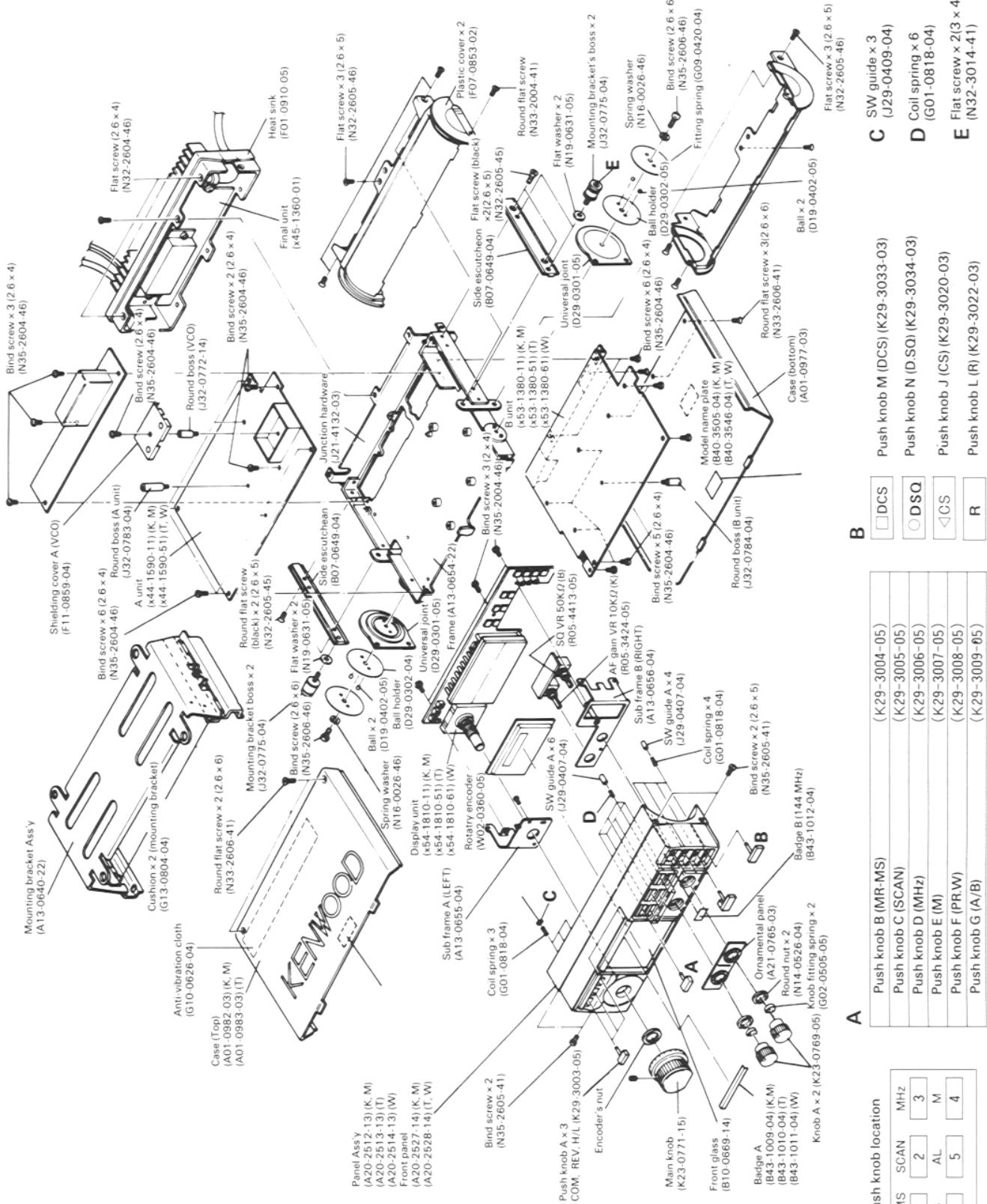
- ① To loosen the side escutcheon's (L & R) screw (black 4 pieces).
- ② Remove lower case's screw (3 pieces).



### DISASSEMBLY FOR FRONT PANEL

- ① Remove side escutcheon's screw and knobs.
- ② Remove plastic cover's (upper and lower) screw.
- ③ Remove front panel's screw (4 pieces).

# DISASSEMBLY



Push knob location

MR/MS	SCAN	MHz
	2	3
A/B	AL	M

Push knob B (MR/MS)	(K29-3004-05)
Push knob C (SCAN)	(K29-3005-05)
Push knob D (MHz)	(K29-3006-05)
Push knob E (M)	(K29-3007-05)
Push knob F (PRW)	(K29-3008-05)
Push knob G (A/B)	(K29-3009-05)

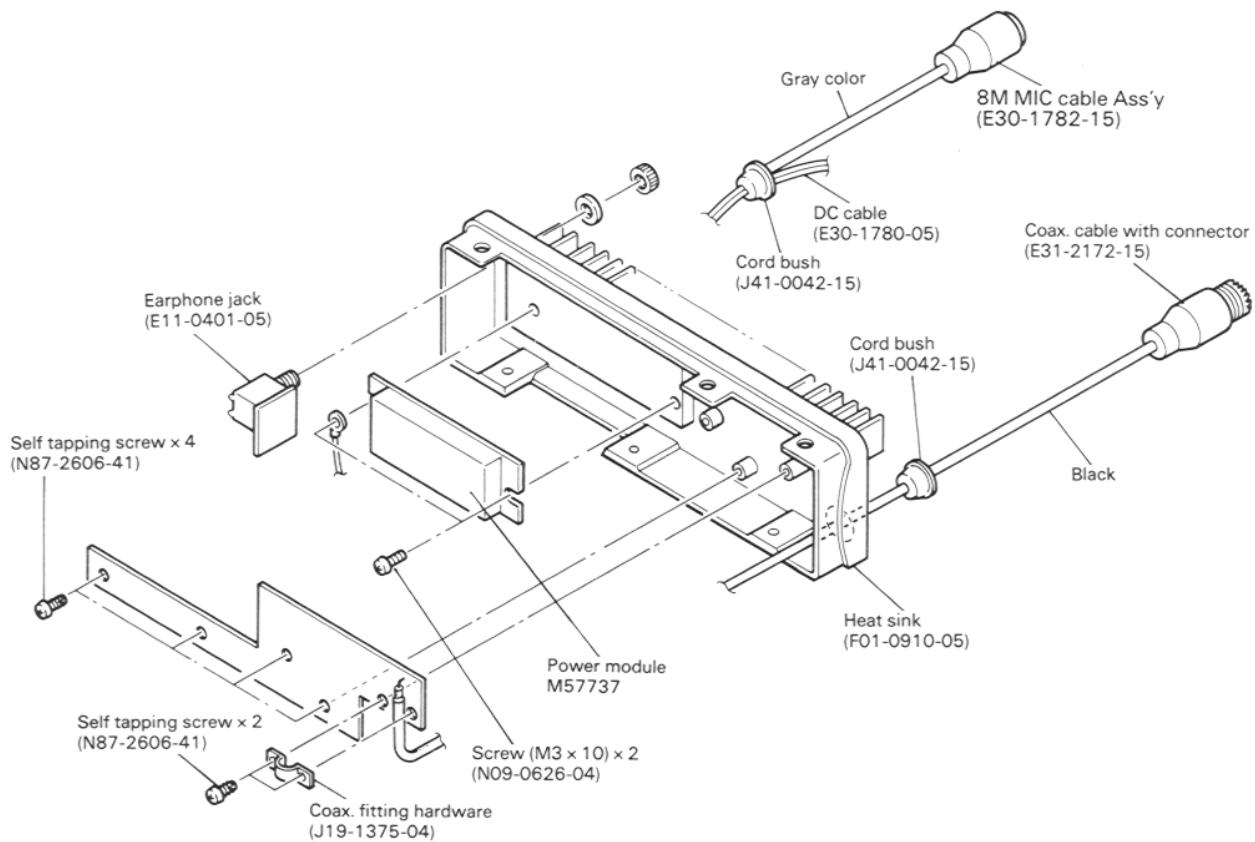
8

DCS     DSA     ACS    R

C SW guide x 3  
1129-0409-04)

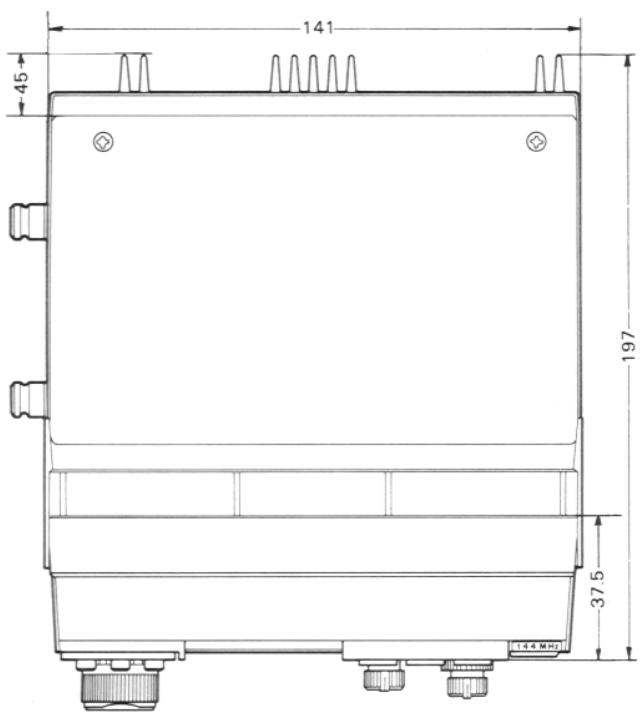
**C** SW guide x 3  
(J29-0409-04)  
**D** Coil spring x 6  
(G01-0818-04)  
**E** Flat screw x 2(3 x 4)  
(N32-3014-4-1)

