SWISS SOUND

VIEWS AND NEWS FROM SWITZERLAND

STUDER REVOX

With warmest thanks

It was the end of summer 1982 – the first edition of SWISS SOUND was ready for distribution. Today I can admit that we were just a little disappointed then. Not that we didn't like our new creation, but after all those mental gymnastics a meagre eight pages of illustrations and text...

I n the meantime SWISS SOUND has increased its volume by 50 % and with a circulation of 20 000 copies (14 000 English and 6 000 German) it has become an integral part of our information strategy. Of course, we have long since realized that the editorship and production of a periodical is not just a pleasant part-time occupation. In view of the professionality of the product line it would be inappropriate to produce an information medium of a lesser standard. From the worldwide responses we can infer that our readers share our view.

In addition some renowned professional journals have reprinted SWISS SOUND articles. Such results are not only welcome but also an incentive for the future. This is an opportune time to express my thanks for the many letters to the editor, for the constructive suggestions, and the obliging contacts with the technical magazines.

The editor's thanks also goes to our in-house authors, all qualified engineers, technicians, and professionals from sales and administration, whose job as such is not to write articles for SWISS SOUND.

The same applies to the diligent authors of our subsidiaries and distributors in all parts of the world. At the front, far removed from the scene of action, linked only by telex, fax, or telephone, it is probably even more difficult to set pen to paper and write an article which will not circle the globe in printed form until several months later. But here is where the deeper meaning of such a magazine is buried: The exchange of information (in both directions!) establishes the links that are essential for a durable partnership between the manufacturer, the dealer, and the customer.

Of prime significance is the selection of articles. Not only because all of us are already saturated with information, but because it becomes increasingly difficult to distinguish real information from pseudo information (take a pinch of truth and season it to taste while constantly stirring). Genuine information in SWISS SOUND – and in our advertising! – we consider to be imperative, even at the risk that one or the other article turns out particularly factual and may be more difficult to obtain and to edit.

An additional, important thanks I would like to express here. It goes to our publisher, Dr. Willi Studer, who in his distinctive manner demands such an attitude but at the same time grants generous freedom for its translation into practical results. And this translation into a readable journal involves not only authors and editors, but also graphic artists, photographers, illustrators, process photographers, printers, and mailers. I am particularly proud to note that they are all Studer employees – SWISS SOUND is, therefore, a characteristic Studer product.

In the name of our publisher, the editorial staff, and all Studer employees I wish you continued pleasure with SWISS SOUND.

Marcel Siegenthaler

15th International television symposium and technical exhibition – Montreux, June 11–17, 1987

TV symposium Montreux

T hose who haven't heard it yet will now know for certain: Montreux is getting very cramped for space. What we refer to is not only the exhibition but also the city, and the situation with respect to available hotel rooms and parking spaces is not much better. The organizers in Montreux – a convention place with its own particular charm – have clearly recognized this, and will certainly do something to remedy the situation in the future. The exhibition hall has been expanded by very expensive, air-conditioned, 3300 square meter temporal quarters. This was more comfortable than many solidly built exhibition

facilities. By 1989, the new annex should be completed and the exhibition area enlarged to a total of 19 000 m².

The importance of 'Montreux' can be underscored by some salient figures. Some 1700 participants had registered for the symposium on which some 70 reports were presented in 18 thematically oriented sessions. (The reprints would fill about 1500 letter-size pages). At 232 exhibition stands manufacturers from all parts of the world showed their latest video and audio technologies, and around 170 trade journalists were accredited.

For HDTV (High Definition TV) some 400 m² of exhibition space were rented in a neighboring hotel were the most perfected video technology was demonstrated to the amazed public. At the same time the first 'Electronic Cinema Festival' was held.

Exhibition stand 520:
Studer International AG
On 72 m² the latest Studer products were demonstrated. The emphasis in Montreux was put on video technology obviously, a field which grows in importance also for Studer. Accordingly our

focal point was the presentation of the system controllers SC 4008 and 4016. Some other modern products such as the tape recorders A820 (2- and multi-channel), A807, A812, A810, D820X, and the mixing consoles 963, 970, 961/62 as well as peripheral units such as the A721, A727, and LHH 2000 were demonstrated. The visitors of our conference and recreation room above the stand were able to see the latest Revox products, including the small audio mixer C279.

Marcel Siegenthaler
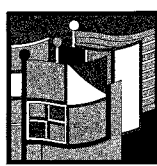
82nd AES Convention, London

The build-up
A great deal of controversy surrounded the 82nd AES Convention held in London this March. Nearly all of this came from the exhibitors and concerned the choice of venue, namely the new Queen Elizabeth II Conference Centre adjacent to the Houses of Parliament. When the Centre was opened in 1986 it became apparent that it was ideal for conferences and meetings but little consideration had been given to the exhibition side of conferences, such as with the AES Convention.

Goods lifts of restricted size, narrow corridors and doorways led to the decision that all large exhibits such as mixing consoles would have to be displayed in the basement car park! At the time the exhibitors visited the venue the basement garage was cold, wet and poorly lit – certainly not the ideal atmosphere for presenting sophisticated audio equipment.

Studer International, meanwhile, had made a successful application for space

on the second floor of the centre, and F.W.O. Bauch had been able to group its other exhibiting brands around the Studer area. But would enough visitors find their way around the rabbit-warren-like centre for this area to be considered a successful exhibiton?

The open days
By the time the Convention opened, the whole venue was in good working order – even the car park was a fairly warm, dry and well lit exhibition hall. The visitors arrived in their hundreds and rapidly found their way round the exhibition with all areas being busy for most of the show. Over 70 technical papers were delivered in the conference halls and the nine workshops attracted a lot of attention. More than 180 exhibitors from all over the world enjoyed a vigorous and stimulating exhibition with the Studer booth being a particularly busy area for the duration.

Michael Cooper

Prominent visitor at our booth: Beatles' producer George Martin.

Studer A807 tape recorder

The universal genius

Studer A807, compact and powerful in an ergonomical design. This machine can be installed in a console, 19" rack, or carrying case; with corresponding accessories it becomes even portable and is suited for OB applications.

Long years of application experience resulting from a steady dialog with customers, cost-consciousness in R & D as well as extensive development and production know-how are probably the key factors that led to the new A807 analog tape recorder, a machine generation that sets a new standard with respect to price/performance ratio.

About a year ago, the first prototypes of this machine generation had been introduced to the public at the AES exhibition in Montreux/Switzerland. In the meantime hundreds of machines have left our Regensdorf factory and are now installed in broadcast and recording studios and at highly divergent users all over the world.

Objectives of the A807

Tape machines have traditionally been used in a large variety of applications. Particularly in the broadcasting field, applications are known in which a 'large, expensive machine' cannot be cost-jus-tified. Nevertheless, professional quality, ruggedness and many of today's popular features are required. This applies particularly to the following fields of application:

Editing, tape listening stations, copying stations, sound acquisition (OB applications), and small broadcasting stations.

With the strong trend toward local broadcasting studios, the demand for a budget-priced, professional machine of 'universal character' became even stronger. The new Studer A807 series is designed to satisfy this development. It is the foundation for today's and future applications in the targeted market segment.

The A807 concept

Despite its low price, none of the traditional values for which Studer recorders have gained an enviable reputation throughout the world, have been sacrificed in this machine.

Like its larger relatives, the A810, A812, and A820, also the A807 features a rugged mechanical design based on a die-cast aluminum alloy chassis on which modular assemblies such as the spooling motors, capstan motor, and tape tension sensor as well as a rigid headblock with separate cast support are mounted. A new type of 3-phase control for the spooling motors, and the DC capstan originally developed for the A820, are part of the tape transport concept.

