



GOLEM-instruments



**Operation instructions
Theremin THOR**

Version : MAI 2021 (V2.00-ENG)

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Safety instructions

WARNING - When using electrical equipment, always observe some basic precautions, including the following:

- Read all instructions before using the theremin.
- Never use the theremin near water, e.g. next to a bathtub, sink, kitchen drain, on damp ground or next to a swimming pool or the like.
- If this theremin is used with a suitable audio stand, check that the stand is secure and that the base of the theremin is securely screwed to the stand. Use only tripods with a 3/8" male thread with a maximum thread length of 20mm.
- This theremin, in combination with an amplifier or headphones or sound amplifying equipment, can produce sound levels that may cause permanent hearing damage. Do not operate at high or uncomfortable volume levels for extended periods of time. If you experience hearing damage or ringing in the ears, consult an ear specialist.
- The theremin should be positioned so that a sufficient supply of fresh air is always guaranteed.
- This theremin should not be placed near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
- The theremin should only be operated on power supplies described in the operating instructions or marked on the product.
- The mains cable of the plug-in power supply should be unplugged from the mains socket if the theremin is not to be used for a long period of time.
- Make sure that no objects fall into the theremin housing and that no liquid enters the interior of the appliance through the openings.
- The theremin should be serviced by qualified personnel when:
 - the mains cable or plug is damaged or
 - objects into the theremin or
 - the plug-in power supply unit has fallen or
 - Liquid has been poured in or
 - the theremin or the plug-in power supply has been exposed to rain, or
 - the theremin or plug-in power supply does not appear to be working normally or should be malfunctioning, or
 - the theremin or the plug-in power supply has fallen down and/or the housing is damaged.
- Do not attempt any repairs yourself beyond the range specified in the maintenance instructions. All further service work should be reserved for qualified personnel.
- **CAUTION:** To avoid the risk of electric shock, do not open the units. User maintenance is not required inside the unit. Service only by qualified personnel.
- Only use the plug-in power supply provided - if this does not fit into the socket, have a qualified technician install a suitable socket.
- **PLEASE KEEP THESE INSTRUCTIONS!**
- The connection of external devices (such as amplifiers) is at your own risk.

Delivery by a shipping service provider

Generally, you will receive this item by shipping service. Please note the following:

- If the parcel arrives obviously damaged, have the damage confirmed directly by the delivery person. It is best to unpack the parcel in the presence of the delivery person and, if possible, document this with photos.
- By signing, you not only confirmed receipt of the parcel, but also that the delivery was handed over properly and thus undamaged.

Scope of delivery

The scope of delivery consists of:

- 1x theremin - Model Thor
- 1x Rod antenna with protective sphere
- 1x Volume-antenna
- 1x Plug-in power supply unit 12V / 300 mA

The theremin is delivered ready for use and calibrated.

Amplifier connection

The theremin is designed to be connected to an amplifier. The output level of up to approx. 0.55 V_{SS} ensures a good useful signal/interference signal ratio.

The amplifier characteristics influence the sound of the instrument, as is the case with other instruments. Basically, however, any audio amplifier with a max. input level of approx. 1 V_{SS} is suitable. This characteristic is given by practically all amplifiers for music applications. In order to be able to reproduce the full bandwidth of the theremin, the switched-on amplifier should also be able to reproduce low tones in the lower frequency spectrum (≤ 100 Hz) well. This is the case when using a so-called guitar amplifier.

The connection to the amplifier is made via a so-called guitar cable. This cable has a jack plug 6.3 mm (mono) at both ends.

If your amplifier has a different audio input socket, use a correspondingly suitable cable or adapter (e.g. 6.3 mm jack socket to 3.5 mm jack plug).

- Most amplifiers are coupled to earth potential. This means that the ground of the input/output socket is connected to the ground potential of the power supply. However, there are also amplifiers available with a potential separation. The use of these amplifiers is not recommended.
- A connection to the audio card of your computer is also possible. Connect the theremin and the audio input of the computer via a guitar cable with the help of an appropriate adapter.

Device properties



The theremin is played by the approach and distance of the player's hand. The following applies: The further the hand is removed from the antenna, the deeper the sound.

