SWISS SOUND

NEWS AND VIEWS FROM STUDER

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In this issue:

Dear SWISS SOUND reader,

Bruno Hochstrasser

I am very pleased to present to you today our magazine SWISS SOUND in a slightly different form. You will see that in addition to our technical articles which enjoy a high reputation among our readership also news from the market and from the «STUDER-Family» are part of the publication. I sincerely hope that you will appreciate this new layout.

We at STUDER Professional Audio AG are proud to state that we had a very successful business year. The integration into the Harman International Industries' group showed positive results. Major organizational changes in Regensdorf have led to cost reduction and to efficiency improvements. Our R&D department was enlarged again and we could set future orientated milestones with the introduction of new digital products and system components. We are very much looking forward to presenting to you the results of our efforts in the coming months. The next issue of the SWISS SOUND which will be published at the upcoming AES Convention in Copenhagen will bring you the details.

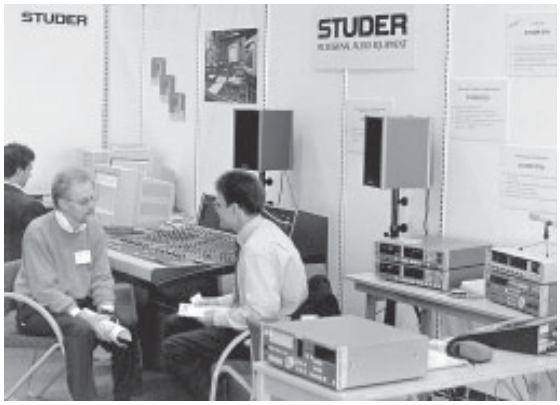
I would like to thank you sincerely for your faithful and constructive ccoperation with our company in this past year. For the coming year I do wish you also in the name of all my colleagues a successful, happy, and prosperous 1996.

Bruno Hochstrasser

STUDER at international exhibitions

Exhibitions are always an important occasion for STUDER to show new products and - most important of all - to interact with our customers. Consequently the STUDER booth at the 99th AES Convention in New York was again the meeting point for experts from all over the world.

STUDER presented on this occasion for the first time the MO Recorder D424 *(Swiss Sound 35)* and the D19 MicVALVE *(described on page 9 of this issue)*. In addition the show presented the opportunity to demonstrate for the first time in the US the D940 Digital Mixing Console.



Another major exhibition was the InterBEE in Tokyo (see front page).

Smaller but very compact was the exhibition in connection with the 17th Nordic Sound Symposium in Bolkesjo (Norway). This remote place in the Telemark province, two hours by car from Oslo and situated in a beautiful landscape, is the venue every second year for the gathering of 250 experts from all over Scandinavia which come together to get informed with respect to the newest developments in professional audio. ■

SWISS SOUND

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Digitale Systems

Application of the MADI-Format in Matrix Routers

by Karl Otto Bäder

Karl Otto Bäder

1. The Development of Matrix Routers

Since the early days of radio signal distribution of both, internal and external connections, was one of the main tasks of a broadcasting house. What started as a patch bay - similar to the telephone connection systems of the early days - developed to relay driven and even later electronically switched connection arrays. Each connection had its own switching point.

As experience showed that only a certain number of all possible switching points were active at a time concentration strategies were introduced (also following the contemporary trends in telephone switching technology). The theoretical number of switching points Z according to:

Z = m (inputs) x n (outputs)

was reduced due to a configuration with separate input and output switching matrices to:

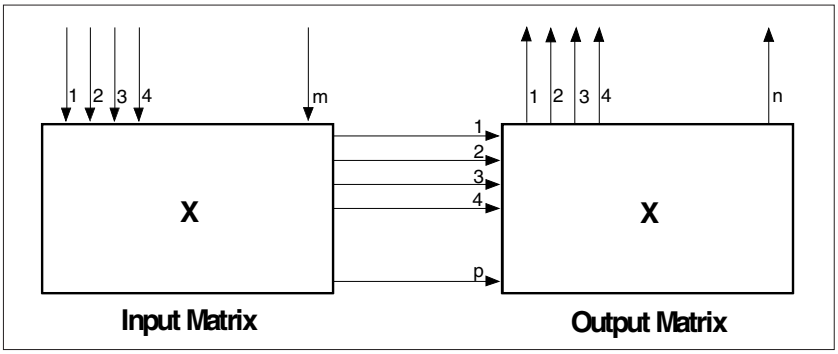

Fig. 1: Broadcast Routing with separate Input and Output Matrix.

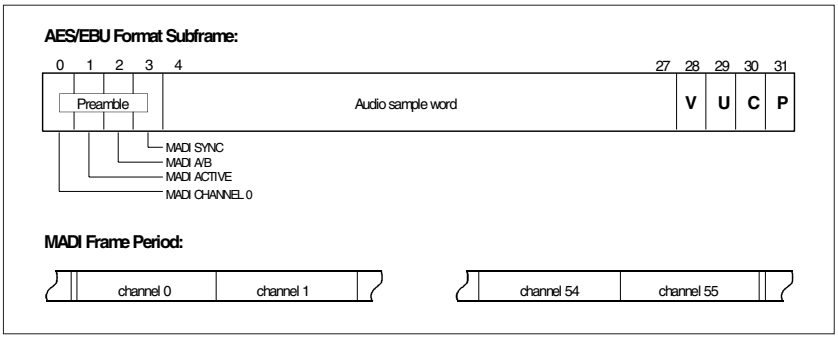

Fig. 2: MADI-Format

Z = (m x p) + (n x p)

with p being the number of interconnections between both matrices *(Fig. 1)*.

