

Joint Venture Studer-Philips Fresh thinking

In the edition No. 15 of Swiss Sound our readers were informed about the planned joint venture between Philips and our Company.

The experience available in these two companies with respect to the professional market and professional equipment for audio recording and reproduction based on compact discs will in the future be merged and all technical evolution will take place within the framework of the joint venture. The equipment will be marketed through Studer International AG.



Dr. Camillo Margna (Philips Zurich) and Dr. h.c. Willi Studer signing the agreement

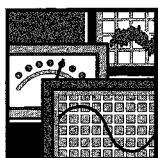
Philips and Studer each own a 50% share in the joint venture.

In my view this newly founded company will ideally complement our line of products. Consolidating the activities of these two companies should, without doubt, have a highly beneficial impact on the future products.

At the same time I feel that this step is further proof of fresh thinking in Europe. The pooling of joint interests rather than battling each other is certain to bear fruit.

I wish the new company, Studer and Philips Compact Disc Systems AG in Regensdorf, much success for the future.

Dr. h.c. Willi Studer



Studer A812 spooling motor control Turbodrive in μP time

As in high-performance racing engines where torque, acceleration, and fast revving up with the lowest possible loss of energy play a decisive role, similar requirements are imposed on tape transport systems. They must be rugged and reliable. For use in editing and synchronizing operations speed and precision are equally critical factors. It therefore comes as no surprise that with each new machine generation the drive technology becomes more advanced. In this report the author introduces the drive concept for the compact and economical A812.

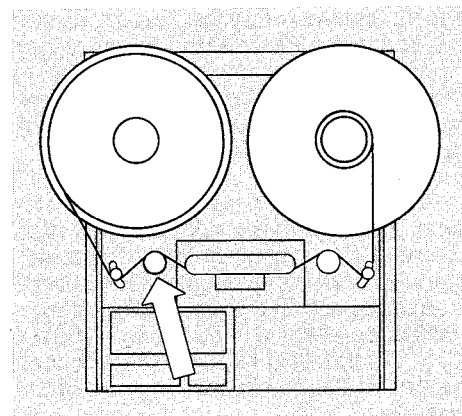
To gain a better understanding of the spooling motor control and its conception, some basic parameters concerning the tape transport should be considered. Before development on the A812 was started, the following specifications had been defined:

- Reel sizes up to 12.5" (318 mm)
- Spooling speed 12 m/sec
- Tape counter and headblock suited for waste basket mode (tape dump)
- Starting time 0.5 seconds [1]
- Use of asynchronous motors
- Power line frequency and power line control commands should have no influence on the tape tension and spooling characteristics.
- Optimized efficiency of the spooling motor output stage for all operating states.

Complex of problems

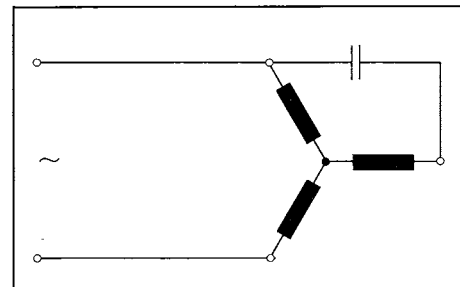
The scanner for the tape counter must have an extremely low mass in order to minimize slippage. This scanner now replaces the scrape flutter idler. In this arrangement - before the headblock and the capstan - it is readily apparent that any torque fault of a take-off motor not equipped with an antisrape flutter roller has a direct effect on the wobble [2] through the entire "spring-mass system" comprising of motor, tape tension sensor, and tape (Fig.1, tape transport).

The main task thus was to analyze the spooling motor for the pendulum moment (wobble) under the assumption of an ideal capstan motor and tape tension sensor. Comprehensive measurements



Tape transport of the A812 with tachoroller located before the headblock

have shown that the pendulum moment of our asynchronous motor (ASM) can be attributed back to the electric control and consequently to the rotary field of the motor.



Asynchronous motor (ASM) in "Steinmetz connection"

SWISS 17 SOUND

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The ASM is normally operated on a single-phase mains in the so-called "Steinmetz" connection, i.e. two phases of the motor are supplied directly from the mains, the third, however, via a phase shift capacitor. Here we can readily see that power line control commands can have a direct influence on the wobble [2] or on the recording.

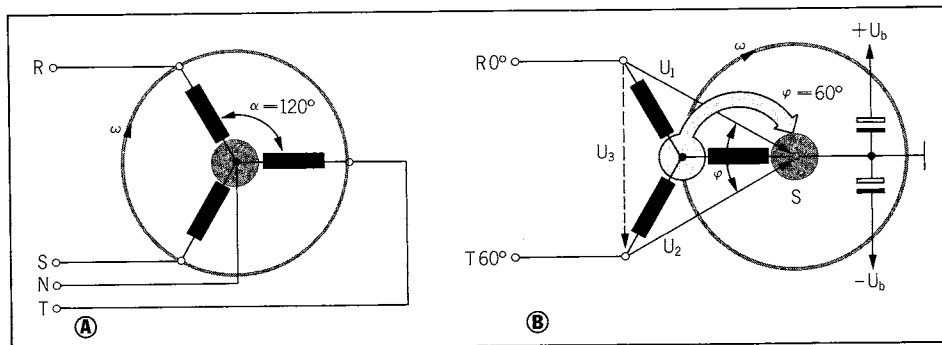
Additional investigations have shown that the rotary field is asymmetrical and produces pendulum moments. None of the optimizing attempts led to the desired success because a three-phase asynchronous motor is ideally operated on a 3-phase network.

The sum of the currents in the star point is zero and the rotary field is symmetrical. If the rotary field is asymmetrical, harmonic components of the control frequency are also produced (example: fundamental wave = 50 Hz, $K_2 = 100$ Hz, $K_4 = 200$ Hz). This effect manifests itself particularly in the linear increase of the wobble.

Comparative measurements with a three-phase, 4-pole asynchronous motor show that with three-phase control the pendulum moment is improved by 33 dB at 100 Hz and 37 dB at 200 Hz over the conventional Steinmetz connection.

Control concept

A three-phase motor requires three stator winding voltages, each of which is offset by 120°. This requirement is inherently satisfied by the 3-phase network.



3-phase/4-pole asynchronous motor in star connection, with 3-phases supply (A) in single-phase operation, with artificial reference point (B)

The reference point of a star-connected motor is the star point (connection of the neutral conductor). If the three phase-shifted voltages are produced artificially, the reference point can be defined arbitrarily, because the motor does not require a connection to the star point.

If the reference point is now placed on a corner (a winding phase) and if the 120° offset voltages U_1 and U_2 of the same magnitude are combined with it, their difference is a quantitatively identical voltage U_3 which is available in correct phase relation at the third motor winding. This means that for the motor supply only the two voltages U_1 and U_2 are required which must be offset by 60° each (number of required components!). Based on Kirchhoff's law it can be shown that it suffices to generate two voltages that are offset by 60°.

Voltage generation by means of a DC converter

Available is the single-phase line voltage which we rectify and from which we create the artificial 3-phase mains. The reference point in the new system is the capacitive neutral point of the DC voltage. Converters are devices that produce an AC voltage from a DC voltage. In order to attain a reasonable level of efficiency, the undershooting method is employed, i.e. the motor receives a switched voltage which connects each motor winding briefly (max. 13µs) to the full operating voltage and then disconnects it. The pulse duty factors are selected in such a way that the filtered mean value (or mean of the pulse width surfaces) produces the desired sine shape. This method is referred to as pulse width modulation (PWM) [3].