## DISASSEMBLY/DIMENSIONS

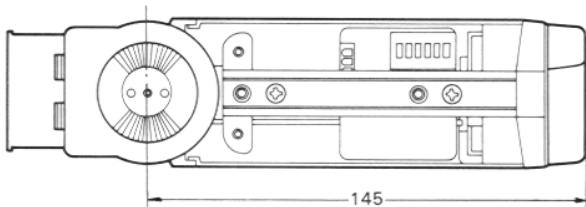


**DIMENSION (: mm)**

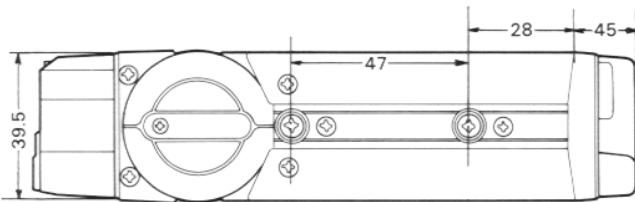
View from top



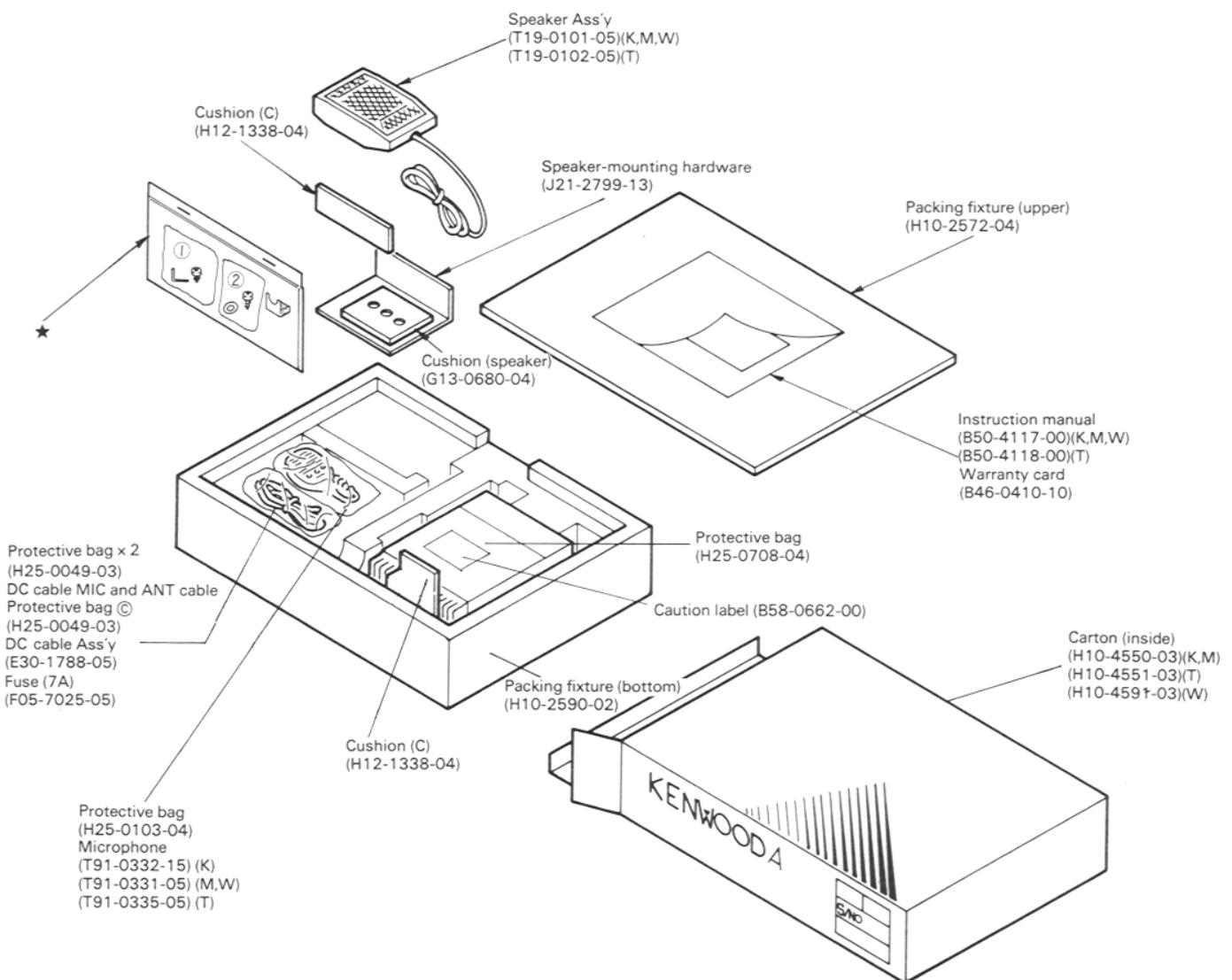
Right side view



Left side view



## PACKING



★

Protective bag D  
(H25-0116-04)  
Cable fitting hardware (J19-1402-04)  
① Protective bag ④  
Hex. head nut (N10-2040-41)  
Screw (4 x 10) x 2 (N10-2040-41)  
Self tapping screw (4 x 8) x 4 (N87-4008-41)  
Flat tapping screw (4 x 8) x 2 (N88-4008-41)

② Protective bag ⑧ (H25-0029-04)  
Screw (mounting bracket) x 4 (N09-0632-05)  
Self tapping screw (mounting bracket) x 4 (N09-0632-05)  
Flange nut C (mounting bracket) x 4 (N14-0510-04)  
Flat washer C (mounting bracket) x 4 (N15-1050-46)  
Flat washer C (mounting bracket) x 4 (N15-1060-46)  
Spring washer (mounting bracket) x 4 (N16-0060-46)  
Bind tapping screw (cable fitting hardware) x 2 (N89-2606-45)

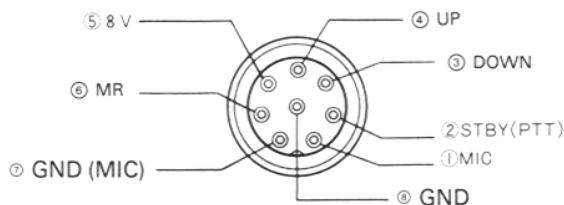
## ADJUSTMENT

## PREPARATION

Unless otherwise specified.  
Set the control as follows.

POWER SW .....	ON
VOL (AFGAIN) .....	MIN
SQL VOL .....	MIN
HI/LOW SW .....	HI
COM SW .....	OFF
REV .....	OFF
OFF SET .....	S

- When adjusting the trimmer or coils, use a non-induced adjusting rod of bakelite, etc.
- When adjusting the RX Section never transmit to prevent SSG damage.
- The output level of SSG is indicated as SSG "S" open circuit.
- Connect MIC connector as shown in bellow.

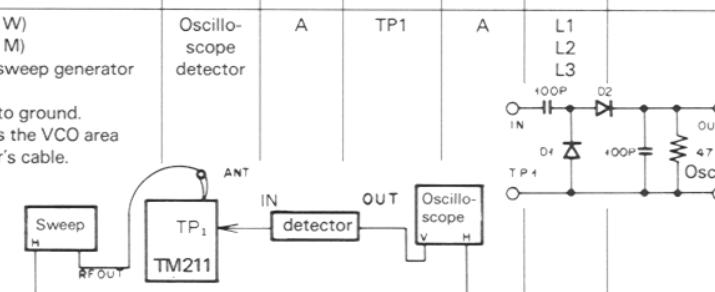
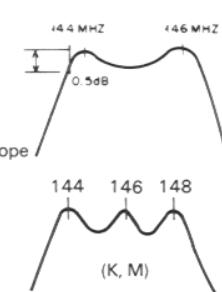


MIC terminal (view from 8P MIC cable)

## RX ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Reset	Reset switch S1 push on (B unit)	DISPLAY					Check	5.000A (T, W) 6.000A (K, M) Tone sounds
2. Voltage check.	1) DC POWER SUPPLY: 13.8V POWER SW: ON (Receive)		A	8C		Connector No. 5 (1 pin)	7.7V ~ 8.3V	
				8R		JP-2 Jumper lead*	7.6 ~ 8.2V	
				8T		Connector No. 5 (2 pin)*	0.1V or less	
				6C		IC2 (1 pin)	5.75 ~ 6.2V	
			B	5L		Connector No. 4 (4 pin)	5.75 ~ 6.25V	
				5C		Connector No. 4 (7 pin)	5.0 ~ 5.6V	
				8T		*	7.6 ~ 8.2V	
				8R		*	0.1V or less	
	3) Push MR SW 1 second more.	DISPLAY					Check	Decimal point is flashed.
3. PLL	1) PLL IF level Frequency: 5.000 (T, W) 6.000 (K, M) Adjust when PLL locked condition, please adjust to TC1, TC3 when PLL unlocked.	Oscillo scope (100 MHz or more) with 10 : 1 probe	A	TP4 (R85) near Q20	A	L21 L22	a) Adjust level to max. when RX.	
					L21	b) Adjust level to max. when TX.		
					L21 L22	c) Repeat adjust (a) and (b) 2 or 3 times then, adjust same level by L21. 3V p-p or more (T, W)		
					TC1	a) When RX 6.5V ± 0.1V (T, W) 2.7V ± 0.1V (K, M)		
					TC3	b) When TX 6.5V ± 0.1V (T, W) 2.7V ± 0.1V (K, M)		
		 Freq. 5.980 (T, W) 2.000 (K, M)	A	DC volt meter	A	TP3 (R52)	Check	5.0 ~ 5.7V (T, W) 5.5 ~ 6.5V (K, M) (RX & TX)
	3) RX VCO output Freq. 5.000 (T, W) 6.000 (K, M)	RFVM	A	TP2 (R9)	A	TC2	When RX MAX	more than 0.75V (r.m.s)
							TP4 shorted to ground when RX	TP2's level should be down.

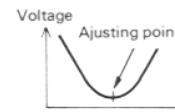
## ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
4) Freq. adjustment Freq. 5.000 (T, W) 6.000 (K, M)	Freq. counter	A	TP2	A	TC6	a) When RX 134.3050 MHz ± 100 Hz (T, W) 135.3050 MHz ± 100 Hz (K, M)		
			DI	A	TC5	b) When TX 145.0000 MHz ± 100 Hz (T, W) 146.0000 MHz ± 100 Hz (K, M)		
3) Return to RX								
4. Herical	1) Freq. 5.00 (T, W) 6.00 (K, M) 2) Connect the sweep generator to ANT. 3) TP4 shorted to ground. 4) Do not across the VCO area from detector's cable.	Oscillo-scope detector	A	TP1	A	L1 L2 L3 +100P D1 D2 +100P 47K Oscilloscope		
5. IF gain	1) Freq. 5.050 (T, W) 6.050 (K, M) 2) Connect the SSG to ANT. MOD : 1 kHz DEV : 5 kHz OUT : 10 dB $\mu$ } SSG conditions	SSG AFVM 8 Ω Oscillo-scope	Final	SP	A	TC2 L4 L6 L8	MAX.	Repeat 2 ~ 3 times
6. Discriminator	1) Freq. 5.050 (T, W) 6.050 (K, M) 2) SSG MOD : 1 kHz DEV. : 5 kHz OUT : 60 dB $\mu$	SSG AFVM 8 Ω Oscillo-scope	Final	SP	A	L9	MAX.	
7. Sensitivity	SSG OUT : -9 dB $\mu$	SSG AFVM 8 Ω Oscillo-scope	Final	SP	A	L6	MAX. (Signal to noise ratio)	S/N: 21 dB or more
8. S-meter	1) Freq. 5.050 (T, M) 6.050 (K, M) SSG OUT : 20 dB $\mu$ 2) SSG OUT : 5 dB $\mu$	S-LED	LED		A	VR1	All LED's light S-1 LED's light (Check)	
9. S/N	Freq. 5.050 (T, W) 6.050 (K, M)	AFVM Oscillo-scope 8 Ω	Final	SP				S/N 20 dB or more

## TX ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. DRIVE	1) Disconnect D0 cable on B unit. 2) Connect 0.6W Power meter to D0 terminal on B unit.	Power meter (Max x 0.6W)	B	D0		To D0 terminal		
	3) VR1, VR3					VR1 VR3	{ Centered	
	4) VR2, VR4					VR2 VR4	Fullcounterclockwise position.	

## ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. POWER	5) Freq. 5,000 (T, W) 6,000 (K, M) Transmit	Power meter (MAXx0.6W)			A	TC4		MAX.
					B	TC1 TC2		
					A	TC4		0.6W power meter Reduce RF output by TC4
								 1) Max (TC1, TC2, TC4) then 2) Reduce RF output by TC4
	6) Freq. 4,000				B	TC2		0.6W power meter 0.02W down
	7) Freq. 5.995 (T, W) 8,000 (K, M)							0.25 ~ 0.5W 0.25 ~ 0.5W check.
2. POWER	1) Disconnect the .6W power meter from D0 terminal. then connect D0 cable. Freq. 5,000 (T, W) 6,000 (K, M)	Power meter						30W or more
	2) Power adj.				B	VR2	28W	28W ± 0.5W less than 5.3A
	3) Freq. 4,000							25 ~ 33W less than 5.6A
	4) Freq. 5.995 (T, W) 8,000 (K, M)							
3. LOW POWER	1) Freq. 5,000 (T, W) 6,000 (K, M)	Power meter			B	VR3	5W	5W ± 0.5W Less than 2.6A
	2) LOW SW : ON Transmit							
	3) Freq. 4,000							3 ~ 7.5W Less than 2.6A
	4) Freq. 5.995 (T, W) 8,000 (K, M)							
4. RF METER	1) LOW SW : ON (LOW POWER POSITION) 2) Freq. 5,000 (T, W) 6,000 (K, M)	RF power meter RF LED			B	VR1	Adjust VR1 for S-5	(S-7 LED's should off.)
5. PROTECTION	1) Freq. 5,000 (T, W) 6,000 (K, M) Transmit	DC voltmeter	Final	TP1	Final	VR1	a) Set full power output. b) Adjust VR1 (clockwise) for dip point.	
								
