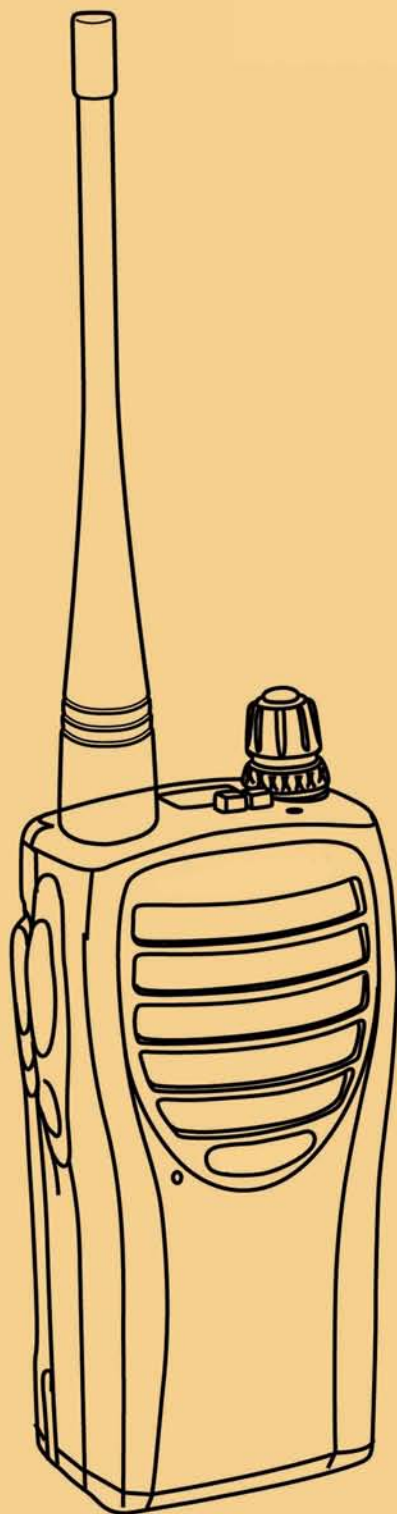


UHF FM TRANSCEIVER



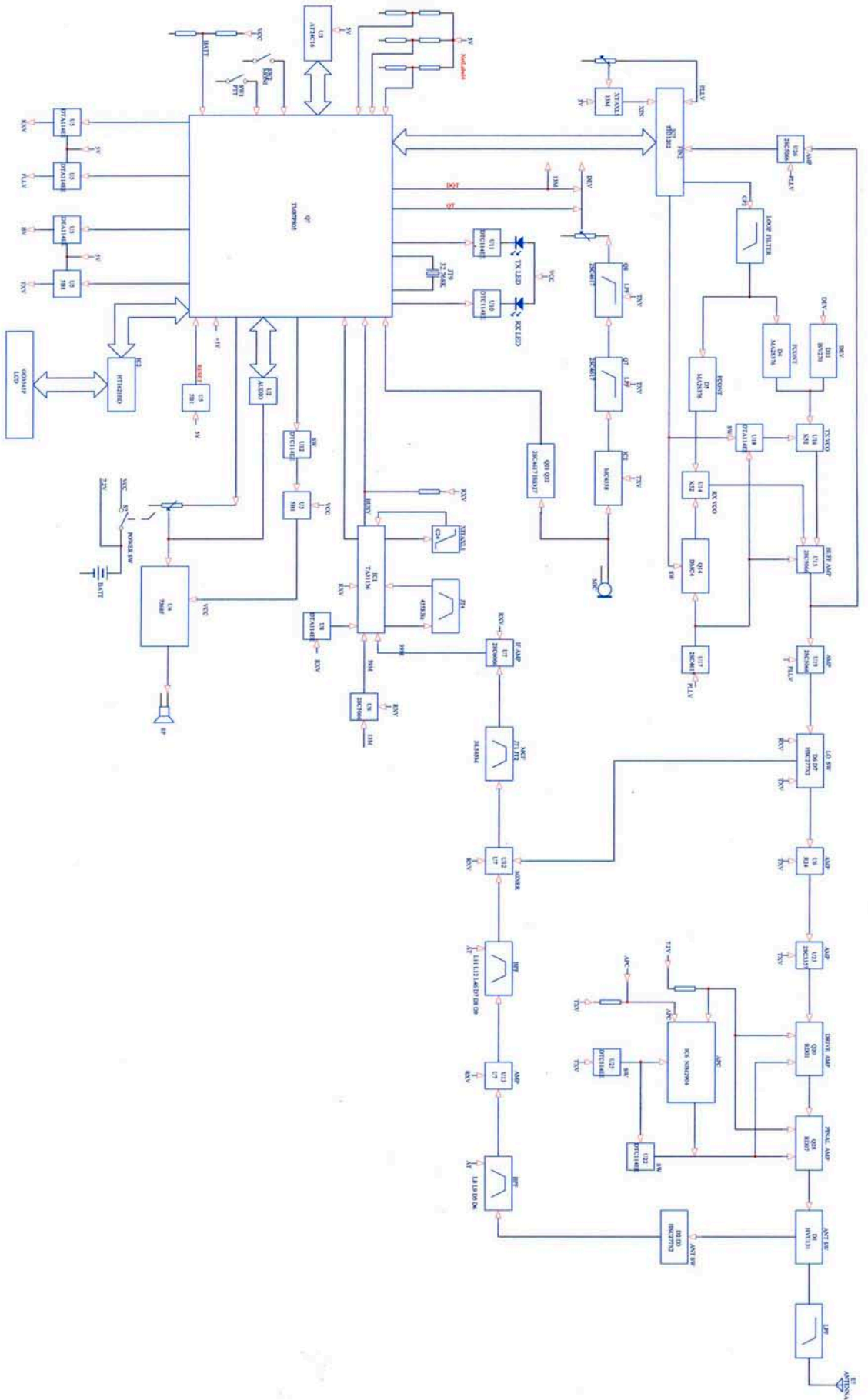
ООО «Радио-навигатор»
117149, Москва, Азовская ул., д. 15, стр. 2