In the PWM we start with a square-wave voltage of constant frequency and

subsequently vary the on/off ratio. For the motor performance only the current flow is relevant. The stored energy in the filter choke maintains the current flow during the off periods. If the on/off ratio of all pulses is 50%/50%, the resulting current flow is zero. When the carrier is modulated, the neutral point changes in

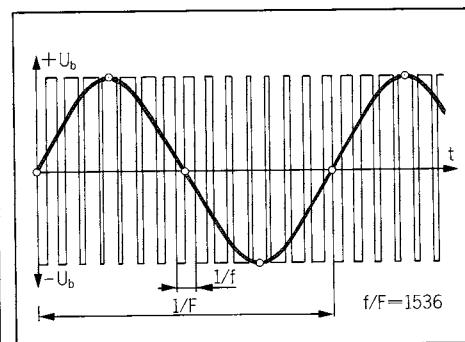
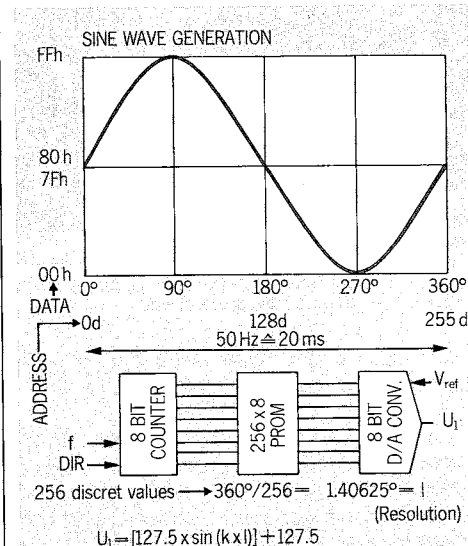


Fig. 4: Undershooting method for producing a sine wave oscillation (PWM, pulse width modulation)

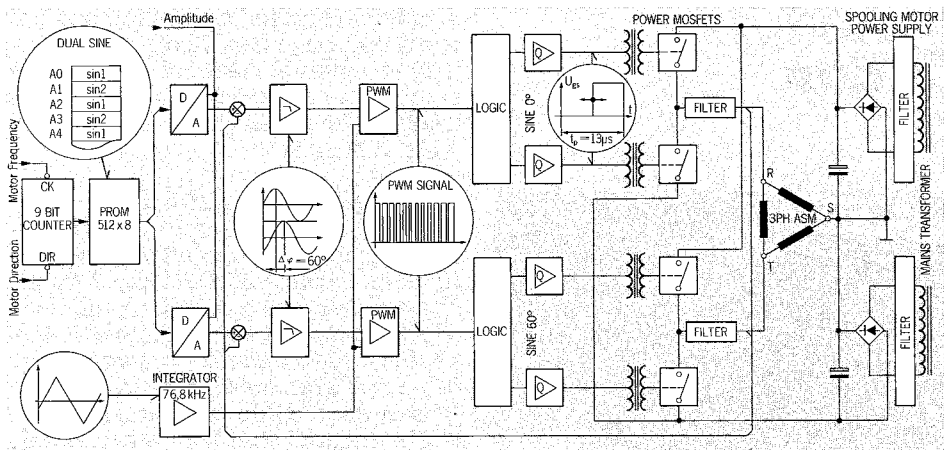
a sinusoidal shape between a positive and a negative maximum, corresponding to the degree of modulation. Figure 4 shows that the current gets closer to an ideal sine shape the larger the number of pulses in a sine period. This means that the converter can supply nearly ideal sinusoidal voltage. The switching elements on the high-voltage side of the A812 spooling motor control are implemented with N-channel power MOSFETs.



Sine wave generation via digital counter, PROM and D/A converter

Sine wave generation

The sine-wave signal is generated on the low-voltage side. For the spooling motor control, two sine-wave signals of identical amplitude, constant phase relation, and variable frequency must be available. The most simple implementation is digital by means of a counter, PROM, and D/A converter.



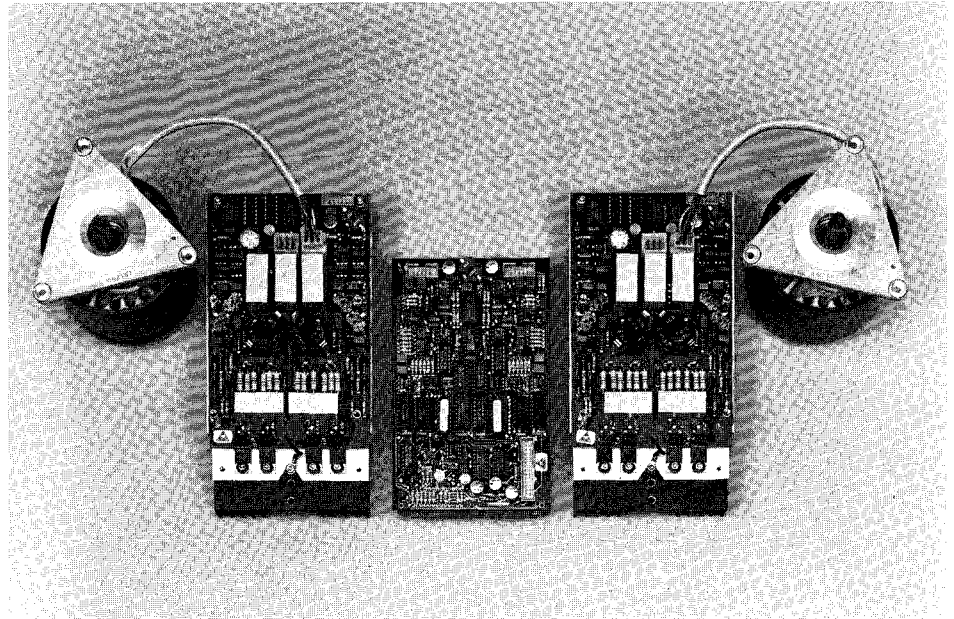
General circuit diagram of the spooling motor control and output stage

Sine wave generation example: in a 256 x 8-bit PROM, 256 discrete values of a sine-wave period are stored. An 8-bit counter advances the PROM from address to address as a function of the counter clock frequency. The corresponding data are input to a D/A converter which produces an analog sine-wave signal at its output. A DC voltage on the V_{ref} input controls the amplitude, while the applied counter frequency influences the frequency of the sine voltage, and the counter direction signal influences the sense of the motor rotation.

However, two sine-wave signals offset by 60° each are required. This can be implemented either with two PROMs in which the two offset, discrete sine va-

lues are programmed at the same address; or with a ROM twice the size in which the phases 1 and 2 are programmed separately by even and uneven addresses.

For the modulation it is essential to produce halve sine waves of identical size to ensure that no DC components are produced which could create undesirable torques. For this reason the output control signals R and T are DC-tapped through a negative feedback arrangement and taken to a correction stage directly after the D/A converters.



Three-phase spooling motor with output stage and circuit board for digital production of the sine wave frequencies

Concluding remarks

The advantages of the converter-supplied 3-phase motors are: longlife, high and variable speeds, simple reversal of the motor rotation, as well as low noise and maintenance. The motor itself is wear resistant (no collector and brushes), simple, rugged, and economical. It has a high acceleration and breakdown torque, it can be overloaded for short periods, and it is also compact.

With respect to the A812 the following benefits are of interest:

- The tape counter works also in tape dump mode
- The dynamic behavior of the tape deck is attractive
- The wobble is independent of the line frequency (50 ... 60 Hz)
- Largely immune to power line control commands

Hans-Rudolf Hässig

[1] Starting time
At the moment the tape starts, the wow and flutter caused by the vast difference to the nominal speed is extremely high. However, this error declines quickly and after a certain time reaches double the specified wobble value. This time is defined as the starting (run-up) time.

