

NAGRA-D

*4 Channel Self-Contained
Professional Digital Audio
Recorder*



NAGRA

NAGRA-D

Setting the new standard in digital audio recording

NAGRA – for decades the quintessence of technological innovation; a classic name for perfection in analogue recording.

The NAGRA-D continues the tradition of leadership also into the digital audio recording domain. NAGRA-D is not just a new recorder, but the beginning of the new era in digital audio quality. Now, professional sound recordists can have the quality and reliability they have been searching for.

NAGRA-D has:

- ▶ *open reel ¼" tape*
- ▶ *24 bits per sample*
- ▶ *2 or 4 channels*

which bring real benefits

- ▶ *A lifetime of 50 years or more for the original master recordings – especially important for archives.*
- ▶ *Important extra headroom – guarantees a true 16 bits dynamic range for the finished product.*
- ▶ *Provides the versatility demanded by professionals e.g. the recording of a pair of ambience microphones for post production mastering.*
- ▶ *Easy editing of tape.*
- ▶ *A factor 4 reduction in the cost of tape and tape storage space compared with analogue recordings.*
- ▶ *A format which will allow immediate use of the continuing evolution in electronics technology.*

And the NAGRA-D is ready to operate in hostile environments.

*NAGRA-D.
More than just a need.*

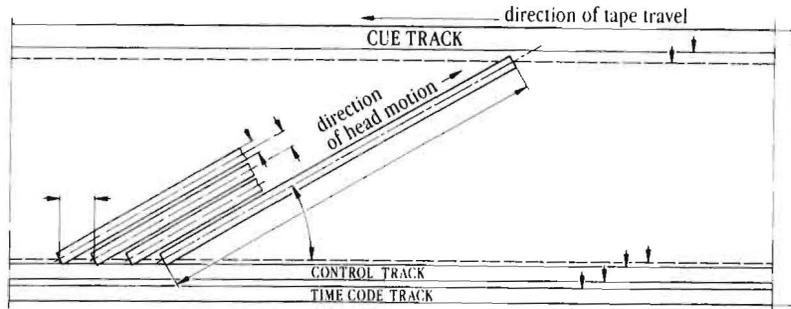


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1/4" tape format – a truly professional approach to digital audio recording

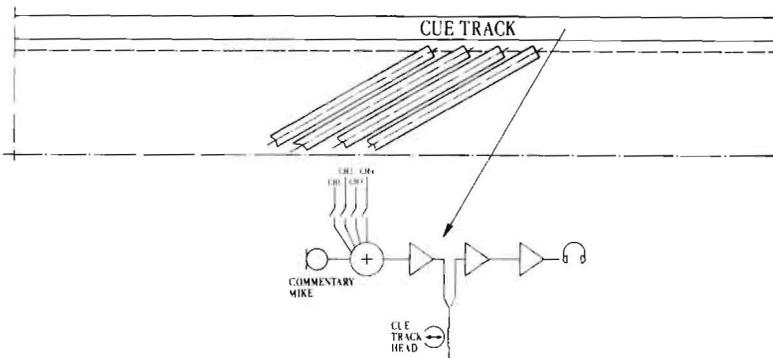
NAGRA chose the digital 1/4" tape format for the NAGRA-D to give you the performance you have come to expect in audio recording.

TAPE FOOTPRINT

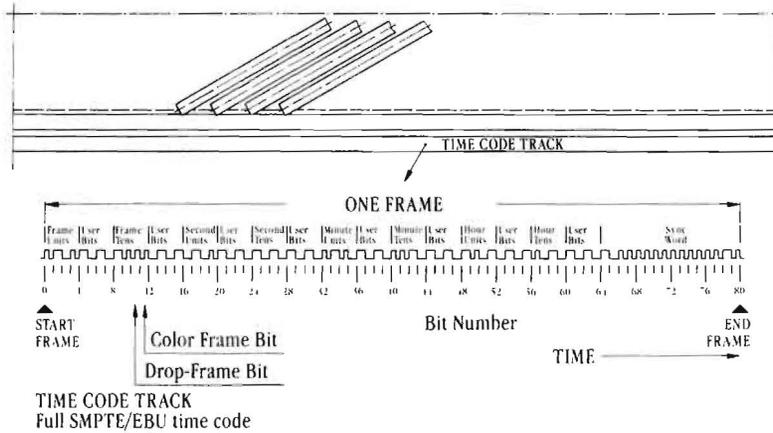


Three auxiliary tracks have been created to give you more information now and in the future. The CUE track can receive a mix of the 4 audio channels, or commentary from the external CUE microphone; the TIME CODE track has full SMPTE/EBU time code information for both video and cinema applications; whilst the CONTROL track could, in the future, record bursts of additional data.

