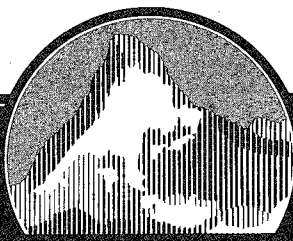


SWISS

VIEWS AND NEWS FROM SWITZERLAND



SOUND

1/83
March 1983

A PUBLICATION BY STUDER REVOX

Editorial

Deadlines

All of us have to contend with various types of deadlines, be it in our personal life or even more so in the business world where a broad spectrum of deadlines for meetings, consultations, customer calls, receiving and delivery, etc. are imposed.

Sometimes I get the impression that it seems to be fashionable to hurry from meeting to meeting and that it would tarnish ones personal image if the agenda were not tightly crammed each day. Such appointments appear to be extremely important and are practically always kept even at the frequent risk of not having sufficient time remaining for productive work.

The result is inevitable: overburdening, stress, haste, improvisation, production delays and consequently tardy deliveries.

I personally find that delivery schedules are one of the most important types of deadlines. It should be a point of honor to meet every confirmed delivery date. Each customer is entitled to the timely fulfillment of our contractual obligations. We should never forget how much we impair our trustworthiness and goodwill by not meeting agreed schedules. In my opinion, a supplier should in the course of his business dealings be able to establish a partnership with each customer that is based on mutual trust, but this trust is again strongly influenced by the rate of on-time deliveries.

Of course, unpredictable circumstances and events can occur that make it impossible to meet an agreed deadline. How fortunate in such predicament if

one can count on the sympathy and goodwill of the affected customer.

However, there are also customers who can make life difficult for a supplier by stipulating unrealistic delivery schedules. Such customers provoke the situation where they receive a confirmation for a delivery date that cannot realistically be kept. There are few suppliers nowadays who can afford to reject an order simply because of an unrealistic delivery term. However, such situations are not exactly beneficial to an existing or a fledgling partnership.

Since almost every company sooner or later finds itself in the position of both supplier and buyer, personal experiences should not simply be tossed aside but be digested and taken into consideration.

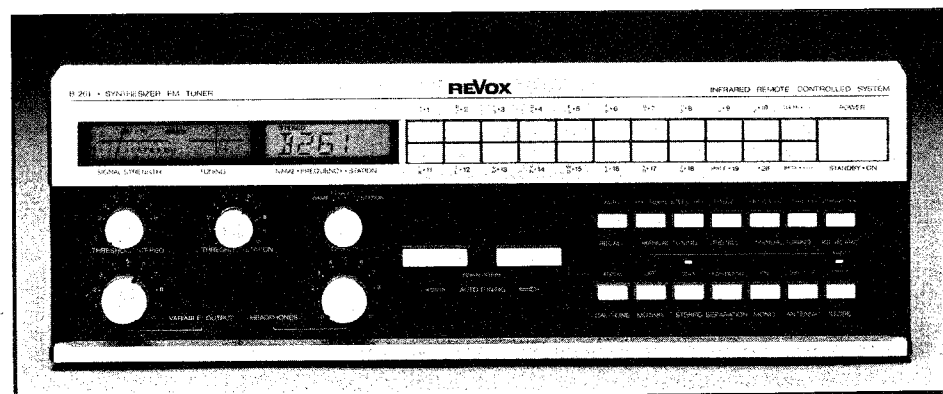
Margrit Meyer

New tuner by Revox with microcomputer control

Tuner operating concept - A new breakthrough



Even among the small elite of the world's top-quality tuners, our existing synthesizer models enjoy an exceptional reputation for great operating convenience. The new tuner generation Revox B261 respectively the professional Studer A726 has again taken a tremendous step forward.



Tuner REVOX B261: superb technology with exceptional operating convenience.

The introduction of the first Studer Revox synthesizer tuner (-pre-amplifier) A720 on the occasion of the company's 25 year jubilee represented a trend-setting achievement in respect to operating convenience. In 1973, the A720 was the world's first digital tuner that was able to sweep the FM band in 50 kHz steps! Over the past 10

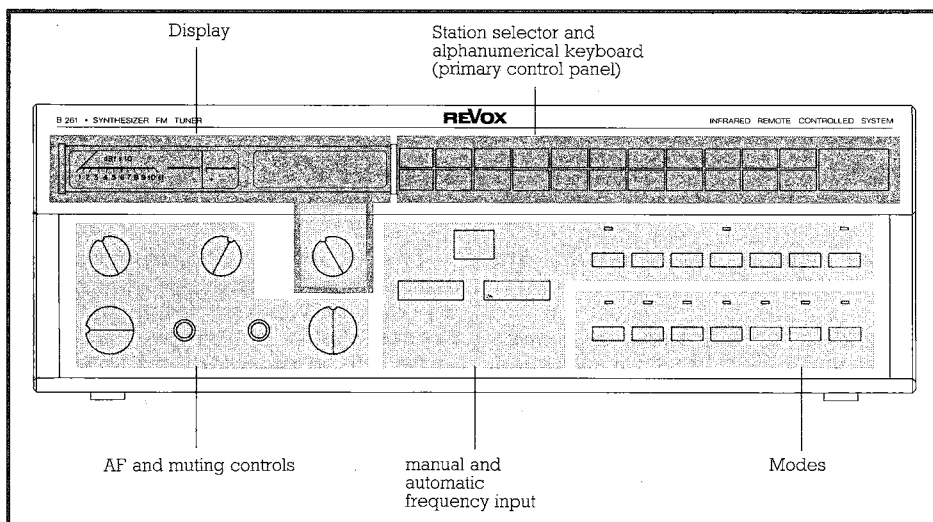
years our tuners have significantly contributed to the world-wide acceptance of the synthesizer principle, be it in high-quality hi-fi systems, as reference units in testing laboratories, or as monitor receivers.

Not much has changed in the basic philosophy if we consider the relatively long time since the product has first

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Clear layout and distinct relation of all operator controls.

been introduced. Our development efforts concentrated on gaining a leading position in respect to reception quality and operating convenience. This goal has been reached. Today we seek to consolidate and to strengthen our leadership. In the new tuner generation, the innovative concepts provide even greater operating convenience and enhanced facilities.

The following are, in brief, the main tasks of the microcomputer control of the Revox B261:

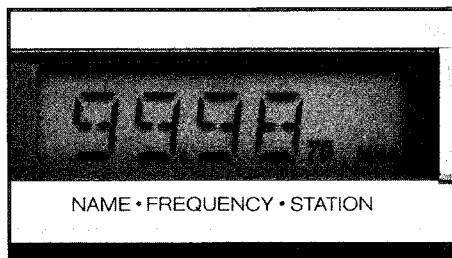
- Input of control commands via keyboard matrix, IR (B261) or wireconnected (A726) remote control.
- Control of frequency synthesizer, LC display, and keyboard matrix.
- Control of non-volatile memory (EARAM).
- Control of tuner modules, from antenna input selector to audio circuit board.

For the first time available with the new FM tuner generation are:

- IR remote control capability (not utilized in A726).
- 20 Memory locations which in addition to the frequency also hold other station-related parameters such as name and individual tuning modes.
- Memory scan for automatic readout of the stored frequencies (can also be initiated via wire-connected remote control).
- Alphanumeric liquid-crystal display (and alphanumeric input).
- 12.5 kHz channel pattern resolution.
- 2 Antenna inputs (option), signal source programmable.
- Built-in calibration oscillator (400 Hz).

