HOW TO CHECK THE RF UNIT

Factory supply only assembled RF unit for base unit and portable handset of KX-TC901-B/KX-TC901-W. (Factory does not supply each parts on RF Unit.) When checking the RF Unit , refer to pages 15 and 16.

Portable Handset

1) Warm up the Marconi Radio Tester for at least 30 minutes to allow internal crystal oscillation to become stable.
2) Refer to figures below for portable handset wire connections.
3) Disconnect the handset antenna from the PCB. If you allow the antenna to remain and be a load, the readings will be wrong.
4) Supply DC 3.9V Handset PCB using a DC power supply.
5) Solder RF cable to ANT and GND and connect BNC side to Marconi. Use 100 W max. RF Input.
6) Press **TALK**, then press "**5**", "**8**" and "**0**" simultaneously.
7) Press **DIRECT** or **INTERCOM**, press **TALK**.

Carrier Frequency Check:

1. Set Marconi to Transmit Test (press **TX TEST** button).
2. Check TX Frequency = **926.100 MHz+/-3.0 kHz**.
3. When value if off, adjust **VRfreq**.
4. If can't adjust replace RF PCB.

Transmit Power Check:

1. Press **dBm** button on Marconi.
2. Check Marconi TX Power reading. It should equal **-3.5 dBm+/-4 dBm** (-7.5 dBm ~ +1.5 dBm).
3. When the value if off, adjust **VRpow** to **-3.5 dBm**.
4. If can't adjust replace RF PCB.

Receiving Sensitivity Check:

1. Connect audio cable BNC side to AF INPUT in Marconi and other side to TP-AF and TP-VSS (GND).
2. Set Marconi to **RX TEST** mode. Enter the following setting:
   (a) Frequency = **902.100 MHz**
   (b) Level = **60 dBμV**
   (c) Set Modulation = **1.000 kHz**
   (d) Level = **6.000 kHz**
3. Press the **SINAD** button on Marconi until the display shows SINAD value. Press the **dB** button.
4. Press the **RF GEN** and **LEVEL** button.
5. Using the **VARIABLE** knob on Marconi decrease RF GEN LEVEL value until **SINAD** value is **12 dB**.
6. Check the **RF GEN LEVEL**. This should be **less than -2 dBμV** (+4 dBμVemf). If can't adjust replace RF PCB.

Squelch Check:

1. Connect scope probe (X1) lead to TP-20 dB, negative to TP-VSS and BNC end to scope.
2. Set scope to the following codition: TIME/DIV = 1 msec, VOLT/DIV = 1 V
3. Set **RF GEN LEVEL** to **+2 dBμV** (+8 dBμVemf). Check scope voltage is **LOW**.
4. Set **RF GEN LEVEL** to **-13 dBμV** (-7 dBμVemf). Check scope voltage is **HIGH**.
5. When scope does not show above condition, adjust **VRsql** until scope voltage toggles between **LOW** & **HIGH**.
6. When RF GEN LEVEL is **-5.5 dBμV** (+0.5 dBμVemf). If can't adjust replace RF PCB.

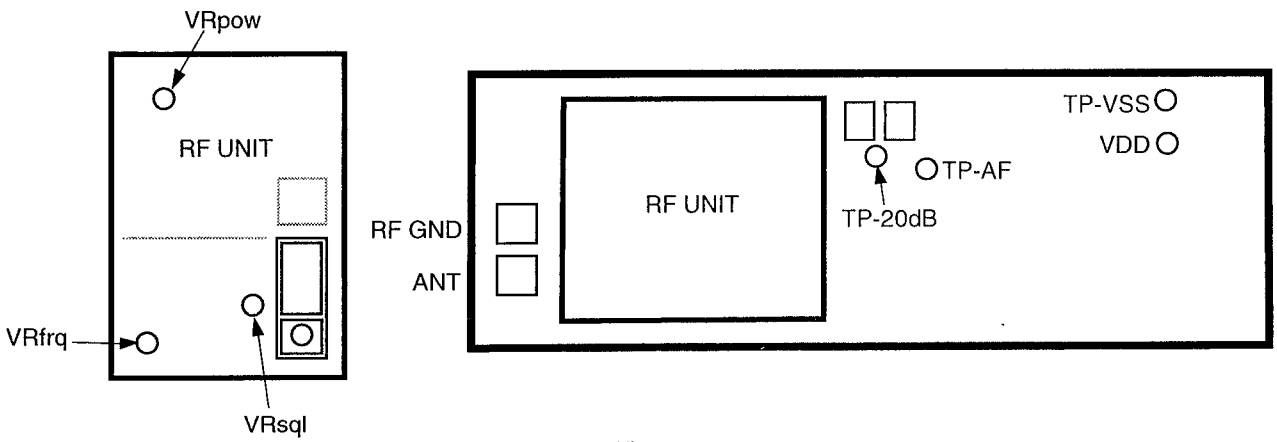


Fig.13

KX-TC901-B/KX-TC901-W

Base Unit

1) Please refer to figures below for base unit wire connection.
2) Solder wire connections from TEST to TEST COM.
3) Connect the AC Adaptor (KX-TCA1-G) to base unit.
4) Press LOCATOR twice to set base to test mode.

Carrier Frequency Check:

1. Solder RF cable to ANT and RF GND.
2. Set Marconi to Transmit Test mode by pressing **TX TEST**.
3. Check TX Frequency as shown on CRT. This should be **902.100 MHz+/-3 kHz**.
4. Adjust value when this is above **902.100 MHz+/-3 kHz**. If can't adjust replace RF PCB.

Transmit Power Check:

Check **TX POWER** reading equals to **-7 dBm+/-4 dBm** (reading should -11 dBm ~ -3 dBm).
If reading is given in μW, press **dB** button.
When value if off, adjust **VRpow** to **-7 dBm**. If can't adjust replace RF PCB.

Receiving Sensitivity Check:

1. Connect audio cable positive lead to TP-AF, negative lead to TP-AGND and BNC end to AF INPUT.
2. Set Marconi to Receiver Test mode by pressing **RX TEST**. Enter the following value:
   (a) RF Erequency = **926100 MHz**
   (b) LEVEL = **60 dBμV**
   (c) Modulation Frequency = **1.000 kHz**
   (d) LEVEL = **5.000 kHz**
3. Press **SINAD** button until the display shows the SINAD value and press **dB** button.
4. Press **RF GEN** and **LEVEL** buttons. Using the **VARIABLE** knob. Decrease RF GEN LEVEL until **SINAD** value is **12 dB**.
5. Check the **RF GEN LEVEL** equals **less than -2 dBμV** (+4 dBμVemf). When value is over, change RF unit.

Squelch Check:

1. Keep same RX TEST settings as in **Receiving Sensitivity Check**.
2. Connect scope (X1) positive lead to TP-SQL, negative lead to TP-AGND and BNC end to scope. Set scope to following codition.
   (a) TIME/DIV = **1 msec.**
   (b) VOLT/DIV = **1 V**
3. Set **RF GEN LEVEL** to **+2 dBμV** (+8 dBμVemf). Check scope voltage is **LOW**.
4. Set **RF GEN LEVEL** to **-13 dBμV** (-7 dBμVemf). Check the scope voltage is **HIGH**.
5. When the scope does not above condition, adjust **VRsql** until scope voltage toggles between **LOW** & **HIGH**.
6. When RF GEN LEVEL is **-5.5 dBμVemf** (+0.5 dBμVemf). If can't adjust replace RF PCB.

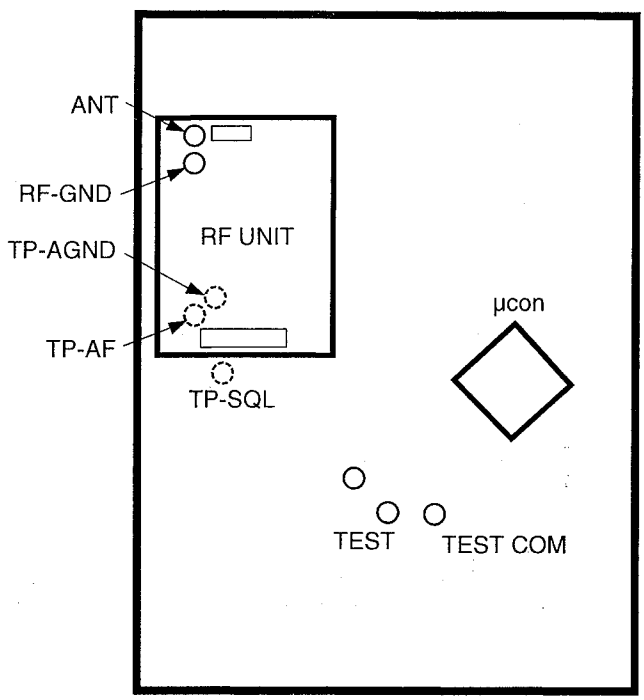


Fig.14

CPU DATA (Base Unit)

