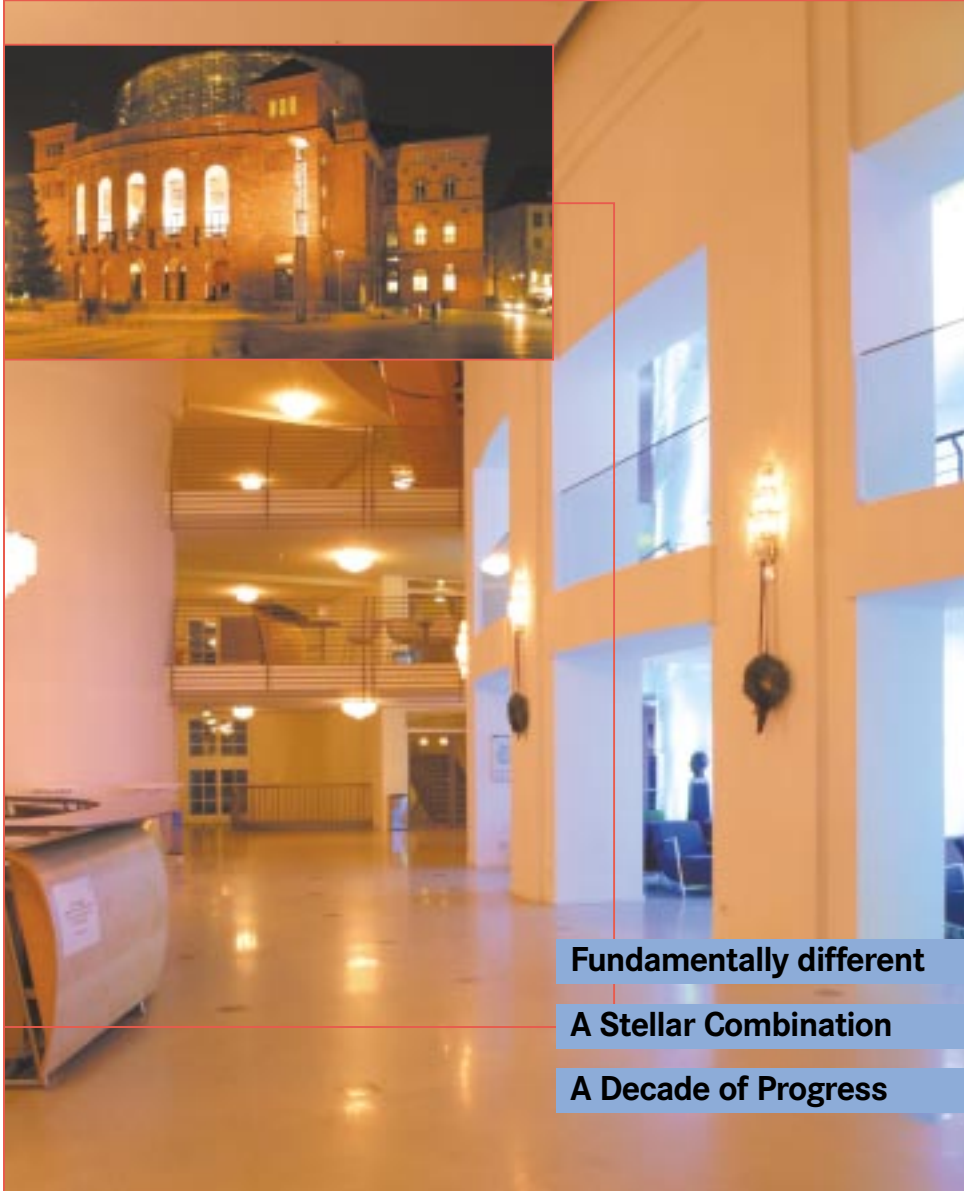


STAGES



Broadcast, Theatre, Film and more

STAGETEC



Fundamentally different

A Stellar Combination

A Decade of Progress

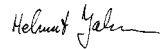
By Individuals for Individuals

Behind every innovation there is an individual. We, the STAGETEC R & D Company, are innovative because we are a team of extraordinary individuals with unconventional ideas.

Our customers and their individual ideas help us to perfect tools for audio professionals. These tools make their users' daily lives easier and in turn help them provide pleasure to opera goers, TV viewers, and film buffs alike.

Today, the backroom boffins come into the limelight, presenting a multitude of innovations, interesting applications, and personal views.

With this current STAGES issue, we want to say thank you - from maker to customer and from individual to individual. Thank you for the confidence and support you have given us as a company and as individuals again and again. Thanks to this support, we are celebrating our 10th anniversary this year. Share our pleasure while reading this jubilee issue!



Dr. Helmut Jahne



Dipl.-Ing. Wolfgang Salzbrenner



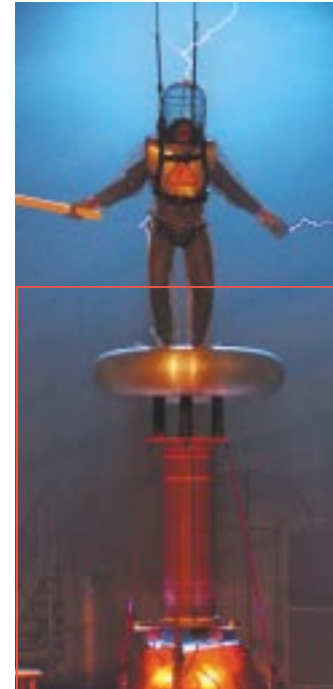
Dr. Klaus-Peter Scholz

The Executive Directors of the STAGETEC Entwicklungsgesellschaft



Cover Photo

At the Mainz State Theatre the Big House foyer is lit up once more. Big and Small houses are reunited after the renovation. The same is true of the audio equipment. Two NEXUS networks and MADI lines link two CANTUS based audio-control rooms and a production studio. Thanks to a custom modification, the CANTUS slave console, purchased in 1997, can be integrated into both networks. Raise the curtain for an impressively flexible tailor-made system.



The Knoff-Hoff Show

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Short Stories



OMUX as a Studio Router

A patchbay, capable of automatically recognizing what to route where? Just such a device has been available for CANTUS/NEXUS fibre-optic networks for some time. The OMUX Optical Multiplexer is an inconspicuous 1-U 19" box which automatically routes a fibre-optic source line to one of four possible destination routing paths. The unit automatically recognizes which of the four destination ports is connected to an active network.

OMUX was originally intended to facilitate simple connection of a portable NEXUS base device or CANTUS slave console at a variety of locations within a network. For this reason, OMUX is often found in concert halls, theatres, and multipurpose venues where flexible response to a variety of requirements is a must.

The unit is also finding creative uses in broadcast applications. At the German HR (Hessischer Rundfunk) broadcasting service, cascaded OMUX units switch up to seven NEXUS Base Devices. E.g. a stage-box in a concert hall can be connected to the CANTUS / NEXUS audio network of the new TV Studio 3 control room. Since the HR specified a hard-wired solution, all four fibre-optic output lines are permanently connected to each OMUX; therefore, the appropriate network is selected manually rather than automatically, using a special version featuring keys. With this manual version, one could also switch an entire studio network within a broadcast station – a solution which the HR carefully considered before selection. The only prerequisite is that the NEXUS networks in all studios must have the same structure.

These two variants, the automatic fibre-optic router and the manual routing unit, make the OMUX a useful additional tool for simplifying the operation of extensive CANTUS and NEXUS networks. ■

DELEC Joins the MEDIAGROUP

A new member joined the SALZBRENNER STAGETEC MEDIAGROUP in late 2002: DELEC Audio- und Videotechnik GmbH, a German manufacturer of intercom systems. "DELEC products will complement our array of intercom products and will open up new markets in the fields of intercom technology," said Stephan Salzbrenner about the co-operation with this highly specialized company.



With the DELEC range of solutions, the MEDIAGROUP is now able to supply a specific high-quality intercom product that is perfectly suited to large radio and theatre projects. The IC48 MKII digital intercom system is a well-established solution in German governmental radio and TV stations (BR, SR, WDR, and ZDF) and is used in both fixed installations and for outside-broadcasting applications. ■

XEOX Turns AES/EBU to Glass



Owners of large studio complexes with extensive cable paths are already familiar with units that convert wire-based AES/EBU into fibre-optic signals. Such third-party converters can easily be plugged into NEXUS interface-board terminals, supporting fibre-optic lines of up to 2,000 meters (1 1/4 miles).