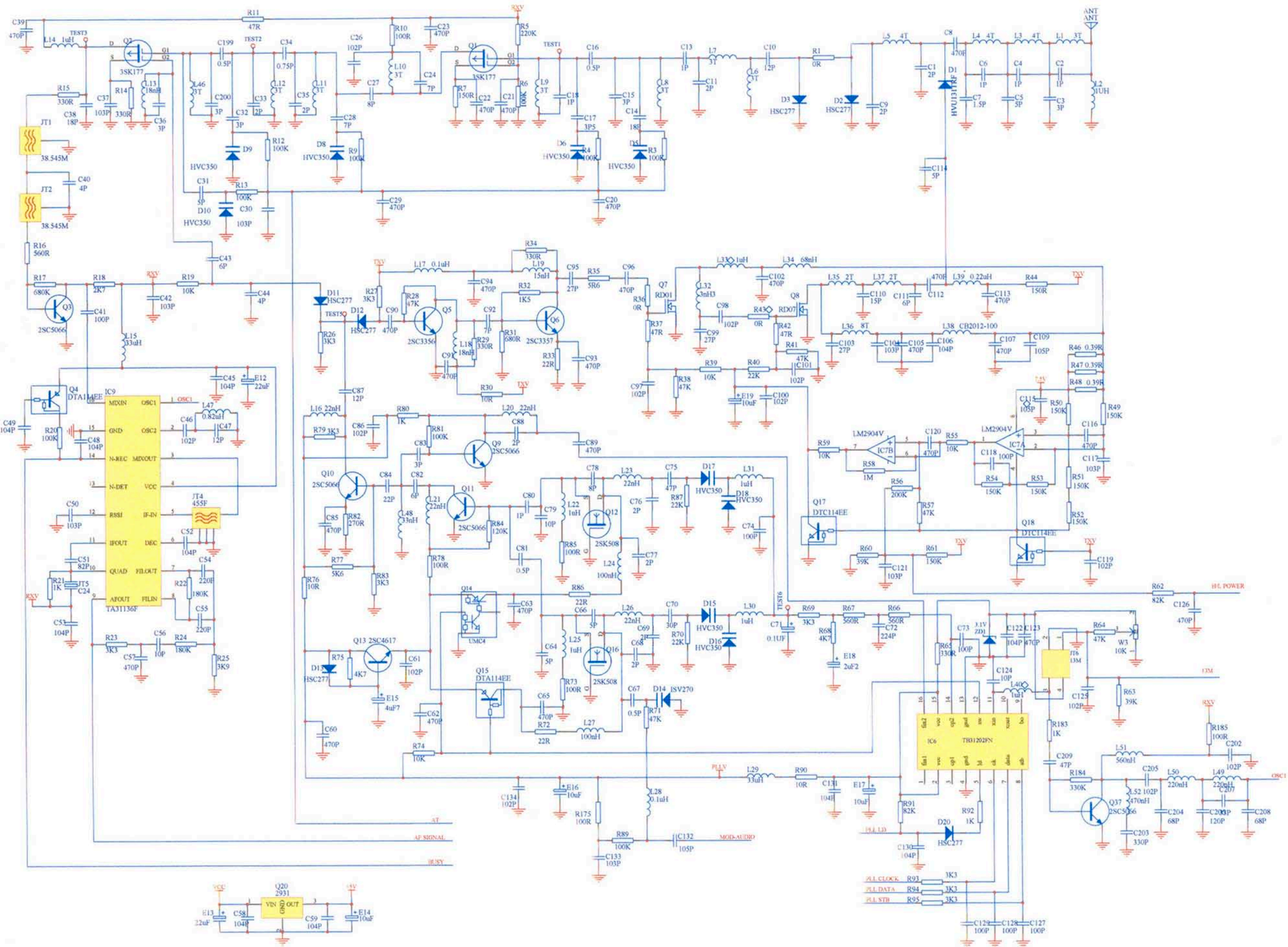
S E R V I C E M A N U A L

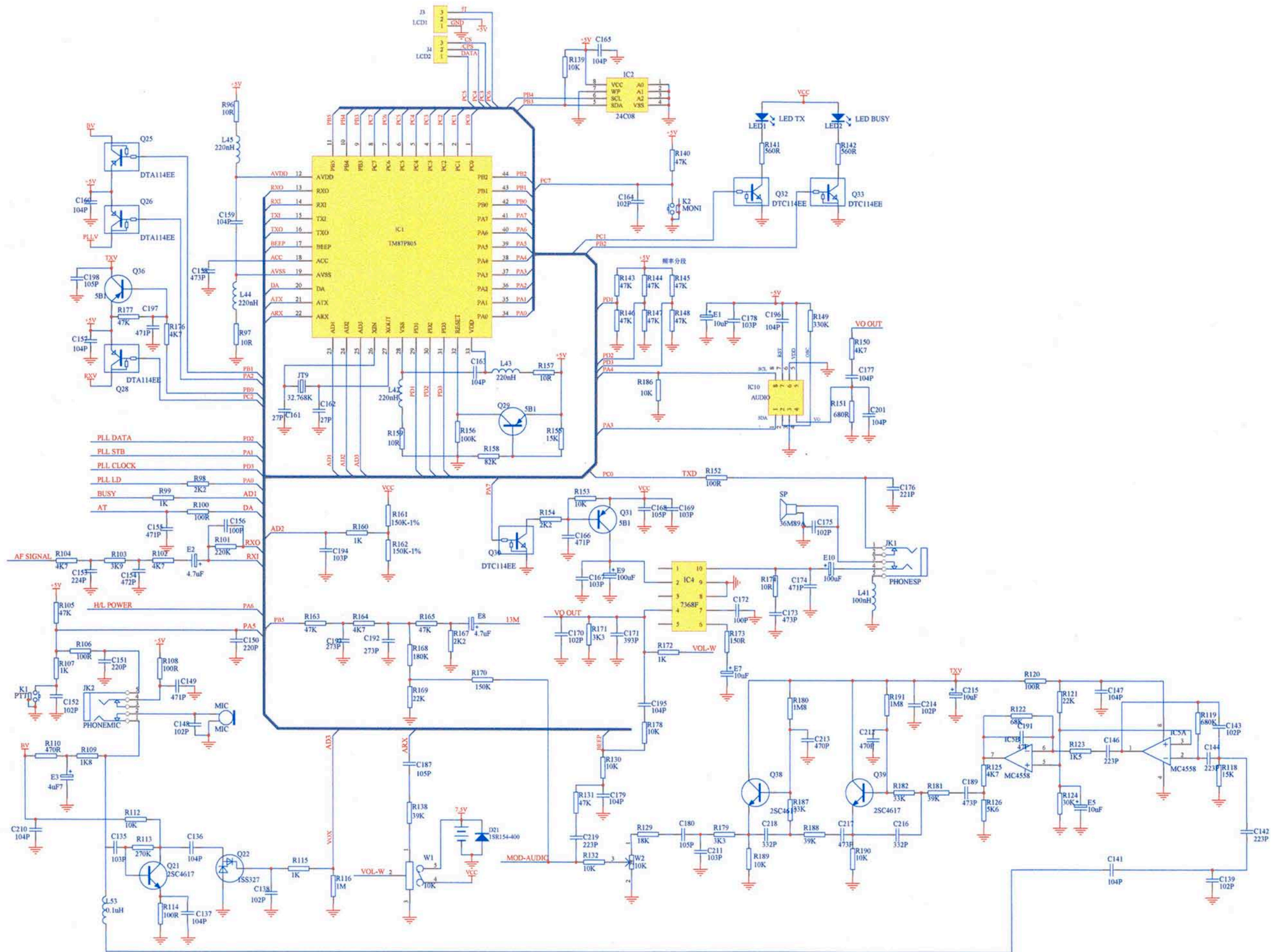


BLOCK DIAGRAM



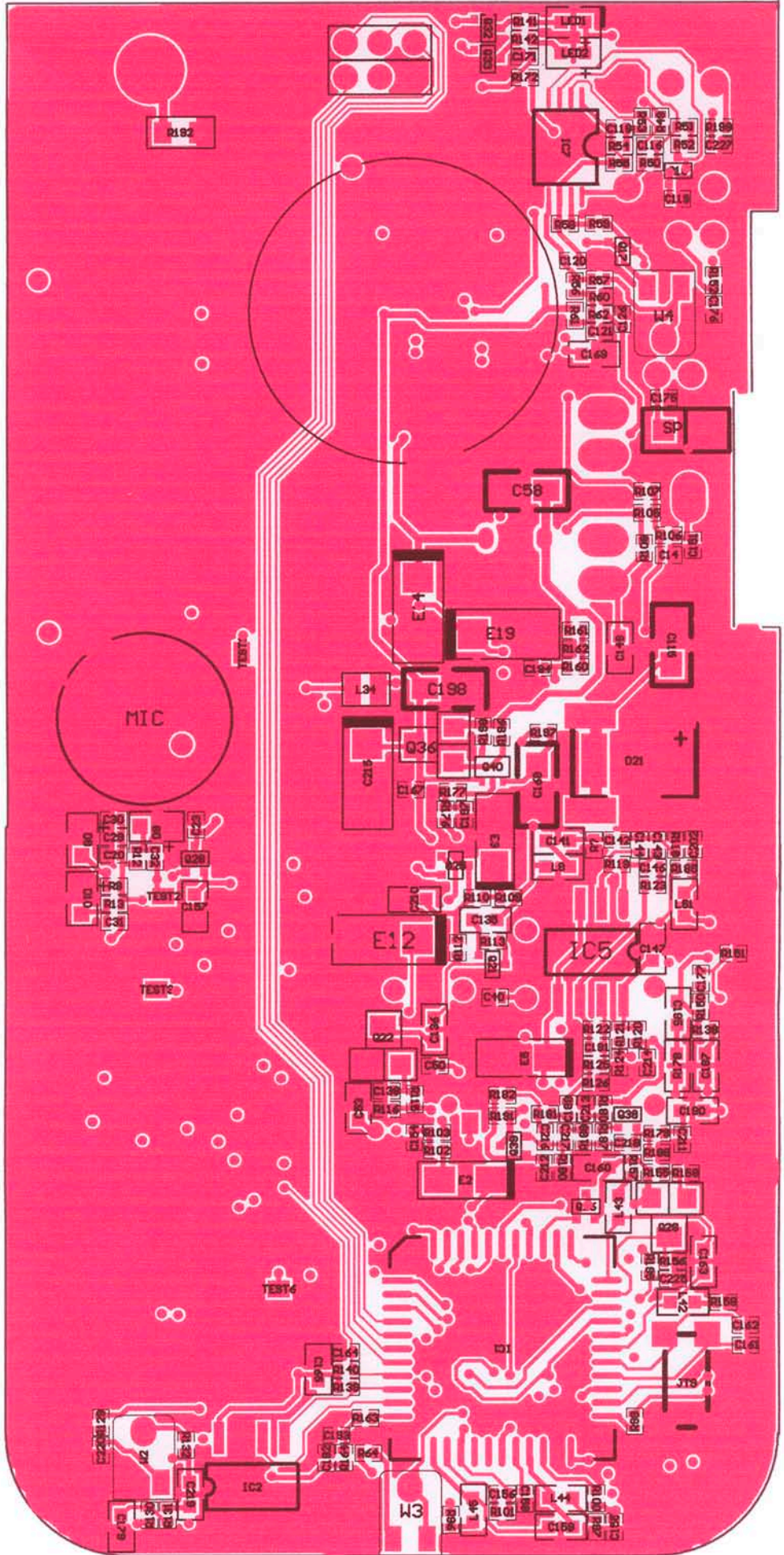
SCHEMATIC DIAGRAM





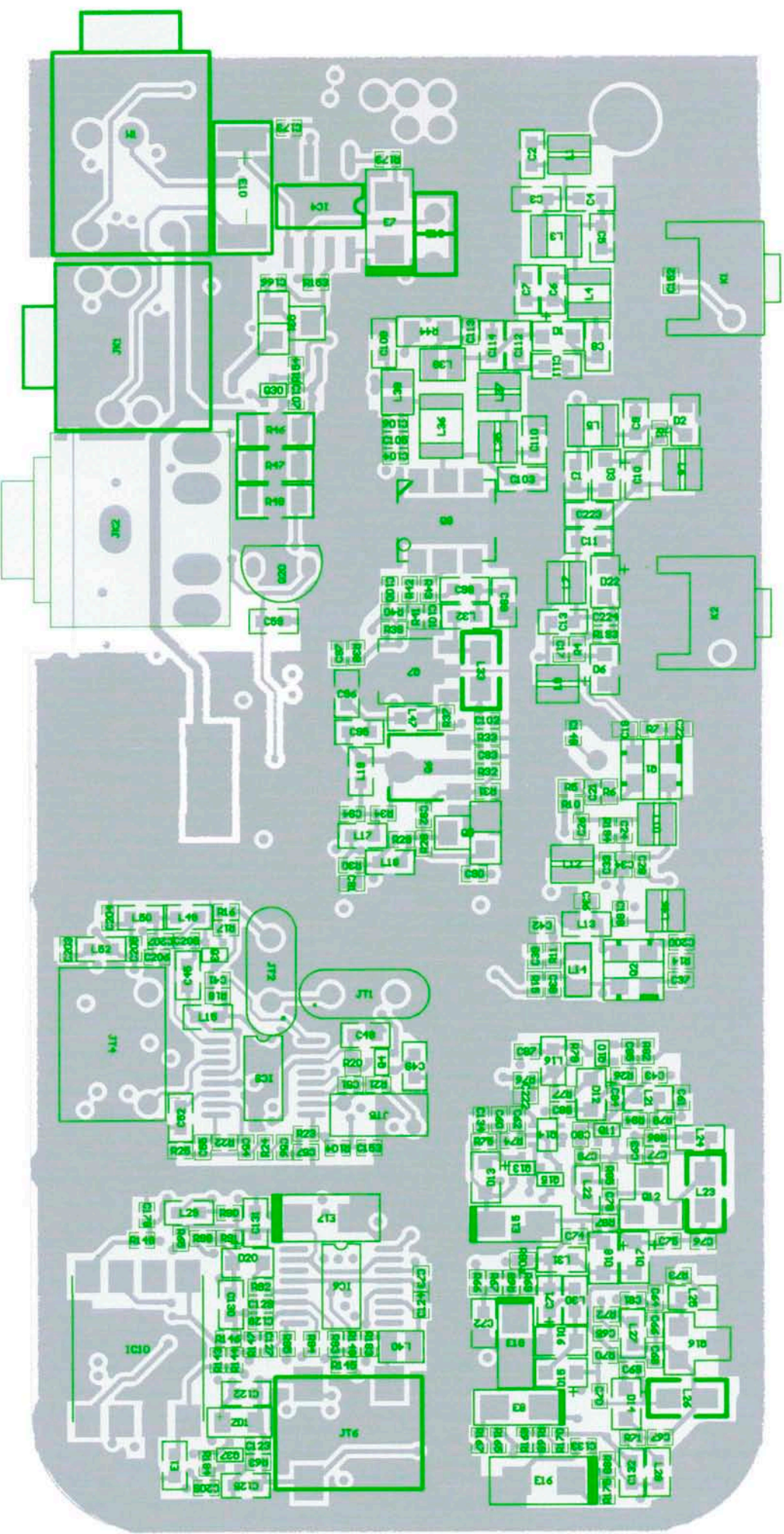
SCHEMATIC DIAGRAM

PCB (TOP)



