

144MHz FM TRANSCEIVER

TH-22A/AT/E(S)

SERVICE MANUAL

REVISED

KENWOOD

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B51-8239-10 (B) 1408

This Service Manual (B51-8239-10) is a revised edition obtained when an (S) type based on the renewed specifications was added to TH-22A/ AT/E with the conventional specifications. For except the description in this revised edition, refer to the first edition manual (B51-8239-00). This (S) type is serial numbers 60900001 and higher. It is products at the Singapore factory.

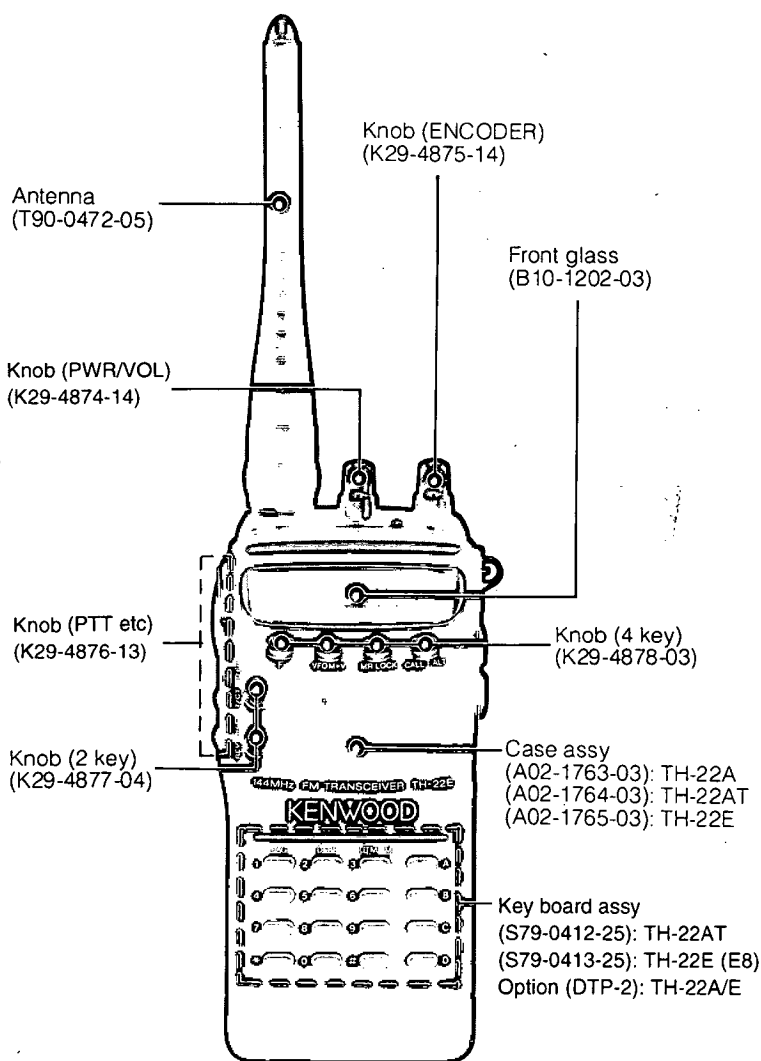


PHOTO is TH-22E (WITH DTP-2)

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TH-22A/AT/E(S)

DESTINATION LIST

DESTINATION LIST

TH-22A/AT/E (JAPAN MADE)

Type		Unit	Freq- range (Guaranteed specification)	Supplied battery (DC)	Supplied charger (AC)	16-key pad (DTP-2)
TH-22AT	K	X57-4370-11	144 to 148 MHz	6V 600mAh	120V	Installed
TH-22AT	K2	K57-4370-11	144 to 148 MHz	-	-	Installed
TH-22E	T	X57-4372-71	144 to 146 MHz	6V 600mAh	240V	Option
TH-22A	X	X57-4370-71	144 to 148 MHz	Battery case (BT-9)	-	Option
TH-22AT	P	X57-4370-11	144 to 148 MHz	6V 600mAh	120V	Installed
TH-22E	E	X57-4372-71	144 to 146 MHz	6V 600mAh	230V	Option
TH-22E	E2	X57-4372-72	144 to 146 MHz	6V 600mAh	230V	Option
TH-22E	E3	X57-4372-71	144 to 146 MHz	6V 600mAh	230V	Option
TH-22E	E4	X57-4372-71	144 to 146 MHz	9.6V 600mAh	230V	Option
TH-22E	E8	X57-4372-74	144 to 146 MHz	-	-	Installed
TH-22E	E9	X57-4372-71	144 to 146 MHz	6V 600mAh	230V	Option
TH-22A	M	X57-4370-21	144 to 148 MHz	6V 600mAh	120/230V	Option
TH-22A	M2	X57-4370-22	144 to 148 MHz	6V 600mAh	120/230V	Option
TH-22A	M3	X57-4370-22	144 to 148 MHz	9.6V 600mAh	120/230V	Option
TH-22A	M4	X57-4370-22	144 to 148 MHz	Battery case (BT-9)	-	Option
TH-22A	M5	X57-4370-23	144 to 146 MHz	Battery case (BT-9)	-	Option
TH-22AT	M	X57-4370-21	144 to 148 MHz	6V 600mAh	120/230V	Installed
TH-22AT	M2	X57-4370-22	144 to 148 MHz	6V 600mAh	120/230V	Installed
TH-22AT	M3	X57-4370-22	144 to 148 MHz	9.6V 600mAh	120/230V	Installed
TH-22AT	M4	X57-4370-22	144 to 148 MHz	Battery case (BT-9)	-	Installed

TH-22A (S)/ AT (S)/ E (S) (SINGAPORE MADE)

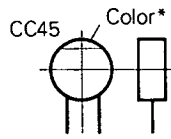
Type		Unit	Freq- range (Guaranteed specification)	Supplied battery (DC)	Supplied charger (AC)	16-key pad (DTP-2)
TH-22AT (S)	K	X57-4770-11	144 to 148 MHz	6V 600mAh	120V	Installed
TH-22AT (S)	K2	X57-4770-11	144 to 148 MHz	-	-	Installed
TH-22E (S)	T	X57-4770-71	144 to 146 MHz	6V 600mAh	240V	Option
TH-22A (S)	X	X57-4770-71	144 to 148 MHz	Battery case (BT-9)	-	Option
TH-22AT (S)	P	X57-4770-11	144 to 148 MHz	6V 600mAh	120V	Installed
TH-22E (S)	E	X57-4770-71	144 to 146 MHz	6V 600mAh	230V	Option
TH-22E (S)	E2	X57-4770-72	144 to 146 MHz	6V 600mAh	230V	Option
TH-22E (S)	E3	X57-4770-71	144 to 146 MHz	6V 600mAh	230V	Option
TH-22E (S)	E4	X57-4770-71	144 to 146 MHz	9.6V 600mAh	230V	Option
TH-22E (S)	E8	X57-4770-74	144 to 146 MHz	-	-	Installed
TH-22E (S)	E9	X57-4770-71	144 to 146 MHz	6V 600mAh	230V	Option
TH-22A (S)	M	X57-4770-21	144 to 148 MHz	6V 600mAh	120/230V	Option
TH-22A (S)	M2	X57-4770-22	144 to 148 MHz	6V 600mAh	120/230V	Option
TH-22A (S)	M3	X57-4770-22	144 to 148 MHz	9.6V 600mAh	120/230V	Option
TH-22A (S)	M4	X57-4770-22	144 to 148 MHz	Battery case (BT-9)	-	Option
TH-22AT (S)	M	X57-4770-21	144 to 148 MHz	6V 600mAh	120/230V	Installed
TH-22AT (S)	M2	X57-4770-22	144 to 148 MHz	6V 600mAh	120/230V	Installed
TH-22AT (S)	M3	X57-4770-22	144 to 148 MHz	9.6V 600mAh	120/230V	Installed
TH-22AT (S)	M4	X57-4770-22	144 to 148 MHz	Battery case (BT-9)	-	Installed
TH-22AT (S)	N	X57-4770-22	144 to 148MHz	-	-	Installed

PARTS LIST

CAPACITORS

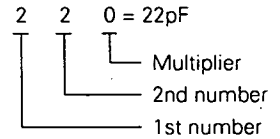
CC	45	TH	1H	220	J
1	2	3	4	5	6

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



• Capacitor value

- 010 = 1pF
 100 = 10pF
 101 = 100pF
 102 = 1000pF = 0.001μF
 103 = 0.01μF



• 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 ± 60ppm/°C

• Tolerance (More than 10pF)

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

(Less than 10pF)

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

• Voltage rating

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

• Chip capacitors

- (EX) C C 7 3 F S L 1 H 0 0 0 J
 1 2 3 4 5 6 7
 (Chip) (CH, RH, UJ, SL)
- (EX) C K 7 3 F F 1 H 0 0 0 Z
 1 2 3 4 5 6 7
 (Chip) (B, F)
- Refer to the table above.
- 1 = Type
 2 = Shape
 3 = Dimension
 4 = Temp. coefficient
 5 = Voltage rating
 6 = Value
 7 = Tolerance

Dimension (Chip capacitors)

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
A	4.5 ± 0.5	3.2 ± 0.4	Less than 2.0
B	4.5 ± 0.5	2.0 ± 0.3	Less than 2.0
C	4.5 ± 0.5	1.25 ± 0.2	Less than 1.25
D	3.2 ± 0.4	2.5 ± 0.3	Less than 1.5
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25
G	1.6 ± 0.2	0.8 ± 0.2	Less than 1.0

RESISTORS

• Chip resistor (Carbon)

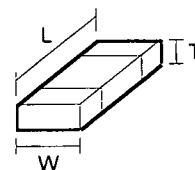
- (EX) R K 7 3 E B 2 B 0 0 0 J
 1 2 3 4 5 6 7
 (Chip) (B, F)

• Carbon resistor (Normal type)

- (EX) R D 1 4 B B 2 C 0 0 0 J
 1 2 3 4 5 6 7

- 1 = Type 5 = Rating wattage
 2 = Shape 6 = Value
 3 = Dimension 7 = Tolerance
 4 = Temp. coefficient

Dimension



Dimension (Chip resistor)

Dimension code	L	W	T
E	3.2 ± 0.2	1.6 ± 0.2	1.0
F	2.0 ± 0.3	1.25 ± 0.2	1.0
G	1.6 ± 0.2	0.8 ± 0.2	0.5 ± 0.1

Rating wattage

Code	Wattage	Code	Wattage	Code	Wattage
1J	1/16W	2C	1/6W	3A	1W
2A	1/10W	2E	1/4W	3D	2W
2B	1/8W	2H	1/2W		

TH-22A/AT/E(S)

PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnes dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

TH-22A/AT/E(S)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
TH-22A/AT/E(S)						
1	3B		A01-2081-02	METALLIC CABINET (REAR)		
2	1B		A02-1763-03	CASE ASSY [22A/(S)]	M M2M3	
2	1B		A02-1763-03	CASE ASSY [22A/(S)]	M4M5X	
3	1B		A02-1764-03	CASE ASSY [22AT/(S)]	KK2MM2	
3	1B		A02-1764-03	CASE ASSY [22AT/(S)]	M3M4PN	
4	1B		A02-1765-03	CASE ASSY [22E/(S)]	TEE2E3	
4	1B		A02-1765-03	CASE ASSY [22E/(S)]	E4E8E9	
5	2B		A02-1784-03	BT-9 CASE (FRONT)	M4M5X	
6	3B		A02-1785-02	BT-9 CASE (REAR)	M4M5X	
7	3A		A62-0277-02	PANEL		
8	-		B09-0335-14	CAP (MIC/SP) :ACCY		
9	3A		B09-0336-14	CAP (DC IN)		
10	1A		B10-1202-03	FRONT GLASS		
11	3A		B11-1092-04	FILTER (ON AIR)		
12	1B		B42-3343-04	S/NO LABEL		
-	-		B42-3394-14	FCC PLATE	K K2	
-	-		B42-5074-04	LABEL	K	
-	-		B42-5526-04	FACE PLATE	K K2	
13	-		B46-0310-03	WARRNTY CARD	E E2E3	
13	-		B46-0310-03	WARRNTY CARD	E4E8E9	
14	-		B46-0410-40	WARRNTY CARD	K K2	
15	-		B46-0422-00	WARRNTY CARD	P	
16	-		B59-0482-00	PANFLET	K2	
17	-	*	B59-0483-00	PANFLET	E8	
18	-	*	B59-0494-00	PANFLET	N	
19	-		B62-0364-00	INSTRUCTION MANUAL[22]		
19	-		B62-0501-00	INSTRUCTION MANUAL[22(S)]		
20	-		B62-0365-10	INSTRUCTION MANUAL[22]	E E2	
20	-		B62-0502-00	INSTRUCTION MANUAL[22(S)]	E E2	
21	-		B62-0366-00	INSTRUCTION MANUAL[22]	M M2M3	
21	-		B62-0366-00	INSTRUCTION MANUAL[22]	M4K2P	
21	-		B62-0366-00	INSTRUCTION MANUAL[22]	E3E4E9	
21	-		B62-0503-00	INSTRUCTION MANUAL[22(S)]	M M2M3	
21	-		B62-0503-00	INSTRUCTION MANUAL[22(S)]	M4K2P	
21	-		B62-0503-00	INSTRUCTION MANUAL[22(S)]	E3E4E9	
22	3B		B72-0553-04	MODEL NAME PLATE(FCC)[22AT]	KP	
22	3B	*	B72-0858-04	MODEL NAME PLATE(FCC)[22AT(S)]	KP	
23	3B		B72-0554-04	MODEL NAME PLATE [22A]	M M2M3	
23	3B		B72-0554-04	MODEL NAME PLATE [22A]	M4M5X	
23	3B	*	B72-0859-04	MODEL NAME PLATE [22A(S)]	MM2M3	
23	3B	*	B72-0859-04	MODEL NAME PLATE [22A(S)]	M4X	
24	3B		B72-0555-04	MODEL NAME PLATE [22AT]	M M2M3	
24	3B		B72-0555-04	MODEL NAME PLATE [22AT]	M4	
24	3B	*	B72-0860-04	MODEL NAME PLATE [22AT(S)]	MM2M3	
24	3B	*	B72-0860-04	MODEL NAME PLATE [22AT(S)]	M4N	
25	3B		B72-0556-14	MODEL NAME PLATE [22E]	TE E2	
25	3B		B72-0556-14	MODEL NAME PLATE [22E]	E3E4	
25	3B	*	B72-0861-04	MODEL NAME PLATE [22E(S)]	TEE2	
25	3B	*	B72-0861-04	MODEL NAME PLATE [22E(S)]	E3E4E8	
26	2B		B72-0572-14	MODEL NAME PLATE (BT-9) [22]	M4M5X	
26	2B		B72-0893-04	MODEL NAME PLATE (BT-9)[22(S)]	M4M5X	
27	3B		B72-0651-14	MODEL NAME PLATE (FA TA)[22E]	E9	
27	3B		B72-0881-04	MODEL NAME PLATE [22E(S)]	E9	

L:Scandinavia

K:USA

P:Canada

Y:PX(Far East, Hawaii)

T:England

E:Europe

Y:AAFES(Europe)

X:Australia

M:Other Areas

TH-22A : M,M2,M3,M4,M5,X

TH-22AT : K,M,M2,M3,M4,P

TH-22E : E,E2,E3,E4,E9,T

△ indicates safety critical components.

PARTS LIST

× New Parts

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TH-22A/AT/E(S)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
28	3A		E04-0181-05	RF COAXIAL CABLE RECEPTACLE		
29	-		E19-0254-05	AC PLUG :ACCY	M M2M3	
30	3B		E23-0944-04	TERMINAL (BT-9 CASE)	M4M5X	
31	3B		E23-0945-04	TERMINAL (BT-9 CASE)	M4M5X	
32	2B		E23-0946-04	TERMINAL (BT-9 CASE)	M4M5X	
33	2B		E23-0947-04	TERMINAL (BT-9 CASE)	M4M5X	
34	3B		E23-0948-04	TERMINAL (BT-9 CASE)	M4M5X	
35	2B		E23-0949-04	TERMINAL (BT-9 CASE)	M4M5X	
36	1B		F07-1371-13	COVER(DTMF) [22A/(S)]	M M2M3	
36	1B		F07-1371-13	COVER(DTMF) [22A/(S)]	M4M5	
36	1B		F07-1371-13	COVER(DTMF)	E E2E3	
36	1B		F07-1371-13	COVER(DTMF)	E4E9TX	
37	3A		F20-1143-14	INSULATING BOARD (DC IN)		
38	3B		G13-1375-04	CUSION (BT-9 CASE)	M4M5X	
39	1B		G13-1460-04	CUSION(DTMF COVER)	TXEE2	
39	1B		G13-1460-04	CUSION(DTMF COVER)	E3E4E9	
39	1B		G13-1460-04	CUSION(DTMF COVER) [22A/(S)]	MM2M3	
39	1B		G13-1460-04	CUSION(DTMF COVER) [22A/(S)]	M4M5	
40	-		H10-2775-02	POLYSTYRENE FOAMED FIXTURE		
41	-		H11-0808-14	POLYSTYRENE FOAMED BOARD	KM5TX	
41	-		H11-0808-14	POLYSTYRENE FOAMED BOARD	E8N	
42	-		H25-0077-03	PROTECTION BAG(10×12:BT-9)	M4M5X	
43	-		H25-0085-04	PROTECTION BAG(10×20)		
44	-		H52-0441-04	ITEM CARTON BOX [22A]	M M2M3	
44	-		H52-0441-04	ITEM CARTON BOX [22A]	M4M5X	
45	-	*	H52-0676-02	ITEM CARTON BOX [22A(S)]	MM2M3	
45	-	*	H52-0676-02	ITEM CARTON BOX [22A(S)]	M4X	
46	-		H52-0442-14	ITEM CARTON BOX [22AT]	KK2MM2	
46	-		H52-0442-14	ITEM CARTON BOX [22AT]	M3M4P	
47	-	*	H52-0677-02	ITEM CARTON BOX [22AT(S)]	KK2MM2	
47	-	*	H52-0677-02	ITEM CARTON BOX [22AT(S)]	M3M4PN	
48	-		H52-0443-04	ITEM CARTON BOX [22E]	TEE2E3	
48	-		H52-0443-04	ITEM CARTON BOX [22E]	E4E8E9	
49	-	*	H52-0678-02	ITEM CARTON BOX [22E(S)]	TEE2E3	
49	-	*	H52-0678-02	ITEM CARTON BOX [22E(S)]	E4E8E9	
50	-		J29-0465-04	BELT HOOK :ACCY		
51	1A		J39-0441-04	SPACER (MIC)		
52	-		J61-0422-05	BAND		
53	-		J69-0327-04	HAND STRAP :ACCY		
54	3A		K29-4874-14	KNØB (PWR/VOL)		
55	3A		K29-4875-14	KNØB (ENCØDER)		
56	2B		K29-4876-13	KNØB (PTTetc)		
57	1B		K29-4877-04	KNØB (2 KEY)		
58	1A		K29-4878-03	KNØB (4 KEY)		
A	3A		N09-2240-05	SCREW (M3×4) (BELT HOOK)		
B	2B		N30-2605-46	PAN HEAD MACHIN SCREW		
C	3A		N09-2254-05	PAN HEAD MACHIN SCREW (BNC)		
D	3B		N80-2022-45	PAN HEAD MACHIN SCREW (CASE)		
E	2A		N83-2004-46	PAN HEAD MACHIN SCREW (PCB)		
59	1B		S79-0412-25	KEY BOARD ASSY(DTMF)[22AT/(S)]	KK2PMN	
59	1B		S79-0412-25	KEY BOARD ASSY(DTMF)[22AT/(S)]	M2M3M4	
59	1B		S79-0413-25	KEY BOARD ASSY(DTMF)[22E]	E8	
59	1B		S79-0413-25	KEY BOARD ASSY(DTMF)[22AT(S)]	N	

L:Scandinavia

K:USA

P:Canada

TH-22A : M,M2,M3,M4,M5,X

Y:PX(Far East, Hawaii)

T:England

E:Europe

TH-22AT : K,M,M2,M3,M4,P

Y:AAFES(Europe)

X:Australia

M:Other Areas

TH-22E : E,E2,E3,E4,E9,T

△ indicates safety critical components.