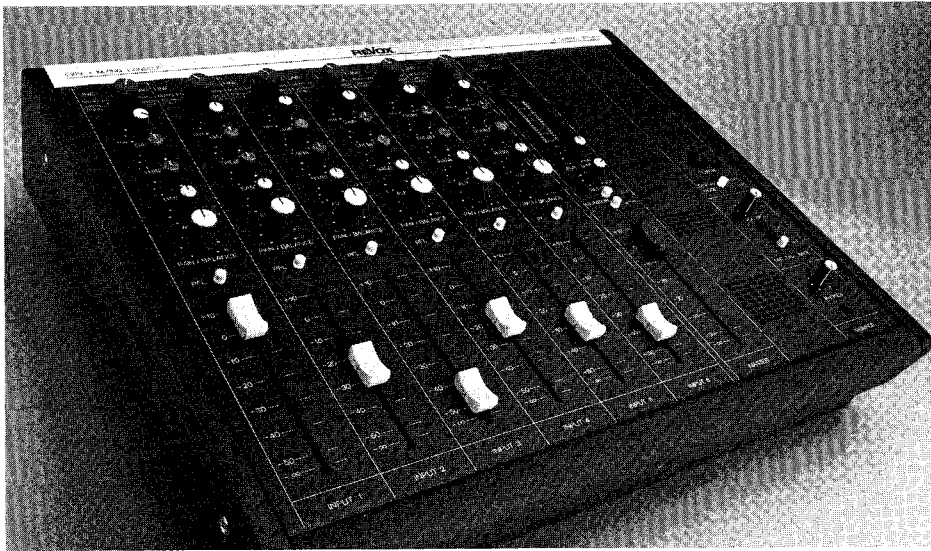
[2] Wobble
The wobble measurement supplies information on frequency fluctuations (wow and flutter) which result from speed deviations of the tape transport. For this purpose a pilot frequency (3.15 kHz) is recorded and its fluctuation measured during reproduction. Wow and flutter greater than 10 Hz are perceived as a "hoarse sound" (flutter).

[3] Pulse duration modulation
In the pulse duration modulation the amplitude value is defined in the time axis of the impulse. Either the leading slope, the trailing slope, or both can be varied. Some of the established terms for this type of modulation (collective term: pulse time modulation; PTM) are:
Pulse duration modulation (PDM), chiefly used in American English;
Pulse width modulation (PWM), chiefly used in British English;
Pulse length modulation (PLM), used less frequently.

Hans-Rudolf Hässig (32)
After graduation from the Swiss Institute of Technology (ETH) in Zurich, he spent two years in a small company engaged in the field of microprocessor controls for machinery and automatic equipment. He joined Willi Studer AG in the spring of 1981. His first assignment involved the development of a microprocessor-controlled auxiliary unit for collecting the required production data for automated commercials broadcasting systems (CAMOS). In 1983 he was transferred to the professional tape machine sector. He subsequently developed the A812 spooling motor output stage as well as the entire tape transport electronics for the A812 (hardware and software).



Small audio mixer Revox C279 Compact solution



Anyone with experience in high fidelity or who strives for even higher spheres will sooner or later be confronted with the situation where two or more signal sources need to be mixed, filtered, or at least be cleanly faded in and out. At this point, at the latest, such facilities become essential – and the situation turns into a problem; at least this is how it was in the past. But now the Revox product line has been enhanced with a new unit: the long awaited C279 mixing console is on the verge of being introduced to the market.

Small audio mixers with 4 to 8 channels are available on the market by the dozen. Why should Revox join the crowd? The answer is quite simple: many of today's and particularly future users of our Revox tape and cassette recorders need a high-quality, small audio mixer with professional characteristics, be it as an accessory for the sophisticated hobby or as a tool in a semiprofessional small studio. Particularly low-noise, balanced inputs and outputs can only be found on much larger and consequently significantly more expensive mixers.

Users who mix down audio programs only infrequently appreciate easy-to-follow operating instructions and as few knobs and keys as possible. A stereo concept such as has been implemented in our C279 cuts the number of controls in many cases in half because only one button must be operated for the left-

hand and right-hand channel. In addition fewer channels are required which has a positive effect on the production costs. In view of this a Revox small audio mixer should certainly find good acceptance. The concept of the C279 fills a real marketing gap.

Stereo concept

To ensure that the broadest possible application spectrum can be covered, the following concept configuration has been chosen (Fig. 2):

- 6 Stereo Input/Output modules
- 1 Stereo Master module
- 1 Monitor module
- 1 Display module

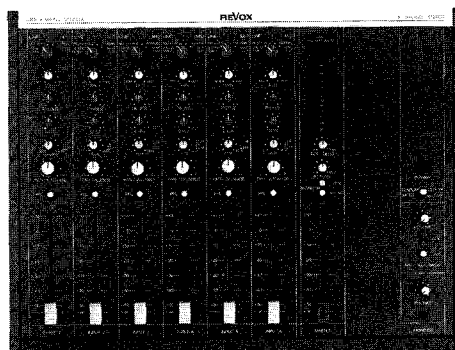


Fig. 2: Functionally arranged despite comprehensive facilities

Due to its compact size (approx. 460 x 350 x 120 mm) this small audio mixer is universally usable: for desktop operation it slopes down toward the front, or for 19" rack mounting it is available with

supplementary mounting brackets. For special applications (expanded facilities) an external electronics box with a height of only approximately 25 mm is available for installation below the base plate of the mixer.

Comprehensive facilities

Each of the 6 Input/Output modules features a cinch input socket for a stereo hi-fi source, a balanced XLR input for mono line sources, and a balanced and floating XLR input for a microphone. A 48 V phantom supply can be connected to all 6 mic inputs in common. The monitor outputs of the module, tapped before Pre (PF) and After Fader (AF), are designed in mono.

From the top to the bottom this module comprises the following controls (Fig. 3):

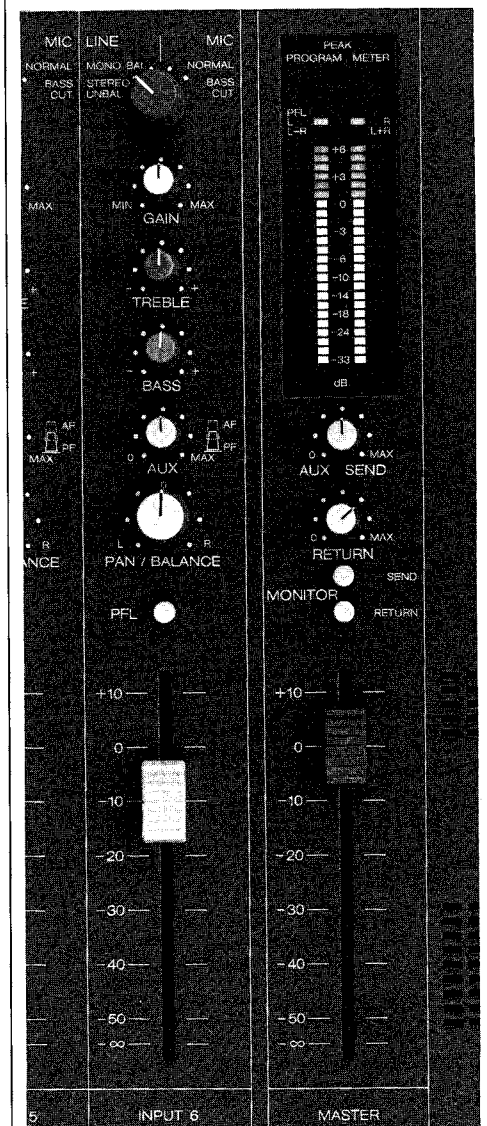


Fig. 3: Input, master, and display module of the C279

- Input Selector with the positions:
STEREO UNBAL
(unbalanced input)
MONO BAL
(balanced input)
MIC NORMAL
(balanced microphone input)
MIC BASS CUT
(bal. microphone input with high-pass filter)
- Gain: Input level control
- Treble: Treble control ± 15 dB
- Bass: Bass control ± 15 dB
- Aux: Level control for Aux bus (mono) switchable with pull-push switch PF/AF
- Pan/Balance: Panorama potentiometer for Mic, Line; balance potentiometer for Stereo
- PFL: Self-locking push button for PF monitor signal (prefader listening; mono), tapped after Treble and Bass
- Fader: Linear fader (stereo) with approx. 100 mm travel