IC301 MN150832KB1

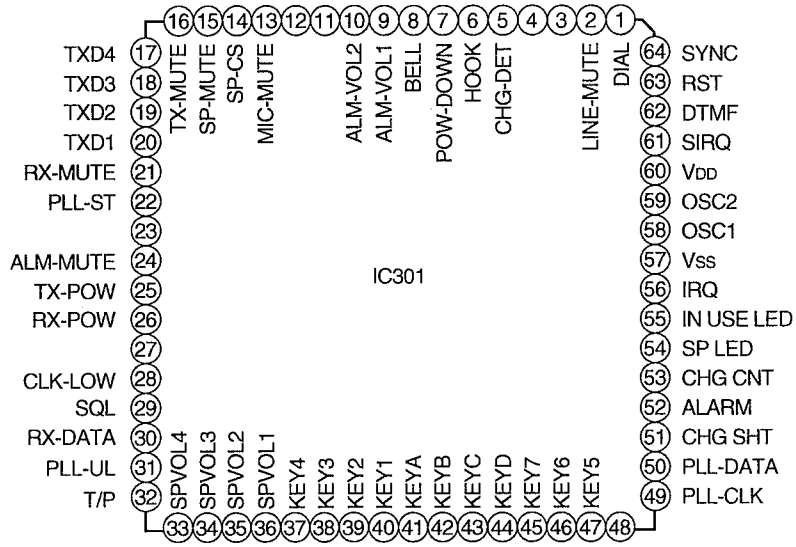


Fig.15

Pin	Description	I/O	High	Low	High-Z	Pin	Description	I/O	High	Low	High-Z
1	DP RLY	I/O	OFF	ON	-	33	SP-VOL1	I/O	Low: Min ~	Hi-Z: Max	
2	LINE MUTE	I/O	ON	OFF	-	34	SP-VOL2	I/O	Low	Hi-Z	
3	Not Used	I/O	-	Fixed	-	35	SP-VOL3	I/O	Hi-Z	Hi-Z	
4	Not Used	I/O	-	Fixed	-	36	SP-VOL4	I/O	Low	Hi-Z	
5	M.CHG DET	I/O		Charge	-	37	KEY-STROBE	I/O	-	Active	Normal
6	EX HOOK	I/O	OFF HOOK		-	38	KEY-STROBE	I/O	-	Active	Normal
7	POW DOWN	I/O		Down	-	39	KEY-STROBE	I/O	-	Active	Normal
8	BELL	I/O		Bell in	-	40	KEY-STROBE	I/O	-	Active	Normal
9	ALM VOL.1	I/O	Hi_Z...High	Hi_Z...Mid	Low...Low	41	KEY IN	I	OFF	ON	-
10	ALM VOL.2	I/O	Hi_Z	Low	Low	42	KEY IN	I	OFF	ON	-
11	Not Used	I/O		Fixed	-	43	KEY IN	I	OFF	ON	-
12	Not Used	I/O		Fixed	-	44	KEY IN	I	OFF	ON	-
13	MIC MUTE	I/O	ON	OFF	-	45	KEY-STROBE	I/O	-	Active	Normal
14	SP-CS	I/O	ON	OFF	-	46	SW-STROBE	I/O	-	Active	Normal
15	SP-MUTE	I/O	ON	OFF	-	47	SW-STROBE	I/O	-	Active	Normal
16	TX MUTE	I/O	ON	OFF	-	48	RU-OPTION	I/O	BX	RU	-
17	(TX DATA4)	I/O			-	49	PLL CLK	I/O(I)	Active	Active	Normal
18	(TX DATA3)	I/O			-	50	PLL DATA	O(I)	Active	Active	Normal
19	(TX DATA2)	I/O			-	51	CHG. SHORT	I	Short	Normal	-
20	TX DATA (ID)	I/O			-	52	ALARM	O(I)	Active	Active	Normal
21	RX MUTE	I/O	ON	OFF	-	53	M.CHG.CONTROL	I/O	-	Tricle	Ultra
22	PLL ST	I/O	Latch		-	54	SP LED	I/O	-	ON	OFF
23	Not Used	I/O		Fixed	-	55	IN USE LED	I/O	-	ON	OFF
24	ALM MUTE	I/O	ON	OFF	-	56	External Interrupt	I	Fixed	-	-
25	TX POW	I/O	-	ON	OFF	57	GND		-	Normal	-
26	RX POW	I/O	-	ON	OFF	58	Oscillator	I	Active	Active	-
27	Not Used	I/O	-	Fixed	-	59	Oscillator	O	Active	Active	-
28	CLK-LOW	I/O	-	ON	OFF	60	Power Supply		Normal	-	-
29	FLS(20)	I/O	Low	High	-	61	External Interrupt	I	Fixed	-	-
30	RX DATA	I/O			-	62	DTMF	O	Active	Active	Normal
31	PLL UNLOCK	I/O		Unlock	-	63	RESET	I	Normal	Reset	-
32	T/P SW	I/O	Tone	Pulse	-	64	System Sync. Idle	O	Active	Active	-

CPU DATA (Portable Handset)

IC201 MN150837KD2

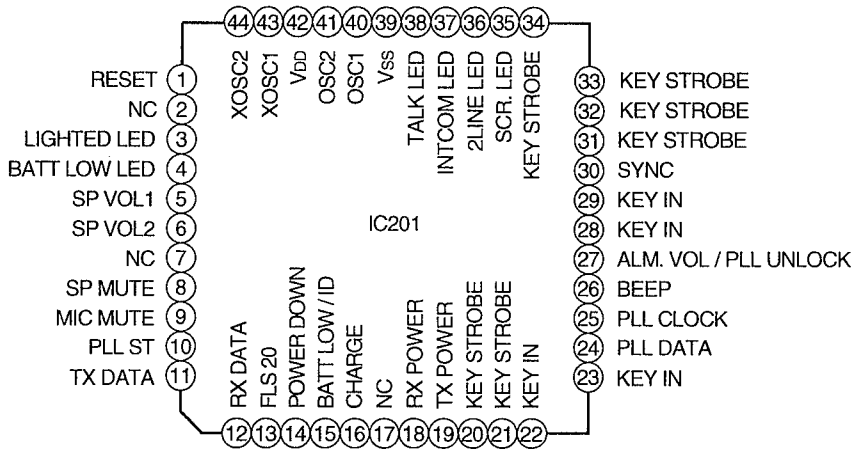


Fig.16

Pin	Description	I/O	High	Low	High-Z	Pin	Description	I/O	High	Low	High-Z
1	RESET	I/O		RESET		23	KEY IN	I		KEY IN	
2	Not Used	-				24	PLL DATA	I/O			
3	LIGHTED LED	I/O	ON	OFF		25	PLL CLOCK	I/O			
4	BATT.LOW LED	I/O	OFF	ON		26	BEEP	I/O			
5	SP VOL.1	I/O				27	ALM. VL/PLK UK	I/O	High/lock	Low/UNLOCK	
6	SP VOL.2	I/O				28	KEY IN	I		KEY IN	
7	Not Used	-				29	KEY IN	I		KEY IN	
8	SP MUTE	I/O	MUTE			30	Not Used	O			
9	MIC MUTE	I/O	MUTE			31	KEY STROBE	O			
10	PLL ST	I/O				32	KEY STROBE	O			
11	TX DATA	I/O				33	KEY STROBE	O			
12	RX DATA	I				34	KEY STROBE	O			
13	FLS20	I/O		Electric Field		35	SCR.LED	O		ON	OFF
14	POW DOWN	I/O		POWDOWN		36	2LINE LED	O		ON	OFF
15	ID/BAT.LOW	I/O		BAT.LOW		37	INT.LED	I/O		ON	OFF
16	CHARGE	I/O		CHARGE		38	TLK.LED	I/O		ON	OFF
17	Not Used	-				39	GND	-			
18	RX POW	I/O		ON	OFF	40	MAIN CLOCK	O			
19	TX POW	I/O		ON	OFF	41	MAIN CLOCK	I			
20	KEY STROBE	I/O				42	POWER SUPPLY	-			
21	KEY STROBE	I/O				43	SUB CLOCK	I			
22	KEY IN	I		KEY IN		44	SUB CLOCK	O			

