AS-212R / AS-309R

Userguide
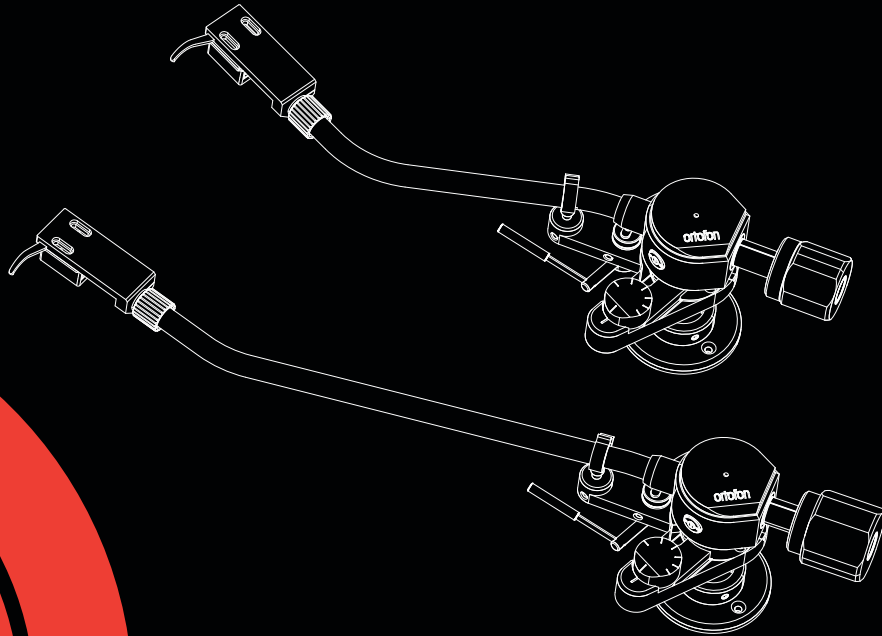
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Introduction

The Reference Tonearm series is a prime example of how the Danish design philosophy and Japanese precision can produce a truly exceptional product.

Since 1953, Ortofon has been designing tonearms with the goal of combining craftsmanship and technology, and the Reference Tonearm series is the culmination of decades of experience and expertise in the field of audio engineering. It improves upon the great build of our original legacy AS-212 and AS-309 models, combining exquisite design, precision manufacturing, and attention to detail, resulting in a beautifully designed tonearm that delivers outstanding performance.

The classic and beautiful S-shaped tonearm tube is crafted from high-grade aluminum alloy, offering an optimal combination of rigidity and mass. The Reference tonearms are intuitive and easy, featuring improved high-grade bearings, a universal brass connector, and a high-strength alloy that enhances rigidity. The internal wiring uses Flexible Copper Wire to allow the arm to move freely without affecting its movement. Its beautiful design and compatibility with a wide range of cartridges and turntables make it an attractive option for any vinyl lover.

About the included counterweights

The tonearm comes with two types of counterweights: a standard weight and a heavy weight, which can be utilized according to the cartridge's weight to allow mounting a wide range of cartridges.

For the AS-212R/309R, the standard weight is used for cartridges on headshell with a total weight of 18 to 26 g, and the heavy weight is for cartridges on headshell weighing 26 to 38 g.
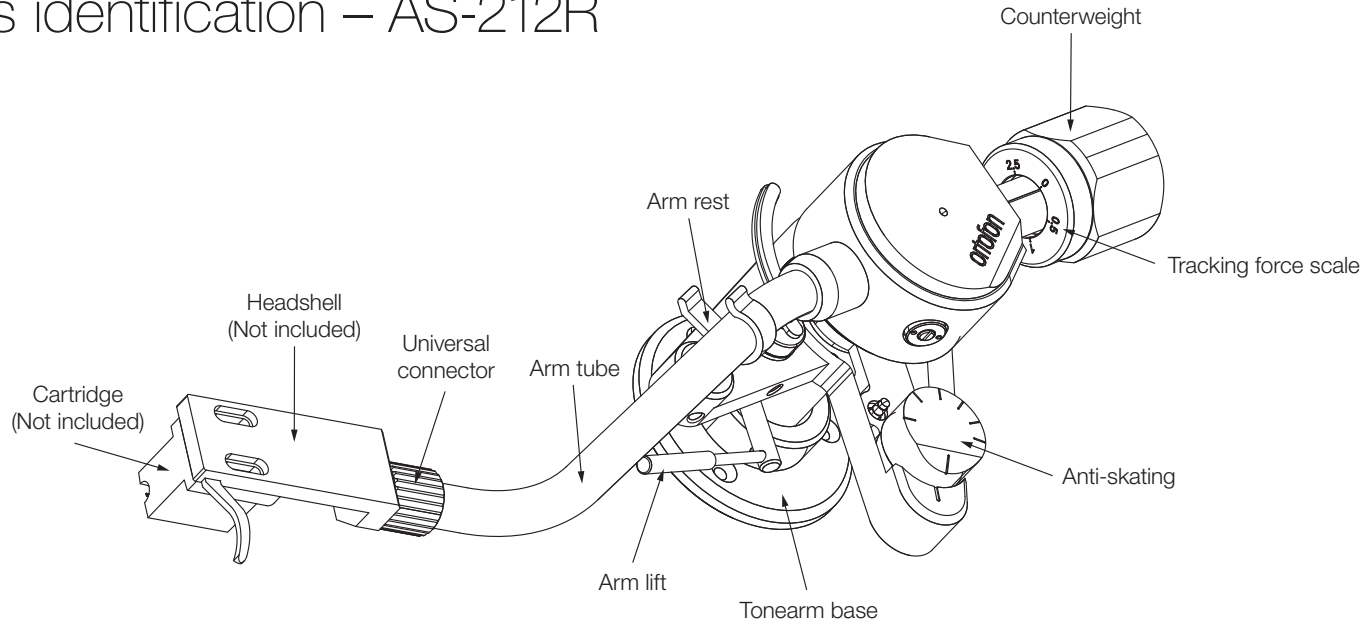
Parts identification – AS-212R

