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SWISS SOUND

VIEWS AND NEWS FROM SWITZERLAND

STUDER REVOX

Time code reader chip Studer TCIA

Time code reading ... ... in the speed range of 1:10000

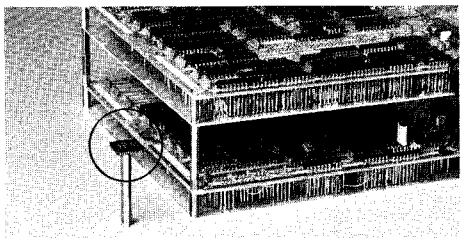

Fig. 1: The TCIA module – designed as an emulator in conventional TTL technology – requires the space of two double EU size circuit boards.

Processing of program material without utilizing time code data is inconceivable in today's television or recording studio. Wherever video and audio material is to be edited, synchronized, or prepared for the library, the evaluation of time code data is an important aspect. In view of these requirements we have developed an application-specific IC, referred to as TCIA. In the following report the project manager concerned gives detailed information about this powerful chip.

Serial reading of TC information (TC = Time Code) from video or audio tape is a complex task both at slow and fast tape speeds, and requires elaborate circuits. For this reason, applications with TC processing have in the past been limited to special equipment such as synchronizers.

Application-specific IC (ASIC)

Due to the progress of modern microelectronics in the field of the ASIC technology it is now possible to create appliaction-specific ICs of great complexity. Semiconductor manufacturers today offer ASICs with a complexity of over 100000 gates. The TCIA chip (Time Code Interface Adapter) has been implemented in ASIC technology with approx. 5000 gates. In conventional TTL technology the same circuit would require two circuit boards in double EU format in place of a single chip (Fig. 1). It is obvious that a solution that permits adaptation to different studio applications is not only economical but also suited for applications with low-cost series production.

In the tape recorders the TC reader chip TCIA is used for implementing a series of new functions – from displaying the time code to a complete internal synchronizer.

The TCIA as a high-speed peripheral chip

The TC reader TCIA is a microprocessor peripheral chip that can be connected to the Motorola 6800/03 or Intel 8080 MPU bus system without any additional circuitry (Fig. 2).

The TIME CODE DECODER section uses the TC clock signal to evaluate the TC data from the serial TC information.

- The synchronizing word is extracted first; at the same time the direction of the TC signal is detected. Both items of information (synchronizing word and TC direction) are processed internally. They are also available as the digital signals SYNCH and UP/DOWN on the corresponding outputs of the TCIA.

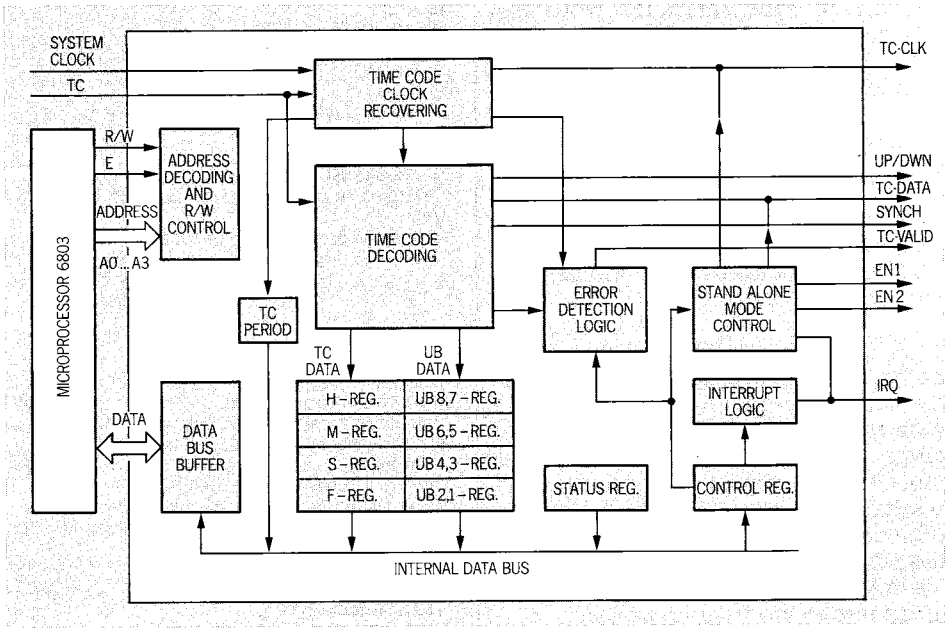

Fig. 2: Simplified block diagram of the TCIA chip.

