Swiss Sound

News and Views from Studer

May 2004 – No 47

In this issues:

Dear Reader

Bruno Hochstrasser

Quite some time has passed since you have received the last issue of Swiss Sound. Much has happened at Studer in the meantime and we are very happy to share with you in this new issue of Swiss Sound our latest achievements. The conversion of Studer to become a world class supplier of digital mixing consoles, switching and processing equipment has progressed significantly in recent times and our company, once famous for the supply of electromechanical equipment such as tape machines, has gone thru a transformation we are very proud of. Innovative designs and leading edge technology in new digital products have positioned Studer firmly again in the world markets now as a leading supplier of digital products for the broadcast markets.

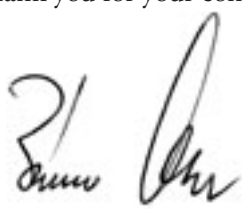
We are particularly proud of our innovations in the domain of mixing console user interface designs and digital signal processing architectures. The unique VISTONICS® mixing consoles surface operating concept, introduced with our VISTA series of digital consoles, is revolutionizing the operating surface paradigm for mixing consoles. Our new SCORE processing engine concept is redefining the state of the art in signal processing for digital mixing consoles.

Reliability of our products has always been a prime objective in our product design. This is also the reason why a large portion of our products are used in mission critical live applications. An industry first is the introduction of a full redundancy concept for our control systems in our digital Vista 8 console design. This redundancy concept of the control system adds to the well proven redundancy concept of our digital processing engines used in our D950 and VISTA digital consoles and is now making the product virtually failsafe - a great benefit when the product is used in live applications.

Front cover:
Studer OnAir 3000
in action at Radio 24 in
Zurich, Switzerland

Vista 8 is the newest member of our VISTA series of digital consoles. Learn in this issue what clever design and VISTONICS® can do for you in a console designed for broadcast live - and live applications for installed sound venues.

The new OnAir 3000 mixing console introduced in this issue of Swiss Sound, describes a new product which includes latest technology and application experience gained from over 1000 OnAir 2000 digital mixing console installations around the globe. I hope you will enjoy reading about our new achievements and I would like to thank you for your continued interest in our products and technologies.



Bruno Hochstrasser

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NAB in Las Vegas/USA
April 19th - 23rd. Introduction of the all new Vista 8 digital live console and the all new OnAir 3000 fix frame digital On Air console using the new SCORE digital processing engine.

Vistonics®:

A User Friendly Operating Concept for Digital Mixing Consoles

You know the situation very well: on-air in five minutes and everything is happening at once. The outside sources need verifying, the presenter is not happy with his headphone feed, the producer has changed the schedule and on top of that the guest band's producer wants a sound check! It is at times like these that you need the console to work for you as much as possible. This will only be the case if the console user interface is friendly to the eye, easy and intuitive to use and offers fantastic visual feedback. Most operators believe that the analogue console interface offers them this. It is my opinion that actually it is only their familiarity with and mature experience of analogue consoles that gives this feeling. The user interface of the analogue console is inflexible and the users mostly work around it. The main reason most broadcasters are turning to digital consoles is the great flexibility in terms of system design and operation that they offer. The problem is that this usually means complexity in operation, and this is certainly true for many digital consoles. Vistonics® is the first concept of a user interface to address the operational needs of the user and offer a way of working that is more familiar and intuitive than an analogue console.

To design a user interface for a digital console is not an easy thing to do. The possibilities are endless. Where do you start?

As all operators are familiar with analogue consoles then it is probably sensible to first establish what are the positive aspects of an analogue console user interface. Ask 1000 operators what these are and 999 will first say channel strip operation. What is it about this operational concept that people like? It is because it offers a "where you look is where you control" philosophy. You see the control; you grab it and control it where you are looking. This is extremely intuitive, fast and easy to learn.

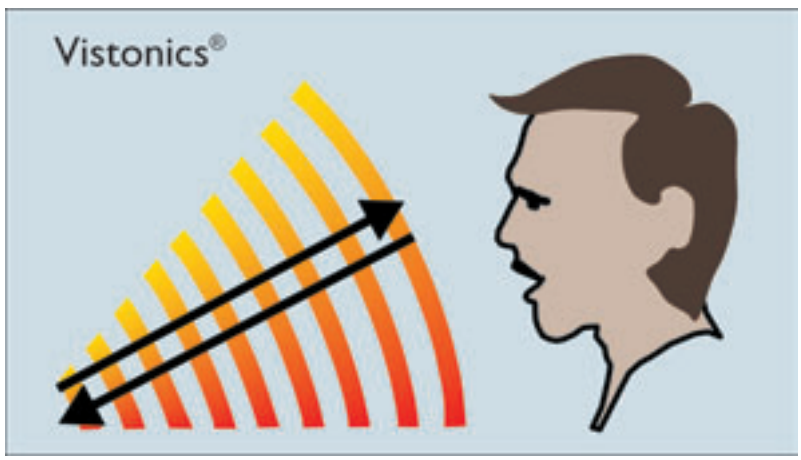
Colour has a strong influence on our sense of sight. Without using written text, colour creates clear visual distinction. Analogue consoles include the use of colour to provide distinction between the functions of the controls on the surface; red controls are often used for EQ, green controls for dynamics etc. Use of colour aids both navigation and overview.

Controls never change position on an analogue console and the interface philosophy offers a "one control per function" concept. This means that instinctively over time, the user automatically knows where to access a particular control and never has to "page" menus to access a function. Interestingly this philosophy is only true for a particular analogue console as the control layout may change from console to console!

The design of a user interface must also address the requirements of the application that the console will be used for. Whatever the application, most operators would agree that a console user interface should be easy and intuitive to use, offer clear and fast operation and provide a good overview of the console settings.

Bearing all these points in mind, the challenge of User Interface design can be split into some key considerations. How best to combine the familiarity of analogue with the flexibility of

Jamie Dunn



Where you look is where you control

digital? Should the operational philosophy incorporate Channel Strip Operation or Central Assign Philosophy? How big should the surface be in terms of physical size to keep it ergonomic? Can each control only have one dedicated function or be assignable to other functions? If some assignable controls are offered, how can a good overview of the console settings be maintained with fewer controls? Inevitably all of these points will have an influence on each other and this is the major challenge. Is it possible to design a concept to address all these issues whilst maintaining the applicational requirements of the control surface?