PCB

(BOTTOM)

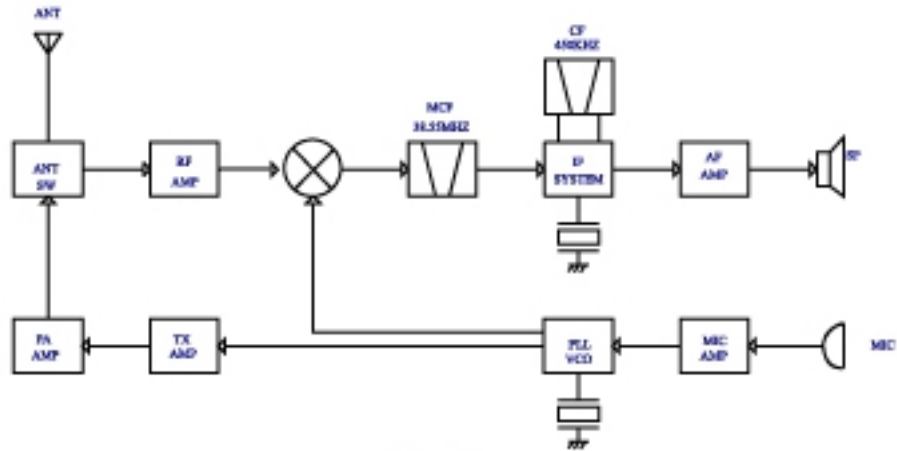


1.Circuit Configuration

The receiver utilizes double conversion. The first IF is 38.55 MHz, the second IF is 450KHZ.

The first local oscillator signal is supplied from PLL circuit .The second local oscillator signal is 39MHz frequency supplied from PLL circuit 13MHz three oscillation.

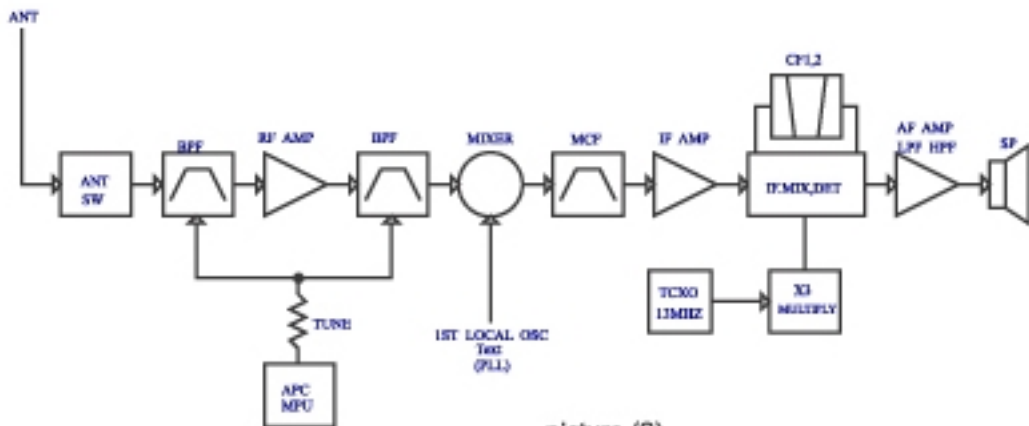
The PLL circuit in the transmitter generates the necessary frequencies.As picture(1) displays.



picture(1)

2.Receiver

The brief composing of receiver (As picture 2)



picture (2)

1)Front-end (RF amplifier)

An incoming signal from the antenna is applied to an RF amplifier (Q1) after passing through a transmit/receive switch circuit Diode (D1) and then through BPF filter made by L7, L6, C11, L8, C14, C15, D5, L9, C18, C17, D4.

Then through the BPF filter by L10, C24, C27, C28, D8, L11, C35, C32, D9, L46, C200, C31, D10 into mixer.

BPF filter made by L7, L6, C11, L8, C14, C15, D5, L9, C18, C17, D4 is 3-pole LC syntony, other low-pass filter and so on circuit cooperate co-suretyship necessary bandwive and spurious restrain character.

2)First Mixer

The signal from the first-end is heterodyned with the first local oscillator signal from the PLL frequency synthesizer circuit at Q2 to create a 38.55MHZ first intermediate frequency signal.

The IF signal is fed through crystal filters (JT1, JT2) to further remove signals, for the technology index such as adjacent-channel power.

3)IF amplifier

The signal is amplified by Q3 and then enters IF circuit (IC9) TA31136F. IC9 is integrate circuit CMOS chip made of a second local oscillator signal, second mixer, second IF amplifier, detector, noisy amplifier, noisy commute circuit.

The signal is heterodyned again with a second local oscillator signal to create a 450 KHZ second IF signal.

The second IF signal is then fed through a ceramic filter(JT4) to further eliminate unwanted signals

Finally, The IF signal through filter produce AF signal output by detecting in IC.

4)AF amplifier

The recovered AF signal obtained from IF integrate circuit is amplified by IC1. And deal with CTCSS and DCS QT signal.

The processed AF signal passes through AF VOL control and amplified to a sufficient level to drive a loud speaker by an AF amplifier LM386 (IC4)

From IC10 output voice signal passes through AF VOL control and amplified to a sufficient level to drive a loud speaker by an AF amplifier LM386 (IC4)

5)Squelch

Part of AF signal from the IC enters the FM IC again, and the noise component is amplified and rectified by a filter and an amplified to produce a DC voltage corresponding to the noise level.

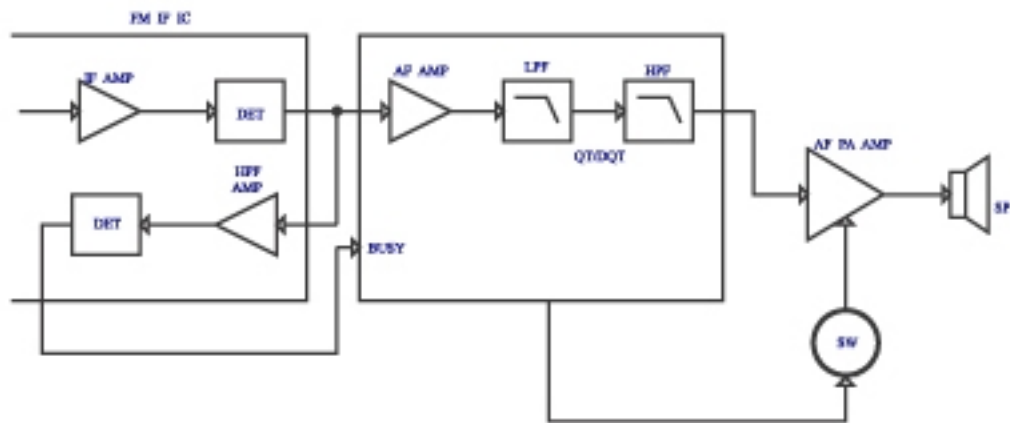
The DC signal from FM IC goes to the analog port of the microprocessor (IC1)(MARK 23). IC1 determines whether to output sounds from the speaker by checking whether to output sounds from the speaker by checking whether the input voltage is higher or lower than preset value.

To output sounds from the speaker, IC (MARK 41) sends a high signal to the MUTE and AFCO lines and turns IC4 on through Q30, Q31.

6)Receive signaling

CTCSS /DCS

300MHZ and higher audio frequencies of the output signal from IF IC and cut by a low-pass filter, the resulting signal enters the microprocessor (IC1). IC1 determines whether the QT or DQT matches the preset value, and controls the MUTE and AFCO and the speaker output sounds according to the squelch results. (As picture 3)



picture (3)

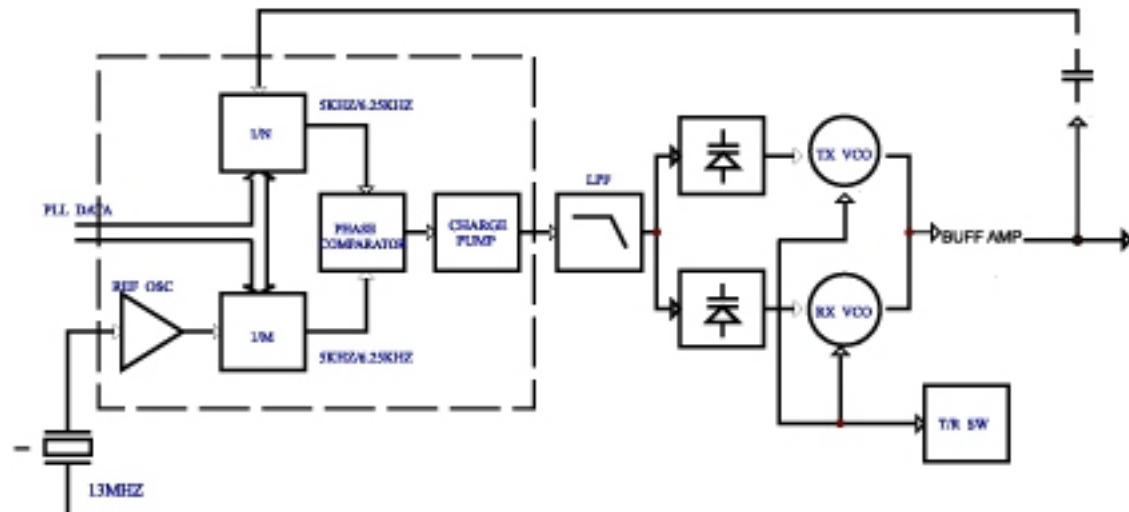
3. PLL circuit

The PLL circuit generates the first local oscillator signal for reception and the RF signal for transmission.

1)PLL: Reception and transmission both have sole VCO, Reception VCO is center of Q12, Transmission VCO is center of Q16.

