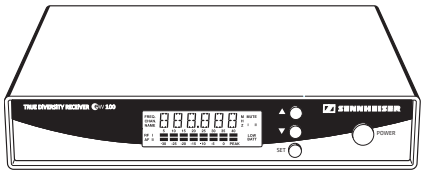
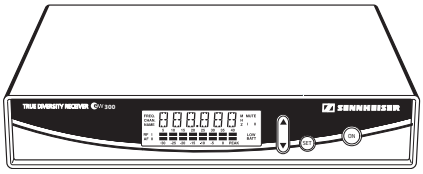
Service manual

EM 100 G2
EM 300 G2
EM 500 G2

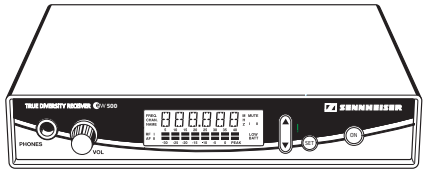
SA 040818



EM 100 G2



EM 300 G2



EM 500 G2

Short Description

The three stationary receivers EM 100 G2, EM 300 G2 and EM 500 G2 are ‚True Diversity' receivers and are equipped with the HDX noise reduction system. Each receiver has a switching bandwidth of 36MHz in the UHF band.

Features

- 1440 UHF frequencies available for interference-free reception.
- Direct channel selection via presets.
- Scan function for finding free receive channels.
- Low battery warning on transmitter and receiver.
- Squelch pilot tone for interference-free operation.
- Sound check mode for checking transmission conditions (only EM 500 G2).

Safety requirements

Observe safety regulations.

Observe ESD instructions while handling electrostatically endangered components.

Only skilled persons are allowed to alter and repair. For repairs and exchanges only approved components according to the current spare parts list are allowed.

It is forbidden to alter the product unauthorised.
If not observed the adaptor is legally liable for possible results of damage.

repairs/exchanges

The following instructions for overhaul and testing must be followed. In case of unusual problems please contact your Sennheiser distributor.

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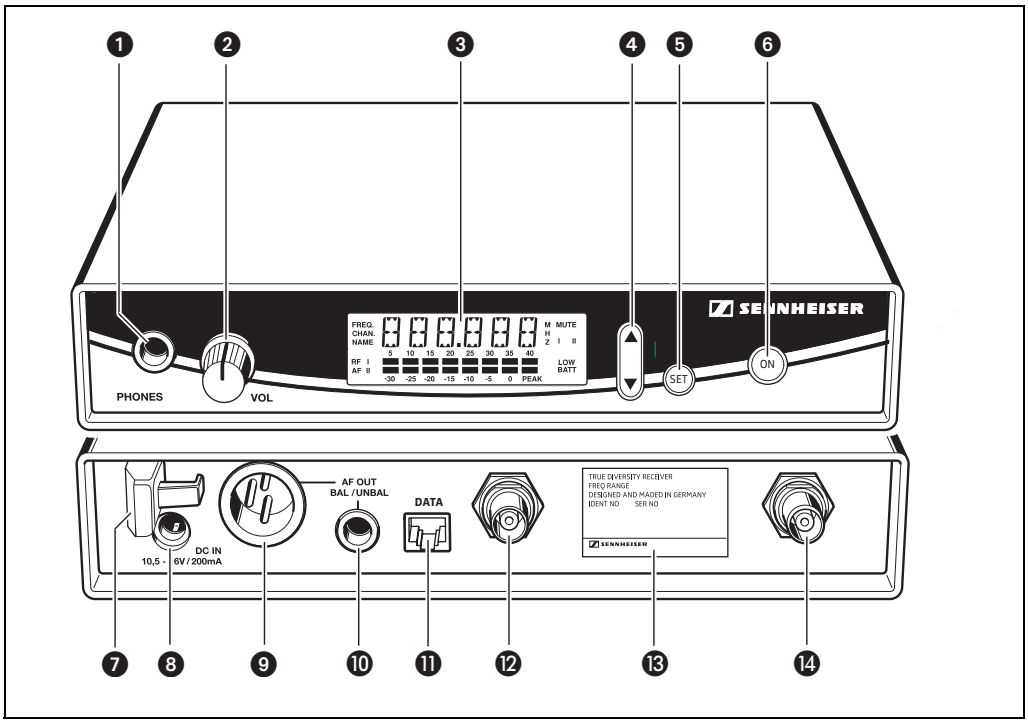
1 Controls and indicators



Front

❶ Headphone output, ¼" (6.3mm) jack socket (PHONES)
(only EM 500 G2)

❷ Headphone volume control (VOL)
(only EM 500 G2)

❸ Display

❹ Button ▲ / ▼
(two separate buttons on EM 100 G2)

❺ Button SET

❻ Button ON / POWER

Back panel

❼ Cable grip for mains unit connector cable

❽ DC socket for power supply unit connection (DC IN)

❾ XLR socket for AF output (AF OUT BAL)

❿ Audio output jack socket (AF OUT UNBAL)

⓫ RJ45 socket as service interface (DATA)

⓬ BNC socket as antenna input 2 (ANT II)

⓭ Type plate

⓮ BNC socket, antenna input 1 (ANT I)

2 Technical data

2.1 General

Nominal output	+12V_{DC}
Operating voltage	+10.5 ... +16V
Current consumption at nominal voltage	typ. 200mA
Quiescent current consumption (standby)	typ. 50mA
Temperature range	-10°C ... +55°C
Dimensions (in mm)	212 x 145 x 38
Weight:	approx. 1200g
Approval	D801 488L RF
Max. audio output level (balanced/unbalanced)	
3-pin XLR socket	+19dBu
1/4 " (6.3 mm) jack socket	+13dBu
Headphone output (only EM 500 G2)	¼" (6.3 mm) jack socket, stereo
THD (at nominal deviation, 1 kHz)	≤ 0.9%
Control range (only EM 500 G2)	40dB

2.2 RF part

Receiver principle	true diversity
Frequency ranges	518 – 554MHz
	626 – 662MHz
	740 – 776MHz
	786 – 822MHz
	830 – 866MHz
Switching bandwidth	36MHz
Receive frequencies	1440
Channel separation	> 400kHz
Channel grid	25kHz
1. Oscillator frequency	$f_{Osc} = f_e + 241MHz$
1. Intermediate frequency	241MHz
2. Oscillator frequency	230.3MHz
2. Intermediate frequency	10.7MHz
Modulation	wideband FM
Nominal/peak deviation	±24kHz / ±48kHz
Frequency stability	≤ ±15ppm
Adjacent channel selection	
EM 100 G2	≥ 65dB
EM 300 G2	≥ 68dB
EM 500 G2	≥ 70dB
Intermodulation attenuation	
EM 100 G2	≥ 65dB
EM 300 G2	≥ 68dB
EM 500 G2	≥ 70dB

Blocking

EM 100 G2, EM 300 G2	≥ 70dB
EM 500 G2	≥ 75dB

Squelch	off, low: 5dBµV, mid: 15dBµV high: 25dBµV
Squelch pilot tone	adjustable
S/N = 52 dBA (unweighted with HDX)	< 2.5µV (typ. 1.4µV)
S/N = 80 dB (unweighted with HDX)	< 10µV (typ. 6µV)
S/N max (peak deviation with HDX)	> 120dB(A) (typ. 124dB(A)
Antenna inputs	RF input: 2 BNC sockets, 50Ω

2.3 AF part

Compander system	HDX

S/N (AF OUT)

EM 100 G2	≥ 110dB(A)
EM 300 G2	≥ 112dB(A)
EM 500 G2	≥ 115dB(A)

AF output voltage (nominal deviation)

Unbalanced	1.25V = +4dBu
Balanced	2.45V = +10dBu

AF output voltage (peak deviation)

Unbalanced	3.4V = +13dBu
Balanced	6.8V = +19dBu

AF frequency response	50Hz ... 18kHz; -3dB
Monitor output level/load	> 100mW/32Ω (only EM 500 G2)
AF outputs	¼" (6.3mm) jack socket Unbalanced XLR-3M, balanced

Pilot tone

Pilot tone frequency	32.768kHz
Pilot tone deviation	≥ 1.5kHz

3 Description

The receiver has a modular structure and comprises the following boards:
- Mainboard
- Display module
- RF module
- Monitor module (only EM 500 G2)

The display, RF and monitor modules are each connected to the mainboard via a 15-pin ribbon connection. The following sections explain the principal functions.

3.1 Mainboard

The mainboard is a single-sided PCB assembly. It is manually screwed to the side walls, the front and the back panel wall and the RF module. The mainboard performs the following functions:
- Conditioning of power supply
- Conditioning of AF signals
- Provision of power supply to additional modules
- Control of own functions and the RF and monitor module via the microprocessor

3.1.1 Processing the diversity signal

The signal from the RF module with the highest field strength is switched by the U50 or U51 diversity switches and reaches four signal conditioning blocks that are connected in parallel.

3.1.2 U52 squelch switch with AF conditioning

If the squelch threshold you set is exceeded, U1 uses U52 to switch the AF signal and activates the AF high pass filter with U75-1, the AF low pass filter with U75-2 and U76-1, the HDX expander with U100 and the AF stages U101-1, U101-2 and U76-2.

With EM 500 G2 the AF stages U101-1 and U101-2 are used via analog switch U300 as LOW-CUT filters with a threshold frequency of 200Hz and with U301 as HI-BOOST filters with an increase of approx. 5dB at 10kHz. Control is via U1, Q300-1 and Q300-2.

The peak detector is connected to the level indicator behind U76-1 with U100 operational amplifiers (U100-2 and U100-1) whose output signal DEV_L is available to microprocessor U1 for evaluation.

The two AF signals AF_0 (U76-2) and AF_180 (U101-2) both reach a divider resistance chain at the inputs of analog switches U175 and U176, via which eight AF signal switching stages are set by the user. The structure is strictly balanced and is laid behind the active stages to guarantee full signal to noise ratio even if the AF signal is weakened by approx. 40dB. From the two outputs, the AF signal then reaches across various components to protect from ESD parasitic signals and phantom voltage at AF sockets P175 and J175.

3.1.3 Evaluation of the TX battery signal

The battery telegram sent by the transmitter reaches the U60-2 trigger stage, at whose output appropriate square wave signals are available for evaluation by U1, via the 4Hz low pass filter with U60-1.

3.1.4 Evaluation of the pilot signal

The 32.768kHz pilot signal sent by the transmitter is filtered from the signal mix by the active crystal filter with Q95, Y95 and U95-1, rectified via the D95 diode and made available for evaluation by U1 via trigger stage U96-1.

3.1.5 Functions of microprocessor U1

The receiver is controlled by the 8-bit U1 microprocessor, which contains in its flash memory the control program and uses a sub-area as an EEPROM for saving data even in the event of power failure. The microprocessor uses a 4MHz crystal to generate both its own internal 8MHz cycle and the reference frequency for the RF module PLL. It processes the signals already described in line with the program specifications and the user specifications that can be set on an individual basis via a menu.

3.1.6 Service interface (RJ45 socket)

The service interface "DATA" with RS485 protocol, located on the back panel of the unit, fulfills an important function. The RJ45 socket allows the relevant EEPROM parameters on the RF module and the simulated EEPROM to be read out and modified in the microprocessor. This interface also enables a software update as part of the hardware options. For example, the RJ45 socket enables you to read unit data and write-in after replacing a board. The necessary service software is available for download free of charge on our Internet homepage:

www.sennheiser.com > Service & Distributors > Service Documentation > Download

3.2 RF module

The RF module is a single-sided PCB assembly that is fixed to the back panel via the BNC input sockets and to the mainboard via a sheet metal brace. The RF module performs RF conditioning until demodulation of the IF signal. The module is connected to the mainboard via a 15-pin ribbon connection; the following functions are performed by the plug-in connection:

- Incoming power supply of 5V DC from the mainboard.
- Incoming system cycle (4MHz) from mainboard microprocessor.
- 2 x outgoing AF voltage to mainboard
- 2 x RSSI voltage to mainboard.
- Communication between the mainboard microprocessor and the EEPROM or the PLL for the RF module.