EXPLANATION OF CPU DATA COMMUNICATION

1. Calling

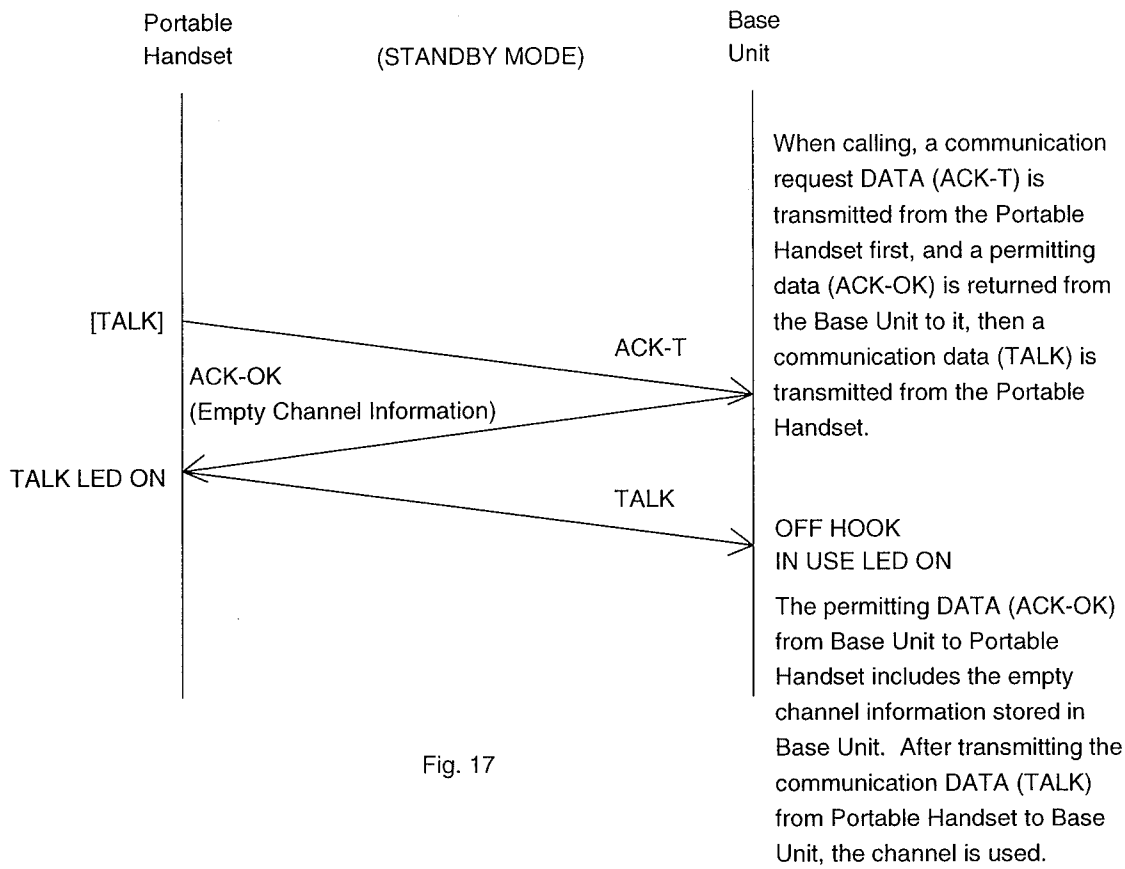


Fig. 17

2. To terminate Communication

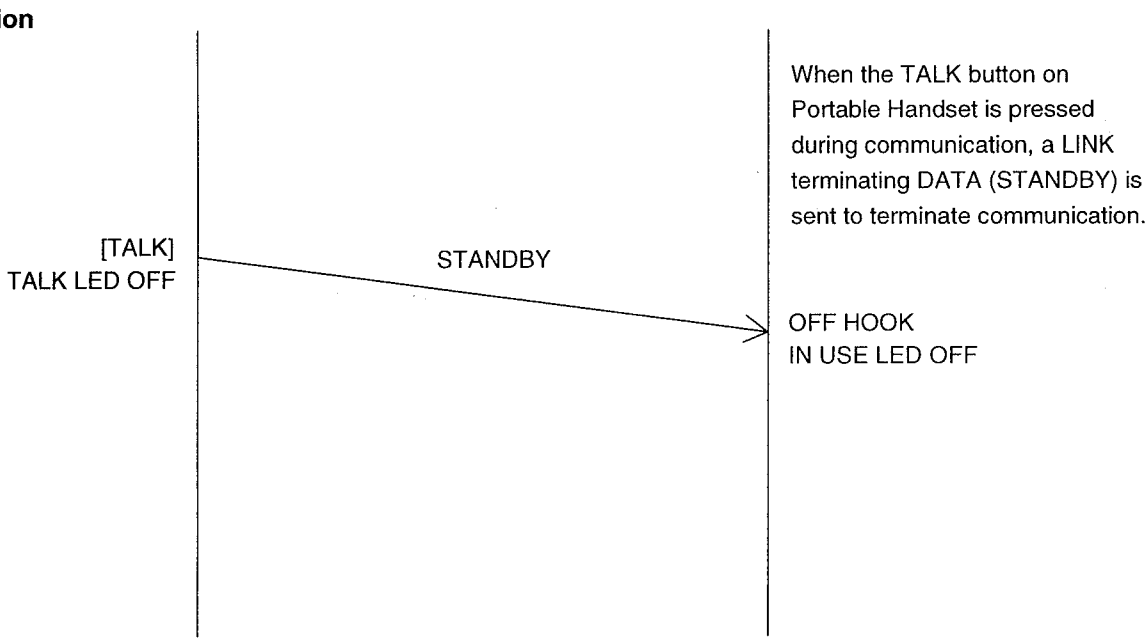


Fig. 18

3. Ringing

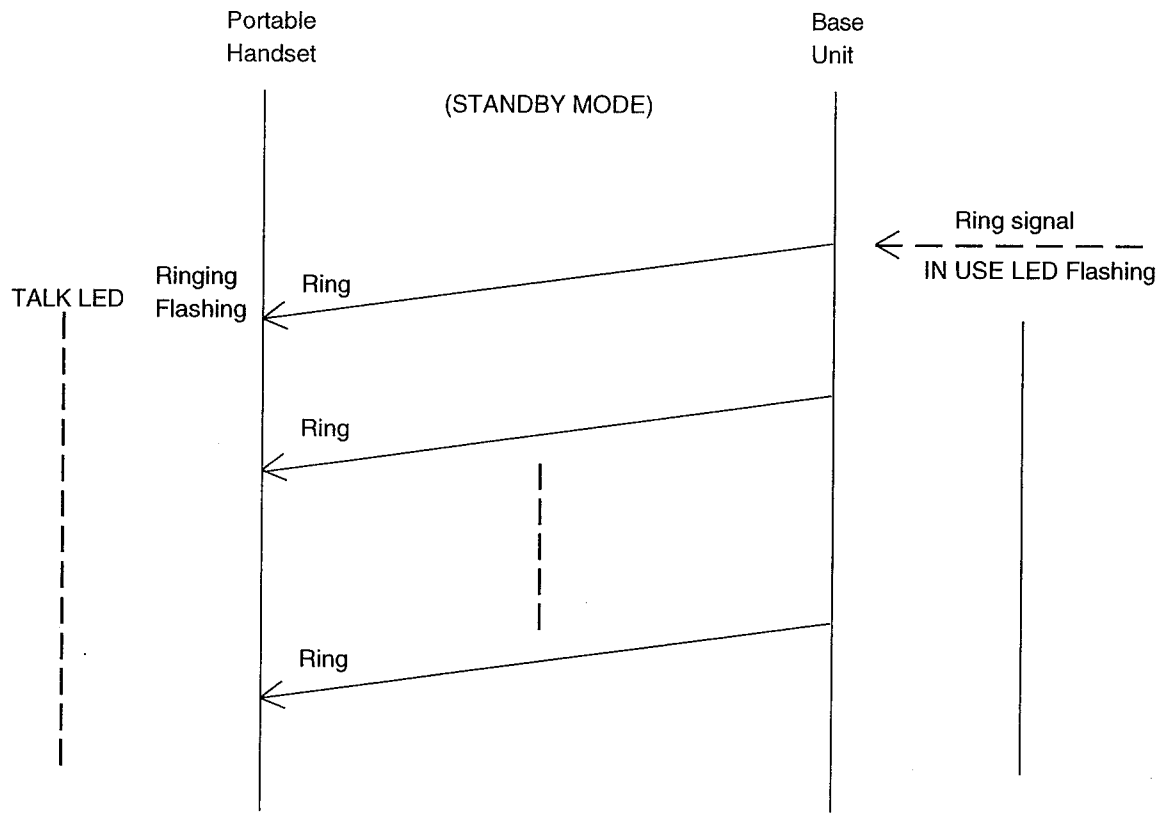


Fig. 19

After detecting the Ring signal from circuit, Base Unit sends a ring signal DATA (Ring), then the Portable Handset starts ringing.

4. Ports for transmitting and receiving of data

Portable Handset :	transmitting ... 11 Pin	receiving ... 12 Pin
Base Unit :	transmitting ... 20 Pin	receiving ... 30 Pin

5. Waveform of DATA used for cordless transmission and reception

The DATA which is transmitted from the Portable Handset to the Base Unit is combination of DATA 0, DATA 1, DATA Delimt, Pre data and End data.

The DATA which is transmitted from the Base Unit to the Portable Handset is combination of DATA 0, DATA 1, DATA Delimt, Pre data and End data.

PORTABLE HANDSET

Transmitting DATA Format

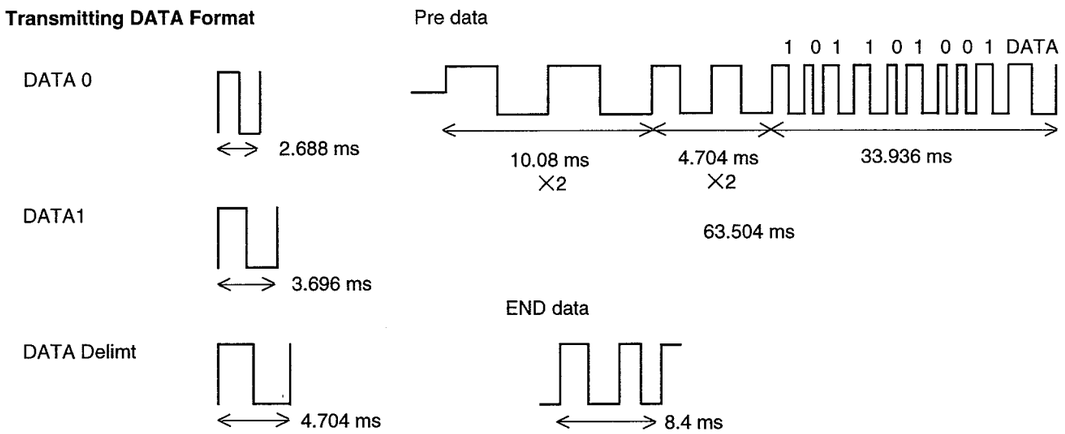


Fig. 20

BASE UNIT

Transmitting DATA Format

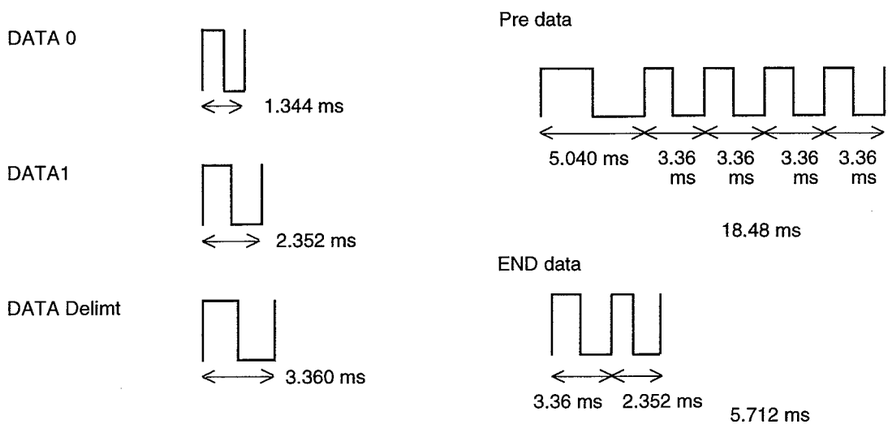


Fig. 21

6. When LINKing

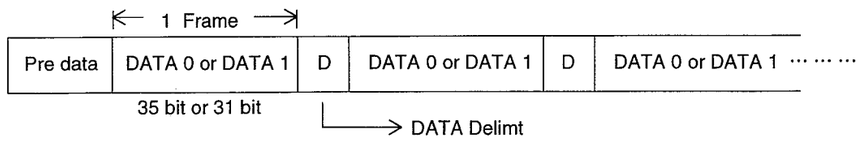


Fig. 22

When LINKing from the Portable Handset (when becoming STBY to TALK), DATA is transmitted in above format. The combined portion of DATA 0 and DATA 1 is transmitted in LINK requesting DATA (35bit) format first. Then, when LINK OK (ACK-OK) DATA (19bit) is returned from the Base Unit, it is sent as LINK from DATA after changing the combination of DATA 0 and DATA 1. And the DATA Delimt is between each Frame as a stop.
The contents of LINK requesting DATA and LINK form DATA are different depending on each operation.