The requirement for such a peripheral component is given by the fact that the microprocessor would be quickly overloaded if it had to assume the burden of directly decoding the TC signal. In addition the decoding at tape speeds higher than the nominal speed would not be feasible.

The TCIA chip can process the incoming TC signal within the range of 0.01 to 100 times the nominal speed (1:10000). The time code clock is recovered from the biphase TC signal by a digital PLL circuit. The advantage of the digital PLL circuit is that the TC is recovered practically without delay as soon as the TC signal appears on the TC input.

SWISS 27 SOUND

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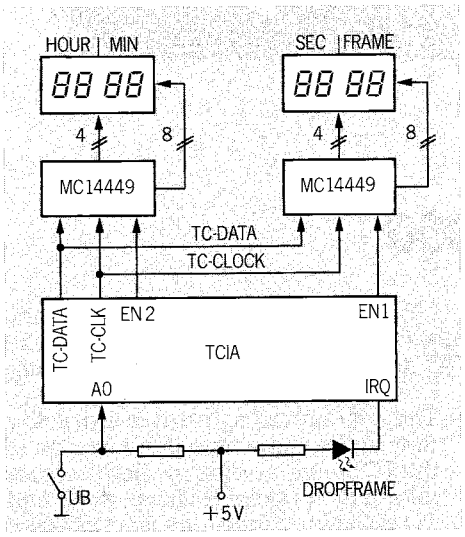


Fig. 3: In stand-alone mode the TCIA requires only two 7-segment drivers for displaying the tape timer or the user bits.

- After the synchronization word has been extracted, the TC and the user bits are sorted and stored in the data buffer (8 registers).

The time data (**h**ours, **m**inutes, **s**econds, **f**rames) are stored in BCD format in four 8-bit registers; the user bit data (UB) are located in the remaining registers of the data buffer. Each register can be individually addressed and read by the microprocessor.

A logic protects the data in the data buffer from being overwritten: only after the microprocessor has read out the old data from the buffer, can the decoder circuit read in new data. Or to give a more exact formulation: reading out of the data is a sequential process via the 8-bit data bus so that the write inhibit for the buffer is cancelled only at the end of the microprocessor read operation by an access to the frame register.

Continuous error monitoring

The decoding of the TC data is monitored by the ERROR DETECTION LOGIC. This circuit can detect the following errors:

- Dropouts, i. e. absence of one or more edges in the incoming TC signal. This is certainly the most frequent error, particularly at higher tape speeds (fast wind), caused by inadequate tape/head contact or poor tape quality.
- Speed too high, i. e. the frequency of the TC signal is too high (overflow).
- TC signal frequency too low (underflow).

The latter two errors occur within the working range of the digital PLL circuit. This working range is defined by the size of the binary counter in the PLL circuit and by the frequency of the system clock signal (SYS-CLK). With a system clock frequency of 5 MHz, overflow errors occur at tape speeds that are greater than 100 times the nominal speed. Underflow errors occur at tape speeds that are 100 times lower than the nominal speed.

The time and user bit data are written into the data buffer only if no errors have been detected during the decoding. The error detection circuit ensures that the information on the quality of the TC signal is stored in the STATUS REGISTER after the decoding of each individual TC data word. Any error condition as well as the message that no errors have been encountered during the decoding are stored as 1-bit information in the status register.

Additional information for the software developer.

To the software developer only the internal data buffers or data registers of the TCIA chip are of ineteresting. These registers are addressed via the address lines A0 ... A3 (ADDRESS BUS). The microprocessor writes or reads the register data via the 8-bit DATA BUS. All TCIA registers are read-only registers except for the control register.

TC DATA BUFFER

The TC data buffer comprises four 8-bit registers for:

Hours (address	0Ch)
Minutes	(0Dh)
Seconds	(0Eh)
Frames	(0Fh)

The time data are stored in BCD format.

USER BIT BUFFER

The user bit data are stored in four 8-bit registers:

User bit (UB)	group 7–8	(address 08h)
	group 5–6	(09h)
	group 3–4	(0Ah)
	group 1–2	(0Bh)

PERIOD REGISTER

The period register contains a 16-bit binary word that represents the halved number of system clock pulses per TC bit period. Because the data bus has a width of 8 bits, this regsiter must be read in two steps: first the MSB value (address 02h) and then the LSB value (01h). This sequence must be maintained to protect the data from being overwritten during the read operation.