This basic circuit was initially used also with the introduction of digital signals; but soon ideas for further concentration came to life, especially by using time multiplex technologies. If it would be possible to find a multiplex format which could also be useable for the signal transport within the broadcast organization, then not only the matrix router could be simplified, but also the - so far very expensive - cabling.

In the meantime such a format does exist, it is called MADI.

2. The MADI Format

The MADI standard (Multichannel Audio Digital Interface) is a derivate of the industry standard FDDI (Fibre Distributed Digital Interface). This standard is used in data communication with a transfer rate of 125 MBit/sec over coax cable (up to 200 m distance) or over glass fibre (up to 2000 m). The possible length depends on the structure of the interfaces and the line equalization. The input word is chopped into 4 bit blocks, and each block will be then transcoded into a 5 bit block according to a given truth table. This increase in block length has the result to achieve a NRZI coding. By the 4:5 extension a net data rate of 100 MBit/sec is at the user's disposal.

In the MADI format this allows the transfer of 56 AES3 subframes with 32 bit each. Under the assumption that also a +12,5 % varispeed deviation should be permitted, the data rate is computed according to the following formula:

(48 kBit/s + 12,5%) x 32 [bit] x 56 [channels] = 96,768 MBit/s

This is a good yield of the given capacity [1], [2].

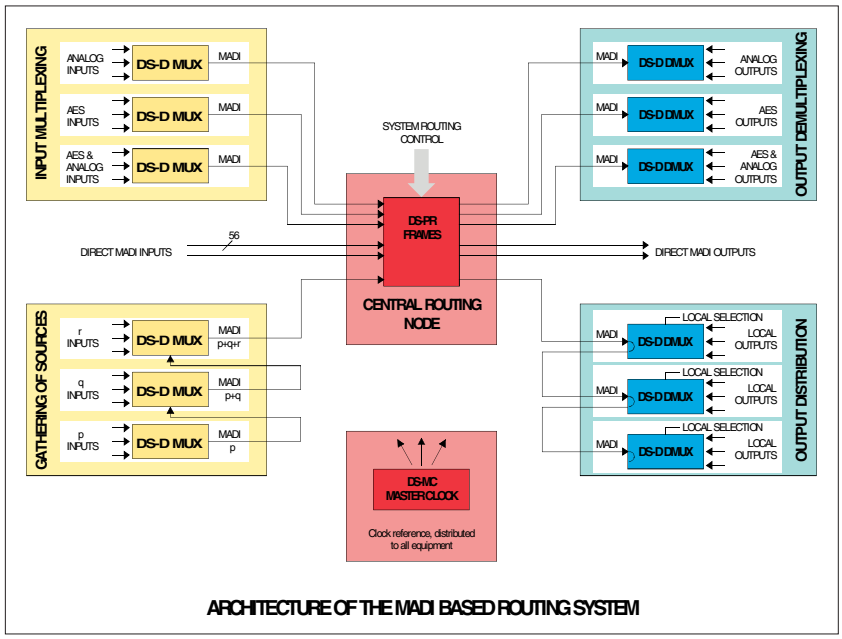

Fig. 3: Block diagram of the MADI-Router

It is easy to understand that this format simplifies the interconnection between a digital mixing console and a digital multichannel tape recorder; originally it was in fact designed as a point-to-point connection between devices of this kind. In addition it would be very attractive if we could combine all outputs of a studio and send them via one MADI cable to the main switching room intead of having a multitude of single audio cables. This, however, would require the techology of «unpacking» the MADI frames and to «repack» the single audio channels into other MADI frames.

If this problem is solved it is then only a small step to a MADI router: there is merely the switcher missing which is able to route the single channels out of a MADI packet.

3. The MADI Router

STUDER has solved these problems and is offering MADI-Router as a part of its system solutions. MADI-Router are already in operation in France and in Switzerland and work to the customers' full satisfaction.

The system consists of:

- peripheral components which have the ability to «pack» audio sources into MADI frames *(Fig. 3 left hand side)* or to distribute a MADI frame to the single audio destinations *(Fig. 3 right hand side)*,

- and a switching node *(Fig. 3 center)*, which receives and sends MADI signals.

A MADI Router can be regarded as a network with a star topology. The hub (switching node) reaches with eight MADI channels a throughput of 1 Gigabit/s, which is among the fastest network systems today. In contrary to pure computer networks MADI has the advantage that AES/EBU signals can be directly processed without format conversions.

The peripheral components accept either AES3 signals (via interface) or analog signals (via converter). In both cases the signals first are given on an internal bus working in time multiplex *(Fig. 5)*. This bus consequently then feeds the MADI driver.

It can happen that a studio does not supply enough channels to fill a full MADI frame. The peripheral components are able to accept partially filled MADI frames, to fill it up with the own input signals, and to resend it *(Fig. 3 left bottom)*. This process can be daisy-chained until all subframes of a MADI signal are set valid (i. e. contain useful data).

Vice versa the system works also at the audio sinks *(Fig. 3 right bottom)*.

Fig. 5 depicts the components for the conversion for analog signals (a) and for AES/EBU-signals (b). The output of the A/D-converter in (a) feeds directly the internal multiplex bus, an additional insertion of the component (b) is not required. The components for the re-conversion are built vice-versa.

