dnt®

service manual

contents

technical data (V1.0)
General:

	micro AS	micro FS
Frequency range FM	26,565 - 27,405 MHz	26,965 - 27,405 MHz
Frequency range AM	27,005 - 27,135 MHz	
Frequency tolerance	max. 20ppm	max. 20ppm
Channel FM/AM	80/12	40/--
Temperature range	-10°C to +55°C	-10°C to +55°C
Supply voltage	min. 6 Volt max. 15,6 Volt	min. 6 Volt max. 15,6 Volt
Dimension	wide=57(69) mm,high=159 mm,depth=35 mm	
Weight without batteries	240g	235g
Approval	BAPT 222 ZV 104	ETS 300135
Approval number	????	CEPT PR27/L
Type of modulation	F3E /A3E	F3E

Receiver

Maximum usable sensitivity (FM)	< 2dBµV 20dB SINAD	< 0dBµV 20dB SINAD
Adjacent channel selectivity	> 60 dB	> 60 dB
Intermodulation response rejection	> 54 dB	> 54 dB
Squelch range	0,1 to 50 µV	0,1 to 50 µV
Audio output power	0,8W/8Ohm	0,8W/8Ohm
Deemphasis	6dB/Oktave	6dB/Oktave
IF frequencies	455kHz/10,695MHz	455kHz/10,965MHz

Transmitter

RF power	FM AM	4 Watt / 1 Watt 1 Watt	4 Watt / 1 Watt
Frequency deviation		max. 2 kHz	max. 2 kHz
AM depth		<90%	
Modulation ALC		40 dB	40 dB
Preemphases		6dB/Oktave	6dB/Oktave

Q.C. Data Measurement Sheet - micro AS - V1.2 (20/12/96)

Reference :

RF Load	: 50 Ohm	TX Mod.	: 1250 Hz	FM Dev.	: 1250 Hz
AF Load	: 8 Ohm	RX Mod.	: 1000 Hz	AM %	: 60 %
AF Output	: 300 mW	Supply Voltage.	: 13,2 V		

Inspection:
Date :
Measured by : _____
Sheet _____ **of** _____

Transmitter Test

1. RF output power FM	Ch 41	3,8 W ± 10%					
	Ch 01	3,8 W ± 10%					
	Ch 40	3,8 W ± 10%					
2. FM RF power with ALC	15,6V	≤ 4,2W					
3. FM low power		1,0 W ± 10%					
4. RF output power AM	Ch.09	1,0 W ± 10%					
5. Frequency offset		≤ ±300Hz					
6. FM dev. (input 4 mV)		≥ 1,6 kHz					
7. FM dev. (input 40 mV)		≤ 2,2 kHz					
8. AM depth (input 4 mV)		≥ 60 %					
9. AM depth (input 40 mV)		≤ 85 %					
10. FM dev. (input 40 mV) in AM		≤ 1,5 kHz					
11. FM hum&noise with 3 kHz filter		≥ 35 dB					
12. DC current full power		≤1200 mA					
13. VCO Voltage at Ch 40		3,8 - 4,2 V					

Receiver Test

14. FM sens. 20 dB SINAD	Ch 41	≤ 5 dBµV					
with CCITT filter (e.m.f)	Ch 01	≤ 5 dBµV					
	Ch 40	≤ 5 dBµV					
15. AM sens. 20 dB SINAD	Ch 09	≤ 5 dBµV					
16. Unclipped Audio output		≥ 0,6 W					
17. VCO Voltage at Ch 40		3,8 - 4,2 V					
18. Tight Squelch (vol. max.)		≥ 25 dBµV					
19. Squelch volume min. position		noise					
20. FM hum&noise w/o filter (50dBµV)		≥ 35dB					

Other Tests

21. Selcall encoder	function					
22. Selcall decoder	function					
23. Channel up/down	function					
24. Display illumination	function					
25. Display all segments on	function					
26. Number keypad 0...9	function					
27. RX channel scan	function					
28. S-Meter TX 4 Watt	full					
29. S-Meter RX 50 µV input	S-9					

Remarks: FM RF outputpower between Ch 41 and Ch.40 max. 0,5 W
FM RX sensitivity between Ch 41 and Ch 40 max 1,0 dB

Q.C. Data Measurement Sheet - micro FS - V1.1 (10/12/96)

Reference :

RF Load	: 50 Ohm	TX Mod.	: 1250 Hz	FM Dev.	: 1250 Hz
AF Load	: 8 Ohm	RX Mod.	: 1000 Hz		
AF Output	: 300 mW	Supply Voltage.	: 13,2 V		

Inspection:
Date :
Measured by : _____
Sheet _____ **of** _____

Transmitter Test

1. RF output power FM	Ch 01	3,8 W ± 10%					
	Ch 20	3,8 W ± 10%					
	Ch 40	3,8 W ± 10%					
2. FM RF power with ALC	15,6V	≤ 4,2W					
3. FM low power		1,0 W ± 10%					
4. Frequency offset		≤ ±300Hz					
5. FM dev. (input 4 mV)		≥ 1,6 kHz					
6. FM dev. (input 40 mV)		≤ 2,2 kHz					
7. FM hum&noise with 3 kHz filter		≥ 35 dB					
8. DC current full power		≤1000 mA					
9. VCO Voltage at Ch 40		3,8 - 4,2 V					

Receiver Test

10. FM sens. 20 dB SINAD	Ch 01	≤ 4 dBµV					
with CCITT filter (e.m.f)	Ch 20	≤ 4 dBµV					
	Ch 40	≤ 4 dBµV					
11. Unclipped Audio output		≥ 0,6 W					
12. Audio distortion at 3 kHz Dev.		≤ 8 %					
13. VCO Voltage at Ch 40		3,8 - 4,2 V					
14. Tight Squelch (vol. max.)		≥ 25 dBµV					
15. Squelch volume min. position		noise					
16. FM hum&noise w/o filter (50dBµV)		≥ 35dB					

Other Tests

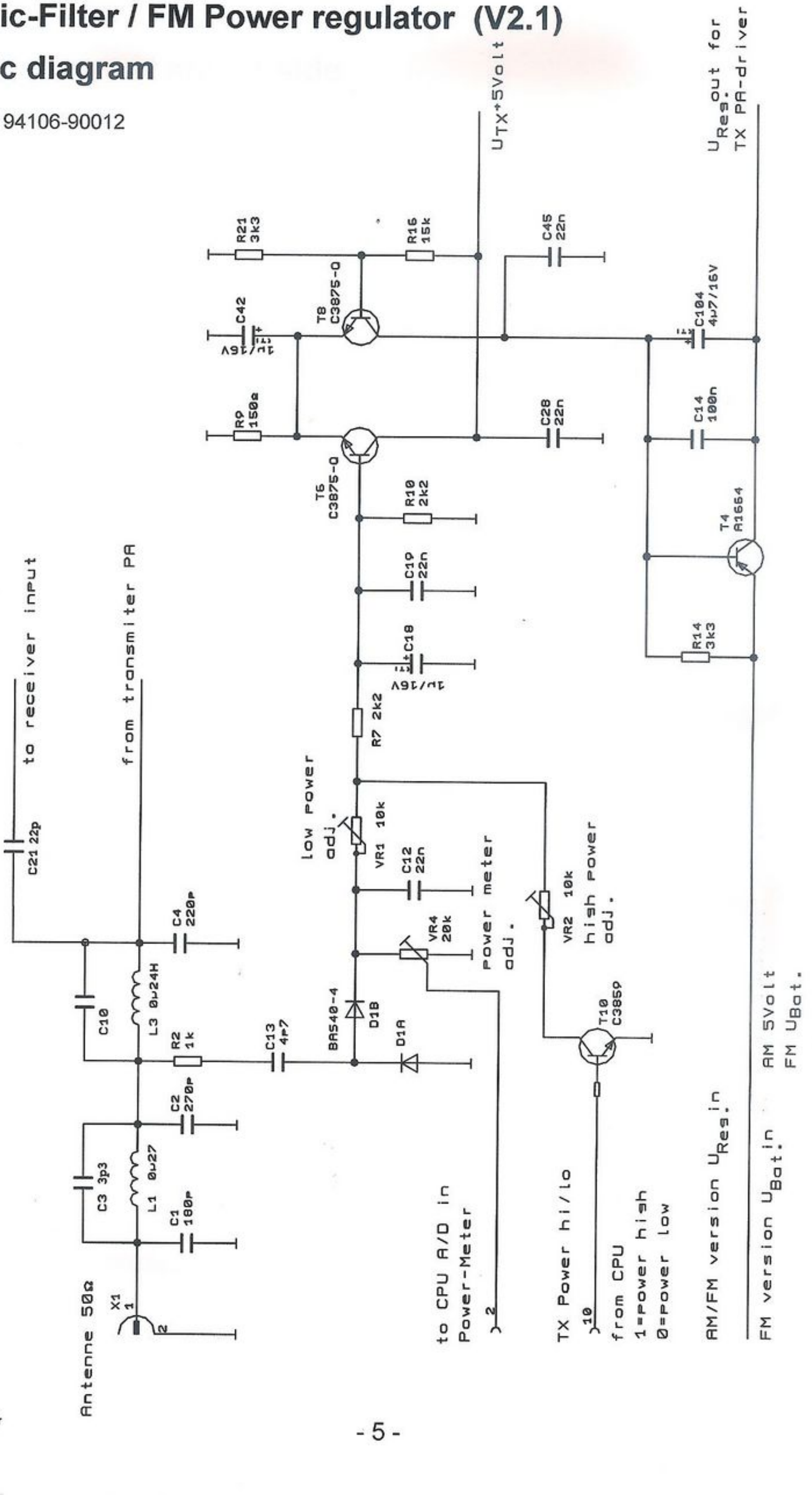
17. Selcall encoder	function					
18. Selcall decoder	function					
19. Channel up/down	function					
20. Display illumination	function					
21. Display all segments on	function					
22. Number keypad 0...9	function					
23. RX channel scan	function					
24. S-Meter TX 4 Watt	full					
25. S-Meter RX 50 µV input	S-9					
26. Memory	function					

Remarks: FM RF output power between Ch 01 and Ch.40 max. 0,5 W
FM RX sensitivity between Ch 01 and Ch 40 max 1,0 dB

Harmonic-Filter / FM Power regulator (V2.1)

shematic diagram

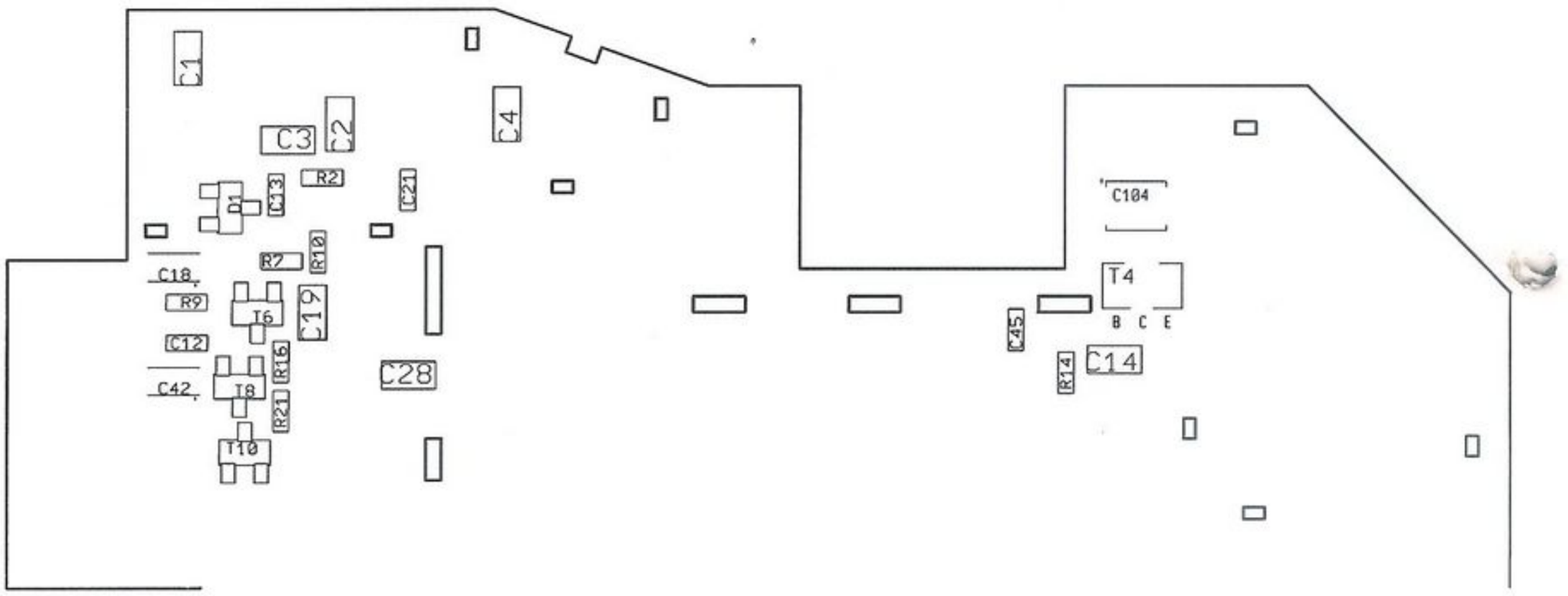
a part of PCB 94106-90012



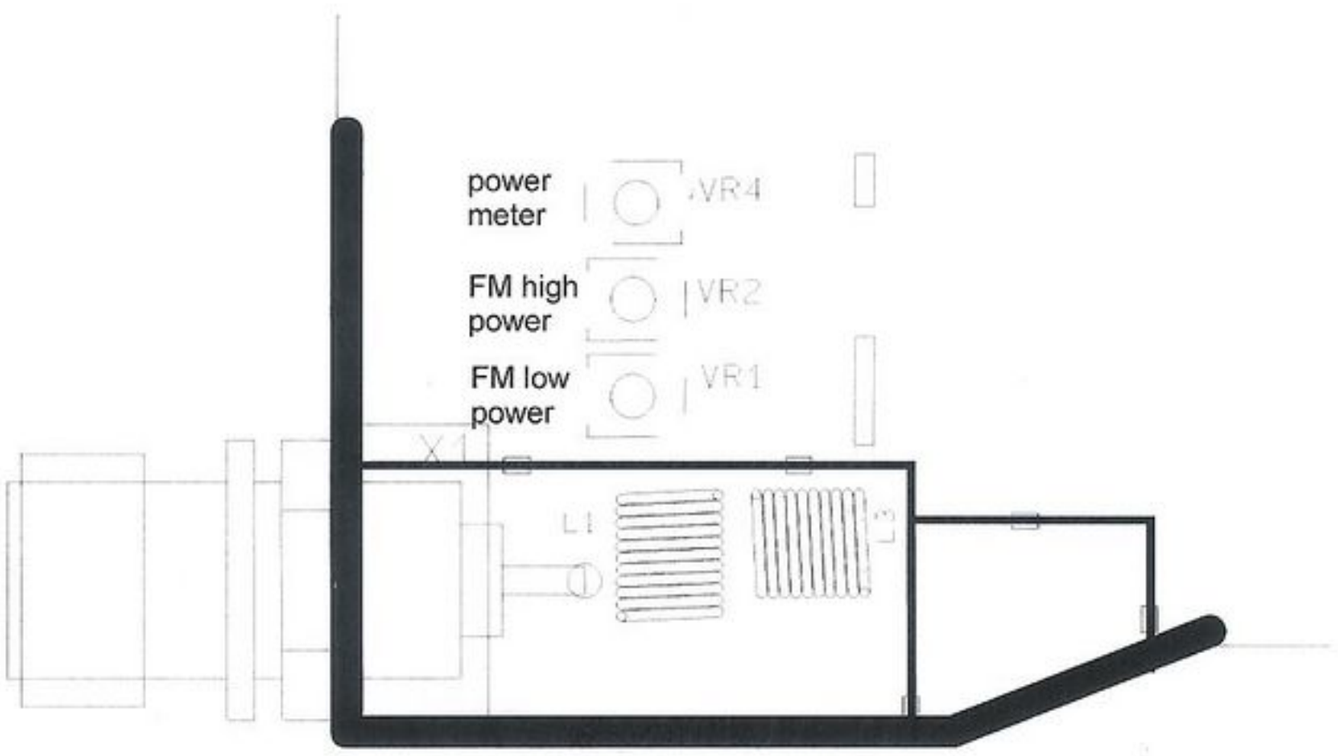
Harmonic-Filter / FM Power regulator (V2.1)

component layout solder side

a part of PCB 94106-90012



component layout component side



Harmonic-Filter / FM Power regulator (V2.1)

partslist

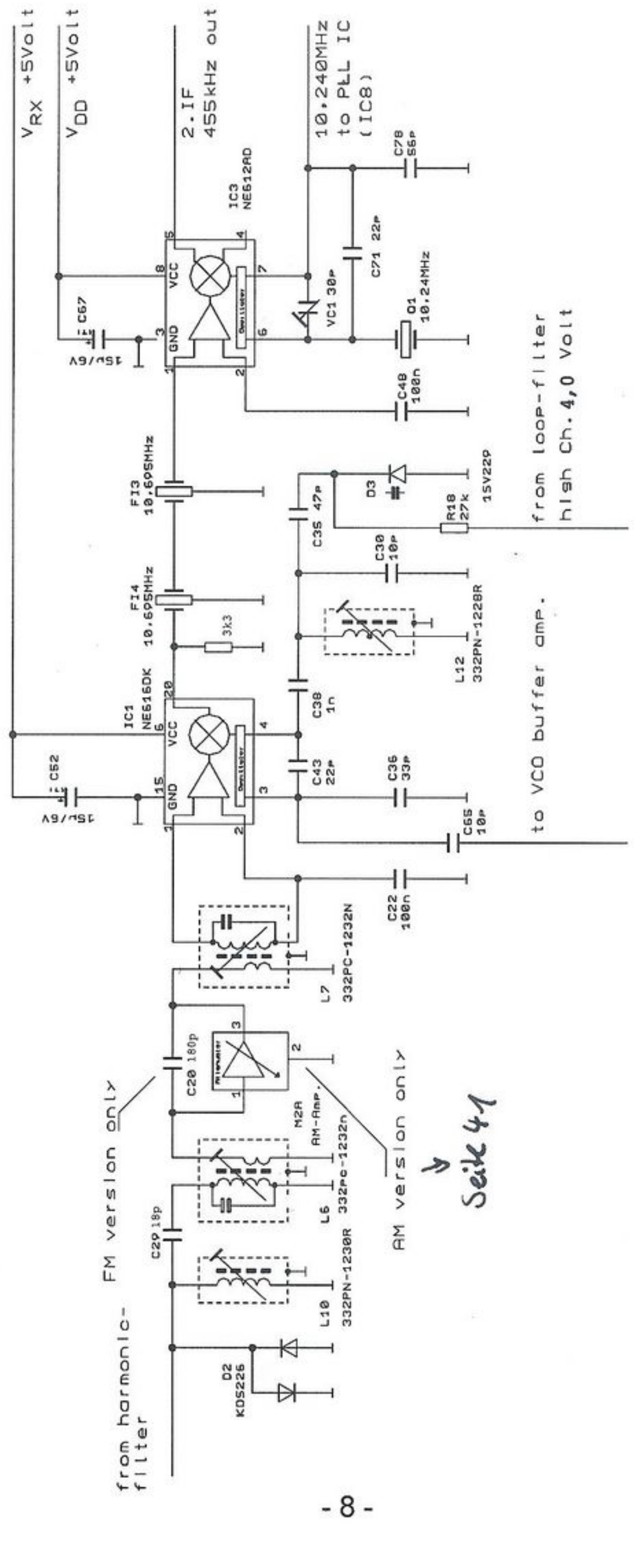
a part of PCB 94106-90012

part no	value/type	name	case/type	pos	remarks
9200400102	1k	Res Chip 1/16W 5 %	0603	R2	
9200400151	150R	Res Chip 1/16W 5 %	0603	R9	
9200400153	15k	Res Chip 1/16W 5 %	0603	R16	
9200400222	2k2	Res Chip 1/16W 5 %	0603	R7,R10	
9200400332	3k3	Res Chip 1/16W 5 %	0603	R14,R21	
9201003103	10k	Cermet Trimmer	C4214	VR1,VR2	
9201004203	20k	Cermet Trimmer	C4314	VR4	
9203300104	100n	Cap Chip XR7	0805	C14	
9203300181	180p	Cap Chip COG	0805	C1	
9203300221	220p	Cap Chip COG	0805	C4	
9203300223	22n	Cap Chip XR7	0805	C19, C28	
9203300271	270p	Cap Chip COG	0805	C2	
9203300339	3p3	Cap Chip COG	0805	C3	
9203300390	39p	Cap Chip COG	0805	C10	
9203400220	22p	Cap Chip COG	0603	C21	
9203400223	22n	Cap Chip XR7	0603	C12, C45	
9203400479	4p7	Cap Chip COG	0603	C13	
9205300105	1µ/16V	Tan Chip Cap	3216	C18, C42	
9205300475	4µ7/16V	Tan Chip Cap	3528	C104	
9208204009	0µ24H	Air Coil 9,5T ID=4mm	L9*4	L3	
9208204010	0µ27H	Air Coil 10,5T ID=4mm	L10*4	L1	
9230001664	A1664	PNP Switch Power Transistor	SOT89	T4	BC858
9230130404	BAS40-4	Si Schottky Diode Array	SOT23	D1	
9231603859	C3859	NPN Switch Transistor with R	SOT23	T10	C111S or BCR166
9231603875	C3875-Q	NPN AF Transistor	SOT23	T6,T8	
9282018022	Ant.	TNC Ant.connector		X1	

Receiver frontend, 1.& 2. mixer; VCO; 1. IF (V2.1)

shematic diagram

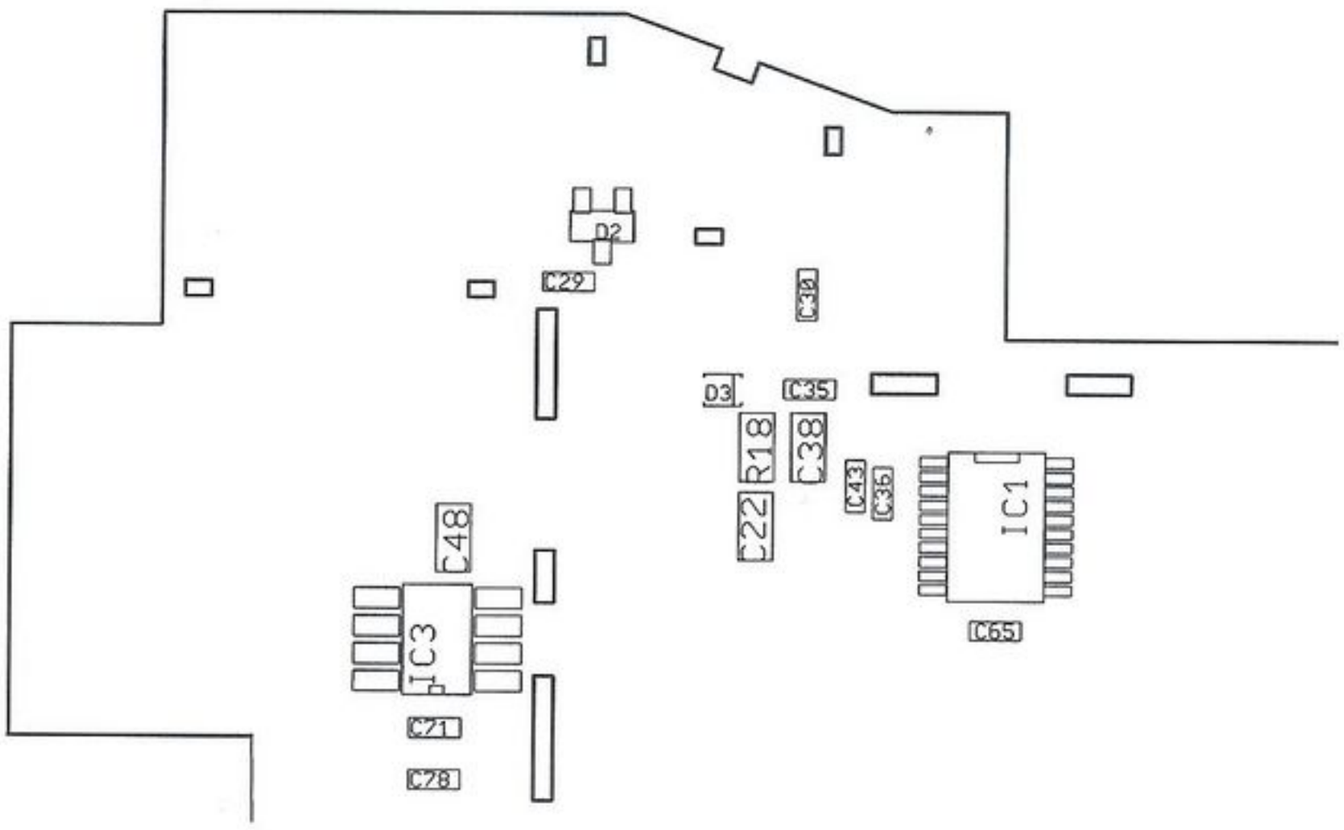
a part of PCB 94106-90012



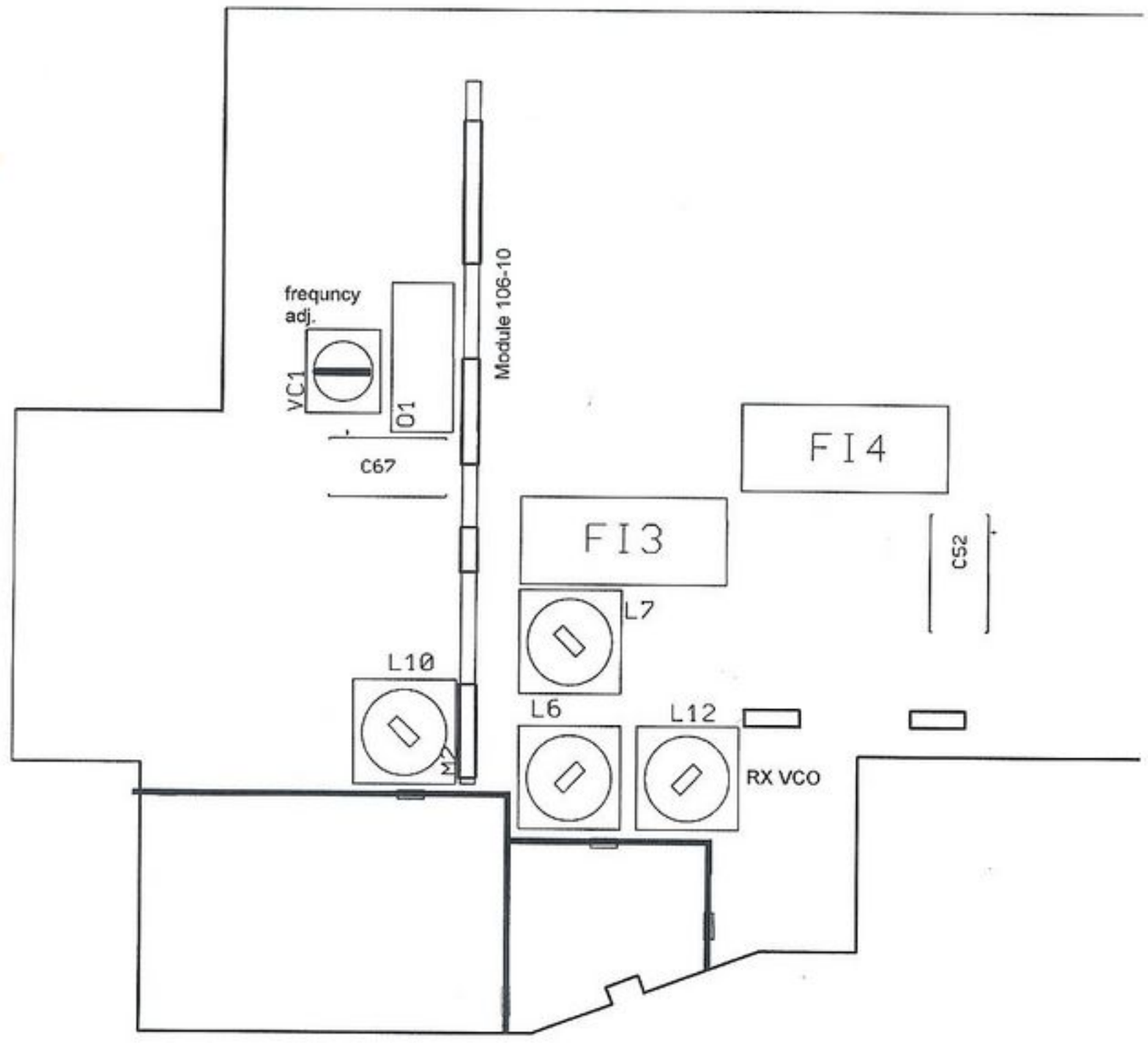
Receiver frontend; 1.&2. mixer; VCO; 1.IF (V2.1)

