

MACHINERIES OF WAR



Battlefield—Britten's *War Requiem* being recorded in St Paul's Cathedral in London

My first experience of the Nagra-D, some time ago, left me both impressed and puzzled. I was confronted with a machine obviously built in the best traditions of Nagra analogue recorders. It combined bomb-proof build quality with exemplary sonic performance but seemed curiously reluctant to give up its secrets. The D's use of yet another digital format makes it something of an enigma; is it different for the sake of being different, or is it a good enough format to find its place in the scheme of things despite its exclusivity?

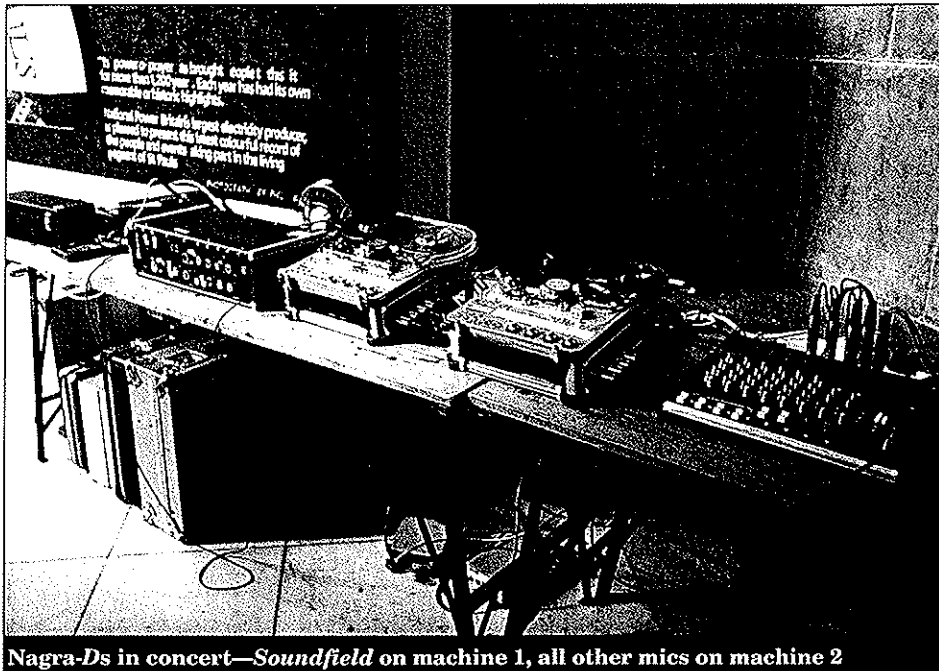
I was also using what was clearly a heavy-duty location recorder, designed for over-the-shoulder, sound-for-picture work, in what was then a less familiar role, that of location classical recording, where many of its features made it the deal choice for the job while others seemed superfluous. Perhaps the biggest

jolt was the fact that I could not just stick on a reel of tape and get on with the job. The display kept flashing, not very helpfully, 'no directory' and I had to resort to the manual just to start recording. This is, perhaps, a surprising response from one who advocates the wider reading of manuals so enthusiastically, but I did expect to feel more comfortable with the machine more quickly. Having said that, the

manual was, and is, very helpful, clear and well laid out.

The point is that the Nagra-D is such a complete recorder that it is hard to see how its range of functions could be handled other than by the now-famous scrolling menus on its little display. Additionally, the effort involved in finding your way round it is rewarded with a host of features and options and unbeatable versatility. This has ►

As digital location multitracking struggles to enter the nonlinear domain, various tape-based alternatives prevail. Dave Foister casts a pair of Nagra-Ds in the role of modular, multitrack, field recorder



Nagra-Ds in concert—Soundfield on machine 1, all other mics on machine 2

to connect the two time-code sockets together. For the sake of completeness, we also slaved the second machine's digital clock to the first even though in this case no digital sources were involved and digital mixing was not contemplated. With the first machine generating code and the second recording its output the setup for multitrack recording is complete.

The recording went smoothly, made all the less stressful for the Nagra's enormous capacity—even in 4-track mode it can record two hours continuously on seven-inch reels, for which it ideally needs an extension platform and a special reel cover. This means that even with a long work like the *War Requiem* reel changes are not necessary. In fact, the only aspect to worry about (assuming suitable microphone positions) was level; even this is made easy on the Nagras, partly because of the meters' peak-hold facility and partly because all four recording level controls can be electronically ganged together.

