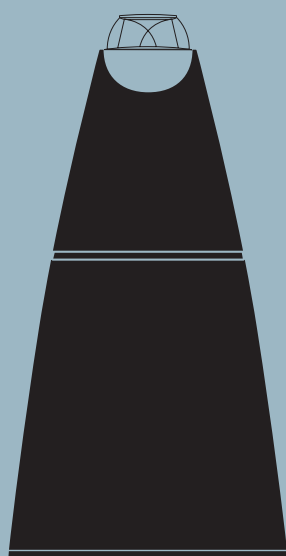# BeoLab 9
Type 6217

Service Manual
English

German, French, Italian, Spanish, Danish, Dutch and Japanese versions are available in the Retail System

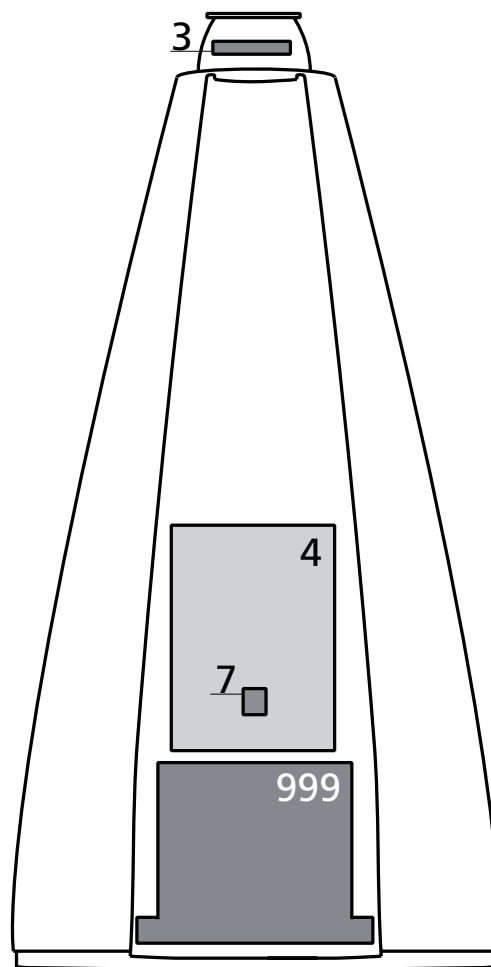*This Service Manual must be returned with the defective parts/back-up suitcase !*

BANG & OLUFSEN

CONTENTS

Survey of modules

PCB1	Cross Over
PCB2	LC-Filter
PCB3	LED
PCB4	Power Supply
PCB5	ICEpower Amplifier
PCB7	NTC
999Module	Chassis complete, incl. PCB1, PCB2, PCB5

How to service

Strategy

BeoLab 9 has been split-up into as few service items as possible. Each service-friendly item is packed individually, prepared for worldwide transport, and has a separate seven digit spare part number to be found in the Bang & Olufsen Retail System or the Service Manual. An exploded view drawing shows the service spare parts.

The back-up suitcase holds all necessary electrical modules for front-line repair of one loudspeaker in e.g. the customers home.

Cabinet parts must be brought with you separately, if to be replaced in the customers home.

An adequate fault description must be returned with each replaced part. For this purpose, use the Module Repair form or the form in the Retail Order System under Exchange Module. To help the Bang & Olufsen Module Repair department it is very important to answer the following questions:
1. Which products are in the setup?
2. Which software versions are used in these products?
3. How are the products linked together?
4. What happens in the actual situation?

All service repair will be on module level by means of the back-up suitcase.
Service Manuals in other languages can be found in the Retail System as PDF-files.

Preparations before service

Always remember to download the latest version of the Service Manual.
Fault description must be returned with the replaced parts.
Use the Module Repair form or the form in the Retail Order System, Exchange Module.

Fault explanation and demonstration

Before troubleshooting is initiated, let the customer demonstrate the fault, if possible.

Recommended tools for service

White gloves.
Soft lint-free cloth.
Multimeter.

Handling and cleaning

Static electricity

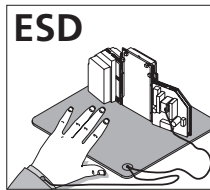STATIC ELECTRICITY
MAY DESTROY THE
PRODUCT

Static electricity may damage the product.

Static-protective field service kit.
A static-protective field service kit must always be used when the product is
disassembled or modules are being handled.
Follow the instructions in this Service Manual and use the ESD-mat for both old
and new modules.

ESD

Please note:
When mains voltage on the product is required, remove the connection between
the product and the ESD-mat.

The chassis or modules must always be connected to the static-protective field
service kit or placed in an ESD-proof bag.

Symbol of safety components

When replacing components with this symbol, the same type has to be used, also
the same values for ohm and watt.
The new component is to be mounted in the same way as the replaced one.

Transport and handling

It is recommended to:
- use the product cover when transporting the product.
- do not move the product when it is operating.

Cleaning

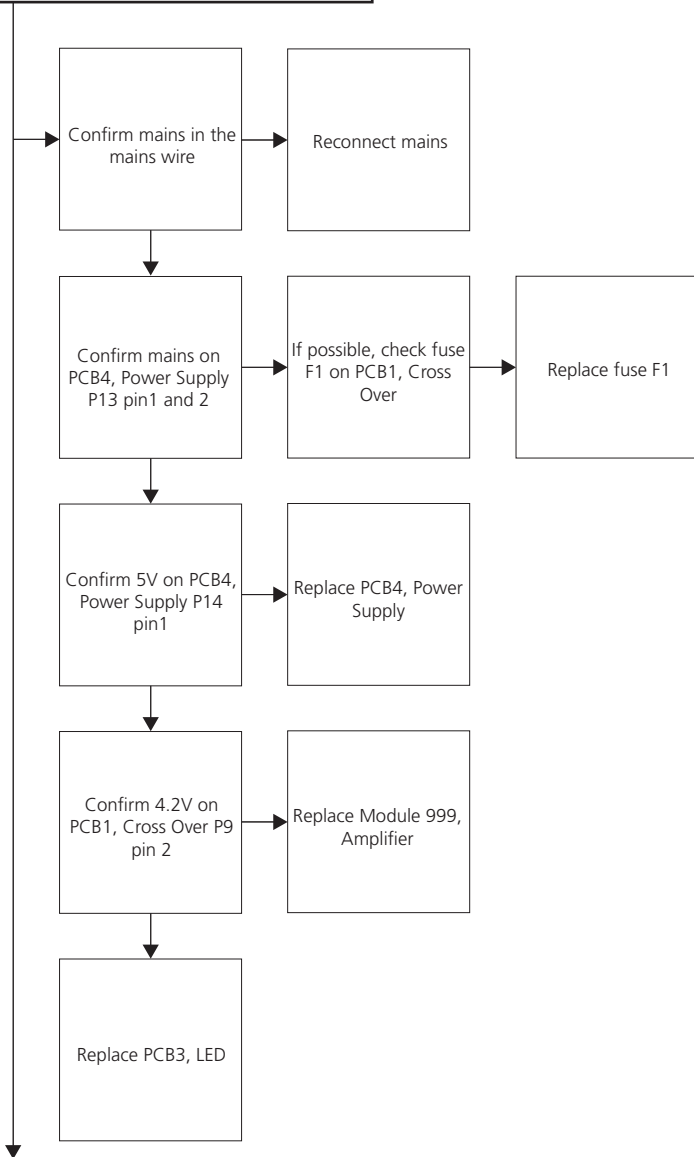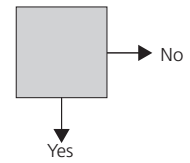Please refer to the chapter "Final check after repair" or the User's guides.

Fault flow chart

Fault symptom:
   - No red light in STANDBY

Possible causes:
   - Fuse F1
   - PCB4, Power Supply
   - Module 999, Amplifier

Connect a Master Link cable from e.g. a
BeoSound 4, to BeoLab 9. Make sure that S101
is set to either L or R. Connect mains to BeoLab 9.
Is there red light in the LED on top of BeoLab 9?

Note:
**Ground is
chassis**

No

Yes

Confirm mains in the
mains wire

Reconnect mains

Confirm mains on
PCB4, Power Supply
P13 pin1 and 2

If possible, check fuse
F1 on PCB1, Cross
Over

Replace fuse F1

Confirm 5V on PCB4,
Power Supply P14
pin1

Replace PCB4, Power
Supply

Confirm 4.2V on
PCB1, Cross Over P9
pin 2

Replace Module 999,
Amplifier

Replace PCB3, LED

No

Yes

Select e.g. Radio or CD on the Audiomaster, and press GO on Beo4

Does BeoLab 9 turn on (Green light in LED)

Go to next page

Confirm 5V on PCB4, Power Supply P14 pin 7

Check Power Link cable and Audiomaster. Reconnect/replace if nescessarry. (This is not covered in this fault flow chart)

Confirm -12V on PCB4, Power Supply P14 pin 3

Replace PCB4, Power Supply

Confirm 12V on PCB4, Power Supply P14 pin 5

Replace PCB4, Power Supply

Confirm 44V on PCB4, Power Supply P15 pin 4

Replace PCB4, Power Supply

Confirm -44V on PCB4, Power Supply P15 pin 5

Replace PCB4, Power Supply

Confirm 66V on PCB4, Power Supply P15 pin 6

Replace PCB4, Power Supply

Confirm approx 4.7V on PCB4, Power Supply P14 pin 9

Replace PCB4, Power Supply

Replace Module 999, Amplifier

From previous
page

No

Yes

Fault symptom:
   - No sound, but green LED is OK

Possible causes:
   - Module 999, Amplifier

Is there no sound, but the green LED is OK?