TH-22A/AT/E(S)

PARTS LIST

× New Parts

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Teile ohne Parts No. werden nicht geliefert.

TH-22 A/AT/E(S)

TX-RX UNIT (X57-437X-XX)

TX-RX UNIT (X57-477X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
SP ANT MIC	1B - 1A		T07-0257-05 T90-0472-05 T91-0539-05	LOUDSPEAKER(8 ohm 0.5w) ANTENNA :ACCY MICROPHONE (ELEMENT)		
60	3B		ERB83-004	DIODE (BT-9 CASE)	M4M5X	
61	-		W08-0437-05	BATTERY CHARGER(120V) :ACCY	KP	
62	-		W08-0438-15	BATTERY CHARGER(230V) :ACCY	T	
63	-		W08-0440-05	BATTERY CHARGER(230V) :ACCY	E E2E3	
63	-		W08-0440-05	BATTERY CHARGER(230V) :ACCY	E4E9	
64	-		W08-0441-05	BATTERY CHARGER(120/230V):ACCY	M M2M3	
65	-		W09-0825-15	BATTERY PACK (PB-34:9.6V):ACCY	M3E4	
66	-		W09-0826-15	BATTERY PACK (PB-32:6.0V):ACCY	KM M2	
66	-		W09-0826-15	BATTERY PACK (PB-32:6.0V):ACCY	TPE9	
66	-		W09-0826-15	BATTERY PACK (PB-32:6.0V):ACCY	E E2E3	
TX-RX UNIT (X57-437X-XX):TH-22 (X57-477X-XX):TH-22(S)						
100	2A		A13-1606-33	FRAME		
101	2A		B11-1093-13	FILTER (LCD)		
102	2A		B11-1094-14	FILTER (LCD)		
LCD	2A		B38-0703-05	LCD		
C1			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C2 ,3			CK73GB1H102K	CHIP C 1000PF K		
C4			CK73GB1H471K	CHIP C 470PF K		
C6			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C7			CK73GB1H102K	CHIP C 1000PF K		
C8			CK73FB1E104K	CHIP C 0.10UF K		
C9			CC73GCH1H101J	CHIP C 100PF J		
C10			CC73GCH1H070D	CHIP C 7PF D		
C13			CC73GCH1H220J	CHIP C 22PF J		
C14			CK73FB1E473K	CHIP C 0.047UF K		
C15			CK73GR1C333K	CHIP C 0.033UF K		
C16			C92-0543-05	CHIP TAN 3.3UF 10WV		
C17			CC73GCH1H101J	CHIP C 100PF J		
C18			C92-0001-05	CHIP TAN 0.1UF 35WV		
C19			C92-0565-05	TANTAL 6.8UF 10WV		
C20			C92-0628-05	TANTAL 10UF 10WV		
C21 ,22			CK73GB1E103K	CHIP C 0.010UF K		
C24			CC73GCH1H390J	CHIP C 39PF J		
C26 ,27			CK73GB1H102K	CHIP C 1000PF K		
C28			CC73GCH1H220J	CHIP C 22PF J		
C29 -31			CK73GB1H102K	CHIP C 1000PF K		
C32			CC73GCH1H330J	CHIP C 33PF J		
C34			CK73GB1H102K	CHIP C 1000PF K		
C36			CK73GB1E103K	CHIP C 0.010UF K		
C37			CK73FB1E104K	CHIP C 0.10UF K		
C38			CK73GB1H102K	CHIP C 1000PF K		
C39			CK73GB1E103K	CHIP C 0.010UF K		
C40			CK73FB1E104K	CHIP C 0.10UF K		
C41			CK73GB1H102K	CHIP C 1000PF K		
C42			CC73GCH1H120J	CHIP C 12PF J		
C43			CC73GCH1H070D	CHIP C 7PF D		
C44			CK73GB1H102K	CHIP C 1000PF K		
C45			CC73GCH1H150J	CHIP C 15PF J		
C46			CC73GCH1H060D	CHIP C 6PF D		
C47			CC73GCH1H070D	CHIP C 7PF D		

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TH-22AT : K,M,M2,M3,M4,P

TH-22E : E,E2,E3,E4,E9,T

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PARTS LIST

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TX-RX UNIT (X57-437X-XX)

TX-RX UNIT (X57-477X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C55			CK73GB1H471K	CHIP C 470PF K		
C56			CK73GB1H102K	CHIP C 1000PF K		
C58			CC73GCH1H560J	CHIP C 56PF J		
C59			CK73GB1H102K	CHIP C 1000PF K		
C61			CC73GCH1H560J	CHIP C 56PF J		
C62 ,63			CK73GB1H102K	CHIP C 1000PF K		
C64			CC73GCH1H560J	CHIP C 56PF J		
C65			CC73GCH1H0R5C	CHIP C 0.5PF C		
C67			CC73GCH1H100D	CHIP C 10PF D		
C68 ,69			CK73GB1E103K	CHIP C 0.010UF K		
C70			C92-0587-05	ELECTR0 2.2UF 4WV		
C71			CK73FB1E104K	CHIP C 0.10UF K		
C72			CK73GB1E103K	CHIP C 0.010UF K		
C74			CK73GB1H332K	CHIP C 3300PF K		
C76 ,77			CK73GB1E123K	CHIP C 0.012UF K		
C79			CK73GB1E103K	CHIP C 0.010UF K		
C80			C92-0005-05	ELECTR0 2.2UF 6.3WV		
C81			CK73FB1E473K	CHIP C 0.047UF K		
C82			CK73GB1H472K	CHIP C 4700PF K		
C83			CK73GB1H102K	CHIP C 1000PF K		
C84			CK73GR1C333K	CHIP C 0.033UF K		
C85			CK73GB1E103K	CHIP C 0.010UF K		
C86			CK73GB1H102K	CHIP C 1000PF K		
C87 ,88			CK73GB1H391K	CHIP C 390PF K		
C89			CK73GB1H102K	CHIP C 1000PF K		
C90			CC73GCH1H080D	CHIP C 8PF D		
C91			CK73FB1E104K	CHIP C 0.10UF K		
C92			CK73GB1E103K	CHIP C 0.010UF K		
C94			CK73GB1E103K	CHIP C 0.010UF K		
C96			CC73GCH1H270J	CHIP C 27PF J		
C97			CC73GCH1H150J	CHIP C 15PF J		
C98			CK73GB1E103K	CHIP C 0.010UF K		
C99			CK73FB1E104K	CHIP C 0.10UF K		
C100			CC73GCH1H270J	CHIP C 27PF J		
C101			CK73FB1E104K	CHIP C 0.10UF K		
C102			CK73GB1E103K	CHIP C 0.010UF K		
C103			CK73FB1E104K	CHIP C 0.10UF K		
C104			CC73GCH1H100D	CHIP C 10PF D		
C105			CC73GCH1H270J	CHIP C 27PF J		
C106			CK73FB1H393K	CHIP C 0.039UF K		
C107			CK73GB1H102K	CHIP C 1000PF K		
C108			CK73GB1C104K	CHIP C 0.10UF K		
C110			CK73GB1H102K	CHIP C 1000PF K		
C111			C92-0585-05	TANTAL 4.7UF 16WV		
C112			C92-0566-05	TANTAL 10UF 6.3WV		
C113			CK73FB1E104K	CHIP C 0.10UF K		
C114 ,115			CK73GB1H102K	CHIP C 1000PF K		
C116			CC73GCH1HR75C	CHIP C 0.75PF C		
C117 ,118			CK73GB1H102K	CHIP C 1000PF K		
C121			CC73GCH1H040C	CHIP C 4PF C		
C122			CK73GB1H102K	CHIP C 1000PF K		
C123			CK73GB1H471K	CHIP C 470PF K		
C124			CK73GB1H102K	CHIP C 1000PF K		
C125 ,126			CK73GB1C104K	CHIP C 0.10UF K		
C127			CC73GCH1H0R5C	CHIP C 0.5PF C		

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PARTS LIST

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TX-RX UNIT (X57-437X-XX)

TX-RX UNIT (X57-477X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C128			CC73GCH1H150J	CHIP C 15PF J		
C201			CK73GR1C473K	CHIP C 0.047UF K		
C202, 203			CC73GCH1H390J	CHIP C 39PF J		
C204			C92-0561-05	ELECTRØ 22UF 16WV		
C205-207			CK73GB1H471K	CHIP C 470PF K		
C208			C90-4017-05	ELECTRØ 470UF 4WV		
C209			CK73FB1E104K	CHIP C 0.10UF K		
C210, 211			CK73GB1H471K	CHIP C 470PF K		
C212			CC73GCH1H151J	CHIP C 150PF J		
C213, 214			CK73GB1H471K	CHIP C 470PF K		
C216, 217			CK73GB1H471K	CHIP C 470PF K		
C219			CK73GR1C473K	CHIP C 0.047UF K		
C220			CK73GB1H103K	CHIP C 0.01UF K		
C221			CC73GCH1H390J	CHIP C 39PF J		
C222			CC73GCH1H430J	CHIP C 43PF J		
C223, 224			CK73FB1E104K	CHIP C 0.10UF K		
C225			CK73GB1E183K	CHIP C 0.018UF K		
C226			CK73GB1H103K	CHIP C 0.01UF K		
C227			CK73GB1H472K	CHIP C 4700PF K		
C227			CK73GB1H472K	CHIP C 4700PF K		KK2PTE E2E3E4
C227			CK73GB1H472K	CHIP C 4700PF K		E9MM2 M4
C228			CK73GB1H471K	CHIP C 470PF K		
C229			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C230			CK73GB1H103K	CHIP C 0.01UF K		
C231, 232			CK73GB1H471K	CHIP C 470PF K		
C233			CC73GCH1H151J	CHIP C 150PF J		
C234			CK73GB1H182K	CHIP C 1800PF K		
C235			CK73GB1E223K	CHIP C 0.022UF K		
C236			C92-0002-05	CHIP TAN 0.22UF 35WV		
C237, 238			CK73GB1H103K	CHIP C 0.01UF K		
C239, 240			C92-0587-05	TANTAL 2.2UF 4WV		
C241			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C242			CK73FB1H102K	CHIP C 1000PF K		
C243			C92-0593-05	ELECTRØ 33UF 10WV		
C244			CK73GB1H102K	CHIP C 1000PF K		
C245			C92-0567-05	TANTAL 68UF 6.3WV		
C246			CK73GR1C473K	CHIP C 0.047UF K		
C247			C92-0566-05	TANTAL 10UF 6.3WV		
C248			CK73GB1E223K	CHIP C 0.022UF K		
C249			CK73GB1H102K	CHIP C 1000PF K		
C250			C92-0587-05	TANTAL 2.2UF 4WV		
C251			CK73GB1H471K	CHIP C 470PF K		
C252			C92-0564-05	ELECTRØ 22UF 6.3WV		
C253			C92-0587-05	TANTAL 2.2UF 4WV		
C254, 255			CK73GB1H471K	CHIP C 470PF K		
C256			C92-0564-05	ELECTRØ 22UF 6.3WV		
C257			CK73GB1H471K	CHIP C 470PF K		
C258			C92-0576-05	TANTAL 1UF 6.3WV		
C259			CK73GB1H471K	CHIP C 470PF K		
C260			CK73GB1H332K	CHIP C 3300PF K		
C265			CK73FB1E104K	CHIP C 0.10UF K		
C267			CK73GR1C333K	CHIP C 0.033UF K		
C268			C92-0576-05	TANTAL 1UF 6.3WV		
C270			CK73GB1H103K	CHIP C 0.01UF K		

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TH-22E : E,E2,E3,E4,E9,T

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PARTS LIST

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TX-RX UNIT (X57-437X-XX)

TX-RX UNIT (X57-477X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C273-276 C277 TC1 TC1			CK73GB1H471K CK73GB1C104K C05-0380-05 C05-0380-15	CHIP C 470PF K CHIP C 0.10UF K TRIMMER CAPACITOR 10PF(- TYPE) TRIMMER CAPACITOR 10PF(+ TYPE)		
- 104 105 106 CN1	2A 2A 2A		E23-0943-04 E29-1118-14 E29-1119-44 E37-0395-05 E40-5651-05	DC TERMINAL INTER CONNECTOR(LCD) INTER CONNECTOR(4 KEY) FLAT CABLE FLAT CABLE CONNECTOR (23P)		
CN2 CN3 CN201 CN202 CN203			E23-0950-14 E23-0603-05 E40-5629-05 E40-5644-05 E40-5651-05	GND TERMINAL TERMINAL PIN CONNECTOR (6P:PTT) FLAT CABLE CONNECTOR(8P:10KEY) FLAT CABLE CONNECTOR (23P)		
CN204 CN301 J1 J201			E40-5618-05 E40-5630-05 E03-0170-05 E11-0457-05	FLAT CABLE CONNECTOR(8P:CTCSS) PIN CONNECTOR (6P:PTT) DC JACK PHONE JACK		
- 107	2B		G13-1303-04 G11-0707-04	CUSION (X' TAL) CONDUCTIVE RUBBER		
108 109	2B 1A		J19-1546-03 J21-4443-53	HOLDER HARDWARE FIXTURE (LCD)		
CD1 CF1 L1 L2 L3			L79-1013-05 L72-0362-05 L40-6871-35 L40-8271-35 L92-0137-05	CRYSTAL DISC (455KHZ) CERAMIC FILTER (455KHz) SMALL FIXED INDUCTOR (68NH) SMALL FIXED INDUCTOR (82NH) CHIP CORE		
L4 L5 L6 L7 L8			L40-1095-34 L40-2771-36 L34-1327-05 L33-0765-05 L40-1092-81	SMALL FIXED INDUCTOR (1UH) SMALL FIXED INDUCTOR (27NH) COIL (7.5T) CHOKE COIL (50NH) SMALL FIXED INDUCTOR		
L9 L11 L12 L13 L14			L92-0131-05 L34-4249-05 L34-4370-05 L34-4369-05 L92-0138-05	FERRITE TIP COIL COIL COIL CHIP CORE		
L15 L16 -18 L19 L21 L22			L40-1885-48 L92-0138-05 L92-0137-05 L79-1076-05 L40-1085-34	SMALL FIXED INDUCTOR (180NH) CHIP CORE CHIP CORE FILTER SMALL FIXED INDUCTOR (100NH)		
L23 L26 L27 L28 L29			L33-1228-05 L40-1081-37 L40-5681-37 L40-1881-37 L40-1091-37	SMALL FIXED INDUCTOR (31NH) SMALL FIXED INDUCTOR (0.1UH) SMALL FIXED INDUCTOR (0.18UH) SMALL FIXED INDUCTOR (0.1UH) SMALL FIXED INDUCTOR (1UH)		
L30 L201,203 L204 L205-207 L208			L40-1881-37 L92-0138-05 L92-0131-05 L92-0138-05 L92-0131-05	SMALL FIXED INDUCTOR (0.18UH) CHIP CORE CHIP CORE CHIP CORE CHIP CORE		

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TH-22E : E,E2,E3,E4,E9,T

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TH-22A/AT/E(S)

