

# SWISS SOUND

NEWS AND VIEWS FROM STUDER

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## Dear SWISS SOUND reader,



**Bruno Hochstrasser**

the confidence that our customers have in our products, particularly in the field of digital mixing consoles, has recently led to a number of interesting orders. For us this is, of course, a reason for joy but also an incentive to continually refine our products. We want to maintain and even expand our technological lead and thereby signal to the professional audio market our commitment to the continual system development of our products.

This SWISS SOUND issue contains not only a number of technical articles concerning new products, but also the short introduction of two already known but technically improved

products: the advanced Digital Mixing Console STUDER D940 and the DASH Multitrack Recorder STUDER D827. Both will be presented at the AES Convention in Munich in a Mark II version. Details can be found in the articles on page 3 and 6.

We at STUDER are not only refining our existing concepts but we are also in a constant developing process with regard to new products. More about this in the next SWISS SOUND issue. In the meantime I wish you a lot of pleasure in reading!

Bruno Hochstrasser

## STUDER at international exhibitions

### Frontpage:

RSR Lausanne (A detailed report will be published in the next issue)

The 19th International Tonmeistertagung took place in November 1996, in Karlsruhe, Germany. A clear accent was on the production and reproduction of multiformat, multichannel recordings. For example, the Institute for Broadcasting Technology (IRT, Munich) together with the German Tonmeister Association has produced daily surround broadcasts in which the technical center piece was a STUDER 980 mixing console in multiformat technology.



Considerable attention was also captured by the STUDER ON-AIR 2000 digital control room console, the DVD premastering system, and STUDER auxiliary equipment for digital processing, in particular the echo canceller developed in cooperation with IRT (see report on page 5). ■

### SWISS SOUND

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## Premiere at AES convention in Munich:

# D940 MK II



Karl Otto Bäder

A large digital mixing console such as the STUDER D940 essentially consists of three functional subsystems, namely the:

- signal processing core (DSP section) and corresponding control,
- user interface with the required control and status information elements, and
- periphery that interconnects the outside world with the DSP section.

The product introduced under the name "D940 Mark II" is principally characterized by improvements and advanced developments in the latter two subsystems.

