

ENGINEERING WHITE PAPER

Ortofon
SPU Gold Reference

A LEGEND IS REBORN

EXECUTIVE SUMMARY

The Ortofon SPU moving coil cartridge is probably the only product which has been available in the audio market for more than a quarter of a century.

The original SPU (Stereo Pick-Up) was introduced in 1958 in response to the demand for cartridges to reproduce the new stereo records. Based on Ortofon's already ten year old technology and experience from mono cartridges, the SPU immediately set the standard for professional and audiophile applications.

The man behind the SPU was Robert Gudmandsen, Ortofon's now retired senior development engineer. At that time, Mr. Gudmandsen of course did not have the elaborate facilities that now make up the company's development laboratories. Nevertheless, his flair for a musical sound reproduction and the touch of a genius enabled him to create *the* cartridge to survive all others.

The sound of the SPU cartridge is characterised by a rich bass and a transparent treble range – plus those extra qualities which are so hard to define, but so easy to appreciate when they are realised.

Back in 1958, the Ortofon SPU sounded like no other cartridge because it was way ahead of the competition. Today, the SPU still has a sound that is definitely its own and it enjoys a remarkable following, in particular among audiophiles whose systems are comprised of vintage valve equipment and horn or reflex loudspeakers.

Until now, the SPU cartridge has been available in two versions – the standard model which basically has remained unchanged for thirty-three and the limited edition SPU Gold featuring gold plated metal parts and a more refined stylus shape.

The new member of Ortofon's SPU family is the SPU Gold Reference whose major features include an Ortofon Replicant 100 stylus, 99.9999% pure copper armature windings and leads, and a slightly modified damping system. These improvements have made it possible to reduce the tracking force and obtain a more linear frequency response. Sonically, the Gold Reference is still a genuine SPU of which Mr. Gudmandsen would be proud.

In order to satisfy the requirements of owners of vintage equipment, the SPU Gold Reference is available in two different housings with identical electrical specifications. The GM housing has the same dimensions as standard shells and will fit into Ortofon's classical RKG 309 and RMG tonearms, plus SME 3009 and 3001 arms. The shorter A housing is designed exclusively for Ortofon's RK 309 and RM 309 tonearms, dating from the late 'forties.

Under all circumstances, the SPU Gold Reference requires a tonearm which is rigid, devoid of resonances and able to counterbalance a cartridge weight of 32 or 30 g.

The design and features of the Ortofon SPU Gold Reference are discussed in more detail on the following pages.

ORTOFON MOVING COIL TECHNOLOGY

The Choice of Stylus Profile

The actual shape of the contact point of the diamond stylus on the groove wall is vitally important for accurate sound reproduction, as is the profile of the contact area.

To allow tracking of the high-frequency information, particularly in the critical inner turns of the groove, it is mandatory to employ a slim stylus profile.

The very first generation of SPU cartridges was equipped with spherical stylus. As soon as elliptical shapes could be produced, such a stylus type was incorporated in the design. The SPU Gold was one of the first cartridges to employ a true elliptical stylus ensuring lower record wear.

Like the other Ortofon top-of-the-line cartridges, the stylus for the SPU Gold Reference has been designed and produced in close collaboration with our Swiss diamond supplier, Fritz Gyger. Its shape is closely aligned to the profile of the original cutting stylus and its quality is the very highest possible.

The front facet of the Ortofon Replicant 100 stylus is flat, which allows maximum space for the stylus to move freely in the groove. The rear contact surface of the diamond has three facets to reduce stylus volume (and thus mass) while maintaining the strength and integrity of the diamond.

The contact area is highly polished in order to achieve a perfect radius. And the stylus profile along the 90° V-track of the groove is shaped to make the highest degree of contact ever made possible by a playback stylus – surpassed only in this respect by the cutting stylus itself.

Cantilever, Armature and Damping

With the selection of the Ortofon Replicant 100 stylus, we have chosen a diamond whose geometry permits tracking of even the highest-frequency groove information.

Following the SPU tradition, the cantilever of the SPU Gold Reference is cylindrical and made from aluminium which has been gold plated by means of a metal evaporation process to match the other metal parts of the cartridge.

The relatively large, square armature ensures a more than adequate output voltage of 0.2 mV plus, while the low number of windings make the cartridge a genuine low-impedance design, featuring an internal resistance of only 3 Ω. A further improvement of the sonic qualities is obtained by means of 99.9999% pure copper for the windings and the litze leads in the GM housing. The A housing requires no leads at all.