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TX-RX UNIT (X57-437X-XX)
TX-RX UNIT (X57-477X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
X1			L77-1528-05	CRYSTAL RESONATOR(12.8MHz)		
X2			L77-1527-15	CRYSTAL RESONATOR(44.595MHz)		
X201			L78-0326-05	RESONATOR (4.19MHz)		
X202			L78-0325-05	RESONATOR (2.0MHz)		
XF1			L71-0409-15	MCF (45.050MHz)		
CP1			R90-0714-05	MULTI-COMP 10Kx4		
CP2			R90-0723-05	MULTI COMP 47Kx2		
CP201			R90-0714-05	MULTI COMP 100Kx4		
CP202			R90-0724-05	MULTI COMP 1Kx4		
CP203			R90-0725-05	MULTI COMP 1Kx2		
CP204			R90-0724-05	MULTI COMP 1Kx4		
CP205			R90-0725-05	MULTI COMP 1Kx2		
CP206			R90-0724-05	MULTI COMP 1Kx4		
CP207, 208			R90-0722-05	MULTI COMP		
R1			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R2			RK73GB1J391J	CHIP R 390 J 1/16W		
R3			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R4			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R6			RK73GB1J563J	CHIP R 56K J 1/16W		
R7			RK73GB1J104J	CHIP R 100K J 1/16W		
R8 ,9			R92-1252-05	CHIP R 0 OHM		
R10			RK73GB1J100J	CHIP R 10 J 1/16W		
R11			RK73GB1J473J	CHIP R 47K J 1/16W		
R12			RK73GB1J223J	CHIP R 22K J 1/16W		
R13			RK73GB1J103J	CHIP R 10K J 1/16W		
R14			RK73GB1J123J	CHIP R 12K J 1/16W		
R15			RK73GB1J103J	CHIP R 10K J 1/16W		
R16			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R17			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R18			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R19			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R20			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R22			RK73GB1J101J	CHIP R 100 J 1/16W		
R23			RK73GB1J104J	CHIP R 100K J 1/16W		
R24			RK73GB1J105J	CHIP R 1.0M J 1/16W		
R26			R92-1252-05	CHIP R 0 OHM		
R27			RK73GB1J101J	CHIP R 100 J 1/16W		
R28			RK73GB1J103J	CHIP R 10K J 1/16W		
R29 ,30			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R31			RK73GB1J820J	CHIP R 82 J 1/16W		
R32			RK73GB1J331J	CHIP R 330 J 1/16W		
R33			RK73GB1J220J	CHIP R 22 J 1/16W		
R34			R92-1252-05	CHIP R 0 OHM		
R36			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R37			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R38			RK73GB1J330J	CHIP R 33 J 1/16W		
R40			RK73GB1J561J	CHIP R 560 J 1/16W		
R41			RK73GB1J180J	CHIP R 18 J 1/16W		
R42 ,43			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R44			R92-1252-05	CHIP R 0 ohm J 1/16W		
R46			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R47			RK73FB2A820J	CHIP R 82 J 1/10W		
R52			RK73GB1J181J	CHIP R 180 J 1/16W		
R54			RK73GB1J104J	CHIP R 100K J 1/16W		
R56			RK73GB1J470J	CHIP R 47 J 1/16W		

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TX-RX UNIT (X57-477X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R57			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R58			RK73GB1J104J	CHIP R 100K J 1/16W		
R59			RK73GB1J330J	CHIP R 33 J 1/16W		
R60			RK73GB1J104J	CHIP R 100K J 1/16W		
R61 -63			RK73EB2ER39K	CHIP R 0.39 K 1/4W		
R64			RK73GB1J471J	CHIP R 470 J 1/16W		
R65			R92-1252-05	CHIP R 0 0HM		
R66			RK73GB1J274J	CHIP R 270K J 1/16W		
R67			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R68			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R69			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R70			RK73GB1J103J	CHIP R 10K J 1/16W		
R71			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R72			RK73FB2A120J	CHIP R 12 J 1/10W		
R73			RK73GB1J473J	CHIP R 47K J 1/16W		
R74			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R76			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R77			RK73GB1J274J	CHIP R 270K J 1/16W		
R78			RK73GB1J561J	CHIP R 560 J 1/16W		
R79			RK73GB1J224J	CHIP R 220K J 1/16W		
R80			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R81			RK73GB1J681J	CHIP R 680 J 1/16W		
R82			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R83			RK73GB1J683J	CHIP R 68K J 1/16W		
R84			RK73GB1J681J	CHIP R 680 J 1/16W		
R86			RK73GB1J154J	CHIP R 150K J 1/16W		
R87			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R88			RK73GB1J103J	CHIP R 10K J 1/16W		
R89 ,90			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R91			RK73GB1J473J	CHIP R 47K J 1/16W		
R92			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R93			RK73GB1J820J	CHIP R 82 J 1/16W		
R94			RK73GB1J681J	CHIP R 680 J 1/16W		
R95			R92-1252-05	CHIP R 0 0HM J 1/16W		
R101			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R102			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R110			RK73GB1J330J	CHIP R 33 J 1/16W		
R111			RK73GB1J821J	CHIP R 820 J 1/16W		
R201			RK73GB1J473J	CHIP R 47K J 1/16W		
R202			RK73GB1J103J	CHIP R 10K J 1/16W		
R203			RK73GB1J331J	CHIP R 330 J 1/16W		
R204, 205			RK73GB1J100J	CHIP R 10 J 1/16W		
R206			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R207			RK73GB1J274J	CHIP R 270 J 1/16W		
R208			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R209			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R210			RK73GB1J120J	CHIP R 12 J 1/16W		
R211			RK73GB1J470J	CHIP R 47 J 1/16W		
R212			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R213			RK73GB1J334J	CHIP R 330K J 1/16W		
R214			R92-1252-05	CHIP R 0 0HM J 1/16W		
R215			RK73GB1J223J	CHIP R 22K J 1/16W		
R216			RK73GB1J563G	CHIP R 56K G 1/16W		
R217			RK73GB1J224G	CHIP R 220K G 1/16W		
R218			RK73GB1J105J	CHIP R 1.0M J 1/16W		

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TH-22A : M,M2,M3,M4,M5,X

TH-22AT : K,M,M2,M3,M4,P

TH-22E : E,E2,E3,E4,E9,T

△ indicates safety critical components.

TH-22A/AT/E(S)

PARTS LIST

× New Parts

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Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-437X-XX)

TX-RX UNIT (X57-477X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R219			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R220			RK73GB1J561J	CHIP R 560 J 1/16W		
R221			RK73GB1J100J	CHIP R 10 J 1/16W		
R222			RK73GB1J103J	CHIP R 10K J 1/16W		
R223			RK73GB1J100J	CHIP R 10 J 1/16W		
R224			RK73GB1J103J	CHIP R 10K J 1/16W		
R225, 226			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R228			RK73GB1J683J	CHIP R 68K J 1/16W		
R229			RK73GB1J153J	CHIP R 15K J 1/16W		
R230			RK73GB1J823J	CHIP R 82K J 1/16W		
R231			RK73GB1J473J	CHIP R 47K J 1/16W		
R232			RK73GB1J224J	CHIP R 220K J 1/16W		
R234			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R235			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R236, 237			RK73GB1J104J	CHIP R 100K J 1/16W		
R238			RK73GB1J823J	CHIP R 82K J 1/16W		
R239			RK73GB1J391J	CHIP R 390 J 1/16W		
R240			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R241			RK73GB1J223J	CHIP R 22K J 1/16W		
R242			RK73GB1J563J	CHIP R 56K J 1/16W		
R244			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R245			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R246			RK73GB1J100J	CHIP R 10 J 1/16W		
R247			RK73GB1J101J	CHIP R 100 J 1/16W		
R248			RK73GB1J471J	CHIP R 470 J 1/16W		
R249			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R250			RK73FB2A101J	CHIP R 100 J 1/10W		
R251			RK73GB1J101J	CHIP R 100 J 1/16W		
R252			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R253			RK73GB1J331J	CHIP R 330 J 1/16W		
R254			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R255			RK73GB1J103J	CHIP R 10K J 1/16W		
R256			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R257			RK73GB1J103J	CHIP R 10K J 1/16W		
R258			RK73GB1J153J	CHIP R 15K J 1/16W		
R259			RK73GB1J100J	CHIP R 10 J 1/16W		
R260			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R261			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R262			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R263			RK73GB1J683J	CHIP R 68K J 1/16W		
R264			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R265			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R266			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R267			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R268			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R269			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R270, 271			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R272			RK73GB1J473J	CHIP R 47K J 1/16W		
R273			RK73GB1J103J	CHIP R 10K J 1/16W		
R274			RK73GB1J473J	CHIP R 47K J 1/16W		
R275			RK73GB1J273J	CHIP R 27K J 1/16W		
R276			RK73GB1J103J	CHIP R 10K J 1/16W		
R277			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R278			RK73GB1J104J	CHIP R 100K J 1/16W		
R279			RK73GB1J473J	CHIP R 47K J 1/16W		

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TH-22AT : K,M,M2,M3,M4,P

TH-22E : E,E2,E3,E4,E9,T

⚠ indicates safety critical components.

PARTS LIST

* New Parts

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TX-RX UNIT (X57-437X-XX)

TX-RX UNIT (X57-477X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R280			RK73GB1J100J	CHIP R 10 J 1/16W		
R287			RK73GB1J104J	CHIP R 100K J 1/16W		
R289			RK73GB1J474J	CHIP R 470K J 1/16W		
R290			RK73GB1J100J	CHIP R 10 J 1/16W		
R293			RK73GB1J104J	CHIP R 100K J 1/16W		
R294			RK73GB1J103J	CHIP R 10K J 1/16W		
R296			RK73GB1J473J	CHIP R 47K J 1/16W		
R297, 298			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R400			R92-1252-05	CHIP R 0 OHM		
R402			RK73GB1J222J	CHIP R 2.2K J 1/16W		
VR1			R05-3469-05	POTENTIOMETER 10K		
VR2			R12-6717-05	TRIM POT 47K		
VR3			R12-7486-05	TRIM POT 10K		
VR3		*	R32-0643-05	TRIM POT 10K		
VR201			R12-7478-05	TRIM POT 470		
VR201		*	R32-0635-05	TRIM POT 470		
VR202			R12-7486-05	TRIM POT 10K		
VR202		*	R32-0643-05	TRIM POT 10K		
S301			S40-1117-05	TACT SWITCH		
D1			MA2S111	DIODE		
D3			MA2S111	DIODE		
D4			MA728	DIODE		
D8 , 9			MA77	DIODE		
D11			MI809	DIORD		
D12			1SS312	DIODE		
D13 , 14			MA362	DIODE		
D15			MA368	DIODE		
D16			MA742	DIODE		
D17			SFPB-72VL	DIODE		
D18			DA221	DIODE		
D20			MA8062	DIODE		
D201			1SS373	DIODE		
D202			MA8039	DIODE		
D204, 205			B30-2139-05	LED		
D206, 207			MA110	DIODE		KK2PXT
D208			MA110	DIODE		MM3EE3
D208			MA110	DIODE		E4E8E9
D208			MA110	DIODE		KK2PXT
D209			MA110	DIODE		
D209			MA110	DIODE		EE2E3
D209			MA110	DIODE		E4E9
D210, 211			MA110	DIODE		
D212			MA110	DIODE		XTBE2
D212			MA110	DIODE		E3E4E8
D212			MA110	DIODE		E9MM2
D212			MA110	DIODE		M3M4N
D213			MA110	DIODE		TBE2E3
D213			MA110	DIODE		E4E8E9
D213			MA110	DIODE		MM2M3
D213			MA110	DIODE		M4N
D215			HN2D01FU	DIODE		
D216			MA2S111	DIODE		
D217			B30-2138-05	LED		
D218			DTZ3.9(B)	DIODE		

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TH-22AT : K,M,M2,M3,M4,P

TH-22E : E,E2,E3,E4,E9,T

⚠ indicates safety critical components.

TH-22A/AT/E(S)

PARTS LIST

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TX-RX UNIT (X57-437X-XX)

TX-RX UNIT (X57-477X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
D220			MA2S111	DIODE		
IC1			MB1511PFV-G-BND	IC(PLL FREQUENCY SYNTHESIZER)		
IC1			MB1511PFV-GBND	IC(PLL FREQUENCY SYNTHESIZER)		
IC2			TC7660ME0A	IC		
IC3			PF0310-01	IC(POWER MODULE)		
IC4			MC3372V	IC		
IC201			LC73880M	IC		
IC202			AT24C04N10SI2.5	IC		
IC202			AT2404N10SI2.5	IC		
IC203			S-81235PG-PI	IC		
IC204			LM301AD	IC(OP AMP)		
IC205			S-80730SN-DT	IC		
IC206			HD404629B49TF	IC(MPU)		
IC207			TA75W558FU	IC		
IC208			NJM2070M	IC(AF AMP)		
IC209			TC7S08FU	IC		
Q1			2SC4738(GR)	TRANSISTOR		
Q2			2SC4619	TRANSISTOR		
Q3			2SA1806(Q)	TRANSISTOR		
Q4			2SC4808(Q)	TRANSISTOR		
Q5			2SK879(Y)	FET		
Q6			2SC4083(N,P)	TRANSISTOR		
Q7			2SC4093	TRANSISTOR		
Q9			2SK1215(E)	FET		
Q10			2SC4738(GR)	TRANSISTOR		
Q11			2SC4619	TRANSISTOR		
Q12			2SC4738(GR)	TRANSISTOR		
Q13			2SK1824	FET		
Q14			2SD1483	TRANSISTOR		
Q15			2SC4738(GR)	TRANSISTOR		
Q16			2SK879(GR)	FET		
Q17			DTC114EE	TRANSISTOR		
Q19			SGM2014M	FET		
Q201			2SK1824	FET		
Q202, 203		×	2SJ204	FET		
Q205			UMC4	DIGITAL TRANSISTOR		
Q206			2SK879(Y)	FET		
Q207			DTC114YE	DIGITAL TRANSISTOR		
Q208			DTA143ZE	DIGITAL TRANSISTOR		
Q209			2SK1824	FET		
Q210			2SB766(R,S)	TRANSISTOR		
Q211			2SC4738(GR)	TRANSISTOR		
Q212			DTA144EE	DIGITAL TRANSISTOR		
Q213, 214			2SB766(R,S)	TRANSISTOR		
Q215, 216			UMW1	DIGITAL TRANSISTOR		
Q217, 218			2SK1824	FET		
Q219			DTA143ZE	DIGITAL TRANSISTOR		
Q220			2SJ243	FET		
Q221			2SK1588	FET		
TH1			157-502-65001	THERMISTOR		
TH201			157-503-65001	THERMISTOR		
A1			X58-4090-00	SUB UNIT (VC0)	[22]	
A1			X58-4270-00	SUB UNIT (VC0)	[22(S)]	
S1			W02-1795-05	ENCODER		

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TH-22A : M,M2,M3,M4,M5,X

TH-22AT : K,M,M2,M3,M4,P

TH-22E : E,E2,E3,E4,E9,T

⚠ indicates safety critical components.

TH-22A/AT/E(S)

PARTS LIST

✕ New Parts

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VCO UNIT (X58-4090-00)(X58-4270-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
VCO UNIT (X58-4090-00)(X58-4270-00)						
C1 ,2			CK73HB1E102K	CHIP C 1000PF K		
C3			CC73GUJ1H010C	CHIP C 1PF C		
C4 ,5			CK73HB1E102K	CHIP C 1000PF K		
C7			CC73HCH1E040C	CHIP C 4PF C		
C8			C93-0544-05	CHIP C 2PF		
C9			CK73HB1E102K	CHIP C 1000PF K		
C10			CC73HCH1E010C	CHIP C 1PF C		
C11			CK73HB1E102K	CHIP C 1000PF K		
C12 ,13			CC73HCH1E100D	CHIP C 10PF D		
C14			C93-0542-05	CHIP C 1PF		
C17			CC73HCH1E100D	CHIP C 10PF D		
CN1 ,2			E40-5622-05	PIN CONNECTOR (3P)		
-			F10-2096-14	SHIELDING CASE		
L1			L33-0797-05	CHØKE COIL (39NH)		
L2			L33-0796-05	CHØKE COIL (33NH)		
L3			L40-1092-34	SMALL FIXED INDUCTOR		
R1			RK73HB1J332J	CHIP R 3.3K J 1/16W		
R2			RK73HB1J104J	CHIP R 100K J 1/16W		
R3			RK73HB1J473J	CHIP R 47K J 1/16W		
R4			RK73HB1J102J	CHIP R 1K J 1/16W		
R5			RK73HB1J561J	CHIP R 560 J 1/16W		
R6			RK73HB1J220J	CHIP R 22 J 1/16W		
R7			RK73HB1J270J	CHIP R 27 J 1/16W		
R8			RK73HB1J823J	CHIP R 82K J 1/16W		
R9			RK73HB1J561J	CHIP R 560 J 1/16W		
R10			RK73HB1J823J	CHIP R 82K J 1/16W		
R11			RK73HB1J561J	CHIP R 560 J 1/16W		
R12			R92-1252-05	CHIP R 0 ØHM		
D1 ,2			MA362*J	DIØDE		
D3			MA360	DIØDE		
D4			MA77	DIØDE		
Q1			DTC144EE	DIGITAL TRANSISTOR		
Q2			2SK238(K17)	PET		
Q3 ,4			2SC4808(Q)	TRANSISTOR		

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Y:PX(Far East, Hawaii)

T:England

E:Europe

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M:Other Areas

TH-22A : M,M2,M3,M4,M5,X

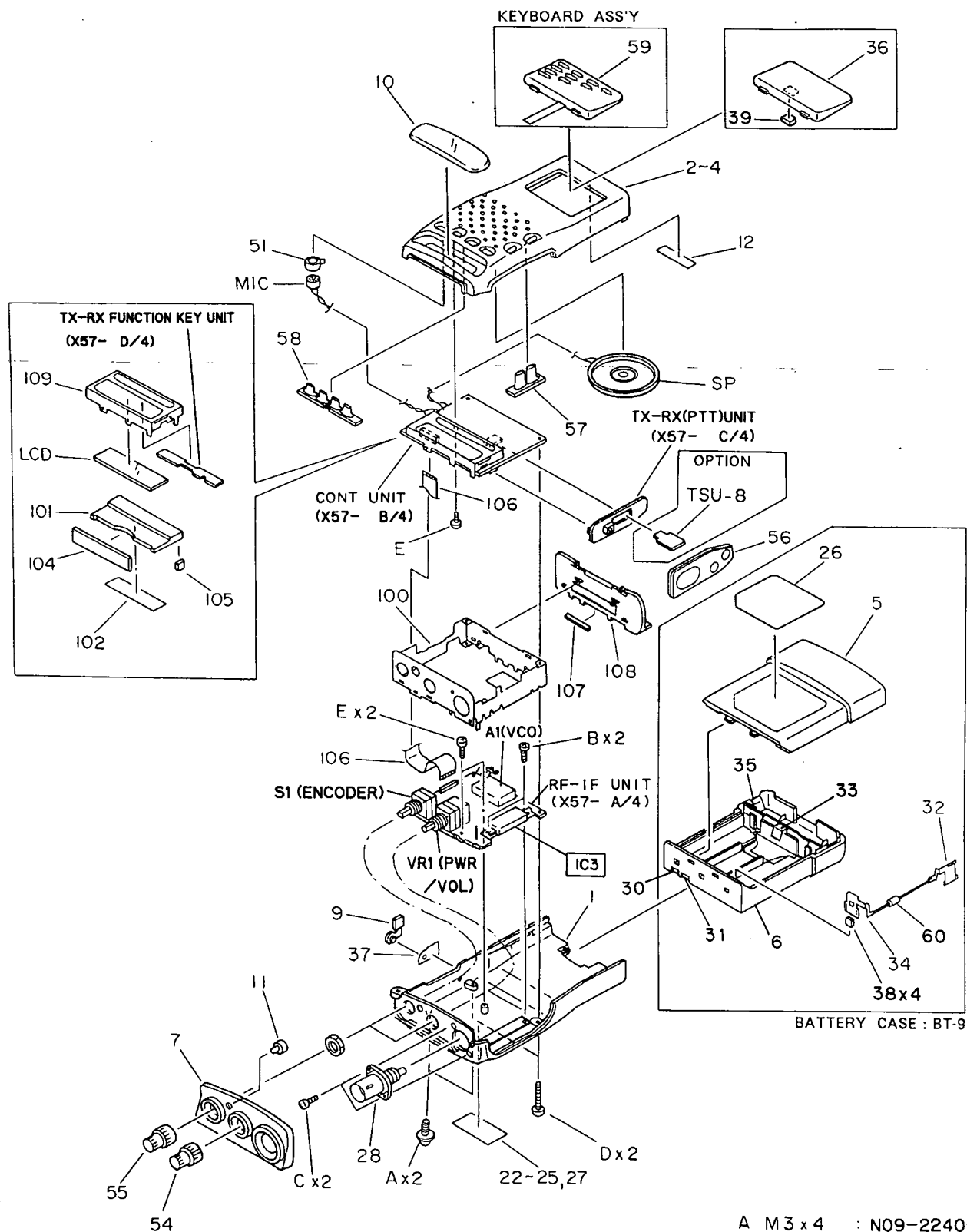
TH-22AT : K,M,M2,M3,M4,P

TH-22E : E,E2,E3,E4,E9,T

⚠ indicates safety critical components.

