Service manual

DRM 85
DRM 85-C

SA 070931

Short description

The Digital Recording Microphone is based on traditional microphone techniques in order to achieve excellent acquisition performance. It includes embedded recorder functionalities, that stores the digitized audio data to a 1 GByte NAND Flash Memory.

The USB port can be used to download the audio data to a PC with a standard browser as well to upload configuration data from PC to the DRM. Two AA mignon alkaline batteries provide about 7 hours continous power.

Features

- Omni-directional condenser capsule at DRM 85, cardioid condenser capsule at DRM 85C
- Pre-record buffer 0 to 10 seconds
- Digital / Analog converter
- DC/DC converter

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.

For safety and certification reasons it is forbidden to alter the product without authorization. Otherwise, the person who has altered the product is liable for any consequential damage.

repairs/exchanges

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

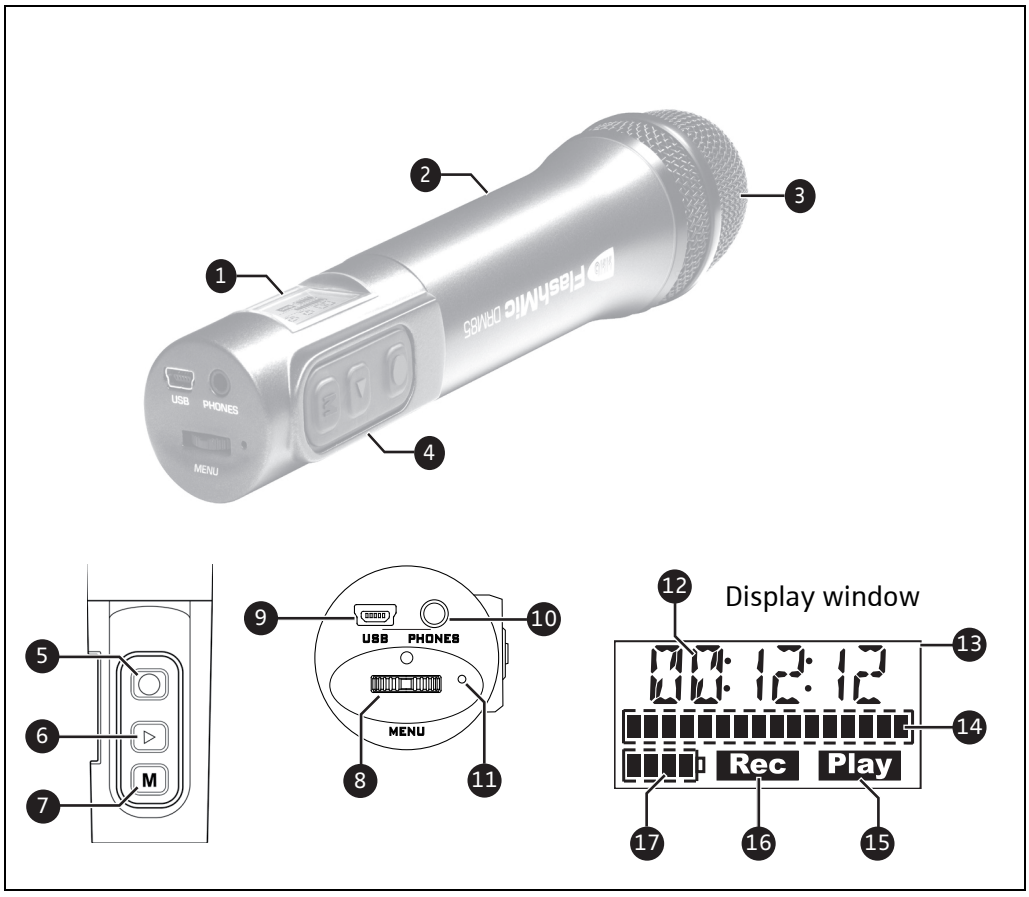
CAUTION

During SMD component soldering you may destroy them by using a standard soldering iron for several seconds.

Only use adapted soldering tools when soldering SMD components.

Contents

1 Controls and indicators



1. LC display
2. FlashMic body
3. Protective basket (windshield) over mic capsule
4. Main operating control section
5. REC button [●]
6. PLAY button [▶]
7. MENU/STOP button [M]
8. Multi-function jogswitch control
9. USB connector (5 pin Mini-B)
10. PHONES: monitor output (3.5 mm 3-pole jack socket)
11. Record mode LED (REC LED)
12. 6-character alphanumeric display
13. Display backlight
14. 16-segment bargraph meter -
    provides an indication of recording and playback level
15. ''PLAY'' - indicates FlashMic is in replay mode
16. ''REC'' - indicates FlashMic is in record mode
17. 4-segment battery status indicator

2 Specifications

Sampling frequency	48 kHz, 44.1 kHz or 32 kHz; selection with FlashMic Manager software or DRM 85 directly.
Bit resolution (linear)	16 Bit
Audio formats	linear PCM or MPEG 1 layer 2; selection with FlashMic Manager software or DRM 85.6 mode settings
Bit rate (MPEG)	192 kbps, 160 kbps or 128 kbps
Frequency response (recorder)	
without capsule	20 Hz to 20 kHz ± 1 dB at 48 kHz FS Linear PCM
with capsule	see measured frequency response curves, page 11ff
THD + N	< 0.1% (20 Hz to 20 kHz) at 48 kHz FS linear PCM
Number of channels	1 (mono)
Microphone capsule	
DRM 85	omni-directional,
DRM 85C	cardioid
Record level	automatic gain control (AGC = on); manual gain control (AGC = off)
High pass filter	switchable on/off; 12 dB/octave at 100 Hz
Data storage system	fixed internal NAND flash memory; capacity 1 GB.
Date / Time	internal real-time clock, running as long as power supply is available. back-up supply for 1 minute to allow battery change. set / synchronized by host computer application according to host computer clock. manual setting on DRM 85 by menu item.
File format	broadcast wave file (.wav). linear PCM or MPEG 1 layer 2 compressed. date / time stamp is stored in file header. Filename generated automatically by DRM 85, basic text string provided from PC software.

File system _____ FAT 16, cluster size 32 kB. mounts as a removable drive via USB mass storage device protocol. file transfer is possible with the FlashMic Manager software or through Windows Explorer and Mac OS finder.

Headphone output _____ 3.5 mm stereo socket, mono signal to both channels. manual volume control by rotary switch. output may be used for audio recording on PC. load impedance for 32 Ω

USB interface _____ USB 2.0 compliant interface with ''Full Speed'' (12 Mbit/s max.) transmission speed
connector type ''Mini B'', 5 pin

User presets _____ Up to 9 presets in a preset.cfg file, uploaded from host computer, selected by menu item on DRM 85

Pre-record _____ off/ on, up to 10 sec in 1 sec step, configured with FlashMic Manager application on host computer

Nominal supply voltage _____ 3 V_{DC}

Operating voltage _____ 2 V_{DC} to 3 V_{DC}

Current consumption
at nominal voltage _____ approx. 175 mA

Battery _____ 2 x mignon AA; per 1.5 V_{DC}

Low Bat switch-off threshold
with batteries _____ +1.8 V_{DC}
with accu _____ +1.9 V_{DC}

Operating time _____ about 7 hrs with Varta blue batteries or Panasonic 2000 mAh Accu

Weight _____ 366 grams (without batteries)

Dimensions _____ length 244 mm / 9.6 inches. diameter at widest point (mic capsule) 50 mm, 2 inches.

Record mode	Audio format	Sample rates	Bit rates	Recording time hours (theoretical)	Recording time hours (displayed)
LIN48K	Linear PCM	48 kHz	768 kbps	3 hrs 6 min	3 hrs 4 min
LIN44K	Linear PCM	44,1 kHz	705.6 kbps	3 hrs 22 min	3 hrs 20 min
LIN32K	Linear PCM	32 kHz	512 kbps	4 hrs 39 min	4 hrs 36 min
MP48k	MPEG1 Layer 2	48 kHz	192 kbps	12 hrs 25 min	12 hrs 18 min
MP44k	MPEG1 Layer 2	44.1 kHz	160 kbps	14 hrs 54 min	14 hrs 46 min
MP32k	MPEG1 Layer 2	32 kHz	128 kbps	18 hrs 38 min	18 hrs 27 min

3 Description

3.1 Mechanical design

Mechanically DRM 85 is based on the Sennheiser Evolution Wireless (generation 2) handheld microphones. A new rear cup was designed to accommodate the keyboard with the push buttons and make accessible a red LED, the user interfaces like USB, headphone output and the rotary control switch.Due to EMC and ESD requirements the rear cup in the same material as ew-G2 has got a metallized coat underneath the lacquered coat.

3.2 Electrical design

DRM 85/ DRM 85-C contains four printed circuit boards:

- AF Board
- Connector Board
- CPU Board
- Keyboard

The KE10 capsule is optimized to an omnidirectional characteristic specially for DRM 85 as well as KE14 to a cardioid characteristic for DRM 85-C. The signal of the capsule is preamplified, digitized and linked via the connector board to the coldfire processor on the CPU Board.

The AF board contains the preamplifier, the preemphasis, the codec and a headphone amplifier for monitoring the recorded or the playback signals. The codec has an onboard A/D-and D/A converter.

The connector board contains the user interfaces like headphone output jack, USB jack and the LC display. It links all control and data signals to and from the codec on the AF Board to the processor on the CPU Board.

The CPU Board contains the power supply section, the CPU section with the coldfire processor for controlling and signal processing and the memory section with the code flash, the SDRAM as a working memory and the data NAND flash.

The keyboard contains the three buttons: Record, Play, Menu/ Stop.

3.3 Functional description

3.3.1 DC supply

Starting with the power supply section located on the CPU board, the system obtains it´s power from a pair of AA type batteries, which can be either primary or secondary cells thus producing a total voltage of 3.0 V in the case of primary cells and of 2.4 V in the case of secondary cells.

If a special Sennheiser accu-pack is used, it can be identified by no voltage at the layer pad M3. In all other cases there can be measured U_accu/2 at M3.

The battery voltage needs to be converted to the system voltages 3.3 V and the processor core operating voltage 1.8 V , from which the device operates. For this purpose a small switching converter is used principally comprising of U600, L600 and D602. This circuit produces a constant 3.3 V at the main reservoir capacitor C611.

This circuit operates in two modes, burst and fixed frequency, selected by controlling Pin2 by the processor (0=Fixed frequency, 1=Burst Mode). Fixed frequency mode operation is used when the DRM is switched into the active state, burst mode when it is switched off into the standby state to maximize battery life.

When switched off the device the control signal from the processor is low, so it has to be inverted via Q604 to high for the burst mode of U600.

Notice that this voltage EVER_3.3 V is constantly available, even when the unit is turned off.

If the battery voltage +Ubatt reaches the threshold of low battery, the backlight, the Rec. LED and also the Batt. Symbol on LCD flashes. A next threshold downwards triggers a shutdown of the device.

Exact values for all thresholds are defined in the software documentation. DRM 85 has about 7 hours life time, measured with VARTA blue batteries and also with Panasonic Accu 2000 mAh.

The converting to 1.8 V is done by U601, L602 and C619 to run in the PWM pulse skipping mode with mode Pin 6 set to V_{in}.

The connector board also hosts an additional power source for the system by way of the USB connector, which becomes energized with 5 V whenever a connection to a PC is made. U201 on the connector board converts the inbound 5 V to the system EVER_3.3 V rail.

3.3.2 CPU and memory section

The code memory can be programmed with the operating system software using the Background Debug Mode (BDM) development tools from Windriver via the BDM port J500.

The code memory is also protected from inadvertent erasure or programming by way of a control signal FWP, which is pulled to O V. When it is desired to program or erase the code flash, the FWP signal must be pulled to 3.3 V (High or H state) which is achieved by software control of CPU port pin GP033.

The unit is turned on by the user operating S500. S500 is a rotary multifunction control switch.

When S500 is pushed, the signal PUSH_SEL goes to O V causing Q602, the main power control FET, to turn-on producing the system 3.3 V rail. After booting, control signal PWR_CTL from the CPU changes to High state, taking over control of the power control FET by way of a second FET Q603. From this point the user may release switch S500 and the power remains on. When the main 3.3 V rail is present, a second switching supply U601 produces the second system rail 1.8 V for the CPU core. As the system 3.3 V rail becomes stable, reset controller U502 unblocks the system reset signal RST*. When the reset signal RST* is in H-state the CPU will begin the boot process fetching instructions from the boot memory U400. U400 is a sixteen bit width flash memory type Atmel AT49BV160C/ ST M28W160ECB70ZB6E which provides 1 MWord (x16) of code storage space. The code contained within U400 runs the entire system. This code can be relocated to run from the CPU´s internal RAM for higher speed operation if desired.

Along with the main 3.3 V rail, the system crystal oscillator Y500 or Y501 starts, selected by the logic state of U503. The system oscillator signal, MASTEROSC, provides the Coldfire CPU clock signal which can be monitored at TP500. Frequencies of 11.2896 MHz or 12.288 MHz are used by the CPU to furnish audio sample rates of 44.1 kHz, 48 kHz and 32 kHz, and are selected as appropriate by system software controlling the logic gate U503 which in turn enables the corresponding oscillator IC.

Two additional memory elements are connected to the Coldfire CPU. U402 is a large 16 bit width Synchronous DRAM type Samsung K4S641633H providing 1 M x 16 bits x 4 banks of volatile storage and can be used by the system for temporary storage of audio or other data.

U401 is an 8 bit width non-volatile NAND flash memory type Samsung K9K4G08U0A providing up to 8 Gbits of storage space for audio data.The NAND flash memory U402 also has a control signal NWP* to prevent accidental erasure which must be in the high (H) state before storage or erasure can take place. This memory is controlled by signals CLE, ALE, SRE, SWE and NAND* which are used to latch either command signals, address signals, read, write and select accordingly.

The intended purpose of NAND flash memory U401 is to store audio data (recordings) and is intended to be used as a virtual disk-drive by way of file system software running on the DRM target hardware.

3.3.3 Real time clock

Real Time Clock U203 type Ricoh R2051 K provides the CPU with a source of time and date information upon request via an IIC connection. The time and date information is used by the system software to add to the recorded files. U203 is supplied by the EVER_3.3 V to run even if the device is switched off.

3.3.4 User Interfaces

Control elements - Switches
Rotary multifunction switch S500 along with additional switches S1, S2, and S3 located on the keyboard provide the input side of the user interface to the CPU. Signals CW1, CW2, CCW1 and CCW2 are provided by S500 for menu navigation and control in concert with signals SW1, SW2 and SW3 from the switches S1 to S3. Assertion of either the SELECT signal (pushing the multifunction control in) or any other control switch event causes either GPI05 or GPI06 to fall low and can be used to generate a hardware interrupt condition to the system software.

USB
A USB interface U602 type Philips ISP1582 is used to provide connectivity to an external personal computer. When connected to a PC the DRM enters a special state for file transfer and all other processes (record or playback) are terminated in difference to the 'disk drive' type operations possible over USB.