component layout solder side

a part of PCB 94106-90012



component layout component side



Receiver frontend; 1.&2. mixer; VCO; 1.IF (V2.1)

partslist

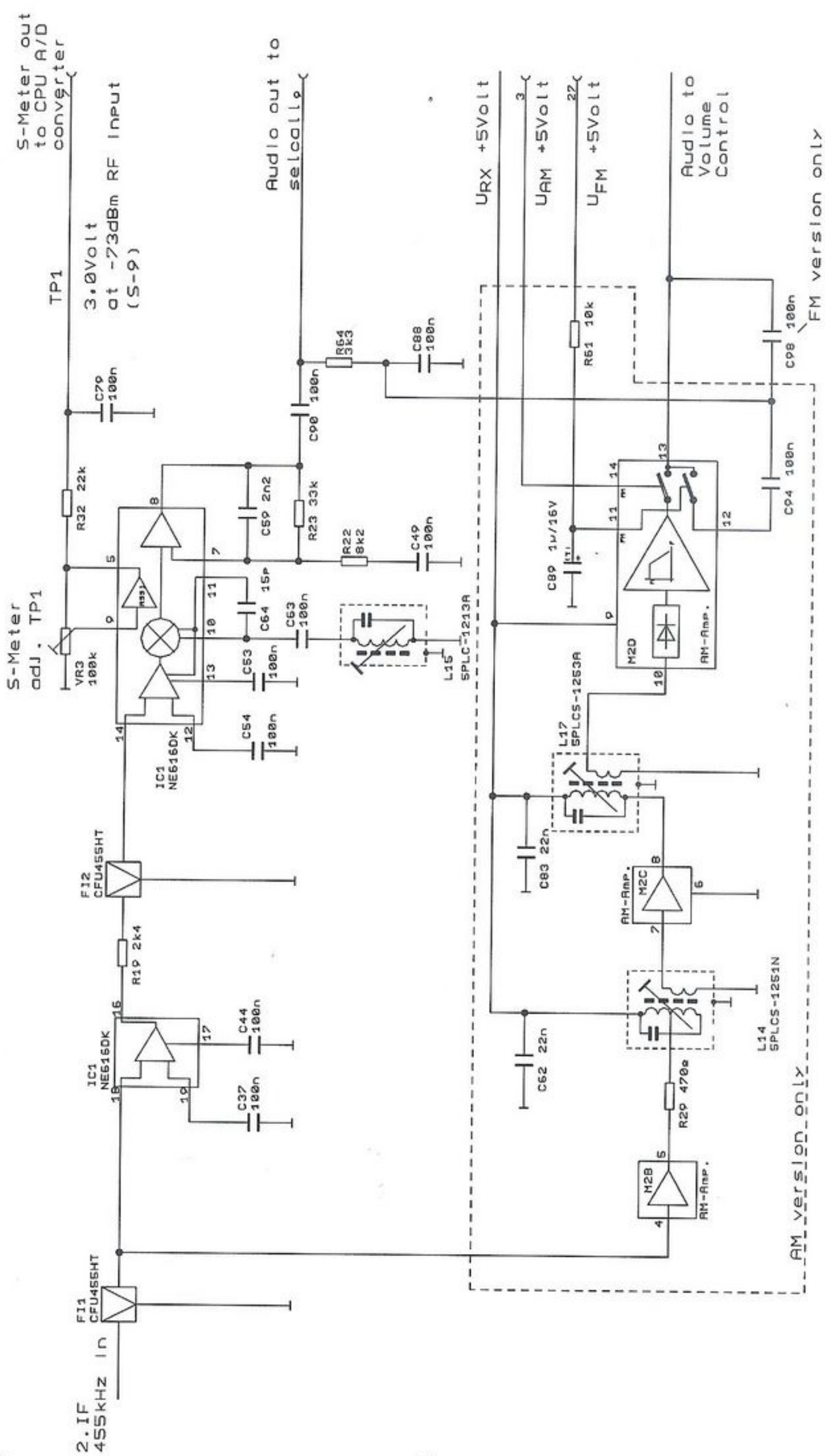
a part of PCB 94106-90012

part no	value/type	name	case/type	pos	remarks
9200300273	27k	Res Chip 1/8W 5%	0805	R18	
9200400332	3k3	Res Chip 1/16W 5%	0603	R?	
9203300104	100n	Cap Chip XR7	0805	C22, C48	
9203400100	10p	Cap Chip COG	0603	C30, C65	
9203400102	1n	Cap Chip XR7	0603	C38	
9203400181	180p	Cap Chip COG	0603	C20	only FS
9203400220	22p	Cap Chip COG	0603	C29,C43, C71	
9203400330	33p	Cap Chip COG	0603	C36	
9203400470	47p	Cap Chip COG	0603	C35	
9203400560	56p	Cap Chip COG	0603	C78	
9205900156	15µ/6V	Tan Chip Cap	6032	C52, C67	
9207802300	30p	Cer Cap Trimmer TZ04P300BA	TZB04A	VC1	
9208429228	332PN-1228R	5 mm IFT 16 MHz	SP50	L12	
9208439230	332PN-1230R	5 mm IFT 27 MHz	SP50	L10	
9208439232	332PC-1232N	5 mm IFT 27 MHz	SP50	L6,L7	
9232300226	KDS226	Si Switching Diode Array	SOT23	D2	
9235550229	1SV229	Voltage Variable Cap.Diode	SOD323	D3	
9248100612	NE612AD	Double balanced mixer and oscillator	SO008	IC3	a part of IC
9248100616	NE616DK	Low power mixer FM IF system	SO020P	IC1	
9280110240	10,24MHz	Crystal 22p 20ppm	HC45U	Q1	
9280510695	10,695MHz	Crystal Filter	HC49U3	FI3,FI4	pair

Receiver 2. IF; AM/FM demodulator; audio switch (V2.01)

shematic diagram

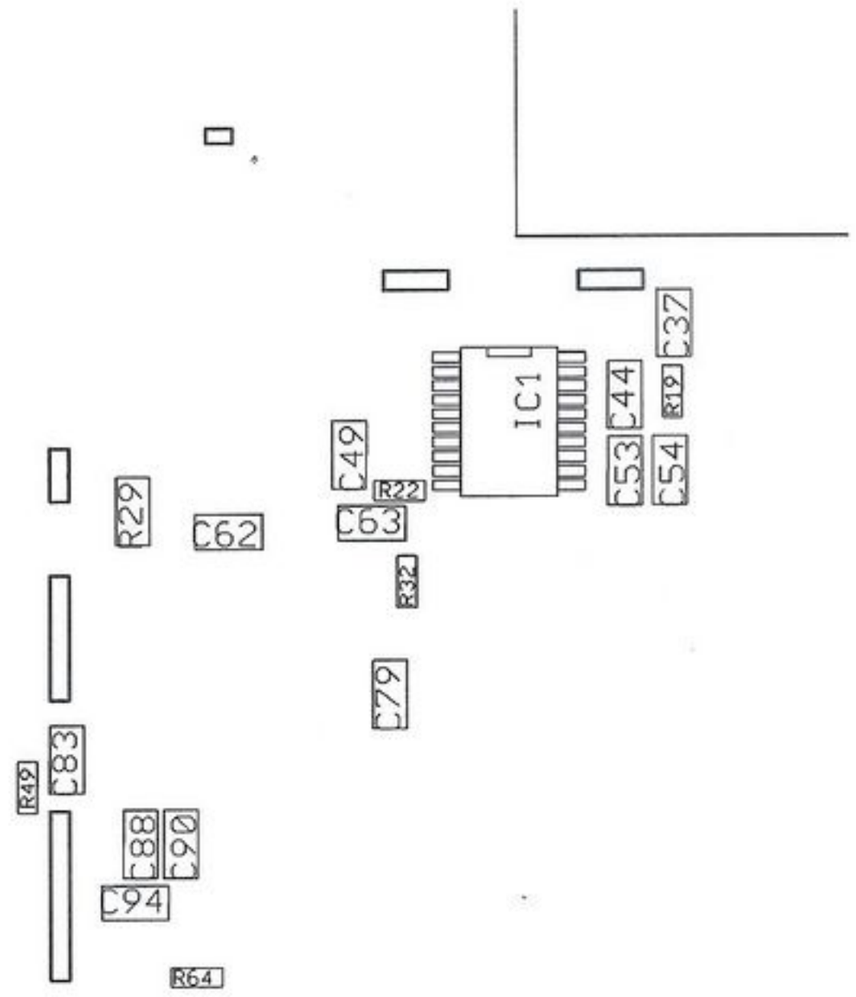
a part of PCB 94106-90012



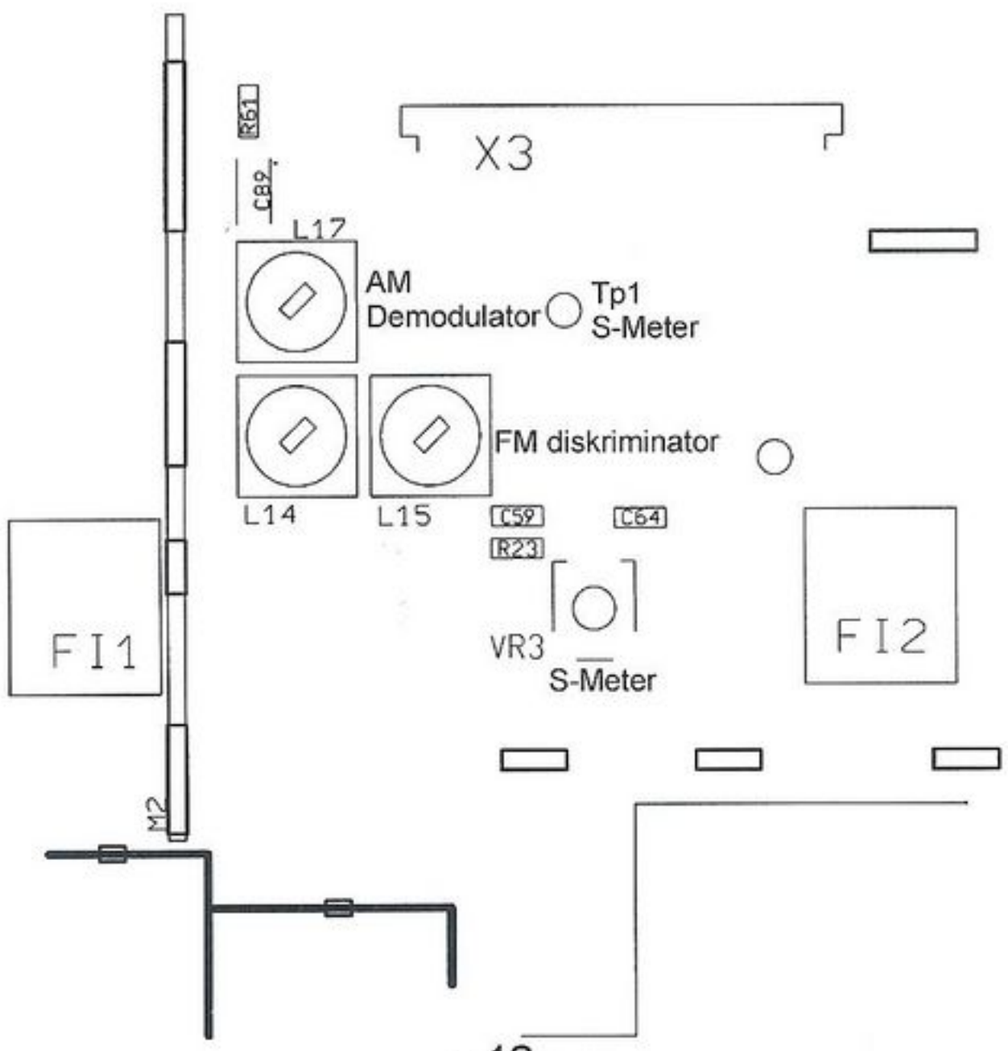
Receiver 2. IF; AM/FM demodulator; audio switch (V2.01)

component layout solder side

a part of PCB 94106-90012



component layout component side



Receiver 2. IF; AM/FM demodulator; audio switch (V2.01)

partslist

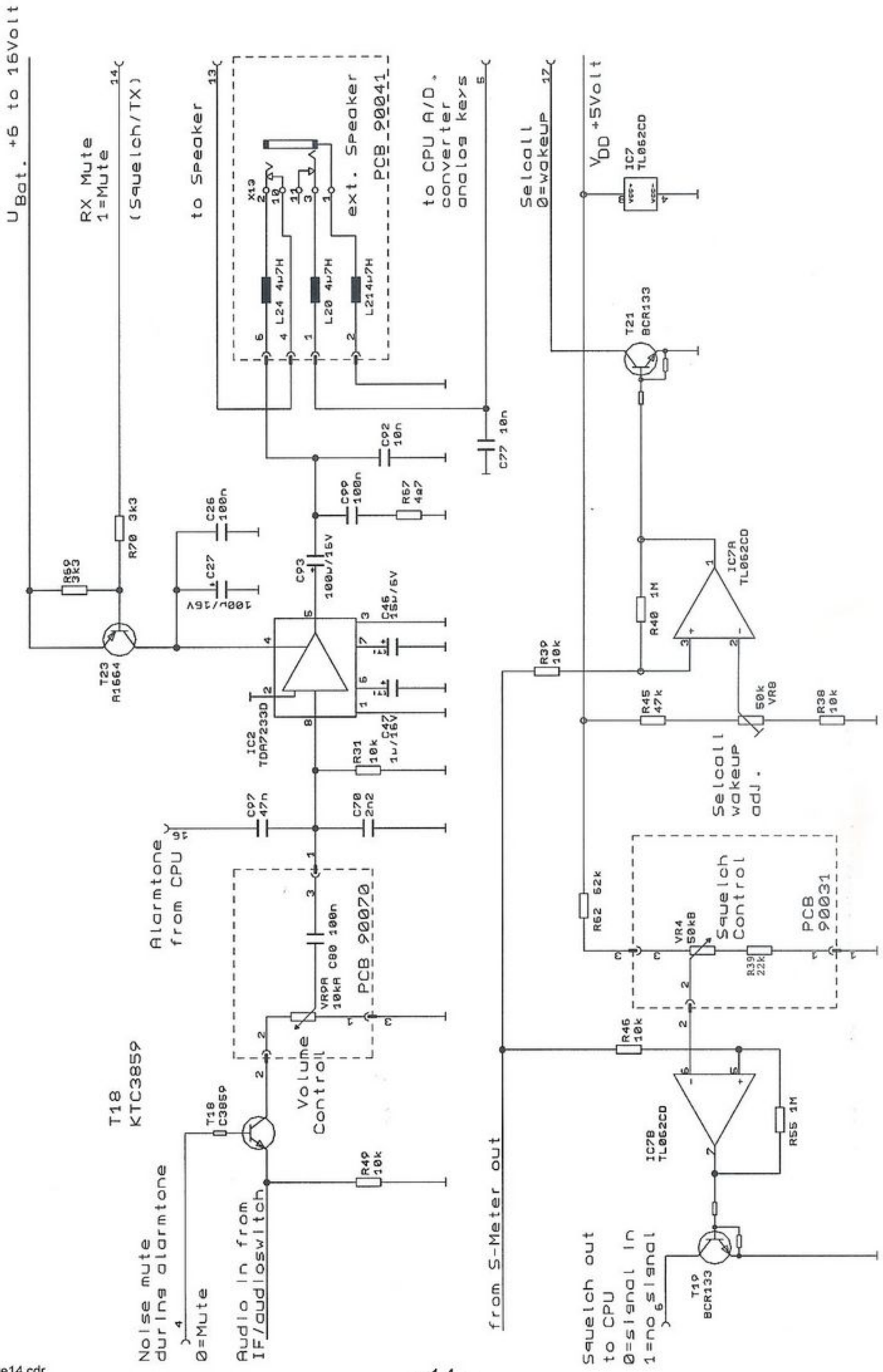
a part of PCB 94106-90012

part no	value/type	name	case/type	pos	remarks
9200300471	470R	Res Chip 1/10W 5%	0805	R29	only AS
9200400103	10k	Res Chip 1/16W 5%	0603	R61	only AS
9200400223	22k	Res Chip 1/16W 5%	0603	R32	
9200400242	2k4	Res Chip 1/16W 5%	0603	R19	
9200400332	3k3	Res Chip 1/16W 5%	0603	R64	
9200400333	33k	Res Chip 1/16W 5%	0603	R23	
9200400822	8k2	Res Chip 1/16W 5%	0603	R22	
9201004104	100k	Cermet Trimmer	C4314	VR3	
9203300104	100n	Cap Chip XR7	0805	C37, C44, C49, C53, C54, C63, C79, C88, C90	
9203300104	100n	Cap Chip XR7	0805	C94	only AS
9203300104	100n	Cap Chip XR7	0805	C98	only FS
9203300223	22n	Cap Chip XR7	0805	C62, C83	only AS
9203400150	15p	Cap Chip COG	0603	C64	
9203400222	2n2	Cap Chip XR7	0603	C59	
9205300105	1µ/16V	Tan Chip Cap	3216	C89	only AS
9208409213	5PLC-1213A	5 mm IFT 455 kHz	SP50	L15	
9208409251	5PLCS-1251N	5 mm IFT 455 kHz	SP50	L14	only AS
9208409253	5PLCS-1253A	5 mm IFT 455 kHz	SP50	L17	only AS
9248100616	NE616DK	Low power mixer FM IF system	SO020P	IC1	a part of IC
9281500455	CFU455HT	Ceramic Filter 455kHz	CFU	FI1, FI2	
9282051300	FC100-50A27-30	Flexible printed circuit connector 30 pin	SFV-30S	X3	
9290010610	AM-Amp.	AM receiver module	RXAM-106	M2	only AS

Receiver Audio amplifier and Squelch switch (V2.01)

shematic diagram

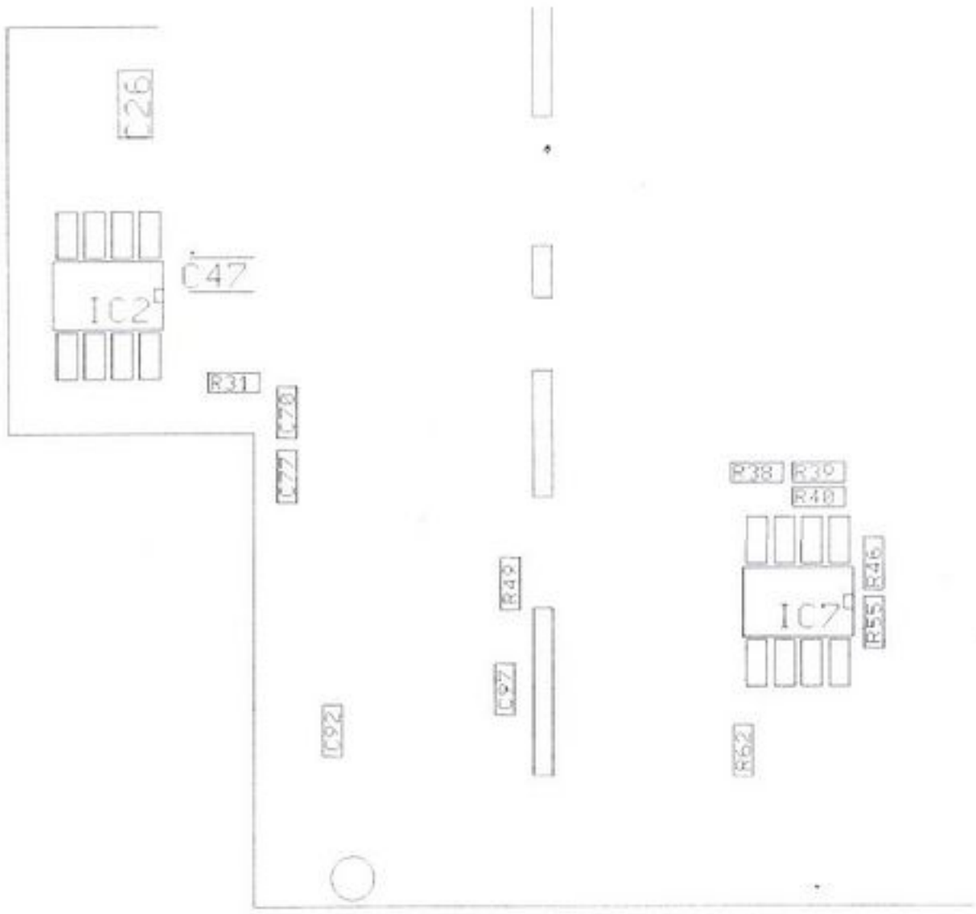
a part of PCB 94106-90012



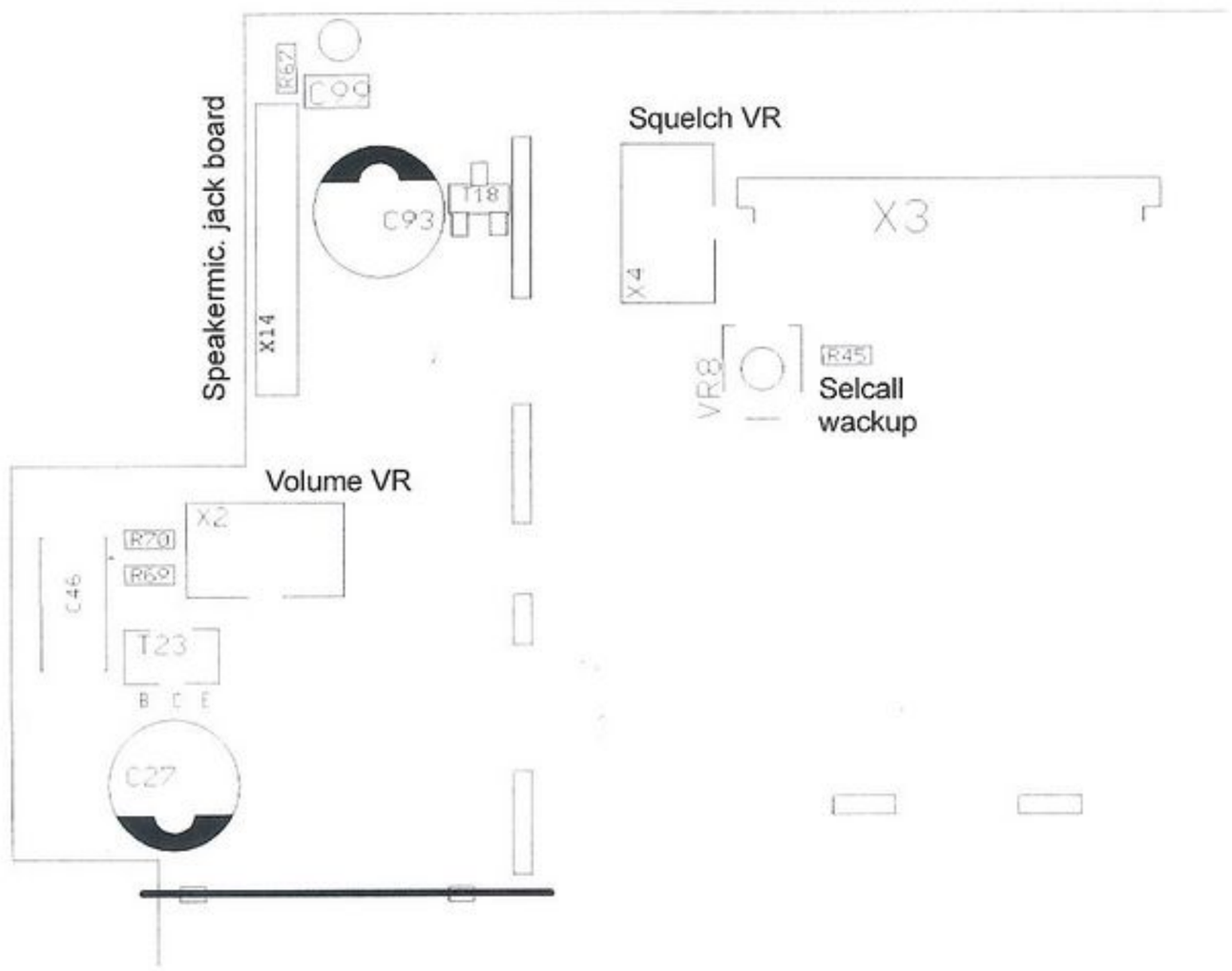
Receiver Audio amplifier and Squelch switch (V2.01)