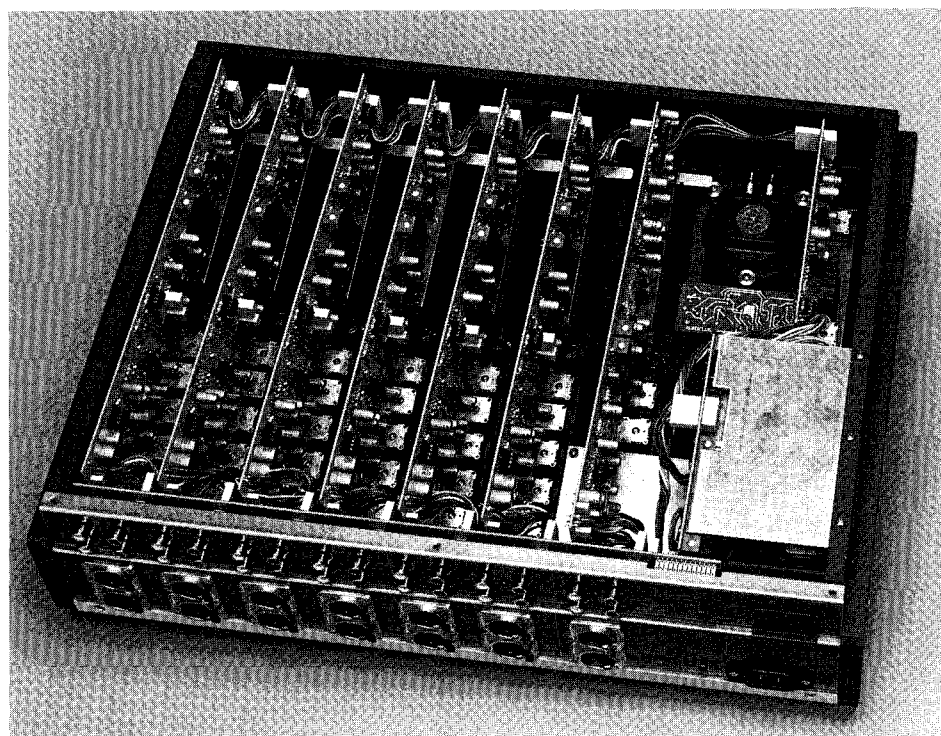


Fig. 5: ... and professional design as our customers expect from a Studer Revox product

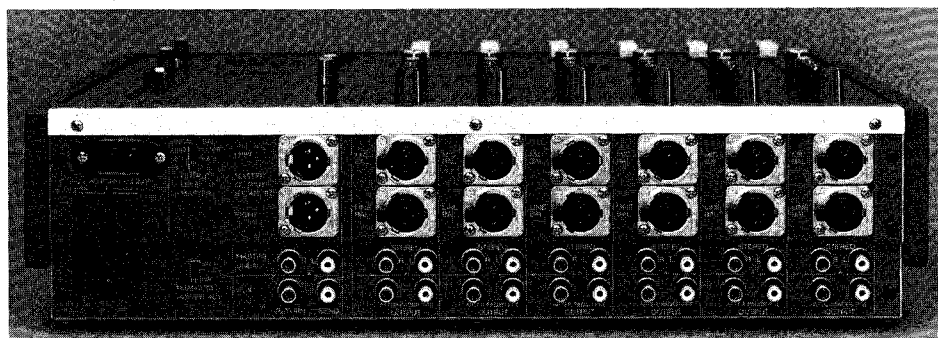


Fig. 4: Professional connection facilities ...

The stereo master module features two unbalanced cinch outputs (stereo L + R) for connecting nonprofessional tape decks as well as two XLR sockets for tape machines with balanced line inputs. The output level can be adjusted by means of a rear-panel slide switch (Fig. 4) in three steps (cinch outputs: -6/0/+6 dBV; XLR outputs: 0/+6/-12 dBV). The master fader is designed for stereo as on the input/output module. Arranged from top to bottom, in a straight line with the master fader are:

- AUX SEND: Master fader for the aux bus
- AUX RETURN: Input control for aux return
- MONITOR SEND: Prelistening button for the aux button
- MONITOR RETURN: Prelistening button for aux return

The aux bus (mono) is accessible via cinch terminals (aux send and aux return).

The monitor module is equipped with a stereo headphones socket and a separate volume control for master monitoring. When the headphones are plugged in, the built-in monitor speaker is disabled. The prefader listening PFL is designed in mono.

A distinctive feature of the C279 is the intercom set for talk back aux (communication on the aux bus) and slate (communication on the master bus).

A peak program meter (PPM, bar graph instrument) is available for monitoring the inputs and outputs. Two strips with 24 LEDs each (18 green and 6 red) indicate the intermediate level of the master bus within the range of -33 to +6 dB.

If one or several PFL buttons are pressed, the peak meter switches to the PFL bus. This condition is signalled by a LED in the display field. The two bargraph instruments can be switched to the master or the difference of the left-hand and the right-hand master signal by pressing the display mode switch.

This display mode, also signalled by LEDs, is used for qualitative assessment of the mixed signal. Optimum readability of the instrument under any illumination conditions is ensured by the brightness control that responds to the intensity of the ambient light.

The aforementioned external electronics box which is under development will offer the following facilities:

- 2 stereo phono MM inputs with equalizer amplifier
- 1 stereo noise reduction system, dbx type II with encoder/decoder
- Calibration oscillator 400 Hz, can be activated via a slide switch (-6 dBV/0 dBV)
- Fader start for 6 inputs and the master.

Professional design

Similar to the Studer mixing consoles, the C279 is internally designed with plug-in modules (Fig. 5). However, since the flexibility of a professional mixing console is not required, a single-piece front panel with graphic outline of the modules can be used.



Jürgen Hartwig (35) studied electrical engineering at the Swiss Institute of Technology (ETH) in Zurich. After graduation in 1974 he joined Willi Studer AG as a development engineer. Project manager for various Revox hi-fi amplifiers and the Studer amplifier

A68. Currently responsible for the first Revox audio mixer C279.

Technical details

In order to minimize switching clicks and contact problems, the audio signals are switched indirectly, i.e. electronically by means of FETs. Analogously to the big Studer mixing consoles also the small Revox C279 has been designed without any mechanical contacts in the signal path.

The hallmark of a mixing console is and will always be the fader. This is why the following specifications have been established:

- 100 mm travel for excellent resolution
- Stereo design with a synchronism error of less than +1 dB within the working range of +10 to -30 dB
- Scale accuracy ± 1 dB within the working range
- Smooth feeling of the fader operation

In the process of selecting a fader, the professional Studer fader had to be eliminated for cost reasons because logarithmic faders with the required accuracy are expensive to manufacture. An optimum solution to this dilemma was

Key technical data

(as of September 1, 1986)

Overload margin:

Maximum input level Mic:	1 V
Line:	8 V
Maximum output level, unbalanced:	8 V
balanced:	16 V

Frequency response:

Treble, Bass linear 20 Hz ... 20 kHz:	± 1 dB
Treble, boost/cut at 20 kHz:	+15 ... -15 dB
Bass, boost/cut at 20 Hz:	+15 ... -15 dB

Signal to noise ratios:

Mic, relative to 1 mV input voltage:	> 65 dB
Line, relative to 500 mV input voltage:	> 86 dB
6 x Line:	> 82 dB

Harmonic distortions:

Line, 500 mV input voltage, 1 kHz	< 0,03 %
Mic, 100 mV input voltage, 1 kHz	< 0,03 %

Crosstalk attenuation:

Channel separation, 10 kHz:	> 50 dB
Switch-off attenuation, channel fader, 10 kHz:	> 85 dB
Switch-off attenuation, master fader, 10 kHz:	> 110 dB