The switching node has the duty to extract single subframes from a MADI signal and to insert it into another MADI frame. This switching transition has to happen exactly at the beginning of a AES subframe. Any other switching point could lead to incomplete AES frames, which then are not readable or may produce switching clicks.

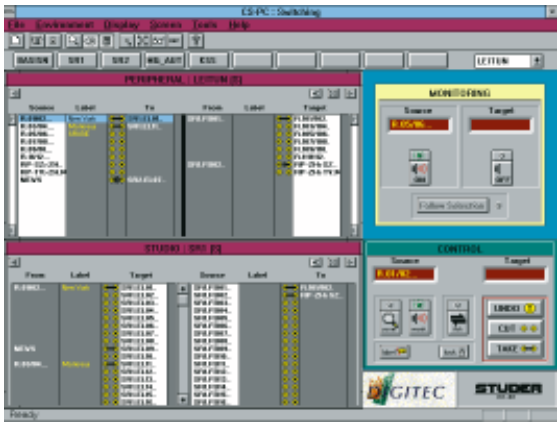

Fig. 4: Indication of the matrix status via video monitor

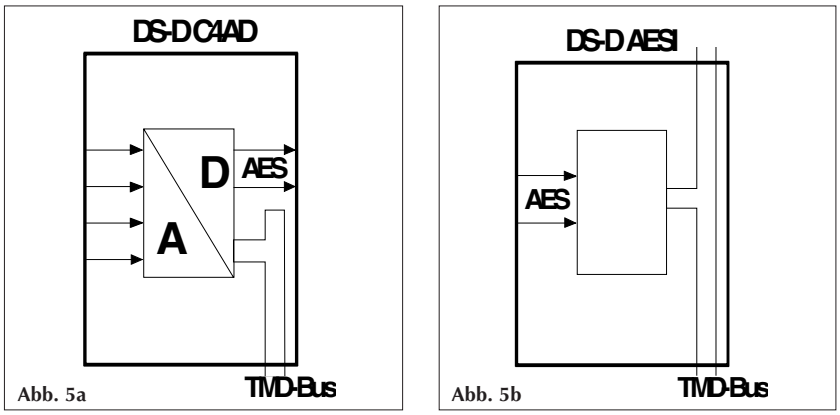

Fig. 5: Converter elements for analog and digital signals

The STUDER MADI-ROUTER provides high-speed DSP capacity which allows the integration of mixing tasks into the system like crossover between two switching states or mono signal generation out of a stereo source.

In the AES3 standard a preamble infringes the coding law and can thus be easily identified. Such a method is not provided in the MADI standard. Whilst the AES3 signal is a «self clocking code», the MADI signal requires an external sync signal which has to clock not only the switching node but also the peripheral components. It is good engineering practice to use the same sync signal to distribute the master clock to the single studios thus solving two problems at the same time.

A certain tolerance is allowed for the AES3 inputs or outputs connected at the peripheral components. If they are clocked with the same clock frequency their phase may shift up to the tolerances as defined in AES11. Such phase offsets can easily occur by cable delay times. But if also the clock frequency is different from the MADI reference clock (e. g. in connection with external sources) asynchronous SFCs are required.

4. Control circuits

The control of matrix routers has to be possible in many different ways, e.g. by:

- automatic mode according to a switching schedule and triggered by a real time clock,
- manual interference in case of short-term alternation, either by editing the switching schedule or by direct control,
- full manual control in case of unexpected and immediate changes.

These requirements call for a multitude of control facilities on different hierarchy levels and locations. Interconnetion of the control devices via LAN is a very versatile solution; if the control unit is a PC it can talk directly to the network, in cases of dedicated control keyboards appropriate interfaces are required *(Fig. 6)*. To improve transparency labels can be designated to the single sources or sinks.

The networked control is very reliable and can be easily expanded. Control hierarchy is defined by programmes and can thus by adapted to changing operational requirements. The matrix status can be indicated on different locations by video data monitors *(Fig. 4)*.

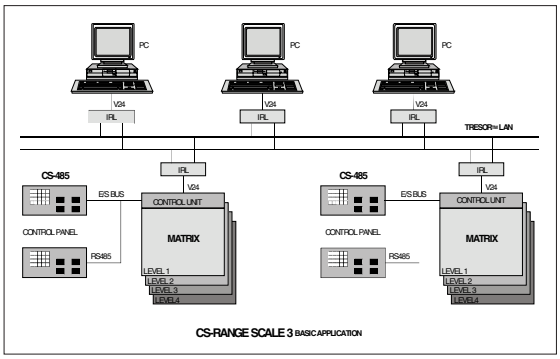

Fig. 6: Matrix control via LAN

Literature:

[1] MADI INTERFACE - AN OVERVIEW
S. Plumbridge und Y. Hashmi, STUDIO SOUND
Dezember 1989, p. 35-36

[2] AES RECOMMENDED PRACTICE FOR DIGITAL AUDIO ENGINEERING - SERIAL MULTICHANNEL DIGITAL INTERFACE (MADI)
Journal of the AES, Vol. 39, 1991, p. 368-377

■

We offer:

Symposia and Seminars

Symposium in digital ...

The rapid advance of proceeding technology is in many cases the main topic in discussions with our customers. Actual example: Hosted by the Training Center of the Deutsche Welle (German federal short wave station, Cologne) STUDER participated in a Symposium held in Kuala Lumpur (Malaysia); *Robert Müller* (right) spoke on «Digital Studio Engineering».

... and Service Seminar in analogue:

If all 1/4" tape recorders ever manufactured by STUDER would be added up, one could count easily more than 100.000 units. Many are still in operation and work day and night.