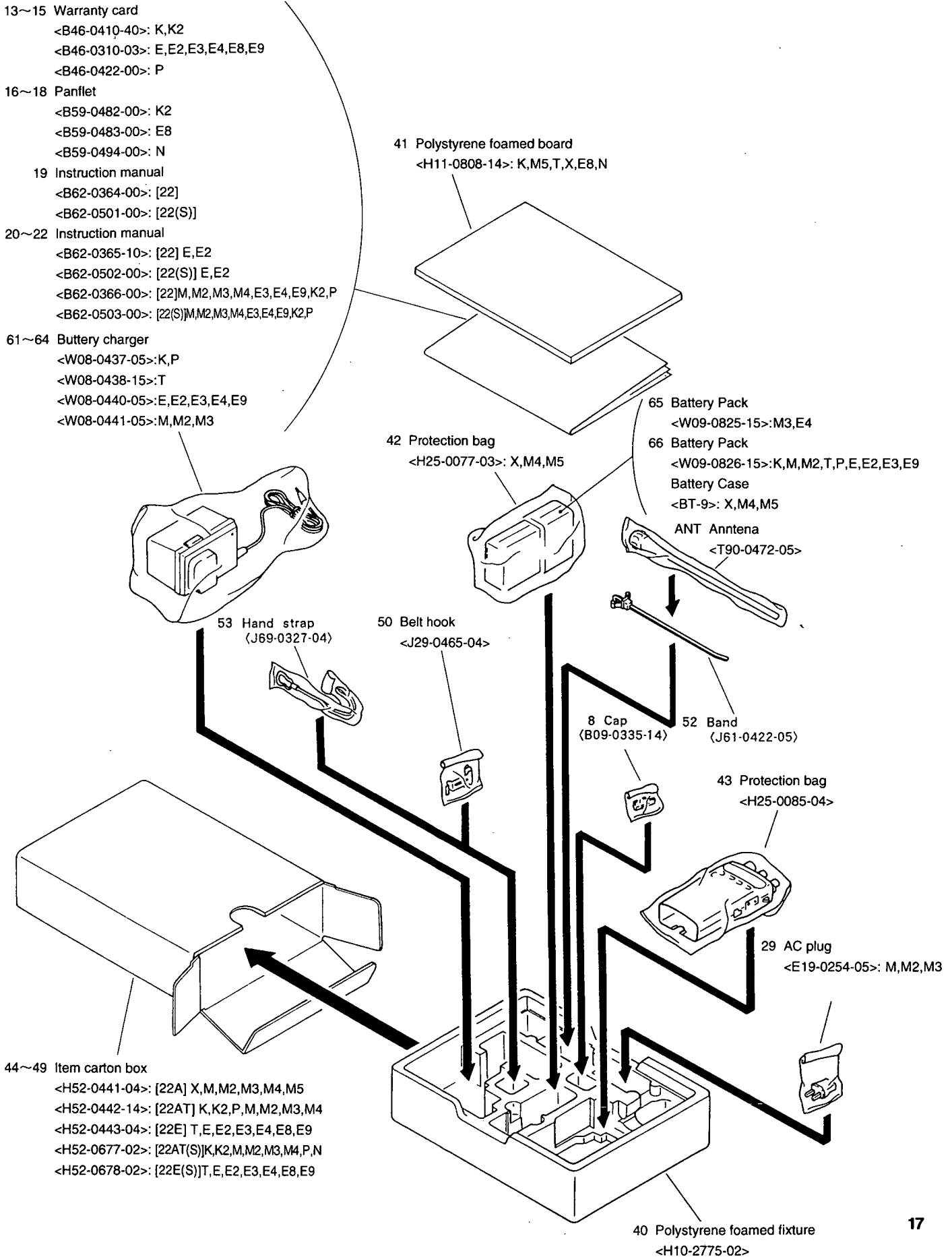
TH-22A/AT/E(S)

EXPLODED VIEW



A	M 3 x 4	: N09-2240-05
B	M 2.6 x 5	: N30-2605-46
C	M 2.6 x 6	: N09-2254-05
D	M 2 x 22	: N80-2022-45
E	M 2 x 4	: N83-2004-46

PACKING



TH-22A/AT/E(S)

ADJUSTMENT

Required Test Equipment

1. Stabilized Power Supply

- 1) The supply voltage can be changed between 5V and 18V, and the current is 3A or more.
- 2) The standard voltage is 13.8V.

2. DC Ammeter

- 1) Class 1 ammeter (17 ranges and other features).
- 2) The full scale can be set to either 300mA or 3A.
- 3) A cable of less internal loss must be used.

3. Frequency Counter (f. counter)

- 1) Frequencies of up to 1GHz or so can be measured.
- 2) The sensitivity can be changed to 250MHz or below, and measurements are highly stable and accurate (0.2ppm or so).

4. Power Meter

- 1) Measurable frequency: Up to 500MHz.
- 2) Impedance: 50Ω, unbalanced.
- 3) Measuring range: Full scale of 10W or so.
- 4) A standard cable (5D2W 1m) must be used.

5. RF VTVM (RF V.M)

- 1) Measurable frequency: Up to 500MHz or so.

6. Linear Detector

- 1) Measurable frequency: Up to 500MHz.
- 2) Characteristics are flat, and CN is 60dB or more.

7. Digital Voltmeter

- 1) Voltage range: FS = 18V or so.
- 2) Input resistance: 1MΩ or more.

8. Oscilloscope

- 1) Measuring range: DC to 30MHz
- 2) Provides highly accurate measurements for 5 to 25MHz.

9. AF Voltmeter (AF V.M)

- 1) Measurable frequency: 50Hz to 1MHz.
- 2) Maximum sensitivity: 1mV or more.

10. Spectrum Analyzer

- 1) Measuring range: DC to 1GHz or more.

11. Standard Signal Generator (SSG)

- 1) Maximum frequency: 500MHz or more.
- 2) Output: 0.05μV/-133dBm to 0.1V/-7dBm.
- 3) Output impedance: 50Ω

12. Tracking Generator

- 1) Center frequency: 50kHz to 500MHz.
- 2) Frequency deviation: ±35MHz.
- 3) Output voltage: 100mV or more.

13. Dummy Load

- 1) 8Ω, 3W or more.

14. Distortion Meter

- 1) Measurable frequency: 30Hz to 100kHz.
- 2) Input level: 50mV to 10Vrms.

TX/RX Common Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Power supply DC IN terminal: 6.3V							Note) BATT terminal: 6.0V
2. All Reset	1) While pressing the F key down, set the POWER: ON.				Display check.			All segments on.
	2) F key: Release				Check the Reset frequency.			144.00

PLL Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. VCO voltage	1) Frequency: Center frequency Receive.	Digital Voltmeter	TX-RX	CV			Check	1.25 to 2.8V
	2) Transmit (PTT: ON).							1.5 to 3.2V

ADJUSTMENT

RX Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. BPF voltage	Adjust with the band expanded. 1) Frequency: HI edge (174.00MHz) Put into the receive state.	Digital voltmeter	TX-RX (A/4)	BA	RF/IF	VR3	Adjust after confirming that the maximum voltage is more than 3.9V.	3.6V±0.1V Set as (maximum voltage - 0.2 V) when the maximum voltage is under 3.9 V.
2. BPF waveform	Adjust after the BPF voltage adjustment is completed with the band expanded. 1) Frequency: 144.00MHz Tracking generator output : -40dBm	Tracking generator Spectrum analyzer	TX-RX (A/4)	ANT TP	RF/IF	L11 L12 L13	Adjust the waveform to 145MHz. (Spectrum analyzer waveform in Fig. 2)	
	2) Frequency: 136.00MHz						The waveform must be shifted to the left. (Spectrum analyzer waveform in Fig. 3)	
	3) Frequency: 174.00MHz						The waveform must be shifted to the right. (Spectrum analyzer waveform in Fig. 4)	
3. Sensitivity	1) Frequency: 144.05MHz SSG output: -122dBm (0.178 μV) MOD: 1kHz DEV: ±3kHz AF VR: 0.63V/8Ω	SSG Oscilloscope AF V.M Distortion meter	TX-RX	ANT SP			Check	SINAD 12dB or more.
	2) Frequency: 147.950MHz: K, K2, X, P, M, M2, M3, M4, N 145.950MHz: M5, T, E, E2, E3, E4, E8, E9							
4. Squelch	1) Push F key, then push MONI key. Turn the encoder to display "SqL3".	SSG Oscilloscope AF V.M	TX-RX	ANT SP	RF/IF	VR2	Check	
	2) Frequency: 146.05MHz: K, K2, X, P, M, M2, M3, M4, N 145.05MHz: M5, T, E, E2, E3, E4, E8, E9 SSG output: -132dBm (0.056 μV) MOD: 1kHz DEV: ±3kHz AF VR: 0.63V/8Ω							
	3) SSG output: -125dBm (0.126 μV)						Check	Squelch should be open.
5. S-meter level	1) Frequency: 144.75MHz SSG output: -120dBm±3dBm (0.22 μV) MOD: 1kHz DEV: ±3kHz						Check S-meter	1st segment is turned on. ■ ■
	2) SSG output: -111dBm±3dBm (0.63 μV)							All segments are turned on. ■■■■■■■■■■
6. DTMF deviation (KEY type only)	1) AG output: OFF Frequency: 144.975MHz D key: Push PTT: ON	Power meter Linear detector	TX-RX	ANT MIC			Check DEV	2.7 to 4.0 kHz
7. TONE deviation (88.5 Hz)	1) Frequency: 144.975MHz T/CT key: Push PTT: ON	Oscilloscope AG AF V.M					Check Display Check DEV	Display "T" on. DEV: 0.5 to 1.25kHz

TH-22A/AT/E(S)

ADJUSTMENT

TX Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Transmit Frequency	1) Frequency: 144.975 MHz PTT: ON	f.counter Power meter	TX-RX	ANT	RF/IF	TC1	144.975 MHz	± 500Hz or less.
2. Power output	1) Max power BATT terminal: 9.6V Frequency: 146.00MHz: K,K2,X, P,M,M2,M3,M4,N 144.975MHz: M5,T,E,E2,E3,E4,E8,E9 Power select: HI PTT: ON	Power meter Ammeter	TX-RX	ANT	CONTROL	VR201	Check.	5.5W or more.
	2) HI power PTT: ON						Adjust to 5.5W	±0.1W (Current consumption 1.7A or less.)
	3) LOW power BATT terminal voltage: 6.0V Power select: LO PTT: ON						Check	0.3 to 1.0W. (Current consumption 0.8A or less.)
	4) EL power Power select: EL PTT: ON						Check	10 to 250mW (Current consumption 0.3A or less.)
	5) HI power Power select: HI PTT: ON						Check	2W or more.
	6) Frequency: 144.00MHz and 147.975MHz: K,P, X,M,M2,M3,M4,N 145.975MHz: M5, T,E,E2,E3,E4,E8,E9 PTT: ON						Check	2W or more.
3. Modulation	1) Frequency: 146.00MHz: K,P, X,M,M2,M3,M4,N 144.975MHz: M5,T,E,E2,E3,E4,E8,E9 AG output: 1kHz/50mV PTT: ON	Power meter Linear detector Oscilloscope AG AF V.M	TX-RX	ANT MIC	CON- TROL	VR202	Adjust to ±4.2kHz at large deflect of ±. Check detection waveform.	±0.1kHz Must be normal.
	2) AG Output: 1kHz/5mV (20dB down) PTT: ON						Check DEV	2.2 to 3.7kHz

Adjustment Points

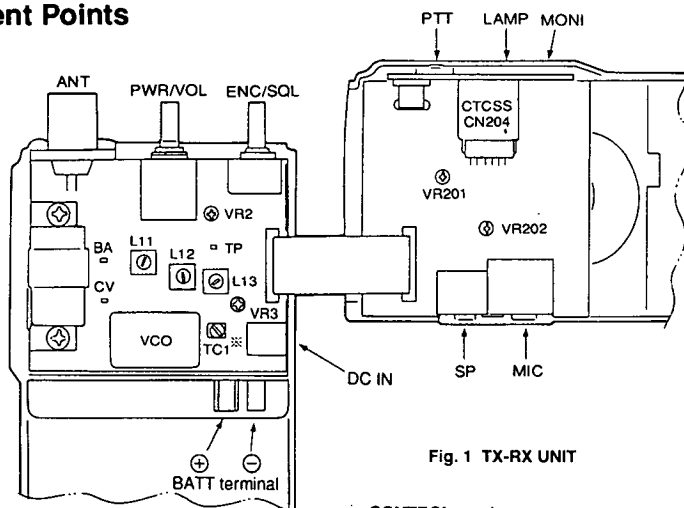


Fig. 1 TX-RX UNIT

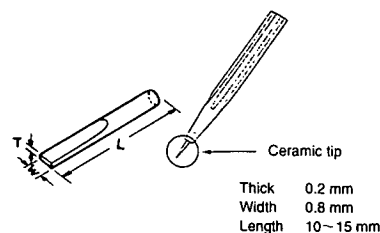
RF-IF section

TC1: Transmit frequency ±
L11, 12, 13: BPF Waveform
VR2: Squelch
CV terminal: VCO voltage
TP terminal: BPF output (Spectrum analyzer)
VR3: BPF voltage (Adjust with the band expanded.)
BA terminal: BPF voltage.

CONTROL section

VR201: HI power
VR202: DEV

※ Use the ceramic tip driver for adjustment tool.