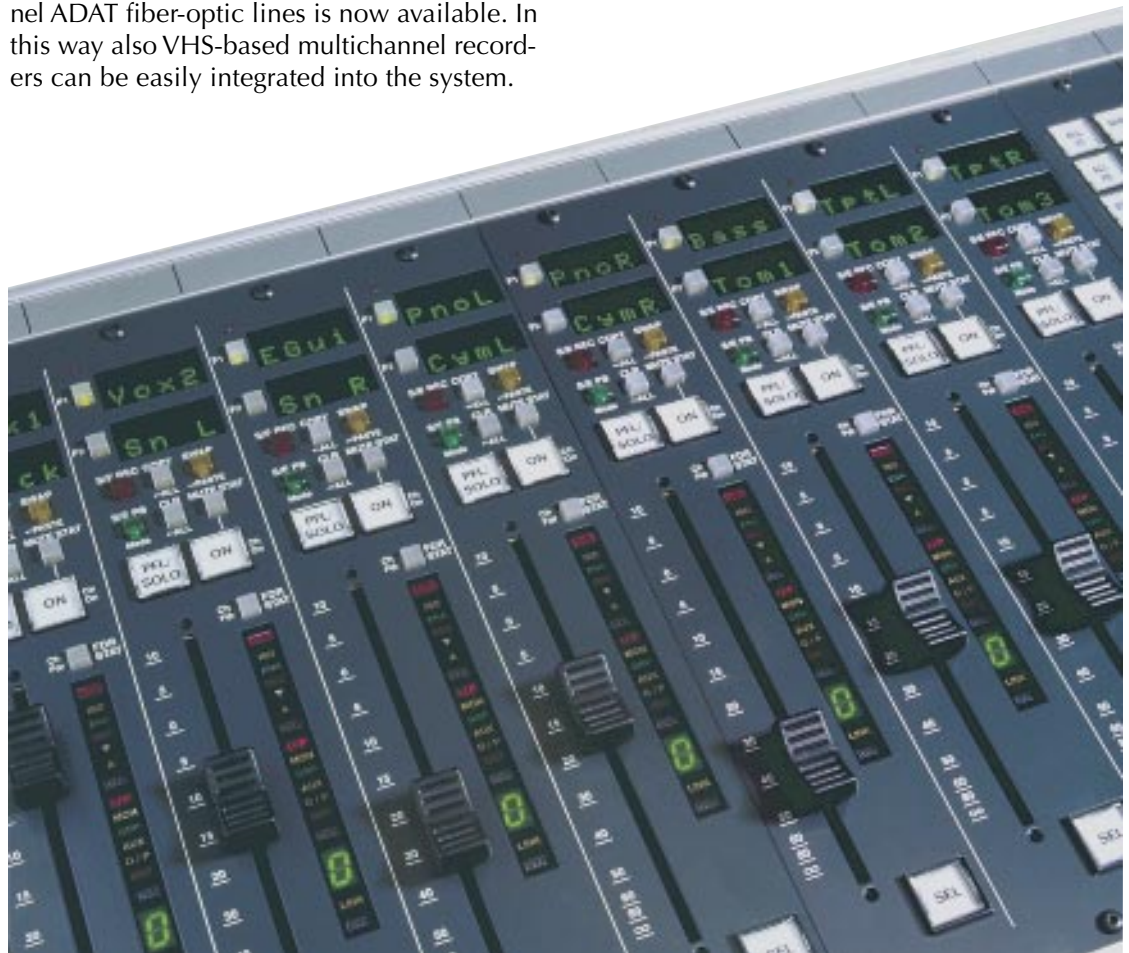
Through the integration of the product groups D19 and D19m described in the previous edition of SWISS SOUND, the quality of the A/D and D/A interfaces in particular has been greatly improved. 20-bit converters for A/D conversion and 22-bit converters for D/A conversion are now the rule. Optionally also 23-bit D/A converters with transformer outputs can be integrated in the system.

As a new feature, direct connection of 2x8-channel ADAT fiber-optic lines is now available. In this way also VHS-based multichannel recorders can be easily integrated into the system.

Also new is the capability to connect asynchronous digital sources – even those with different sampling frequencies. For this purpose AES/EBU interfaces with integrated sampling frequency converter are available.

The microphone amplifiers in which the conversion is integrated, can be remote controlled via an RS 422 interface (preamplification, phantom powering) and also be installed in remote locations via MADI fiber-optic cables. This means that the microphone preamplifier can be positioned near the sound source to be recorded with correspondingly positive effects on hum pickup and EMC resistiveness against RF communications equipment and light control systems.

The principal enhancements to the user interface are the ergonomically improved displays, and the integration of a central assignable control panel (CACP). ■



Small additions, high efficiency:

# New D19 subcards for the mixing console periphery



Rudolf Kiseljak

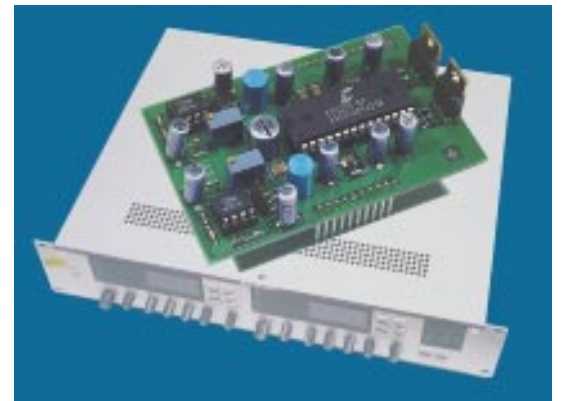
**LDP (long distance package)**

If there is a large distance between the stage or recording studio and the control room or the OB van, cabling of microphones is often a major problem. Multicore cables are heavy and costly, and in addition long links can also lead to capacitive losses, hum or RF pickup, or problems with ground potential.