However, these converters are active components, so they need a power supply. The voltage they require is normally supplied by a costly external phantom-powering unit. With the amazingly pricey XEOX daughter-board, piggy backed onto the NEXUS AES/EBU board, the third-

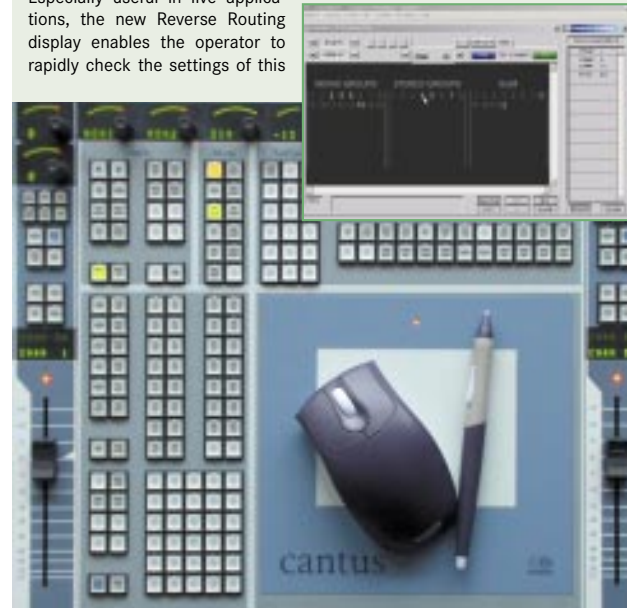
party converter can be directly powered from the NEXUS.

Phantom power can be enabled or disabled per AES/EBU interface. Transparent operation as a standard AES/EBU interface connecting to copper wire is, however, assured, even when the phantom power is turned on.

The first XEOX user was a prestigious one: German Telekom installed the option at their Berlin headquarters. The XEOX connects to the audio line of a huge LED display panel used for international press conferences and other major events. ■

CANTUS III

Showcasing major changes in hardware and software, CANTUS III is the natural successor to the CANTUS II console, which has been available since 1999. One alteration can be seen at a glance: The CANTUS III includes a new Central Control Unit with enlarged graphics tablet which can be operated either using the familiar pen or a battery-free wireless mouse. Especially useful in live applications, the new Reverse Routing display enables the operator to rapidly check the settings of this



freely configurable console. When a channel strip is selected, this new function shows all the buses that the selected strip is routed to. Selecting one of these buses shows, in turn, a list of all channels that are routed to this bus. With these functions, the Reverse Routing display greatly enhances the graphical view of the audio-structure on the CANTUS III's integrated TFT screen.

Apart from this, there are major functional enhancements to the dynamic automation of the CANTUS III. The new Rehearse mode for theatre applications is one notable example.

Snapshot automation has also been extensively improved. New features have been implemented specifically for theatres and opera house applications. A new software feature now allows individual parts of the console's status to be edited. This simplifies the audio engineer's task during rehearsals where snapshot-automation status settings are frequently modified. ■

C.A.S. MIX 64 on Ethernet

Complementing both CANTUS and AURUS mixing-console systems, SALZBRENNER STAGETEC MEDIAGROUP now offers the new C.A.S. MIX 64 audio-mixing system. Unlike its larger siblings from Berlin, the C.A.S. MIX 64 is designed around the concept of central control. The C.A.S. MIX 64 is an advanced version of the smaller C.A.S. Mix mixing desk which was originally intended to be a hardware controller

for NEXUS and is in use, for example, at the German Federal Chancellery. The C.A.S. MIX 64 is a digital 64-bus mixing console for theatre, broadcasting, and complex sound-reinforcement applications and fully integrates with the NEXUS audio network. For example, the Vienna Volksoper opera house employs two independent C.A.S. MIX 64 systems to handle all sound-reinforcement tasks. The

Double CINETRA

Geyer Video & Audio studios in Berlin have had a CINETRA console in their large mixing suite since 1997. For their current project – the period film "Luther", directed by Eric Till – their CINETRA's capacity turned out to be insufficient for the medieval sound design, the 6-channel Dolby Digital surround sound, and the massive number of source tracks. To solve this problem, Geyer Synchron have borrowed a second CINETRA from STAGETEC for the duration of the production.

The loaned console will be mainly used as a monitoring desk during the pre-mix phase. Later, it will assist during the final mix. The 6-channel pre-mixes, which still include separate tracks, quickly use up the input channels of the two CINETRAs. Audio connections between the two consoles were easily established thanks to the underlying NEXUS network: The loaned console was accompanied by a NEXUS base device, which was simply



integrated into the local network using optical fibres. Installation of the second CINETRA (Photo) was accomplished in short order. The console was up and running within an hour of arriving in the room. ■



Fundamentally Different

A small, highly creative team with a raft of brilliant ideas. This is how Berlin based STAGETEC has harnessed the white-heat of High-Tech to develop a brand-new mixing console in an amazingly short time. Chief engineer Dr. Helmut Jahne and product designer Harald Klaus explain the unique characteristics of the new instant-access console AURUS

STAGETEC have recently introduced a new mixing console. What are the unique, innovative features of AURUS?

Jahne: The AURUS is an entirely new mixing-console system. Not only the user interface – the control surface – but also the audio processing, the basic design, and the hardware and software have been designed from scratch. This in itself is unusual in times where most manufacturers are just trying to optimise their user interfaces.

Klaus: As the starting point, we examined the user interface and the fundamental operating principles of a mixing console and worked out how an innovative and user-friendly mixing console could be designed. Almost ten years of design experience with the CANTUS and CINETRA consoles have contributed to it. Thus, the AURUS is different to the CANTUS but on the other hand, it is clearly a continuation of our previous work.

When the CANTUS was introduced, it rapidly set the trend for a new generation of mixing consoles. What goals did you set and aspirations did you have for the AURUS?

Klaus: One important anchor in our vision was direct operation. For sound reinforcement, musicals, or in any other live application, one requires instant access and

the ability to see all the console settings at a glance. Literally instant access – visually and ‘tactilely’!

Jahne: In addition, the AURUS continues to progress the revolutionary CANTUS principle: the combination of a router and a mixing console. While the CANTUS still requires its dedicated audio-processor rack, the AURUS boards are directly installed into the rack of the associated NEXUS STAR. Apart from this, audio-signal processing and system control have been integrated. This has eliminated a multitude of communications bottlenecks. As a result, system architecture is simplified and operation has become more straightforward and fluid.

Klaus: It also was clear that AURUS should be designed from the ground up for multi-channel applications. We had already learned the detailed requirements of a multi-channel console from experience gained in designing the CINETRA. The key point is flexible routing: There must be support for combining various multi-channel source formats on to one summing bus. For example, a stereo mix to a 4-channel bus, or a 4-channel bus to a 6-channel mix. More channels and more buses are required. We considered all these aspects when designing the AURUS.

Since you started with a ‘blank sheet of paper’, how did you go about planning the new channel strip and new console layout?

Klaus: Considering our self-imposed prerequisites, we did not actually have so much freedom of choice. First, we had to analyse which channel-strip parameters were vital for the intended applications and thus had to be directly accessible. The AURUS is targeted at sound-reinforcement and live applications. This partly defines the layout of the channel-strip controls. Another important point is the hardware...

Jahne: During the planning stage, I found a prototype of a new shaft encoder: our new double encoders. These dual-concentric encoders enabled us to translate our instant-access idea into a mixing console control surface whilst retaining an acceptable channel-strip length.

Klaus: It was also a must for us to match the meter-bridge grid with the channel-strip grid. The type of metering, too, almost chose itself. For flexibility reasons, we preferred TFT screens rather than dedicated metering modules. Therefore, the meter-bridge screens shaped the channel grid. Each AURUS channel panel contains eight channels.

Jahne: Pricing was a major aspect, too. The individual controls and modules had to be as inexpensive as possible to keep the price within a reasonable range. The controls contribute a major share to the total costs of a console. No customer will accept a console, which costs eleven times more than another one, just because it features 22 instead of two encoders per channel strip.

So what ingredients go into the AURUS recipe?

Jahne: Every AURUS console includes a NEXUS STAR. This houses the AURUS boards. There are two types of board: the RMC central controller board and one or more RMD signal-processor boards. The controller board provides a network interface to a Linux-based computer and fibre-optic connections for up to two operating consoles. The optical fibres transfer Ethernet data, audio signals for monitoring and for the audio vectorscope, talk-back etc. and all control information. I.e. virtually all data for the console. Thus, the AURUS console requires a power-cable socket and a fibre-optic connector – that’s it! The NEXUS STAR can be equipped with MADI connections or fibre-optic interfaces to other NEXUS base devices. In a similar manner to a CANTUS system,

these base devices will then act as I/O units and audio networking for the mixing console.