ADJUSTMENT

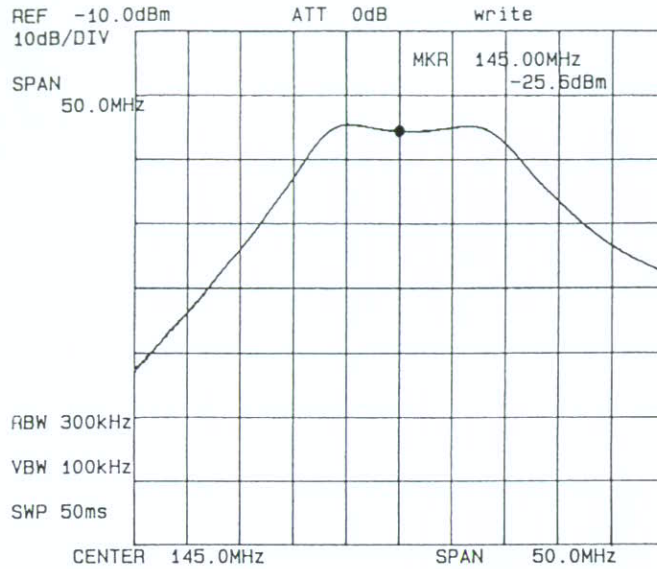


Fig. 2 BPF waveform (145MHz)

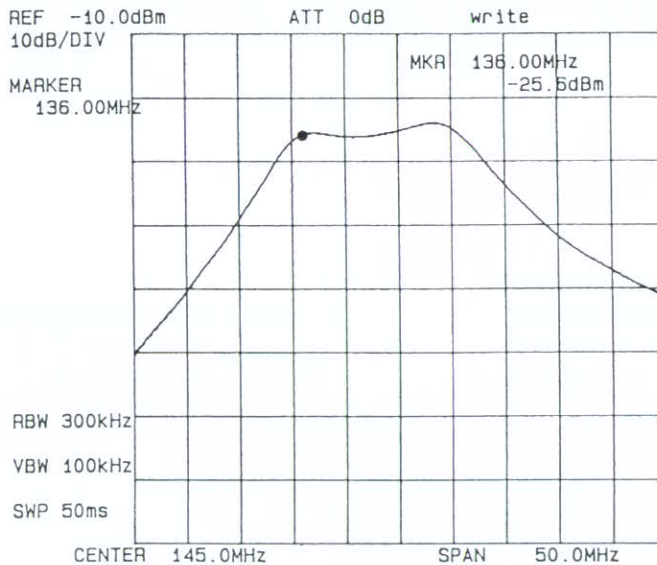


Fig. 3 BPF waveform (136MHz)

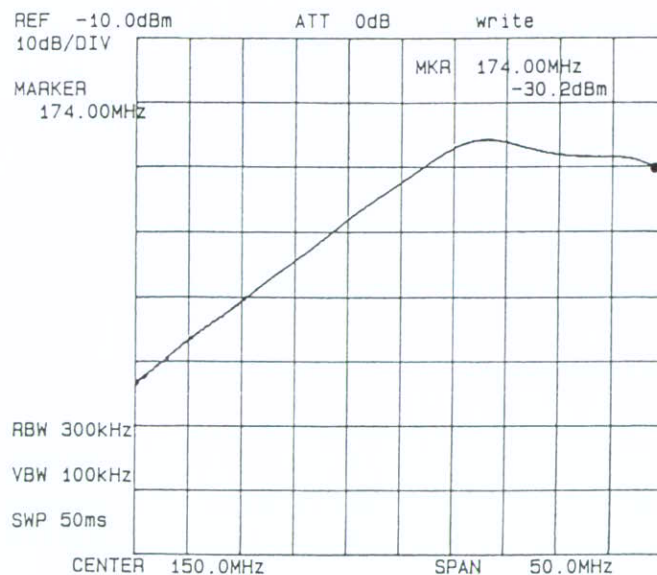


Fig. 4 BPF waveform (174MHz)

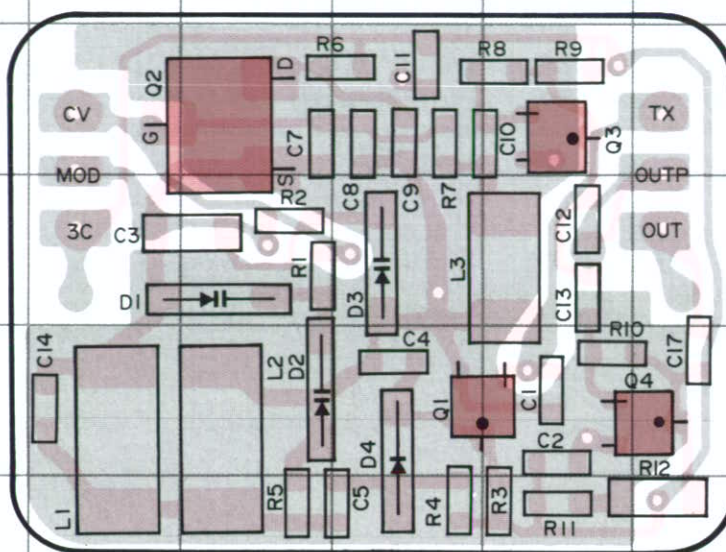
TH-22A/AT/E(S) PC BOARD VIEWS

VCO UNIT (X58-4090-00) (X57-4270-00) (Component side view)

VCO UNIT

(Component side)

Ref. NO.	Address
Q1	5F
Q2	3D
Q3	3G
Q4	5G
D1	4D
D2	5E
D3	4F
D4	5F



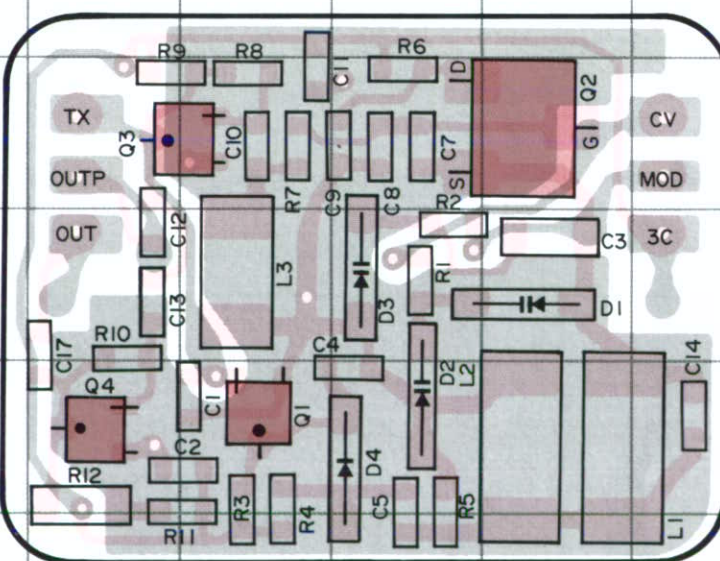
A pattern
 B pattern

VCO UNIT (X58-4090-00) (X57-4270-00) (Foil side view)

VCO UNIT

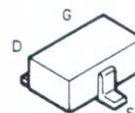
(Foil side)

Ref. NO.	Address
Q1	11E
Q2	9G
Q3	9D
Q4	11D
D1	10G
D2	10F
D3	10F
D4	11F



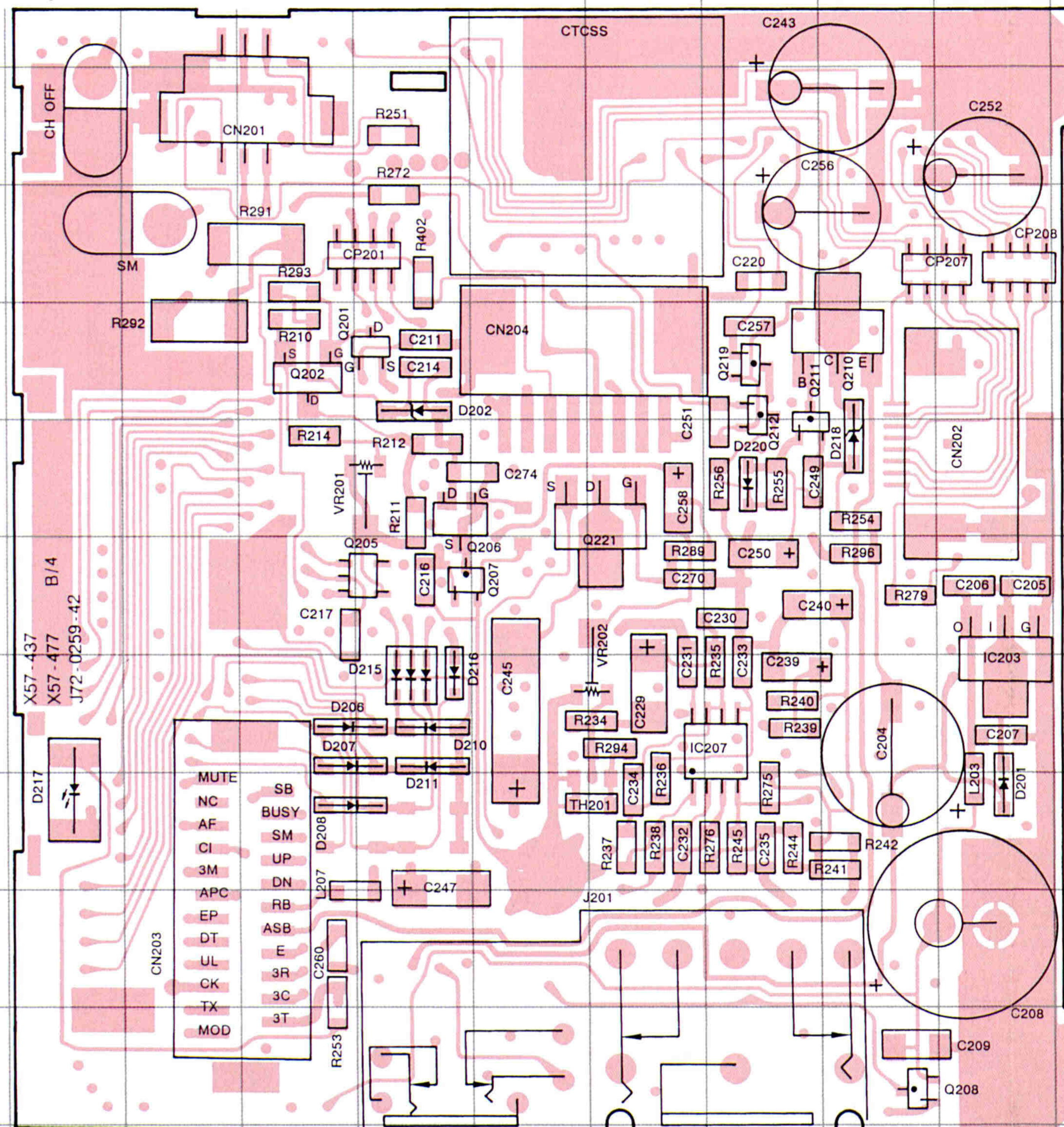
DTC144EE
2SC4808

2SK238



TH-22A/AT/E(S) PC BOARD VIEWS

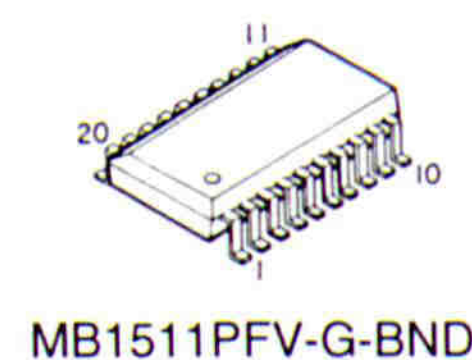
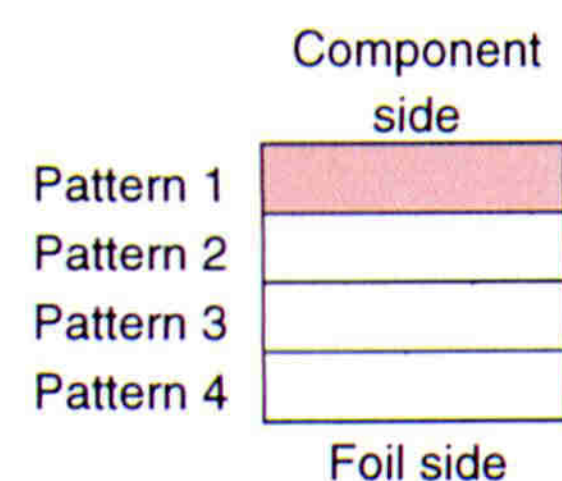
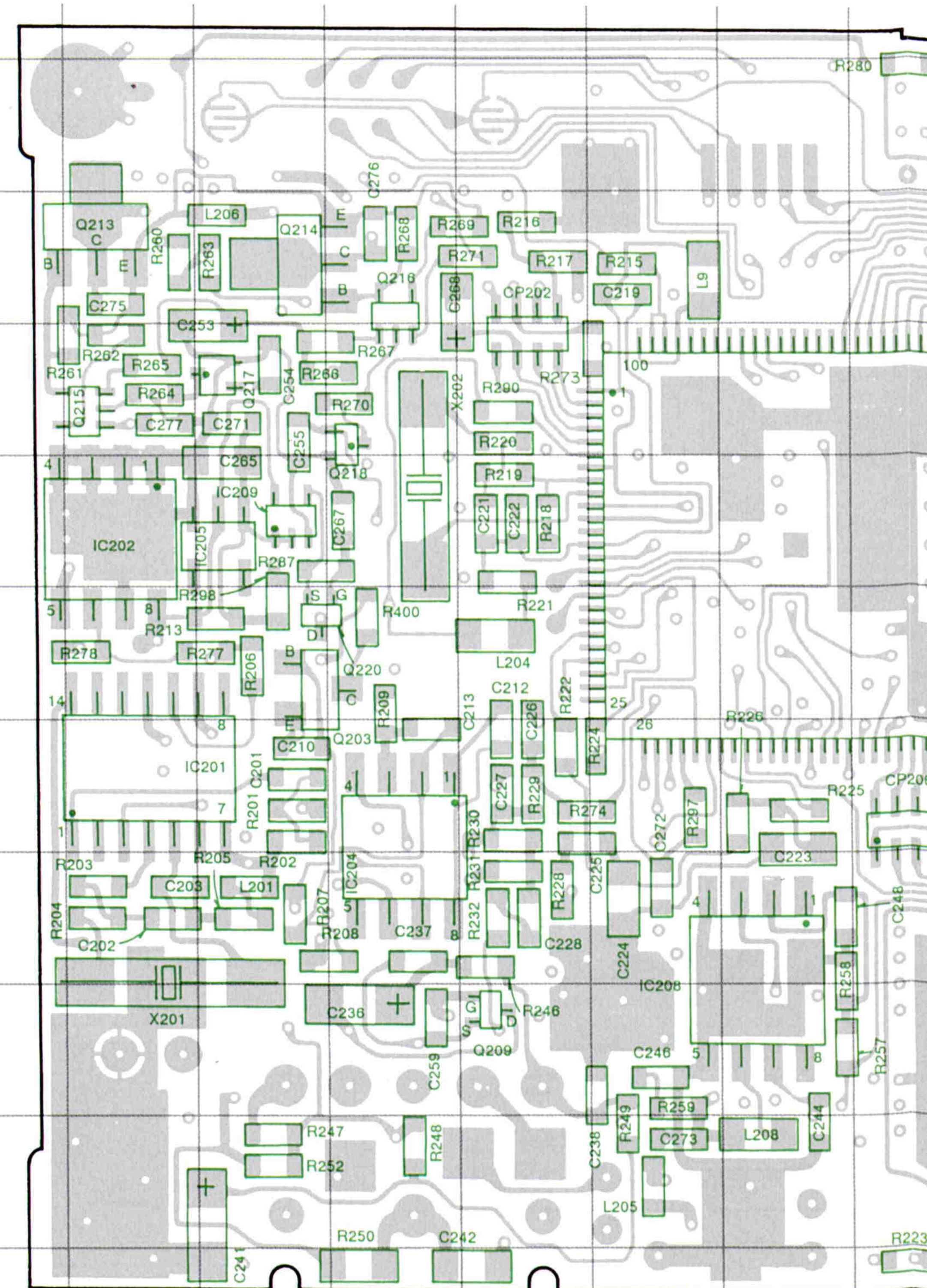
TX-RX UNIT (X57-437X-XX) (B/4):TH-22
 TX-RX UNIT (X57-477X-XX) (B/4):TH-22(S)
 (Component side view)



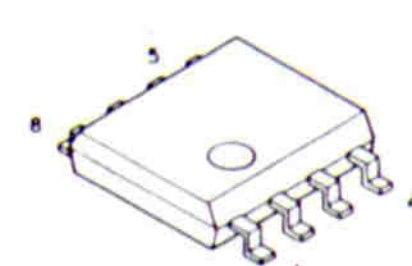
TX-RX UNIT (B/4)
 (Component side)

Ref. NO.	Address
IC203	8J
IC207	9G
Q201	5D
Q202	5D
Q205	7D
Q206	7E
Q207	7E
Q208	11I
Q210	5I
Q211	6H
Q212	6H
Q219	5H
Q221	7F
D201	9J
D202	6E
D206	8D
D207	9D
D208	9D
D210	8E
D211	9E
D215	8E
D216	8E
D217	9B
D218	6I
D220	6H

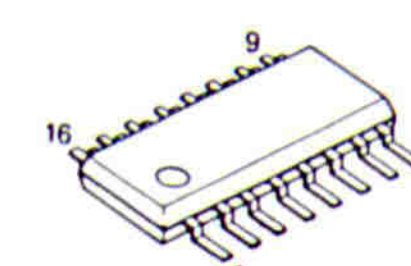
TX-RX UNIT (X57-437X-XX) (B/4):TH-22
 TX-RX UNIT (X57-477X-XX) (B/4):TH-22(S)
 (Foil side view)



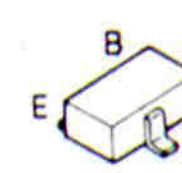
MB1511PFV-G-BND



TC7660MEOA

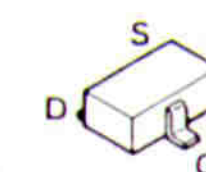


MC3372V

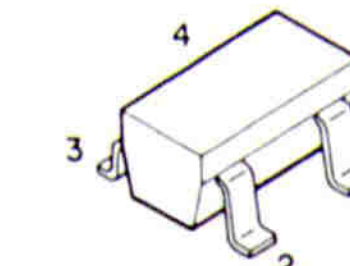
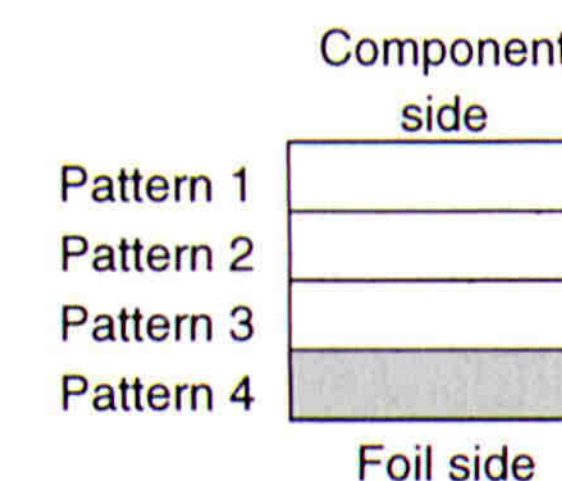