Go to box
further down
on page

Replace Module 999,
Amplifier

Note:
It wil give the best result if it is possible to
use an audio test CD with pure sine waves
and an oscilloscope, when measuring on
the woofer or midrange.

Warning:
Be very careful, when measuring on the
woofer, because there is approx 35Vdc on
both input terminals. Make sure to use a
differential probe, or make sure that the
oscilloscope and the product is not
connected to earth.

From above

Fault symptom:
   - No sound from woofer, but tweeter and
     midrange is OK

Possible cause:
   - Woofer
   - Module 999, Amplifier

Turn volume on the Audio Master up to 50.
Confirm an AC-Sound signal by means of the
Bar-graph on the multimeter or an oscilloscope,
when measuring across the woofer input
terminals.

Visual confirm cable
connection between
woofer and Module
999, Amplifier

Reconnect/replace
cable

Remove mains from the
product. Remove the black wire
from the woofer. Measure the
resistance across the woofer
terminals:
   Approx 2.9 ohm?

Replace woofer

Replace Module 999,
Amplifier

No

Yes

Note:
It wil give the best result if it is possible to use a audio test CD with pure sine waves and an oscilloscope, when measuring on the woofer or midrange

Fault symtom:
- No sound from midrange, but tweeter and woofer is OK

Possible cause:
- Midrange
- Module 999, Amplifier

Turn volume on the Audio Master up to 50. Confirm an AC-Sound signal by means of the Bar-graph on the multimeter or an oscilloscope, when measuring across the midrange input terminals.

Visual confirm cable connection between midrange and Module 999, Amplifier

Reconnect/replace cable

Remove mains from the product. Remove the black wire from the midrange. Measure the resistance across the midrange terminals:
Approx 6.1 ohm?

Replace midrange

Replace Module 999, Amplifier

Fault symtom:
- No sound from tweeter, but midrange and woofer is OK

Possible cause:
- Tweeter
- Module 999, Amplifier

Turn volume on the Audio Master up to 50. Confirm an AC-Sound signal by means of the Bar-graph on the multimeter or an oscilloscope, when measuring between PCB1, Cross Over P10 pin 1 and ground.

Visual confirm cable connection between tweeter and Module 999, Amplifier

Reconnect/replace cable

Remove mains from the product. Remove the connector on PCB1, Cross Over P10. Measure the resistance between the orange and white wire:
Approx 6.6 ohm?

Replace tweeter

Replace Module 999, Amplifier

No

Yes

Fault symptom:
- No function of the PCB7, NTC

Possible cause:
- PCB7, NTC
- Cable W4
- Module 999, Amplifier

Fig1

Red   Black

Is the loudspeaker in protection mode?

Visual confirm cable connection between Module 999, Amplifier and PCB7, NTC

Reconnect/replace cable

Replace PCB7, NTC

Replace Module 999, Amplifier

To confirm correct operation of the NTC, measure approx. 9.35V DC at normal room temperature, as shown in fig 1
(When the temperature is rising, the DC voltage is going towards 0)

Note:
When the loudspeaker goes into protection mode, it is nescessarry to disconnect mains and wait one minute before connecting it again.

Fault symptom:
- No function of S1 and S2

Possible cause:
- Module 999, Amplifier

Is there no function of switch S1 and/or S2?

Replace Module 999, Amplifier

Adjustments

Adjustments described

Speaker driver adjustment.
The speakers are individually measured and the speaker driver must be adjusted accordingly.

Adjustment must be performed when either speaker or speaker driver is replaced.

Access to adjustment points

The adjustment points are placed on the socket panel on the back of the product.
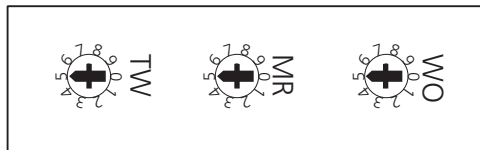
TW: Tweeter
MR: Midrange
WO: Woofer

Speaker adjustment table

Speaker value from label on speaker	Switch position
1.8 – 2.3	0
1.3 – 1.7	1
0.8 – 1.2	2
0.3 – 0.7	3
-0.2 – 0.2	4
-0.3 – -0.7	5
-0.8 – -1.2	6
-1.3 – -1.7	7
-1.8 – -2.2	8
-2.3 – -2.5	9

Repair tips

Hum in speaker when no music is played
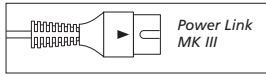
The Power Link cable must be of type MK III or higher.
The ground connection in Power Link cable lower than MK III may be insufficient for optimum sound performance.

Standby LED

The standby LED indicates the status of the BeoLab 9.

Standby LED STATUS
Red   BeoLab 9 is in standby.
Green   BeoLab 9 is operating.
Orange   BeoLab 9 is shut down due to thermal overload.

If the LED Status is orange, turn off and disconnect the product from the mains.
Wait for minimum 5 minutes for the speaker to cool down.
Connect mains and turn on BeoLab 9.

If the LED status still is orange the fault may be due to:
1. Woofer protection – perform speaker check.
2. Tweeter protection – perform speaker check.
3. Midrange protection – perform speaker check.
4. NTC-board or connection on one of the woofers.
   Access the NTC-board by dismantling the woofer.
4. Power supply failure.

Final check after repair

Final check after repair

The final check after repair describes the activities that are needed to ensure the product will be returned in perfect condition to the customer.

The content is:
– Insulation test.
– Restore setup.
– Final cleaning of the product.

Insulation test

The product must be insulation tested after having been dismantled. Make the test when the set has been reassembled and is ready to be returned to the customer.
Flashover must not occur during the test.

Make the insulation test as follows:
Short-circuit the two pins of the mains plug and connect them to one of the terminals of the insulation tester.
Connect the other terminal to ground on the Power Link socket.

NOTE!
To avoid damaging the product it is essential that both terminals of the insulation tester have good contact.

During the test the current must not exceed 5 mA.
Slowly increase the voltage on the insulation tester until a voltage of 2.5 kV (ac) is obtained. Maintain the voltage level for one second, then slowly decrease the voltage to 0 V (ac).

Restore setup

Ensure that,
– The F/W/C switch is in correct position.
– The plug is inserted over the standby LED.
– The Power Link cable is a MK III or higher.

Check sound

Ensure that all speakers are OK.

Clean the product

Clean dusty surfaces using a dry soft cloth. If necessary, remove grease stains or persistent dirt with a lint-free, firmly wrung cloth, dipped in a solution of water containing only a few drops of mild detergent such as washing-up liquid.

The loudspeaker front grill may be cleaned with a vacuum cleaner with a soft brush nozzle, and set to the lowest level.

Replacement of modules

Modules that can be replaced

Warning – Static electricity

ESD
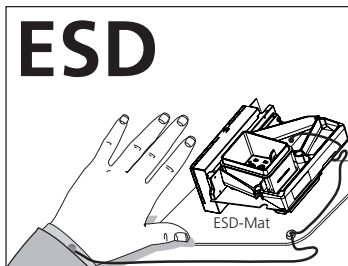
ESD-Mat

Static electricity may damage the product.
A static-protective field service kit must always be used when the product is
disassembled or modules are being handled.

Notice!

All modules must be placed on the ESD-mat or in an ESD-proof bag.

Purpose of replacement of modules

Short instructions for replacement of the available modules, with reference to
additional illustrations:
- The correct sequence for replacing modules.
- Text and illustrations.
- Reference to adjustment.
  Modules that do not require any special procedure may be shown as only
  illustrations.

After replacement of drivers

After replacing a driver, see Adjustments and Repair tips.