The implementation of a well-developed microcomputer control also resulted in a new and greatly simplified

wiring concept. Serial bus connections not only reduce the number of leads, contacts, and soldering joints but increase the reliability even further. Matrix scanning of the keyboard functions provides two advantages: (a) the exclusive use of momentary-action push buttons combined with a checkback display on the front panel assures easy, clear, and quick operating, and (b) prepares the way for full-scale infrared remote control.



LC display in the frequency mode (12.5 kHz channel pattern resolution).

The operating philosophy of the B261 also features a coordinating component in that it can be integrated into an IR remote control system that currently also includes the new amplifier B251, the cassette tape recorder B710 MKII, and the reel-to-reel recorder B77.

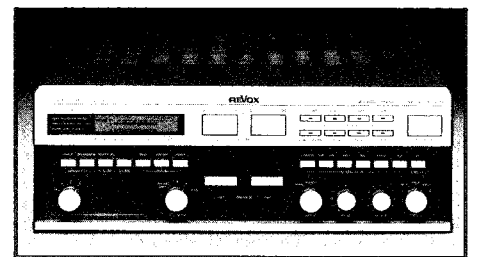
The state-of-the-art technology incorporated in the receiver section further enhances and optimizes the exceptional allround characteristics of the earlier models. Advanced components and manufacturing techniques have also contributed to the excellent price/performance ratio of this new tuner generation.

With this last aspect, another important requirement in the Studer Revox product philosophy has been satisfied.

Marcel Siegenthaler

Amplifier design concept New integrated amplifier Revox B251

With the newly developed B251 integrated amplifier, Revox introduces a completely fresh design concept which perfectly follows the existing series of Revox hi-fidelity music reproduction equipment.



Integrated amplifier REVOX B251: together with the tuner B261 an outstanding combination, in technology and design.

An important novelty in the B251 is the segregation of the operator controls into primary and secondary elements. After programming, the latter can be covered with an acrylic glass panel. Another first for Revox is the infrared transmitter which enables remote control of all operational parameters such as source, volume, and balance, as well as activation of a preselected tone control setting. Revox had in the past decided against this type of remote control because its implementation was only possible by sacrificing some of the peak performance available with comparable, directly controlled amplifiers. Because of the new technologies available today, such compromises are no longer required. To the contrary, the specifications have been improved even further through the skillful installation of CMOS D/A converters for volume control. The infrared remote control of the B251 can also handle other devices such as the reel-to-reel recorder B77 or the cassette recorder B710. To enable full remote control for all functions, two microprocessors are used.

The B251 not only features inputs for a tuner and two tape recorders, but also a phono input with variable input capacitance for optimum adaption to the cartridge system, as well as an optional moving coil input, an auxiliary input, and an input for a compact disc digital audio player. The high-level inputs feature individual isolating amplifiers for superior cross-talk cancellation. Since two indivi-

dual signal paths are available, any sound source can be recorded on tape while listening to a second one with speakers. External devices (e.g. an equalizer) can also be switched into the second path.

The sensitivity of the seven inputs can be individually adjusted in steps of 0.5 dB up to 23 dB in order to compensate for the volume difference in each sound source. Any sensitivity setting can be stored in the microprocessor memory.

The liquid-crystal (LCD) level display can be switched between indicating the power level on the amplifier output, the voltage level in the copying branch or the setting of the electronic volume control.

Special attention has been given to the signal-to-noise ratio. With pride we can point out that we succeeded in

achieving an SN ratio of 80 dB starting at a low output power of only 50 mW. Even at such low settings the B251 is eminently suited for processing digital signals.

Detent-type potentiometers with 5 setting for boosting and de-emphasizing the treble and the bass frequencies are available. With a bell-shaped curve the volume can be compensated to match the human hearing physiology. The corresponding filter network has been designed in consultation with a speaker designer of international renown. A 18 Hz subsonic filter can also be programmatically switched in for each source.

A highly efficient switching power supply feeds this amplifier that outputs up to 300 W per channel driven into 4 ohms.

The circuit of the power amplifier is

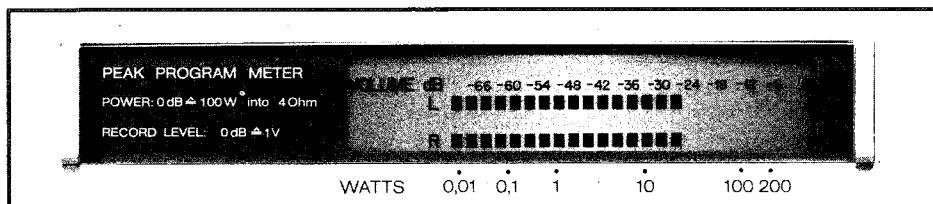
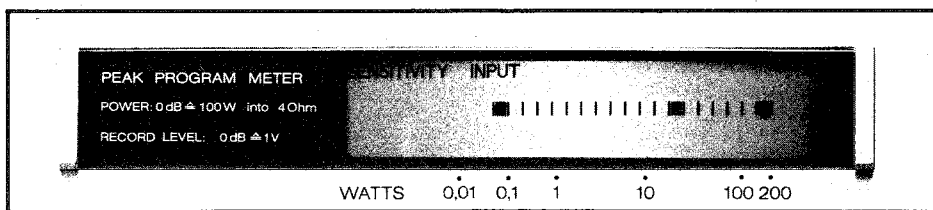
also a novelty since the so-called inter-modulation distortions are avoided while simultaneously permitting exceptionally fast rise times. This is of decisive importance for reproducing digital compact discs.

The power transistors which are mounted on a common aluminium block are cooled through excellent thermal coupling to a heat pipe which, although small and light, provides a large heat-sinking surface.

If two different speaker systems are alternately connected to the amplifier, the sensitivity of the speakers can be matched and the setting stored in the B251. For headphones-only operation, a separate volume setting can be selected and stored.

This amplifier is not only destined to gain wide popularity because of its excellent design and price/performance ratio but also to be classified among the world's top-rated units because of its technical characteristics, its sound fidelity, and its exceptional operating convenience.

Urs Zogg
Joseph Dörner



Portrait F.W.O. BAUCH Limited

Within the British sound recording and broadcast industries the Bauch name is identified with the finest audio and video equipment and a comprehensive back-up and after sales service. The name and the company's business philosophy, devoted to the pursuit of excellence, is derived from its founder, the research physicist, Friedrich Wilhelm Otto Bauch.

FWO, as he is respectfully referred to in the company, has an extensive background in recording technology: in 1928 he and a partner designed and patented a recorder for

the continuous playback of music and speech for advertising purposes (the talking shop window). This machine employed multitrack techniques and a closed-core with air-gap magnetic head, bearing on one side of the steel tape.

Following research into high frequency techniques at the new Heinrich Hertz Institute in Berlin and a first visit to England in 1934, FWO became the founding director of Philips-Electrospecial in Berlin.

In 1946 he was appointed Technical Director of the new RIAS American broadcasting station in Berlin, with re-

sponsibility for all technical matters, as well as recording and broadcasting administration.

In 1947, at the request of the Government's Department of Scientific and Industrial Research, FWO returned to Britain to work again as a research physicist.