One of the best solutions for displaying any form of information is a TFT screen. The advantage of a screen is that you can combine colour, icons and text to display the required information to the operator. It is of course one thing to display information, but the major problem is that rotary encoders and switches are still required to control the functions, even if the settings of those functions are displayed on the screen. Remember that one of the most intuitive aspects of an analogue console is the 'where you look is where you control' philosophy. If a user interface is to offer similar intuitiveness, this operational philosophy must be included. By mounting the rotary controls and switches onto the TFT screen, this will offer both the advantages of colour, icons and text, whilst also offering the "where you look is where you control" philosophy. A function is no longer just displayed graphically on a screen but the function can be controlled directly where it is displayed. The mounting of rotary encoders and switches on a TFT screen is called Vistonics, and forms the basis of the operational concept of the Vista console range.

Vistonics: 40 rotary encoders and switches mounted on a TFT Screen

Operators find this extremely intuitive because it requires minimal thought. This means that the user can concentrate on the work at hand and not on how to operate the console.

Vistonics® Operation

As has been discussed, mounting of the rotary controls and switches onto a TFT screen provides the fundamental philosophy of a "where you look is where you control" user interface. But how can this technology be utilised in an operational concept that exceeds an analogue console in both ease of use and ergonomic design?

Vistonics® screen in channel bay

The principle of operation is channel strip orientated and is based on the rule that it should only take one button push to access any audio function if the function is not already instantly accessible. Each fader bay houses 10 channel strips that run up from the faders and through the screen. Each channel strip has 4 Vistonics rotaries and switches per channel strip. The parameters that are displayed on the 4 rotaries per channel are selected via the "Global View" buttons. The "Global View" selection shows the same parameter view on the 4 rotaries of all channel strips. Some typical views include Aux controls, Pan, input gain, etc. User definable views are also possible. In fact all channel parameters can be accessed via the Global view. How is it possible to stick to channel strip operation and the one button push rule when each channel strip only has 4 rotaries? The 4 band EQ audio function, for instance, requires at least 14 rotary controls including the filters! The dynamics function requires 16 controls! This is where the touch screen area below the Vistonics comes into operation.

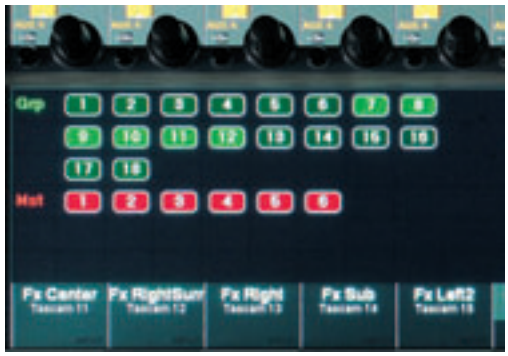
The touch screen is not only used for accessing certain functions but firstly it provides a fantastic overview of the settings of the EQ, Dynamics and Pan for each channel displayed on the control surface. It is my view that this offers a far better overview than on an analogue console. On an analogue console for instance, you may look at the EQ controls and map the positions of all of the rotaries and switches in your head to an imaginary EQ curve. Here that curve is displayed to you all of the time for every channel displayed on the control surface!

Touch 'n' Access

To access the entire Dynamics controls for one channel, the user simply touches the Dynamics graph of the desired channel and then the complete dynamics controls temporarily "open up" on top of the currently shown Global view.

The view only utilises as many rotaries as required for the chosen function and temporarily "steals" a number of the rotaries of adjacent channel strips to show all of the dynamics controls. The user can then directly control the parameters directly on the Vistonics® controls. The use of colour and icons aids both the user navigation and parameter recognition. Once finished, the user simply can close the "opened up" view by hitting the selected curve once more. The Global view underneath now returns to all of the temporarily utilised rotary controls. This method of access is extremely intuitive and is learnt in minutes. It is even possible to open up two audio functions from any of the 10 channels simultaneously by simply touching a second curve whilst holding and touching another. This is particularly useful for accessing the EQ and Dynamics controls for one channel simultaneously. In this instance all of the 40 rotary and switch controls of one fader bay are temporarily utilised for displaying and controlling the selected functions.

A "Channel View" is also available per channel which with a single button push temporarily utilises all the Vistonics® controls of one bay for displaying all the audio functions of the chosen channel. Not included in this view are the Dynamics, EQ and Pan views which are instantly accessed via the touch screen. This "Channel View" in essence offers a Central Assign View but everywhere on the console!



Bus assign view on Vistonics® screen

Lastly, a global and local bus assign view utilises the Touch screen area for displaying and selecting the bus assign for each channel.

Graphical Issues

One of the major benefits of the TFT technology is the possibility to combine colour, icons and text to represent the parameters. It is far easier for the brain to work with images and colour rather that just text to assess large amounts of information. It is important that if graphics are a major part of the operating concept then these also are utilised in a sensible and intuitive way.

Vertical Graph for Level Control

Colour is used extensively in the user interface philosophy for identifying not only displayed audio functions (Dynamics controls are green, EQ controls are red, Pan controls are yellow, etc.) but also for identifying channel types and indicating on/off status of parameters. We all know how difficult the colour choice is when decorating the house! It is essential that the chosen colours work together so that one is not

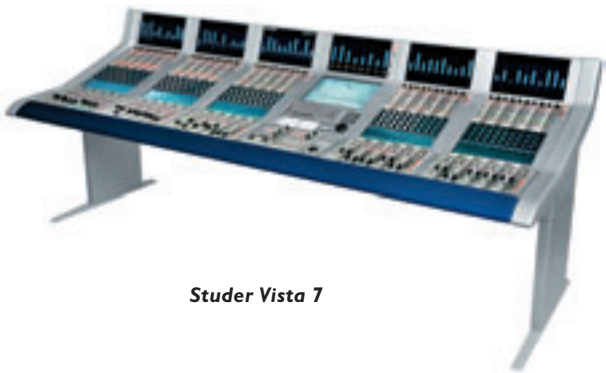
more prominent than the other and the overall system is easy and friendly to the eye. This was the goal and much time, money and thought was given to this consideration in the design process. The end result is a colour system that provides instant recognition, without disturbing the eye.

Intuitive and descriptive icons are also a major feature of the graphical interface. These are utilised to give the user an instant overview of parameter settings without having to read written values. This is particularly useful for the global views. A good example is the icon utilised for any level controls. A vertical graph display is an extremely intuitive method to indicate level values. This is utilised in channel metering on most consoles. It is very easy to see level differences at a glance with this method.

Clocks for Time Controls

Every level parameter control (e.g. Input Gain, Aux send Level, Compressor threshold, etc.) is displayed with a vertical graph icon. Time parameters such as attack time and release time are displayed as small clocks. These are just two examples. As an operator becomes more accustomed to using the console, the icons become the primary method of identifying the parameter settings.

