

# NAGRA T-Audio

## Time Code

DOUBLE SYSTEM VIDEO EDITING  
COMPUTER ASSISTED SOUND SWEETENING  
PILOT TRANSFER  
OB - VAN INSTALLATION





# T-Audio Time Code

The NAGRA T-Audio was built by the same engineering team that created such products as NAGRA III, NAGRA SN, NAGRA 4.2 and AMPEX-NAGRA VPR-5, some of which became industry standards.

The T-Audio tape transport is derived from the NAGRA TI, a compact twin capstan instrumentation recorder, designed for field applications.

In addition to its remarkable specifications, its size, weight and low power consumption make it especially suitable for mobile applications.



The centre track timecode version is Piloton compatible and may be equipped with an internal chasing synchronizer of outstanding performance.

Optional RS-232 and RS-422 serial remote ports permit the integration of the NAGRA T-Audio-TC in any computer assisted post production system.



The keyboard is detachable and a second one may be connected to the machine, using an extension cable up to 50 m (150 ft) long.

Up to four combinations of tape speed, recording standard and tape type are directly accessible by simple keystroke.

One of the NAGRA highlights is easy access for maintenance; the high precision tape transport hinges upwards for servicing and functions in this position.

The detachable front cover allows direct access to all electronics that are logically grouped on the five slide-in circuit boards.

The most important adjustments are made with potentiometers located on the edge of these circuits so that the use of extender boards is reduced to a minimum.

The control logics and the tape transport are designed in such a way that no erroneous keyboard manipulation, or power failure, will ever cause damage to your precious tape.

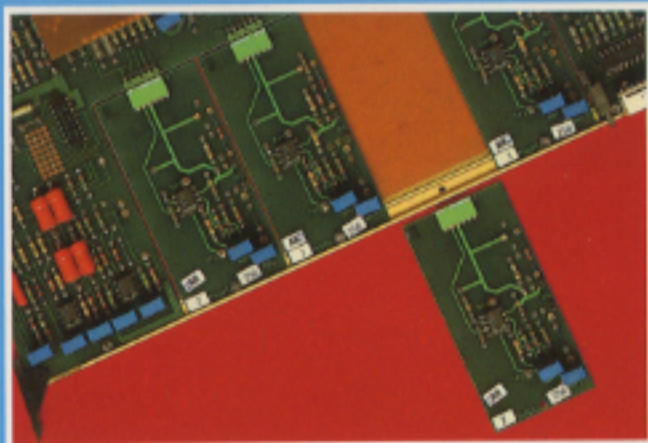
## Audio electronics

The exceptionally high audio specifications are mainly due to a sophisticated phase compensation system as well as to the use of wide band predistortion recording amplifiers.

This technique was already applied to previous NAGRA recorders but was further developed for implementation in the NAGRA T-Audio electronics.

It consists in the introduction into the record signal of distortion which is the exact opposite of that of the tape.

This allows higher recording levels without excessive distortion or offers much lower distortion when recording at standard levels.



The section of the record amplifier that generates predistortion is implanted on a small plug-in circuit.

Up to four of these circuits, calibrated for different tapes, may be installed on an audio board and are selectable by simple keystroke.

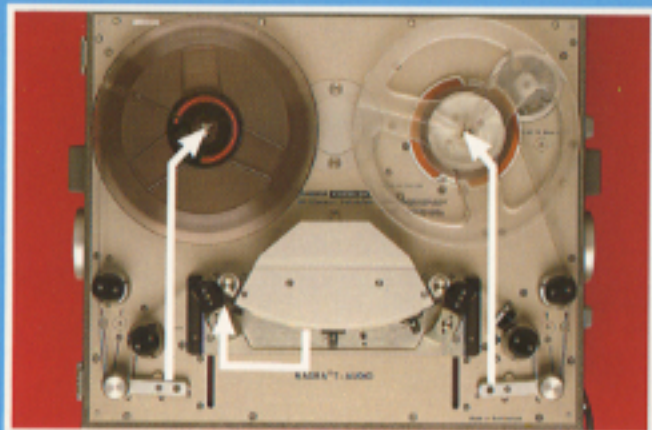
Versions without predistortion are available for applications where calibration must be as easy as possible.