3.2.1 RF module shielded compartments

The shielded compartments on the RF module perform the following functions:

- The two compartments between the BNC sockets contain the second mixer, the 10.7MHz limiting amplifier and the FM demodulator.
- The compartment directly behind the BNC socket contains RF conditioning up to an including the SAW filter for the first IF.
- The middle compartment performs frequency conditioning for the first oscillator with VCO, buffer and PLL for both diversity channels.

The input filters are assembled outside the shielded compartments to ensure that parasitic LO frequency currents cannot be coupled directly to the RF input. The input filters are relatively complex owing to the integrated IF and LO cases, but nevertheless do not require alignment.

3.2.2 Alignment of the RF module

The only components still to be adjusted are

- C540 for alignment of VCO voltage at center frequency,
- C330 for setting the LO2 crystal oscillator,
- The L310 and L410 discriminator coils, and
- The two level adjusters for the AF outputs.

For communication with the processor on the mainboard, the RF module contains the U700 EEPROM, in which the relevant frequency range data, the RSSI table and other status data are stored. Communication is processed via the same bus used by the microprocessor to communicate with the PLL U500 (frequency setting).

3.3 Display module

The display module for the status displays is connected to the mainboard via a 15-pin ribbon connection.

3.4 Monitor module (only EM 500 G2)

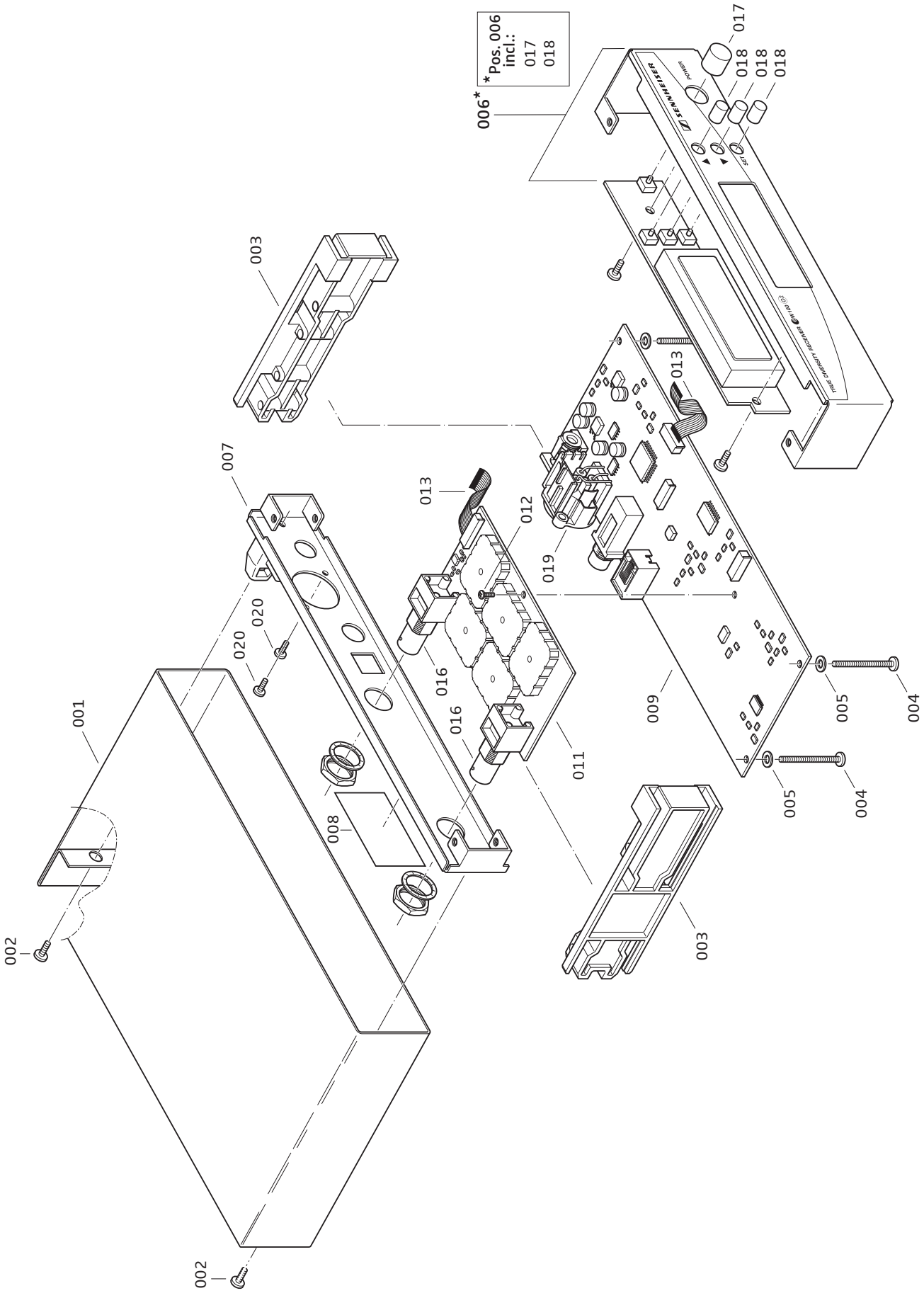
The monitor module (MOD.A020) is a single-sided PCB assembly and is connected to the mainboard via a 15-pin plug-in connector. The monitor module PCB has a jack socket for connecting headphones, and an appropriate volume control. The monitor module also has a complete U1 and U2 amplifier for each AF phase; the volume can be adjusted via R1.

The monitor module is primarily intended for stereo operation, but in phase configuration is possible for mono operation. If you want to minimize the volume differences in mono operation between the left and right channel (this may occur as a result of the tolerances of R1), you must close the M1 solder bridge.

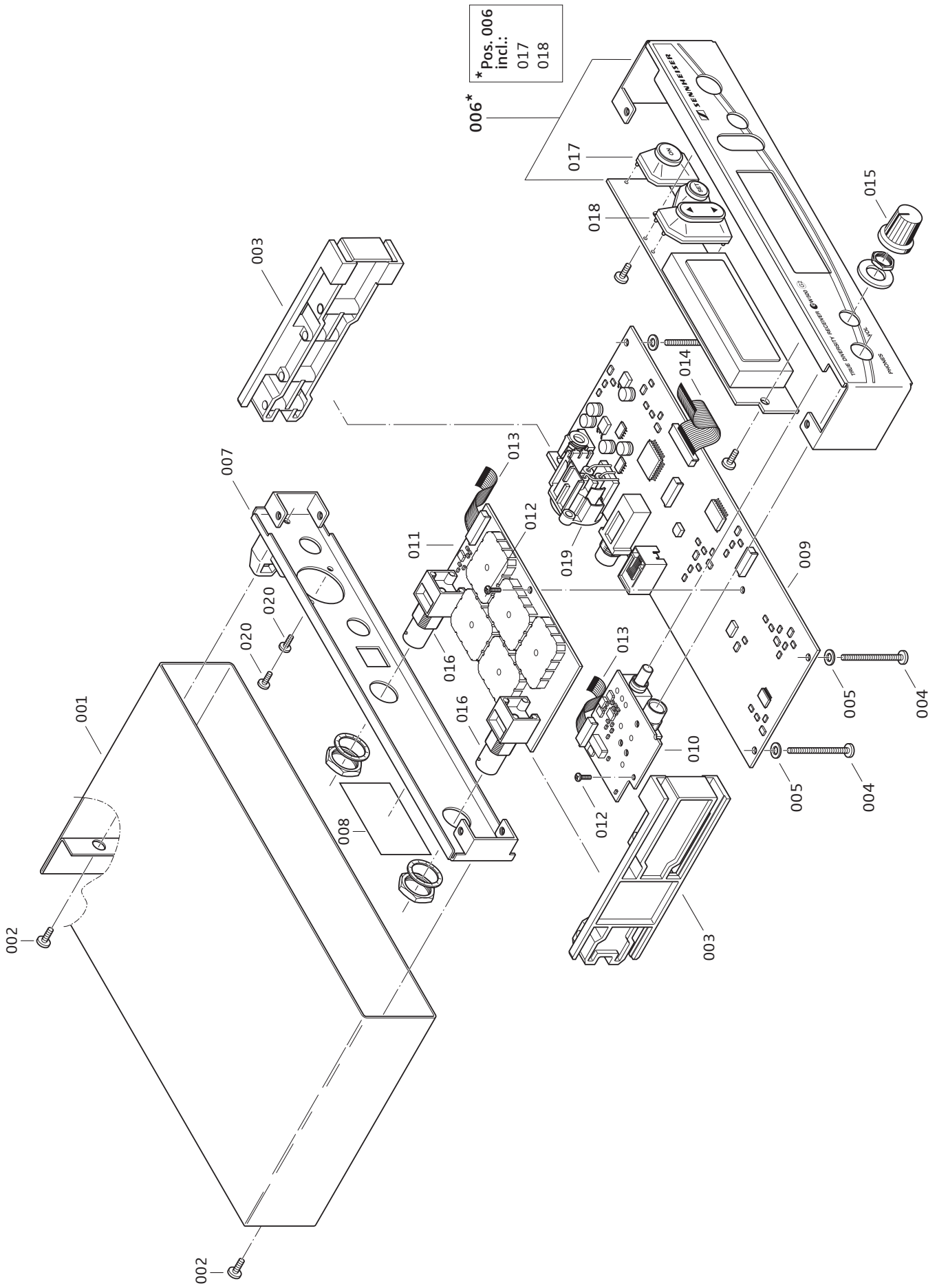
You must not close the M1 solder bridge if you are using the monitor module in stereo mode.