During the development of the theremin, care was taken to cover the classical playing range, so that a frequency spectrum of max. 20 - 16000 Hz (corresponding to approx. 9 octaves) can be played with the Thor model. The upper frequency is a fixed value that cannot be exceeded and, depending on the setting, is not only reached by touching the antenna, but already approx. 1 cm before the antenna. In the range 0 - 1 cm, the pitch does not change any more. This enables good play even in the highest frequency range.

By moving a finger slightly, a clean pitch-shifting effect can be achieved with the fundamental held constant. The same applies to the ranges that are set by the transposition switch.

The volume of the theremin is controlled by the approach and distance of the player's hand from the curved volume antenna. The following applies: The further the hand is removed from the antenna, the louder the sound.

The characteristic curve of the volume reduction is exponential. I.e. at a distance of approx. 30 cm - 10 cm the volume is 100 % - approx. 50 %. At a distance of approx. 10 - 5 cm, the volume is reduced from approx. 50 % to approx. 1-0 %.

When the hand is in the range of approx. 5 - 0 cm above the antenna, the volume is set to minimum. This type of control enables a soft gentle volume control in the upper range and in the lower range a fast, but still gliding, fading in and out of the sound. Touching the volume antenna directly no longer changes the volume.

Pitch control



The theremin has a pitch control on the top of the unit and a pitch adjustment control on the bottom of the unit. Both pitch controls have the same function, with the control on the front of the unit providing fine adjustment.

The pitch control on the bottom is for calibration and should not be adjusted by you!

The pitch control changes the pitch of the pitch antenna.

For normal use of the instrument, the setting should be such that a tone of the lowest possible frequency can be heard when the antenna is free.

With the pitch control, it is also possible to make a setting so that a tone of any pitch can be heard when the antenna is free. This changes the bandwidth of the pitch to be played. A pitch setting of less than approx. 50 Hz should be avoided, as this can lead to a 'break-off' of the output signal. The theremin is then 'restarted' by the approach of the hand. Changing the transposition setting also changes the set fundamental. The higher the octave boost, the higher the fundamental should also be set via the pitch control.

Distance controller



The theremin has a Distance control on the top of the unit and a distance adjustment control on the bottom of the unit. Both distance controls have the same function, but the control on the top of the unit allows fine adjustment.

The distance control on the bottom is for calibration and should not be adjusted by you!

The distance control changes the sensitivity of the volume antenna.

The sensitivity is greatest at the right stop and therefore the volume is lowest.

Use the upper Distance control to adjust the volume so that the volume is 100 % when the antenna is free and the approach of the hand causes the volume to be lowered as early as possible.

Transposition switch



The term transposition is a musical term and refers to the equal raising of a note or sequence of notes. The transposition switch of the Thor theremin model has 5 possible settings (plus ON/OFF). The leftmost setting, "Bass", is the lowest possible range of the theremin. In relation to this setting, the pitch is raised by approx. 1 octave at "+ 1". Correspondingly, the other 4 possible settings raise the pitch by 2, 3, 4 or 5 octaves.

By means of the transposition setting, the playing range of the theremin can be adjusted over practically the entire human hearing range.

After switching the transposition range, pitch fluctuations may occur depending on the setting of the pitch control. In this case, use the pitch control to increase the pitch of the starting note (with free antenna) until the fluctuations are minimised.

Frequency ranges depending on the transposition switch setting:

- Bass: 20 Hz 1000 Hz / $\pm 20\%$
- +1: 100 Hz 2000 Hz / $\pm 20\%$
- +2: 400 Hz 4000 Hz / $\pm 20\%$
- +3: 500 Hz 8000 Hz / $\pm 20\%$
- +4: 600 Hz 16000 Hz / $\pm 20\%$

Switching on the theremin

The theremin is switched on via the transposition switch. When the theremin is switched on, the green control LED "On" lights up.

Antenna-controlled theremins use the physical property of detecting a change in capacitance between the antenna and the player's hand and evaluating it electronically. As these changes are very small in practice, various factors can influence the result of the electronic evaluation. These include, in particular, the heating of the electronic components of the theremin.

