

# DJ-X10

## Service Manual

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**ALINCO, INC.**

- In the NFM, AM, SSB and CW modes, the second IF signal goes through an IF filter (XF300 and XF301) and is input to pin No. 16 of an IF IC (IC304). A 455 kHz third IF signal converted by the IC's internal mixer is output from pin No. 3 and is filtered of adjacent signals by a ceramic filter (FL301). Thereafter, a switch (D306 and D309) selects the mode. In the NFM mode, the signal is input to pin No. 5, demodulated by IC's internal limiter amplifier and quadrature detection circuit, and output from pin No. 9 as an AF signal. In the AM mode, the signal is amplified by an AGC amplifier (Q313) and input to pin No. 7 of an IF IC (IC305). It is amplified inside the circuit, demodulated by the detection circuit and output from pin No. 8 as an AF signal. In the SSB mode, the signal goes through a ceramic filter (FL303) and is amplified by an AGC amplifier (Q313) and an IF amplifier (Q316). It is then mixed with a carrier signal, which is generated by the BFO circuit (X302 and Q318) and fed through a buffer (Q317), demodulated by a balanced modulation circuit consisting of diodes (Q315, D314 and D313), and output as an AF signal.
- The AF signal for each of the modes is selected with a switch (IC308) and amplified by an AF signal amplifier (IC309). It is controlled by an AF mute circuit (Q319) and adjusted for volume by an electronic volume (IC306). It is then amplified by an audio amplifier (IC307) and input to the speaker.

### 3) PLL Synthesizer Circuit

- The signal from a 12.8 MHz crystal (X100) oscillator circuit (Q100) is input to a PLL IC (IC101) to obtain a 10 MHz reference oscillation signal frequency. The comparison frequency is output from a VCO circuit (Q114, L108, D104, D105, D107 and D108), amplified by an amplifier (Q115, Q113 and Q116) and divided by a divider inside the PLL IC. It is then compared against the reference frequency to make the PLL synthesizer.
- The VCO output signal (675 ~ 1225 MHz) is amplified by a buffer amplifier (Q115, Q113 and Q120) and input into the first mixer as the first local oscillator signal.
- Frequencies of 9 kHz steps or less are varied by the VCXO circuit (X300, D304 and D305) of the D/A converter (IC303).

# CIRCUIT DESCRIPTION

## 1) Frequency

- Signals in the 0.1 ~ 449.99 MHz and 1500 ~ 2000 MHz bands are converted into the 736.25 MHz first IF signal by the first local oscillator signal.
- Signals in the 450 ~ 1499.99 MHz band are converted into the 275.45 MHz first IF signal by this same first local oscillator signal.
- The first IF signal is converted into the 45.05 MHz second IF signal from the two second local oscillator signals (671.2 and 230.4 MHz) by the second mixer circuit.
- Depending on the mode, the second IF signal is input to one of the two IF amplifier ICs. In one mode, the second IF signal is mixed with a 34.35 MHz third local oscillator signal and converted into a third IF signal of 10.7 MHz, while in the other, it is mixed with a 44.595 MHz third local oscillator signal and converted into the third IF signal of 455 kHz.

## 2) Receiver Block

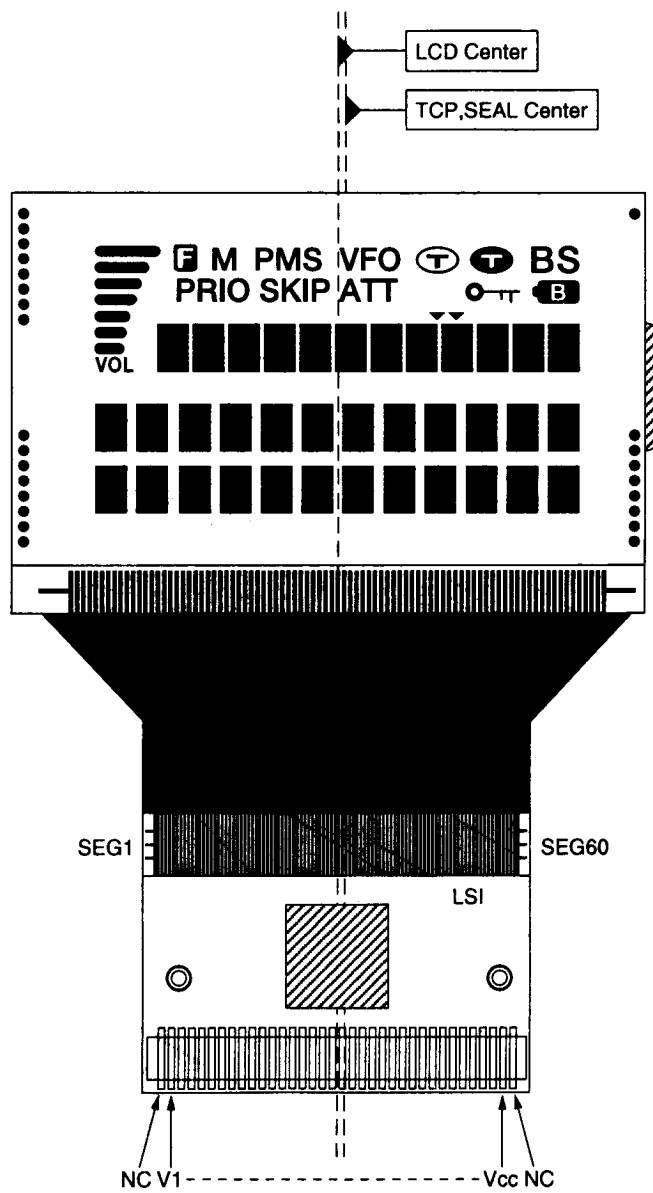
### Front-End Circuit

- The received signal from the antenna goes through the antenna circuits (D128, D124 and D125) and is screened by seven band pass filters consisting of several antenna switches (D131, D111, D127, D112, D126, D114, D130, D115, D134, D119, D135, D121, D136, D122 and D133) to remove unwanted signals.
- The RF signal is amplified by each of the RF amplifiers Q123 (0.1 ~ 222 MHz), Q125 (222 ~ 797 MHz), Q126 (797 ~ 2000 MHz) and Q118. It is then converted into the first IF signal by the first mixer circuit (T101, T100, D109 and D116).
- The adjacent signals in first IF signal, the 275.45 MHz IF signal and the 736.25 MHz IF signal are filtered out respectively by the band switch (D110 and D102), the IF filter (L113, L110, L107 and L101) and the IF filter (FL102 and FL101). Then, the signals are input into the second mixer circuit (Q102).
- In the second mixer circuit, the 12.8 MHz reference signal is mixed with either a 230.4 MHz second local oscillator signal (amplified 18 times) or a 691.2 MHz second local oscillator signal (amplified 54 times) selected by a switch (D101), and is converted into a 45.05 MHz second IF signal.
- In the WFM mode, the second IF signal goes through an IF filter (L301) and is input into pin No. 16 of an IF IC (IC305). A 10.7 MHz third IF signal converted by the IC's internal mixer is output from pin No. 14, filtered of adjacent signals by a ceramic filter (FL302) and input into pin No. 12. Next, it is demodulated by IC's internal limiter amplifier and quadrature detection circuit, and output from pin No. 8 as an AF signal.

# SPECIFICATIONS

<b>Frequency range</b>	0.1 ~ 1999.999950 MHz				
<b>Radio systems received</b>	WFM, NFM, AM, USB, LSB, CW				
<b>Frequency steps</b>	50 Hz, 100 Hz, 1 kHz, 2 kHz, 5 kHz, 6.25 kHz, 9 kHz, 10 kHz, 12.5 kHz, 15 kHz, 20 kHz, 25 kHz, 30 kHz, 50 kHz, 100 kHz, 125 kHz, 150 kHz, 200 kHz, 250 kHz, 500 kHz				
<b>Sensitivity (Typ.)</b>	AM	0.1 ~ 0.5 MHz 0.5 ~ 5 MHz 5 ~ 30 MHz 30 MHz ~ 1000 MHz (1 kHz 30 %mod 10 dB S/N)	10 $\mu$ V(20 dB $\mu$ ) 1.5 $\mu$ V( 3.5 dB $\mu$ ) 1 $\mu$ V(0 dB $\mu$ ) 1 $\mu$ V(0 dB $\mu$ )		
		SSB	0.5 ~ 5 MHz 5 ~ 30 MHz 30 MHz ~ 1000 MHz (10 dB S/N)	0.5 $\mu$ V(-6 dB $\mu$ ) 0.25 $\mu$ V(-12 dB $\mu$ ) 0.5 $\mu$ V(-6 dB $\mu$ )	
			NFM	5 ~ 30 MHz 30 ~ 1000 MHz 1000 ~ 1300 MHz 1300 ~ 1999 MHz (1 kHz 3.5 kHz 12 dB SINAD)	0.35 $\mu$ V(-9 dB $\mu$ ) 0.25 $\mu$ V(-12 dB $\mu$ ) 1.5 $\mu$ V(3.5 dB $\mu$ ) 10 $\mu$ V(20 dB $\mu$ )
				WFM	30 ~ 1000 MHz (12 dB SINAD)
<b>Memory channels</b>	1200				
<b>Search pass mode channels</b>	1000				
<b>Priority channel</b>	1				
<b>Memory banks</b>	30				
<b>Channels per bank</b>	40				
<b>Search bands</b>	20				
<b>Scan speed</b>	Approx. 25 CH/sec				
<b>Antenna connector</b>	BNC, 50 $\Omega$				
<b>Power supply</b>	4.8V DC (Ni-Cd)/6V DC (AA dry cell)				
<b>External power supply</b>	8 ~ 15V DC				
<b>Rated AF output</b>	Min. 100 mW, 10% THD				
<b>Power consumption</b>	At rated output	Approx. 200 mA			
	Squelched	Approx. 140 mA			
	BS ON	Approx. 30 mA			
<b>Weight</b>	Approx. 320 g				
<b>Dimensions</b>	57 x 150 x 27.5 mm (without projections)				
<b>Operating temperature range</b>	-10 ~ +50°C				
<b>Frequency stability</b>	$\pm$ 10 ppm				

# 19) LCD Diagram

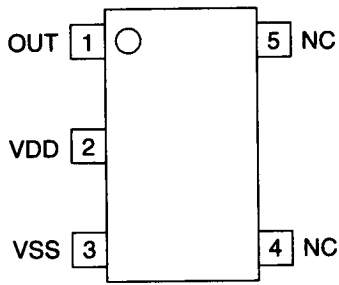


# 18) Transistor, Diode, and LED Outline Drawings

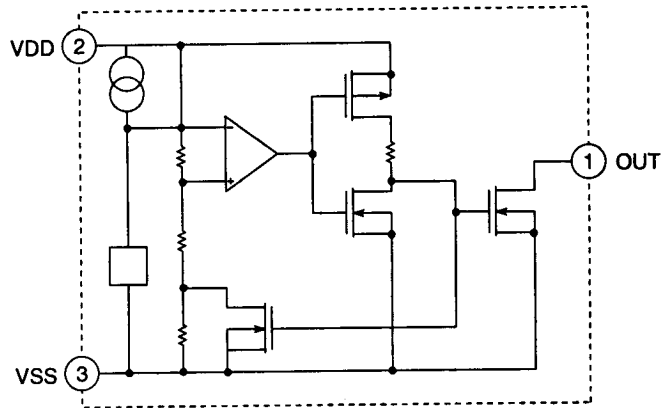
DA204U XD0130	DAN202U XD0230	MA742TX XD0250	MA741WK XD0252	1SS295 XD0306	1SS312 XD0307
1SV231 XD0260	1SS356 XD0272	MA111 XD0290	MA729 XD0291	U2FWJ44N XD0294	HVU350 XD0313
DTB123YK XU0155	XP1501TX XU0172	UN9112 XU0182	UN5212 XU0184	DTA143ZE XU0185	DTC143ZE XU0186
2SC4649 XT0108	2SC4181 XT0149	2SC4738 XT0150	2SC5006 XT0151	2SC5007 XT0152	2SC5008 XT0153
BRPG1201W XL0028	SML-310MT XL0036	PG1101F XL0045	2SK425 XE0033	UMC5N XU0152	
2SA1213-Y XT0088					