Stored files may be transferred across the USB connection at transfer speeds up to 12 Mbits/s (Full Speed) but using USB2.0 protocol set. In conjunction with a flash file system suited to the NAND flash memory and USB protocol software, the DRM appears to the remote PC as a removable disk drive.The connected state allows operation direct from USB power with no batteries fitted.

Headphone Output
J203 located on the connector board can be used to monitor a current recording, a playback signal or a sound check to adjust the record level. The headphone output level can be adjusted in steps from 0 to 50, diplayed on the LCD:

- Total range is 68 dB,
- Step 50 to step 18 in 1 dB steps
- Step 18 to step 0 in 2 dB steps
- Step 50 to step 20 reduces the gain in Mout inside the codec, Step 20 to step 0 increases the attenuation of the digital attenuator inside the codec.

LCD
The output side of the user interface is provided by way of a small Liquid Crystal Display element driven by an LCD controller IC U205. U205 is connected to the LCD element via J205, and is serially connected to the CPU via signals LCD_R, LCD_W, LCD_CS, and LCD_D.

The LCD controller provides it's own system clock, although an additional clock LCDCLK can be sourced from Real Time Clock IC U203.

A backlighting LED D209 is present on the connector board, driven by a dual transistor Q201, controlled by signal BACKLIGHT from the CPU, and is used to improve the visibility of the LCD under low ambient light conditions.

LED
A single red LED D609 driven by CPU GPI048 is used to signal 'record' state to the user. In case of low battery the red LED flashes together with the LCD backlight LED and the battery symbol, displayed on the LCD.

3.3.5 AF signal processing

The AF Board hosts the microphone preamplifier section, an audio codec and a headphone amplifier. Audio signal voltages from an electret microphone capsule are amplified by U101 who's gain is controlled by a digitally adjustable potentiometer U107. U107 is connected to the CPU via standard SPI. Second part of U101 forms a low cut filter which can be switched on and off by selecting the outputs of U101 to the inputs of the codec U105. Codec IC U105 ADC section converts the microphone signals into IIS format digital audio data which is passed to the CPU audio port via J102. An automatic gain control circuit inside the codec performs an adequate gain range suitable for both electret and dynamic capsules under software control.

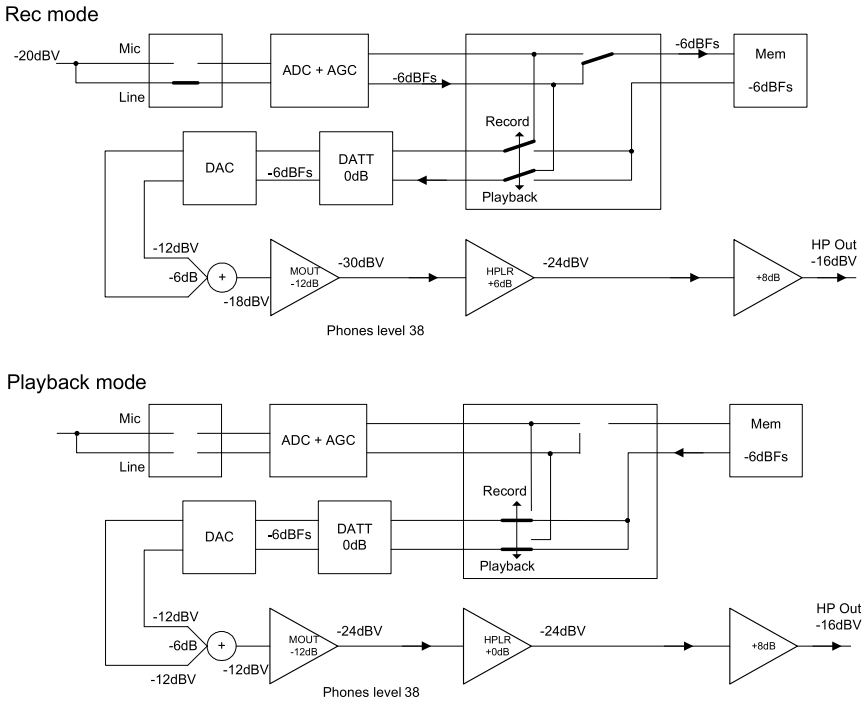
Additionally, U105 DAC section receives IIS digital audio data from the CPU for headphone monitoring. The signal from the DAC output of U105 must be amplified by IC U106 in order to drive a wide range of headphone impedances as specified. U106 headphone amplifier contains a switching type charge pump in order to generate the necessary voltages for the amplifier section.

The system word clock signal WCK is used for powering an electret microphone capsule via Q101 and diodes D101 and D102 forming a voltage multiplier.
In record mode the Line input at the codec is controlled active for leveling by the AGC as well as for the recording and the monitoring path. The recorded level is –6 dBFs defined as the best compromise between clipping and S/N.

Record and playback levels are balanced to provide the user the same output level. Default HPVol setting is 38 for the output level. The HP output level at high input signals is –16 dBV.

Totally 40 steps with 1 dB step size is designed to adjust the record level.
RecVol 40 → +20 dB (Line input)
RecVol 0 → -20 dB

Codec settings and levels:



3.3.6 Capsule modules

The module for DRM 85 accommodates an electret capsule of 9.8 mm ∅ with a bearing ring and a special designed snapped-in filter plate (assembled with silk) in front of the modul to be optimised to an omnidirectional characteristics. For DRM 85 C it is an electret capsule of 14.5 mm ∅ with the same filter plate but different silk on it optimised to a cardioid characteristics. It is easy to distinguish the cardioid capsule as it has two extensions on either side of the front plate of the capsule.

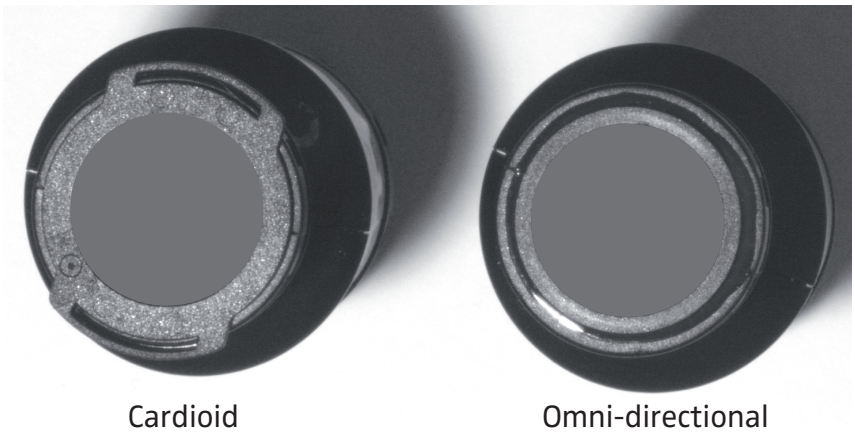
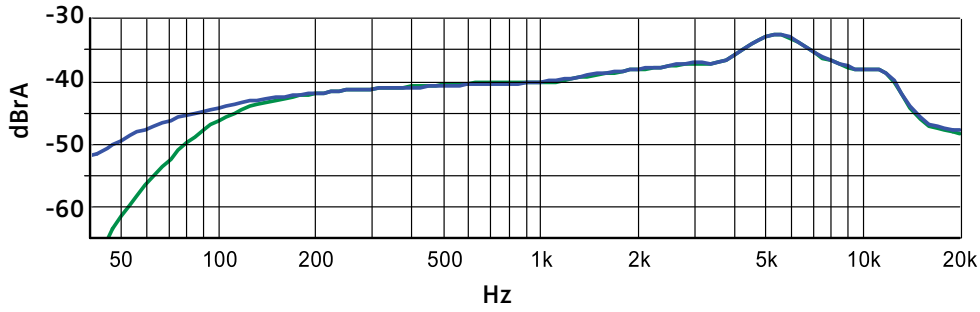
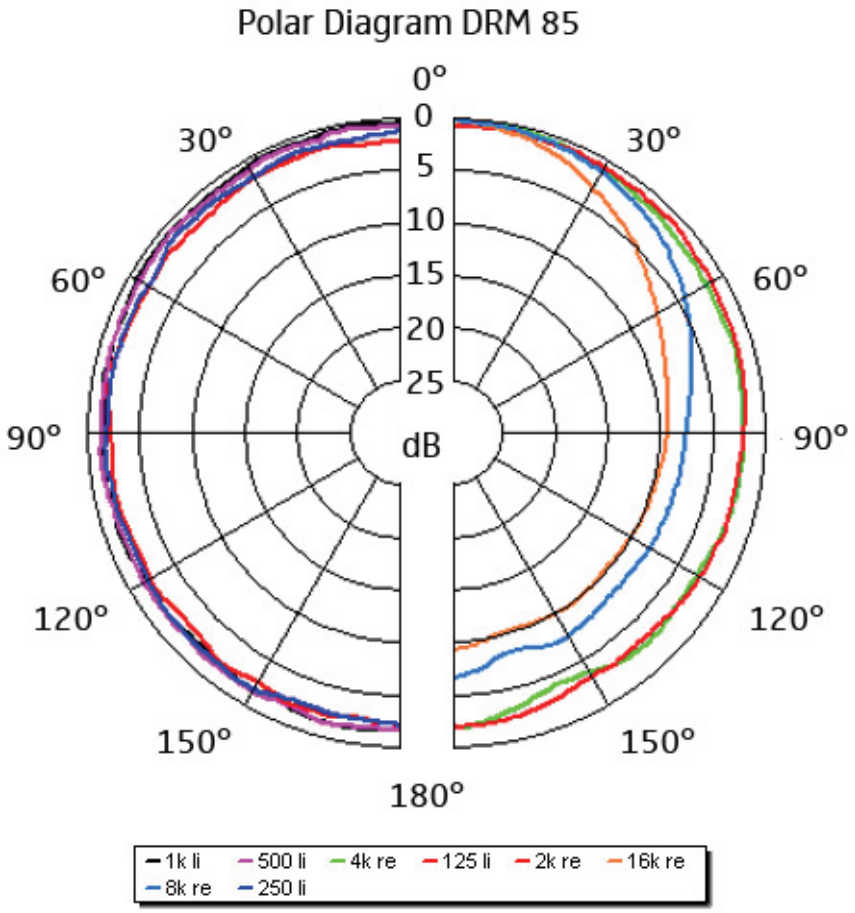


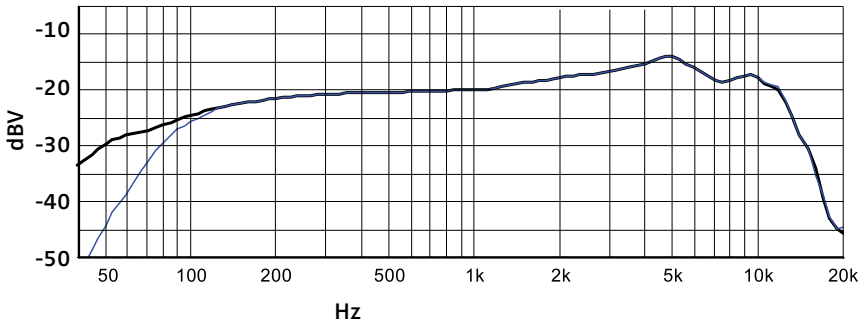
Figure 1: Capsule differences

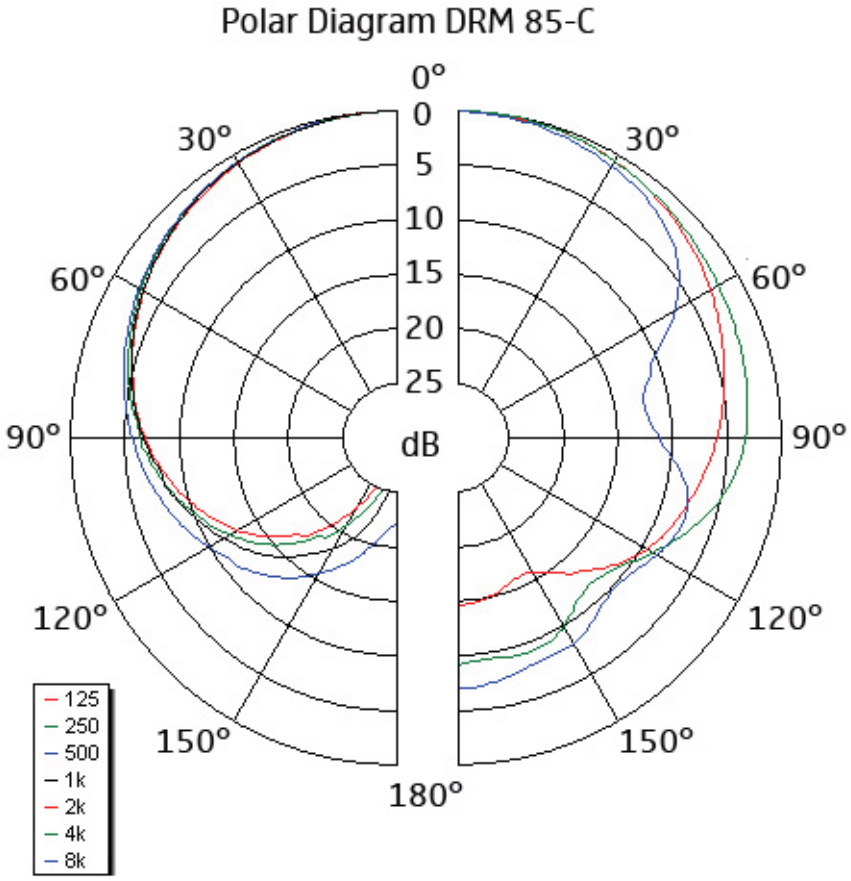
DRM 85 Omnidirectional
Frequency Response Curve





DRM 85C Cardioid
Frequency Response Curve





3.4 Disassembly

3.4.1 Note

Before disassembly remove the batteries.

3.4.2 Tools

Normal workshop tools for work on small electronic assemblies are required; the only additional items that are essential are a number T06 and T08 Torx driver. Do not attempt to use other tools to remove the Torx headed screws as damage will result.

3.4.3 Capsule removal only

If it is necessary to remove the capsule, then follow the instructions below. If the FlashMic is being completely dismantled, then it is easier to remove the capsule later on. In that case, start at section ''Keypad removal''.To remove the capsule on its own, without dismantling the end cap or the removing the AF board, first remove the protective basket [001] by unscrewing counter-clockwise, when viewed from the top of the microphone. Ensure that the coloured ring is not misplaced when the basket is removed. Be careful not to damage or touch the front elements of the capsule. Next unscrew the barrel of the microphone [004] from the end cap; this is also removed by unscrewing anticlockwise, when viewed from the capsule end. Pull the barrel forward away from the end cap, this will expose the battery compartment lid [001] and allow access to the screw [004], which holds the capsule in place. Remove screw [004] then push the barrel back toward the end cap and the capsule can be gently pulled from the chassis [005].