## Tape transport

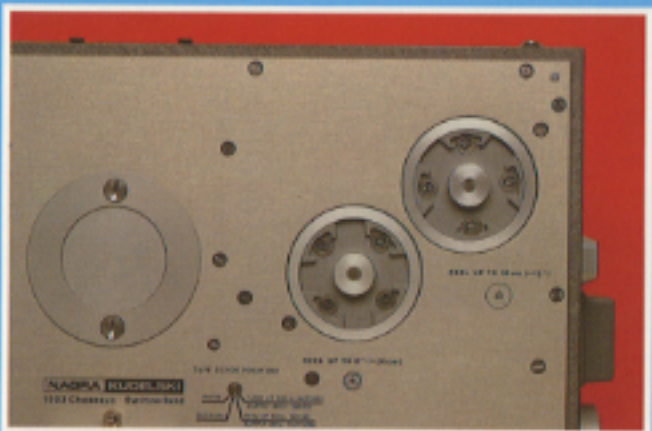
The unique design of the NAGRA T-AUDIO tape transport guarantees gentle tape handling even when abrupt speed variations and shuttle motions occur due to synchronizing operations.

Both reel motors are controlled by their own (no-contact) tape tension rollers, thus assuring constant tape tension during accelerations and decelerations.

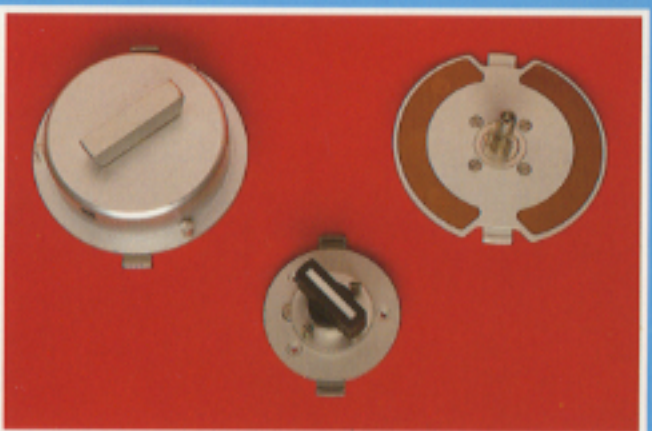




The mixed use of large and small reels does not interfere with the safe operation of the machine.



Thanks to rugged reel adaptors the T-AUDIO quickly adapts to any reel standard, sizes up to 11.8" (30 cm). High precision rotating tape guides are located as close as possible to the hubs to assure the safe use of pancakes.



Mechanical emergency brakes bring the reels gently to a stop when a power failure occurs during fast winding. The use of two electronically stabilized capstan motors reduces wow & flutter and modulation noise considerably and isolates the inter capstan area completely from the reels. Bad splices sticking on the supply reel will not cause a glitch in the tape speed of tape in the head zone. The left hand capstan is servo controlled by a tape tension sensor placed between the heads. Manual servo control over the right hand capstan provides smooth JOG-operation.

## Splicing

Standard functions such as free spool edit or single hand cue with one reel motor activated are provided for splicing.

But, in addition, the SERVO function provides accurate JOG control over the tape by means of a rotary control.



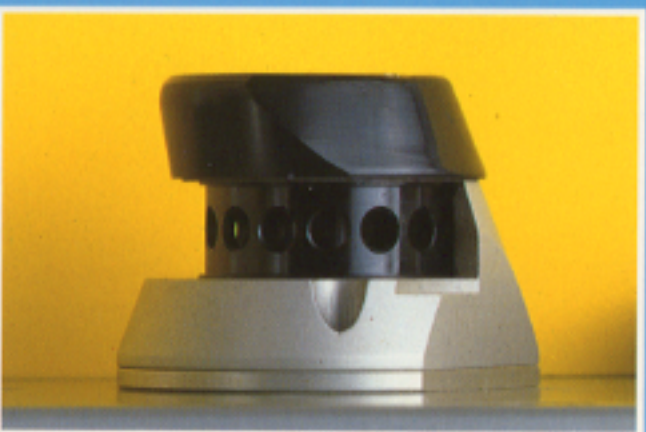
Once the splicing point is positioned on the playback head, the tape will be automatically advanced to the deck-mounted scissors by the CUT function.

The use of grease pencils is thus eliminated and the deck and heads remain clean.

A splicing path is provided on the head bridge cover to splice tape sections together.

## Tape counter

A high resolution electronic tape counter is provided with its optical sensor built inside one of the rotating tape guides.



The mechanical design of this roller ensures minimal tape slippage.

It features a «GO TO ZERO» function with an accuracy better than 0,1% with 50 micron backcoated tape.

The output of the counter encoder is also used by the timecode circuitry for dropout compensation and tape transport control through timecode interruptions.



## Timecode synchronizer

The timecode synchronizer is remarkably rapid thanks to the T-Audio low inertia tape transport and due to the fact that the synchronizer is not a separate control device but integrated in the control logics of the machine.