### 14) S-80725SN-2 (XA0528)

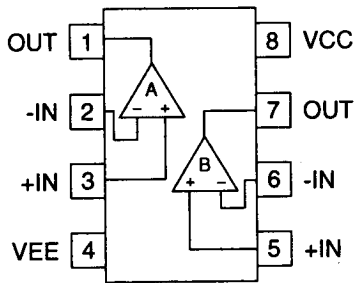
#### Pin Assignment



#### Block Diagram

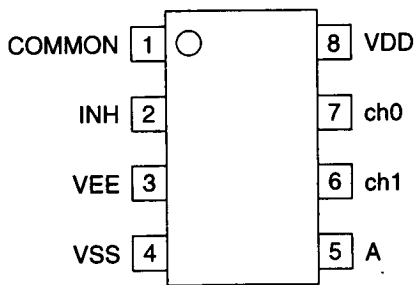


### 15) TA75W01FU-2 (XA0349)

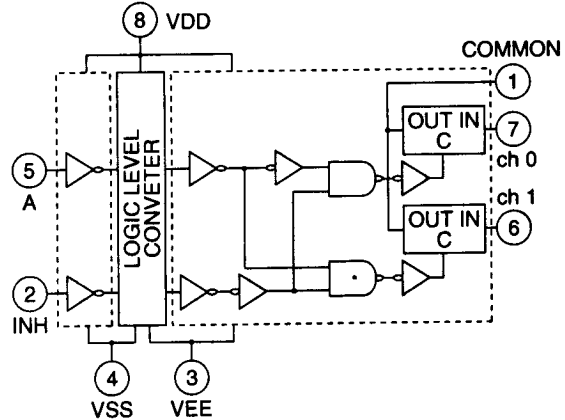


### 16) TC4W53FU (XA0348)

#### Pin Assignment

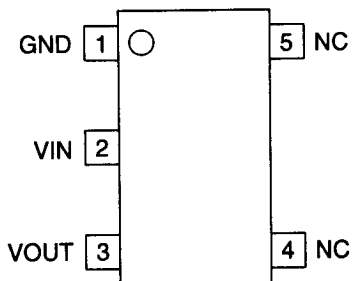


#### Block Diagram

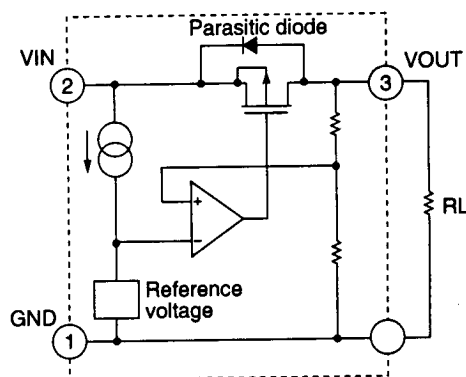


### 17) S-812XXSG (XA0358)

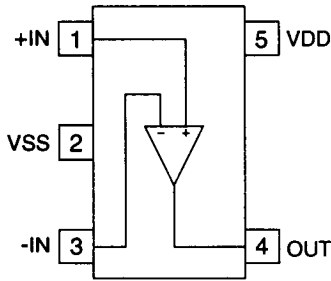
#### Pin Assignment



#### Block Diagram

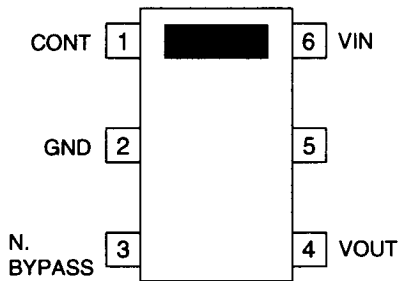


### 10) TC75S51F (XA0465)

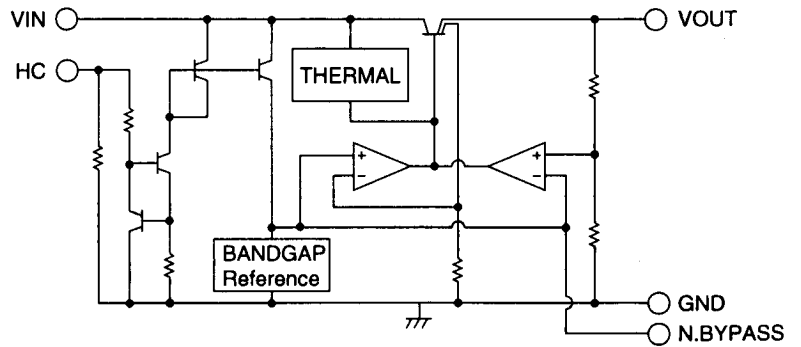


### 11) TK11235AM (XA0467)

#### Pin Assignment

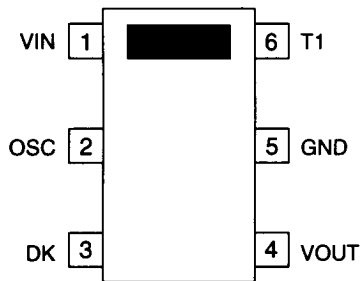


#### Block Diagram

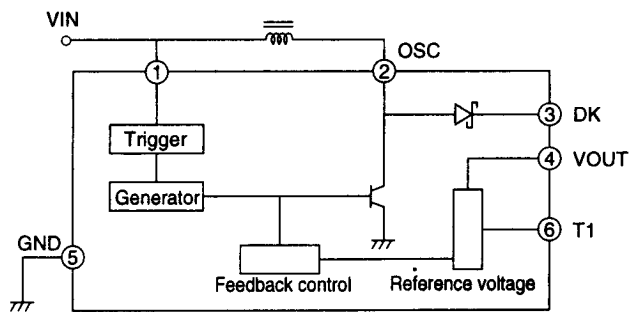


### 12) TK11819M (XA0468)

#### Pin Assignment

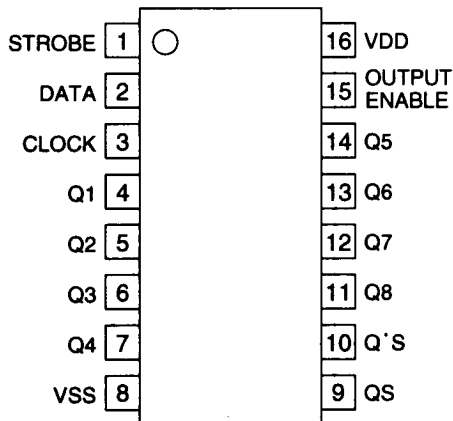


#### Block Diagram

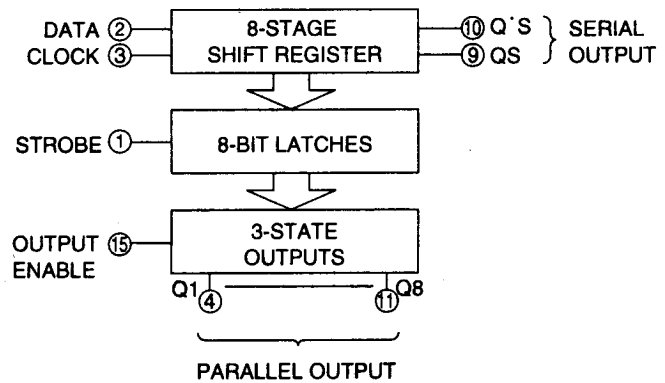


### 13) BU4094BCFV (XA0506)

#### Pin Assignment



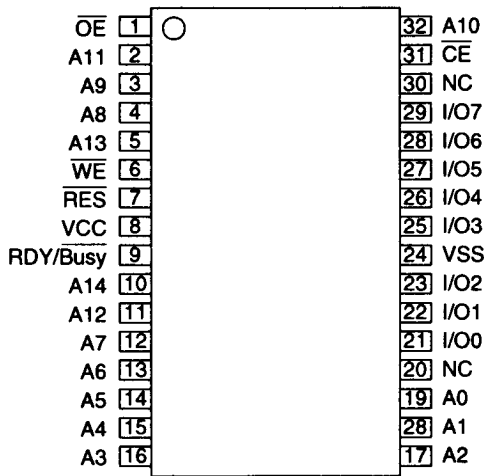
#### Block Diagram



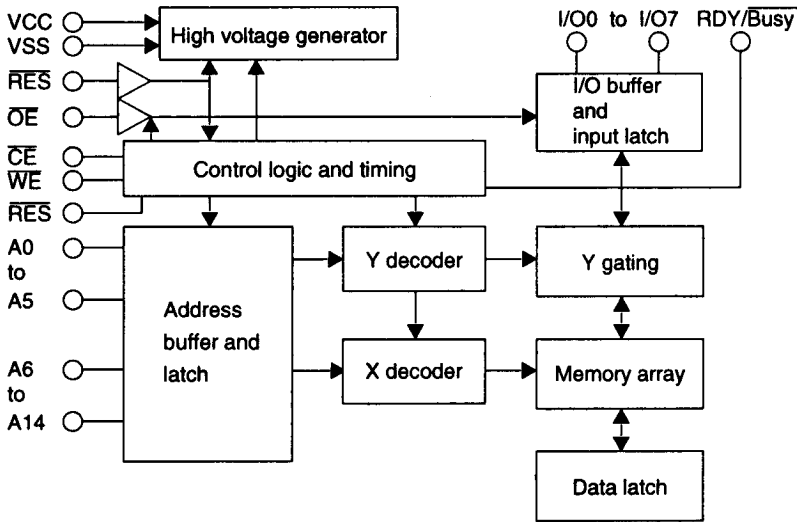


## 8) HN58V257A (XA0462)

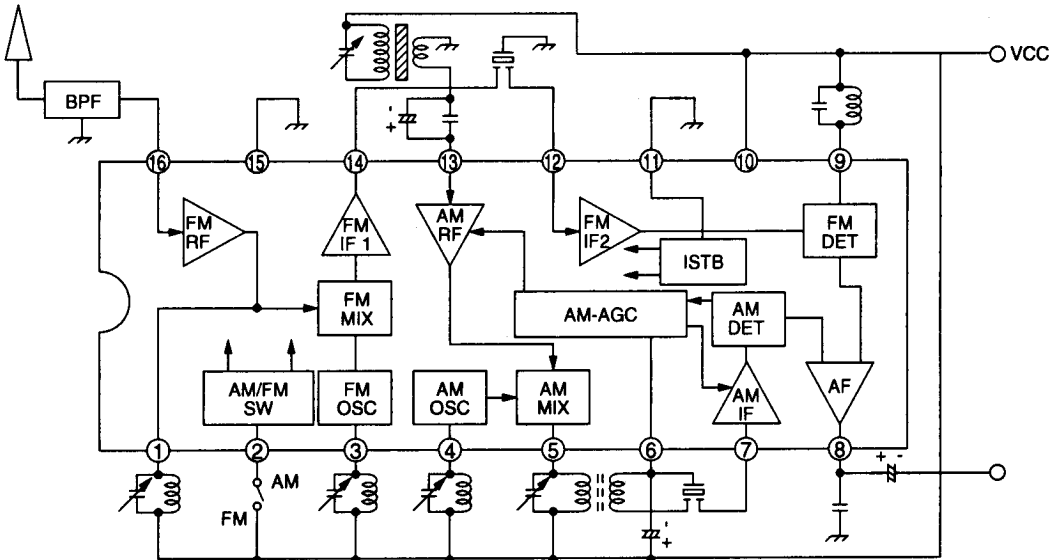
### Pin Assignment



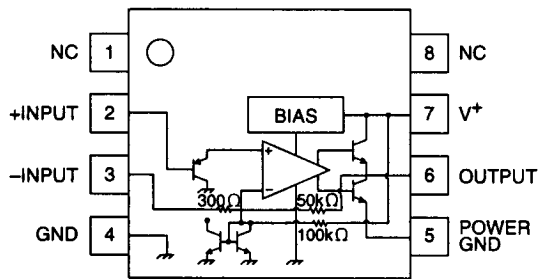
### Block Diagram



## 9) TA7792F (XA0464)

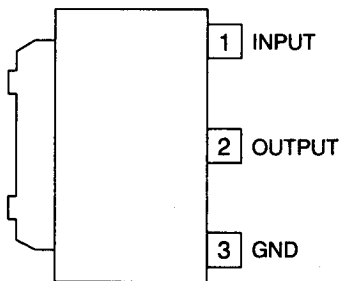


#### 4) NJM2070MT (XA0210)

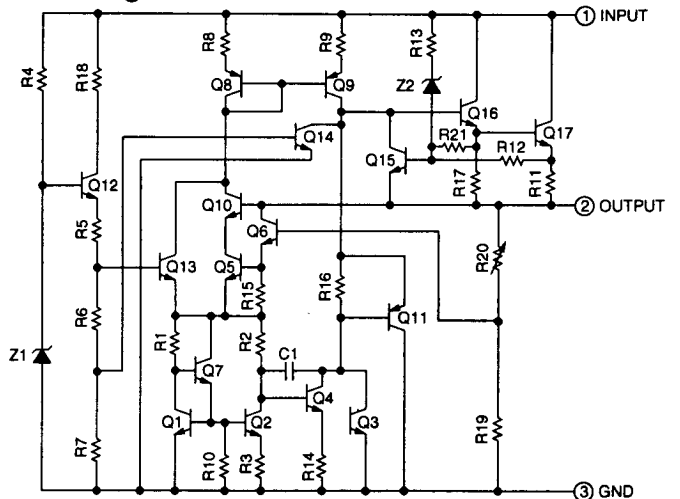


#### 5) TA7806F (XA0267)

Pin Assignment

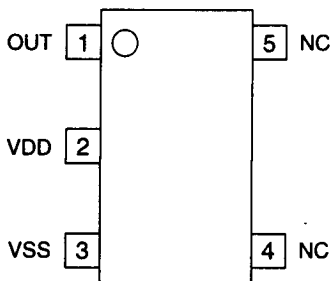


Block Diagram

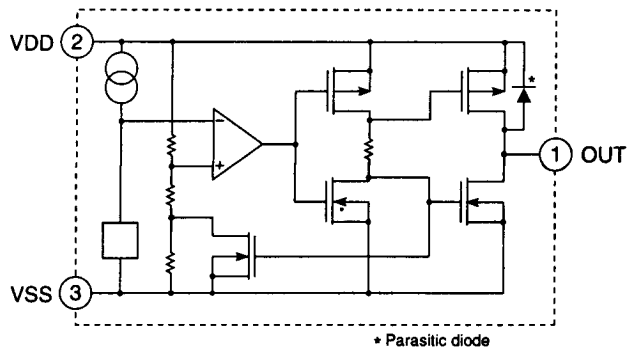


#### 6) S-80733SLAXT2 (XA0357)

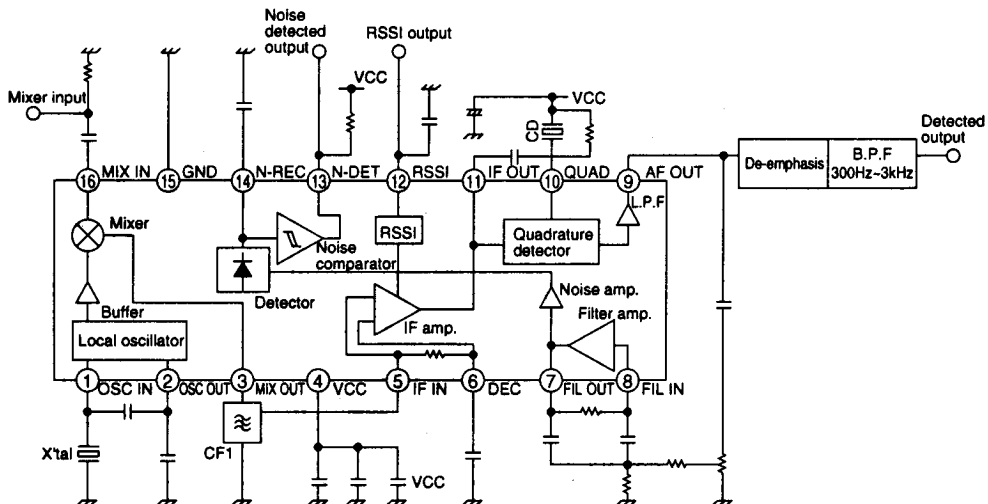
Pin Assignment



Block Diagram



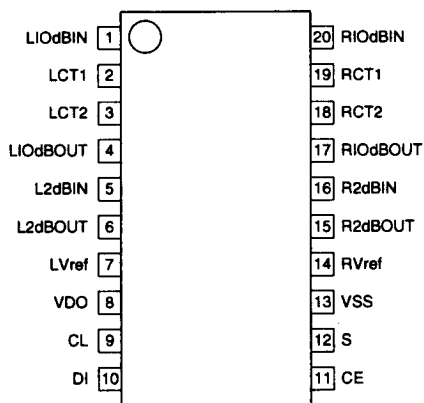
#### 7) TA31136FN (XA0404)