The audio electronics also incorporates the experience gained with the larger machines. It dispenses with nearly all potentiometers. All important adjustments (level, treble equalization, bias, etc.) are made with digitally controlled DACs. The digital control signals are prepared by a microprocessor that is responsible for controlling all machine functions. The microprocessor also supports the dialog with the user and optional peripheral devices.
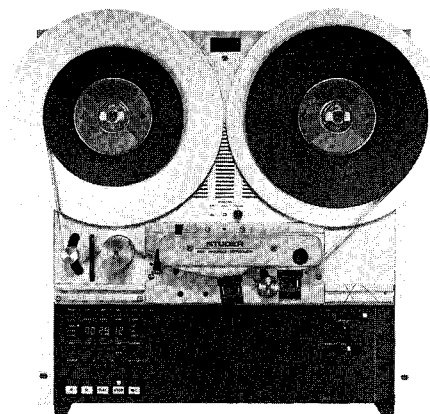

Operating surface of the A807 broadcasting version. Logically grouped operator controls and a simplified tape path are some of the key features.

The A807 concept is comprehensive. In addition to the state-of-the-art microprocessor and servo technology and the rugged mechanical assemblies, it features another important element: ease of use. The operating concept of the A807 is strictly geared to the user requirements.

Far-reaching compatibility with larger machines in the area of remote controls and interfaces as well as outstanding ease of maintenance are part of the A807 concept – which will manifest itself in the economy of the unit.

A807 tape deck with intelligence

The tape transport comprises two rugged 6-pole asynchronous AC spooling motors and a brushless, Hall-commutated DC capstan motor. Sophisticated servo technology and the use of a microprocessor for control functions are the key to the very simple tape transport design. Both spooling motors are equipped with one tacho sensor each that continuously supply the processor with information on the current speed of the motors. An additional sensor, mounted on the left-hand, low-inertia guide roller, measures the speed as well as the direction of the tape motion.
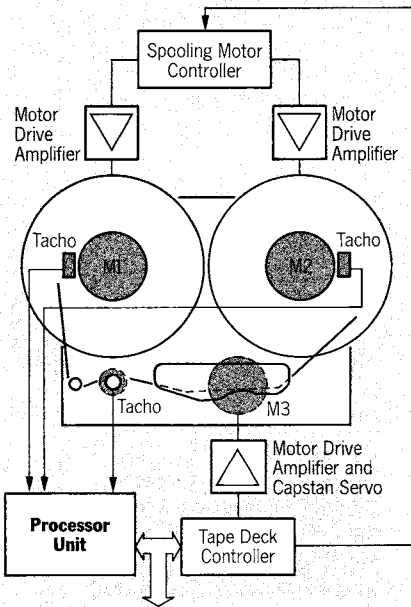

Block diagram of the A807 tape deck control
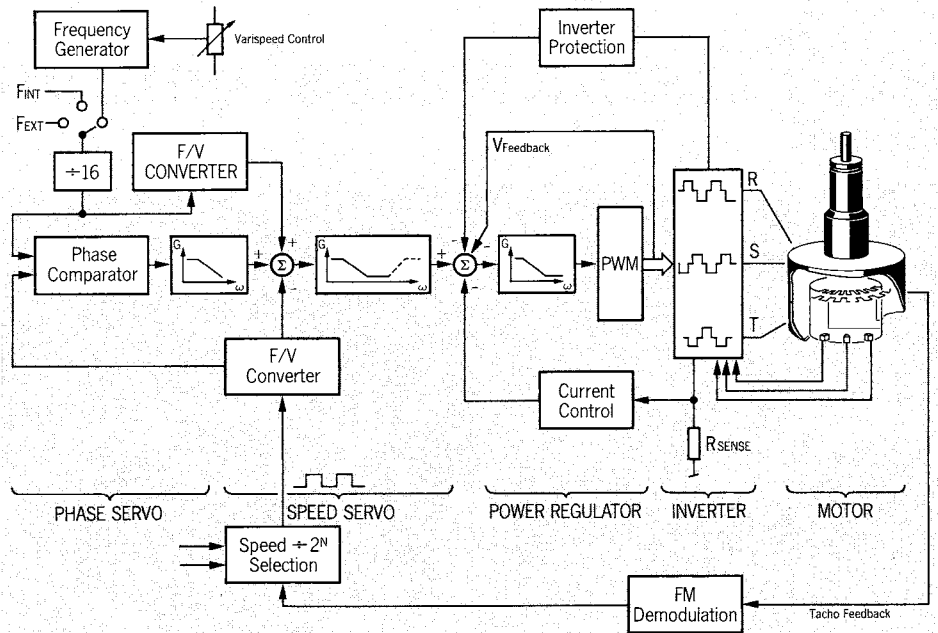
Block diagram of the capstan drive. The switched output stage ensures high efficiency but low heat dissipation.

The processor analyzes this tacho information and computes the diameter of the mounted pancakes. Since these data can be used to control the torque of the right-hand spooling motor, the traditional tape tension sensor on the right-hand side is no longer required. The elimination of this tape tension sensor plus corresponding guide rollers offers significant benefits in editing operations, because it is no longer necessary to thread the tape around these rollers. The left-hand tape tension sensor with inductive sensing supplies a tension-dependent signal that is used for controlling the left-hand spooling motor. This arrangement ensures constant tape tension, regardless of the diameter of the left-hand pancake.

The roller combination of the tape tension sensor also serves as a mechanical filter for irregularities in the tape travel which can, for example, be caused by splices. The sensor of the guide roller in the tape tension sensor supplies also the signals for the tape counter. Since the tacho roller is mounted to the left of the headblock, this means that the tape segment to be edited can be measured.

New approaches have also been taken in the spooling motor control which now feature an active 3-phase control. The frequency of the rotating field is readjusted as a function of the speed. This optimizes the torque behavior and as a result also the efficiency; in addition it allows high motor speeds and consequently high spooling speeds.

The rotating field can be electronically reversed which allows stepless control of the motors in either direction. This is a desirable characteristic which is particularly useful for controlled active braking with the motors in spooling mode. The motor output stages are, of course, switched in order to achieve high efficiency combined with low heat dissipation. Spooling motors with such a control have similar characteristics as DC motors, however they offer several advantages: No brushes and consequently very rugged, long service life, no maintenance, no torque pulsation, and low noise.
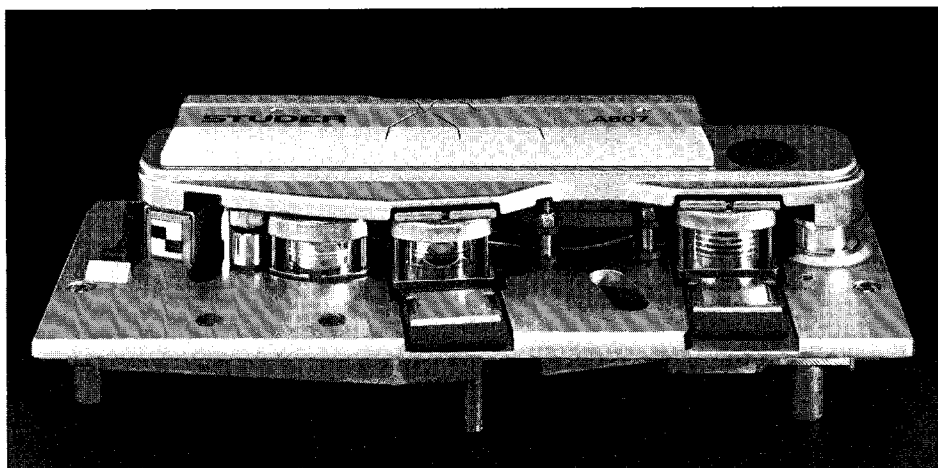
Headblock with two reproduce heads, optional headblock cover with integrated cutting/splicing block.

