

SWISS SOUND

VIEWS AND NEWS FROM SWITZERLAND

A PUBLICATION BY STUDER REVOX

No. 10
January 1985

Editorial

Satisfying the demands of the market - a key to success

In August 1951 I had the opportunity to record on location the International Music Festival of Lucerne, together with the responsible gentlemen of Radio Basle, using the prototype model of our first 027 series studio tape recorder. Tension was high, because no one was certain whether or not the recorder would perform without fail during the length of a full concert, and whether the open-wound tape would stay in place with the pancake extending half an inch beyond the 12 inch flange. Well, it worked. The recorder had stood its first test, and in 1952 the first batch of 100 STUDER studio tape recorders was produced and sold successfully. All this happened 32 years ago; since then many thousands of C37, A62, B67, various A80 models and the A800 series of STUDER professional tape recorders have been shipped world-wide.

Over the years, our company has gained a wealth of experience. Success came with progress, however, not everything was without fault. It has always been our first and foremost concern to correct any flaws on equipment already delivered, and this at no cost for the owner. At this point it must also be mentioned that spare parts and service are still available for the C37 recorders which were introduced 23 years ago. In this context it is also worth noting that a STUDER tape recorder still represents a "best buy", even after 10 years of use when adding up its purchase price and service costs.

It seemed essential to me to recollect these facts, as without this background and experience, plus 30 years of relationship with our customers, it would have been impossible to create and to produce a totally new product such as the STUDER A820 magnetic tape recorder.

Information additionally needed is derived from excellent contacts with the users of our products, may this be through our own marketing organizations or through our agents world-wide. It is this close contact to those working with our products, the early recognition of their special requirements, their innovative ideas that create new methods of application, which enables us to create a product that is not only capable to cope with today's demands, but which consid-

ers future developments as well. To collect the many different ideas and requests, and to weigh each one carefully against cost and usefulness, is a demanding task for our product managers who have to work in close co-operation with research and design. With the use of microprocessors in our products, decisions are made easier, because software modifications that may become necessary are less costly than a change of hardware. Interesting to note is the fact that on our current products the design costs for hardware and software are approximately equal. Today's demands for an ever increasing versatility are not only raising development costs, they are also reflected in longer development periods, even though larger design teams have to be assigned to a project, a point which should not be overlooked.

The best design will not meet with success if it is not backed up by first-class and up-to-date production facilities, as only with the use of modern machinery can good value for money be ensured in a product.

We are fortunate in this respect because we possess most modern machines in both our mechanical and electronic manufacturing department. Within the time span of eleven years, we have

already installed the fourth generation of CNC machinery to give you just one example. The average age of our production machines is less than five years.

Mechanical and electrical design engineers find that they have to keep abreast of the many possibilities offered by the continuously changing automated production methods in order to ensure their optimum utilization. This also includes most of the automated test procedures, of course. In-circuit testers and computer controlled functional tests, right up to the print out of test reports as well as automatic component stuffing have to be considered right from the outset when designing new equipment.

The high precision of our production facilities ensures the interchangeability of all mechanical components during the service life of every individual product, and all this is finally reflected in the competitive price and the value represented by the finished product.

I do hope these reflections have conveyed an idea to the reader of how complex the problems are one encounters when creating a product that satisfies market demands in every respect.

Dr. h.c. Willi Studer

W. Studer



STUDER A820 analog master recorder

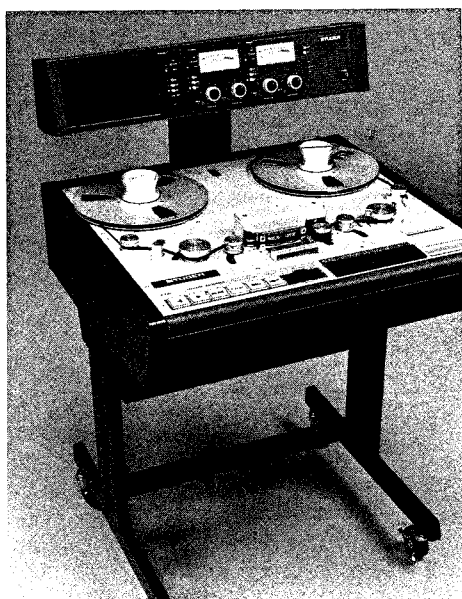
The analog challenge

In our time inspired by "euphoris digitalis" it is certainly not very revolutionary to pursue both technologies, but it is part of the responsibility of a manufacturer who probably offers the most comprehensive line of recorders on the world-wide market. What this means in practical terms is exemplified by the new A820 which for the first time was introduced to an amazed audience at the IBC in Brighton and at the AES in New York.

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STUDER A820 - advanced technology but also elegant. The inclination of the tape transport is adjustable. The recorder is available with different VU-meter penthouses, depending on the version.

“At the dawn of the next millennium, many recorders of this new A820 generation will world-wide still be in daily use!” comments Bruno Hochstrasser, product manager for analog recorders, with respect to the medium-term future of magnetic recording. “The existence of countless professional recorders in tenths of thousands of recording studios, particularly in the field of broadcasting and television, is apt to make the transition to digital recording a rather drawn out, long-term process. As a consequence, it was a logically sound decision to build an analog machine according to the latest technologies that satisfies the most stringent requirements.”

The A820 concept

The concept of the A820 generation is based on traditional values such as stability, precision, and ruggedness in order to maintain the demanding specification over a long life - this is part of the Studer philosophy and is, in this sense, also an integral feature of this totally new development.

Beyond this the concept compatibility with respect to handling and peripherals has been generously adapted to the requirements of the nineties. In addition to the excellent tape transport with DC motors, sophisticated servo circuits, and flexible audio electronics with superb performance specifications, much attention has been given to the operating concept. A systematic approach has

been developed that goes far beyond the ergonomic aspects, i.e. it encompasses not only the handling of the machine but it also provides optimum access and facilities when the A820 operates in conjunction with other audio and video equipment. The A820 is exceptionally well-suited for tomorrow's or future host controls, because not only the internal control but also the interaction with partner machines are software-defined via peripheral interfaces. This results in flexibility and makes the product future-safe.

An additional, essential conceptual feature is the intentionally close resemblance of the A820 with the digital D820: the tape transports and the ope-

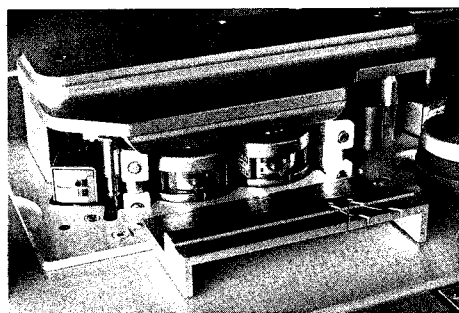
Tape transport with 5 motors

The totally new tape transport is suited for tape reels with a diameter of 14" (16" in special version) and easy changeover between ¼" and ½" tape.