To guarantee undisturbed operation, regular maintenance is mandatory. This requires, however, occasional information updates by our experts who can share their experience.

Hence STUDER offers Service Courses for all different units in regular time intervals. The interest of the customers can be seen by the participation from all over the world; Danmark, Switzerland and Korea e. g. joined for a recent A807 seminar

with *Martin Berner* (second from left) being the instructor with longstanding expertise. ■

STUDER Service Seminars in 1996/1

96031E	**Service Course**	**A807**	**english**	**11.03. - 14.03.96**	**4 days**
Tape deck features, ports disassembling/assembling and alignment of tape deck, explanation of various circuits, trouble-shooting.					
96032E	**Training Course**	**D424**	**english**	**18.03. - 20.03.96**	**3 days**
MO-technology, operation, applications, explanation, servicing.					
96033E	**Training Course**	**D827 MCH**	**english**	**21.03. - 22.03.96**	**2 days**
Operation and applications.					
96934E	**Service Course**	**D827 MCH**	**english**	**25.03. - 27.03.96**	**3 days**
Electronics, trouble-shooting and servicing.					
96951E	**Service Course**	**D741**	**english**	**20.05. - 21.05.96**	**2 days**
CD-R-technology in general, operation, explanation of circuits, disassembling/assembling, alignments and servicing.					
96052E	**Service Course**	**D730, D731, D731QC D732, C221**	**english**	**22.05. - 24.05.96**	**3 days**
CD-technology in general, operation, explanation of circuits, disassembling/assembling, alignments and servicing.					
96061E	**Service Course**	**980**	**english**	**24.06. - 27.06.96**	**4 days**
Electronics, trouble-shooting and servicing.					

(This List represents the actual situation. As changes are possible please check again prior to registration).

We hear:

News from our Representatives

NDR is using DYAXIS IIi in production

by Bernd Fuhrmann

STUDER Germany installed in August 1995 a 24-channel DYAXIS IIi system in the drama production studio of the NDR (North German Radio) in Hamburg. In 1994 NDR used already a 16-channel DYAXIS II system for the production of the drama «The man who lived twice» (140 minutes, director: Norbert Schaeffer) which was promptly awarded the «drama of the month» citation by the academy of arts. So NDR's recent decision to continue with the STUDER EdiTech product line was not a surprise.

NDR gave the task of planning and integration of the existing analog technique environment to STUDER Germany. In discussions with the NDR engineers and technicians the requirements could be defined and possible solutions were discussed.

The system is operated from the machine room via a MultiDesk and two Monitors. The control room has another VDU for monitoring purposes. To ensure sight contact and an undisturbed sound area for the monitor speakers, the two video monitors have been lowered down next to the MultiDesk and mounted on a rolling table which was individually designed for this application in close cooperation with NDR's physician with special attention to the ergonomic aspects.

This world wide largest DYAXIS IIi installation uses six HD drives with a total capacity of 24 GByte (equivalent to 66 track hours). Two stand-by drives are provided for operation use during the back-up phase of the system.

The complete system and additional devices like D731, D19, D740 and digital patch bay are mounted in racks, painted - like the moveable control table - in STUDER colours.

The drama department of the NDR in Hamburg has with this installation definitively performed the step into the digital age; since the installation all drama productions have been made on the DYAXIS system. ■

Clear solutions inspite short timeframes

by Achim Strauch

MDR (Central German Radio) has to clear his existing studios in the state parliament by the end of this year. As the new buildings are yet in a very early state of planning, an intermediate solution was necessary.

Two continuity studios (D.J. type) had to be constructed plus the existing production studio transferred to the intermediate premises. The new on-air studios are equipped with one STUDER 970 console, three D731 CD Player, two A807 Tape Recorder, and one A721 Cassette Recorder each. The studios are prepared for the installation of computer-aided transmission systems. STUDER Germany supplied not only the equipment but also the woodwork and the patch bays, and performed planning, installation and comissioning on site.

The existing production studio was moved to the new venue, installed and put into operation. The heart of this area is a STUDER 903 production console.

A new intercom system developed by STUDER Germany has been installed in all studios. The communication between studio CEO, moderator and control room is achieved in a very comfort-

able way (priority levels, call storage, busy indication and integration in the existing consoles). The intercom system allows also monitoring of different program contributions based on STUDER 990 technology.

The total work was performed in seven weeks. Since November 30 the studios are on air.

News from the STUDER world

- From the United States we received an order covering 60 STUDER A827 Multitrack Tape Recorders; 11 units alone go the the New York based studio Hit Factory which replaces part of its multitrack recorder pool.

- KBS in Seoul ordered 16 STUDER 963 mixing consoles; the delivery must be completed already by January 1997.

- EPLS in Algeria has substantual plans of expanding their facilities and has purchased 60 STUDER A807, 30 STUDER D731 and a number of STUDER Mixing Consoles.

- The Sendezentrum München (Transmission Center) took delivery of the largest STUDER 990 built so far; this digitally controlled analog console features 60 input channels. For audio post production in the TV department 4 STUDER 962 mixing consoles with VCA control and video editor control interface were ordered.

- Taiwan will receive three STUDER D827 Digital Multitrack Recorders. In this country with highly developed studio structure then a total of six of these units will be in operation.

- MBC Seoul purchased four STUDER 963 mixing consoles which will go successively into operation, the last in mid 1997.