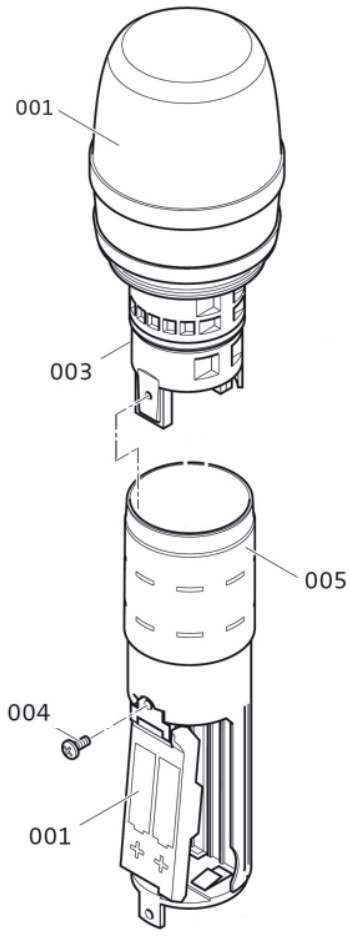


Figure 2: Capsule removal

3.4.4 Keypad removal

The keypad [fig. 4, 019] Record, Play and Menu buttons should be removed by using a stiff but not scratchy narrow tool inserted just above the Record button (shown by arrow). Be careful not to scratch the case or damage the rubber keypad. If a screwdriver is used this is very easy to do.

Figure 3: Keypad

The rubber keypad is lifted away and then thekeypad PCB [018] can be carefully removed. Care should be taken to keep the interboard connector (shown by arrow in fig 4) square when separating the keypad PCB from the connector PCB, otherwise the connector may be damaged.

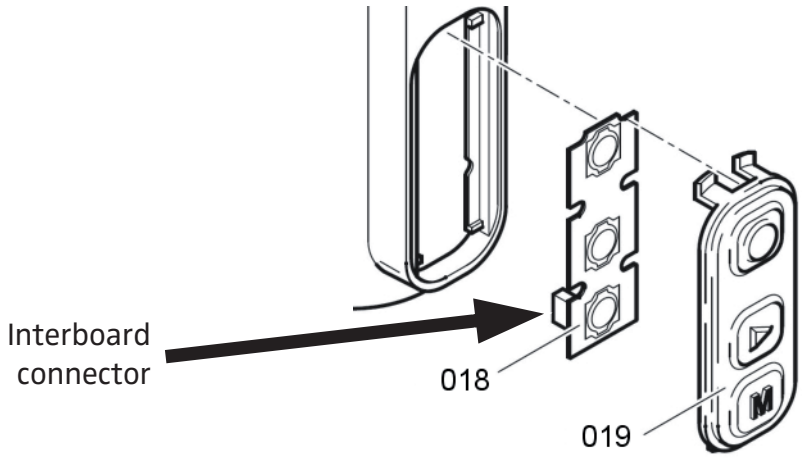


Figure 4: Keypad removal

3.4.5 End cap removal

The keypad **must** be removed before the end cap is removed otherwise damage to the Keyboard and CPU PCB's **will** occur.

Unscrew the barrel (the main metal grip with the HHB FlashMic logo) and slide away from the end cap. Using a T08 Torx driver removing the three retaining screws [fig. 5, 017].

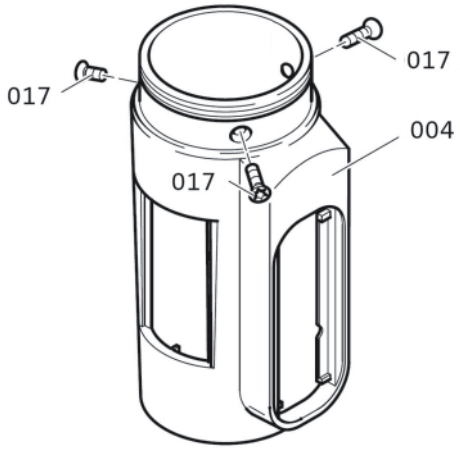


Figure 5: End cap

The end cap can then be gently removed from the chassis and barrel, taking care to ensure the PCB's slide out of the end cap squarely.

3.4.6 Separate chassis and barrel

First, remove the protective basket [fig. 2, 001]. Ensure that the coloured ring is not misplaced when the basket is removed and be careful not to damage or touch the front elements of the capsule [fig. 2, 003]. The whole chassis and PCB assembly [fig. 2, 005] may now be removed from the barrel [fig. 2, 004] by passing the chassis to the left (as the FlashMic is viewed with the capsule to the left), through the barrel. Figure 6 shows the chassis and PCBs, complete with capsule, with the barrel and end-cap [fig. 2, 004] removed.

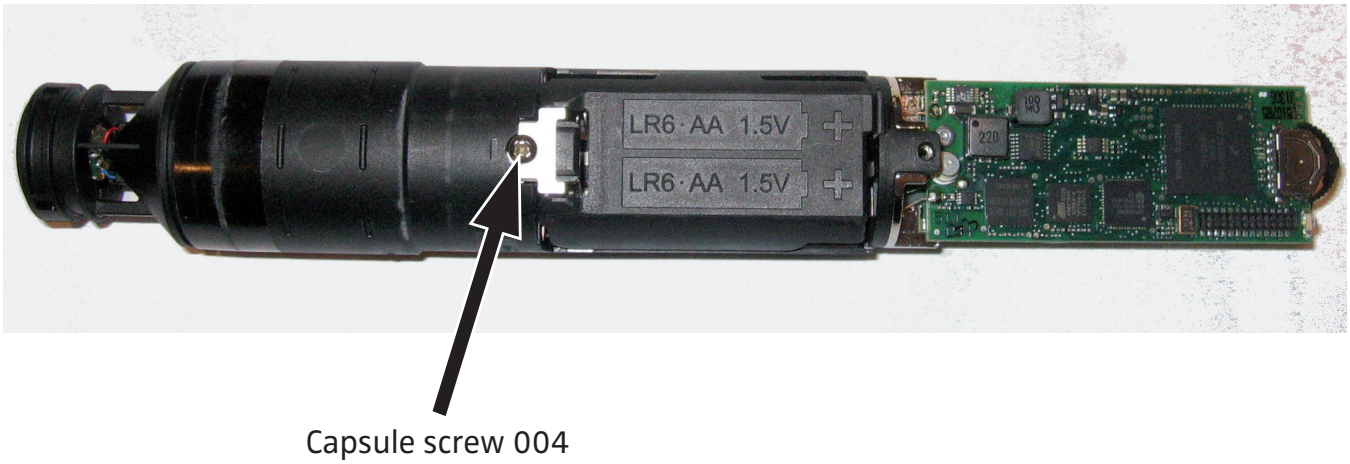


Figure 6: FlashMic Chassis & PCBs

3.4.7 AF PCB and capsule removal

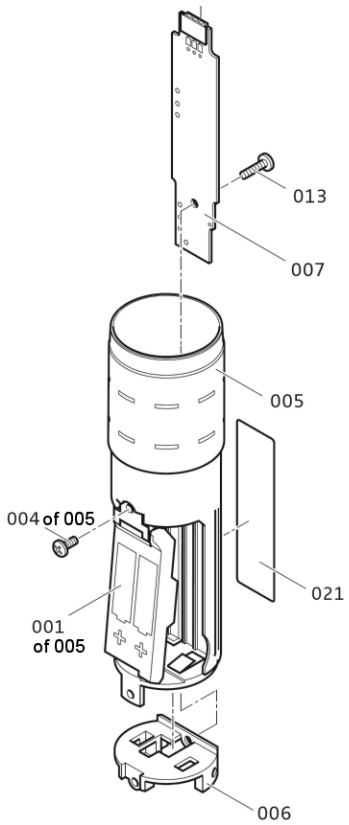


Figure 7: Chassis and AF PCB

The AF PCB [fig. 7, 007] is located inside the battery chassis [005] and is largely hidden from view as it is behind the battery compartment; with the end cap removed the end of the AF PCB (shown by arrow in fig. 8) can be seen.

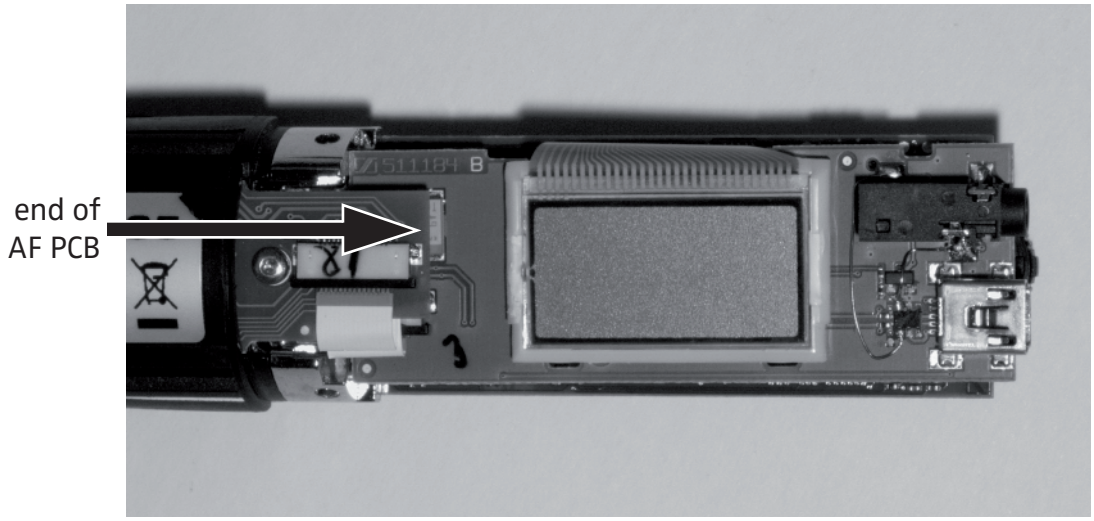


Figure 8: Location of AF PCB

To remove the AF PCB, the flat ribbon cable [fig. 10, 012], has disconnected from the AF PCB. This is done by lifting the black locking-latch on the connector (fig. 9), and then the flat ribbon cable can be carefully pulled out from the connector. Once the cable is free the screw [fig. 7,013] T06 Torx is unscrewed. Now remove the screw holding the capsule in place [fig. 7], if it was not removed earlier in section „capsule removal only".

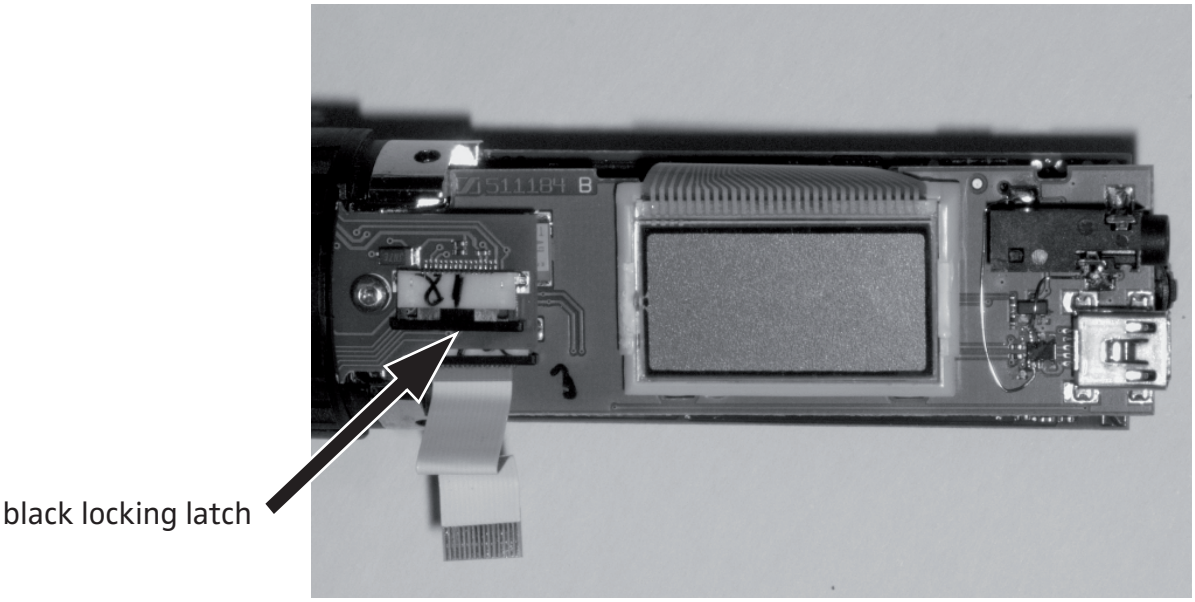


Figure 9: Locking latch on AF PCB

The capsule may be removed gently from the chassis [fig. 7, 005] and the AF board will come with it. Pay attention to the orientation of the AF board connected to the capsule. If the capsule was already removed, the AF board may be removed on its own by sliding down and out of the front end of the chassis.

3.4.8 Connector PCB removal

After removing the AF PCB, the connector PCB [009] can be removed. Remove screw [015] with a T06 Torx driver being careful to retain washer [016].

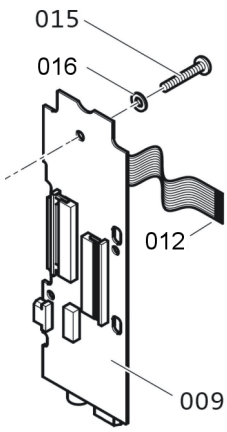


Figure 10: Connector PCB

This will leave the connector board only linked via the flat ribbon cable [fig. 10, 012]. Turn the connector board over to gain access to the ribbon cable latches.

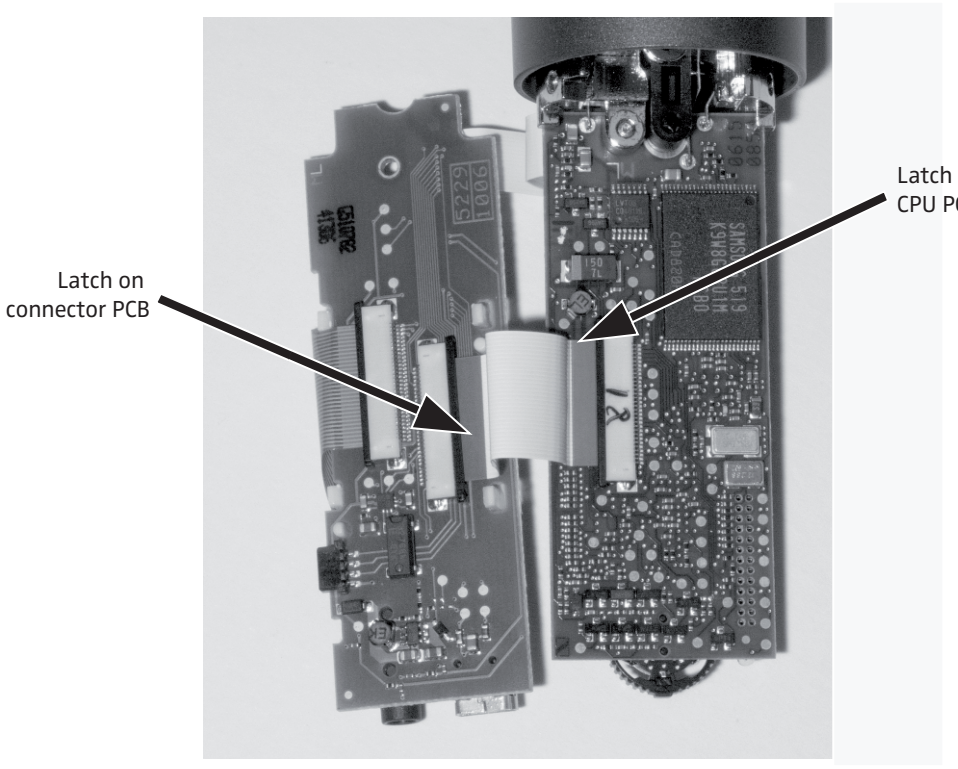


Figure 11: CPU and Connector PCBs

The latch at either end, shown by arrows in fig. 11, can be released and the flat ribbon cable removed, this will then free the Connector PCB.

