

# THÖRESS

## *845 Mono Power Amplifiers*



### INSTRUCTION MANUAL

Thank you for purchasing the THÖRESS 845 Mono Power Amplifiers. These single ended triode amplifiers, hand-made in Germany, have been tailored around the highly regarded directly-heated 845 power triode for an output of up to 25 watts into a 4, 8 or 16-ohm load. The zero-feedback circuit incorporates an extraordinary single-stage driver topology employing two EL803S power pentodes operating in triode mode. This driver stage is so powerful that it could (theoretically) drive a loudspeaker load with ultra-low distortion on its own. We believe that these state-of-the-art amplifiers offer the highest possible sonic performance in the class of 25-watt amplifiers, when combined with a pair of highly efficient loudspeakers such as our FR20 or 2CD12 speaker models. Please read the following explanations and instructions carefully to get the most out your amplifiers.

#### A NOTE ON INPUT SENSITIVITY

Please note that our Mono Power Amplifiers are specifically designed to have a comparatively low input sensitivity. Such the idle noise of the preamplifier can be more easily kept within inaudible limits when combined with high-efficiency to very-high-efficiency loudspeakers such as our 2CD12 speaker model or even large horn systems. This design choice has the further benefit of avoiding the problems of channel imbalance and sub-optimal frequency response which may result when the preamplifier's volume controls rests at too low an angle of rotation. Should speakers with somewhat lower efficiency be used it may, however, be observed that the volume-knob(s) of the preamplifier need to be turned to a somewhat larger than usual an angle of rotation for convenient loudness.

**Please note that low input sensitivity of the power amplifier is a desirable feature when driving highly-efficient speakers. It should by no means be suspected, that the amplifiers do not have enough power to drive the speakers accurately when the volume-knob(s) of the preamplifier needs to be turned to a somewhat larger than usual an angle of rotation for convenient loudness.**

#### DIRECTLY HEATED TUBES AND AMPLIFIER PLACEMENT

It is well known that directly heated triodes (DHT's) such as the 845 (2A3 or 300B) power tube are rather sensitive devices. By their nature, these tubes are namely heated with thin wires mounted with spring suspensions to mica supports pressed into the glass

envelope. The fragile heater wires can break very easily under shock or over-tension, especially when they are glowing or when they are still hot.

**DHT-s are fragile devices and must be handled with exceptional care!**

**Never pull out a DHT out of its sockets as long as it is still hot!**

**Never move or even transport a DHT as long as it is still hot!**

Moreover, the heater wires are able to swing very easily. As a result, severe vibrations of the glass envelope will be converted into audio signal and passed on to the speakers. This effect will be especially pronounced when very-high-efficiency speakers are driven by the amps. In view of this effect called tube microphony, amplifiers using DHT's need more considerate placement than amplifiers with the more widely used indirectly-heated tubes in order to prevent sonic artifacts from entering the audio signal due to power tube tube microphony.

**Is is strongly advisable to place DHT amplifiers on a rigid rack, shelf or platform, carefully decoupled from the floor or wall, and as far away from the speakers as possible, in order to prevent sonic artifacts from entering the audio signal due to power tube microphony.**

## 845 POWER TUBES

In our amplifiers the control-grid bias voltage of the 845 tube is factory preset to 140V and cannot be trimmed in any way to adjust the idle current of an individual power tube. This is a very reliable and stable way to achieve grid bias, but it makes it especially important to use tubes that meet tight specifications. The average 845 power tube draws an anode current  $I_a$  of 70mA for an anode-cathode-voltage of 980V when the negative grid bias voltage is set to 140V. Allowing for a 10% tolerance in anode current with respect to the this reference, only tubes with have  $I_a$  values between 63 mA and 77 mA should be used to equip the amplifier. Although matching the power tubes is not very critical, a difference in the  $I_a$  values of the two tubes of a matched pair should be preferably not more than 5 mA. The use of 845 tubes with questionable tube data and/or poor quality will lead to inferior sound quality or in (extreme cases) even to serious damage to the amplifier. If there is any doubt that a certain 845 power tube actually fulfills the stated requirements, the idle current can be easily determined by Ohm's law by measuring the DC voltage-drop over the winding resistance of the output transformer primary while the amplifier is powered on. In order to make this measurement reliable the amplifier needs to be balanced with respect to the 845 cathode in the way described in the relevant chapter.