The extremely rigid transport with its die-cast aluminium alloy chassis features 3 tape transport motors and 2 stepping motors for the pinch unit. Two rugged, high-torque disc-type motors with favorable control characteristics are used for spooling. A real jewel is the new DC capstan motor: it features a very low rotor mass, Hall commutation, and in conjunction with its own processor control, also excellent control behavior. The pinch unit is moved silently to the re-



Neatly arranged tape guidance and ergonomically favorable arrangement of the controls.



Compact and solid - the plug-in headblock with precision tape guidance elements and integrated preamplifier.

rating concepts are nearly identical for both machines. This results not only in considerable simplification of the daily work but also means that tape transport modules are interchangeable which in turn enhances the maintainability.

The mechanical layout of the tape transport permits a low-profile design and offers ample knee space if the tape transport is installed in a console. Wooden side panels and a soft hand rest accentuate the elegant design.

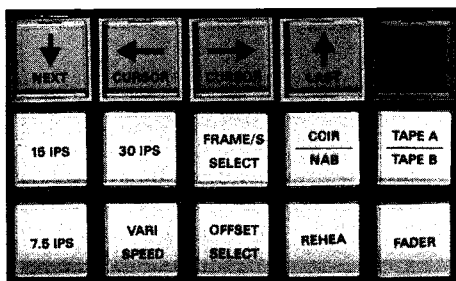
quired position by means of two stepping motors controlled by the processor.

Superbly stable headblock

The headblock on a plug-in die-cast aluminium alloy chassis features a highly compact design, very close head spacing, and high-quality tape guidance elements. Much attention was given to the screening, and a built-in preamplifier ensures outstanding signal-to-noise ratios. The headblock is also equipped with an identification module which enables the processor to recognize the headblock type and to automatically retrieve the corresponding machine parameters.

Processor electronics for the tape transport

A network of microcomputers, supervised by a master processor, controls the tape transport. A separate processor is dedicated to each basic function, e.g. for spooling motor and tape tension control, capstan servo, or peripherals control.



Tape transport display (LCD) located above the key field for programming the softkey functions. The programming functions can be locked against unintentional activation.

With this sophisticated combination of programmable microelectronics, state-of-the-art servo technology, and precision mechanics, a "fast" machine has been created that responds quickly but treats the tapes gently. Example: when play is selected, stress on the tape is avoided by starting the capstan motor only when the tape and the capstan are in contact. "Starting" in this context means accelerating with an accurately defined ramp and stabilizing within the shortest possible time. The processor-controlled DC capstan motor used for this purpose features excellent acceleration and deceleration characteristics and functions equally well in either direction. For this reason this new capstan system is eminently suited for synchronizing applications.

mable spooling speed for tapes that are to be stored in the library.

All acceleration and braking operations are automatically optimized by computing the inertia torque of the reels. The automatic control also ensures constant spooling speeds as well as deceleration when the end of the tape is approached. Also worth mentioning is that the switched-mode motor output stages with power FETs operate highly efficiently and produce very little heat, even under full load, which means that the machine requires no ventilators for cooling. All operating voltages of the A820 are software-monitored.

Flexible audio electronics in master quality

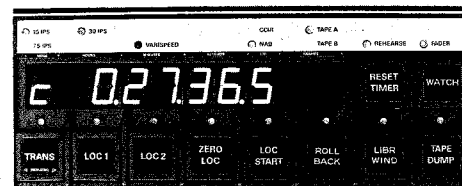
The audio electronics is designed in advanced, phase-compensated A810 amplifier technology with transformerless inputs and outputs (or with transformers on request). All calibration tasks are processor-controlled. They can be entered via the multifunction wheel SET/CUE and checked via the tape transport LCD. The representation on the LCD also enables "paging" through the menu. A serial interface type RS 232/422 (SMPTE/EBU format) is available for control purposes or for calibration with the service computer. Other options available at this time are: time code channel, mono-stereo switch, and an audio oscillator.

A new level of operating convenience

Extensive use of programmable microelectronics also had a beneficial im-

tape transport display (LCD) shows these functions in plain text; if desired, the selected function can be assigned to a push button (soft key).

The operating center for editing and programming (multifunction wheel SET/CUE) is located between these two key fields. With the shuttle function it is possible to shuttle the tape in both directions at variable speed, with the program determining whether the tape should contact the heads or not. If the shuttle speed is to be saved in memory, the operator simply presses the central shuttle bar. The third element in the operating center is the CUE wheel that can be operated like a flywheel. In direct programming, this wheel is used for entering the parameters, and in the CUE function it serves as a "control wheel" for



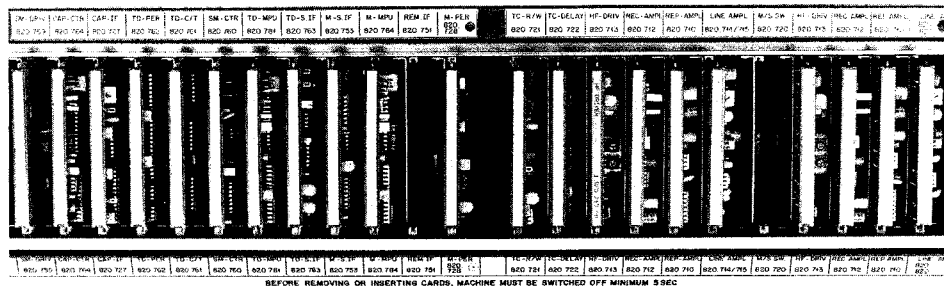
Direct access to a multitude of programmable machine functions is possible through the secondary control panel.

fine-positioning the tape. The A820 combines all previously known functions with a number of new ones such as:

- Address locator with 5 memories
- Rollback with programmable time and sequence of functions
- Loc start, programmable sequence of functions
- Zero lock
- Tape dump (waste basket mode), programmable counter functions
- Reverse play
- Library wind with programmable spooling speed in steps of 0.1 m/s
- Tape calibration A and B
- Mono/stereo
- Rehearse; spot erase
- Varispeed, ± 7 semitones, with selectable display format in %, semitones, or ips; etc.

A separate precision LED tape counter, arranged in the secondary key field, indicates incrementing or decrementing "HRS", "MIN", "SEC" and also "1/10 SEC" (display of "FRAMES" is planned in conjunction with timecode versions).

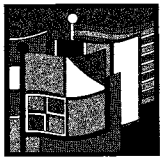
Marcel Siegenthaler



The audio and tape transport electronics are implemented on an easily accessible, common assembly.