The voltage controlled oscillator (VCO) output signal is buffer by Q9 and through L20, C88, C89 into PLL (IC6) integrate circuit.

IC6 is the integrate circuit included 13MHZ reference oscillator and the phase comparator, the input oscillator signal is divided at IC1 by a fixed counter to produce the 5 or 6.25KHZ reference frequency. The divided signal is compared in phase with the 5 or 6.25KHZ reference signal in the phase comparator in IC1, then produce a potential difference signal which produce a frequency controlled signal by electricity. This controlled signal is filtered through a low-pass filter (LPF) which comprises of C73, R66, R68, E18, R69, C71, L30, L31 and passed to the VCO to the varactor diodes D17, D18(in receive mode) and D15, D16(in transmit mode)to control the output frequency .(As picture 4)



picture (4)

2) A 13MHz reference oscillator: PLL 13MHz reference signal adopted the speciality selective 13MHz crystal. 13MHz crystal has temperature compensate circuit, through it to improve the frequency stability of products.

TG-91、TG-92、TG-93 VCO Adjustment(450MHZ-469.975MHZ)

Item	Condition	Test equipment	Terminal	Adjustment parts	Adjustment specification	Remark
setting	Power supply voltage battery:7.5V					
VCO lock voltage	TX HI	Digital voltmeter	TEST0	FIX	< 3.8V	
	TX LOW	Digital voltmeter	TEST0	FIX	> 0.7V	
	RX HI	Digital voltmeter	TEST0	FIX	< 3.8V	
	RX LOW	Digital voltmeter	TEST0	FIX	> 0.8V	

4. Transmitter

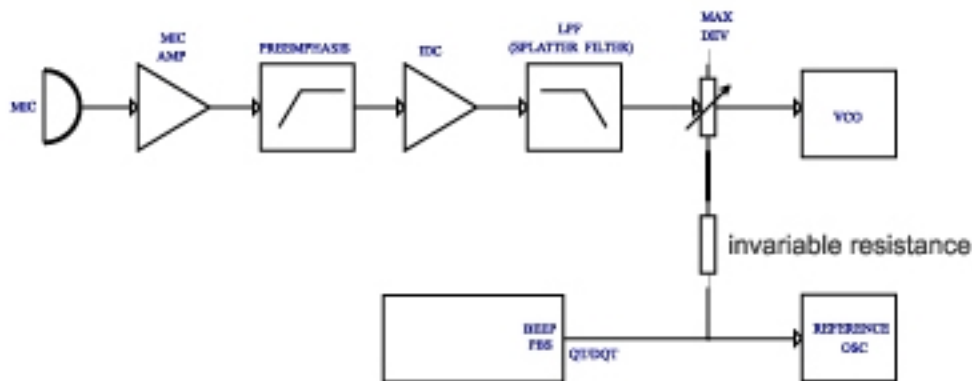
1) Transmit audio

The modulation signal from the microphone is amplified by IC5A (1/2), passes through a preemphasis circuit and amplified by the IC5B (1/2) to perform IDC operation.

The signal then passes through a low-pass filter (spurious interrupt filter) (Q39, Q38) and cuts 3KHZ and higher frequencies. The resulting signal goes to the VCO through the VCO modulation terminal for direct FM modulation.

2) QT/DQT encoder

A necessary signal for QT/DQT encoding is generated by IC403 and FM-modulated to the PLL reference signal. Since the reference OSC does not modulate the loop characteristic frequency or higher, modulation is performed at the VCO side by adjusting the balance. (As picture 5)



picture (5)

3) VCO and RF amplifier

The modulated signal modulate VCO output signal at D14.

PLL output RF signal is amplified by Q5 and Q6, to reach final amplifier required Driver level, After driver level is amplified at Q7, force final power amplifier.

4) Final power amplifier

Power is amplified by MOS final power amplifier (RD07)

5) ANT switch and LPF

The RF amplifier output signal is passed through DIODE D1 and a low-pass filter L4, C5, C6, C7, L3, C4, L1, C2, C3 transmit from the antenna terminal.

The transmit/receive switching circuit is comprised of D2, D3. The low-pass filter LC surge circuit.

6) APC

APC made the electricity of final power amplifier invariableness. IC7 (A) survey the final electricity produce voltage signal. Compare the signal at IC7 (B) AND IC11 provided APC voltage , always control the voltage between the signal and APC is the same. Taking controlled output voltage as Q28 power control voltage, the close loop made the electricity invariableness.

IC1 provided APC voltage corresponding to the preestablished the voltage of high and low power.

5 .power supply

A 5V power system have 5V, RXV, TXV microprocessor, 5V microprocessor output at once when power on.

5C is common 5Vpower, in power safe function, output except "dormancy"

RXV is reception 5V power, output when receive

TXV is transmission 5V power, output when transmit.

6 .Control system

The IC1 CPU operates at 32.768 KHZ. This oscillator has a circuit that shifts the frequency according to the EEPROM data.

IC1 deal with LCD drive, keypad control independence.

Key and circumrotate encoder signals are inputted to microprocessor directly.

Pin No.	Circuit Port Name	I/O	Function
1	PC0 TXD	O	RS-232C output connected to SP/MIC test (REM)
2	PC1	O	Transmit LED control (RED) H:LED LIT
3	PC2	O	Reception power supply control
4	PC3 CS	O	LCD clock line
5	PC4 CPS	O	LCD Drive IC permit
6	PC5 DATA	O	LCD Drive IC data line
7	PC6	O	LCD LED indicate control (emerald)
8	PC7	I	MONI input
9	PB3 SDA	I/O	E2PROM data line
10	PB4 SCL	O	E2PROM clock line
11	PB5	O	DCS output
12	AVDO	I	AF Amplifier positive electricity
13	RXO	O	AF amplifier feedback output
14	RXI	I	AF input
15	TXI	I	NC
16	TXO	O	NC
17	BEE	O	CTCSS Output
18	ACC	O	A/D Conversion reference voltage connected to VCC
19	AVSS	O	A/D Conversion power supply connected to VSS
20	DA	O	RX:BPF tuning D/A output
21	ATX	O	TX AF amplifier
22	ARX	O	alarm output
23	AD1 BUSY	I	Busy Input
24	AD2	I	Battery voltage detection
25	AD3 VOX	I	VOX Input
26	XIN	I	32.768KHZ Clock oscillator
27	XOUT	O	32.769KHZ Clock oscillator
28	VSS	I	GND
29	PD1	O/I	EM55400BD IC data line and channel choose data input
30	PD2	O/I	PLL data line and channel choose data input
31	PD3	O/I	PLL data line and channel choose data input
32	RESET	I	Reset input
33	VDD	I	CPU power supply, 5V input
34	PA0 PLL LD	I	PLL unlock detection pin L:unlock
35	PA1	O	EM55400BD IC clock line (voice prompt)
36	PA2	O	PLL IC POWER CONTROL L:ON
37	PA3	O	EM55402BD IC Busy output (voice prompt)
38	PA4 PLLSTB	O	PLL IC enable H: latches
39	PA5 PTT	I	PTT key input connected to RXD
40	PA6 H/L POWER	O	High/low power choose H: high L: low
41	PAT	O	AF AMP power supply H:ON
42	PBO	O	Reception/Transmission power supply control H: Reception on L: Transmission on
43	PB1	O	VOX power supply L:ON
44	PB2	O	Reception LED control H:LED ON

Ref No.	Semiconductor	Description
IC1	IC	MICRO PROCESSOR
IC2	IC	EEPROM
IC3	IC	LCD DRIVE
IC4	IC	AUDIO POWER AMP
IC5	IC	MIC AMP/LIMITER
IC6	IC	PHASE LOCKED LOOP SYSTEM
IC7	IC	AUTOMATIC POWER CONTROL
IC9	IC	IF SYSTEM
IC10	IC	VOICE PROMPT
Q1	FET	RF AMP
Q2	FET	MIXER
Q3	TRANSISTOR	IF AMP
Q4	TRANSISTOR	DC SWITCH
Q5,Q10	TRANSISTOR	RF BUFFER AMP
Q6,Q11	TRANSISTOR	RF AMP
Q7	FET	POWER TX DRIVE
Q8	FET	POWER AMP
Q12	FET	VCO RX
Q13	TRANSISTOR	RIPPLE FILTER
Q14,Q15	TRANSISTOR	DC SWITCH
Q16	FET	VCO TX
Q17,Q18	TRANSISTOR	DC SWITCH
Q20	REGULATION INTEGRATION	5V REGULATOR
Q21	TRANSISTOR	MIC AGC DETECT
Q22	TRANSISTOR	VOX
Q25,Q26	TRANSISTOR	DC SWITCH
Q28,Q29	TRANSISTOR	DC SWITCH
Q30,Q31	TRANSISTOR	DC SWITCH
Q32,Q33	TRANSISTOR	DC SWITCH
Q36,Q40	TRANSISTOR	DC SWITCH
Q37	TRANSISTOR	TRIPLER
Q38,Q39	TRANSISTOR	ACTIVE FILTER
D1	DIODE	ANTENNA SWITCH
D2,D3	DIODE	ANTENNA SWITCH
D6,D8	VARIABLE CAPACITANCE DIODE	BPF TUNING
D9,D10	VARIABLE CAPACITANCE DIODE	BPF TUNING
D22	VARIABLE CAPACITANCE DIODE	BPF TUNING
D14	VARIABLE CAPACITANCE DIODE	TX MODULATION
D15,D16	VARIABLE CAPACITANCE DIODE	FREQ.CONTROL
D17,D18	VARIABLE CAPACITANCE DIODE	FREQ.CONTROL
LED1	LED	TX INDICATION LIGHT
LED2	LED	BUSY INDICATION LIGHT
D21	DIODE	REVERSE PROTECTION
D20	DIODE	UNLOCK DETECT
D12	DIODE	RF SWITC
ZD1	REGULATION DIODE	3.1V REGULATION