An additional important part of the A807 tape deck is the capstan drive. A Hall-commutated, brushless DC motor is used for this purpose. The design of this motor has been described in the Swiss Sound edition No. 12. In this case, however, a more simple analog control is used in place of the microprocessor control. Also on the A807, the capstan unit is switched off when the tape stands still.

During the start phase the tape is pressed against the capstan shaft and only then is the motor accelerated up to the nominal speed. The capstan unit is accelerated according to the ramp that corresponds to the selected nominal speed. This acceleration procedure,

from 0 to 40 °C, which means that this machine is ideally suited for OB applications.

Outline of the A807 tape deck:

– Max. reel diameter: 11.1" (282 mm)
– 3 tape speeds: 3.75; 7.5; 15 ips
– Max. spooling speed: approx. 10 m/s
– Reduced spooling speed: approx. 5 m/s
– Braking time from maximum spooling speed: approx. 3 s
– Shuttle operation with one hand cueing

Multifunctional: Tape counter and transport functions.

A807 headblock, flexible and rugged
The headblock plugs into a rigid die-cast aluminum alloy chassis. Up to four soundheads can be installed on the headblock casting. Close head spacing and a precision guidance system with scrape flutter roller between the erase head and record head ensure excellent tape guidance and phase stability. The A807 headblock is available in all ¼" head formats. A version with ¼" stereo consumer format heads is also available which means that reproduction of the quarter-track stereo format of nonprofessional tapes is also possible. Special versions of the A807 with two reproduce heads are available and allow normal operation within the selected ¼" professional format as well as reproduction of quarter-track stereo recordings in the nonprofessional format.

The headblock can be configured with various options. Scissors, tape marker as well as a headblock cover with integrated cutter/splicing block can be added to the headblock, depending on the application.

## Made possible by the microprocessor
The central microprocessor fulfills a number of demanding functions. It controls the tape deck, it drives the interface to the user, communicates via interface with the outside world, and controls (unique for a machine in this price category) the audio electronics by means of DACs which as digital control elements influence parameters such as gain, treble equalization, bias, etc. The processor program resides in two 16K EPROMs. Both EPROMs are plug-in devices that can be easily exchanged which means that an advanced version of a program can be installed in a few minutes.
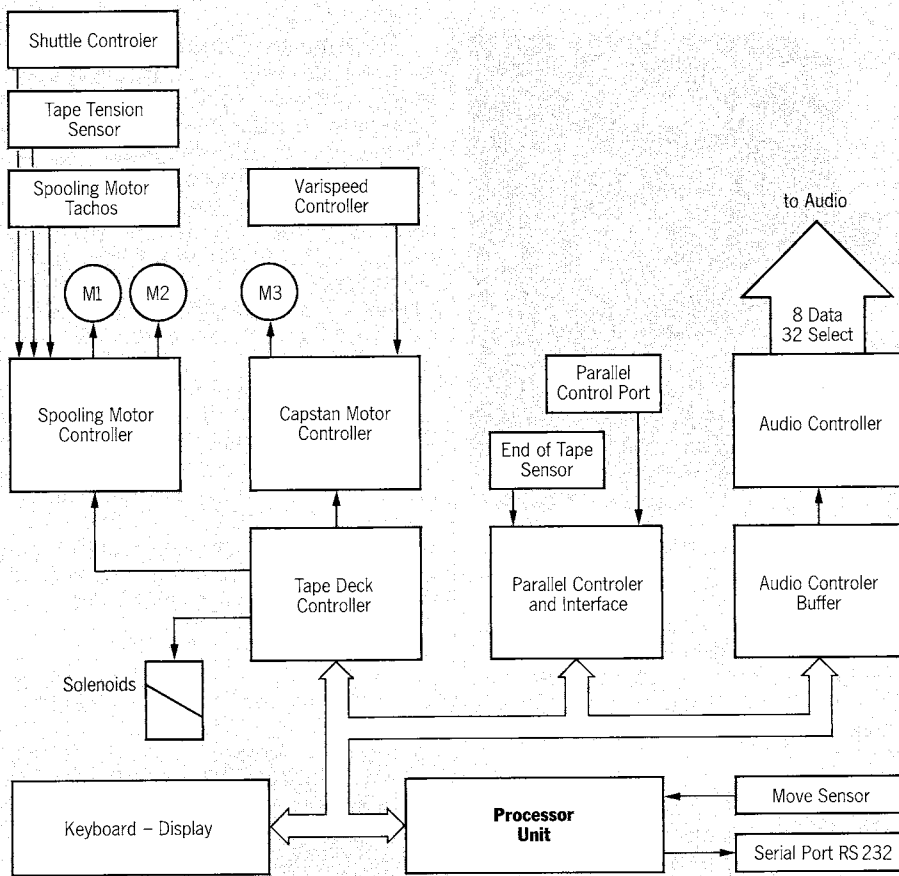
Block diagram of the microprocessor control with 6803 processor.

which is executed within 200 to 300 ms, is characterized by the very gentle treatment of the tape.

The capstan motor operates in either direction and also supports reverse play. Special attention has been given to the capstan shaft bearing. The unit functions perfectly at ambient temperatures
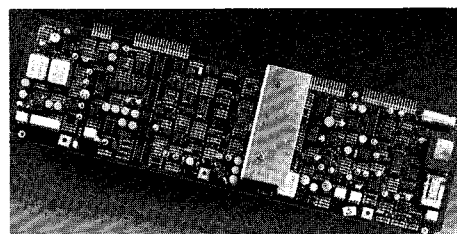
The complete audio electronics of each channel is arranged on a single plug-in PC board.

A807 Audio electronics

The complete audio electronics of each channel is assembled on a single circuit board. The phase-compensated electronics with transformer type inputs and outputs is designed for three tape speeds and for the two equalization standards CCIR and NAB.

All calibration functions are controlled by the processor, and the traditional trimmer potentiometers have been replaced by DACs. This greatly simplifies the calibration and servicing of the machine.

The maximum configuration of an audio channel also includes circuits for a microphone input. A phantom supply, switchable between 48 V and 12 V, is also available. On machines equipped with channel selectors, reproduction is also possible from the record head (Sync); a corresponding transformer-coupled input is provided on the audio electronics board. It is possible to insert an optional mono/stereo switch with booster amplifier via the switchable interfaces in the record as well as the reproduce path. In combination with the mono/stereo switch an audio oscillator can be installed for calibrating the audio electronics. To improve the treble dynamic range at low tape speeds, a Dolby HX Pro processor is installed in the record path as a standard feature.

The A807 User Interface

User-friendliness is a key aspect of the A807. The fields for primary and secondary functions are logically arranged. Additional, practical tape deck functions can be selected via the secondary key pad of which two keys can be programmed by the user to suit his requirements.

A function library is available for this purpose. Examples (partial listing):
Fader preparation key; backspace (backs up the tape at 4 times the selected nominal speed, with the head making contact with the tape to permit cueing); lifter; two additional locator keys; loop; loc start.

