SPEAKER MICROPHONE

KMC-51

SERVICE MANUAL

REVISED

KENWOOD

JVC KENWOOD Corporation

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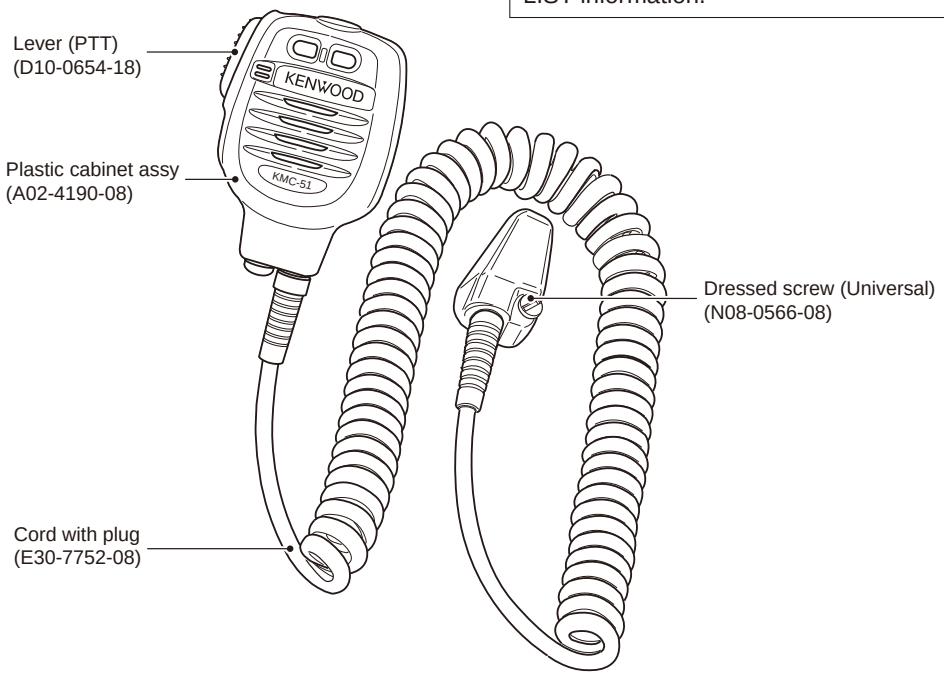
This revised edition service manual updates the PARTS LIST information.



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SPECIFICATIONS

General

Operating temperature range
.....–30°C ~ +60°C (–22°F ~ +140°F)

Microphone

Impedance .....600Ω (MAX)
Sensitivity .....–39dB ±3.5dB at 1kHz

Speaker

Impedance .....16Ω ±15% at 1.2kHz
Rating input 0.8W
Maximum input 1.6W
Dimensions (W x H x D)
..... 67.8 x 91.5 x 43.3 mm (2.67 x 3.60 x 1.70 in)
Weight .....Approx. 260g/9.2oz

This product complies with the **RoHS** directive for the European market.

This product uses Lead Free solder.

DISASSEMBLY FOR REPAIR

1. Removing the cable ASSY

1) Pull out the holder that is set into the fixing bracket of the cable ASSY, using a pair of pliers.

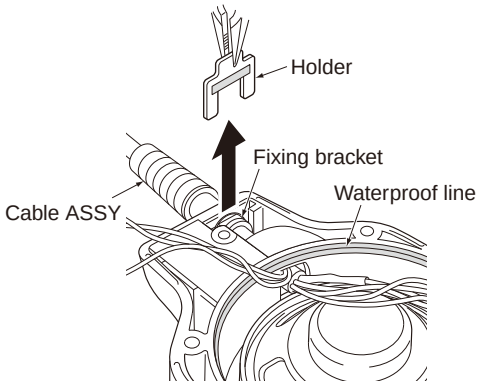


Fig. 1

2) Completely peel off the bond (*1) glued to the cable ASSY, using a set of diagonal cutters.
Note: Please be careful not to damage the coating of the cable ASSY and the waterproofing line of the front case.
*1: Use the following bond:
• Manufacture name: Shin-Etsu Chemical Co., Ltd.
• Bond name: Shin-Etsu silicone One-component RTV silicone rubbers Alcohol type KE-4898-T

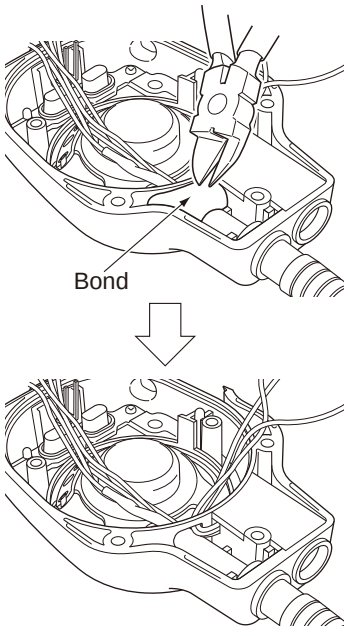


Fig. 2

3) Following the procedure below, pass through the connector part of the cable ASSY into the hole of the front case (waterproof line part).

(1) Move the three lead wires soldered onto the PCB to the upper corner of the hole.
(2) The yellow lead wire side of the connector comes in the inside of the front case.

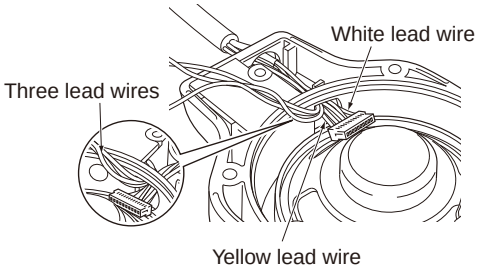


Fig. 3

(3) Push the cable ASSY to the earphone jack side with the connector part bent as shown in the figure, then hook the end of the connector (white lead wire side) into the outside corner of the hole, using your finger.
(4) Pass the connector through the hole, pushing the connector (yellow lead wire side) using a pair of tweezers or similar tool.
Note: Attach adhesive tape or rubber to the end of the tweezers so as not to damage the connector of the cable ASSY.

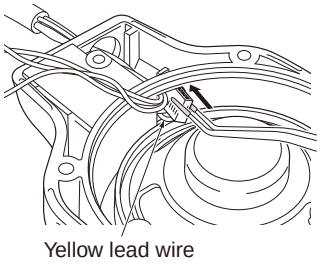


Fig. 4

4) Pull the cable ASSY, then remove the cable ASSY from the front case by passing the connector part through the hole of the front case.

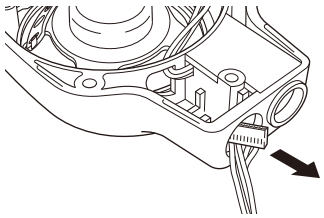


Fig. 5

DISASSEMBLY FOR REPAIR

2. Installing the cable ASSY

1) Pass the connector part of cable ASSY through the hole of the front case.
2) Move the three lead wires soldered onto the PCB to the upper corner of the hole.

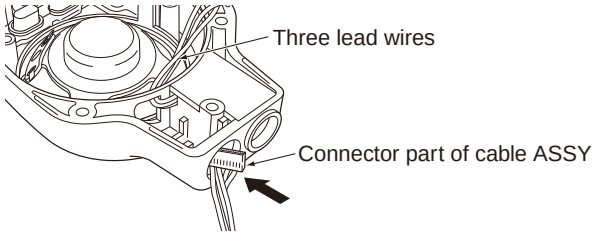


Fig. 6

3) Make sure the yellow lead wire side of the connector is in the inside of the front case.

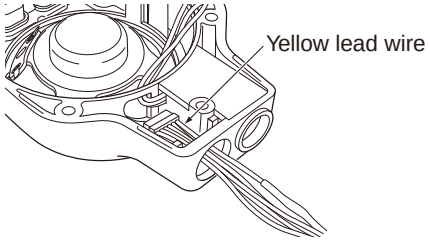


Fig. 7

4) Push the connector (yellow lead wire side) to the lower corner of the hole using a pair of tweezers.
   Note: Attach adhesive tape or rubber to the end of the tweezers so as not to damage the connector of the cable ASSY.
5) Pass the connector through the hole by pushing the connector (white lead wire side) using a pair of tweezers or similar tool.