component layout solder side

a part of PCB 94106-90012



component layout component side



Receiver Audio amplifier and Squelch switch (V2.01)

partslist

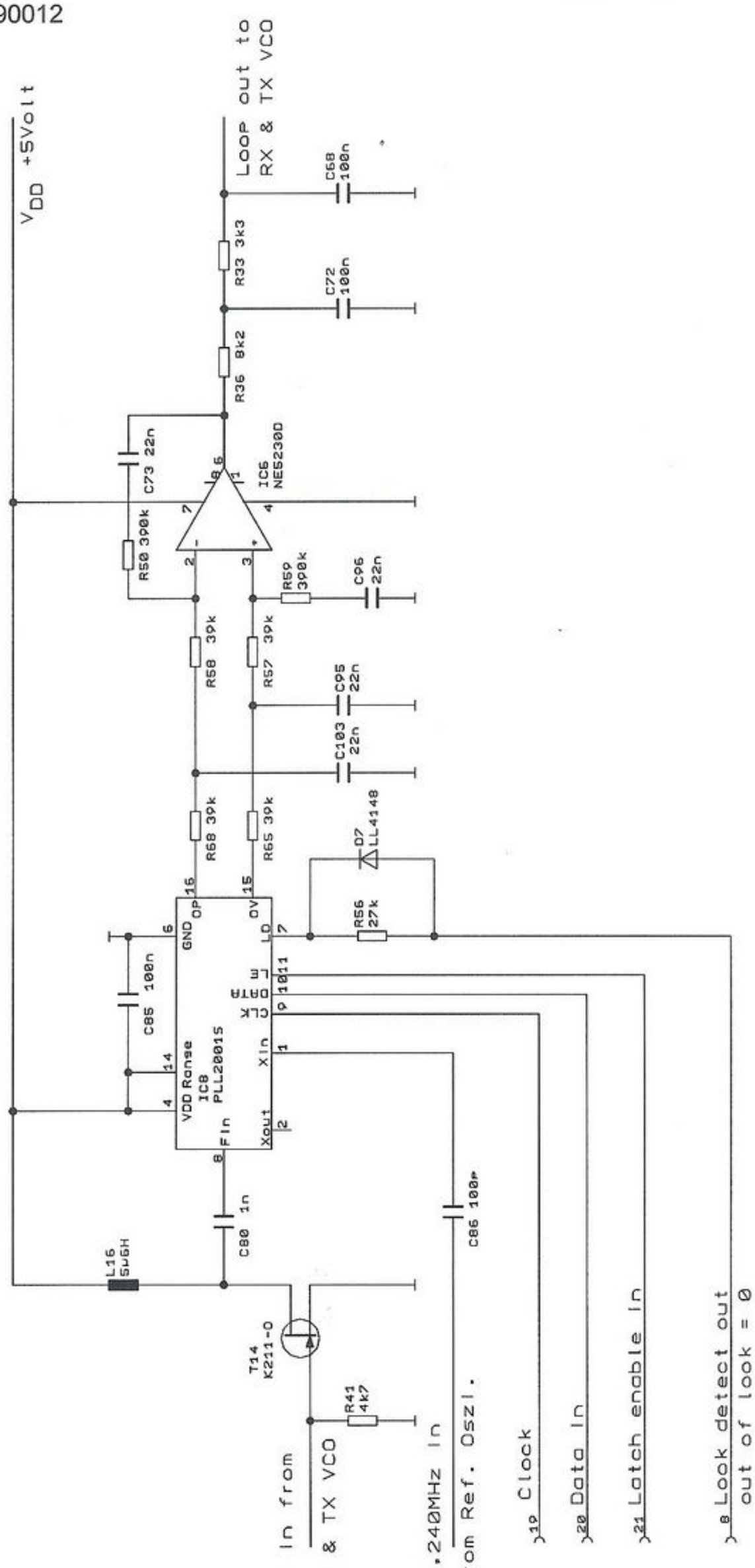
a part of PCB 94106-90012

part no	value/type	name	case/type	pos	remarks
9200400103	10k	Res Chip 1/16W 5%	0603	R31, R38, R39, R46, R49	
9200400105	1M	Res Chip 1/16W 5%	0603	R40, R55	
9200400332	3k3	Res Chip 1/16W 5%	0603	R69, R70	
9200400473	47k	Res Chip 1/16W 5%	0603	R45	
9200400479	4R7	Res Chip 1/16W 5%	0603	R67	
9200400623	62k	Res Chip 1/16W 5%	0603	R62	
9201004503	50k	Cermet Trimmer	C4314	VR8	
9203300104	100n	Cap Chip XR7	0805	C26, C99	
9203400103	10n	Cap Chip XR7	0603	C77, C92	
9203400222	2n2	Cap Chip XR7	0603	C70	
9203400473	47n	Cap Chip XR7	0603	C97	
9205300105	1µ/16V	Tan Chip Cap	3216	C47	
9205900156	15µ/6V	Tan Chip Cap	6032	C46	
9206200107	100µ/16V	Elec Cap SMS	ELK6,5	C27, C93	
9230001664	A1664	PNP Switch Power Transistor	SOT89	T23	BC858
9230300133	BCR133	NPN switch Transistor with 2R	SOT23	T19, T21	
9231603859	C3859	NPN Switch Transistor with R	SOT23	T18	C111S or BCR166
9256107233	TDA7233D	AF Amplifier 1W 8R	SO008	IC2	
9258100062	TL062CD	Dual Low Power Operational Amplifier	SO008	IC7	
9282040033	GIL-S-3P-S2T2-EF	PCB mount 3pin 2mm connector	3P-S2T2	X2, X4	
9282041073	314-10-007 -60	PCB to PCB 7pin 1row 2mm connector	31410-07	X14	

PLL and loop filter (V2.1)

shematic diagram

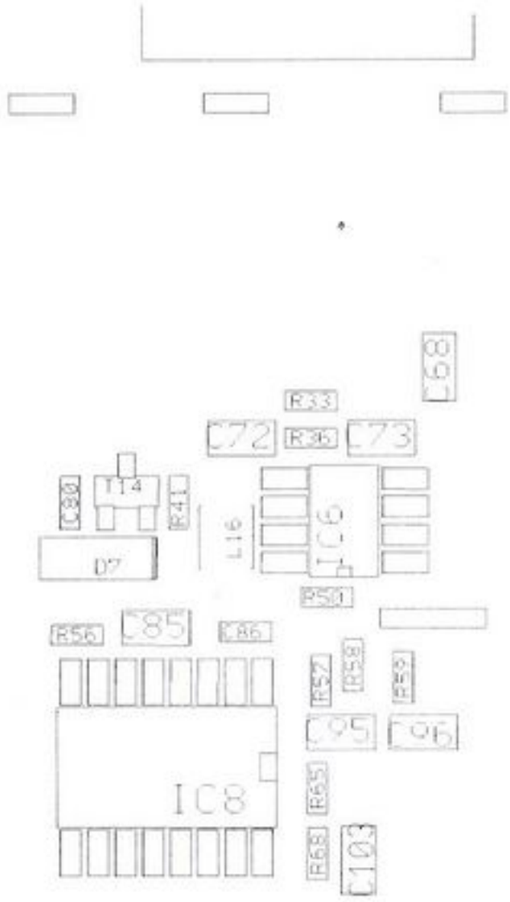
a part of PCB 94106-90012



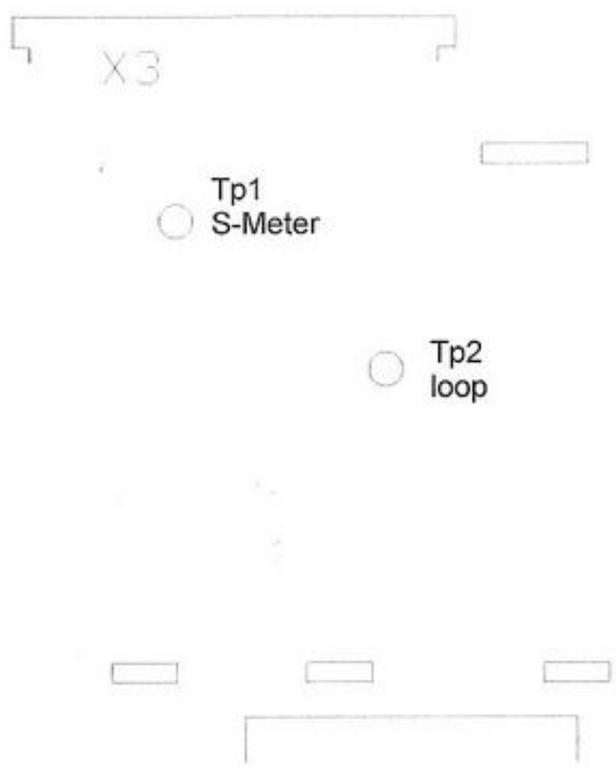
PLL and loop filter (V2.1)

components layout solder side

a part of PCB 94106-90012



components layout component side



PLL and loop filter (V2.1)

partslist

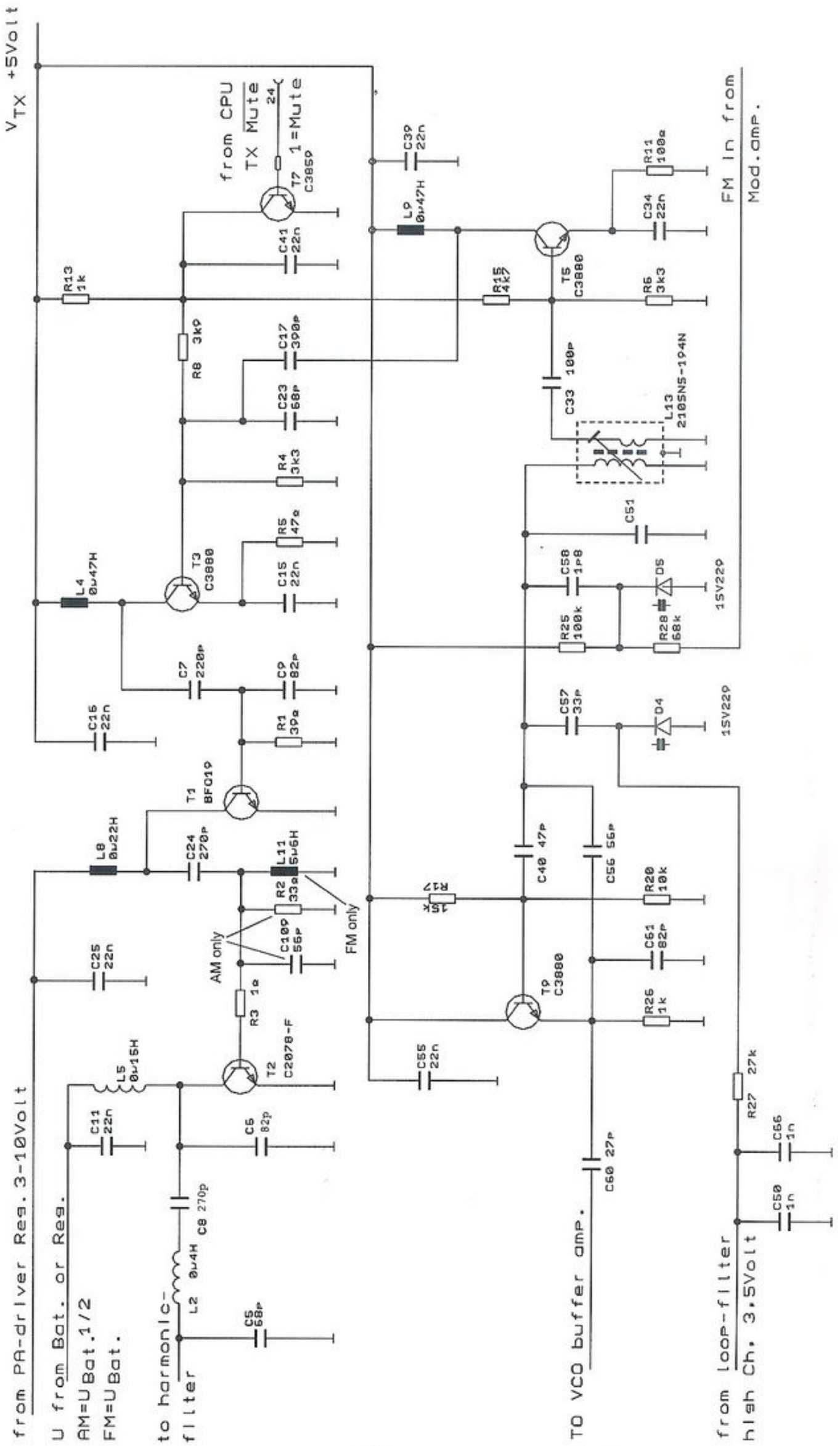
a part of PCB 94106-90012

part no	value/type	name	case/type	pos	remarks
9200400273	27k	Res Chip 1/16W 5%	0603	R56	
9200400332	3k3	Res Chip 1/16W 5%	0603	R33	
9200400393	39k	Res Chip 1/16W 5%	0603	R57,R58, R65,R68	
9200400394	390k	Res Chip 1/16W 5%	0603	R50, R59	
9200400472	4k7	Res Chip 1/16W 5%	0603	R41	
9200400822	8k2	Res Chip 1/16W 5%	0603	R36	
9203300104	100n	Cap Chip XR7 0805	0805	C68,C72, C85	
9203300223	22n	Cap Chip XR7 0805	0805	C73,C95, C96,C103	
9203400101	100p	Cap Chip COG 0603	0603	C86	
9203400102	1n	Cap Chip XR7 0603	0603	C80	
9208001565	5µ6H	SMD miniature choke coil	SIMID1	L16	
9232300211	K211-O	N-Channel FET	SOT23	T14	
9232404148	LL4148	Si Switching Diode SOD80	SOD80	D7	
9248105230	NE5230D	low Voltatge Operational Amplifier	SO008	IC6	
9269302001	PLL2001S	200 MHz Frequency Synthesizer	SO016P	IC8	

TX VCO; driver and power amplifier (V2.1)

shematic diagram

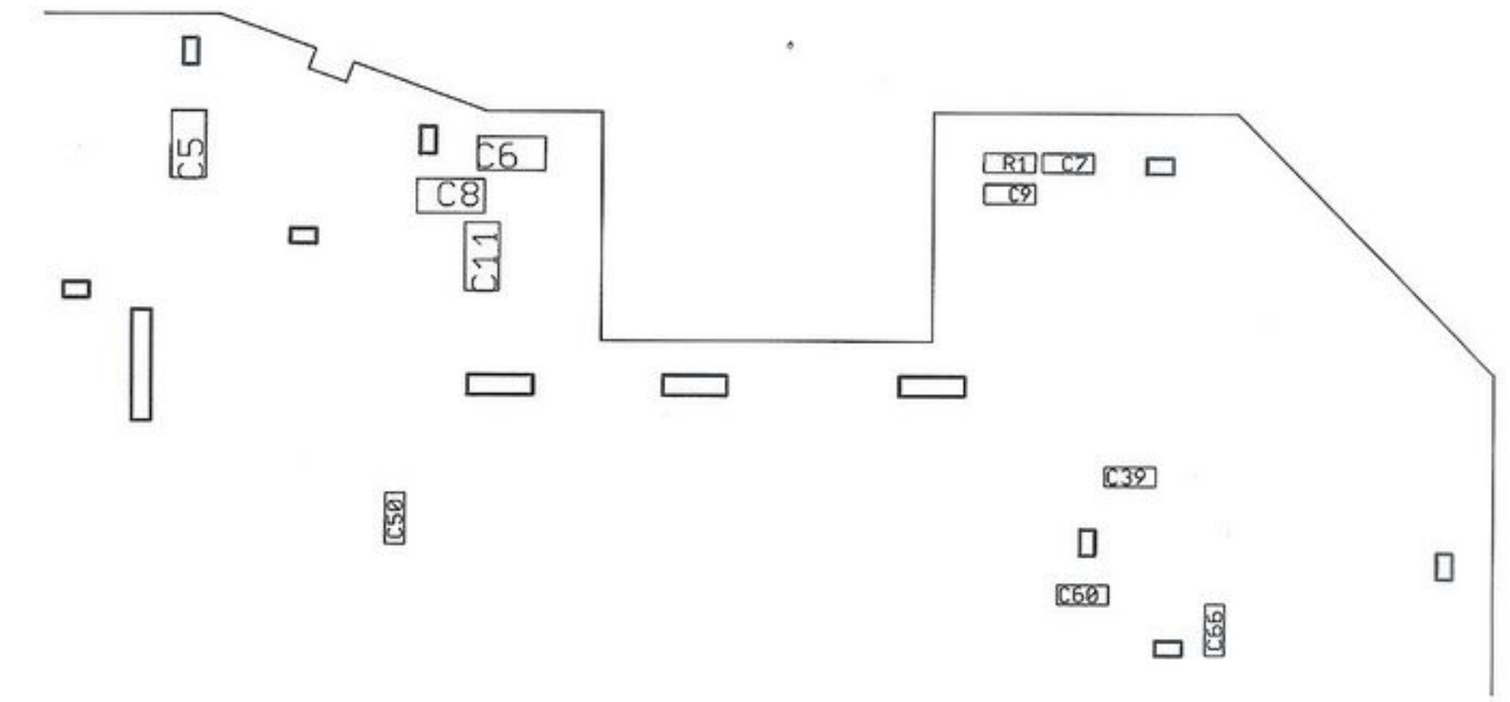
a part of PCB 94106-90012



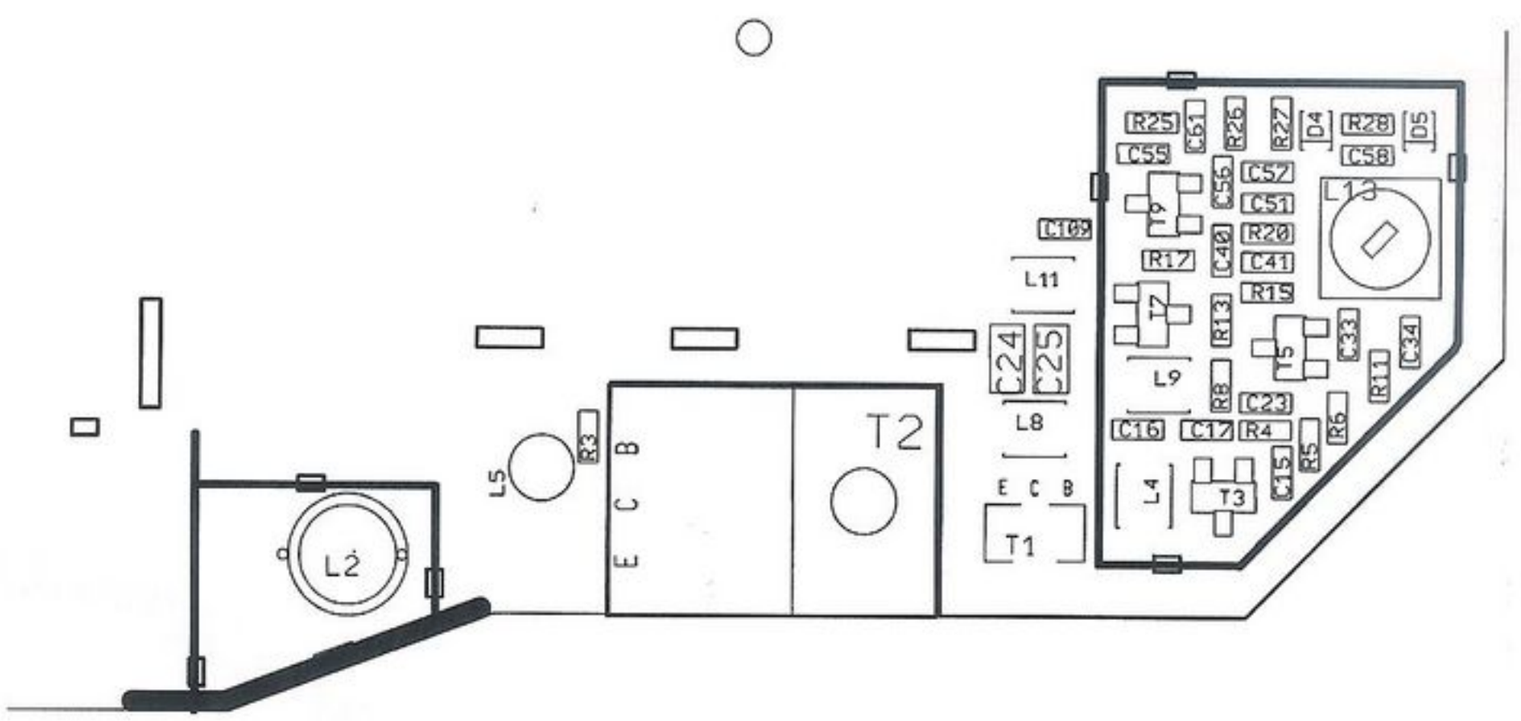
TX VCO; driver and power amplifier (V2.1)