The standard functions of the A807 include a tape counter with timer function (LAP), a programmable locator, library wind (with reduced speed), a controller for shuttling the tape at reduced speed, reverse play, varispeed, manual tape positioning (turning the right-hand tape pancake in shuttle mode), and many more.

Comprehensive operating facilities for every application. VU-meter with integrated peak indicators.
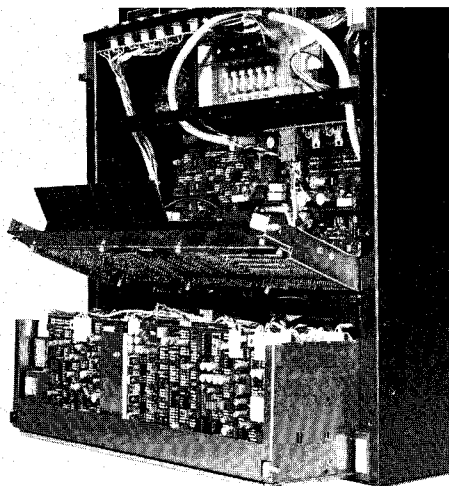
Clearly easy to service, also behind the facade.

With programming switches behind the front panel, specific operating sequences can be programmed such as indirect speed selection, which is only possible when the SHIFT key is pressed first.

Versions with VU meters are equipped with an operator panel that is similar to those on the large machines. Inputs and outputs can be uncalibrated, or calibrated to line level (potentiometers).

The A807 service concept

The elaborate electronic circuits and the compact size require an unusual physical design. The control and function groups for the processor, servo, and channel-related audio electronics are implemented on one circuit board each. Clever drawer and swing-out mechanisms permit optimum access for the service engineer.

For routine service it is not necessary to open the A807. All important adjustments are accessible directly on the front panel (below the left-hand splicing block), and on the secondary keypad. The service engineer can reprogram this keypad to function as a calibration keypad so that the digital control elements in the audio amplifiers can be addressed and influenced by pressing a button. For this work the display serves as a function and status indicator.

All stored calibration parameters can be read in and out via the serial RS 232 port (standard feature). This means that these data can be saved on an external storage medium and be reloaded. The A807 can even be recalibrated via this interface (with the aid of an external service computer and controllable measuring equipment).

The calibration center: multifunctional keypad and display serving as function and status indicators.
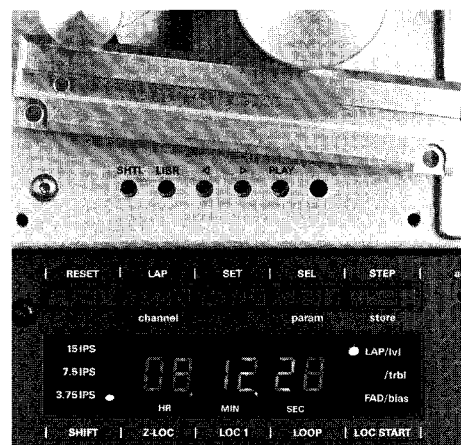
Peripheral interfaces of the A807
The parallel and serial interfaces, built into the A807 as standard features, are largely identical to those of the A810, A812, and A820 machines which means that virtually all currently available peripheral equipment can be connected to all four machine types.

Since these interfaces feature a universal design, the A807 can be readily integrated in modern systems – the A807 is indeed a 'universal genius'.

Bruno Hochstrasser
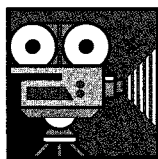
## Edison player at BBC London

Edison-o-mate

When attending the last AES convention in London the SWISS SOUND editor found the opportunity to visit the BBC Service Department. That's the way how we got the exclusive story about an interesting in-house development of BBC Radio.

Since the early days of radio broadcasting BBC Radio has used the state-of-the-art to make and reproduce sound recordings. However, the phonograph or cylinder player has never featured as a recording device, although it was used to replay early cylinders.

The challenge facing Peter Thomas from BBC Radio's Operational Engineering Services was to produce a modern machine, to replace a modified 60 year old Edison machine, which would take account of the variations in speed, groove size and cylinder size without damaging the original cylinder in the process.

As a collector of 78 rpm records, Peter used his contacts to see if his fellow collectors had better machines, and also looked at what commercial machines were available. Most machines were rejected because of the operational facilities they provided and because of the costs involved. The only solution was to build a machine using existing 'off the shelf' products which could be suitably modified.
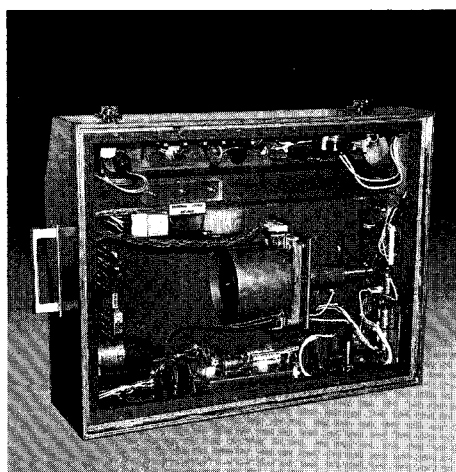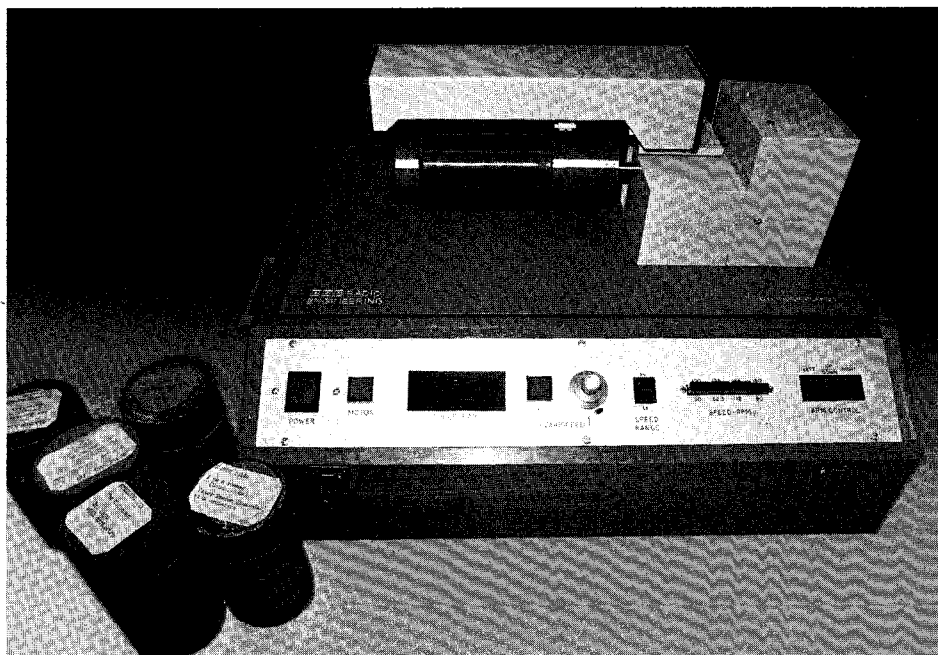
The first problem to be solved was where to find a motor that could drive the cylinder at speeds varying from 50 to 250 revs per minute. The Studer A80 capstan motor was chosen as the servo system associated with this motor offered a wide variable speed range, controllable to a fine tolerance, with long term stability. The motor was mounted horizontally and decoupled from the chassis with rubber bushes. The aluminum mandrel, on which the cylinders were to be mounted, was coupled to the motor via a belt and pulley. The mandrel itself was supported at one end only, on two fine tolerance bearings spaced two inches apart, allowing easy access to the fragile cylinders.