In 1950, FWO was responsible for supplying two professional tape recorders commissioned by Universal Programmes Corporation in London. These Magnetophon machines, rebuilt and modified entirely by FWO himself, achieved an unheard of frequency re-



Last checks on an A800 before delivery.

sponse, for that time, of ± 0.5 dB from 40 Hz to 15 kHz. It was virtually this commission that germinated the seed of FWO's own company supplying equipment to the professional sound recording industry in Britain.

By 1952 the FWO Bauch company had established firm roots with its appointment as the UK agent for Georg Neumann GmbH. The following year, signs of the Bauch company's steady growth were marked by the appoint-



Competent engineers at F.W.O. Bauch Ltd.

ment as the UK agent for EMT with their range of studio equipment.

In 1960 the company had its first contact with STUDER products and in February 1963 the first C37 machines were supplied to ATV (the major independent television company) and the British Broadcasting Corporation who went on to purchase a total of 78 machines of this type! These magnificent "tank-like" machines represented a major step forward in tape recorder design, performance and reliability - there were even instances where machines

were put straight into service without being removed from their freight pallette! For many years demand exceeded supply, and the close contacts and personal relationships with both Studer management and engineering personnel were developed on the basis of mutual trust and appreciation.

The company experienced steady growth, based upon FWO's basic principles of offering only top quality equipment and providing a comprehensive after sales service, rooted in a deep understanding of the product and its design. These principles remain the hallmark of the Bauch company.

The mid 1960s saw the entry of FWO's two sons, John and Michael, into the company. They, like their father before them, had their pre-university electromechanical training at Siemens & Halske in Germany.

Growth in the latter half of the 60s was assisted by an expanding broadcast and recording industry. The advent of multi-track recording, coinciding with the "Beatles" era led to a rapid increase in demand for professional tape recorders, enabling the company to establish the STUDER name at the forefront of the

British recording industry. By that time, the company had been appointed the UK agent for a number of new professional audio suppliers, as well as industrial batteries and electronic components.

In 1970 the company moved to the extensive self contained premises of its present location in Boreham Wood, just north of London. Growth continued to be based essentially on the company's reputation for excellence in equipment and service. In fact, such was the confidence generated in STUDER products,

that the new unseen A80/VU 8-track recorder had attracted numerous firm orders prior to its first arrival at the APRS exhibition in June 1970.

In 1975 the company's ties with the Studer organisation were further cemented by its appointment as distributor for the Revox range of Hi-Fi and Language laboratory equipment. To supply and service the consumer and semiprofessional market, a new division was established, with its own sales force and service team. This, combined with the later introduction of the new Revox "B" series resulted in an increased consumer awareness of the Revox brand-name and led to a rapid expansion of the dealer network, and service and training facilities.

By the close of the 70s Bauch had been appointed UK agents for further suppliers of professional sound equipment, many from the USA, and secured for itself the position of leading supplier of a complete service to the professional audio market in Britain.

The beginning of the 1980s was to witness yet another landmark in the development of the Bauch company as it became involved in supplying the broadcast video industry with its appointment as agent for CMX videotape editing systems. Again, a new division was set up, headed by an expert in video systems, thus continuing the company's philosophy of not diluting effort in established areas. In the meantime, many video product lines have been added, ranging from cameras to vision mixers and digital videographics systems.

Today, in 1983, the company employs some 65 persons, of which 22 are qualified electronics engineers, and occupies premises of approximately 22'000 square feet. The company has recently installed its third computer system, an ICL ME29/54, with 32 terminals located throughout the building complex, giving on-line access to data and processing for management and all staff in sales, service, accounts, order-processing, stores and despatch.

It is true to say that, without the introduction of a sophisticated data processing system in 1973, it would have been impossible for the company to support efficiently the growing needs for spare parts and service demanded by the equipment base - the first Neumann M49 microphone supplied in 1952 is still in use and many of the more than 3000 Studer machines in constant use in the United Kingdom are now with their third or fourth proud owners!

All at F.W.O. Bauch Limited value highly the close association, which is enjoyed with the Studer organisation. As a major supplier of the company over the past 20 years, Studer has supported the needs and requirements of some of the most critical and demanding engineers in the world. To sustain this is no mean achievement.

With the advent of digital recording the future will place increased demands

on engineering capability and service back-up. F.W.O. Bauch Limited is ensuring today that its facilities, technology and staff will be there in strength to meet the challenge.

Michael Cooper

Michael Cooper is manager for Marketing Services at F.W.O. Bauch Limited.



Mixing consoles

"A new generation"

In the early seventies I had the opportunity to discuss with Monsieur Grossenbacher, manager of the UN radio studio in Geneva, the latest developments in mixer technologies. The occasion for our discussion was the fact that the 15-year-old Studer vacuum-tube mixing console was still in full use at the UN.

I tried to convince him of the benefits



Two veterans of broadcasting: Mr Grossenbacher working at the STUDER vacuum-tube mixing console.

of the new 089 mixer technology hoping to replace the old mixing console and to make a deal. Monsieur Grossenbacher listened attentively to my arguments and then, to my surprise, formulated the prophetic statement: "Parce que ce puytre donne chaque jour entière satisfaction, j'attends la prochaine génération!"

Although I hesitated to take this prediction at face value, it nevertheless was fulfilled in the summer of 1981 when the UN placed the very first order for a Series 900 mixing console and that simply on the strength of a single discussion, a photograph of the prototype, and a preliminary data sheet!

Although this anecdote shows that it is still possible to establish a relationship based on mutual trust and personal contacts, it also makes clear that conti-

uous efforts are required of each of us in order to extend valuable manufacturer-customer relationship also into the future.

For space reasons, only a brief outline of the developments that led to the various generations of Studer mixing consoles and their significance can be given here.

In cooperation with the PTT and the radio studios of the Swiss Broadcasting Corporation (SRG), approximately thirty 6-channel vacuum-tube-equipped mono amplifiers type 69 for outside broadcasts as well as two special versions for the OB van of the Radio Studio Bern and for the previously mentioned UN studio were manufactured from 1955 to 1957.

This equipment was kept in operation until spare tubes were no longer available. Because of the intense developments on the studio tape recorder

C37, the manufacture of mixing consoles was temporarily neglected, however, only superficially, because in the meantime the development engineers worked on the transistorized stereo mixing console 089 which was based on the standard specifications of the PTT/SRG. The first of these units was delivered in 1968. During the subsequent years this 12-channel model was successfully upgraded and large music, radio drama, and broadcasting controls were built which are now accommodated in various parts of the world. In the mid-seventies, a market for portable mini-mixers developed. Towards the end of 1976, the first units of the now indispensable STUDER 169 mixing console became available. Within four years of its introduction, more than 1'000 units were manufactured, a number that had never before been reached by any of our mixers. Together with the magnetic recording technology, the mixing consoles range is now one of the main product lines of our company. For many years it has enabled us to successfully participate in large-scale international projects.

Although our present time is frequently characterized by a rapid succession of new technologies, our mixing consoles enjoy tremendous staying power in the market if we consider the fact that it took 15 years before the current series of STUDER 900 replaced the 089. This phenomenal success should be attributed to the loyalty of our customers and their confidence in the existing Studer mixing consoles.

As far as the new generation is concerned, we are convinced that we have again developed a product which will hold its position well into the next decade.