- Remove cover
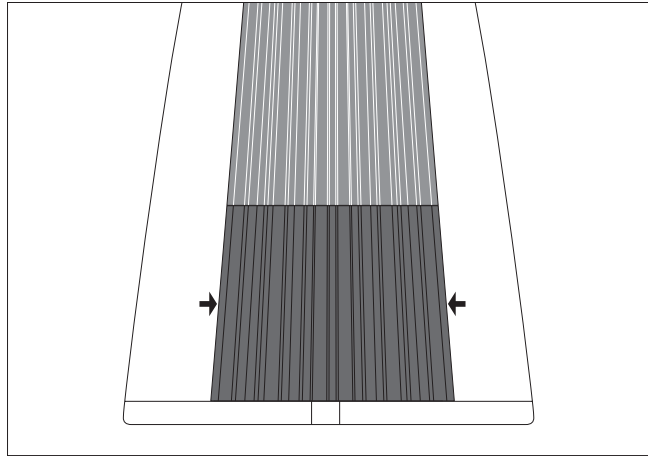
- Remove cables connected to BeoLab 9

2x
3mm

- Remove cover, top

- Use Special tool

- Remove screws for lens

3x
2.5mm
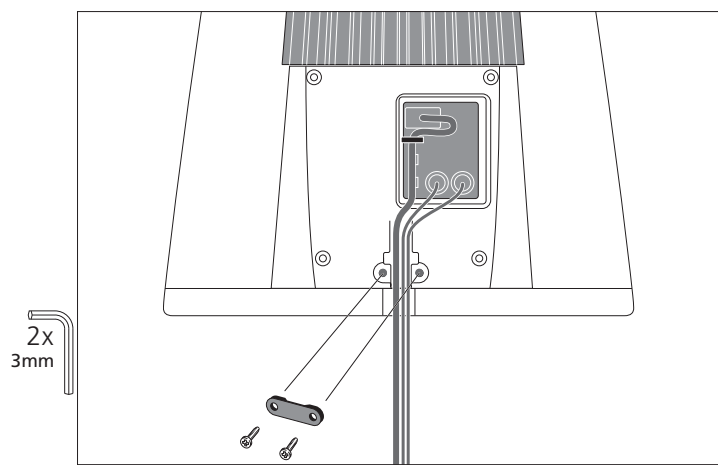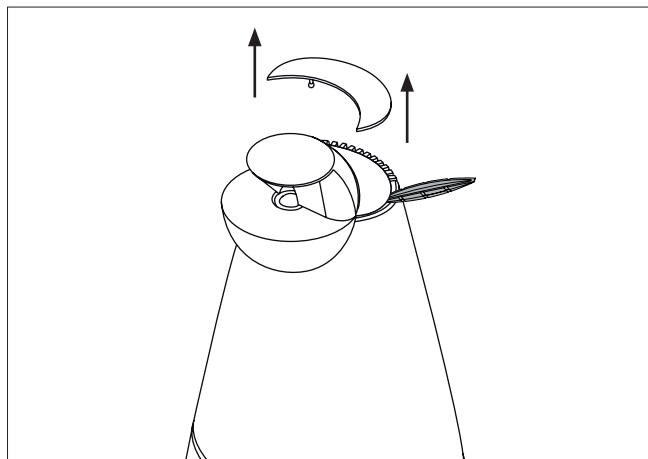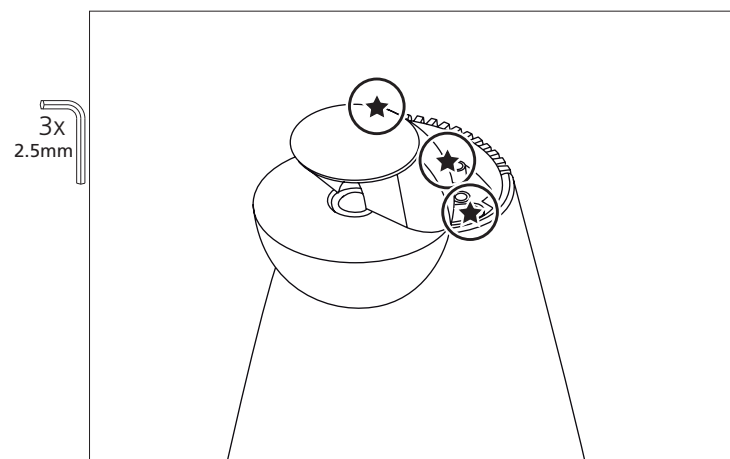
- Gently lift off lens
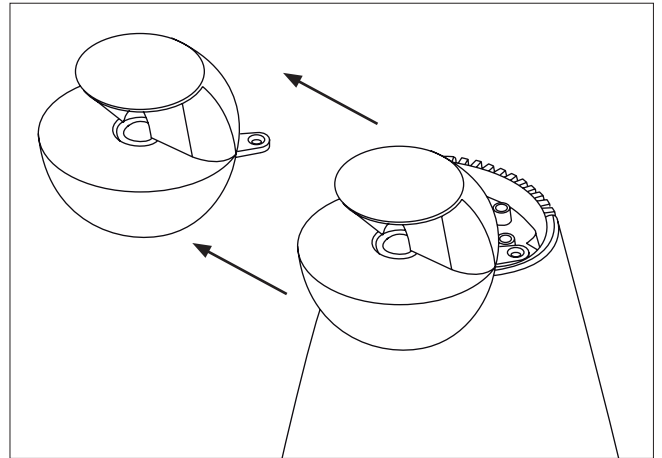
- Pull off fabric frame
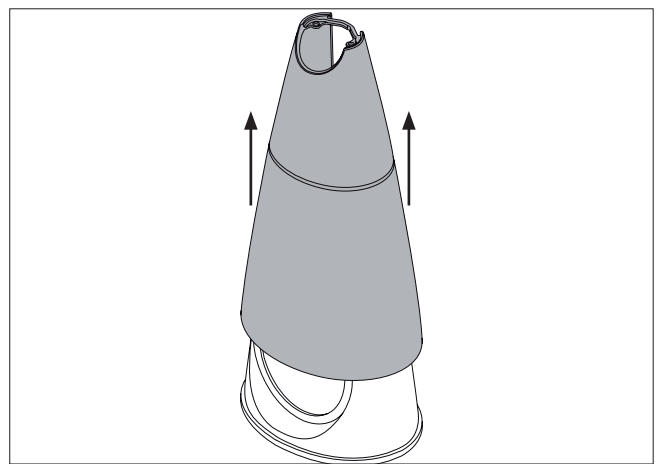
- Remove cover
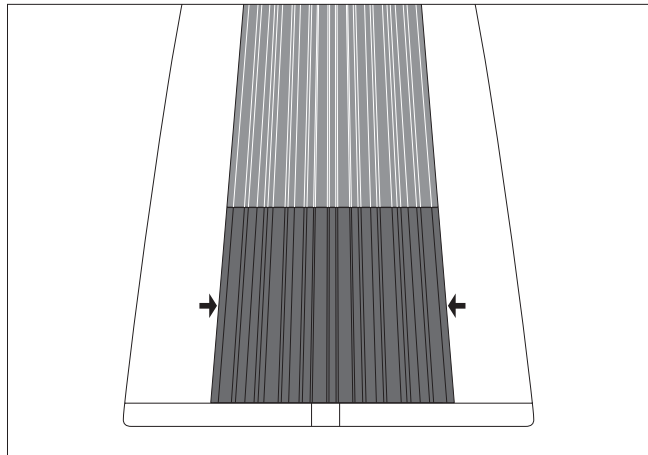
- Remove cables connected to BeoLab 9
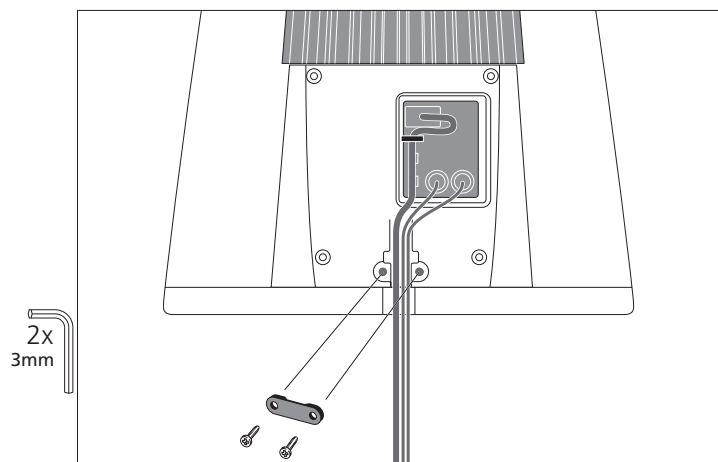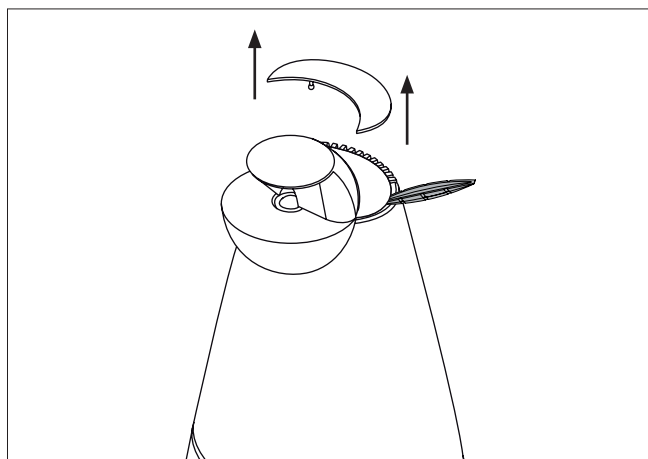
2x
3mm