Why do you need a Linux computer?

Jahne: We need some kind of data server in the processor-rack to store all the projects, status data, and dynamic-automation files. In addition, the server provides optimum connectivity to the whole wide world...

The computer can be mirrored or equipped with any standard computer-security technology. This is just one of the many advantages over a computer hardwired within the control surface.

We opted for Linux because it is both reliable and widespread. Only the comput-



er with the control software runs under Windows in order to preserve the benefits of using the offline-configurability features on any laptop. However, this computer, too, boots from the Linux computer, as this is the only computer in the system with a hard disk.

The AURUS operating console has the same svelte look as the CANTUS console ...

Klaus: ... yes, the visual resemblance results from the ultra-flat console design. After all, we did not want to lose the benefits of CANTUS.

Jahne: The AURUS features an even lower mounting depth of only 8 cm (3.15")! We could have made it even thinner; however, we abandoned that idea for the sake of increased frame stability and rigidity. This stability is a major attribute, considering the portable nature of the system.

How did you accomplish this ultra-low mounting depth?

Jahne: There is only a single circuit board horizontally below the controls of each

module. Thanks to an ingenious design we have avoided the double PCBs and sandwiched boards, which are so common with other digital desks.

Bearing all these visual similarities and technical differences in mind: Which projects would you recommend an AURUS for, and where would a CANTUS be the ideal console?

Klaus: With instant access to all channel parameters, AURUS is, of course, the first choice for live operation and sound reinforcement, especially in mobile use. Being a desktop model, or optionally a console with easily detachable legs, it is readily portable. Also, since it is pre-configured it can be used like an analogue console

directly after boot-up. Thus, it is the perfect match for recording and production studios with a comparatively fixed setup. Next, the AURUS suggests itself when upgrading an existing NEXUS STAR network with a mixing console. CANTUS, however, shows its power in the range of applications where it has been in use for years. In places such as O.B. vans where an extremely compact design with shallow operating depth is required, and everywhere where extreme flexibility is a key requirement. CANTUS is a freely configurable console while the AURUS is a direct-access console providing clear view on all settings. The choice is yours! ■

The AURUS Team: Designing a new mixing console is teamwork. Therefore, the STAGETEC planning group holds a meeting every Wednesday – the perfect opportunity for our interview.

Dr. Helmut Jahne, Ekkehard Brandt, Peter Recktenwald, Dirk Berar, Olaf Altenburg, Stephan Eicheler, Detlef Kutschabsky, Harald Klaus, Karsten Bookhagen, Bernd Hübler (left to right).



DIY Audio System

With ideas developed by the enthusiastic staff, the Hessian State Theatre in Wiesbaden provided themselves with a new audio system designed entirely in house

As the old audio system of the Hessian State Theatre in Wiesbaden was becoming more and more unreliable, the operators were faced with two alternatives. Temporarily close the theatre or install a new system to a very tight schedule. This was a real dilemma since public authority purchasing decisions invariably take time. The money was authorised only three months before the proposed installation of the audio systems into the first of the three houses. Obviously this was too late to begin the usual process of externally commissioning the planning.

Due to this anticipated time pressure, as a last resort, the three members of the sound department started work on the conceptual planning before the finance was in place. The result is amazing! A perfectly tailored installation with a multitude of extras.

Separated and Yet United

In 2001, during the summer break, the Large Hall, where operas and ballets are performed, was the first subject of a technical overhaul. The Large Hall control room is now home to a CANTUS console plus a NEXUS network. Similar changes were made to both drama stages, the Small Hall and the Studio Stage (which were renovated a year later). The Large Hall control room is now home to a CANTUS console

and NEXUS network. For sound-reinforcement purposes a mobile NEXUS base device and a slave console can be freely deployed anywhere in the three halls.

The three NEXUS networks were deliberately kept separate, so servicing and updates can be undertaken independently. This network architecture also prevents rehearsals and shows on the various stages interfering with one another. Notwithstanding this separation, signals can still be exchanged between the halls. A fourth NEXUS system in the PA plant room integrates the three halls, the rehearsal room and PA distribution systems in a star topology.

During performances, signals outside the three hall networks, are transmitted via this central NEXUS network. For example, live performances in the orchestra rehearsal room or monitoring signals for the stage-management system.

To make this work the central NEXUS must be remotely controlled from each of the three control rooms. This is accomplished using an Ethernet network to integrate the three CANTUS consoles and the central NEXUS system.

Fixed Sequence

The Hessian State Theatre places heavy demands on the sound department. The

institution stages a multitude of events ranging from operas, plays, and ballets to children's plays. Even back in the seventies with the old sound system, it was one of the best-equipped theatres in Europe. Therefore, the members of the sound department are highly motivated and interested in technological as well as artistic aspects of their work. They use the three CANTUS consoles extensively, pushing system capabilities to the limits. This is especially true of sequence automation where virtually all elements are recorded, even including replay machines started via MIDI. For this application, the automation snapshot is adapted to suit. Snapshots are edited until, at the end of rehearsals, the entire automated sequence is stored in the CANTUS systems. This significantly reduces lead times for individual performances and also ensures all performances are largely identical – at least so far as the sound is concerned. This high degree of automation, combined with the superior audio quality and surround-sound features of the CANTUS consoles, enables the introduction of new creative elements. Meanwhile, the directors have started enjoying the modern multi-channel sound and have made it an integral part of their productions!

What Wiesbaden Wants

However, this automated operation gave rise to new requirements. Even a product as sophisticated as the CANTUS can still be enhanced with extra functions. An extended version of the sequence automation was developed at the sound team's request. The genesis of sequence automation itself came out of a customer suggestion.

The Wiesbaden crew wanted easier editing of snapshots. An understandable desire considering the complex ways in which they utilise the automation features. STAGETEC not only fulfilled this wish but also considerably enlarged the number of storable snapshots. At the same time a function was implemented which allows only selected function groups, such as the filter section parameters, to be copied into the snapshot-list. A Reverse Routing indicator, suggested by various parties, was also added.

It is an element of STAGETEC's product philosophy to avoid individually customised software solutions. Therefore, all these new features were integrated into the standard CANTUS III software (see also page 5) and are thus available for all other CANTUS users as well.

Hand in Hand

During this project, manufacturer and customer were closely co-operating not only with regard to product development but also during the outline planning phase. The SALZBRENNER STAGETEC MEDIAGROUP, as general contractor, took up the basic

overall system concept elaborated by the State Theatre Wiesbaden. This allowed a customised high-performance tool for theatre operation to be made to a very tight schedule. A result of the rare combination of competent users and precise planning and implementation. Simply the optimum solution in all houses! ■



State Theatre

The Hessian State Theatre in Wiesbaden is a multi-purpose venue staging five different types of performance; opera, drama, ballet, concerts and children's theatre, with approximately 600 employees. During each season, more than 20 new opera, play, and ballet productions and many repertoire performances provide a broad cultural variety that includes classical works as well as modern musical theatre and dramas by contemporary German writers. Sometimes, four events are performed in a day as all three State Theatre stages can be used in parallel.

Source: <http://www.staatstheater-wiesbaden.de>



Ute Schatz is manager of the audio-department of the State Theatre in Wiesbaden. She and her highly competent colleagues Christian Peters and Walter Giebel planned and implemented the new audio system.

"We had had a look at other theatres and found that there were not too many alternatives to CANTUS and NEXUS. A key factor was the integration of all functions into the NEXUS network. Today, physical connections need no longer be made, although there is an emergency routing system. Normally, all system parameters are controlled via NEXUS; this includes the power-amplifier settings and parameters of the speaker-line delay functions."



A Stellar Combination

St. Moritz, 1 February 2003. A clear and frosty night. Down in the valley, the opening ceremony of the FIS Alpine World Ski Championships 2003 has just begun. 10,000 enthusiastic spectators and the whole international TV community are there. Above, the heavens are welcoming a new constellation. The largest and highest audio and intercom network ever, with two NEXUS STARS

The Author:



Dr. Klaus-Peter Scholz, one of the executive directors, came to St. Moritz to supervise setting up the equipment.

