

TDU 7000 Time Delay Unit

Introduction

The history of time delay equipment has shown a gradual replacement of analogue by digital techniques. This cannot be ascribed purely to fashion as this trend goes hand in hand with significant improvements, e.g. noise, distortion, etc. which would otherwise not have been possible. The primitive acoustical tube delays, with their inherent group delay distortions and low frequency cutoffs, were initially replaced by electronic bucket brigade delay lines.

However, it was not until the advent of purely digital time delay techniques using PCM that a signal to noise ratio of 90 dB could be achieved. This, as well as the extremely low distortion and other advantages, allows digital delay to meet the most stringent requirements of high quality studio equipment.

Time quantization is achieved by sampling the signal periodically. According to Shannon's Sampling Theorem, a signal is completely defined by its samples if the sampling rate is at least twice the signal band width. The amplitude quantization results from the conversion of these samples into numbers causing the so-called roundoff or quantization noise. To cover a wide dynamic range with a limited number of digits most digital time delay techniques use the floating point format. Above a certain signal level the floating format produces an almost constant signal to noise ratio with the disadvantage of modulating the quantization noise. To reduce high frequency noise modulation caused by low frequency signals, the latter unable to mask the former, the signal is pre-emphasized at the input of the delay and de-emphasized at the output with the effect that the de-emphasis suppresses the unmasked modulated high frequency noise.

Basic Unit N 700:

Housing with power supply unit and clock generator, one or more input modules M 710, output modules M 720, delay extension M 730, and effects module M 750.

The basic unit N 700 comprises eight module receptacles, the configuration may be chosen as desired. Automatic by-pass in case of sudden voltage loss, or for fuse change during operation.

Input Module M 710:

Balanced input stage, low-pass filter, limiter, 14 bit ADC, RAM with addressing logic.

Other features: Adjustable nominal input, deviation from nominal input is indicated by LED-band, 3-contact XLR-type connector.

Output Module M 720:

14-bit DAC, low-pass filter, balancing transformers, binary coding system of time preselection.

Three separate switches on the front panel for adjusting the desired delay time in steps of units, tens and hundreds. Maximum value to be reached: 399 ms.

Special features: by-pass switch for digital section, switch for setting the delay time to one-tenth of the indicated value, adjustable nominal output level, 3-pin XLR-type connector.

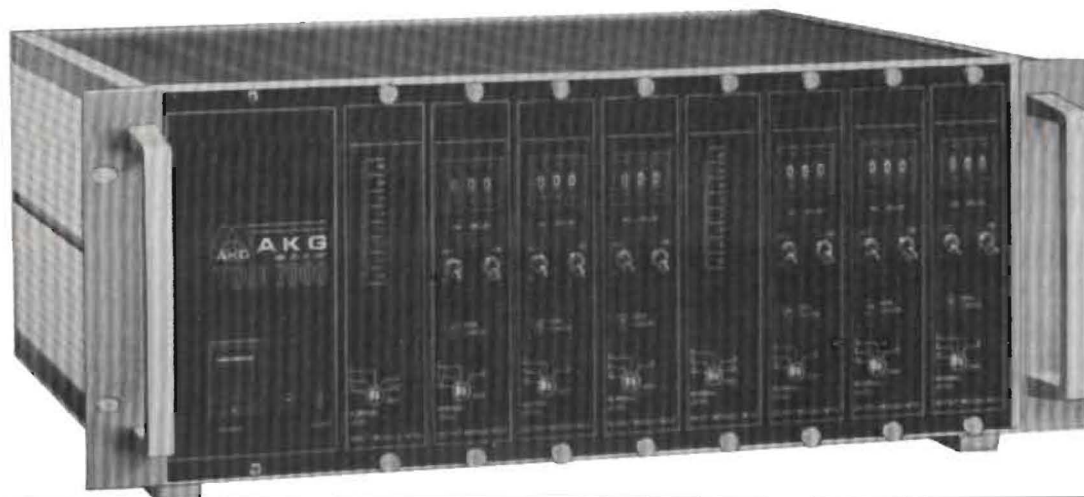
Modules M 730 and M 750 will be available after mid 1980.

Recommended applications: Broadcast and sound studios, large PA systems, stages, satellite TV, recording lathes.

Technical Data:

12 + 2 bit system (floating point).

- Frequency response: 30 to 15,000 Hz +/- 1 dB.
- Clock frequency: 40 kHz.
- Dynamic range: 87 dB r.m.s. (filter acc. to DIN 45405), 93 dB, A-weighted.
- Noise and distortion: for nominal input level $\leq 0.05\%$ at 1 kHz, $\leq 0.1\%$ (30 to 15,000 Hz).
- Intermodulation: $\leq 0.1\%$ (twitone CCIF).
- Nominal input level: -22, -6, 0, +6, and +12 dBm.
- Nominal output level: -6, 0, +6, and +12 dBm.
- Maximum output level: 12 dB above nominal output level.
- Limiter response level: (incorporated in every input module): 12 dB above nominal input level setting.
- Limiter range: 20 dB.
- Input impedance: ≥ 10 k ohms.
- Output impedance: ≤ 50 ohms (-6 to +6 dBm) transformer balanced, ≤ 150 ohms (+12 dBm) transformer balanced.
- Recommended load impedance: ≥ 600 ohms.
- Pre- and de-emphasis: 50 μ s.
- Power requirement: 220/110 volts a.c.
- Power consumption: appr. 70 VA.
- Dimensions:
 - N 700: 483 x 178 x 366 mm (19 x 7.7 x 14.4 inch)
 - M 710, 720, 730, 750: 40 x 173 x 380 mm (1.5 x 7 x 15 inch).
- Weight:
 - N 700: 7.1 kg (15 lb) net.,
 - M 710: 1.1 kg (2.5 lb) net.,
 - M 720: 0.9 kg (2 lb) net.
- Shipping weight: appr. 30 kg (65 lb), (depending on module configuration).



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