- NDR in Hamburg is expanding; next to the DYAXIS IIi (see page 7) one STUDER 903 mixing console and three STUDER D827 Digital Multitrack Recorder with 24-bit extension will go into operation.

- ERTU in Cairo has placed an order with STUDER concerning the audio installations in the TV studios 1 and 4. ■

THE NEW PRODUCT IN THE STUDER D19 SERIES

STUDER D19 MicVALVE

by Rudolf Kiseljak

Rudolf Kiseljak

Shortly after the introduction of the new STUDER D19 series of studio products in spring 1995 [1] the second unit from the range could be presented at the 99. AES Convnetion in New York; it is named D19 MicVALVE and is, as the designation already suggests, a mic preamplifier with valves.

Together with the renaissance of natural sounds and the classical recorded performance of a real artist (as opposed to computer programmed sound) users quote often the term «valve sound» in a meaning far beyond nostalgic reminiscence. STUDER engineers have investigated systematically the differences between valve and transisor amplifiers. The result of this research is now part of the D19 MicVALVE where the typical properties of valve amplifiers are implemented in the form of adjustable parameters.

The unit is not just another «vintage» sounding preamplifier with a valve stage, but more a device like an equalizer with a variety of sounds to choose. A sound engineer can generate with the help of this device his own acoustical picture.

At the same time, STUDER wanted to preserve the high resolution digital recording and processing with the advantage of good noise performance, less distortion and the absence of crosstalk in focus. Therefore we are using one of the best Analogue to Digital converters on the market, included DSP Noise Shaping, and many other interesting features.

An initial order intake of 60 units at the exhibition underlined that this concept found wide interest on the market!

Basic design

The D19 MicVALVE is a 2-channel MIC/LINE preamplifier with analogue and digital outputs. The basic signal path is solid-state, enabling superb direct to digital recordings.

A Valve Dignifier stage with 2 ECC 81 per channel can be switched into the signal path, providing a number of controls for individual valve sound treatment. Each channel has a switchable analog insert and an analog output. Both channels are then combined into an AES/EBU output. The built in 20-bit A/D converter technology represents today's state of the art. The mounting is modular and the A/D converter can easily be upgraded as technology advances.

The front panel of the unit is clearly laid out to represent it's 2-channel nature. Each channel has controls for the Mic and the Line input sensitivity and the Fine Gain of the selected input. The level of the analog output can be adjsuted by a separate knob. The Mic input features 48V switchable Phantom powering, a highpass filter and a phase reversal switch (which effects also the line input). Three more keys are used to switch the valve stage into the signal path, select the insert point pre/post the valve stage and activate the insert, A bright LED display is used to indicate the activity of all those functions, as well as for a 16-segment PPM meter.

The knobs for controlling the valve parameters are explained below.

A third operating area for global functions is situated at the right hand side. They include Peak Hold of the PPM meters, a selection of internal and external sync clocks for the digital part, the analog soft clip function and the output wordlength selection. The 20-bit wordlength can be

Fig. 1: D19 MicVALVE front panel

reduced to 16 bits, and either Dithering or Noise Shaping techniques [2] are used to retain most of the 20-bit quality even on a 16-bit output. For the optional digital 8-channel output (either ADAT™ or TDIF-1™, like in the D19 MicAD) the channel configuration of the AES/EBU output can be selected *(fig. 1)*.

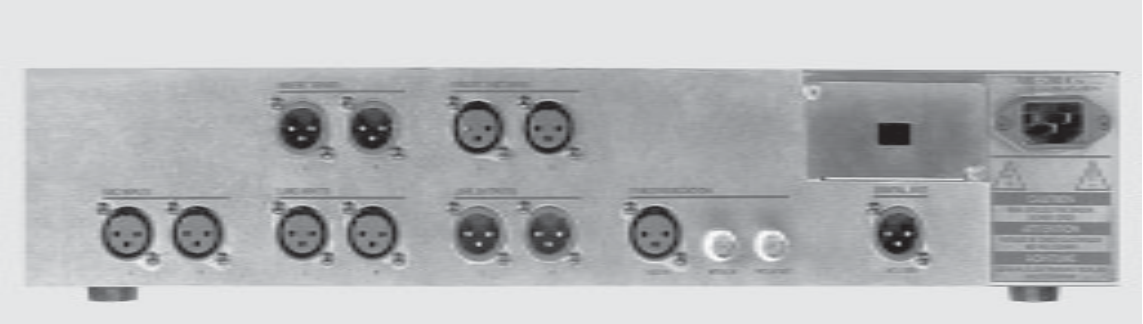

Fig. 2: D19 MicVALVE rear panel

The rear panel houses the separate XLR's for the transformer balanced mic and line inputs, the two XLR pairs for the balanced analog inserts, and the line outputs. In addition to the analog connections, there are the AES/EBU output and the synchronization (supporting AES11) and word-clock inputs and outputs *(fig.2)*.

Adjustment of the «valve sound»

As stated above, Studer engineers have analyzed the characteristics of the typical valve sound in order to find out just which ingredients are responsible. The differences from the theoretically ideal amplifier transfer characteristics can be described by 3 dominant parameters, both in subjective and in technical terms *(see table 3)*.

These parameters have been made adjustable in the D 19 MicVALVE; the recording engineer is thus not forced to use a preset sound but has the possibility to create a sound according to his individual likes.

Due to the variability of the single parameters and the excellent properties in the direct microphone path inclusive the A/D conversion the STUDER D19 MicVALVE can be used in many applications in professional audio. Especially in direct digital recording, mastering, in project studios and in post production many tasks may be successfully solved with this new development.