In summary, the Vistonics® operating concept is based on channel strip operation with a combination of 4 different views (Global, Channel, Bus Assign and the EQ, Dynamics or Pan view) to provide all channel audio functions with a "one action to access rule". In addition the user works with a "where you look is where you control" philosophy with extensive use of colours and icons to help with navigation and identification. It is an operating concept that is incredibly intuitive, fast to operate, gives unmatched visual overview and can be learnt in minutes. What has been described is only the beginning of the concept. Other features include temporary activation of all buttons, a ganging function, quick copy/paste functionality and a Banking with Scrolling navigation concept. Quite simply, Studer Vistonics® is the "return of the human interface".



Studer Vista 7

Studer Vista 6

Studer Vista 8

Vista 8:

New Studer digital Live Console

Two years ago Studer has started a revolution in the audio console industry by introducing the first Vista console, incorporating the stunning Vistonics® operating concept. While Vista 7 with its extensive dynamic automation and machine control was mostly designed for production applications, we have introduced just months later the Vista 6, specifically designed for live broadcast use. With the latest software release we have presented an extensive static automation system, which made the Vista 6 the live broadcast console of choice for a lot of broadcasters. The new Vista 8 is a very versatile console, combining the Vista 7 dynamic automation features with the great static automation of the Vista 6 in one product. More than that, Vista 8 is having a lot of new features dedicated to our customers doing any sort of live work: Be it live broadcasting from a studio or OB vehicle, be it theaters!

Stefan Ledergerber

Vista 8 specialities

Near the center of the Vista 6 and 7 consoles we are having a control bay containing all controls for monitoring and administrations. At the Vista 8, we have completely redesigned this center section. The administration screen is now mounted on the meterbridge or anywhere outside the console while the keyboard is hidden in a drawer underneath the console. This has freed up the space to add 12 output faders as well as another Vistonics® screen into that section. This makes this console very attractive for any customer who is concerned about physical space of the console and wants to have as many faders as possible across the console. With this additional control elements we are now offering direct control over 52 levels just within that new center section: 40 rotaries on the Vistonics® screen and 12 faders – while maintaining all controls for monitoring, dynamic automation, machine control and administrative purposes. 10 of the faders maybe switched to one of four pages while the other two "grand master" faders are constantly on the surface for emergency access.

Level control is very closely related to metering: If you don't like what you are seeing on meters, you would like immediate access to the corresponding level control. Since we have brought our "where you look is where you control" principle to its next perfection level, we have even incorporated real time meters on the Vistonics® screen! In other words: You see all your output levels at a glance and you are able to adjust them within a fraction of a second by turning the knob next to it - virtually grabbing the meter. The pushbutton next to each knob may be used as PFL, MUTE or TALK button.

Of course you can create your own sets of output views and put them on one of the 4 USER view keys. In addition to these user definable views, Vista 8 offers dedicated viewing keys for any kind of masters and multitrack outputs.

The Vistonics® screen of the new center section is also the solution for another important task: You look at an output fader and want to know which input channels are actually contributing

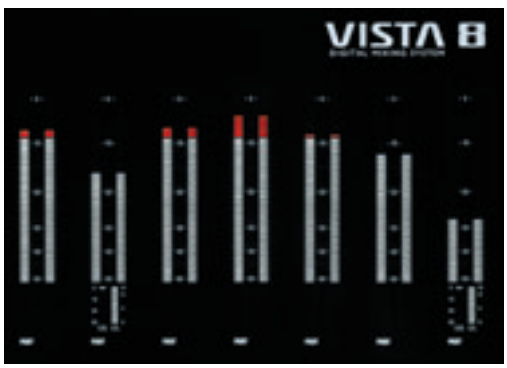
Incorporated real time meter in Vistonics® field

The new Vista 8

The Vista 8 control bay

to this output. In fact you would like to slightly adjust some of the contributions, altering the balance between the input signals. Here is how you do this on Vista 8: One press on the "CONTRIBUTION" button above the master fader and you will see all input channel faders visualized on the Vistonics® screen, each with its fader controled by the rotary next to it. You don't just look at the contribution, you can actually alter the fader of the input channels by turning the corresponding knob on the Vistonics® screen. Of course the faders on the channel strip will always follow these adjustments in the center section.

While talking about metering: Studer has developed a new high resolution meter, located on top of each channel strip within the console. The new meters are multicolor and allow adjustment of headroom by software. By adding these ergonomically designed meters, we have completed the idea of giving maximum overview over the console at all times.



The new Vista 8 multi colour meters

The fader bays have also been redesigned and got some new functions. The most important one is probably the ability to switch individual fader strips to another "layer". If it comes to n-1 usage, there is a dedicated push button on each channel strip in order to switch any alternate signal like station IDs etc. onto the n-1 output for a moment. The output switches back to the normal n-1 signal as soon as the fader is opened. The n-1 functionality has been completely redesigned as well, including full conferencing between the n-1 channels.

In addition to these more broadcast related features, Vista 8 ads up to 16 mute groups as well as matrix outputs to its feature set. Completed with a convincing night design the console offers everything for use in theatres as well.

All Vista consoles are basically running the same software. This means that existing customers are still benefitting of the ongoing development at Studer. New features like the "motor off" option for control groups (VCA style operation) or the ability to alter DIM and PFL monitor offset level very fast will be given to all Vista customers: Vista 6, 7, 8.

100% Redundant Control System

Live is Life! Anything you miss now is gone forever. Studer is well known for its reliability as well as its redundancy concepts – just in case. In addition to our famous DSP redundancy we are now even offering 100% redundancy on the control surface level: Pressing one button for several second will activate an emergency switch and take the whole control surface onto a second control system. This control system will know about your latest settings and bring up the whole console immediately again. If there would be any problem with a physical channel strip, just press the scroll button and you will see the channels on the bay next to it.

Stagebox

With the Vista 8 we are also proud to present our new D21m IO system incorporating long distance stagebox connectivity. This new IO system allows cost effective distributed Input/Output systems at an unbeatable form factor: up to 48 mic/line inputs within a 3U rack! Since the redundancy concept was mentioned earlier: It is obvious that the IO system provides constant software survey over all IO cards and redundant power supplies. In case you would like to share a stagebox between two consoles, just put another optical cable between and you are all set. In this case the stagebox return lines may be fed by any of the two consoles.

Vista 8 is our new flagship, no doubt. It is the incarnation of all expertise collected in our long history, including our first two Vista consoles. The fact that Studer has sold the Vista 8 to customer before it even existed is a proof of the confidence Studer enjoys by its customers. And we are absolutely sure that they will not be disappointed!