Counterweight

Arm rest

Tracking force scale

Headshell
(Not included)

Universal
connector

Arm tube

Cartridge
(Not included)

Anti-skating

Arm lift

Tonearm base

Figure 1

Dimensions – AS-212R

1:4

Figure 2

Center spindle

R 66

R 120.9

Null point

Null point

Effective length: 232 mm

Overhang

18

Mounting distance: 214 mm

Stylus point

23.75°

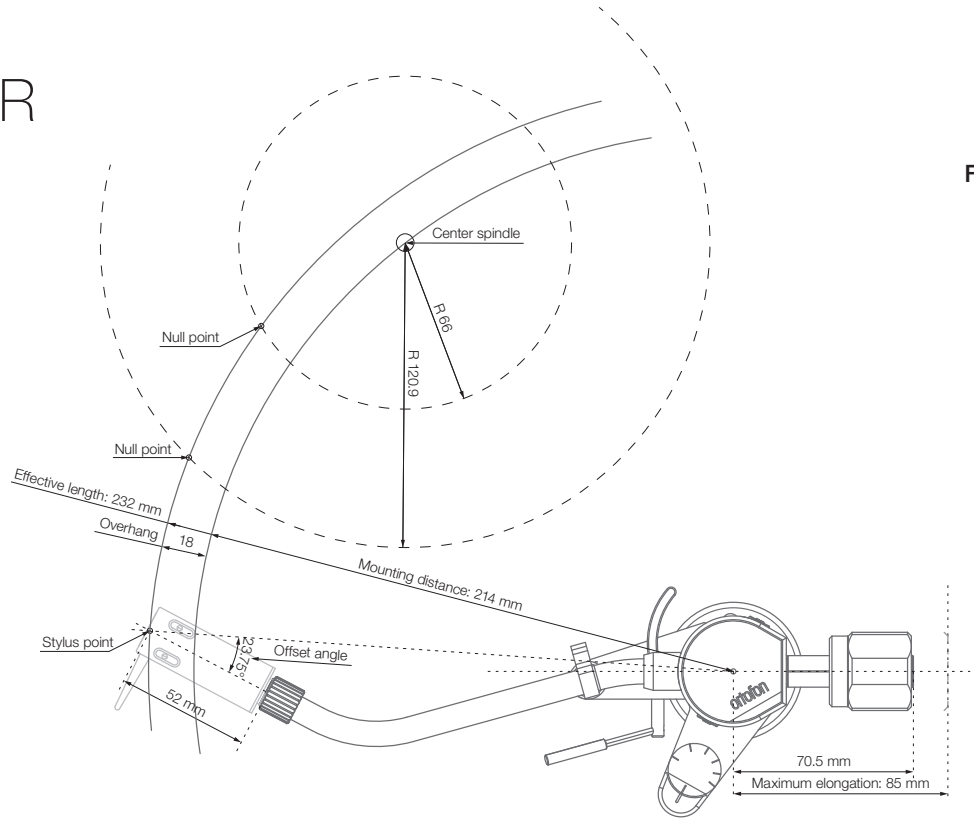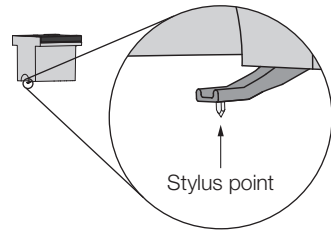Offset angle

52 mm

70.5 mm

Maximum elongation: 85 mm

Stylus point

Specifications – AS-212R

Arm base

- Arm base fixing screw position: 40 mm in diameter from the center of the base.
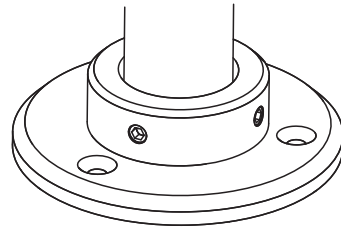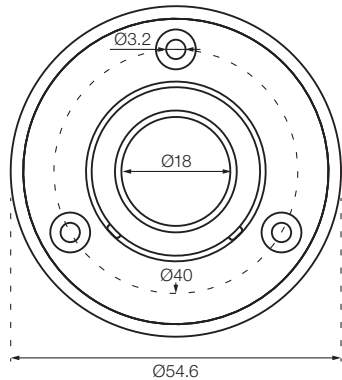- Three screws are equally spaced at 120°.