4 Exploded view

4.1 Exploded view: EM 100 G2



4.2 Exploded view: EM 300 G2, EM 500 G2



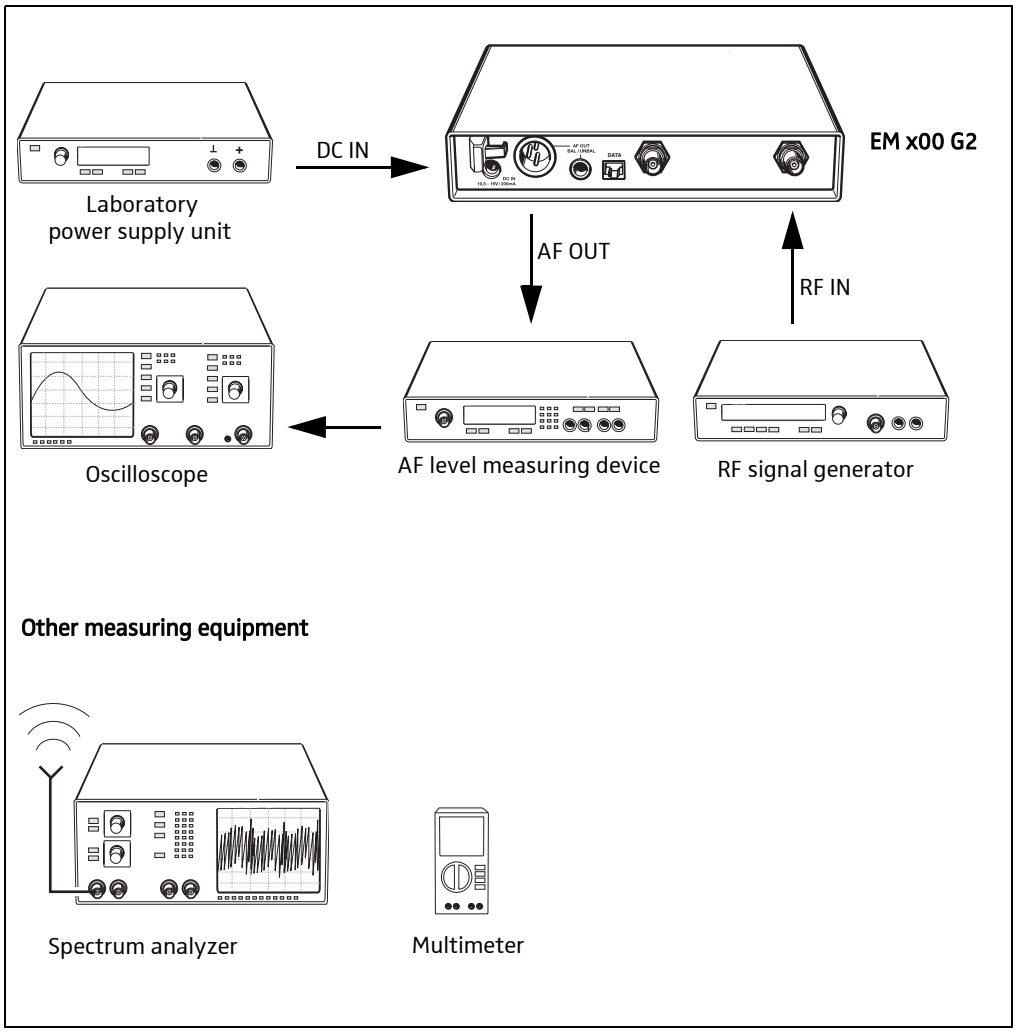
Pos	Bezeichnung
001	Casing
002	Lens screw
003	Holder
004	Lens screw
005	Spring washer
006	Front module with display
007	Rear panel
008	Label
009	PCB mainboard
010	PCB monitoring module (EM 500 G2 only)
011	PCB RF module
012	Lens screw
013	Flat cable, 15-pin
014	Flat cable, 30-pin
015	Knob (EM 500 G2 only)
016	Socket BNC 50R
017	Key cap ON/POWER
018	Key cap UP/DOWN/SET
019	Built-in plug XLR3M
020	Lens screw

5 Test and alignment instructions

5.1 Measuring and test equipment

- 1 Spectrum analyzer up to at least 1.5GHz
- 1 RF signal generator
- 1 AF level measuring device
- 1 Oscilloscope
- 1 Multimeter
- 1 Laboratory power supply unit

5.2 Measuring set-up



5.3 Test table

Sequence	Type of measurement/adjustment	Signal input	Settings	Measuring point/test point	Required value	Remarks
1	**Visual inspection**					
1.1	Jack socket PHONES (only EM 500 G2)	–	–	–	–	Contacts are not twisted, no hairline cracks at the solder points, no mechanical damage
1.2	Volume control (only EM 500 G2)	–	–	–	–	See 1.1
1.3	▲▼, SET, POWER/ON buttons	–	–	–	–	See 1.1
1.4	DC socket, DC IN	–	–	–	–	See 1.1
1.5	XLR socket	–	–	–	–	See 1.1
1.6	Jack socket	–	–	–	–	See 1.1
1.7	RJ45 DATA socket	–	–	–	–	See 1.1
1.8	BNC sockets	–	–	–	–	See 1.1
1.9	Monitoring of all display elements	+12V_{DC} at DC socket	"POWER" = ON	–	–	Monitoring of all display segments
1.10	Monitoring of the illuminated ▲▼, SET, ON buttons (not EM 100 G2)	See 1.9	See 1.9	–	–	–
2	**Mainboard: current and voltage measurement**					
2.1	Standby	See 1.9	"POWER" = Off "VOL" = min. (R1) "AF level" = max.	–	50mA	Set laboratory power supply unit current limiter to I_{ON} = 1A
2.2	Current consumption during operation	See 1.9	"POWER" = On "VOL" = min. (R1) "AF level" = max.	–	200mA	See 2.1
2.3	Commissioning	See 1.9	VOL = min. (R1) AF LEVEL = max.	–	–	–
2.4	Operating voltage (+12V_{DC})	See 1.9	POWER = On	Mainboard, solder side: TP209 (+) TP208 (-)	+12V_{DC}	–
2.5	Operating voltage (+6V_{DD})	See 1.9	See 2.4	TP226/ GND	+5.8V to +6.2V	–
2.6	Operating voltage (+5V_{CC})	See 1.9	See 2.4	TP231/ GND	+4.8V to +5.2V	–
2.7	Operating voltage (+5V_{SW})	See 1.9	See 2.4	TP233/ GND	+4.8V to +5.2V	–
2.8	Operating voltage (+6V_{SW})	See 1.9	See 2.4	TP229/ GND	+5.8V to +6.2V	–

Sequence	Type of measurement/adjustment	Signal input	Settings	Measuring point/test point	Required value	Remarks
3	**RF module**					
	RF module removal: 1. Loosen the lens screw (RF board fastening, see Exploded view, Pos. 12). 2. Remove both BNC socket screws from the back panel of the unit. 3. Remove the RF module (the connection to the mainboard via the 15-pin flat cable remains). **Re-establishing the ground connection between the RF module and the mainboard:** Create an interference-free connection between MH3 on the RF board and 801 on the mainboard. To do this, solder a wire approx. 10cm long between MH3 and 801.					
3.1	Operating voltage ($+5V_{SW}$)	$+12V_{DC}$ at the DC socket	Multimeter, DC	RF module Component side: L500	+4.9V to +5.1V	
3.2	**Tuning voltage measurement** 1. Open the center shielded compartment on the RF module. 2. On the track, solder a piece of wire approx. 2cm long to TP17 and one to TP4. 3. Guide the wires out of the receiver as measuring lines. 4. Set the C540 trimmer in the shielded compartment to precisely 2.4V; (use TP17 and TP4 for this).					
3.2.1	Mid range limit	See 3.1	Use TUNE to set the medium receiving frequency.	RF module Solder side: TP 17	+2.3V to +2.5V	Alignment via RF module, component side C540
3.2.2	Lowest range limit	See 3.1	Use TUNE to set the lowest receiving frequency.	TP 17	+0.8V to +2.0V	–
3.2.3	Uppermost range limit	See 3.1	Use TUNE to set the highest receiving frequency.	TP 17	+3.0V to +4.2V	–
3.3	**Oscillator**					
3.3.1	1. frequency measurement	See 3.1	Use the "SET" and "DOWN" buttons to switch to the mid receiving frequency; then spectrum analyzer	TP 1	LO1= f_E +241MHz	–
3.3.2	1. Oscillator level	See 3.1	See 3.3.1	TP 102 / TP 202	+4.3 V	Measurement takes place indirectly via the voltage at the 1st oscillator
3.3.3	2. frequency measurement	See 3.1	See 3.3.1	TP 300	230.3MHz ± 11.5kHz	–
3.3.4	2. Oscillator level	See 3.1	See 3.3.1	TP 300	-20dBm to -35dBm	–
3.4	Sensitivity, channel 1	Set the receiving frequency on the RF signal generator: ANT I RF: 2, 5µV; deviation: 24kHz mod: off	Center frequency; Squelch at "0"; AF level measuring device	AF output	Better than 52dB(A)	–
3.5	Sensitivity, channel 2	See 3.4 at ANT II	See 3.4	AF output	Better than 52dB(A)	–
3.6	THD, channel 1	RF signal generator at ANT I RF: 1mV; deviation: 24kHz mod: 1kHz	–	AF output	< 0.9%, typ. 0,3%	–
3.7	THD, channel 2	See 3.4 at ANT II	–	AF output	< 0.9%, typ. 0,3%	–
3.8	S/N max., channel 1	See 3.4 at ANT I Mod: off	–	–	Better than 110dB(A)	–
3.9	S/N max, channel 2	See 3.4 at ANT II Mod: off	–	–	Better than 110dB(A)	–
3.10	AF output voltage, tuner 1	See 3.1; Mod: on, deviation: 48kHz	with AF meter	TP 6	+540mV$_{eff}$ to +555mV$_{eff}$	Alignment via R360
3.11	AF output voltage, tuner 2	See 3.1 Mod: on, deviation: 48kHz	with AF meter	TP 8	+540mV$_{eff}$ to +555mV$_{eff}$	Alignment via R460

Sequence	Type of measure-ment/adjustment	Signal input	Settings	Measuring point/test point	Required value	Remarks
3.12	Balanced RF output voltage at 1kHz peak deviation	Feed in via XLR socket	–	–	+18dBu and +6.1V	–
3.13	Unbalanced RF output voltage at 1kHz peak deviation	Feed in via Jack socket	–	–	+12dBu and +3.0V	–
4	**Pilot tone**					
4.1	Pilot tone on	RF signal generator at ANT I: RF level: 1mV **FM1** Deviation: 24kHz Mod: 1kHz **FM2** Deviation: 2kHz Mod: 32.768kHz	Pilot tone: ''ON''	XLR socket	10dBu	–
4.2	Pilot tone off	RF signal generator at ANT I: RF level: 1mV **FM1** Deviation: 24kHz Mod: 1kHz **FM2** OFF	See 4.1	XLR socket	no signal	The display is red illuminated
5	**Monitor module (only EM 500 G2)**					
5.1	Monitor output "PHONE"	Reduce deviation from 24kHz to 6kHz.	–	–	–	AF segments 1 to 2 bars
5.2	Monitor output "PHONE"	+12V_{DC} at the DC socket	oscilloscope at the relevant PHONE connection: Termination impedances, 32Ω in connector.	Gradually turn monitor control VOL to maximum, noting the sinus test signal. The signal must increase cleanly and evenly, without distortion or drop-out, until it starts to clip.		
5.3	Volume control	+12V_{DC} at the DC socket	"POWER" = On	–	–	No "scratching" is heard on turning and there is no tone drop-out.
6	**Display module** - The EM 100 G2 exhibits a change in the form of individual segments. - The EM 300 G2 and EM 500 G2 exhibit consistent changes in color display.					
6.1	RF display	RF signal at ANT I Mod: off **RF: 3µV** RF signal at ANT II Mod: off **RF: 3µV**	–	EM 100 G2 EM 300 G2, EM 500 G2 EM 100 G2 EM 300 G2, EM 500 G2	AF segment, no bar RF segments 2 ± 1 bar Diversity display I lights up AF segment not visible RF segments visible Diversity display I lights up AF segment, no bar RF segments 2 ± 1 bar Diversity display II lights up AF segment not visible RF segments visible Diversity display II lights up	
6.2	RF display	See 5.1 **RF: 20µV**	–	EM 100 G2 EM 300 G2, EM 500 G2	RF segment: 4 bars RF segment: 25dB	
6.3	RF display	See 5.1 **RF: 1mV**	–	EM 100 G2 EM 300 G2, EM 500 G2	RF segments:end-scale deflection RF segments:end-scale deflection	
6.4	AF display at nominal deviation	24kHz Mod: off	–	All	AF display "0"	
6.5	AF display at nominal deviation	48kHz Mod: off	–	All	PEAK	

5.4 Reading out/changing unit data via the “DATA“ service interface

5.4.1 Overview

You can read out and change unit data via the integrated “DATA“ service interface.
For example, Sennheiser's service software helps you with the following functions:

- Reading out the current software version and, if necessary, initiating a software update.
- Commissioning the receiver following replacement of hardware (e.g. when a board is changed).
- Changing the current frequency table.
- Changing/resetting the receiver factory settings.

