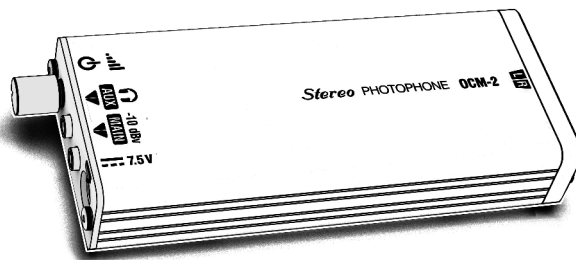


OCM-2 Stereo Photophone™

rare waves optical audio transducer



Photophone: a new way to capture natural sound

OCM stands for Optical Contact Microphone

This analog device picks up detailed stereo audio from vibrating surfaces using reflected light

*No handling noise or wind noise
Immune to background sounds
Full frequency response
No off-axis coloration
Low distortion*

Quick Start Tips

You unbox it, you plug it in. Ready, set, go! ... Not hearing anything?

This is not a microphone - it does not pick up sound waves traveling through the air. That means you can't check if its live by speaking at it or listening for room tone.

For a quick check of the audio connections, sweep your hand quickly past its sensor window. You should hear a thumping sound in the audio output.

When you first power it on, have some sample objects ready to listen to. Try a piece of glossy plastic film like a silver antistatic bag, crinkly packaging film, mylar, or aluminum foil. Hold the sample in front of the sensor window and crinkle it with your fingertips. Or pluck a stretched rubber band. You should hear detailed stereo sound.

Connections

The audio outputs are analog and take stereo 3.5mm plugs. Make connections using a standard aux cable for portable audio devices.

For best sound quality, connect Main Out to the stereo mic/line input of a grounded (earthed) audio system. Nominal signal level is -10dBv.

Use Aux Out when convenient monitoring is needed. The headphones drive level is adjustable with the rotary knob.

▶ To avoid unexpected loud pops and buzzing in the audio, follow these 1-2-3 steps while making cable connections:

Connecting

1. Connect OCM-2 Main Out to your audio system
2. Plug in the AC adapter
3. Power on OCM-2

Disconnecting

1. Power off OCM-2
2. Unplug the AC adapter
3. Disconnect OCM-2 Main Out from your audio system

If you connect or disconnect the OCM-2 Main Out while the AC adapter is plugged in, there can be unexpected loud noises in the audio. This is true even while the unit's power switch is off.

Power Supply

Use an AC adapter with nominal output 7.5 Volts DC, 1000 mA.

It will also operate on 6 x AA cell external NiMH battery pack. This must be user configured, or as special order item from manufacturer.

Power On/Off

To power on, turn the knob clockwise. The indicator LED illuminates. To power off, rotate the knob fully counterclockwise so it clicks.

After switching the power on, there is a delay of about 10 seconds while the system initializes before proper audio output begins.

Operating Temperature

This device will become warm while it is operating. By design, it radiates excess heat to the air around it. Do not block airflow around it with user-added covers, housings, or wrapping.

In a normal room temperature environment, the exterior surface of the case can reach 120° F (49° C).

If ambient temperature is above 86° F (30° C), operation for long periods may cause OCM-2 to shut down in Thermal Protection Mode.

Thermal Protection Mode (Flashing LED)

If its case temperature exceeds 125° F, this unit shuts down automatically in *Thermal Protection Mode*. In this state, the power indicator LED flashes and there is no audio output. This does not mean that its damaged or faulty. It is designed to alert you that the surface may be hot and to prevent further heat increase.



If the LED is flashing, follow these steps:

1. Be careful handling the unit, the exterior may be hot
2. Disconnect the AC adapter
3. Determine the cause and make corrections before restarting

Possible causes of overheating:

Something is blocking ambient air flow around the device. Remove any user-added wrappings, covers, or housings.

Ambient temperature is too high. Resume operation in a cooler environment, if possible.

Use of incorrect power source. Only use a power adapter rated for the specified DC voltage. Excessive heat will be generated if you power this unit from a higher DC voltage.

To cancel Thermal Protection Mode and restore normal operation, simply power off then power on again.

Eye Safety

The sensor window of this device emits near-infrared light (IR-A) with total power output of 1 watt.

This is not a laser device, therefore it does not present an acute eye hazard like lasers do. Nevertheless, for complete safety please follow these precautions:



Do not stare into the sensor window while the power is on



Do not direct the sensor window at the eyes of people or animals

Mounting

This device fits in many common microphone clips made for handheld vocal microphones. Check that it fits firmly and won't fall out of your mic clip during use. A boom stand is recommended.

Pickup Pattern

The pickup pattern is directional. The region of sensitivity is in the form of a cone shape with a base angle of 20 degrees, projecting outward from the sensor window.