The operation of the capstan motor is supported by a high-quality, closed-loop spooling motor servo control. The processor determines and controls the tape tensions and the spooling speeds by means of non-contacting Hall-type tape tension sensors. The tape tension and spooling speeds parameters can be entered and stored via software. Of particular interest is also the program-

impact on the operating convenience of the A820. The term "fingertip control" stands for an operating concept through which the largely expanded functions can be easily mastered. In addition to the primary, large-surfaces tape command keys which are the same as those on the A800, a secondary set of keys is available through which some 40 additional functions can be programmed. The



Brighton, England

IBC - International Broadcast Convention 1984

The 1984 International Broadcast Convention was held in Brighton in September and demonstrated its growing importance by attracting twice as many visitors as in 1982.

High quality audio was very clearly of major interest to a large number of visitors. Stereo television sound, already a viable proposition in a number of countries, undoubtedly had a part to play in the interest factor of this previously "poor relation" at IBC.

The British Broadcasting Corporation Research Department had, for example, built a sound proofed listening booth in order to demonstrate stereo television, and had arranged special programming to be transmitted from London to Vienna and back, just for the IBC!

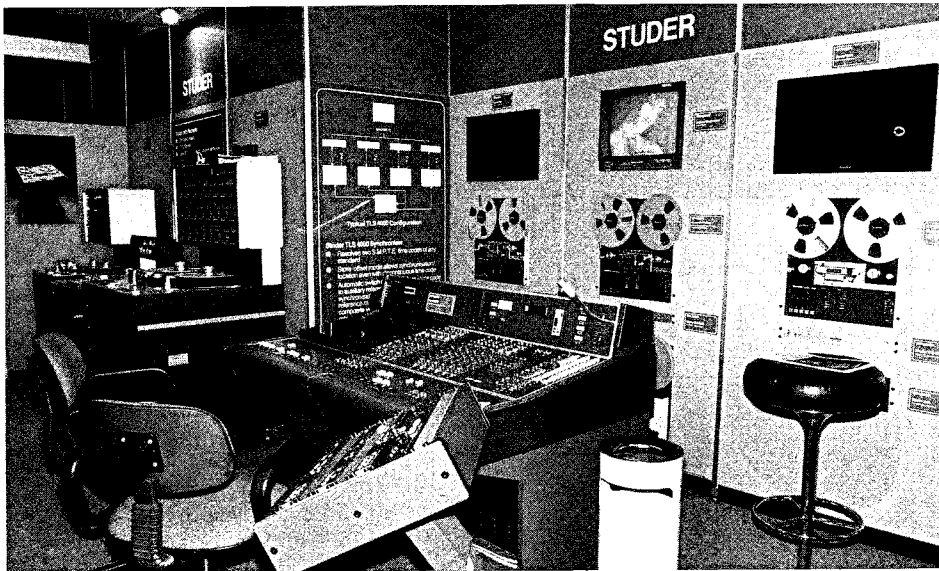
Three A810TC recorders and an A800 24-Track were synchronised by TLS 4000 to an Ampex VPR80. All audio-signals were routed through the 902 console to a pair of Studer 2706 broadcast monitors. The entire system was linked purely by SMPTE time code, no tallies were used at all. This allowed any machine to be used as the master by simply patching the time code around, within the jack-bay.

Studer equipment was also shown by Bauch in conjunction with one of their video demonstrations. Here a Studer A810TC recorder and a Studer 169 mixing console formed an integral part of a fully operational CMX 3400 computerised videotape editing suite.

Another Studer product which evoked a lot of interest, was the Studer A80 VU-3LB Layback Recorder. This machine, which enables audio tracks to be recorded on 1" Video Tape without the need to tie up expensive 1" VTR recorders, also produces vastly improved audio signals - once again highlighting the increasing importance of good quality audio in video.

All in all although IBC '84 was a "video" exhibition with "audio" in second place, good audio was of such interest that the staff of F.W.O. Bauch Limited and Studer International had no time to notice aching legs or tired feet. Yet another first for IBC 1984.

Michael Cooper, F.W.O. Bauch Ltd.



As a design exercise and as part of their on-going research into digital recording, the BBC were featuring a digital editing system controlling two Studer Digital 808 transports and were making use of "labels" which have been the result of the close collaboration between Guy McNalley of the BBC and Roger Lagadec of Willi Studer AG.

The STUDER display was on the stand of the UK distributor, **F.W.O. Bauch Limited**. There, Studer A810 TC machines featured in the fully integral sound dubbing suite centered around a 900 Series Mixing Console.

Informative as these demonstrations proved to be, the real "show stealer" was the world premier of the much awaited Studer **A820**. For the full five days of the show the recorder was being put through its paces and duly demonstrated the enormous step forward in tape handling and technology which it represents. Of particular interest to the considerable number of potential users was the way in which the machine could be tailored so precisely to different operational requirements, by the use of soft keys.

Firm orders for the A820 were received during the course of the show.

Exhibitions

13th Convention of Sound Engineers in Munich, Germany

from 21 to 24 November 1984

The Association of German Sound Engineers (VDT) organized its 13th International Congress and Professional Exhibition at the Congress Building of the "Deutsche Museum" in Munich. 44 lectures and 20 excursions on 13 diffe-



In a very compact display, the main products of the STUDER REVOX range were presented to the professional visitor.



Portrait of a Company

Studer Revox Japan Ltd.

In Tokyo, there is a world-famous area symbolizing Japan as "the land of electronics" - Akihabara. Numerous electronic companies have their domicile there. People visiting Tokyo will at least once include Akihabara: to buy a Walkman at 30% discount, purchase CD players, personal computers and similar new items. People from South East Asia buy microprocessor-controlled rice boilers (!), and visitors from the USSR are said to purchase IC's most frequently.

Many items filling the Akihabara shop shelves are produced by giant companies with turnovers of several billion yen. Our trade papers state that the largest turnover ever



The head of the company, Takeo Asano (with cap), and his crew.



... even competitors showed keen interest in the STUDER A820.

rent subjects were included. 80 exhibitors represented 150 manufacturing companies. Focus of attention at the STUDER REVOX booth was no doubt the new STUDER A820 analogue stereo tape recorder on its first introduction on the European continent. In addition to well-known products of the professional range, TLS 4000 was demonstrated as part of a synchronisation system.

Marcel Siegenthaler

achieved in the industry was done by Matsushita (Panasonic) last year; it came up to four billion yen (four trillion in American terms). These giants have enlarged their markets in overseas primarily with the production of consumer goods, including audio equipment. However, they were apparently not interested in the professional market.