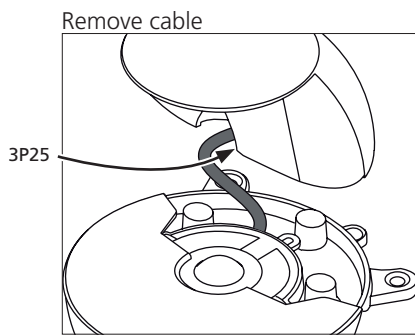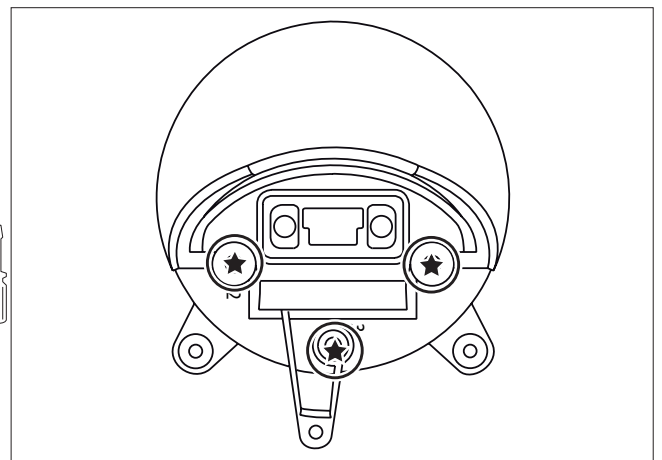
- Remove cover, top

- Use Special tool

- Remove screws for lens

3x
2.5mm

- Gently lift off lens

- Remove screws and pull of lens top

Remove cable

3P25
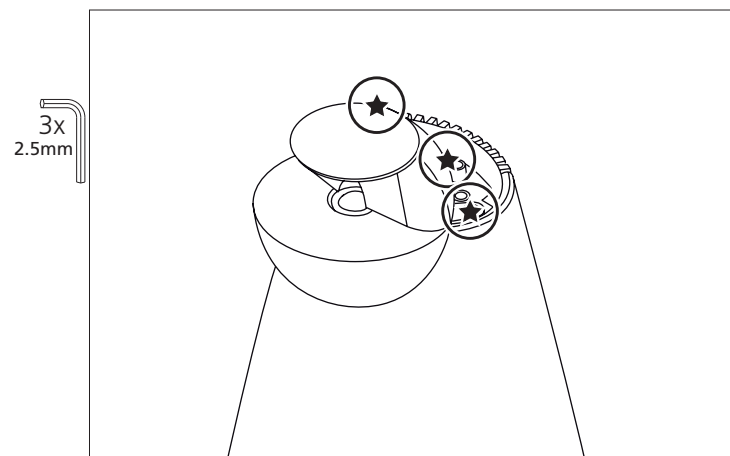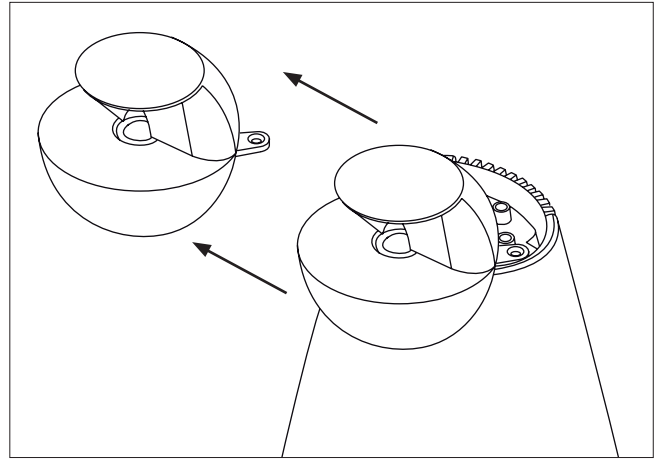
3x
TX20

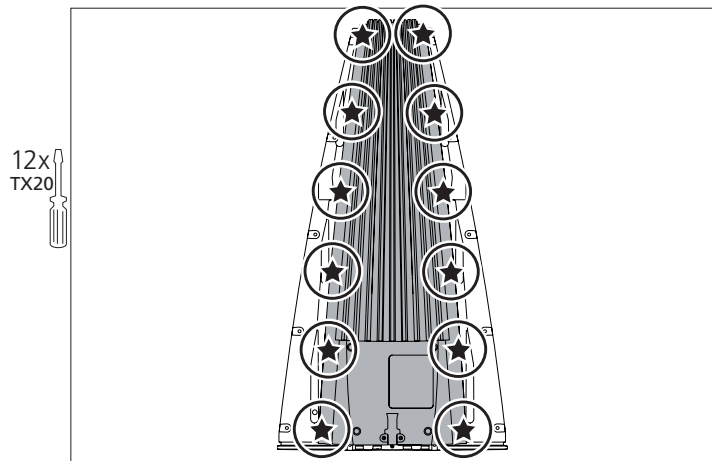- Remove screws and pull off PCB3, LED with chassis

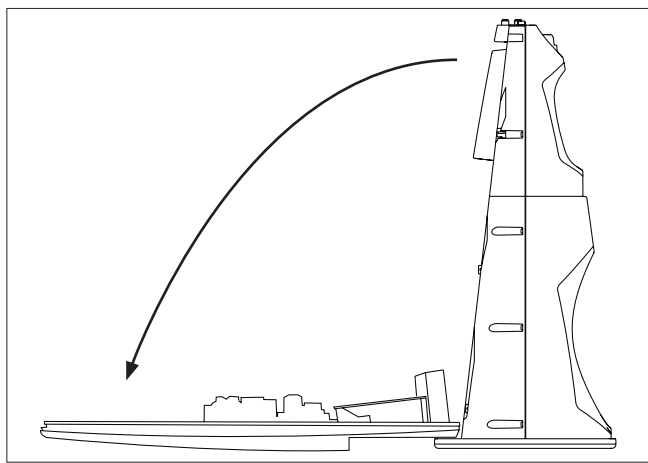4x
TX10
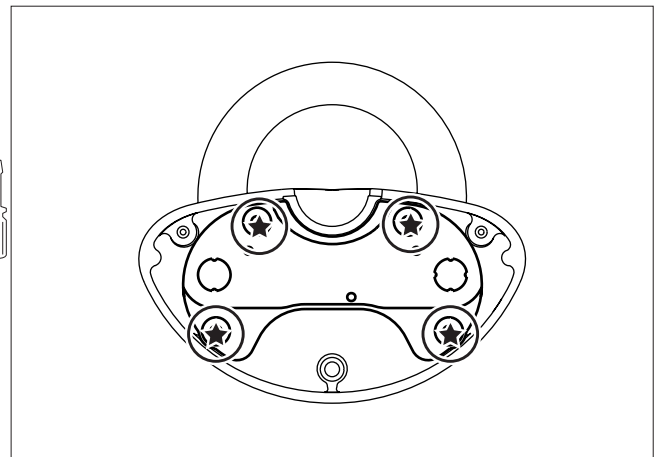
- Remove screws for PCB3, LED
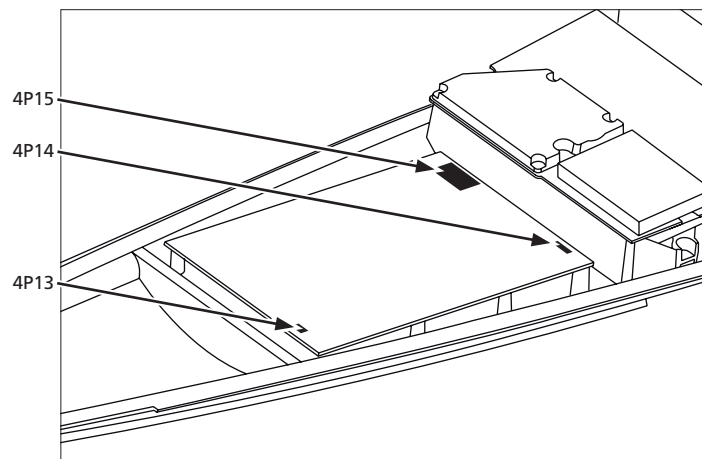
3x
TX10
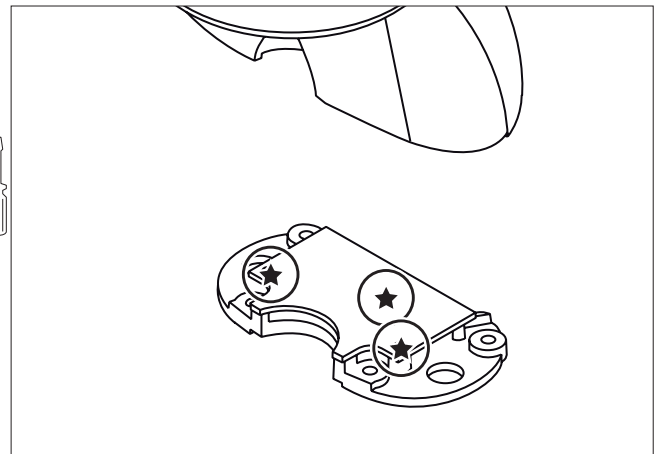
☞ 4.2   BeoLab 9 in service position