3.4.9 CPU PCB removal

To remove the CPU PCB [fig. 13, 008] one Torx screw [014] must be removed and the three connections from the battery compartment must be unsoldered very carefully.

Once the screw [014] is removed the connections can be unsoldered (3 connections as shown in fig. 12) and the CPU PCB removed, this must be done with care to ensure no damage occurs to the PCB or the battery connecting wires.

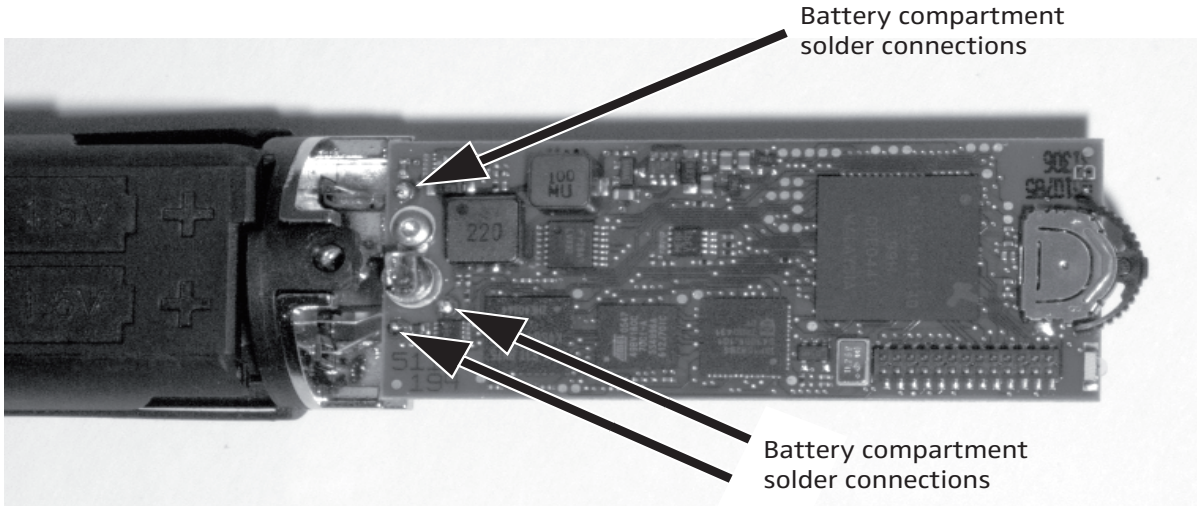


Figure 12: CPU PCB solder connections

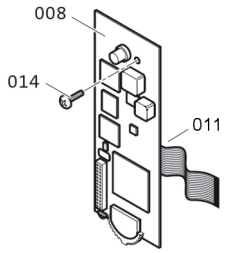


Figure 13: CPU PCB

3.4.10 LCD removal

To remove the LCD from the Connector PCB, first follow all previous steps and then on the Connector PCB [009] release the black latch holding the ribbon cable [012] from the Connector PCB [009] to the LCD module [010]. Exercise extreme caution and do not use sharp tools to remove the LCD ribbon cable – it is very delicate.

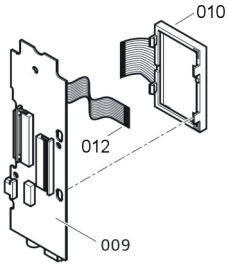


Figure 14: LCD

Then unclip the LCD [010] from the PCB [009] by moving the 4 LCD clips (shown arrowed in fig. 15) to release the module.

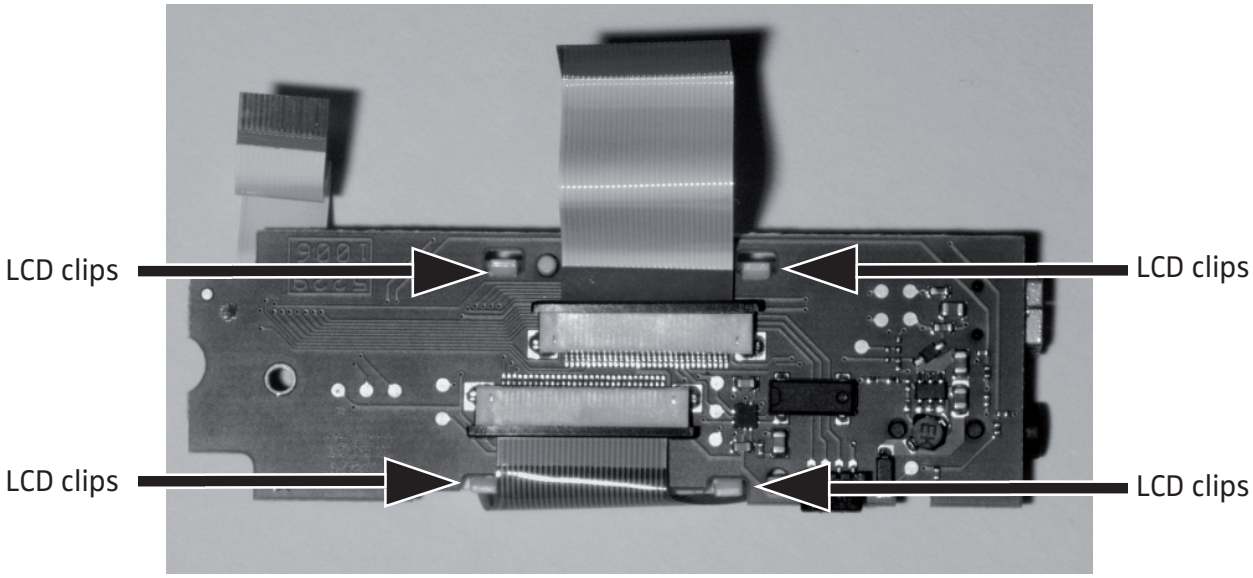


Figure 15: LCD clips

3.4.11 LCD lens removal

The LCD lens [020] can be removed from the exterior of the FlashMic with no other disassembly but it is very difficult to do. It is much easier to remove the lens once the end cap is removed from the unit.

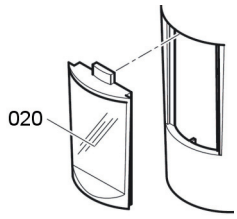


Figure 16: LCD lens

Simply remove the lens by releasing the clip of the lens that is located near the closed end of the cap. Use either your finger inserted into the end cap or a non-scratchy tool inserted through the keypad opening.

3.5 Assembly

In general assembly is the reverse of disassembly but there are a number of steps in the assembly that require particular care and these are detailed below:

3.5.1 LCD lens replacement

The LCD easily clips back into place but ensure the inside surface is cleaned before assembly of the end cap onto the unit.

3.5.2 LCD replacement

Note that there are two alignment pins to allow easy positioning of the LCD module. When re-attaching the ribbon cable first make sure the latch is open then ensure that the cable is fully inserted, before closing the socket latch.

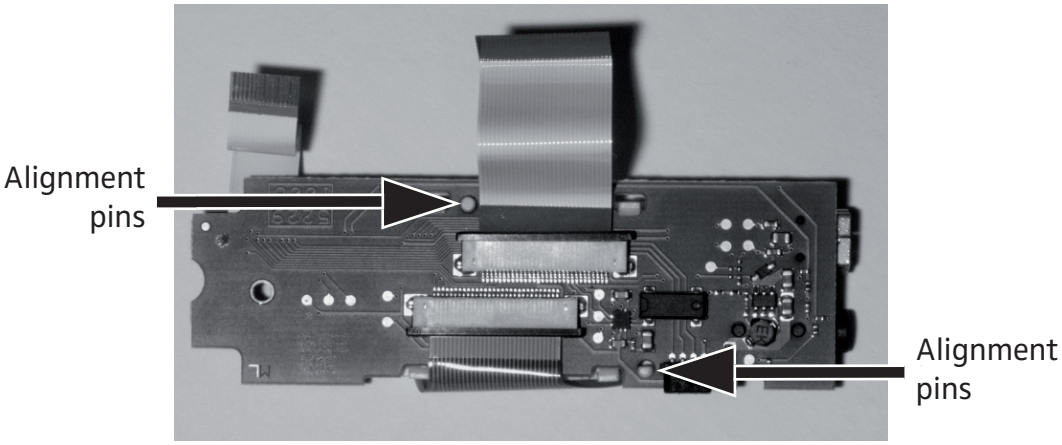


Figure 17: LCD alignment pins

3.5.3 CPU PCB replacement

Check that the CPU PCB holes for the soldered connections are clean before reassembly. Insert the CPU PCB in place checking the battery connections are in place in the PCB holes then screw the board in place using the T06 Torx screw before soldering the connections.

3.5.4 Connector PCB replacement

Lay the Connector PCB beside the CPU PCB so that the ribbon cable can be inserted, make sure the latch on the ribbon cable socket is fully open, then insert the cable fully and close the latch. The Connector PCB can then be folded over on top of the CPU PCB – check the ribbon cable folds neatly between the two boards. Then screw the Connector PCB into place using the T06 Torx screw [015] and washer [016].

3.5.5 AF PCB replacement

The AF PCB must be slid down the battery chassis [005] from the capsule end. When the PCB reaches the ribbon cable carefully fold the cable so that it goes under the AF PCB and the free end protrudes for connection after the T06 Torx screw [013] is inserted. Reconnect the ribbon cable, first making sure the latch on the ribbon cable socket is fully open, then insert the cable fully and **close** the latch.

3.5.6 Capsule replacement

The capsule replacement is straightforward but make sure that the connector pins (opposite the screw socket) on the capsule are in correct alignment with the socket in the unit – the alignment is correct when the pins on the capsule align with the LCD display window. When replacing the basket make sure the coloured ring [002] is replaced between the basket and the barrel.

3.5.7 Refit barrel over chassis

The chassis should be gently inserted PCB-end first into the wide-end of the barrel until the battery compartment comes out of the other end and it stops.

3.5.8 End Cap replacement

Inside the end cap are guides to hold the PCB's securely in place, and during reassembly it is essential to make sure the boards are properly located. When the rear cap is pushed almost fully home the USB connector, jack socket, and rotary switch will emerge from the end of the rear cap – check these are correctly aligned, and do not force the end cap into place. When replacing the three T08 Torx screws [017] do NOT over tighten as this could strip the threads in the battery chassis [005].

3.5.9 Key pad replacement

When replacing the keypad it is very important to make sure that the plug on the Keypad PCB [018] is correctly located in the socket that is mounted on the Connector PCB [009]. This connector is located at the bottom left hand corner of the PCB in Figure 2.9-1 (indicated by arrow). Guides in the end cap moulding precisely locate the PCB but it is essential to push the Keyboard PCB onto the socket squarely, otherwise damage to the plug or socket could result.

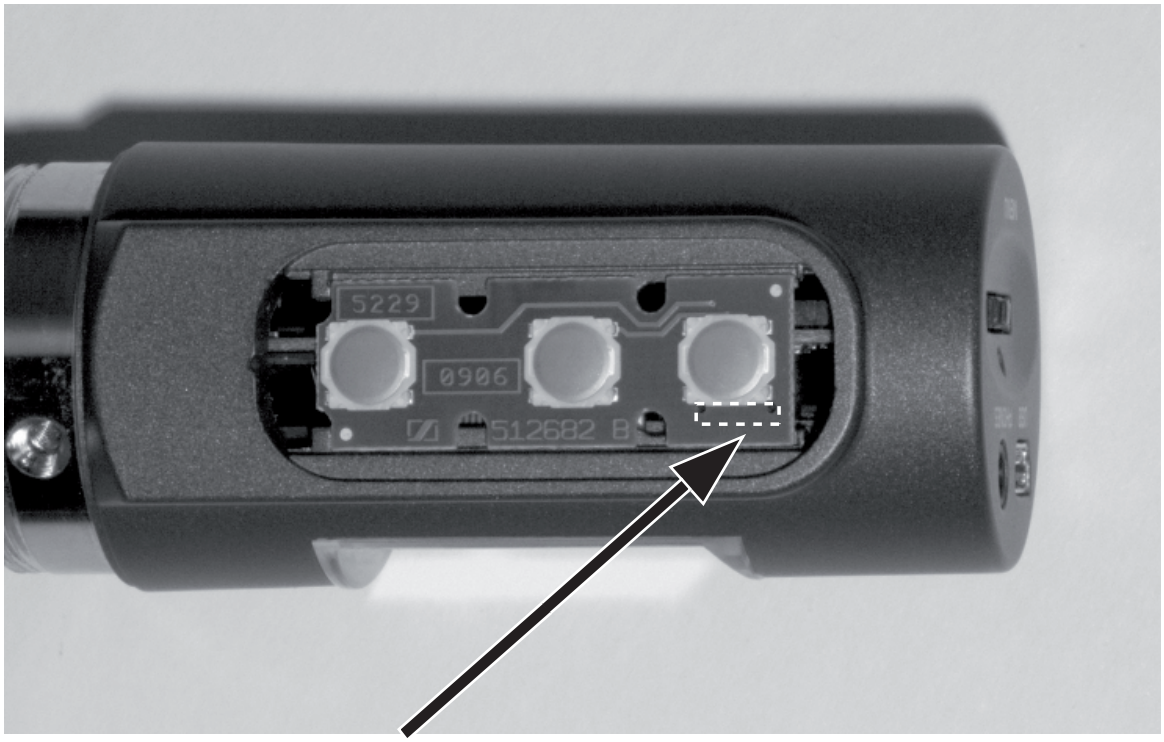


Figure 18: Keypad PCB connector

3.6 Firmware including updates

The FlashMic firmware is held in non-volatile memory and two copies are kept in memory to ensure that operation is still possible even if the currently in use firmware somehow becomes corrupt.

3.6.1 Firmware problems

Generally, most booting, freezing or locking up problems have been due to the earliest release of firmware, v3.02.10, which could corrupt the flash memory file system if the batteries were allowed to run flat in the mic. This bug was removed in an update to v3.02.12; all microphones should have been updated at that time. The current firmware is v5.01.08, which contains a still more secure file system.

The firmware for the FlashMic may be updated from time to time and the latest version will be available for download from the website:

www.flashmic.info

3.6.2 File corruption

FlashMic's with "corrupt" files systems (and, indeed, any FlashMic) should be reformatted and then updated to the latest firmware. All data will be lost.