The situation has drastically altered since. There is, for example, the founder of a Japanese enterprise who started production in a one-room apartment with only two collaborators, and now produces professional equipment on a larger scale, sold world-wide.

There is another company, offering video equipment that dominates the world market, and extending its production to professional PCM tape recorders.

In spite of all competition, STUDER has acquired a good position in this country's professional market where the brand is fully acknowledged.

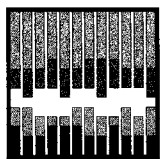
In fact, STUDER professional equipment was already here in the sixties. The gradual success in a market considered to be the stronghold for electronic products is based on years of hard work, done by an exclusive distributor.

With the range of products growing, marketing requirements have also increased, demanding a more concentrat-



Studer Revox Japan Ltd. ...

ed control of all activities. **Studer Revox Japan Limited was established in 1982**, domiciled in the centre of activity, and responsible for the marketing of STUDER professional audio equipment. We not only sell, we also look after technical service and maintenance, and consider ourselves an ideal "interface" between supplier and market. We convey the right information to customers, and guarantee feedback to the manufacturer as regards technical topics, latest trends, new developments, and thus



For broadcasting applications

Professional Compact-Disc-Player STUDER A725

In Swiss Sound 1/84 we have introduced the first REVOX CD-player B225. Its appearance has generated a positive response, also from professional users. The new professional version A725 has been specifically tailored to the requirements of broadcasting applications.

The demand for our REVOX CD-player B225 has clearly demonstrated that the compact disc will be a success, particularly since significant improvement of the reproduction quality can be offered to the hard to please hi-fi enthusiast.

For professional users, the handling in conjunction with the new medium is



Happy lunch-break...

form an important link between a conservative but excellent manufacturer and Japanese clientele, who is expertly guided to decide for the best.

Ten STUDER REVOX JAPAN members are just unique. At an average age of 30, we are flexible enough to catch on with new movements in the market. We are not really conservative; this includes our representative director, Mr. Takeo Asano. He rarely wears a tie. When he once put one on with great reluctance, he found himself wearing sneakers! We also have a rock musician in our crew – Mr. Niekawa, sales engineer at SRJ who writes texts, composes, arranges, plays various instruments, records and mixes. Our working hours exceed the average, and work is carried out with great engagement. With one glance in the direction of the Swiss Alps, we cannot but observe that Swiss watches, although accurate, are behind in time; for when the Swiss have their breakfast, the Japanese already consume their supper...

Atsuko Nakayama, SRJ Tokyo

probably of primary interest. For example very little time is required to accurately position the laser on any position of the CD. The information required for this purpose such as title number, index, and time are encoded on the CD itself.

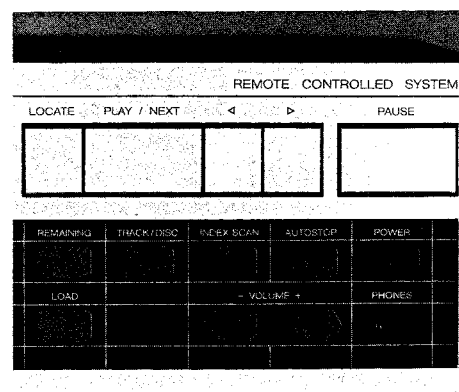
For copyright fee computations, the CD offers new possibilities because the necessary information is also encoded on the digital disc. In the digitalized broadcasting studio of the future, this time-consuming work will be handled by the computer without much costly manual effort. The fact that the quality of the CD is not degraded even by years of frequent utilization is certainly of invaluable benefit to professional users.

The design of the STUDER A725

The front panel is partitioned into three operating sectors: the upper section with metallic keys plus a lower section each on the left and the right. The upper section contains the command keys for the player mechanism. These keys ("LOCATE", "PLAY/NEXT", "<", ">", "PAUSE") and the keyboard (0...9) control the primary functions that the professional uses every day.

The secondary control functions such as display changeover, index search, and level adjustment for the headphones socket are accessible in the lower right group of controls.

The left-hand side of the lower operating section contains the buttons for comprehensive programming functions like those known from the REVOX B225. This key field can be covered, if necessary.

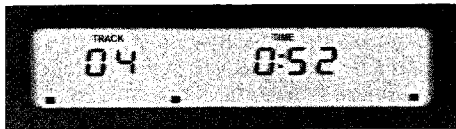


Operating facilities and characteristics

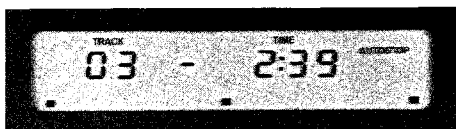
- Superfast access (average time less than 1 second!)
- Direct access to each track
- Access to each index encoded on the CD
- Start from pause: less than 0.6 sec.
- Start accuracy: ± 1 frame (13.3 msec)
- Cueing
- Autostop mode
- Fader start
- Built-in digital reference level generator
- Responds to a remote control with status feedback

Facilities of the liquid-crystal multi-function display

Four time versions can be displayed with two buttons (REMAINING and TRACK/DISC).



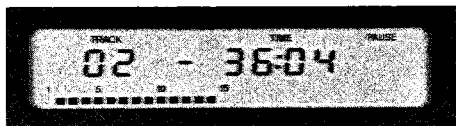
TRACK TIME



TRACK REMAINING TIME



DISC TIME



DISC REMAINING TIME

Connectors for audio and control signals

- Balanced outputs (XLR)
- Cinch, fixed and variable
- Fader start
- Remote control system

Remote control system with status feedback

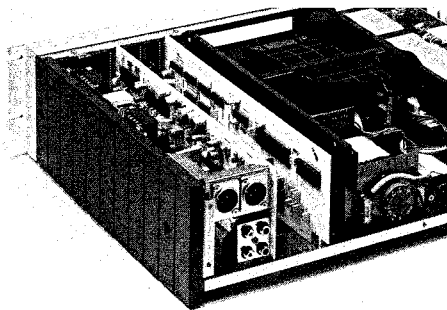
All essential tape commands can be transmitted from a serial remote control system (connector: SERIAL LINK). The same socket also supplies status feedbacks (play, pause, autostop) and display data (4 time versions). Automatic operation with several A725 CD-players can be implemented through the serial bus terminal.

Information concerning copyright fees can also be inquired through the SERIAL LINK and shown on a display or be processed directly by computer.

Design of the STUDER A725 CD-player

The fully professional, modular design of the CD-player combines on the left-hand side the printed circuit boards for the power supply, the control circuits of the player mechanism, and the micro-processor PCB specifically developed for the A725.

On the right-hand side we find the decoding circuits, D/A converters, and amplifiers for the balanced outputs (with transformers). The STUDER A725 CD-player is optionally available with transformerless outputs.