Playback for mixing was almost as straightforward to set up. The same time-code link is established as for recording, and Machine 2 is configured as slave to Machine 1, whereupon its built-in chase synchroniser takes over, making the pair behave almost as a single 8-track machine. Lockup is extremely fast, particularly if the second machine has been given a chance to park first—winding is not synchronised. The fact that the time relationship remains precisely constant was proved by the stability of the delays necessary to time-align the soloists' microphones with the main pair, which were simply set and forgotten.

Nadcom

Checking the tapes back in the control room gave me the chance to look at the *Nadcom* software, which provides control over, and information about, the machine and any recordings made on it. The software runs on a PC, a mere 286 will do, and an adaptor is provided to convert RS232 to RS422.

become more and more the case as the system has developed, with the implementation of the originally planned ideas such as the use of directories of information about the tape. One of comparatively recently introduced capabilities is that of synchronising multiple machines, and recording a large-scale performance in St Paul's Cathedral gave me the chance to put it through its paces.

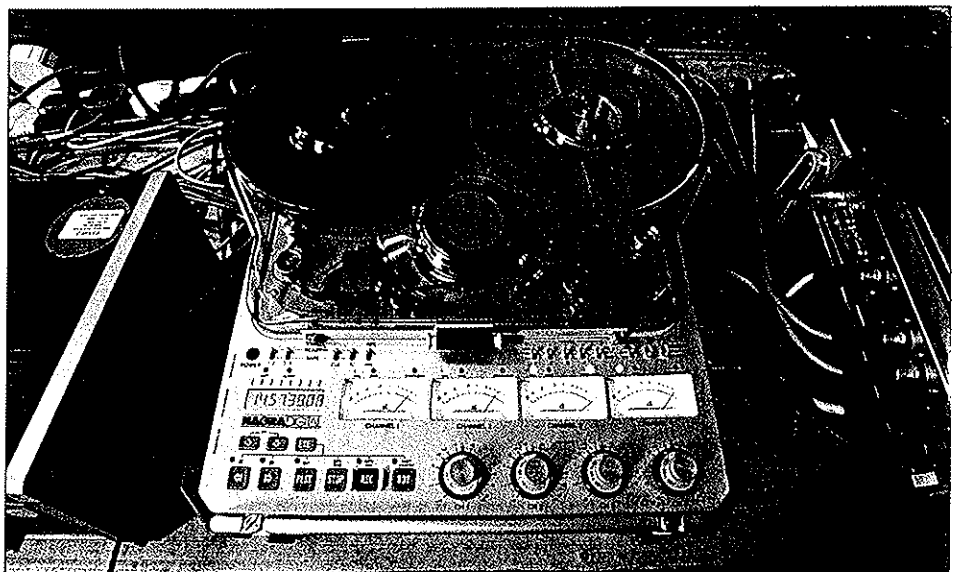
Classic performance

Of all the various types of recording job, the one most likely to end up straight to stereo is classical-music recording, partly through a desire to keep the overall signal chain as short as possible and partly because it lends itself so well to the techniques involved—it is more or less essential to establish a balance and then stick to it. Obvious difficulties arise, however, when proper monitoring is difficult or impossible, and this is one of the usual reasons for the use of multitrack. This was the case in St Paul's, where the equipment had to be set up in a side aisle to record a performance by the Guildhall School of Music and Drama's orchestras and choir (under Richard Hickox) of Britten's *War Requiem*, a work whose forces suggested something more than a purist pair would be required. Monitoring would be on headphones with the live sound from the performance very audible at the equipment position, making mixing little more than guesswork. The solution was clearly to leave as many options open as possible for later mixing, and a pair of Nagra-Ds (giving eight tracks) provided an elegant solution.

The main microphone was a Calrec *Soundfield Mk III*, whose B-format outputs were recorded raw on the first Nagra. This, as devotees will know, would allow the entire configuration, polar patterns and angles, and the rotation and tilt of the microphone to be freely adjusted on replay. The

rest was kept as simple as possible, with an AKG 414B-ULS on each soloist's position and an AMS ST250 behind the main stage for the St Paul's choristers. The stereo output of this plus the 414s filled the second Nagra.