7. Pulse Dial

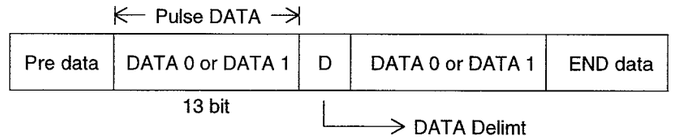


Fig. 23

When executing Pulse Dial,the Pulse Dial DATA is transmitted from the Portable Handset to the Base Unit in above format.
The combination of DATA 0 and DATA 1 are changed by each Dial No. And the DATA Delimt is between each Frame as a stop.
The number of Frame is 2.

8. Tone Dial

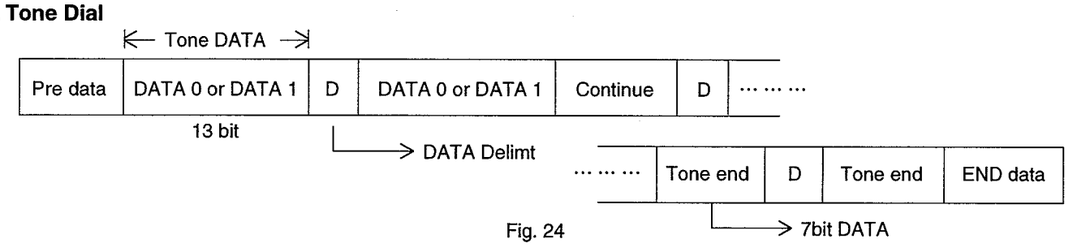


Fig. 24

When executing Tone Dial, Tone Dial DATA is transmitted from the Portable Handset to the Base Unit in above format.
The DATA is changed by Dial No. as same as Pulse Dial. When Tone Dialing, DATA (Continue DATA) that the key is pressed continuously is sent to the Base Unit during the key is pressed. When depressing the key, the TONE Dial exterminating DATA (Tone end DATA) is send, and the END data is sent finally.

NOTE

1,000,000 kinds of the security code are available for the model KX-TC901-B/KX-TC901-W. Each time the portable handset is set on the cradle of the base unit (for charging), the CPU automatically change the security code.

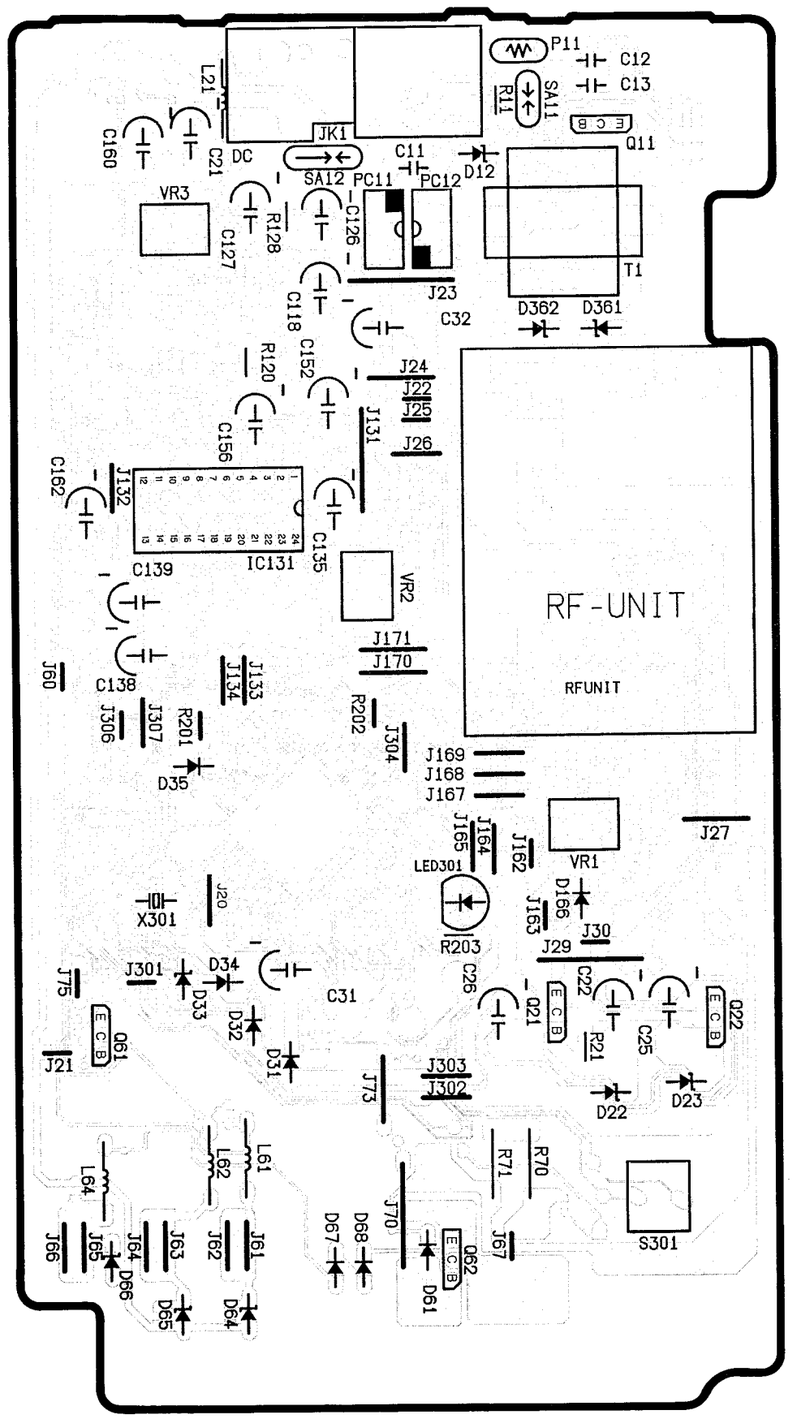
FREQUENCY TABLE (MHz)

CH	Base Unit TX Portable Handset RX	Base Unit RX Portable Handset TX	CH	Base Unit TX Portable Handset RX	Base Unit RX Portable Handset TX
1	902.100 MHz	926.100 MHz	16	902.850 MHz	926.850 MHz
2	902.150 MHz	926.150 MHz	17	902.900 MHz	926.900 MHz
3	902.200 MHz	926.200 MHz	18	902.950 MHz	926.950 MHz
4	902.250 MHz	926.250 MHz	19	903.000 MHz	927.000 MHz
5	902.300 MHz	926.300 MHz	20	903.050 MHz	927.050 MHz
6	902.350 MHz	926.350 MHz	21	903.100 MHz	927.100 MHz
7	902.400 MHz	926.400 MHz	22	903.150 MHz	927.150 MHz
8	902.450 MHz	926.450 MHz	23	903.200 MHz	927.200 MHz
9	902.500 MHz	926.500 MHz	24	903.250 MHz	927.250 MHz
10	902.550 MHz	926.550 MHz	25	903.300 MHz	927.300 MHz
11	902.600 MHz	926.600 MHz	26	903.350 MHz	927.350 MHz
12	902.650 MHz	926.650 MHz	27	903.400 MHz	927.400 MHz
13	902.700 MHz	926.700 MHz	28	903.450 MHz	927.450 MHz
14	902.750 MHz	926.750 MHz	29	903.500 MHz	927.500 MHz
15	902.800 MHz	926.800 MHz	30	903.550 MHz	927.550 MHz

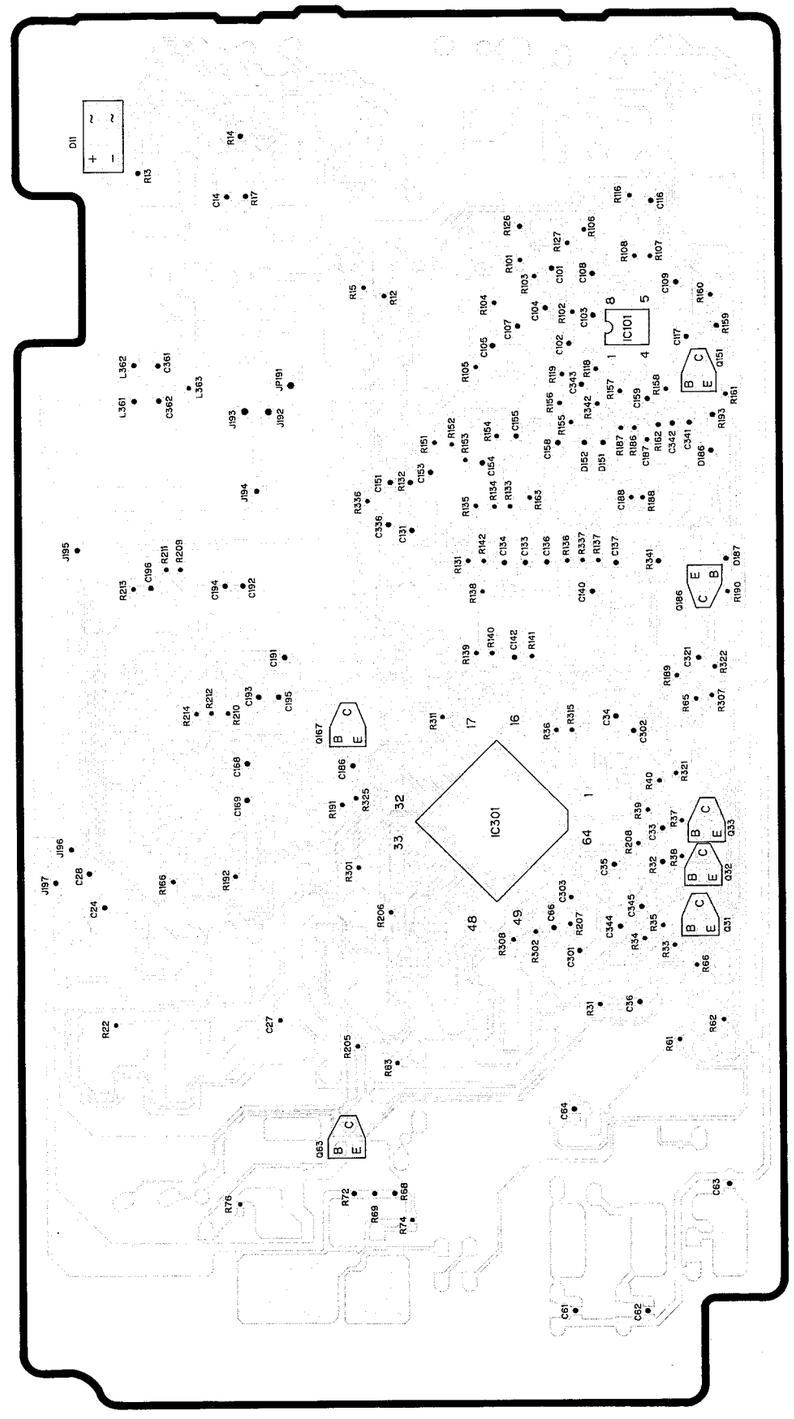
KX-TC901-B/KX-TC901-W

CIRCUIT BOARD (Base Unit)