Therefore, switch on the theremin about 10 minutes before the start of the game to bring it to operating temperature. The Theremin's housing will heat up only insignificantly. The same applies if, for example, you choose a location in direct sunlight or move the Theremin from a cold to a heated room.

Power supply

The Theremin requires the connection of a plug-in power supply (12V-15V=) for power supply.

Only use the power supply unit supplied.

To do this, switch off the theremin and connect the mains adapter to the socket on the back of the unit using the hollow socket plug.

The unit has an internal reverse polarity protection. If the plug-in power supply has polarity switching, this can be set as desired. This protects the Theremin from accidental damage due to an inadvertent incorrect connection.

If there is a switch on the power supply to adjust the output voltage, set it to the position labelled 12V or 15V.

Pitch antenna

The effective length of the pitch antenna is approx. 50 cm. The diameter is 6 mm.

The antenna connection on the housing of the theremin consists of a 6 mm socket. The antenna can be pulled out here for transport. It must be easy to insert the antenna into the socket. If you encounter greater resistance when inserting the antenna, change the insertion angle slightly. Do not use force, otherwise the socket contacts may be damaged! Turning the antenna slightly while inserting it makes the insertion process easier.

The use of a 6 mm socket gives you the opportunity to experiment with your own antenna shapes if necessary. The shape of the antenna influences the sensitivity of the pitch control.

- The antennas are made of polished brass. Brass has the property of tarnishing when exposed to air, i.e. a dark oxide layer forms. The best way to remove this oxide layer is with steel wool or with a standard stainless steel cleaner. The resulting oxide layer has a slight effect on the sensitivity of the antenna.
- Please make sure that the ball is always on the antenna. This has no influence on the technical properties of the theremin, but serves not only to enhance its appearance but also to protect you. When playing, the end of the antenna is approximately at eye level! Never use an antenna without tip protection!

Volume-Antenna

The volume antenna consists of a specially bent brass tube. Insert the antenna as far as it will go into the sockets provided on the left side of the theremin. The insertion depth is approx. 3 cm. There is a stop. Push the two ends of the antenna evenly into the two sockets - if necessary, slightly change the direction of insertion. Do not use force!

The dimensions of the volume antenna are approx. 5 x 20 cm.

Here, too, the use of two 6mm sockets gives you the opportunity to experiment with your own antenna shapes if necessary. The shape of the antenna influences the sensitivity of the pitch control.

Notes on installation

The functioning of every classical theremin is based on an electronic measurement and evaluation of the capacitance between the antenna and the player's hand. But not only the player's hand influences the pitch of the theremin, all electrically conductive materials in the vicinity of the antenna also have an influence on the pitch. Therefore, look for a location where there are as few disturbing influences as possible at a distance of at least 1 metre around the antenna.

The following conditions in particular can lead to an increase in the pitch:

- Reinforced concrete walls
- Reinforcing steels in concrete floors
- Electrical appliances of all kinds, especially if they are earthed.
- The supply lines to earthed electrical equipment
- Electromagnetic radiation sources in the high-frequency range (e.g. microwave, TV, radio, power supply units from computers, mobile phones, etc.)
- Electromagnetic radiation sources in the low frequency range (e.g. loudspeaker boxes, electric motors, etc.)
- Make sure that the connection cable to the amplifier - as well as the cable from the mains adapter - is not located under the volume antenna.

In most cases, the effect of the source can be compensated for constant interference sources, as the theremin offers the possibility of recalibration. However, this option only works with interference sources that do not change in intensity (e.g. reinforced concrete walls). The theremin's function may be affected by the above-mentioned sources of interference, but it will not be damaged.

You can either set up the theremin as a tabletop unit or use a suitable stand. For mounting on a tripod, there is a threaded socket on the underside of the theremin with a 3/8" female thread as used on audio tripods.

The depth of the screwed-in thread should not exceed approx. 2 cm.

Adjustment knobs on the underside



The theremin is delivered calibrated. It is not necessary to recalibrate the theremin as long as it is installed in the correct location.

Adjust the control knobs only when absolutely necessary. When doing so, remember the old position on the basis of the changed revolutions! Recalibration is very difficult without technical aids!