There are two operator recovery options (first fit fresh or fully charged batteries). Try 'A' first:

A. Hold down the REC and M buttons whilst powering on. The display will show DRM85 and go no further. Move the rocker switch up or down. If the display shows SAME, them remove the batteries and start again, but move the rocker switch in the opposite direction to before (i.e., turn switch up if the switch was turned down before). The display should show UPDATE, with a progress bar. If successful, note, the firmware version, and then perform a forced format, as described in 'B' (backup any available data first)

B. Forced reformat. Hold down REC, PLAY and M buttons whilst powering on. The display should show DRM85, then the firmware version, then "FMT N" Use the rocker control to select "FMT Y" and press in to select (all data will obviously be lost).

Assuming you manage to re-update in 'A' and successfully reformat, then update the firmware to v5.01.08 (or later if available). Do the update twice!! (as stated above, the Mic holds two copies of the firmware; you are choosing between the two copies in 'A' above, so it's important that both copies are updated).

3.6.3 Firmware revisions

The latest version of firmware is always available from the download section of the website www.flashmic.info.

3.6.4 Pre Production FMO units

Units marked FMO, either on the box or on the microphone label, are pre-production prototypes. They are NOT suitable to be used be any of the released versions of firmware and should be returned to HHB!

3.7 Known faults

To date there have been very few reoccurring faults, most problems relate to the use of very early firmware, please see above There is one known hardware problem that has occurred on a few occasions and that is detailed in section **failure of keyboard buttons**.

3.7.1 Failure of Keyboard buttons

This fault is exhibited by a total lack of any operation being possible from the Record, Play or Menu keys.The cause of this is the failure of the interboard connector between the Connector PCB (009) and the Keyboard PCB (010) – one half of the mating pair will have detached from the Connector PCB at the solder pads.

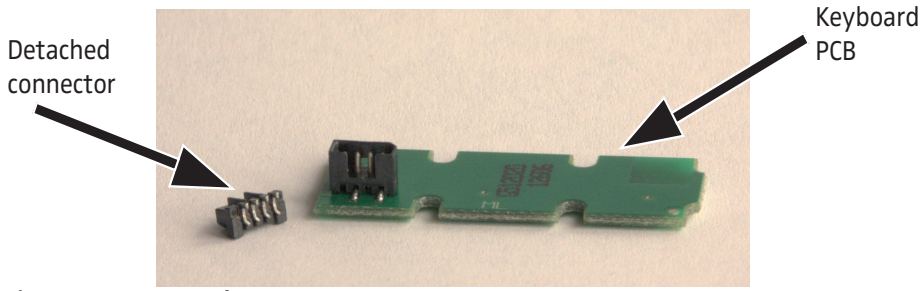


Figure 19: Keypad connector

Repair requires disassembly of the unit as detailed in steps 1-5 above. It is then a case of aligning and resoldering the detached part to the connector PCB.

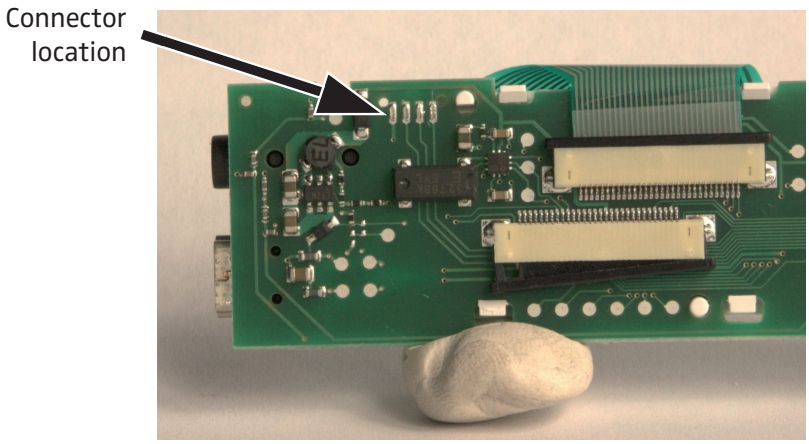


Figure 20: Connector location

The connector can then be resoldered onto the PCB. Note that there are small alignment pips on the socket to locate the socket square in the PCB, it is most important to ensure the socket is square to the PCB once soldering is complete.

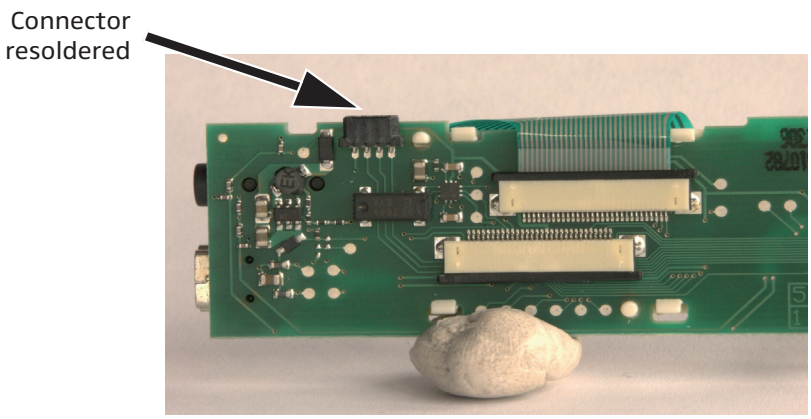
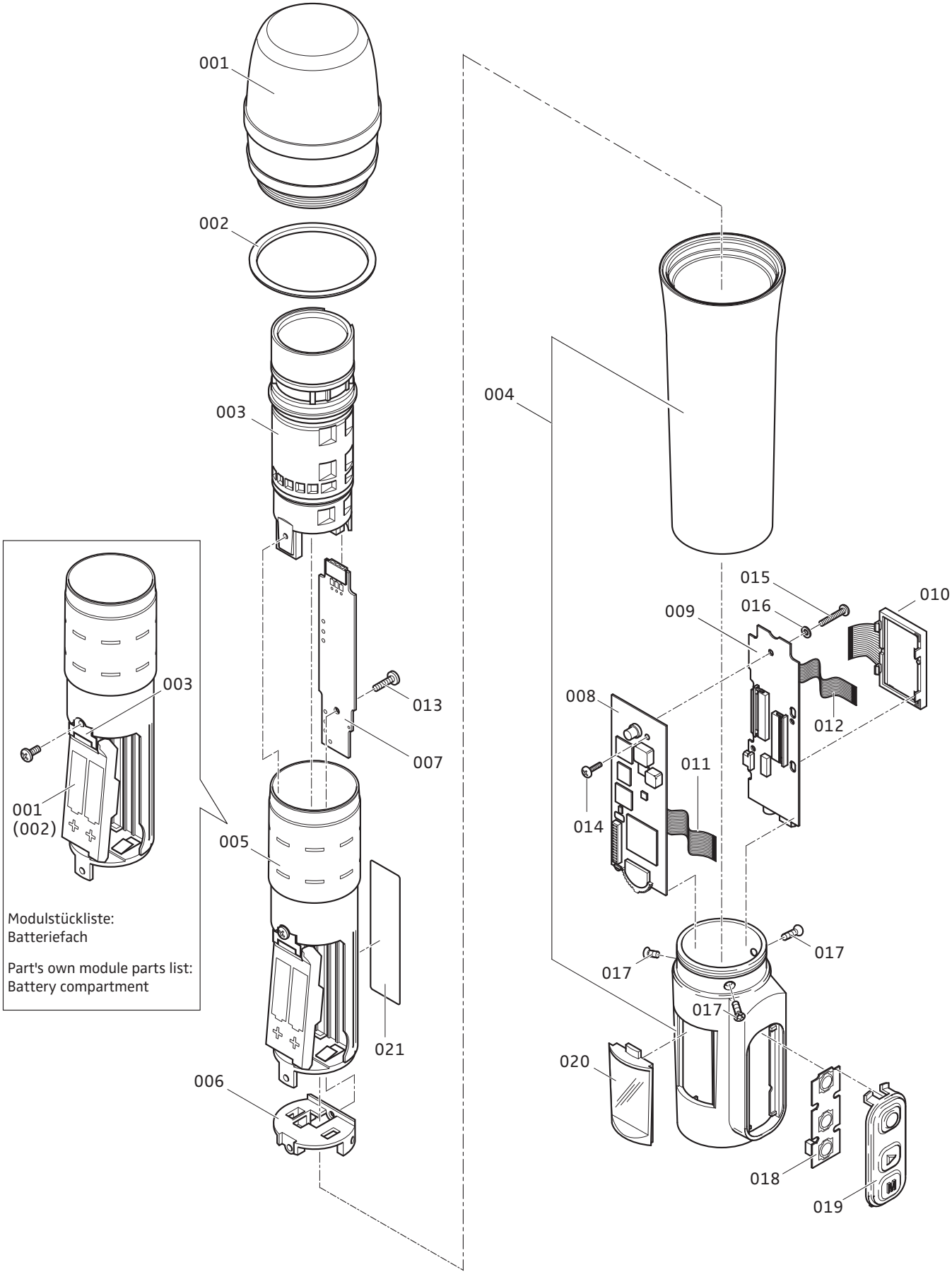


Figure 21: Connector re-attached

4 Exploded view



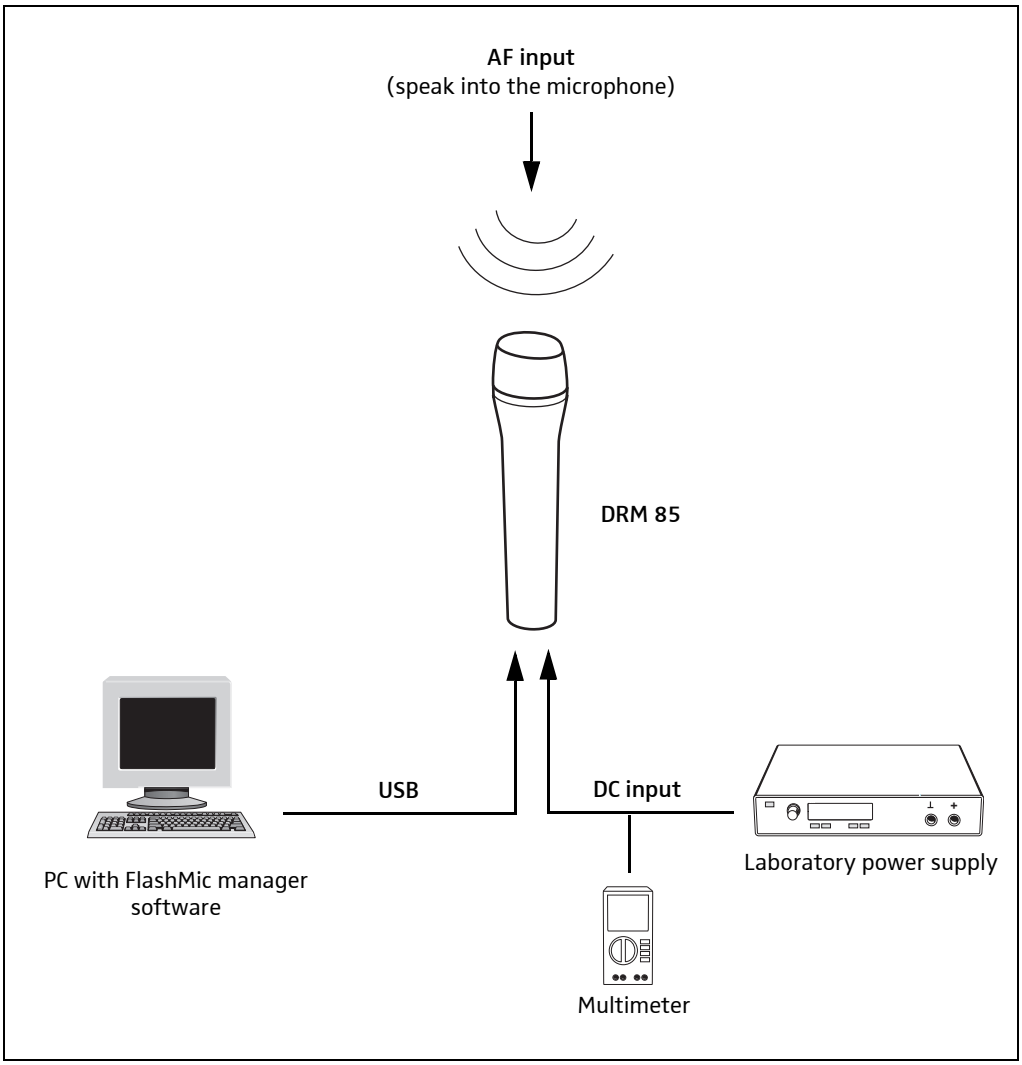
Item	Designation
001	basket with popp protection
002	colored ring, violett
003	microphone module
004	grip
005	battery compartment
	001 flap for battery compartment
	002 pad (flap battery compartment)
	003 holder
006	PCB holder, metal
007	PCB AF
008	PCB CPU
009	PCB connector
010	LCD
011	flat cable 30xRM0.5
012	flat cable 15xRM0.5
013	lens screw 2.5x4
014	screw 2x6-4.8 Torx
015	lens screw M2x12 TORXT6
016	washer
017	screw 2.5x8 Torx
018	PCB keyboard
019	rocker
020	cover 34.5x21x2.2 LCD
021	label silver

5 Test and alignment instructions

- 1 Spectrum analyzer, at least 3 GHz, e.g. Rohde & Schwarz FSP 7
- 1 AF signal generator, at least 100 kHz, e.g. Rohde & Schwarz UPL
- 1 AF level meter, at least 1 MHz, e.g. Rohde & Schwarz UPL audio analyzer
- 1 Frequency counter, e.g. Rohde & Schwarz FSP 7
- 1 RF power meter, e.g. Rohde & Schwarz FSP 7 or Rohde & Schwarz NRVS
- 1 Multimeter, e.g. FLUKE 177
- 1 Laboratory power supply unit, 0 to 30 V_{DC}, 1 A, e.g. HAMEG 8142

Note:
Make sure that your measurement and test equipment is regularly calibrated.