One of the secrets behind the characteristic Ortofon SPU sound is the rubber bearing which dampens the cantilever movements. Consequently, this bearing is of exactly the same type as in the standard SPU cartridge. In order to improve the frequency linearity, the suspension wire has been made a little longer.

Limited Edition

The SPU Gold Reference is supplied in a solid mahogany box. The plate inside the lid is engraved with the individual serial number of each cartridge.

TECHNICAL DATA SPU GOLD REFERENCE

Weight	32 g
Colour (body/shield)	Gold/Black
Shell material	Diecast zinc alloy
Stylus (diamond shape)	Ortofon Replicant 100
Stylus tip radius	5 x 100 µm
Equivalent stylus tip mass	0.45 mg
Frequency range	20 - 50,000 Hz
Frequency response	20 - 20,000 Hz, +2.5 dB/-0 dB
Output voltage (1 kHz, 5 cm/s)	>200 µV
Channel separation (1/15 kHz)	>25/15 dB
Channel balance (1 kHz)	<1.0 dB
Compliance, dynamic (lateral/vertical)	10/10 µm/mN
Tracking angle (vertical)	20°
Tracking force range	2.5 - 3.5 g (25 - 35 mN)
Tracking force (recommended)	3.0 g (30 mN)
Tracking ability (315 Hz, lateral)	>70 µm
Internal resistance	3 Ω
Recommended load impedance	>10 Ω

* GM version, A version 30 g

AMPLIFIER COMPATIBILITY

Despite the higher output voltage compared to earlier Ortofon designs, the new SPU Gold Reference cartridge will normally only provide optimum sound quality and dynamics when it is connected to the associated amplifier via a matching step-up unit. For this purpose, the Ortofon T 3000 transformer is recommended.

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DK-2500 Copenhagen-Valby
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Type

SPU - Gold GM
Reference

No.

0-210005-04

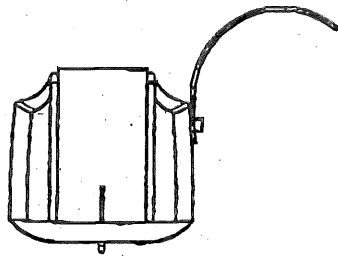
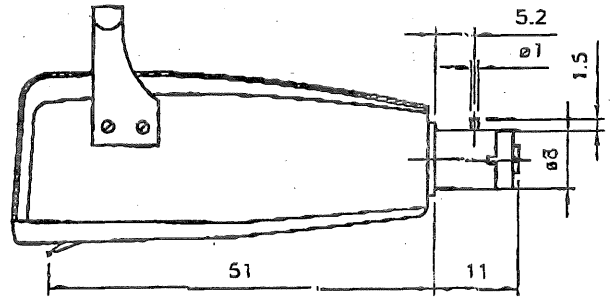
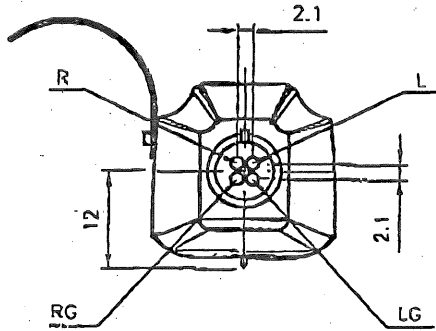
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By PW

TECHNICAL DATA

Approved 5/12/96 JHH



	VALUE	REMARKS
WEIGHT	32 gram	In GM housing
COLOR: body/shield stylus unit	- -	
STYLUS (diamond shape) STYLUS TIP RADIUS EQUIVALENT STYLUS TIP MASS REPLACEMENT STYLUS UNIT	Ortofon Replicant 100 5 x 100 µm 0.45 mg -	
TRACKING ANGLE (vertical) TRACKING FORCE RANGE TRACKING FORCE (recommended) TRACKING ABILITY at 315 Hz (lateral)	20° 25-35/2.5-3.5 mN/gram 30/3.0 mN/gram 70 µm	
COMPLIANCE dynamic (lateral)	10 µm/mN	
FREQUENCY RESPONSE FREQUENCY RESPONSE	20-50,000 Hz 20-20,000 Hz	+2.5 / -0 dB
OUTPUT VOLTAGE at 1 kHz (5 cm/sec)	>0.2 mV	
CHANNEL SEPARATION at 1 kHz CHANNEL BALANCE at 1 kHz	25 dB 1 dB	
INTERNAL RESISTANCE RECOMMENDED LOAD IMPEDANCE	3 Ohm - Ohm	30 µm Silver