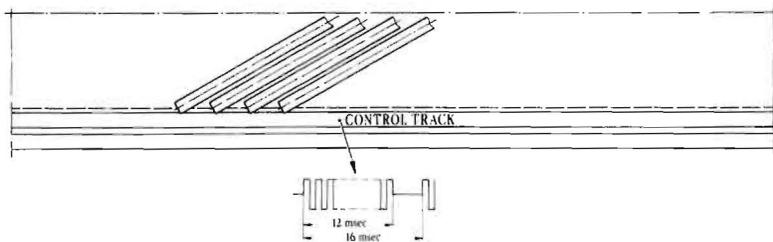
CUE TRACK



TIME CODE TRACK

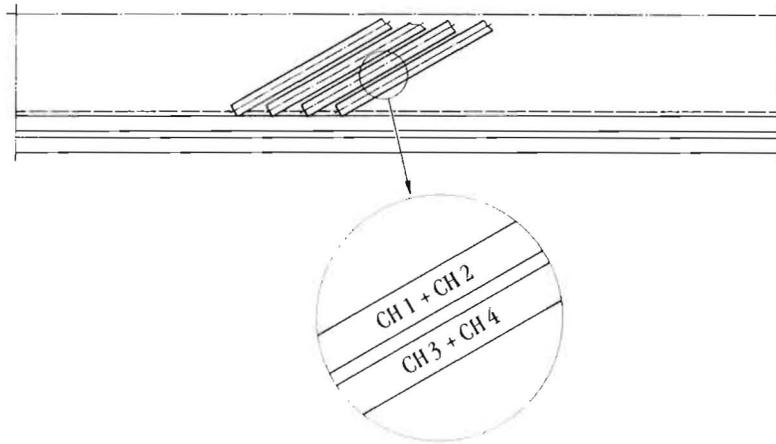


CONTROL TRACK



The four channel recording system consists of pairs of tracks. Data for channels 1 & 2 are on one track; that for channels 3 & 4 on the other. This configuration allows simple lockout of either pair. Auxiliary information such as fader positions, drop out files etc. are recorded in the 48 samples/track reserved for this purpose.

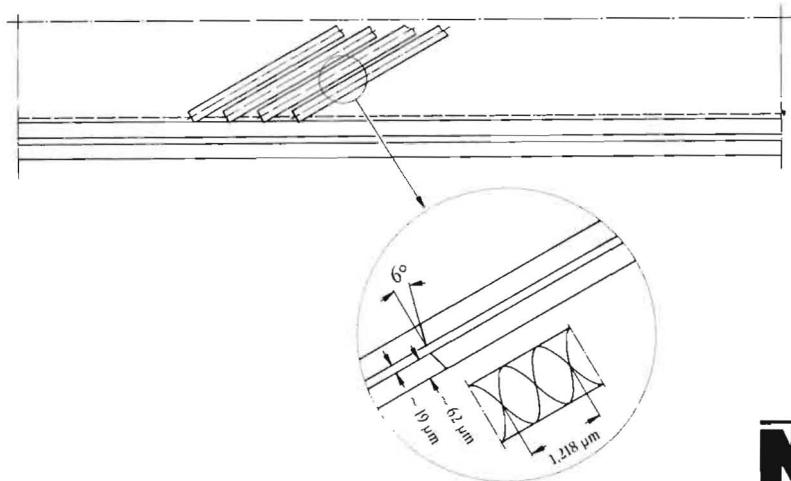
HELICAL TRACKS



The 1/4" tape format has several important features which make it especially rugged:

- ▶ Azimuthed recording ($\pm 6^\circ$) and large track gap ($\sim 10\mu\text{m}$) ensure low track-to-track crosstalk.
- ▶ Wide tracks ($\sim 70\mu\text{m}$) reduce tracking difficulties caused by vibration.
- ▶ Safe wavelength ($1.218\mu\text{m}$) avoids self-demagnetisation.