5.1 Measuring set-up

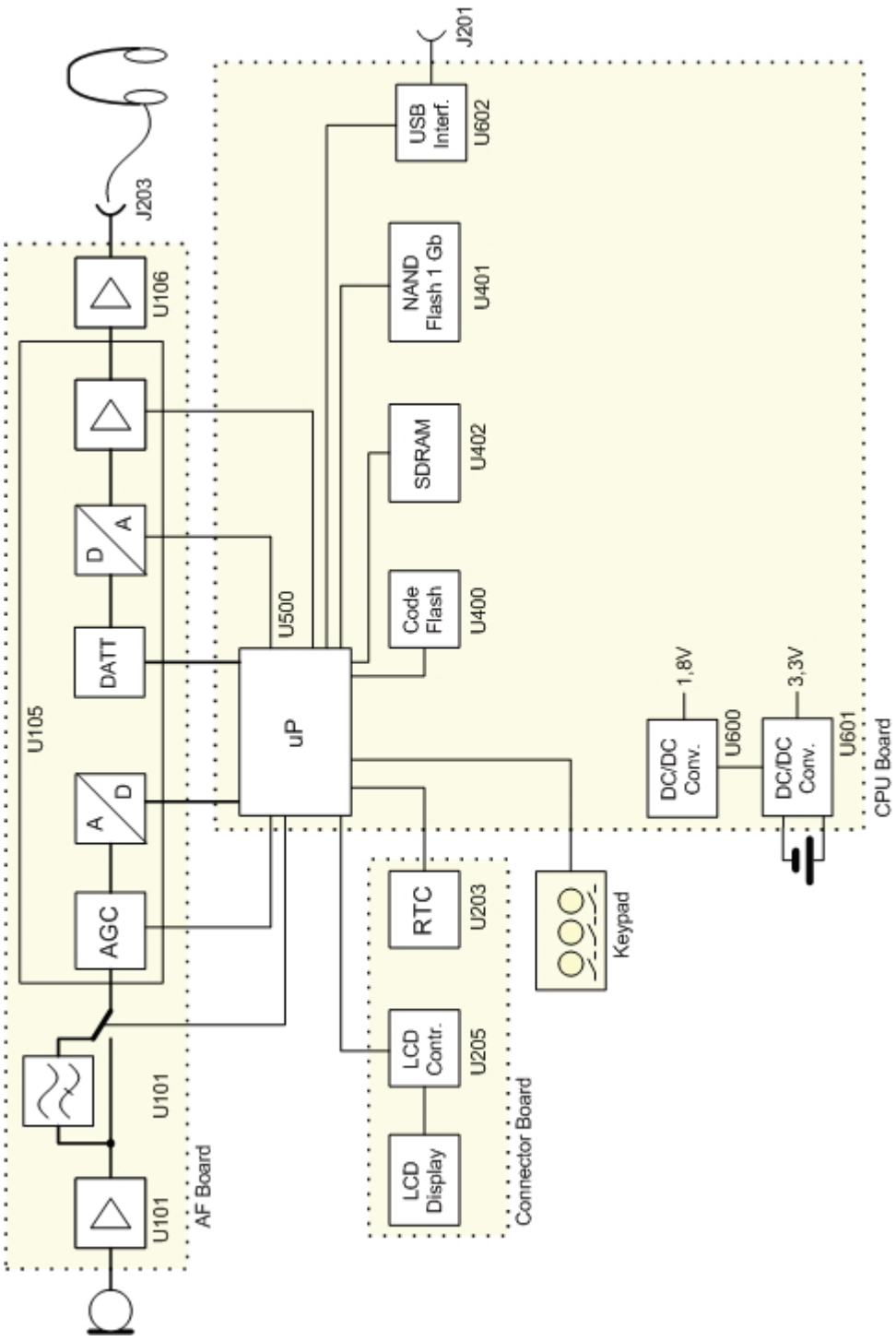


5.2 Test table

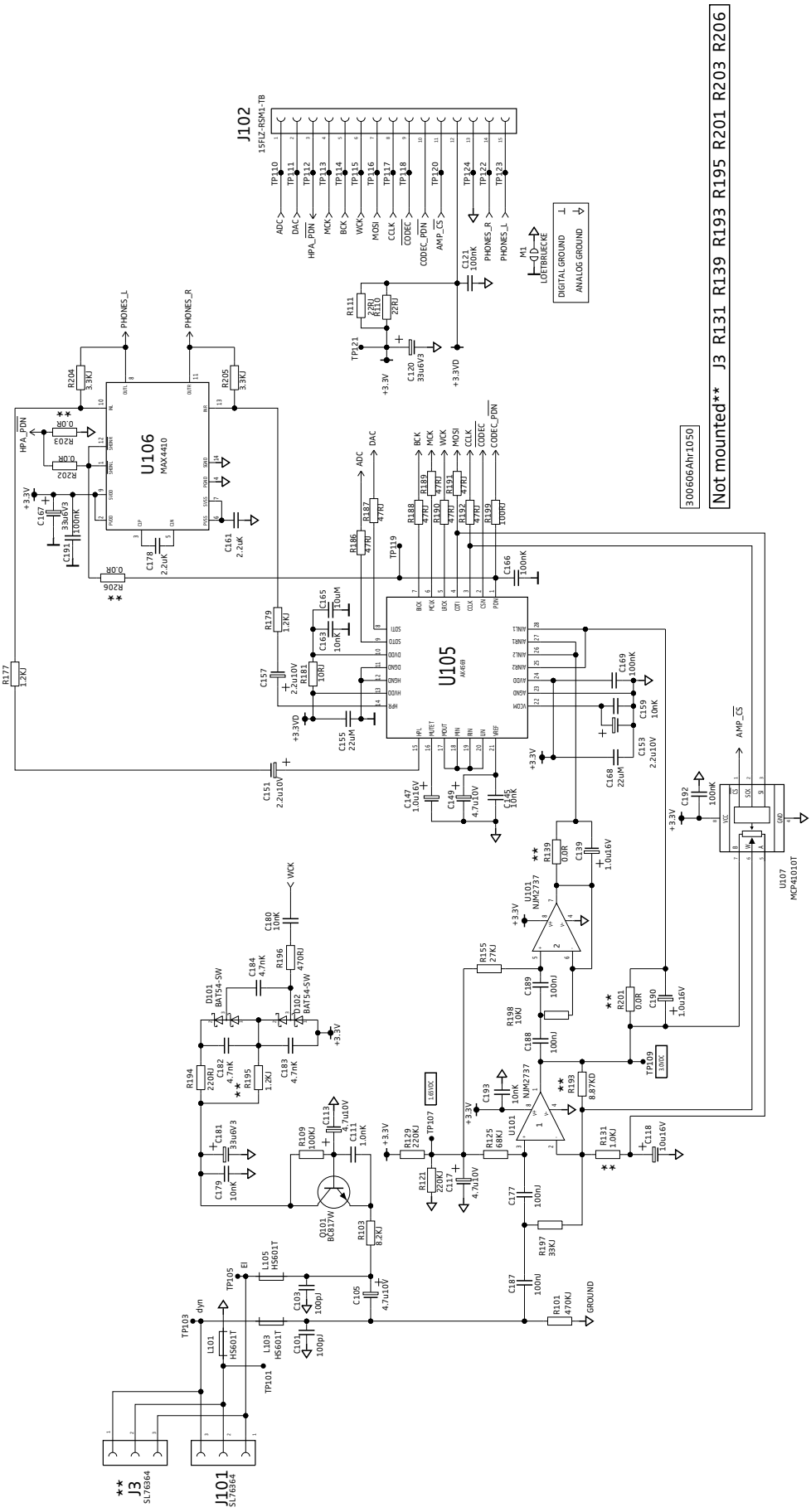
se-quence	type of measure-ment/adjustment	signal input	device settings	measuring point/ test point	required value	remarks
1	**visual inspection** at first dismount the transmitter. See also exploded view.					
1.1	switches and buttons	–	–	–	contacts are not twisted, no hairline cracks at the solder points, no mechanical damage	
1.2	battery compartment	–	–	–	see 1.1	
1.3	flat ribbon cables and terminal strips	–	–	–	see 1.1; terminal strips are locked	
2	**current and voltage measurement**					
2.1	operating voltage	supply +3 V_{DC} via battery contacts	DRM 85 = ON	–	+2 V_{DC} to +3 V_{DC} LOW BAT: +1.8 V_{DC}	current limitation min. 500 mA REC LED is blinking; the recording sequence stops see also the LOW BAT logfile entry in the DRM 85 root directory
2.2	current consumption when in operation	see 2.1	see 2.1	ampere-meter in series to the power supply	typ. 175 mA	–
2.3	DC/DC-converter voltage	see 2.1	see 2.1	TP406 "EVER 3.3V" / M2 TP507 / M2	+3.3 V_{DC} +1.8 V_{DC}	see page 39, 41
2.4	supply voltage AF board	see 2.1	see 2.1	C121 / GND	+3.3 V_{DC}	–
3	**checking the display elements**					
3.1	checking the automatic backlight display deactivation	see 2.1	see 2.1; No user interaction	–	backlighting switches off after approx. 15 seconds	
3.2	audio level display	see 2.1	see 2.1; ''RECLEV'' = 10 dB Speak into the microphone	–	AF display deflection	
3.3	''REC'' and alphanumeric display	see 2.1;	see 2.1; Press ''REC'' button	–	''REC'' lights up the visible display recording time counts down	
3.4	''PLAY'' display	see 2.1;	See 2.1; press the ''PLAY'' button	–	''PLAY'' lights up; the visible play time counts up	

se-quence	type of measure-ment/adjustment	signal input	device settings	measuring point/ test point	required value	remarks
4	**checking the jack socket, the USB socket and the file transfer between PC and DRM 85 microphone**					
4.1	jack socket	see 2.1; insert an 32 Ω headphone and speak into the microphone capsule	see 2.1	–	a clear noise without any distortion must be audible via headphone	
4.2	USB socket	put the provided USB cable into the DRM 85 USB socket and into a free PC USB port.	The DRM 85 switches on for data transmission	–	the operation system of your PC will be identify the USB device automatically. the display of the device shows ''USB''	
4.3	checking the file transfer	see 2.1; 1. for hearing your own noise during recording insert an 32 Ω headphone in the DRM 85 jack socket. 2. press the DRM 85 ''REC'' button. 3. speak into the microphone (your own noise is audible via your connected headphone) 4. press the DRM 85 ''STOP'' button. 5. put the provided USB cable into the DRM 85 USB socket and into one free PC USB port (the operation system of your PC will be identify the USB device automatically). 6. put the audio file via drag & drop from the DRM 85 into your PC file system. 7. Listen to the audio file with any audio tool (e.g. winamp or other media players): A clear noise without any distortion must be audible.				