Ref No.	specification	Title	Remark
L8	0603X	0. 1uH	
L17	0603X	0. 1uH	
L28	0603X	0. 1uH	
R48	1210B	0. 39R	
R47	1210B	0. 39R	
R46	1210B	0. 39R	
C67	0402B	0. 5P	
C81	0402B	0. 5P	
C199	0402B	0. 5P	
R43	0402B	0R	
R1	0402B	0R	
R9	0402B	100K	
R13	0402B	100K	
R12	0402B	100K	
R156	0402B	100K	
R149	0402B	100K	
R89	0402B	100K	
R20	0402B	100K	
R4	0402B	100K	
R6	0402B	100K	
R175	0402B	100K	
R193	0402B	100K	
L27	0603X	100nH	
L39	0805B	100NH	
L24	0603X	100nH	
C156	0402B	100P	
C118	0402B	100P	
C41	0402B	100P	
C129	0402B	100P	
C128	0402B	100P	
C127	0402B	100P	
C74	0402B	100P	
C73	0402B	100P	
R185	0402B	100R	
R152	0402B	100R	
R120	0402B	100R	
R106	0402B	100R	
R106	0402B	100R	
R100	0402B	100R	
R10	0402B	100R	
R78	0402B	100R	
R85	0402B	100R	
R73	0402B	100R	
E10	1000P	100uF/10V	

Ref No.	specification	Title	Remark
C171	0402B	223P	
C144	0402B	223P	
C142	0402B	223P	
C166	0402B	223P	
C72	0603X	224P	
C71	0603X	224P	
R121	0402B	22K	
R90a	0402B	22K	
R71	0402B	22K	
R87	0402B	22K	
R70	0402B	22K	
L13	0603X	22nH	
L21	0603X	22nH	
C84	0402B	22P	
R72	0402B	22R	
R33	0402B	22R	
R86	0402B	22R	
E12	ECTP1	22uF	
IC2	SMD8A	24C16	
R113	0402B	270K	
R199	0402b	270R	
R132	0402B	27K	
R170	0402B	27K	
L26	805	27nH	
L23	805	27nH	
C162	0402B	27P	
C161	0402B	27P	
C99	0603x	27P	
Q20	7805	2931	
R98	0402B	2K2	
R129	0402B	2K7	
R18	0402B	2K7	
C9	0603x	2P	
C1	0603X	2P	
C88	0402B	2P	
C24	0402B	2P5	
C114	0603X	2P5	
Q6	SOT-89	2SC3357	
Q39	SMDQX	2SC4617	
Q38	SMDQX	2SC4617	
Q21	SMDQX	2SC4617	
Q13	SMDQX	2SC4617	
Q37	SMDQX	2SC5066	
Q3	SMDQX	2SC5066	

Ref No.	specification	Title	Remark
C227	0402b	102P	
C202	0402B	102P	
C214	0402B	102P	
C175	0402B	102P	
C164	0402B	102P	
C14	0402B	102P	
C143	0402B	102P	
C119	0402B	102P	
C169	0603X	102P	
C205	0402B	102P	
C61	0402B	102P	
C148	0402B	102P	
C97	0402B	102P	
C101	0402B	102P	
C100	0402B	102P	
C26	0402B	102P	
C112	0603X	102P	
C134	0402B	102P	
C125	0603X	102P	
C152	0402B	102P	
C167	0402B	103P	
C211	0402B	103P	
C30	0402B	103P	
C194	0402B	103P	
C146	0402B	103P	
C135	0603X	103P	
C121	0402B	103P	
C50	0402B	103P	
C178	0402B	103P	
C133	0402B	103P	
C37	0402B	103P	
C104	0402B	103P	
C42	0402B	103P	
C177	0402B	104P	
C210	0603X	104P	
C195	0603X	104P	
C179	0603X	104P	
C165	0603X	104P	
C163	0603X	104P	
C160	0603X	104P	
C159	0603X	104P	
C157	0603X	104P	
C147	0603X	104P	
C141	0603X	104P	

Ref No.	specification	Title	Remark
Q11	SMDQX	25C5066	
Q10	SMDQX	25C5066	
L37	6RT-3T	2T(1.0)	
L35	6RT-3T	2T(1.0)	
E18	ETP	2uF2	
ZD1	805	3.1V	
R124	0402B	30K	
J79	SMD32.768	32.768K	
R184	0402B	330K	
C203	0402B	330P	
R151	0402B	330R	
R15	0402B	330R	
R14	0402B	330R	
R65	0402B	330R	
R34	0402B	330R	
R29	0402B	330R	
C218	0402B	332P	
C216	0402B	332P	
R187	0402B	33K	
R182	0402B	33K	
R57	0402B	33K	
R138	0402B	33K	
R165	0402B	33K	
C207	0402B	33P	
L15	0603X	33uH	
L29	0603X	33uH	
J72	21.4L	38.550M	
J71	21.4L	38.550M	
R188	0402B	39K	
R181	0402B	39K	
C103	0603X	39P	
R179	0402B	3K3	
R192	805	3K3	
R196	0402B	3K3	
R23	0402B	3K3	
R95	0402B	3K3	
R94	0402B	3K3	
R93	0402B	3K3	
R79	0402B	3K3	
R26	0402B	3K3	
R69	0402B	3K3	
R103	0402B	3K9	
R?	0402B	3K9	
R25	0402B	3K9	

Ref No.	specification	Title	Remark
C136	0603X	104P	
C53	0603X	104P	
C59	0603x	104P	
C52	0603X	104P	
C49	0603X	104P	
C48	0603X	104P	
C106	0402B	104P	
C131	0603X	104P	
C130	0603X	104P	
C122	0603X	104P	
C45	0603X	104P	
C173	0402B	104P	
C168	805	106P	
C58	805	106P	
C187	0603X	106P	
C138	0402B	106P	
C115	805	106P	
C198	805	106P	
C180	0603x	106P	
E1	0603X	106P	
C132	0603X	106P	
C109	0603x	106P	
R150	0402B	10K	
R190	0402B	10K	
R189	0402B	10K	
W3	VRTP	10K	
W2	VRTP	10K	
R59	0402B	10K	
R55	0402B	10K	
R163	0402B	10K	
R139	0402B	10K	
R130	0402B	10K	
R112	0402B	10K	
W4	VRTP	10K	
W1	VRK	10K	
R77	0402B	10K	
R74	0402B	10K	
C40	0402B	10P	
C223	0603X	10P	
C56	0402B	10P	
C124	0402B	10P	
C79	0402B	10P	
R97	0402B	10R	
R96	0402B	10R	

Ref No.	specification	Title	Remark
L32	0603X	3nH3	
C28	0402B	3P	
C3	0603X	3P	
C77	0402B	3P	
C69	0402B	3P	
C200	0402B	3P	
L12	6RT-3T	3T	
L10	6RT-3T	3T	
L9	6RT-3T	3T	
L7	6RT-3T	3T	
L1	6RT-3T	3T	
L46	6RT-3T	3T	
J74	455H5	450P	
J75	C24	450K C24	
R154	0402B	470K	
R153	0402B	470K	
L52	0603X	470nH	
C213	0402B	470P	
C23	0402B	470P	
C20	0402B	470P	
C126	0402B	470P	
C120	0402B	470P	
C116	0402B	470P	
C29	0402B	470P	
C113	0402B	470P	
C222	0402B	470P	
C60	0402B	470P	
C39	0402B	470P	
C65	0402B	470P	
C63	0402B	470P	
C98	0603X	470P	
C102	0402B	470P	
C57	0402B	470P	
C8	0603X	470P	
C22	0402B	470P	
C21	0402B	470P	
C107	0402B	470P	
C105	0402B	470P	
C94	0402B	470P	
C93	0402B	470P	
C91	0402B	470P	
C85	0402B	470P	
C123	0402B	470P	
C90	0402B	470P	

Ref No.	specification	Title	Remark
R157	0402B	10R	
R159	0402B	10R	
R90	0402B	10R	
R76	0402B	10R	
R30	0402B	10R	
C215	BCTP1	10uF	
E2	ETP	10uF	
E5	ETP	10uF	
E19	BCTP1	10uF	
E14	BCTP1	10uF	
E7	BCTP1	10uF	
E17	BCTP1	10uF	
E16	BCTP1	10uF	
E8	ETP	10uF	
C206	0402B	120P	
R169	0402B	12K	
L47	0603x	12nH	
J76	13. 00MEZ	13M	
R61	0402B	150K	
R54	0402B	150K	
R53	0402B	150K	
R52	0402B	150K	
R51	0402B	150K	
R50	0402B	150K	
R49	0402B	150K	
R162	0402B	150K	
R161	0402B	150K	
R44	805	150R	
R7	0402B	150R	
C153	0402B	154P	
R64	0402B	15K	
R178	0603X	15K	
R155	0402B	15K	
R118	0402B	15K	
L19	0603X	15nH	
C96	0603X	15P	
C10	0603X	15P	
C110	0603X	15P	
R24	0402B	180K	
R22	0402B	180K	
R82	0402B	180R	
R83	0402B	18K	
L18	0603X	18nH	
L16	0603X	18nH	

Ref No.	specification	Title	Remark
C62	0402B	470P	
R110	0402B	470R	
C155	0402B	471P	
C149	0603x	471P	
C197	0402B	471P	
C154	0402B	472P	
C217	0402B	473P	
C193	0402B	473P	
C192	0402B	473P	
C189	0402B	473P	
C158	0402B	473P	
R140	0402B	47K	
R131	0402B	47K	
R105	0402B	47K	
C225	0402B	47K	
R148	0402B	47K	
R147	0402B	47K	
R146	0402B	47K	
R144	0402B	47K	
R143	0402B	47K	
R41	0402B	47K	
R40	0402B	47K	
R39	0402B	47K	
R38	0402B	47K	
R28	0402B	47K	
R145	0402B	47K	
C191	0402B	47P	
C209	0402B	47P	
R11	0402B	47R	
R42	0402B	47R	
R37	0402B	47R	
R102	0402B	4K7	
R164	0402B	4K7	
R125	0402B	4K7	
R109	0402B	4K7	
R75	0402B	4K7	
R104	0402B	4K7	
R68	0402B	4K7	
C31	0402B	4P	
C36	0402B	4P	
C76	0402B	4P	
L5	6K7-5T	4T	
L4	6K7-5T	4T	
L3	6K7-5T	4T	

Ref No.	specification	Title	Remark
R197	0402B	1K	
R198	0402B	1K	
R99	0402B	1K	
R160	0402B	1K	
R141	0402B	1K	
R115	0402B	1K	
R107	0402B	1K	
R176	0402B	1K	
R172	0402B	1K	
R183	0402B	1K	
R173	0402B	1K	
R21	0402B	1K	
R92	0402B	1K	
R123	0402B	1K5	
R32	0402B	1K5	
R194	0402B	1K5	
R177	0402B	1K8	
R58	0402B	1M	
R116	0402B	1M	
R191	0402B	1M8	
R180	0402B	1M8	
C34	0402B	1P	
C7	0603X	1P	
C6	0603X	1P	
C4	0603X	1P	
C2	0603X	1P	
C13	0603X	1P	
C11	0603X	1P	
C80	0402B	1P	
C18	0402B	1P5	
C68	0402B	1P5	
D21	D-B	1SR154-400	
Q22	A7	1SS327	
L30	0603X	1uH	
L33	805	1uH	
L14	2.2UH	1uH	
L40	0806B	1uH	
L31	0603X	1uH	
L25	0603X	1uH	
L22	0603X	1uH	
R56	0402B	200K	
R101	0402B	220K	
R5	0402B	220K	
R168	0402B	220K	