Desination	Subjektive term	Technical reason
Bass Warmth	the sound of low frequencies becomes rounder basses have more depth vocals have more body percussive instruments are less aggressive	the group delay behaviour due to AC coupling of the stages is different in tube amplifiers
Angel Zoom	adds transparency and clarity to vocals emphasizes the solo instuments	valve amps have a characteristic response, midfrequency harmonic content is emphasized
Valve Drive Soft / Hard	tight, full sound the sound is softer / harder	the harmonic spectrum when overloaded is different, the content of odd harmonics can be adjusted.

Tab. 3: Properties of valve amplifiers

Literature:
[1] D19 MicAD: Swiss Sound 35, page 2
[2] Noise Shaper: Swiss Sound 35, page 3

■

STUDER D741

New CD-Recorder for universal use

by David Roth

David Roth

STUDER has been active in the research and development of CD Player and CD Recorder systems for 12 years. With the CD Player generation D730, D731, D 731QC, D732 and the respective remote systems STUDER offers a complete CD product range. The reliability, the capability to reproduce CDs even when far out of specifications, the ergonomic design, the audio quality and the dedicated unique features for the professional user are the key factor for our success with the new CD Player generation.

The corresponding CD Recorder, the new STUDER D741, was presented for the first time at the recent AES Convention in New York. The numerous new features as well as the universal applications have been very well received by our customers.

Interfaces

Main target for the development was a universal device which can be used for all CD applications. Transcriptions e.g. from archive tapes can be generated via the balanced analog inputs; their sensitivity can be changed in the CAL mode to +15 dBu or +1 dBu (for low level HiFi sources) via a setup menu. In the UNCAL mode the levels for the right and left channel can be set independently.

Both, SPDIF and AES/EBU signals can be used as digital sources. A built-in digital asynchronous sampling rate converter accepts input signals with a sampling rate between 32 and 50 kHz. Via the setup menu the digital output can be directly linked with the digital input which allows a daisy-chain connection of several D741 CD Recorders. In this configuration several CD-Rs can be produced at the same time; the drive control is effected via the parallel control interface.

So far CD Recorders on the market have been either pure audio recorders or pure SCSI data recorders without audio circuits and control systems. There is, however, a clear trend on the market, that the strict separation of CD-Audio and the different CD-ROM-formats belongs to the past. Therefore, the STUDER D741 CD Recorder features a SCSI 2 interface which allows to write all common CD formats including audio (audio workstations) in double speed and to read out CD-Rs up to four times real time.

The protocol of this interface is identical with the new Philips CDD 2000. This allows the use of practically all CD-writer software packages available today.

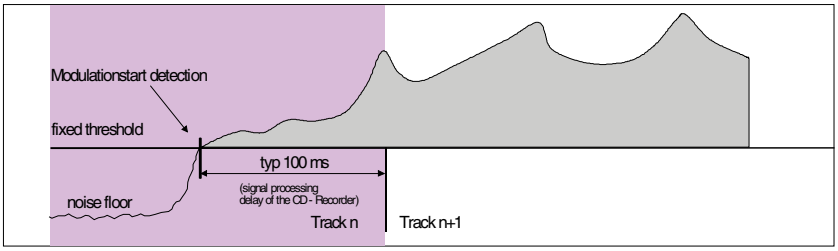

Fig. 1.1: Automatic track increments of first generation CD-recorders

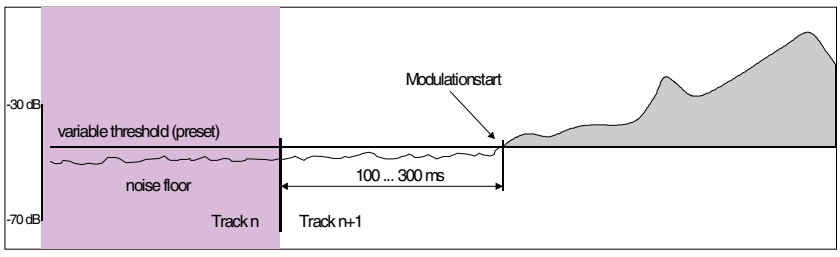

Fig. 1.2: Adjustable delay of modulation start as well as the modulation threshold of the D741

TRACK- and INDEX increment

Track and Index marks can be generated via the keyboard or automatically. In case of a digital source the track marks (in case of a CD source also index marks) are derived from the source subcode via the user channel in the AES/EBU or SPDIF interface. The time delay between track mark and audio start can be normally neglected; however, an adjustable delay can be used for the compensation of time delays such as late ID marks on DAT-tapes.

With analog sources the track mark can be derived from the modulation start of the audio signal. Both, the threshold level (-70 … -30 dB) and the audio delay time (-1 … 0 … +1 second) can be adjusted. This wide range ensures that also different noise floors in analog recordings can be accepted, and that the start time is always between 100 and 300 ms after the track change *(Fig. 1.2)*. Specially with CD-Recorders of the first generation due to internal delays, the modulation start was before the beginning of the track. As a result problems occurred, if such tracks had to be cued on a CD Player *(Fig. 1.1)*. This delay is also recommended because not all players