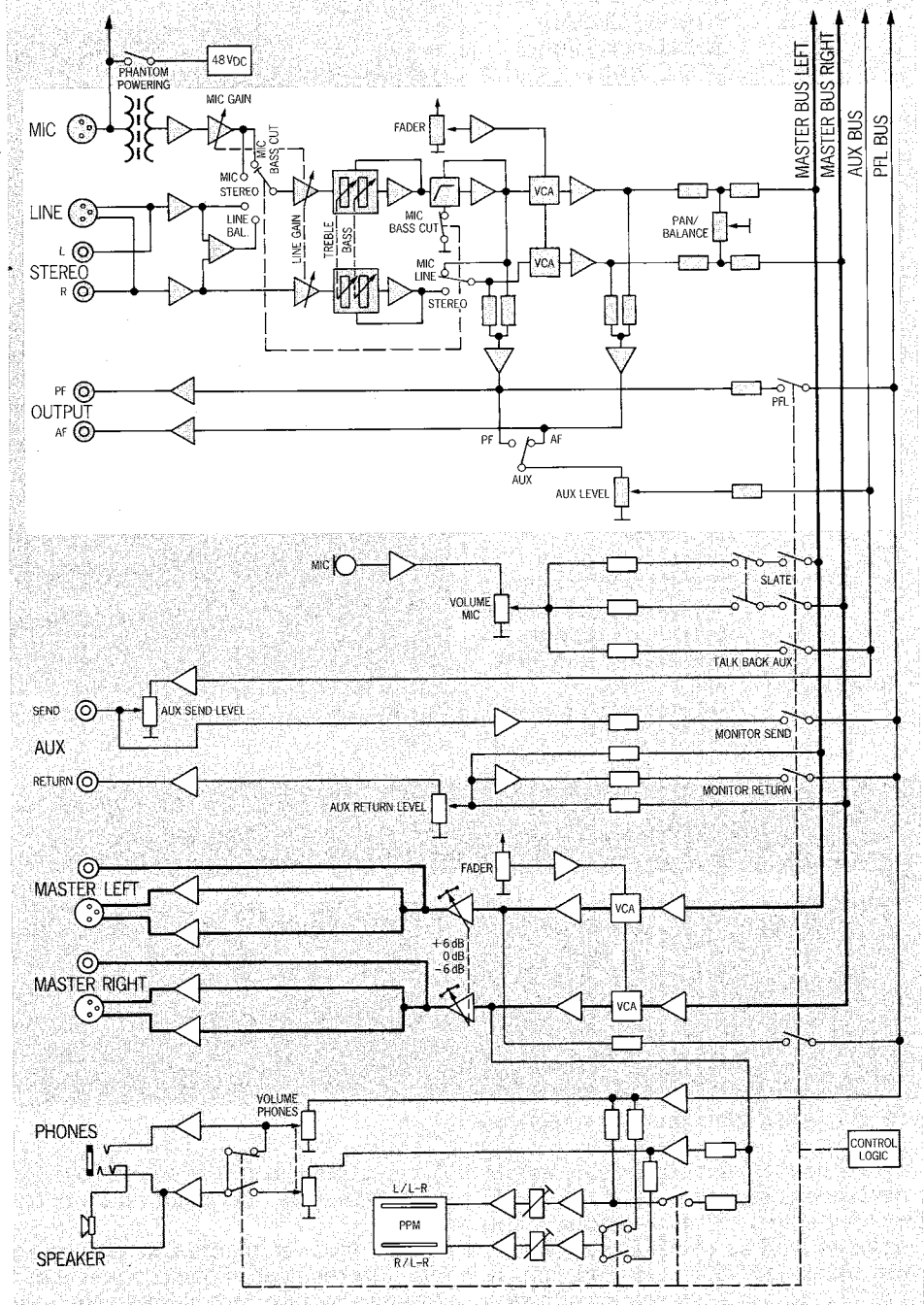


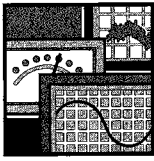
Fig. 6: Simplified block diagram of the Revox C279

provided by the modern VCA control (Fig. 6): an economical linear sliding potentiometer works as a voltage divider.

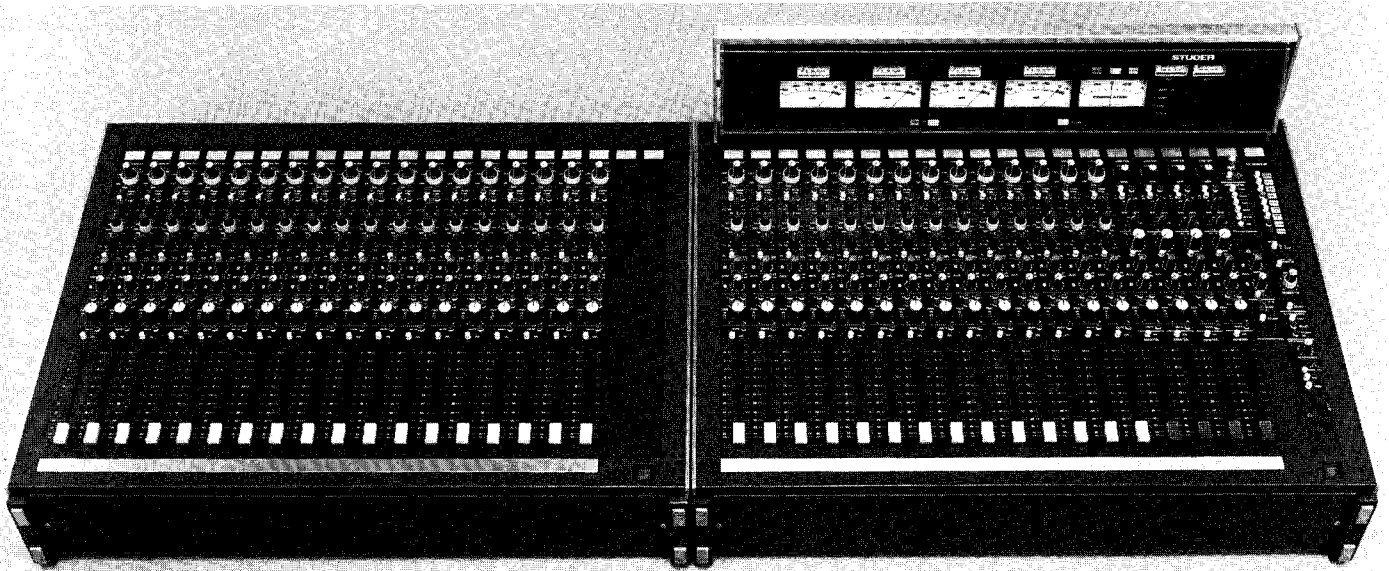
The DC voltage set with this component is taken via a decoupling amplifier to an integrated, high-quality VCA which is responsible for the linear/dB conversion. The accuracy of these ICs ensures excellent phase synchronism. Light and smooth travel is ensured by a plastic glider with Teflon sleeves on two ground steel shafts.

In summary the new Revox C279 offers excellent performance for the value because the design, the facilities, and specifications are very close to those of a small professional mixing console.

Jürgen Hartwig



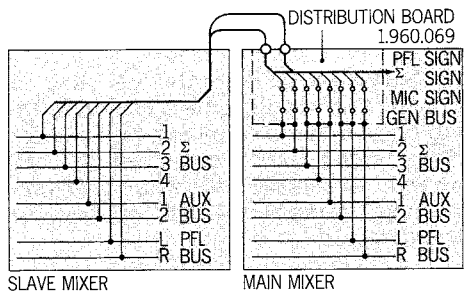
961/962 Coupling kit versions
2:1 for the flexibility



Master-slave combination (bus coupling kit) with two 962 mixing consoles

In larger broadcasting productions it is often desirable to couple one or several mixing consoles of the series 961/962. For price reasons it may even make sense to permanently combine two small audio mixers into a larger unit so that a mixing console with e.g. 24 inputs and 4 masters is obtained.

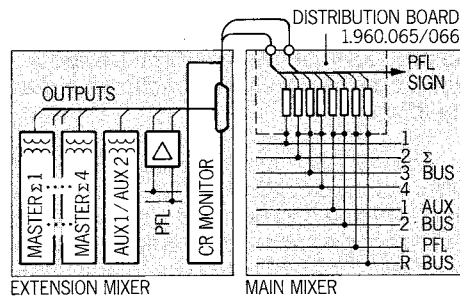
Two different coupling kits are available: firstly, the so-called master-slave combination referred to as the "bus coupling kit" and secondly the "normal" coupling kit.