component layout solder side

a part of PCB 94106-90012



component layout component side



TX VCO; driver and power amplifier (V2.1)
partslist

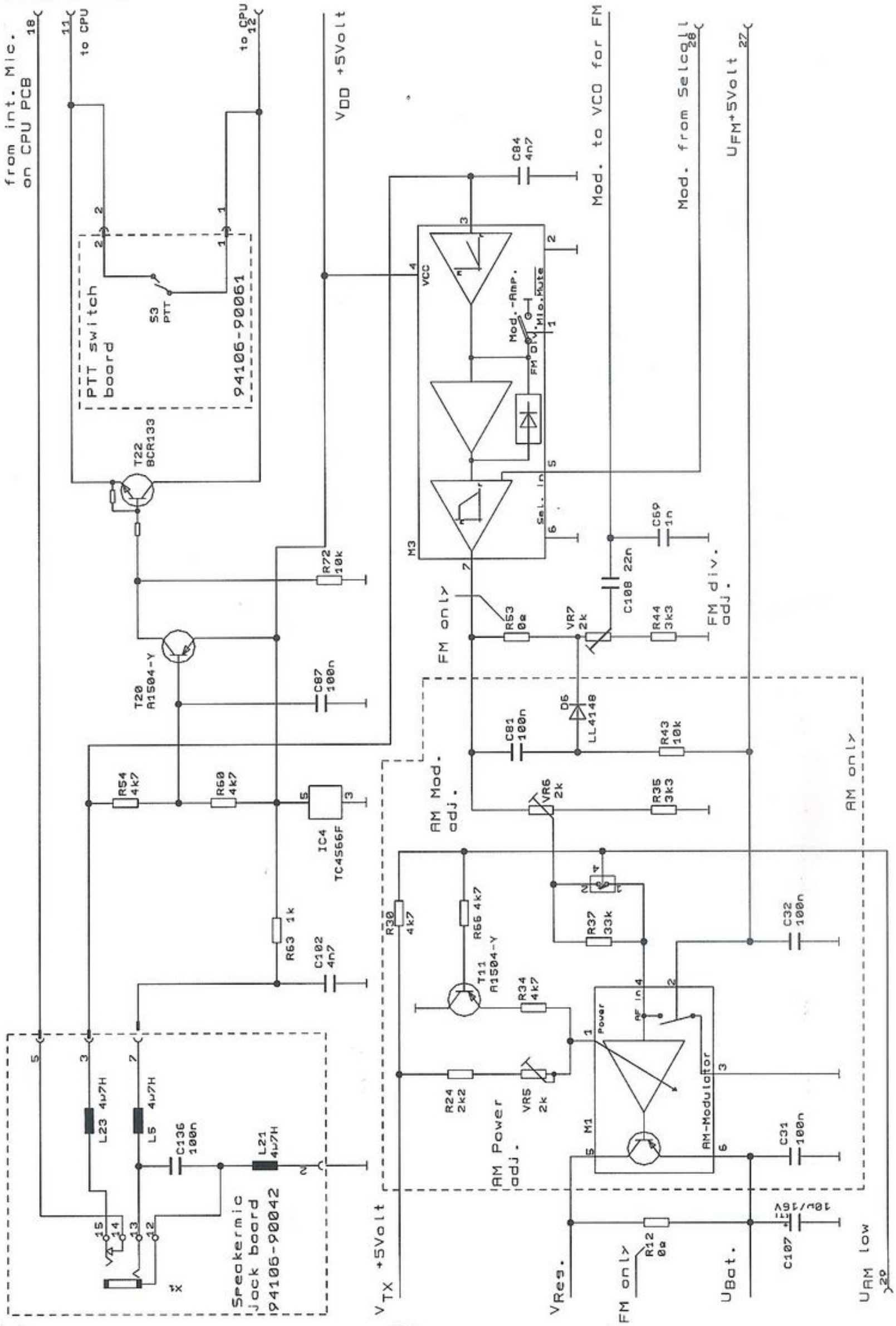
a part of PCB 94106-90012

part no	value/type	name	case/type	pos	remarks
9200400101	100R	Res Chip 1/16W 5%	0603	R11	
9200400102	1k	Res Chip 1/16W 5%	0603	R13, R26	
9200400103	10k	Res Chip 1/16W 5%	0603	R20	
9200400104	100k	Res Chip 1/16W 5%	0603	R25	
9200400109	1R	Res Chip 1/16W 5%	0603	R3	
9200400153	15k	Res Chip 1/16W 5%	0603	R17	
9200400273	27k	Res Chip 1/16W 5%	0603	R27	
9200400332	3k3	Res Chip 1/16W 5%	0603	R4, R6	
9200400390	39R	Res Chip 1/16W 5%	0603	R1	
9200400392	3k9	Res Chip 1/16W 5%	0603	R8	
9200400470	47R	Res Chip 1/16W 5%	0603	R5	
9200400472	4k7	Res Chip 1/16W 5%	0603	R15	
9200400683	68k	Res Chip 1/16W 5%	0603	R28	
9200500330	33R	Res Chip 1/4W 5%	1206	R2	only AS
9203300223	22n	Cap Chip XR7	0805	C11, C25	
9203300271	270p	Cap Chip COG	0805	C8,C24	
9203300680	68p	Cap Chip COG	0805	C5	
9203300820	82p	Cap Chip COG	0805	C6	
9203400101	100p	Cap Chip COG	0603	C33	
9203400102	1n	Cap Chip XR7	0603	C50,C66	
9203400189	1p8	Cap Chip COG	0603	C58	
9203400221	220p	Cap Chip COG	0603	C7	
9203400223	22n	Cap Chip XR7	0603	C15,C16,C34, C39, C41,C55	
9203400270	27p	Cap Chip COG	0603	C60	
9203400330	33p	Cap Chip COG	0603	C57	
9203400391	390p	Cap Chip X7R	0603	C17	
9203400470	47p	Cap Chip COG	0603	C40	
9203400560	56p	Cap Chip COG	0603	C56	only AS
9203400560	56p	Cap Chip COG	0603	C109	
9203400680	68p	Cap Chip COG	0603	C23	
9203400820	82p	Cap Chip COG	0603	C9, C61	
9208001224	0µ22H	SMD miniature choke coil	SIMID1	L8	
9208001474	0µ47H	SMD miniature choke coil	SIMID1	L4, L9	
9208001565	5µ6H	SMD miniature choke coil	SIMID1	L11	only FS
9208203009	0µ15H	Air Coil 9T í 3mm	RM3,0	L5	
9208204510	0µ4H	Air Coil 10,5 d=4,5	L-D45	L2	
9208449194	210SNS-194N	5 mm IFT 35 MHz	SP50	L13	
9230530019	BFQ19	NPN RF Power Transistor	SOT89	T1	
9231602078	C2078-E	NPN CB mid. Power Transistor	TO220	T2	
9231603859	C3859	NPN Switch Transistor with R	SOT23	T7	
9231603880	C3880-Y	NPN RF Transistor	SOT23	T3, T5, T9	BFS17
9235550229	1SV229	Voltage Variable Cap.Diode	SOD323	D4, D5	BB132

TX modulator; PTT switch (V2.1)

shematic diagram

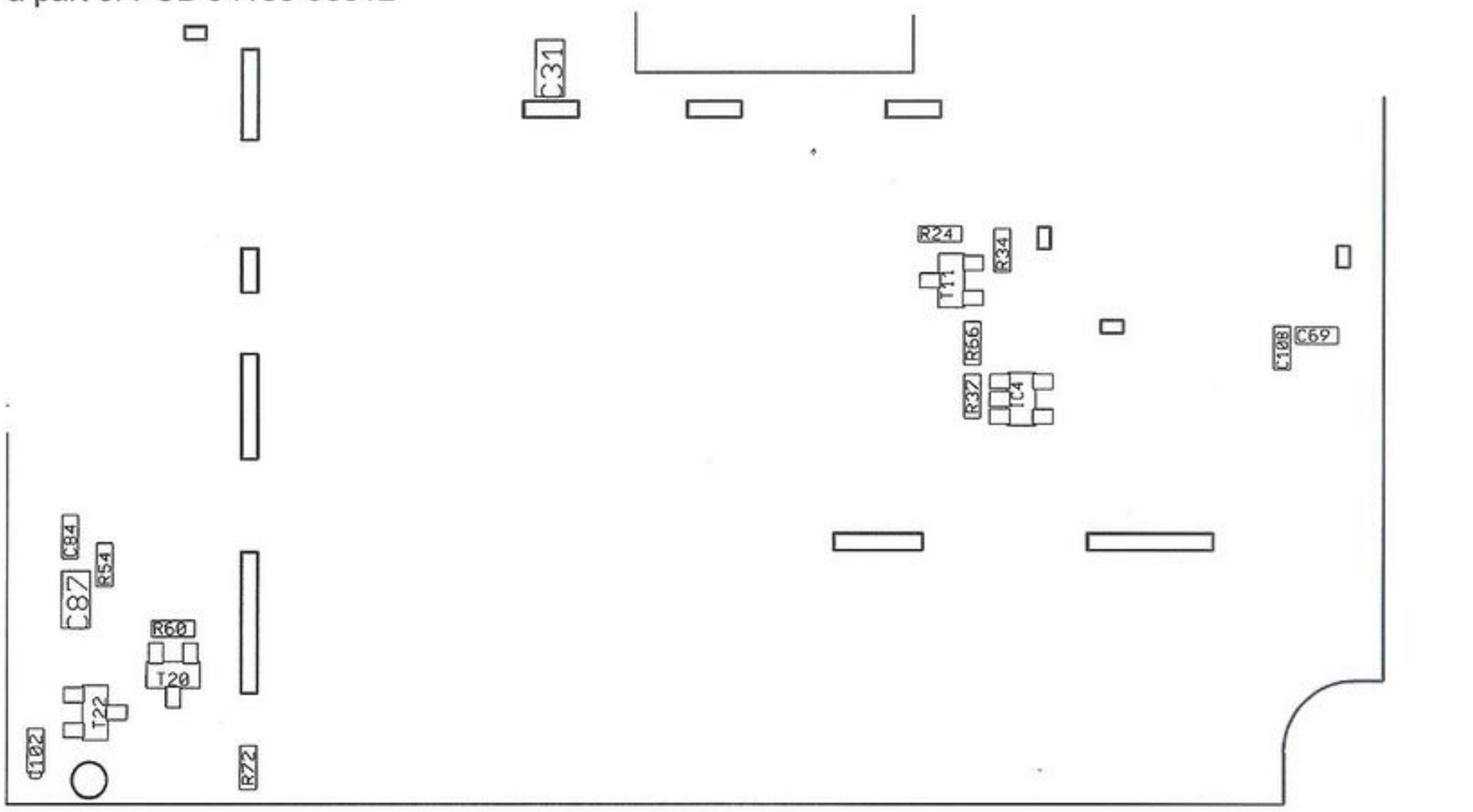
a part of PCB 94106-90012



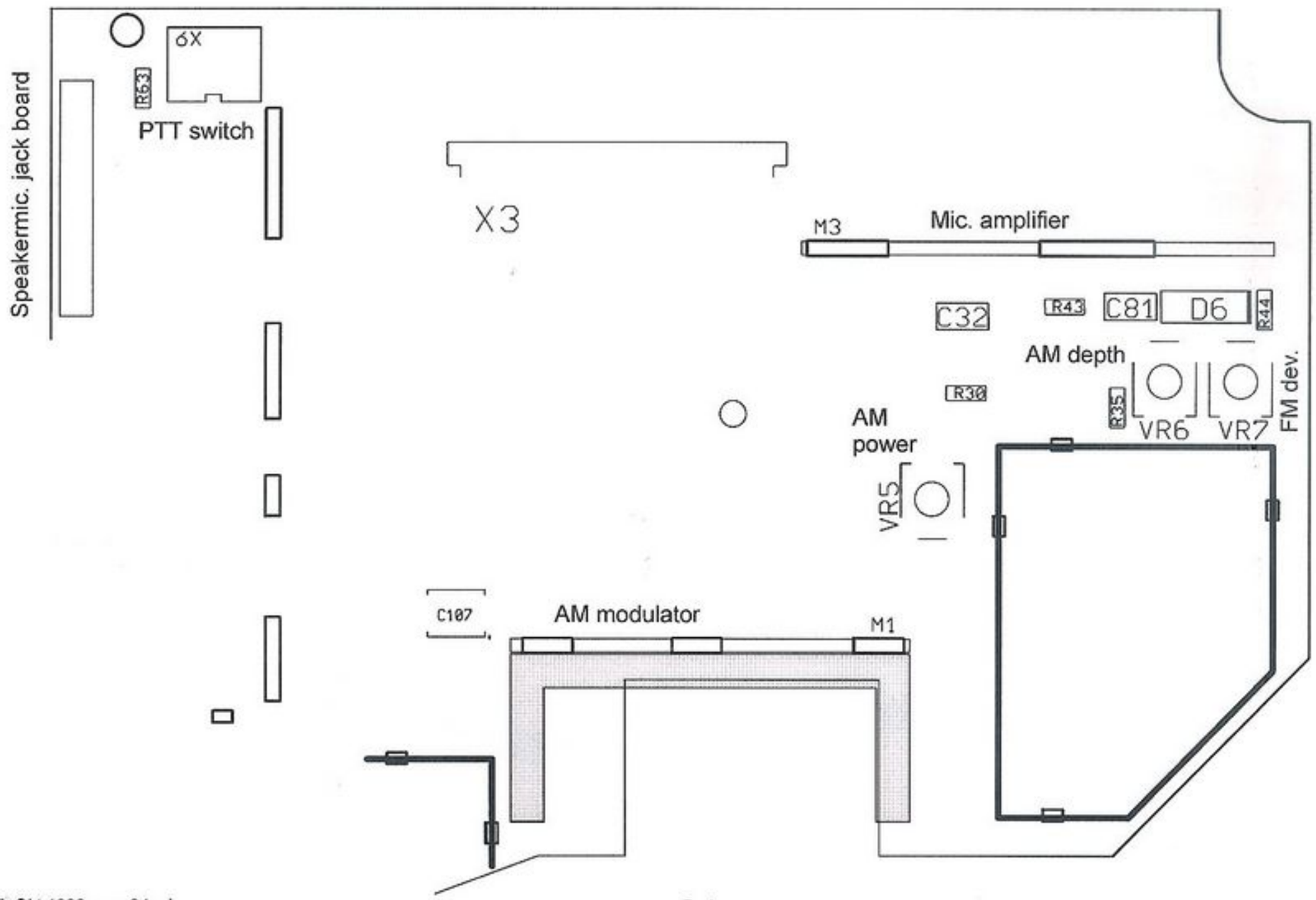
TX modulator; PTT switch (V2.1)

component layout solder side

a part of PCB 94106-90012



component layout component side



TX modulator; PTT switch (V2.1)

partslist

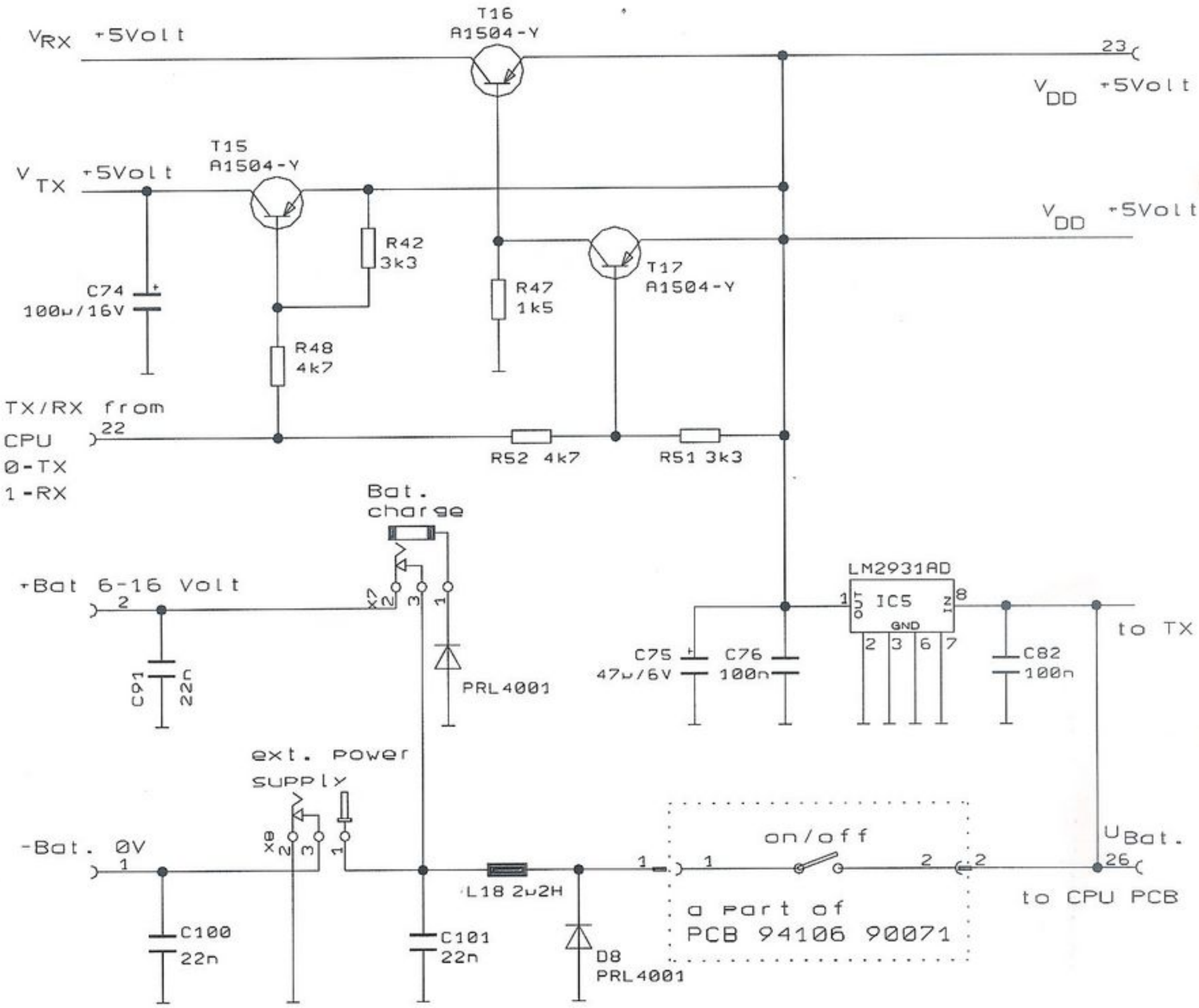
a part of PCB 94106-90012

parts no	value/type	name	case/type	pos	remarks
9200100000	0R	Res Chip 1/16W 5%	0603	R12, R53	only FS
9200400102	1k	Res Chip 1/16W 5%	0603	R63	
9200400103	10k	Res Chip 1/16W 5%	0603	R43	only AS
9200400103	10k	Res Chip 1/16W 5%	0603	R72	
9200400222	2k2	Res Chip 1/16W 5%	0603	R24	only AS
9200400332	3k3	Res Chip 1/16W 5%	0603	R35	only AS
9200400332	3k3	Res Chip 1/16W 5%	0603	R44	
9200400333	33k	Res Chip 1/16W 5%	0603	R37	only AS
9200400472	4k7	Res Chip 1/16W 5%	0603	R30, R34, R66	only AS
9200400472	4k7	Res Chip 1/16W 5%	0603	R54,R60	
9201003202	2k	Cermet Trimmer	C4214	VR5	only AS
9201004202	2k	Cermet Trimmer	C4314	VR6	only AS
9201004202	2k	Cermet Trimmer	C4314	VR7	
9203300104	100n	Cap Chip XR7	0805	C31, C32, C81	only AS
9203300104	100n	Cap Chip XR7	0805	C87	
9203400102	1n	Cap Chip XR7	0603	C69	
9203400223	22n	Cap Chip XR7	0603	C108	
9203400472	4n7	Cap Chip XR7	0603	C84, C102	
9205300106	10µ/16V	Tan Chip Cap	3528	C107	
9230001504	A1504-Y	PNP Switch Transistor	SOT23	T11	only AS
9230001504	A1504-Y	PNP Switch Transistor	SOT23	T20	BC858
9230300133	BCR133	NPN switch Transistor with 2R	SOT23	T22	
9232404148	LL4148	Si Switching Diode SOD80	SOD80	D6	only AS
9260304066	TC4S66F	singel bilateral switches	SOT235	IC4	only AS
9282040023	GIL-S-2P-S2T2-EF	PCB mount 2pin 2mm connector	2P-S2T2	X9	
9290010620	Mod.-Amp.	Mic. amplifier	MOD-106	M3	
9290010630	AM-Modulator	AM modulator module	TXAM-106	M1	only AS

Power supply; regulator and RX/TX switch (V2.01)

shematic diagram

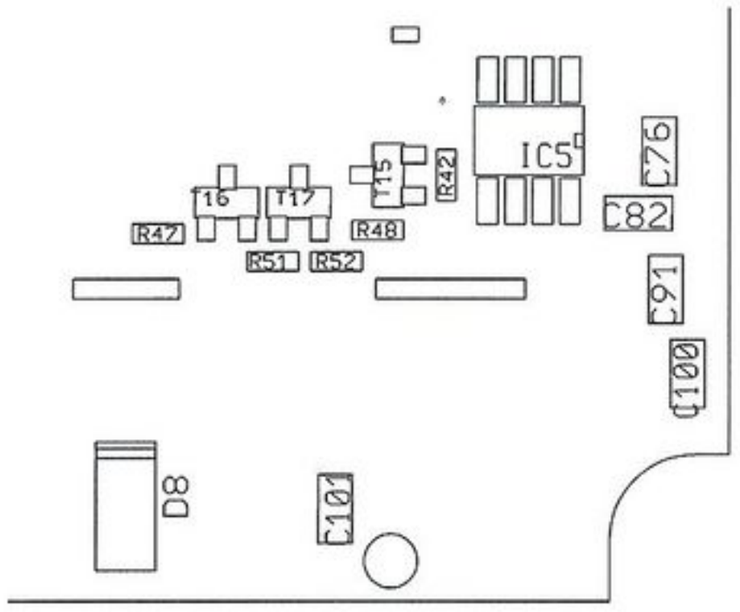
a part of PCB 94106-90012



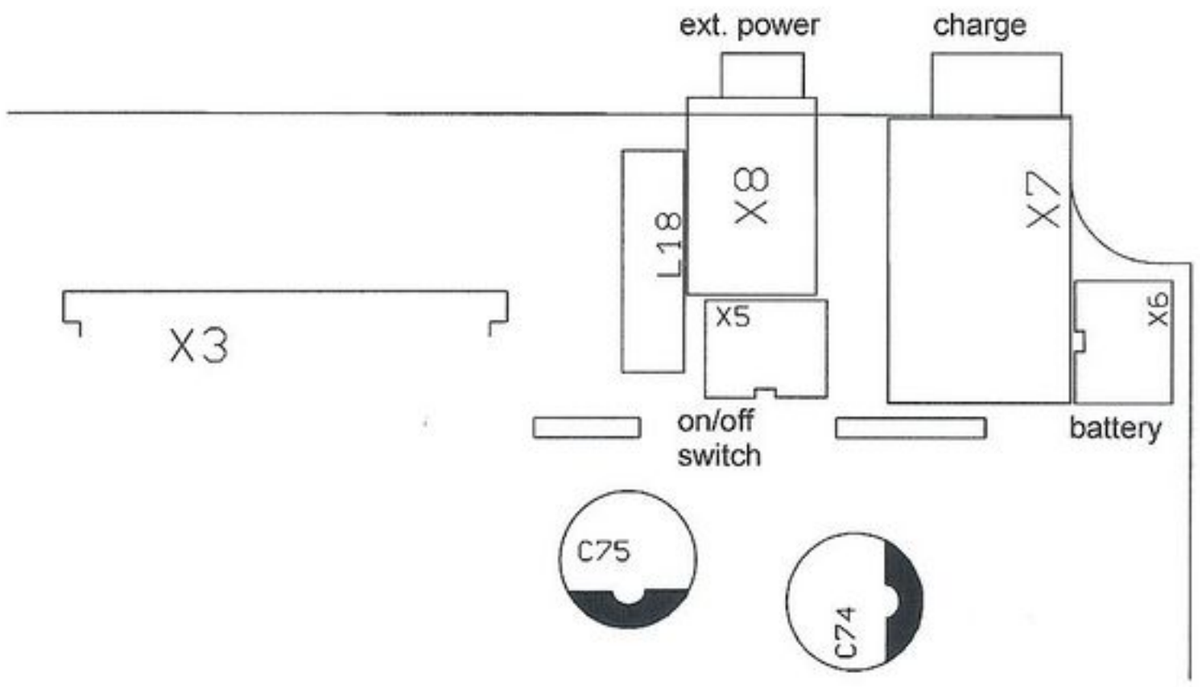
Power supply; regulator and RX/TX switch (V2.01)

component layout solder side

a part of PCB 94106-90012



component layout component side



Power supply; regulator and RX/TX switch (V2.01)

partslist

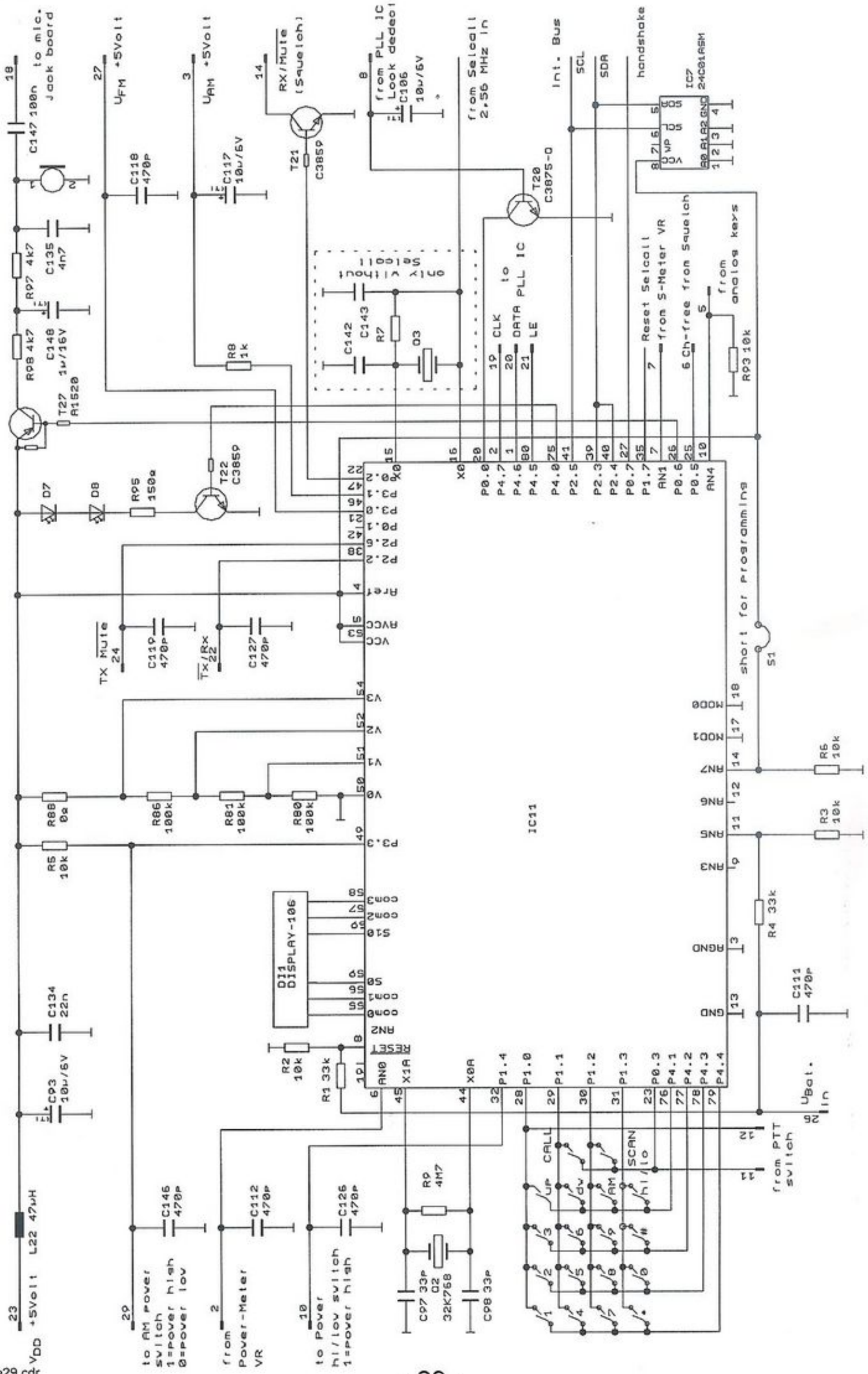
a part of PCB 94106-90012

part no	value/type	name	case/type	pos	remarks
9200400152	1k5	Res Chip 1/16W 5%	0603	R47	
9200400332	3k3	Res Chip 1/16W 5%	0603	R42, R51	
9200400472	4k7	Res Chip 1/16W 5%	0603	R48, R52	
9203300104	100n	Cap Chip XR7	0805	C76,C82	
9203300223	22n	Cap Chip XR7	0805	C91,C100, C101	
9206200107	100µ/16V	Elec Cap SMS	ELK6,5	C74	
9206200476	47µ/6V	Elec Cap SMS	ELK6,5	C75	
9208008225	2µ2H	RF Choke high current	RC0910	L18	
9230001504	A1504-Y	PNP Switch Transistor	SOT23	T15, T16, T17	
9233724001	PRL4001	Si rectifier diode	SOD87	D8	
9245202931	LM2931AD	AD Low Drop 5V Regulator	SO8	IC5	
9282002030	HSJ0836-01-310	Miniatur jack 3,5 DIA	HSJ0836	X7	
9282040023	GIL-S-2P-S2T2-EF	PCB mount 2pin 2mm connector	2P-S2T2	X5,X6	
9282066020	HEC2712-01-620	DC power jack (for E Mate Plug)	HEC2712	X8	