5.4.2 Required hardware

You need the Sennheiser service set for unit data read-in and read-out.

The service set contains for portable ew G2 units
- an infrared adapter for reading out/in data from portable units (e. g. SK 100),

for rack-mount ew G2 units
- an RS232/RS485 converter,
- an RS232 cable to connect the PC and the converter.
- an RS485 cable to connect the receiver and the converter.

You can order the service set directly from Sennheiser:
service set for software ew G2, ID no. 094739, price group 161

5.4.3 Required software

The service software is available for download free of charge on our Internet homepage:

www.sennheise.com > Service & Distributors > Service Documentation > Download

The minimum operating system requirement to run the software is Microsoft® Windows 95™ ,
and a free COM port (RS232) is also required.

5.4.4 Information about the service software

A user guide for the service software is available in PDF format. It contains information about how to commission the service set, how to install the service software and how to read in/out unit data.

Please find more informations in the instructions for use of the ew G2 service software. Once the installation of the software is complete you can find this help file in the Windows menu [Start].

5.4.5 Commissioning after board replacement

After you have fitted a new board to the unit, you must use the service software to write the data to the unit again (e.g. new frequency table).

Requirements

1. You have replaced a faulty board (e.g. receiver RF board),
2. You have connected the receiver via the DC IN an +12 V DC socket.
3. You have connected the unit to the COM port on the PC via the ‘‘DATA‘‘ service interface.
4. You have installed the service software and launched it.
5. You have switched on the unit.

Writing unit data

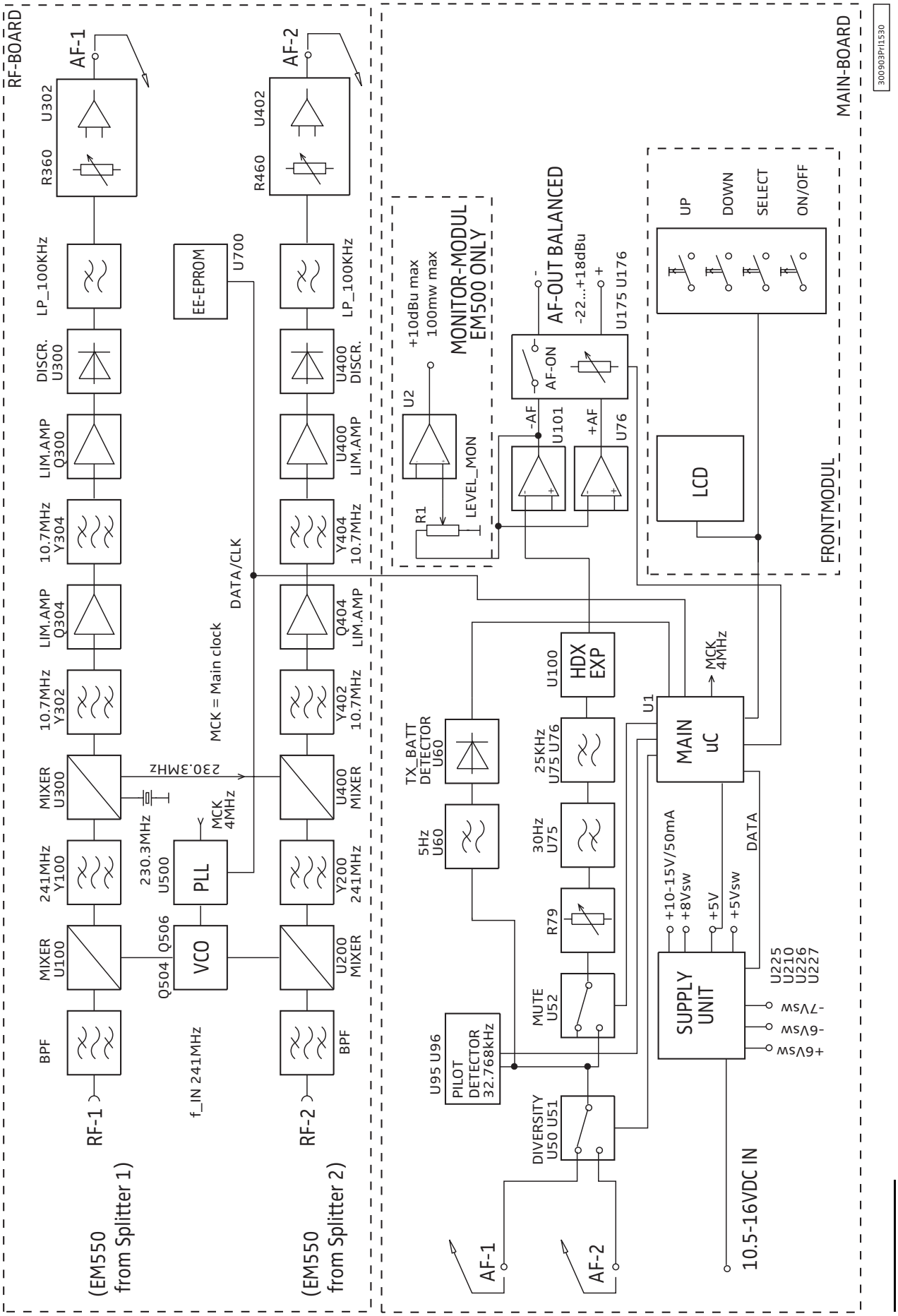
Perform the following steps:

1. Click the button [Auto Detect].
   Result: Your connected unit is detected.
2. Click the button [EXECUTE ALL] in the Info tab.
   Result: All unit data is read out. If all the data are successfully read out, the message ‘‘Success‘‘ appears.
   Note: If you perform individual actions in the ‘‘Info‘‘ or ‘‘Service‘‘ tabs, you must subsequently return the unit to operational status. Click on [Close Device] once the actions have been completed to do this.
3. Switch to the ‘‘Service‘‘ tab.
4. Click the button [EXECUTE ALL].
   Result: The new unit data will be written. If all the data are successfully written, the message "Success" appears.

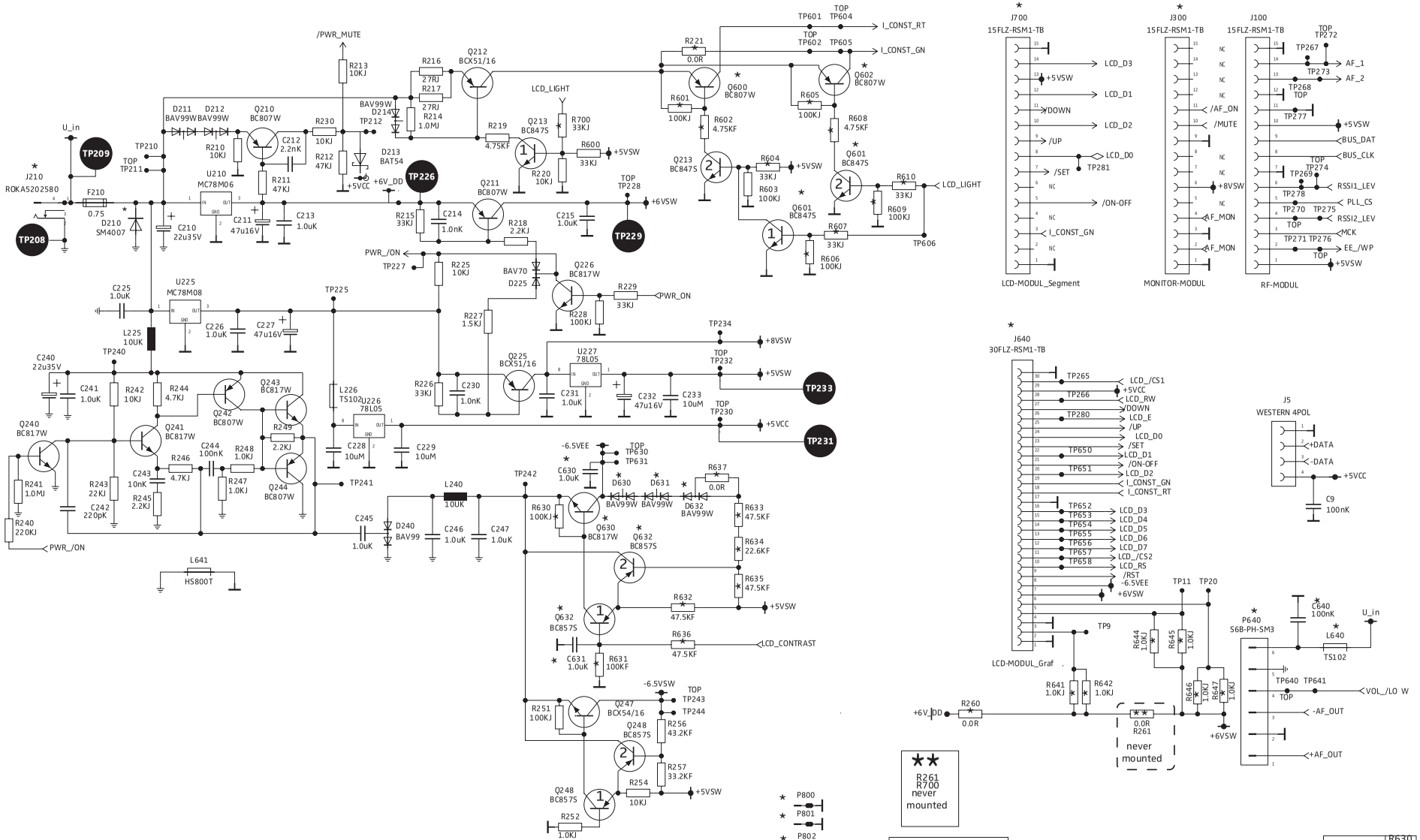
Result

You have successfully written the new data to the unit. These new data now correspond to the new factory settings for your unit. Your can find these data in ‘‘D:\Sennheiser\ew G2 service package‘‘ in the files ‘‘Defaults.dat‘‘ and ‘‘FreqTable.dat‘‘ or alternatively ‘‘FreqTableIEM.dat‘‘.