2SC4738
 2SC4619
 2SA1806
 2SC4808
 2SC4083
 DTC114EE

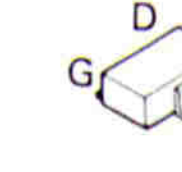
28



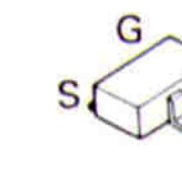
2SK879



2SC4093



2SK1215



2SK1824

2SD

71:X,2-72:E2
23:M5

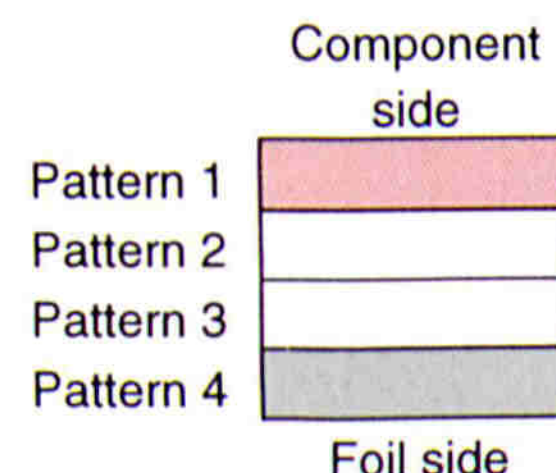
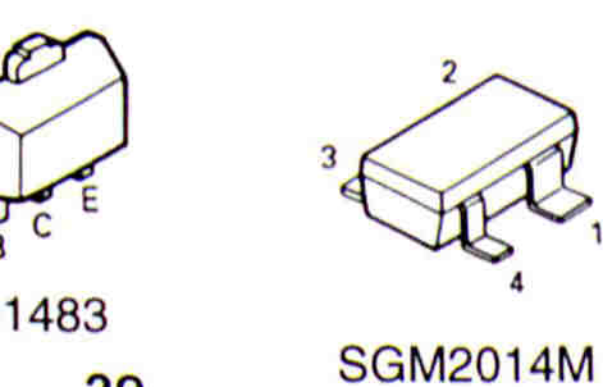
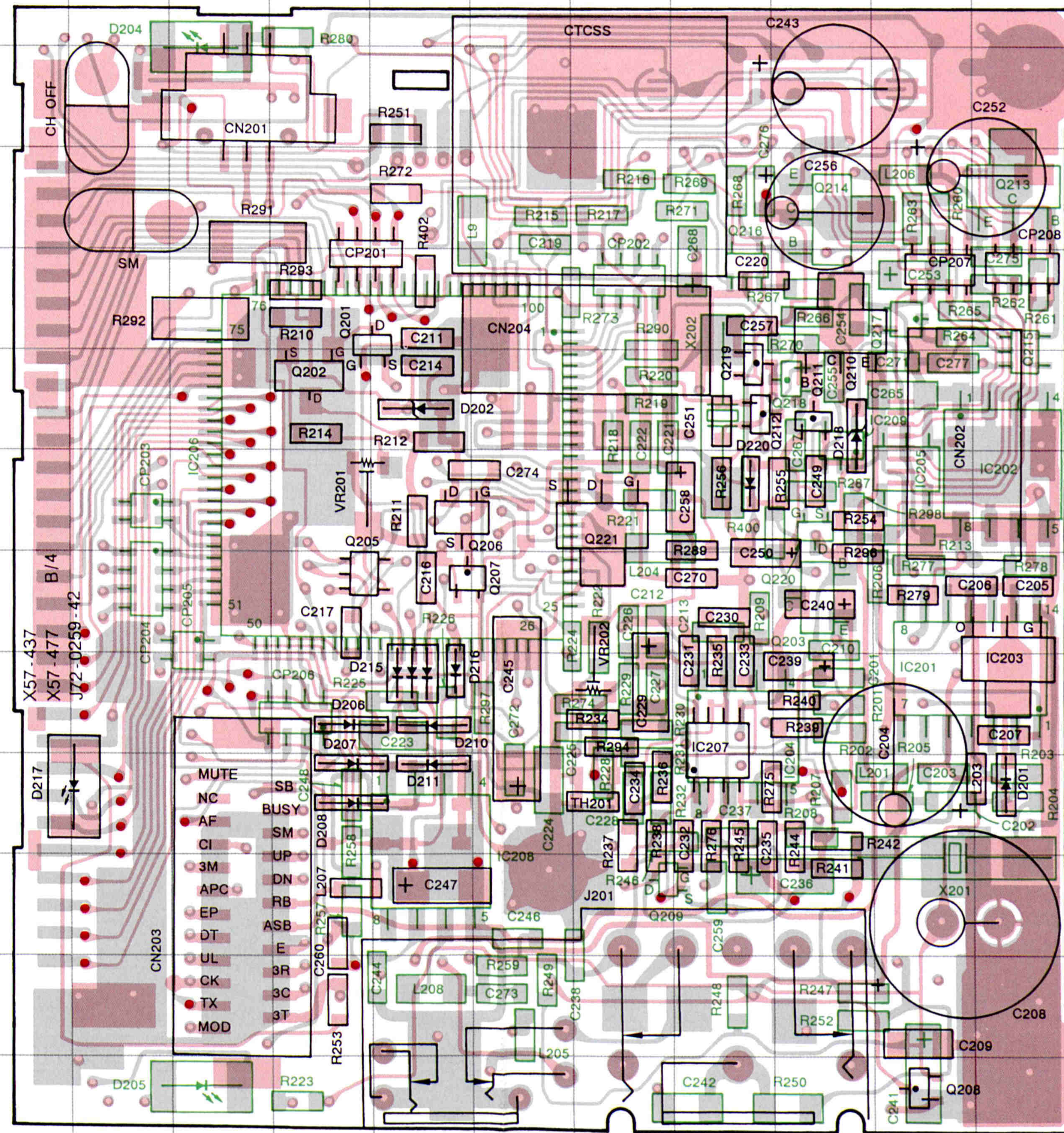
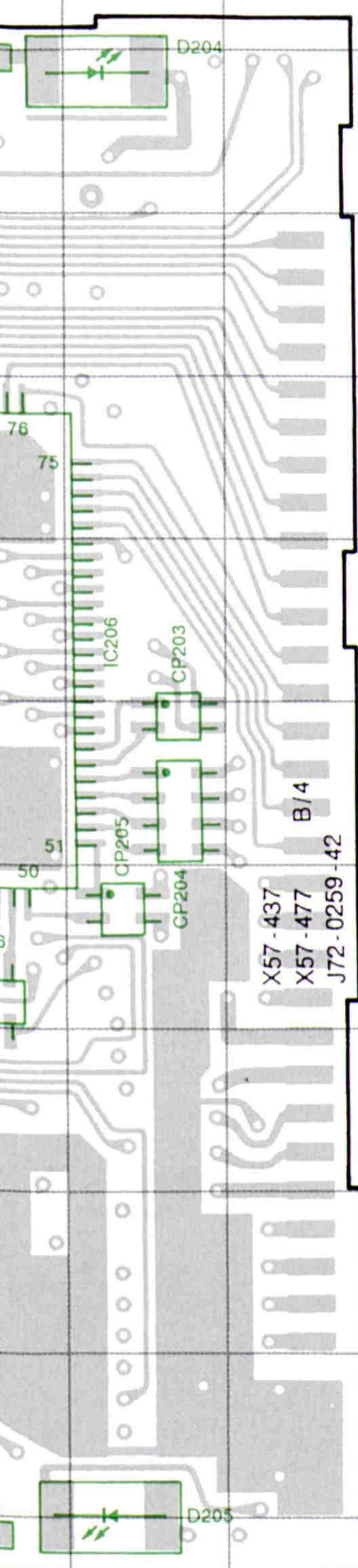
TX-RX UNIT (B/4)
(Foil side)

Ref. NO.	Address
IC201	8N
IC202	6N
IC204	8P
IC205	6N
IC206	6S
IC208	9S
IC209	6O
Q203	7O
Q209	10Q
Q213	4N
Q214	5O
Q215	5N
Q216	4P
Q217	5O
Q218	5P
Q220	7O
D204	3U
D205	12U

TX-RX UNIT (X57-437X-XX) (B/4):TH-22 } 0-11:K,K2,P,2-71:T,E,E3,E4,E9,0-71:X,2-72:E2
TX-RX UNIT (X57-477X-XX) (B/4):TH-22(S) } 2-74:E8,0-21:M,0-22:M2,M3,M4,0-23:M5
(Component side+Foil side view)

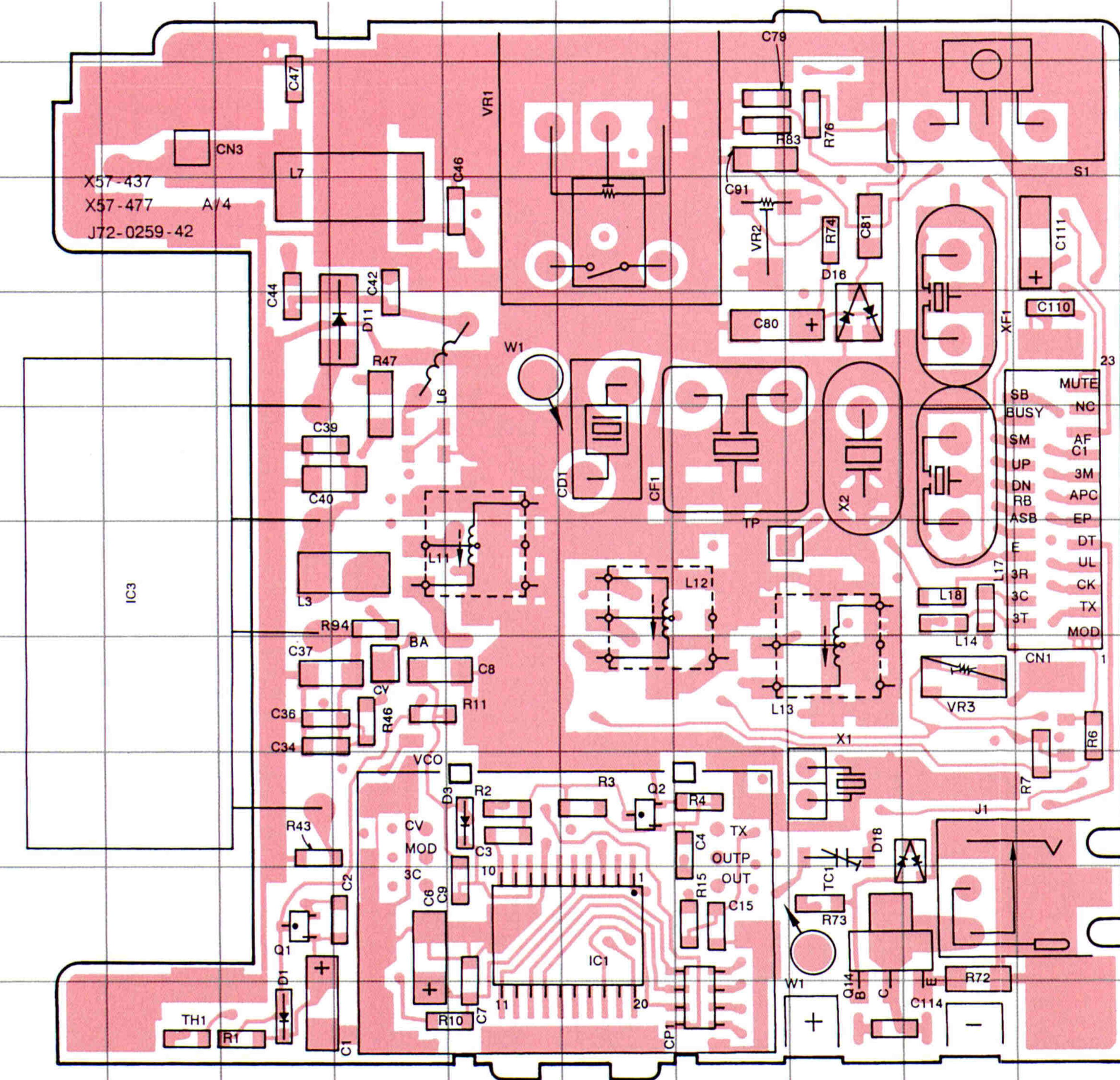
TX-RX UNIT (B/4)
(Component side)+(Foil side)

Ref. NO.	Address
IC201	9AH
IC202	7AI
IC203	9AI
IC204	9AF
IC205	7AH
IC206	6AA
IC207	9AF
IC208	10AC
IC209	6AG
Q201	5AB
Q202	6AB
Q203	8AG
Q205	8AB
Q206	7AC
Q207	8AC
Q208	13AH
Q209	11AE
Q210	5AG
Q211	6AG
Q212	6AF
Q213	4AI
Q214	4AG
Q215	5AI
Q216	5AF
Q217	5AH
Q218	6AG
Q219	6AF
Q220	7AG
Q221	7AE
D201	10AI
D202	6AC
D204	2Z
D205	13Z
D206	9AB
D207	10AB
D208	10AB
D210	9AC
D211	10AC
D215	9AC
D216	9AC
D217	10Y
D218	6AG
D220	7AF



● Connect 1 to 4

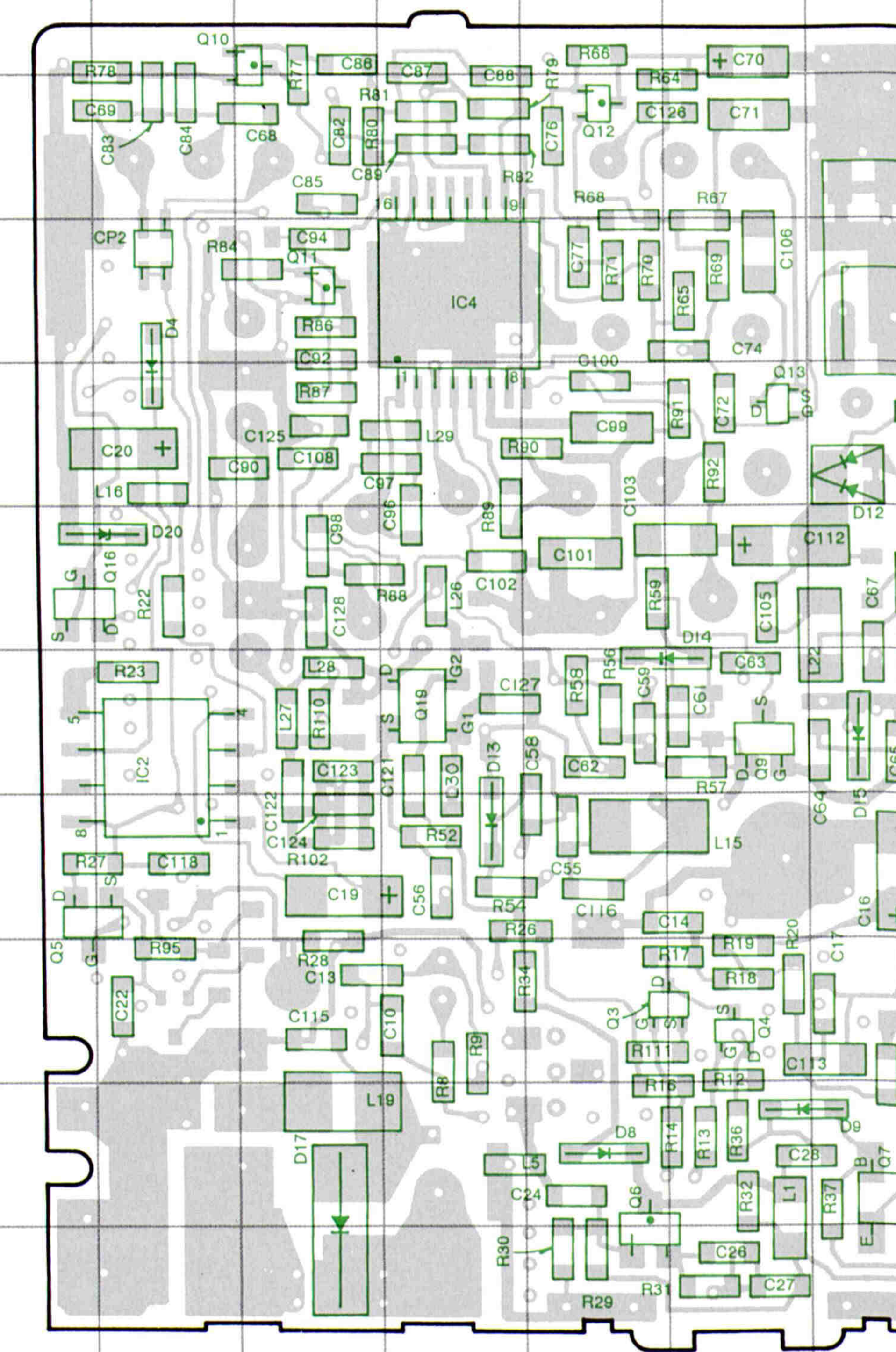
TX-RX UNIT (X57-437X-XX) (A/4):TH-22 } 0-11:K,K2,P,2-71:T,E,E3,E4,E9,0-71:X,2-72:E2
 TX-RX UNIT (X57-477X-XX) (A/4):TH-22(S) } 2-74:E8,0-21:M,0-22:M2,M3,M4,0-23:M5
 (Component side view)



TX-RX UNIT (A/4)
 (Component side)

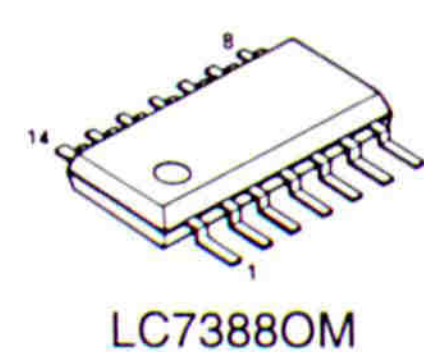
Ref. NO.	Address
IC1	10E
IC3	7B
Q1	10C
Q2	9F
Q14	10H
D1	11C
D3	9D
D11	5C
D16	5H
D18	9H

TX-RX UNIT (X57-437X-XX) (A/4):TH-22 } 0-11:K,K2,P,2-71:T,E,E3,E4,E9,0-71:X,2-72:E2
 TX-RX UNIT (X57-477X-XX) (A/4):TH-22(S) } 2-74:E8,0-21:M,0-22:M2,M3,M4,0-23:M5
 (Foil side view)

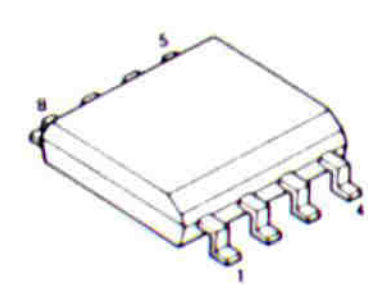


Component side
 Pattern 1
 Pattern 2
 Pattern 3
 Pattern 4
 Foil side

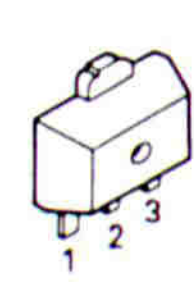
Component side
 Pattern 1
 Pattern 2
 Pattern 3
 Pattern 4
 Foil side