Fitted adjacent to the mandrel pulley was a strobe disk and optical sensor which was used to feed a counter providing a digital readout of the mandrel speed. Operational control of the motor was facilitated by the combination of a vari-speed control together with preset switches for the common commercial cylinder speeds. The two ranges provided by the A80 capstan servo card allowed the whole range of cylinder speeds to be encompassed. The specification for the pick-up arm was more complex. The arm needed to cope with warped or damaged cylinders, revolving at high speeds, whilst still tracking securely. Experiments revealed that the low mass achievable with a tangential arm gave much better results than a pivoted arm which was more prone to bounce and poor tracking. The choice was made for the Revox B795 arm because of its exceptional low mass.

Although the response time of the servos for lateral warps and variation in track pitch was excellent for 33/45 discs, it did not quite fit the specification for replaying cylinders. Several modifications to the servo loop resolved these difficulties. Furthermore, the length of the arm's travel was insufficient for many cylinders. Consequently, the arm guides and mountings were extended and a new cover manufactured. The British distributors F.W.O. Bauch kindly supplied additional lengths of the special cable required for the audio and optical sensor interconnections. One bonus of this arm was that its mounting arrangement allowed the complete assembly to be swung away whilst fitting or removing a cylinder.

The standard Revox controls were retained providing left and right movement as well as lift and lower. These proved ideal for use on cylinders having no lead-in or lead-out grooves.

The final problem was the choice of styli and cartridge. The cartridge needed to be of low compliance if it was to track warped cylinders successfully and for mechanical robustness the Shure SC35 – already in use in BBC studios – was an obvious choice. The styli were retipped in five sizes ranging from 0.0037 inches to 0.018 inches. Compare these sizes to the standard 0.0006 inch used for current day micro-groove long playing records!

The resultant two channel output from the stereo cartridge is then amplified to line level without equalization and used to drive a commercial 'declicker' device which requires both 'channels' in order to select the least noisy output at a given moment. The declicked output is then equalized and recorded onto standard magnetic tape for future replaying. Surprisingly the output quality of the archive material is very good, with most background noise and scratches coming from poor replay equipment and not from the original recordings.

The National Sound Archives were consulted during the initial stages of the design and manufacture of the new player and engineer Lloyd Stickells, who was already working on a similar design, gave much valuable advice.

Credit must also be given to Peter Bulley, from BBC Radio Operational Engineering Services, who took over the project from Peter Thomas and saw it to completion; and to the BBC Radio mechanical workshops, who's skilled engineering translated into a first class piece of equipment. My thanks to the Managing Director Radio and the Director of Engineering for their permission to publish this article.

Peter Thomas

Peter Thomas (32) Studied at Canterbury Technical College. Employed by Racal Marine in 1973 troubleshooting transceivers and R.F. test equipment. Joined BBC Radio in 1978 as studio maintenance engineer. Became Engineering Services Manager in 1985, responsible for four teams of engineers servicing Radio studios, including the large Rock and Classical studios. Hobby: collecting records from 1900's to present day.
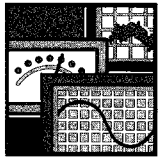
Studer Compact Mixing Consoles, Series 963
Larger inside than outside

Continued from Swiss Sound No. 19

Note: For the sake of functional clarity only the console parts relevant to the corresponding application are shown in Figs. 5 to 8.

Example 1: **LIVE transmission** (Fig. 5)

Problem definition: Four commentators with one or several microphones participate in a radio/television program. In addition high-level sources such as tape recorders, cassette recorders, turntables, and transmission lines are to be included.

Solution: For each of the four commentator stations A, B, C, D, a mono or stereo group is formed from the corresponding input modules. Each group can be processed separately with compressor or limiter.

Via the 4 auxiliary masters AUX1...AUX4 each commentator station is assigned to an individual headphones insertion, and individual intercom is also possible. These groups can be mixed down to max. 4 mono or 2 stereo masters, each of which is equipped with its own compressor/limiter.
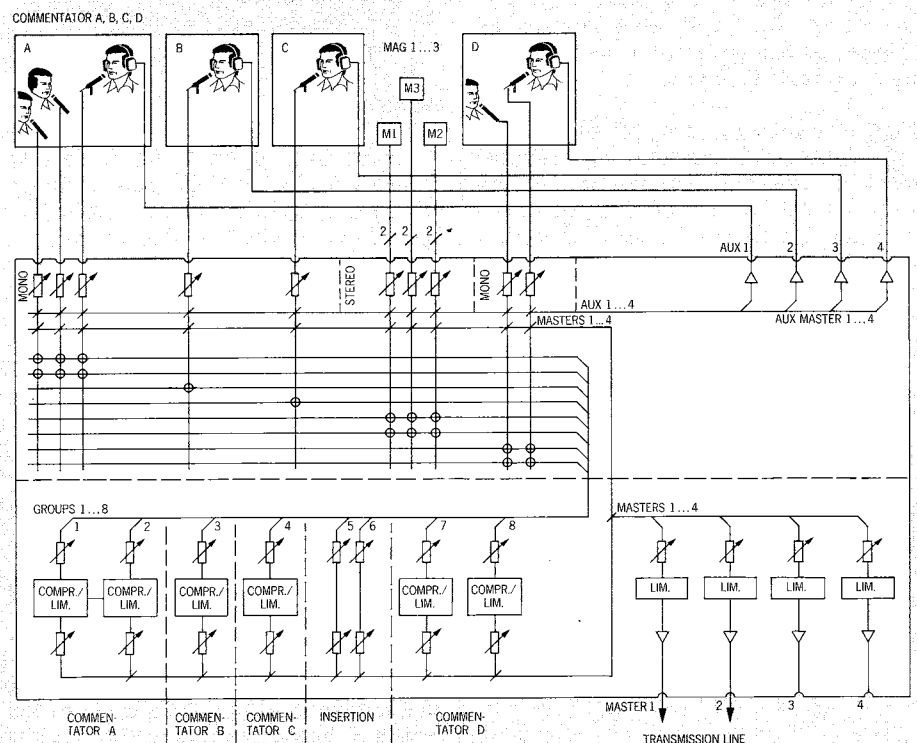
LEGEND:

⟶ : BUS CONNECTION

: COMMON WIRING

⟶ : BUS SELECTION WITH PUSH BUTTON SWITCH

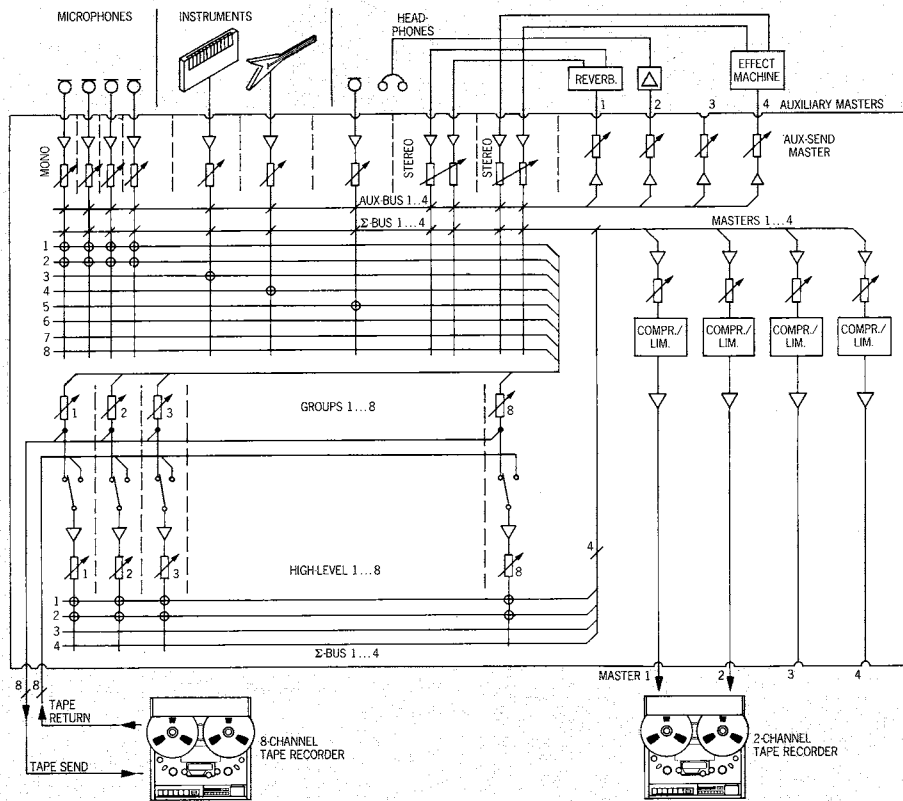**Fig. 5:** 963/Example 1: Live broadcast.

Fig. 6: 963/Example 2: Multichannel recording.

Example 2: **Multichannel recording (8-track)**
(Fig. 6)

Problem definition: A recording or dubbing is to be recorded with an 8-channel tape machine and a monitor mixing panel is needed. Reverberation units and effect machines shall be accessible to the input modules and the monitor mixer.

Solution: The 8-channel tape machine is connected with its inputs and outputs to the group/high-level modules. The input signals (microphones, instruments, reverberation units, and effect machines) are connected to the input modules. Via the 8 group buses, any mixdown of the input signals is possible; in this case the outputs of the 8 groups are connected directly to the inputs of the tape machine. The outputs of the tape machines are mixed down in the group modules to the masters 1...4 for monitoring (monitor mixdown). A separate headphones mixdown can be implemented via an AUX bus (in this case AUX2), the reverberation components for the individual tracks are mixed down via AUX1.

The output of the reverberation units is connected via a stereo high-level input directly to the masters 1...4. It is also possible to record input signals together with the effect machine return path. In this example an effect machine is connected to AUX 4. Its output can also be connected via a stereo input module to the groups 1...8.

With the PFL, the SOLO, and the monitor system the signals can be checked on all important points.

Example 3: **Multitrack LIVE recording**
(Fig. 7)

Problem definition: A concert or a big-band performance is to be mixed down for a stereo recording or broadcast. For subsequent processing or safety reasons a multitrack recording is to be made.

Fig 7: 963/Example 3: Live recording with multichannel recording.

Fig. 8: Example 4:
Sound reinforcement in theater.
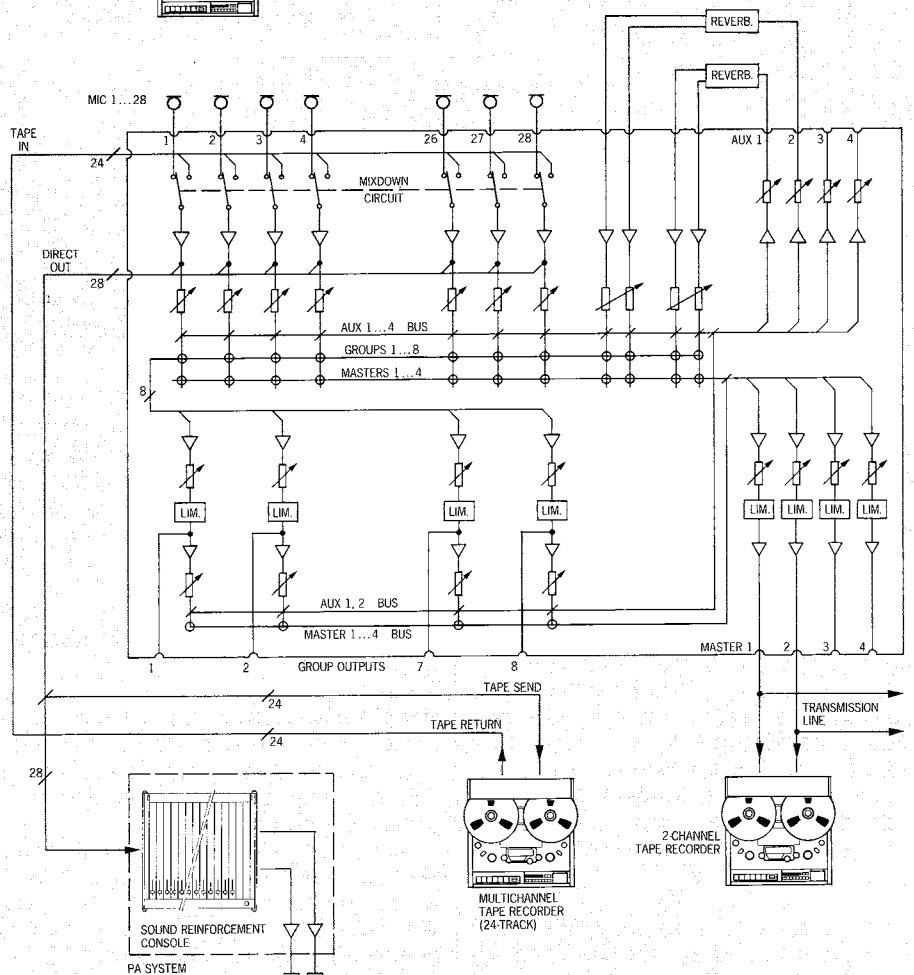
Expansion Unit to Revox C279 Mixing Console

Enhancement

In the SWISS SOUND issue No. 17 of October 1986, the report on the Revox C279 mixing console mentioned the expansion unit for special applications. Since this option will shortly become available we shall briefly introduce it here.

The flat electronics box which is only 32 mm wide can be fastened to the base of the mixing console with a few manipulations. The electrical connector supplies the power as well as the static signals for the fader start device. The following function groups are arranged on a 420 x 110 mm circuit board:

- Two stereo MM de-emphasizing phono amplifiers with cinch inputs and outputs.
  Frequency response 20 Hz...20 kHz: ±0,5 dB
  Gain: 40 dB at 1000 Hz
  Signal-to-noise ratio: >72 dB relative to 5 mV input voltage
- Calibration tone oscillator 1000 Hz with two cinch outputs, can be activated via a 3-position slide switch: off/0dBu/+6dBu
  Harmonic distortion: <0.1%
- Fader start with 3.5 mm jack socket for the six input modules and the master.
  Contact rating: 0.5 A/36 VAC
              0.2 A/36 VDC
- A dbx type II stereo noise reduction system, encoder/decoder, with cinch inputs and outputs. Frequency response 40 Hz...20 kHz: ±1 dB. Harmonic distortion 100 Hz...20 kHz: <0.1%

At this point we shall take a closer look at the noise reduction system.

Why dbx?
The dbx system as a self-contained module in an auxiliary unit offers some decisive advantages: in contrast to other systems, it is not necessary to calibrate the connected tape recorder. Compati-

Solution: The microphone signals available at the input modules are combined into whatever groups are desired and mixed down to the masters 1...4 so that they can be recorded (2 or 4-channel tape machine) or placed on a transmission line (live broadcast).

At the input to the linear fader the signals of the mono input modules are branched off and combined on multipin connectors. These direct outputs carry line level and are electronically balanced. For example a 24-channel tape machine can be connected here.