Ref No.	specification	Title	Remark
E3	ETP	4uF7	
E15	ETP	4uF7	
L51	0603X	560nH	
C212	0402B	560P	
R142	0402B	560R	
R16	0402B	560R	
R67	0402B	560R	
R66	0402B	560R	
C219	0603X	562P	
Q29	SMDQ	5B1	
Q31	SMDQ	5B1	
R126	0402B	5K6	
C32	0402B	5P	
C33	0402B	5P	
C5	0603X	5P	
C17	0402B	5P	
C66	0402B	5P	
C64	0402B	5P	
C224	0402B	5P	
L36	68T-8T	5T	
R119	0402B	680K	
R17	0402B	680K	
R31	0402B	680R	
R122	0402B	68K	
C208	0402B	68P	
C204	0402B	68P	
C111	0603X	6P	
C43	0402B	6P	
C96	0603X	7P	
C92	0402B	7P	
C78	0402B	7P	
R62	0402B	82K	
R60	0402B	82K	
R158	0402B	82K	
R91	0402B	82K	
R84	0402B	82K	
C51	0402B	82P	
R167	0402B	8K2	
C87	0402B	8P	
C38	0402B	9P	
C75	0402B	9P	
C70	0402B	9P	
ANT	PAD	ANT	
Q36	SMDQ	BV4	

Ref No.	specification	Title	Remark
L46	0603X	220nF	
L44	0603X	220nF	
L43	0603X	220nF	
L42	0603X	220nF	
L50	0603X	220nF	
L49	0603X	220nF	
C151	0402B	220P	
C56	0402B	220P	
C54	0402B	220P	
E13	S1P2	220uF/16V	
C176	0402B	221P	
C220	0402B	222P	
D12	HSC277	HSC277	
D13	HSC277	HSC277	
D3	HSC277	HSC277	
D2	HSC277	HSC277	
D20	HSC277	HSC277	
D9	HSC277	HVC350	
D10	HSC277	HVC350	
D8	HSC277	HVC350	
D6	HSC277	HVC350	
D18	HSC277	HVC350	
D17	HSC277	HVC350	
D15	HSC277	HVC350	
D16	HSC277	HVC350	
D22	HSC277	HVC350	
D14	HSC277	HVC350B	
D1	HSC277	HVU131TRP	
Q5	SMDQ	R24	
Q7	RD01	RD01	
Q8	RD07WFS3	RD07	
IC9	SSOP16	TA31136F	
IC6	SSOP16	TB31202FN	
IC1	TMP87P605	TMS7P605	
1		Eyeglass	
2		Front case	
3		PTT key	
4		PTT cover	
5		Earphone waterproof rubber (Inside)	
6		Earphone waterproof rubber (Outside)	
7		Loudspeaker dustproof net	
8		Speake	
9		Loudspeaker gasket	
10		Rubber keypad	

Ref No.	specification	Title	Remark
L34	0805B	C32012-100	
L38	0805B	C32012-100	
Q25	SMDQX	DTA114EE	
Q28	SMDQX	DTA114EE	
Q26	SMDQX	DTA114EE	
Q15	SMDQX	DTA114EE	
Q4	SMDQX	DTA114EE	
Q33	SMDQX	DTC114EE	
Q32	SMDQX	DTC114EE	
Q18	SMDQX	DTC114EE	
Q17	SMDQX	DTC114EE	
Q30	SMDQX	DTC114EE	
Q16	K52	K52	
Q12	K52	K52	
J3	2.0CON3	LCD1	
J4	2.0CON3	LCD2	
LED2	0603LED	LED BUSY	
LED1	0603LED	LED TX	
IC7	SSOP8B	LM2904V	
IC4	SMD8A	LM386	
IC5	SMD8A	MC4558	
MIC	MIC-B	MIC	
K2	KEY328	MONI	
JK2	PHONEJ50	PHONEMIC	
JK1	PHONEC	PHONESP	
K1	KEY328	PTT	
Q2	V11	U73	
Q1	V11	U73	
Q14	UMC4	UMC4	
Q10	UMC4	UMG3N	
11		Introducer for TX	
12		Washer for volume	
13		Nut for volume	
14		Knob for volume	
15		Packing for bracker	
16		Power plastic	
17		Aluminum case	
18		Antenna base	
19		Antenna nut	
20		Bottom case	
21		Rubber waterproof	

NO SOUND

Check if the sound reminding function on.

NO

Turn on again

Check if the sound CMOS chip +5V power supply normal

Check 5V power supply routeway

Check if R149(100K) carve out a way

Replace R149

Check CMO Schip pin (29) (35) (37)
If connection is normal

Check sound CMOS chip and CMOS chip

Check if C177、R15、R199 normal

Replace component

NO NOISE

Check if 31136 output checking signal

check if 5V power supply 31136 pin (4)

Check if TM87P805 pin (14) input

Check R104、C153、R103
C154、R102、E2

Check if TM87P805 pin (22) output

TM87P805 work abnormality

Check if C187、R138 normal

Replace correspond component

Check if power switch is normal

Replace power switch

Press monitor key to check if LM386 pin (6) power supply +7.5V

Check if BV4、DTC114 and TM87P805 pin (14) output a pulse signal

Check if LM386 output audio frequency

LM386 broken

Check if small earphone base put through

Replace small earphone base

Check if loudspeaker disconnection

Replace loudspeaker

NO RECEPTION OR TRANSMISSION

Check if 31202 have power supply

Check if 33UH put through

Replace

Check if Q26 normal

Check if TM78P805
Pin (38) work

normal

Check if 13M OSCILLATOR

Check if 13M have power supply

Check if 1nH (L40) inductance

Check if 3.1V striked out or abnormality

Check 31202 pin (6) (7) (8)

Check if TM78P085 pin (30) (31) (38)
connected with 31202 pin (6) (7) (8)

Check if 31202 (14) pin voltage is controlled

check control voltage

Check if 5066 (Q9) (Q10) (Q11) magnified

Check if U7 have power supply

Check if 1uH (L14) ,CMOS chip
Pin (3) work normal

Check if 31136 pin (4) have power supply

33nH (L15)

Check if 5066 (Q37) and second local 39M
double-frequency circuit work .

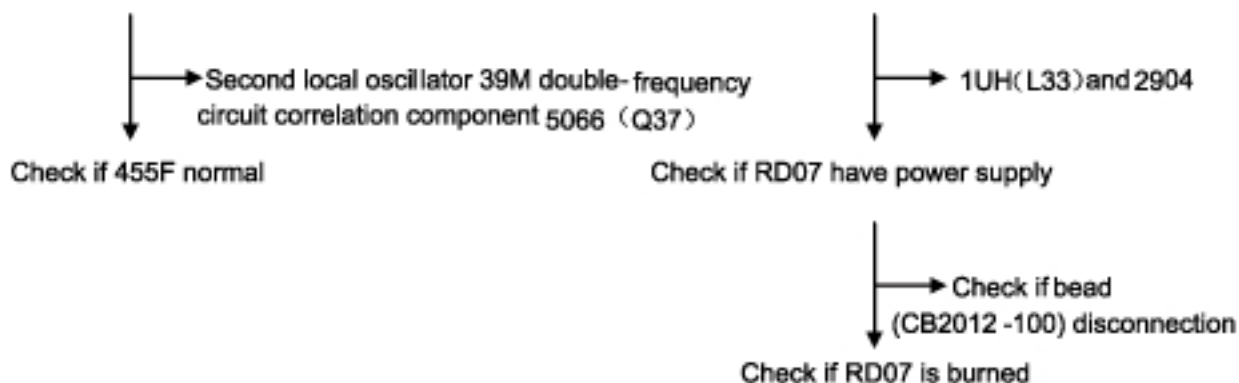
Check if 5066 (Q37) have power supply

Check CMOS chip
TM78P805 pin(42)

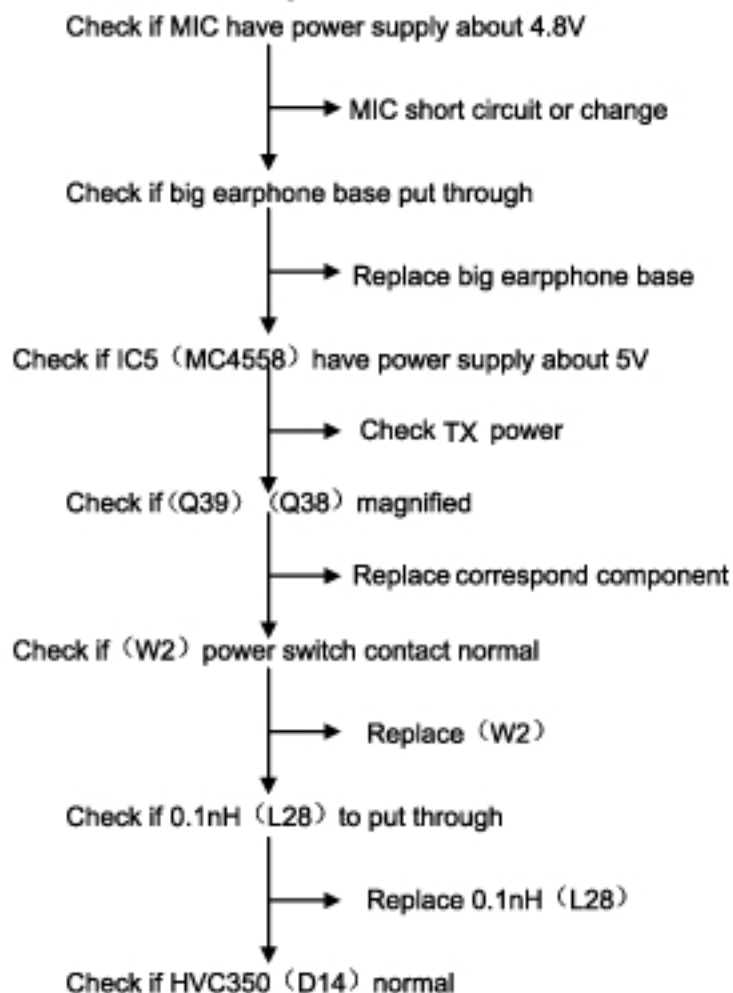
Check if R24 3357 have power supply

Check 0.1uH (L17)