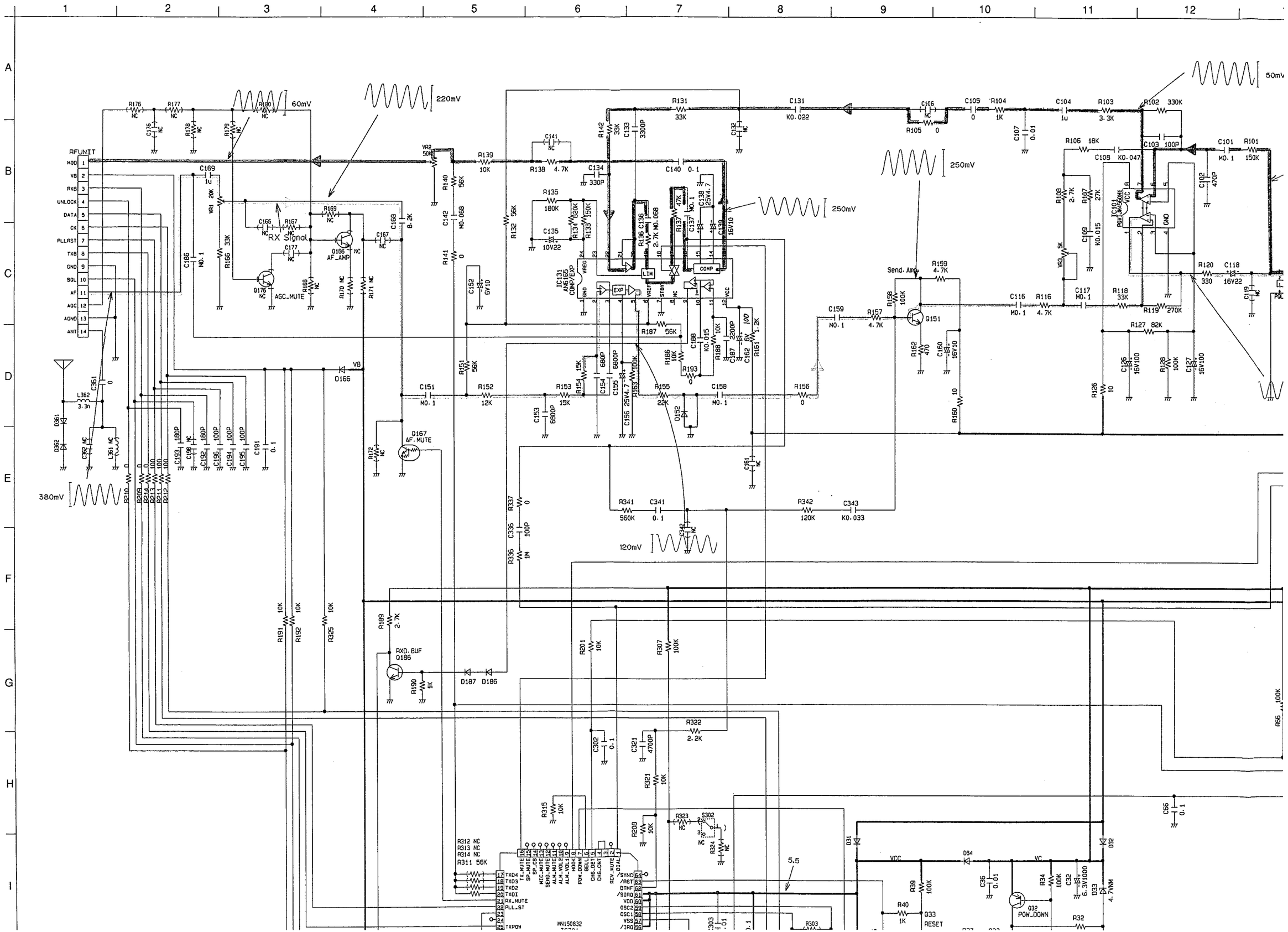
(Component View)

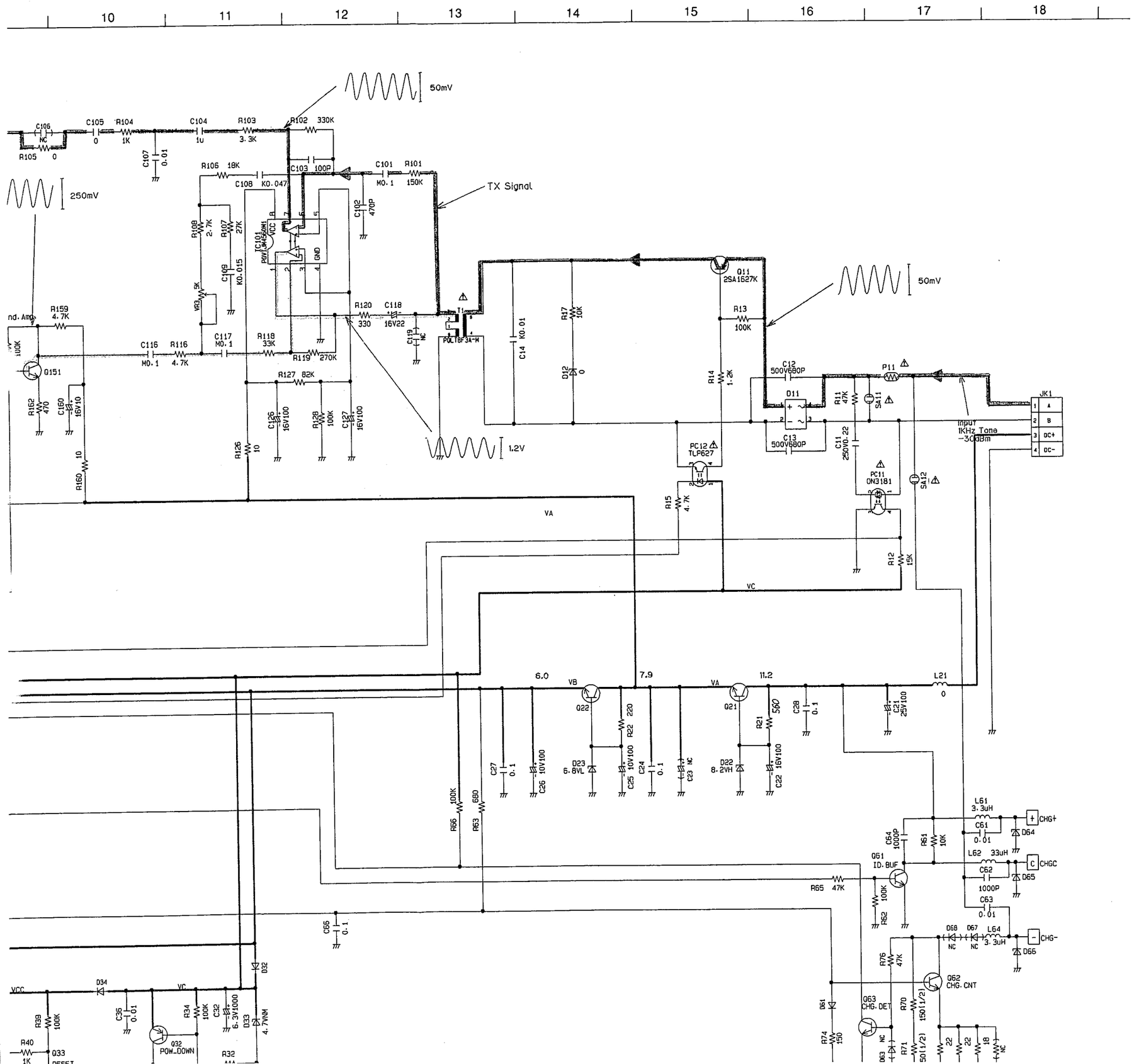


(Flow Solder Side View)



SCHEMATIC DIAGRAM (Base Unit)