	2) Freq. 5,000 (T, W) 5,000 (K, M) LOW SW : OFF Shorted ANT Transmit	DC power supply with DC current meter			B	VR4	3.5A	3.5A ± 0.2A

## ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. DEV	1) VR5: counterclockwise 2) Connect the AG to MIC. AG: 1 kHz 28 mV (T, W) 52 mV (K, M) 3) Freq. 5.000 (T, W) 6.000 (K, M) Transmit	Linear detector  AG			B	VR6	{ DE-ENPHASIS : OFF } FILTER : OFF 4.5 kHz	4.5 kHz ± 100 Hz
	4) MIC GAIN AG : 1 kHz 2.8 mV (T, W)						3 kHz	3 kHz ± 100 Hz
7. TONE	1) Freq. 5.000 (T, W) 6.000 (K, M)	Linear detector  Freq. counter	Connect the freq. to output of linear detector		VR1	1750 Hz	Freq. 1750 Hz DEV: 2.5 kHz or more	
	2) "T type" a) Install TONE unit b) R86 shorted to ground on B unit. c) Shorted between R2 and R7 on TONE unit. d) TONE SW : ON e) Transmit (Return to RX when adjust TONE freq.)							
	3) "W" type a) Install TONE unit b) TONE SW : push							
	4) "K, M" type a) Install TU-3A b) OFF SET SW :- c) Transmit	Linear detector			VR1	0.65 kHz	0.65 kHz ± 0.1 kHz	

# TM-211A/E

## OPERATIONAL CHECKS

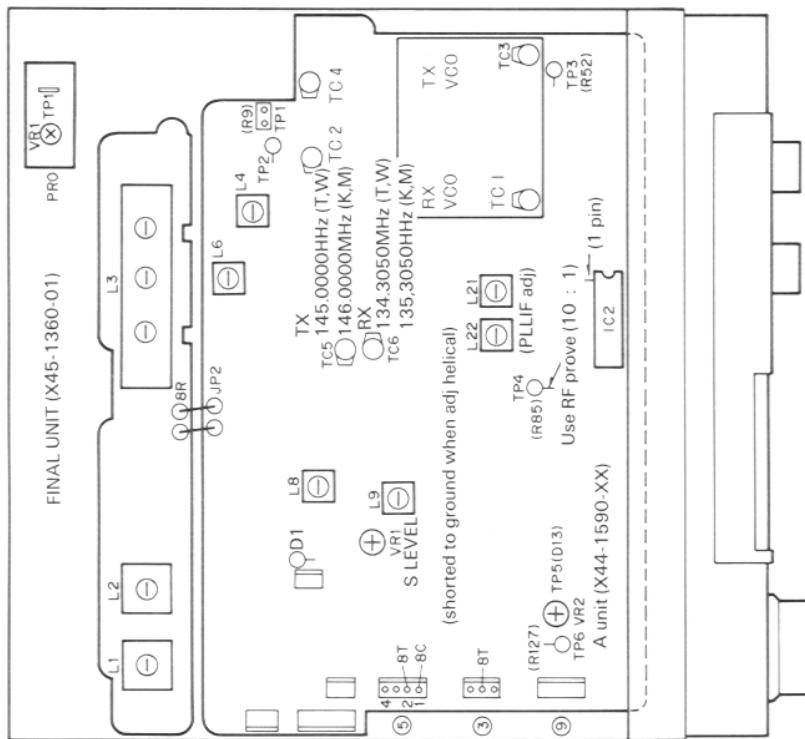
Item	Condition	Check of movement									
1. Reset	1) Reset SW S1 : ON AF GAIN VOL : Centered SQ VOL : MIN.	Tone sounds 5.000A displayed (T, W) 6.000A displayed (K, M)									
2. Main dial	1) Main dial : turn to clockwise	Display increases by 5 kHz (K, M) Display increases by 25 kHz (T, W)									
	2) Main dial : turn to counterclockwise	Display decreases by 5 kHz (K, M) Display decreases by 25 kHz (T, W)									
3. VFO A/B	1) A/B : push on	Tone sounds 4.000 b displayed (T, W), (K, M)									
	2) Main dial : turn to clockwise and counterclockwise	Display increase and decrease by 5 kHz (T, W), (K, M)									
	3) A/B : push on again	Tone sounds 5.000A displayed (T, W) 6.000A displayed (K, M)									
4. COM SW (K, M only)	1) COM SW : ON	Tone sounds 6.000C displayed (K, M only)									
	2) COM SW : OFF	Tone sounds 5.000A displayed									
5. Memory write	1) M knob is depressed make a continuous beep sound. MR/MS SCAN MHz <table border="1"><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>A/B</td><td>PRW</td><td>M</td></tr><tr><td></td><td>5</td><td>4</td></tr></table> 1 ~ 3 knob is depressed during beep sounds.	1	2	3	A/B	PRW	M		5	4	Tone sounds Memory wrote already. <ex> 5.000 CH1 Memory write 5.100 CH2 Memory write 5.200 CH3 Memory write
1	2	3									
A/B	PRW	M									
	5	4									
6. Memory check	1) MR/MS : ON <table border="1"><tr><td>1</td></tr></table>	1	Tone sounds 5.000 1 displayed								
1											
2) SCAN : ON <table border="1"><tr><td>2</td></tr></table>	2	Tone sounds 5.100 2 displayed									
2											
3) MHz : ON <table border="1"><tr><td>3</td></tr></table>	3	Tone sounds 5.200 3 displayed									
3											
7. SCAN	1) Connect the SSG to ANT connector f = 145.300 MHz MOD: 1 kHz DEV: 5 kHz SCAN : ON <table border="1"><tr><td>2</td></tr></table> SQ:  MAX.	2	Tone sounds MHz dot is flashed Scan will start increase by 25 kHz (T, W) and 5 kHz (K, M). Then scan stopped (freq. 5.300)								
2											
2) SQ: 	After about 6 seconds, scan will start again.										
3) MIC PTT: 1 push	Scan operation stopped										
8. OFFSET	1) Turn to main dial then set freq 5.100A	5.100A displayed									
	2) OFFSET SW: (-) (+) Transmitt	ON AIR LED's light. 4.500A displayed OFFSET (-) 5.700A displayed OFFSET (+)									
	3) REV SW: ON	5.100A displayed									
	4) Return to RX OFFSET SW: (S)										
9. MHz	1) MHz : ON <table border="1"><tr><td>3</td></tr></table>	3	Tone sounds MHz digit increases by 1 MHz ex. 4.100 → 5.100								
3											
10. Memory scan	1) MR/MS : depressed over <table border="1"><tr><td>1</td></tr></table> 1 second	1	1) Decimal point is flashed memory scan will start between ex. M1 → M2 → M3 → M1 5.000 → 5.100 → 5.200 → 5.000								
1											
11. PR.W (Priority-watch)	1) PRW : ON <table border="1"><tr><td>4</td></tr></table> SQ VOL:  MIN	4	Tones sounds PRW LED's light. Busy LED's light. After 6 seconds, 5.100 displayed. (2 seconds hold)								
4											
2) PRW : ON again <table border="1"><tr><td>4</td></tr></table>	4	PRW LED's OFF.									
4											

## DCS FUNCTION OPERATIONAL CHECKS

Item	Condition	Check of movement											
1. Digital cord setting (Digital cord will program 5.)	1) Freq. 5.000 LOW SW: ON <table border="1"><tr><td>CS</td></tr></table> (Front panel): ON (push)	CS	Tone sounds 00000 displayed <table border="1"><tr><td>CS</td></tr></table> LED's light	CS									
CS													
CS													
	2) Digital cord setting <table border="1"><tr><td>1</td><td>2</td><td>3</td></tr><tr><td></td><td>5</td><td>4</td></tr></table> If push 1 ~ 5 knob, display will change numbers (0 ~ 9).	1	2	3		5	4	ex. Incase of digital cord <table border="1"><tr><td>1</td></tr></table> ..... push 1 time <table border="1"><tr><td>2</td></tr></table> ..... push 2 time <table border="1"><tr><td>3</td></tr></table> ..... push 3 time <table border="1"><tr><td>4</td></tr></table> ..... push 4 time <table border="1"><tr><td>5</td></tr></table> ..... push 5 time Also, tone sounds if push each times.	1	2	3	4	5
1	2	3											
	5	4											
1													
2													
3													
4													
5													
	3) Another digital cord setting <table border="1"><tr><td>OC.SQ</td></tr></table> : ON	OC.SQ	Tone sounds 00000 displayed again Then repeat item (2) again. 5 kind of digital cord wrote already										
OC.SQ													
2. Call sign setting	1) Freq. 5.000 <table border="1"><tr><td>CS</td></tr></table> : ON	CS	Tone sounds 12345 displayed										
CS													
	2) <table border="1"><tr><td>R</td></tr></table> : ON	R	Tone sounds 1 00 displayed 1st digit 3rd digit 4th digit then, set a number of ASCII cord (call sign) (See a service manual page 9)										
R													
	3) <table border="1"><tr><td>C.SQ</td></tr></table> : ON	C.SQ	Tone sounds 200 displayed Call sign will make a 6 digit.										
C.SQ													
	4) <table border="1"><tr><td>R</td></tr></table> : ON	R	Tone sounds 5.000 displayed										
R													
3. Digital card Squelch operation	1) Freq. 4.900 <table border="1"><tr><td>DCS</td></tr></table> : ON AF GAIN VR: Centered *Also monitor radio's condition Freq. 4.9000 <table border="1"><tr><td>DCS</td></tr></table> : ON	DCS	DCS	Tone sounds <table border="1"><tr><td>DCS</td></tr></table> LED's light Noise heard from speaker.	DCS								
DCS													
DCS													
DCS													
	2) <table border="1"><tr><td>DSQ</td></tr></table> : ON	DSQ	Tone sounds Noise stopped.										
DSQ													
	3) <Monitor radio condition> MIC PTT: 1 push	<table border="1"><tr><td>DSQ</td></tr></table> LED's OFF Noise heard from speaker. C. AL LED's light.	DSQ										
DSQ													
	4) <table border="1"><tr><td>R</td></tr></table> : ON	R	Tone sounds <table border="1"><tr><td>CALL</td></tr></table> LED's OFF	CALL									
R													
CALL													
	5) <table border="1"><tr><td>DSQ</td></tr></table> : ON <table border="1"><tr><td>R</td></tr></table> : ON	DSQ	R	Tone sounds <table border="1"><tr><td>DSQ</td></tr></table> LED's light. <table border="1"><tr><td>R</td></tr></table> LED's light Noise stopped	DSQ	R							
DSQ													
R													
DSQ													
R													
	6) <Monitor radio condition> MIC PTT: 1 push	Tone sounds <table border="1"><tr><td>DSQ</td></tr></table> LED's OFF. <table border="1"><tr><td>CALL</td></tr></table> LED's light Noise heard from speaker and piping sound (continuous sounds)	DSQ	CALL									
DSQ													
CALL													
	7) <table border="1"><tr><td>R</td></tr></table> : ON	R	Tone sounds piping sound stopped. <table border="1"><tr><td>CALL</td></tr></table> LED's OFF	CALL									
R													
CALL													
	8) <Monitor radio condition> <table border="1"><tr><td>D.SQ</td></tr></table> : ON	D.SQ	<Monitor radio condition> <table border="1"><tr><td>D.SQ</td></tr></table> LED's light	D.SQ									
D.SQ													
D.SQ													
	9) MIC PTT: 1 push	<Monitor radio condition> <table border="1"><tr><td>D.SQ</td></tr></table> LED's OFF Noise heard from speaker	D.SQ										
D.SQ													