STATUS REGISTER

The status register displays various states that can occur during the decoding process. The corresponding information is coded as individual bits within the 8-bit status register:

BIT 0: If this bit is set (log. 1), it means that after the decoding of a TC word the data are completely located in the data buffer.
This bit is automatically reset after the frame register has been read.

BIT 1: This bit is set when a new TC word has been decoded but not transferred into the two data buffers, because the old TC data have not been read out by the microprocessor (receive buffer overrun error). The bit is automatically reset by the microprocessor after the two data buffers have been read.

BIT 3: This bit indicates the direction of the TC signal (log. 0 = forward, log. 1 = reverse).

BIT 4: This bit is set when no error occurs in the regeneration of the TC clock signal and a valid clock signal is available at the TC CLK output.
The bit is reset when the following errors occur: PLL overflow, PLL underflow, and TC dropout.

BIT 5: When this bit is set this means that the frequency of the incoming TC signal is too low (PLL underflow) or that no TC signal is available at the input.
This bit is reset as soon as a valid synchronization word is decoded in the TC signal.

BIT 6: This bit is set when the frequency of the TC signal is too high (PLL overflow).
This bit remains set until the next valid synchronization word has been decoded.

BIT 7: The status of the IRQ output is signalled by this bit. Bit 7 will be set if an interrupt signal is generated (log. 0 at the IRQ output).
This bit is automatically reset after the status register has been read.

CONTROL REGISTER

This register is used for initializing various modes of the TCIA chip.
The microprocessor can only write the register data. The desired operating states are stored as a 5-bit pattern in the control register:

BIT 0: In order to put the TCIA chip into the initial state (reset function), a log. 0 must be written into this bit position.
The reset state is terminated when the bit is restored to 1.

BIT 4: This bit is automatically set to 0 when the supply voltage is switched on, i. e. the chip is initialized for operation without a microprocessor.
If the TCIA is to be operated with a microprocessor, bit 4 must be set to 1.

BIT 5: When this bit is log. 1 the interrupt signal IRQ is generated when the PLL underflow status occurs.

BIT 6: When this bit is log. 1 the interrupt signal IRQ is generated when the PLL overflow status occurs.

BIT 7: When this bit is set an interrupt signal IRQ is generated each time a complete TC data word has been completely decoded.

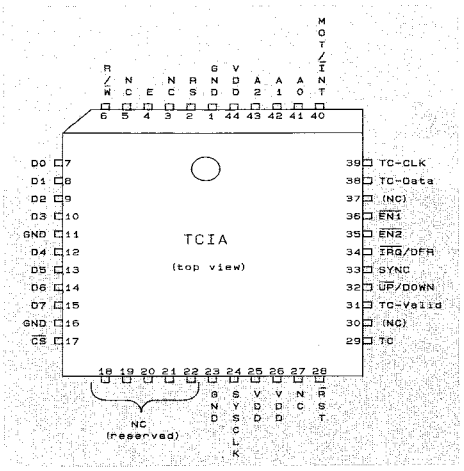


Fig. 4: PLCC configuration of the TCIA chip with 44 connections.

In addition the signal TC word valid/invalid is generated at the corresponding output of the chip.

The TCIA chip features an INTERRUPT LOGIC that informs the microprocessor via a special interrupt line that a status change has occured during the TC decoding.

The interrupt signal IQR can be generated for the following status changes:

- TC data decoded and stored in the data buffer
- Overflow error
- Underflow error

By writing the corresponding information into the CONTROL REGISTER, the microprocessor determines which of these status changes are to produce an interrupt signal. The microprocessor can also inhibit the generation of interrupts, if required.

Accurate measurement of the tape speed

During the decoding of the TC data the period of the TC signal is continually measured in the digital PLL circuit and written into the TC PERIOD register. This TC period value has a 16-bit resolution (!) and can be used by the microprocessor for computing the tape speed. This information represents the true tape speed because it is read directly from tape without mechanical slippage.

For passive data display only a simple driver is needed.

The TCIA chip can also operate without a microprocessor (stand-alone mode). This mode is automatically initialized after the supply voltage is applied.