Block diagram for coupling of two "normal" mixing consoles (normal coupling kit version)

In the master-slave combination based on the bus coupling kit, the buses (zero-ohm bus) of two consoles

are connected in series, i.e. the bus is extended. This means that the existing mixing console is extended without nearly any loss. The "slave" console houses only the input modules, 12 in the model 961 and 18 in the model 962; no master channels, AUX master, and monitor modules are needed. Autonomous operation of the slave console is, therefore, not possible.



Block diagram for coupling master and slave mixing consoles (bus coupling kit version)

In the normal coupling kit version, however, two standard mixing consoles equipped with input and master modules are coupled. The link is established from the D-type connector on the C.R. monitor module via a multiconductor cable to the coupling board on the

master console, from where the audio signals are taken via an attenuator to the zero-ohm bus.

In this coupling version it is also possible to serially connect mixing consoles of the series 169-269 to the new equipment, however, with the restriction that prelistening is input in mono mode (stereo in the case of the models 961-962). For PPM and VU models, different coupling circuits are offered because of the difference in the levels.

In both versions coupling is possible either with 2- or 4-channel audio mixers. The maximum number of input modules for 2-channel audio mixers is:

- Bus coupling kit versions «961-961» = 22
- «962-962» = 34
- "Normal" coupling kit versions
- «961-961» = 20
- «962-962» = 32

These coupling facilities expand not only the application range of the compact and mobile 961-962 mixing consoles, but they also represent a highly cost-effective alternative as small "large mixing consoles".

Herbert Jurt



Synchronizer Studer TLS 4000 MKII

How does a synchronizer work?

In earlier articles we have discussed the TLS 4000 synchronizer system with its fields of application, as well as the SMPTE/EBU time code as the most important signal for coupling studio machines (Swiss Sound 2/84 and 13/85).

The following report gives a glimpse at the functions and operating principles of the TLS 4000 MKII.

The main function of the synchronizer is the phase-locked coupling of audio, video and film machines with various reference signals. This means that the synchronizer has to be equipped with three important interfaces to its environment:

The **master interface** supplies the synchronizer with one or several signals for determining the desired tape address and the operating state. The master can be either a studio machine or a time code generator.

Via the **slave interface** not only the actual tape address is determined but it also outputs machine-dependent control signals for influencing the tape deck status and the audio/video parameters.

The **control interface** of the synchronizer permits the latter's integration in a host system, ranging from a simple master/slave combination to complex, automated editing systems.

Various approaches for implementation of such a synchronizer are technically feasible. All functions can be assigned to a central unit which consequently handles higher ranking functions (such as editing) as well as machine-oriented control functions.

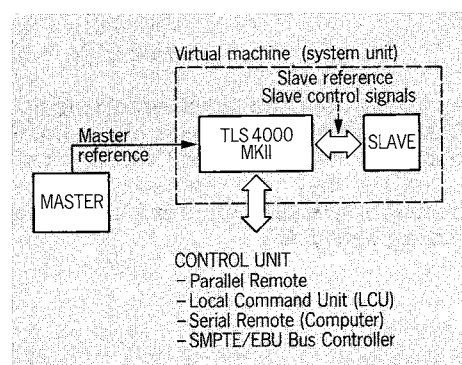


Fig. 1

A different concept has been followed for the TLS 4000. All slave-dependent and all real time functions have been shifted to the machine. This results in a decentralized design. Each system unit comprising a machine with the synchronizer serially connected to its control port can be considered as a new virtual machine, the instruction set of which has been expanded by a few intelligent functions and whose interface to the control unit is independent of the machine type and make (Fig. 1).

The ultimate approach would be the integration of the synchronizer functions

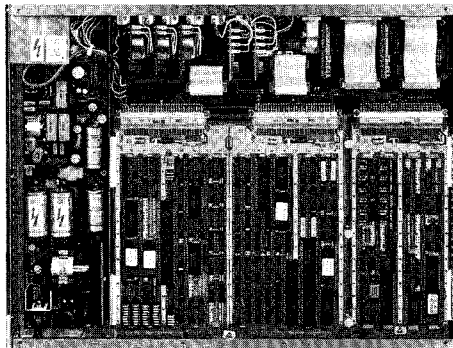


Fig. 2

into the slave machine. Although with the acceptance of the SMPTE/EBU bus system as the international standard an important prerequisite has been established for future applications, the use of a modular, adaptable synchronizer such as the TLS 4000 MKII will still be essential for the many studio machines already in use.

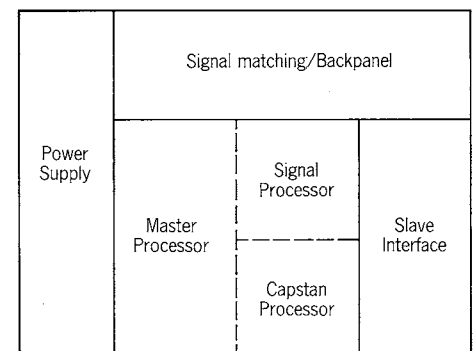
The Studer synchronizer TLS 4000 MKII processes SMPTE/EBU time code and biphasic code from film machines; it can decode move pulses and a large number of pilot signals. The 19" rack module which is only one unit high, contains not only the power supply but also the signal matching and connection board, and two digital logic modules (Fig. 2).

Three microcomputers are implemented on a double EU P.C. board. The **master processor** monitors the control interfaces and coordinates the functions within the unit. The **signal processor** processes all reference signals from the master and slave. The **capstan processor** performs the fine-synchronization

for audio and film machines. The machine-dependent circuitry with an additional processor is located on a second wrap board. This processor, together with the master processor and with the aid of data from the signal processor, performs the rough synchronization and selects the most favorable moment for switching over to the capstan control.

The **interface processor** also performs locate functions and is responsible for the correct conversion of the system commands for "his" slave.

The signals to be processed by the synchronizer can be broken down into



four groups. **Code signals** are absolutely necessary for completely synchronous operation during stop, play and spooling. They contain clock and direction information. In contrast to the SMPTE/EBU time code which supplies the absolute time in coded form, positioning by means of the biphasic code is accomplished by adding the periods of a signal that is phase-shifted by 90°.

Move pulse signals are used in conjunction with the time code for bridging code failures. They can be used for determining the tape position at very slow or very fast speeds when the working range of the code amplifier or reader is exceeded.

Pilot signals supply only clock information. They are effective within the play tape speeds and are needed for autopilot, resolver, and time line operation. Additional reliability is ensured by **tape deck status feedbacks**. They are available from the slave through the interface; master feedbacks can be connected to the master tallies input.

The desired signal sources can be defined to the signal processor by means of DIL switches and via the control interface; the slave configuration is determined by the interface processor. The following list gives an overview of the various reference signals:

- Code:
 - SMPTE/EBU time code (24, 25, 30 frames/sec and drop format)
 - Biphase code (nominal 48 ... 500 Hz)
- Movepulse:
 - Clock/direction or biphasic (max. 50 kHz)
- Pilot:
 - Frequency 20 Hz ... 20 kHz
 - Clock from code signal
 - Composite video (master)
 - Internal quartz clock (master)
 - Clock from interface board (slave)
- Tape deck:
 - Status information from interface (slave)
 - Stop, Play, Rec (master)

In the main operating mode, **Lock**, the synchronizer controls the slave machine with all available code and control signals. Coarse control stops when the master is in stop mode and the slave is parked (cued) in this position, or when the time for changing over to fine synchronization has been reached. This can be the case after continuous approximation to the master position. If the slave does not permit efficient control at slow speeds, it is parked ahead of the master and restarted at the precise moment.

In film and audio machines, control is subsequently assumed by the capstan processor. The phase difference is settled to a value of less than 50µs, the control algorithm becomes slower-acting for minimizing wow and flutter. In order to obtain a steady image in video machines, phase control is transferred to the machine as soon as the difference becomes smaller than one frame. A prerequisite for a continuing synchronous state is, however, that the master and the slave work with the same video reference. Fig. 3 illustrates the control circuit of three different machines. Striking in the case of biphase synchronization is that the slave is not in the control loop. This simplification is possible because Sprocket machines ensure rigid coupling between the control signal and the tape position.