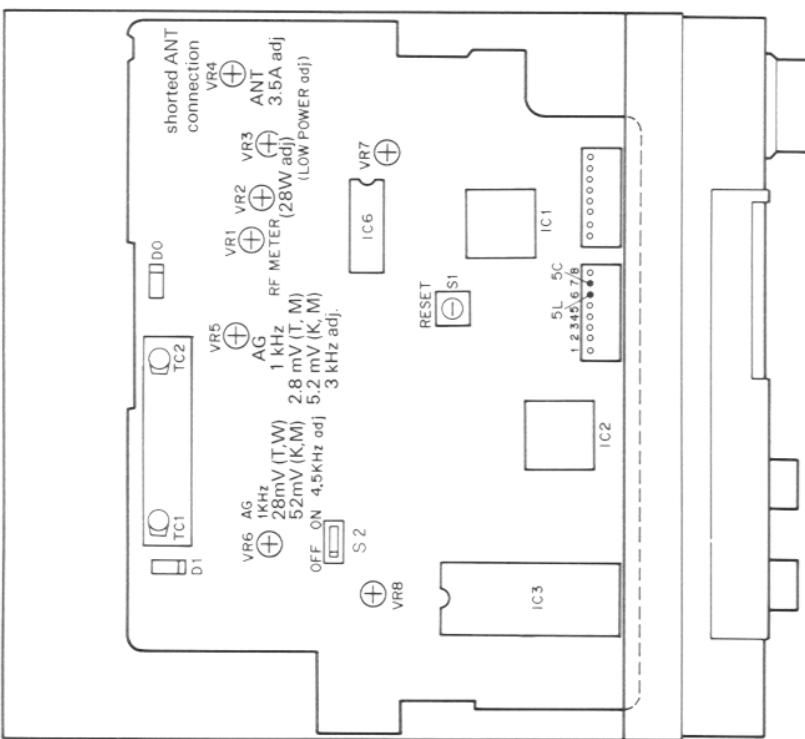
TOP VIEW

A UNIT (view from top case side)



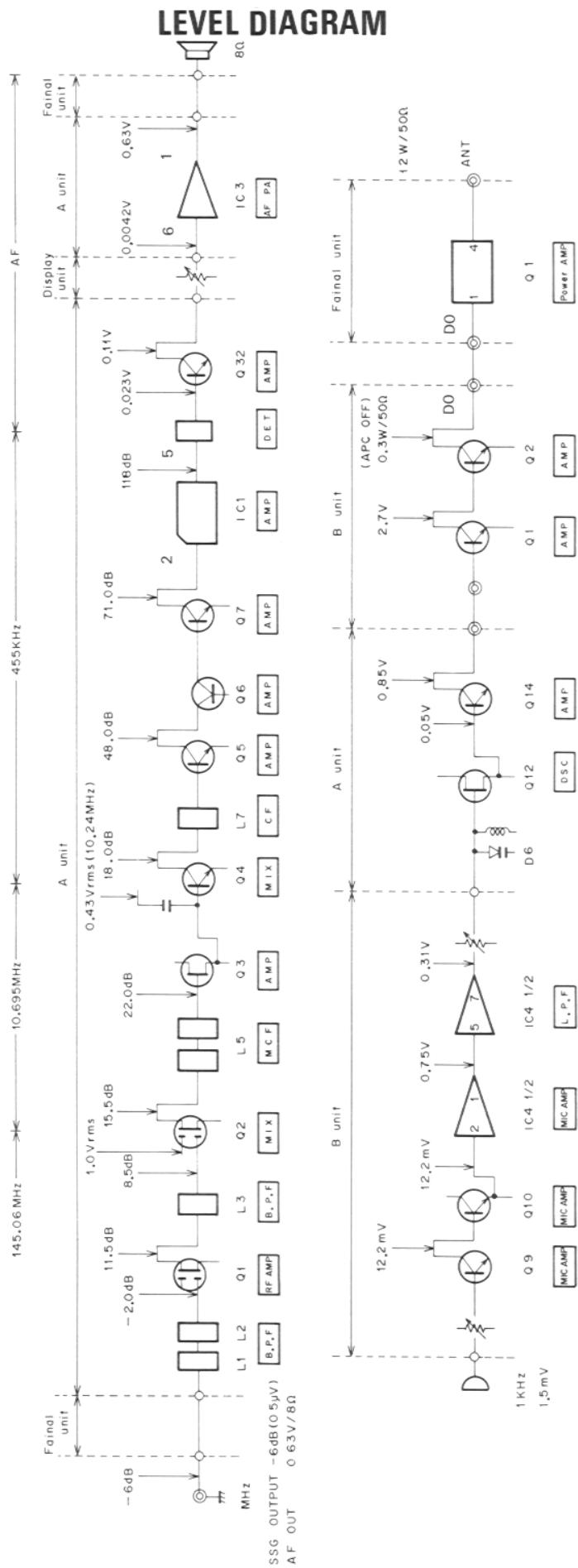
### BOTTOM VIEW

B UNIT (view from bottom case side)



Note:

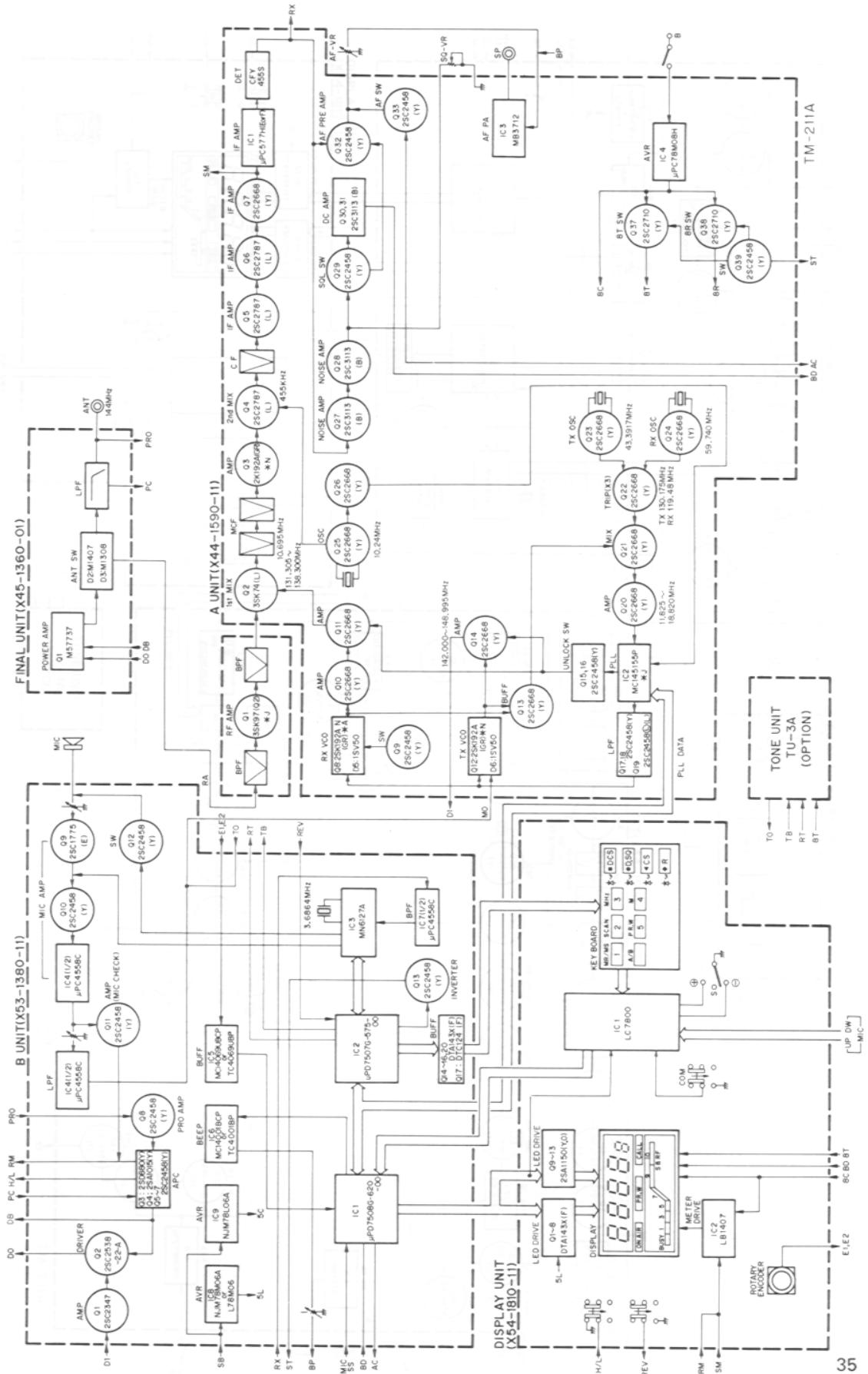
1. In measuring the circuit from the ANT terminal to the spin of IC1 an unmodulated signal of 145.06 MHz, -6 dB $\mu$  from an SSG was applied to the ANT terminal to obtain a reference NO sensitivity. Then, the SSG output was measured when the NO sensitivity at each SSG signal input point became equal to the reference NO sensitivity. The SSG output was measured through a 0.01 $\mu$ F capacitor.
2. In measuring the circuit from the base of Q32 to the SP terminal, an SSG signal of 145.06 MHz, -6 dB $\mu$ , 1 kHz MOD, 5 kHz DEV was applied to the ANT terminal and the AF VR was adjusted to obtain an AF output of 0.63V/8 $\Omega$ . The signal voltage at each point was measured with an audio V.V.