St. Moritz has a special alpine ambiance and it's a unique venue for skiing competitions. Unlike other places, for example St. Anton or Schladming, the finish line is a long way up the mountain in Salastrains, at an altitude of approximately 2,000 metres. The incredibly beautiful mountainous



terrain impresses visitors and athletes alike. However, it poses major technical challenges for the outside broadcast teams. Extended logistics, extreme climate, and the consistent lack of level surfaces for positioning the technical gear close to the action! Therefore, in partnership with the City of St. Moritz, host broadcaster SRG, (SRG SSR idée suisse) and its production company tpc (tv productioncenter zürich ag),

have only installed absolutely essential technical equipment up at the Salastrains finish area and alongside the ski runs of the 2,836 m high Piz Nair. All other TV and broadcasting facilities, including studios, editing rooms for foreign TV stations, and the satellite communications vehicles, were accommodated at St. Moritz Dorf, 200 metres below the finish area, or even further downhill in the bottom of the valley at St. Moritz Bad.

Optical and Digital

Making a virtue out of necessity, the organisers used optical fibres for the multi-kilometre cable links between the separate sites. The 2003 Ski World Championships were the first where all the video, audio, and intercom signals were distributed solely using fibre-optic cables. The number of channels was limited, so for more efficient operation, video, audio, and intercom signals were transmitted over the same cable. tpc used a multiplexing method with different "coloured" light signals on the same fibre for this purpose, thus improving the cable utilisation by up to 400 per cent. tpc utilised recently developed Flashlink components, capable of encoding signals with different wavelengths using the Dense Wave Length Division Multiplexing DWDM method.

Widespread

The use of fibre-optic lines brought another first for the Ski World Champs, completely digital video and sound production. However, this is nothing new for tpc: The NEXUS, usually in combination with the CANTUS, is now almost a standard component in both outside broadcasting and production studios. Therefore, selection of a signal router and an audio/intercom-distribution system for use at the Ski World Championships was simple. A large NEXUS network was the obvious choice. The concept of distributed control suggested the establishment of two technical headquarters: the Technical Operation Centre, TOC, at the finish area and the International Broadcasting Centre, IBC, at St. Moritz Bad. Both centres were locally networked using a NEXUS STAR and interconnected via MAD1, to keep the networks isolated yet allow for free exchange of signals.

The TOC was the host broadcaster's main technical area, housing not only the NEXUS STAR but also 17 widely scattered NEXUS base devices with a total of 1,436 inputs and 1,380 outputs. These were positioned, for example, in boxes along the runs where they gathered microphone signals and interfaced to the intercom system. Some of the base devices were mobile and could be operated right at the edge of the ski run whenever necessary. Others were used by Eurovision, or to integrate four studios overlooking the finishing line into the network. Other base devices connected the microphones required for short interviews with the athletes at the finish area. These signals were then routed to an O.B. van or the IBC. All base devices were connected to the STAR in star topology, so the STAR was a real distribution centre.

Constellation at 2,000 Metres

Even in summer, it is a tricky job to drive an O.B. van up the mountain around steep and narrow serpentine bends. In winter, when the roads are icy and enclosed by snow walls and when snow chains are a must, it is specialist work and impossible to accomplish without the support of tractors or snowploughs. Despite the immense expenditure, in total eight O.B. vans were taken up the mountain and parked close to the TOC. Two of these huge vehicles owned by tpc produced the international feed for all participating TV stations. To be more accu-

rate, the two tpc vans were responsible for mixing signals from the middle of the course and the finish line, while signals from the start were mixed by a studio within the TOC. Both vans smoothly integrated with the TOC network, since they are equipped with CANTUS and NEXUS. Some of the visiting broadcasters made the effort to take their own O.B. vehicles to the TOC. One, Austrian broadcaster ORF for example, has a traditionally strong affinity with the Ski World Championships. An additional NEXUS base device was supplied to enable these stations' O.B. vans to integrate into the network too.



Two Snowploughs lend tpc a helping hand

Two Strong Partners

The Swiss tpc (tv productioncenter zürich ag) and the SALZBRENNER STAGETEC MEDIAGROUP have close ties. They both hold a half share in tpc international, a TV-production company based near Stuttgart. Beginning with a co-operation agreement late in 2001, the Swiss share holders participation in tpc international officially came into effect on 1 January 2003. This co-operation is based on positive experience gained during previous joint projects — tpc has been extensively working with STAGETEC products for a considerable time. tpc is a subsidiary of the SRG SSR idée suisse broadcasting service and is Switzerland's largest TV-production company with 800 employees. The corporation produces telecasts for the DRS Swiss broadcasting service and other TV stations in the German-speaking countries.

The partnership also proved itself during the Alpine Skiing World Championships 2003. While tpc sent staff and equipment to St. Moritz, tpc international provided support for some other TV productions in Switzerland. For example, O.B.s from the World Economic Forum at Davos and the "Art of Ice" show in Zurich.

Hotel with Infrastructure

However, many other stations came without their vans and instead preferred to use the many technically prepared IBC rooms. The IBC, constructed in an indoor tennis hall, was subdivided into 75 rooms. Equipped by the users, these were mainly transformed into editing rooms by TV

companies, and audio-control centres by radio stations. The host broadcaster's main tasks were to route the signals coming from the TOC to the individual IBC rooms, to monitor the outgoing signals, and to link to the satellite vehicles parked in front of the IBC. These jobs were done by the second NEXUS STAR supported by ten NEXUS base devices. Installed in a temporary control room, this STAR distributed the audio and intercom signals within the IBC and connected to the TOC and all the other installations at St. Moritz. The IBC was located a little way outside, at St. Moritz Bad. The presentation ceremonies took place somewhat further up, at St. Moritz Dorf, also home to some additional studios. The hotels where these temporary studios were installed have providently invested in a fibre-optic ring which interconnects all of them. This ring was used for the first time during the Ski World Championships, even enabling external base devices to be connected there, in any of the studios!

Redundancy

What would happen if broadcasting from such a unique and short-lived event as the Ski World Championships crashed due to technical failure? Obviously, the TV audience would not be able to see their stars. The host broadcaster would not only have to tackle massive financial problems, but cope with loss of face, not to mention 170 frustrated technicians who had been working for weeks. Nevertheless, the massively complex system is only required for a comparably short time. No matter how strong the desire for absolute certainty, it would be irrational to invest a huge amount to make it fully redundant. So, it was decided not to mirror the overall



Fibre-optic ice sculpture

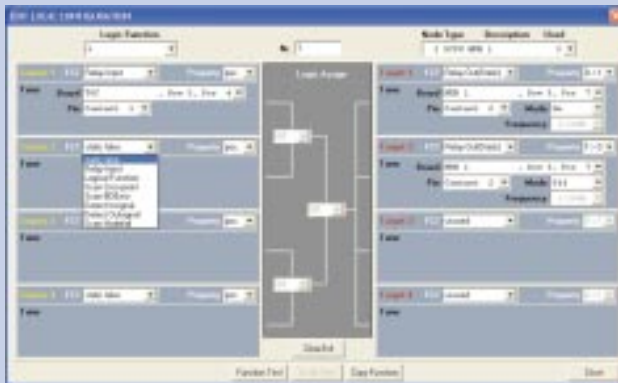
system, but only the most vulnerable components. In the audio and intercom network, this means the optical fibres. The NEXUS already features innate high redundancy because all fibre-optic lines can be doubled up between any base device and the STARS. In addition, the cable running from the TOC to the IBC was safeguarded with a rented fibre-optic backup line from Swisscom. An extra STAR was waiting in the wings in case of hardware failure at the IBC or the TOC; however, this device was not required thanks to the high reliability of the NEXUS.

Strong Support

This project was a big challenge for all the participants, and for STAGETEC. They provided the majority of the NEXUS equipment, the STARS and 25 base devices, plus the CANTUS and NEXUS systems of the primary international broadcast feed control room, on loan. Starting with the initial project-planning phase, STAGETEC continually supported the overall-system planning, thus directly contributing to the success of the event and the galaxy of stars.