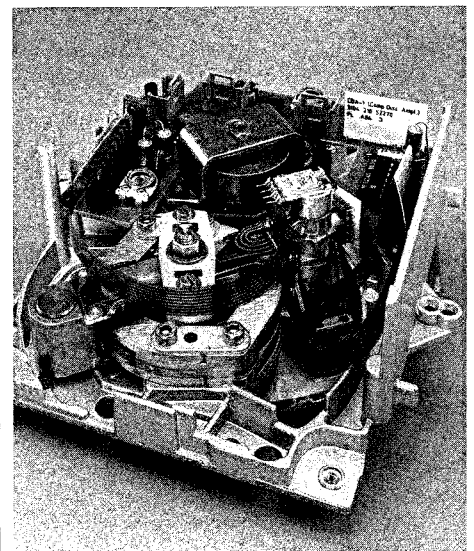
Phase-linear oversampling principle

The D/A converter operates according to the oversampling principle that has demonstrated excellent temperature and aging stability. This converter principle is phaselinear. Its sophisticated design with two separate D/A converters for the left-hand and the right-hand channel ensures that the output signal is mono-compatible, a factor that is of particular importance in broadcasting applications.

Professional player mechanism for maximum stability

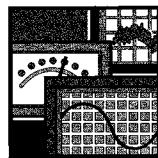
The A725 player mechanism is mounted on a die-cast aluminium alloy chassis. The drive system for the compact disc

consists of a Hall-commuted, brushless DC motor with control electronics. This non-contacting commutation reduces noise and also ensures a long service life of the motor.



The very short access time has been achieved by combining the proven rotary arm principle of the laser scanner with sophisticated servo electronics. Experience has shown that this type of player mechanism is best able to cope with tracking problems resulting from contamination, scratches, or fingerprints on the CD.

David Roth



Active speaker box REVOX AGORA B (part 2)

Technical details of the AGORA B

In the first section of the report which appeared in Edition 3/84 of Swiss Sound, the basic concept that led to the development of active speakers has been explained. What is new and how the motion control of the bass speaker has been implemented is described in this second part.

High-frequency range

An active high-pass of the 4th order separates the treble range above approx. 3.4 kHz from the input signal. The box is equipped with three identical output amplifiers of which one handles the treble range. The treble speaker features some unusual characteristics. The diaphragm consists

of a titanium dome with a thickness of only 30 µm. The rigidity provided by the strength of the titanium and the critical convexity allow a working range of up to 20 kHz without harmonic components. The small diameter of only 19 mm in conjunction with a diffusor in front of the diaphragm result in an ideal circular radiation pattern. Accurate alignment of the box is, therefore, not required. The sophisticated design of the driver system achieves an air gap induction of 1.9 Tesla (19,000 Gauss).

Midrange

An active filter (consisting of a 3-pole high-pass and low-pass each) filters the midrange out of the input signal and the

second output amplifier drives the mid-range speaker.

The geometry of the diaphragm as well as the material composition has been optimized through extensive experiments. Particularly the fact that the pulse handling behavior of a speaker is of crucial importance required a special magnet system design. The simple, primary consideration was as follows: we know that a current induces force in the moving coil which means that a fast current rise produces a fast force rise. However, if the fast current rise is prevented by a short-circuit winding in the form of a low-resistance pole plate, no fast force rise can be achieved. This is why the midrange speaker features a pole plate that is made of low-eddy-current material.

Bass range

A 2-pole active filter separates the low-frequency spectrum from the input signal; subsonic frequencies are eliminated by an additional filter. The third output amplifier drives two parallel connected woofer chassis with a diameter of 200 mm each. Approximately 100 W are available for the bass range.

A sound pressure level of 110 dB in the bass range requires high membrane amplitudes in the speakers. Mechanical asymmetry produces even-numbered harmonics which cannot be prevented because of the conical shape of the diaphragm and the fact that the magnet system is mounted on only one side. This situation can be remedied by installing two identical speakers in a push-pull configuration.

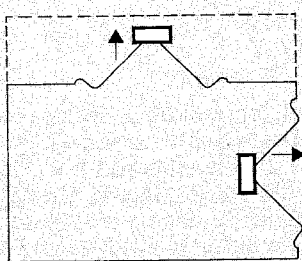


Fig. 1: The magnet system, one facing outward and one inward, compensates even-numbered harmonic distortion components.

Motion control

Experience has taught that elaborate and expensive speaker chassis with strong magnets produce a better sound. Their build-up and decay response is better and they are said to give greater definition. It is also known that the source impedance of the output amplifier influences the sound quality.

Conventional speakers are electrodynamic transducers; they function reciprocally and also operate as a microphone. As such they supply an output voltage that is proportional to speed of the moving coil.

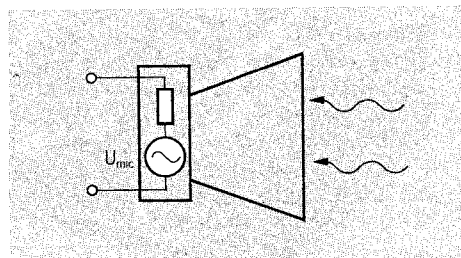


Fig. 2: The speaker working as a microphone supplies information on the deflection of the moving coil.

When the transducer is connected to a voltage source as a speaker, the diaphragm is deflected.

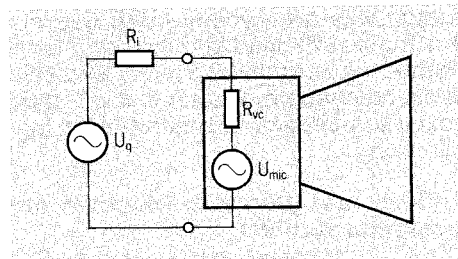
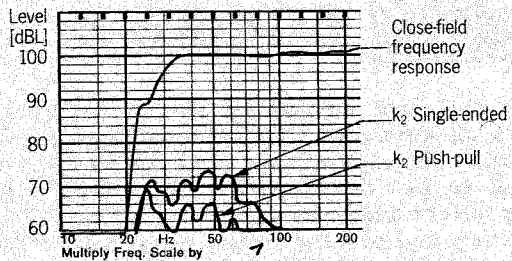


Fig. 3

Let us assume that no force is required for deflecting the membrane and that the moving coil moves in such a way that the microphone voltage generated



by the speaker corresponds to the input voltage U_q . These two voltages are of identical magnitude and opposed which means that in this assumed circuit the sum of all voltages is zero and no current flows. This corresponds to our assumption that no power is required for the deflection.

The fact is, however, that drive power is required for the diaphragm deflection in order to overcome various resistances. And this requires current. But, the current induces a voltage drop in the internal resistance R_i and in the moving coil resistance. U_q differs from U_{mic} exactly by this voltage drop. In our case this means that the moving coil does not follow the input voltage because of mechanical resistances. How can this situation be remedied?