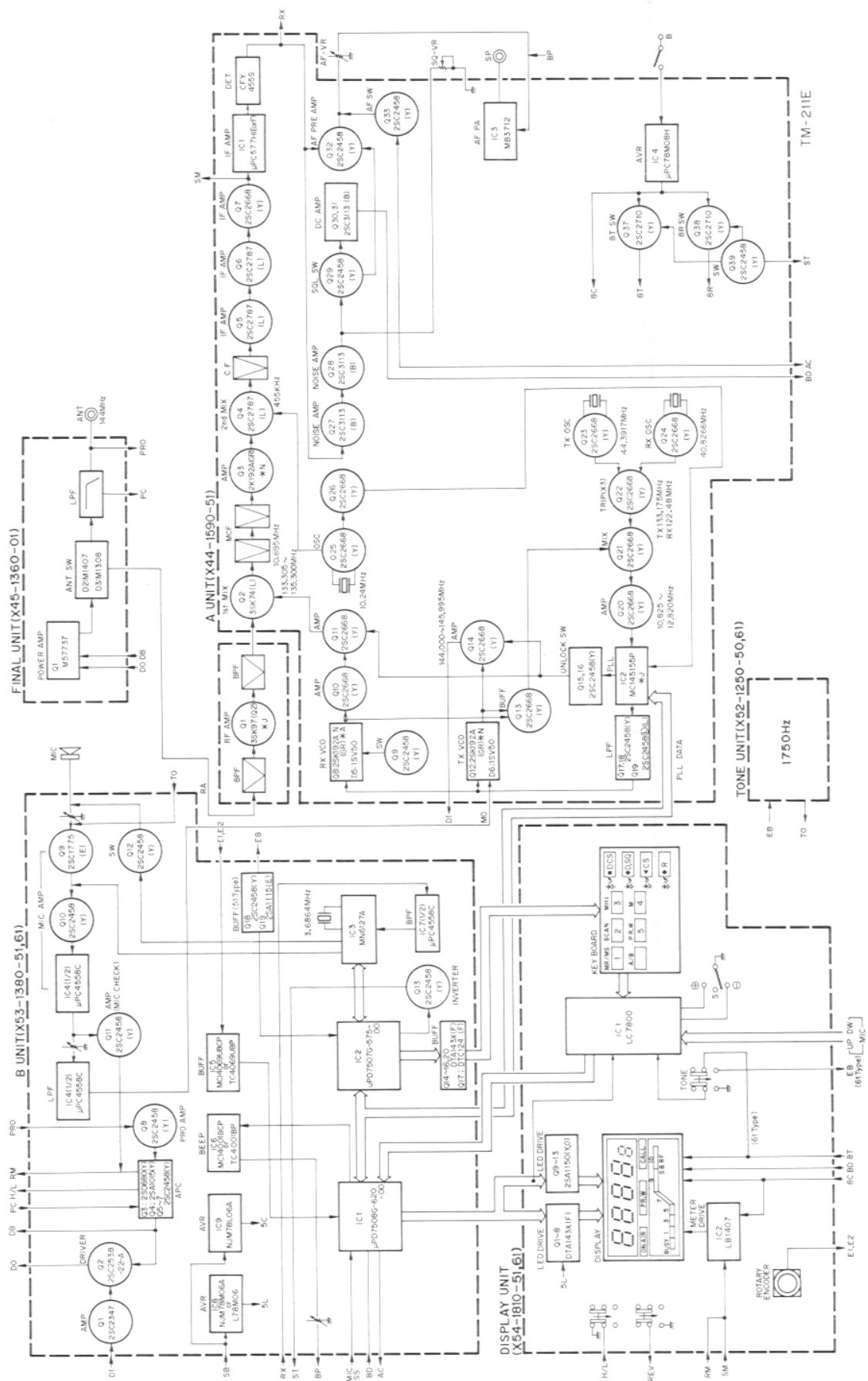
Note:

1. The signal level before DO was measured with the coaxial cable disconnected from DO and the final unit. The signal level after the DO terminal was the level under normal operating conditions.
  2. The B unit ( $Q_9 \sim Q_{14}$ ) was measured using audio V.V. and A unit ( $Q_{12} \sim Q_{14}$ ), B unit ( $Q_1 \sim Q_2$ ) was measured using an RF V.V. (1/100 attenuator used for levels of more than 3V).

## BLOCK DIAGRAM (K Type)



## BLOCK DIAGRAM (T Type)



A

B

C

D

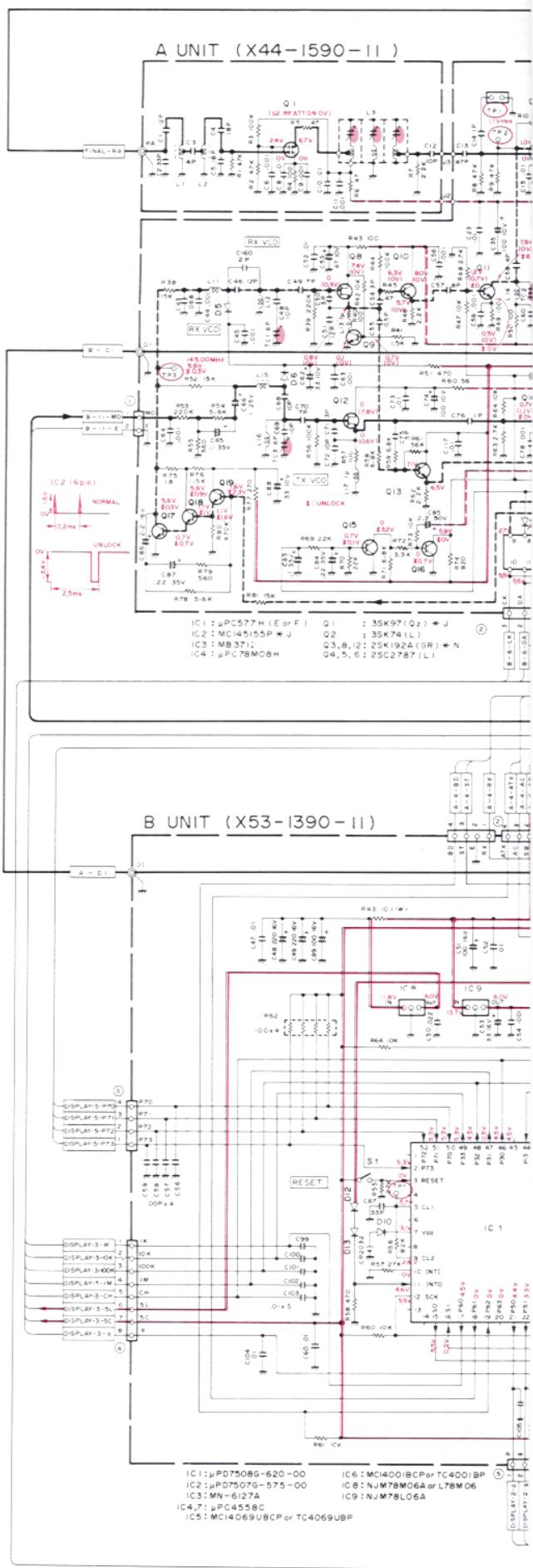
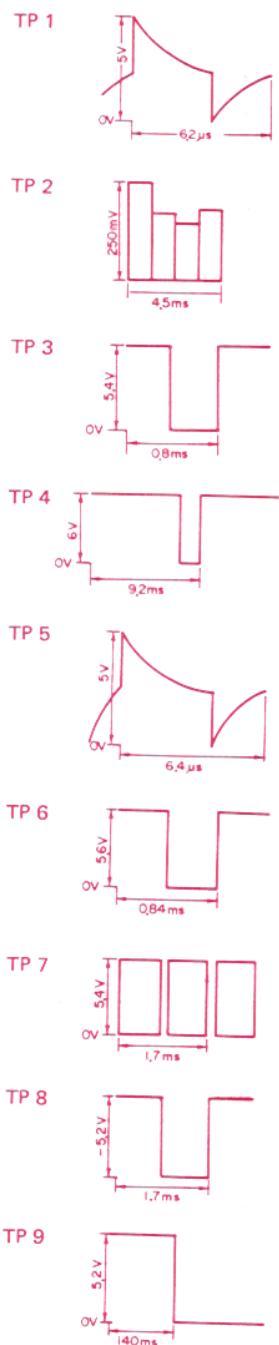
8