Studer D950:

BBC Maida Vale

Studio One at Maida Vale in West London is BBC Radio & Music's largest music studio, and is the home of the BBC Symphony Orchestra. The decision to replace the studio's ageing analogue console resulted in an EU procurement process involving six manufacturers, led by BBC Technology, and during 2002 detailed operational evaluations of three consoles were carried out. As budgetary limitations ruled out increasing the size of the existing control room, the operational requirement for a 72-channel console could not be met with any design of analogue console, so a digital solution was proposed, and the Studer D950 M2 emerged as the most operationally suitable choice.

John Andrews

The 56-fader D950 was the first large-scale digital console to be installed in a BBC Radio music studio, and went "live" on BBC Radio 3 in December 2002, with the BBCSO conducted by Sir Edward Downes performing Prokofiev's 4th Symphony. Another "first" was a live transmission on Friday December 20th of the very popular Radio 2 "Friday Night is Music Night" with the BBC Concert Orchestra, introduced by Richard Baker.

In BBC Radio & Music, the responsibility for the balance and control of programmes is in the hands of Studio Managers, and the three resident SMs for the BBC Symphony Orchestra are Neil Pemberton, Simon Hancock and Phillip Burwell. Senior Studio Manager Neil Pemberton, who joined the BBC in 1975, has worked with the Symphony Orchestra since the 1980s and was deeply involved in the discussions about the replacement of the analogue desk. As he explained, the proposed change to digital led to an extensive debate within the BBC. "Reliability is paramount for a desk which is being used for the live broadcasting of a large orchestra, we had to be as sure as we could be that the one we chose would be absolutely stable. Even if we were using it for recording, losing say 30 minutes during a session with the Symphony Orchestra might mean the loss of the whole concert, and that's a very expensive business, so another analogue console was the obvious choice – but then the contradictory argument was to go digital for absolute sound quality."

All the SMs involved were familiar with digital technology, having used the BBC's digital mobile control room for the annual Promenade Concerts for a number of years, and the prospect of having recall and snapshot facilities was attractive. Furthermore, none of them used EQ unless absolutely necessary, so assignability was not regarded as a problem, and a visit to see a D950 under operational conditions at Pinewood Studios was arranged. "Studer's approach was very good" said Neil Pemberton. "They're good at listening, and they are a broadcast company, which made us feel very comfortable with them."

Studer D950 M2 in action

The configurability of the D950 was regarded as a major feature by all the Studio Managers who examined the console. As Neil Pemberton pointed out, "most sound engineers are creatures of habit – we want to work in a particular way, so how do we do it?" The ease with which the console could be reconfigured was put to the test soon after commissioning, when the BBC

Concert Orchestra was booked to use Maida Vale One for a live Christmas Special broadcast of the long-running Radio 2 programme "Friday Night is Music Night", as Senior Studio Manager Rupert Flindt explained. "This is a hybrid classical and light music show of one and a half hours duration which involves about 20 pieces of music linked with a presenter, a second act (guest group) and (uniquely these days I think) a live orchestral sig. tune with voiceover. The longest piece is about 8 minutes or so and every item requires a different style of sound balance."

As this was to be the first live broadcast using the newly installed D950 (the Prokofiev Symphony Orchestra concert was pre-recorded), Rupert did a "live rehearsal" the previous week, using the mic splitters in the studio stageboxes to send feeds to an analogue OB truck parked outside which mixed the actual broadcast while Rupert was able to experience mixing on the D950 without the tensions of a live transmission. As Rupert said, "this went well enough to give me the confidence to 'go for it' the next week" and the broadcast went without a hitch.

The combination of the fibre-optic connected remote stageboxes and Studer's internal routeing system, used in all the range of large digital consoles including the D950 in Maida Vale and the BBC's first Vista 6 in Manchester, has revolutionised both studio installation and operational practice. MV1 has three 24-channel stageboxes distributed around the studio, which allow the use of short microphone cables – highly desirable in classical music situations when very low level signals are often encountered – and are, as Neil Pemberton pointed out, "completely silent". There are thus only three fibre-optic (noise and interference free) cable runs back to the console instead of the 72 shielded pairs which a traditional analogue installation would require, and there is no analogue microphone-to-channel patchbay, as all the channel selection is done using the console's integral digital patch system, and the settings saved in the console's memory for future recall. This, said Neil, can save up to 30 minutes per session of time previously spent in plugging up the old analogue console and fault-finding, as contemporary classical music often requires 30 or more microphones, and Rupert Flindt listed no fewer than 52 for that first digital Friday Night is Music Night – a main pair (DPA), 3 vox mics (Schoeps and Neumann), 17 string (Schoeps and Neumann), 6 wind (DPA), 6 brass (AKG and Neumann), 6 percussion (Neumann), 6 rhythm (various) and 4 audience (AKG).

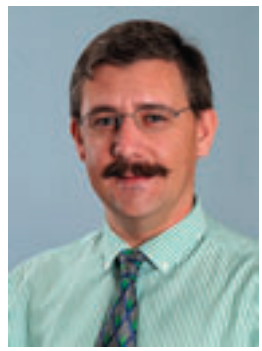
This was not the first time Rupert had used a large digital console, but it was his first time in this studio "flying solo after only two days familiarisation" as he described it, and having come from using large analogue consoles for rock and pop music, he was not looking forward to using an assignable control surface. However – "By the second show I was comfortable to be using the Studer so I think the overall design is good especially the way the controls mimic the analogue function. When you turn a knob the sound does what you would expect! Since the first show I have used it in other contexts and found it hugely flexible as a design although I don't like not being able to easily see how you have it configured."

Everyone who has used the D950 in Maida Vale has been complimentary about the sound of the console and the way in which Studer has provided the additional facilities so often demanded by broadcasters. Neil Pemberton commented that the production talkback system "demonstrated a high degree of customisation" and went on to claim that "we haven't had a console that was 100% right for classical music until the D950", while Rupert Flindt's final words were "the desk and converters sound fantastic! It is good to use and hasn't let me down once. Excellent!"

OnAir 3000:

More than an excellent radio and production console

With the introduction of the 3rd generation digital mixing console Studer OnAir 3000, Studer has not only enhanced its large offering of radio continuity and production consoles but also established a new and most modern platform. The OnAir 3000 offers utmost flexibility and configurability to suit any application and with the OnAir 3000Net software extension allows for whole networked systems.



Roland Casagrande

The OnAir 3000 consists of the new Compact SCore DSP frame combined with the proven high density Studer D21m I/O system and a most flexible desk surface. The surface itself is a modular subsystem consisting of different modules which can be combined individually in order to comply with the specific local needs, e.g. in a control room for complex broadcasts or just a small number of faders for a news studio.