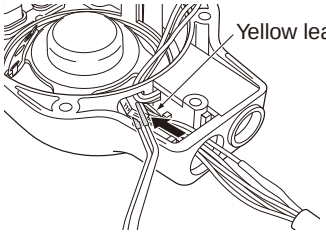


Fig. 8

6) Push the cable ASSY to the inside of the case, then insert the fixing bracket of the cable ASSY to the hole of the front case.
7) Fit the holder to the fixing bracket of the cable ASSY.

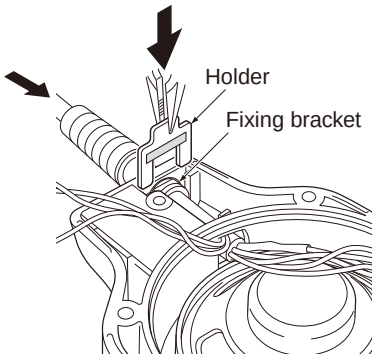


Fig. 9

8) Insert the cap in the earphone jack hole of the front case.
9) Apply the bond (*1) at the position shown in the figure, then firmly attach the cable ASSY and case.
   Note: Take care not to apply the bond to the waterproofing line of the front case.
   *1: Use the following bond :
   • Manufacture name: Shin-Etsu Chemical Co., Ltd.
   • Bond name: Shin-Etsu silicone One-component RTV silicone rubbers Alcohol type KE-4898-T

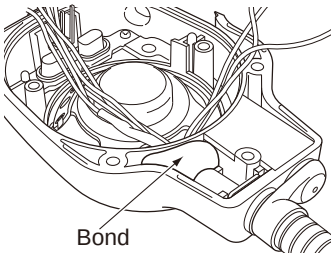


Fig. 10

3. Attach the lead wires of the earphone jack and connector of the cable ASSY to the PCB

1) Solder the three lead wires (red, white, black) of the earphone jack to the three solder pads (RED, WHT, BLK) of the PCB, respectively.
   Note: When you solder the three lead wires to the PCB, be careful that the soldering iron does not touch the lead wires of the cable ASSY.
2) Insert the connector of the cable ASSY into the connector (CN1) of the PCB.

DISASSEMBLY FOR REPAIR

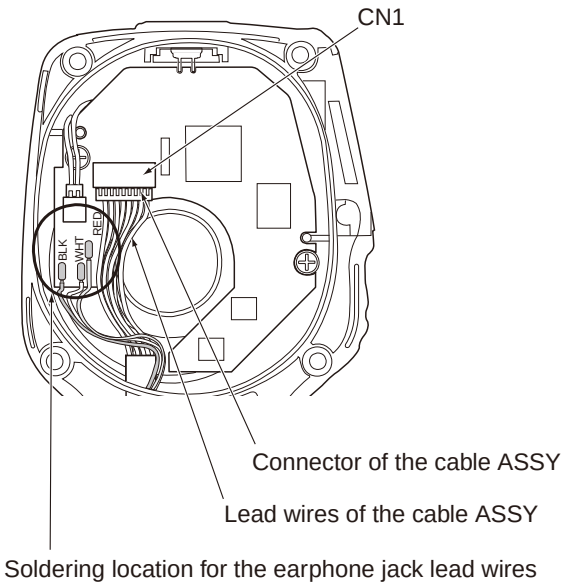


Fig. 11

4. Forming the lead wires of the sub microphone

1) Pass the lead wires of the sub microphone between boss A and boss B of the holder.
2) Push the lead wires into the spaces between the triangle shape of the holder and the packing.
3) Insert the connector (CN4) of the PCB without strongly pulling the lead wires.

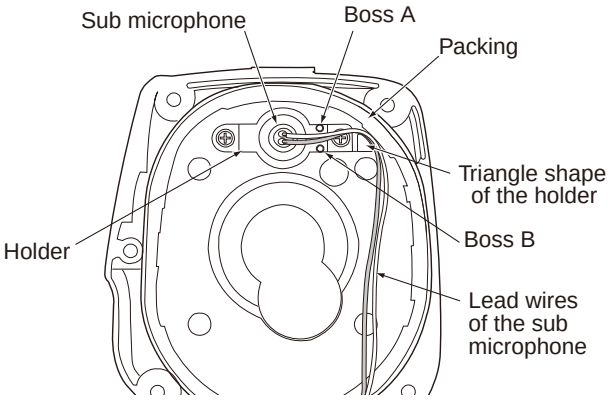


Fig. 12

5. Assemble the main microphone circumference

1) Insert the keytop into the front case.
2) Insert the main microphone into the keytop.
3) Pass the lead wires of the microphone through the hole of the holder.

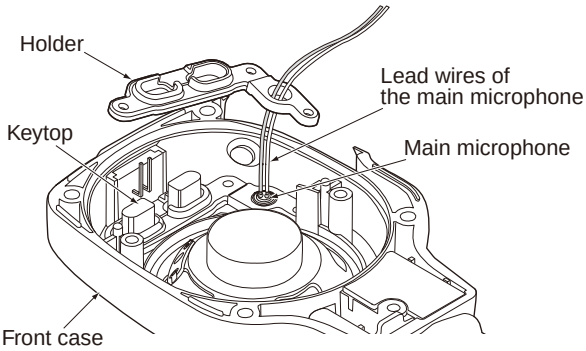


Fig. 13

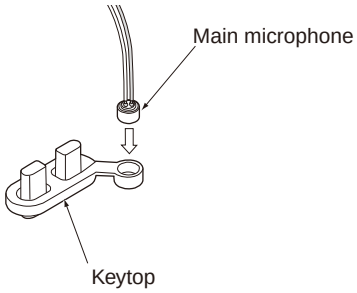


Fig. 14

4) Fit the holder to the front case, avoiding the leg of LED.

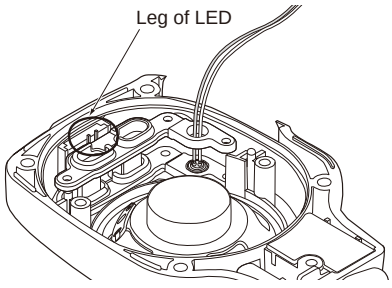


Fig. 15

DISASSEMBLY FOR REPAIR

5) Attach the three screws to the holder.

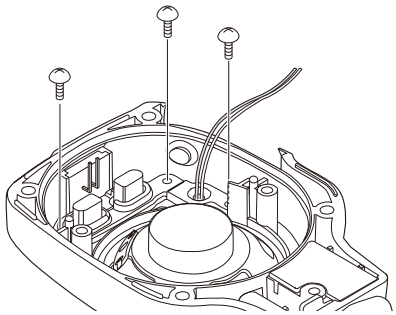


Fig. 16

6. Precautions for the soldering work of the ECM (microphone)

A FET is contained in the ECM.

This FET can be easily damaged from excessive heat and electrical shock.

Frequency characteristics and sensitivity will degrade when applying exterior power to the ECM.

Be sure to adhere to the following points.

- We recommend you use a soldering iron and apply a temperature of 345°C (653°F) or less.
- Soldering should be accomplished within 2 seconds at each terminal so as not to overheat the ECM.
- Do not hold the ECM with a pair of pliers.
- Do not drop the ECM from a high place.

NOISE CANCELLATION OPERATION CHECK METHOD

Check the noise cancellation operation according to the following procedures.

■ Preparation

Procedure 1. Prepare the two transceivers (transmitting side and receiving side) and one microphone. (The receiving side can also use the radio communication tester, etc..)

Procedure 2. Set the two transceivers so that they can communicate.

Procedure 3. Connect the microphone to the universal connector on the transmitting transceiver.

Procedure 4. Press the PTT switch of the microphone (the transceiver will transmit if the LED lights up).

■ Checking the main microphone

Procedure 5. Blow into the front side microphone hole, from a distance of 3 to 4 cm (1.18 to 1.57 inches).

[Expected Result]

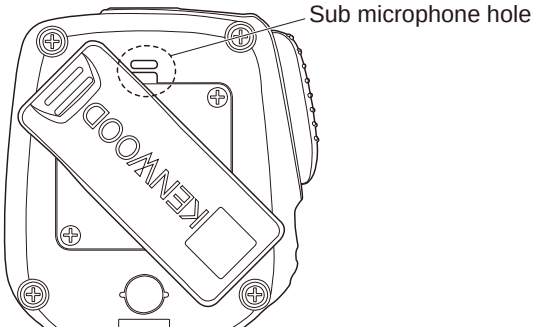
It is OK if you can hear a wind noise from the speaker of the receiving transceiver.