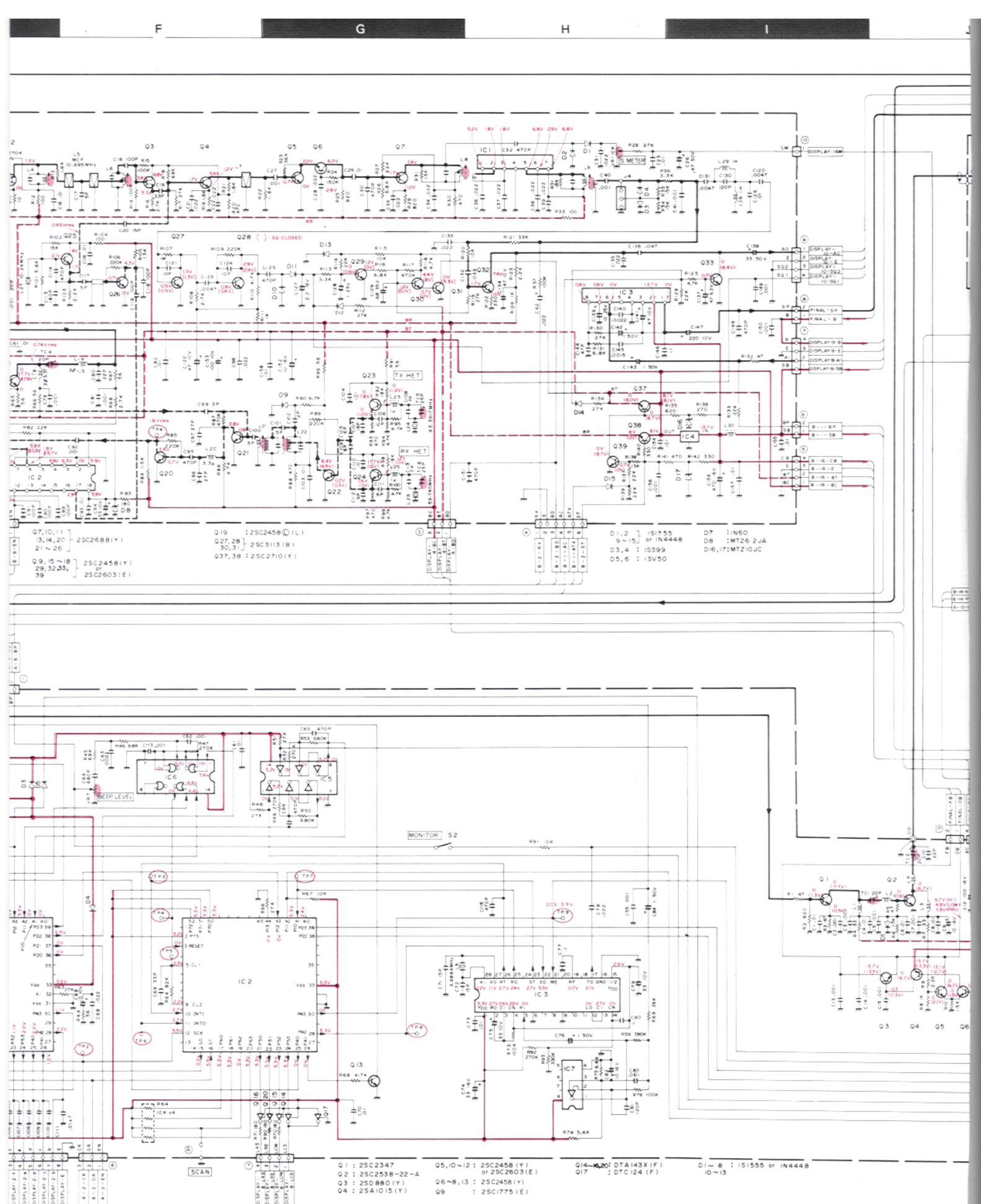
## Signal Line

----- Control Line

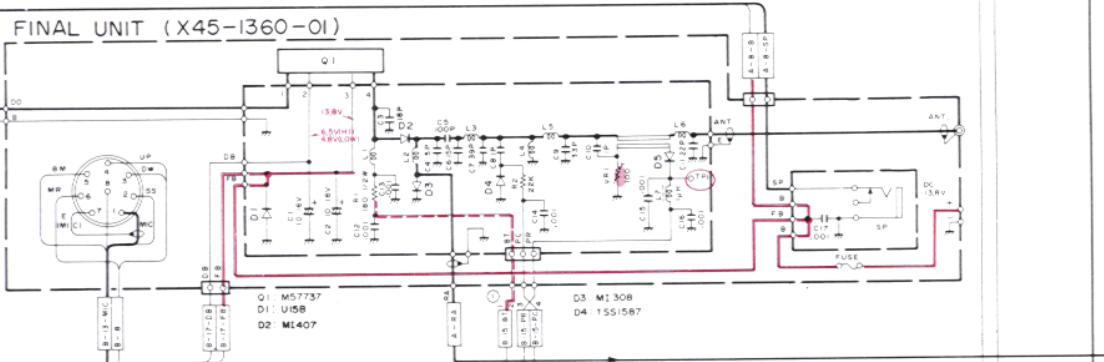
— Common DC Line

- The voltages measured when receiving  
145 MHz  
( ): in TX

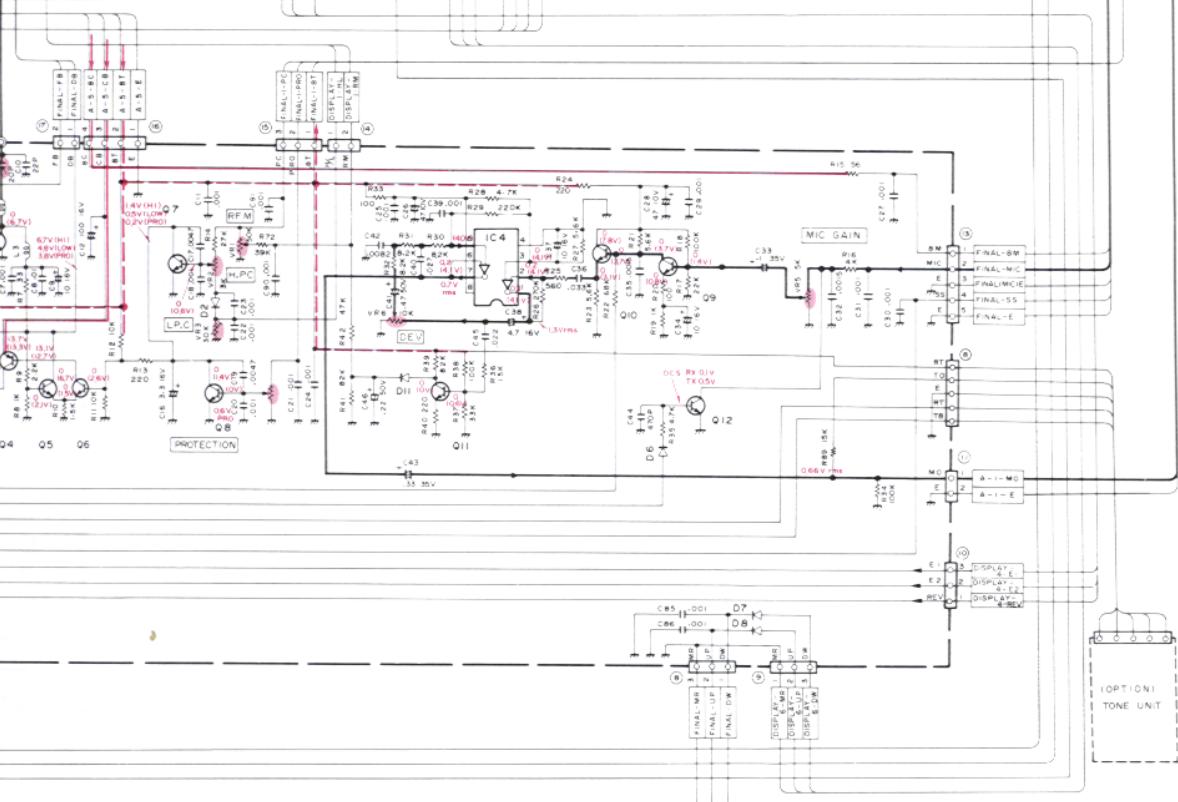
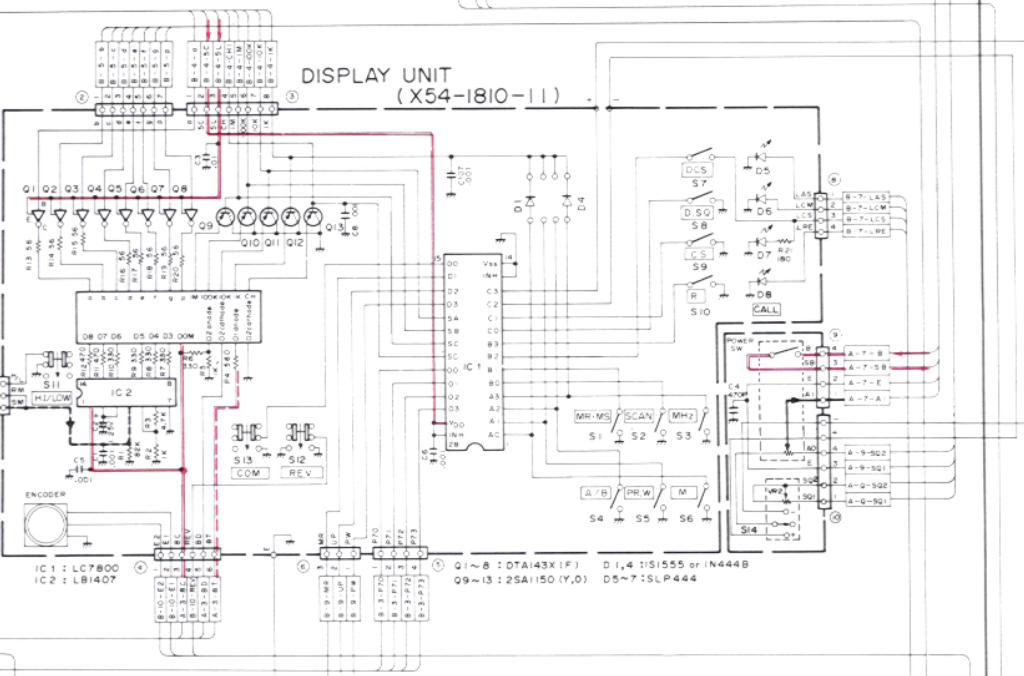




## FINAL UNIT (X45-1360-01)



## DISPLAY UNIT (X54-1810-11)

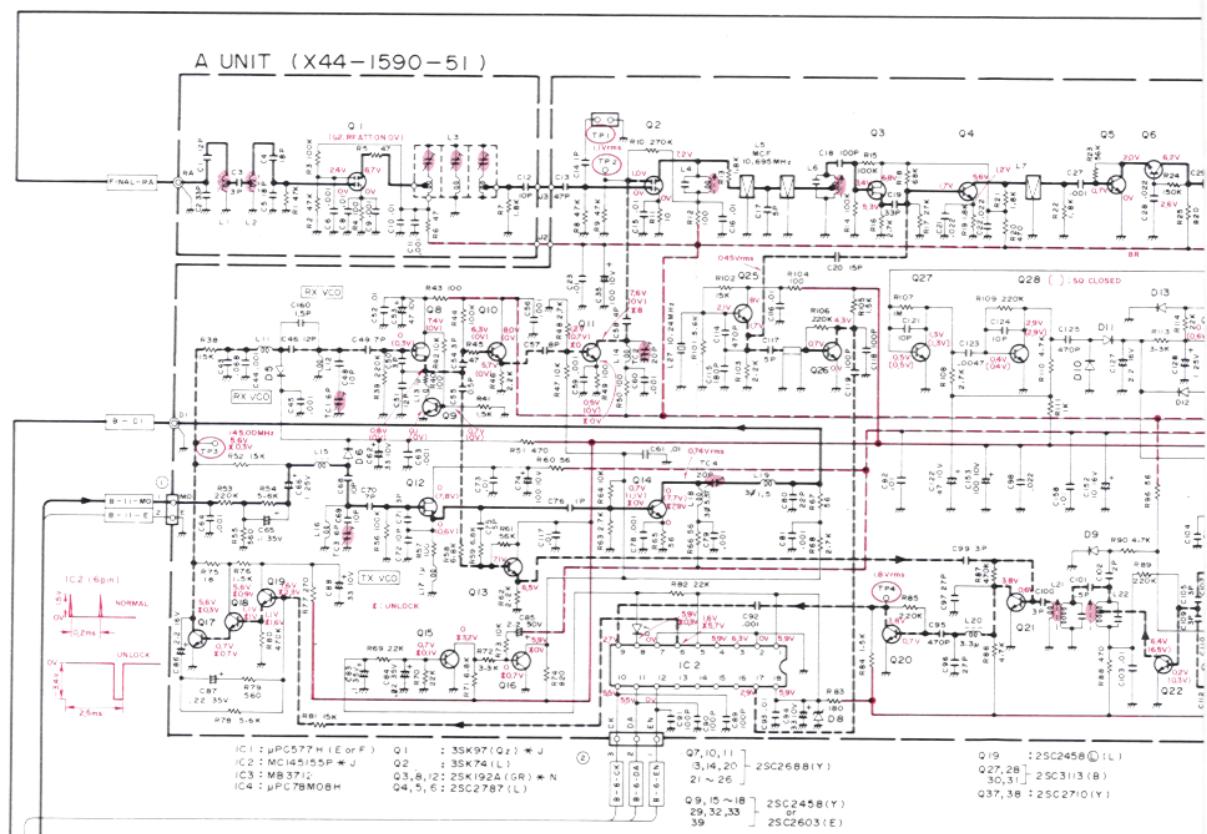


TM-211A(K,M)