Main CPU; display; keyboard (V2.01)

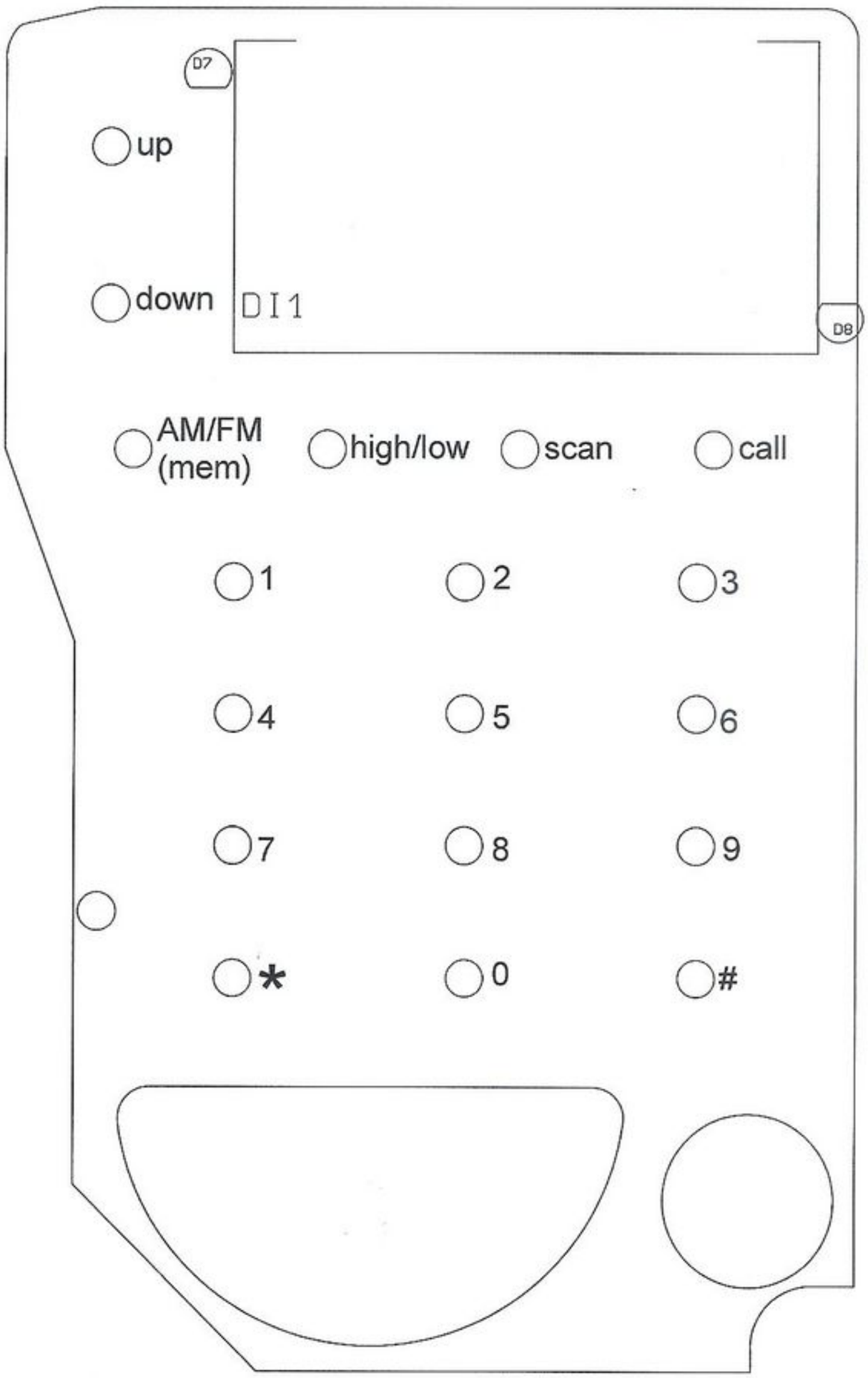
shematic diagram

a part of PCB 94106-90022



Main CPU; display; keyboard (V2.01)
component layout component side

a part of PCB 94106-90022



Main CPU; display; keyboard (V2.01)

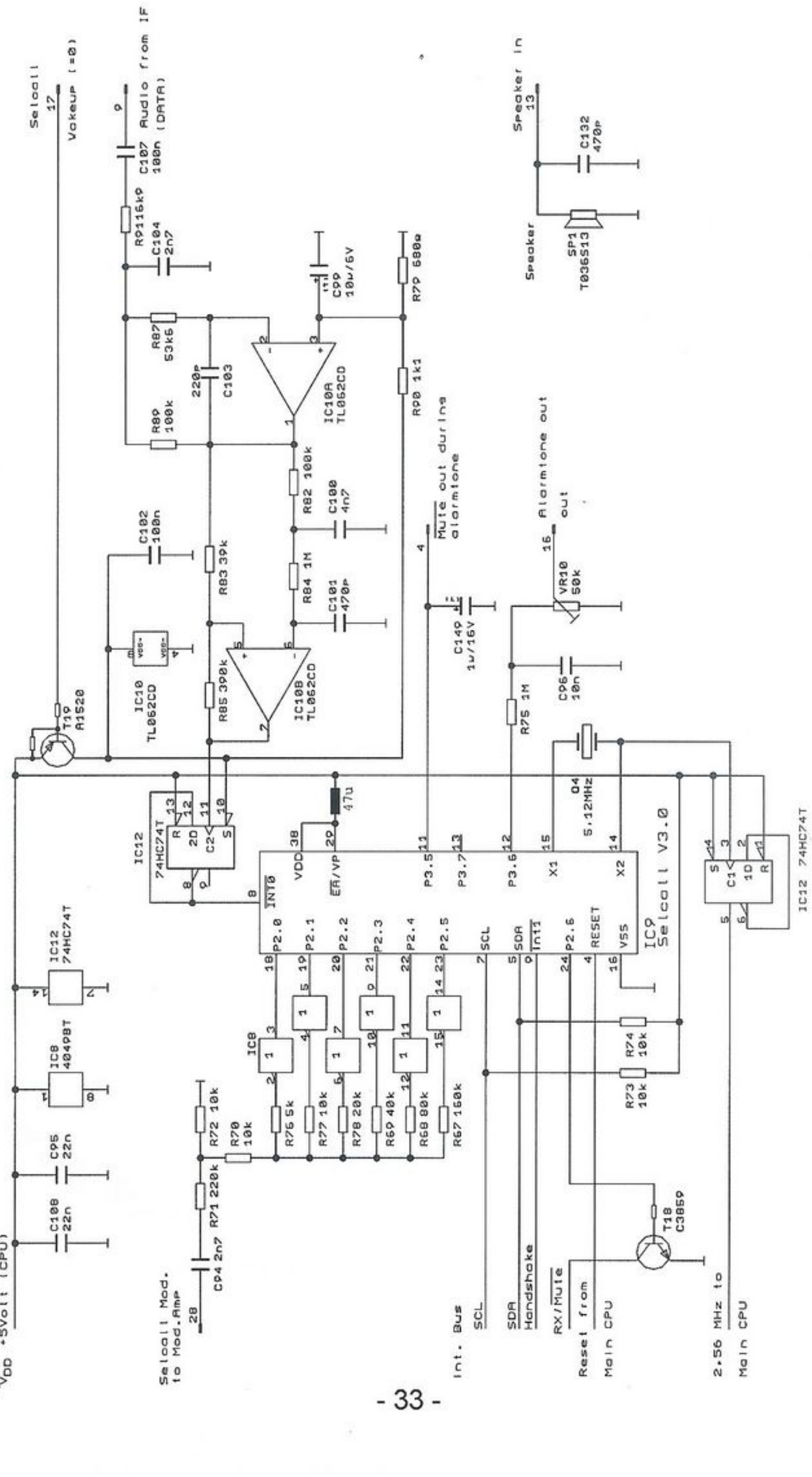
partslist

a part of PCB 94106-90022

part no	value/type	name	case/type	pos	remarks
9200400000	0R	Res Chip 1/16W 5%	0603	R88	
9200400102	1k	Res Chip 1/16W 5%	0603	R8	
9200400103	10k	Res Chip 1/16W 5%	0603	R2, R3, R5, R6; R93	
9200400104	100k	Res Chip 1/16W 5%	0603	R7, R80, R81, R86	
9200400151	150R	Res Chip 1/16W 5%	0603	R	
9200400333	33k	Res Chip 1/16W 5%	0603	R1, R4	
9200400472	4k7	Res Chip 1/16W 5%	0603	R97, R98	
9200400475	4M7	Res Chip 1/16W 5%	0603	R9	
9203300104	100n	Cap Chip XR7	0603	C147	
9203400330	33p	Cap Chip COG	0603	C97, R98	
9203400471	470p	Cap Chip X7R	0603	C111, C112, C118, C119, C127, C146	
9203400472	4n7	Cap Chip XR7	0603	C135	
9203500223	22n	Cap Chip XR7	1206	C134	
9205300105	1µ/16V	Tan Chip Cap	3216	C148	
9205900106	10µ/6V	Tan Chip Cap	3528	C93, C106, C117	
9208011476	47µH	SMD choke coil	SIMID2	L22	
9230001520	A1520	PNP Switch Transistor with R1=10K+R2=20k	SOT23	T27	
9231603859	C3859	NPN Switch Transistor with R=10K	SOT23	T21, T22	C111S or BCR166
9231603875	C3875-Q	NPN AF Transistor	SOT23	T20	BC848
9236200100	amber	Led d = 3mm	LED3	D7, D8	
9236910601	DISPLAY-106	LCD 940926-EC-01	D-106	Di1	
9279102401	24C01ASM	1K Serial EEPROM	SO008	IC7	
9279802062	micro V1.0	Low power singel chip microcontroller	SQFP80	IC11	
9280400032	32K768	Crystal	AT26-L	Q2	
9282051300	FC100-50A27-30	Flexible printed circuit connector 30 pin	SFV-30	X15	

Selcall encoder / decoder (V2.1)
shematic diagram

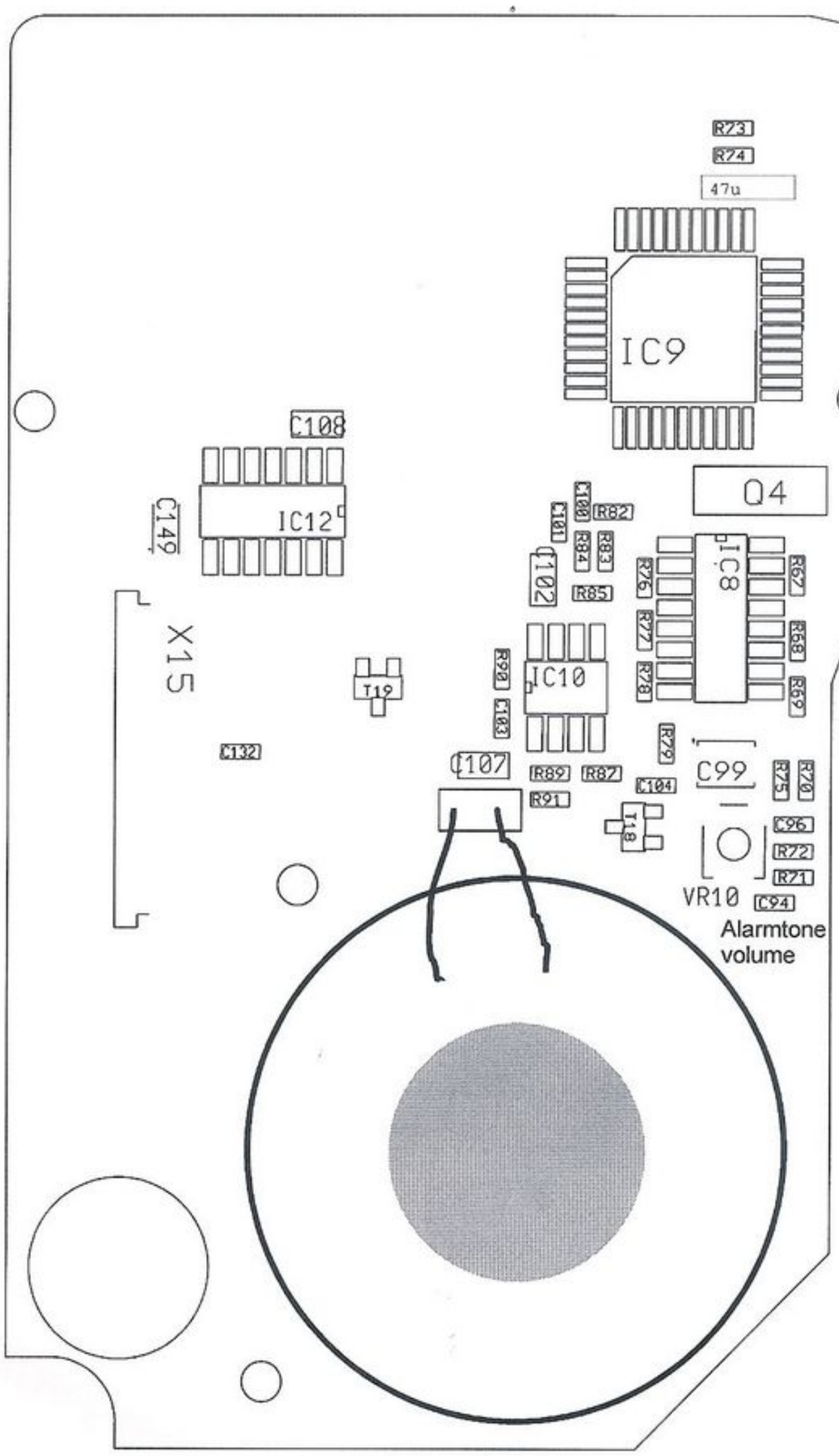
a part of PCB 94106-90022



Selcall (V2.1)

component layout solder side

a part of PCB 94106-90022



Selcall (V2.1)

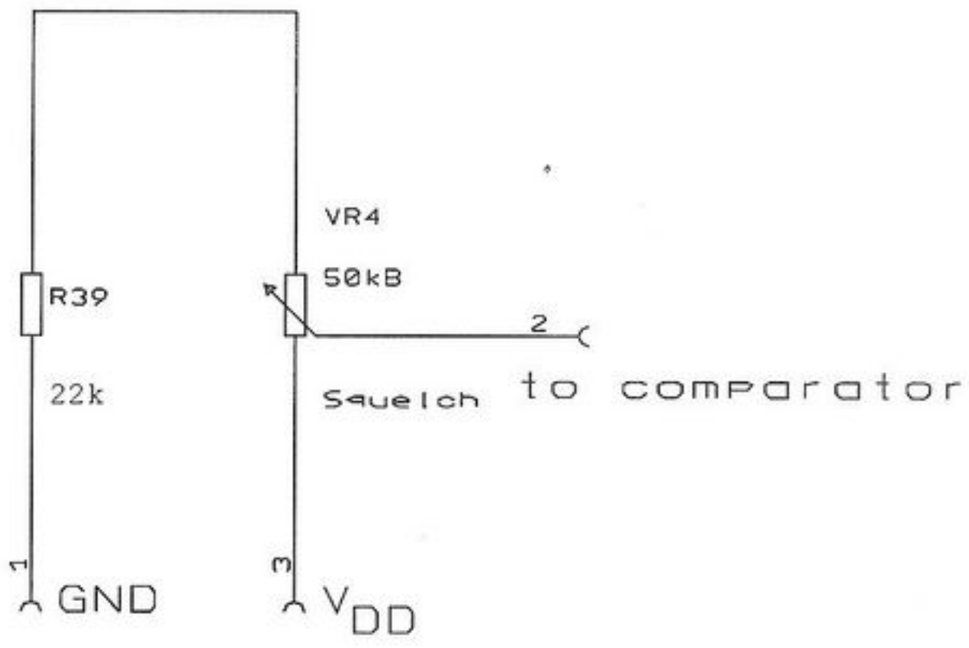
partslist

a part of PCB 94106-90022

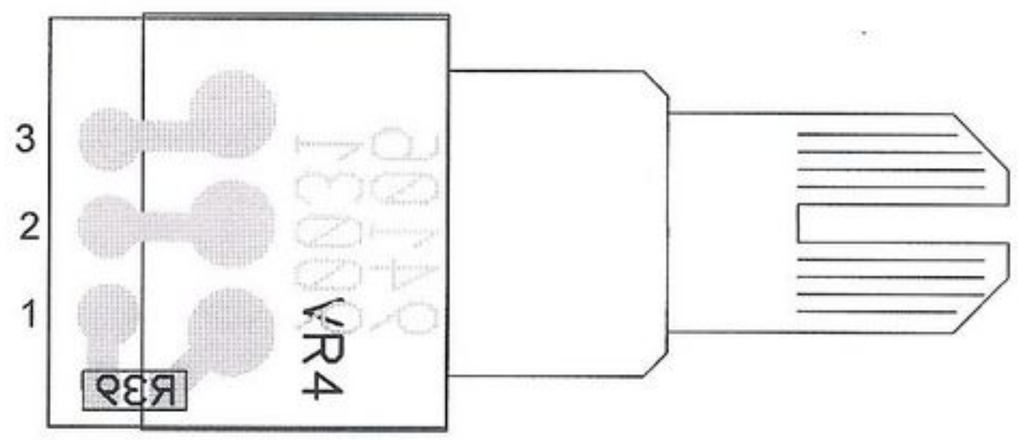
part no	value/type	name	case/type	pos	remarks
9200400103	10k	Res Chip 1/16W 5%	0603	R70, R72, R73, R74, R77	
9200400104	100k	Res Chip 1/16W 5%	0603	R82, R89	
9200400105	1M	Res Chip 1/16W 5%	0603	R75, R84	
9200400112	1k1	Res Chip 1/16W 1%	0603	R90	
9200400164	160k	Res Chip 1/16W 1%	0603	R67	
9200400203	20k	Res Chip 1/16W 5%	0603	R78	
9200400224	220k	Res Chip 1/16W 5%	0603	R71	
9200400393	39k	Res Chip 1/16W 5%	0603	R83	
9200400394	390k	Res Chip 1/16W 5%	0603	R85	
9200400403	40k	Res Chip 1/16W 1%	0603	R69	
9200400502	5k	Res Chip 1/16W 1%	0603	R76	
9200400681	680R	Res Chip 1/16W 5%	0603	R79	
9200400803	80k	Res Chip 1/16W 1%	0603	R68	
9200401693	16k9	Res Chip 1/16W 1%	0603	R91	
9200405363	53k6	Res Chip 1/16W 1%	0603	R87	
9201004503	50k	Cermet Trimmer C4314	C4314	VR10	
9203300104	100n	Cap Chip XR7 0805	0805	C102, C107	
9203300223	22n	Cap Chip XR7 0805	0805	C95, C108	
9203400103	10n	Cap Chip XR7 0603	0603	C96	
9203400221	220p	Cap Chip COG 0603	0603	C103	
9203400272	2n7	Cap Chip XR7 0603	0603	C94, C104	
9203400471	470p	Cap Chip X7R 0603	0603	C101, C132	
9203400472	4n7	Cap Chip XR7 0603	0603	C100	
9205300105	1µ/16V	Tan Chip Cap 3216	3216	C149	
9205900106	10µ/6V	Tan Chip Cap 3528	3528	C99	
9230001520	A1520	PNP Switch Transistor with R1=10K+R2=20k	SOT23	T19	
9231603859	C3859	NPN Switch Transistor with R=10K	SOT23	T18	C111S or BCR166
9258100062	TL062CD	Dual Low Power Operational Amplifier	SO8	IC10	
9260104049	4049BT	hex inverting buffer	SO16	IC8	
9262107474	74HC74T	dual D-type flip-flop	SO14	IC12	
9279800062	Selcall V3.0	Low power singel chip microcontroller	QFP44	IC9	
9280405120	5,12MHz	Crystal AT38-L	AT38-L	Q4	
9285110601	T036S13	Speaker 8R Dia 36mm high 4,6mm		SP1	
9410690020	87x55mm	CPU PCB FR4 0,8mm			

Squelch-volume-controle 90031 (V2.0)

shematic diagram



PCB layout

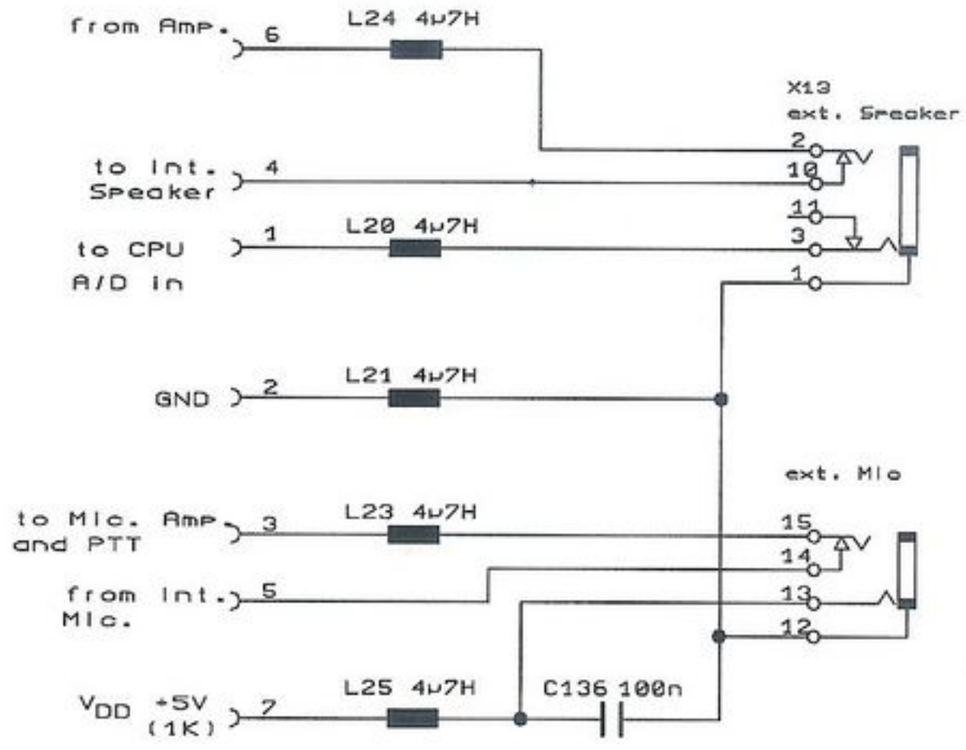


partlist

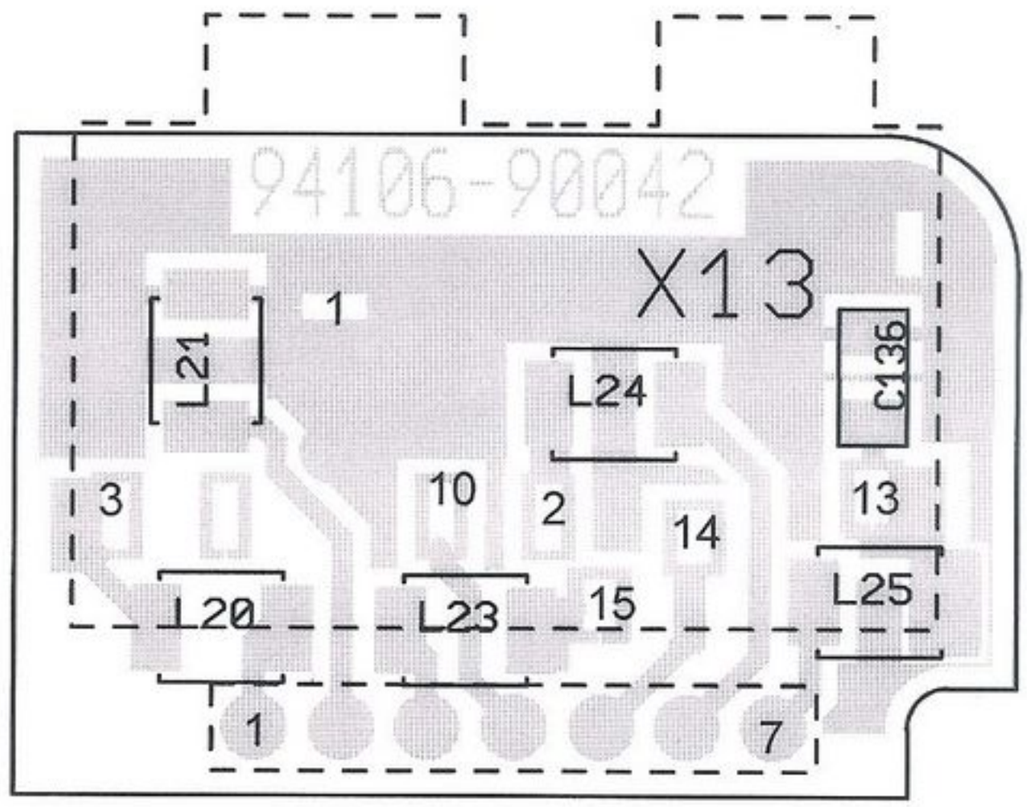
part no	value/type	name	case/type	pos	remarks
9202004503	50kB	Rotary potentiometer	RK0971110	VR4	
9200400223	22k	Res Chip 1/16W 5%	0603	R39	
9282040034	51004-0300	PCB 3pin 2mm connector (male)		X1	length of wire 50mm
9410690031		PCB FR4 0,8mm	9x9,2mm		