6 Circuit diagrams



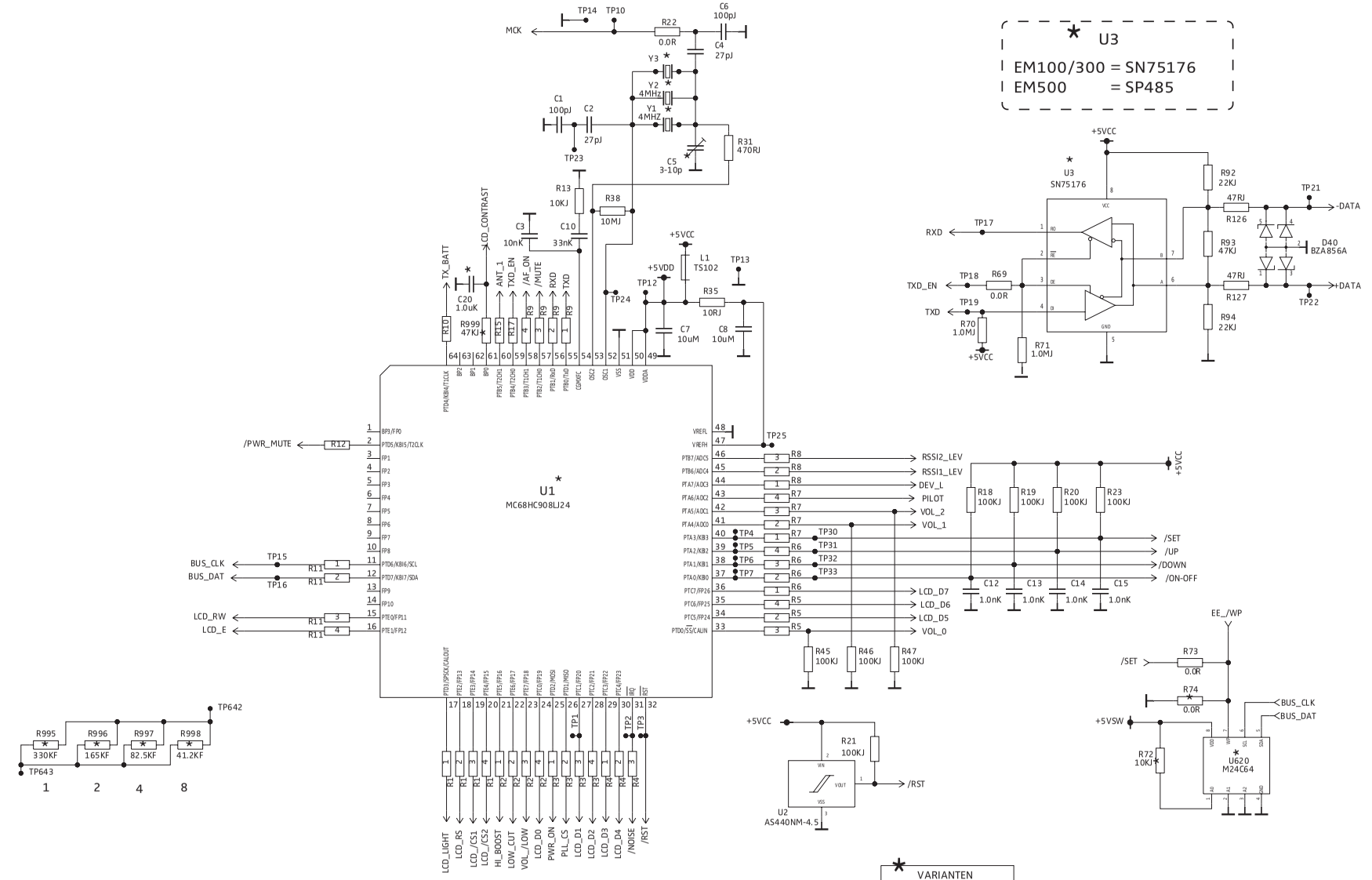
Block diagram



★ VARIANTEN
nm = not mounted
m = mounted

	P801	P800 P802	J210	J300	J640	J700	P640	D210	D630 D631 D632	Q600 Q601 Q602	Q630 Q632	L640	C630 C631	C640	R221	R260	R641 R642	R644 R645 R646 R647	R601 R602 R604 R605 R606 R609 R610 R607 R608	R630 R631 R632 R633 R634 R635 R636 R637
EM100	m	nm	m	nm	m	nm	m	nm	nm	nm	nm	nm	nm	nm	m	nm	nm	nm	nm	nm
EM300	m	nm	m	nm	m	nm	m	nm	m	m	m	nm	m	nm	nm	m	m	m	m	m
EM500	m	nm	m	m	m	nm	m	nm	m	m	m	nm	m	nm	nm	m	m	m	m	m

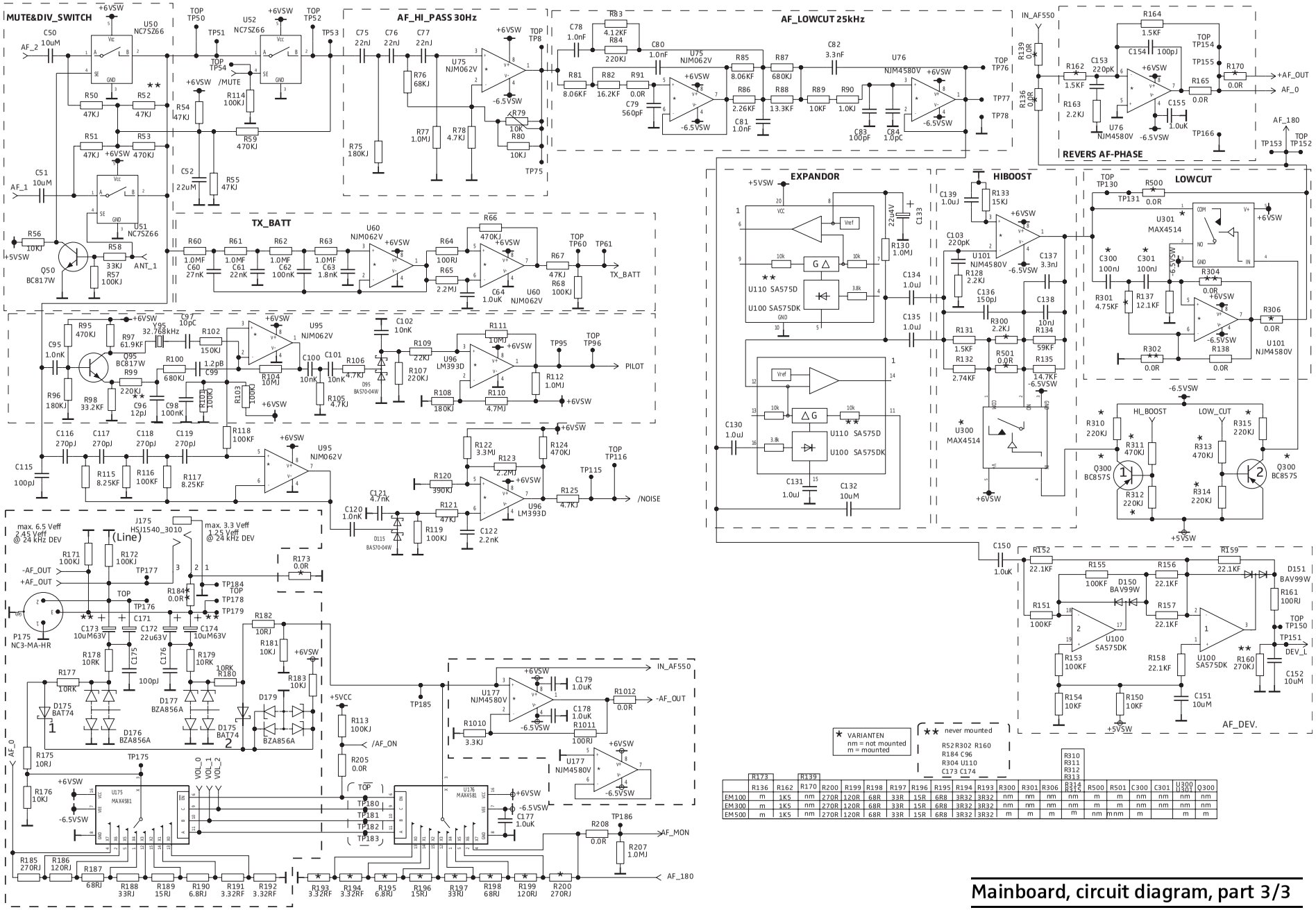
Mainboard, circuit diagram, part 1/3



	U1(87224)	U620	R72	R74	R995	R996	R997	R998	R999	C5	C20	Y1 72339	Y2 87187
EM100	MC68HC908LJ24	nm	nm	nm	m	nm	nm	nm	nm	nm	nm	m	nm
EM300	MC68HC908LJ24	nm	nm	nm	nm	m	nm	nm	m	nm	m	m	nm
EM500	MC68HC908LJ24	nm	nm	nm	m	m	nm	nm	m	nm	m	m	nm

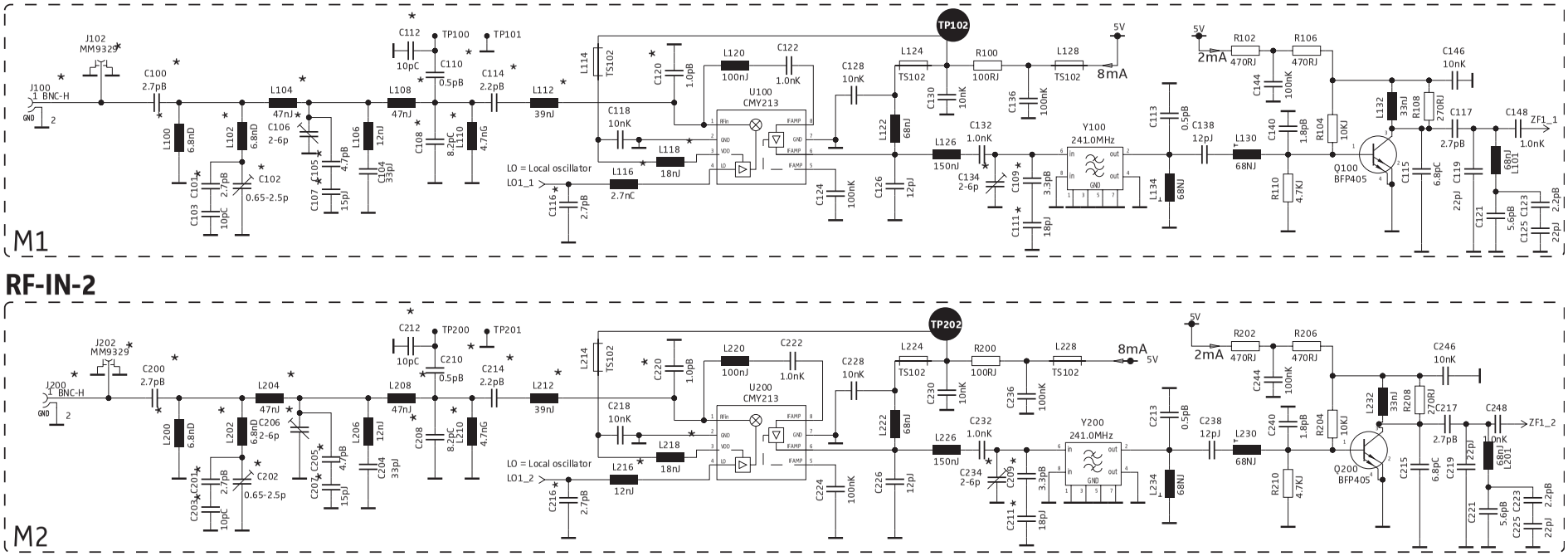
VARIANTEN
nm = not mounted
m = mounted

Mainboard, circuit diagram, part 2/3



	R173		R139																			
	R136	R162	R170	R200	R199	R198	R197	R196	R195	R194	R193	R300	R301	R306	R310 R311 R312 R313 R314 R315	R500	R501	C300	C301	U300 U301	Q300
EM100	m	1K5	nm	270R	120R	68R	33R	15R	6R8	3R32	3R32	nm	nm	nm	nm	m	m	nm	nm	nm	nm
EM300	m	1K5	nm	270R	120R	68R	33R	15R	6R8	3R32	3R32	nm	nm	nm	nm	m	m	nm	nm	nm	nm
EM500	m	1K5	nm	270R	120R	68R	33R	15R	6R8	3R32	3R32	m	m	m	m	nm	nm	m		m	m

Mainboard, circuit diagram, part 3/3



* Variable RF-Parts (Range4 EM100-500 is shown)

Range	EM100-500										
	C100 C200	C101 C201	C102 C202	C103	C203	C105 C205	C106 C206	C107 C207	L100 L200	L102 L202	L104 L204
1	3p9B	5p6B	n.m.	15pJ	15pJ	10pC	n.m.	100pJ	10nJ	6n8D	47nJ
2	3p9B	4p7B	n.m.	18pJ	18pJ	8p2C	n.m.	22pJ	6n8D	6n8D	47nJ
3	3p3B	3p3B	n.m.	10pC	10pC	5p6B	n.m.	18pJ	6n8D	6n8D	47nJ
4	2p7B	2p7B	n.m.	10pC	10pC	4p7B	n.m.	15pJ	6n8D	6n8D	47nJ
5	2p7B	2p2B	n.m.	15pJ	12pJ	3p9B	n.m.	18pJ	6n8D	6n8D	47nJ