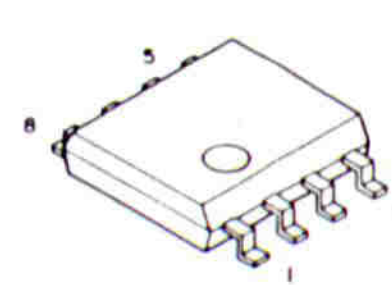
LC7388OM



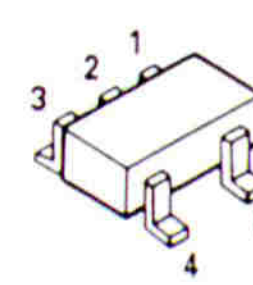
AT24CO4N10SI2.5



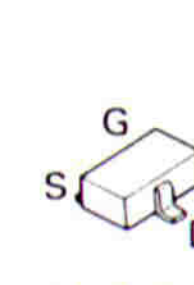
S-81235PG-PI



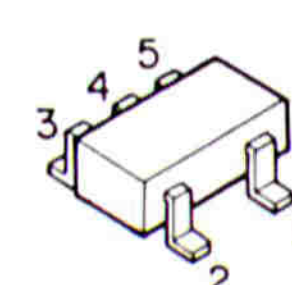
LM301AD
 TA75W558FU
 NJM2070M



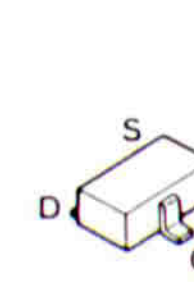
S-80730SN-DT
 TC7508FU



2SK1824
 2SJ204
 2SJ243

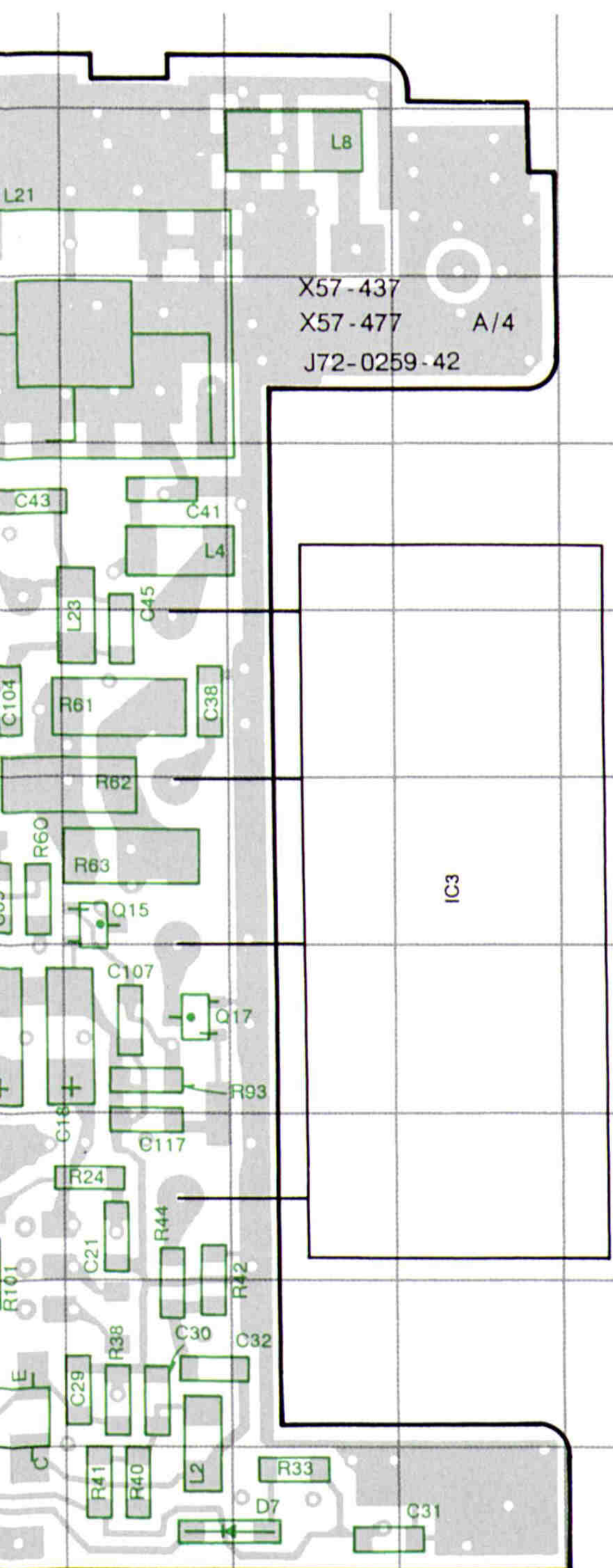


UMC4
 UMW1



2SK879

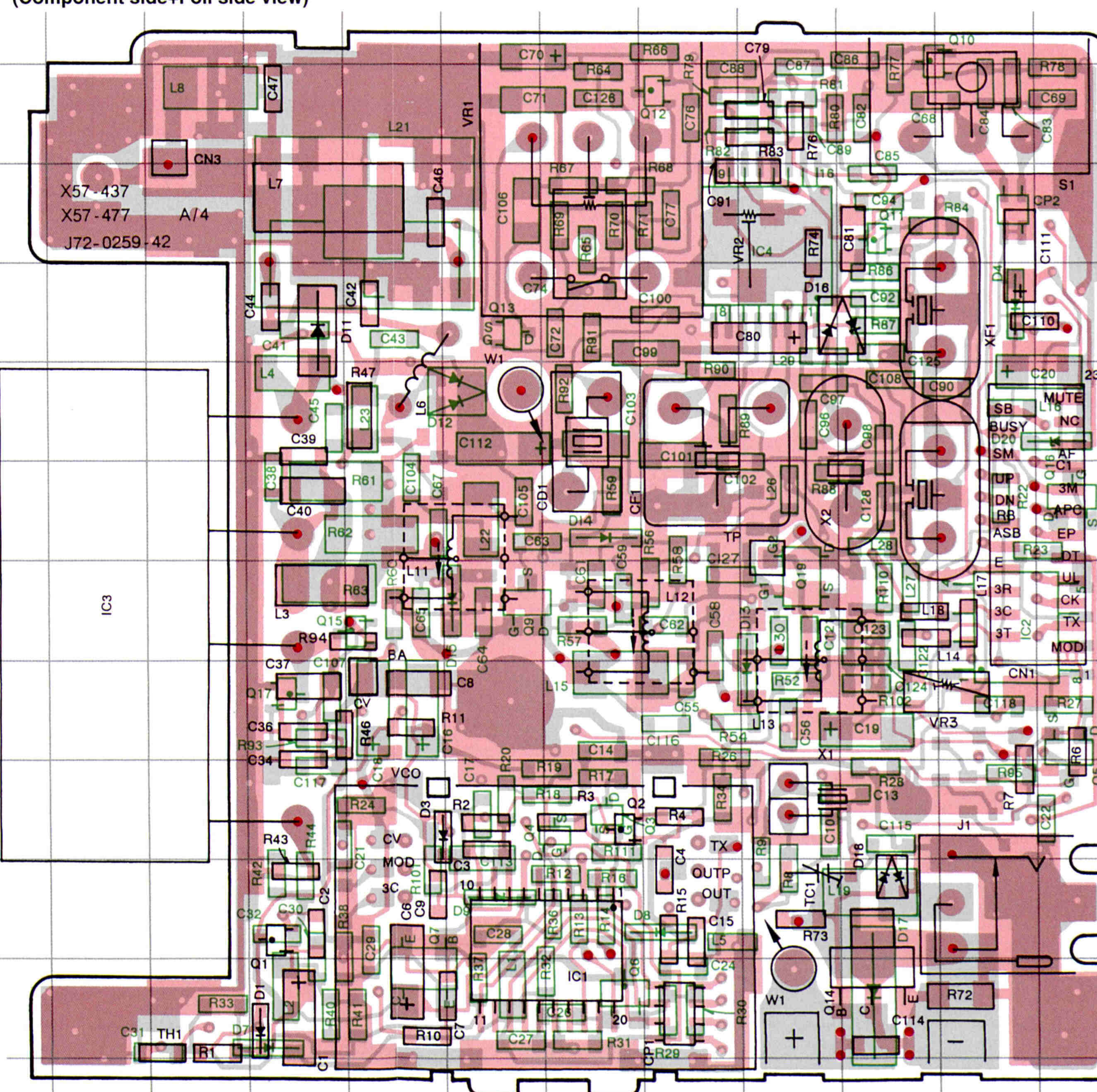
3,E4,E9,0-71:X,2-72:E2
2,M3,M4,0-23:M5



TX-RX UNIT (A/4)
(Foil side)

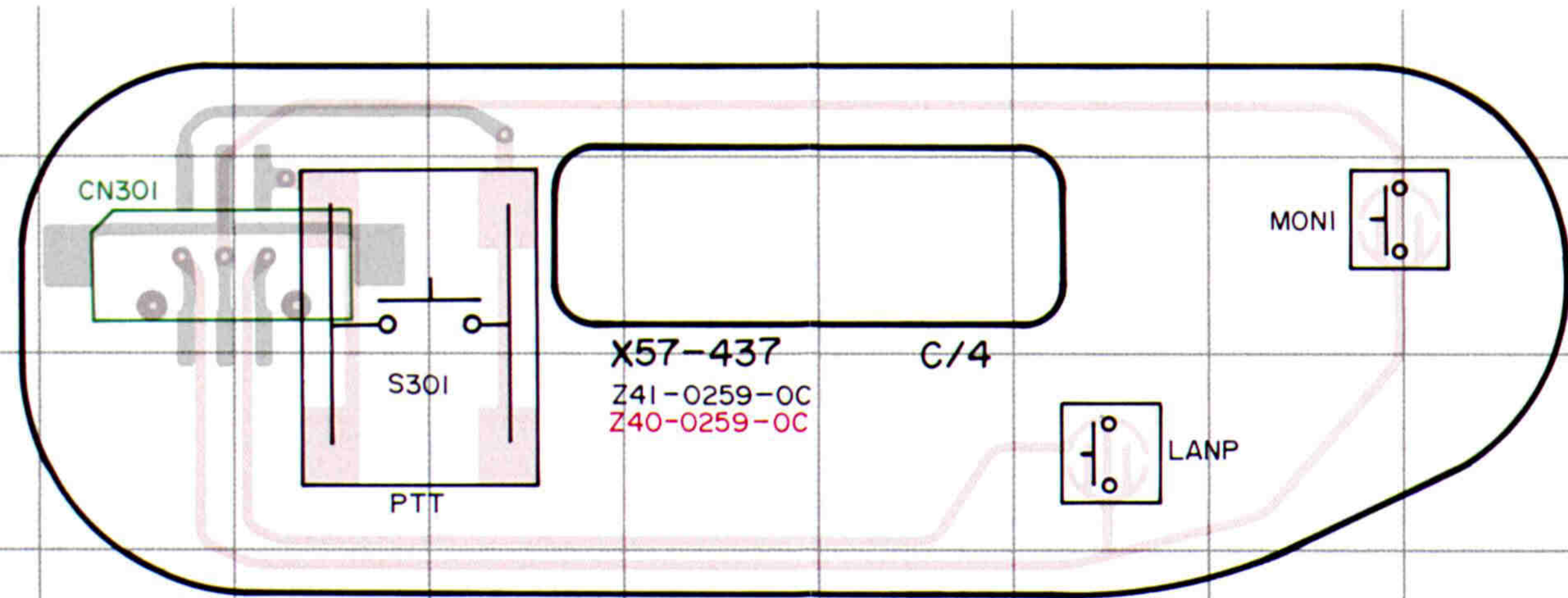
Ref. NO.	Address
IC2	7N
IC4	4P
Q3	9D
Q4	9R
Q5	8M
Q6	11Q
Q7	10S
Q9	7R
Q10	2N
Q11	4O
Q12	3Q
Q13	5R
Q15	7T
Q16	6M
Q17	8T
Q19	7P

TX-RX UNIT (X57-437X-XX) (A/4):TH-22 } 0-11:K,K2,P,2-71:T,E,E3,E4,E9,0-71:X,2-72:E2
TX-RX UNIT (X57-477X-XX) (A/4):TH-22(S) } 2-74:E8,0-21:M,0-22:M2,M3,M4,0-23:M5
(Component side+Foil side view)



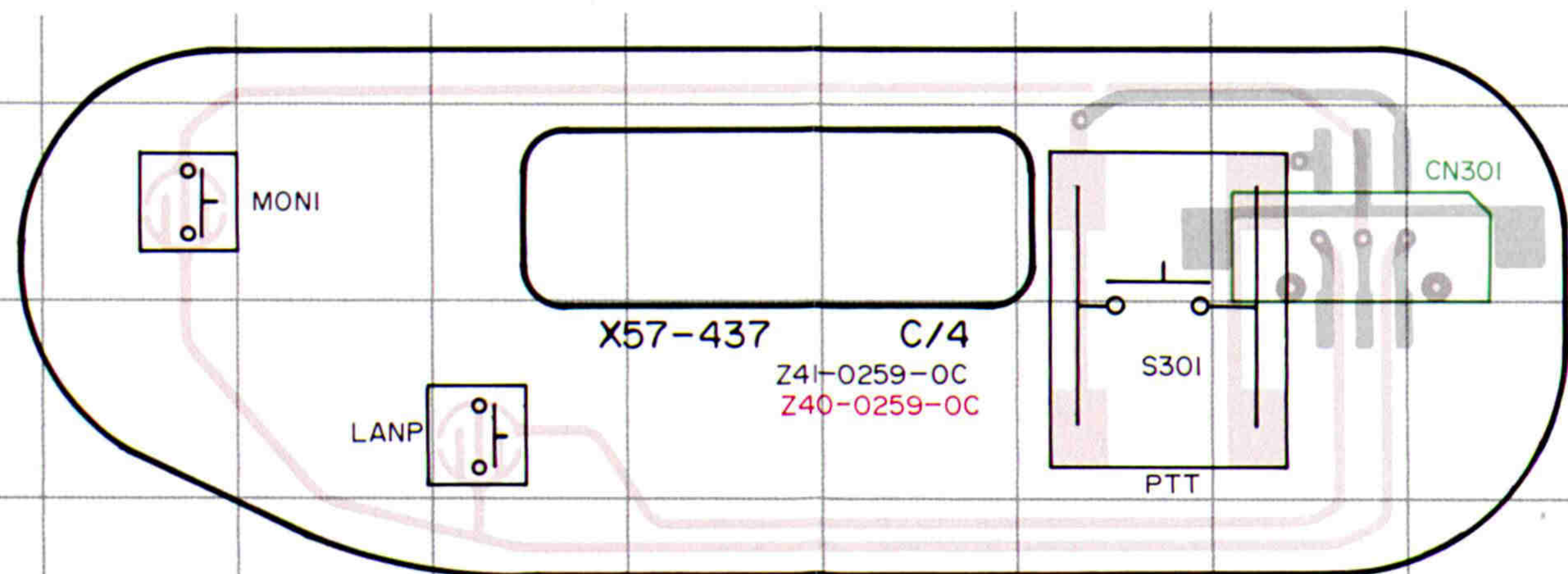
TH-22A/AT/E(S) PC BOARD VIEWS

TX-RX UNIT (X57-437X-XX) (C/4):TH-22
TX-RX UNIT (X57-477X-XX) (C/4):TH-22(S)
(Component side view)

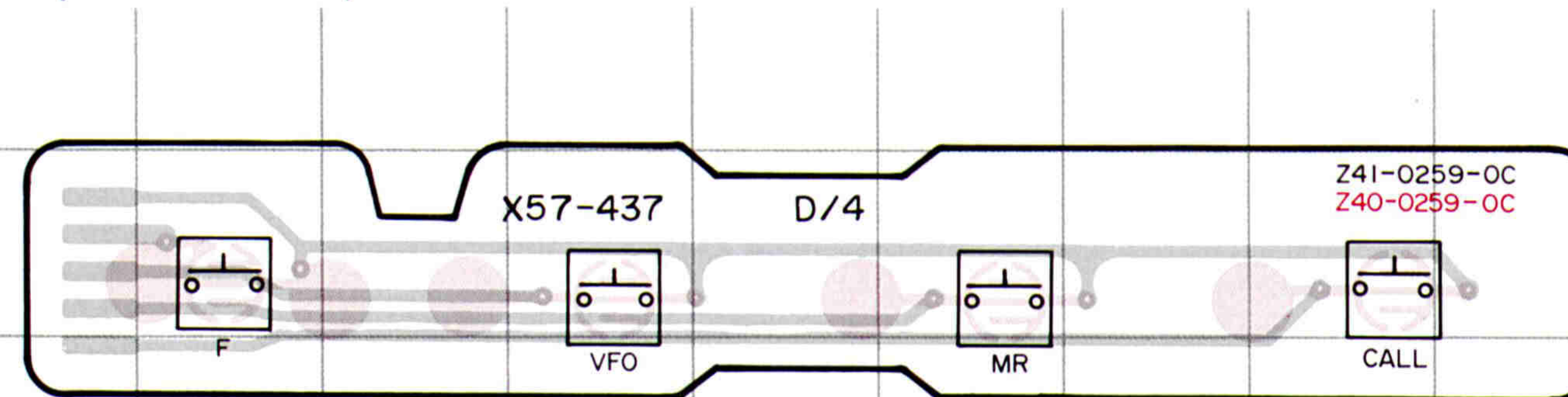


Apattern
Bpattern

TX-RX UNIT (X57-437X-XX) (C/4):TH-22
TX-RX UNIT (X57-477X-XX) (C/4):TH-22(S)
(Foil side view)