Speakerphone jack board 90042 (V2.1)

shematic diagram



PCB layout



partlist

part no	value/type	name	case/type	pos	remarks
9208011475	4µ7	Choke coil SMD	1206	L20,L21,L23, L24,L25	
9203500104	100nF	Chip cap XR7 SMD	1206	C136	
9282036060	HSJ1468-01-010	Miniatur jack 2,5 and 3,5 DIA		X13	Hosiden
9410690042		PCB FR4 0,8mm	23x15mm		

Battery contact board 90051 (V1.0)

shematic diagram

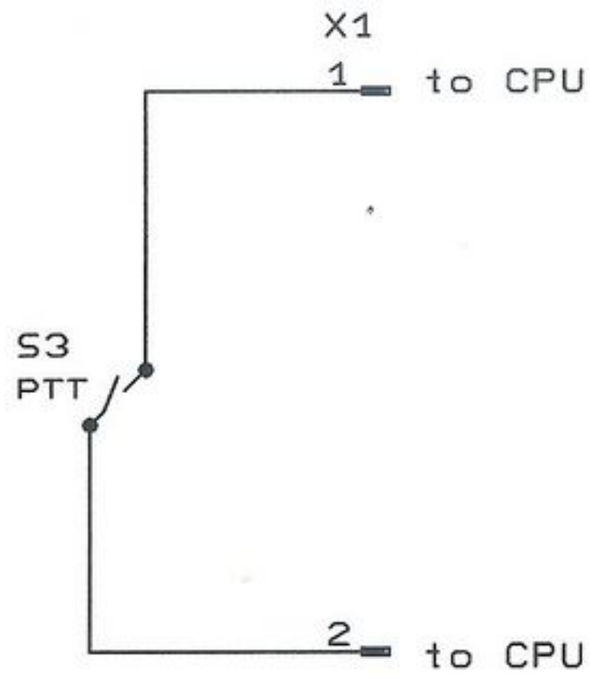
PCB layout

partslist

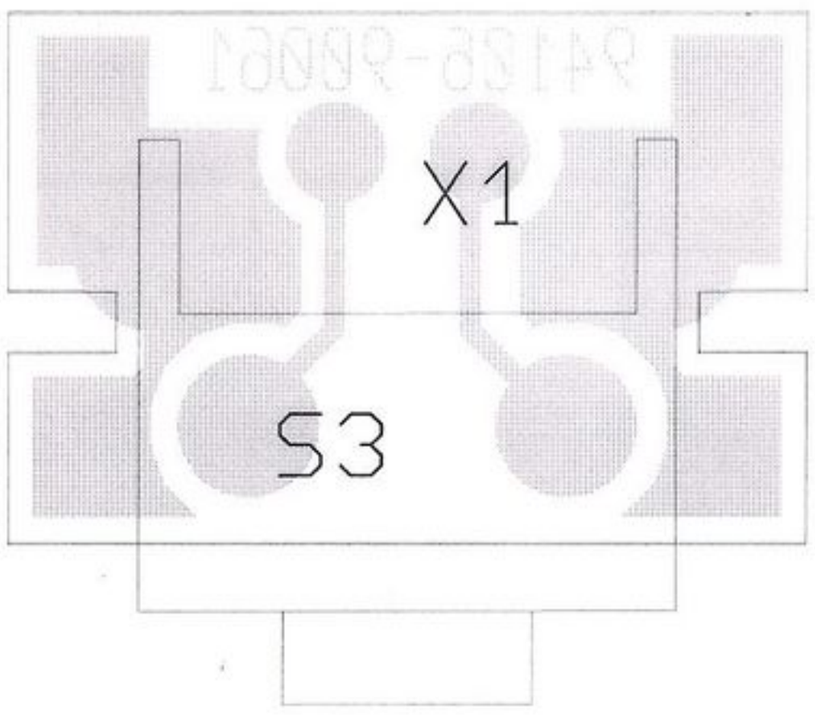
part no	value/type	name	case/type	pos	remarks
9282040024	51004-0200	PCB 2pin 2mm connector (male)		X1	length of wire 75 mm
9410690051		PCB FR4 0,8mm	11x7,2mm		

PTT switch board 90061 (V2.0)

shematic diagram



PCB layout

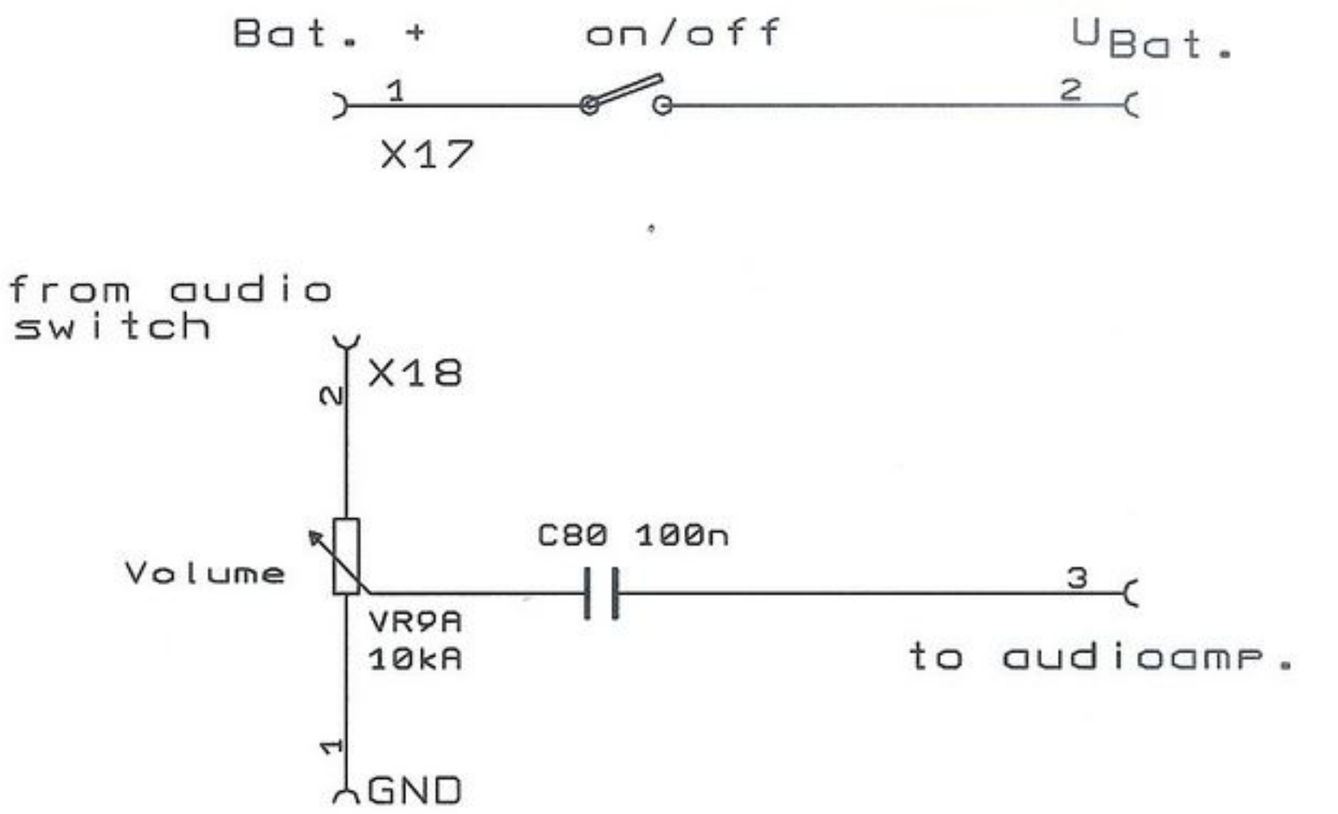


partlist

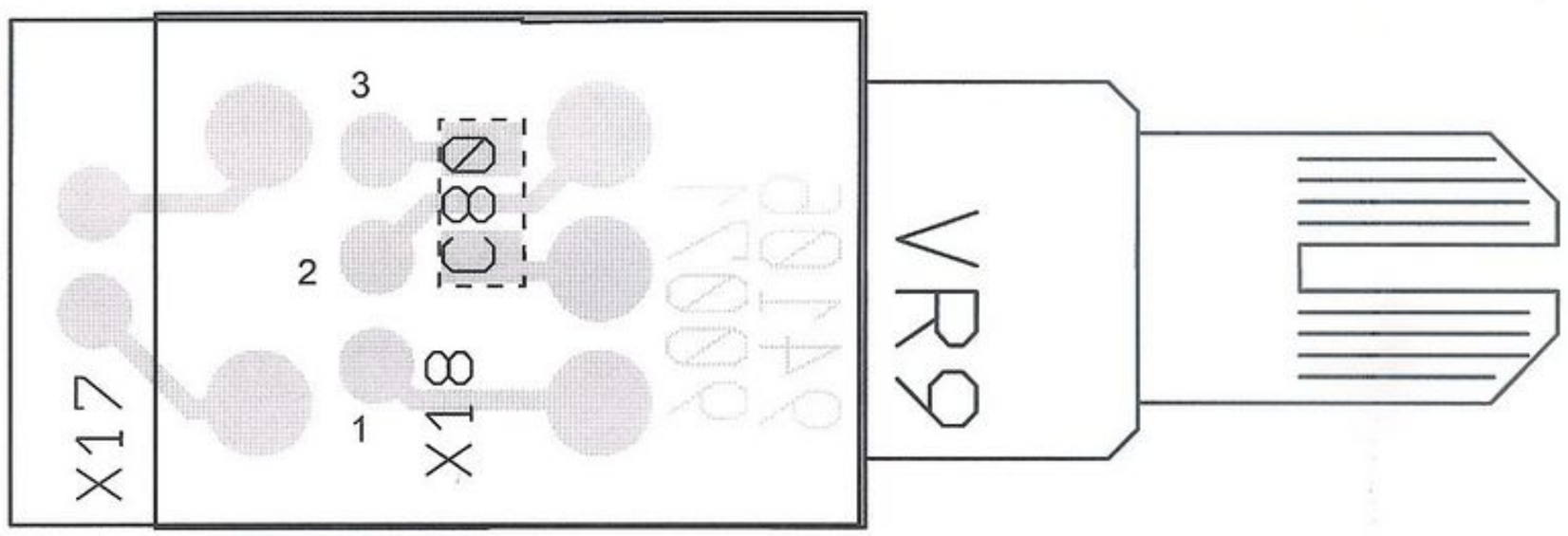
part no	value/type	name	case/type	pos	remarks
9283801001	SKHHLP	Vertical tact switch		S3	
9282040024	51004-0200	PCB 2pin 2mm connector (male)		X1	length of wire 75 mm
9410690061		PCB FR4 0,8mm	11x7,2mm		

Power on/off, volume control board 90071 (V1.0)

shematic diagram



PCB layout

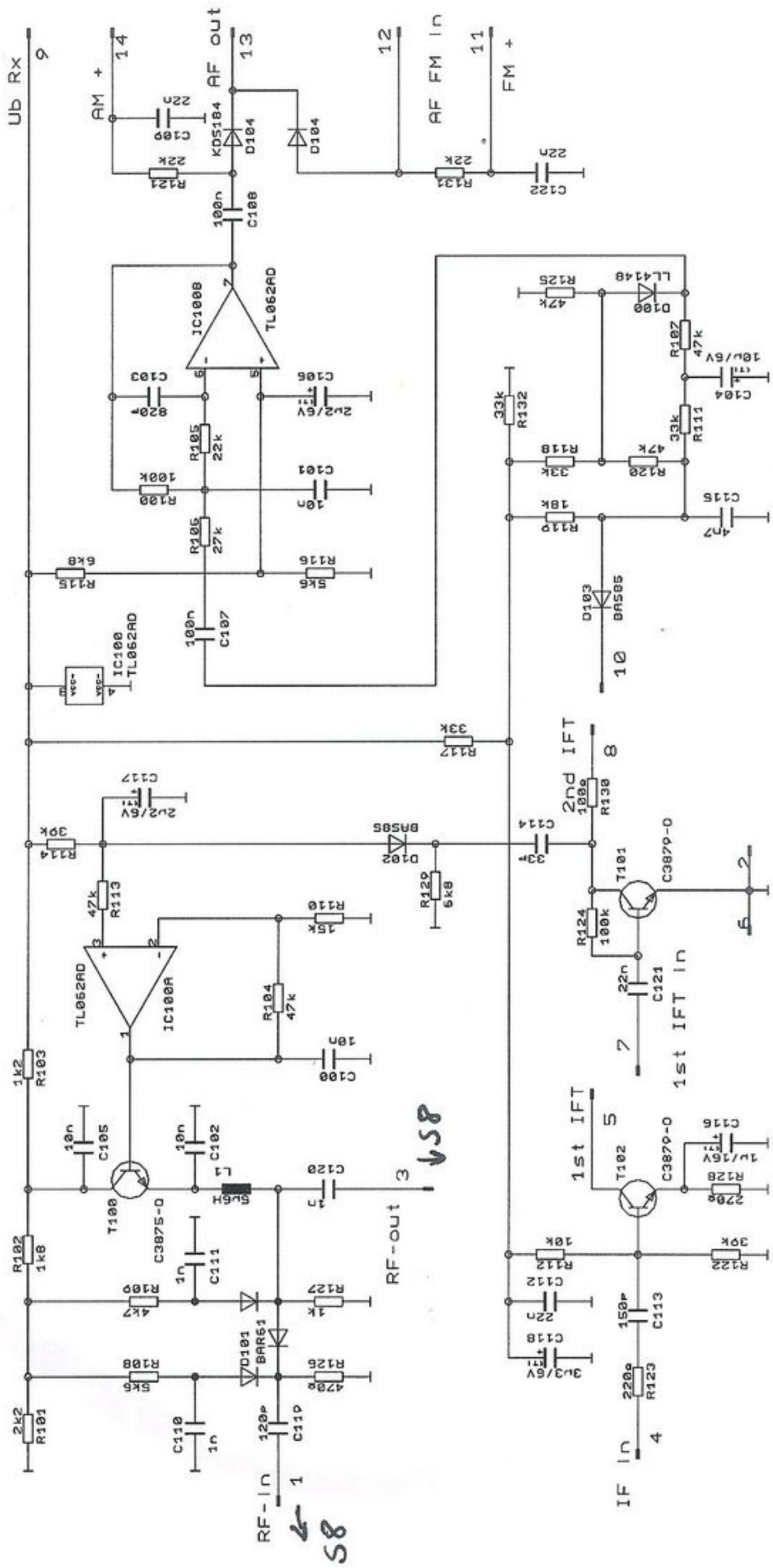


partlist

part no	value/type	name	case/type	pos	remarks
9202013103	10kA	Rotary potentiometer with switch	RK0971111	S3	
9203500104	100nF	Chip cap. XR7	1206	C80	
9282040034	51004-0300	PCB 3pin 2mm connector (male)		X18	length of wire 50 mm
9282040024	51004-0200	PCB 2pin 2mm connector (male)		X17	length of wire 75 mm
9410690071		PCB FR4 0,8mm	15,7x9,2mm		

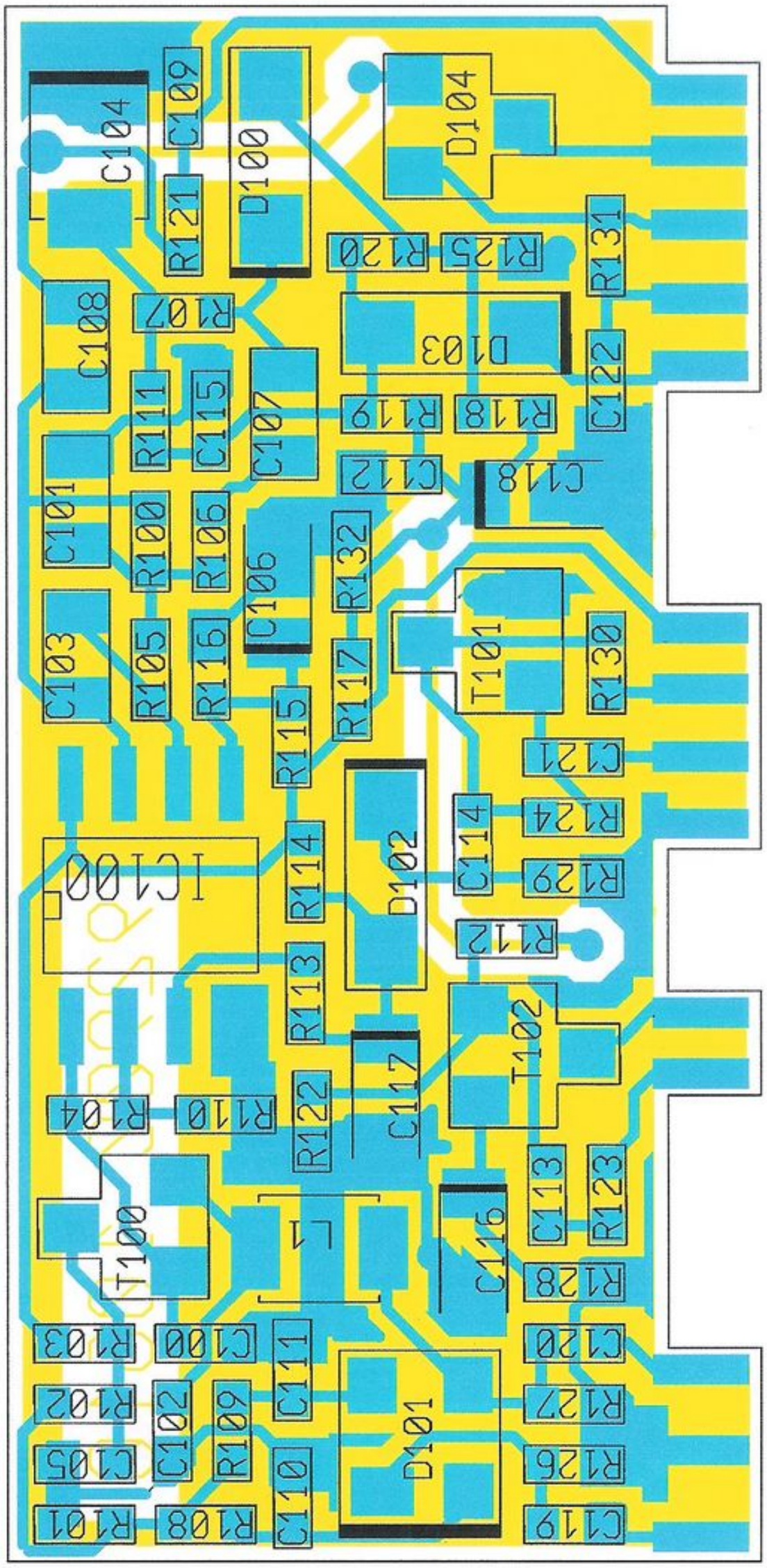
AM receiver; module 106-10 (V2.0)

shematic diagram



AM receiver; module 106-10 (V2.0)

component layout



AM receiver; module 106-10 (V2.0)

partslist

part no	value/type	name	case/type	pos	remarks
9200400101	100R	Res Chip 1/16W 5%	0603	R130	
9200400102	1k	Res Chip 1/16W 5%	0603	R127	
9200400103	10k	Res Chip 1/16W 5%	0603	R112	
9200400104	100k	Res Chip 1/16W 5%	0603	R100, R124	
9200400122	1k2	Res Chip 1/16W 5%	0603	R103	
9200400153	15k	Res Chip 1/16W 5%	0603	R110	
9200400182	1k8	Res Chip 1/16W 5%	0603	R102	
9200400183	18k	Res Chip 1/16W 5%	0603	R119	
9200400221	220R	Res Chip 1/16W 5%	0603	R123	
9200400222	2k2	Res Chip 1/16W 5%	0603	R101	
9200400223	22k	Res Chip 1/16W 5%	0603	R105, R121, R131	
9200400271	270R	Res Chip 1/16W 5%	0603	R128	
9200400273	27k	Res Chip 1/16W 5%	0603	R106	
9200400333	33k	Res Chip 1/16W 5%	0603	R111, R117, R118, R132	
9200400393	39k	Res Chip 1/16W 5%	0603	R114, R122	
9200400471	470R	Res Chip 1/16W 5%	0603	R126	
9200400472	4k7	Res Chip 1/16W 5%	0603	R109	
9200400473	47k	Res Chip 1/16W 5%	0603	R104, R107, R113, R120, R125	
9200400562	5k6	Res Chip 1/16W 5%	0603	R108, R116	
9200400682	6k8	Res Chip 1/16W 5%	0603	R115, R129	
9203300103	10n	Cap Chip XR7	0805	C101	
9203300104	100n	Cap Chip XR7	0805	C107, C108	
9203300821	820p	Cap Chip XR7	0805	C103	
9203400102	1n	Cap Chip XR7	0603	C110, C111, C1120	
9203400103	10n	Cap Chip XR7	0603	C100, C102, C105	
9203400121	120p	Cap Chip COG	0603	C119	
9203400151	150p	Cap Chip COG	0603	C113	
9203400223	22n	Cap Chip XR7	0603	C109, C112, C121, C122	
9203400330	33p	Cap Chip COG	0603	C114	
9203400472	4n7	Cap Chip XR7	0603	C115	

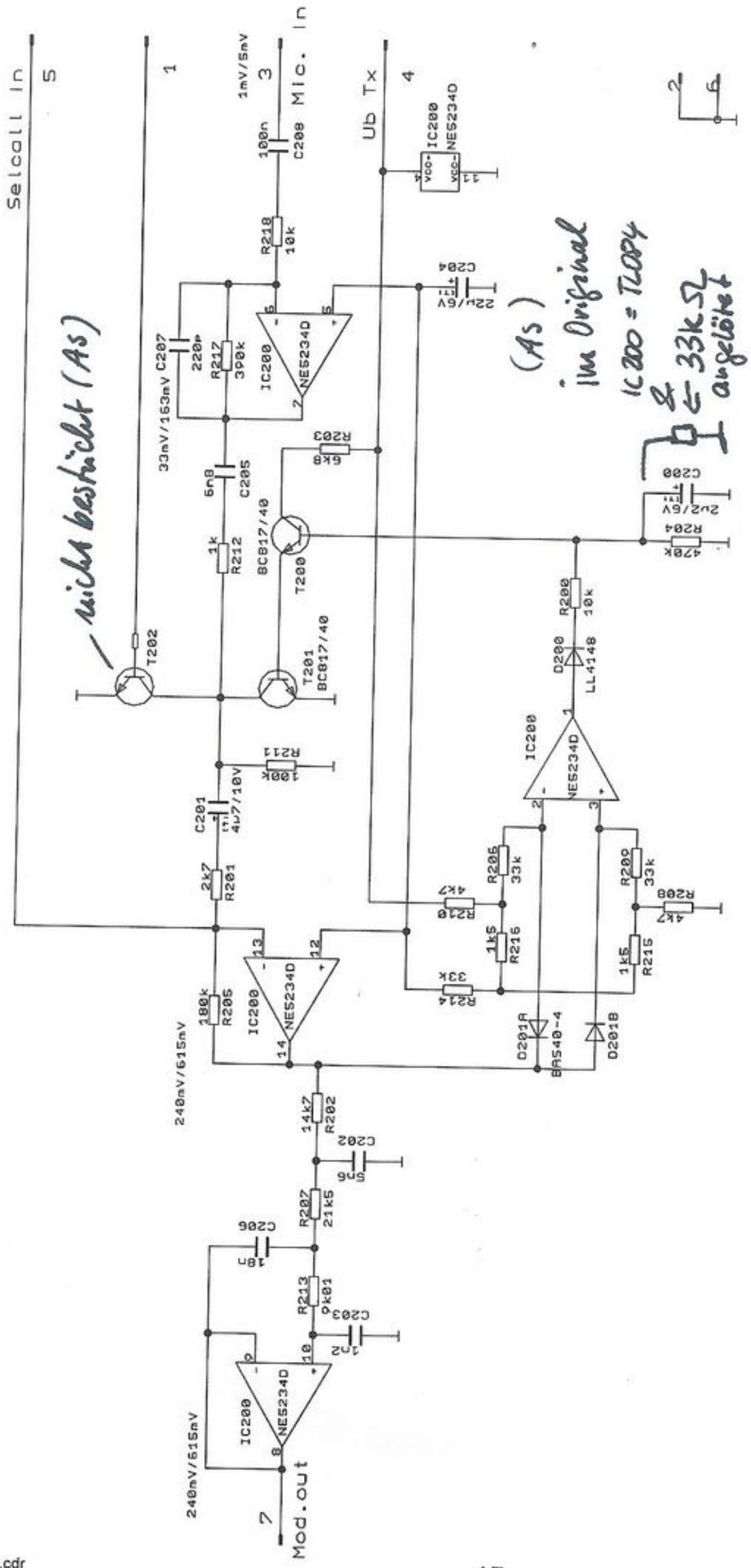
AM receiver; module 106-10 (V2.0)

partslist (countinue)

part no	value/type	name	case/type	pos	remarks
9205300105	1µ/16V	Tan Chip Cap	3216	C116	
9205900106	10µ/6V	Tan Chip Cap	3528	C104	
9205900225	2µ2/6V	Tan Chip Cap	3216	C106, C117	
9205900335	3µ3/6V	Tan Chip Cap	3216	C118	
9208001565	5µ6H	SMD miniature choke coil	SIMID1	L100	
9230120061	BAR61	Si Pin Diode Array	SOT143	D101	
9230130080	BAS85	Si Schottky Diode	SOD80	D102, D103	BA423L
9231603875	C3875-Q	NPN AF Transistor	SOT23	T100	
9231603879	C3879-O	NPN FM IF Transistor	SOT23	T101,T102	
9232300184	KDS184	Si Switching Diode Array	SOT23	D104	
9232404148	LL4148	Si Switching Diode	SOD80	D100	
9258100062	TL062CD	Dual Low Power Operational Amplifier	SO8	IC100	
9290010610	37.8x16mm	PCB FR4 0,8mm			