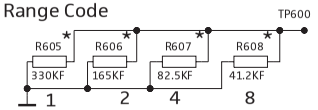
EM100-500														
C108 C208	C109 C209	C110 C210	C111 C211	C112 C212	C114 C214	C116 C216	C120 C220	C134 C234	L108 L208	L110 L210	L112 L212	L116	L216	L118 L218
10pC	3p3B	1p0B	18pJ	10pC	2p2B	n.m.	0p5B	n.m.	56nJ	6n8D	39nJ	10nJ	27nJ	33nJ
8p2C	3p3B	n.m.	18pJ	n.m.	2p2B	n.m.	n.m.	n.m.	47nJ	5n6D	39nJ	4n7D	12nJ	27nJ
10pC	3p3B	n.m.	18pJ	n.m.	2p2B	n.m.	n.m.	n.m.	39nJ	4n7D	39nJ	2n7C	12nJ	18nJ
8p2C	3p3B	n.m.	18pJ	n.m.	2p2B	n.m.	n.m.	n.m.	47nJ	4n7D	39nJ	2n7C	12nJ	18nJ
6p8C	3p3B	0p5B	18pJ	10pC	2p2B	n.m.	n.m.	n.m.	47nJ	4n7D	33nJ	2n7C	12nJ	18nJ

Version	Version Code					
	R600	R601	R602	R603	J100 J200	J102 J202
EM100 -500	m	nm	nm	nm	m	nm

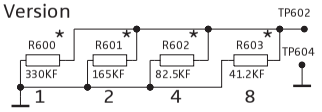
040803Prl1415

Range	Range Code			
	R605	R606	R607	R608
1	m	nm	nm	nm
2	nm	m	nm	nm
3	m	m	nm	nm
4	nm	nm	m	nm
5	m	nm	m	nm
6	nm	m	m	nm
7	m	m	m	nm