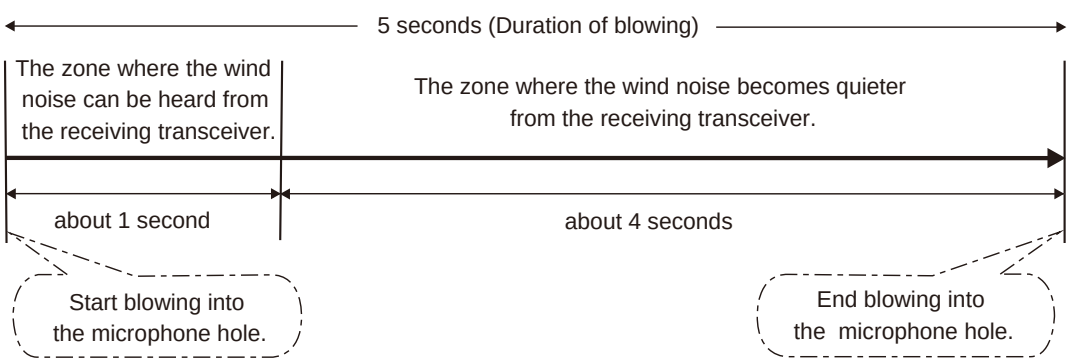
■ Checking the sub microphone

Procedure 6. Blow into the rear side microphone hole for 5 seconds, from a distance of 3 to 4 cm (1.18 to 1.57 inches).

[Expected Result]

You can hear a wind noise from the speaker of the receiving transceiver for about 1 second. Then, it is OK if the wind noise level becomes quieter.





TROUBLE SHOOTING

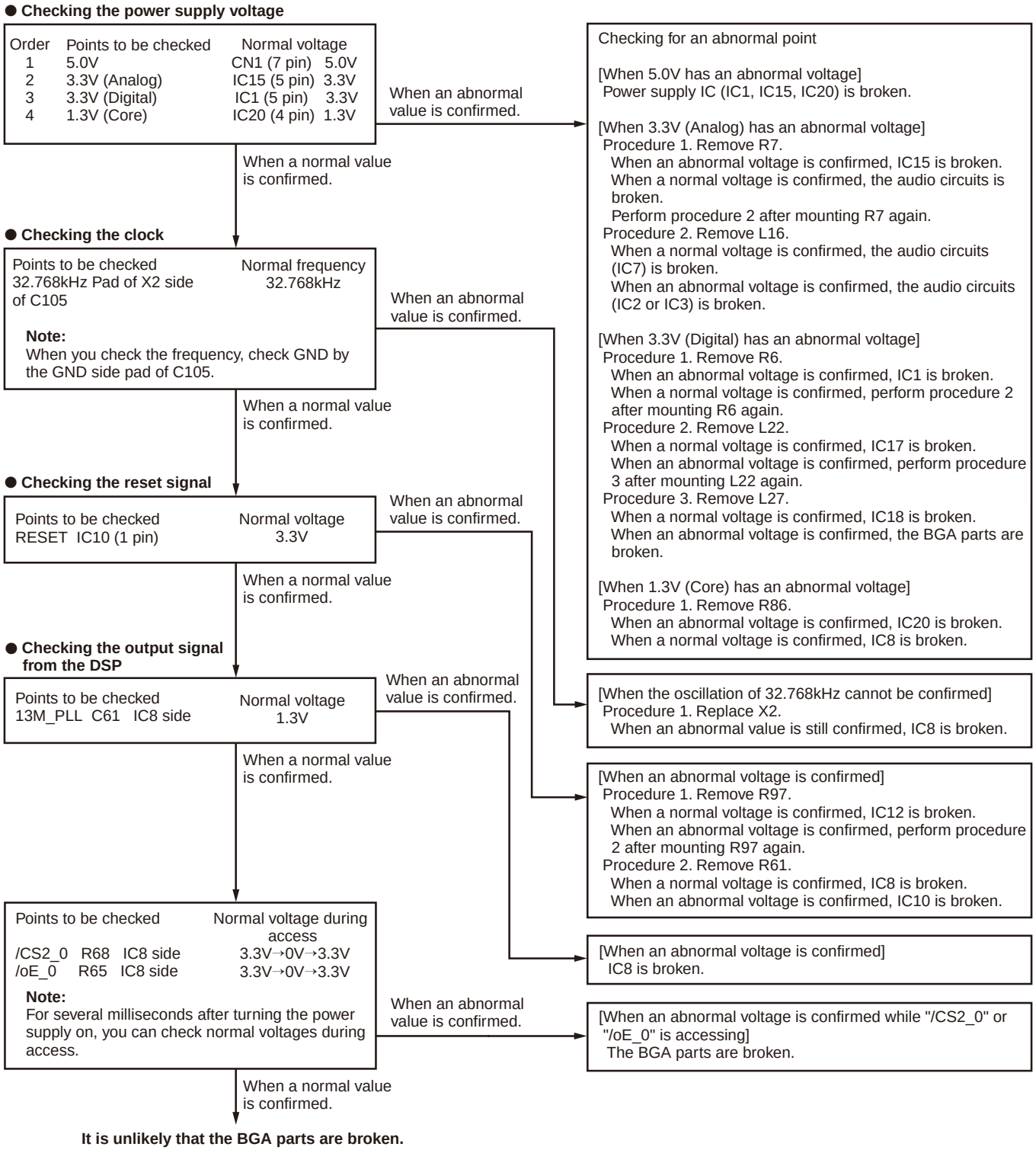
Fault Diagnosis of the BGA (Ball Grid Array) IC

■ Overview:

The following flowchart is used to determine whether or not the problem is with the BGA parts when the microphone (which satisfies the following conditions) does not turn on.

■ Conditions for the microphone which does not turn on

When the transceiver does not transmit (the LED does not light up) even if the microphone PTT switch is pressed while the microphone is connected to the transceiver.



PARTS LIST

✻ New Parts. ⚠indicates safety critical components.
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.

L : Scandinavia **K** : USA **P** : Canada
Y : PX (Far East, Hawaii) **T** : England **E** : Europe
C : China **X** : Australia **M** : Other Areas

KMC-51
MICROPHONE/EARPHONE JACK UNIT

Ref. No.	Address	New parts	Parts No.	Description	Destination
KMC-51					
1		✻	A02-4190-08	PLASTIC CABINET ASSY	
2		✻	A82-0086-08	REAR PANEL	
4		✻	B43-1670-08	BADGE(KMC-51)	
5		✻	B43-1681-08	BADGE(KENWOOD)	
7			D10-0654-18	LEVER(PTT)	
10		✻	E30-7752-08	CORD WITH PLUG	
11			G10-1386-08	FIBROUS SHEET(PHONE JACK)	
12		✻	G10-1389-08	FIBROUS SHEET(MAIN/SUB ECM)	
13			G11-4450-08	SHEET(LEAK TEST)	
14			G11-4452-08	SHEET(PHONE JACK)	
15		✻	G11-4505-08	SHEET(LEAK HOLE)	
16			G13-2241-08	CUSHION(PTT)	
17			G53-1779-08	PACKING(PTT)	
18		✻	G53-1814-08	PACKING(BOTTOM CAP)	
20			J19-5515-08	HOLDER(PTT)	
22			J29-0740-08	BELT HOOK ASSY	
23			J99-0729-08	ADHESIVE SHEET(JACK COVER)	
A			N08-0566-08	DRESSED SCREW(UNIVERSAL)	
28			T07-0359-18	SPEAKER	
29			T91-0584-08	MIC ELEMENT(MAIN/SUB)	
MICROPHONE/EARPHONE JACK UNIT					
C1			CK73HB0J105K	CHIP C 1.0UF K	
C2			CC73HCH1H470J	CHIP C 47PF J	
C5 ,6			CC73GCH1H102J	CHIP C 1000PF J	
C7			CC73GCH1H471J	CHIP C 470PF J	
C8			CK73HB1H102K	CHIP C 1000PF K	
C9			CK73HB1A104K	CHIP C 0.10UF K	
C12			CK73HB0J105K	CHIP C 1.0UF K	
C14			CK73HB1H102K	CHIP C 1000PF K	
C15			CK73GB0J106K	CHIP C 10UF K	
C16			CK73HB0J105K	CHIP C 1.0UF K	