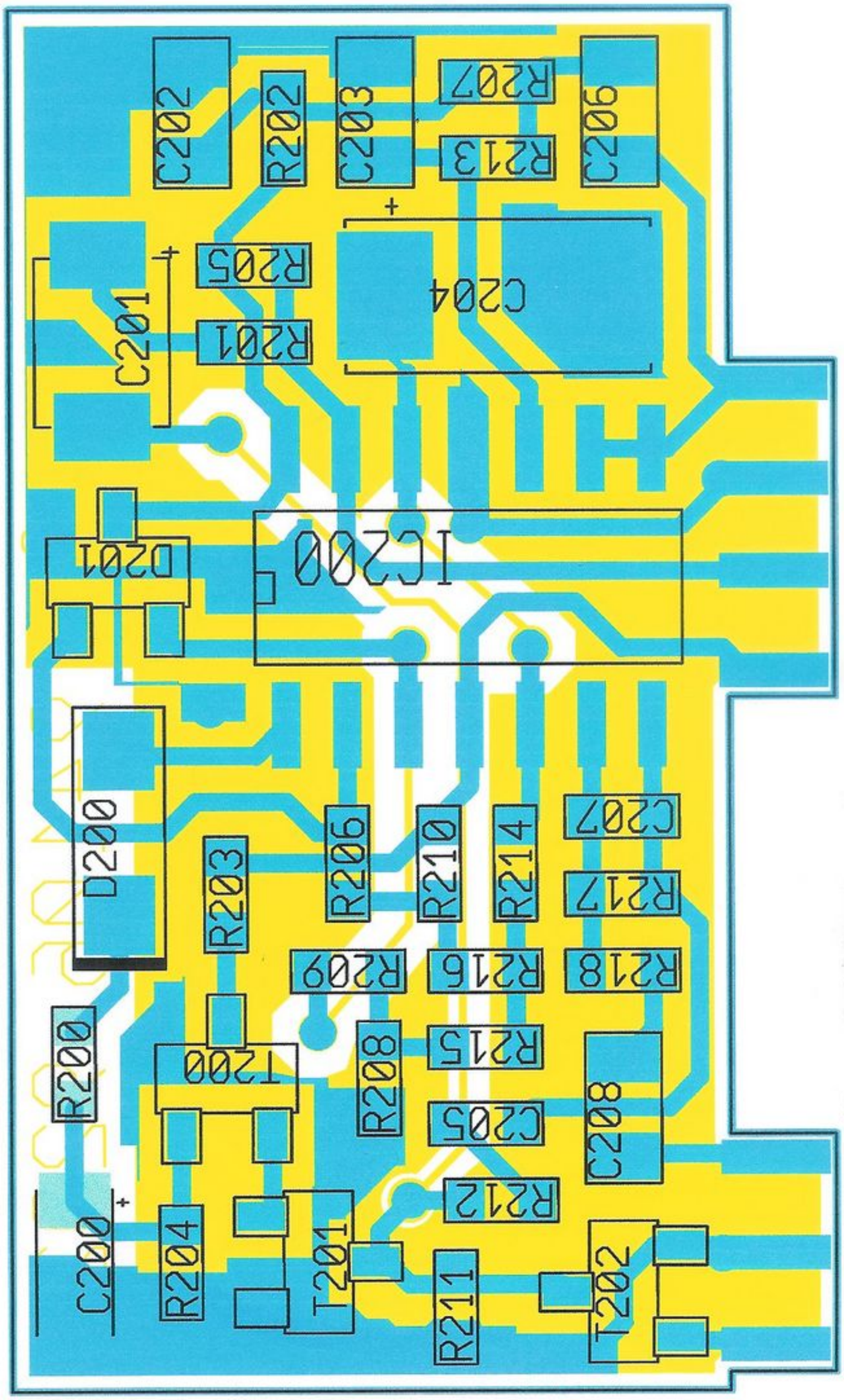
Microphone amplifier; module 106-20 (V2.0)

shematic diagram



Microphone amplifier; module 106-20 (V2.0)

component layout



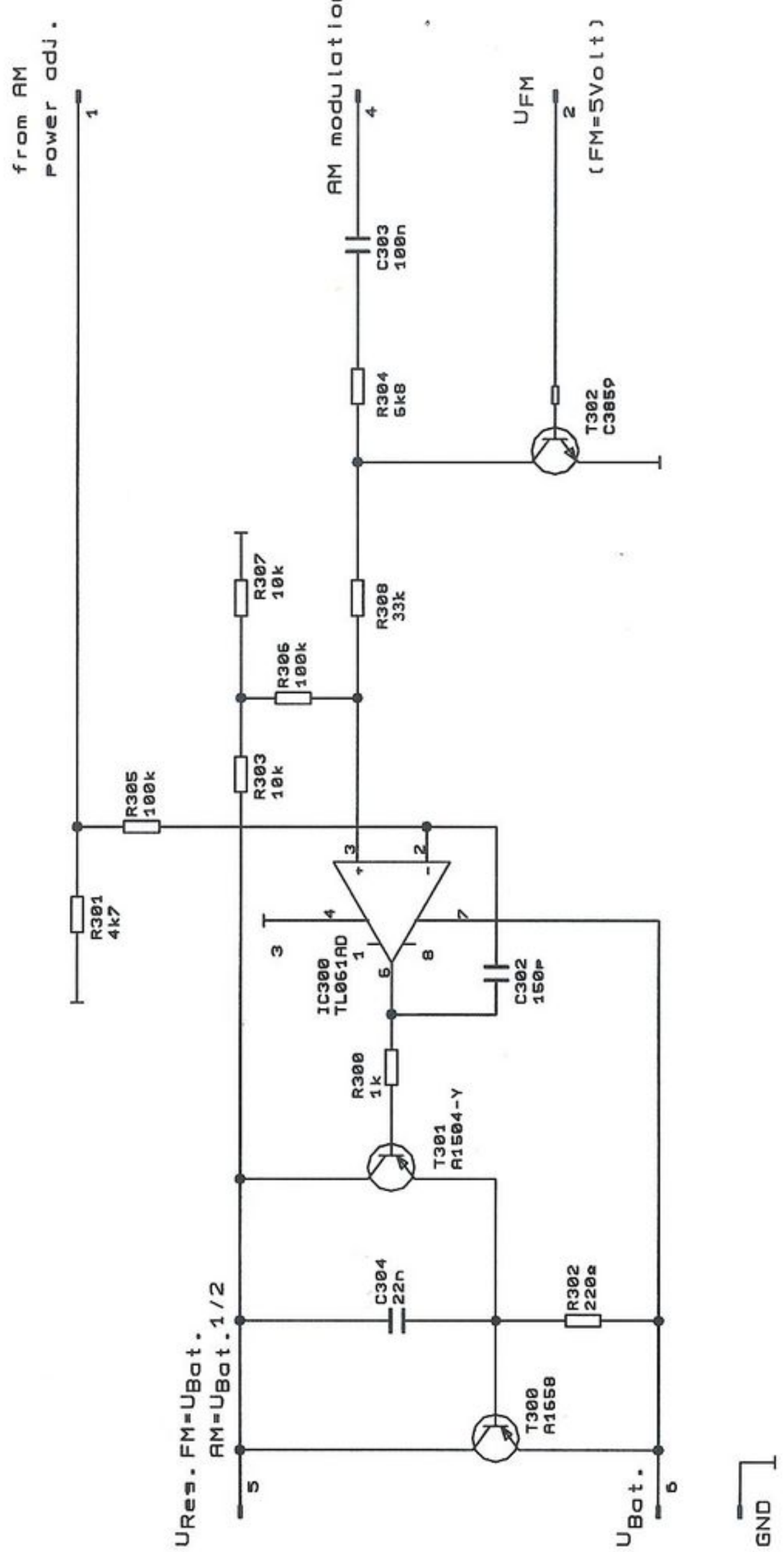
Microphone amplifier; module 106-20 (V2.0)

partslist

part no	value/type	name	case/type	pos	remarks
9200400102	1k	Res Chip 1/16W 5%	0603	R212	
9200400103	10k	Res Chip 1/16W 5%	0603	R200, R218	
9200400104	100k	Res Chip 1/16W 5%	0603	R211	
9200400152	1k5	Res Chip 1/16W 5%	0603	R215, R216	
9200400184	180k	Res Chip 1/16W 5%	0603	R205	
9200400272	2k7	Res Chip 1/16W 5%	0603	R201	
9200400333	33k	Res Chip 1/16W 5%	0603	R206, R209, R214	
9200400394	390k	Res Chip 1/16W 5%	0603	R217	
9200400472	4k7	Res Chip 1/16W 5%	0603	R208, R210	
9200400474	470k	Res Chip 1/16W 5%	0603	R204	
9200400682	6k8	Res Chip 1/16W 5%	0603	R203	
9200401473	14k7	Res Chip 1/16W 1%	0603	R202	
9200402153	21k5	Res Chip 1/16W 1%	0603	R207	
9200409012	9k01	Res Chip 1/16W 1%	0603	R213	
9203300104	100n	Cap Chip XR7	0805	C208	
9203300122	1n2	Cap Chip XR7	0805	C203	
9203300183	18n	Cap Chip XR7	0805	C206	
9203300562	5n6	Cap Chip X7R	0805	C202	
9203400221	220p	Cap Chip COG	0603	C207	
9203400682	6n8	Cap Chip XR7	0603	C205	
9205100475	4µ7/10V	Tan Chip Cap	3528	C201	
9205900225	2µ2/6V	Tan Chip Cap	3216	C200	
9205900226	22µ/6V	Tan Chip Cap	6032	C204	
9230130404	BAS40-4	Si Schottky Diode Array	SOT23	D201	
9230300817	BC817/40	NPN AF Transistor	SOT23	T200, T201	
9232404148	LL4148	Si Switching Diode	SOD80	D200	
9248305234	NE5234D	Quad Low noise Operational Amplifier	SO14	IC200	
9410692020	28.5x16mm	PCB FR4 0,8mm			

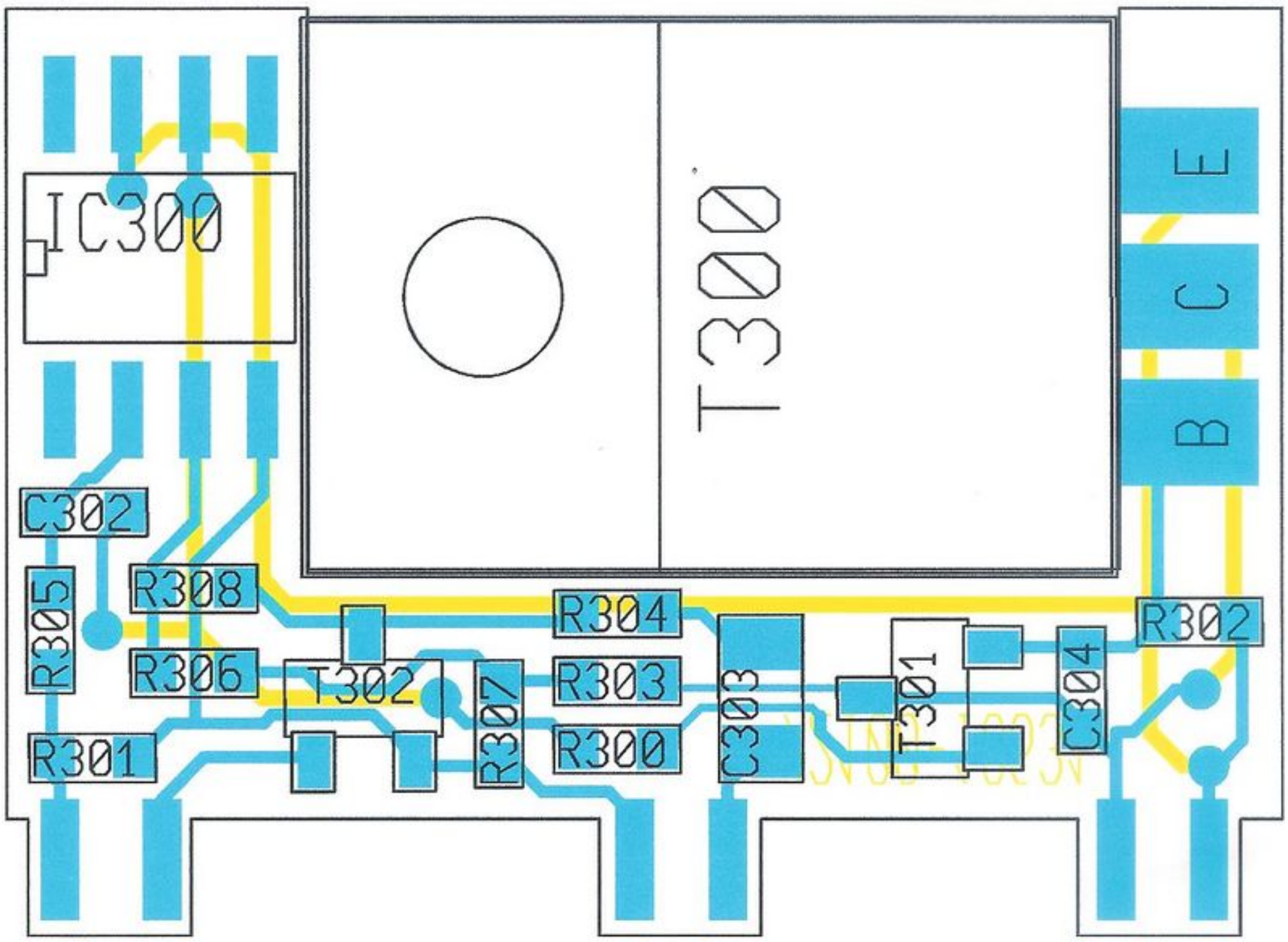
AM modulator modul 106-31 (V1.0)

shematic diagram



AM modulator module 106-31 (V1.0)

PCB layout 92100 10631

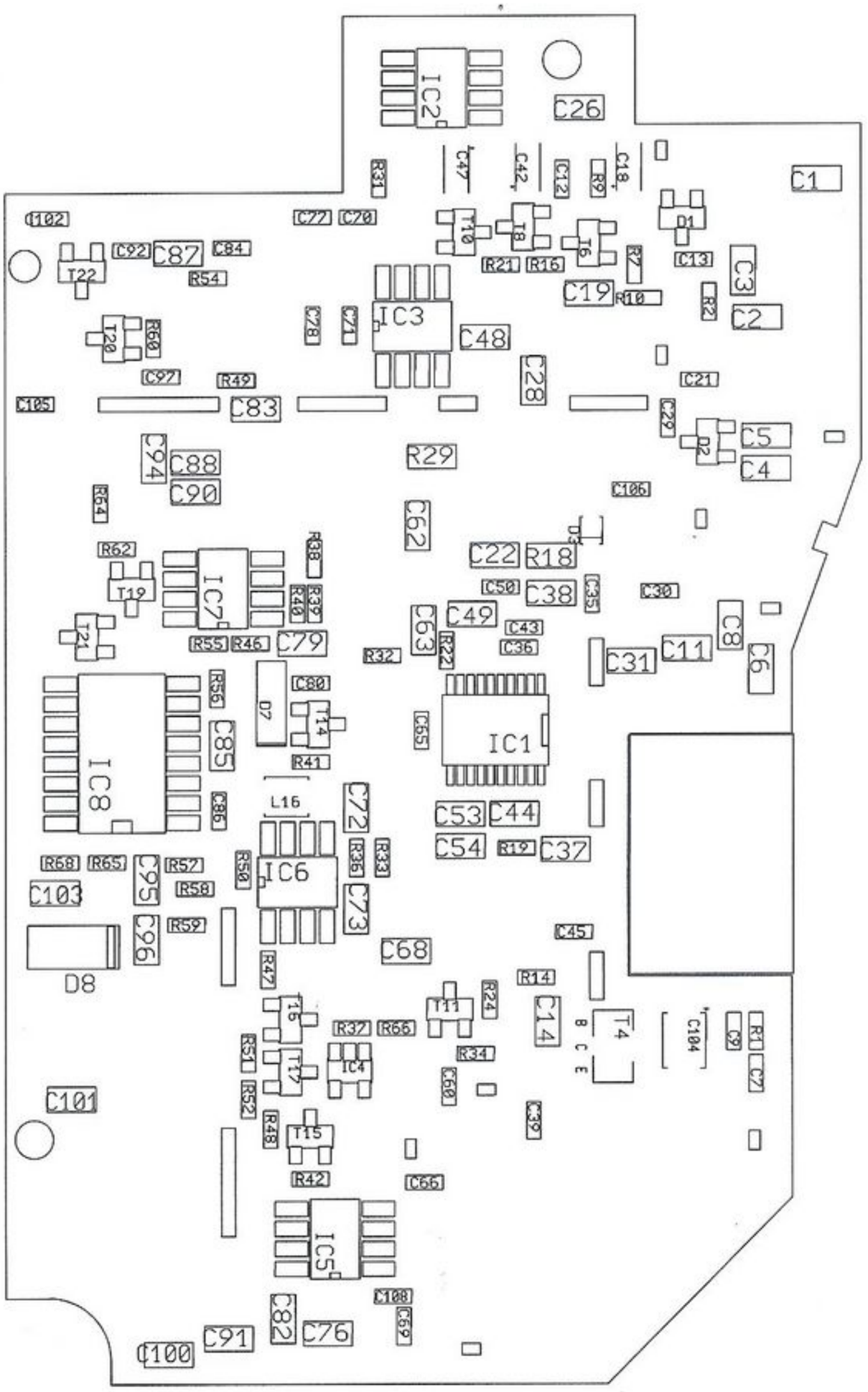


partlist

part no	value/type	name	case/type	pos	remarks
9200400102	1k	Res Chip 1/16W 0603	0603	R300	
9200400103	10k	Res Chip 1/16W 0603	0603	R303, R307	
9200400104	100k	Res Chip 1/16W 0603	0603	R305, R306	
9200400221	220R	Res Chip 1/16W 0603	0603	R302	
9200400333	33k	Res Chip 1/16W 0603	0603	R308	
9200400472	4k7	Res Chip 1/16W 0603	0603	R301	
9200400682	6k8	Res Chip 1/16W 0603	0603	R304	
9203300104	100n	Cap Chip XR7 0805	0805	C303	
9203400151	150p	Cap Chip COG 0603	0603	C302	
9203400223	22n	Cap Chip XR7 0603	0603	C304	
9230001517	A1504-Y	PNP AF Switch Transistor	SOT23	T301	BC858
9230001658	A1658	PNP AF Power Transistor	TO220	T300	SA1307
9231603859	C3859	NPN Switch Transistor with R	SOT23	T302	C111S or BCR166
9258100061	TL061AD	Single Low noise Operational Amplifier	SO8	IC300	
9491290010	24.1x18mm	PCB FR4 0,8mm			

RF-PCB 94106-90012

component layout solder side



RF-PCB 94106-90012

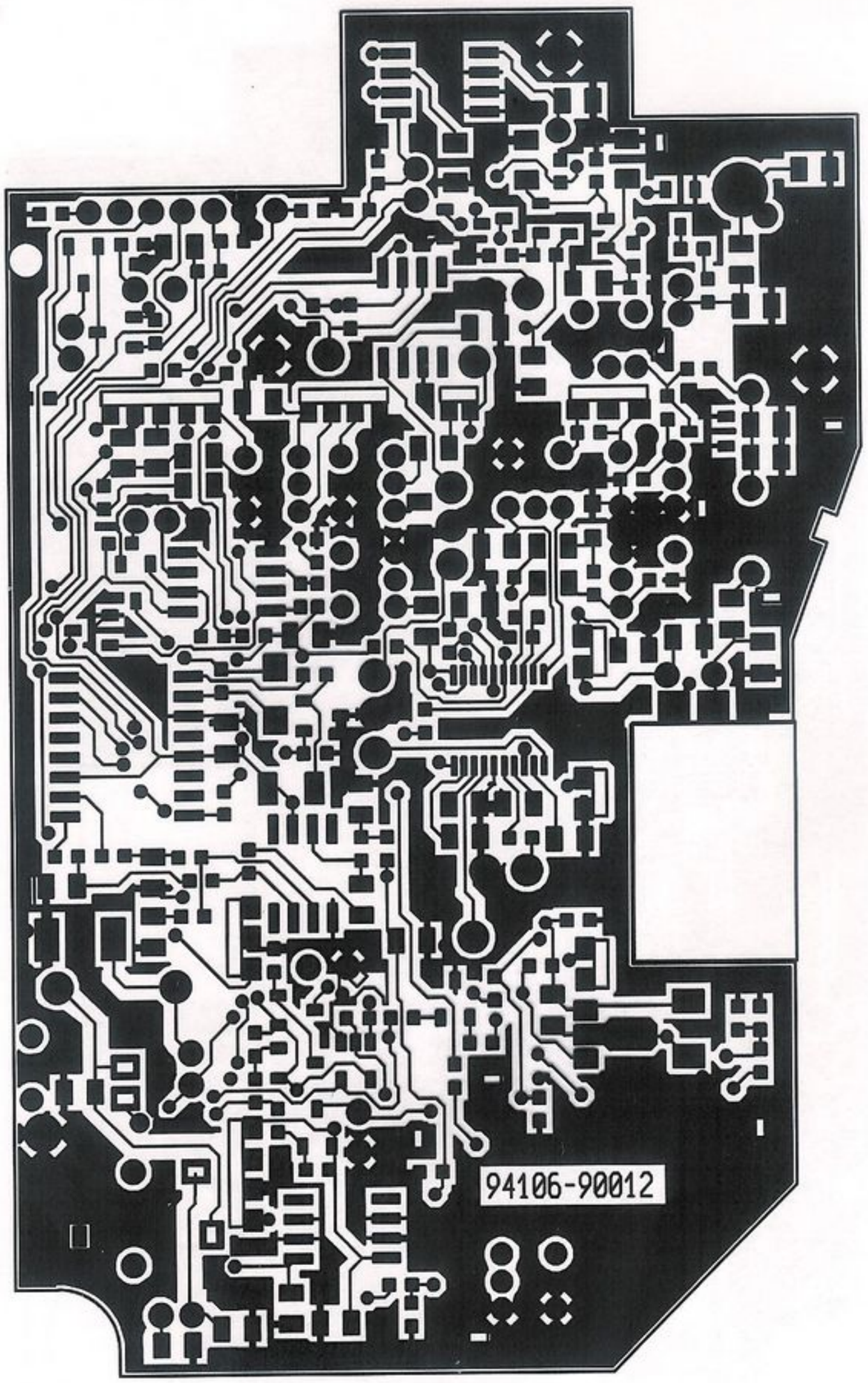
component layout component side

VR1 = Low power Adj
VR2 = High " "
3 = S. Meter
4
5 = AM Power Adj
6 = AM Mod Adj
7 = Dev. Adj

VC1 = Reg. Adj.