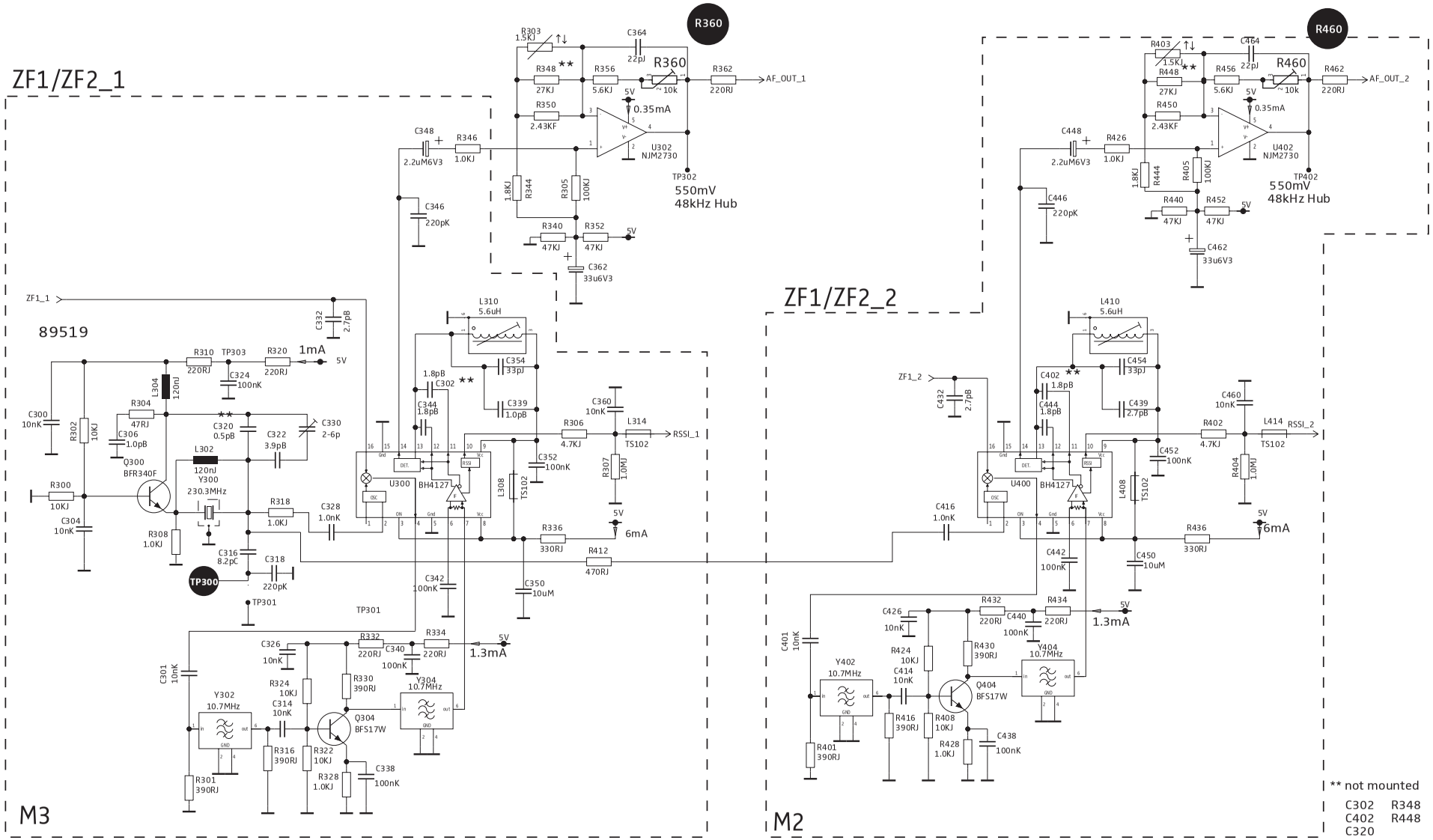
Range Code



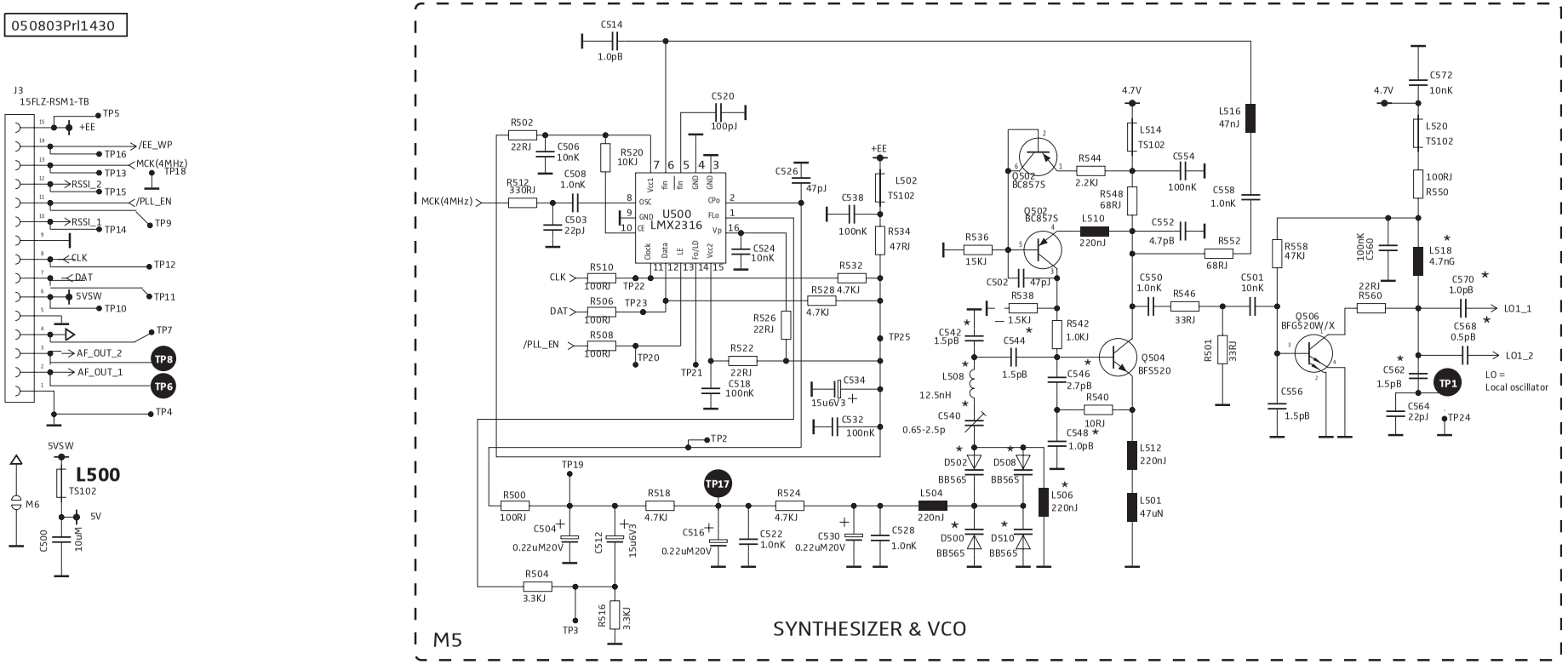
Version



RF board, circuit diagram, part 1/3



RF board, circuit diagram, part 2/3



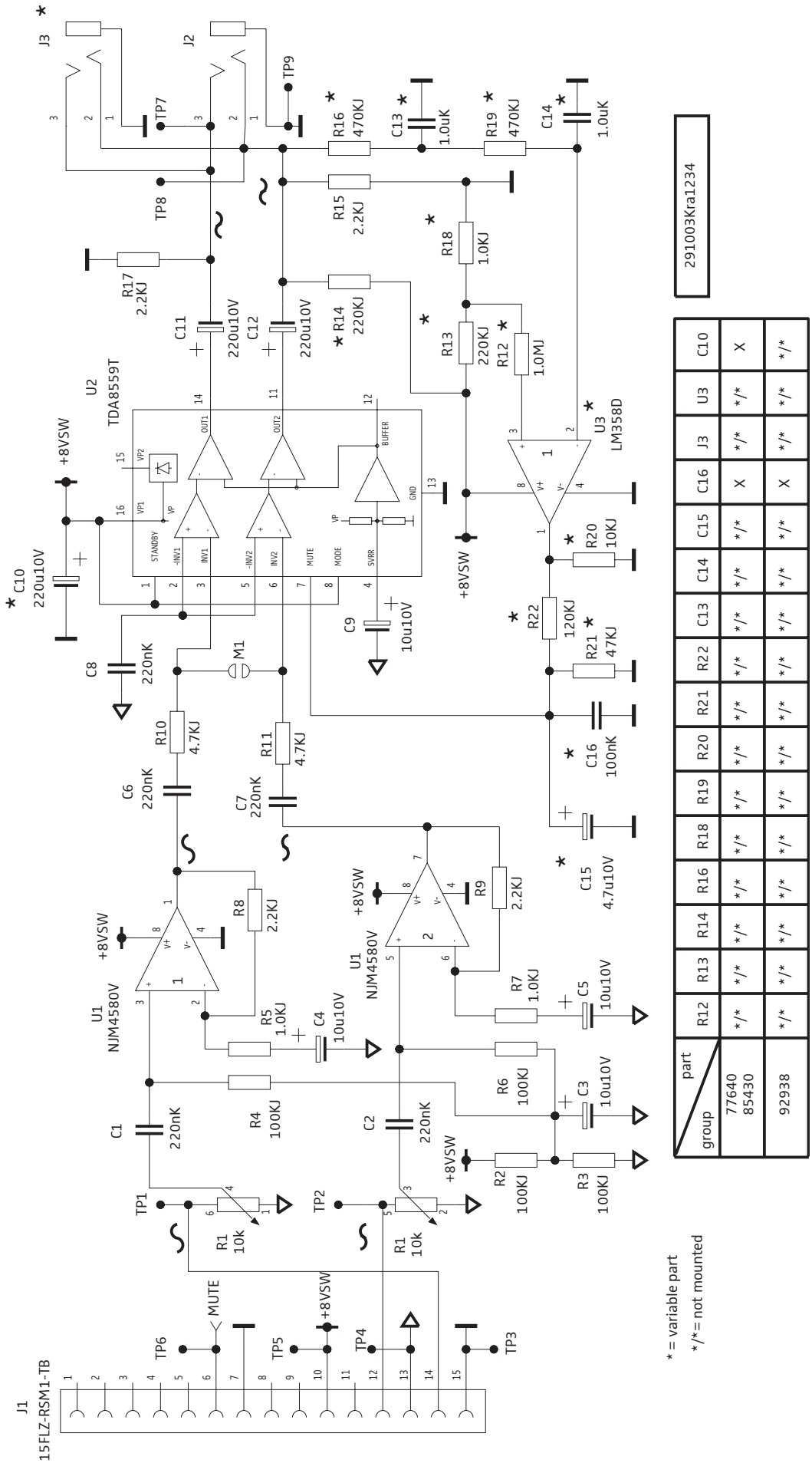
Range	* Variable Parts														
	C540	C542	C544	C546	C548	C562	C568	C570	D500	D502	D508	D510	L506	L508	L518
1	2-6p	1p8B	1p8B	4p7B	1p0B	3p3B	0p5B	0p75B	n.m.	m	n.m.	m	220nJ	18n5	6n8D
2	2-6p	1p8B	1p8B	3p9B	1p0B	2p7B	0p5B	0p75B	n.m.	m	n.m.	m	220nJ	12n5	4n7G
3	0.65-2.5p	1p8B	1p8B	2p7B	1p0B	1p5B	0p5B	0p75B	n.m.	m	n.m.	m	220nJ	12n5	5n6D
4	0.65-2.5p	1p5B	1p5B	2p7B	1p0B	1p5B	0p5B	1p0B	n.m.	m	n.m.	m	220nJ	12n5	4n7G
5	0.65-2.5p	1p0B	1p5B	2p7B	1p0B	1p5B	0p5B	1p0B	n.m.	m	n.m.	m	220nJ	12n5	4n7G

**

R700 R702	m. n.m.

m. = mounted
n.m. = not mounted

RF board, circuit diagram, part 3/3



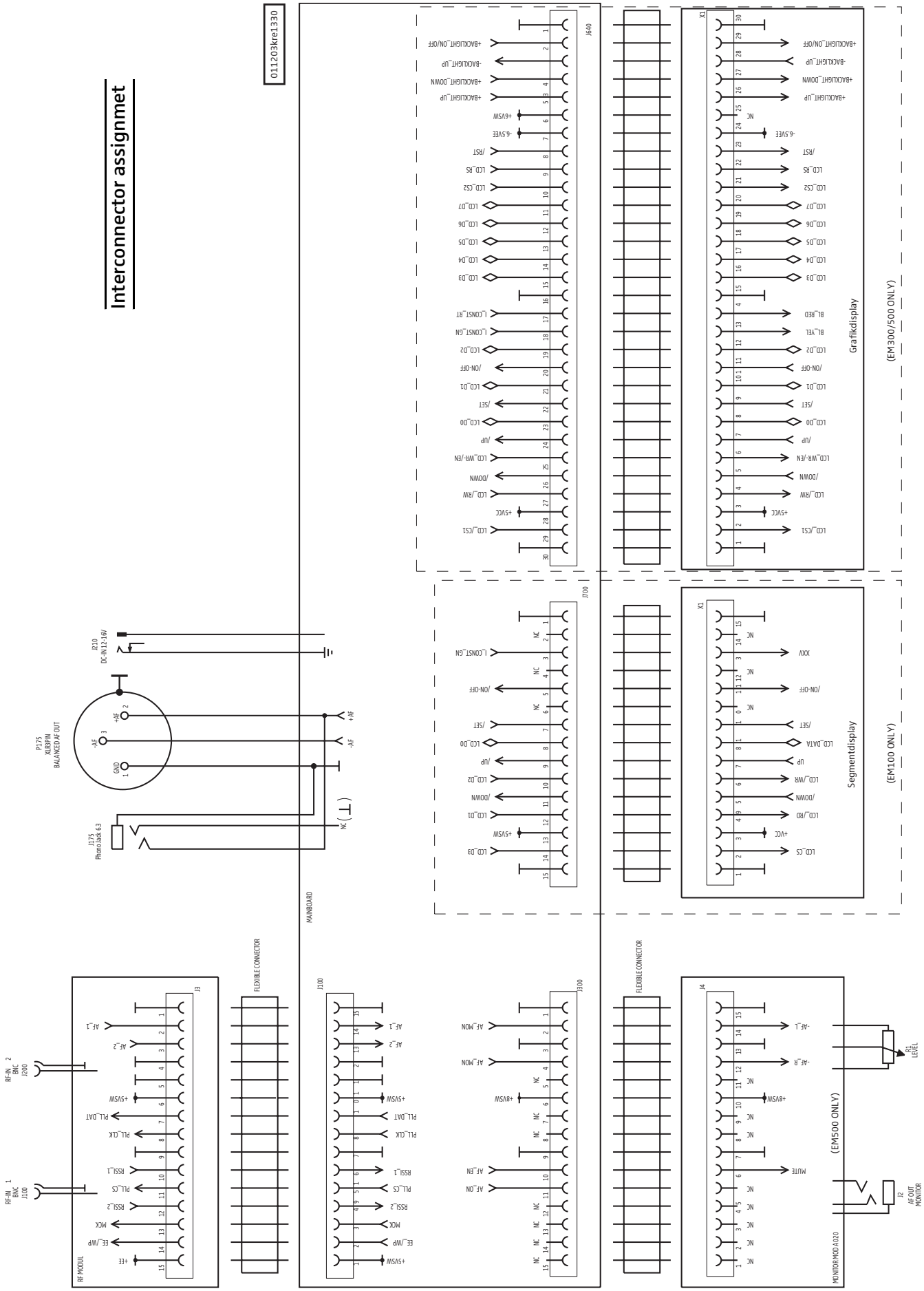
part / group	R12	R13	R14	R16	R18	R19	R20	R21	R22	C13	C14	C15	C16	J3	U3	C10
77640 85430	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	X	*/*	*/*	X
92938	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	*/*	X	*/*	*/*	*/*

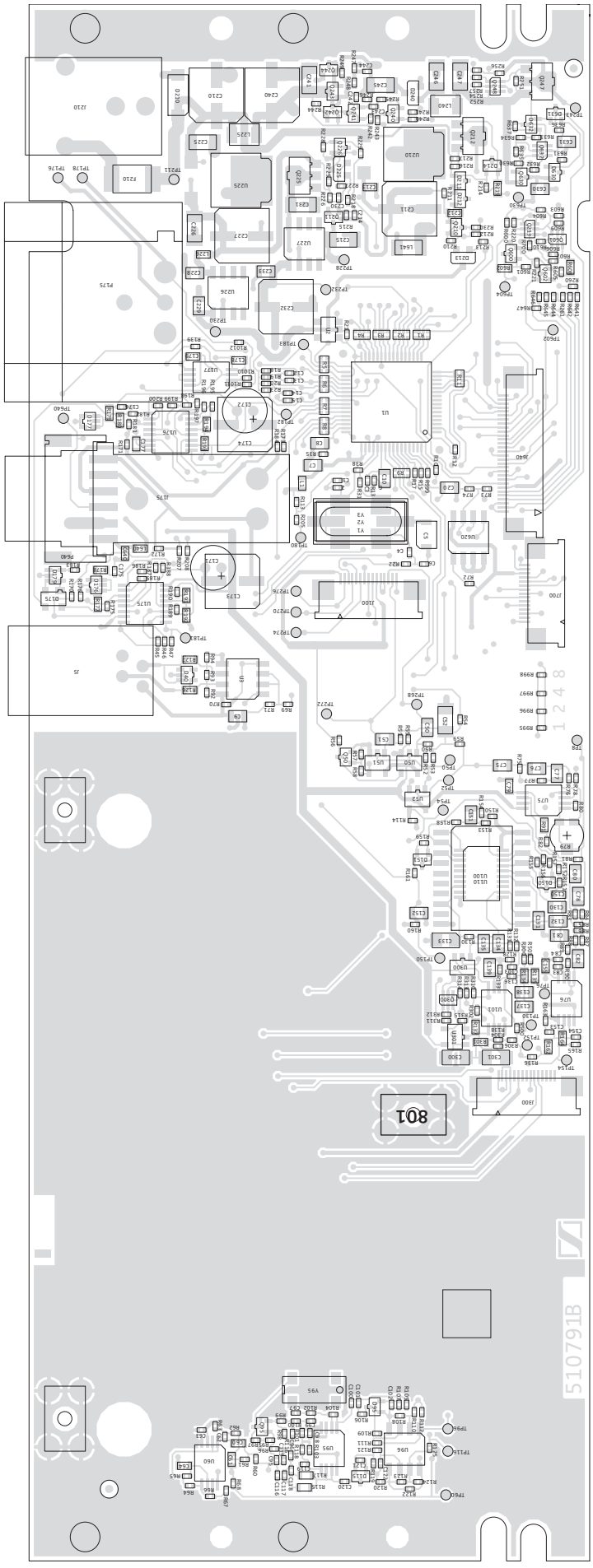
291003Kra1234

* = variable part
/= not mounted

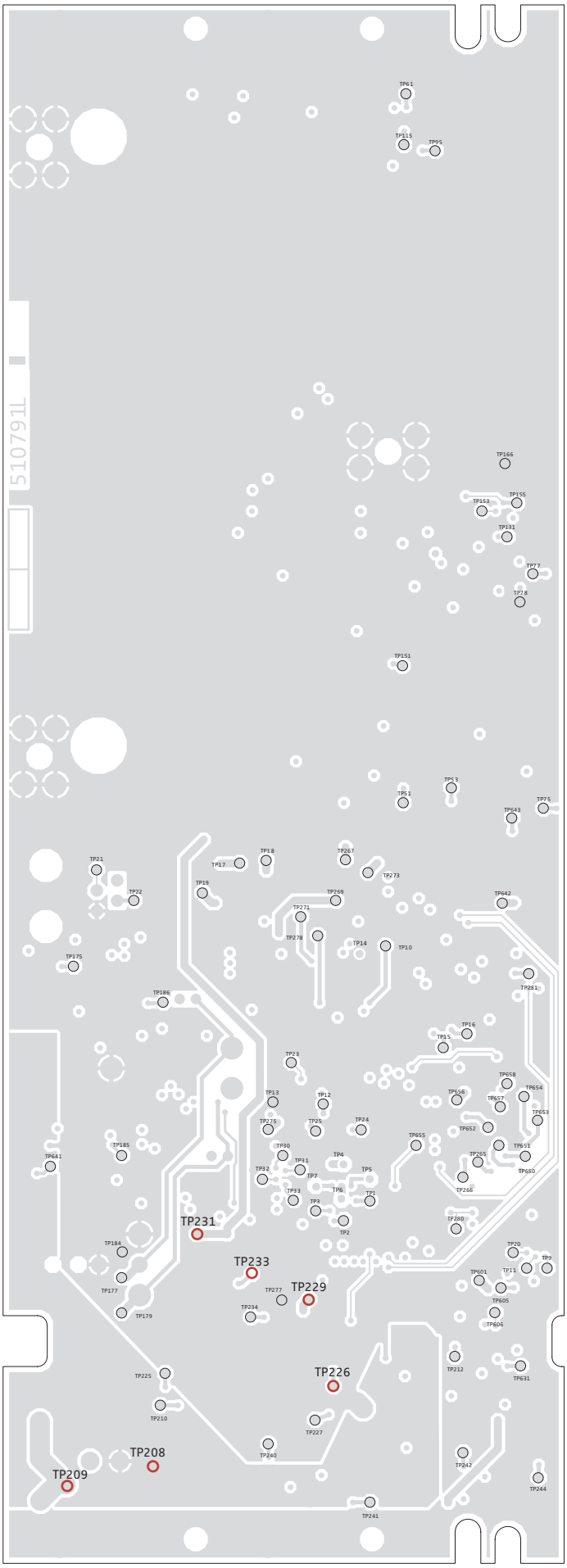
Monitoring module MOD.A020, Circuit diagram