The OnAir 3000 in the fixed frame version

Desk

The surface of the OnAir 3000 is a combination of the worldwide experience Studer has collected with the OnAir 5000, the OnAir 2000 and the OnAir 1000 together with new developments. The proven "Touch'n'Action" user interface concept from the OnAir 2000 was further refined and adapted to colour screens. In doing so any user familiar with this operating concept feels immediately at home with the OnAir 3000 making the learning curve extremely short. The patented "Touch'n'Action" concept permits an easy and clean user surface and in the same way allows for a complete overview of all relevant parameters of all channels at a glance. Parameter access is extremely quick, a most important fact in life broadcast situations. By touching for example the EQ-curve in one channel strip display the respective EQ-curve expands immediately on the main screen and can be adjusted via the rotary encoders below the screens with its patented magnetic breaks.

The same system supports an extremely flexible user access rights management. Depending on the work philosophy and the technical competence of an operator the system administrator can permit access to certain parameters or deny it by editing a respective user profile. The setting still remains visible on the screens but the respective parameters are no more displayed on the main screen and hence can not be altered.

The OnAir 3000 Graphical User Interface (GUI) uses the same symbols and colours as the Studer Vista family. The menu hierarchy is kept absolutely flat for fast parameter access and easy overview. It can also be emulated on a PC or laptop. This is very useful for service and support over TCP/IP, to control and set-up a system from a remote location or to connect the systems into a network.

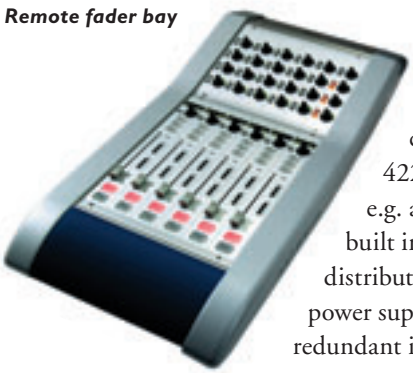
Studer OnAir 3000 Modulo

The currently offered desk modules include:
- Fader module with either 6 or 3 faders
- Fader assign module
- Rotary module
- Rotary assign module
- Monitoring/TB module
- Main screen module
- Fader screen module

The minimum desk configuration consists of a Main Screen Module, a Monitoring/TB Module and one Fader Module. From there all combinations up to 48 faders, including Rotary Modules, Fader Screen Modules and Assign Modules are possible resulting in a quite large and very powerful user surface.

Any button on the surface may be freely configured, being it ON/OFF, PFL, TB, SEL, bus assign or any other function. The rotaries in the Rotary Module may be given a parameter set like all 4 gains of the EQ or AUX1…AUX4 send level, etc. per channel giving immediate parameter access within a channel, e.g. for production tasks time critical life broadcasts. These parameter sets can be pre-configured and recalled via the buttons on the Rotary Assign Module. Input routing can be performed either through the main screen menu, by loading a routing snapshopt configured on any of the buttons, e.g. in the Fader Assign Module or via the rotary within the fader strip giving access to a pre-defined selection of sources.

Remote fader bay



Every module is connected via an RS 422, CAT5 cable link to a Distribution Unit which then is connected to the main screen via RS 422. This makes it possible to detach e.g. a fader module up to 50m and with built in power supply even further. The distribution box also includes the separate power supply for the desk which can be redundant if required.

The desk has its own microprocessor system included in the Main Screen Module which controls all functions. It is connected via Ethernet CAT5 cable to the SCore frame. An ADAT fibre connection between SCore and desk assures the audio links for headphones, TB microphones, PFL loudspeaker and monitors.

The architecture allows also to operate a second surface in parallel for example in another studio or in an OB vehicle. As the systems offers two separate PFL circuits and three separate Studio monitoring and TB circuits a split desk operation with two independent programs becomes possible.

Studer's new DSP engine

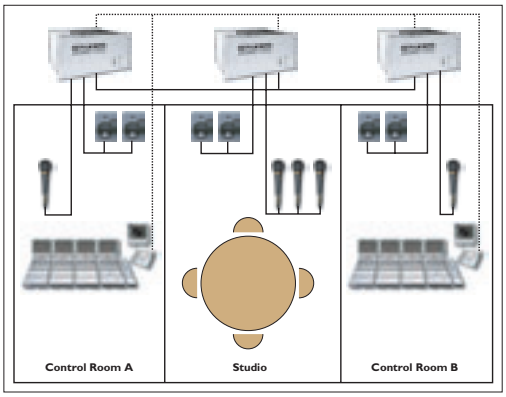
Compact SCore

The Compact SCore DSP and control system is a completely new Studer in house development. It includes in a 6U frame up to six DSP cards, each having 6 Sharc chips on it, a microprocessor card, space for GPIO cards, a time synchronisation and a clock synchronisation card and in the lower part of the frame standard D21m input and output interface cards. The compact SCore can be equipped with redundant power supplies if required. A separate article in this Swiss Sound edition describes the new Compact SCore in detail, please refer to these pages for further interesting information.

Networking

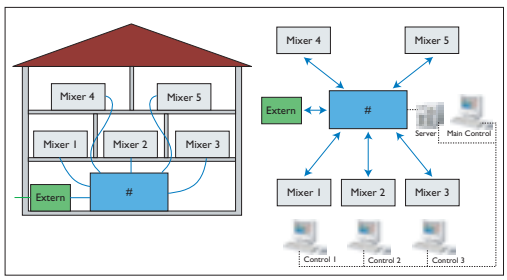
The Studer OnAir 3000 is not only a most versatile and flexible digital mixing console but it is also part of a new architecture in networking of mixing consoles. Modern studio complexes can include several studios, control rooms and data sources like play out systems. Digitised audio in fact is just digital data. Data with special qualities of course but still data. Very much like in a well known IT network, data can be exchanged and shared through the IT network from many locally distant users. Similarly the

Studer OnAir 3000Net software extension allows for interconnection of many OnAir 3000Net systems into a broadcast network either within a broadcast house or in a larger context. In doing so, signal sources like microphones and codec's can not only be shared from any OnAir 3000Net mixing console within the network but all the respective signalisation and GPIO's follow the use of the source.



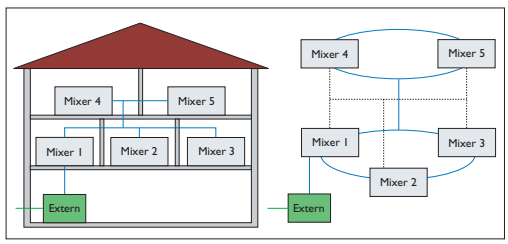
Two control rooms sharing one studio

A typical set up may be two control rooms and one shared studio. In interconnecting the SCore's the whole system becomes transparent to both mixing desks. Control room A may for example use the microphones in the studio or the microphone in the control room B very much as if it would be a local microphone. If the fader in control room A is opened the red light in the Studio or Control room B goes on and the monitors are cut. This operation principle is still valid for a set-up where the control room A is for example in city A and the microphone in city B.