**In view of the high voltages involved, measurements within the powered-on amplifier circuitry should always be carried out by an experienced technician only !**

When the power tubes are replaced for whatever reason, it is strongly advisable to use only high quality matched pairs tested for the above specs supplied either from the manufacturer or a “decent” tube supplier.

**Always remember to re-balance the amplifiers in the way described in the relevant chapter when the amplifiers have been equipped with new power tubes.**

**Note that a carefully tested tube of current production can be a better choice than a highly considered (and expensive) “new old stock” brand with questionable data.**

### BALANCING THE POWER TUBE CATHODES

**Eliminate eventual residual hum present in the system by adjusting the cathode balance control on the rear panel of the amplifier case.**

DC heating is provided for the 845 power tube with very simple and reliable circuitry. The ripple of the heater supply will introduce residual hum to the signal if the amplifier is not properly balanced with respect to the respective 845 cathode. In this case hum may become audible when a medium-efficiency to high-efficiency speaker is driven by the amp. To balance the 845 cathode and eliminate eventual hum present in the system proceed as follows:

1. Power on the preamplifier, leaving all other devices of the setup switched off.
2. Turn the volume control(s) of the preamplifier to zero.
3. After one minute, power on one Mono Amplifier, leaving the second Mono Amplifier switched off.
4. Wait for another minute until the warm-up process of the power amplifier has come to an end. Then adjust the cathode balance control on the rear panel of the amplifier so as to minimize the hum reproduced by the respective speaker when observed close to the bass driver. Note that the hum will not necessarily be perceptible in every position of the listening room due to standing waves (room modes). Once this adjustment has been carried out properly no hum should be perceptible at the listening position.
4. Once the first amplifier has been balanced, it should be switched off again.
5. Now repeat step 1 to 4 with the second Mono Amplifier.

Once both mono amplifiers have been balanced with respect to their power tube cathodes, the amplifiers will offer hum-free performance even when connected to very high-efficiency speakers.

**Power tube aging, or replacement of the power tubes, will necessitate re-balancing the amplifiers.**

### DRIVER TUBES AND MATCHING CONSIDERATIONS

The THÖRESS 845 Mono Amplifier uses matched pairs of triode-strapped EL803S power pentodes in the driver stage. These tubes have been carefully tested and hand-picked to meet tight specifications. A triode-strapped EL803S tube (g2 tied to the anode and g3 connected to the cathode) draws an average cathode current  $I_k$  of 40mA at an

anode-cathode-voltage of 290 Volt and a control grid bias of (minus) 8.3 Volt. Allowing for a 10% tolerance, only tubes with  $I_k$  between 36mA and 44mA under the specified quiescent voltages can be used to form matched pairs. The difference in the  $I_k$  values of the two tubes of a matched pair should be preferably not more than 2mA.

**Never use other driver tubes than the carefully tested matched pairs supplied by the manufacturer. The use of driver tubes of questionable quality may lead to degraded sound quality and, in extreme cases, to damage in the driver circuit!**

When the amplifier is to be equipped with “fresh” driver tubes, proceed as follows:

1. Carefully clean the tube pins with a dry brush.
2. Spray a few drops of highly viscous oil (such as Ballistol) on a cotton-tip.
3. Then use the tip to apply a thin oil film onto the contact pins.

Tubes handled this way will move in and out of the sockets more easily and will help to increase the life expectancy of these parts.

**Never switch on the amplifier while one of the driver tubes is cold whereas the other one is still hot, as it may happen if only one of the driver tubes has been replaced!**

**Never switch on the Amplifier until all tubes have been placed into their respective sockets.**

**Never pull out a driver tube or a power tube while the amplifier is powered on !**

**Always remove all tubes from their sockets and put them in their original transport box before shipping or transporting the amplifier.**

## SETUP

To set up the amplifiers, proceed as follows:

Do not connect the amplifiers to the mains until the following steps have been taken.

1. Switch off all powered devices which are to be used in the setup.
2. Set the power switch of the amplifiers to the off position (power switch lever directed downwards to the power inlet).
3. Place all tubes into their respective sockets very carefully.