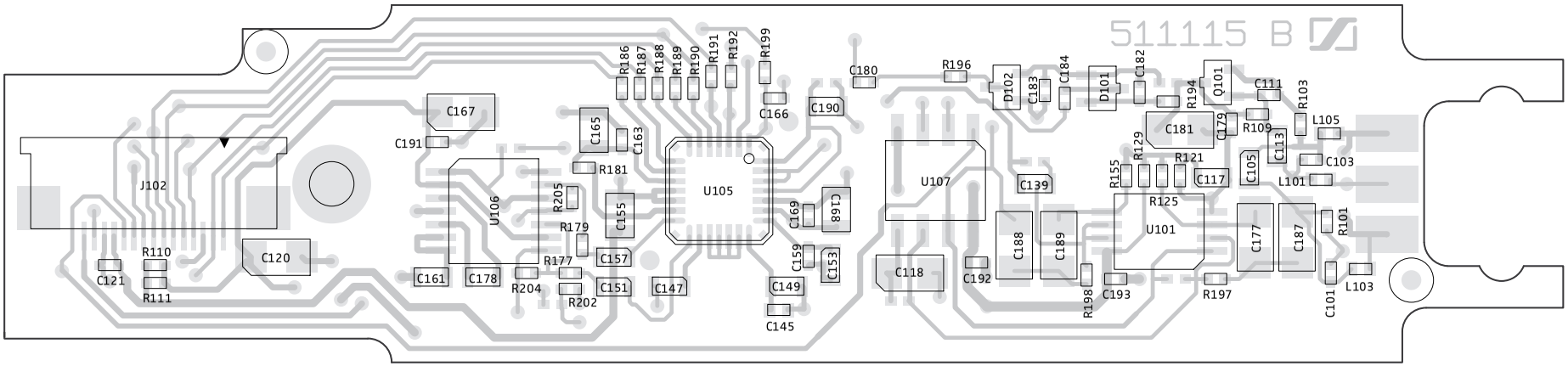
6 Circuit diagrams



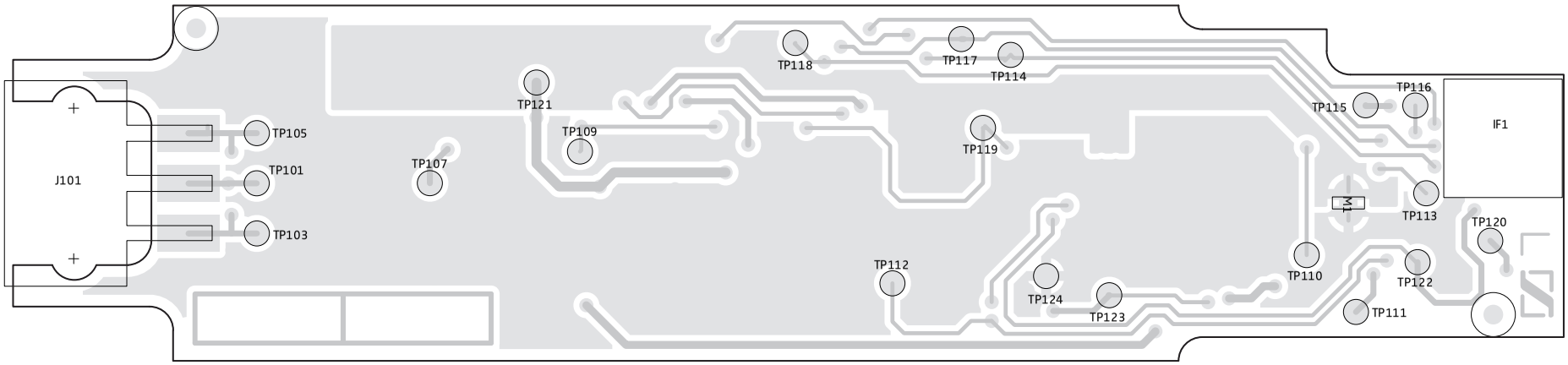
Block diagram



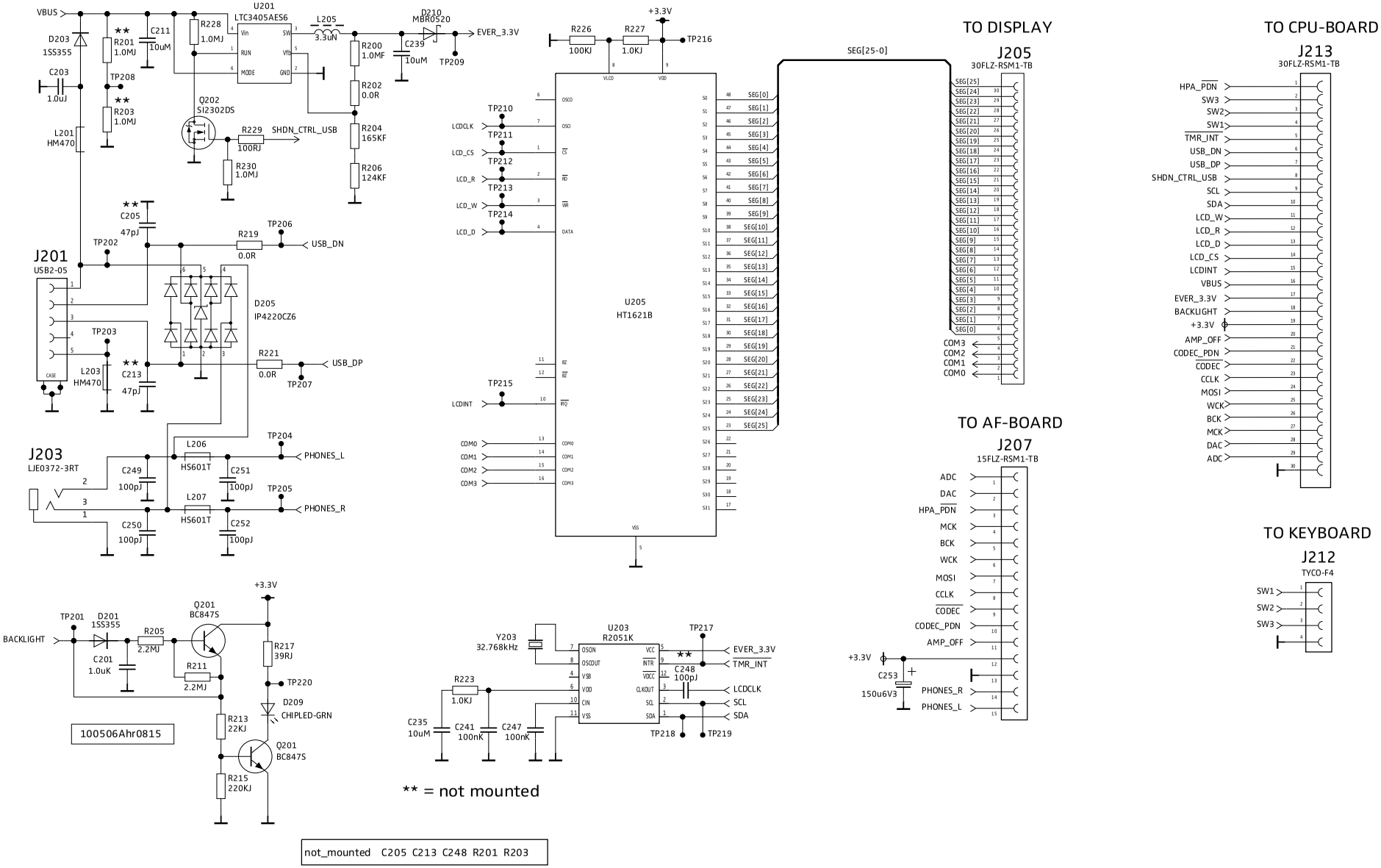
AF board, circuit diagram



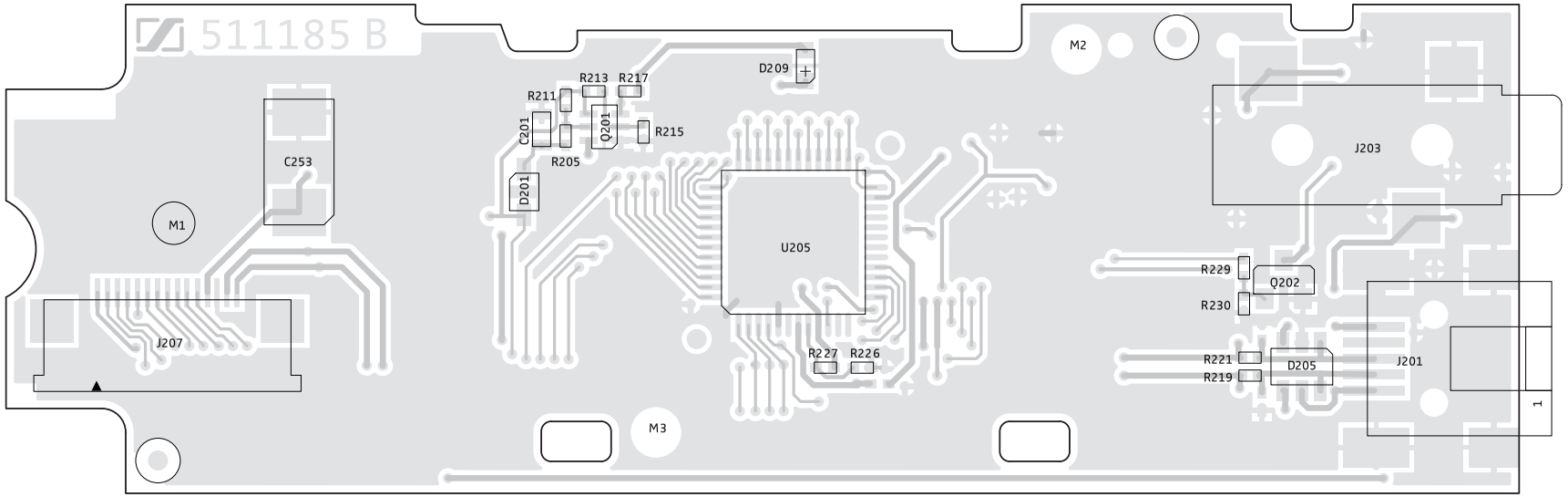
AF board, printed circuit board, component side



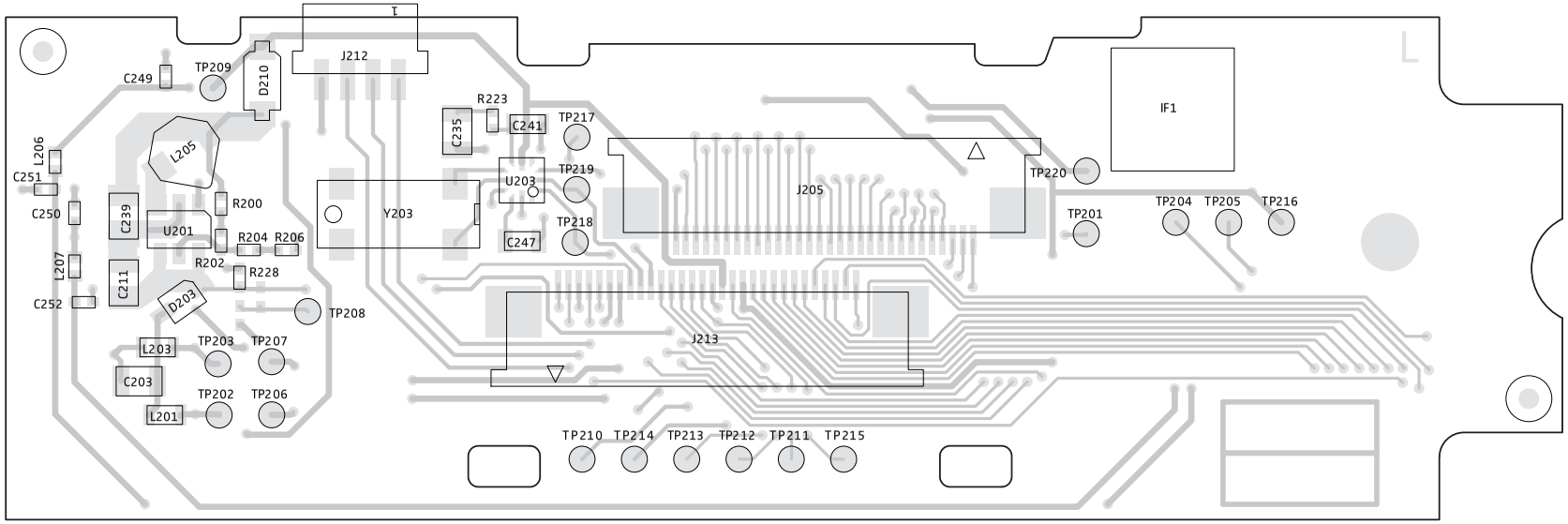
AF board, printed circuit board, solder side



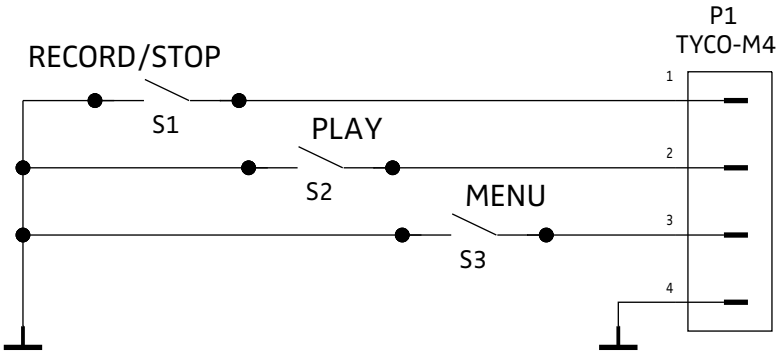
Connector board, circuit diagram



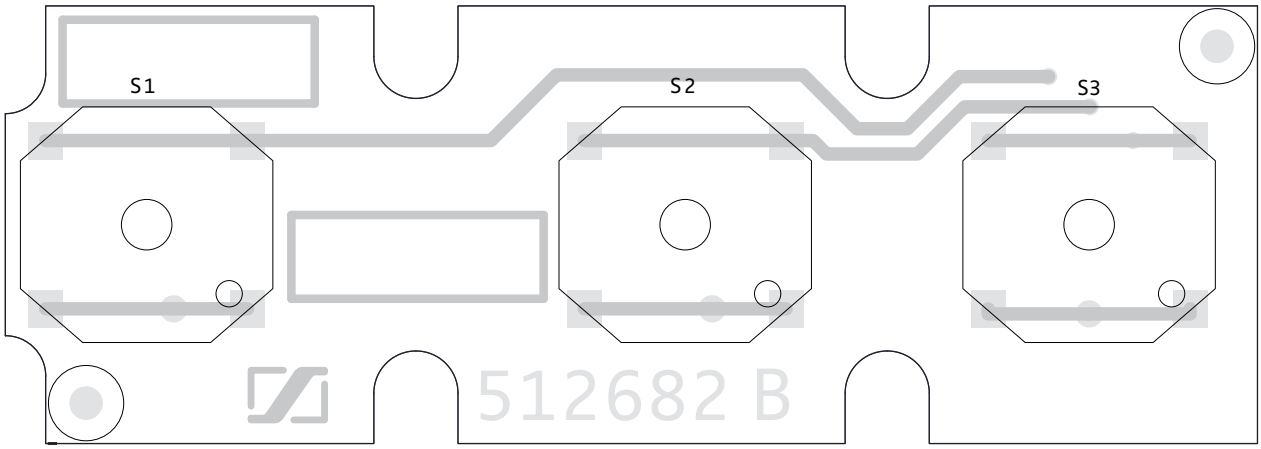
Connector board, printed circuit board, component side



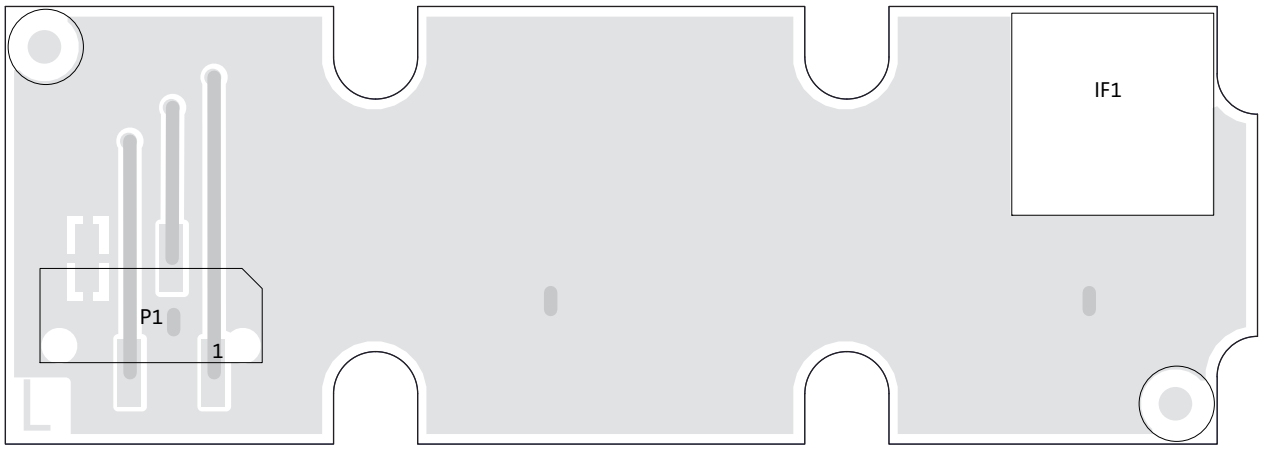
Connector board, printed circuit board, solder side