Walter Hodel

Professional Mixing Consoles: Series 900

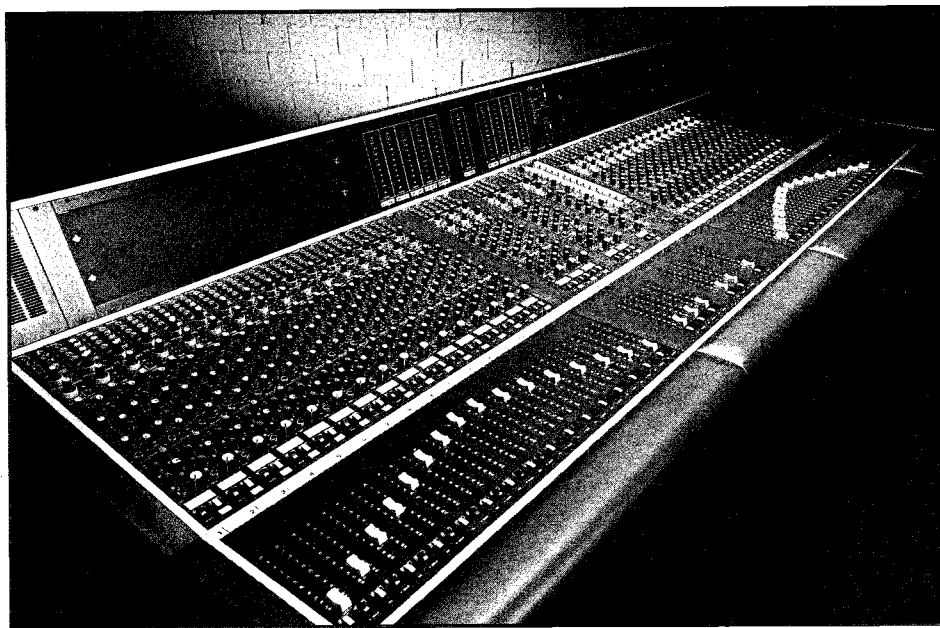
Advanced technology - flexible concept

Introduced approximately one year ago - First standard and special versions already shipped - Development of additional modules in full swing - That's the status of the Series 900 mixing consoles, the state-of-the-art generation with innovations that are more than skin deep.

In the third generation of the Studer mixing consoles, a major characteristic has become tradition: the standard versions of these advanced mixing consoles will again be manufactured in series. If we examine this almost trivial fact more closely we can readily discov-

er the fundamental strategy that is responsible for the excellent price/performance ratio of this equipment.

In the design of the new generation, great emphasis was placed on flexibility for two reasons. The incorporation of modules into a "sound" basic structure not only ensures that the standard versions can be manufactured economically, but also leaves an unsurpassed degree of freedom in building special mixing consoles to customer specifications.



Successful fusion of technology and design: Control desk 904 special version (32 inputs/8 outputs).

Both the mechanical layout as well as the new design are readily suited for implementing this concept. But new dimensions in human-factor engineering and functional handling have also been opened. Even minor constructional details such as the charcoal matt front panels, the inclined filter and display panels, as well as the side panels of natural wood testify to the care that has been taken in creating an optimum work station for the audio engineer.

Considerable flexibility has been attained in adapting the console size and its configuration to the requirements of the customers. The input units feature greatly enhanced filtering capabilities and are optionally available with transformerless and balanced microphone inputs. Professional fader units in Standard or VCA design are available. The VCA (voltage-controlled amplifiers) are also suited for computer-assisted level control.

The display panel can optionally be fitted with ballistic VU or PPM level meters; however it can also accommodate upright bar graph instruments that are assigned directly to the master modules.

Even the standard version of these elegant mixing consoles of the new Series 900 are fully equipped. All auxiliary circuits are included without additional cost; studio signalling, talkback, and studio break-in are standard equipment just like the auxiliary outputs, monitoring, and foldback.

Standard versions are currently available in two console sizes:

Model 901: up to 13 input and 4 master units;
console width 750 mm.

A810 Spooling Motor Control

Envelope curve clamping for switched 50 Hz power supplies

In the 1/82 edition of Swiss Sound we introduced the principle of the switched spooling motor control that is now used in our products for the first time (Cool Control Saves Energy). The following article explains the interesting interrelations of this AC regulator in respect to energy recovery by means of dynamic clamping.

In switched spooling motor controls, the electronic switch is connected serially to the load (motor); the controlled energy is determined by the mark-to-space ratio. For our application a frequency of 76 kHz has been chosen which results in 760 duty-cycle-modulated pulses per sinusoidal half-wave (50 Hz).

Because of the "hard" switching of the electronic switch, the starting current must be limited externally. Rather than using a resistor which would not be suited for energy balanced reasons, inductor L serves as a loss-free current limiter which enables the starting cur-

Model 902: up to 28 input and 4 master units;
console width 1420 mm.

Special versions with up to approximately 50 input and 24 master units can be built to customer specifications.

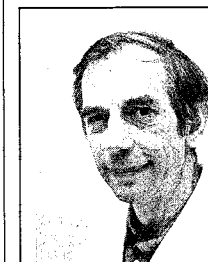
Technical evolution: As mentioned in the beginning, the Series 900 will be continuously expanded with new modules. At the moment the lab team in the mixing console department is actively engaged in developing a new, slightly simplified series of input modules. These mono and stereo modules, identified with suffix B, are advantageous for applications in which the main emphasis is on low price and simple operating, e.g. in continuity control or for editing. Mixing consoles equipped with B-modules will be available approximately in mid 1983.

Other projects to be tackled in the near future are: development of 16- and 24-channel mixing consoles (we expect to be able to exhibit a demonstration unit at the TV symposium in Montreux).

We intend to supply detailed information on the studies concerning a new type of multiplex units in a later edition.

Marcel Siegenthaler

rent to rise controlledly for each gating pulse. When the switch opens, the "braking energy" becomes available in the form of a magnetic field. Inductor L, therefore, attempts to retain the momentary current and responds with an inverse voltage jump that can reach a magnitude where the induced current continues to flow because of flash-over.



Artur Stosberg (51):

graduated in 1957 as an electrical engineer from the Federal Technical High School (ETH) in Zurich. After working as a research fellow at the ETH he continued his career as a development engineer in the field of industrial electronics

and later video tape recorders in Palo Alto (USA). In 1965 Artur Stosberg joined the STUDER company as a development engineer. He is engaged in a great variety of projects and he has demonstrated a special flair for drive systems. The following developments are "credited" to him: capstan drive A77, A80; tape transport control A80; turn table; spooling motor control A810, etc.

A favorable energy balance is only achieved if this breaking current is also conducted through the motor.

An electronic commutator would be the most simple solution for recovering the energy, however, because of the high switching frequency and the requirement for a broad range of mark-to-space ratios from 0 to 100%, this solution cannot be implemented.