Setting up the Nagras for the job was simplicity itself. Their switchable line-mic inputs and phantom power allowed for the different output formats of all the microphones I was using (the *Soundfield* is line level and the ST250 somewhere in between nominal mic and line), and all went direct to the machines themselves, with a simple mixer used for monitoring and a rough mix to DAT. Full synchronisation of the machines is achieved without any external hardware other than the Lemo-terminated cable



A lone Nagra-D showing peak-hold meters. Recording level controls can be ganged for multimachine operation

The control port is a standard 9-pin connector, and the machine will respond to both Sony and Ampex protocols, the Nagra protocol being an extension of Ampex. The software provides full transport control, with various screens of information. The most straightforward is an interactive control panel, with a huge time-code read-out, a similarly unmissable panel showing the current transport mode, and a set of four level meters complete with peak hold. At the bottom is a section which is present on all screens, showing which function keys operate the transport modes and a status panel with read-outs of all the various types of running information, including time code or user bits and error occurrences.

The time-code screen shows no less than seven time-code values, complete with user bits and fractional rates, simultaneously, covering all the possibilities of external, tape, generator and offset values among others. These read-outs are also displayed in a smaller form on the time-code menu screen, where adjustments to the time-code operation can be made.

Virtually every parameter of the machine can be set up from the computer on the various *Nadcom* pages, and there is even a diagnostic page showing the measured values of over 40 internal parameters—supply rail voltages, motor voltages and currents, tension arm positions and so on. But the most interesting page, and the one which makes use of the *Nagra-D*'s unique facility for recording, on every reel of tape, detailed information about its contents, is the Directory Management page.

The difficulty mentioned earlier about not being able to start recording as readily as I expected on my first job with a *Nagra-D* was caused by my failure to realise that each reel needs to be formatted before use. This is not a long-winded process requiring the whole reel to be preformatted before it will accept data, but a matter of recording a Directory area at the head of the tape which will store up-to-date information about the contents of the reel each time it is used. The Directory will log takes and timings automatically, and also note the occurrence of errors and overloads together with the precise time at which they occur. It has to be said that the chief practical use for this facility on the machine alone is as a friendly and intuitive autolocator, but hook it up to *Nadcom* and it really comes into its own.

The computer can display a complete list of takes, with time-code positions, durations and date stamps, and allows them to be named, which the machine alone cannot do. It also indicates the presence of any problems within the take, which at this stage it simply calls Drops, and the peak level achieved during the take. The display can be expanded to show more information about the Drops, including whether they are overloads or data errors, with the duration of the problem in frames in both cases. Any problem can be selected on the screen and the machine made to find it, then play it back with a bit of preroll to assess how bad it is audibly. This level of frankness about errors is quite remarkable, and perhaps made possible by the infrequency with which they occur on the machine. In more than an hour and a half of the



Inside view of the orchestra

War Requiem I had one over (my fault and inaudible, particularly as it was on the soprano soloist's microphone) and the merest scattering of errors, all of which were well below typical DAT rates and hardly troubled the correction system. The machine will warn of unrecoverable errors (which it labels, rather alarmingly, Fatal) but these are only likely to be caused by rough handling of the tape and I experienced none of them. A separate page goes into yet more detail about errors, plotting them as a graph against time. The listing of takes and error reports can be printed out for storage with the session documentation, but as all the information is stored on the tape itself this facility is pretty much redundant.

A pleasurable few days with the *Nagra-D* and all that goes with it was topped off with a 4-channel Ambisonic playback of the *Soundfield* tape alone, which to all intents and purposes placed the audience back in St Paul's. The combination of the

Soundfield's capabilities and the sonic integrity of the *Nagra-D* created an awe-inspiring audio experience which genuinely made the hairs on the back of the neck stand up.

With its ruggedness and portability as a machine, its robustness as a medium, its sound quality, its synchronisation and system integration possibilities and the enormous control offered by the *Nadcom* software, the *Nagra-D* deserves to find a home in virtually every audio application. Had I the money (always the crunch, although the machine is worth every penny) I would regard it as an essential acquisition. ■

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