RUGGEDNESS OF THE FORMAT



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All the versatility you would expect in a NAGRA

Controls which put you in command

All the main controls, switches and indicators are grouped together on the top of the NAGRA-D, giving the operator an easy overview of the recording parameters being used.

Each channel is equipped with an individual direct amplifier - permitting phase switching.

Three position, low cut filters are available on each channel - a standard NAGRA feature.

Level adjustment is via two concentric potentiometers for each channel: the outer ring for input sensitivity; the inner ring for fade control - recording the control signal on the tape gives a non-destructive fade out.

Audio levels are shown on the microprocessor-driven level indicators. These guarantee real modulometer ballistics at low temperatures and are easy to read even in extremely brightly lit situations. In addition, microprocessor control means that you can display maximum recorded levels at any time.



Selection of the signal to the headphone outputs can be made via the phones' switches.

Lockout for either pair of channels can be selected during recording.

When not using a PC, the small, built-in display gives access to, and information about, the many features in the NAGRA-D: Time Code, counters, IN/OUT configuration, Drop Out Files, and many more.

The main function keys are all easily accessible and, because the NAGRA-D is designed to perform under extreme conditions, can be operated when wearing gloves.

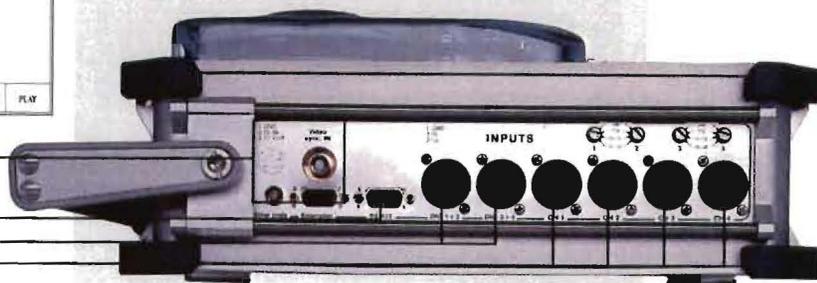
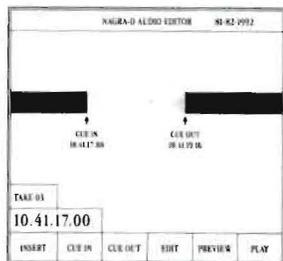
The hermetically sealed, transparent cover protects the tape and transport system from dust and moisture, but still allows easy access and a fast visual inspection of the mechanics.

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Two-way communication

The NAGRA-D is versatile enough as a completely self-contained unit, but connect it to the outside world and the potential is unlimited.



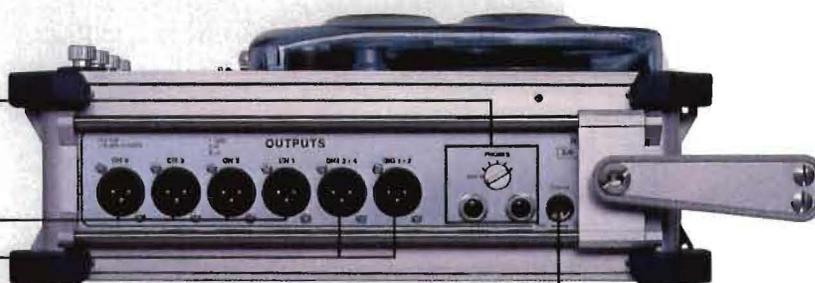
The extension and reference sockets provide for multiple synchronisation possibilities; Video (PAL, SECAM, NTSC), EXT (32 kHz, 44.1 kHz, 48 kHz); AES; Time Code (SMPTE/EBU).

The RS 422 serial communication port can be used to connect a PC for external control or editing.

The four analogue audio channel inputs on XLR connectors are individually switchable; line, "T" 12 V, Ph + 12 V, Ph + 48 V. Currently they are digitized to 18 bit resolution, and can be changed to 20 bits when lower consumption A/D converters become available.

The NAGRA-D also includes, as standard, one AES INPUT/OUTPUT for each pair of channels allowing 24 bits per sample to be recorded.

External monitoring



Continuous selectable monitoring of all four channels or the CUE track is made possible via a high level monitoring amplifier fed to two 1/4" headphone jacks.

Four channel, symmetrical, floating, and transformerless analogue audio outputs provide practical connection to external analogue equipment.

To ensure a long life of the internal battery pack, the NAGRA-D can be connected to an external intelligent NAGRA current control charger.