Ref. No.	Address	New parts	Parts No.	Description	Destination
C17 ,18			CK73HB1A104K	CHIP C 0.10UF K	
C19			CK73HB1E103K	CHIP C 0.010UF K	
C22			CC73HCH1H271J	CHIP C 270PF J	
C24			CK73HB0J105K	CHIP C 1.0UF K	
C25 ,26			CC73HCH1H271J	CHIP C 270PF J	
C27			CK73HB1E103K	CHIP C 0.010UF K	
C28			CK73HB1A104K	CHIP C 0.10UF K	
C37			CK73HB1A104K	CHIP C 0.10UF K	
C38 ,39			CK73HB0J105K	CHIP C 1.0UF K	
C40			CK73HB1A104K	CHIP C 0.10UF K	
C41			CK73GB0J106K	CHIP C 10UF K	
C44			CK73HB1H102K	CHIP C 1000PF K	
C45			CK73HB0J105K	CHIP C 1.0UF K	
C46 ,47			CK73HB1A104K	CHIP C 0.10UF K	
C48			CK73GB0J475K	CHIP C 4.7UF K	
C49			CK73HB1H102K	CHIP C 1000PF K	
C51			CK73GB0J106K	CHIP C 10UF K	
C52			CK73HB1H102K	CHIP C 1000PF K	
C59			CK73HB0J105K	CHIP C 1.0UF K	
C60			CK73HB1E103K	CHIP C 0.010UF K	
C61 -78			CK73HB1A104K	CHIP C 0.10UF K	
C80			CK73HB0J105K	CHIP C 1.0UF K	
C81			CK73HB1E103K	CHIP C 0.010UF K	
C82			CK73HB1A104K	CHIP C 0.10UF K	
C83			CK73HB0J105K	CHIP C 1.0UF K	
C84			CK73HB1E103K	CHIP C 0.010UF K	
C85			CK73HB1A104K	CHIP C 0.10UF K	
C86			CK73HB0J105K	CHIP C 1.0UF K	
C87			CK73HB1E103K	CHIP C 0.010UF K	
C89			CK73HB0J105K	CHIP C 1.0UF K	
C90			CK73HB1E103K	CHIP C 0.010UF K	
C92			CK73GB1A684K	CHIP C 0.68UF K	
C93			CK73HB1A104K	CHIP C 0.10UF K	
C95			CK73HB1H102K	CHIP C 1000PF K	
C98			CK73HB1H102K	CHIP C 1000PF K	
C100			CK73HB0J105K	CHIP C 1.0UF K	
C101			CK73HB1A104K	CHIP C 0.10UF K	
C102			CK73HB0J105K	CHIP C 1.0UF K	
C104			CK73HB1A104K	CHIP C 0.10UF K	
C105,106			CC73HCH1H120J	CHIP C 12PF J	
C108			CK73HB1H102K	CHIP C 1000PF K	
C109			CK73HB1A104K	CHIP C 0.10UF K	
C110			CK73HB1H102K	CHIP C 1000PF K	
C111			CK73HB0J105K	CHIP C 1.0UF K	
C112			CC73HCH1H100D	CHIP C 10PF D	
C113			CK73HB0J105K	CHIP C 1.0UF K	
C114		✻	C90-4161-05	ELECTRO 100UF 25WV	
C115,116			CK73HB1A104K	CHIP C 0.10UF K	
C117			CK73HB0J105K	CHIP C 1.0UF K	
C118,119			CK73HB1H102K	CHIP C 1000PF K	
CN1		✻	E41-1492-05	PIN ASSY(9P)	
CN2 -4			E41-1486-05	PIN ASSY(2P)	
J1			E11-0712-08	EARPHONE JACK(3.5D)	
L1			L92-0138-05	CHIP FERRITE	
L2 ,3			L92-0408-05	CHIP FERRITE	