10
11
12
13
14
15
16
17
18
50mV
250mV
TX Signal
50mV
1.2V
Input
1KHz Tone
-30dBm
JK1
A
B
DC+
DC-
CHG+
CHGC
CHG-
VA
VB
VC
VCC
6.0
7.9
11.2
Q11
2SA1627K
Q151
Q22
Q21
Q32
POW_DOWN
Q33
Q61
Q62
CHG. CNT
Q63
CHG. DET
PC12
TLP627
PC11
ON3181
D11
D12
D22
8.2VH
D23
6.8VL
D32
D33
4.7VNM
D34
D61
D64
D65
D66
D67
D68
L21
L61
3.3uH
L62
33uH
L64
3.3uH
T1
POLTBF3A-M
IC101
POWER AMP
VCC
GND
R101
150K
R102
330K
R103
3.3K
R104
1K
R105
0
R106
18K
R107
27K
R108
2.7K
R109
5K
R110
100K
R111
4.7K
R112
15K
R113
100K
R114
1.2K
R115
4.7K
R116
4.7K
R117
33K
R118
33K
R119
270K
R120
330
R121
560
R122
220
R123
10
R124
10
R125
10
R126
10
R127
82K
R128
100K
R129
100K
R130
100K
R131
100K
R132
100K
R133
100K
R134
100K
R135
100K
R136
100K
R137
100K
R138
100K
R139
100K
R140
1K
R141
47K
R142
47K
R143
47K
R144
47K
R145
47K
R146
47K
R147
47K
R148
47K
R149
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R150
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R151
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R152
47K
R153
47K
R154
47K
R155
47K
R156
47K
R157
47K
R158
47K
R159
4.7K
R160
10
R161
470
R162
470
R163
680
R164
680
R165
47K
R166
100K
R167
10K
R168
10K
R169
10K
R170
150(1/2)
R171
150(1/2)
R172
22
R173
22
R174
150
R175
18
R176
47K
C101
M0.1
C102
470P
C103
100P
C104
1u
C105
0
C106
NC
C107
0.01
C108
K0.047
C109
K0.015
C110
M0.1
C111
M0.1
C112
M0.1
C113
M0.1
C114
K0.01
C115
M0.1
C116
M0.1
C117
M0.1
C118
16V22
C119
NC
C120
NC
C121
NC
C122
NC
C123
NC
C124
0.1
C125
0.1
C126
16V100
C127
16V100
C128
0.1
C129
0.1
C130
0.1
C131
0.1
C132
6.3V1000
C133
0.1
C134
0.1
C135
0.1
C136
0.01
C137
0.1
C138
0.1
C139
0.1
C140
0.1
C141
0.1
C142
0.1
C143
0.1
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C151
0.1
C152
0.1
C153
0.1
C154
0.1
C155
0.1
C156
0.1
C157
0.1
C158
0.1
C159
0.1
C160
16V10
C161
0.1
C162
0.1
C163
0.1
C164
0.1
C165
0.1
C166
0.1
C167
0.1
C168
0.1
C169
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C170
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C171
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C172
0.1
C173
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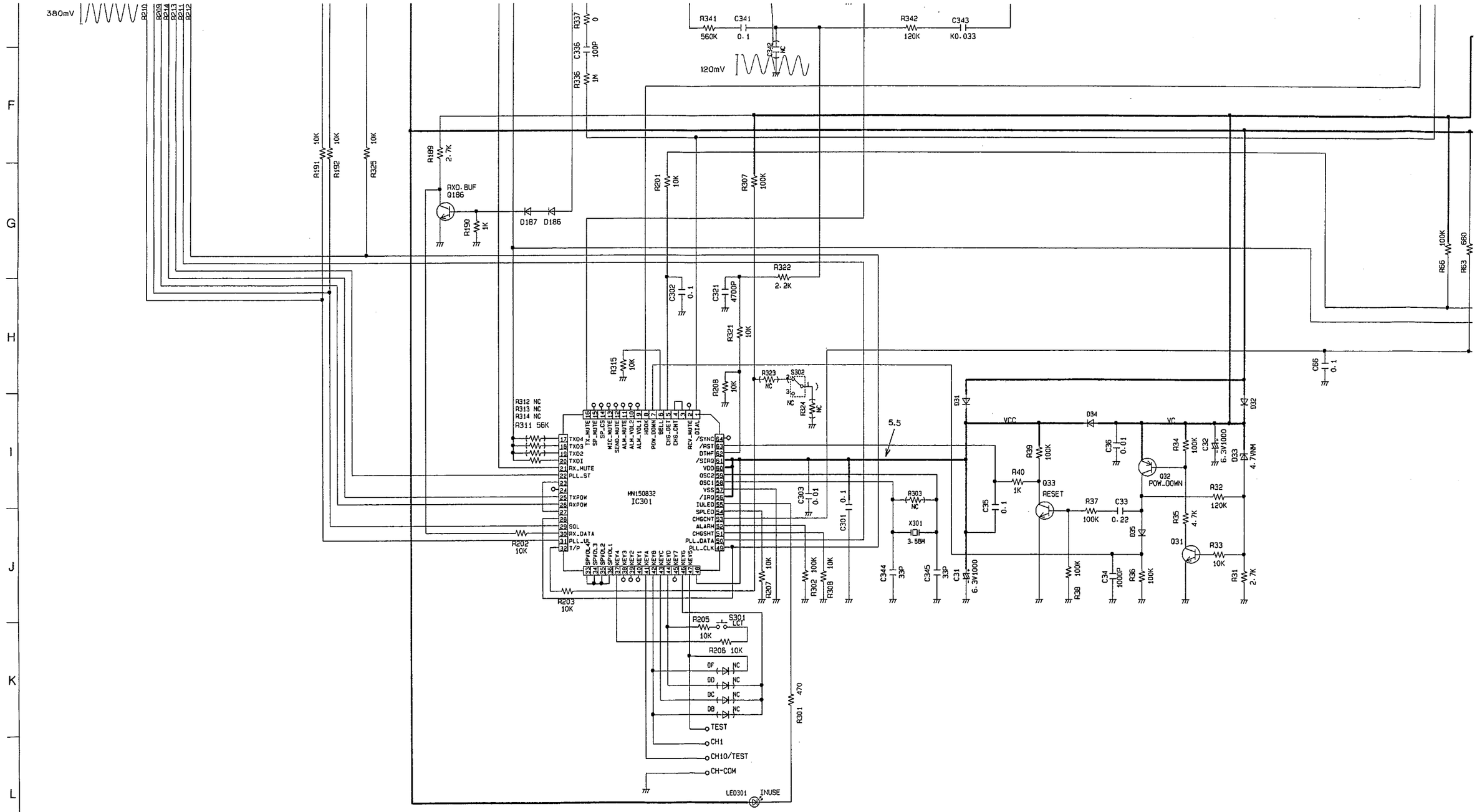
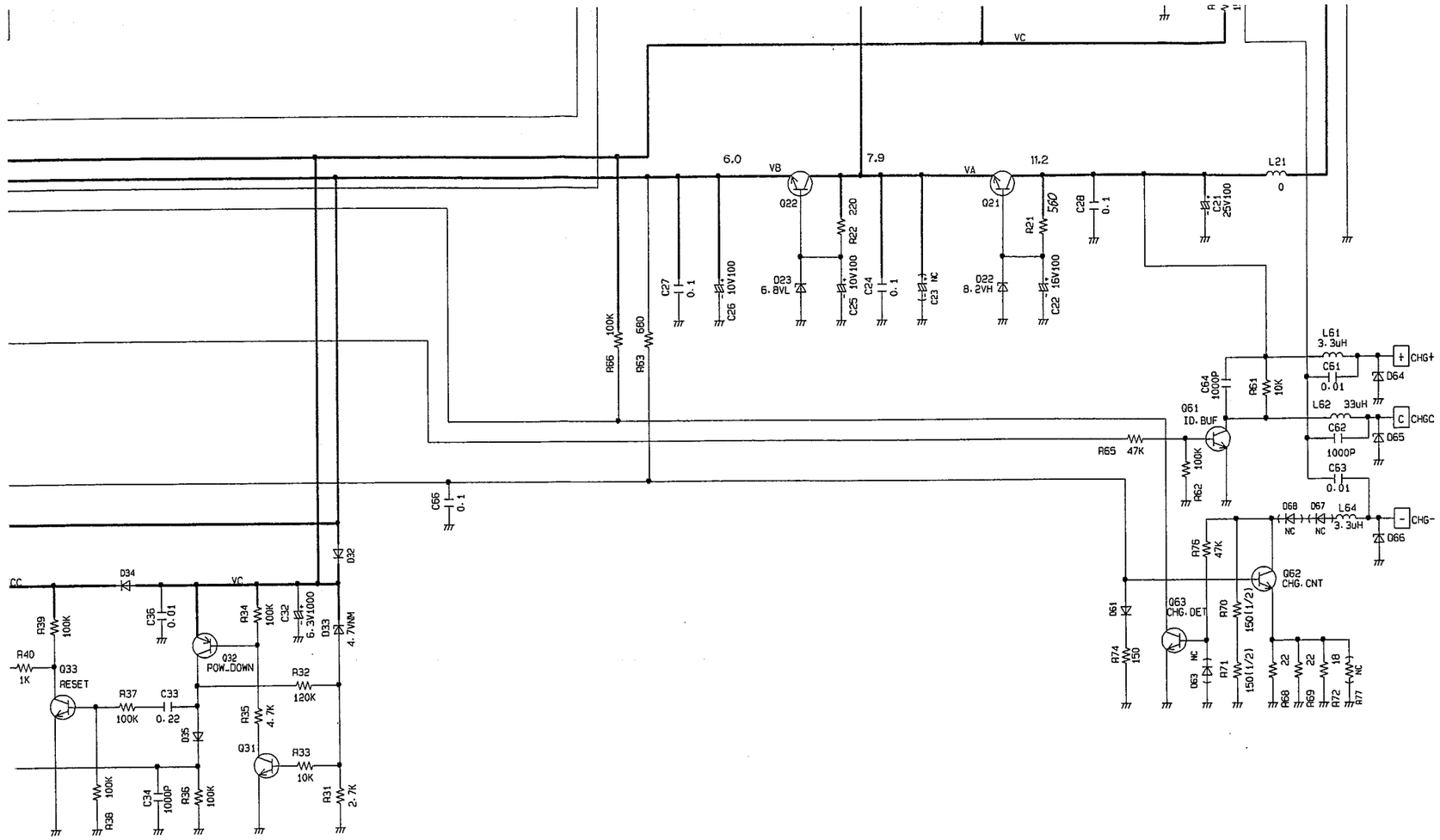


Notes:

1. S301: Handset Locator Switch
2. DC voltage measurements are taken with voltmeter from the negative voltage line.

Important Safety Notice:
Components identified by ⚠ mark have special characteristics impotant for safety. When replacing any of these components, use only manufacturer's specified parts.