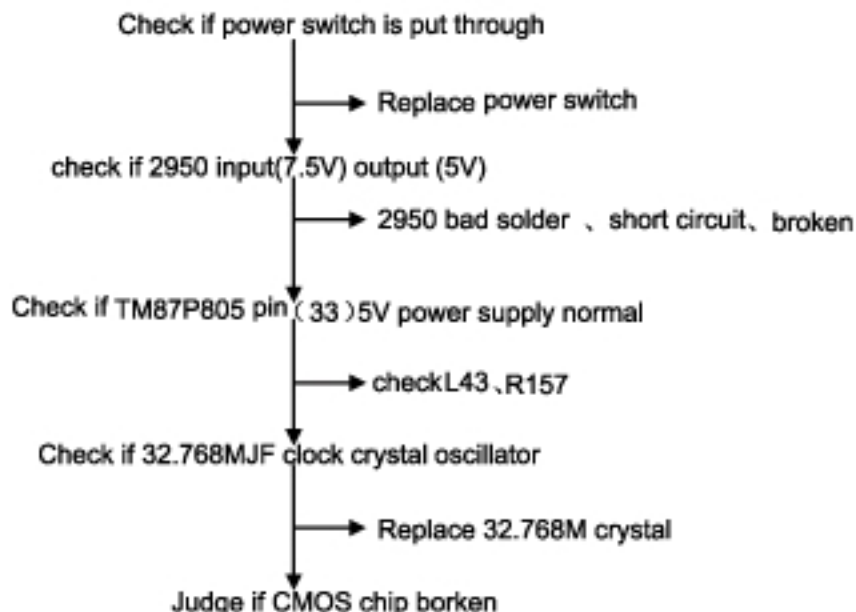
Check RD01 is the work voltage of all mark



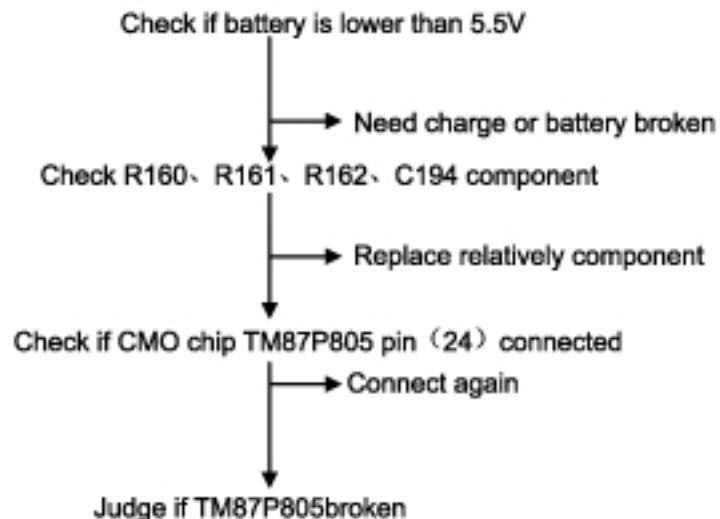
Microphone



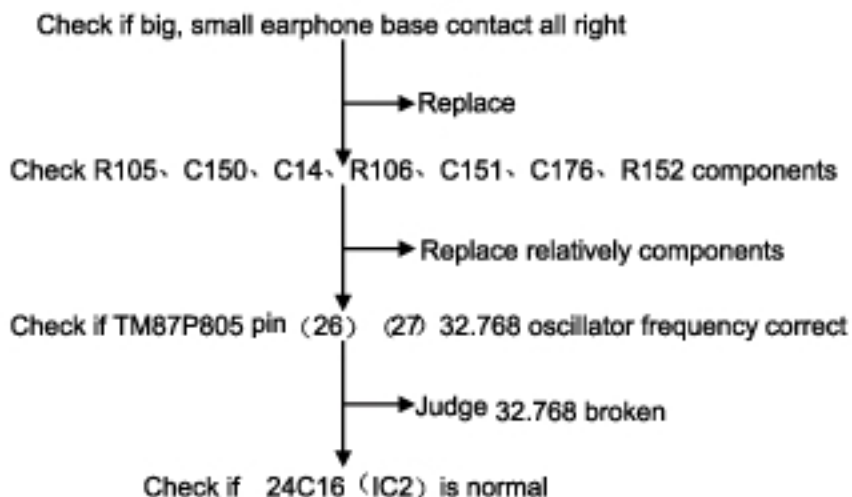
No power on



Low power alarm



Input frequency

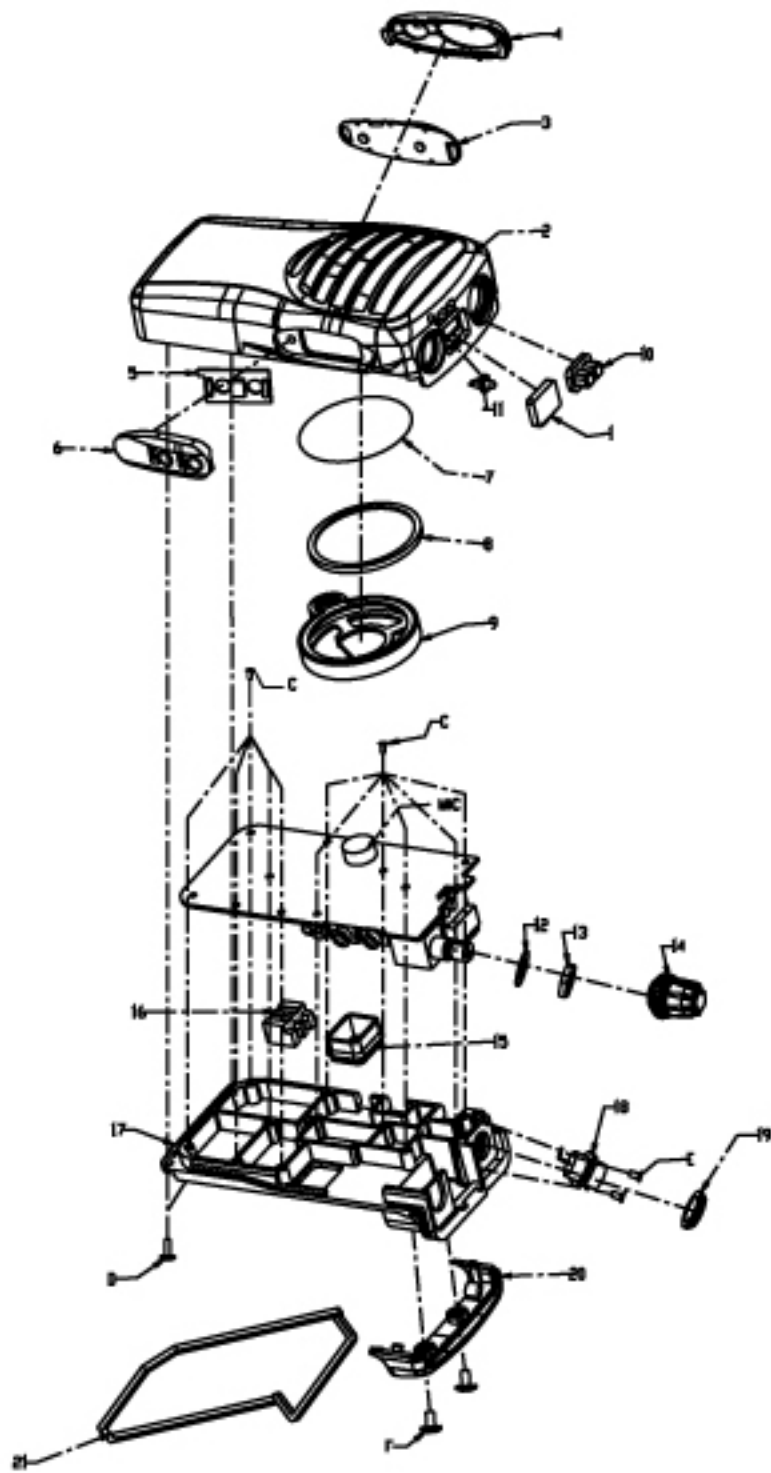


Frequency	Modulate Voltage	Waiting current (no power save)	Voltage controlled	SNR	Power	transmit current	Frequency Deviation (KHz)	CTCSS (15KHz Rate) 67Hz250Hz	DCS (15KHz Rate)	Frequency Error	Max Audio Voltage	Turn on Sensitivity
450.100MHz	7.5V	40mA	RX \geq 0.8V TX \geq 0.8V	-124dB \geq 10dbm	\geq 4W	\leq 1.5A	4.8K -5.0K	\geq 0.5KHz \leq 0.8KHz	0.55K~0.85K	\pm 500HZ	1.7~1.8V	124dBm~ -126dBm
460.025MHz	7.5V	40mA		-124dB \geq 10dbm	\geq 4W	\leq 1.5A	\geq 4.0K	\geq 0.5KHz \leq 0.8KHz	0.55K~0.85K	\pm 500HZ	1.7~1.8V	124dBm~ -126dBm
469.975MHz	7.5V	40mA	RX \leq 3.5V TX \leq 3.5V	-124dB \geq 10dbm	\geq 4W	\leq 1.5A	\geq 4.0K	\geq 0.5KHz \leq 0.8KHz	0.55K~0.85K	\pm 500HZ	1.7~1.8V	124dBm~ -126dBm
Testing equipment	Voltmeter	DC Ammeter	Digital Voltmeter	Signal arrange 、 Millivoltmeter	2955B	DC Ammeter	2955B	2955B	2955B	2955B	2955B	295 5B

Ps:

1. When testing SNR, you need test with and without CTCSS (include CTCSS and DCS).
2. When testing MIC frequency deviation, MIC frequency deviation modulated at 4.8KHz - 5.0KHz.
3. When testing CTCSS (include CTCSS and DCS) frequency deviation 2955 synthesis tester modulated at LOW PASS 15KHZ, turn off audio signal test.
4. Current waiting no power save about 40mA, power save lower than 20mA.
5. Input frequency software wireless copy frequency setup 455.825MHz.