For the first time since 1974, the sophisticated Swiss winter-sports resort of St. Moritz hosted the FIS Alpine World Ski Championships 2003. With a total of 12 kilometres of fibre-optic cable hardwired into the mountain, the City and the SRG SSR idée suisse, the association of the governmental TV and radio stations in Switzerland, as host broadcaster were well prepared for this long-desired opportunity. Last year's World Cup Ski race was an excellent technical dress rehearsal (see STAGES Vol. 5). However, the Championships required significantly greater effort than a World Cup race. Around 400 athletes from 59 nations, all the way from Algeria to Uzbekistan, wanted to be filmed during the twelve races and three downhill training sessions. Almost 450 hours of material were broadcast to 300 million TV spectators world-wide. For the technical staff, this meant more races needed to be broadcast in less time. Sometimes this required portable base devices and camera equipment to be physically moved to new locations when the track layout changed. The narrowest time window, just 90 minutes for technical rearrangements and operating tests, occurred when the combination downhill and slalom races took place. This was only achievable by using a helicopter. ■

Pure Logic: Programmable GPIs in the New Generation of NEXUS



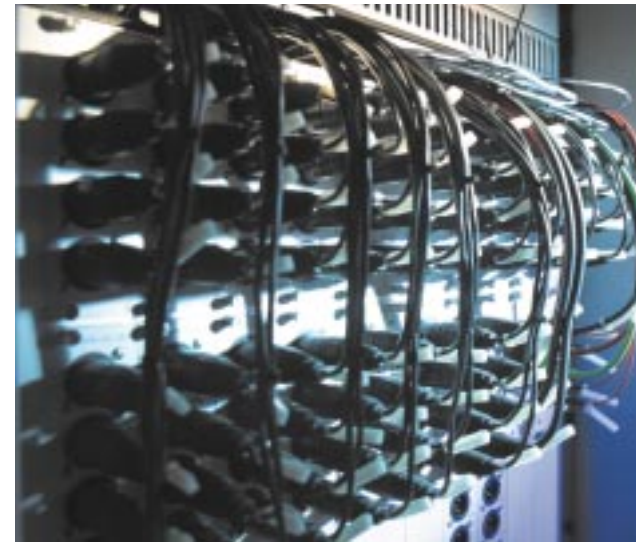
Control of external equipment is standard with NEXUS systems. A multitude of external control functions has always been possible using general-purpose interfaces, GPIs. Although customers have been able to specify this feature when purchasing, hitherto only factory pre-sets have been available. The latest version of NEXUS makes GPI functionality flexible. Now even com-

plex logical connections can be programmed and modified on the spot! This feature was heavily used at the Skiing World Championships to determine camera on-air light status for each race. The new logic functions edit window enables every single XRI (NEXUS relay interface) input and output within the system to be defined. The output may be, for example, a TTL voltage or a switched

external control voltage. Various parameters ranging from the status of NEXUS internal cross-points, other system settings or external relay signals are all legitimate input criteria. Up to four input criteria can be combined using Boolean operators to toggle up to four outputs then stored as a function. These logic functions can be cascaded enabling complex logical sequences to be programmed for the GPIs.

Logic functions are defined using a graphic representation of the flow to keep the process comprehensible. The real challenge lies in developing the function criteria – inputting them into the NEXUS system is foolproof!

These programmable logic functions are just one of the many features provided by the new NEXUS Matrix 5 software in combination with the new CPU. Moreover, although both the software and processor were originally developed for the NEXUS STAR, they can now be used with classic NEXUS systems.



Four Variations on a Theme

For many broadcasters, the ultimate stage in moving towards a fully digital studio complex is the digitalisation of the main switching centre. However, there are as many broadcasting services as there are concepts for switching centres with NEXUS

They only share a few common attributes. All are NEXUS-based and brand new. Since the NEXUS technology is so multifarious, they can differ in almost every other respect, above all, in fundamental concept.

Small yet Centralised

First example: The Hamburg NDR control-centre. A direct substitution of the previous analogue system was required. The new system comprises two compact NEXUS racks, housing the entire control-centre matrix. This exceptionally high packing density was achievable by using

RJ45 sockets on 8-channel converter boards. This modern connector, familiar from computer networks, was specially adapted to the good old Siemens terminal strips, so with only a few plugs to reconnect, the new NEXUS could immediately be put into operation. Another aspect peculiar to this system is NDR's use of Matrix 5 software and the latest generation CPU. Both were originally designed for NEXUS STAR systems, although NDR's NEXUS is built around conventional base devices. The reason for this variation is that NDR needed one of the brand-new Matrix 5 options; the crossfade board. This is used to crossfade to and from regional programme opt outs.

Big Star

The Polish Broadcasting Service in Warsaw pursued an entirely different route. Here, the NEXUS installation was extended right into the studios. 18 distributed base devices connect to a NEXUS STAR in the control centre. This network is unusually wide, interconnecting two buildings almost 20 km (12.5 miles) apart. This gulf is spanned using a mono-mode fibre to connect the second building to the STAR. This system architecture looks almost like a comet – a star with a

long sub-net tail. Building this system was a real technical challenge for the SALZBRENNER STAGETEC MEDIAGROUP. Acting as a general contractor, they not only installed the audio network, but all the studio equipment for the broadcasting service.

Dual Security

The French Canal+ pay-TV service, based in Paris, runs one of the largest networks. Their existing NEXUS network was complemented with two STARS, each provides 4,096 inputs and 4,096 outputs. Under normal conditions, the total traffic is distributed between the routers. However, a single STAR has enough capacity to manage the whole network if necessary. This built in redundancy was a critical feature for Canal+, because here too, the entire internal audio cabling is based on NEXUS, with base devices spread throughout the building and into the individual machine rooms.

Distributed Control

A large distributed network with no sign of a STAR. This is a reasonable idea if you need to adopt working practices born out of the analogue world. A good example is All India Radio, AIR, the Indian government radio. At their New Delhi headquarters, AIR have completed the changeover from the analogue era to an entirely new, fully digital radio complex. NEXUS is a reassuring factor here as it has proved reliable in countless other installations, even under unusual climatic conditions.

Unlike European radio services, this system is designed on a decentralised paradigm. The signals are not directly routed to a control centre, but to NEXUS base devices located in primary control rooms. Each sub-centre autonomously manages the output of five or six radio studios, therefore, only a bare minimum of routing is required at the control centre.

Always Included

All four of these installations, located in very different corners of the world, illustrate an important trend. The new generation of control centres adapts to the task(s), not vice-versa. Small or large, centralised or distributed, with STARS or sub-nets, the choice is extensive, but always includes the very highest reliability and optimum audio quality, and of course, a NEXUS. ■



Classicism and Modernity

The contrast between the ages could hardly be more marked. Rubbing shoulders with classic art treasures, German Bayerischer Rundfunk broadcasting service BR, exhibits the ultimate in high-tech equipment. The new radio control room, a CANTUS Residency

Crystal chandeliers hanging from the ceiling and precious tapestries contribute to the noble classical ambience. The view from BR's brand new CANTUS control room really is unique. The Herkulesaal (Hercules Hall), maintained by the Bavarian Castle Administration, is one of Munich's most popular concert halls thanks to its atmosphere and acoustics. It is situated at the Munich Residency, founded in the 13th century, and has an audience capacity of up to 1,450 people. The BR regularly organises concerts here. In fact so frequently that the broadcasting service maintains its own recording studio at the venue, including a complete technical infrastructure in adjacent rooms.

Optimum Balance

The radio studio in the grand Municipal Residency has been equipped with a digital console for twelve years. At the time of the original installation, BR was in the vanguard, one of the earliest pioneering organisations to use one of the very first, ultra-large digital desks. After an amazingly long life this needed to be replaced. Where, a decade ago, serried ranks of tall fully populated racks stood side by side heating the machine room, today a single 19" rack houses all the hardware for the new CANTUS and NEXUS systems. The

room is almost chilly now. The original air-conditioning system continues to blow air but refrigeration is no longer needed. Energy consumption has fallen almost to a tenth of what it used to be.

A Simple Decision

From classic concerts and theatre performances to TV productions, the Herkulesaal hosts a very broad range of events. It is a very varied workplace for the BR sound engineers and an ideal application for the flexible and extremely reliable CANTUS. The choice of this system was a simple one because the BR is already using CANTUS desks in two O.B. vans for radio productions, two more for TV productions, two radio studios, and one TV studio. In fact, the Studio 10 radio studio houses the very first CANTUS console ever delivered! Therefore, sound engineers working at the Herkulesaal, Studio 10, and the Gasteig (which is the third BR radio CANTUS control room), do not need additional training. With only one console type in use, their job is also made considerably simpler.