Traditional star router architecture

If we apply this architecture to a whole broadcast house we see that the classic set-up whereby all signals are connected and distributed to a central star router changes into a de-centralized cluster of local SCore platforms handling inputs and outputs locally and making them available to all users within the network. Here also signalisation and control of the individual sources, e.g. fader start, remains attached to the respective source within the whole network. If for example a CD player is located in city A or studio A and the user accesses it from city B or studio B via opening the fader, the fader start signal is automatically routed to the correct location.



Decentralized, virtual router

The topology form a centralized star router merges into a de-centralized "virtual" router. The advantages of this topology are a much greater flexibility and transparency, much less cabeling effort and last but not least more cost efficiency as the infrastructure can be used more effectively.

The Studer OnAir 3000Net system is basically independent of the network protocol used as long as the quality of service and the necessary bandwidths are guaranteed. In the minimum case the audio interconnection between the SCores can be realized via a simple XLR cable and the control exchanged via TCP/IP. If more signals need to be shared a multi channel protocol such as ADAT or MADI may be sufficient. For large and complex applications a high speed large bandwidth protocol will become necessary.

The OnAir 3000Net software extension is an option "for" the OnAir 3000 and "requires" a software upgrade and, depending on the network protocol used, a D21m network interface card.

The SCORE Platform:

A scalable design for high-end DSP clustering in professional audio applications

Adrian Riedo

Digital Signal Processing turned "classical" mixing consoles into versatile and flexible systems for various types of application fields several years ago. The requirements of today's mixing engines are not only higher sampling rates and more audio channels but also higher degree of application diversity while maintaining robustness and ease of use.

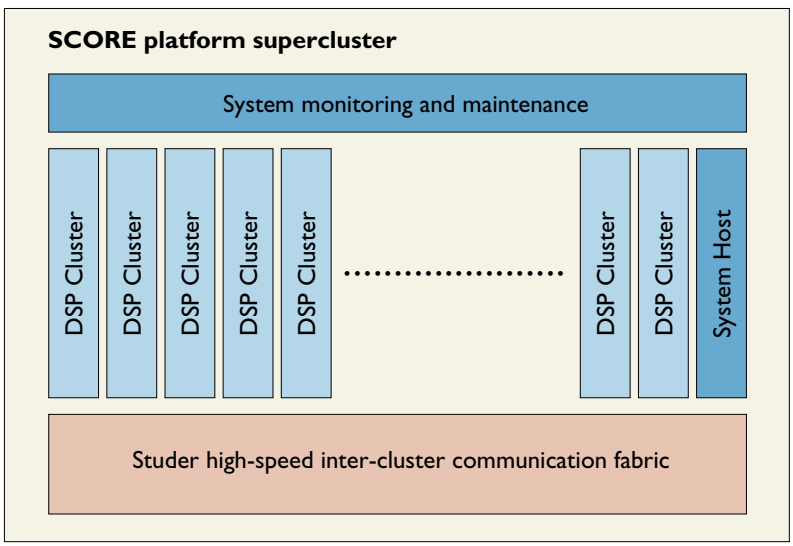
The SCORE Platform is our solution to these requirements.

The Platform

Based on the philosophy of what was called the "Performa Core" first introduced with the Studer D950 back in 1997 and later used with the Vista Series in 2001 the SCORE Platform follows a simple but powerful concept: separate backend data communication from the processing elements. The heart of the SCORE Platform is therefore not the DSP itself but our custom high-speed inter-cluster communication fabric.

Blocks of individual DSP clusters become highly scalable thanks to a system architecture which is parallel throughout *(Fig. 1)*.

Fig. 1:
SCORE cluster overview



The purely passive backplane is designed for standard 19 inch frames and can handle data rates up to 6.4 Gbps and more while supporting up to 21 plug-in cards where at least one card is the system host. The internal capacity goes above 4'000 audio channels that are globally accessible for any processing element within the system *(Fig. 2)*.

Fig. 2: Inter-cluster backbone

All slots of the SCORE frame are fully hot-swappable and are permanently monitored from the system host.

The SCORE Platform is designed from the bottom up for full redundancy support should any processing element in the system fail.

DSP Clustering

The SCORE DSP card, as with any other SCORE card, incorporates our custom backplane interface device that handles two complete sets of DSP clusters. The current implementation is optimized for Analog Device SHARC processors which are grouped in numbers of six resulting in a total maximum of 12 DSPs per card.

To the system each SCORE card is virtually seen as two independent processor clusters. This feature enables a hybrid and flexible implementation on one single DSP board as is the case for the Compact SCORE.

This virtual dual card architecture leads to a total maximum of 240 SHARC DSPs working in parallel – that's 144 Gflops of horsepower and an overall throughput of more than 16 Gbytes/s in a fully equipped system *(Fig. 3)*. In terms of audio this means every DSP card can handle over 60 fully equipped standard mono channels at 48 kHz.

Audio data is internally always represented as 32 bit floating point values and processed at 40 bit resolution.

Fig. 3: SHARC DSP clusters

The demand for more audio channels requires enough memory for standard and surround but also for future audio algorithms – every DSP cluster has therefore its own set of memory units making a total of 128 MB per card. User-adjustable delays in the order of seconds but also complex block processing algorithms are just some examples of advantages of the huge on-board memory.

High Density I/O

Finally there is the I/O - the D21m that is already shipping with our D950 and Vista series. All DSP cards have built in HD Link connectors for interfacing with the I/O Frame *(Fig. 4)*.

Fig 4: HD Link to D21m

Every Link carries 96 channels in both directions making it a total of 3840 possible inputs and 3840 outputs to and from the SCORE DSP supercluster.

This number is also the maximum routing capacity of the whole system when used in audio router applications.

Compact SCORE

The Compact SCORE *(Fig. 5)* is one example of an implementation of the SCORE Platform – applied in Studer's OnAir 3000 mixing console. A six-unit rack with redundant power supplies carries up to 6 DSP cards for flexible configurations and one completely integrated D21m subset for Analogue, AES/EBU, ADAT, TDIF, MADI, GPIO and Mic cards. Five additional D21m systems can enlarge the IO capacity to meet the requirements of larger installations.

The modular system talks over standard TCP/IP networks to the (multiple) desk unit(s) and runs without fans or hard-drives.

Fig 5: Compact SCORE Frame

Studer Broadcast System:

DigiMedia 5: New features, new modules

Robert Habersaat

Studer DigiMedia has been synonymous with reliable, functional broadcast management for the past 10 years. Version 5 of the popular broadcast system offers many new features, along with a series of new software modules.