In today's fiber-optic age there are now solutions that are suitable for analog as well as digital mixing consoles. The signal transmission is always digital: in the STUDER D19 MicAD an 8-channel microphone preamplifier with integrated A/D converters and a resolution of 20 bit, the LDP transmitter is installed. A fiber-optic cable that can have a length of up to 1000 m leads to the opposite element, the LDP receiver. At this point there are two possibilities:

- Subsequent signal processing continues in analog mode: in this case the LDP receiver board is installed in a STUDER D19 Multi-DAC, an 8-port D/A converter, and the 23 bit D/A conversion of this unit is used for obtaining a high-quality analog signal, or
- Subsequent signal processing continues in digital mode: in this case the STUDER D19m ADATI interface is used which outputs the signal either in AES/EBU format or in the form of a MADI signal.

Such a solution is immune from interferences, allows transmission across large distances, and offers transformers at all analog inputs and outputs. Due to the large word length of the conversion this system offers a large headroom reserve.

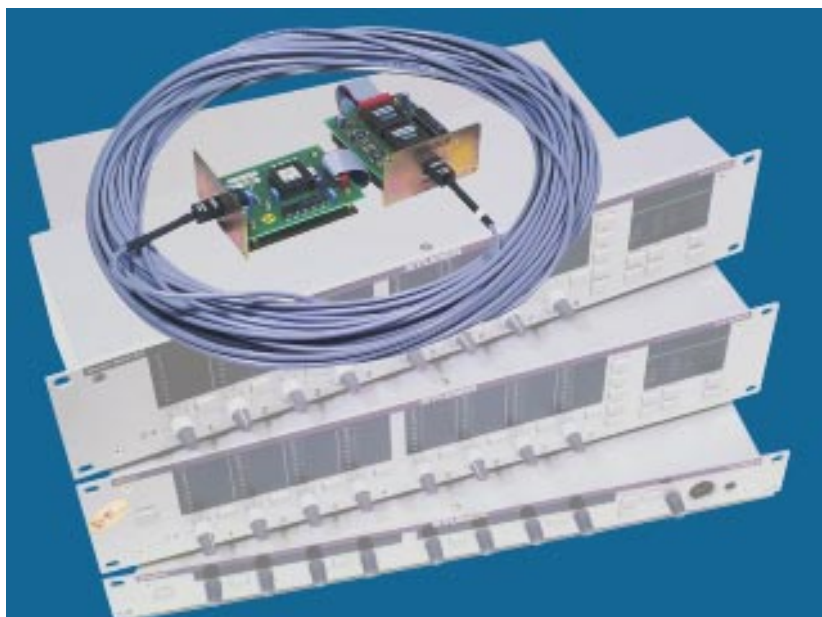


**... and 22-bit A/D converter**

New is also an addition to the STUDER MicValve, the microphone preamplifier of the D19 series, for conversion with a larger word length. The originally installed 20-bit converter is expanded by a subcard in such a way that a conversion corresponding to 22 bit is performed. The original converter remains in function.

The factory has designed the software of the STUDER D19 MicValve in such a way that the subcard is detected and the function adapted correspondingly. For this reason no correction to the software or adjustments are needed.

The advantage of the extended dynamic range is particularly noticeable in applications where the input level can fluctuate strongly due to changing recording conditions; with a linear signal-to-noise ratio of 112 dB relative to peak level an extremely large headroom is available. ■



Delays caused by MPEG Codecs can be compensated:

# Echo Cancellor



Kurt Schwendener

The reporter sits in the soccer stadium and waits for his turn. Over the headphones he hears his colleague who is currently on air. When instructed by the control room he activates his microphone, begins to talk ... and hears himself with a delay of about half a second through his headset.

Anybody who has ever tried it will understand that fluent speaking without stuttering is practically impossible under these conditions. What happened?

sports broadcasts as the one described above also the utilization of a small transistor radio for monitoring events at other sites was no problem in the past.