This schematic diagram may be modified at any time with the development of new technology.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VA
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Q22
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R22 220
R21 560
C28 0.1
C27 25V100
C27 0.1
C26 10V100
Q23 6.8VL
C25 10V100
C24 0.1
C23 NC
Q22 8.2VH
C22 16V100
R66 100K
R63 560
L61 3.3uH
C61 0.01
CHG+
D64
R61 10K
C64 1000P
Q61 ID.BUF
L62 33uH
C62 1000P
CHGC
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R65 47K
R62 100K
C63 0.01
C66 0.1
D68 NC
D67 NC
L64 3.3uH
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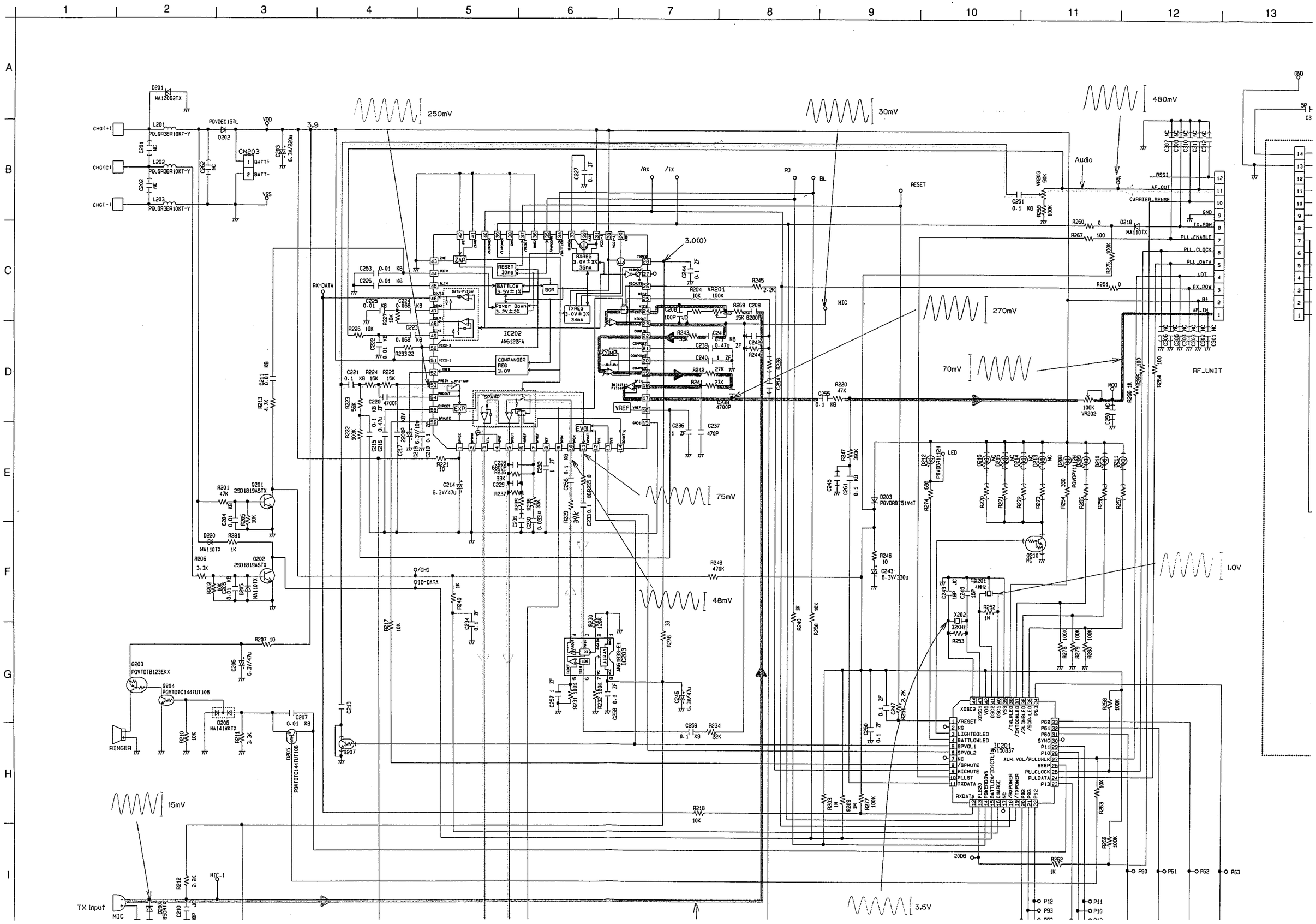
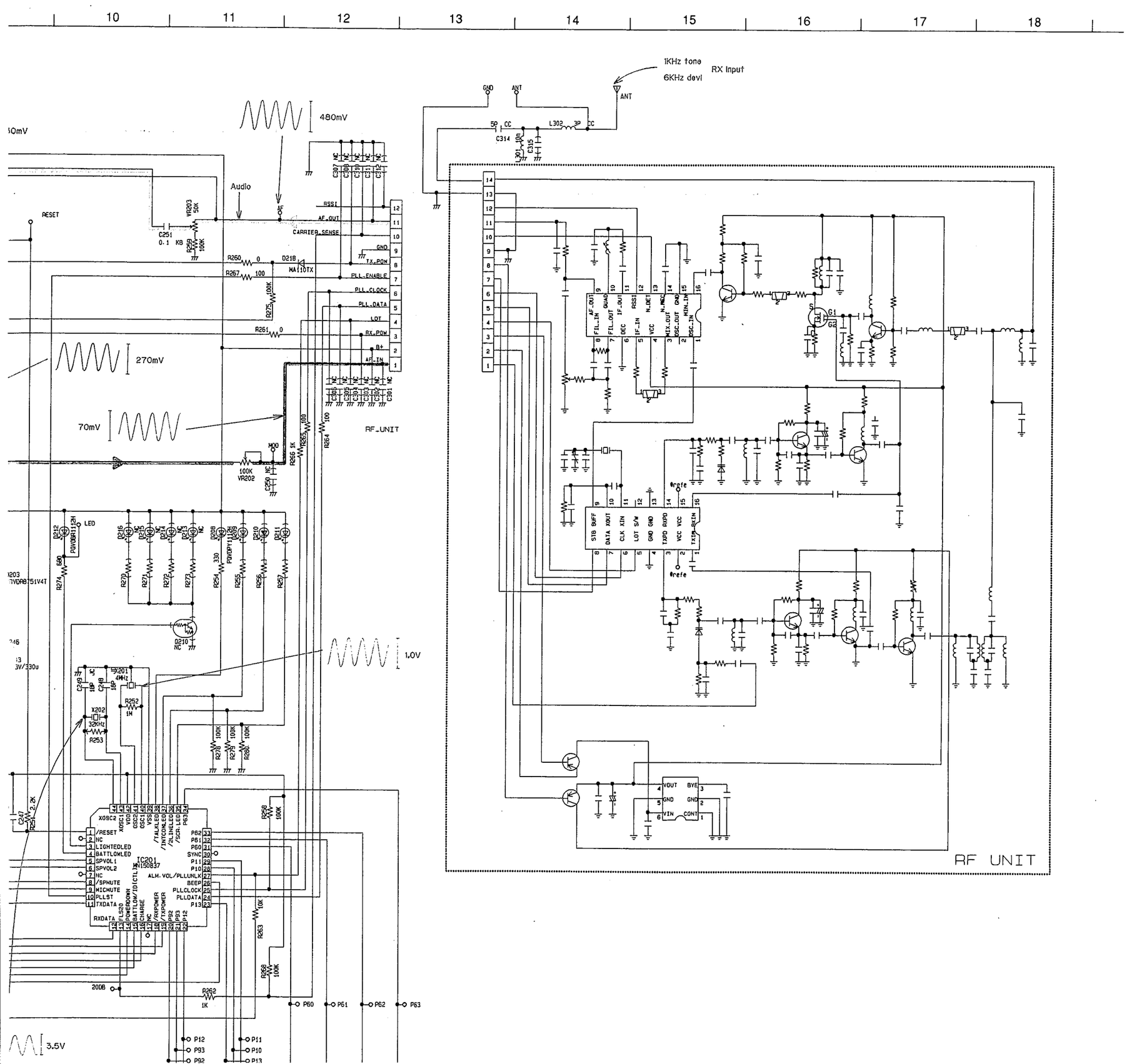
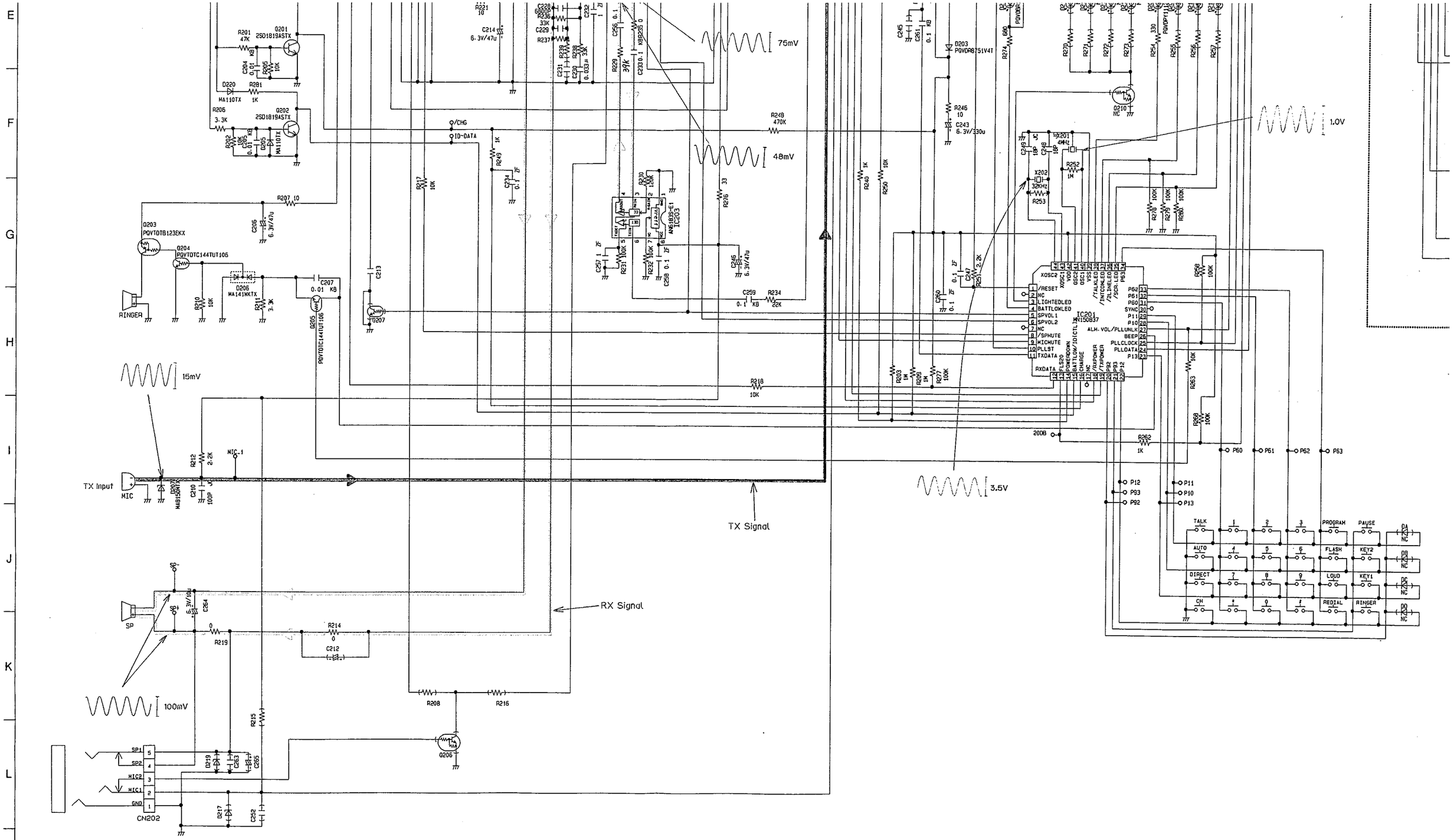
R75 47K
Q62 CHG.CNT
D61
Q63 CHG.DET
R70 150(1/2)
R74 150
D63 NC
R71 150(1/2)
R68 22
R69 22
R72 18
R77 NC
D34
VC
D32
R39 100K
C36 0.01
R34 100K
C32 6.3V1000
D33 4.7VNM
R40 1K
Q33 RESET
Q32 POW_DOWN
R32 120K
R37 100K
C33 0.22
R35 4.7K
D35
Q31
R33 10K
R38 100K
C34 1000P
R36 100K
R31 2.7K