PARTS LIST

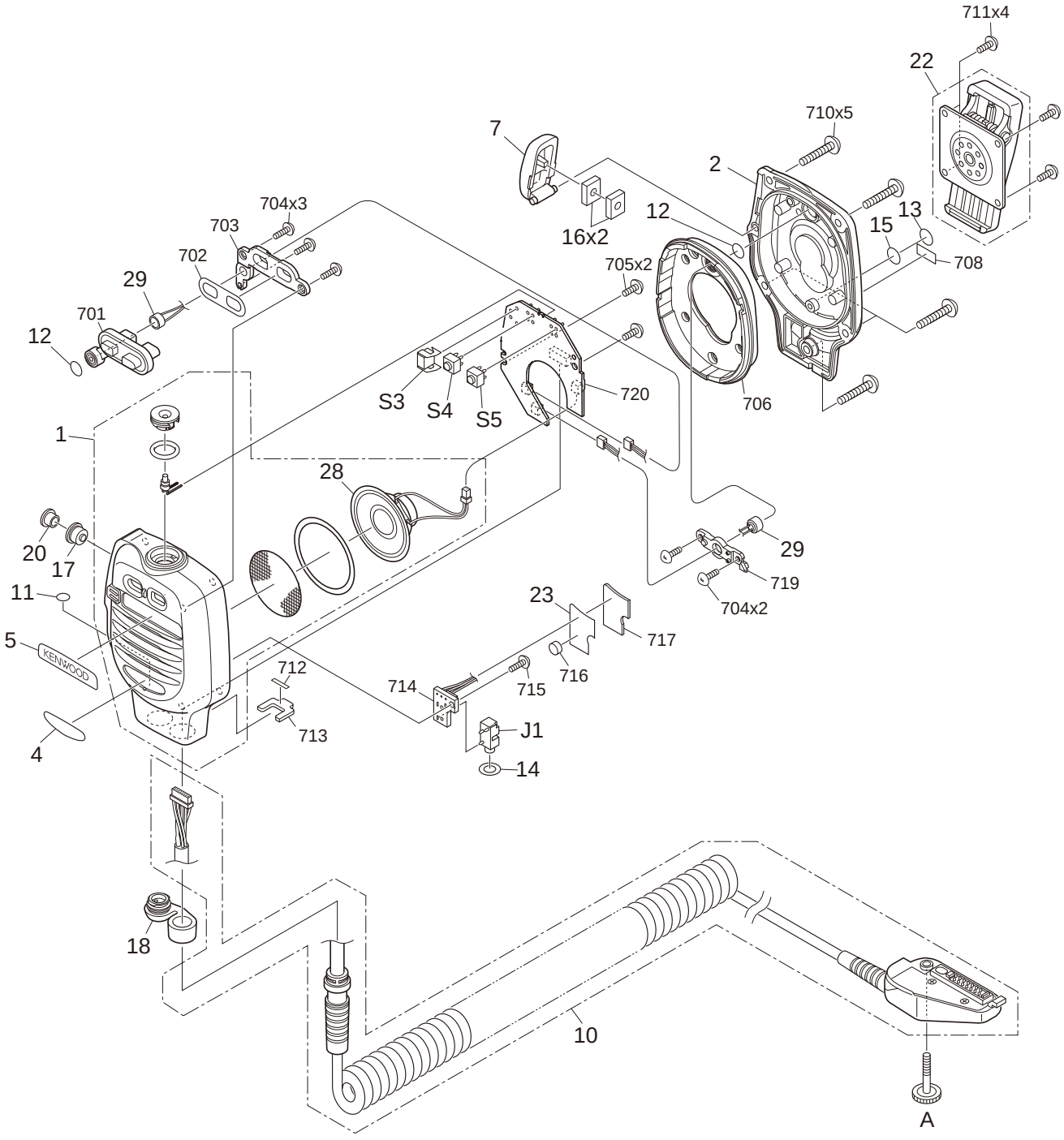
MICROPHONE/EARPHONE JACK UNIT

Ref. No.	Address	New parts	Parts No.	Description	Destination
L4			L92-0138-05	CHIP FERRITE	
L5 ,6			L92-0162-05	BEADS CORE	
L16			L92-0467-05	CHIP FERRITE	
L20 -25			L92-0467-05	CHIP FERRITE	
L26			L33-1494-05	SMALL FIXED INDUCTOR(4.7UH)	
L27			L92-0467-05	CHIP FERRITE	
X2			L77-1802-05	CRYSTAL RESONATOR(32.768KHZ)	
R1			RK73HB1J000J	CHIP R 0 J 1/16W	
R3			RK73HB1J182J	CHIP R 1.8K J 1/16W	
R4			RK73HB1J471J	CHIP R 470 J 1/16W	
R5			RK73HB1J182J	CHIP R 1.8K J 1/16W	
R6 ,7			RK73GB2A000J	CHIP R 0 J 1/10W	
R10			RK73HH1J103D	CHIP R 10K D 1/16W	
R11 ,12			RK73HH1J473D	CHIP R 47K D 1/16W	
R17			RK73HH1J273D	CHIP R 27K D 1/16W	
R18			RK73HH1J473D	CHIP R 47K D 1/16W	
R20 ,21			RK73HH1J473D	CHIP R 47K D 1/16W	
R24			RK73HH1J473D	CHIP R 47K D 1/16W	
R25			RK73HB1J220J	CHIP R 220 J 1/16W	
R32			RK73HB1J000J	CHIP R 0 J 1/16W	
R37			RK73HB1J220J	CHIP R 220 J 1/16W	
R40			RK73HB1J104J	CHIP R 100K J 1/16W	
R43			RK73HB1J000J	CHIP R 0 J 1/16W	
R46			RK73HB1J103J	CHIP R 10K J 1/16W	
R48 -50			RK73HB1J104J	CHIP R 100K J 1/16W	
R51			RK73HB1J103J	CHIP R 10K J 1/16W	
R52 -54			RK73HB1J220J	CHIP R 220 J 1/16W	
R55			RK73HB1J104J	CHIP R 100K J 1/16W	
R56			RK73HB1J221J	CHIP R 220 J 1/16W	
R58			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R61			RK73HB1J000J	CHIP R 0 J 1/16W	
R63			RK73HB1J104J	CHIP R 100K J 1/16W	
R65			RK73HB1J220J	CHIP R 220 J 1/16W	
R66			RK73HB1J104J	CHIP R 100K J 1/16W	
R67 ,68			RK73HB1J220J	CHIP R 220 J 1/16W	
R74			RK73HB1J000J	CHIP R 0 J 1/16W	
R75			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R76			RK73HB1J103J	CHIP R 10K J 1/16W	
R77			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R79			RK73HB1J103J	CHIP R 10K J 1/16W	
R81			RK73HB1J104J	CHIP R 100K J 1/16W	
R84 ,85			RK73HB1J473J	CHIP R 47K J 1/16W	
R86			RK73GB2A000J	CHIP R 0 J 1/10W	
R87			RK73HB1J271J	CHIP R 270 J 1/16W	
R88			RK73HB1J104J	CHIP R 100K J 1/16W	
R90			RK73HB1J104J	CHIP R 100K J 1/16W	
R92			RK73HB1J104J	CHIP R 100K J 1/16W	
R95			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R97 ,98			RK73HB1J000J	CHIP R 0 J 1/16W	
R109-111			RK73HB1J000J	CHIP R 0 J 1/16W	
R112			RK73GB2A000J	CHIP R 0 J 1/10W	
R113-117			RK73HB1J104J	CHIP R 100K J 1/16W	
R119			RK73HB1J220J	CHIP R 220 J 1/16W	
R120			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R121			RK73HB1J104J	CHIP R 100K J 1/16W	
R122			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R123			RK73HB1J103J	CHIP R 10K J 1/16W	
R124			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R125			RK73HB1J473J	CHIP R 47K J 1/16W	

Ref. No.	Address	New parts	Parts No.	Description	Destination
R126			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R127			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R128-131			RK73HB1J104J	CHIP R 100K J 1/16W	
S3			S70-0511-08	TACT SWITCH(PTT)	
S4 ,5			S70-0471-08	TACT SWITCH(PF1/PF2)	
D3			1SS388F	DIODE	
D5			AVRM16080MAAB	VARISTOR	
D6 -9			1SS388F	DIODE	
D10 -12			AVRM16080MAAB	VARISTOR	
IC1			XC6223H331M-G	ANALOGUE IC	
IC2 ,3			TC75W51FK(F)	MOS-IC	
IC7			AK4555VT	MOS-IC	
IC8			**Note 1**	MICROPROCESSOR IC	
IC10		✻	XC6118N38BM-G	ANALOGUE IC	
IC12			**Note 1**	ROM IC	
IC15			XC6223H331M-G	ANALOGUE IC	
IC17			TC7SH17FU-F	MOS-IC	
IC18			TC7SZ125FU-F	MOS-IC	
IC20		✻	XC9235A13CM-G	MOS-IC	
Q3			SSM6N16FE-F	FET	
Q5 ,6			DTC144EUA	TRANSISTOR	
Q10			UMX2N	TRANSISTOR	

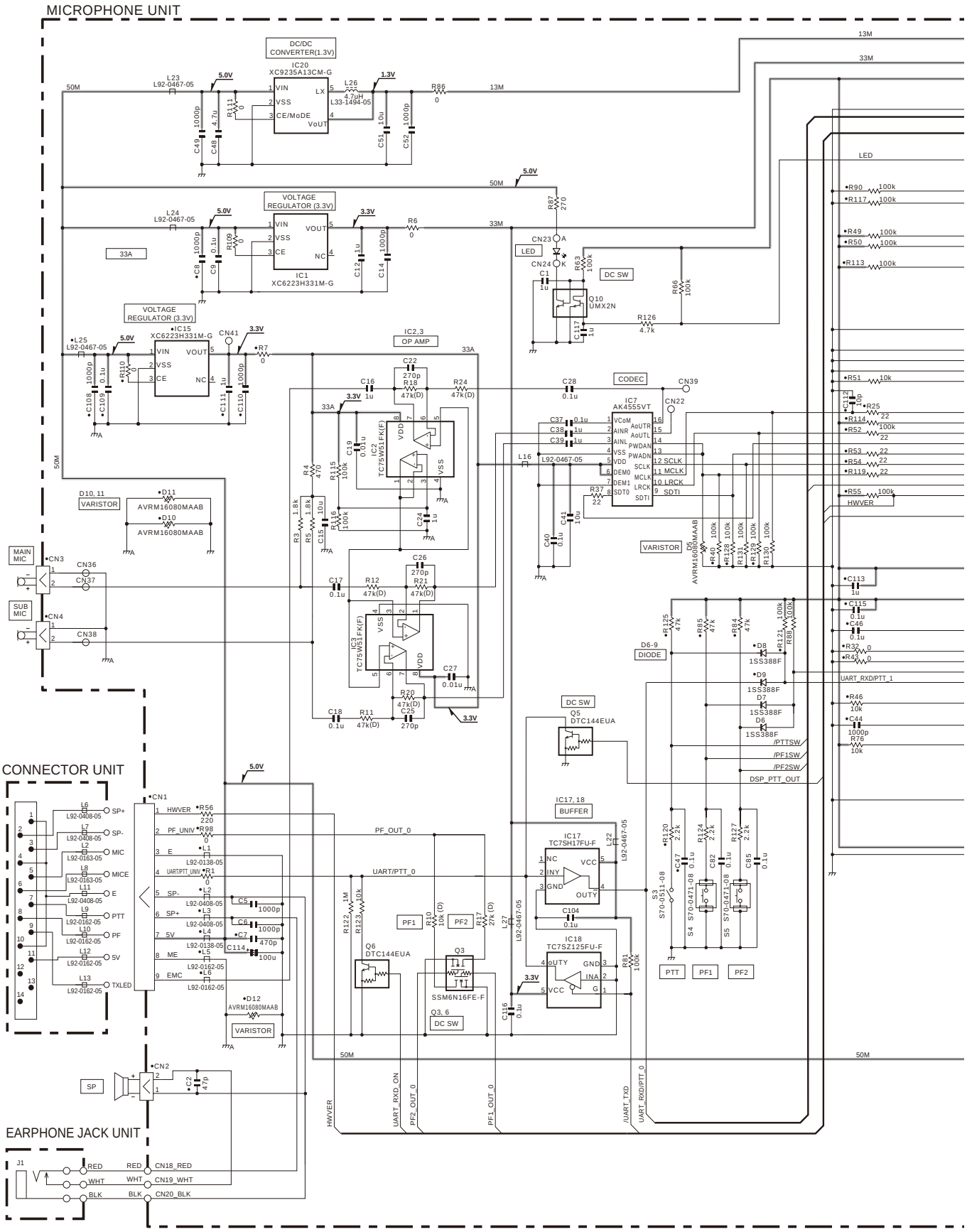
Note 1: This part cannot be replaced. Therefore, this part is not supplied as a service part.