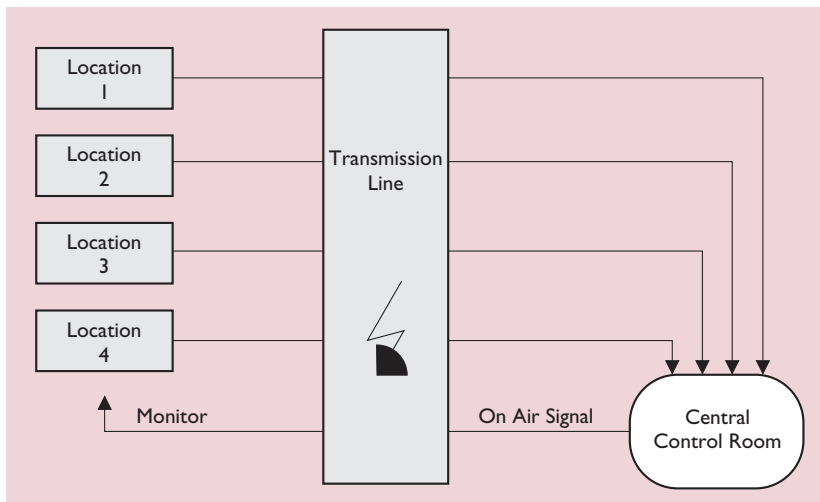
How can this problem be solved by technical means? For suppressing line reflections and feedback in telephone applications a solution in the form of a telephone hybrid was already found for similar problems. Corresponding algorithms for the digital relay station are available, but its working range for compensating echoes of up to half a second is not large enough.

The STUDER Echo Canceller is looped locally (in the OB van) into the return line. By using an additional delay line (0...1 sec) an existing echo canceling algorithm works in its optimum range of 5...20 msec.

The algorithms can suppress the delayed useful signal from the incoming transmitter signal. In our example of the sports reporter this means that he hears additional sound sources from his environment, for example, the ambient noise of the stadium as well as other reporters and the control room, but not his own delayed voice.

The delay line can work automatically through a correlation measurement from the local and delayed signal, or have a fixed setting if the data are known.

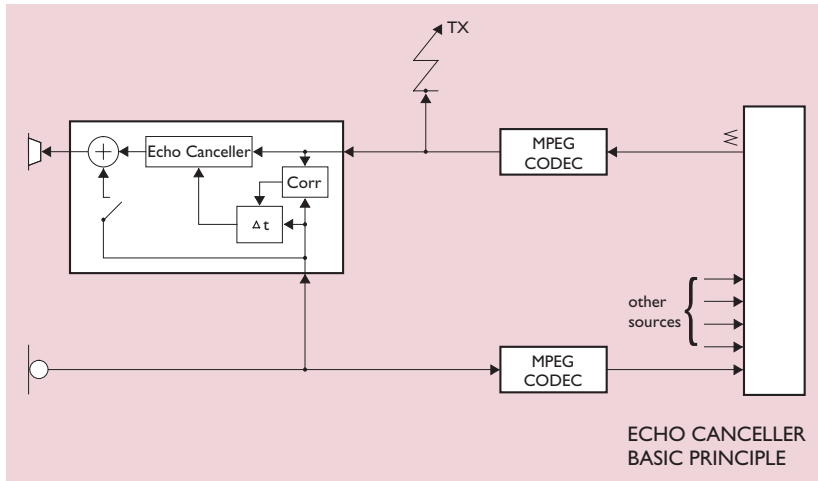
In place of the suppressed, delayed useful signal the eigentone can be locally mixed down. In this way the reporter can again hear his own voice through the headphones without delay.



Digital transmission in outside broadcasts has a number of obvious advantages but also some unwanted side effects. In complex live broadcasts the signal can sometimes be connected via cable and sometimes via satellite; in some cases the data are transmitted in compressed form. This can result in delays of up to several hundred milliseconds. This becomes particularly noticeable if the broadcast signal is re-utilized at the source as a monitoring signal. In



The STUDER Echo Canceller is installed in a 19" rack housing type D19. The two analog inputs for the local tone (LOCAL IN) and the feedback signal (FAR IN), as well as the monitor output (LOCAL OUT) are equipped with balanced analog stages with studio level.



The operator controls on the front panel are limited to the absolute minimum. With MODE the signal delay function is defined. The time can either be set manually with two keys (UP / DOWN) or be determined automatically. In the ONCE setting a one-time measurement is taken, whereas in CONT the setting is continually verified and readjusted.