Version 5's voice-tracking and FilePlayer features squarely target broadcast management productivity and efficiency. Now, in addition to playing out linear and MPEG layer 2 encoded files, DigiMedia customers can also select MPEG layer 3 as their standard in-house format. And last but not least, the OnAir screen layout has been adapted to take advantage of increasingly popular 1280 x 1024 resolution screens.

OnAir Screen 1280 x 1024

Voice-Tracking

DigiMedia was one of the first broadcast management systems with voice-over and drop-in facilities, for highly efficient pre-production of complete broadcasts. Now there is convenient voice-tracking as well, offering even more possibilities for spot-on pre-production.

FilePlayer

Although most of today's programming runs exactly to specified broadcast schedules, in a fast-moving medium like radio there is always the need to insert broadcast elements in any format directly into the on-air playlist. With the new DigiMedia FilePlayer, it is e.g. possible to drag and drop any type of audio file directly and without database entry into the playlist for broadcast playout. DigiMedia then sets to work in the background and converts the relevant files to the established house format, for dependable playout without any noticeable delay.

MP3 playout

DigiMedia presently gives users a choice of linear or MPEG layer 2 encoded audio files as the playout format. Version 5 additionally supports MP3 (MPEG layer 3) files as the standard house format. The DigiMedia basic philosophy still holds: all audio files are converted in the background and played out in the established house format.

1280 x 1024 OnAir screen

One of the main reasons for DigiMedia's extraordinarily high user acceptance has been its very clear and cleanly designed OnAir screen layout. This is still the case with enhanced 1280 x 1024 pixel resolution: the additional screen space accommodates clickable tabs for accessing a variety of peripheral applications like voice-tracking, audio editing, news and listener call handling systems.

Configuration tool and playlist editor

Other significant new features slated for DigiMedia 5 include an easy-to-use configuration tool and an improved playlist editor.

DigiMedia NewsWire

DigiMedia iNews and DigiMedia FastNews are an existing pair of highly functional software

DigiMedia AudioLink

modules for handling agency newsfeeds. They will be joined by the new DigiMedia NewsWire module, an easy-to-use plug-in that receives and processes newsfeeds in Microsoft Outlook.

DigiMedia AudioLink

The main reason behind TCP/IP's lack of acceptance for audio transmission to date has been the necessity for manual reconnection in the event of a datalink glitch. But now there is DigiMedia AudioLink, a tool that transmits studio-quality stereo audio and re-establishes a broken network connection in seconds. As well as TCP/IP transport (Internet und Intranet), DigiMedia AudioLink can alternatively operate as a software ISDN codec.

DigiMedia NewsWire

Studer Call Management System:

Telephony, ISDN and VoIP in the broadcast studio

For decades, Studer has been a by-word for the best in telephone hybrids, the bridging units that patch listeners' calls into the studio infrastructure. The new Studer Call Management System interfaces with external analogue and digital transmission lines, plus voice-over-IP technology, in a package that also includes extensive management capabilities.

Robert Habersaat

At the heart of the system is a voice server that can handle the entire gamut of telecommunications formats, from analogue POTS circuits, through ISDN, to the latest voice-over-IP technology. The system's main job is to automatically manage and distribute calls to clients used by reporters and operators working in studios and editorial offices. There is unified messaging support for voicemail, faxmail and SMS. The entire system is under straightforward software control, managed by a client application that is installable on any number of networked PCs. Users do not have to be concerned with distinctions between analogue, ISDN, or VoIP telephone traffic, or indeed a mix of all three.

User-Interface for Software-Clients

Voice-over-IP

The Studer Call Management System handles VoIP telephone traffic with ease. With Ethernet connections, the voice server can control and distribute up to 240 channels either directly or via holding areas to broadcast studios, editors' desks, or call operators. There are virtually no limits to call patching and management via holding areas. Standard audio cards (e.g. Digigram VX222) provide a two-way interface with the audio world.

Analogue telephone lines

The Studer Call Management System can of course handle calls on analogue telephone lines. In this scenario, the voice server manages up to four analogue telephone hybrids per studio or audio workstation via networked, programmable control units that are operated via the same software client.

ISDN lines

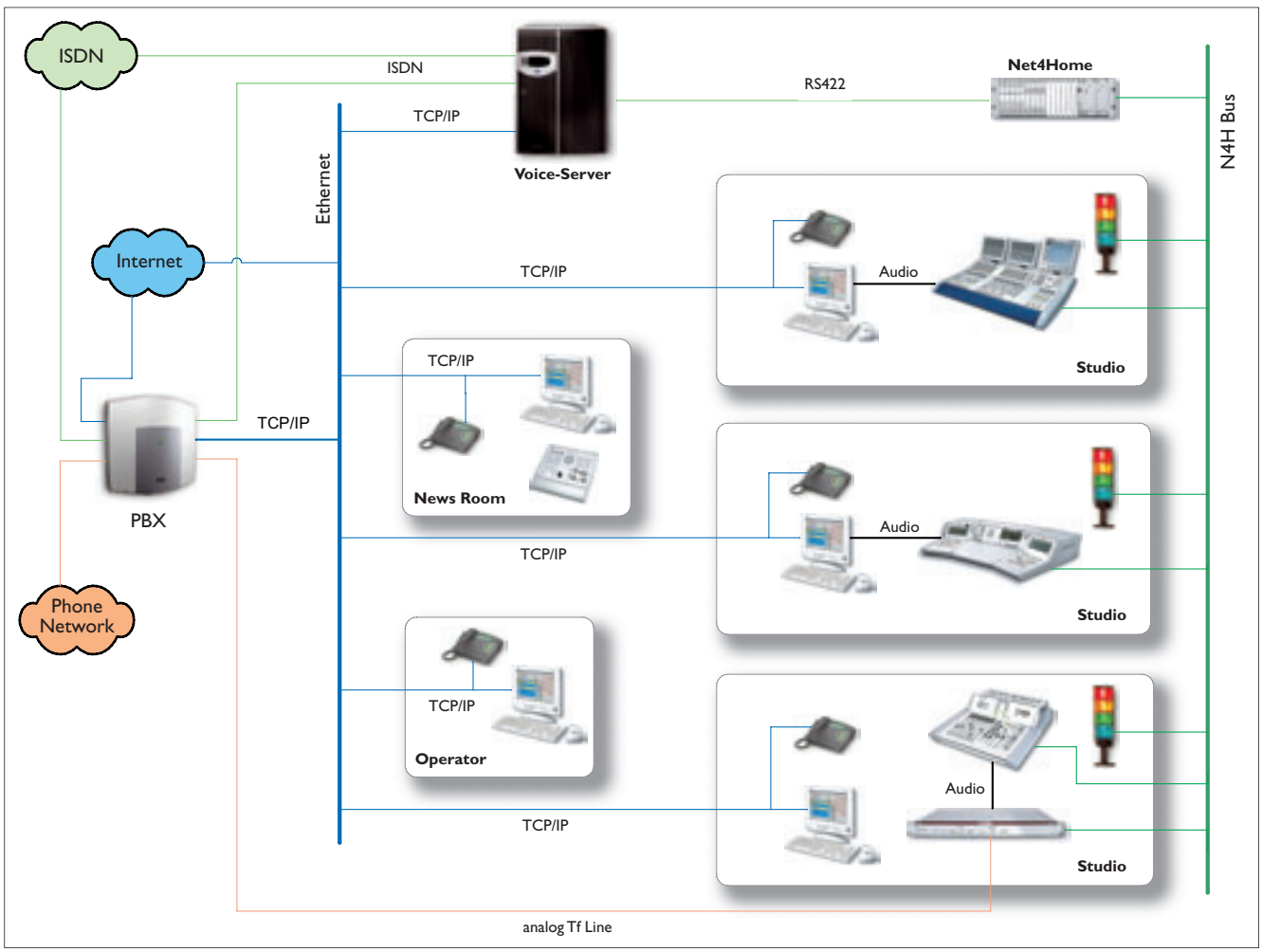
Up to 120 channels can be connected with the voice server via an ISDN adapter and managed/distributed using voice-over-IP. Again, operation is via the same client that controls VoIP and analogue telephone lines.