**Never switch on the amplifier until all tubes have been placed into their respective sockets.**

**Always remove all tubes from their sockets and put them in their original transport box before shipping or transporting the amplifier.**

4. Bring the amplifiers into its final position on the rack, shelf or platform. Some remarks regarding amplifier placement can be found in the relevant chapter of this manual.
5. Connect the speakers to the amplifier.
6. Connect the input of the amplifiers to the (main) output of the preamplifier and turn the

volume knob(s) of this unit to zero.

7. Power on all program sources and the preamplifier.

8. After a delay of about one minute, both power amps can be connected to the mains and switched on.

**Always switch on the program sources and the preamplifiers first, and then switch on the power amplifiers with a delay of not less than one minute !**

10. Select the desired program source on the preamplifier. Then adjust the volume for convenient loudness, balance the channels and enjoy the music.

**When powering off the system, always switch off the power amplifiers first, then switch off the program sources and eventual preamplifiers observing a delay of not less than 30 seconds.**

**Never switch a program source or the preamplifier on or off while the power amplifier is powered on.**

#### SPEAKER LOAD MATCHING

Precise 4, 8 and 16-ohm load impedance matching can be attained with our 845 Mono Power Amplifier by changing the turns ration on the output transformer by way of jumpers soldered to pairs of secondary terminals to form the patterns as indicated below.

##### 4-ohm speaker:

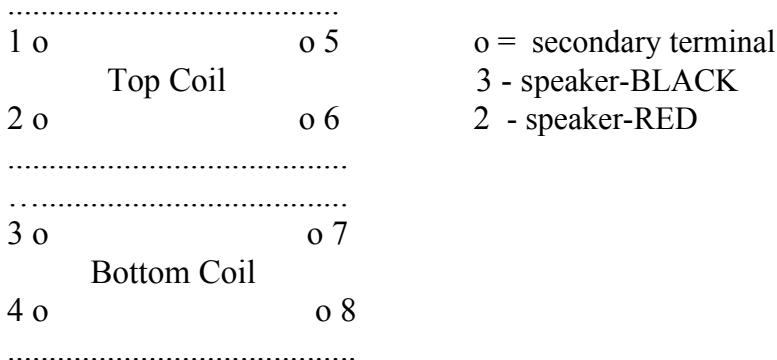
(1 and 2) - (3 and 4) - (5 and 6) - (6 and 7) - (7 and 8).

##### 8-ohm speaker:

(1 and 6) - (1 and 8) - (4 and 5) - (4 and 7).

##### 16-ohm speaker:

(1 and 6) - (4 and 7) - (5 and 8).



It is well known that the distortion and the damping behavior (output resistance) of a tube power amplifier is affected by the output transformer turns ratio. As our 845 Mono Amp

is a class-A triode amplifier, loudspeakers may be typically used with a higher output transformer turns ratio than the one corresponding to the rated speaker impedance (especially when the speaker efficiency is high). This would, theoretically, reduce the distortion and lower the output resistance of the amplifier (both of which are desirable features) at the expense of a lower maximum power output into the speaker load. On the other hand, it is very unlikely that optimum sound quality will be achieved when speakers are connected to a lower output transformer turns ratio than the one corresponding to the rated speaker impedance. Thus:

**It is possible to use a 8-ohm rated speaker with the 4-ohm load pattern.**

**It is possible to use a 16-ohm rated speaker with the 8-ohm or even the 4-ohm load pattern.**

**It is not advisable to use a 4-ohm rated speaker on the 8-ohm or 16-ohm load pattern.**

**It is not advisable to use a 8-ohm rated speaker on the 16-ohm load pattern.**

#### POWER INLET AND FUSE

The THÖRESS 845 Power Amplifier draws a current of 1.5 or 0.75 amperes from the 120V or 230V mains respectively, which corresponds to a power consumption of about 160 watts. It is equipped with a single fuse located in the fuse case next to the power inlet. Very occasionally, the fuse may blow at the moment the amplifier is powered on, due to the current spike drawn by the power transformer in this instant, especially when power cords with very low internal resistance are in use. Should this problem arise more regularly it may be advisable to use a fuse with slightly higher current rating. If, however, fuses with larger current ratings still blow regularly the amplifier should be returned to the factory for inspection.

**Always remove all tubes from their sockets and put them in their original transport box before shipping or transporting the amplifier.**

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**THÖRESS...**

*A Tribute to Professional Equipment from  
the Golden Age of the Electronic Tube !*

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