The current setting within the range 0...999 msec is displayed.

A rotary switch (DIRECT VOLUME) allows mix-down of the undelayed eigentone. BYPASS disables the function of the Echo Canceller. ■

**Tape: still No 1 in multitrack production**

**D827 MCH MK II**



Robert Müller

Over 200 DASH multichannel machines produced by STUDER are installed worldwide. Based on this success we are now introducing the next generation of the legendary STUDER D827 MCH DASH digital multichannel machine, the D827 MCH MK II. Many innovative features combined with the proven advantages such as superb audio quality and an agile tape deck characterize the D827 MCH.

**From the operation ...**

The most conspicuous part of the D827 MCH MK II for the user is the new control panel. The grouping of related keys and the ergonomic arrangement of the controls allow quick access to the functions.

As a rule the studio illumination is rather subdued. In many cases this is problematic for the user if he has to search for control elements in the dark. The "Night design" implemented in the new autolocator allows quick location of operator controls, also in a dark environment.

The sound memory function has been enhanced with a true audio trigger input. With the aid of this input which is accessible directly on the remote control via a 6.3 mm jack, previously stored sound elements can be triggered by means of an audio signal. For example, instru-



ments to be recorded such as the base drum, can be supplemented by the machine automatically with a sample.



### via the sound ....

In addition to the remote control also the A/D converters have been refined. The STUDER D827 MCH is reputedly the best sounding digital multichannel machine on the market. The utilization of 20-bit A/D converters combined with our unique noise shaping algorithm further improve the already excellent audio quality.

### up to the tape deck ...

With its microprocessor-controlled and monitored tape deck the D827 MCH offers unsurpassed agility and acceleration. With the D827 MCH MK II a new tape cleaning and stabilization system is introduced which makes the tape deck even more accurate and contributes to the gentle handling of the tape. Occasional drop-outs of the peripheral tracks are corrected.

### We have retained ...

the unsurpassed audio quality as well as the long list of features and options which are, of course, also available on the D827 MCH MK II. In particular these include:

- MADI, AES/EBU interface and remote control interfaces are standard features of all machines.

- 24-bit extended digital resolution which enables the user to make 24-bit recordings on tape in order to gain maximum benefit from his digital environment.
- Digital editing, track slipping and track bouncing are accessible through the sound memory. With its large capacity of 180 seconds large portions of a production can be stored in memory, edited, and reinserted in a different location.
- The modular system can be easily tailored to different user requirements. For example, a 24-channel machine can be upgraded to 48 tracks or options can be retrofitted later in the field.

The combination of existing and new features make the D827 MCH MK II unbeatable with respect to reliability, audio quality and price/performance ratio.

Up to now more hits have been recorded on STUDER machines than on any other product. The long list of Studer multichannel machines that have contributed to the making of true hits will be further extended with the D827 MCH MK II. This ensures that this legend will survive far into the next century. ■

# What's new at STUDER?



Hans Peter Staub

The STUDER family has a new member.

On November 15, 1996 Mr. *Hans Peter Staub* has taken over the function as Manager Sales & Marketing.

*Mr. Staub* has a Bachelor of Science and a Masters Degree in Business Administration.

He started his professional career in 1976 in the OB production of Swiss Television DRS in Zurich.

In 1986 he went to Canada and the USA where he was a Group Leader for Oerlikon Aerospace Inc. in St. Jean-sur-Richelieu, Quebec.

In this function he was responsible for the instrumentation of the "ADATS" guided missile system during evaluation, tests and live-firings in Canada and in the USA.

In 1989 *Mr. Staub* returned to Switzerland where he worked for Sony (Switzerland) Ltd. as Sales Engineer Broadcast Products and thus returned to his original field of activity.

In the last four years at Sony *Mr. Staub* held the position of Manager Broadcast before he decided to accept a new challenge at STUDER in Regensdorf.