Signalling

Not only does the Studer Call Management System provide virtually unlimited control over telephone traffic, it also handles related peripherals like signal lamps, studio red-light installations, and other items of broadcast equipment that need to be controlled in tandem with communication systems.

Extended applications

Connected to a telephone network that supports caller ID (e.g. ISDN), the STUDER Call Management System can also be linked with directory services. This allows focused analysis of caller demographics, which offers major benefits for gaming and voting applications.



Studer Call Management System block schematic

Studer D21m I/O System

The D21m I/O system offers very cost effective inputs and outputs with maximum flexibility, also at 96kHz operation. Different I/O modules can be plugged into the frame, providing I/O systems tailor-made to customer's needs in an extremely compact format. Full redundancy is available; from power supplies up to redundant interconnections. The D21m I/O system is currently available with Studer OnAir 3000, D950 and Vista series digital consoles.

Peter Weber

System Philosophy

The D21m system acts as the I/O to the DSP core and is connected via a Studer proprietary high density link. In Vista systems the connection is made via PED21m cards, which are standard processing cards with additional link capabilities. The high density link distance is limited to 10m, so the local I/O frames must be located close to the DSP core. For longer distances, up to several kilometers if required, optical fiber MADI links are used. In this case one or several MADI I/O cards sit in the local D21m frame which acts as a "hub". Using this "star" architecture ensures that any problem with one of the remote I/O boxes does not affect the whole I/O system. A maximum of 6 remote I/O boxes (stage boxes) may be connected to one hub frame. If additional I/O channels are required, it is also possible to have multiple hubs (local frames) in the system. Redundancy issues are highly important, and it is therefore possible to run any MADI links over redundant cables, with the system switching automatically to the redundant connection. For 96 kHz operation it is possible to use the second link as a bandwidth extension, keeping a total of 64 MADI channels at 96kHz.

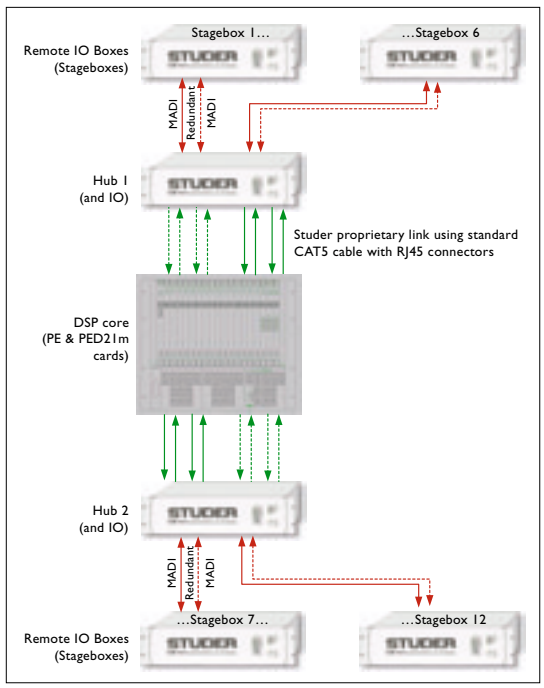
The MADI link between the D21m hub frame and the remote I/O boxes also carries signals for the control of the microphone amplifiers and for monitoring the condition of the remote I/O cards and displaying the results on the console system surveyor page. This is done without sacrificing any audio channel bandwidth within the MADI link. Additionally, it is possible to "tunnel" an RS422 signal through the MADI connection and make it appear via an identical connector on the Hub frame adjacent to the core, so that e.g. a MIDI device can be connected via the remote I/O box

The frame and its cards

One D21m frame provides space for twelve I/O cards. Since the audio connectors are integrated into the cards themselves, no internal wiring is necessary and user flexibility is assured. Following I/O cards are available: Line In, Line Out, AES/EBU, Mic (optional analog insert), ADAT, TDIF and MADI. Since the AES/EBU card has optional sampling frequency converters on the inputs and/or outputs, it is even possible to work with mixed sampling rates within the same system or, by providing a separate sync signal to the AES/EBU cards, it is possible to have the outputs at any desired sampling frequency.

Remote I/O frame as "Shared I/O"

In applications where two control rooms need to have access to the same microphones from one single studio, a D21m stagebox can be shared between two Vista mixing consoles. This allows substantial savings in complex broadcast installations whilst providing great flexibility for the user.



STUDER
professional audio equipment

Recent Installations

Studer D950M2 in OB van, RSR Lausanne, Switzerland

Studer OnAir2000M2 Modulo, Europe1 Paris, France

Studer OnAir2000M2, Radio Monte Carlo Paris, France

Studer Vista 7, SFS Digi-Media Shanghai, China

Studer Vista 7 with Remote bays, DetNorske Teater Oslo, Norway

Studer Vista 7 in OB van, VCF Paris, France

Studer digital mixing console line-up

OnAir 500 *OnAir 1000* *OnAir 2000M2* *OnAir 2000M2 Modulo* *OnAir 3000* *OnAir 3000 Modulo* *OnAir 5000*

D950 M2 *Vista 6* *Vista 7* *Vista 8*