Ø3.2
Ø18
Ø40
Ø54.6

Figure 3

Tonearm

- Mounting distance: 214 mm
- Effective length: 232 mm
- Overhang: 18 mm
- Offset angle: 23.75°
- Stylus point to the rear end of headshell: 52 mm
- Tonearm geometry: Baerwald alignment (IEC recommendation, the null point is 66.04 and 120.9 mm)
- Arm shaft diameter: 18 mm
- Recommended arm shaft hole diameter:: 22 mm
- Cartridge weight: 18 to 26 g (with standard weight, including headshell)
- Cartridge weight: 26 to 38 g (with heavy weight, including headshell)
- Tonearm weight: 600 g / 630 g standard weight/heavy weight
- Height above mounting surface: 59 – 79 mm (up to top of the tonearm)
- Counterweight radial clearance: 80 mm for standard weight; 89 mm for heavy weight (measured from pivot point)
- Distance from mounting surface to top of platter: 20 – 48 mm
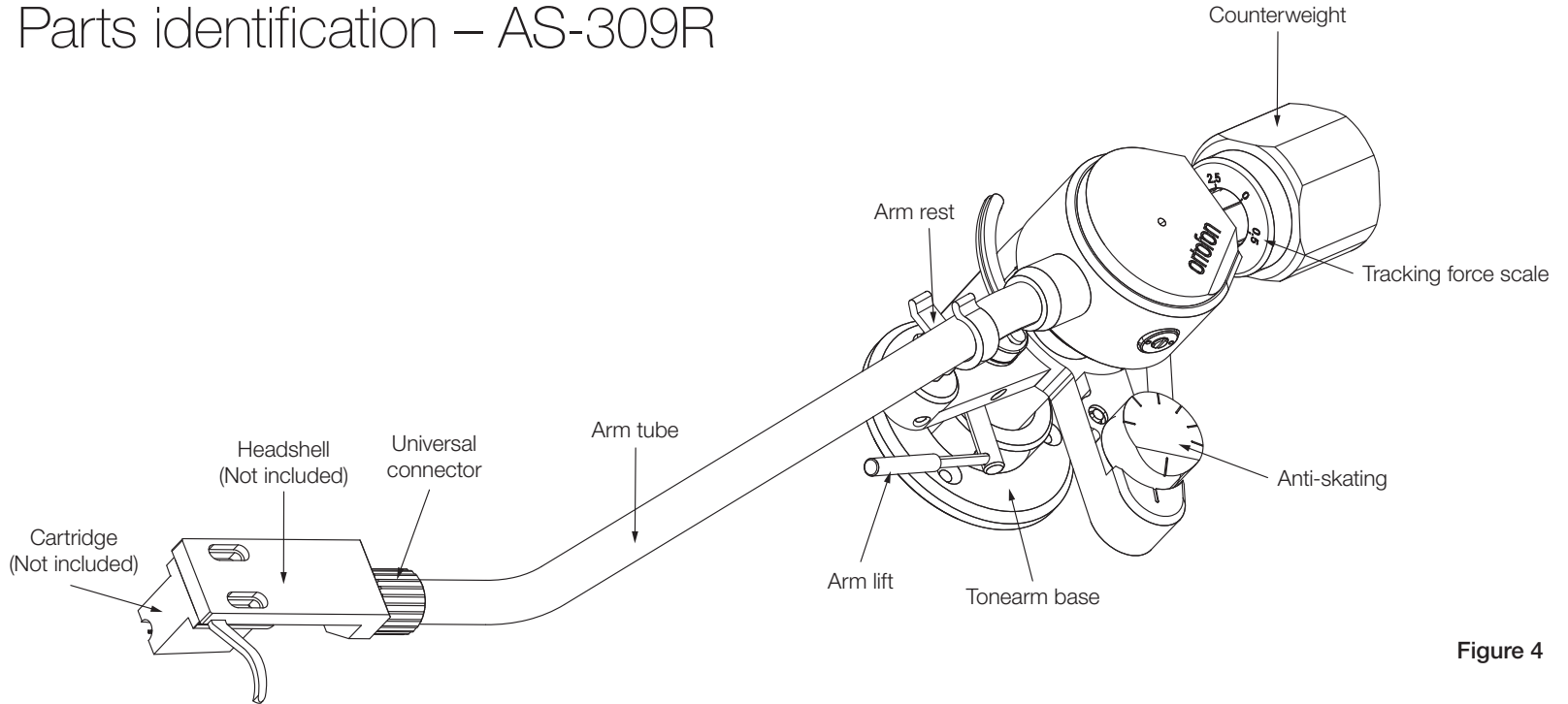- Effective arm mass: 7 g