In DC choppers, the breaking current can be conducted through the load with a free-wheeling diode, i.e. without switching by the element. By adding a second electronic switch, this principle can also be extended to DC currents. **Fig. 1** shows an elementary circuit dia-

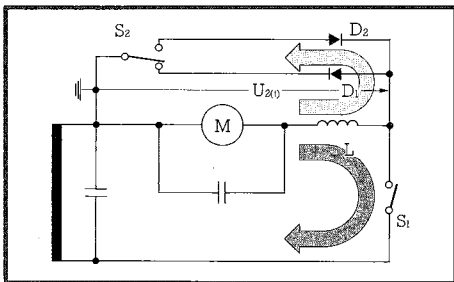


Fig. 1

gram. S_1 switches with chopper frequency (variable mark-to-space ratio); S_2 switches with AC power line frequency (commutation). Each time S_1 opens, and depending on the polarity of the AC supply voltage, the current flows either via D_1 or D_2 and switch S_2 back to the motor. Irregularities of the switch (dead periods, overlaps) can only occur near the AC voltage zero crossing where they are less critical. **Fig. 2** illustrates the potential gradient U_2 across M and L . The sinus voltage is composed of switched pulses (S_1). Clamping is static: the negative content of U_2 is clamped for the positive half-wave and vice-versa.

In respect to the physical implementation of the electronic switch, certain fundamental considerations are worth pointing out. The electronic switch S_1 must be able to process currents in either direction. Because of the very short switching times, only a FET transistor can be used. However, because it only processes polarized currents and voltages, it is embedded in a diode bridge.

Theoretically it would be possible to implement switch S_2 with two switching transistors (NPN and PNP) that are controlled by a separate winding of the power transformer. The following considerations speak against this approach:

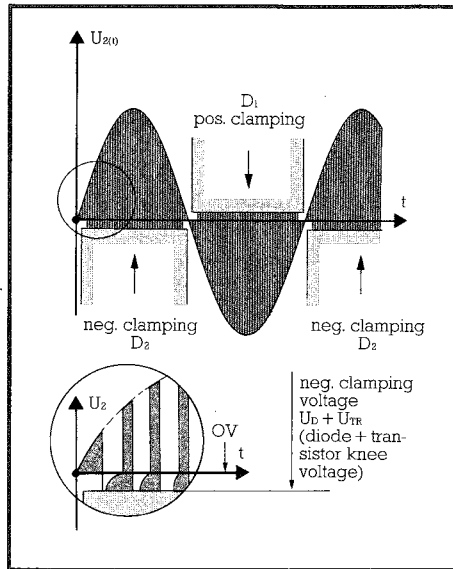


Fig. 2

1. There are two circuits that are supplied individually (from the transformer). The load circuit must only be driven if the commutation circuit operates properly and in correct phase relationship, otherwise it destroys itself by short circuit. The same occurs in the event of a commutation failure.
2. Not only the storage inductor L but also the motor is a load to the 50 Hz power line frequency. This results in phase displacement between current and voltage. After the zero crossing of the voltage, the current flows in the reverse direction for a short period.

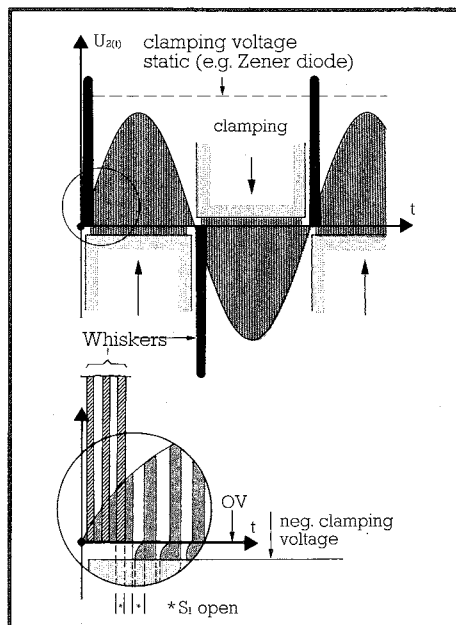


Fig. 3

Fig. 3 illustrates the induced voltage peaks (whiskers) which occur because the circuit is interrupted by gating and because the current is prevented from flowing through the diodes by the unilateral, static clamping. If these whiskers were reduced with a Zener diode across switch S_1 , energy would be lost to the system. Equally unsuccessful are attempts to compensate the inductive component with parallel capacitors because the inductivity varies as a function of the load and the motor speed.

The solution to this problem: envelope curve commutation.

The basic idea is to clamp the voltage U_2 in the positive and the negative range throughout the entire period. **Fig. 4** (and detail in Fig. 3) illustrate how the clamping voltage follows the sinusoidal curve. This continuous, dynamic clamping renders superfluous all other protective components across the electronic switching elements such as RC networks or Zener diodes.

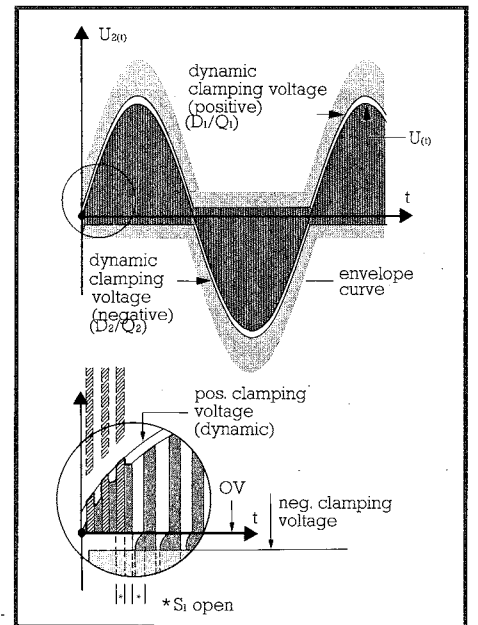


Fig. 4

Fig. 5 illustrates the dynamic clamping principle. The main winding, which also supplies the motor, drives the emitter followers Q_1 and Q_2 in such a manner that the positive and the negative clamping voltage follow the diode paths of the motor sinusoidal voltage in the interval of the collector saturation voltage (D_1/Q_1 for the positive and D_2/Q_2 for the negative range).

This dynamic clamping or commutation results in the decisive advantage that it fully recovers the energy stored in the inductors, regardless of whether the breaking current is heteropolar in respect to the useful current (L) or homopolar (M, whiskers).

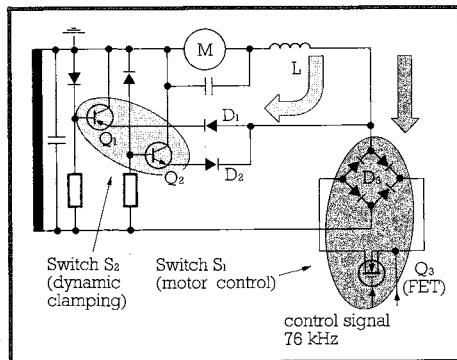


Fig. 5

Fig. 6 illustrates the achievable clamping. Only after the zero crossing can negligibly small disturbances be detected in the sine-wave shape.

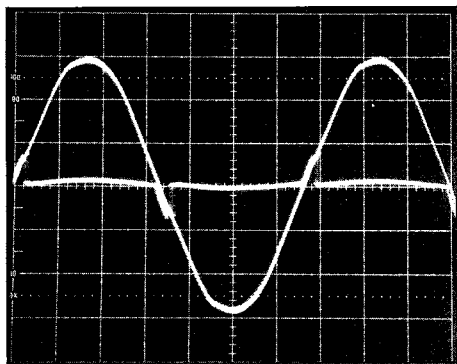
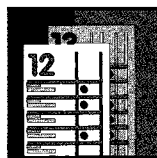


Fig. 6

With this type of spooling motor control which for the first time has been implemented in the A810, AC motor drives are not only exceptionally rugged but also very energy efficient.