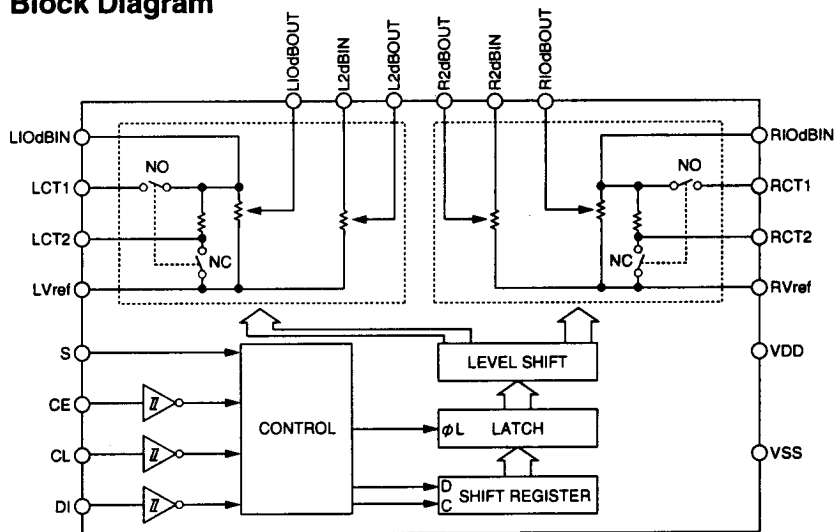
# SEMICONDUCTOR DATA

## 1) LC75366M (XA0345)

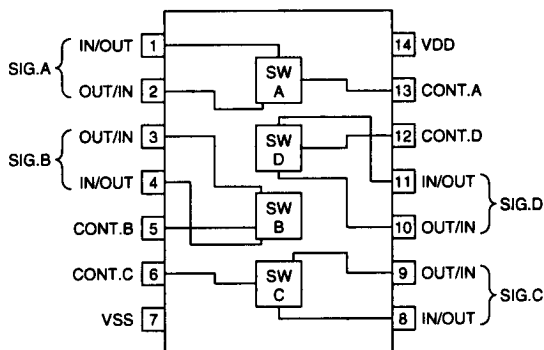
### Pin Assignment



### Block Diagram

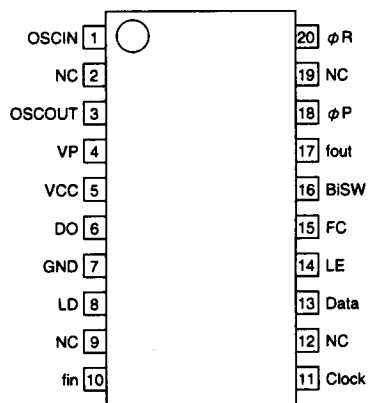


## 2) NJU4066BM (XA0095)

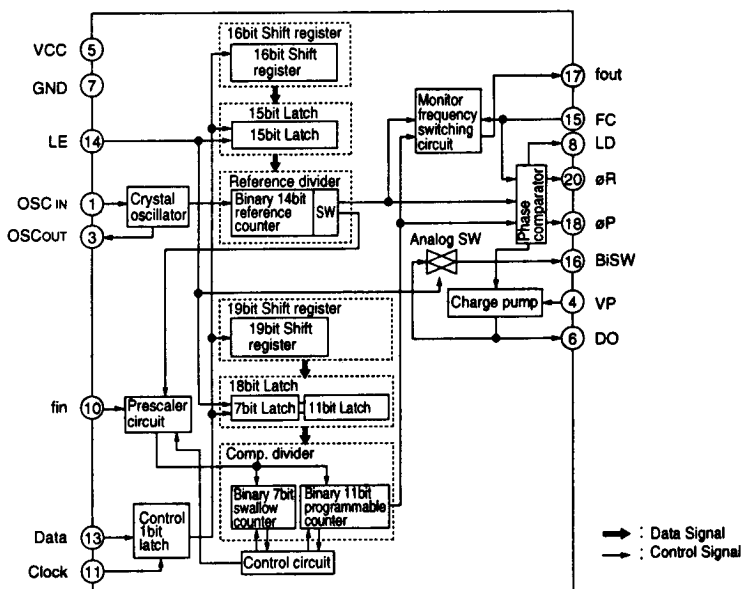


## 3) MB1511 (XA0173)

### Pin Assignment

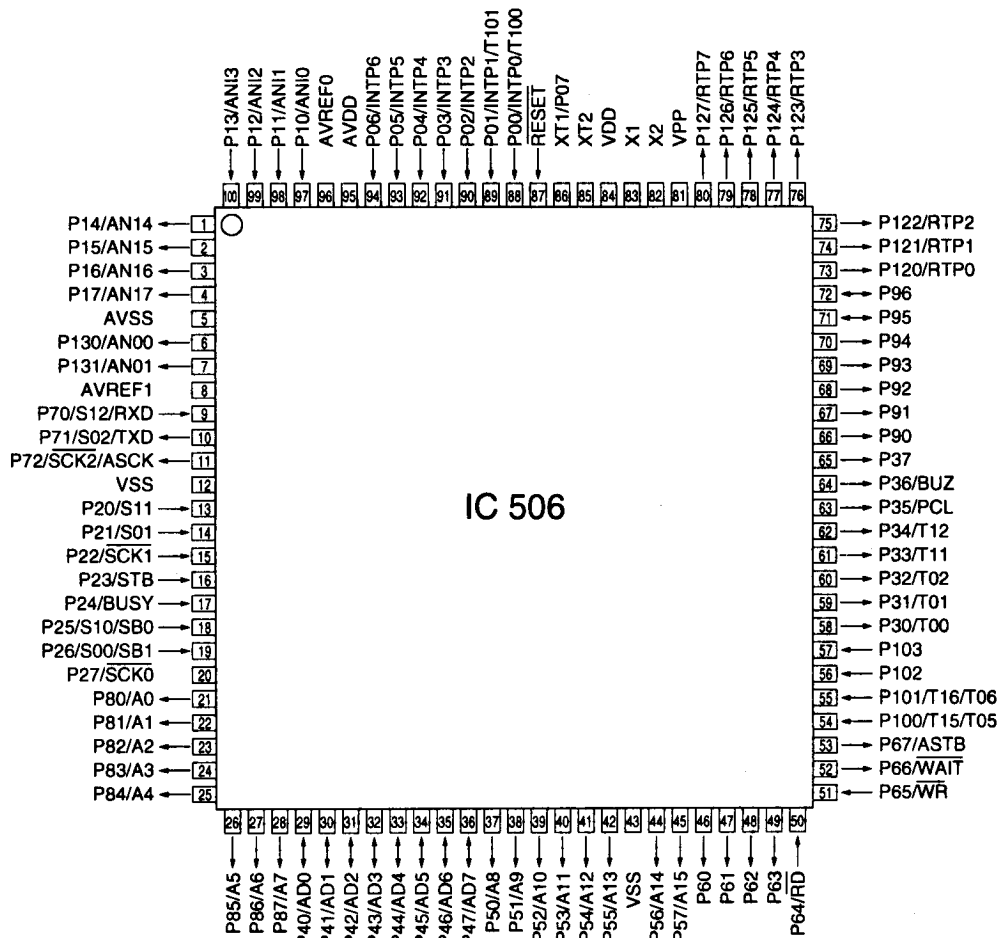


### Block Diagram



No.	Name	Pin Name	I/O	Description	H	L	Hi Z	Pull UP
32	P43/AD3	DD3	I/O	EEPROM DATA				
33	P44/AD4	DD4	I/O	EEPROM DATA				
34	P45/AD5	DD5	I/O	EEPROM DATA				
35	P46/AD6	DD6	I/O	EEPROM DATA				
36	P47/AD7	DD7	I/O	EEPROM DATA				
37	P50/A8	A8	O	EEPROM ADDRESS				
38	P51/A9	A9	O	EEPROM ADDRESS				
39	P52/A10	A10	O	EEPROM ADDRESS				
40	P53/A11	A11	O	EEPROM ADDRESS				
41	P54/A12	A12	O	EEPROM ADDRESS				
42	P55/A13	A13	O	EEPROM ADDRESS				
43	VSS	GND		GND				
44	P56/A14	A14	O	EEPROM ADDRESS				
45	P57/A15	/RES	O	EEPROM LCD RESET				
46	P60	STB4	O	STB FOR IC500				
47	P61	SHIFT	O	NOT USED				
48	P62	OECNT	O	OUT CONTROL IC500				
49	P63	/CE	O	CHIP ENABLE EEPROM				
50	P64/RD	RD	I	OUT ENABLE EEPROM				
51	P65/WR	/WE	I	WRITE ENABLE EEPROM				
52	P66/WAIT	OPTSTB	O	STB FOR OPTION				
53	P67/ASTB	OPTCT	O	CONTROL FOR OPTION	ON	OFF		
54	P100/T15/T05	RDY	I	EEPROM STATUS				
55	P101/T16/T06	OPTDET	I	OPTION DETECT	ON	OFF		
56	P102	WIDES	I	ENABLE BAND				
57	P103	LOCK	I	PLL LOCK		UNLOCK		
58	P30/T00	BEEP	O	BEEP				
59	P31/T01	AFS	O	AMP CONTROL	ON	OFF		
60	P32/T02	MUTE	O	MUTE	ON	OFF		
61	P33/T11	STB3	O	STB FOR IC300				
62	P34/T12	STB2	O	STB FOR IC306				
63	P35/PCL	STB1	O	STB FOR IC103				
64	P36/BUZ	LE	O	STB FOR IC101				
65	P37	BUSLS	O	BUSY LED CONTROL	ON	OFF		
66	P90	DB4	O	DATA LCD				
67	P91	DB5	O	DATA LCD				
68	P92	DB6	O	DATA LCD				
69	P93	DB7	O	DATA LCD				
70	P94	E/SCLK	O	E/SCLK LCD				
71	P95	RW/SID	I/O	RW/SID LCD				
72	P96	RS/CS	I/O	RS/CS LCD				
73	P120/RTP0	DATA	O	DATA FOR 4094				
74	P121/RTP1	CLK	O	CLK FOR 4094				
75	P122/RTP2	BATSV	O	BATT SAV CONTROL	ON	OFF		
76	P123/RTP3	RFL	O	FILTER CONTROL	OFF	ON		
77	P124/RTP4	RFM	O	FILTER CONTROL	OFF	ON		
78	P125/RTP5	RFH	O	FILTER CONTROL	OFF	ON		
79	P126/RTP6	BARS	O	NOT USED				
80	P127/RTP7	IFS	O	IF SWITCH	OFF	ON		
81	VPP	GND						
82	X2			XTAL MAIN				
83	X1			XTAL MAIN				
84	VDD	VDD						
85	XT2			XTAL SUB				
86	XT1/P07			XTAL SUB				
87	/RESET	/RST	I	RESET CPU				
88	P00/INTP0/T100	LAMPK	I	LAMP KEY	OFF	ON		0
89	P01/INTP1/T101	BRDET	I	BAT DETECT				0
90	P02/INTP2	POWK	I	POWER KEY	OFF	ON		0
91	P03/INTP3	MONK	I	MONITOR KEY	OFF	ON		0
92	P04/INTP4	FUNK	I	FUNCTION KEY	OFF	ON		0
93	P05/INTP5	A	I	ROTARY ENCORDER				0
94	P06/INTP6	B	I	ROTARY ENCORDER				0
95	AVDD	VDD		VDD				
96	AVREF0	VCC		VCC				
97	P10/ANI0	SQD	I	SQ				
98	P11/ANI1	SM	I	S-METER				
99	P12/ANI2	JRDET	I	NOT USED				
100	P13/ANI3	BATTDET	I	LOW BAT DETECT				

