

# TANDBERG

## Control Amplifier 3002



### The Ultimate Control Amplifier from Tandberg, featuring

- Phono inputs with buffer stages, passive  $75 \mu\text{s}$  de-emphasis and active bass boost.
- High slew rate,  $300 \text{ V}/\mu\text{s}$  in the Moving Magnet and the Moving Coil input stages.
- Inductive Emitter Compensation —  $9 \text{ dB/oct.}$  — slope in the MM and MC input stages for maximum speed stability, high open loop frequency response, minimum static and dynamic distortion and symmetrical square wave.
- $80 \text{ dB}$  signal/noise MM (IHF-A-202-1978).  $74 \text{ dB}$  signal/noise MC (IHF-A-202-1978).
- Buffer stages for all inputs for optimum source matching and lower crosstalk.
- Switchable matching load for the MM-cartridge, 9 combinations for Resistance/Capacitance.

### Unparalleled Performance

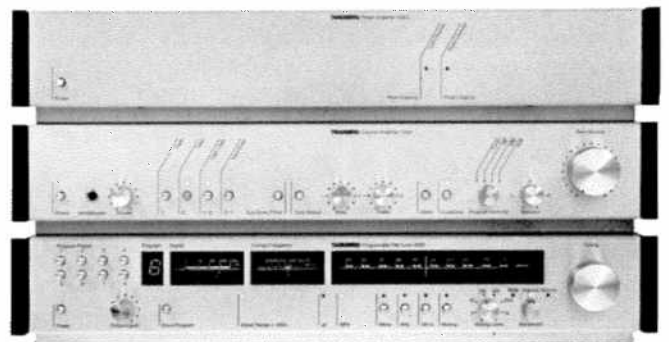
Tandberg "Series 3000" will excite the most demanding and critical Hi Fi enthusiast.

The picture shows from the bottom:

- Tandberg Programable Tuner (TPT 3001),
- Tandberg Control Amplifier (TCA 3002), and
- Tandberg Power Amplifier (TPA 3003).

Tandberg Cassette Deck 3004 and Tandberg Monitor Loudspeaker 3005 represent two more elements in this matched system.

Separately, each of these units represents a new peak in audio quality. Together they make an integrated system whose specification is unbeatable.



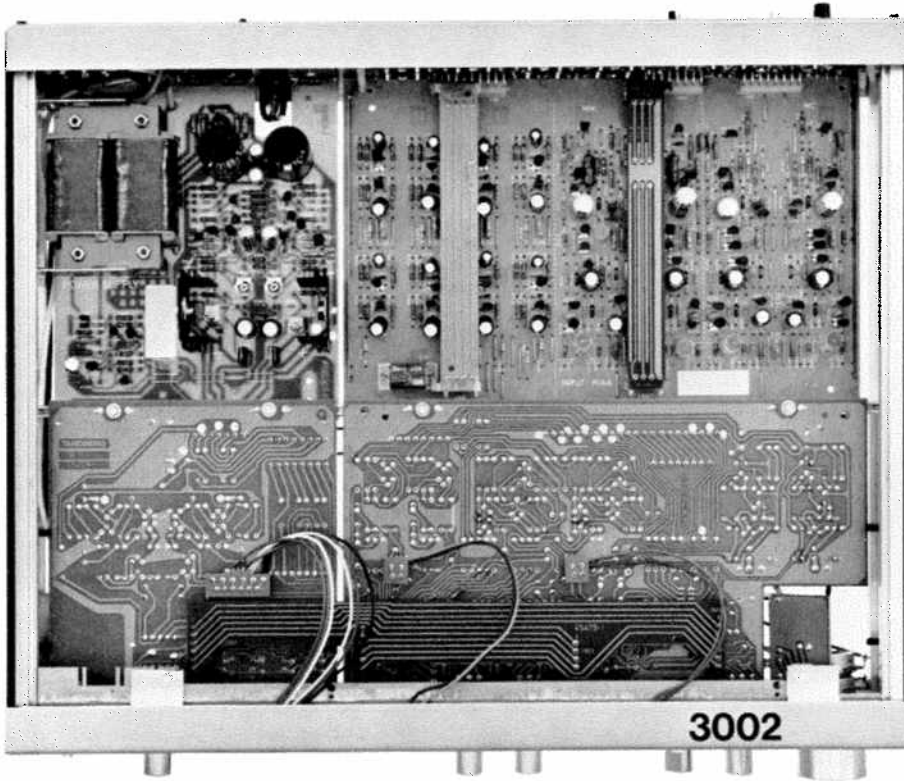
We set out to design and develop a system without compromise. A system engineered to maintain its performance through years of hard use.

Judge Tandberg "Series 3000" for yourself. It will give you the ultimate in sound reproduction.

## The control amplifier TCA 3002 in general

Tandberg Control Amplifier TCA 3002 utilizes semiconductor technology to the optimum regarding noise, distortion, dynamic range, channel separation and crosstalk. To achieve this no integrated circuit has been used. This professional

control amplifier has all the functions needed and all electronic circuits are designed to give the utmost performance. All technical data for this amplifier is given according to the new IHF audio standard.