Artur Stosberg



Coming events

1983 April 10 - 13: NAB Las Vegas, USA
 1983 May 28 - June 2: International TV-Symposium Montreux, CH
 1983 October 9 - 12: 74. AES New York, USA

Sound and Vision

Audio post-production for video programmes

Since the advent of "talking pictures" in 1927 ("The Jazz Singer"), the crucial problem has been one of editing sound and picture without limiting artistic freedom by technical means.

Introduction

The following method used to simplify this complex task:

- Film only pre-editing
- then sound pre-editing
- then definitive film editing
- then definitive audio editing with dialogue dubbing, music scoring and special effects (sweetening).

Each audio track of the final product - film or video - is normally a careful mix of 4 sound sources, e.g.: dialogue, music, special effects and background noises. This means that for a 70 mm film with six audio tracks, 24 channels at least should be available (4 x 6). However, to ensure smooth continuity between sound cues, each sound source depends upon three or more sound tracks, leading to 72 channels plus. Large productions aside, we can assume that for a normal 3-way Dolby production 24 to 48 basic audio channels (or tracks) will be needed.

The basic material

For editing purposes in post-production, the basic picture and sound materials may be in the following forms:

Film:

35 mm and 16 mm, or exceptionally, 65 mm/35 mm Todd AO/Super 16 mm/Super 8 mm/8 mm

Video:

1" Helical C or B format, 3/4" U-matic, or exceptionally 2" Quadruplex, 1/2" VHS, Betamax or VCR.

Audio:

1/4" tape - mono (neopilot) or stereo (Timecode or FM pilot)
 1/2" tape - 4 track (audio and 1 TC or pilot)
 Multitrack tape - 8 to 24 tracks
 Magnetic film - 35 mm, 1-4 tracks, 17.5 mm, 1 or 2 tracks, 16 mm, 1 or 2 tracks.

Video tape:

Original sound recorded on audio tracks 1 and/or 2

Vinyl disc:

Recorded music or effects

NAB cartridges and compact cassettes:
 Background noise, etc.

Today's tendency is to copy everything - film or video - onto 3/4" U-matic and lock the video and audio signals together by means of a timecode based synchroniser, the main advantage being that this method lends itself to computer control and automation of dubbing and editing.

Typical modern audio post-production setup

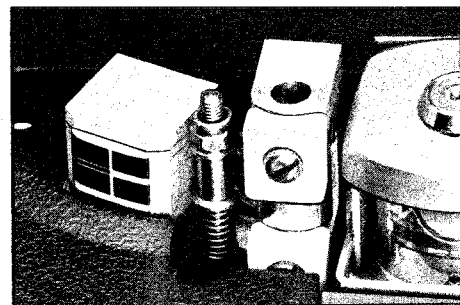
We now focus on all aspects of audio post-production: editing, scoring, dubbing and sweetening. We also assume the picture to be pre-edited and timecode and computers to be used throughout.

The following diagram shows a typical system where efficiency and rentability are as high as possible.

The photo shows a typical setup that was operational at the Instructa Exhibition held in summer 1982 in Johannesburg, South Africa. To fully demonstrate the whole system we used a small production unit that enabled us to show the actual advantages of the complete installation.

An interesting point to note is that Studer manufactures most of the audio units, i.e.: Studer can deliver a whole audio post-production system for film and video in one package.

This compact production unit can be run by a two-man crew and produce highest quality sound thanks to a lightweight portable recorder (Nagra) with built-in timecode generator. Full compatibility with the STUDER A810 timecode record/repro system is ensured due to normalized track width and flux. The system is easy to operate, the TLS 2000 making dubbing or drop-ins child's play.



Left "combi-head" containing the time code reproducible gap and the audio erase gap.



designed specially for integration into modern film and video production systems. The A810 can be totally remote controlled as part of a large computer-based system (via a serial bus, type RS 232) and co-exist perfectly with sophisticated film or video equipment.

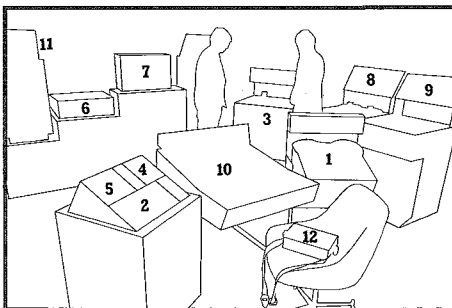
The 900 series console is also new, with a wide number of possible configurations due to its modular construction, eg: simple or parametric eq, VCA faders, etc. Full communications and monitoring are standard on each model.

Conclusion

A full facility can be installed in a compact space. The audio side is derived from multitrack technology and is thus of the highest quality – ask any Studer user!

For more details or a hands-on demo, please contact your local Studer agent or Mr A. Bourget at Studer headquarters in Switzerland. Your enquiries are always welcomed!

André Bourget



- 7. Videomonitor
- 8./9. Turntables 1 und 2
- 10. STUDER 900
- 11. Monitorloudspeaker REVOX Symbol B
- 12. Portable recorder (Nagra)

- 1. STUDER A810
- 2. TLS 2000
- 3. STUDER A800 8-track
- 4. Autolocator
- 5. Audio remote control
- 6. Videorecorder

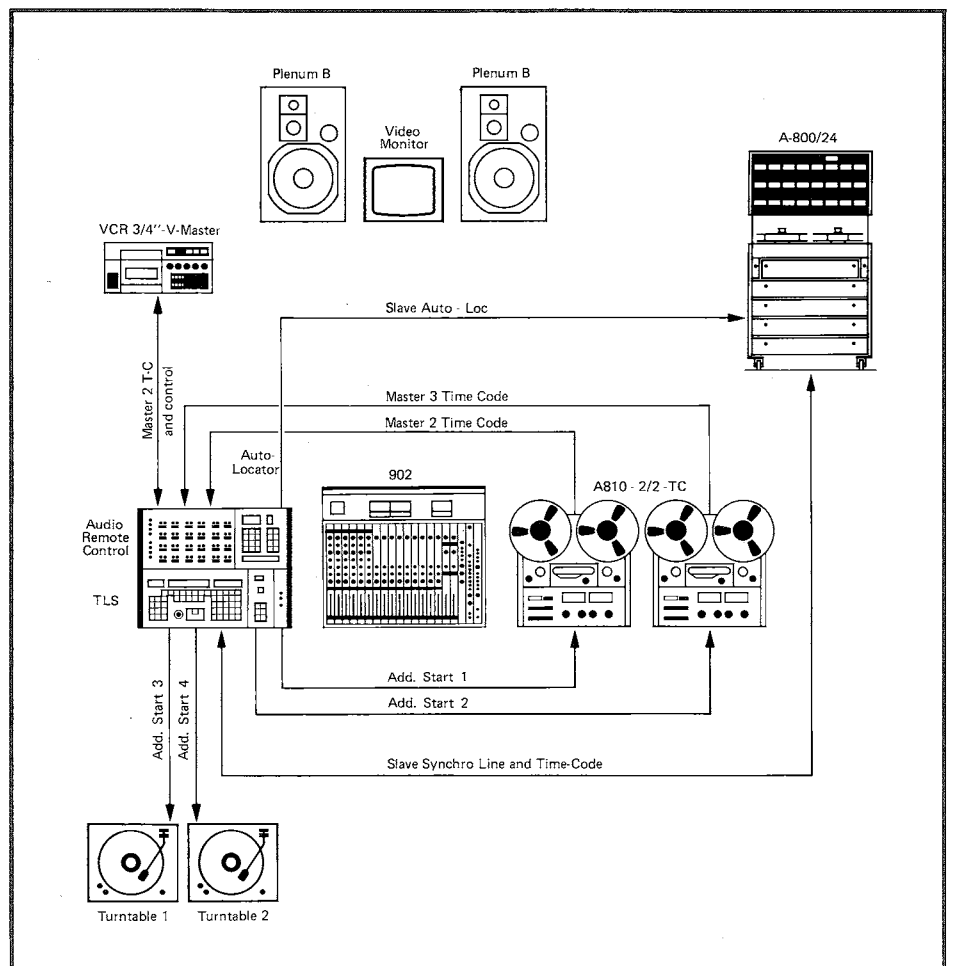
Where Studer does it all

The key components of the system are the STUDER A800/24 multitrack, TLS 2000 tape lock, A810 master recorder with centre track timecode and 900 mixing console.