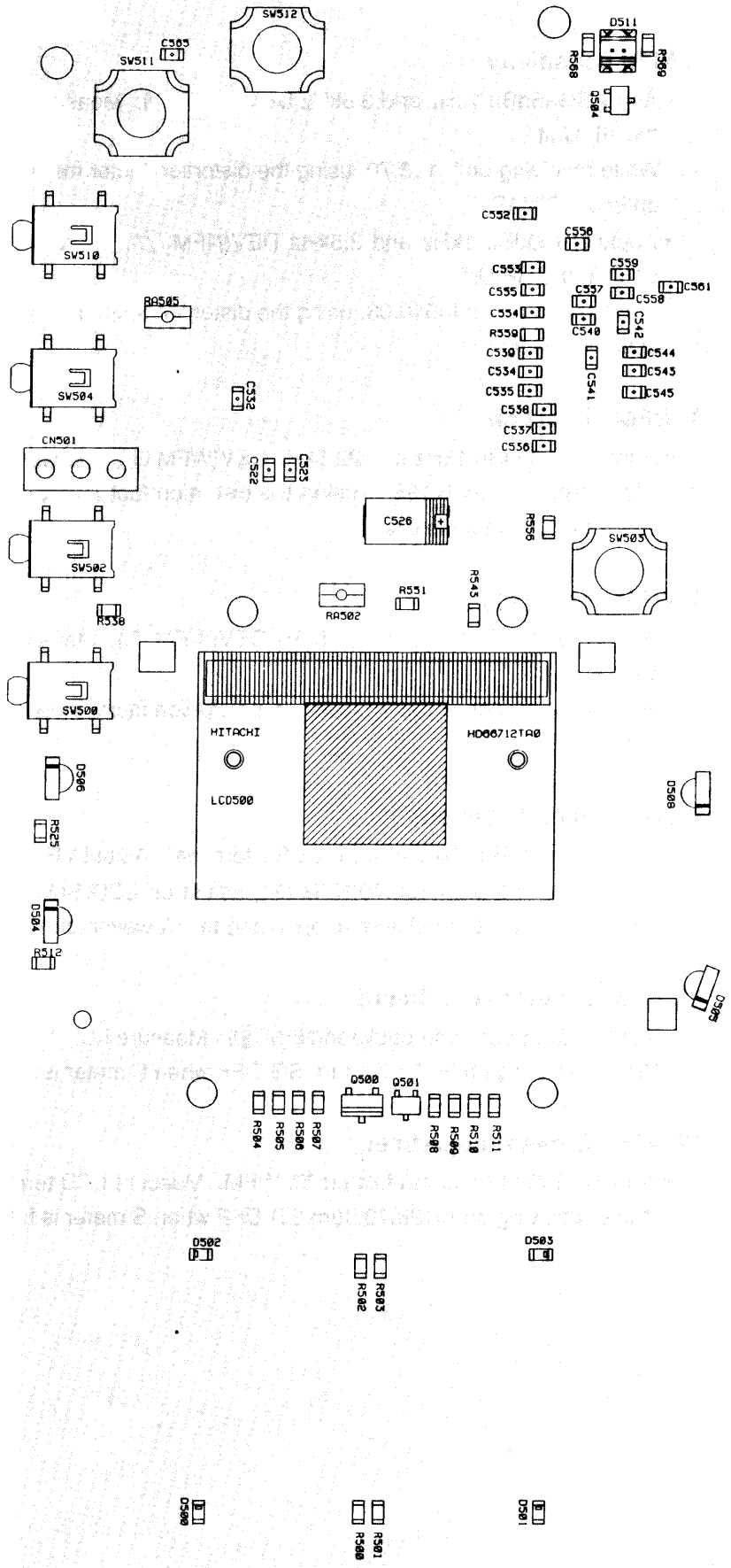
#### 4) CPU Terminal Functions: $\mu$ PD78076 (E:XA0536) (T:XA0550)



No.	Name	Pin Name	I/O	Description	H	L	Hi Z	Pull UP
1	P14/AN14	C0	O	16KEY MATRIX				
2	P15/AN15	CB1	O	16KEY MATRIX				
3	P16/AN16	CB2	O	16KEY MATRIX				
4	P17/AN17	CB3	O	16KEY MATRIX				
5	AVSS	GND		GND				
6	P130/AN00	BARTU	O	NOT USED				
7	P131/AN01	VCXOIN	O	VCXO CONTROL				
8	AVREF1	VCC		VCC				
9	P70/S12/RXD	RXD	I	CLONE RX INPUT				
10	P71/S02/TXD	TXD	O	CLONE TX OUTPUT				
11	P72/SCK2/ASCK	PCNTS	O	DC DC POWER CONTROL	ON	OFF		
12	VSS	GND		GND				
13	P20/S11	RB0	I	16KEY MATRIX	OFF	ON		
14	P21/S01	RB1	I	16KEY MATRIX	OFF	ON		
15	P22/SCK1	RB2	I	16KEY MATRIX	OFF	ON		
16	P23/STB	RB3	I	16KEY MATRIX	OFF	ON		
17	P24/BUSY	RB4	I	16KEY MATRIX	OFF	ON		
18	P25/S10/SB0	RB5	I	16KEY MATRIX	OFF	ON		
19	P26/S00/SB1	SRCHK	I	SRCH KEY	OFF	ON		
20	P27/SCK0	NOVOEDET		NOT USED				
21	P80/A0	A0	O	EEPROM ADDRESS				
22	P81/A1	A1	O	EEPROM ADDRESS				
23	P82/A2	A2	O	EEPROM ADDRESS				
24	P83/A3	A3	O	EEPROM ADDRESS				
25	P84/A4	A4	O	EEPROM ADDRESS				
26	P85/A5	A5	O	EEPROM ADDRESS				
27	P86/A6	A6	O	EEPROM ADDRESS				
28	P87/A7	A7	O	EEPROM ADDRESS				
29	P40/AD0	DD0	I/O	EEPROM DATA				
30	P41/AD1	DD1	I/O	EEPROM DATA				
31	P42/AD2	DD2	I/O	EEPROM DATA				

# PC BOARD VIEW

## CPU Unit Side A



## 7. NFM sensitivity

- Apply SG=6dBu 1kHz and 3.5kHz DEV (NFM ⑥). Measure SP terminal. Adjust FL102, FL101, and L102 in the RF Unit.  
While receiving on f=198.70, using the distortion factor meter oscilloscope, repeat adjustment until obtaining optimum SINAD.
- Apply SG=0dBu 1kHz and 3.5kHz DEV(NFM ⑦). Measure SP terminal. Adjust L113, L110, L107, and L101 in the RF Unit.  
While receiving on f=510.03, using the distortion factor meter oscilloscope, repeat adjustment until obtaining optimum SINAD.

## 8. WFM distortion

- Apply SG=60dBu 1kHz and 22.5kHz DEV(WFM ⑧). Measure SP terminal. Adjust L305 in the IF Unit.  
While receiving on f=198.7, using the distortion factor meter oscilloscope, set distortion factor to minimum and max. AF output to 6%.

## 9. WFM sensitivity

- Apply SG=10dBu 1kHz and 22.5kHz DEV(WFM ⑧). Measure SP terminal. Adjust L304 and L309 in the IF Unit.  
While receiving on f=198.70, using the distortion factor meter oscilloscope, repeat adjustment until obtaining optimum SINAD.

## 10. SQ level adjustment

- Apply SG=-3dBu. Measure SP BUSY terminal. Adjust VR302 in the IF Unit.  
While receiving on f=198.70(NFM ⑨), adjust on LCD SQ level 1, turn VR304 clockwise to close squelch. Then, turn counter-clockwise to open and fix. However, close with SQ.

## 11. NFM S meter adjustment

- Apply SG=25dBu, unmodulated(NFM ⑨). Measure LCD terminal. Adjust VR302 in the IF Unit.  
While receiving on f=198.70, turn SG OFF when S meter is full scale. Check S meter does not light up.

## 12. WFM S meter adjustment

- Apply SG=32dBu, unmodulated ⑩, WFM. Measure LCD terminal. Adjust VR301 in the IF Unit.  
While receiving on f=198.70, turn SG OFF when S meter is full scale. Check S meter does not light up.

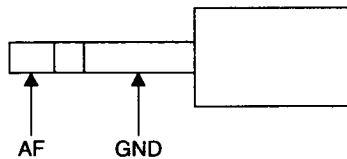
# ADJUSTMENT

## 1) Required measuring instruments and tools

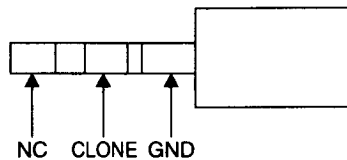
1. Digital voltmeter
2. Regulated power supply of 10 V, 1 A or more
3. Oscilloscope
4. Frequency counter
5. External speaker
6. 0.1 MHz ~ 2 GHz SG
7. Audio analyzer  
Level meter, distortion factor meter, linear detector
8. Spectrum analyzer

1 m coaxial cable with BNC connector

Speaker cable with 3.5ø plug



Cloning cable with 2.5ø stereo plug on both ends



Power supply cable for external power supply terminal (For DJG5)

## 2) Adjustment

All SSG outputs are indicated in EMF.

The SP is 8  $\Omega$ . Output is 50 mW.

Level meter filter must be HPF (30 ~ 50 Hz) and LPF (10 ~ 15 kHz).



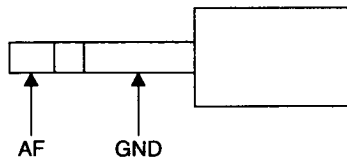
# ADJUSTMENT

## 1) Required measuring instruments and tools

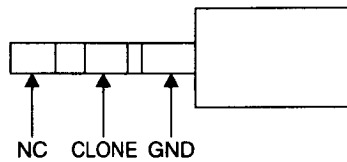
1. Digital voltmeter
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7. Audio analyzer  
Level meter, distortion factor meter, linear detector
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Speaker cable with 3.5ø plug



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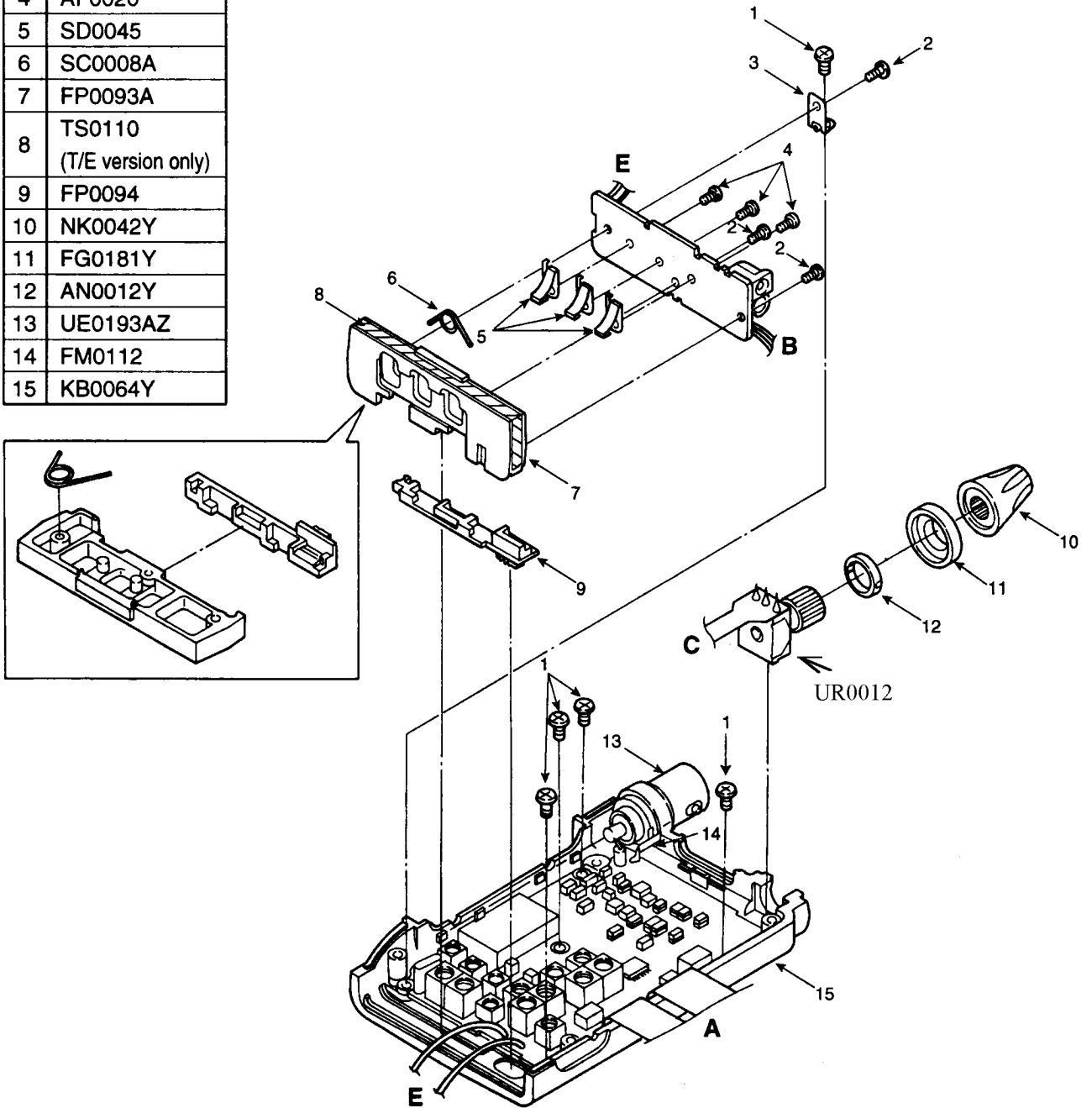