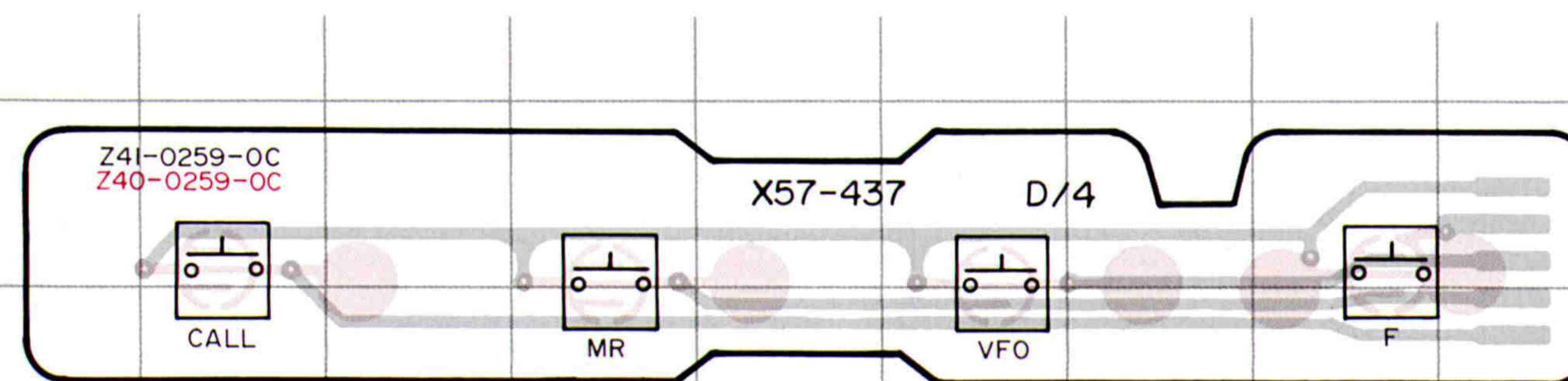


TX-RX UNIT (X57-437X-XX) (D/4):TH-22
TX-RX UNIT (X57-477X-XX) (D/4):TH-22(S)
(Component side view)



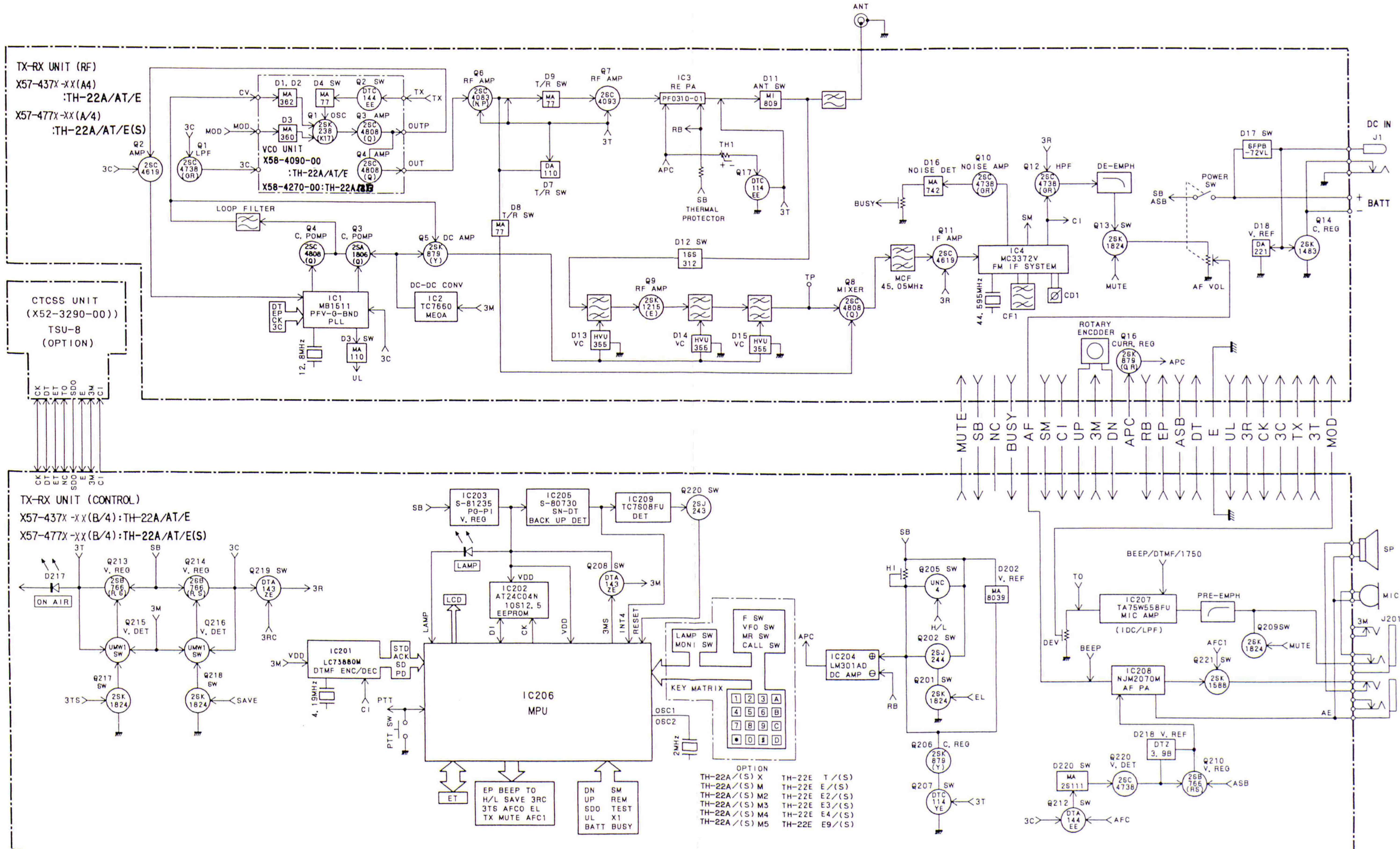
Apat
Bpat

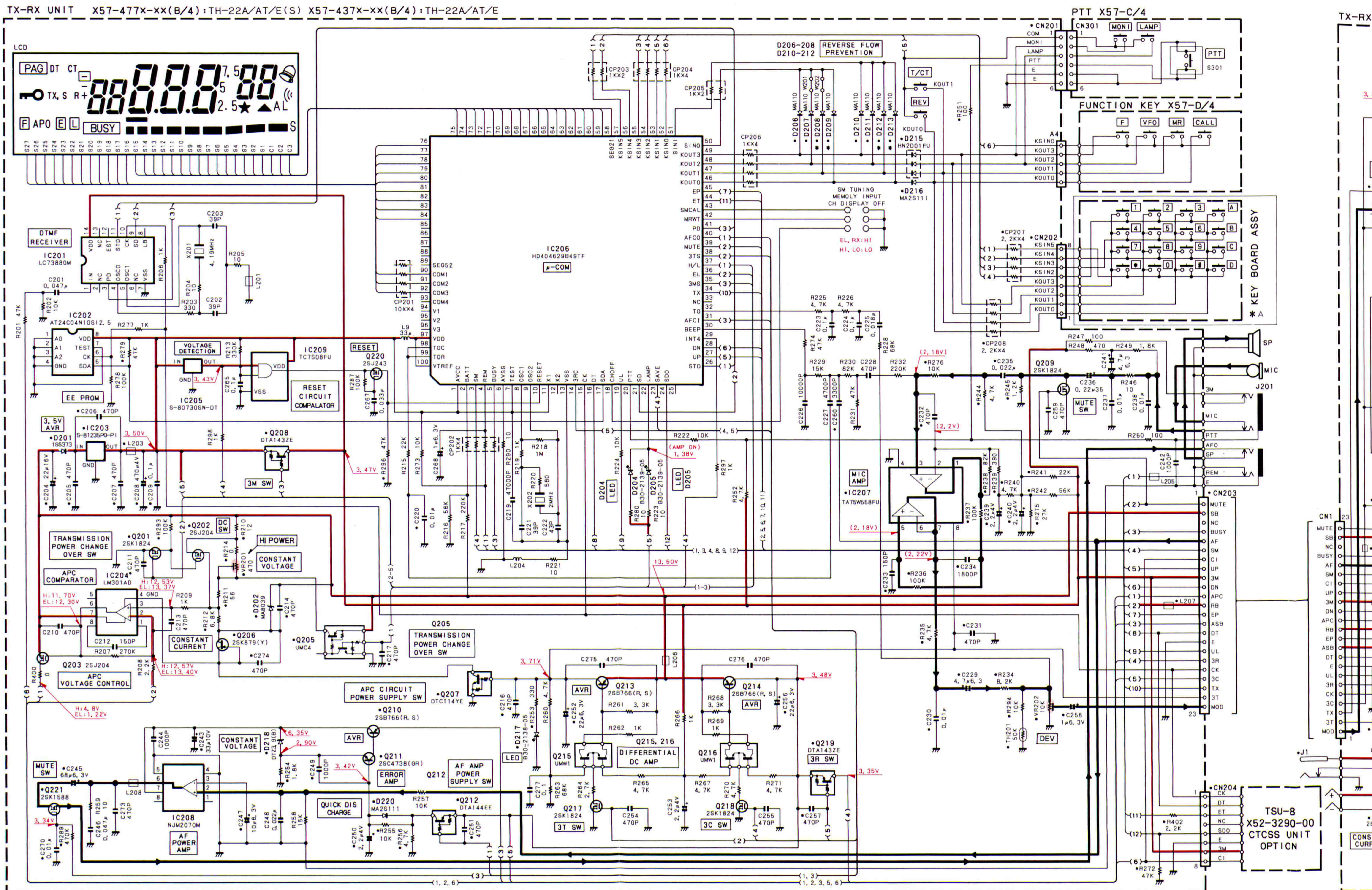
TX-RX UNIT (X57-437X-XX) (D/4):TH-22
TX-RX UNIT (X57-477X-XX) (D/4):TH-22(S)
(Foil side view)



TH-22A/AT/E(S) TH-22A/AT/E(S)

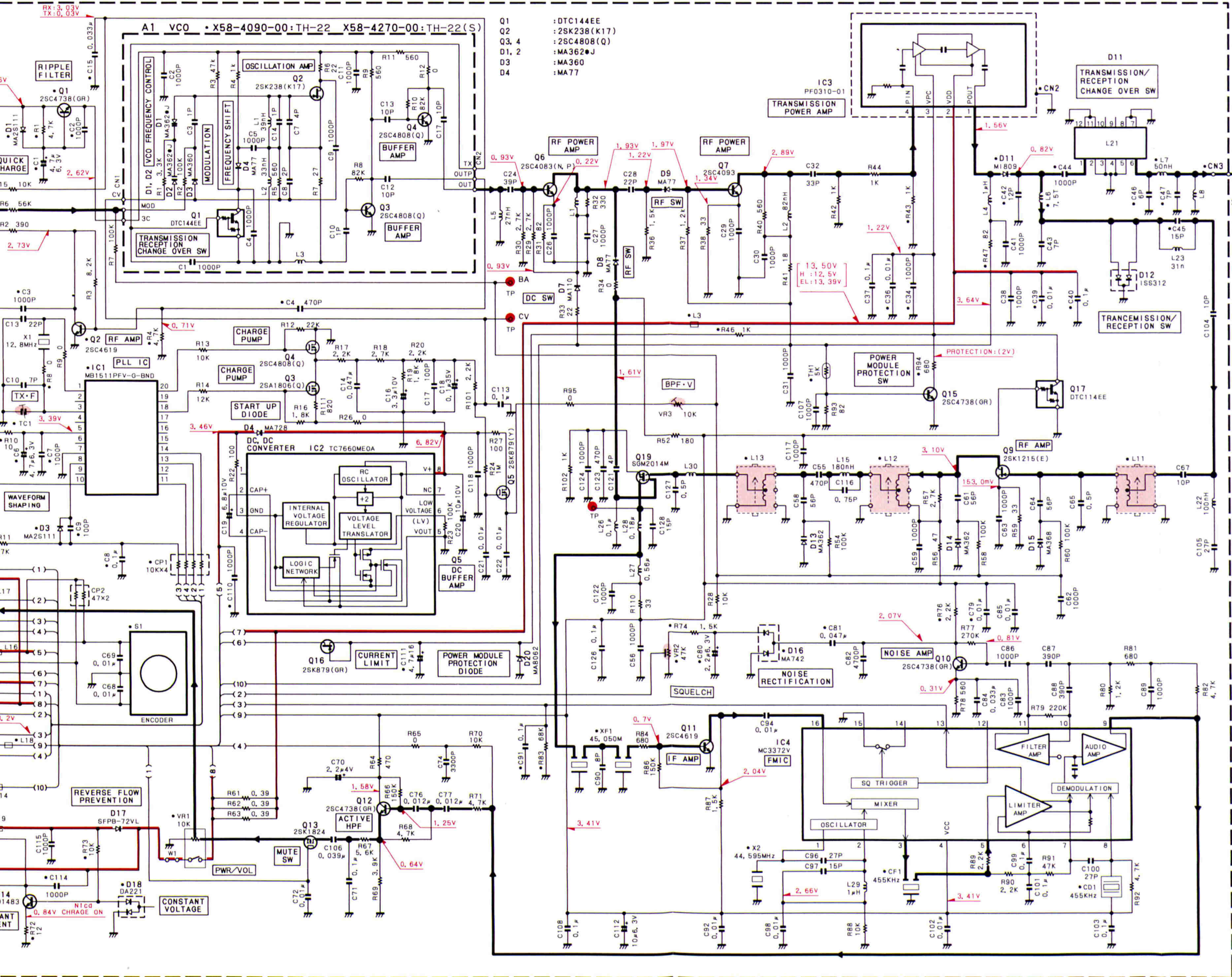
BLOCK DIAGRAM





SCHEMATIC DIAGRAM TH-22A/AT/E(S)

UNIT X57- (A/4)



X57-477X-XX:TH-22(S)
X57-437X-XX:TH-22

	X-XX	D208	D209	D212	D213	*A
TH-22AT	K	0-11	YES	YES	NO	NO
TH-22AT(S)	K2	0-21	YES	NO	YES	YES
TH-22AT(S)	M	0-21	YES	NO	YES	YES
TH-22A	M2	0-22	NO	NO	YES	YES
TH-22A(S)	M3	0-22	NO	NO	YES	YES
TH-22E	M4	0-23	YES	NO	NO	YES
TH-22E(S)	M5	0-23	YES	NO	NO	YES
	T	2-71	YES	YES	YES	YES
	E	2-71	YES	YES	YES	YES
	E3	2-71	YES	YES	YES	YES
	E4	2-71	YES	YES	YES	YES
	E9	2-71	YES	YES	YES	YES
	E2	2-72	NO	YES	YES	YES
	E8	2-74	YES	NO	NO	YES

(A/4)

IC1
IC2
IC3
IC4

Q1, 10, 12, 15
Q2, 11
Q3
Q4
Q5
Q6
Q7
Q9
Q13
Q14
Q16
Q17
Q19

D1, 3
D4
D7
D8, 9
D11
D12
D13, 14
D15
D16
D17
D18
D20

(B/4)

IC201
IC202
IC203
IC204
IC205
IC206
IC207
IC208
IC209

Q201, 209,
217, 218
Q202, 203
Q205
Q206
Q207
Q208, 219
Q210, 213, 214
Q211
Q212
Q215, 216
Q220
Q221

D201
D202
D204, D205
D207, 208
210, 211
D215
D216, 220
D217
D218

LCD

:MB1511PFV-G-BND or MB1511PFV-GBND
:TC7660ME0A
:PF0310-01
:MC3372V

:2SC4738(GR)
:2SC4619
:2SA1806(Q)
:2SC4808(Q)
:2SK879(Y)
:2SC4083(N, P)
:2SC4093
:2SK1215(E)
:2SK1824
:2SD1483
:2SK879(GR)
:DTC114EE
:SGM2014M

:MA2S111
:MA728
:MA110
:MA77
:MI809
:1SS312
:MA362
:MA368
:MA742
:SFPB-72VL
:DA221
:MA8062

:LC73880M
:AT24C04N10S12.5 or AT24C04N10S12.5
:S-81235PG-P1
:LM301AD
:S-80730SN-DT
:HD404629B49TF
:TA75W58FU
:NJM2070M
:TC7S08FU

:2SK1824
:2SJ204
:UMC4
:2SK879(Y)
:DTC114YE
:DTA1432E
:2SB766(R, S)
:2SC4738(GR)
:DTA144EE
:UMW1
:2SJ243
:2SK1588

:1SS373
:MA8039
:B30-2139-05
:MA110
:HN2D01FU
:MA2S111
:B30-2138-05
:DTZ3, 9(B)

:B38-0703-05

Note •Ref. NO: Parts of pattern 1

TH-22A/AT/E(S)

REVISED

SPECIFICATIONS

GENERAL

Frequency range (MHz)	
U.S./Canada	144 to 148
Europe	144 to 146
Australia	144 to 148
General market	144 to 148 ¹
Mode	F2, F3 (FM)
Usable temperature range	-20°C to +60°C (-4°F to +140°F)
Rated voltage	
External power supply (DC IN)	5.0 to 16.0 V DC (13.8 V DC)
Battery terminals	4.0 to 15.0 V DC (6.0V DC)
Current drain (Approx.)	
Receive with no signal (Average)	45 mA
Battery Saver ON	15 mA
Transmit with H, 13.8V DC (Ext. power supply)	1.3 A
Transmit with H, 6.0V DC (Battery)	1.3 A
Transmit with L, 6.0V DC (Battery)	0.5 A
Transmit with EL, 6.0V DC (Battery)	250 mA
Grounding method	Negative ground
Dimensions (WxHxD)	56 x 116.5 x 24.5 mm
Dimensions (projections included)	65 x 130.5 x 29.8 mm
Weight ² (Approx.)	290 g
Microphone impedance	2 kΩ
Antenna impedance	50 Ω

TRANSMITTER

Power output (Approx.)	
H, 13.8 V	5 W
H, 6.0 V	3 W
L, 6.0 V	0.5 W
EL, 6.0 V	30 mW
Modulation	Reactance
Maximum frequency deviation	±3.5 kHz to ±5 kHz
Spurious emissions	-60 dB or less

RECEIVER

Circuitry	Double conversion superheterodyne
1st intermediate frequency	45.05 MHz
2nd intermediate frequency	455 kHz
Sensitivity (12 dB SINAD)	-16 dBμ 0.16 μV or less
Squelch sensitivity	-20 dBμ (0.1 μV) or less
Selectivity	
-6 dB	12 kHz or more
-40 dB	28 kHz or less
Audio output (10 % distortion)	200 mW or higher (8 Ω load)

¹ Some versions have reduced RX and TX range: 144 to 146 MHz.

² Antenna, hand strap, belt hook, and PB-32 included.

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