The A800 is a fast and reliable recorder with all audio and transport functions under microprocessor control, thus enabling the machine to be under computer command and follow instructions exactly.

The TLS 2000 has been designed to not only control perfectly the A800, but also most of today's video machines used for mastering. This system is entirely based on highly sophisticated processing of SMPTE Time Code.

The A810 is new to the Studer range and, as well as featuring full microprocessor control over all audio and transport parameters including adjustments, has been





A "small customer" introduces his studio

Recording Studio EXKLUSIV in St. Gallen, Switzerland

In 1967 I founded my studio with the goal of producing lifelike recordings. Initially, my equipment consisted of two REVOX G36 tape recorders which were "fed" from a small mixer console and 4 electrostatic microphones. Despite this relatively simple configuration, the recordings turned out reasonably well and I started to produce records under my own label EXKLUSIV. From the assets of a bankruptcy I was able to acquire a mono disc cutter at bargain price. This cutter, subsequently converted to stereo, greatly enhanced the existing studio equipment.

However it soon became apparent that this cutter no longer conformed to the current technical standards since it was built entirely in vacuum-tube technology. I was unable to transfer a violine tone to a disc without a certain amount of distortion. The mechanical recording head was less accurate than the latest pickups. A new, modern unit solved this problem. Since my old tape recorder (not made by Studer) showed a poor wow-and-flutter behaviour, I ordered one of the first STUDER A80s. From Studer mixer components I built my first console designed specifically for recording on location. It functioned perfectly despite the skepsis of the Studer engineers (hum, etc.).

The first A62s replaced the now slightly ancient G36s and an A80 quadro was used for recording and mastering functions. Together with the new mixer console 089, my studio gradually reached an acceptable level of technical sophistication, a fact which was also recognized by the record industry. The investment paid off: a few golden records are the visual proof.

However, time does not stand still. I sold the A62s and replaced them by B62s. A 189 quadro mixer console was added and as the non-plus-ultra, a STUDER A8016/24 multichannel recorder with autolocator. For me the locator is one of the most important devices in multichannel recording; simple and reliable, yet it saves a lot of time.

Since the new equipment required more space and a new ultramodern cutter with video monitor for groove inspection was added, the studio had to be enlarged. On October 1981 I relocated to the new address and the business, as well as the Studer equipment, run to my complete satisfaction.



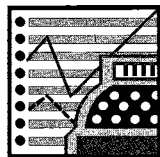
The author at work inmidst of his STUDER equipment.

Allow me to add a few words concerning the Studer company. It is no coincidence that I own this much Studer equipment. (In addition to the previously mentioned units I also own two 069s, A700 and A77 each.) I'm completely satisfied with the superb workmanship and the excellent sound fidelity. This company deserves special praise for the immense development work performed by its engineers. The outstanding workmanship of the parts even in minute details testifies to the skill and dedication of the production personnel.

During each visit to the plant I'm impressed by the clean and orderly work environment. I wish the company much success for the future.

Rico Sonderegger

Among Rico Sonderegger's customers are several Swiss artists of international renown: Krokus; Che & Ray; Peter, Sue & Marc, as well as the entertainers Emil (Steinberger); Kliby & Caroline, and the Cabaret Rotstift.



Abu Dhabi:

Big success for STUDER

After 7 months of tough negotiations and in the face of stiff competition from Japan, Germany, France and the United States, Studer International AG succeeded in the autumn of 1982 to secure an order for the installation of a radio center in Abu Dhabi as a subcontractor of Brown Boveri Ltd. The total project is valued at sFr.150 Mio. (equivalent to approximately US\$ 75 Mio.). Studer International's share is sFr. 6.3 Mio. (approx. US\$ 3.15 Mio.).

The project comprises two transmitter stations (medium and short wave) and is scheduled for completion by the middle of 1984.

The medium-frequency station with two coupled 1000 kW transmitters will serve the Golf Region, the Middle East, as well as India and Pakistan. The short-wave station with four transmitters of 500 kW each will broadcast a program for reception in North and South America, Europe, Western Africa, and the Near and Far East.

STI supplies the following equipment for the 13 studios, 3 editing studios, 2 master control rooms, and the maintenance center: 10 mixer consoles 900, 1 mixer console 169; 56 tape recorders A80RC; 2 multichannel recorders A80VU-4-1/2"; 17 cassette recorders A710, 2 FM tuners A726, and 9 amplifiers A68. This order again sets a milestone in the history of the STUDER broadcasting projects.



Sabah

Turnkey Project for STUDER

In October 1982, the "Centre of Education" in Sabah, East Malaysia, placed an order for STUDER professional audio equipment, to be installed in:

- 1 drama studio
- 1 talk studio
- 3 editing rooms
- 3 listening rooms
- set of o.b. production facilities

Condition of the project was a delivery deadline of December 31, 1982; the impossible was done, and the consignment arrived Kota Kinabalu on date. Installation work will start in spring 1983, with a team of four (Studer International AG / Diethelm Singapore). Many thanks to the Diethelm team who obtained the order for STUDER and to all those at this end who have done their best to secure supply before expiry date.

Paul Meisel

Austrian Broadcasting Corporation

Revox speakers for professional application

After comprehensive comparative speaker tests, the Austrian Broadcasting Corporation (ORF) decided in favor of our Revox speakers. The large broadcasting studio in Vienna is now equipped with 4 Symbol B and 8 Plenum B speakers. The Symbol B speakers are located directly on stage while the Plenum B speakers are mounted on the side walls with swivel arms. This speaker arrangement results in optimum sound coverage of the room with its excellent acoustic properties.

Revox speakers are also used in other applications of the ORF, e.g. in the TV theatre and the OB vans. An addi-



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:



Bruno Hochstrasser

Product Manager for Professional Recording Systems at Willi Studer AG Regensdorf • born 1948 in Zurich • married • commercial and technical graduate • special management training.

His hobbies are skiing, sailing and operating model trains.

Bruno Hochstrasser has been associated with STUDER since 1971 when he started a part-time employment at the test department for professional tape recorders; he was in charge of the department one year later - in 1972.

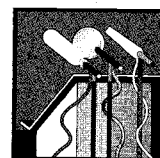
In 1973, he established "Willi Studer Canada" in Toronto with a team of four, and took over the Revox product range in 1975; the company was changed to "Studer Revox Canada Ltd." and grew to 14 employees.