*The inside of the amplifier is characterized by a super clean layout. The boards are interconnected by a high quality connector system.*

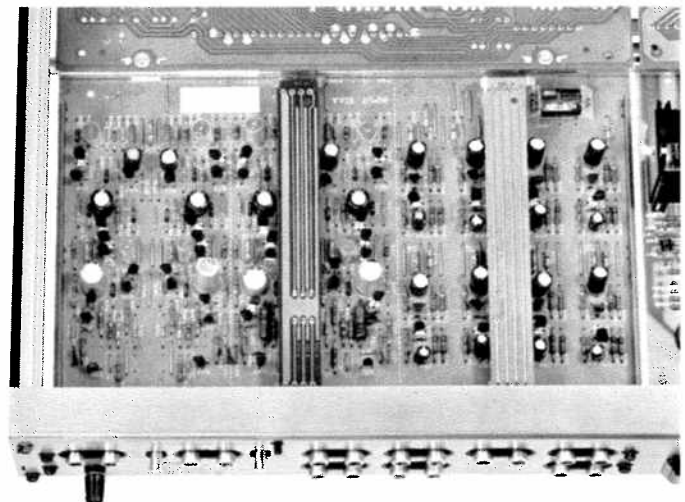
## The Phono Preamps

The Phono preamps have separate amplifiers for MM and MC and consist of three main parts – a linear buffer stage, a passive equalization network for the high frequencies, and an amplifying stage with equalization for the low frequencies. Maximum deviation from the RIAA-curve is within  $\pm 0.2$  dB! For the moving magnet both the load impedance and capacitance can be adjusted to the actual cartridge used.

The MC-input is designed for cartridges having an internal impedance of 30 to 100 ohms. To achieve maximum transient qualities the compensation circuit is in the input stage at low signal level. THD for the pre-amp is below 0.004%.

## Line input stages

Buffer stages are used in all line inputs to avoid all interface problems, and to reduce the crosstalk between the different program sources.

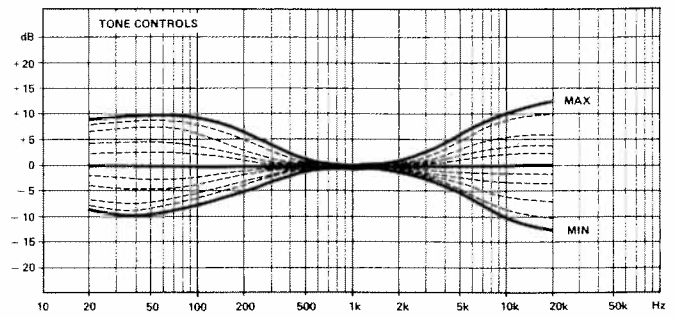


*The preamp stages with input terminals*

## Tone control system

To achieve minimum distortion in the tone control system, the driving stage and the feedback stage, which are both push pull stages, are designed to have very low output impedance and high current capacity. The bass and treble curves can be varied within  $\pm 10$  dB.

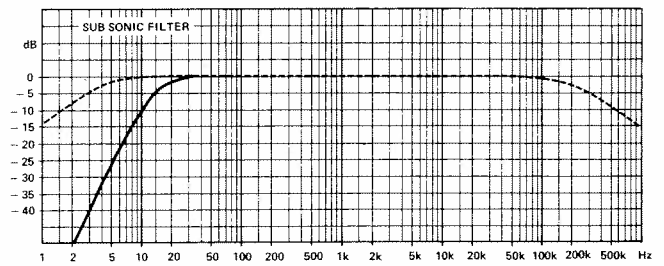
These stages add no measurable noise or distortion to the signal.



*Tone Control curves*

## Sub-sonic filter

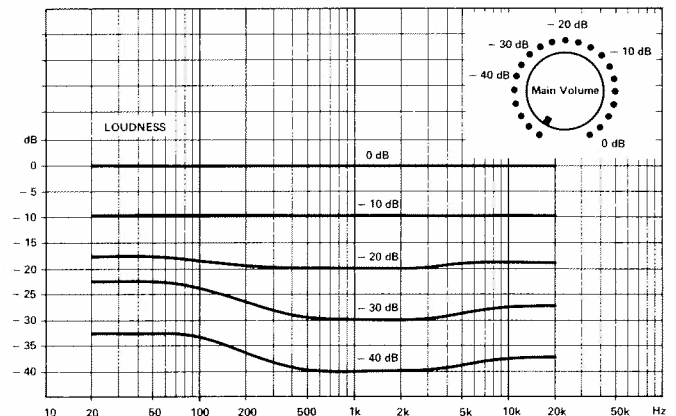
To achieve maximum flat frequency response and minimum phase shift in the audio section a Butterworth filter (12 dB/oct.) is used.