- Remove screws

12x
TX20

- Flip down heat sink as shown

- Remove cables

4P15

4P14

4P13

- Remove screws

9x
TX10

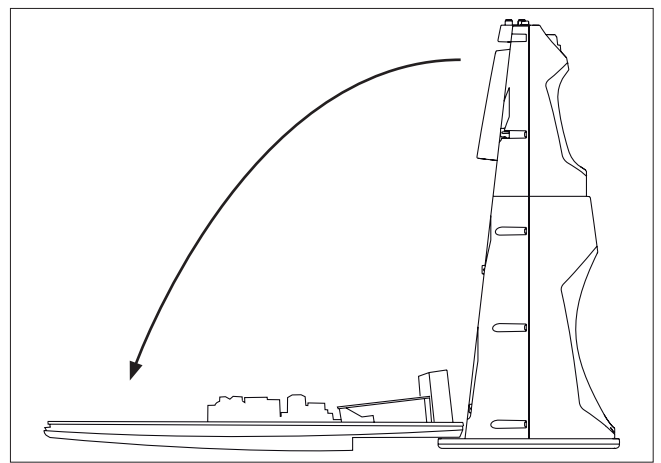☞ 4.2   BeoLab 9 in service position

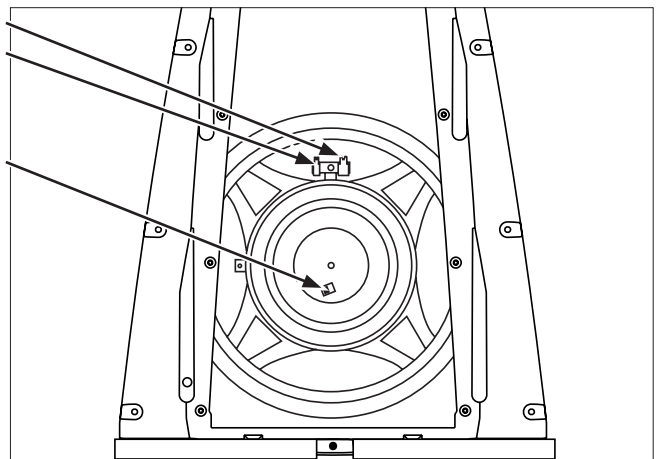- Remove screws

12x
TX20
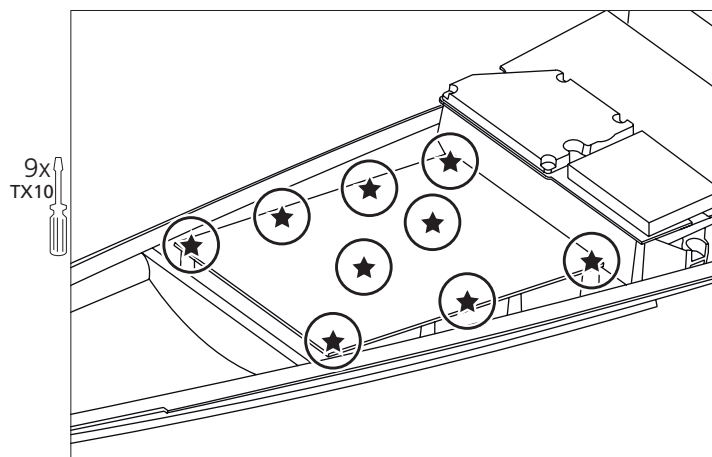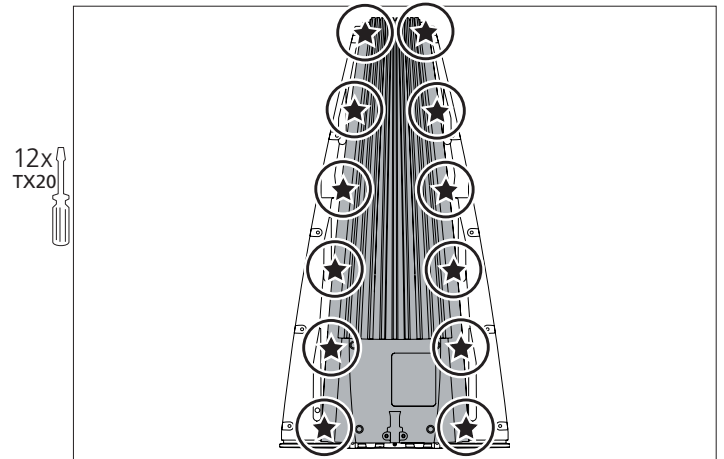
- Flip down heat sink as shown

- Remove cables from woofer

- Remove cables as shown

1P10
1P9
4P15
4P14

- Remove screws as shown

3x
TX20

- Remove screws as shown

3x
TX10
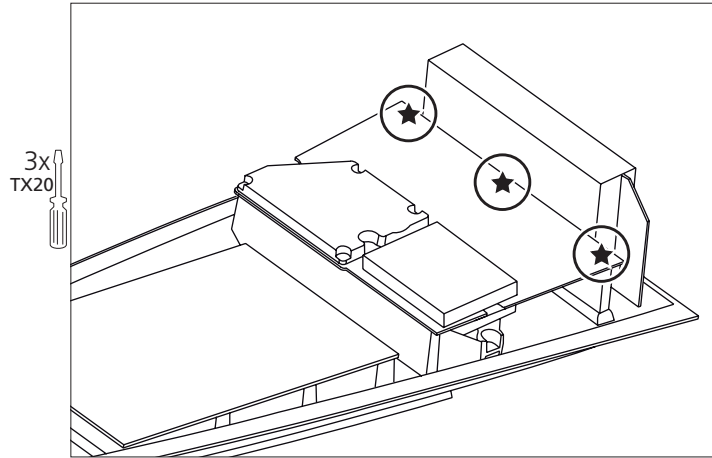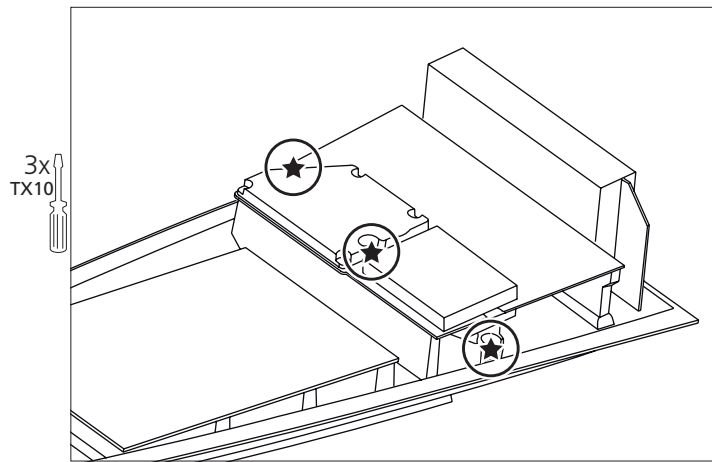
- Remove cable on backside of 999Module, Amplifier
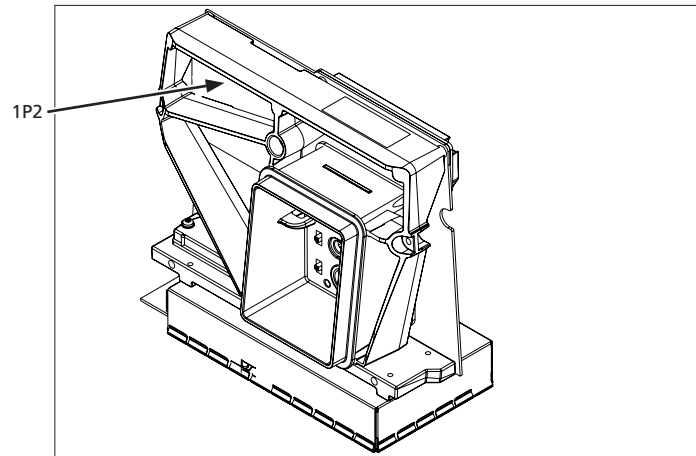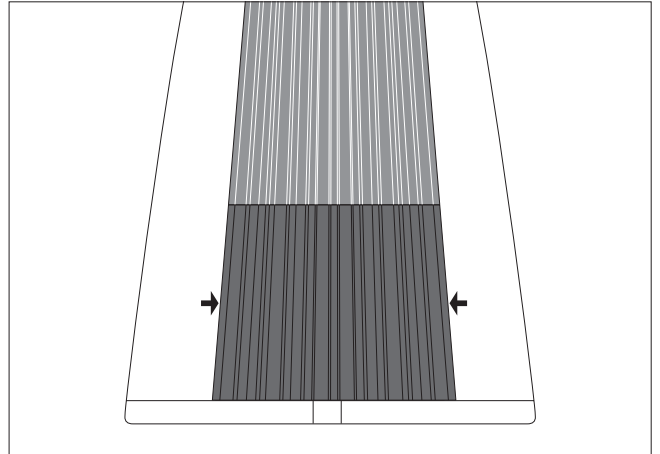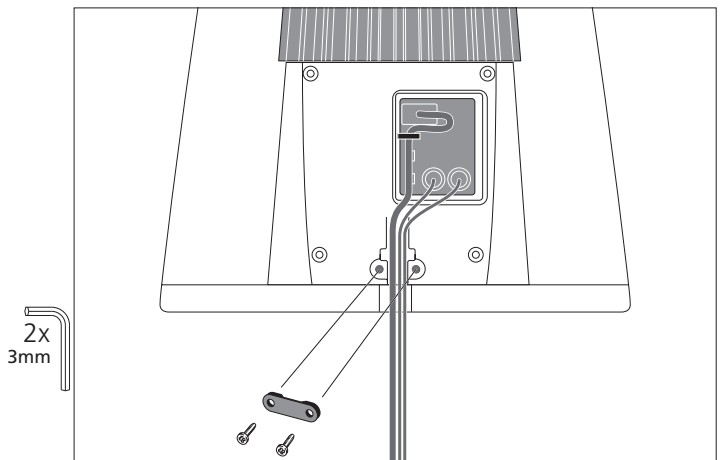
1P2