In Lock mode the code signals can be replaced by pilot signals when synchronism has been attained. This ensures greater reliability in the event of poor code quality. In the TLS 4000 this function is referred to as "Autopilot mode".

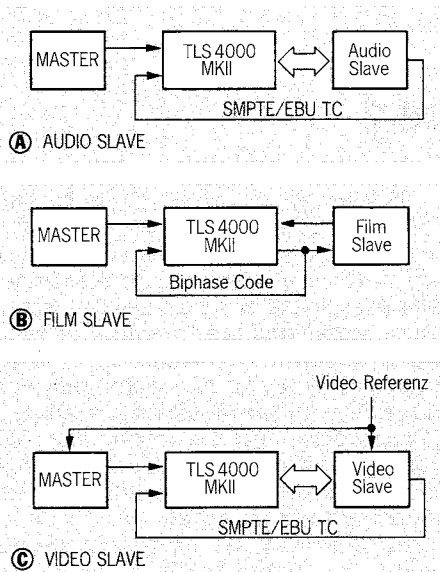
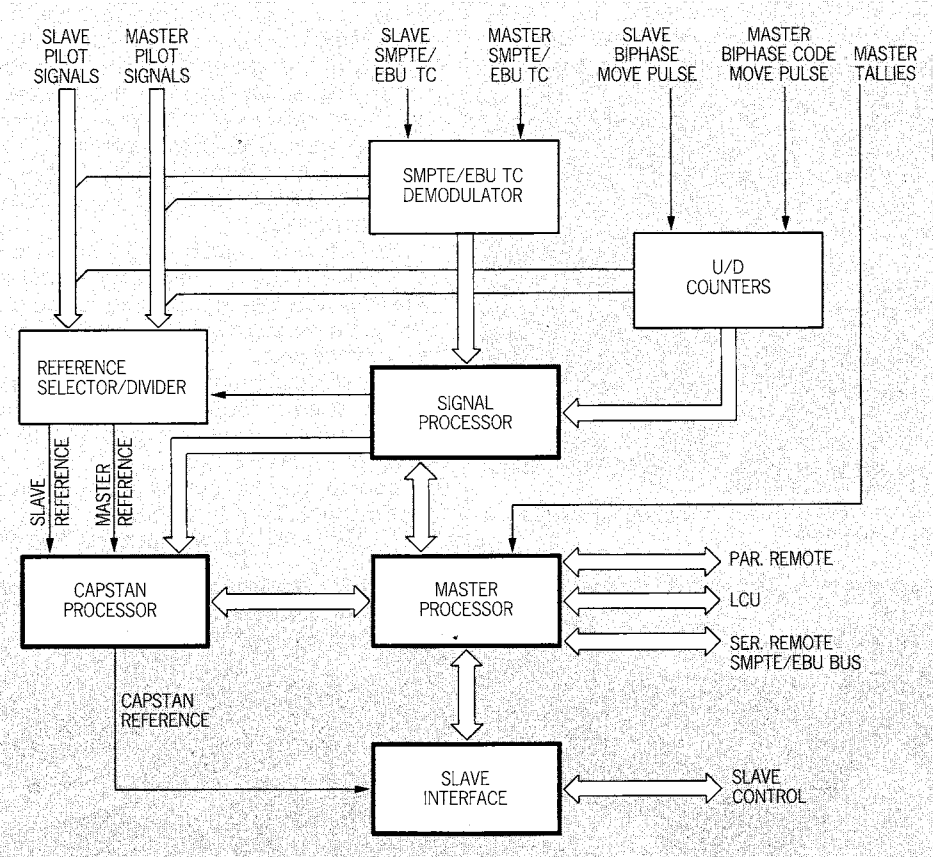


Fig. 3



Block diagram Studer TLS 4000 MKII

In **Resolver mode** the pilot sources are used as the reference from the beginning. The synchronizer starts directly with fine synchronization as soon as the two frequencies are within the play range.

An additional application of the master pilot signal is the **Time line operation**. The synchronizer functions as in

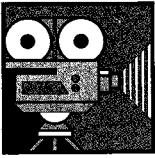
normal Lock mode, except that the master code is replaced by an internal code generator. The latter is controlled by the pilot signal and can also be started, stopped or loaded with any value.

In addition to these synchronizer modes the TLS 4000 MKII features a time code locator (**Goto mode**) and 2 **editing modes**. These can be used for pre-programming and executing editing sequences. The slave waits at a starting point for time coincidence with the master, synchronizes automatically, and initiates Record commands (drop-in, drop-out) with millisecond accuracy.

The controller, be it a simple operating unit, a system controller (e.g. Studer SC 4008, SC 4016), or any computer, can now support a complex system with the aid of the modular basic functions and

the standardized control interface of the synchronizer. It does no longer have to be aware of the individual machines with their different facilities and behaviors.

Kurt Schwendener



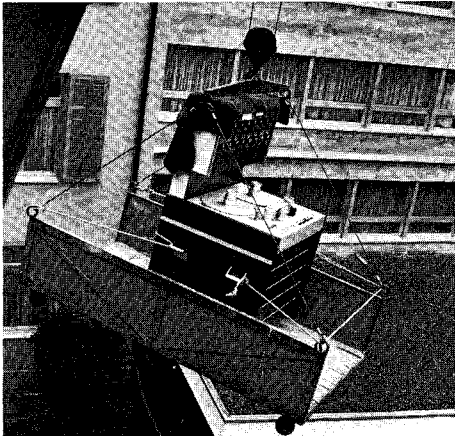
Synchronization on Lake Zurich

Time is money

The competition in the video business is fierce. In hardly any other field could the motto "Time is money" be truer.

For this reason Condor Productions AG decided during the last autumn to equip control room 2 of its Bellerive studio on Lake Zurich with an advanced synchronizing system which comprises the following components:

- 1 Mixing console 902 VCA
 - 1 Studer A800-16 MKIII
 - 1 Studer A820-2 TC
 - 1 System controller SC 4008 with TLS 4000 and interfaces to the above machines.
- U-Matic cassette machines or 1" MAZ machines are used for mastering.



Adventurous transport of the mixing console and tape recorders

The equipment was delivered in December 1985. As part of the preinstallation work the equipment had to be hoisted by means of an adventurous external elevator into the upper floors. The installation work was performed between Christmas and New Year. The replacement of the technical equipment was preceded by the renovation of the entire control room, and the mixing console was moved in place virtually at the same time the carpet layers had fitted the last square meters of carpet.

After New Year the synchronizing system was immediately put into productive operation without any protracted familiarization phase. The first crucial test was passed by the control room No. 2 by adding the sound to the film: Video Poly, an order which Condor Productions AG received from the three television networks ARD (Germany), ORF (Austria) and SRG (Switzerland). This film has been produced and dubbed within a very short time and has already been broadcast.

Mr. Jansa, Condor's audio engineer for control room 2, was very excited about the time saving and the improvement in the audio quality achieved with "his" new system.

In the backroom there is already talk that the control room 1 in the Bellerive studio which is also equipped with Studer tape recorders and TLS 4000, may in the near future be possibly equipped with its own SC 4008 controller ...

Jean François Raoult



Control room No. 2 of Condor Productions AG in the Bellerive Studio, Zurich



The Studer Group

"Who is who"

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



Walter U. Derrer

General Sales Manager professional products, Studer Revox GmbH Löffingen, Germany ● responsible for sales and service of the professional Studer range of products in Germany ● born 1945, brought up in Aarau, Switzerland ● studies at the Teacher's Training College of Wettingen, Switzerland ● study of sound engineering at the Academy of Music, Detmold, Germany.