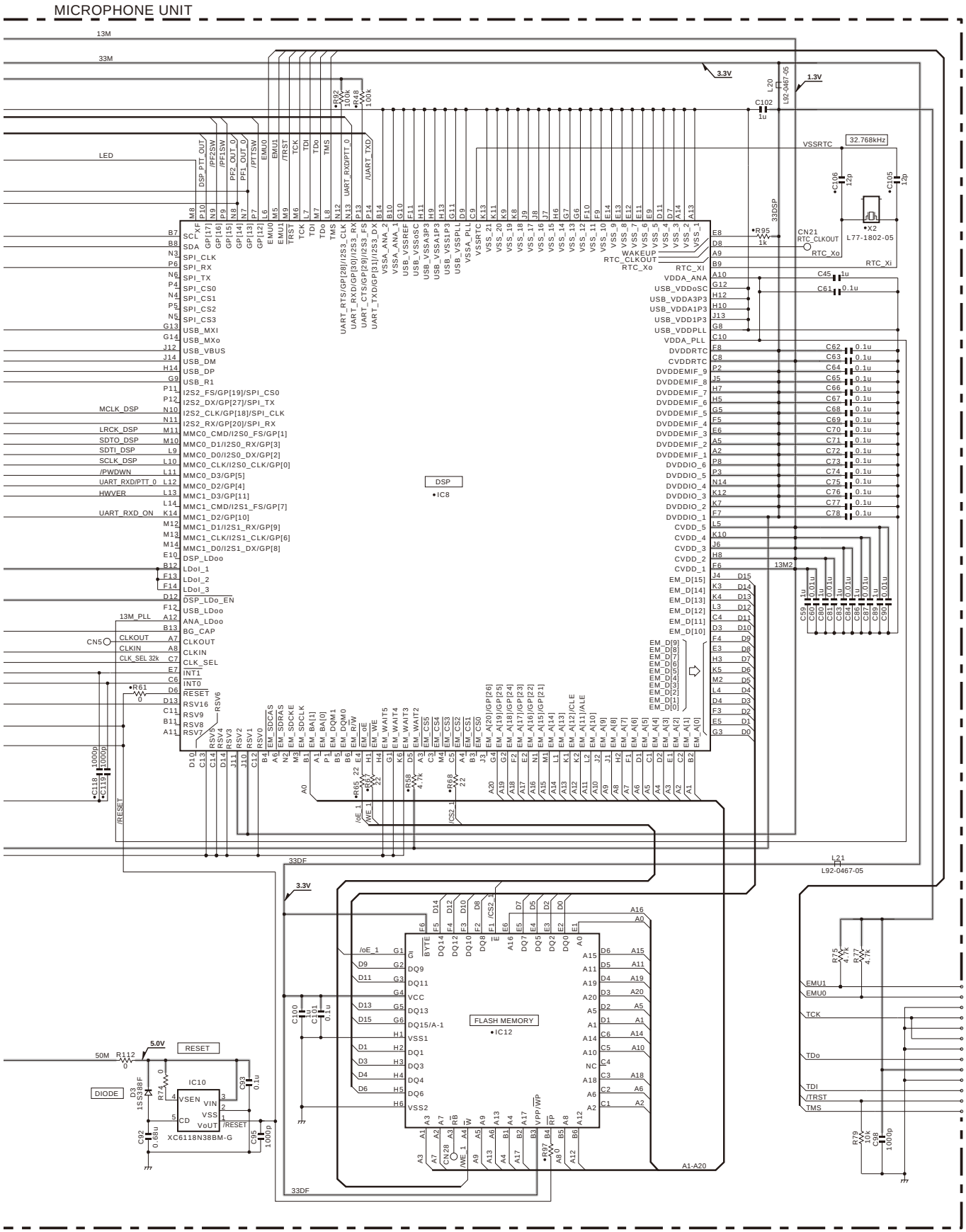
EXPLODED VIEW



Parts with the exploded numbers larger than 700 are not supplied.

SCHEMATIC DIAGRAM





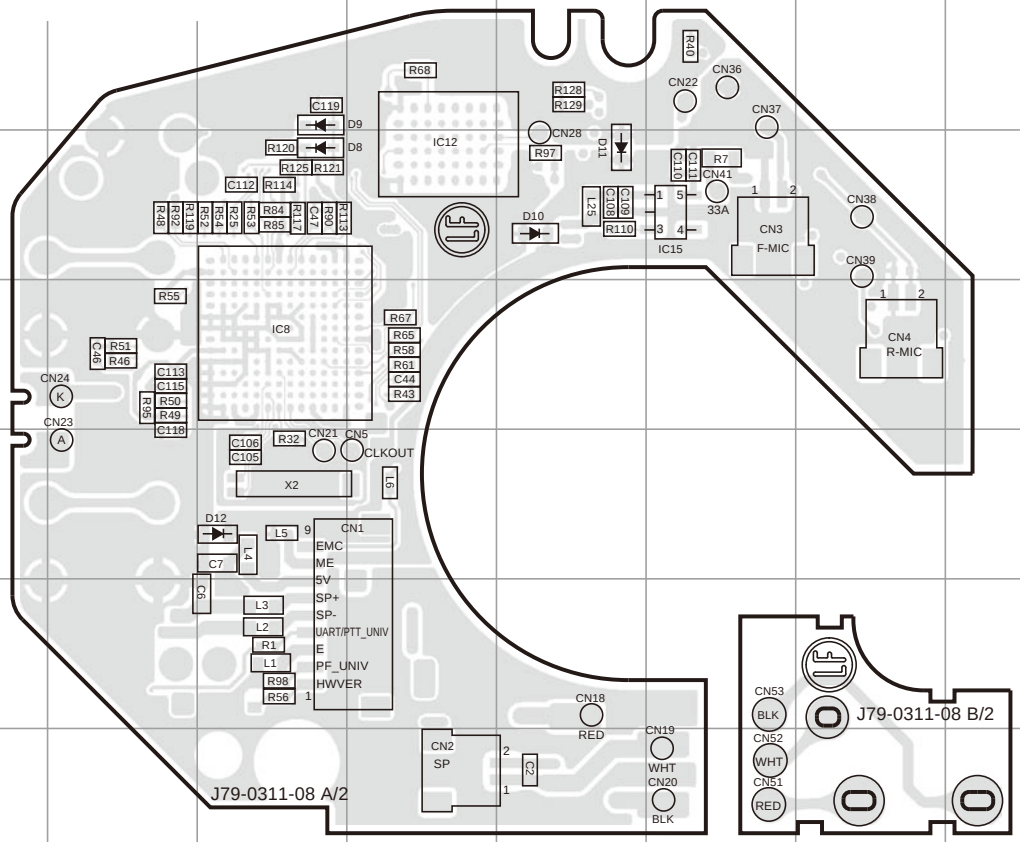
Note : The components marked with a dot (•) are parts of layer 1.

KMC-51 PC BOARD

MICROPHONE UNIT, EARPHONE JACK UNIT
Component side view

Ref. No.	Address
IC8	4E
IC12	3F
IC15	3H
D8	3E
D9	2E
D10	3G
D11	3G
D12	5E

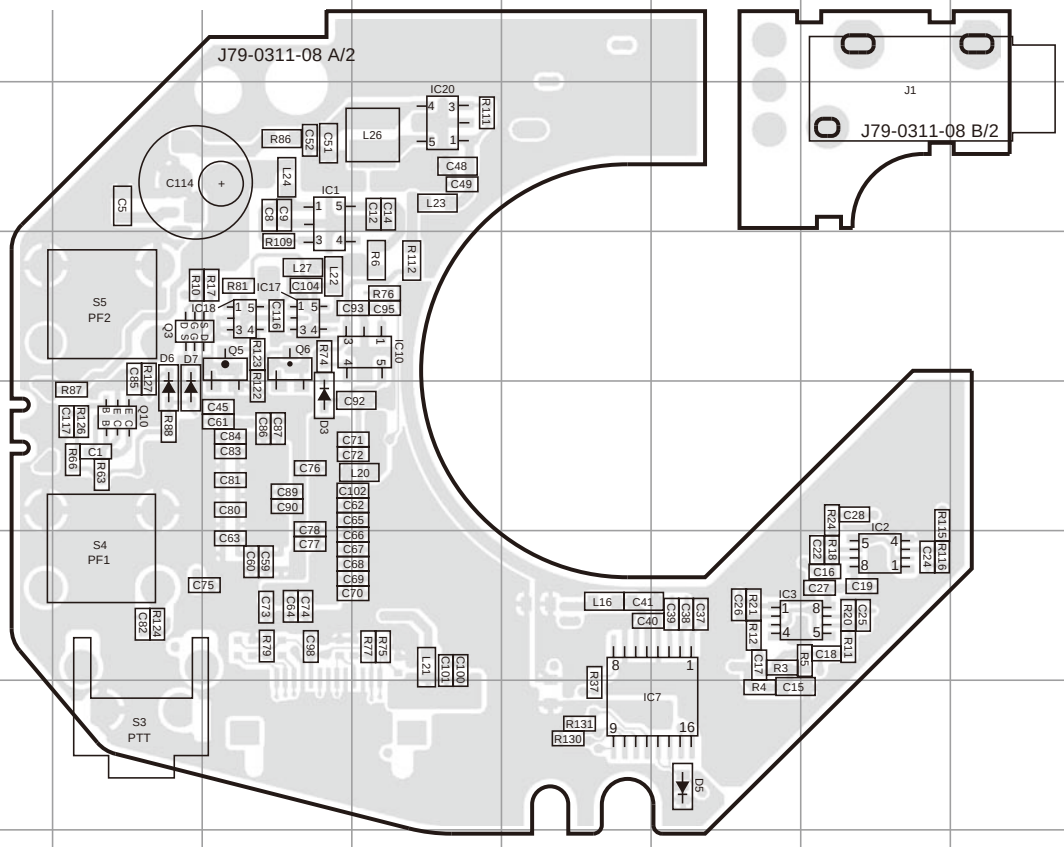
Component side
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Layer 6
Foil side