*Sub Sonic Filter curve*

## Volume control

In addition to extremely accurate channel tracking, the volume control is designed to add minimum noise. The loudness function which belongs to the volume control adds maximum 7 dB to the low and 3 dB to the high frequencies when activated.



*Loudness curves at five different positions of the Main Volume control*

## Headphone amplifier

Among very few preamps the Tandberg preamp has a headphone output where the headphone volume can be adjusted separately, independent of the main volume. Any headphones with an impedance above 4 ohms can be used.

## Muting circuit

When the preamp is turned on it needs a few seconds for d.c. stabilization. A time delayed reed-relay is *therefore* built into the unit and connects the preamp output to the poweramp input in a smooth and silent way.

## Power supply

The power supply used has an extreme ripple rejection of 90 dB. The ripple rejection plays an important role in the unique signal/noise specification achieved in this amplifier. The two voltage stabilizers tolerate a wide range of mains fluctuations and they will work well even down to 198 V a.c. at 230 V a.c. nominal mains voltage, or down to 103 V a.c. at 120 V a.c. nominal mains voltage.

# Tandberg Control Amplifier TCA 3002

## Technical data

Power requirements:	115/230 V $\pm$ 10%, 50/60 Hz
Power consumption:	30 W max.
AC-outlets:	Unswitched 1
	Switched 3
Dimensions:	Width 17 1/8" (43.5 cm)
	Depth 13 3/4" (35.0 cm)
	Height 3 1/4" ( 8.3 cm)
	Weight 12.5 lbs (5,7 kg)

## Technical Data according to IHF-A-202, 1978

### Frequency response

Phono MM:	20 – 20,000 Hz	$\pm$ 0.2 dB
Phono MC:	20 – 20,000 Hz	$\pm$ 0.2 dB
Tape 1, Tape 2:	20 – 20,000 Hz	+ 0/– 0.1 dB
Tuner, AUX:	20 – 20,000 Hz	+ 0/– 0.1 dB

### Maximum Voltage Output

Preamp output:	5 V at THD = 0.004%
Preamp output:	10 V at clipping level
Tape 1, Tape 2:	7.5 V
Headphone output:	20 V/R = $\infty$

### Total Harmonic Distortion (20 Hz – 20,000 Hz)

Phono MM:	< 0.004%
Phono MC:	< 0.004%
Tape 1, Tape 2:	< 0.004%
Tuner, AUX:	< 0.004%

### Input Sensitivity – Ref. 0.5 V output voltage

Phono MM:	1 mV
Phono MC:	80 $\mu$ V
Tape 1, Tape 2:	70 mV
Tuner, AUX:	70 mV

### A-weighted Signal-to-Noise Ratio

Phono MM:	80 dB
Phono MC:	74 dB
Tape 1, Tape 2:	97 dB
Tuner, AUX:	97 dB

### Maximum Input Voltage (1 kHz)

Phono MM:	290 mV
Phono MC:	22 mV
Tape 1, Tape 2:	11 V
Tuner, AUX:	11 V

### Input Impedance

Phono MM:	33 / 47 / 100 kohms
Phono MC:	1 kohm
Tape 1, Tape 2:	47 kohms
Tuner, AUX:	47 kohms

## Secondary Disclosures

### Output Impedance

Preamp:	560 ohms + 10 $\mu$ F in series
Headphones:	470 ohms
Headphones (min. load):	4 ohms

### Tone-control Response

Bass:	$\pm$ 10 dB at 50 Hz
Treble:	$\pm$ 10 dB at 10,000 Hz
Loudness:	Max. 7 dB at 50 Hz
	Max. 3 dB at 10,000 Hz

### Filter

Sub Sonic:	– 12 dB/oct., – 3 dB at 15 Hz
------------	-------------------------------

### Crosstalk (100 Hz – 10 kHz)

Phono MM:	To any of the other sources > 70 dB
Phono MC:	To any of the other sources > 70 dB
Tape 1, Tape 2:	To any of the other sources > 70 dB
Tuner, AUX:	To any of the other sources > 70 dB

### Separation (100 Hz – 10 kHz)

Phono MM:	> 53 dB
Phono MC:	> 53 dB
Tape 1, Tape 2:	> 58 dB
Tuner, AUX:	> 58 dB

### Transient intermodulation

All inputs:	Immeasurable
-------------	--------------

## Other Technical Data

### Frequency Response

Tape 1, Tape 2:	5 – 130,000 Hz, + 0/– 1.5 dB
Tuner, AUX:	5 – 130,000 Hz, + 0/– 1.5 dB

### Phase shift (20 Hz – 20,000 Hz)

Tape 1, Tape 2:	+ 9.5°/– 2.5°
Tuner, AUX:	+ 9.5°/– 2.5°

- Specifications are subject to change for further improvement without notice.

## Optional Extras

- Black acrylic side walls for freestanding units.
- Attachment sets for installation in 19 inch racks.

**TANDBERG**  
The European Alternative

Tandberg A/S, Post Office Box 55, Bogerud, N-Oslo 6, Norway