Parts identification – AS-309R

Counterweight

Arm rest

Tracking force scale

Arm tube

Headshell
(Not included)

Universal
connector

Anti-skating

Cartridge
(Not included)

Arm lift

Tonearm base

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Figure 4

Dimensions – AS-309R

1:4

Figure 5

Center spindle

R 66

R 120.9

Null point

Null point

Effective length: 323.5 mm

Overhang 12.5

Mounting distance: 311 mm

Stylus point

Offset angle

52 mm

Stylus point

70.5 mm

Maximum elongation: 90 mm

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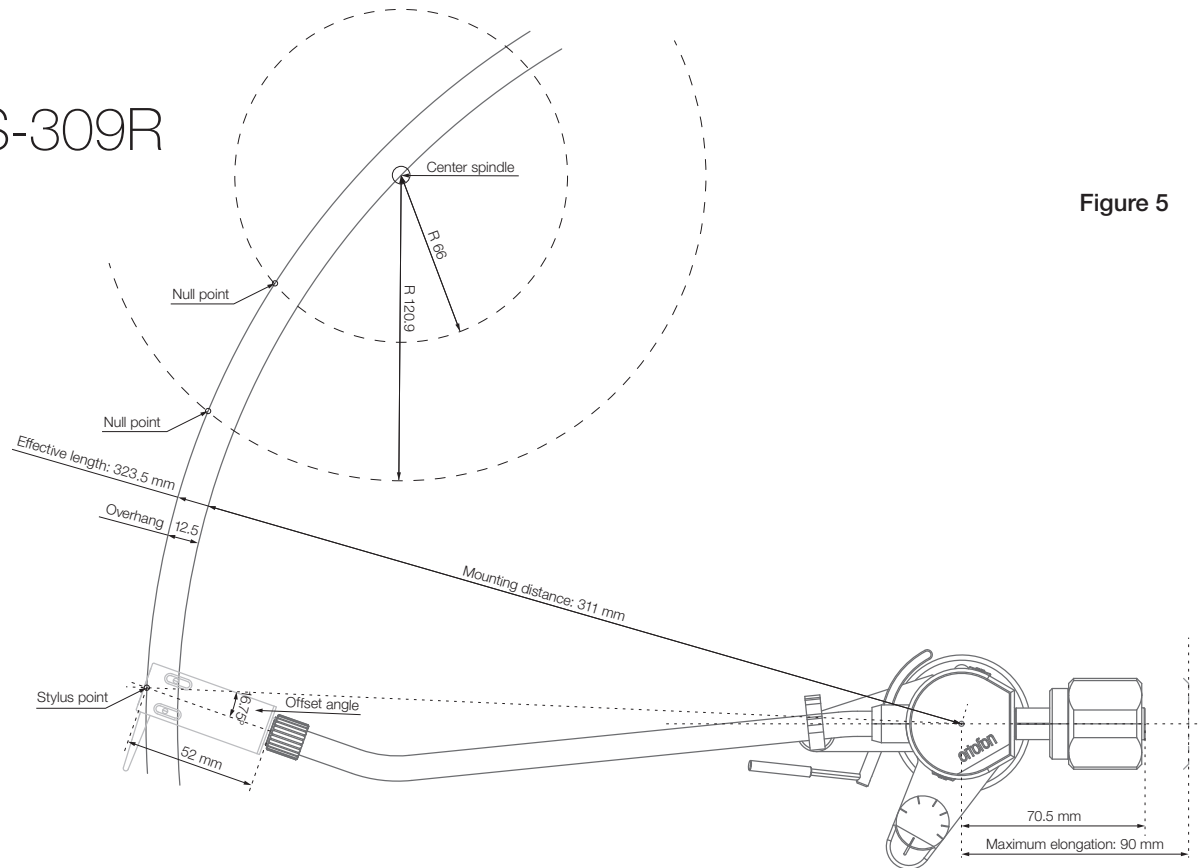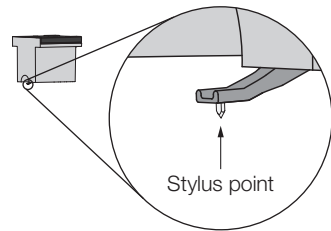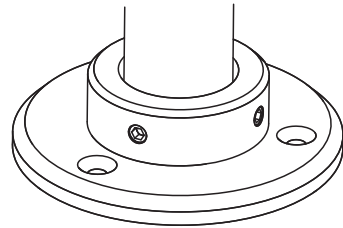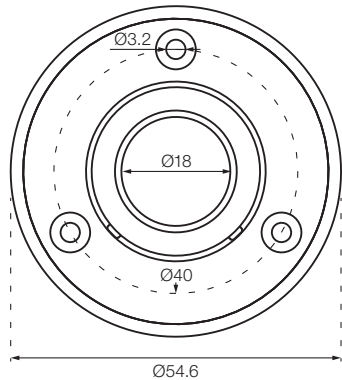
Specifications – AS-309R

Arm base

- Arm base fixing screw position: 40 mm in diameter from the center of the base.
- Three screws are equally spaced at 120°.