There are five adjustment knobs on the underside of the theremin.

The adjusters have the following functions:

- [1] Pitch antenna: This sets the oscillator frequency of the pitch oscillator. NEVER change this setting!
- [2] Pitch working point: This control is the coarse setting to the top pitch control. Do NOT change this control!
- [3] Null-Abgleich: With this control you can minimise the volume of the theremin when the volume antenna is occupied. The setting can be made by ear.
- [4] Volume working point: This control is the coarse adjustment to the Distance control on top. Do NOT change this control!
- [5] Volume antenna: This sets the oscillator frequency of the volume oscillator. NEVER change this setting!

Calibration

The theremin is delivered calibrated. Recalibration is not necessary.

However, if the settings need to be reset to the factory settings, this is not possible without technical assistance.

You may find an emergency calibration by ear in our web shop under the menu item "Service". We always try to stay up to date here.

Care and cleaning

- Only use a dry cloth or dust brush to clean the housing. Do not use any damp cleaning agents!
- Please note that the antennas are tubes. These must never be cleaned when wet, as liquids can get into the housing!

Notes for the left-handed version



Right-handed version



Left-handed version

- All information applies to both the right-handed version and the left-handed version.
- In particular, the position of the adjustment controls on the underside are identical.
- The position of the adjustment controls on the upper side are reversed.
- The position of the rear voltage and output signal sockets are reversed.

Troubleshooting

- ➔ I don't hear any sound.
 - ➔ Make the connection to the plug-in power supply unit.
 - ➔ Switch on the theremin.
 - ➔ Check the used socket.
 - ➔ Connect an amplifier.
 - ➔ Turn the Distance control fully anti-clockwise.
 - ➔ Turn the pitch control fully clockwise.
 - ➔ Plug in the two antennas.
 - ➔ Check the amplifier on another unit.

- You can recognise a stereo cable that is not usable by two (instead of one) black ring on the contacts.
- The green LED does not light up.
 - Connect the power supply unit. Only use the one supplied.
 - Switch on the theremin at the transposition switch.
- I hear a "fluttering" sound.
 - Turn the pitch control a little further to the right.
- The pitch cannot be influenced via the antenna.
 - Turn the pitch control counterclockwise until you hear the lowest possible tone when your hand is no longer near the pitch antenna.
- The volume cannot be influenced via the volume antenna.
 - Turn the Distance control counterclockwise until you hear a tone.
 - Remove all cables that lie below the volume antenna.
- Something else doesn't seem to be working.
 - You can visit our website www.golem-instruments.de search for further or current information.
 - You can send us an email at golem-instruments@online.de.

Technical properties

Housing dimensions:	approx. 190 x 140 x 50 mm (without antenna)
Antenna connection:	Buchse 6 mm (Pitch), 2 x Buchse 6 mm (Volume)
Antenna length:	50 cm (Pitch), 20 x 5 cm (Volume)
Weight:	approx. 400 g
Power consumption:	ca. 85 mA
Frequency range:	approx. 20 Hz – ca. 16 000 Hz (~9 Octaves)
Output:	Audio - jack socket 6.3 mm (mono)
Output signal:	to approx. 0.55 V _{SS} constant over the entire frequency range (sine). Depending on the assignment of the volume antenna
Volume reduction:	approx. 0 – 99 % (through the assignment of the volume antenna)

Contact

- You can contact us via our website www.golem-instruments.de .
- You can contact us via our e-mail address golem-instrument@online.de .

Disposal instructions



- **Disposal of electrical and electronic equipment**

The crossed-out waste bin means that you are legally obliged to dispose of these devices separately from unsorted municipal waste. Disposal via the residual waste bin or the yellow bin is prohibited. If the products contain batteries or rechargeable batteries that are not permanently installed, these must be removed before disposal and disposed of separately as batteries.

- **Options for returning old appliances**

Owners of old appliances can hand them in within the framework of the possibilities for the return or collection of old appliances set up and available by public waste management authorities, so that the proper disposal of old appliances is ensured.

- **Data protection**

We would like to point out to all end users of WEEE that you are responsible for deleting personal data on the WEEE to be disposed of.