The connection to a master transport is very simple; the T-Audio-TC only requires a timecode feed.

It will follow synchronously from 1/4 nominal speed to 2x nominal speed, it will park with one frame accuracy when the master stops and it will chase with shuttle speeds up to 60x nominal speed.

At nominal speed, both forward and reverse, the T-Audio-TC will LOCK itself to its master with an accuracy of  $\pm 25$  microseconds.

Manual phase tuning is provided for audio-audio synchronization.

Positive or negative OFFSETs of any value up to 24 hours (minus one frame) may be introduced.

The OFFSET can be trimmed in steps of only one timecode bit (1/4096 th of a frame) by means of a rotary control. This can also be done with the tape in motion, and when LOCKED at nominal speed to the master transport.

The INCREMENTAL function automatically calculates the actual numerical OFFSET between master and off-tape timecode when activated, and continues to do so when a timecode discontinuity occurs in either track when the T-Audio is at nominal speed and in LOCKED state.

This feature makes it possible to roll back from a given scene into the preceding one, and to roll forward to the selected scene again with immediate synchronization at the very first frame.

Also audio laybacks of extended length (split-edits) are possible thanks to this function.

An integration time can be introduced into the synchronizer to prevent wow & flutter of the master transport to be copied by the T-Audio.

This integration time may be temporarily increased to run without audible speed variations across larger dropouts in either master or slave timecode track.

## Electronic editing

The three channels of the T-Audio-TC are completely independent, they can be selected individually between recording and playback by means of a transparent status matrix on the keyboard.

Switching between PLAY and RECORD with the tape transport at nominal speed will result in an undetectable crossfade which is the result of accurate timing of the erase, bias and record amplifiers.

It is equally possible to start audio recording when the tape transport is in synchronizer mode, LOCKED to a master, provided the tape being used was "pre-striped" with a timecode track.

Two of the five memories are reserved for the automation of such an operation.

CUE-1 and CUE-2 may be loaded with edit entry and edit exit points.

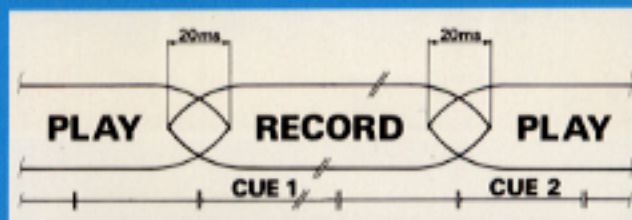
When the machine reaches CUE-1 in LOCKED state with all channels selected to SAFE in the status matrix, a rehearsal of the edit will be performed by switching the monitoring output from REPRO to INPUT (EE).

With one or both audio channels selected to READY, the edit will be executed.

The synchronizer is automatically phased on the appropriate audio head during these operations.

Generally, the T-Audio editor functions are very similar to the editors as incorporated in professional video tape recorders.

This feature does not only allow electronic editing of audio to video, but also pure audio editing is possible between two (or more) T-Audio recorders.



## Post production systems

The T-Audio-TC can communicate through the RS-232 and RS-422 serial remote ports with any computer based controller device, this permits its integration in a computer assisted post production system.

Video editing can be performed with a NAGRA T-Audio editing sound in parallel to the video edit recorders in order to maintain high sound quality or to increase the number of available audio tracks.

The studio reference (BLACKBURST) may also be applied to the T-Audio tape transport and internal timecode generator.

A controller has direct access to all functions and status answerbacks through the serial remote port.

The RS-232 port is typically suitable for special applications where control through a personal computer is required.

The RS-422 port is becoming standard for audiovisual applications.

The controller and the T-Audio must of course "speak the same language" when using a serial communication bus.

The SMPTE has a universal protocol in preparation with a special dialect for audio tape recorders.

Until this standard is set, software is available which is specially adapted to the edit controller of the customers' choice.

These protocols are developed in such a way that the T-Audio reacts just like a video tape recorder.

This allows the use of standard VTR-interface software in the edit controller with only minor modifications.

A special software permits the use of a T-Audio-TC in a small scale video edit equipment with an edit controller that can handle only three VTR's.

The T-Audio will then "listen" to the RS-422 bus between the edit controller and the video recorder and copy all commands.

The edit controller will not even be aware of its presence.

## Ordering information

The NAGRAT T-Audio is available in different versions and with several combinations of options and accessories. Some of the features described in this leaflet are optional. Configuration may be subject to modification. Please consult our current pricelist. Or contact your nearest NAGRA dealer or phone or write directly to:

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