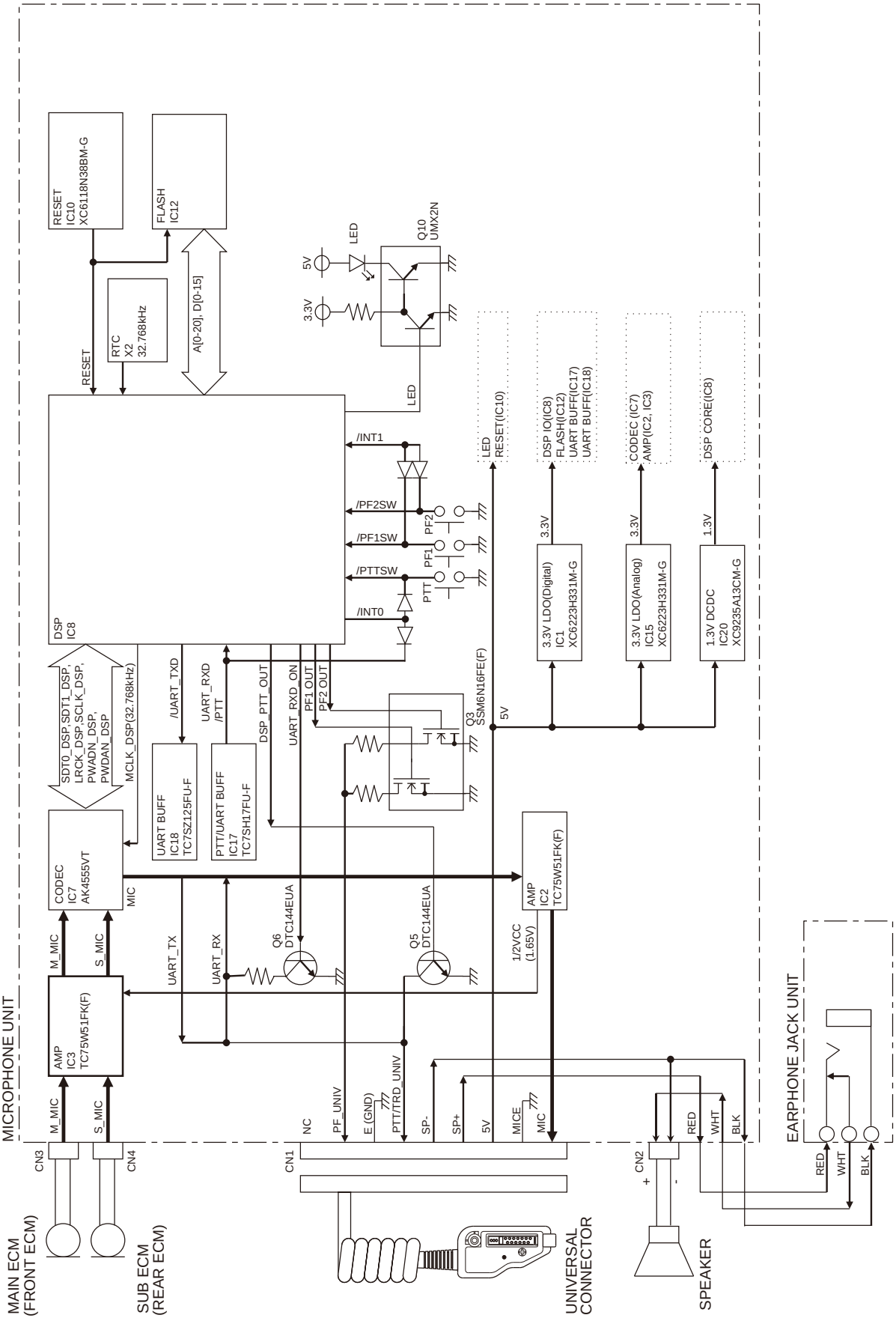
MICROPHONE UNIT, EARPHONE JACK UNIT
Foil side view

Ref. No.	Address
IC1	9E
IC2	12I
IC3	12H
IC7	13G
IC10	10F
IC17	10E
IC18	10E
IC20	9F
Q3	10D
Q5	10E
Q6	10E
Q10	11D
D3	11E
D6	11D
D7	11D

Component side
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Layer 6
Foil side



BLOCK DIAGRAM



MEMO

MEMO

KMC-51

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Tsuen Wan, New Territories, Hong Kong

Kenwood Electronics Singapore Pte Ltd

1 Ang Mo Kio Street 63, Singapore 569110

MICROPHONE UNIT

DC/DC CONVERTER(1.3V)
IC20 XC9235A13CM-G
L23 L92-0467-05
L26 4.7uH L33-1494-05
R86 0
VOLTAGE REGULATOR (3.3V)
L24 L92-0467-05
IC1 XC6223H331M-G
R6 0
33A
VOLTAGE REGULATOR (3.3V)
•L25 L92-0467-05
•IC15 XC6223H331M-G
CN41
•R7 0
IC2,3 OP AMP
IC2 TC75W51FK(F)
IC3 TC75W51FK(F)
R3 1.8k
R4 470
R5 1.8k
R15 10u
R115 100k
R116 100k
C15 10u
C16 1u
C17 0.1u
C18 0.1u
C19 0.01u
C22 270p
C24 1u
C25 270p
C26 270p
C27 0.01u
R18 47k(D)
R24 47k(D)
R12 47k(D)
R21 47k(D)
R11 47k(D)
R20 47k(D)
D10,11 VARISTOR
•D11 AVRM16080MAAB
•D10 AVRM16080MAAB
MAIN MIC
SUB MIC
•CN3
•CN4
CN36
CN37
CN38
CN1
•CN2
SP
C2 470p
CONNECTOR UNIT
EARPHONE JACK UNIT
J1
RED RED CN18_RED
WHT WHT CN19_WHT
BLK BLK CN20_BLK
L6 L92-0408-05 SP+
L7 L92-0408-05 SP-
L2 L92-0163-05 MIC
L8 L92-0163-05 MICE
L11 L92-0408-05 E
L9 L92-0162-05 PTT
L10 L92-0162-05 PF
L12 L92-0162-05 5V
L13 L92-0162-05 TXLED
HWVER R56 220
PF_UNIV R88 0
E L1 L92-0138-05
UART/PTT_UNIV R1 0
SP- L2 L92-0408-05
SP+ L3 L92-0408-05
5V L4 L92-0138-05
ME L5 L92-0162-05
EMC L6 L92-0162-05
C5 1000p
C6 1000p
C7 470p
C114 100u
5.0V
PF_OUT_0
UART/PTT_0
R122 1M
R123 10k
Q6 DTC144EUA
PF1
R10 10k (D)
PF2
R17 27k (D)
Q3
SSM6N16FE-F
Q3, 6
DC SW
C27 L92-0467-05
C16 0.1u
3.3V
HWVER
UART_RXD_ON
PF2_OUT_0
PF1_OUT_0
UART_TXD
UART_RXD/PTT_0
50M
13M
33M
CN23 A
CN24 K
LED
R63 100k
C1 1u
DC SW
Q10 UMX2N
R66 100k
R126 4.7k
CODEC
CN39
CN22
C28 0.1u
IC7 AK4555VT
C37 0.1u
C38 1u
C39 1u
L16 L92-0467-05
C40 0.1u
C41 10u
R37 22
VARISTOR
D5 AVRM16080MAAB
R40 100k
R128 100k
R131 100k
R130 100k
R129 100k
R125 47k
R85 47k
R84 47k
R121 100k
R88 100k
D6-9 DIODE
•D8 1SS388F
•D9 1SS388F
D7 1SS388F
D6 1SS388F
/PTTSW
/PF1SW
/PF2SW
DSP_PTT_OUT
DC SW
Q5 DTC144EUA
IC17,18 BUFFER
IC17 TC7SH17FU-F
IC18 TC7SZ125FU-F
C104 0.1u
R120 2.2k
R124 2.2k
R127 2.2k
C47 0.1u
C82 0.1u
C85 0.1u
S8 S70-0511-08
S4 S70-0471-08
S5 S70-0471-08
PTT
PF1
PF2
L22 L92-0467-05
R90 100k
R117 100k
R49 100k
R50 100k
R113 100k
R51 10k
C112 10p
R25 22
R114 100k
R52 22
R53 22
R54 22
R119 22
R55 100k
HWVER
C113 1u
C115 0.1u
C46 0.1u
R32 0
R45 0
13M_PLL
CN5
CLKOUT
CLKIN
CLK_SEL 32k
UART_RXD/PTT_1
R46 10k
C44 1000p
R76 10k
R61
/RESET
C118 1000p
C119 1000p
DSP_PTT_OUT
/PF2SW
/PF1SW
PF2_OUT_0
PF1_OUT_0
EMU0
EMU1
/TRST
TCK
TDI
TDo
TMS
UART_RXD/PTT_0
/UART_TXD
R100 100k
R101 100k
R102 100k
R103 100k
R104 100k
R105 100k
R106 100k
R107 100k
R108 100k
R109 100k
R110 100k
R111 100k
R112 100k
R113 100k
R114 100k
R115 100k
R116 100k
R117 100k
R118 100k
R119 100k