Figure 6

Tonearm

- Mounting distance: 311 mm
- Effective length: 323.5 mm
- Overhang: 12.5 mm
- Offset angle: 16.75°
- Stylus point to the rear end of the headshell: 52 mm
- Tonearm geometry: Baerwald alignment (IEC recommendation, the null point is 66 and 120.9 mm)
- Arm shaft diameter: 18 mm
- Recommended arm shaft hole diameter: 22 mm
- Cartridge weight: 18 to 26 g (with standard weight, including shell)
- Cartridge weight: 26 to 38 g (with heavy weight, including shell)
- Tonearm weight: 680 g / 730 g standard weight/heavy weight
- Height above mounting surface: 59 – 79 mm (up to top of the tonearm)
- Counterweight radial clearance: 85 mm for standard weight; 93 mm for heavy weight (measured from pivot point)
- Distance from mounting surface to top of platter: 20 – 48 mm
- Effective arm mass: 11 g

Packing list – AS-212R and AS-309R

To securely remove the arm from the form, please hold the lower base of the arm.

After unpacking your tonearm, immediately confirm that the following accessories are included. We recommend keeping the packaging, which will be needed when transporting the product safely.

• Tonearm
• Standard counterweight
• Heavy counterweight
• Arm base
• Tonearm base template
• Tonearm cable

• Arm base mounting screw/Hexagonal wrench set
  - Round countersunk Phillips-head wood screws: 3.1 x 20 mm long (3 pcs.)
  - Round countersunk Phillips-head screws: M3 x 30 mm long (3 pcs.)
  - Round countersunk Phillips head screws: M3 x 20 mm long (3 pcs.)
  - Hexagon nut: M3 (3 pcs.)
  - Flat washers: M3 (3 pcs.)
  - Hexagonal wrench: 1.5 mm (1 pcs.)
  - Hexagonal wrench: 2.0 mm (1 pcs.)
• Paper mounting template
• Userguide (this manual)
• Product warranty card
• Cartridge alignment tool
• Guide pin adaptor + guide pin

Guidelines for tonearm care maintenance and warranty protection

Do not remove or adjust the bearings on the tonearm pivot assembly. They are factory adjusted to exacting specifications, and any changes will result in malfunctioning of the arm and will void the warranty.

Note: When handling the tonearm, ensure it is securely fastened to the armrest, and never handle or carry the arm by the arm tube. Do not transport the arm with the counterweight attached.
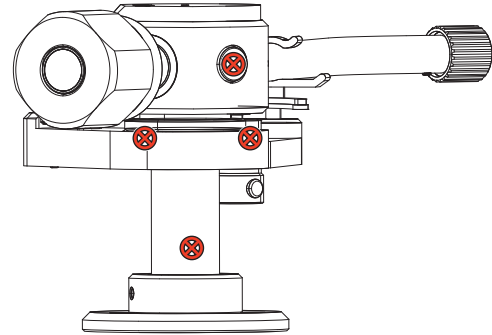
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Figure 7A
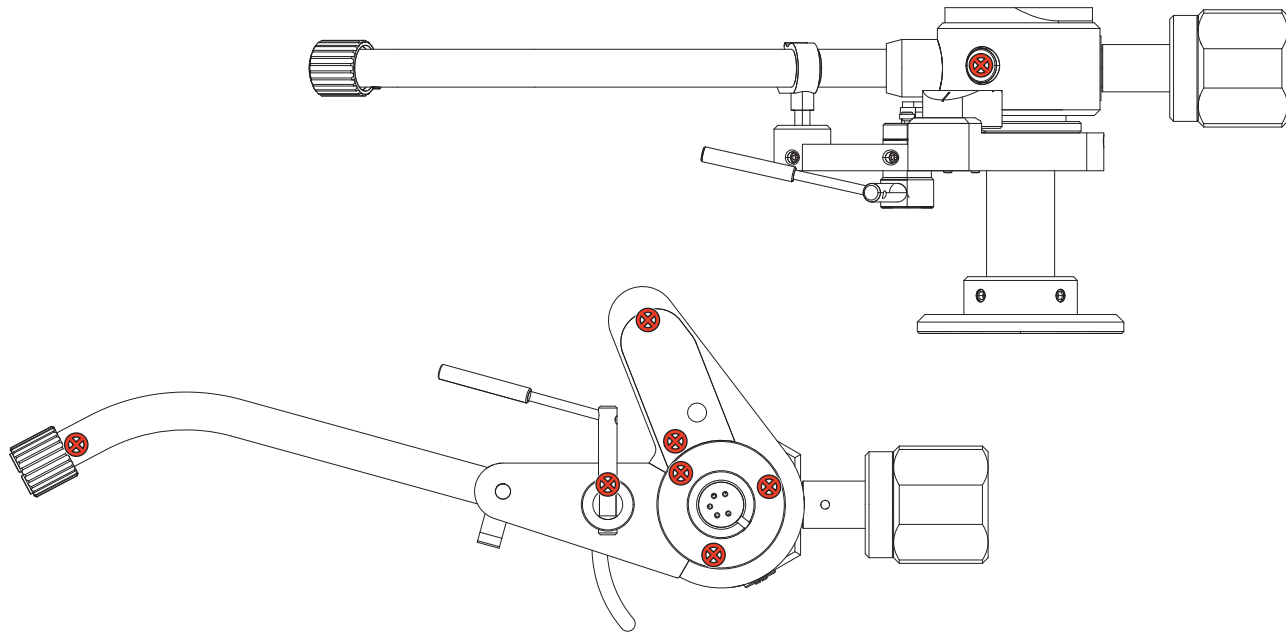
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Figure 7B