SCHEMATIC DIAGRAM (Portable Handset)



: DIAGRAM (Portable Handset)




TX Input
MIC
RINGER
SP
CN202
TX Signal
RX Signal
IC201
IC203
X201
X202
Q201
Q202
Q203
Q204
Q205
Q206
Q207
Q210
D203
D206
D207
D220
D221
D222
D223
D224
D225
D226
D227
D228
D229
D230
D231
D232
D233
D234
D235
D236
D237
D238
D239
D240
D241
D242
D243
D244
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D252
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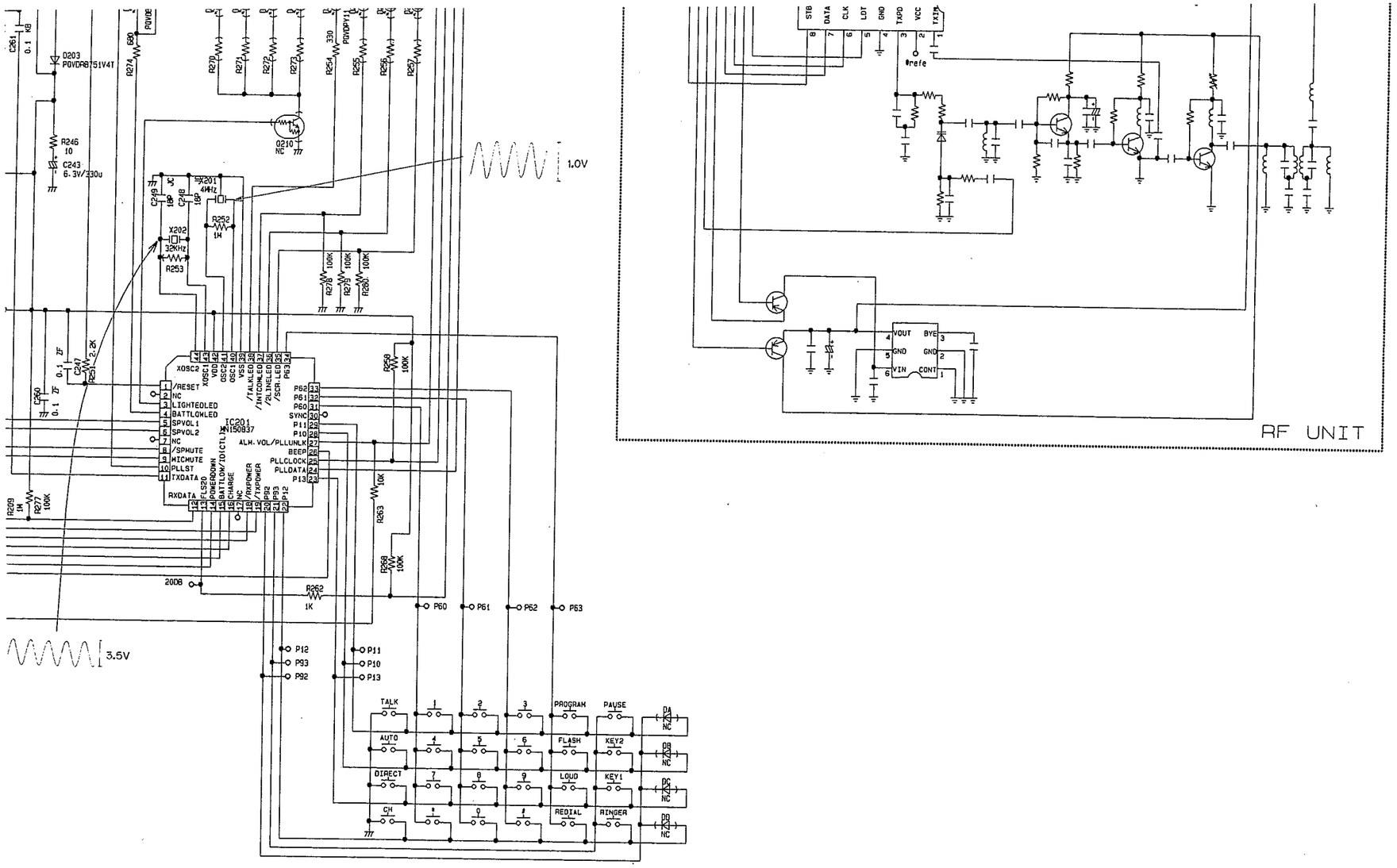
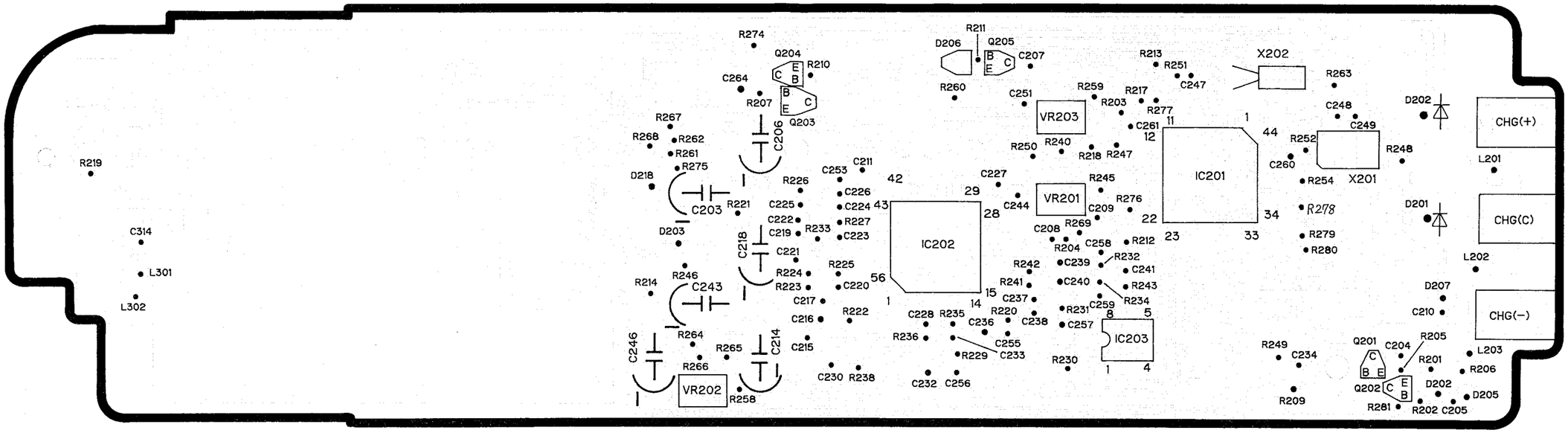
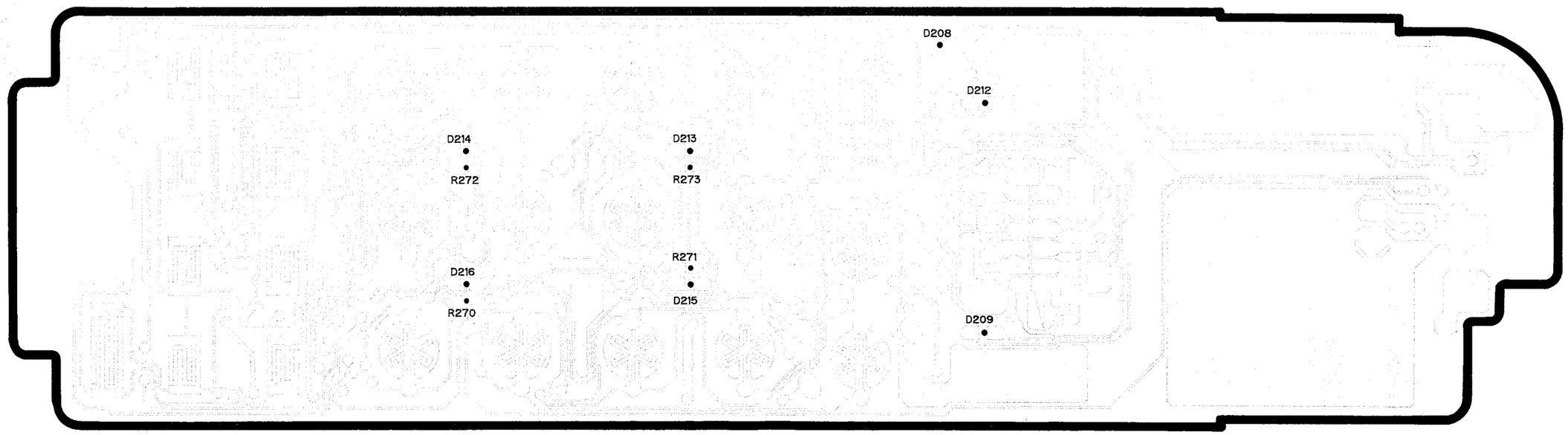
D254
D255
D256
D257
D258
D259


IC201
M150837
X201
4MHz
X202
32KHz
1.0V
3.5V
RF UNIT
TALK
PROGRAM
PAUSE
AUTO
FLASH
KEY2
DIRECT
LOUD
KEY1
CH
REDIAL
RINGER

KX-TC901-B/KX-TC901-W

CIRCUIT BOARD (Portable Handset)

(Flow Solder Side View)



(Component View)