In 1978, Bruno Hochstrasser, Vice President Sales at Studer International AG, was responsible for sales in the Far East and North America.

Most recently President of Studer Revox America, Inc., Nashville, Tennessee, USA (1979 - 1982), he accommodated headquarters in a new building in Nashville and established the company to be the industry leader. The substantial growth of Studer Revox America, Inc. is no doubt the result of everlasting efforts on Bruno Hochstrasser's part, supported by a high-spirited and efficient company team.

His future activities at Willi Studer AG, will bring overall responsibility for all STUDER programs involving professional analog recorders and associated systems (remote units, synchronizing systems etc.). In a 'matrix' structure of management, a product manager's line of responsibility follows the professional products group all the way from initial research through development, testing, manufacturing and marketing.

R. Ziemann



Symposium

Language trainer

Kuala Lumpur, Malaysia Nov 23, 1983

Diethelm Singapore PTE. LTD, our agent for Singapore and Malaysia organized a Revox language trainer symposium in November of last year. We gladly agreed to provide the necessary support because we were convinced that this rather infrequently used marketing approach is well suited for addressing a specific group of prospective customers. In addition, such a symposium also gives us, as representatives of our company, the opportunity to establish personal contacts with the decision makers and thus to obtain direct input that complements the reports of our agents responsible for the corresponding market. Another important consideration in favor of such symposiums is the fact that our equipment can be demonstrated to a larger group of potential buyers and that we can point out the advantages that our products provide over competitive offerings directly on the model. This method is more convincing because the prospective buyers can personally operate the system.

Diethelm invited 40 persons of which 30 accepted - in itself a success. Some of the visitors had to travel great distances and even came from remote areas such as East Malaysia (Sabah and Sarawak).

nal factor that contributed to the decision in favor of Revox speakers was their excellent price/performance ratio.

With this speaker generation, Studer Revox is well on its way of penetrating also this professional field.

Franz Wagner

Mr Franz Wagner is the sales manager for hi-fi products of Studer Revox Vienna Ltd.

The symposium was opened by introducing the Studer Revox Group as well as our philosophy. Subsequently we gave a brief "tour of the plant" in the form of a slide show. The visitors now were familiar with our company and the technical session was started by demonstrating the language trainer. Mr Chan K.W. of the Diethelm company handled this assignment with great skill and did a fine job in "selling" the language trainer.

The demonstration was followed by a hands-on session. The visitors readily accepted the challenge of working with a real system. The final period of the meeting was devoted to the discussion of system-related questions.



The team: left to right Paul Meisel (Studer International AG), Roland Kasper (Revox ELA AG), Chan K.W. (Diethelm), Val Ortega (Diethelm) and Song Chin Kah (Diethelm K.L.).

Diethelm's own staff as well as I are convinced that we have succeeded in drawing the attention of prospective buyers to our product and its advantages, and that we will be able to gain a foothold in this market.

Roland Kasper

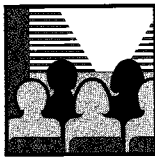
Revox

Marketing Meeting 1983

This year's international Revox workshop was held from January 17 to 19 in the business localities of Revox ELA AG in Regensdorf. Around 30 managers of the Studer Revox subsidiaries and the major European Revox agencies followed our invitation and thereby ensured that their market was also represented.

During this 3-day workshop we had the opportunity to inform the visitors of our world-wide promotion and sales activities, the Revox product mix 83, and the planned introduction of the new series 200 equipment. With reports on our quality assurance efforts applicable to Revox products and our development expenditures in the analog and digital technology, the participants gained some insight into our strategy and our untiring efforts in respect to product innovation. The series of presentations was rounded out with several product demonstrations and a slide show.

However, this meeting also provided



Workshop Seminar 1982

- Information on new products
- Updating of current range
- "Crosstalk"

These were the headlines of the workshop seminar 1982.

Nine days of active sessions offered evaluation and expansion of the knowledge we have of our product range. Delegates of STUDER representations and affiliated companies were undergoing an intensive seminar, strenuous enough where length and topics are concerned. This, however, was looked at as a great challenge and was met with initiative, engagement and humour. "Let's do it" was the driving motif - once even at 6 o'clock in the evenings with 9 working hours behind.

Opinions vary regarding one's professional life; there are the passive yet critical, and those who focus on their tasks. It is no secret that field people belong to the latter category. Results count! Our customers expect the best. So let us back up our colleagues in the field when it comes to keeping delivery schedules, carrying out modifications and supplying spare parts in next to no time.

Let's Do It!

Peter Joss

ample opportunity for the exchange of ideas among the agents. Those from Spain, Germany, and the United States informed on their current marketing and sales promotion activities which aim to ensure the success of the Revox products in their respective markets. Between the presentations and the workshop sessions and also during the leisurely dinners our guests had the opportunity to share experiences with some of the Studer Revox employees or their colleagues from other countries.

At the end of the marketing meeting the participants were given a tour through the new manufacturing building of the Willi Studer Company.

In retrospect we are well pleased with this successful meeting. We wish to express our thanks to all visitors from the various countries who contributed so much to its success. Their active participation during the presentations and in the group sessions again testified to the tremendous creativity and goodwill which lie in our agencies and subsidiaries.

Werner Schuler

Studer in the Far East

Workshop/Symposium in South Korea

Korean Broadcasting System (KBS) is the national broadcasting and television corporation of the Republic of Korea. For many years it has been a large buyer of Studer equipment (B67/A80VU/A80RC/169/269/369). KBS is currently in a planning phase for the 1988 Olympic Games and it is indeed impressive how far the project has matured.

Because of the large stock of Studer equipment already in use by KBS, an internal symposium/maintenance workshop became a real necessity. The list of the 70 participants who came from all parts of the country (local studios) clearly demonstrated that there was a genuine need for such a meeting. The key topics were the B67 and the mixer console 169.

Those who were interested had the opportunity to attend a brief symposium in which our complete product line was introduced. The climax was the presentation of our latest developments such as the A810, A710 and the control console 900.

Studer has been able to gain a foothold in the Korean market some time ago. Initially, this country was served by our branch in Hong Kong but today, Studer is represented by the small, but very active team of Daesan International, Inc. in Seoul.

Paul Meisel

From the printers

- 23.359.0383 **A726**, Leaflet (d)
- 23.360.0383 **A726**, Leaflet (e)
- 23.356.0183 **A710**, Leaflet (d)
- 23.357.0183 **A710**, Leaflet (e)
- 23.358.0183 **A710**, Leaflet (f)
- 23.503.1182 **A710**, SI (short version) (d/e/f)
- 23.504.1282 **A726**, OI/SD (d/e/f)
- 23.505.1282 **CAD**, OI/SI (d)
- 23.289.0283 **A80 VU MK II/MK III**, OI/SI (d/e)
- 23.830.0383 **Modern Multitrack Recording Techniques**, PI 4/83
- 18.509.0183 **PR99**, Leaflet (spanish)
- 18.193.0183 **B710 MK II**, SI (d/e/f)
- 18.192.1282 **B780/B739**, SI (d/e/f)
- 18.656.1282 **PR99 repro only**, OI/SD (d/e/f)
- 18.652.1082 **B710 MK II**, OI (spanish)

PI = Product information / SD = Set of diagrams
SI = Service instructions / OI = Operating instr.

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

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