The continuation of Walter Derrer's career as a school teacher and head of a cultural centre in his home canton should take an entirely different turn in 1970. It was music – pursued as a rather ambitious sideline – that influenced him to change his profession. Accompanying his violoncello teacher on a trip to Holland and Belgium for broadcast recording sessions, he was so deeply impressed by the technique and background activities of studio recording that he had no other desire but study the "art" of sound engineering. Three acknowledged music academies – in Berlin, Detmold and Düsseldorf – were ready to help him realize his plans; he chose Detmold where he finished his studies in 1977 with a diploma in the profession of sound engineering.

He made acquaintance with the Studer company in 1976, shortly before ending his studies. In his function as technical tutor at the academy, he met many audio people and was referred to Studer during the Zurich AES 1976 by an audio "insider". At that time, Studer International AG was looking for a sound engineer capable of training Iranian broadcast operators. On first interview, Walter Derrer accepted the job on a free-lance basis and worked henceforth in the Iran. He had operated Studer

equipment at the academy and was well acquainted with their technical features; consequently, a time-consuming training period was unnecessary. 1977, Walter Derrer joined Studer International AG full-time as an area sales manager. In charge of the engineering work of large projects, he spent more than 200 days per year in the Middle East, in Korea and trained technical staff in Cameroon, Iran, Eastern Europe and at home.

After the termination of the distribution agreement for Studer Revox products in Germany between Studer International AG and a reputable German company, Walter Derrer was appointed sales manager for Studer professional equipment in Germany, domiciled in Löffingen, Black Forest. Two assistants supported the new sales manager in the initial year of activity which brought good results: sales were doubled. The organization, gradually increased in size, has multiplied its business today.

Walter Derrer attributes this to the Regensdorf model, the courage to (occasionally) experiment, the freedom of decision-making which underlines his independent engagement in work.

After all, Walter Derrer is a man of the deed, and rather rejects blank theory. On account of this, customers are looked after in a more practical way. Whenever the occasion requires, he carries out repairs on the spot, leaving his "sales mind" far behind. There is a lot of mobility in his daily routine. In addition to a good number of domestic flights, he covers some 60 000 kilometers per year on Germany's Autobahn. Such trips are backed up by his well-functioning team in Löffingen who supports "the man in the field" efficiently. The number of customers increases; projecting work gets more demanding and time scarcer than ever. Walter Derrer regrets that on account of such inevitable circumstances, a closer relation and the exchange of views among business friends becomes a rarity.

In addition to the general supply of professional equipment, the team has equipped local radio studios, OB-Vans for British Forces Broadcasting of Cologne and the famous "Städtische Bühnen" (new opera house) in Frankfurt. Even the city's legendary old opera house was Studer-equipped to a large extent. Last not least, the supply of 94 Studer A812 machines to Radio Free Europe in Munich only added to the good results ...

The department's location in the far south of Germany asked for decentralization of sales and service facilities. A first branch was opened in Munich years ago and is now looked after by a team member, Erich Obergfell. Another facility operates in Kleve under Henry Paes' supervision to cover certain areas of the German market.

Business-related companies joined forces and support Studer Revox in Berlin and in Hamburg; another company looks after German theatre houses, ensuring instant service in every respect. Wolfgang Timmermann of the Löffingen team also visits stage organisations, town halls and broadcast companies; "back home", Ursula Flesch and Regina Bürer rule administration and accounting matters, whereas Klaus Schwär, Fritz Kaufmann and Adolf Strobel have charge of the technical sector.



With 60 hours work per week, you can forget about hobbies, says Walter Derrer. There is a large collection of classical records, a spinet and a cello at home – seldom used. Sailing and skiing are rarely practised, and growing orchids has been postponed indefinitely. Remains the preference for good food (and cooking); the gourmet takes it with a pinch of salt that his culinary taste is evident. There is also great enthusiasm for (engine) flying and the wanderlust for remote countries, as he feels that in spite of the mileage he covers regularly, his world seems to be too small.

Under the guiding principle "who looks for a helping hand finds it best at the end of his own arm" he keeps his team alert. Spontaneity and enthusiasm for the product complement his wide range of practical experience gained in demanding business circles. In complete tune with the principles of the company, he still thinks that "success is often enough the courage not to stick to the rules of the book".

Renate Ziemann



Exhibitions

Beijing Recording 1986

Organized by Beijing Acoustics Society, the exhibition was held at the Cultural Palace of Nationalities in Beijing, China, from August 30 to September 4, 1986.

As the very first professional audio/recording equipment exhibition in China, it drew major manufacturers and suppliers for participation to the show; there were also lectures and symposia held in the course of the meeting.

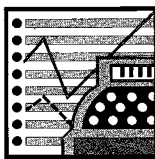
Being a long-established and reputed supplier in China, Studer Revox (Far East) Limited of Hongkong offered an impressive four-stand booth for display and demonstration of Studer Revox products. Focus of attention were the Studer mixing console 963, PCM recorder D820X, A820 and A812 master recorders, A807 professional recorder and Studer SC 4008 system controller and TLS 4000 synchronizer.

Delegates of Studer International AG of Switzerland, Mr. Paul Meisel and Mr. Peter Joss, were also present at the exhibition and informed interested parties in particular about the Studer PCM recorder D820X.

In addition to the general public visitors, some 2000 experts, scientists, engineers and officials from radio and TV stations, film and recording companies, universities and other Chinese institutions attended the show. All were most interested to obtain latest information on equipment available in the market place today.

No doubt, Studer Revox made it a successful show with a complete range of sophisticated audio and recording equipment for professionals. Last not least, substantial orders were placed at the exhibition by old and new enduser friends to whom Studer Revox will prove to be a reliable and trustworthy partner.

David F.C. Ling, Hongkong



Right on success

Studer worldwide

Germany

Radio Free Europe

A total of 92 Studer A812-1 VU recorders was supplied to Radio Free Europe in the last few months; the new machine has in RFE operation now passed its crucial test.



Finland

Yleisradio

The Finnish broadcasting company has placed several orders for Studer equipment, comprising 7 mixing consoles Studer 902, 16 Studer A810, 7 Studer A820-1/4" as well as 2 Studer multi-channel machines.

Holland

De Nederlandsche Blindenbibliothek (nbb)

The library for the blind has ordered another batch of 12 Studer A810 professional recording machines and has now 27 of this model in operation.

New Patents

"Technique for editing interleaved digital recordings". This invention is credited to Philip S. Gaskell, Dr. Roger Lagadec, and Guy W.W. McNally. It was registered in the USA on May 27, 1986, under No. 4,591,926.

When digital signals are played back from tape or disc, some data may possibly be lost (dropouts). For this reason additional in-

Revox

New Prospectus - Complete Product Range

With the introduction of new products, a new version brochure will also be available. 48 coloured pages present the complete range of Revox products; a 16-page addition comprises all technical data.

The entirely new concept of the artwork comes from Lorenz Schneider, illustrator-designer of our company. Since Fera 1986 (end of August), the new brochure has been made available in no less than six languages (German, English, French, Italian, Spanish and Dutch).



STUDER REVOX

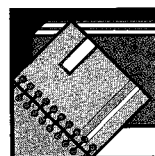
The philosophy of excellence

formation is encoded on the recording medium, based on which the loss of data can be detected and the content reconstructed. However, if long bursts of data are lost, also this supplementary information is destroyed. To overcome this problem the data, rather than being contiguously arranged, are distributed over a track length that is greater than any defect area. As a consequence it is not possible to correlate the time of a specific audio event with a specific track location on the disc or tape. The data associated with a given playback instant are distributed over a certain track length and are intermixed with data that belong to a different instant; the data are "interleaved". When such a tape is to be edited, this longitudinal distribution of the data makes editing a difficult task.

The patented invention solves the problem in such a way that the noncontiguous data of an instant are buffered and reproduced in the correct rhythm. The tape which has become "too long" because of the edit function, is realigned by the tape transport.

Paul Zwicky

For further information please contact



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Art and production: Lorenz Schneider

Publisher: WILLI STUDER AG, Althardstrasse 30,
CH-8105 Regensdorf

Reprint permitted with reference to
SWISS SOUND (please send a copy to the editor)

Printed in Switzerland by WILLI STUDER AG
10.23.8210 (Ed.1086)