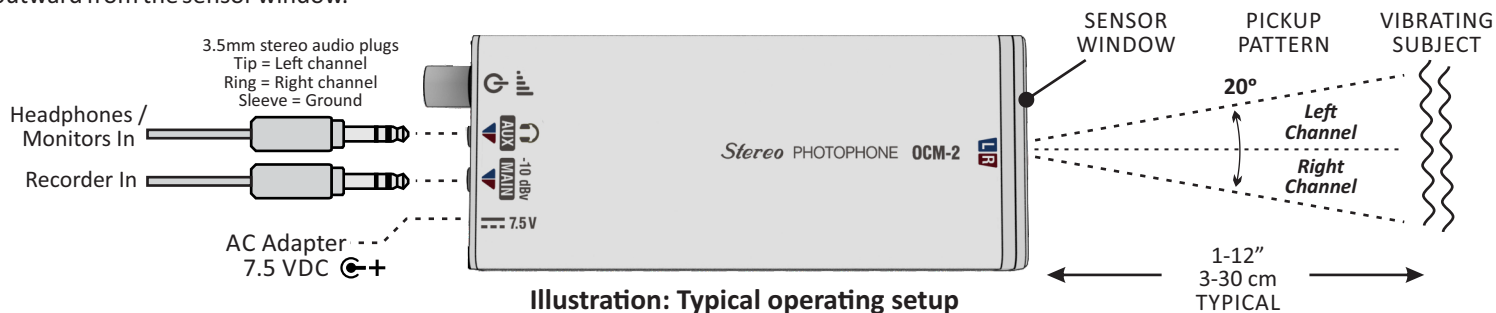


Illustration: Typical operating setup

Adjustments

Besides headphones volume, there are no settings to dial in. Sound quality is entirely a matter of choice of subject, distance and angle.

Signal-to-Noise Ratio

In reality all analog sensors present some amount of random noise in their output, and this device is no exception. In the absence of an input signal, you may hear a white noise sound in the audio output. This is the device's noise floor.

Depending on the characteristics of the vibrating subject, a signal-to-noise ratio of 70 dB is possible. This means with favorable subjects, the audio can be more than 3,000 times greater than the noise floor.

▶ Please don't presume that everything in the world which makes sound will be picked up equally well with the photophone. Good signal-to-noise ratio is only possible when all the factors and requirements for operation are accounted for.

Factors and Requirements for Operation

Vibrational amplitude. Subjects that have large amplitude of vibration give stronger photophone output. If you can see a vibrational blur, that is a good indication. On the other hand, consider an acoustic soundboard. Its motions are nearly microscopic, so its reflectivity does not vary much as it vibrates. Therefore the photophone is not efficient as a soundboard pickup.

Type of surface. The vibrating subject must have a surface which reflects some percentage of the light that falls on it. Polished, gloss, and mirror-like surfaces give the strongest signal. On the other hand, consider black paint with a matte finish - most light that falls it is either absorbed or scattered. Therefore even if a matte or rough surfaced object is vibrating strongly, it may not reflect enough light to provide a good signal-to-noise ratio.

Distance. The farther away the subject is, the lower the signal to noise ratio. Best results are generally within a distance range of 1-6" (3-15 cm) from the subject. Polished, mirror-like subjects can be further.

Angle. Generally, the photophone's axis must be held perpendicular to the subject's plane of vibration. If the angle of the subject is varying greatly, such as something that shifts position or wobbles uncontrollably, the signal will cut out.

Line of sight. The photophone must have a line of sight to the vibrating subject. You can't use it as a sound hole pickup for an acoustic instrument, and it will not work as a vocal microphone.

Sensing area. This device only senses vibrations in a specific area defined by its pickup pattern. For example, if pointed at the strings of a guitar or piano, it will only pick up a few strings simultaneously.

Workspace

The OCM-2 photophone is designed for indoor use.

Arrange your workspace so the photophone is not pointed directly at video screens or light fixtures.

In some cases you can obtain better sound quality when working against a nonreflective background. For your desktop recording setup, try a matte / nonreflective backdrop such as black cloth or black paper, positioning it behind or under the subject.

Reflectivity Enhancement

In some cases, you can produce a stronger signal by applying a patch or tag of reflector tape to the vibrating subject. This is something to try when the subject's surface is matte / dull / nonreflective. Aluminum foil tape of the type used for air ducts is suitable.

Audio Interference

This unit is designed reject interference from ambient light. Nevertheless, there are common situations where other light sources in the room can cause unintentional audio artifacts.

- ▶ Avoid pointing the photophone directly at bright light sources like lamps and overhead light fixtures.
- ▶ Avoid pointing the photophone directly at video screens and computer displays.

Any device that emits infrared light might cause interference.

Cleaning the Sensor Window

Frequent cleaning of the sensor window is not necessary because sound quality is unaffected by normal amounts of dust, smudges and light scratches. The pickup pattern will be affected if the sensor window is very dirty or badly scratched. If the sensor window becomes soiled, use lens cleaner fluid or isopropanol on a soft cloth.

Care and Safe Keeping

Strong impacts could damage this unit. Protect it from falls and mishandling during shipping.

This unit is not designed to be weather-resistant. Do not expose it to precipitation, steam or conditions of condensing humidity.

Do not expose the sensor window to solvents or abrasive substances.

While in storage, keep temperature between 32-130° F (0-55° C). There is no internal battery or other slow corrosion hazards.

Specifications

Pickup pattern: Directional, 20 degree angle
Audio format: Analog stereo, unbalanced
Output signal level: -10 dBv typical max average
Audio connections: 3.5mm TRS phone jack, for stereo mini plug
Frequency response: 20 Hz to 20 kHz (-3 dB)
Headphones drive (per channel): 150 mW, 16Ω min. impedance
Output impedance (Main Output): 75Ω
Power input voltage range: DC 7.0-9.0 Volts
Power input connector: 2.1 x 5.5mm barrel plug, center positive
Reverse polarity protection? Yes
Total power dissipation: 5 watts
Current consumption (Power On): 650 mA
Current consumption (Power Off): 10 mA
Infrared wavelength: NIR (IR-A)
Infrared output power: 1 watt
Emits laser radiation? No
Mass: 6.6 oz (188 g)
Size: 0.95 x 2.125 x 5.5 in
Case material: Aluminum
Lead(Pb)-free? Yes
Country of origin: - United States
There are no aluminum electrolytic capacitors inside