We must ensure that the voltage drop becomes as small as possible:

- Reduction of R_i down to zero. The damping factor R_{vc}/R_i should become large.
- Reduction of R_{vc} while retaining U_{mic} . This implies to accommodate as much copper as possible in the gap field area. This improves the efficiency.
- Increasing the microphone voltage while retaining the number of turns. This means greater flux density in the gap field; use of stronger, larger magnets. This also improves the efficiency.
- Reducing the force required for diaphragm deflection. This can be accomplished with a lower membrane mass. The current consumption drops. This corresponds to an increase in efficiency.

We thus see that two well-known remedies are useful:

In addition to amplifiers with a damping factor of >10 , the use of high-efficiency speaker chassis is of prime importance. Hence the excellent reputation of expensive chassis with very extreme magnet systems. Unfortunately, high-efficiency chassis that also feature low harmonic distortion and a decent frequency response are rare and prohibitively priced. But there is an alternate solution: if it were possible to lower the internal resistance of the amplifier not only to zero but to even make it negative to such an extent that it exactly compensates

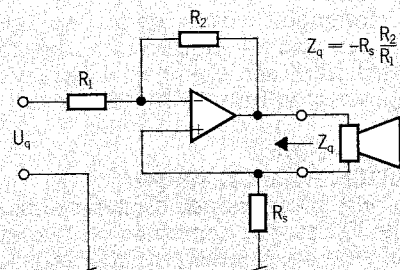
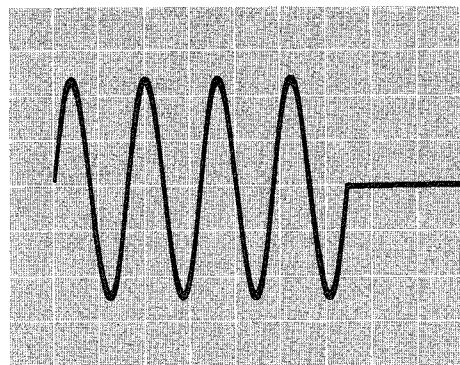


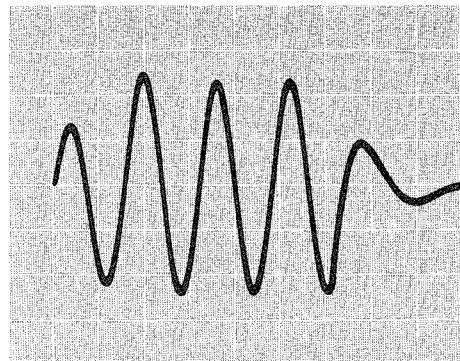
Fig. 4: A negative source resistance can be achieved through positive current feedback.

the moving coil resistance, the sum of all resistances would be zero. The magnitude of the current/power requirements thus becomes irrelevant because no voltage drop occurs. What we have accomplished is that U_{mic} corresponds exactly to the control voltage U_c . This we refer to as motion control.

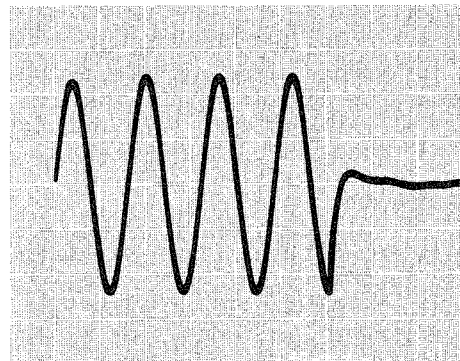
Numerous benefits result from motion control:



Input signal: Burst, 100 Hz



AGORA woofer, without motion control



AGORA woofer, with motion control

Fig. 5: Transient response improved by the negative internal resistance as shown by a 100 Hz pulse.

- Nonlinear restoring forces of the diaphragm suspension and the air (adiabat) have no influence.

- Eigentones of the box (resonance effects) can no longer be transmitted acoustically because the diaphragm is immune to external influences. This results in a linear frequency response (see Figure 1). The phenomenon of undefined box rumble is now a thing of the past.
- Because of the controlled deflection the speaker chassis is no longer a resonant structure. The bass reflex box thus becomes a system of the zero order to which a Helmholtz resonator has been added. Tuning of this resonator poses no problem. The build-up and decay behavior is improved (Figure 5).

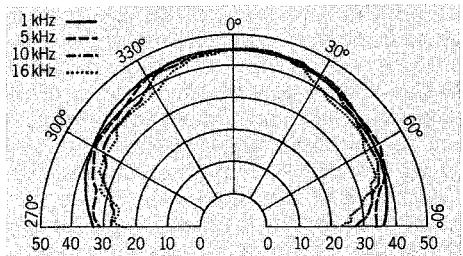
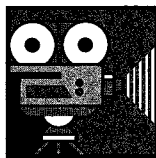


Fig. 6: The circular radiation pattern at 1, 5, 10 and 16 kHz shows the excellent behaviour of the AGORA B.

Conclusion: **You simply have to hear the AGORA B in order to believe it!**
Wolfgang Kelpin / Paul Zwicky



Australia

Studios 301 in Sydney

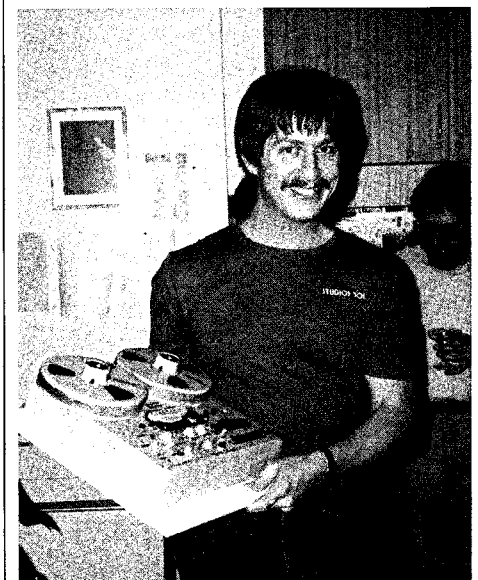
In the course of modernizing their studios, involving a complete re-building and re-equipping program, EMI Australia (now Thorn EMI Australia) have invested approx. A\$ 2 million for the renewal of the studio complex in 1977.

The re-building program involved a number of firsts, including the first studio to interface Necam with STUDER TLS 2000 and A80 VU multi-tracks, plus another synchronizer for video post production, offering the facility of computer-assisted interlocked mix-down synchronized to image - way back in 1979!