# TM-211A/E

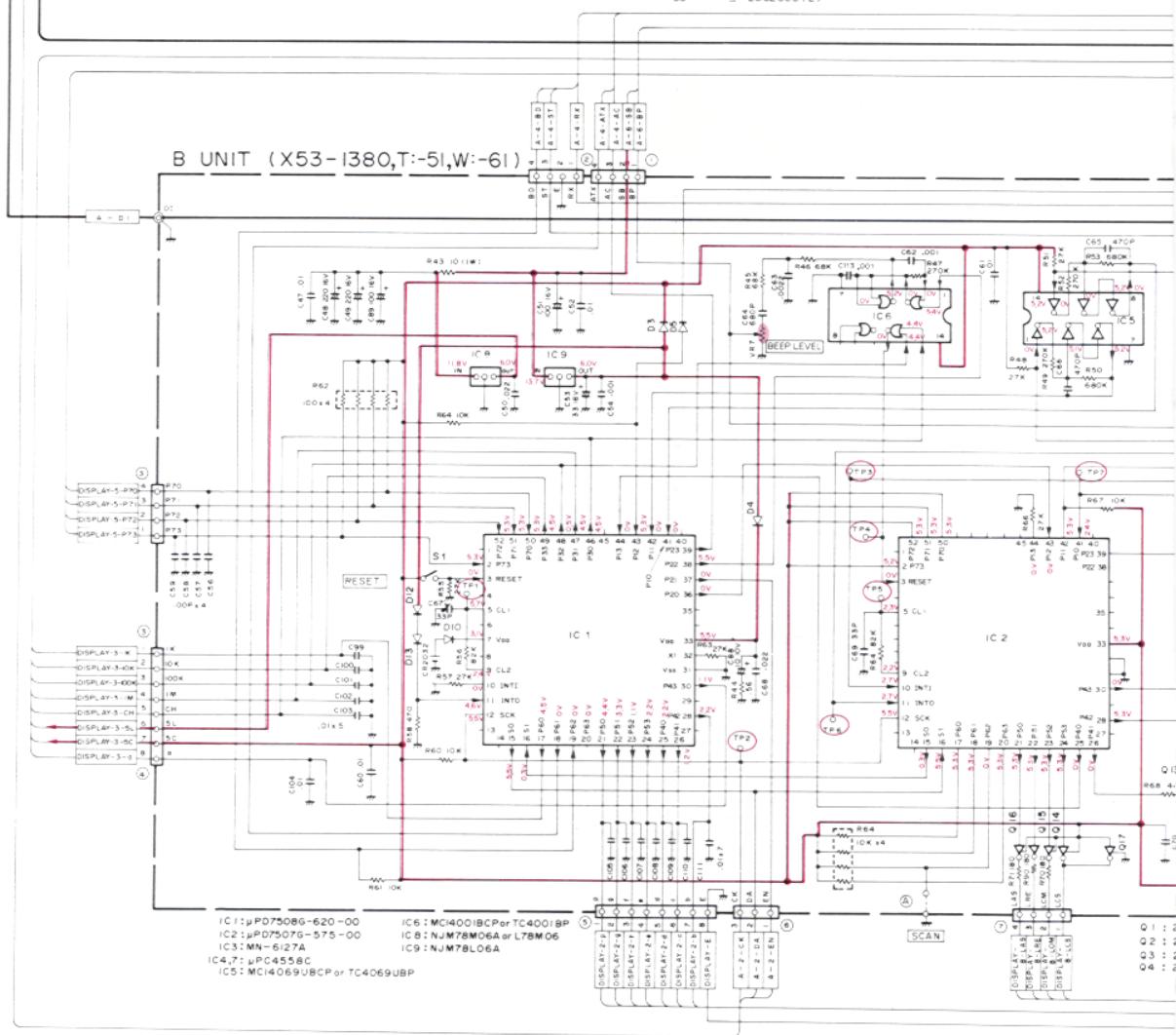
A

## A UNIT (X44-1590-51)



C

## B UNIT (X53-1380,T:-51,W:-61)



D

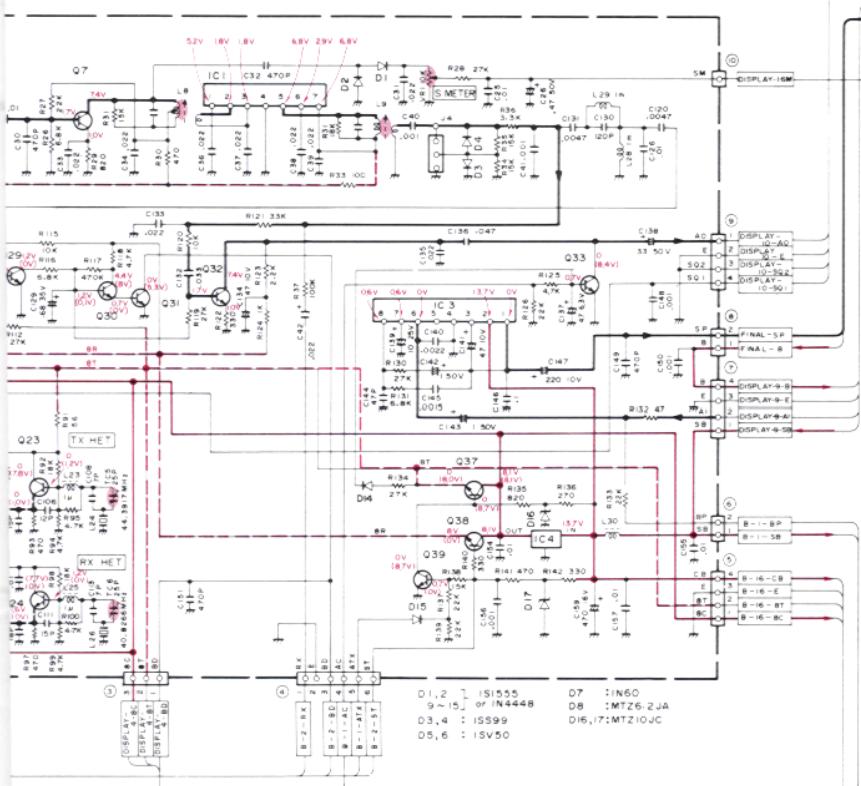
E

F

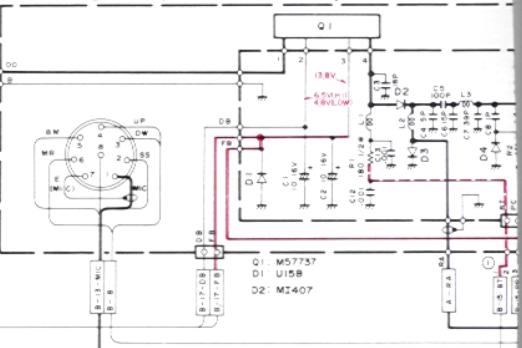
G

H

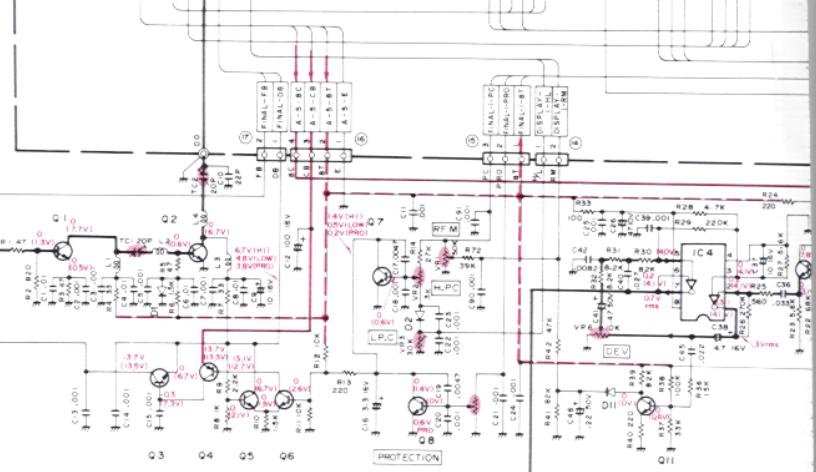
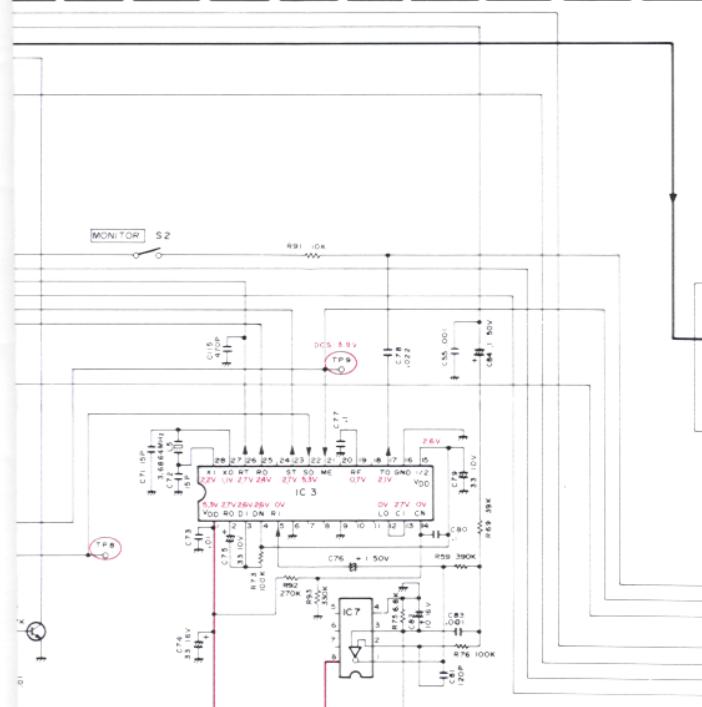
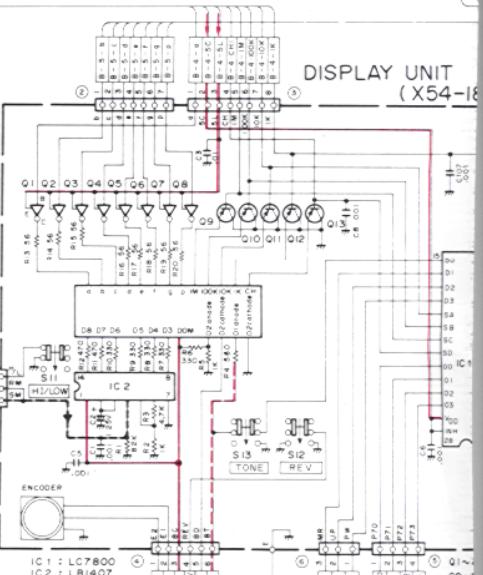
I