How to setup your tonearm

Mounting the arm base

1. Insert the metal guide pin into the hole on the guide pin adapter (the plastic base) to assemble the guide pin adapter.
2. Insert the guide pin adaptor in the hole for the tonearm shaft and secure it with one of the set screws.

3. Place the spindle hole of the supplied Paper Mounting Template onto the turntable spindle and determine the position of the arm base (Figure 8 and 9).
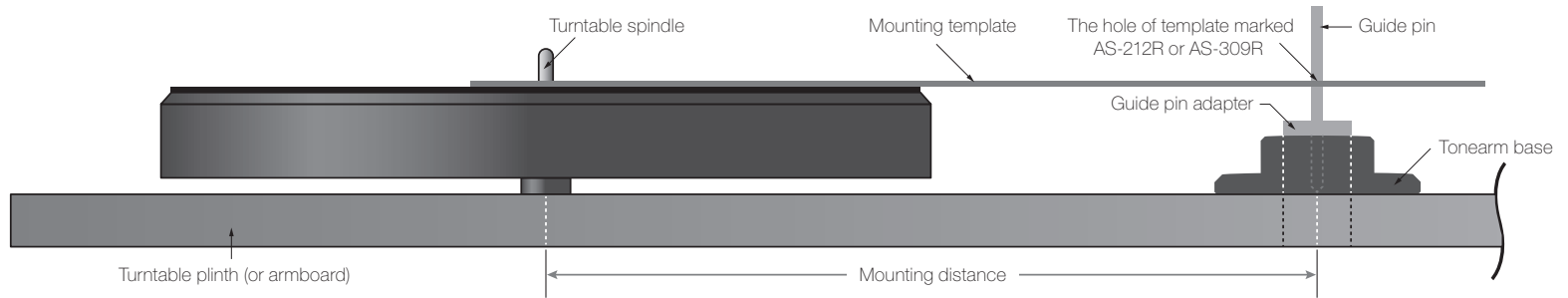

Turntable spindle

Mounting template

The hole of template marked AS-212R or AS-309R

Guide pin

Guide pin adapter

Tonearm base

Turntable plinth (or armboard)

Mounting distance

Figure 8

Mounting the arm base (continued)

3. Place the Paper Mounting Template hole marked "AS-212R or AS-309R" on the guide pin.

4. Since the set screw on the side of the arm base is frequently operated when adjusting the arm height, etc., ensure to install the screw openings facing away from the platter by referring to the position example (Figure 9).

5. Depending on the turntable on which your arm is to be mounted, you may need to drill a hole for the tonearm shaft to mount the arm base and then mount it with the appropriate screws.