The outputs of the tape machine are connected to the tape inputs of the input modules which are also available on multipin connectors.

By actuating the central MIXDOWN switch, all mono input modules are connected to the tape input with bypassing of the input selector.

When the tape machine is connected in this way, the stereo microphone signals can be mixed down independently of the level of the individual tape machine channels. Other equipment, e.g. a mixing console for the sound coverage in a room, can be connected to the direct outputs.

Example 4: **Sound reinforcement in a theater**
(Fig. 8)
Problem definition: Sound coverage in a theater shall be provided by several 2-channel speaker groups. The lobby and the technical rooms shall receive independent insertions.

Solution: The sound reinforcement system is fed by the 8 group outputs which are accessible in any combination from the input channels. The sound coverage for the lobby is fed via masters 1 and 2, the sound coverage for the technical rooms via masters 3 and 4.

The auxiliary masters are available for reverberation branches, for additional insertions, or for talk-back paths.

Boris Balin

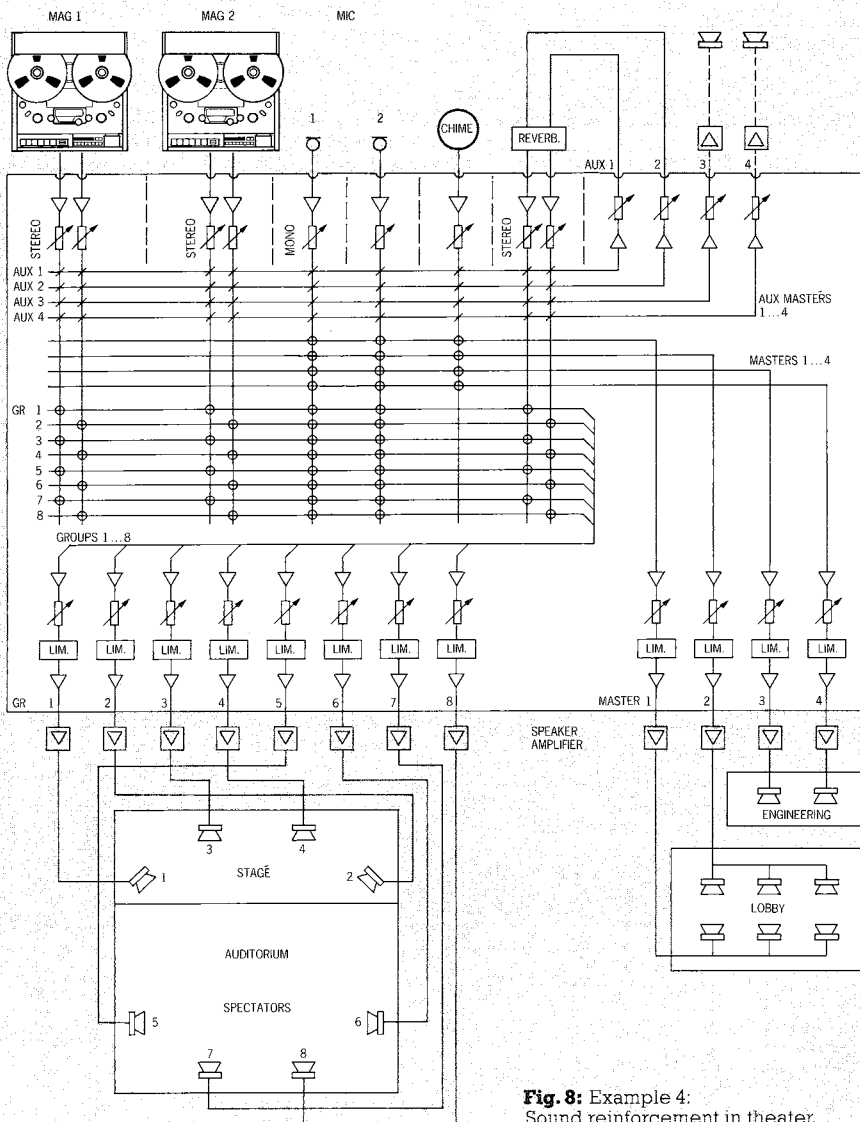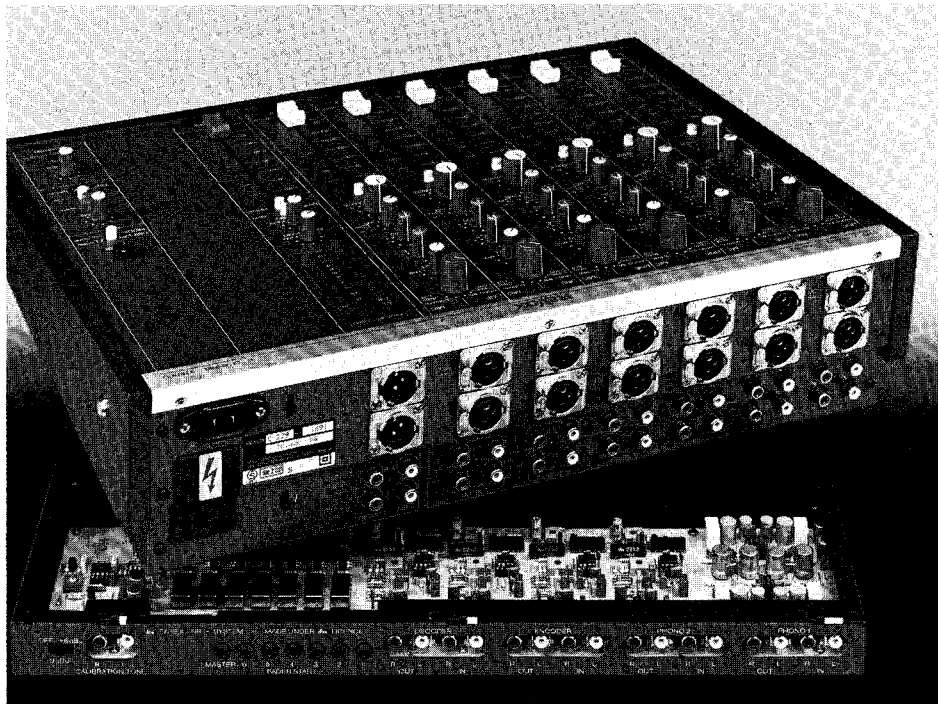The expansion unit is designed for direct coupling to the Revox mixing console C 279.

This block diagram illustrates the electronic function groups of the expansion module.
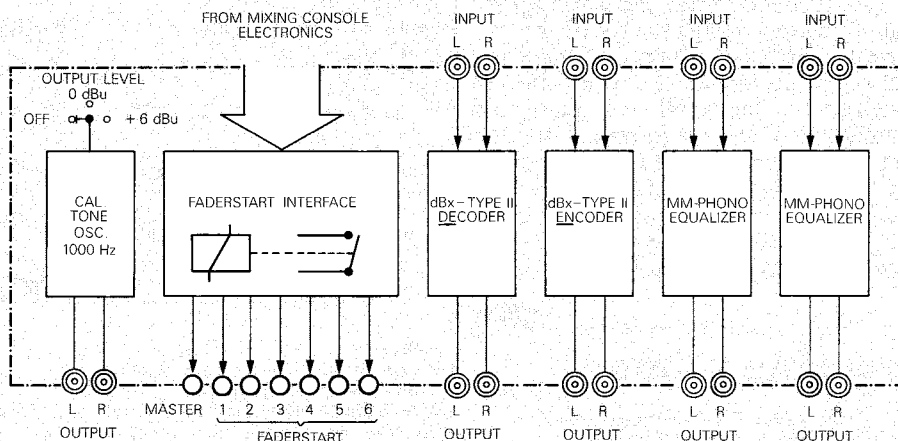
Studer A800 and Dolby SR for CD Production

O mniphon of Bâle has proven that an independent Swiss company of only modest size is perfectly capable of producing a good compact disc. In co-operation with the Swiss broadcasting company, SRG, but on its own production risk, Omniphon produced a CD under the title of 'Adventure Organ' for the widely-spread German magazine 'Stereoplay'. In the course of several months, recording sessions were held at a Sion church that houses the world's oldest organ, at the famous 'Gross-munster' in Zurich, at the Cathedral of Constance and other famous places; the

internationally renown Swiss organist Hannes Meyer added to the famous plot.