## FINAL UNIT (X45-1360-01)

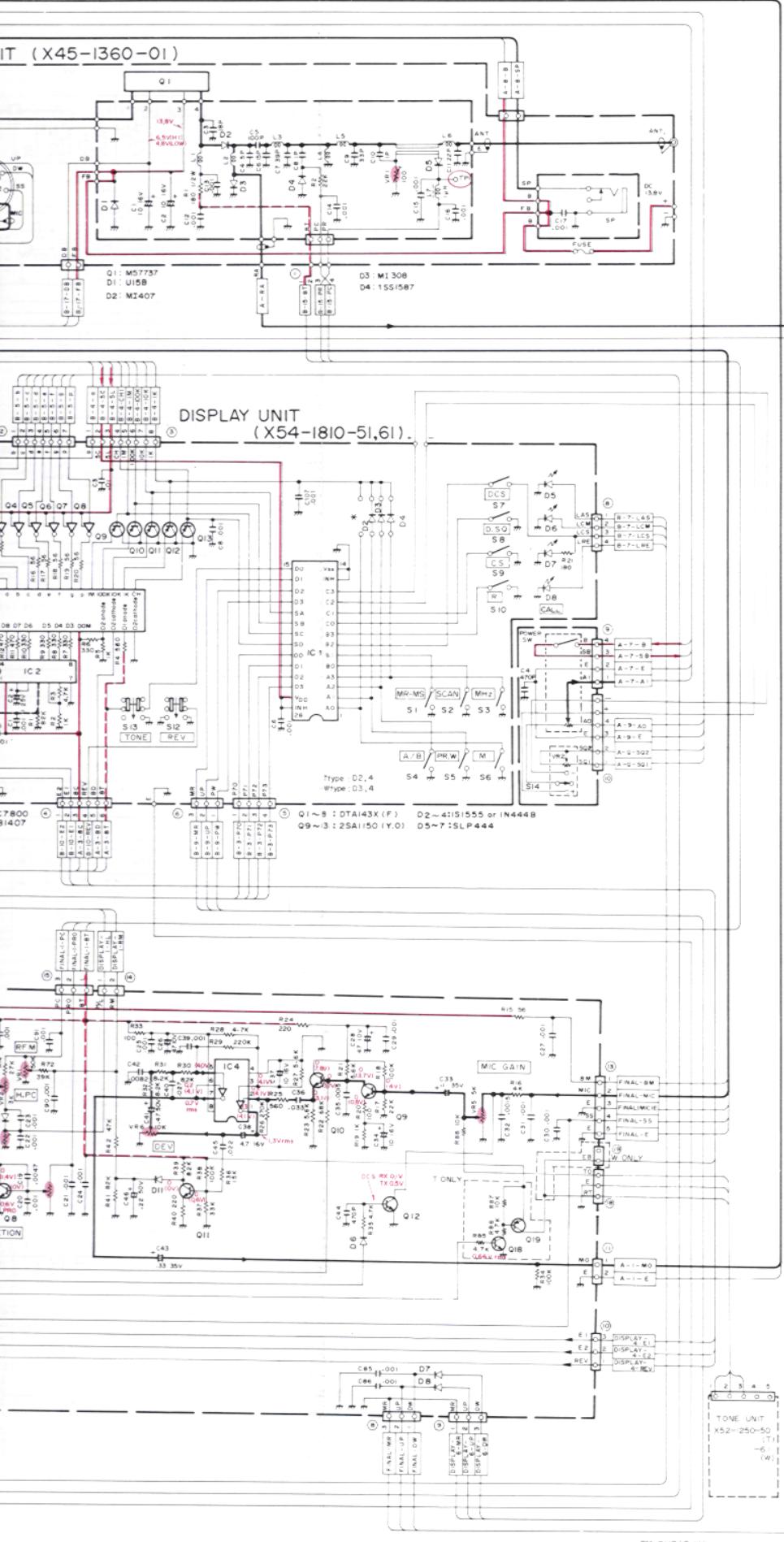


## DISPLAY UNIT (X54-16)



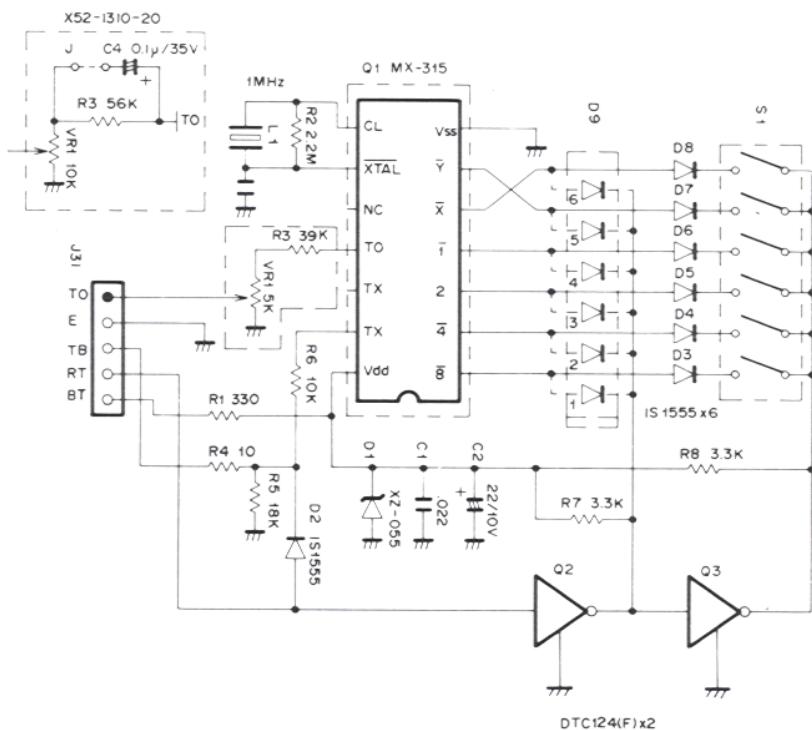
SC2347	Q5, IO~12 : 2SC2458 (Y) or 2SC2603 (E)
SC2538-22-A	18 : DTA143X (F) Q6~8, 13 : 2SC2458 (Y)
SD880 (Y)	Q17 : DTC124 (F)
SA1015 (Y)	Q19 : 2SA1115 (E)
Q9 : 2SC1775 (E)	

D1 ~ 8 : 1S1555 or IN4448  
10 ~ 13

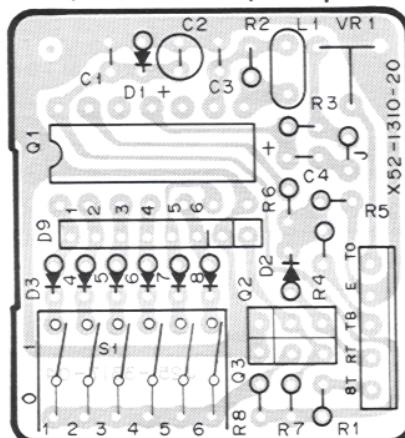


TM-211E (T,W)

## **OPTION TU-3A**



▼ TONE UNIT (X52-1310-20) Component side view



Q1 MX-315  
Q2,3 DTC124(F)  
D1: MTZ 5.6JB  
D2 8: 1S1555 or 1N4448  
L1 L77-0982-05  
S1 S31-6401-05

Destination	Frame A
011	Q1: Not provided IC socket: provided
021	Q1: provided
020	IC socket: Not provided

EIA Specification Group 1 denotes that the diode must be cut.

## Tone Frequency Table

## SPECIFICATIONS

## [General]

Frequency range .....	144.000 to 147.995 MHz (TM-211A) 144.000 to 145.995 MHz (TM-211E)
Mode .....	FM F3, F2 (Control signal for DCS system)
Antenna impedance .....	50 ohms
Power requirement .....	13.8V DC ± 15%
Grounding .....	Negative
Operating temperature .....	-20°C to +60°C (-4°F to +140°F)
External speaker impedance .....	8 ohms
Current drain .....	0.5 A in receive mode with no input signal Max. 5.6 A in HI transmit mode 2.5 A in LOW transmit mode (Approx.)
Dimensions .....	140 mm wide 40 mm high 197 mm deep (projections not included)
Weight.....	1.25 kg (2.75 lbs)

## [Transmitter]

RF output power (at 13.8V DC, 50Ω load) .....	HI 25 Watts min. Low 5 Watts approx. (adjustable up to about 15 W)
Modulation.....	TX duty cycle: 1 minute ON 3 minutes OFF
Frequency tolerance (-10°C ~ +60°C) .....	RX duty cycle: Continuous (100%)
Spurious radiation.....	Reactance
Maximum frequency deviation (FM).....	Less than ± 15 × 10 <sup>-6</sup>
Audio distortion (at 60% modulation).....	HI Less than -70 dB LOW Less than -60 dB ± 5 kHz 3% max. (300 Hz ~ 3000 Hz)

## [Receiver]

Circuitry .....	Double superheterodyne
Intermediate frequency .....	1st 10.695 MHz 2nd 455 kHz
Receiver sensitivity .....	SINAD 12 dB less than 0.18 µV S + N/N more than 50 dB at 1.0 mV input
Receiver selectivity .....	More than 12 kHz (-6 dB) Less than 24 kHz (-60 dB)
Spurious response .....	Better than 70 dB (except f <sub>d</sub> -IF/2)
Squelch sensitivity.....	Less than 0.15 µV (threshold)
Auto scan stop level .....	Less than 0.18 µV (threshold)
Audio output.....	More than 2.0 watts across 8 ohms load (5% dist.)

## [Auto patch microphone (MC-48) supplied] – For U.S.A. version only

Impedance .....	500 ohms
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## [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 ± 200 PPM
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.

## TRIO-KENWOOD CORPORATION

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TRIO-KENWOOD (AUSTRALIA) PTY. LTD. (INCORPORATED IN N.S.W.)  
4E, Woodcock Place, Lane Cove, N.S.W. 2066, Australia

# SERVICE BULLETIN

VON/FROM/DE: TRIO KENWOOD COMMUNICATIONS  
Division of TRIO KENWOOD ELECTRONICS GMBH

No.: Model: Destination: Date:  
0087 TM-211E/411E Distrib./dealers April 30th, 1985

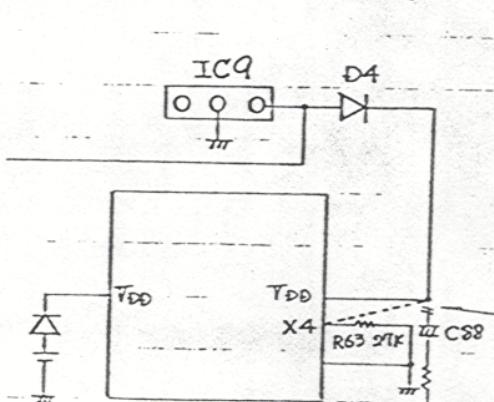
**SUBJECT** Countermeasure for lithium battery running down due to miswiring of the jumper wire at the rear of the B unit PCB

## CONTENTS

**Symptom:** The memory contents cannot be backed up and the lithium battery sometimes runs down. At this time, the back-up current (normally less than 5  $\mu$ A) becomes 50 - 100  $\mu$ A (disconnect the (+) side of lithium battery and an ammeter is connected in parallel and the voltage of the lithium battery drops to 1.5 V.

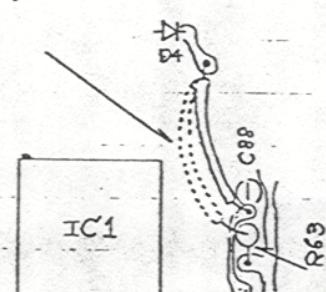
**Possible cause:** The jumper wire located near the lithium battery is erroneously connected at the rear of the B unit (X53-1380-00, X53-1390-00) (connected to R63 side). (The jumper wire should be connected to (+) side of C88.)

- Countermeasure:**
1. Replace the lithium battery.
  2. Reconnect the jumper wire.



Erroneously connected  
to R63 pattern.

The jumper wire which  
should be connected to C88  
is connected as shown with  
broken lines.



(Pattern diagram)

**Note:** When this fault occurs, disconnect the (+) side of the lithium battery and check the back-up current (should be less than 5  $\mu$ A).

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# SERVICE BULLETIN

VON/FROM/DE: TRIO KENWOOD COMMUNICATIONS  
Division of TRIO KENWOOD ELECTRONICS GMBH

No.: Model: Destination: Date:  
0067 TM-211E/411E Distrib./dealers Nov. 29th, 1984

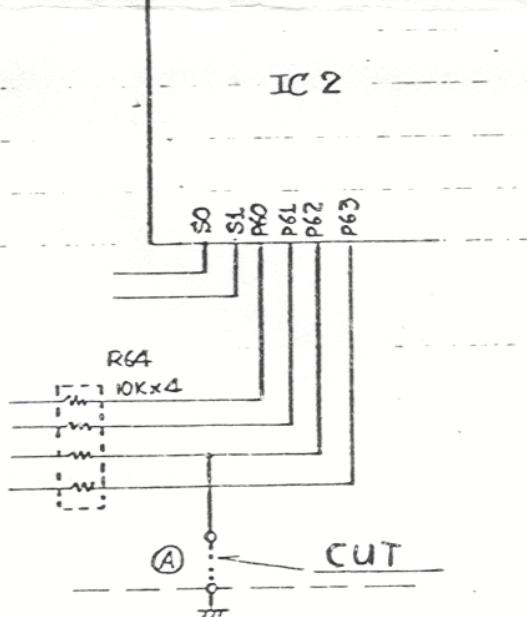
Subject: Modification of the scan control

To change the scan control from timer controlled scan (TC) to carrier operated scan (CO) cut or remove the jumper "A" from the B UNIT X53-1380/1390-XX.

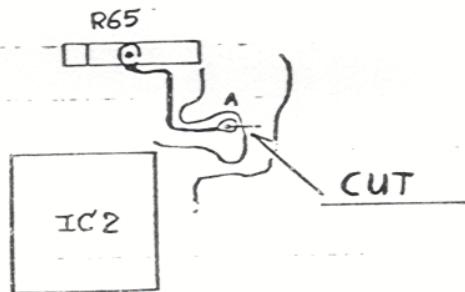
B UNIT (X53-1380-00,01 TM-211E), (X53-1390-00,01 TM-411E)

SCHEMATIC DIAGRAM

B UNIT



PCB VIEW



KENWOOD

# SERVICE BULLETIN

VON/FROM/DE: TRIO KENWOOD COMMUNICATIONS  
Division of TRIO KENWOOD ELECTRONICS GMBH

No.:	Model:	Destination:	Date:
0068	TM-211E	Distrib./dealers	Dec.3rd, 1984

Subject: Misprint in the Instruction Manual

The description contained in "program scan, item 3)" on page 17 of the operating manual is inadequate. Please replace item 3) with the following description.

- 3) In the following cases, all the frequencies in all the bands are scanned.
  - 1) When the reception frequency R and the transmission frequency T are identical.
  - 2) When either of 145.975 MHz (when VFO A is used) or 145.995 MHz (when VFO B is used) is memorized for reception frequency R or transmission frequency T, and the VFO frequency is set to each corresponding point A.

Note: To program scan the frequency range of 145.500 - 145.975 MHz, store a frequency of 144.000 MHz for reception frequency R and 145.500 MHz for transmission frequency and set the VFO frequency to point B.

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