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NAGRA-D...

designed for the practical sound recordist.

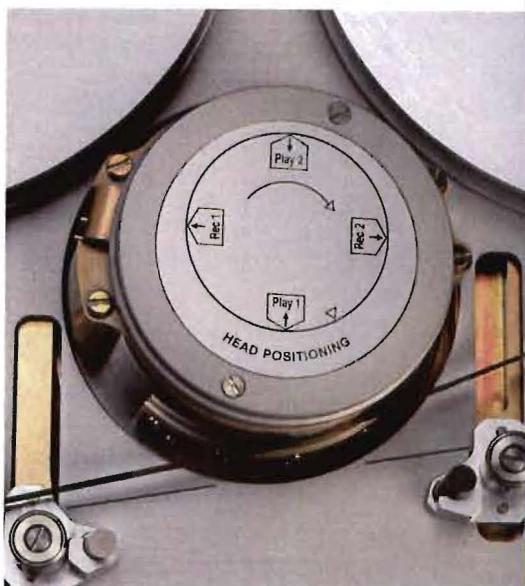
Because we have been your partner in the recording of sound for many years we understand your needs.

TRANSPORT ACCESSIBILITY



The rugged, open reel NAGRA-D format gives you easy access to the tape transport mechanism. Visual checking, cleaning, and rough scissor editing are possible.

ROTARY HEAD CONFIGURATION



The scanner is equipped with four heads, two for recording and two for playback. This advanced technology gives an improvement in signal level compared to stationary head formats, and allows full confidence playback.

Portability

Not all sound recordings can be made in the comfortable environment of a studio and so the recorder needs to be able to go to the source. This can mean anything from hot and dusty to cold and dry conditions.

The NAGRA-D is designed to go anywhere you can go, giving the possibility to make truly professional, 4 channel, digital recordings in the field.

- ▶ weighs only 7.5 kg without battery
- ▶ all metal case with corners protected by rubber shock absorbers
- ▶ protected connectors

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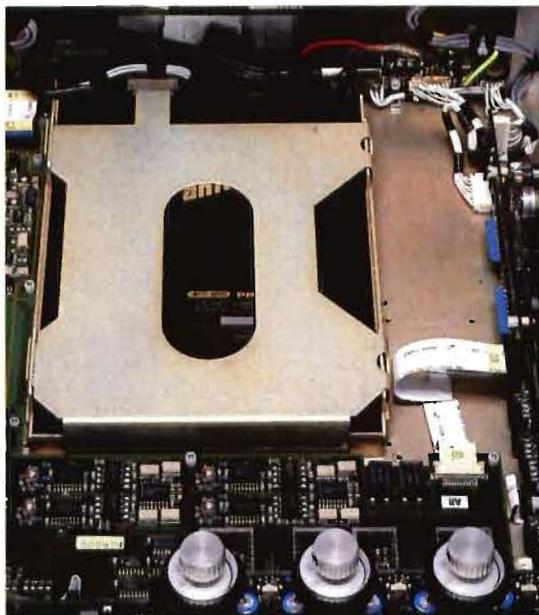
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Tapes

The NAGRA-D uses standard 1/4" metal oxide tape as in PD and DASH formats. Metal oxide tapes are far less sensitive to corrosive oxidation than metal particles, a very important factor when tapes are to be stored for long periods.

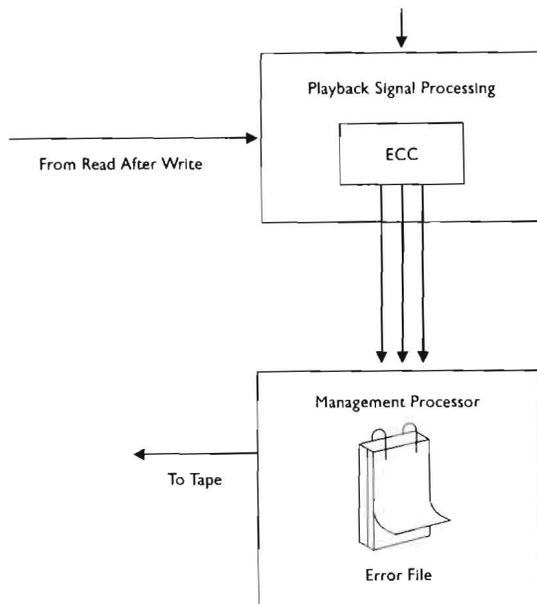
One hour and forty-five minutes continuous recording in the field is achieved by use of a "Betacam™" battery pack. Most recording units will already have chargers for this battery and it has the added advantage that, for video applications, only one type of battery pack is needed on location.