For this purpose two 7-segment Motorola MC14449 driver chips are required (Fig. 3). In this configuration the TCIA chip is able to decode the TC signal and to display the tape time or the user bit data. The internal STAND ALONE MODE CONTROL circuit generates the required signals for controlling the drivers (TC-CLK, TC-DATA, EN1, EN2). The changeover to TC or user bit indication takes place at the «A0» input.

Miodrag Milicevic

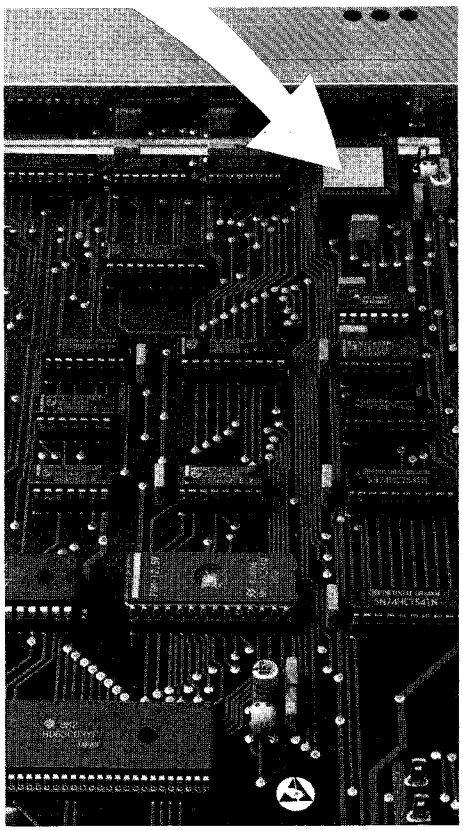


Fig. 5: The TCIA chip in practical application: the picture shows the DC processor circuit board of the future tape recorder Studer A807-TC.

16th International TV Symposium, Montreux

ITS – TV – HDTV – HDVS – CATV – DBS – ...

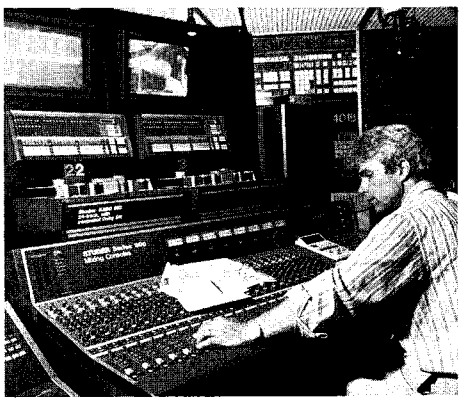
Montreux – that greatly admired beauty spot – presented itself to the illustrious visitor once again at its best in beautiful summer weather for the most important convention of TV specialists worldwide.

The principal topic of the exhibitions and the wide range of papers was, of course, television. Over 300 exhibitors presented their professional products with HDTV being the front runner.

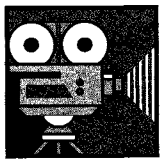
On the two-floor stand of Studer Revox, the exhibition concentrated on live demonstrations of various synchronization and editing systems. Postproduction facilities for video and film were demonstrated by a studio professional in an elaborate demonstration area.

New equipment from the professional range included the small mixer A779, the demonstration model from the digitally controlled audio mixer series 990, and of course also the A827 multitrack tape recorder with integrated TLS 4000 synchronizer (LCU control unit built into the meter panel).

Marcel Siegenthaler



Application-oriented demonstration for post-production – François Musy an audio/video professional from the «SMB son» studio in action.



Rediffusion's cable TV network and Studer Revox

The electronic network – Spider webs of the coaxial kind

The idea of supplying households directly through a network is nothing new. The Romans already built long water lines and were even capable of fine distribution – at least for the privileged class. Modern society has picked up this concept and extended it: extensive networks of gas and telephone lines have been either suspended on masts or buried in the ground. But the latest networks are of an electronic nature and transmit pictures, sound, and data – in the most sophisticated version even bi-directionally. Cable television (CATV) is part of this modern development. The fact that more than a cable is required despite this sober designation, is the reason why we have prepared the following report.

In many cities and numerous Swiss villages, even those in mountain regions, roof antennas have disappeared. Despite this, the choice of TV and radio programs has increased considerably due to the availability of cable connections. To make this possible, the industry has redesigned the television sets and FM tuners: the television sets are equipped with special channels for TV programs, and the FM tuners feature high-sensitivity RF input stages that are highly immune to strong input signals.