The studios occupy two floors of the Thorn EMI headquarters building in Sydney City, with staff of 22 including administration, operations, engineering, mastering and custom records sections. There are **17 STUDER A80 VU** machines of various types. The five 2" machines include three 24-track models, two of which are STUDER TLS 2000 master wide-frame versions, plus two 16-track TLS 2000 slaves. There is a STUDER A80 MR-1" upgraded with the latest headblock for mastering of «XDR» high-quality cassettes, as well as two STUDER A80 VU Prelistening machines, used in the two disc mastering studios with VMS70/SAL74B systems.

The other nine A80 VUs are 1/4"-1/2" 2-track models, three of which are normally set up for half-inch two-track operation. In addition to the above, there is a

STUDER **B67 MK II** and recently added a STUDER **A810** with time code for video sync sessions. The REVOX B225 CD Player has also found a comfortable home at Studios 301 which has several professional PCM systems in operation and is planning the phased introduction of state-of-the-art digital recording equipment in the years to come. Studios 301 are in the favourable position to offer full package service - from recording to final product (LPs/cassettes).



The photograph shows **Steve Shurtz**, General Manager of the Studios 301 project, who was from the be-

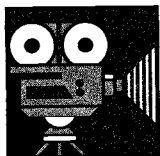
ginning in 1977 involved in the design, specification and installation of the new studios. Under the direction of Nigel Wake, then General Manager of EMI Australia, Steve promoted from technician to Engineering Manager and became General Manager in 1980; he gave "Studios 301" the name which has become well-known in the industry. During the following years, he established Studios 301's international reputation. After 11 years in Australia, Steve Shurtz has decided to return to San Francisco; for farewell he received a special STUDER REVOX "Machine", made by a Sydney cake shop, at a party in an all-STUDER studio.

His successor will be Martin Bengel, who brings a wealth of experience in the recording industry. Martin had an early training at Abbey Road Studios during the Beatles' fame, and recent activities as a highly respected and successful engineer/producer in Australia. Best wishes for success go to both Steve and Martin.

Dave Hudson, Studios 301



Studios 301 in Sydney.



For the amateur? For the professional? (Part 4)

Revox reel-to-reel recorders

The fourth and last installment of this series deals with industrial applications.

You will understand that it is difficult to draw a clear-cut line between «professional» and «industrial» applications. This report concentrates on logging operations.

Logging

Logging generally refers to the collection of data, e.g. monitor recordings in aeronautical radio or recording of telephone calls by fire or police departments, etc.

Depending on the desired quality, access facilities (real-time counter), and tape speeds, the user can choose between the **PR99 MK II** or the **B77 MK II**, as mentioned in the last article. The available recorder versions are listed in the table below:

ips	B77 CCIR	B77 NAB	PR99 CCIR	PR99 NAB
1 5/16, 1 7/8		X		
1 7/8, 3 3/4		X		
3 3/4, 7 1/2		X		X
7 1/2, 15	X	X	X	X

Cyclic control

The cyclic control mentioned in the third installment of this report can also be used for logging purposes. By programming the automatic recording function it is possible to spread the recording over practically any number of machines which corresponds to a virtually unlimited recording time.

Clock time recording

The endless recording described above can be enhanced by simulta-

neously recording time announcements or a digital time code on the second track.

A system that records the audio signal and the time code on the same track is also available in which case the sound and the time are inseparably linked!

Autostart

If a sound event is to be recorded at a specific time, this can be accomplished through the remote-control port with the aid of a commercially available timer. For automatic recording starts of radio of telephone conversations either a control signal from the corresponding radio transceiver or telephone set can be used or an autostart version of the REVOX B77 should be selected.

The **B77-Autostart** features two separate sensitivity potentiometers for calibrating the start-up threshold for the

left-hand and the right-hand channel. The machine starts automatically in record mode if this level is exceeded by the signal to be recorded. The machine stops automatically 3 seconds after the last sound event. This switch-off delay can be internally modified. Both inputs can selectively be looped through this automatic on/off-switching circuit.

EOM kit

The EOM kit detects **25 Hz signals**. EOM means "end of message". The retrofit kit for the REVOX B77 contains a filter that removes the 25 Hz signal from the audio signal and supplies a stop pulse to the recorder via the remote control circuit. This feature can, for example, be used for automatically stopping the recorder at the end of a commercial. When the 25 Hz signal is detected, a circuit is activated that can also be used to control external switching functions or for connecting a 24 V / 50 mA lamp.

Other applications for Revox reel-to-reel recorders

Satellite signals are for example recorded on Revox reel-to-reel machines so that subsequent copies can be produced from photographs taken by satellites.

Do you know of other reel-to-reel recorder applications? Please fill us in on the details so that we can share your experiences with our REVOX distributors and dealers.

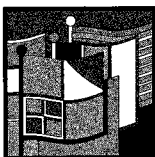
Or do you have an application potential that has not been fully exploited? We shall do our best to come up with a solution.

Bruno Baronio

Satellite signals: recorded with a Revox B77.



METS 02 DEC 1981 0900 W132 C101



Crowds...

Highlight at the AES in New York

For those who suffer from claustrophobia, the Studer Revox stand at the New York AES was often a dreadful place to be. But for those seeking the leading edge of audio technology, the Studer Revox display was a focal point of excitement, activity and - quite often - astonishment.

“We experienced some of the largest crowds at our stand that I've ever noticed,” says Thomas E. Mintner, Vice President and General Manager of Studer Revox America. “With a whole new generation of Studer and Revox products emerging from the factory, we feel this past AES marks the first of several shows where the Studer stand will always be a focal point of attention on the exhibit floor.”

Sam Borgerson

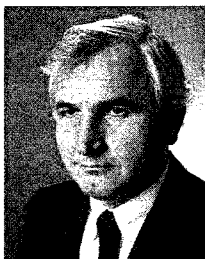


The Studer Group
of Companies

“Who is who”

This column has been reserved for introduction of personalities of our affiliated companies and representations in Europe and Overseas.

Introducing:



Oldrich Mikoska

President of Studer France S.à.r.l. • born 1938 in Zlin, CSR • grown up in Prague • after compulsory and secondary schools, studies of engineering at the Prague Polytechnicum • 1965 change of domicile from Prague to Paris, France • studies of business administration at Paris University • married • joined the STUDER group in January 1971.

Oldrich Mikoska got first acquainted with business life at Supraphon of Prague. After his move to France in 1965, he became technical director of a recording studio of EMI Pathé Marconi in Paris.

Already then was he well-known to STUDER as a customer: He was so enthusiastic about the concept of the STUDER A80 VU multichannel machine that he placed his first order without ever having seen a prototype A80 VU in operation! The enthusiasm for the brand has never left him.