	RX	TX	CTCSS	DCS		RX	TX	CTCSS	DCS
CH41	450.100MHz	450.100MHz	No	No	CH46	469.975MHz	469.975MHz	254.1Hz	No
CH42	460.025MHz	460.025MHz	No	No	CH47	450.100MHz	450.100MHz	No	D023N
CH43	469.975MHz	469.975MHz	No	No	CH48	460.025MHz	460.025MHz	No	D754N
CH44	450.100MHz	450.100MHz	67Hz	No	CH49	469.975MHz	469.975MHz	No	D023I
CH45	460.025MHz	460.025MHz	123Hz	No					



Wireless cloning

Both master and sub-master selected in channel 56, turn the power off.

PS: The master transceiver is used to send data to the sub-transceiver.(We dont need to attach antenna to the sub-transceiver.)

2) Turn both the mater and sub-master transceiver on.

3) When turn the sub-master transceiver power on, press Monitor switch and hold for two seconds. "CP" appears on the display. Press Monitor key again, "r-" displays, waiting for receiving data.

4) Press the master transceiver' s PTT key, the LCD will show "t1" to suggest it is transmitting signals to the sub-transceiver. When cloning is finished, "En" appears on the master transceivers display. Then if we press PTT key, it will send data again. Press ▲ ▼ to exit cloning.

5) If sub-master transceiver receives data completely correct, when cloning is finished, "OC" displays. When it receives wrong data, "Er" appears on the display.As picture (8)displays.

Channel programming

Channel programming is programmed by computer. The main functions include: Time our timer (TOT), Busy channel lockout, Squelch level, CTCSS/ DCS. We can set CTCSS codes free by 0.1HZ step.

PS: Please use the special programming software .

Time-out Timer

This function is to prevent excessively long transmissions. If the time for transmitting is over the time limited, the radio will stop transmitting and alarm.

Busy channel lockout (BCLO)

The BCLO feature disables the transmitter if another signal is present.

If the channel is occupied, just press PTT. The radio will alarm and be back to the mode of receiving.

Adjust Squelch level

Adjust squelch level to set the radio in a better state with least noise interfering.

Set CTCSS and DCS

CTCSS and DCS to avoid interfering of the signals of the same setting from other transmitters.

1.Fixed CTCSS:50 codes.

we can set CTCSS by 0.1HZ within 67.0-254.1HZ

2.DCS:210 codes

CTCSS

1	67.0	18	118.8	35	183.5
2	69.3	19	123.0	36	186.2
3	71.9	20	127.3	37	189.9
4	74.4	21	131.8	38	192.8
5	77.0	22	136.5	39	196.6
6	79.7	23	141.3	40	199.5
7	82.5	24	146.2	41	203.5
8	85.4	25	151.4	42	206.5
9	88.5	26	156.7	43	210.7
10	91.5	27	159.8	44	218.1
11	94.8	28	162.2	45	225.7
12	97.4	29	165.5	46	229.1
13	100.0	30	167.9	47	233.6
14	103.5	31	171.3	48	241.8
15	107.2	32	173.8	49	250.3
16	110.9	33	177.3	50	254.1
17	114.8	34	179.9		



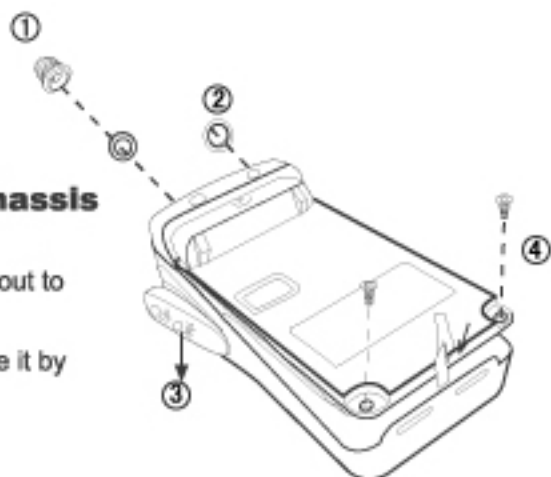
picture (8)

DCS

1	D023N	43	D251N	85	D532N	127	D131I	169	D371I
2	D025N	44	D252N	86	D546N	128	D132I	170	D411I
3	D026N	45	D255N	87	D565N	129	D134I	171	D412I
4	D031N	46	D261N	88	D606N	130	D143I	172	D413I
5	D032N	47	D263N	89	D612N	131	D145I	173	D423I
6	D036N	48	D265N	90	D624N	132	D152I	174	D431I
7	D043N	49	D266N	91	D627N	133	D155I	175	D432I
8	D047N	50	D271N	92	D631N	134	D156I	176	D445I
9	D051N	51	D274N	93	D632N	135	D162I	177	D446I
10	D053N	52	D306N	94	D645N	136	D165I	178	D452I
11	D054N	53	D311N	95	D654N	137	D172I	179	D454I
12	D065N	54	D315N	96	D662N	138	D174I	180	D455I
13	D071N	55	D325N	97	D664N	139	D205I	181	D462I
14	D072N	56	D331N	98	D703N	140	D212I	182	D464I
15	D073N	57	D332N	99	D712N	141	D223I	183	D465I
16	D074N	58	D343N	100	D723N	142	D225I	184	D466I
17	D114N	59	D346N	101	D731N	143	D226I	185	D503I
18	D115N	60	D351N	102	D732N	144	D243I	186	D506I
19	D116N	61	D356N	103	D734N	145	D144I	187	D516I
20	D122N	62	D364N	104	D743N	146	D245I	188	D523I
21	D125N	63	D365N	105	D754N	147	D246I	189	D526I
22	D131N	64	D371N	106	D023I	148	D251I	190	D532I
23	D132N	65	D411N	107	D025I	149	D252I	191	D546I
24	D134N	66	D412N	108	D026I	150	D255I	192	D565I
25	D143N	67	D413N	109	D031I	151	D261I	193	D606I
26	D145N	68	D423N	110	D032I	152	D263I	194	D612I
27	D152N	69	D431N	111	D036I	153	D265I	195	D624I
28	D155N	70	D432N	112	D043I	154	D266I	196	D627I
29	D156N	71	D445N	113	D047I	155	D271I	197	D631I
30	D162N	72	D446N	114	D051I	156	D274I	198	D632I
31	D165N	73	D452N	115	D053I	157	D306I	199	D645I
32	D172N	74	D454N	116	D054I	158	D311I	200	D654I
33	D174N	75	D455N	117	D065I	159	D315I	201	D662I
34	D205N	76	D462N	118	D071I	160	D325I	202	D664I
35	D212N	77	D464N	119	D072I	161	D331I	203	D703I
36	D223N	78	D465N	120	D073I	162	D332I	204	D712I
37	D225N	79	D466N	121	D074I	163	D343I	205	D723I
38	D226N	80	D503N	122	D114I	164	D346I	206	D731I
39	D243N	81	D506N	123	D115I	165	D351I	207	D732I
40	D144N	82	D516N	124	D116I	166	D356I	208	D734I
41	D245N	83	D523N	125	D122I	167	D364I	209	D743I
42	D246N	84	D526N	126	D125I	168	D365I	210	D754I

Separating the case assembly from the chassis

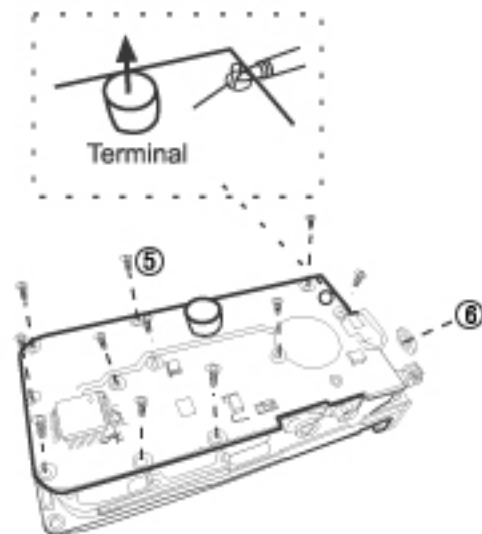
- (1) Remove the knobs ① and antenna round nuts ②
- (2) Remove the two screws ④ and take the earphone stuff ③ out to separate from earphone hole.
- (3) Cut in the clearance of aluminium board bottom and remove it by screwdriver



Separating the aluminium board from the wiring board

- (1) Remove the fix up wiring board screws. ⑤
- (2) Remove the volume/power off screw ⑥
- (3) Remove the solder from the antenna ⑦ terminal using a soldering iron then put up the connection board.

Note: When reassembling the connection board in the chassis, be sure to solder the antenna terminal.

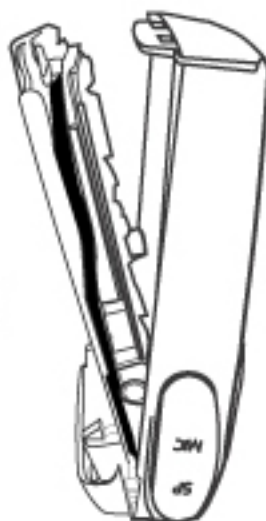


Assembling the case assembly to the chassis

(1) Aim at hole between case assembly and chassis, then put it into chassis slowly.

(2) Tighten two screws. ④

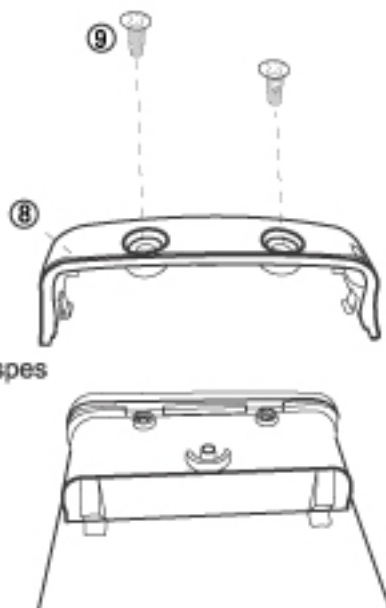
Note: when installing, separate the earphone stuff ③ from earphone hole, otherwise after chassis the earphone hole will pin the earphone stuff. Notice waterproof loop must be pressed tightly.



Assembling the bottom case to the chassis

(1) When installing, two clasps of the bottom case fastening to the clasps of the chassis.

(2) Tighten two screws ⑨



Speaker setting position

Speaker setting position is decided by MIC hole of loudspeaker rubber circle.