Interconnector assignmet

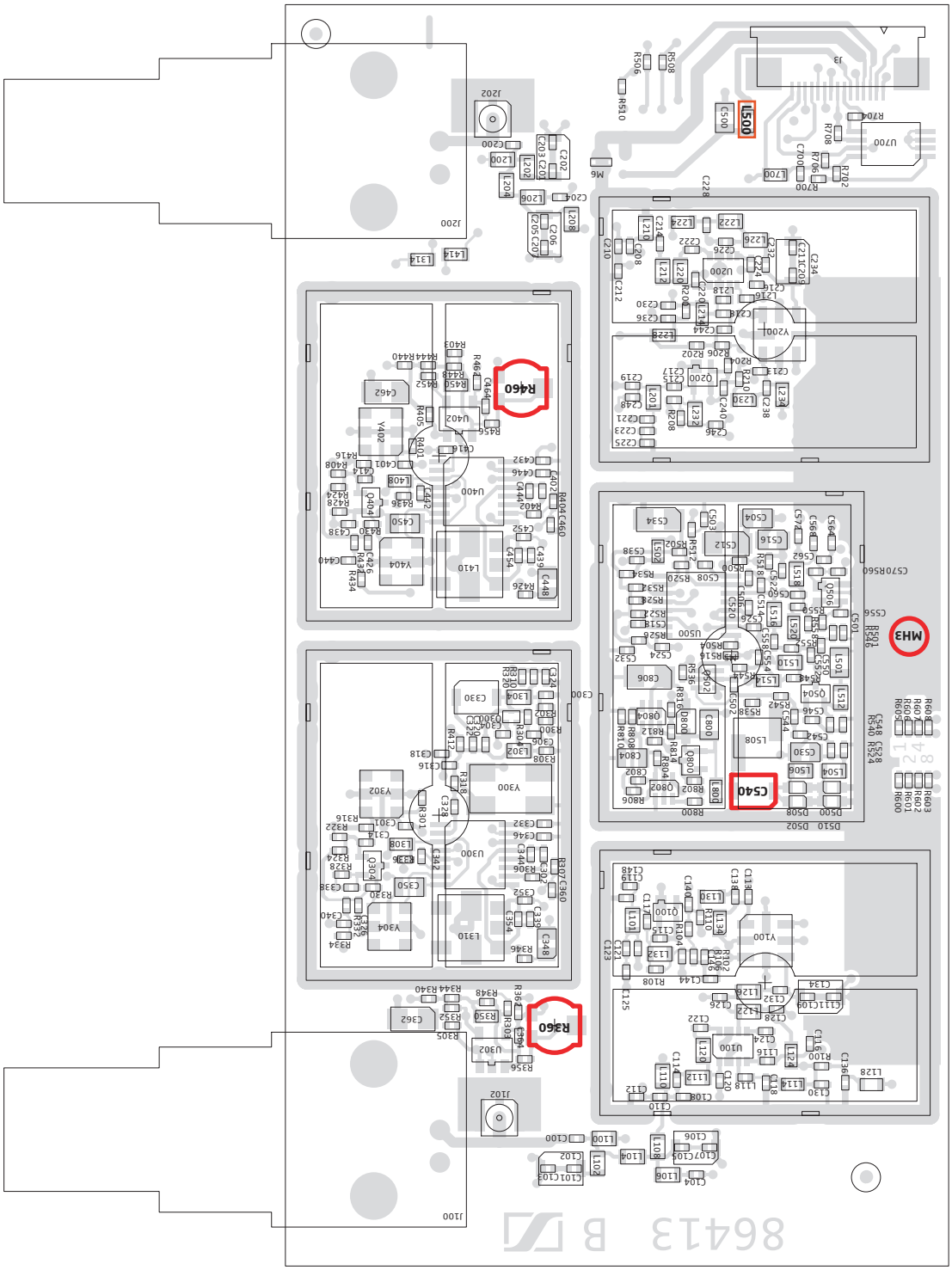




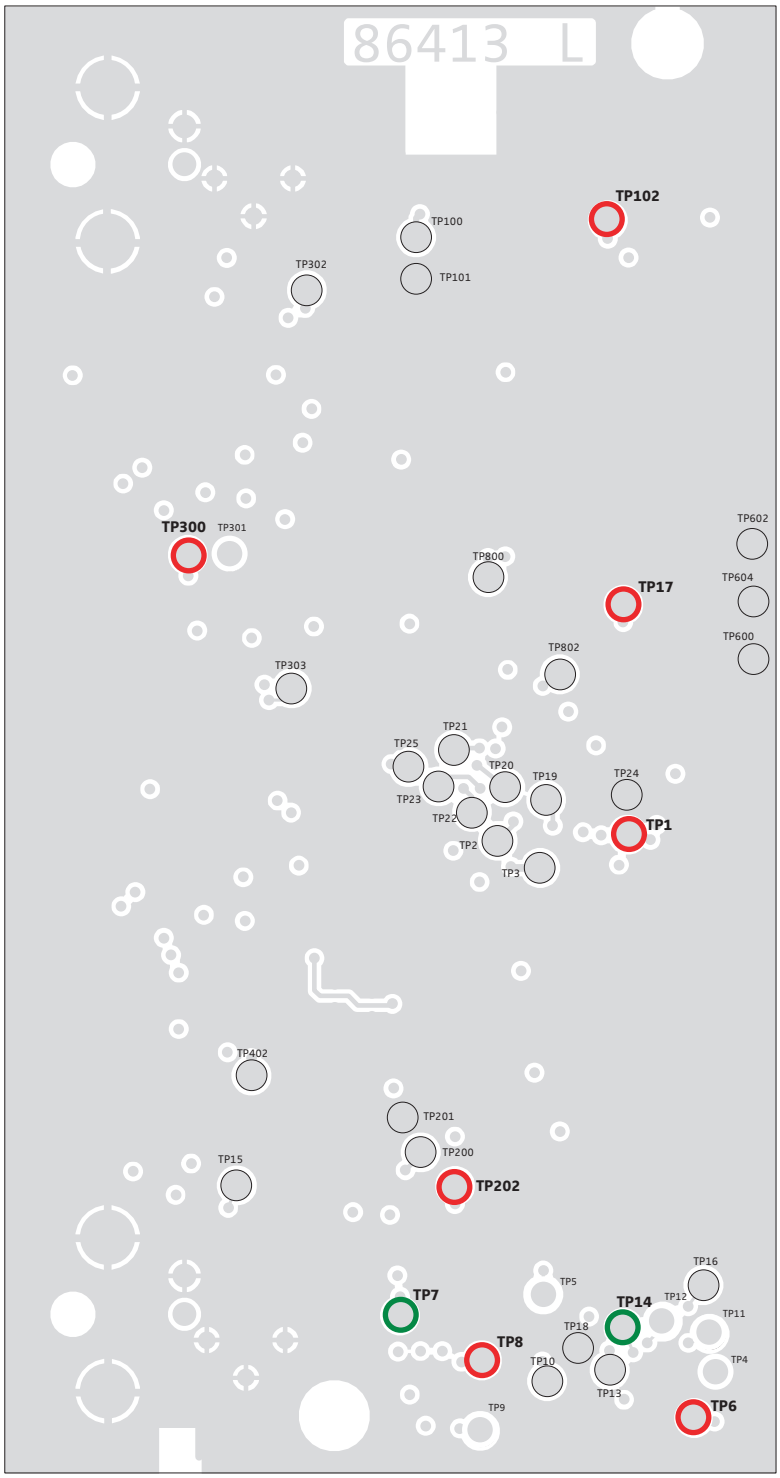
Mainboard, component side



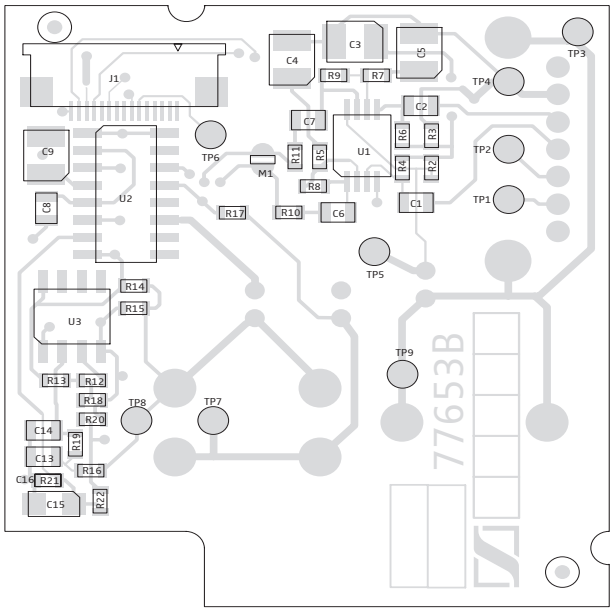
Mainboard, solder side



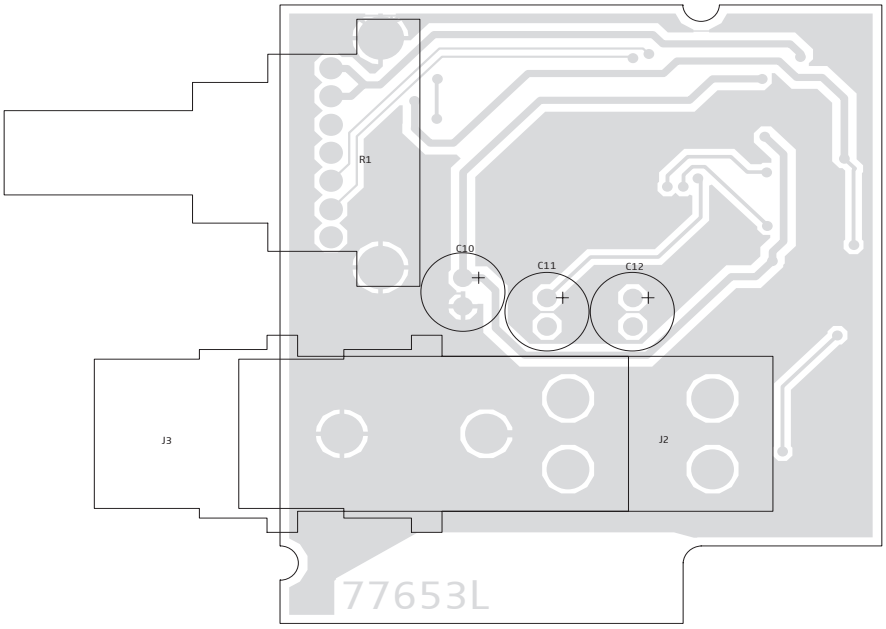
RF board, component side



RF board, solder side



Monitoring module MOD.A020
Component side



Monitoring module: MOD.A020
Solder side