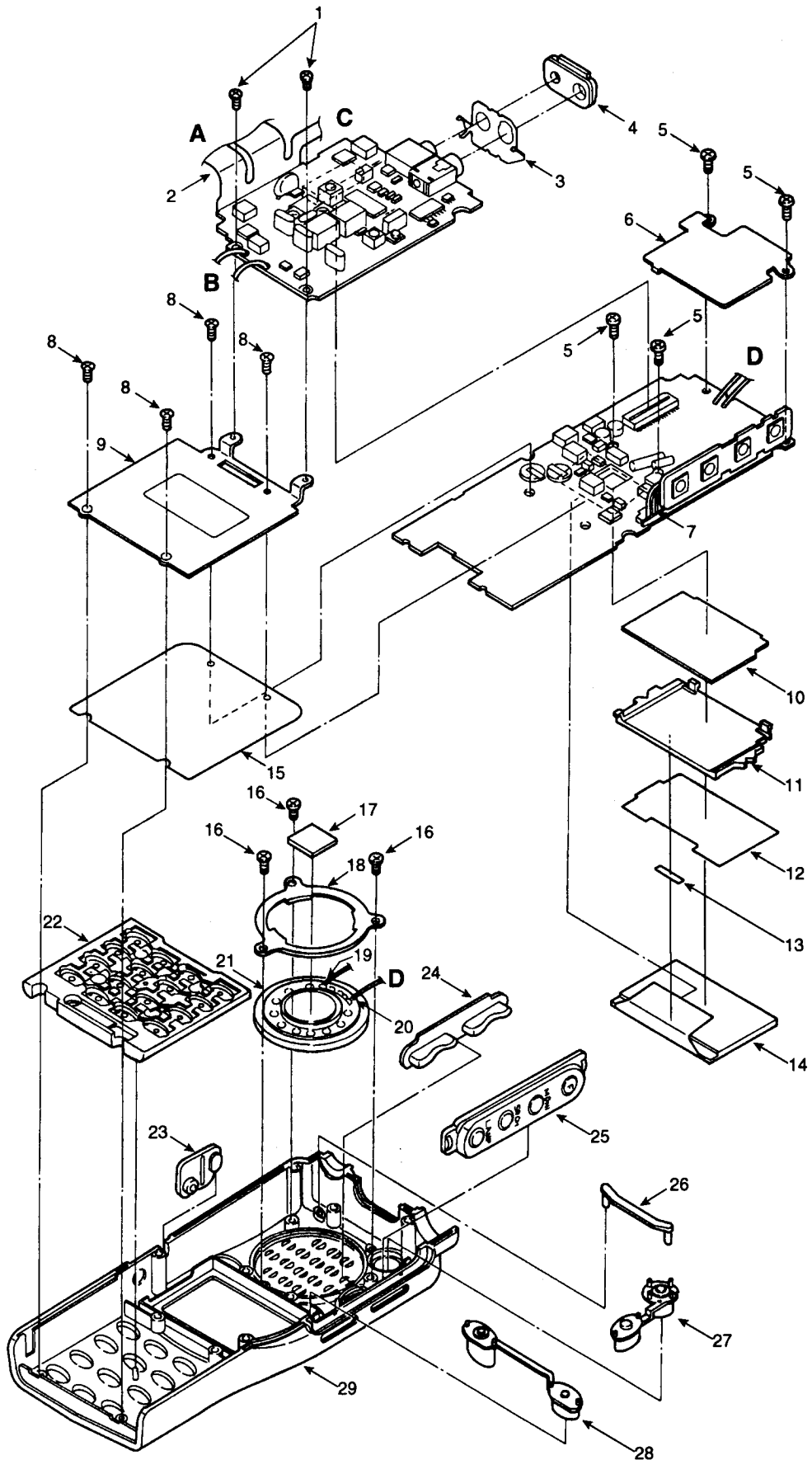
### 3) Charge/RF Unit

	Parts No.
1	AK0001
2	AX0001
3	TS0141
4	AF0020
5	SD0045
6	SC0008A
7	FP0093A
8	TS0110 (T/E version only)
9	FP0094
10	NK0042Y
11	FG0181Y
12	AN0012Y
13	UE0193AZ
14	FM0112
15	KB0064Y



## 2) IF Unit/CPU Unit

	Parts No.
1	AF0020
2	uP0282
3	FM0100
4	FG0178Y
5	AP0004
6	TN006Z
7	uP0281
8	AX0002
9	FM0098
10	TL0017
11	DG0027
12	TL0020
13	TX0004
14	EL0037
15	TZ0064
16	AX0001
17	FG0218
18	ST0052
19	MKCL00AA
20	MNCLH2AA
21	ES0011
22	FG0255
23	FG0180Y
24	FG0176Y </td
25	FG0235
26	FG0242
27	FG0243Y
28	FG0177Y
29	KZ0051Y

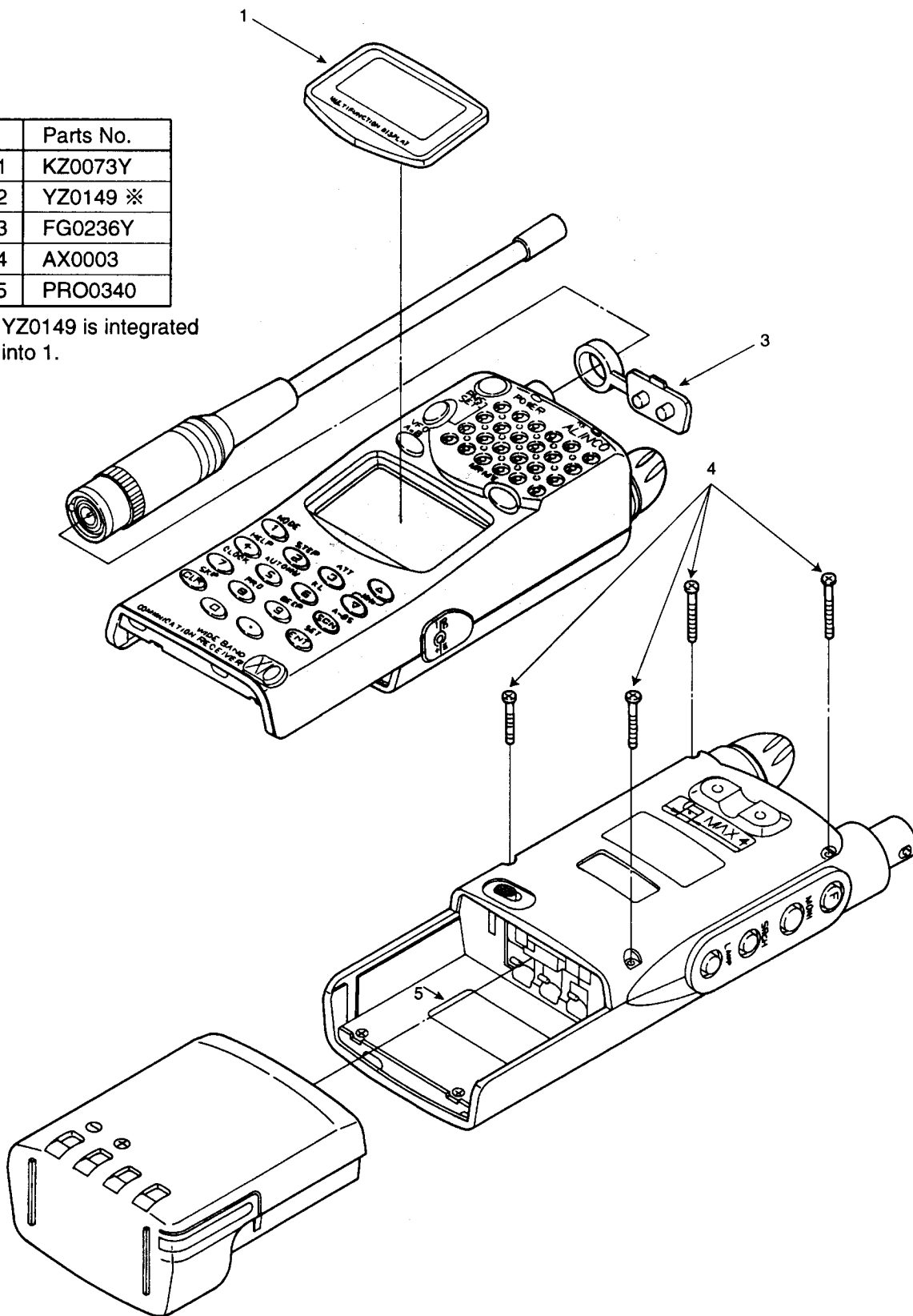


# EXPLODED VIEW

## 1) Front/Rear View

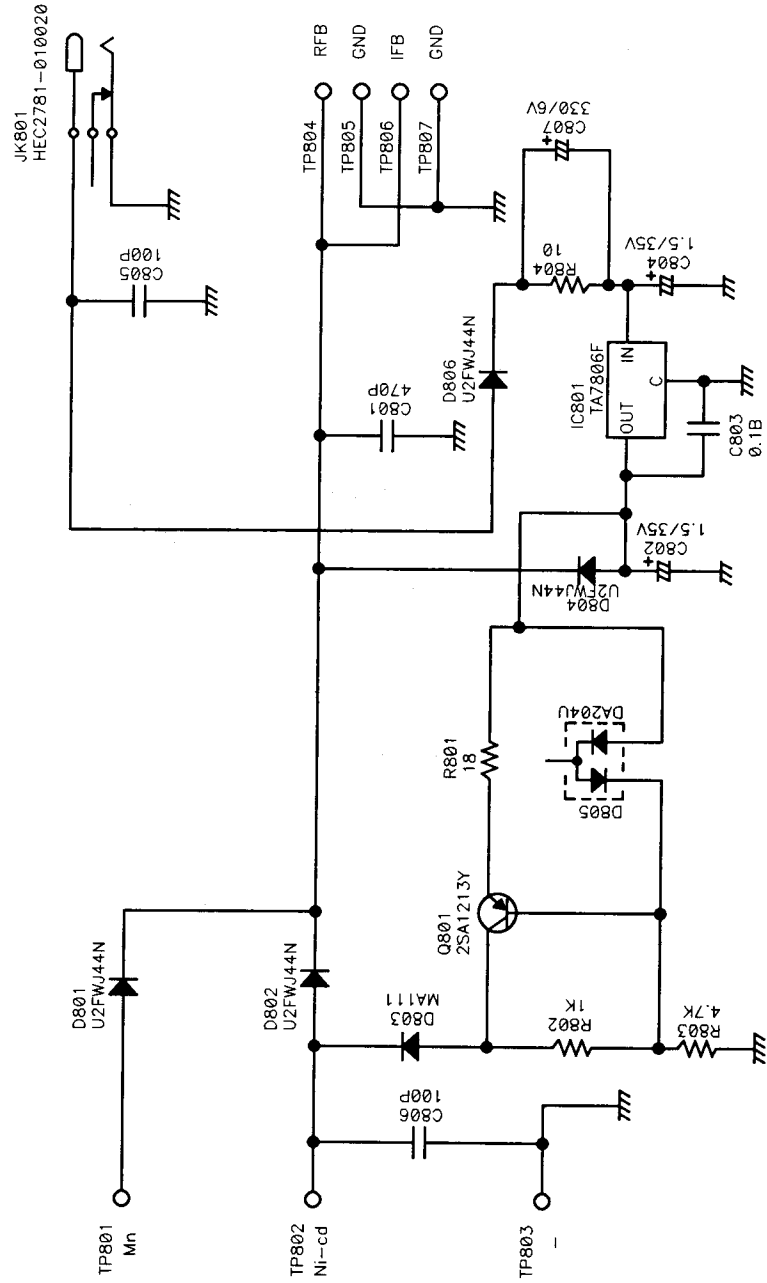
	Parts No.
1	KZ0073Y
2	YZ0149 ※
3	FG0236Y
4	AX0003
5	PRO0340

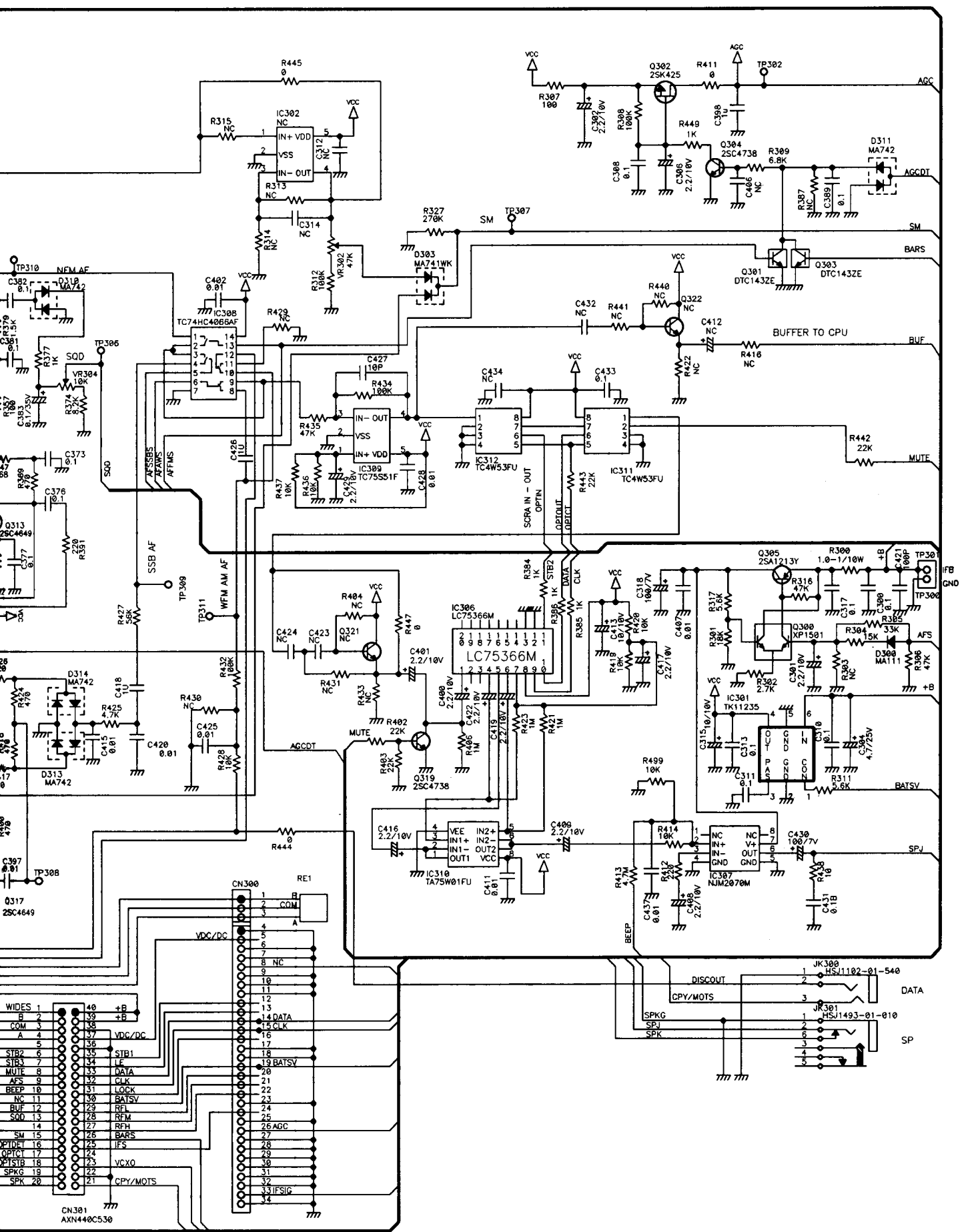
※YZ0149 is integrated into 1.