Ambitious Slaves

The BR included future proofing in their planning. When revamping the entire

audio and video equipment of the Herkulesaal studio, multi-channel capability was included from the start. With five Geithain speakers and a 5.0-mix option, including motorised joystick, integrated into the CANTUS, the studio is well prepared for format changes in years to come. However, not only the main console needs to be surround-capable. The small slave console located in the audio-edit room next door needs similar capabilities. In this room the recordings are auditioned, monitored, and edited. The small slave console is essentially used as a monitoring desk for all signals received from the control room and audio-edit room sources.

Up to this time, all CANTUS slave consoles had been used in stereo environments, so STAGETEC needed to make modifications for the BR and to implement a multi-channel monitoring bus, independent of the main console. Incidentally, this was not

Logically Speaking

An integrated NEXUS and CANTUS system provides enhanced functionality, e.g. a compact intercom matrix. Offering 32 inputs and outputs connecting remote intercom stations, or to internal CANTUS functions, the matrix can often replace an external intercom installation. Every matrix is customized to exact requirements, featuring complex routing criteria and hierarchic control. For example, it is often used to toggle a reporter's foldback line. While preparing his piece, he can listen to station output but when on air, he hears his own voice. The intercom matrix was designed at the suggestion of the Bayerischer Rundfunk broadcasting service, the very first CANTUS users, and is now available as a CANTUS option.

XET with Parallel Outs

In Broadcast stations, monitoring the signal before it goes to the transmitters is essential. Until now, this task has been accomplished by using a distribution amplifier to route the NEXUS output to the broadcast line and return the signal to the NEXUS system for monitoring purposes. This can now be achieved more ele-



As a project manager and planning engineer for the BR, Ulrike Haub was in charge of the reconstruction of the Herkulesaal studio.

"For the new equipment in the Herkulesaal, we opted for a CANTUS system which was customised to meet our requirements. A mixing console in the control room, three small NEXUS base devices and a modified slave console in the audio-editing room. Undertaking this project in a historic building was also interesting from the planner's point of view, because there were often surprising discoveries. For example, when we were looking for old conduits in the hall.

Another novel aspect for us was the fact that the technical equipment as well as the general contractor all came from one source. We were pleasantly surprised and impressed by the SALZBRENNER STAGETEC MEDIAGROUP's performance as general contractor and manufacturer. The new studio was actually completed two weeks earlier than originally scheduled!"

the first alteration made at the BR's suggestion. The NEXUS intercom matrix was originally designed for a CANTUS installation in one of the BR O.B. vans.

Quick Start

The studio modernisation had to be rigidly scheduled to fit in with the Herkulesaal programme of events. The major works needed to be carried out in a few weeks during the summer break. Removing the old equipment from the tight confines of this historic building was difficult, and all the new components needed to be carried up a stairway, by hand, into the studio.

Cabling from the studio into the auditorium only required a few modifications, but the control room, audio-edit room, and of course the machine room, were rewired from scratch.

The SALZBRENNER STAGETEC MEDIAGROUP has gained considerable experience in completing such projects. This is especially true in the theatre field, where almost every renovation is subject to immense time pressure during the

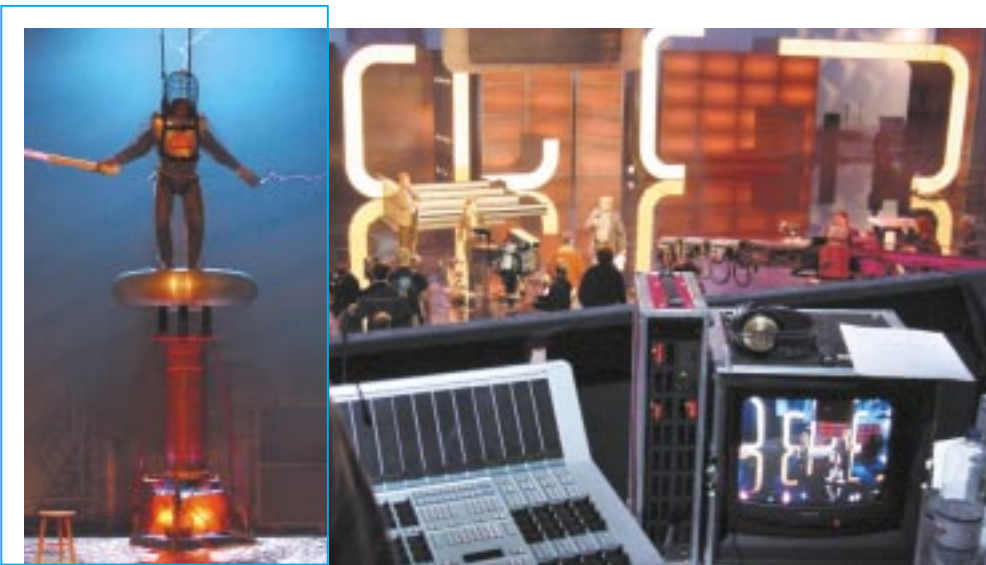
inter-season breaks. This expertise was obvious during the Herkulesaal installation, SALZBRENNER STAGETEC MEDIAGROUP's first installation for the BR as a general contractor: The well-planned modernisation ran quickly and smoothly, with no technical problems. This was essential, since the very first production to use the new installation was the live-transmission of the ARD Musikwettbewerb, a musical competition organised by the German TV and a really major project.

For Posterity

The technical overview is very exciting, functionality and reliability highly convincing – but the glorious period environment leaves the most lasting impression of this project. Several centuries old, this fascinating building enchants everyone, artists, technicians, and the audience. Against this backdrop, every performance in the Herkulesaal becomes a unique event, recorded for posterity by sophisticated technology working unobtrusively in the background. ■

a ribbon cable inside the NEXUS base device.

The parallel output ports are separately driven and isolated. This application is not only recommended for monitoring output signals but also for archive recordings of transmissions or for connecting multiple tape machines, in parallel, to a single output.



Know-How for Knoff-Hoff

With their big Ü2 O.B. van tpc international are acknowledged experts for complex location projects with excellent CANTUS sound. The live broadcast of the Knoff-Hoff TV-Show clearly demonstrated that the CANTUS potential extends way beyond broadcasting. It proved its prowess in both TV audio and sound reinforcement

The Author:

Alexander Nemes works for tpc international as an audio engineer. He mostly handles large productions on the company's flagship Ü2.



TV audio and location sound reinforcement make uneasy bedfellows. Fading up the in-house PA to create a good live-atmosphere adversely affects the TV sound. If levels are reduced to create a clean and uncoloured sound for broadcasting then speech intelligibility for the live audience is compromised. In any case, without considerable expertise and close co-operation between the P.A. and TV-sound engineers, this classic audio challenge, so typical of TV shows with an audience, becomes an exercise in squaring the circle.

Slaves to the Hall

Bavaria Film and TV Studios, (producer of the Knoff-Hoff-Show), contacted us and commissioned us to undertake both the TV-audio production and the live sound reinforcement for a remake of the show. We immediately realised this unusual extra task posed a big challenge if we were going to get a good live sound. During the planning meeting at the location, we decided to use the outstandingly high-quality audio equipment of the Ü2 van for sound reinforcement as well as the broadcast mix. A CANTUS slave console, which is part of the OB van's inventory and normally used in a secondary sound control room for the van, would become our pub-

lic-address board. This idea had two implicit advantages, a transparent FOH sound and thus excellent speech intelligibility even at low levels, and – obviously – close co-operation between the sound-reinforcement and TV-audio crews.

The Technical Approach

Our Ü2 van is equipped with a NEXUS audio network and a CANTUS broadcast console. At production sites, the NEXUS network is normally extended to the spot where it's needed – in this case to the stage and the control gallery – using portable base devices. This is very handy, as we do not need to lay multi-core cables. The NEXUS system only requires thin and flexible fibre-optic cables. In addition, the van carries a small CANTUS slave console capable of accessing the same resources as the main internal console. Both consoles share the available processing capacity. So, when starting a project where both consoles are involved, the total number of available channels is distributed between them. After this, it is possible to operate the two consoles in a largely independent manner. For this production, the slave console was configured to access all sources connected to the NEXUS audio network. Thus, the NEXUS acted as a splitter because every

The Knoff-Hoff-Show

The Knoff-Hoff-Show used to be a very popular show on German TV where the presenters demonstrated the basic rules of physics in a comprehensive "hands-on" manner. When the decision was made to revive the show, the producer awarded the commission for the audio production to tpc international.

microphone signal was available both in the O.B. van and at the FOH console. However, signals from replay devices such as MD or CD players, or video hard-disk players, were mixed in the van and were only then transferred, post fader via a direct output, to the slave console. This enabled the same fades to happen at both desks, which was important for the flow of the show.