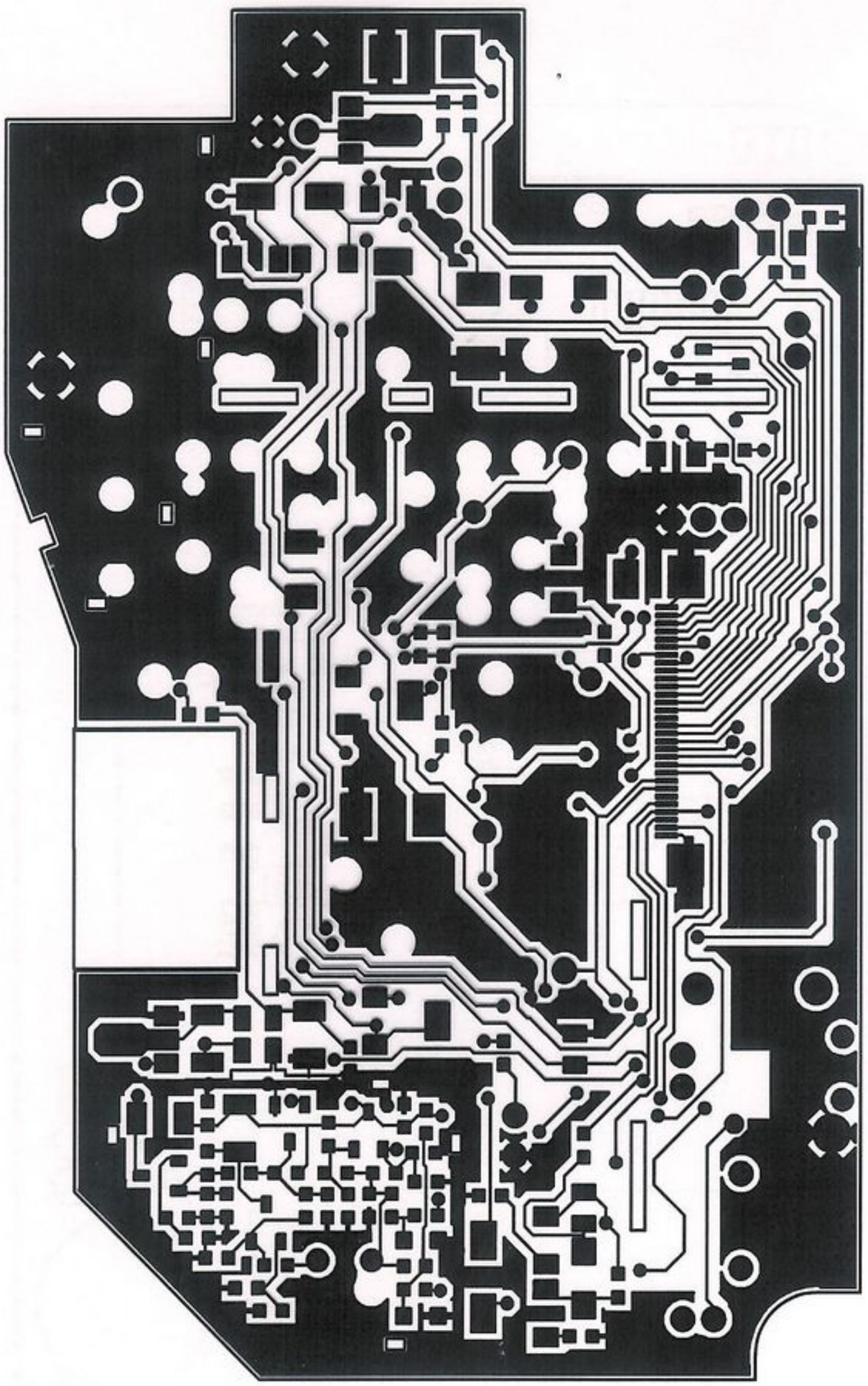
RF-PCB 94106-90012

pattern layout solder side



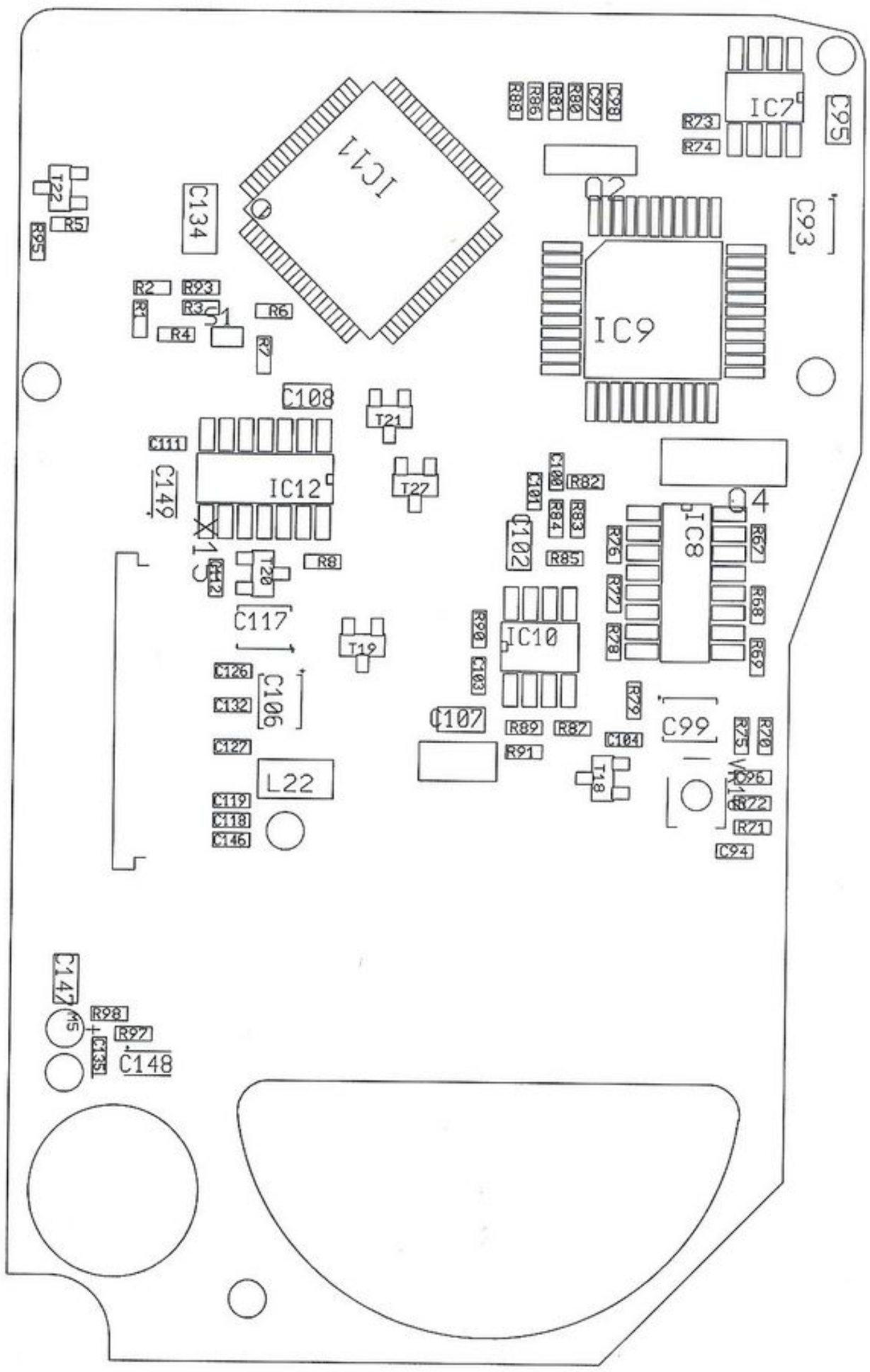
RF-PCB 94106-90012

pattern layout component side



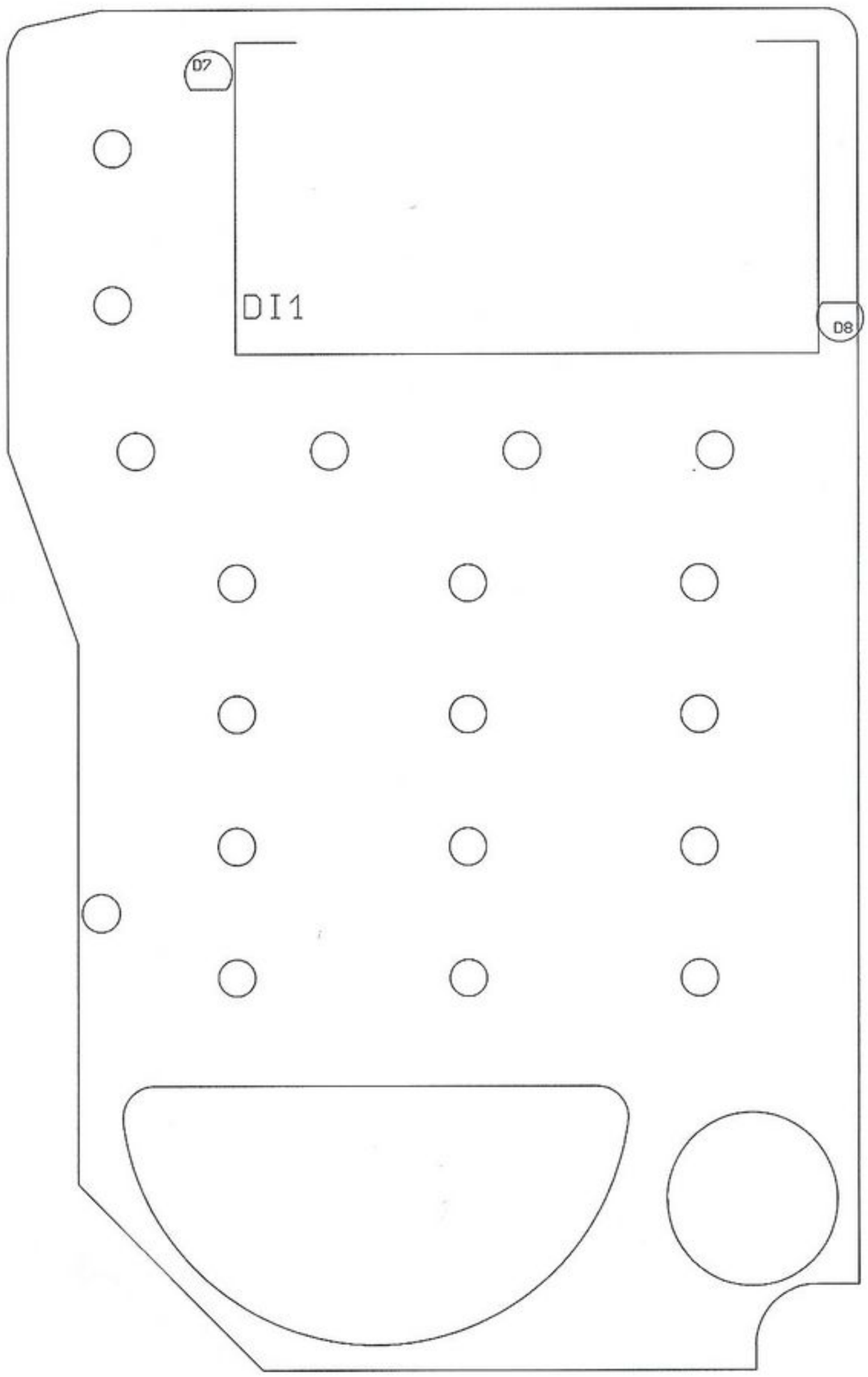
CPU-PCB 94106-90022

component layout solder side



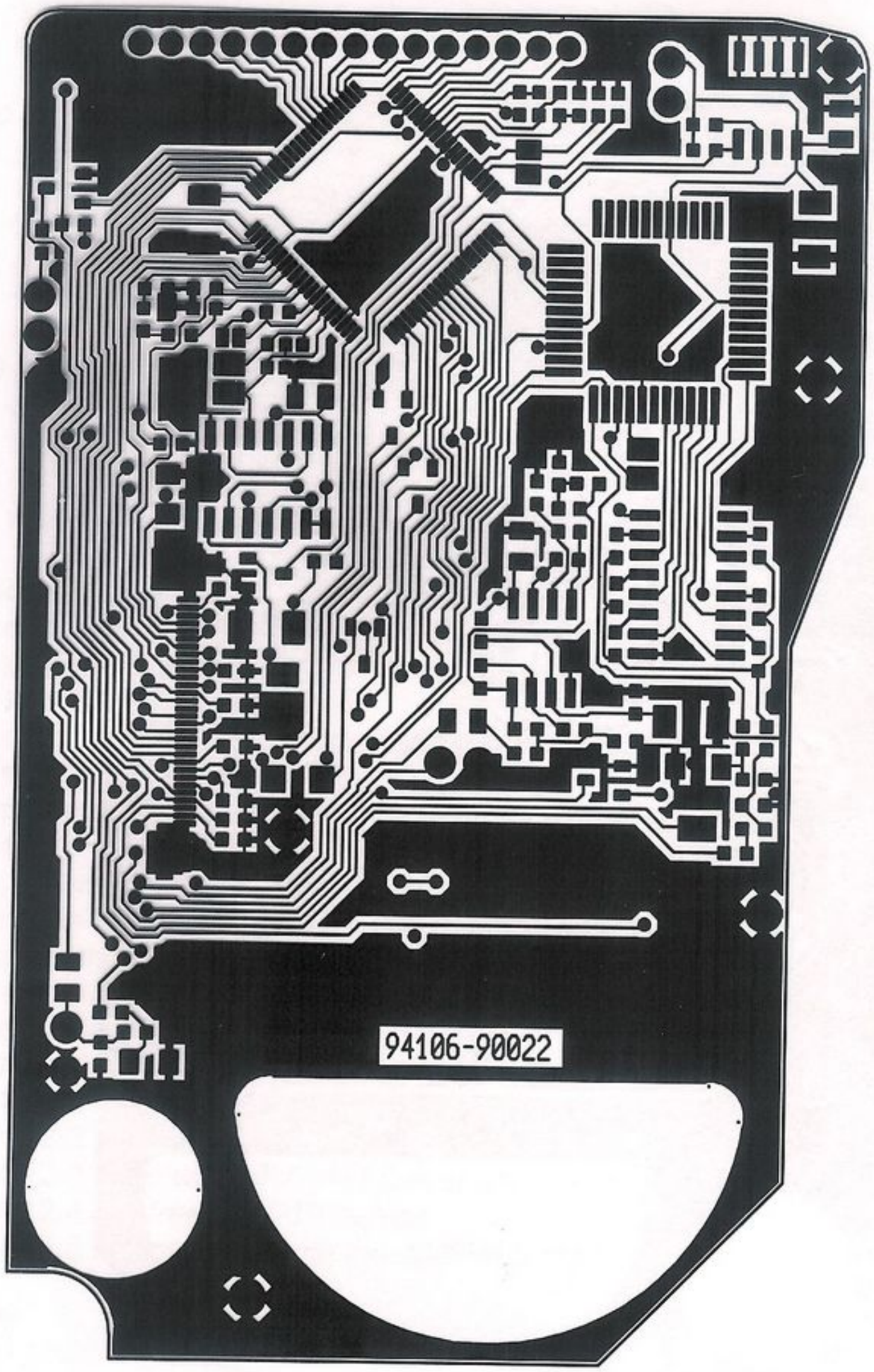
CPU-PCB 94106-90022

component layout component side



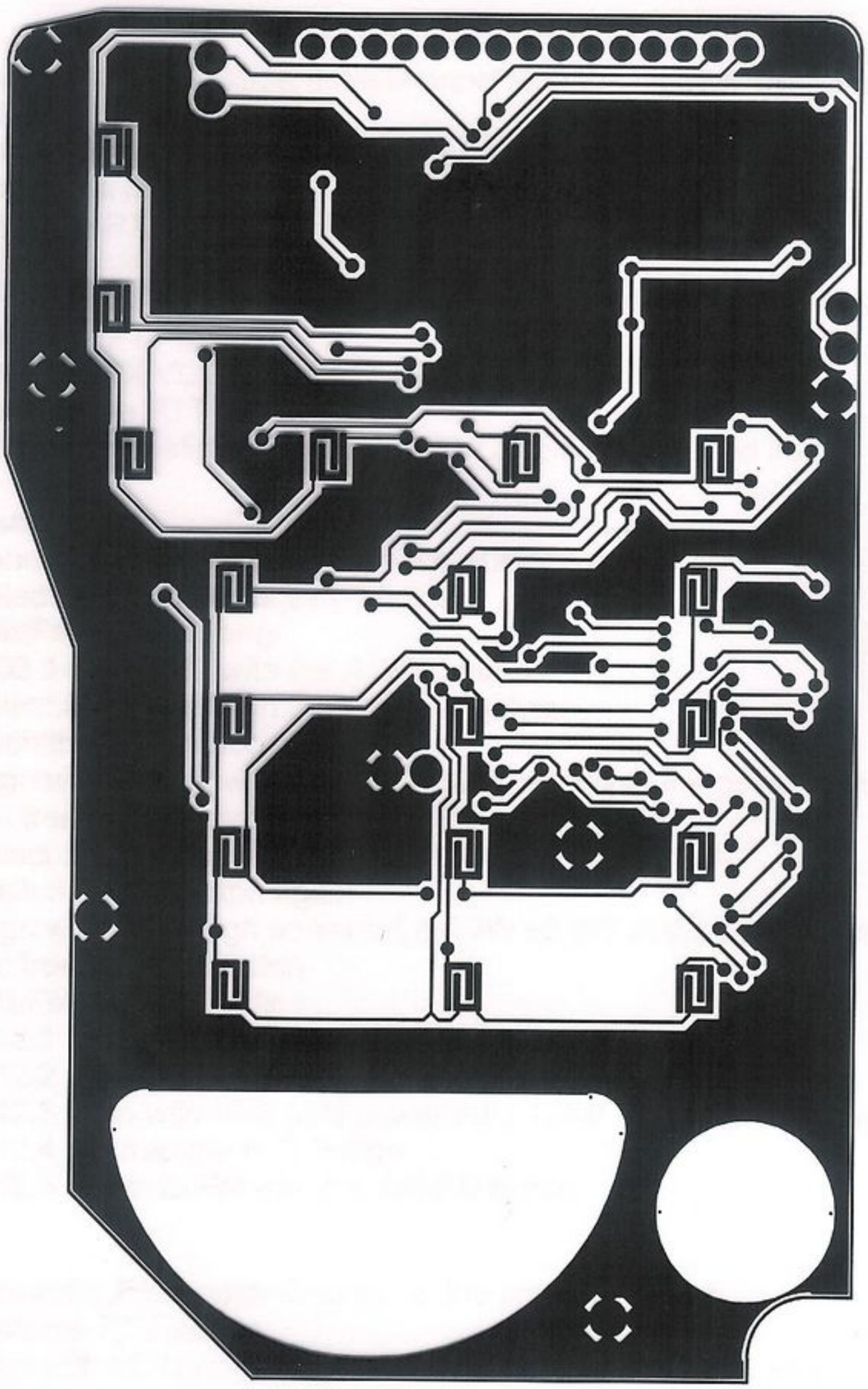
CPU-PCB 94106-90022

pattern layout solder side



CPU-PCB 94106-90022

component layout component side



Test and alignment procedur

1. presettings

1.01 connect the unit to a power supply 13,2 V / 1,5 A
1.02 connect a RF-Power-Meter to the antenna socket
1.03 switch the unit on
1.04 for about 2 sec all segments are displayed on the LCD,
after that the last channel appears on the LCD
note: *do not switch off the unit during this time*

2. RX VCO

2.01 select with the keyboard the channel with the highest frequency
2.02 ***AM/FM Version only***
2.02.1 *select FM with the AM/FM button*
2.03 connect a Multi-Meter to Tp2
2.04 align the RX VCO (L12) to 4,0V ±0,2V

3. TX VCO

3.01 push the PTT button
3.02 align the TX VCO (L13) to 4,0V ±0,2V
3.03 get free the PTT button
note: before alignment of the TX VCO please proceed item 2

4. TX RF power

4.01 connect a RF-Power-Meter to the antenna socket
4.02 select at the power supply 13,2 Volt
4.03 ***AM/FM Version only***
4.03.1 *select FM with the AM/FM button*
4.04 select low power with the high/low button
4.05 push the PTT button
4.06 align with VR1 (low power adj.) 1,0W ±0,1W at the power meter
4.07 get free the PTT button
4.08 select high power with the high/low button
4.09 push the PTT button again
4.10 align with VR2 (high power adj.) 4,0W ±0,2W at the power meter
4.11 get free the PTT button
4.12 ***AM/FM Version only***
4.12.1 *select AM with the AM/FM button*
4.12.2 *push the PTT button again*
4.12.3 *align with VR5 (AM power adj.) 1,0W ±0,1W at the power meter*
4.12.4 *get free the PTT button*
4.12.5 *return to FM with the AM/FM button*

5. frequency

5.01 connect a Frequency-Counter to the antenna socket
5.02 push the PTT button
5.03 align with VC1 (frequency adj.) the channels frequency ±100Hz
5.04 get free the PTT button

Test and alignment procedur (cont.)

6. modulation

6.01 connect the antenna socket with a Modulation-Meter
6.02 ***AM/FM Version only***
6.02.1 select FM with the AM/FM button
6.03 connect a Audio-Signal-Generator Ri ≤ 600Ω to the ext. mic. connector
6.04 select at Audio-Generator 1250Hz and 20mV RMS
6.05 align with VR7 (FM dev. adj.) 2,0 kHz ±100 Hz dev. at the Modulation-Meter
6.06 get free the PTT button
6.07 ***AM/FM Version only***
6.07.1 select AM with the AM/FM button
6.07.2 push the PTT button again
6.07.3 align with VR6 (AM mod. adj.) 80% depth ±5% at the Modulation-Meter
6.07.4 get free the PTT button
6.07.5 return to FM with the AM/FM button

7. receiver sensitivity

7.01 connect a RF-Signal-Generator to the antenna socket
7.02 select a the frequency in the center of the frequency range and a RF-Level of 40dBµV
7.03 select 1000 Hz audio frequency and 1200 Hz deviation
7.04 connect the ext. speaker output to a SINAD-Meter with CCITT-Filter and a Audio-Level-Meter
7.05 turn the Volume-Control to the center position.Be sure that the Squelch is open
7.06 select the center FM channel (of the frequency range) at the test unit
7.07 ***AM/FM Version only***
7.07.1 select FM with the AM/FM button
7.08 align L15 (FM discriminator) to the max. Audio output level at the meter
7.09 reduce the RF-Level to a level where noise come up
7.10 align L7 to max SINAD level or min. noise
7.11 reduce the RF-Level to a level where noise come up
7.12 align L6 to max SINAD level or min. noise
7.13 reduce the RF-Level to a level where noise come up
7.14 align L10 to max SINAD level or min. noise
7.15 repeat item 7.10 to 7.14 until your RF-Level is ≤0,8µV for a 20dB SINAD
7.16 control the sensitivity on lowest and on the highest channel. The sensitivity has to be less than 0,8µV
7.17 ***AM/FM Version only***
7.17.1 select AM with the AM/FM button
7.17.2 select the frequency from the middel FM channel and the RF-Level to 10dBµV
7.17.3 change the Signal-Generator to 60% AM and
7.17.4 align L17 (AM Demodulator) to the max. Audio output level at the meter
7.17.5 reduce the RF-Level to point wher the Audio-Level will reduce to
7.17.6 align L14 to the max. Audio output level at the meter
7.17.7 repead item 7.17.4 to 7.17.6 until your RF-Level is ≤0,8µV for a 20dB SINAD
7.17.8 controle the sensitivity on lowest and on the highest channel. The sensitivity

Type programming (channel)

1) Short **S1** on CPU PCB 94106 90022

2) Push the star-button ✻ and turn the unit on

3) Hold the star-button ✻ until you see "- -" on the display

4) leave the star-button ✻

5) enter the code according the table below

6) push the # -button

Channel / Code	01-40	41-80	81-120	121-160	AM Channel
80	26,965 - 27,405				
81	26,965 - 27,405				4-15
83	26,965 - 27,405				all
85	26,965 - 27,405	26,565 - 26,955			4-15
47	26,965 - 27,405	27,415 - 27,855			all
88	26,965 - 27,405	26,565 - 26,955	27,415 - 27,855		all
24	26,965 - 27,405	27,60125 - 27,99125			
20	27,60125 - 27,99125				
8F	26,965 - 27,405	26,565 - 26,955	27,415 - 27,855	27,60125 - 27,99125	all

Mechanical spare parts

part no	name	pos
9410600301	Display window	FS
9410600302	Display window	AS
9410600401	Battery front cabinet	3 x AA
9410600402	Battery back cabinet	3 x AA
9410600403	Battery front cabinet	5 x AA
9410600404	Battery back cabinet	5 x AA
9410601001	Volume Squelch knob	
9410601003	Battery box lock knob	
9410602001	Main front cabinet	
9410602002	Main back cabinet	
9410602006	Belt clip	
9410602501	Upper battery contact -	
9410602502	Upper battery contact +	
9410602503	Lower battery contact -	
9410602504	Lower battery contact -	
9410602505	Battery contact - +	
9410602506	Battery contact + -	
9410602507	Battery contact	Main / Battery cabinet
9410608001	Rubber keyboard (18 key)	FS
9410608002	Rubber keyboard (18 key)	AS
9410608003	PTT Rubber key	
9410609004	Batt. box mounting bracket	
9410609007	Ant. socket mounting ring	
9410609008	Speaker bracket	
9410609101	Screw PA 1,7x4 blk	Key board PCB
9410609102	Screw PA 1,7x5	Speakerbracket
9410609103	Screw PM 1,7x4 head d=2,5	Main PCB
9410609104	Screw PM 1,7x5 big head	Ant., Volume and Squelch bracket
9410609105	Screw KM 2x4 Head d=3,0	Battery mounting bracket
9410609106	Screw PM 2x5 blk	Front/back cabinet
9410609107	Screw PM 2x5	Battery plate
9410609108	Screw PM 2,6x5	Power transistor
9410609109	Screw PM 3x5 blk	Belt clip
9410609110	Screw PM 2x23 blk	Front/back cabinet
9410609111	Screw PM 2x12 blk	Front/back cabinet
9410609112	Brass stand	Key board

Modification 1/97

no	page	pos	from	to	remarks
1	5	C10	-	39pF	
2	11	C59	2n2	4n7	
3		R23	33k	56k	
4	20	T3	C3880-Q	C3880-Y	or BFS19
5		L2	d=4,5; t=10,5	d=4,5; t=12,5	
6		C8	270p	180p	
7		C58	1p8	1p5	
8	41	C119	120p	220p	AS only

1) Item 1 to 6 and 8 improves the RX sensitivity and the RF output power

2) Item 7 improves the FM dev. alignment

Modification 2/97

no	page	pos	from	to	remarks
9	29	R95	150R	47R	

1)Item 9 improves the display illumination

Modification 3/97

no	page	pos	from	to	remarks
10	26	-	-	PRL4001	

1)Item 10 Protection from short circuit in the charge plug by plugging the jake in.
The minus pin of the charge plug has to be isolated at both PCB sides.

Technical Information 1/97

Microphon for **Micro AS/FS**