# CHARGE Unit





WIDES	1	40	+B
B	2	39	+B
COM	3	38	
A	4	37	VDC/DC
STB2	5	36	
STB1	6	35	STB1
MUTE	7	34	IF
AFS	8	33	DATA
BEEP	9	32	CLK
NC	10	31	LOCK
BUF	11	30	BATS
SPKG	12	29	RFL
SPK	13	28	RFM
	14	27	RFH
	15	26	AGC
	16	25	BARS
	17	24	IFS
	18	23	VCX0
	19	22	CPY/MOTS
	20	21	

CN300	1	B
	2	COM
	3	A
	4	
	5	
	6	
	7	
	8	NC
	9	
	10	
	11	
	12	
	13	DATA
	14	CLK
	15	
	16	
	17	
	18	
	19	BATS
	20	
	21	
	22	
	23	
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	
	32	
	33	IFS
	34	

CN301	1	B
	2	COM
	3	A
	4	
	5	
	6	
	7	
	8	NC
	9	
	10	
	11	
	12	
	13	DATA
	14	CLK
	15	
	16	
	17	
	18	
	19	BATS
	20	
	21	
	22	
	23	
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	
	32	
	33	IFS
	34	

JK300	1	HS/1102-01-540
	2	
	3	
JK301	1	HS/11493-01-010
	2	
	3	
	4	
	5	

DISCOUT	1	
CPY/MOTS	2	
SPKG	3	
SPJ	4	
SPK	5	

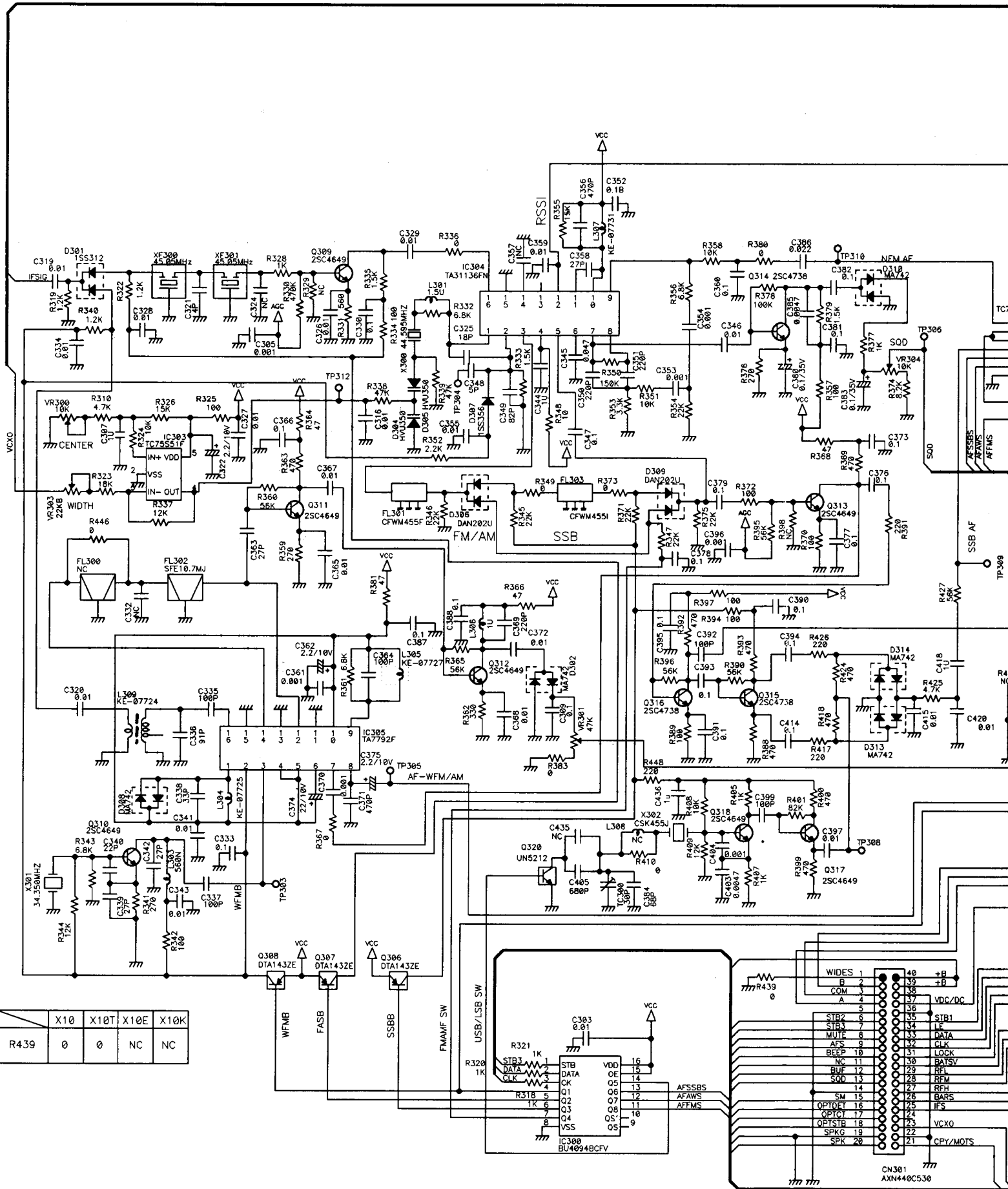
DATA	1	
SP	2	

DATA	1	
SP	2	

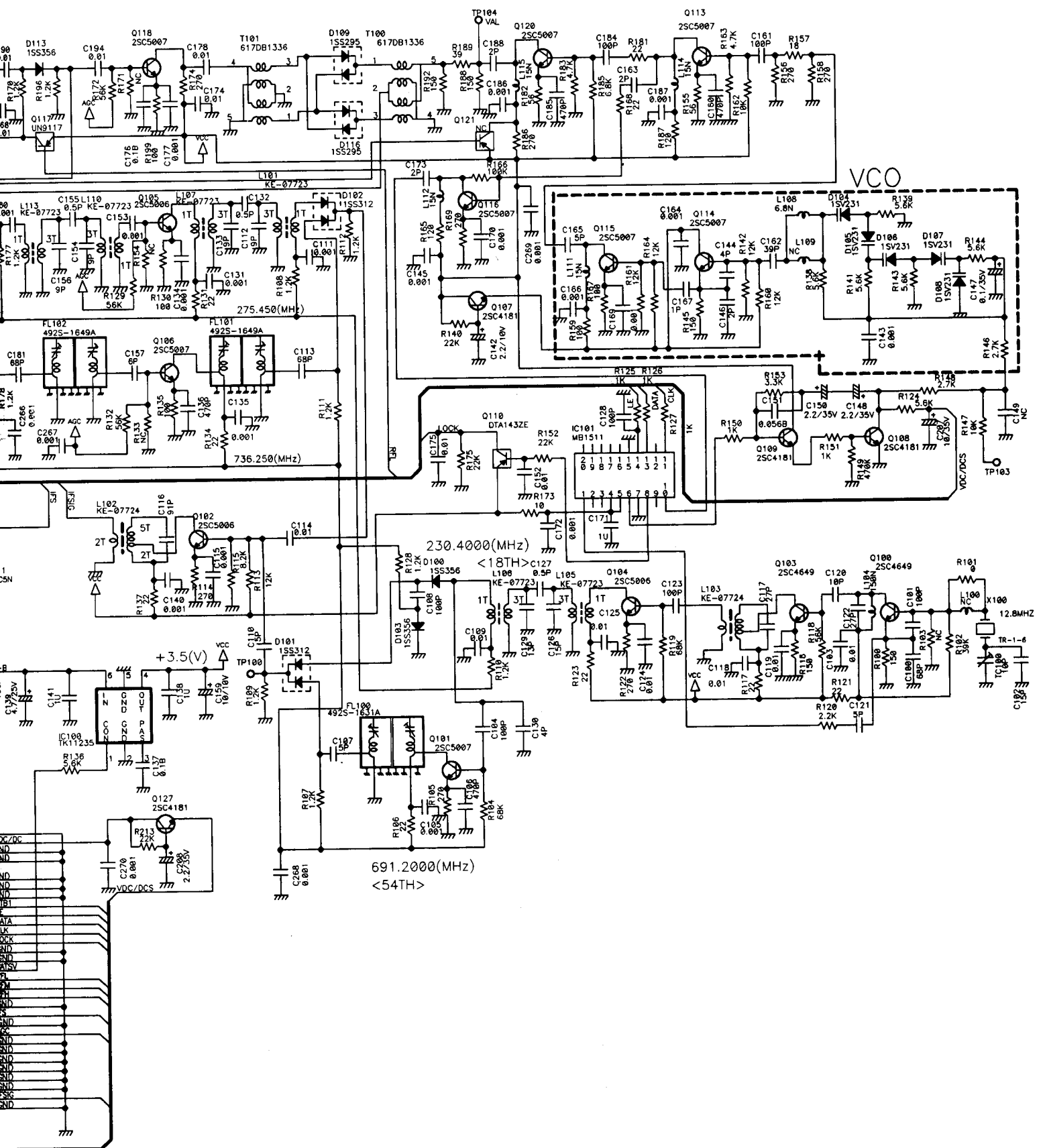
DATA	1	
SP	2	

DATA	1	
SP	2	

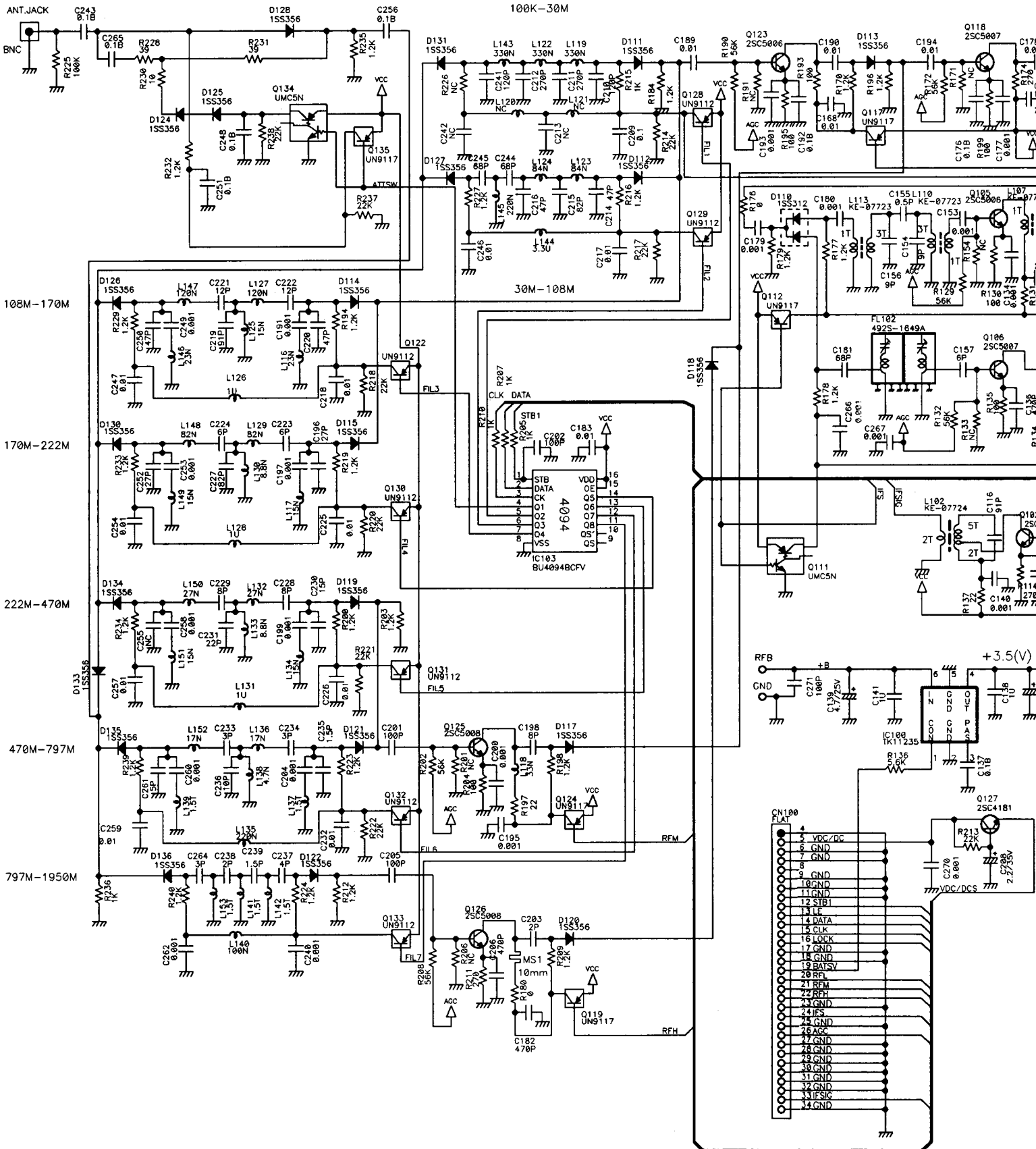
# IF Unit

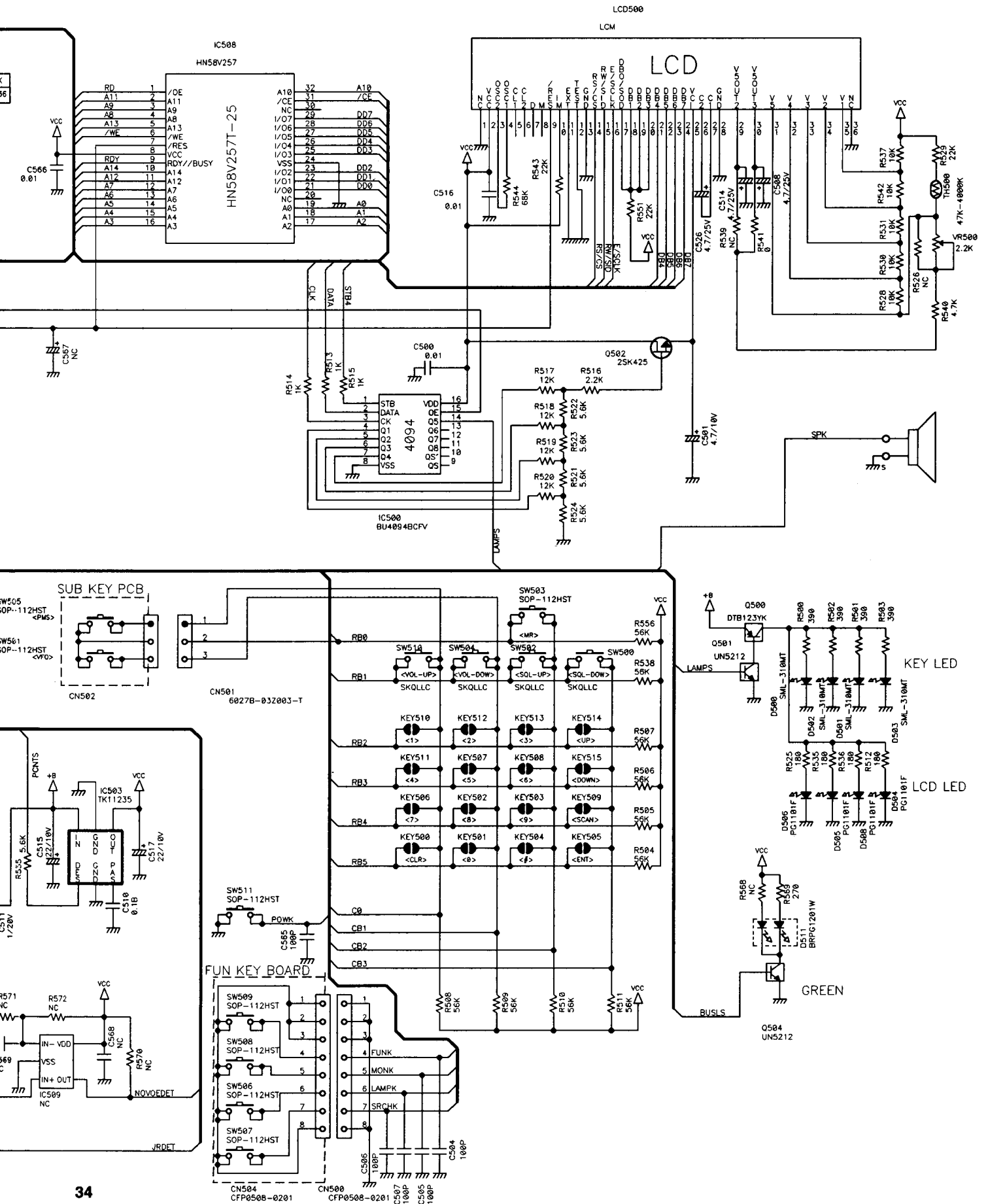


	X10	X10T	X10E	X10K
R439	0	0	NC	NC



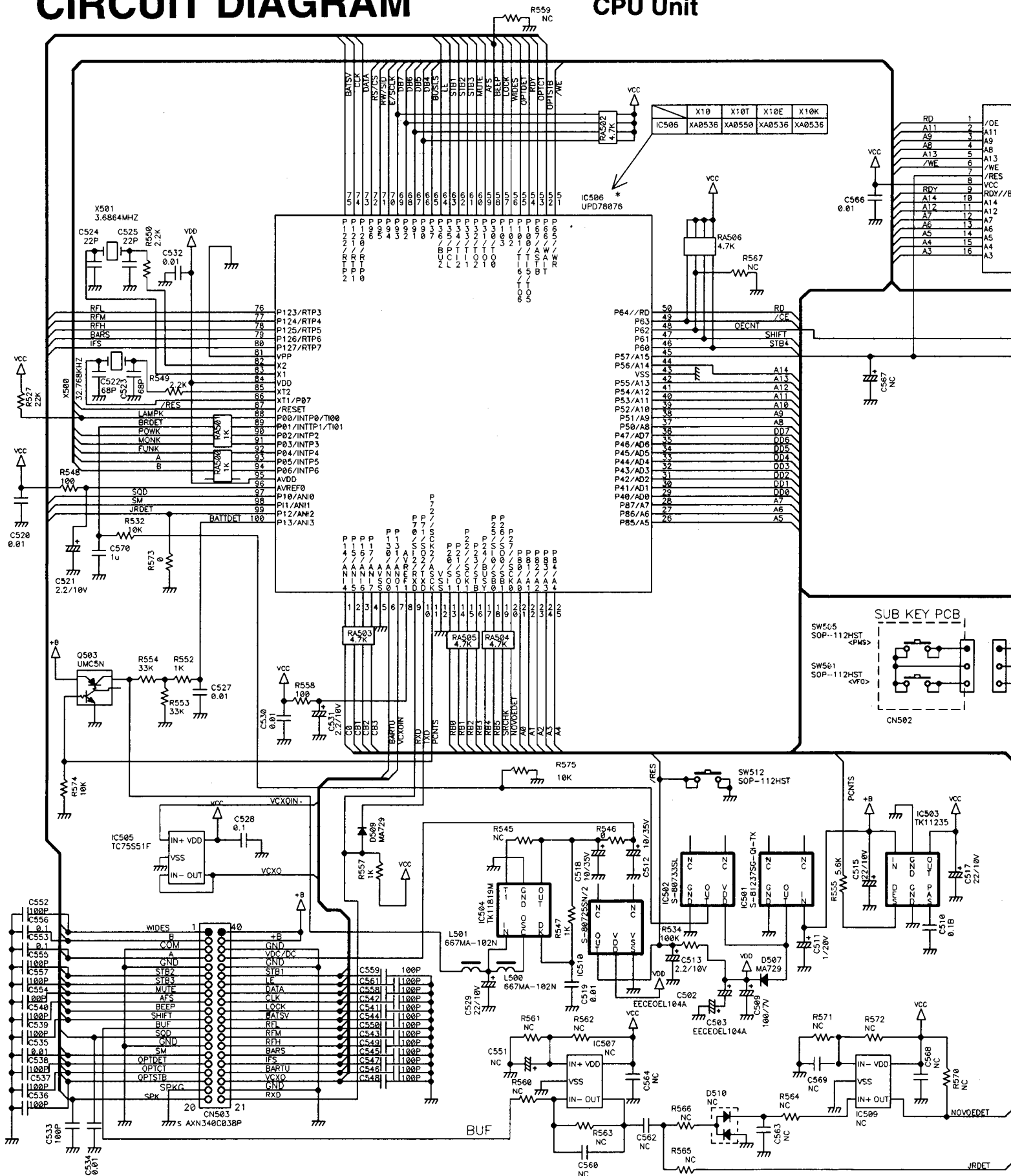
# RF Unit



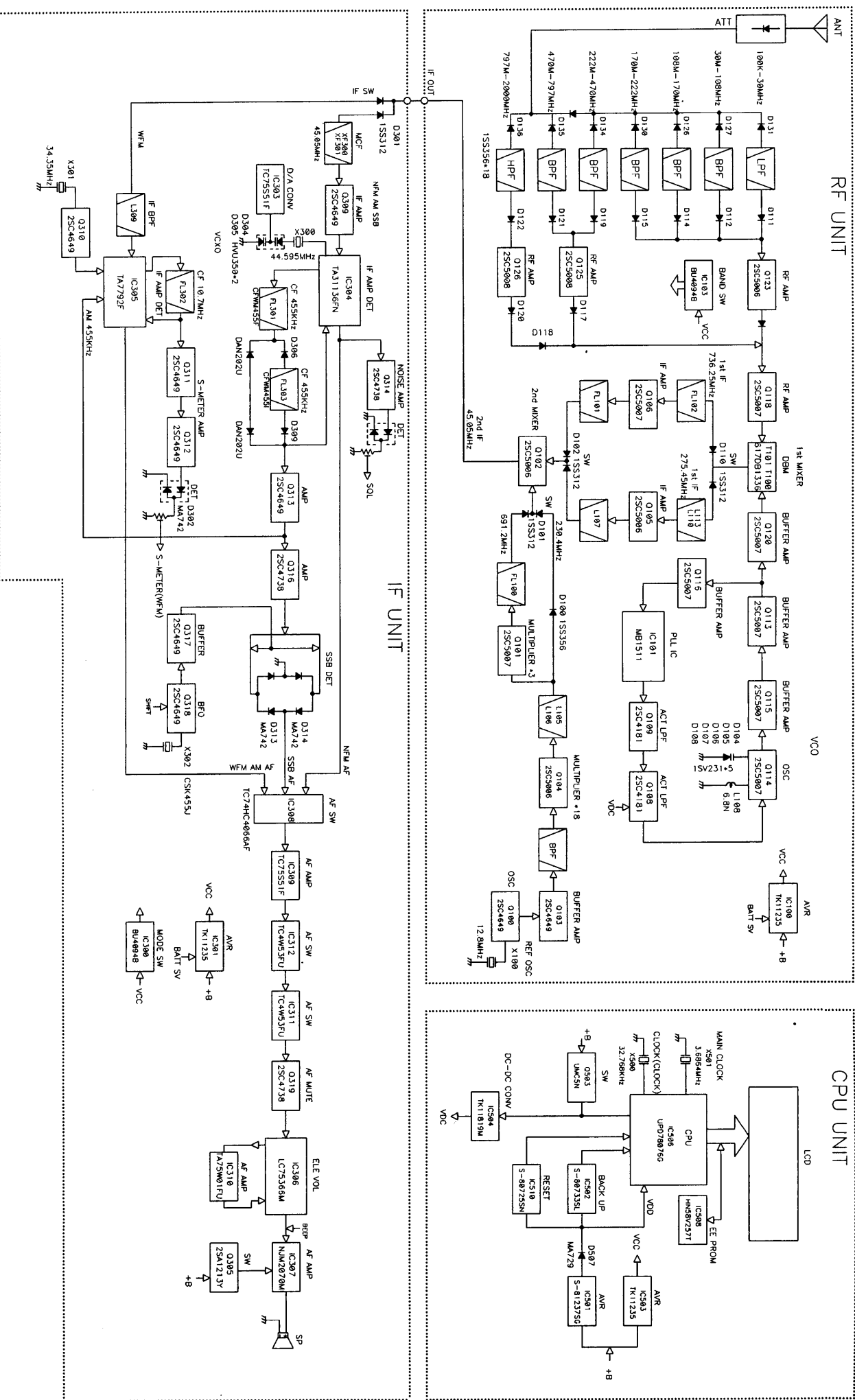