We wish him much success in the future. ■

## STUDER service courses, 1st half year 1997.

97041E	Service Course	D424	english	16. - 18.4.97	3 days
<i>MO-technology, operation, applications, explanation, servicing.</i>					
97042E	Service Course	980	english	21. - 23.4.97	3 days
<i>Operating, alignments, servicing, trouble-shooting and explanation of circuits.</i>					
97043E	Service Course	928	english	24. - 25.4.97	2 days
<i>Operating, alignments, servicing, trouble-shooting and explanation of circuits.</i>					
97051E	Training Course	D827 MCH	english	22. - 23.5.97	2 days
<i>Operation and applications.</i>					
97052E	Service Course	D827 MCH	english	26. - 29.5.97	4 days
<i>Electronics, trouble-shooting and servicing.</i>					
<i>Please note that we recommend to attend to the above D827 MCH training course (no. 97051E) before participating the service course!</i>					
97061E	Service Course	On Air 2000	english	9. - 10.6.97	2 days
<i>Technology, operation, applications, explanation of circuits, servicing.</i>					
97062E	Training Course	DVD	english	19. - 20.6.97	2 days
<i>DVD-technology in general, operation.</i>					

For the second half of 1997 the following courses are planned, but no date has been set yet:  
 DVD Training course - 2 days / DVD Service course - 3 days  
 D940 Training course - 2 days / D940 Service course - 3 days  
 D424 Service course - 3 days  
 On Air 2000 Service course - 2 days

## New Publications

D19m Data sheets	10.26.3430, german	10.26.3440, english
General Product booklet	10.26.3130, german	10.26.3090, english
980 booklet	10.26.3070, german	10.26.3120, english
928 booklet	10.26.3370, german	10.26.3380, english
On-Air 2000 booklet	-	10.26.3420, english



## STUDER 928 in video applications

For recording, mixdown or postproduction of multichannel audio signals for video or film the STUDER 928 mixing console is available in a special version in which groups 7 and 8 can be used as masters for surround signals. Together with the four additional masters which are standard equipment, it is possible to work in six-channel mode. Highly practical in this connection is the utilization of the "film monitor" (right) which originally was developed for the STUDER 980 mixing console. With this monitor it is possible to mix down before matrixing in matrixed form, and to monitor after dematrixing so that the audio engineer obtains information also on the subsequent process steps and can set up his mixing console accordingly.

For direct link of the mixing console with a video editor (audio follows video) there is a very simple connection possibility: as the mixing console is equipped with VCAs as channel control elements, the DC control voltage of the video editor can be connected directly to the VCAs. An interface (in development) is required only when an ESAM II protocol is used. ■



## Salvaging of historical Pavarotti recordings with the STUDER D424 MOD recorder



Klaus Ramoser

In Italy a spectacular discovery of previously unpublished concert recordings of *Luciano Pavarotti* was announced. These apparently are the first official sound recordings in Pavarotti's career. They were made in 1961 in Reggio Emilia, Italy, during a concert of *La Bohème*.

The desolate condition of the tapes resulting from poor storage conditions (the oxide coating was about to separate from the substrate) was a great worry to the owners so that *Mr. Bock* of Mastering Studio Munich (MSM) who is considered to be an expert in this field, was consulted and charged with salvaging the tapes and subsequently restoring the recordings. However, the owners were unwilling to send the enormously valuable tapes abroad which induced *Bock* to take his high-tech equipment to Italy in order to copy the tapes in the best-possible quality directly on site.

After the tapes had been baked at 40°C over 10 hours, a copying run was attempted. For this purpose a STUDER A820 ¼" master machine

was used for playback. The recording was made on the new STUDER D424 MOD.

The successful copying to a 24-bit medium was now the best possible starting point for subsequently restoring the historical recordings at MSM in Munich by means of the Audio Workstation Sonic Solutions in a highly sophisticated and time-consuming process.

Bock was very pleased with the quality of the STUDER D424 and said "The end of the DAT recorder as a master machine is now in sight. We have waited for this equipment for a long time and are now able to fully exploit the entire bandwidth of old as well as new recordings". ■

## News from the **STUDER** world



Igor Pogorzelski

### **STUDER mixing consoles in Poland**

The first STUDER mixing console in Poland was a STUDER 961 which was purchased in the eighties for use in the first digital trial recordings conducted within the framework of the digitally recorded international Chopin Competition.

