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.
"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.

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.
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 ¼" tape format has several important features which make it especially rugged:
- Azimuthed recording (± 6°) and large track gap (~10 µm) ensure low track-to-track crosstalk.
- Wide tracks (~70 µm) reduce tracking difficulties caused by vibration.
- Safe wavelength (1.218 µm) avoids self-demagnetisation.

RUGGEDNESS OF THE FORMAT
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 modulator/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, XV/UL 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.
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, Pb + 12 V, Pb + 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 transformer-less 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.
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
Tapes
The NAGRA-D uses standard 1/2" 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**

**Tape Quality Surveillance**

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.

**Playback Signal Processing**

From Read After Write

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<thead>
<tr>
<th>ECC</th>
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<tbody>
<tr>
<td>Management Processor</td>
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<td>Error File</td>
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To Tape
SPECIFICATIONS

TAPE FORMAT/TRANSPORT

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

AUDIO PERFORMANCE

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

Analogue inputs: Switchable Line or Microphone
Microphone: 4 XLR (switchable, 12 V ‘T’, Phantom +12 V, Phantom + 48 V, dynamic microphones can also be used for high sound level)
Line: Symmetrical, transformerless (Z in > 8 kΩ)
Analogue outputs: Symmetrical, transformerless on XLR connectors 3.1 V max (Z out = 50Ω)
Digital I/O: AES (standard mode)
Time code I/O: SMPTE/EBU
External sync: PAL/SECAM/NTSC/EXT (32 kHz, 44.1 kHz, 48 kHz)/AES/TC
Serial communication: RS-422 3 pin
Headphone outputs: 2 x Stereo with stepped level adjustment

GENERAL

Power requirement: Internal battery pack
Battery type: Betacam™ (4.5 Ah 12 V)
Autonomy: 1 h 45 min
Consumption: 24 W “STOP” mode
29 W “REC” mode
External dimensions (LxDxH): 13 1/2 x 6 x 13 1/8” (332 x 347 x 143 mm) without handle
16 1/2 x 6 x 16 3/4” (420 x 155 x 163 mm) with handle
Weight (without battery): 15.8 lbs (7.2 kg) without handle
16.5 lbs (7.5 kg) with handle

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The specifications contained in this publication are subject to change at any time without prior notice following improvements and modifications of the equipment.

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