Against the original doubts of the customer, Producer A. Gasteiner and Senior Sound Engineer Jürg Jecklin (SRG, Radio Studio Bâle) used analog tape machines in order to prove that this technology is far from having served out. A Studer A800-MK III 24 channel machine was selected and Dolby SR included for recording and mixing. Not only sound engineer Jecklin – actually a great supporter of digital technics – was filled with enthusiasm about the sound quality achieved. The recording was finally awarded this year's 'Prix Suisse'. The compact disc will be available end September 1987 at Stereoplay's.

bility with other dbx type II systems is ensured. The noise reduction system doubles the dynamic range of a tape deck to max. 105 dB. This corresponds to a noise reduction of at least 40 dB.

How does the dbx system function?
The source to be recorded is connected to the encoder which compresses the dynamic range of the audio signal by a ratio of 2:1. This means that high levels are de-emphasized and low levels are boosted. At the same time high and low frequency contents are weighted strong-er than medium frequencies. The tape recorder looped between the encoder and the decoder adds the tape hiss to

the compressed signal during the re-cording. The opposite takes place dur-ing reproduction: the dynamic range of the compressed signal is expanded in the ratio 1:2 and with the same frequ-ency weighting than was the case for the encoder. High levels are boosted, low levels are de-emphasized. Since the tape hiss produces low levels, this noise is also de-emphasized. The original dynamic range and the linear frequency response of the input signal is thus re-stored in the output signal.

Jürgen Hartwig
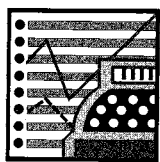
Right on success
Studer worldwide

Norway
NRK, Oslo

At the beginning of June this year, the Norwegian broadcasting company – NRK – received 16 Studer tape recording machines A810-0.75 broadcast version, together with serial interfaces and other accessories. NRK also placed another order for 15 machines of same type.

Iceland
State Broadcasting, Reykjavík

Studer has recently supplied to the government broadcasting company 12 A812-0.75 tape recording machines, broadcast version, with accessories.

USSR
Studer Symposium in Moscow

Mr. P.I. Schabanow, Ministry of Culture (second from left) and representatives of Melodia Studios have the Studer D820X demonstrated at the Moscow symposium.

A Studer symposium was held at the premises of Melodia Studios in Moscow from May 19–21. Included in the demonstration of the latest Studer product range were two D820X digital tape recorders. In addition to interested guests, Vice Minister Piotr I. Schabanow of the Soviet Ministry of Culture, and the Management of Melodia Studios also visited the exhibition and showed great interest in modern sound technology.

The digital tape recorder machines were both sold at the exhibition and will now be operated in Moscow for the first time as open-reel digital equipment at Melodia Studios.
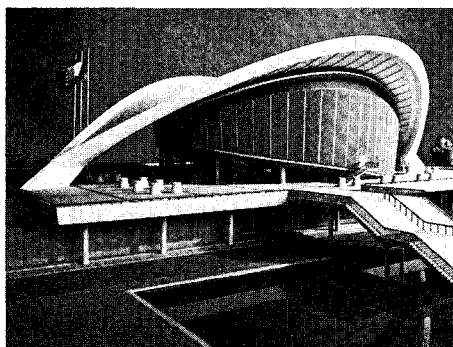
Turkey
TRT Diyarbakir

In May this year, Studer has signed a contract for supply of equipment for a regional broadcast studio in Diyarbakir, in the south-eastern region of Turkey. The project involves three mixing consoles 902B, three 962 and two 961 special version, as well as the entire master control room including cross-bar system.

Germany
Congress Hall, Berlin

1980, the roof of the Berlin congress hall – called 'Pregnant Oyster' by the people of Berlin – came partly down and damaged the technical interior. The reconstruction included the complete installation of new equipment for the technical site of the building. Studer has supplied one each mixing console 900 with 10 inputs and 4 masters for lecture hall and auditorium as well as two each tape recorder PR99 and A810.

From the printers

10.29.1110	**Revox C279 brochure** (s)
10.31.0050	**Kardiogon leaflet** (g)
10.31.0060	**Kardiogon leaflet** (e)
10.31.0080	**Kardiogon leaflet** (f)
10.26.0310	**Studer A807 leaflet** (p)
10.26.0192	**Studer D820X leaflet** (e)
10.26.0710	**Studer SC4008 leaflet** (g)
10.26.0720	**Studer SC4008 leaflet** (e)
10.26.0730	**Studer SC4016 leaflet** (g)
10.26.0740	**Studer SC4016 leaflet** (e)
10.26.0680	**Studer 970 leaflet** (g)
10.26.0690	**Studer 970 leaflet** (e)
10.26.0600	**Studer 963 leaflet** (g)
10.26.0610	**Studer 963 leaflet** (e)
10.26.0700	**Studer 900 data sheet** (g/e)
10.26.0461	**Studer 961/962 data sheet** (g)
10.26.0471	**Studer 961/962 data sheet** (e)

g = german   s = spanish
e = english   p = portuguese
f = french

To our readers
The next issue of SWISS SOUND will be devoted especially to the 40th anniversary of our company. It will be published as number 21 in January 88.
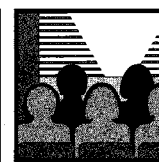
Studer Training courses

31.08.–04.09.87	
Studer A820 MCH Tape Recorder	French
07.09.–11.09.87	
Studer D820X Digital Tape Recorder	German
14.09.–18.09.87	
Studer 961–962 Mixing Consoles	English
Studer 900 Mixing Console	
23.09.–25.09.87	
Studer A812 Tape Recorder	English
28.09.–01.10.87	
Studer TLS 4000 Synchronizer	English
Studer SC4008/16 System Controllers	
28.09.–01.10.87	
Studer A807 Tape Recorder	German
28.09.–02.10.87	
Studer A725/A727/	
Philips LHH 2000 CD-Players	French
Studer A710/A721 Cassette Recorders	French
05.10.–09.10.87	
Studer 900 Mixing Console	French
Studer 961–963 Mixing Consoles	French
19.10.–21.10.87	
Studer A710/A721 Cassette Recorders	German
Studer A725/A727 CD-Players	German
26.10.–30.10.87	
Studer 900 Mixing Console	German
Studer 961–963 Mixing Consoles	German
02.11.–06.11.87	
Studer D820X Digital Tape Recorder	English
11.11.–13.11.87	
Studer Tape Recorder A810	English
25.11.–27.11.87	
Studer Tape Recorder A807	English
30.11.–04.12.87	
Studer Tape Recorder A820 MCH	English

The courses are held only with a minimum number of 5 participants. All courses require reasonable knowledge of electronics.

Course fee is 110 Swiss Francs per day.

For further information please contact