6. Mount the arm base with three suitable mounting screws on the plinth or armboard.
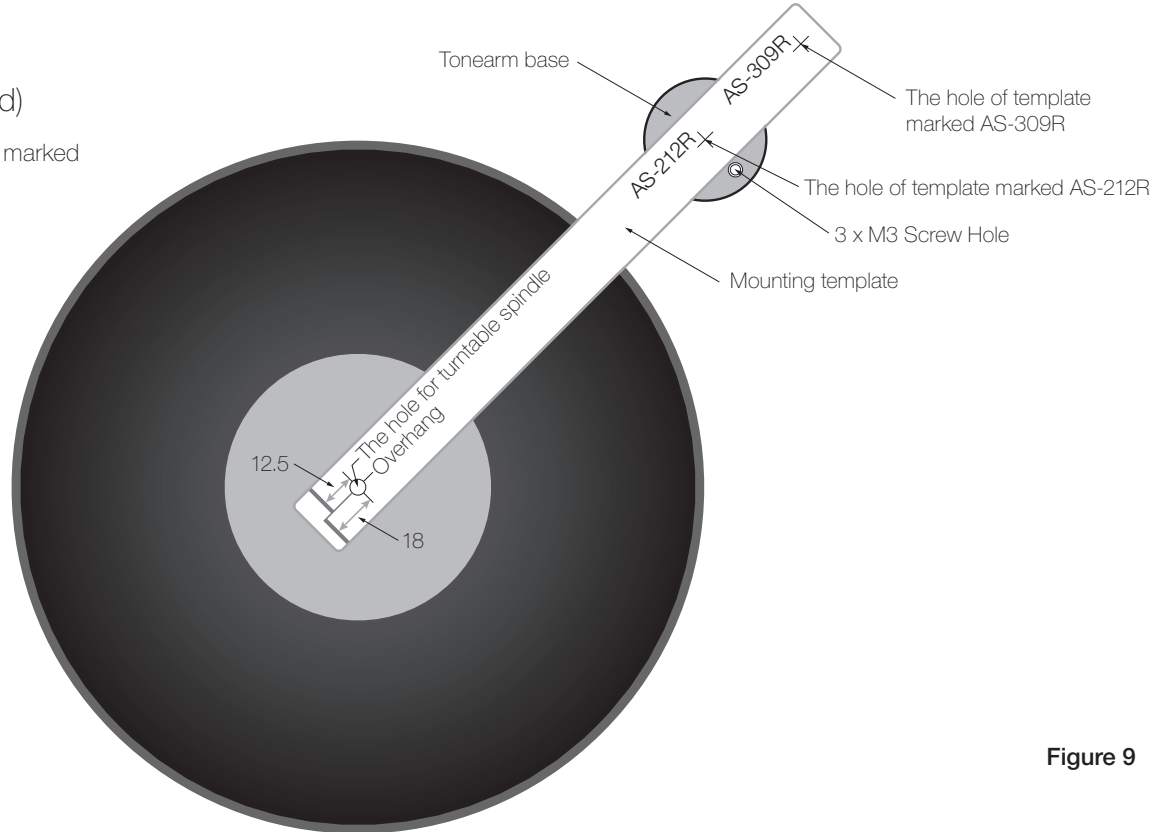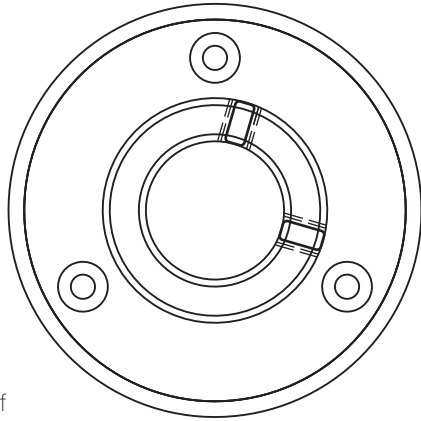
Tonearm base

AS-309R

AS-212R

The hole of template marked AS-309R

The hole of template marked AS-212R

3 x M3 Screw Hole

Mounting template

The hole for turntable spindle
Overhang

12.5

18

Figure 9

Fitting the arm

1. After attaching the arm base, it is possible to pass the supplied phono cable or your phono cable (compatible with phono 5-pin terminal) through the hole in the center of the base*. Connect the phono cable to the tonearm while holding it with one hand. Connect the tonearm cable to the connector inside the bottom of the arm shaft. Make sure to align the pin on the cable with the slot on the bottom of the arm shaft.
If you are more confident with mounting the cables after mounting the tonearm, it's possible to wait.

2. Temporarily tighten the arm shaft to the base at an appropriate height. Only one of the set screws should be lightly tightened for temporary fixing.

Figure 10

Fitting the cartridge

1. After fixing the shaft, ensure the tonearm is locked in to the arm rest, and then attach the headshell with the cartridge attached to the headshell connector. Remember to keep the stylus guard on the cartridge.
a. Ensure your cartridge is mounted on the headshell with the stylus point at a 52 mm distance to the end of the headshell to achieve correct Baerwald alignment (Figure 2 and 5).
b. Mount the cartridge with the headshell on the tonearm.
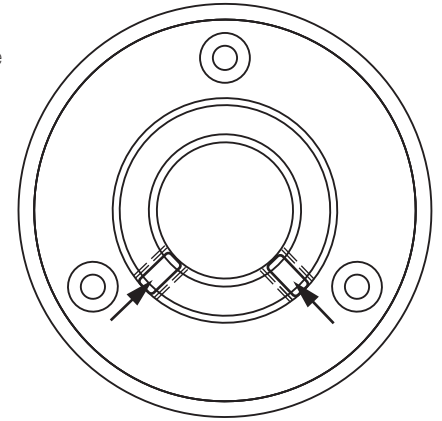
Figure 11

Adjusting the arm height and swing angle
(without counterweight)

1. Lower the cartridge on the platter's outer edge and check if the bottom of the tonearm is parallel to the platter surface.
   For this initial alignment, we need to keep the stylus guard on.