It was in 1971 that Oldrich Mikoska joined the former STUDER representative in Paris. After six months of employment, the existing distribution company was formed into Studer France S.à.r.l., with O. Mikoska as General Manager; it was the year he sold the last C37 and A62. The affiliated company's activities started in January 1971 with the new STUDER A80 VU machines.

Oldrich Mikoska got the STUDER FRANCE going with the assistance of two part-time employees who are still with the company. After modest initial investment, company stocks increased substantially over the years; the company became progressively greater in value. Studer France moved into larger premises in 1974; more staff was employed. With the introduction of the A80 R version, radio stations became interested; today, government and private customers alike operate STUDER professional equipment.

The once technically-minded head of the company has very quickly gained profound commercial know-how and successfully piloted his company through good and bad times. His understanding for international economics and its implications on market developments did not let him forget the details of business administration. He is always cost-conscious.

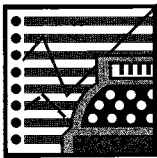
Because of his comprehensive technical know-how in the wide area of recording technology, his personal flexibility and his sociable business approach, Oldrich Mikoska has intensively travelled for Studer International AG in the seventies and has helped to open markets and improve business contacts

for STUDER professional audio equipment in West and East Africa, Middle and Far East as well as South America. He also travels abroad in connection with special projects. His first visits to customers in Nigeria, Ghana, Ivory Coast and Kenya, the STUDER symposia in Singapore, Hong Kong and Japan years ago are kept in vivid memory.

With all his business activities, there is still some leisure for his hobbies: skiing, preferably in the Swiss Alps, photographing and – cooking. He is a great gourmet and knows all about vintage wines.

His style of living and working is dominated by a great preference for quality. He conducts his business in a practical manner: "Selling starts where the customer says 'no' – everything else is mere distribution. Good selling is like gambling – however, with STUDER REVOX both parties win!" His persuasive power in business is unbeatable. After all, he knows both sides of a deal – as a buyer and as a seller.

Renate Ziemann



Right on success

**Studer
worldwide**

Finland

Yleisradio Helsinki

Thorough discussions with the management of the Planning Department of Finnish Broadcasting Corporation resulted in an order for six mixing consoles of the STUDER 900 series. In the forthcoming six months, different versions of mixing consoles will be supplied together with a first order for 40 STUDER A810 broadcast recorders.

Portugal

RTP Lisbon

STUDER supplies all audio equipment for the new TV centre of Radio-televisao Portuguesa. Included are 8 mixing consoles of the STUDER 903, 269 and 069 models, 19 professional tape recorders A810 and 12 synchronizing systems TLS 4000. Furthermore, 9 Cassette Decks A810 and 7 Telephone Hybrid Systems as well as various consoles and racks will be required as an integral part of a large "audio" order of Siemens Austria, main supplier of this project.

England

British Broadcasting Corporation

Proven technology – successful STUDER B67 Tape Recording Machine! Another order for 35 STUDER B67-0.75 Compact machines was supplied to BBC – a custom-made, special version of the STUDER B67.

Sultanate of Oman

Radiostation Qurm

For installation in a new radio production centre STUDER supplies all audio equipment as part of a large project. The requirements consist of 50 STUDER A80 RC, 1 A80 VU 24-track multichannel machine and a number of A810 broadcast recorders. Delivery has been scheduled for the fourth quarter of 1985.

In brief ...

SWISS SOUND

We have changed the release date of our SWISS SOUND magazine which will now appear in numbered issues end of January, April, July and October.

Introduction of STUDER A820

Demonstration of the new machine to interested parties and the presentation at various exhibitions have resulted in substantial orders.

STUDER REVOX distributors in Benelux

Belgium:	
Electronique Générale S.P.R.L. B-1040 Bruxelles	STUDER range REVOX Trainer
Heynen Audio Video BV B-3500 Hasselt	REVOX Hi-Fi
The Netherlands:	
Heynen B.V. NL-6590 AA Gennepe	STUDER range
Heynen Audio Video BV NL-6590 AA Gennepe	REVOX Hi-Fi REVOX Trainer
Luxembourg:	
Heynen Audio Video BV B-3500 Hasselt	REVOX Trainer

AES Hamburg, March 1985

STUDER REVOX will exhibit on more than 1000 sq ft at the AES convention. The entire product range, pro and hi-fi, will be presented, with focus on the digital tape recorder D820-2-DASH, the analogue stereo tape recorder A820 as well as an advanced mixing console range.

An additional demonstration booth permits individual presentation of equipment to smaller groups of interested customers; such demonstrations can be arranged for on request either at the STUDER booth or prior to the exhibition.

Editors:

Heinz Schiess, Marcel Siegenthaler

Please mail your letters to:

SWISS SOUND, STUDER INTERNATIONAL AG
Althardstrasse 10, CH-8105 Regensdorf
Phone 01/840 29 60 · Telex 58 489 stui ch
Telefax 01/840 47 37 (CCITT 3/2)

Coming events

1985 February 4 - 7

MECOM, Bahrain

1985 March 5 - 8

77th AES Convention, Hamburg

1985 April 14 - 17

NAB, Las Vegas

1985 May 3 - 6

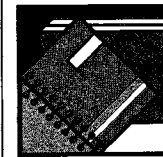
78th AES Convention, Anaheim

1985 June 6 - 12

14th International TV Symposium, Montreux

1985 June 12 - 14

APRS, London



From
the printers

10.27.0170	TLS 4000 Interface A800 , OI/SI (g/e)
10.27.0190	TLS 4000 , SD
10.23.1902	Studer product range , Leaflet (g)
10.23.1912	Studer product range , Leaflet (e)
10.26.0160	A820 , Flyer (g)
10.26.0170	A820 , Flyer (e)
10.26.0180	D820 , Flyer (g)
10.26.0190	D820 , Flyer (e)
10.26.0110	A80 VU - 3 LB , Flyer (g)
10.26.0120	A80 VU - 3 LB , Flyer (e)
10.26.0200	A725 , Flyer (e)
10.26.0210	Audio System Components , Flyer (e)
10.26.0101	Audio System Components , Catalogue (e)
10.18.4941	Shelf box Piccolo , Flyer (g/e/f)
10.29.0190	Subwoofer Piccolo-Bass , Flyer (g/e/f)
10.29.0180	Loudspeaker Studio 4 , Flyer (g/e/f)
10.29.0480	B77 MK II Special versions , Brochure (f)
10.18.2342	PR99 MK II , SD
10.18.6322	PR99 MK II , OI (g/e/f)
10.30.0270	B225 , OI (span.)

PI = Product information
TI = Technical information
OI = Operating instructions
SI = Service instructions
SD = Set of diagrams

Sets of diagrams, operating and service instructions available at nominal charge.

For further information please contact

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