- Remove cover

- Remove cables connected to BeoLab 9

2x
3mm

- Remove cover, top

- Use Special tool

- Remove screws for lens

3x
2.5mm

- Gently lift off lens

- Remove screws and pull of lens top

Remove cable

3P25

3x
TX20
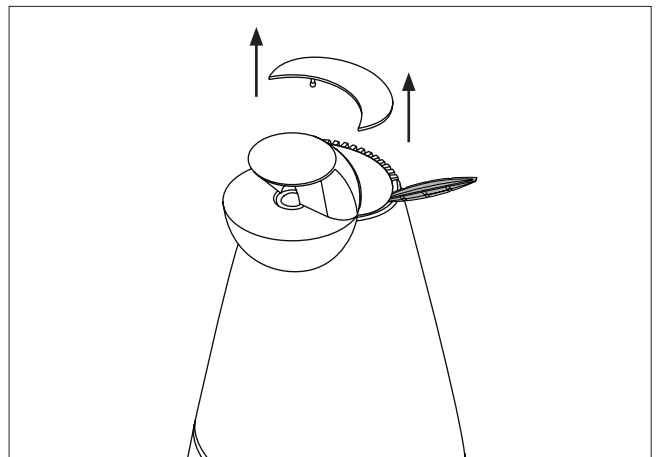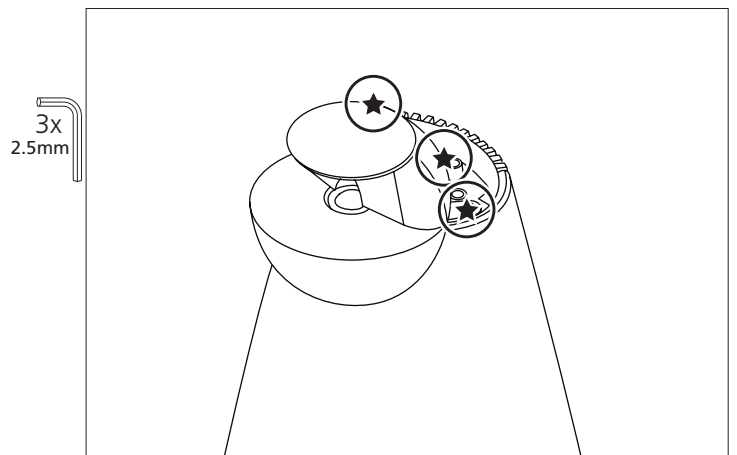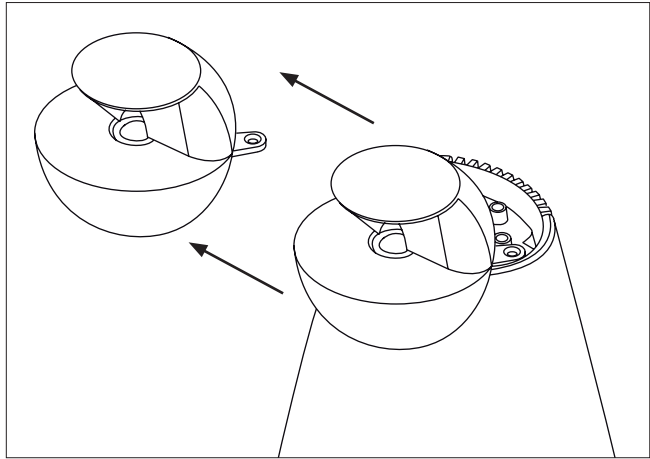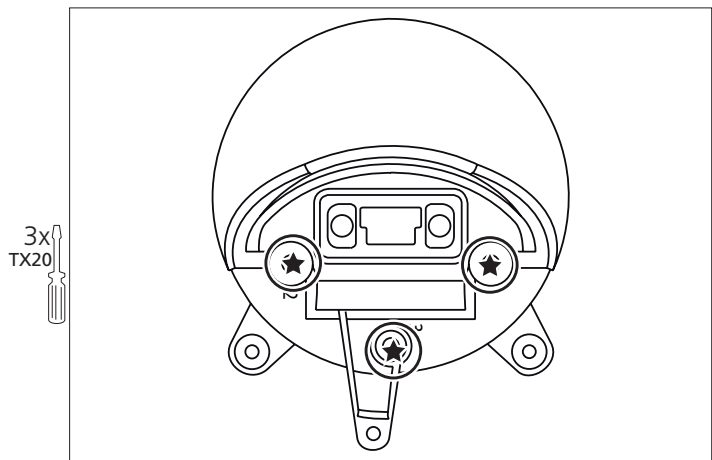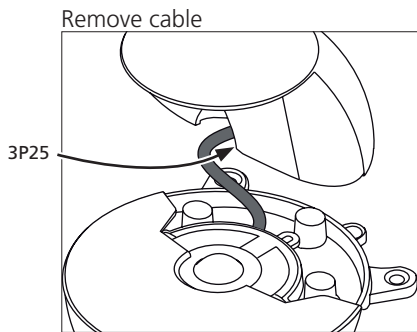
- Remove tweeter cover
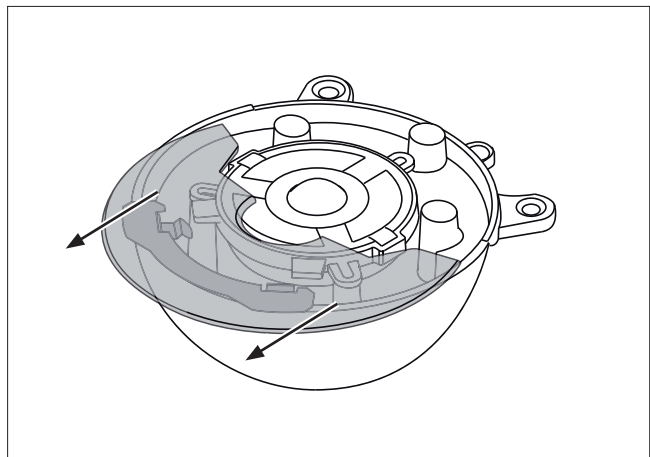
- Remove screws for tweeter

3x
TX10

☞ 4.2   BeoLab 9 in service position

- Remove screws

4x
TX20

- Remove cables
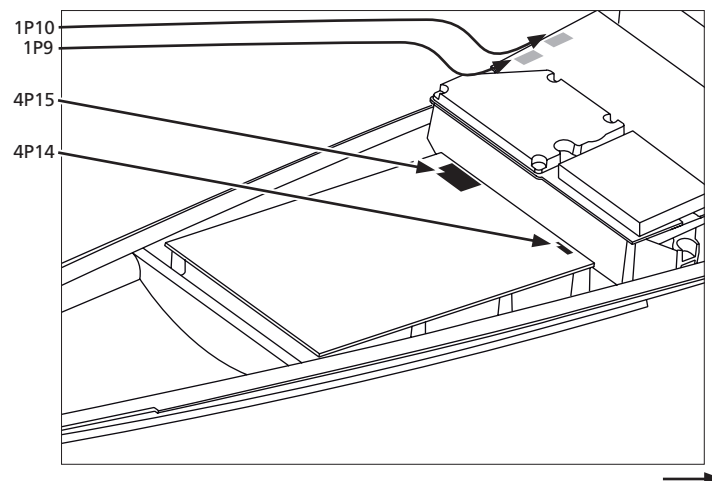
☞ 4.2   BeoLab 9 in service position

- Remove screws

4x
TX20
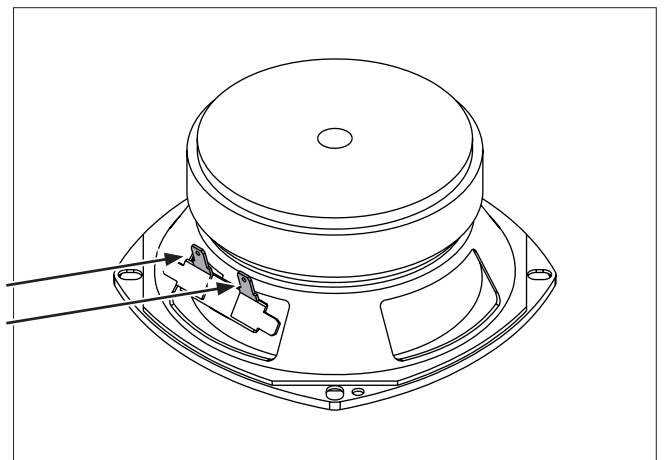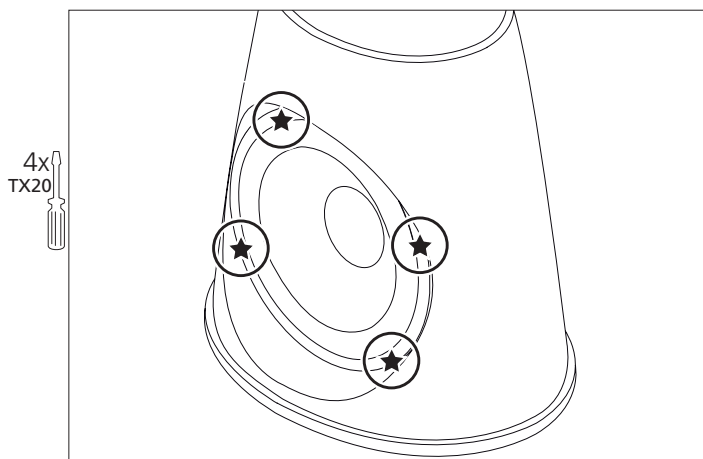
- Remove cables (remember NTC)