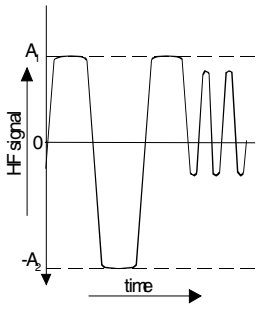

Abb. 2.1: P << P_0

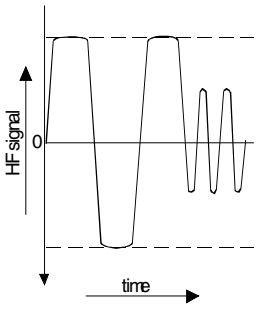

Abb. 2.2: P ~ P_0

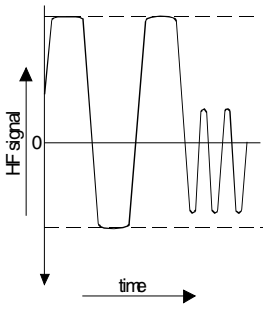

Abb. 2.3: P >> P_0

$$ß = \frac{A_1 + A_2}{A_1 - A_2} \qquad ß = 0 \ldots 0{,}08$$

on the market cue as precisely as a STUDER CD Player. In addition, many CD Players have a soft muting function, which might be up to 50 ms. Too early start after the track change would then be partially muted.

Track at once- and disc at once-mode

The D741 allows to create a CD-Audio step by step. This means, that part of the disc may be written and additional tracks can be added later. This procedure is called incremental writing, assemble mode or track at once mode. The track at once mode allows to add tracks to the disc, until the table of contents (TOC) is written. Whenever a new track is added to the already existing recording, an overlap of the recordings is generated. As a consequence, an uncorrectable E32-flag is unavoidable *(see also Swiss Sound no. 34, October 1994)*. Since there must be silence between such tracks, an E32-flag will result in a non audible interpolation. However, if these discs are used for the direct transfer to the glass master for the CD-production, these E32-flags might result in an interruption of this process. Not all pressing plants can handle CD-Rs, written in the track at once mode yet. Therefore, we recommend to check, if your pressing plant can accept such CD-Rs. To avoid possible problems caused by the track at once mode, the D741 allows in addition to write CD-Rs in the disc at once mode through the SCSI-interface. In this mode, the complete disc including the table of contents is written in one single step. Therefore no uncorrectable E32- flags will be generated.

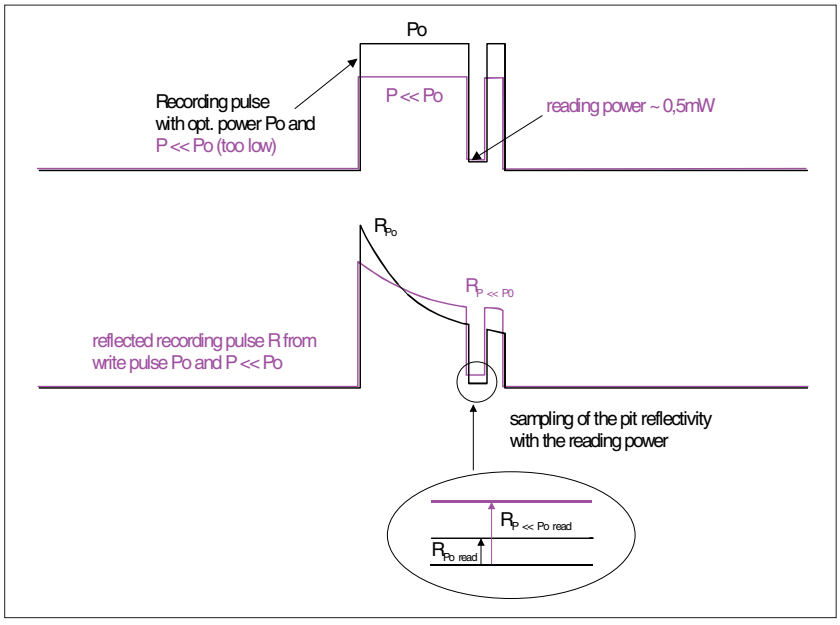

Fig. 3: Write power calibration based on intermediate measurement

Individual laser power calibration for each CD-R (OPC)

The sensitivity of the recording layer can differ considerably between different brands of CD-Rs and may vary in the range of 4 to 8 mW optical writing power required. The optimum value is prerecorded in the ATIP of a preformatted CD-R and so the coarse value can be adjusted in the CD Recorder. This coarse value is, however, not precise enough and can generate asymmetrical HF which in turn may generate problems when read on an older CD Player model. The cause can be found in tolerances of the laser wavelength (and the dependence of the optimum laser power on the wavelength) and in tolerances in the medium itself. To improve the situation the STUDER D741 CD Recorder writes test recordings with different laser power in an unused area (power calibration area PCA) of the CD-R. Then the different test recordings are analysed. If the write power P is much larger or lower than the optimal value P_0 the HF signal is not symmetrical *(Fig. 2)*.
In the CD Recorder D741, the asymmetry of the HF-signal (without DC) is measured with ß. Since ß has to be within 0 and 0.08, the tolerance for the asymmetry is between -4 % … 0 % for CD-Rs. This is much less compared to normal CDs, which might have asymmetry between -20 % … + 20 %.

Dynamic control of the laser power during writing

In spite of the general calibration of a CD-R at the beginning (OPC) the results during the recording can differ from the optimum for the following reasons:

- variations of sensitivity in different areas of the disc,
- change of laser wavelength due to temperature differences,
- mechanical imperfections like finger prints, uneveness, etc.