2. If they are not parallel, return the tonearm to the arm rest, loosen the set screws on the arm base, adjust the height of the arm shaft fixing position, and check again.

3. To control the swing angle, gently swing the tonearm toward the platter.

4. Check if the arm pipe contacts the arm rest when the tip of the headshell is placed near the outer circumference of the platter (two points indicated by the circles in Figure 12)

5. If there is contact, loosen the set screws on the arm base, adjust the arm body outward, and then re-tighten it. Be careful not to change the arm height of the tonearm while adjusting the swing angle. Please notice that further adjustments might are needed after adjusting the tracking force.
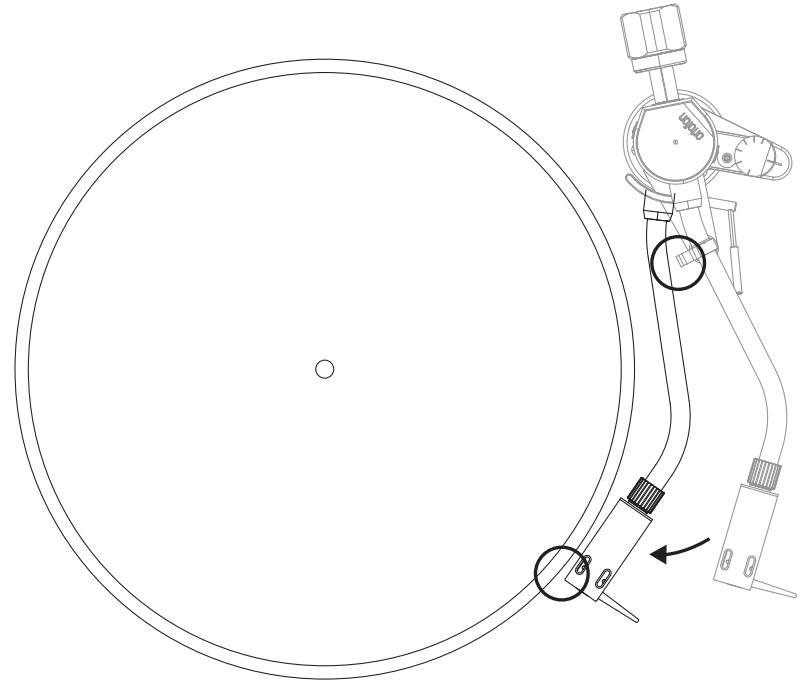
Figure 12

Mounting the counterweight

1. Mount the counterweight to the shaft of the rear arm, place the side with the numbers towards the tonearm pivot, and turn it while giving it a slight push until it catches and moves back and forth when rotated.

Horizontal adjustment

1. Remove the cartridge stylus guard and lower the arm lift. From this point on, the stylus tip and cantilever at the end of the cartridge will be exposed, so be careful not to damage them while making adjustments.

2. Remove the tonearm from the arm rest and hold the cartridge up with one hand.

3. In order to perform the zero balance adjustment, turn the entire counterweight (both the tracking force scale and the black weight itself) and balance the tonearm until it floats.

4. After confirming that the tonearm is balanced, return the tonearm to the arm rest.

5. Align the "0" on the tracking force scale with the white line drawn at the top of the weight shaft without turning the weight itself. This completes the zero balance adjustment.

Vertical adjustment

1. Adjust the value of the tracking force to the white line at the center of the weight shaft within the value of the recommended tracking force specified in the official cartridge specifications.

2. To control the adjustment, use a stylus pressure gauge (Ortofon DS-3) to check the needle pressure.

3. Place a record on the turntable.

4. Lower the cartridge on the outer edge of the record and check if the bottom of the tonearm is parallel to the record surface.

5. If not parallel, please adjust the tonearm height while checking the swing angle of the tonearm.

Lift height

1. In most cases, no adjustment is necessary, but to control the lift height, raise the arm lift and move the stylus to the middle of the record.

2. The tonearm should be slightly above the parallel position, not too high or too low. If the distance between the needle tip of the cartridge and the record surface is too high or if the distance is so low that the needle tip almost touches the record, even when the lifter lever is raised, return the tonearm to the arm rest, loosen the tonearm lift fixing screw to move the lifter cylinder up and down.

Adjusting anti-skating

When a vinyl record spins, the stylus riding in the groove is pulled inwards toward the center of the vinyl, causing a greater stylus pressure against the inside wall of the groove than against the outside wall. The anti-skating mechanism incorporated in the tonearm will neutralize this.

1. Adjust anti-skating by turning the anti-skating knob on the tonearm. Each increment on the knob responds roughly to 0.5 g. The force is applied by turning clockwise. Normal anti-skating is set at the same value as the vertical tracking force.

2. To determine the perfect value, use an Ortofon Test Record to compare the two channels.

Your tonearm is now set up and ready to use.
Follow the QR code for setup and support.

Scan and follow the QR code for setup
and support or find more information on
www.ortofon.com/support

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