**INTERNAL
BATTERY PACK**



During recording or playback, continuous tape quality surveillance takes place. A drop out file is established and recorded on the tape (overloads, drop outs etc.). Later consultation of this information will give the operator vital details about tape/recording quality.

**TAPE QUALITY
SURVEILLANCE**



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SPECIFICATIONS

TAPE FORMAT/TRANSPORT

<i>Recording system:</i>	<i>Rotary head and 3 Longitudinal tracks</i>
<i>Monitoring:</i>	<i>Read after write</i>
<i>Tape type:</i>	<i>1/4" (6.35 mm) Digital tape</i>
<i>Tape speed:</i>	<i>49.6 mm/s for 2 channels 99.2 mm/s for 4 channels</i>
<i>Recording time:</i>	<i>5" reel (360 m) 2 Ch = 2 h 4 Ch = 1 h 7" reel (720 m) 2 Ch = 4 h 4 Ch = 2 h</i>
<i>Variable speed:</i>	<i>± 10%</i>
<i>Search possibilities:</i>	<i>Using longitudinal analogue CUE track</i>
<i>Start up time:</i>	<i>From "READY" to "REC" < 2 secs</i>
<i>Winding speed:</i>	<i>~ 90 secs (for 5" reel)</i>

AUDIO PERFORMANCE

<i>No of channels:</i>	<i>2 or 4</i>
<i>Sampling frequencies:</i>	<i>32 kHz, 44.1 kHz and 48 kHz</i>
<i>Analogue IN/OUT:</i>	<i>18 bits</i>
<i>Signal/noise ratio:</i>	<i>> 98 dB</i>
<i>Frequency response:</i>	<i>20 Hz to 20 kHz ± 0.5 dB (48 kHz sampling frequency)</i>
<i>Total Harmonic distortion:</i>	<i>< 0.05%</i>
<i>Channel separation:</i>	<i>> 80 dB</i>
<i>Digital IN/OUT:</i>	<i>24 bits (AES)</i>
<i>Error correction:</i>	<i>Reed Solomon (38, 34, 5) (12, 9, 4)</i>

INPUTS/OUTPUTS

<i>Analogue inputs:</i>	<i>Switchable Line or Microphone</i>
<i>Microphone:</i>	<i>4 XLR (switchable, 12 V "T", Phantom +12 V, Phantom +48 V, dynamic microphones can also be used for high sound level)</i>
<i>Line:</i>	<i>Symmetrical, transformerless (Z in > 8 kΩ)</i>
<i>Analogue outputs:</i>	<i>Symmetrical, transformerless on XLR connectors 3.1 V max (Z out = 50 Ω)</i>
<i>Digital I/O:</i>	<i>AES (standard mode)</i>
<i>Time code I/O:</i>	<i>SMPTE/EBU</i>
<i>External sync:</i>	<i>PAL/SECAM/NTSC/EXT (32 kHz, 44.1 kHz, 48 kHz)/AES/TC</i>
<i>Serial communication:</i>	<i>RS 422 9 pin</i>
<i>Headphone outputs:</i>	<i>2 x Stereo with stepped level adjustment</i>

GENERAL

<i>Power requirement:</i>	<i>Internal battery pack</i>
<i>Battery type:</i>	<i>Betacam™ (4.5 Ah 12 V)</i>
<i>Autonomy:</i>	<i>1 h 45 min</i>
<i>Consumption:</i>	<i>24 W "STOP" mode 29 W "REC" mode</i>
<i>External dimensions (L x D x H):</i>	<i>13 1/16 x 13 21/32 x 5 5/8" (332 x 347 x 143 mm) without handle 13 3/4 x 13 13/16 x 5 5/8" (350 x 351 x 143 mm) with handle</i>
<i>Weight (without battery):</i>	<i>15.8 lbs (7.2 kg) without handle 16.5 lbs (7.5 kg) with handle</i>

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KUDELSKI SA
Nagra Tape Recorder
Manufacturer
CH 1033 Cheseaux
Switzerland
Phone: ++41 21 732 01 01
Fax: ++41 21 732 01 00
telex: 459 302 nagr ch

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