# CIRCUIT DIAGRAM

## CPU Unit

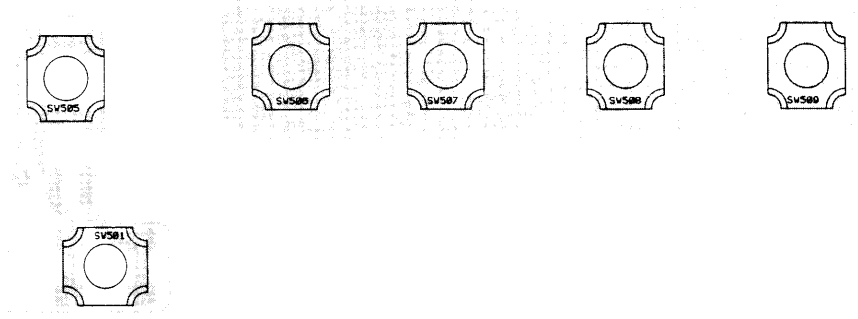


# BLOCK DIAGRAM

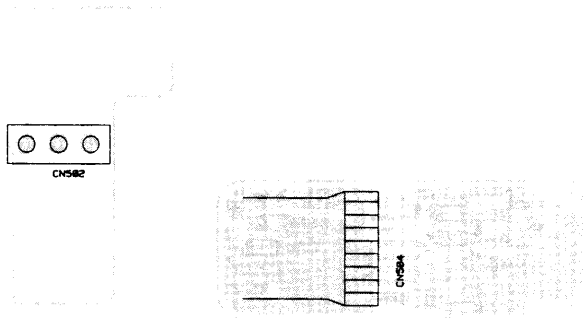




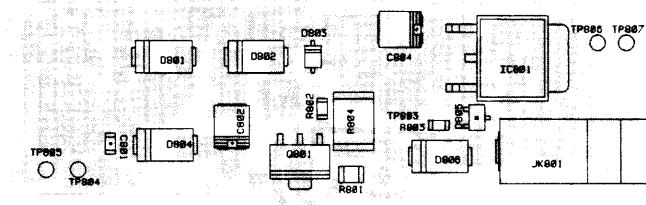
# PTT SW Unit Side A



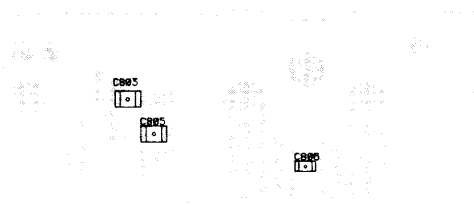
# PTT SW Unit Side B



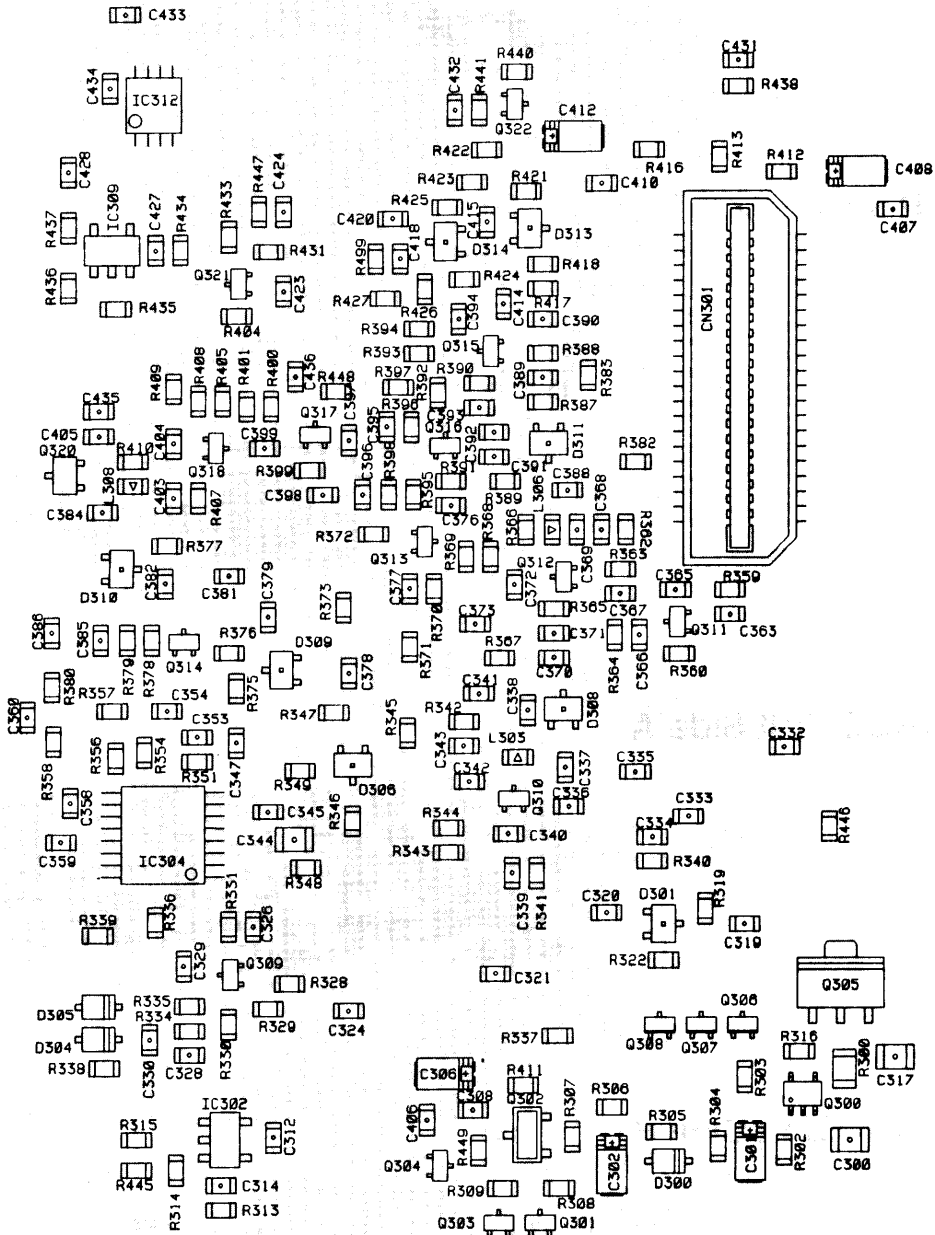
# CHARGE Unit Side A



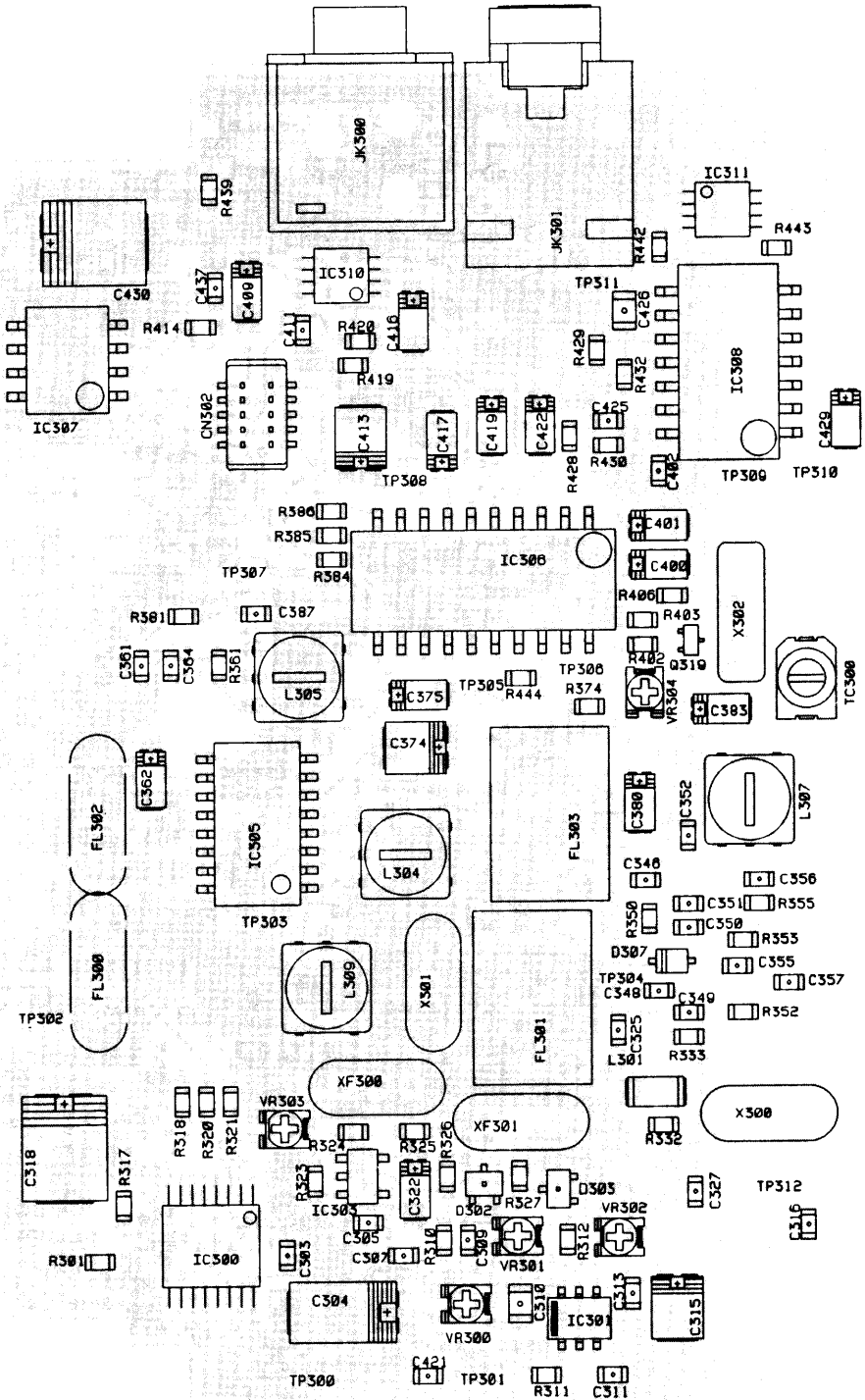
# CHARGE Unit Side B



# IF Unit Side B

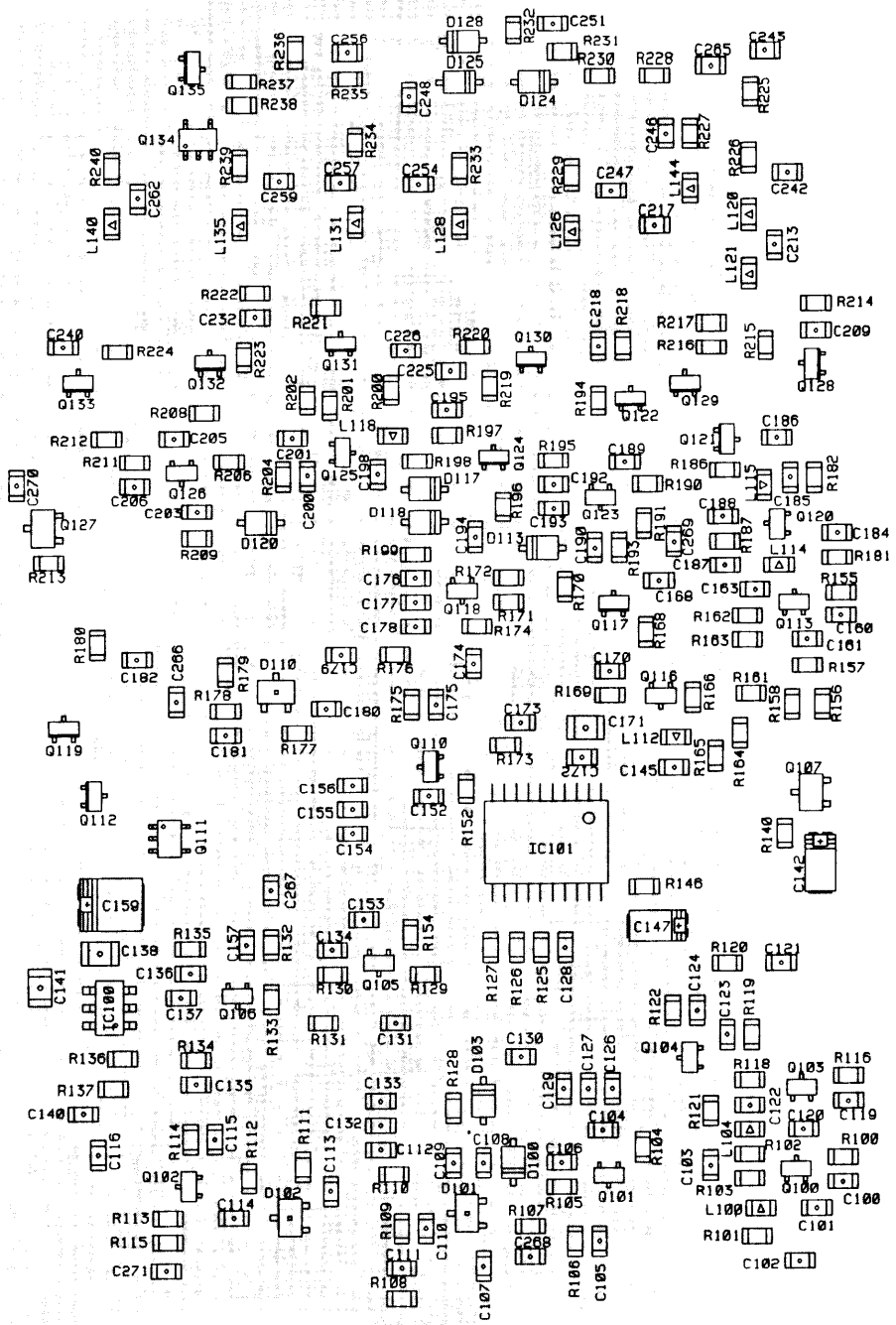


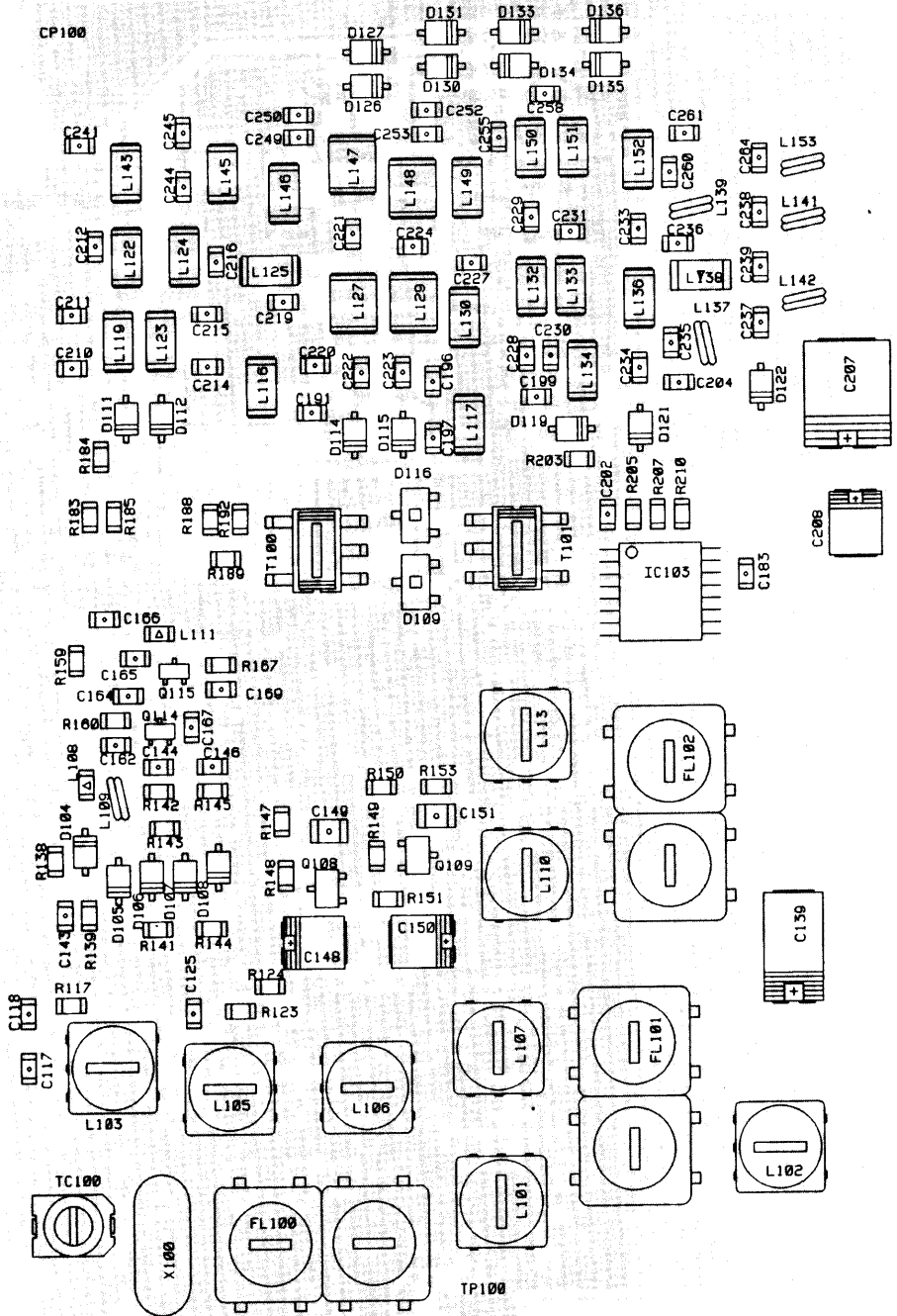
CN500



# RF Unit Side B

CN100





# CPU Unit Side B