- Remove screw

1x
TX10
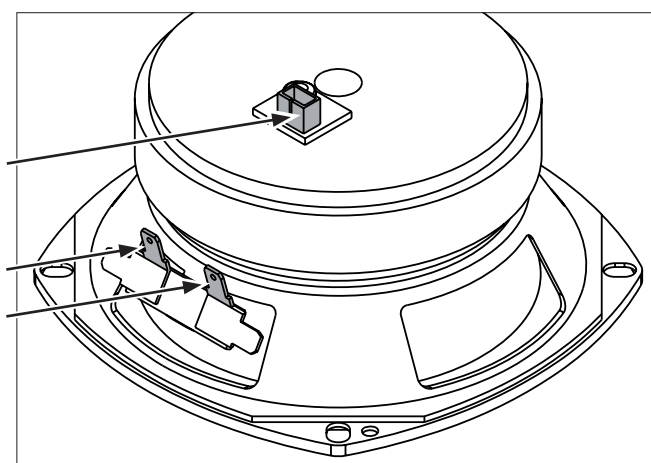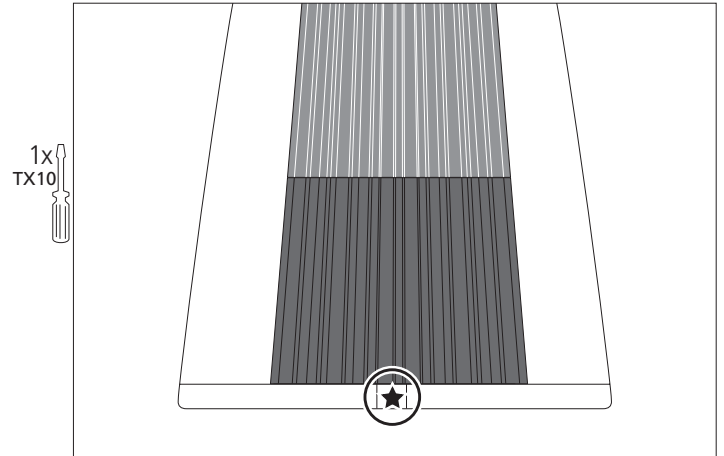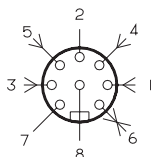
- Pull off bracket
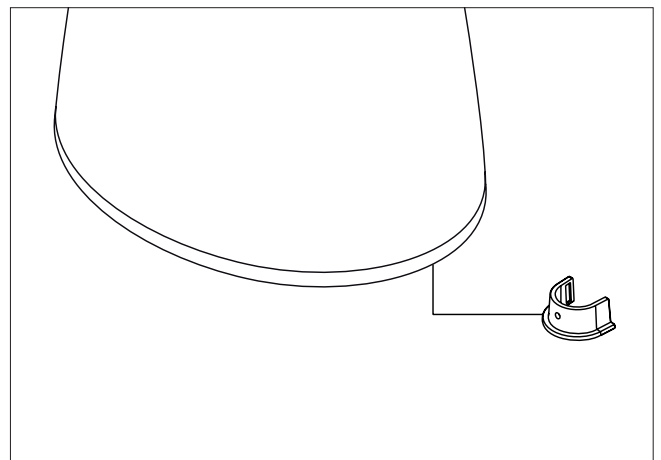
- Pull off rubber foot

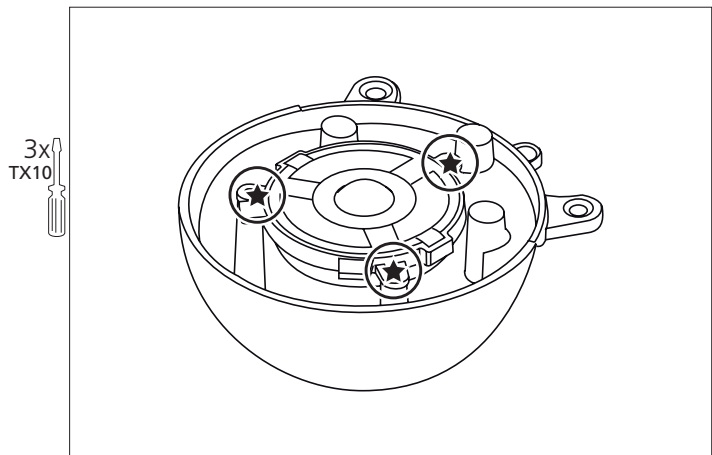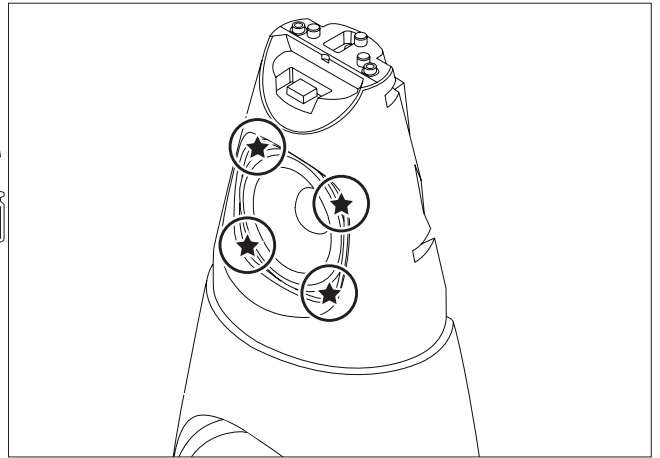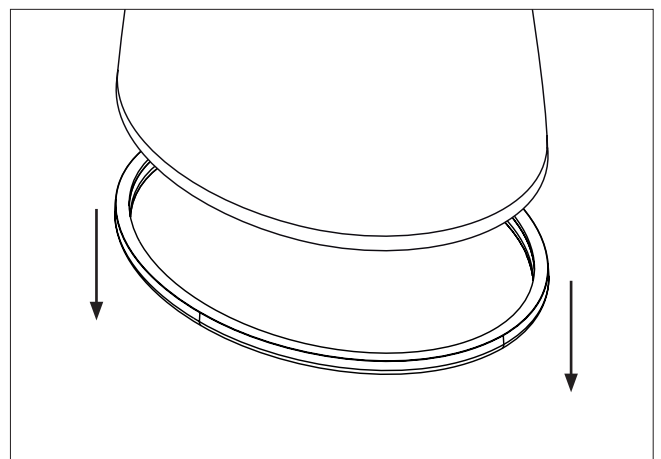| Specification guidelines for service use	BeoLab 9
Type number	6217
Dimensions W x H x D	775mm x 400mm x 300mm
Dimensions W x H x D, incl. packaging two pcs. in one carton box	1004mm x 800mm x 600mm
Weight	16.6 kg
Weight, incl. packaging	44.9 kg
Cabinet finish	Black cloth, aluminium
	Blue cloth, aluminium
	Dark grey cloth, aluminium
	Red cloth, aluminium
Mains	90-240Vac
Power consumption	65W (IEC60065)
	25W typical
	< 0,5W in standby
Power amplifier, bass	400W, 4 ohm, class D ICEpower
Power amplifier, midrange	100W, 6 ohm, class AB
Power amplifier, treble	100W, 8 ohm, class AB
Effective Frequency range	30 - 20,000 Hz
Crossover frequency	180/2000 Hz
Cabinet principle	Closed box
Net volume, bass	18 litres
Net volume, midrange	4 litres
Woofer	10" / 250mm cone
Midrange	5" / 125mm cone
Tweeter	3/4" / 19mm dome in acoustic lens
Bass equalization	ABL (Adaptive Bass Linearization)
Input sensitivity (Power Link) and (line)	125mV @ 91dB SPL
Switch off time (line)	Automatic on /off (up to 3min)
Indication	On/Off LED placed in the acoustic lens
Operation	Switch for Free standing - Against wall - In corner
	Switch for Left - Right - Line (via PL plug)
Protection	Thermal protection of all drivers
	ABL system protects the bass unit against mechanical damage
Connections	
Power Link	Two (use semi-balanced PL cable type MKIII, or fully mounted PL cable)

POWER LINK	Pin 1	PL ON => 2.5V, OFF = < 0.5V
	Pin 2	Signal GND
	Pin 3	Audio L out 0V - 6.5V RMS
	Pin 4	PL speaker ON => 2.5V, OFF = < 0.5V
	Pin 5	Audio R out 0V - 6.5V RMS
	Pin 6	Data: High > 3.5V, Low < 0.8V
	Pin 7	Data GND
	Pin 8	Not used

Line-in	Via PL using Line-to-PL adaptor cable
Mains	One (two pin male shaver plug type)

Subject to change without notice

Block diagram

Module 999

LED PCB
Red   Green

Tweeter 8 ohm

Delay Compensation

HP-filter
2 ord.