KMC-51 PC BOARD

MICROPHONE UNIT, EARPHONE JACK UNIT
Component side view

Ref. No.	Address
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D11	3G
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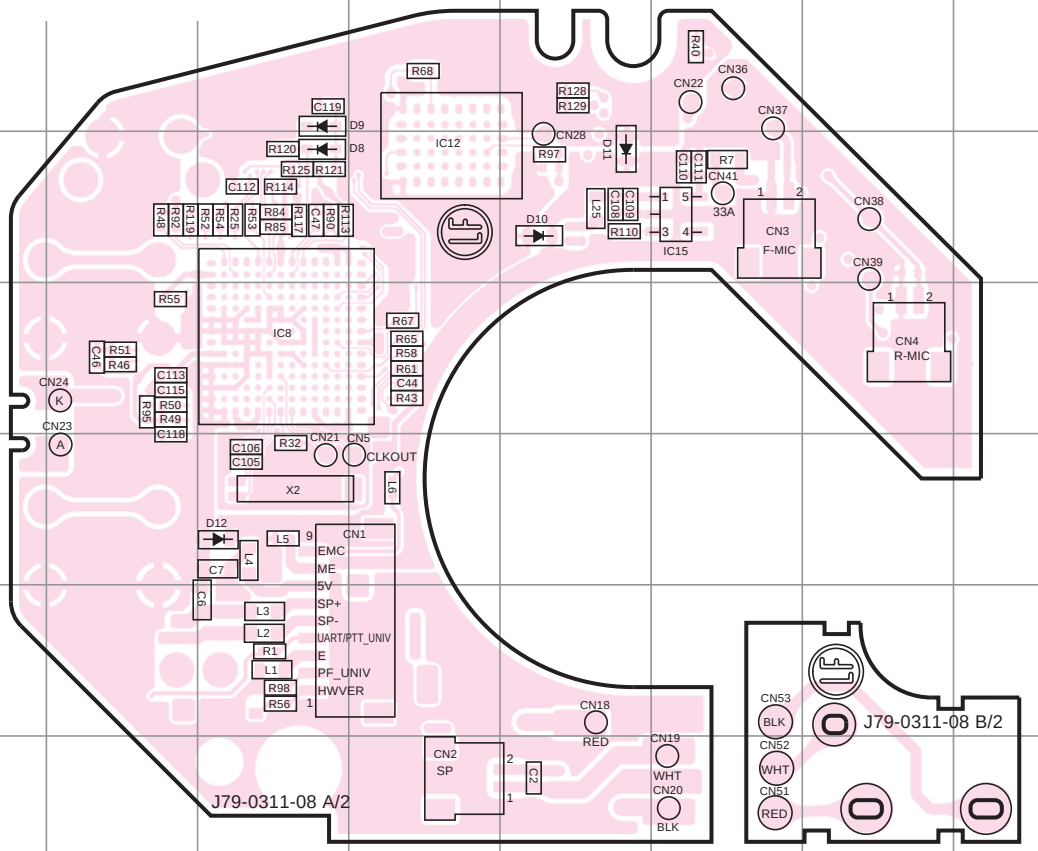
Component side
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Layer 6
Foil side



MICROPHONE UNIT, EARPHONE JACK UNIT
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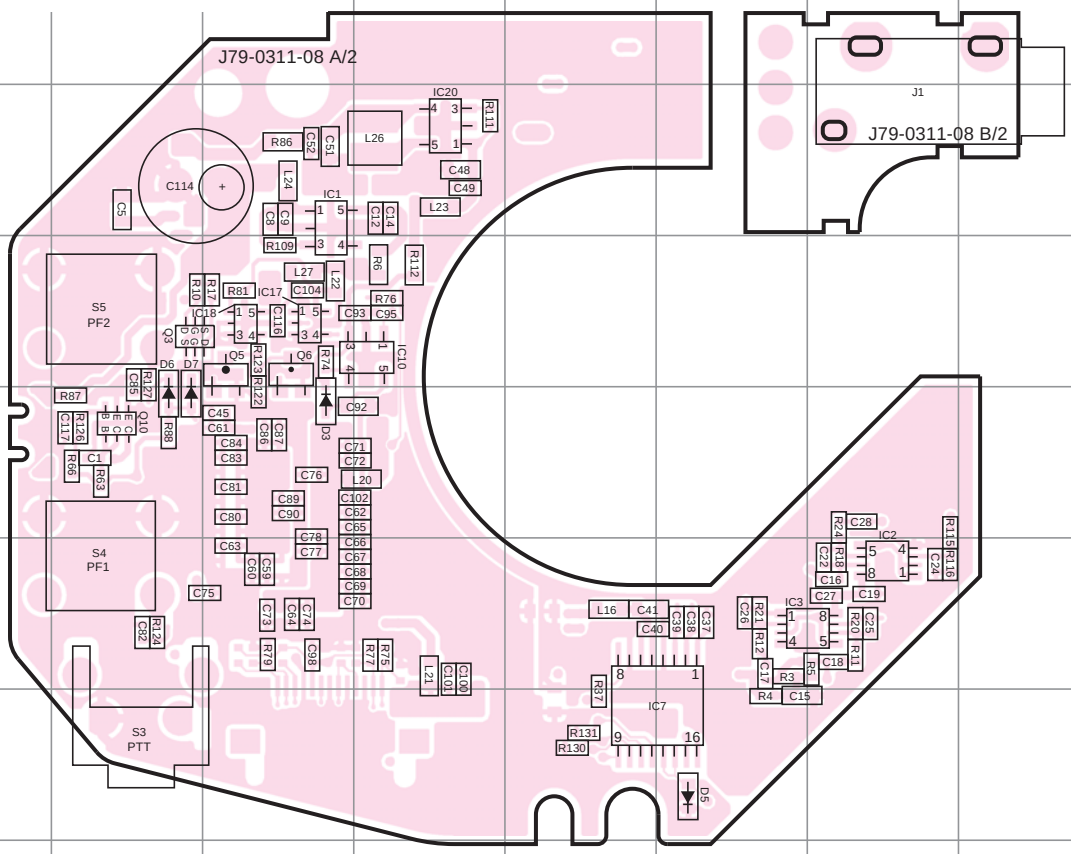
Component side
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Layer 6
Foil side