Therefore STUDER has introduced an additional dynamic control of the laser power during the recording. As on a normal CD the reflection on «land» (no pit) is highest (approx. 73%). Is a pit written, the reflection drops at this spot due to interferences and refraction effects to approx. 25%. In the STUDER D741 the write process during the generation of a pit will be interrupted for a very short time (200 ns). The recorder is switched to «read-mode» and the reflection is measured. If the reflection is too high, the laser writing power will be increased until the correct value of 25 % will be reached *(Fig. 3)*.

These different background processes (individual and dynamic laser current alignment for each CD-R) are among other reasons responsible for the excellent record parameters of the STUDER D741 CD Recorder and for the extremely good playability of such recorded discs on standard CD Players. ■

NOB OB-Van for multichannel TV recording

NOB 61 is the name of the flagship among the OB Vans of the Nederlandse Oemroep-produktie Bedrijf (NOB) and is designed for large and complex TV productions. Up to 16 cameras can be connected, and production in different formats (16:9, 4:3) is possible.

The audio mixing console selected was the new STUDER 980 not only for reasons of quality and reliability but especially because of it's multichannel recording facilities. The desk is able to operate in six master channels with the respective controls in every input channel (L, C, R, front/rear, SPREAD and DIVERGENCE). Thus the console is able to work in DOLBY SURROUND productions, as well in 3/2 film sound and digital multichannel formats (384 kbit/s).

The 980 console contains a very elegant monitor unit which enables the sound engineer to listen to original, coded and decoded signals. This feature enables to monitor not only the console output but also the quality of the signal as received by the final listener.

Fader and switch control can be performed by automation. The settings (Snap-shots) can be easily stored on a small magnetic card in the size of a bank card; sound engineers can save on this personal medium their individual parameters. ■

In memoriam

Eugen Spörri

August 2, 1935 - October 10, 1995

Dr. h. c. Willi Studer

The sun is descending over the lake of Hallwil. Far out Eugen Spörri has anchored his sailing boat to prepare it for the winter to come. He makes a note in his logbook: Boat cleaned. No wind.

These were his last words, his last act in an intensive life. Born in 1935 he grows up as a single child in a family in Wettingen, Aargau. He finishes his business education with the trade diploma. His talents show up already in this early state: languages, interest in international trade connections and in technical matters. He is gaining first experience at the Bührle Oerlikon group and at Contraves and spends some time abroad in an export-orientated company in the U.K. In 1959 he marries Martha Zimmermann; three daughters and finally six grand children are offsprings of the family.

Much earlier he joins EMT Wilhelm Franz AG in Wettingen and in May 1962 he starts with the task to develop the international sales of professional STUDER audio products. With a team of three colleagues the first export success is the legendary C37. This is the starting point of his career: professional audio. Immediately an immense expansion work begins.

In 1971 EMT Wettingen is transferred into STUDER FRANZ AG with Eugen Spörri as managing director. In 1974 the company becomes a 100% STUDER daughter company and is renamed STUDER INTERNATIONAL AG. Next to the management of this company he becomes instrumental in the inauguration of an international distribution network with independent representatives. Additionally STUDER-owned companies in important market areas are set up with his help: between 1972 and 1983 daughter companies are founded in Austria, France, Canada, USA, Hongkong, Japan and Singapore. Eugen Spörri has direct influence on the business development of these companies; his abilities to establish good contacts and his sensibility for the market requirements have a very good influence. Besides the expansion of the professional product range he pushes these partnerships with great personal engagement and opens new markets.

In addition to the generation of an internal organization also extended business trips overseas become more and more part of his duties. His direct contacts to professional clients like radio and television organizations, major recording studios, and the audio industry do not only create confidence, but also help formulate precise marketing data for the future product development. Success duly rewards the effort: with approximately 190 employees in Switzerland and abroad he realizes a turnover of more than 100 Mio. swiss francs for the professional STUDER product lines.

In connection with the steady expansion of the business new challenges come up. One is the technology transfer for the manufacturing of tape recorders in India and China - at a time when only few recognize the market potential of these countries in the far east.

His excellent relations to the industry produces results when he is constructing a Joint Venture

with the PHILIPS company for the mutual development and production of CD Players. Eugen Spörri and his colleagues also manage a cooperation with the japanese MATSUSHITA company to open the STUDER product line for the R-DAT recorder domain. Finally his good contacts and his practical cooperation are important when harddisk recording is established as a new working area for STUDER and the acquisition of the US company EDITECH is the milestone for entering this new field of technology.

At the time when I realize the necessity for a succession in my position in STUDER-REVOX Eugen Spörri is effectively engaged in finding possible solutions. On April 1, 1990 the MOTOR COLUMBUS group is taking over, and Eugen Spörri becomes a member of the board of directors. He is responsible as an executive officer for marketing and sales, especially for STUDER INTERNATIONAL and the affiliates abroad. In connection with the reorganisation into divisions shortly later and the formation of STUDER REVOX AG - with the well-known restructuration - Eugen Spörri on April 1, 1991 is appointed head of the newly formed strategy and technology department.

So far the facts. It is no secret that Eugen Spörri - and with him not only his closest colleagues - could not support any longer the way MOTOR COLUMBUS operated the business. As an expert he had now to deal with managers with little knowledge in the studio market. His objections were massive, but his rich experience was not in demand any more! This stress situation led to health problems, and on December 31, 1992 he left the company after more than 30 years of loyal work.

I have always regarded Eugen Spörri as a man of faithfulness and responsibility who performed his work with expertise and personal engagement. We have lost a great personality and a dear friend.

Dr. h. c. Willi Studer