Gain & VGA

EQs

EQs HP-filter
2 ord.

Tw Mute

Hybrid STK403-130

MidRange 8 ohm

Global EQ

Free EQ

Wall EQ

Corner EQ

EQs

BP-filter
2 ord.

Gain & VGA

BP-filter
2. ord.

MR Mute

Protection

FET Switches

VGA

ABL

GAIN

EQs

LP-filter
4 ord.

NTC

LC-Filter

Woofer Mute

Woofer 4 ohm

WoofMon.

Diff. Input
HT_ON
Control

HT_ON

Right

Left

Right

Left

Li R Le

Free Wall Corner

Gain setting 0-9

Tw   MR   Wo

ICEpower

PCB5

PCB4

Switchmode Power Supply

230V IN

Mains filter

+66V Switchable
+44V Switchable
-44V Switchable
+12V Switchable
-12V Switchable
+5V Always ON

Wiring diagram

Module 999
Amplifier

Tweeter + Lens

Speaker 8 ohm

W9 Tweeter_out
GND44

Green
Red
GNDA
GND_for_Lens

P25.1
P25.2
P25.3
P25.4
G R

LED

Plug

Plug-in

3

MidRange_out

GND44

8 ohm

Midrange

4

Power Supply

Micro-Match

P14.1 +5V_STBY
P14.2 GNDA
P14.3 -12V
P14.4 GNDA
P14.5 +12V
P14.6 GNDA
P14.7 Speaker_ON
P14.8 Not connected
P14.9 MainsFailure
P14.10 TemperatureSense
P14.11 Not connected
P14.12 GNDA

W1

+5V_STBY
GNDA
-12V
GNDA
+12V
GNDA
Speaker_ON
Not connected
MainsFailure
TemperatureSense
Not connected
GNDA

Micro-Match
Soldered into PCB

P3.1
P3.2
P3.3
P3.4
P3.5
P3.6
P3.7
P3.8
P3.9
P3.10
P3.11
P3.12

F1

LIVE NEUTRAL

P1

GND_REF
Right Signal 5 4 PL_ON
Left Signal 3 2 1
GND
P101
PowerLink

GND_REF
Right Signal 5 4 PL_ON
Left Signal 3 2 1
GND
P102
PowerLink

JST VH

P13.1 MainsLive
P13.3 MainsNeutral

W2

MainsLive
MainsNeutral

JST VH

P2.2
P2.1

1

Cross Over

S101
10 5
9 LINE 4
8 RIGHT 3
7 2
6 LEFT 1
11 12

S102
10 5
9 FREE 4
8 WALL 3
7 2
6 CORNER 1
11 12

Molex MLX

P15.1 GND44
P15.2 GND44
P15.3 GND66
P15.4 +44V
P15.5 -44V
P15.6 +66V

W3

+44V
GND44
GND44
-44V

JST SDN
Soldered into PCB

P4.1
P4.2
P4.3
P4.4

JST 2mm

P9.1 Green
P9.2 Red
P9.3 GNDA
P9.4 GNDA for Lens

JST XA

P10.1 Tweeter_out
P10.2 GND44
P10.3 MidRange_out
P10.4 GND44

W8

NTC+
NTC-

JST 2mm

P8.1
P8.2

Micro-Match
Soldered into PCB

P6.10 P6.9 P6.8 P6.7 P6.6 P6.5 P6.4 P6.3 P6.2 P6.1

W4

7

NTC

NTC+
NTC-

Speaker_mute
Standby_ICE500A
Signal_mute
Vo-_to_ICE500A
Vo+_to_ICE500A
Monitor_woofer
GNDA
-12V
+12V
Not connected

W5

4 ohm

+Terminal
-Terminal

Woofer

woofer+
woofer-
woofer_out-
woofer_out+
GND66
+66V

JST VH

P18.4 P18.3 P18.2 P18.1

Speaker_mute
Standby_ICE500A
Signal_mute
Vo-_to_ICE500A
Vo+to_ICE500A
Monitor_woofer
GNDA
-12V
+12V
Not connected

Micro-Match

P17.1 P17.2 P17.3 P17.4 P17.5 P17.6 P17.7 P17.8 P17.9 P17.10

W6

Standby_ICE500A
Signal_mute
Vo-_to_ICE500A
Vo+to_ICE500A
Monitor_woofer
GNDA
-12V
+12V

JST SAN
Soldered into PCB

P19.1
P19.2
P19.3
P19.4
P19.5
P19.6
P19.7
P19.8

Standby_ICE500A
Signal_mute
Vo-_to_ICE500A
Vo+to_ICE500A
Monitor_woofer
GNDA
-12V
+12V

JST PH

Px.8
Px.7
Px.6
Px.5
Px.4
Px.3
Px.2
Px.1

5

ICE-Power Amplifier

2

LC-Filter

W7

JST SDN
Soldered into PCB

P20.1 GND66
P20.2 Woofer+
P20.3 +66V
P20.4 Woofer-

Woofer-
Woofer-
+66V
+66V
Woofer+
Woofer+
GND66
GND66

Molex Micro-Fit

Py.1
Py.2
Py.3
Py.4
Py.5
Py.6
Py.7
Py.8

Available parts
BeoLab 9

9001

9002

9003   *Incl. pos. no. 1*

9004

3

9005

9006

9007

9008

*Incl. pos.
no. 9008*

9009

9010

9011

9004

*Incl. pos. nos.
9010, 9011*

9012

9013

9014

*Incl. pos. nos. 9016, 9017,
9020, 9021, 9, 10*

9015

9016

9017

9017

9017

9017

9017

9017

9018

9018

9019*

9020

9021

9022

4

999

Incl. pos. no. 9022

*Incl. pos. nos. 9018, 9019,
9022, 9024, 3, 4, 11, 9, 13*

9023

9024

9025

9026

9027

BeoLab 9

9001	3458152	Cover, top
9002	3321047	Fabric frame, black
	3321048	Fabric frame, dark grey
	3321049	Fabric frame, blue
	3321050	Fabric frame, red
9003	3131109	Lens, top incl. pos. no. 1
9004	3332007	Damping material
9005	3152321	Chassis w/light guide
9006	3912009	Acoustic felt
9007	3459508	Cover, tweeter
9008	3947303	Gasket
9009	8480084	Tweeter
9010	3947306	Gasket
9011	3947318	Gasket
9012	3131108	Lens, bottom incl pos. nos. 9010, 9011
9013	8480080	Midrange
9014	8480082	Woofer 10"
9015	3400061	Cabinet incl. pos. nos. 9016, 9017, 9020, 9021, 9, 10
	3947350	Tape/foam 3 x 7mm – 10m
9016	3332010	Damping material
9017	3151911	Guide
9018	3152235	Clips f/wire
9019	3947305	Gasket, set
9020	3152154	Bracket f/foot
9021	2954004	Rubber foot
9022	3947304	Gasket
9023	3358277	Heat sink incl. pos. nos. 9018, 9019, 9022, 9024, 3, 4, 11, 9, 13
9024	3151552	Wire holder
9025	3160408	Cover
9026	6100273	Mains wire, EU
	6100329	Mains wire, UK
	6100307	Mains wire, US
	6100332	Mains wire, AUS
	6100386	Mains wire, KOR
	6100331	Mains wire, JPN
	6100047	Mains wire, CHN
9027	6270688	Powerlink cable, black, 5m

3Module	8003276	PCB3, LED

4Module	8003325	PCB4, Power Supply

7Module	8100090	PCB7, NTC

999Module	8052273	999Module, Amplifier consists of: PCB1 - PCB2 - PCB5, incl. pos. no. 9022
F1	6600177	Fuse T 5A 250V

Survey of screws etc.

1	2930112	Gasket
2	2052040	Screw 3 x8 mm
3	2054060	Screw 3 x 10mm
4	2058092	Screw 4 x 10mm
5	2019025	Screw 4 x 12mm
6	2019021	Screw 4 x 12mm
7	2058026	Screw 3 x 8mm
8	2625002	Lock washer
9	2930178	Bushing
10	2052011	Screw 3 x 10mm
11	2054043	Screw 3 x 10mm
12	2015005	Screw 4 x 55mm
13	7530118	Solder pin

Wire bundles	W2	6277985	Wire from PCB1, P2 – PCB4, P13

Parts not shown		3395313	Back-up suitcase
		3376000	Product cover
		3040017	Special tool

Accessories		6270856	Cable, RCA-phono to PL Line-in, black, 5m
		6270433	Adapter, mini-jack/male – RCA female x 2

Packing		3393016	Outer carton, top-bottom
		3396425	Packing, complete
		3392768	Pallet

Available documentation			See Retail Ordering System