The choice of supplier made at that time apparently was not regretted because in the meantime a considerable number of different STUDER mixing consoles are in operation. The latest, recently concluded contracts include two STUDER 980 and over ten STUDER 963 mixing consoles.

In its Warsaw studio the Polish public television system, TVP, uses a STUDER 980 mixing console with 28 mono and 4 stereo inputs, 8 groups and three masters. This unit has been operating to the owner's full satisfaction for over a year. An auxiliary rack contains, among other units, a STUDER D731 CD player. The audio tracks of the TV programs produced in studio S5 are recorded digitally on Betacam machines in the video equipment room.

Another mixing console type STUDER 980 with 20 mono and 8 stereo inputs, eight groups and

two stereo masters has recently been put into service in the completely renovated studio S2 located in the main building of Polskie Radio Warszawa. Studio S2 is designed for large productions and live broadcasts, mostly with a large number of participants and public spectators. Contributions from regional studios can be integrated into the broadcast via multiplex lines.

According to the managing transmission engineer, *Andrzej Solcak*, the STUDER 980 was preferred over competitive products "due to its high dynamic range, excellent n-1 function, simple digital control and set-up change which are important for fast configuration changes, and the flexible output circuit". The renovation work on the remaining sections of studio S2 is in progress, and the start of production is scheduled for July 1st of this year.

Up to now TVP has purchased 13 STUDER mixing consoles, most of which are installed in newly built or renovated OB vans. Six of these are stationed in Warsaw, other is Posen, Bydgoszcz, Rzeszow, Lodz, Lublin, Szczecin and Gdansk. The purchase of three additional units for Kattowice, Krakow and Wroclaw is in discussion. ■





Libor Havlicek

### STUDER equipment in Czech TV

The Czech public television (CT) broadcasts daily two programs to over 10 million national viewers. The TV studios are located in the three largest cities with the largest studio complex located in the capital Prague.

The relationships between CT and STUDER are long-standing and for a long time it was taken as a matter of course that equipment for which quality and long-time stability were critical factors would be purchased from STUDER. The first equipment of this type were analog tape recorders. When time code techniques were introduced, CT was among the first users: synchronizers and controls type TLS 2000, TSL 4000 and SC 4008 were acquired. Two DYAXIS II systems have been in operation since 1993, one in video postproduction and the other in news production. The widely known TV music production studio uses DASH D820/24 multichannel machines as well as two older analog machines type A800/24. Especially these old-timers are regarded as real work-horses as each of them has been in operation for over 10,000 working hours...



With respect to mixing consoles, however, the situation in former Czechoslovakia was completely different. The domestic manufacturer TESLA produced professional mixing consoles. For this reason the importation of mixing consoles from foreign suppliers was blocked. The breakthrough occurred in 1993 when a STUDER 963 was supplied for the first time in a custom version. This mixing console was

installed in the news broadcasting studio RK6 – an absolute reference position, because since September 1993 CT broadcasts daily for 18 hours from this studio – including all prime time news.



Especially appreciated by the audio engineers is the logical mixing console operating technique even though they initially had difficulties to reorient themselves away from the familiar product. All units in this studio have log books in which all faults are recorded. Only one so far has zero entries: the STUDER mixing console.

Recently the management structure of CT has changed. An audio engineering department was established which maintains close relationships with the corresponding EBU Steering Committee. This was a precondition for the expected decision to replace the outdated mixing consoles for new equipment. Due to the long-standing relationship STUDER is thoroughly familiar with the requirements of CT. A new STUDER 963 was installed in an OB van at the end of 1996. Two additional units were delivered for offline production, both with special features for extended monitoring source selection. By putting in some extra shifts one of these mixing consoles was ready for acceptance at the end of 1996. For March 1997 the complete overhaul of the two identical studios RK7 and RK8 is planned. These will be equipped with two STUDER 980 On-Air mixing consoles.

Czech TV is a long-standing STUDER customer that has maintained close contact throughout a period characterized by many changes. In this way the mutual exchange of technical information and the discussion on modern audio technology has remained alive. ■