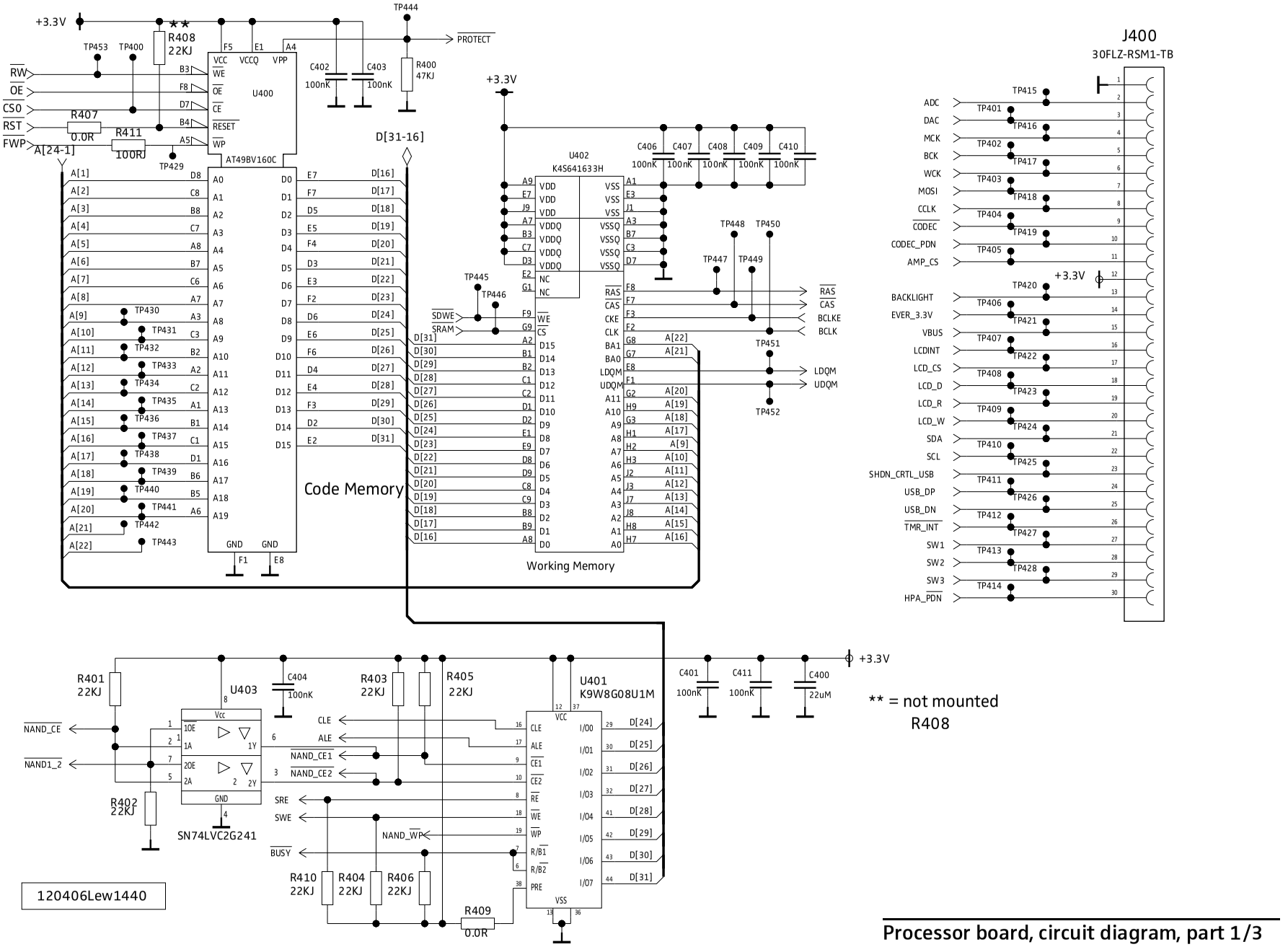
Keyboard PCB, circuit diagram



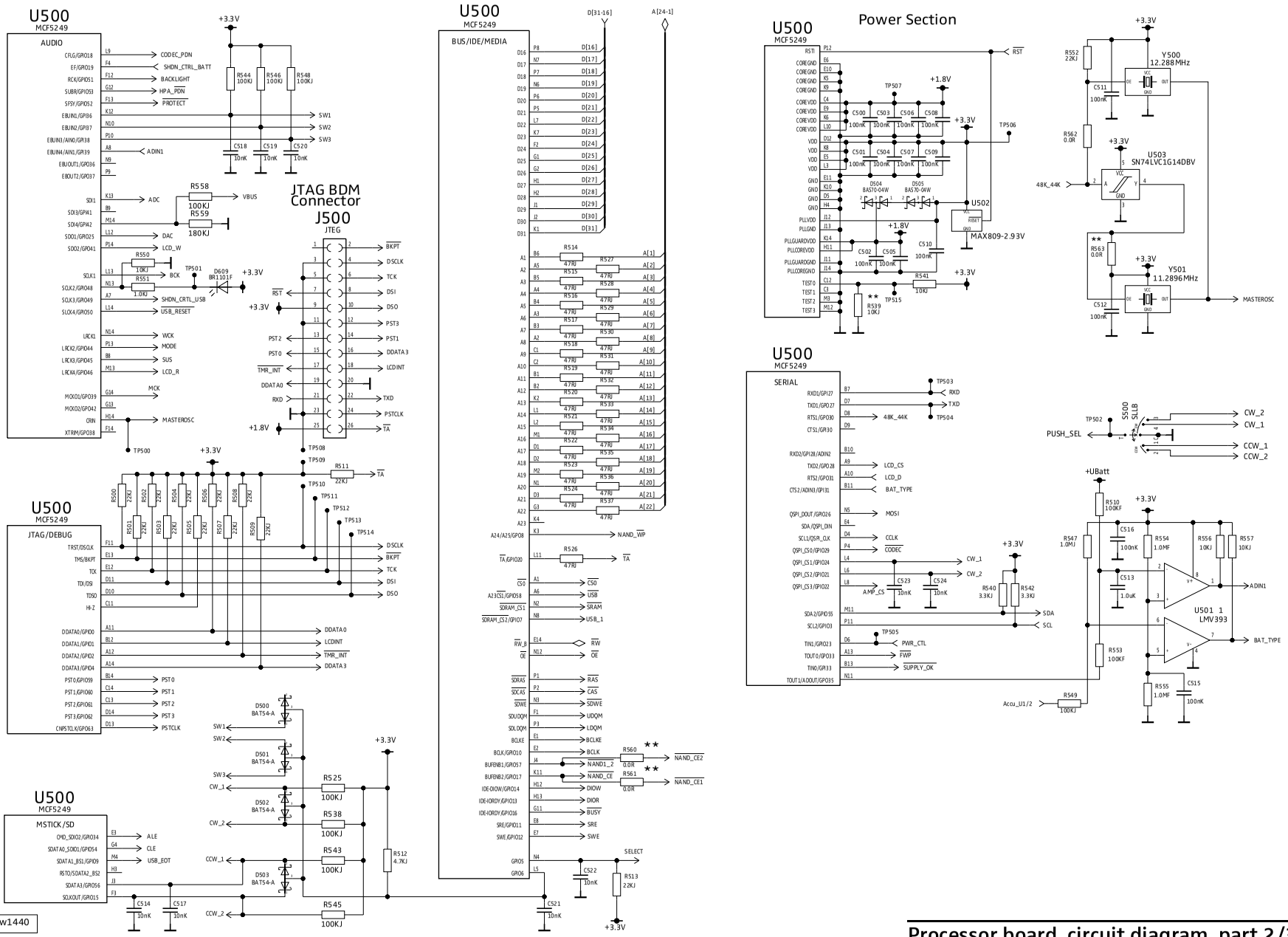
Keyboard PCB, printed circuit board, component side



Keyboard PCB, printed circuit board, solder side

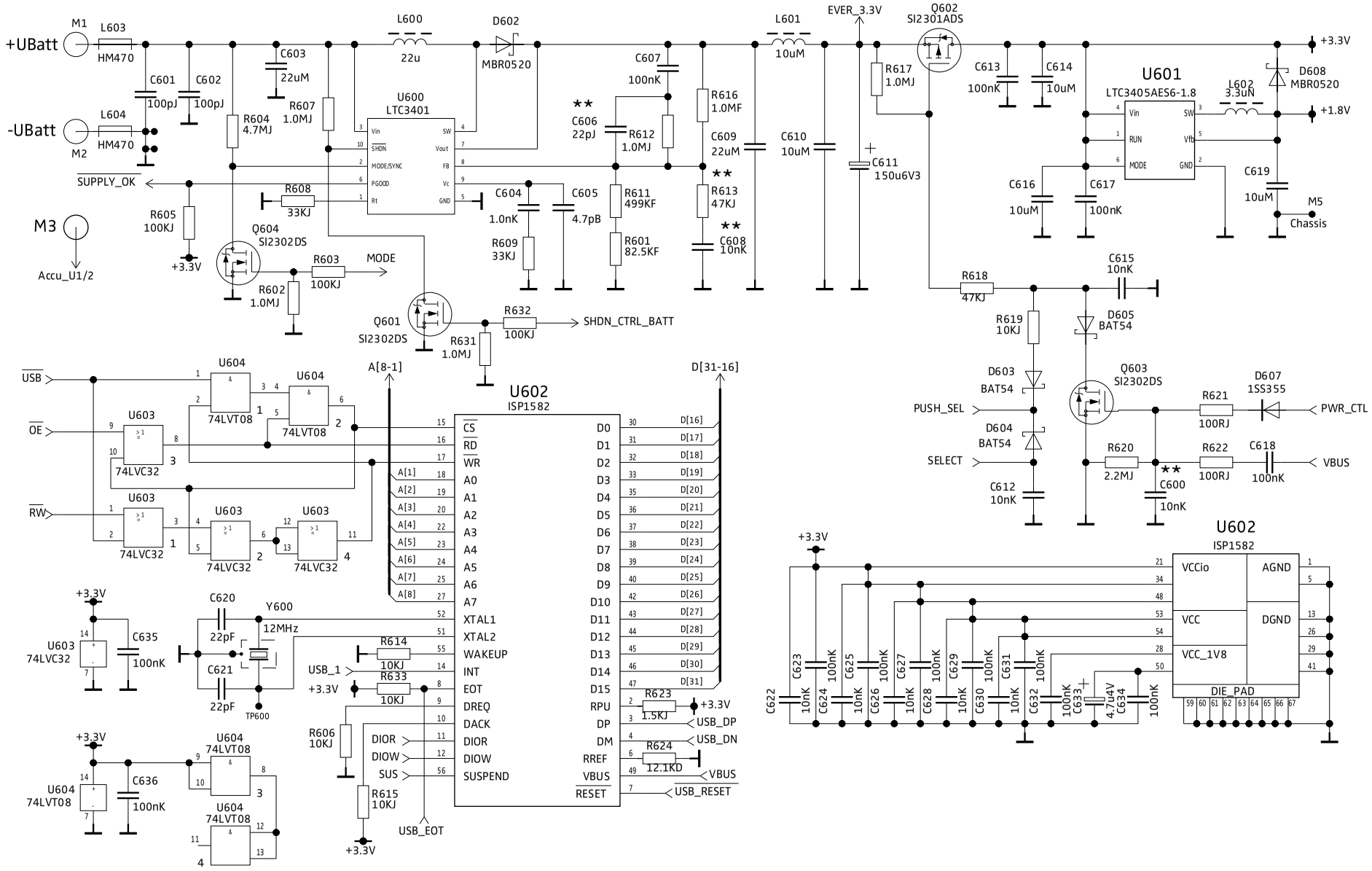


Processor board, circuit diagram, part 1/3



120406Lew1440

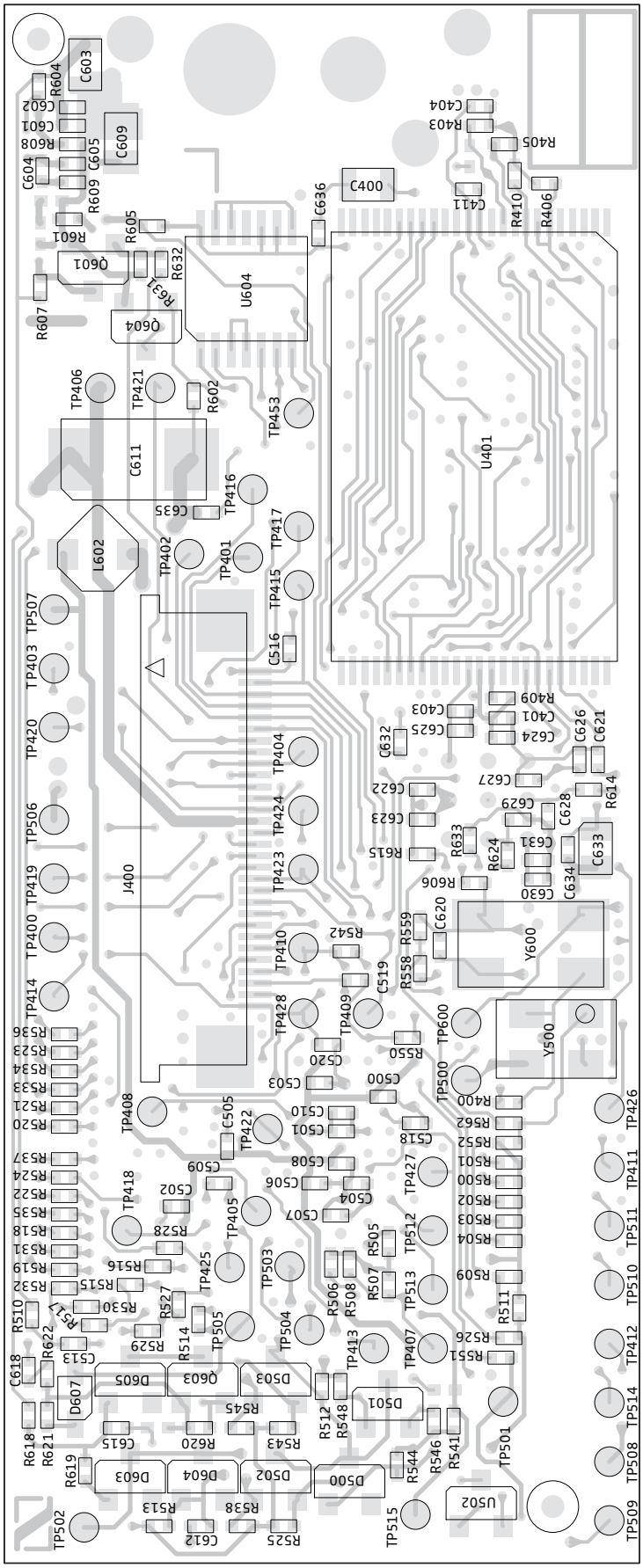
Processor board, circuit diagram, part 2/3



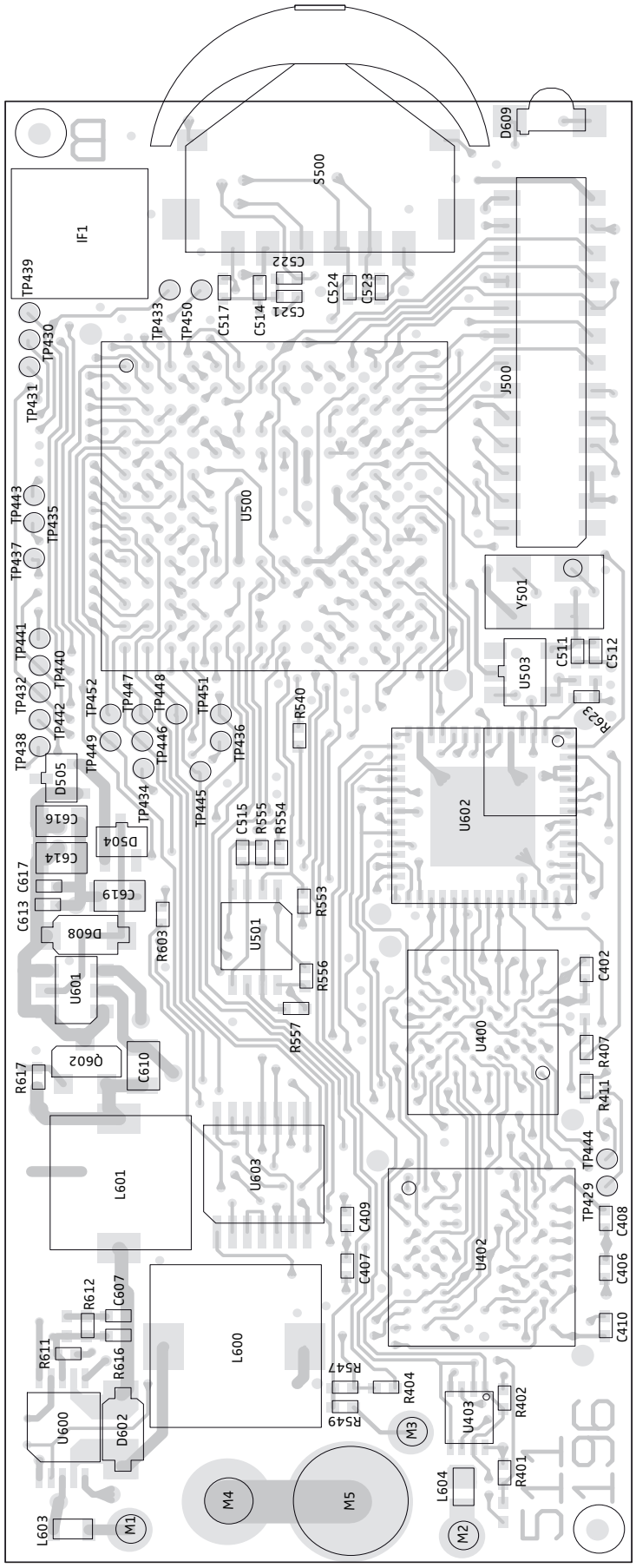
** = not mounted
C600 C606 C608 R613

120406Lew1440

Processor board, circuit diagram, part 3/3



Processor board, printed circuit board, component side



Processor board, printed circuit board, solder side