Configured to fit

We were able to book Mario Obermeit, one of the sound-reinforcements experts of the SALZBRENNER STAGETEC MEDIA-GROUP, to do the FOH mix. He was responsible not only for operating the CANTUS slave console, but also for setting up the entire P.A. system. Since the actual sound-reinforcement requirements had only been roughly defined at the planning meeting, Mario Obermeit initially set up 14 separate PA areas. These areas allowed different signals to be routed to the various audience loudspeakers, the backstage speakers, the monitor wedges for the band miming to playback, the stage monitors, the producers desk, and so on. This large number of areas was reduced during rehearsals, once it became clear which areas could be fed with the same signals. The audio was routed to the individual areas using the aux paths of the CANTUS slave console. This demonstrated some of the advantages this console offers: Firstly, it is possible to set up as many aux buses as necessary, which means it has the flexibility to adapt to virtually any requirement – assuming there is sufficient DSP power. Another benefit is that the arrangement of the output paths can be very flexibly configured to exactly suit the specific task. For example, this might include notch filters, delay or compressors. The third advantage of the console is the clear overview of the 16 bus settings, provided by the central control module. The engineer can see at a glance the lev-

el at which each signal is sent to the bus. Finally, every signal path of the CANTUS can be freely labelled: "Aux 14" can be displayed as "band", etc. This is a very convenient feature, especially with so many buses configured.

Digital Superiority

Time was an issue when completing the Knoff-Hoff-Show set-up, so the settings had to be made very quickly. Rehearsals started on the same day that the technical equipment was installed; wireless-microphone support and monitoring were required from the very beginning. Therefore, equalisation of the P.A. system and filtering of the wireless microphones was carried out at night, when the official rehearsals were over. Here, another advantage of the CANTUS became apparent: Wherever practical, channel settings were made and stored only once and could then be copied from one channel to one or many others.



Full Load

In total, there were almost 40 sources connected to the sound-reinforcement console. However, as this console is normally used for smaller jobs, it features only 24 faders. This is sufficient for the usual duties of a secondary O.B. van control surface. Therefore, we used another CANTUS feature which enables up to ten different easily toggled control layers to be defined. Layer A contained all 22 wireless microphones, so it was almost fully assigned. All the aux-master sends were allocated to the faders of layer B, controlling the PA area levels. Layer C carried the signals coming from the O.B. van – the Knoff-Hoff band, video feeds, etc. – plus direct

outputs from the live musician and the sound-effects man. This set-up resulted in a console that was still simple and fast to operate despite having relatively few faders.

Services during the Rehearsal

Reliability is always a concern when doing a live job. When recording a show with an audience, console failure could stop the entire production. This is also true for other CANTUS applications, for example, in theatres, or when doing live recording in the O.B. van or broadcasting costly performances of popular artists. Therefore, the console features a highly sophisticated reliability pack with a multitude of internal functionality checks, ranging from the constant monitoring of module boards and fibre-optic lines to the implementation of redundant power supplies. Moreover, as the mixing console is merely a remote control for the DSP rack, it can even be switched off during the performance without affecting the audio. This functionality proved itself during the set-up. While searching for a cabling error during a rehearsal, we cut the power of the public-address console. The two presenters microphones and the aux buses to the FOH speakers were – and remained – enabled, so we could unhurriedly search for the problem.

A Multitude of Features

It was interesting for me as a long-time CANTUS user to see how quickly a sound-reinforcement professional becomes acquainted with the console. Before this show, Mario Obermeit and his assistant Heiko Hannig had only been familiar with analogue desks. However, it wasn't very long before Mario started talking to us about the optimum console configuration for the job, a notch filter here or a direct out there, and how he would have loved to do all the configuration work himself. Next time – who knows? – we might be able to enable him to do this thanks to the NEXUS. We might integrate his laptop into the NEXUS network, so he could use the audio router to distribute and route to the PA areas himself and, for example, to enter delay times for the various areas. If the NEXUS is equipped with the appropriate DSP board, he could even use it for equalising the PA areas. This way, the slave console would merely be required for dynamic level settings and for equalising microphones. ■



On the 1st of July 2003, the STAGETEC R&D Company in Berlin will celebrate their 10th anniversary. From the very first NEXUS to today's AURUS, their corporate history is a story of extraordinary success



A Decade of Progress

At the beginning of the large digital systems era, qualities such as reliability and breadth of choice were still associated with the analogue world. This was the scene when STAGETEC R&D started up in business - with a considerable impact on the burgeoning applications of digital technology.

Solid Work

And yet there were still a few hurdles to jump before the digital age dawned and STAGETEC became well known. The employee-owned company (ten of the eleven original employees are still co-owners today) had to settle themselves into their offices in the Berlin suburbs. One of the engineers had already begun development work, while the rest of the team was still revamping the new headquarters. Due to a high level of commitment the team celebrated its very first success after only four months. The NEXUS digital routing system was unveiled at the New York AES Convention in 1993! Just a few months later, the Museum of Musical Instruments in Berlin became the first to install a NEXUS network. Quite a coup for a young company - the distribution partnership with the well established STAGETEC Marketing Company was successful from the word go.

2-Step

But NEXUS was just the first step on the way to an ambitious goal, the design and construction of a digital mixing-console system! The digital routing system was no longer simply a standalone universal interface, but became an integral component of the new mixing console. Development of digital signal processing, and an ergonomic and attractive user interface were the final steps on the road to achieving the dream. The CANTUS was born! At the 1994 Tonmeistertagung, it received an enthusiastic welcome from the audience thanks to its clever design. The CANTUS consolidated STAGETEC's reputation as an innovative company for professional digital audio technology and was one of the foundations of future prosperity.

Constant Innovation

The designers have consistently produced a stream of innovative improvements, even in the details. The 18-bit converters, standard at the time, were developed into the patented 28-bit TrueMatch converter. This offers the widest dynamic range of any currently available converter. New components were added, and software and hardware were continuously improved. Further development based on the

CANTUS saw the introduction of a dedicated film console, the CINETRA.

The most recent addition to the STAGETEC product range is the AURUS, a mixing-console system for live applications and sound reinforcement, designed completely from scratch.

Today, NEXUS and CANTUS are worldwide players. Systems have been installed at the Kourou Spaceport, the United Nations, the Kremlin, many Hollywood studios, and countless theatres. Broadcasting is also a major activity with, for example, more than 30 CANTUS systems sold in Italy, most of them to the state broadcasting service RAI.

New Headquarters

Meanwhile, the company's old home had become much too small, so a new headquarters building was commissioned. In autumn 1999, the entire company moved to the new site in the heart of Berlin. The complex includes manufacturing production lines, well-equipped offices, various QC facilities, and even a recording studio. Today, the company premises are future-proof too. However, then as now, this success is built on two pillars - the founders' and employees' commitment and the helpful feedback and confidence of countless satisfied customers all over the world! ■

You find CANTUS ... in Broadcast and TV: Belgium: RTBF Charleroi; RTBF Radio Studio Liège; RTBF TV, Liège; VRT, Bruxelles; Germany: BR FM 1, FM2, BR Gasteig, BR Herkulesaal, BR Studio 10, München; DW Berlin; HR Frankfurt; MCI Berlin; MDR Leipzig; Plazamedia, Ismaning; RTL TR 1, TR 2, Köln; SFB Berlin; SWR FS Berg TBR 1, TBR 2, TBR 3, TBR 5, Stuttgart; Italy: RAI Main Switching Room, Milano; RAI Nomentano 3, 4, 5, Roma; RAI RS 1 - 5, Roma; RAI Studio C, Milano; RAI Studio C, Roma; Teatro delle Vittorie, Roma; RAI TV 2, Milano; RAI Salario, Roma; Sweden: SBC, Stockholm; Switzerland: tpc ag zürich, Studio 6, Studio 7, Studio 8, Studio 9, Studio Vision 2002, Zürich; USA: ABC TV Network; Hollywood; RAI Corp., New York; ... **in OB-Vans:** Belgium: RTBF, TVC2, Bruxelles; Germany: BR Ü 1, Nürnberg; BR TV Ü 1, TV Ü 2, München; BR Ü 1, München; HR Ü 1, Frankfurt; ORB Potsdam; SWR FÜ 1, Stuttgart; Topvision, Berlin; tpc international ÜZ, Pliezhausen; Great Britain: BBC DMCCR, BBC Sound 3, London; Italy: Valerio Maioli, Ravenna; RAI TV 1 - 7, Roma; Poland: Polish TV, Warsaw; Switzerland: tpc ag, M 1, M 2, M 3, XL 1, XL 2, Zürich; ... **in Theatres:** Austria: Akademietheater Wien; Germany: Bayerische Staatsoper and Nationaltheater, München; Deutsche Oper Berlin; Deutsches Theater Berlin; Grillo Theater Essen; Großes Haus Mainz; Kammerspiele Berlin; Kammerspiele München; Kleines Haus Mainz; Kleist-Kultur-Center, Frankfurt/Oder; Konzerthaus Berlin; Maxim-Gorki-Theater, Berlin; Musicaltheater Neuschwanstein, Füssen; Nationaltheater Mannheim; Opernhaus Köln; Schauspielhaus Leipzig; Staatssoper Hannover; Staatstheater Wiesbaden; Städtische Bühnen Münster; Städtische Bühnen Regensburg; Volksbühne am Rosa-Luxemburg-Platz, Berlin; Luxembourg:

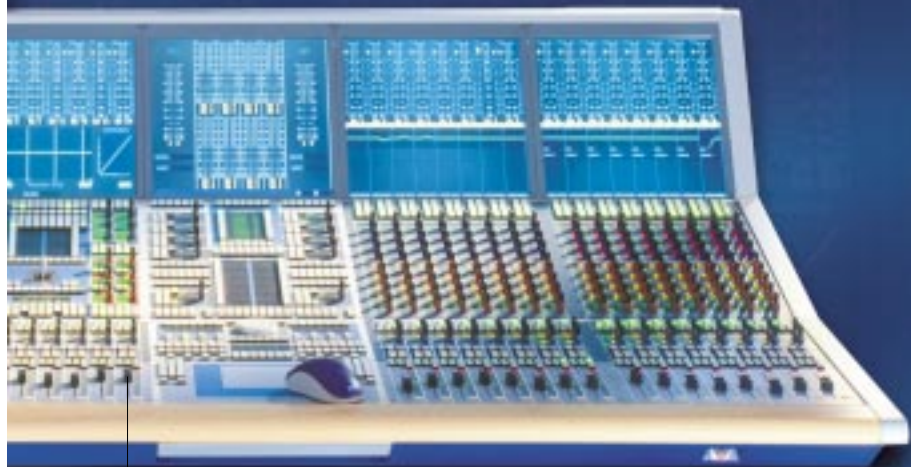
Every day is a STAGETEC day ...



... e. g. at the flamish VRT in Liège

Théâtre Unipale, Luxembourg; Italy: Auditorium Sala 1200, Roma; Japan: Concert Hall, Wakayama; Switzerland: Schauspielhaus Zürich; Stadttheater Bern; ... **at Exhibition Grounds:** Germany: Neue Messe München; ... **at Film Studios:** Germany: Cinemedia AG, Berlin; ... **in Government Buildings:** Austria: UNIDO, Wien; Germany: German Reichstag, Berlin; Saudi-Arabia: Al Shura Riyadh, Riad; ... **at Universities:** Germany: ETI Musikhochschule, Detmold; Hochschule für Musik "Franz Liszt", Weimar; Hochschule für Musik und Darstellende Kunst, Stuttgart; Hochschule für Musik und Theater, München; Musikhochschule Leipzig; Musikhochschule Rostock; ... **Live at:** France: Opera La Traviata, Paris; Italy: Pavarotti and Friends, Modena; San Remo Festival Giovanni, San Remo Festival della Canzone; ... **others:** Germany: Media Service Center, Mainz; Seminar Kloster Banz 2001, 2002. **You find CINETRA ... in Film Studios:** Geyer-Synchro, Berlin; Hochschule für Film und Fernsehen, Potsdam. **You find NEXUS ... in Broadcast and TV:** Austria: ORF, Studios Dornbirn, Eisenstadt, Klagenfurt; France: Canal+, Radio France, RTL 2, Radio Traffic, Paris; Germany: BR MAZ Komplex, München; Deutschlandradio Köln; DW Berlin; HR Frankfurt; HR Wiesbaden; IRT Project Hybnet, München; MDR Leipzig; n-tv, Berlin; ORB/DVB Babelsberg; RTL, Studio Berlin; SR TV-HSR, Saarbrücken; SFB Berlin; Studio Hamburg; Studio Hamburg, TV3; SWR Astra Satellit, Baden-Baden; SWR Audio- and Data-Services, Baden-Baden; SWR Experimental Studio, Freiburg; SWR Main Switching Rooms Baden-Baden, Tübingen, Mainz, TV Mainz and Stuttgart; ZDF Studio Berlin; ZDF Mainz; Italy: Radio Vatican; RAI, All News 24, Roma; Japan: NHK, Tokio; Poland: Polskie Radio S.A., Warsaw; Portugal: Portuguese Broadcasting Service, Lisboa; Spain: PTT, Madrid; Cadena SER, Barcelona; Cadena SER, Madrid; Canal Mundo Radio, Madrid; Radio 9, Valencia; Radio Cope, Madrid; Radio Marca, Madrid; Switzerland: SAT 1 Broadcasting Management, Zürich; Ukraine: Public Radio of the Ukraine, Kiev; USA: NBC, New York; Usbekistan: Radio Usbekistan; ... **in OB-Vans:** France: Radio France, Paris; Italy: RAI Torino; Netherlands: JVE Audio; NOB/Cinevideo; ... **in Theatres:** Austria: Kongresshaus Salzburg; Landestheater Innsbruck; Konzerthaus Salzburg; Volksoper Wien; Wiener Staatsoper; Germany: Berliner Ensemble; Deutsche Oper am Rhein, Düsseldorf; E.T.A. Hoffmann Theater, Bamberg; Konzerthaus Freiburg; Nationaltheater München; Opernhaus Kiel; Schauspielhaus Bonn; Schauspielhaus Bochum; Schauspielhaus Dresden; Schauspielhaus Kiel; Semperoper, Dresden; Staatsoper Hamburg; Staatstheater Darmstadt; Städtebundtheater Hof; Theater Würzburg; Uckermarkische Bühnen, Schwedt; Slovakia: SND Bratislava; Switzerland: Schauspielhaus Zürich; Konzerthaus Luzern; Vietnam: State Opera, Hanoi; ... **at Exhibition Grounds:** Austria: Salzburger Ausstellungszentrum; Germany: AMK Berlin Messezentrum, Berlin; Deutsche Messe Hannover, Messe Düsseldorf; Messe Nürnberg; ... **at Film Studios:** USA: 20th Century Fox, Hollywood; Advanced Audio, Burbank; Fotokem Burbank; Skywalker Ranch, San Francisco; Warner Bros., Burbank; ... **in Government Buildings:** Germany: Alsen- und Luisenblöcke, Bundeskanzleramt, Bundespresseamt, Deutscher Reichstag, Berlin; Bundespresseamt, Bonn; Landtag NRW, Düsseldorf; Staatskanzlei Potsdam; Technikerbund Parlamentsbauten, Berlin; Turkey: Parliament of Ankara; ... **at Universities:** Austria: Musikhochschule Wien; Germany: HdK Berlin; Musikhochschule Dresden; Musikhochschule Leipzig; Universität Tübingen; Universität Würzburg; ... **last but not least:** Austria: Flughafen Linz; Stadion Lehen, Salzburg; French Guyana: Space Center Kourou; Germany: Arena Hannover; BASF, Ludwigshafen; BKL Recording Group, Lüneburg; Eurospeedway Lausitzring, Klettwitz; Führungsakademie der Bundeswehr, Hamburg; Gottlieb-Daimler-Stadion, Stuttgart; Hanns-Seidel-Stiftung, München; HCA, Weinheim; Internationaler Seegerichtshof, Hamburg; Kultur- und Kongresszentrum, Brandenburg; Kultur- und Tageszentrum Stadeum, Stade; Musikinstrumentenmuseum Berlin; Pauler Acoustics, Northeim; Regententbau, Bad Kissingen; Robert Bosch, Werkvernetzung; Saarländhalle, Saarbrücken; Stadthalle Leonberg; Stadthalle Pforzheim; Stadthalle Weiden; Telekom Berlin; Telekom Bonn; Untel Unterföhring; ZKM Karlsruhe; Luxembourg: Casino 2000; Netherlands: Electrocare; Sweden: BIS Records, StockundTaiwan; Central Personnel Administration, Taipei.

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