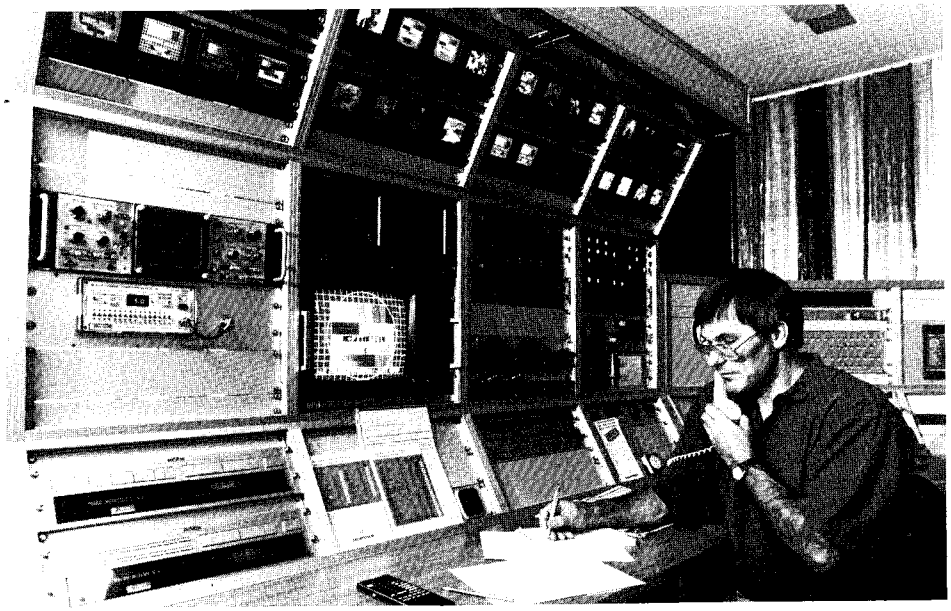


Fig. 2: Impression of the Rediffusion control center

Since the first A76 generation (1968), Studer Revox FM tuners have been continually refined and adapted to the changing requirements imposed by the steady growth in the number of stations and the evolution of the cable technology. For this reason they are ideally suited for connection to a powerfull antenna with rotor or for linking to a cable network by means of a simple connector. This simple socket has the advantage, however, that in most situations the range of available programs is far greater and that the interference is much lower.

But what is behind this simple cable connection? In order to answer this question I have looked around at Switzerland's largest cable TV operator, REDIFFUSION AG.

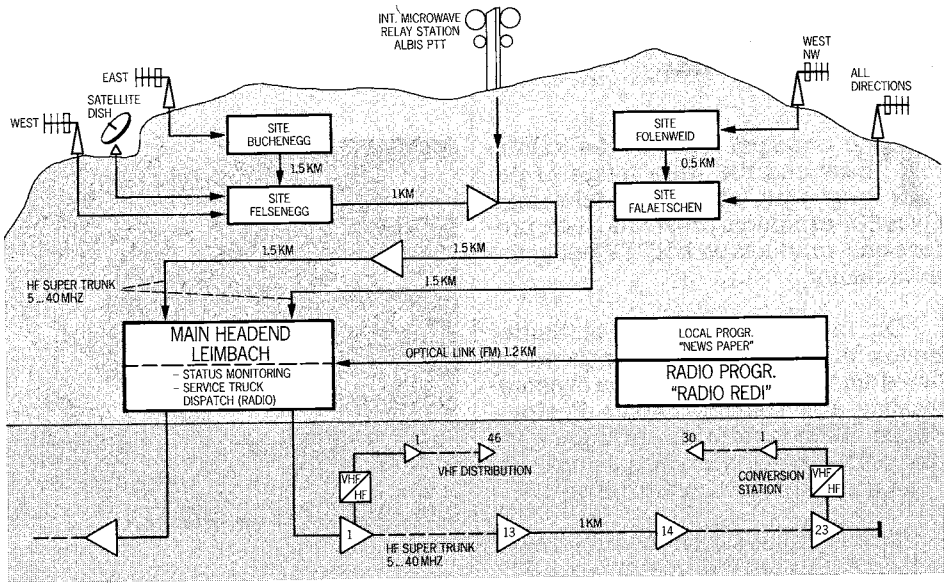


Fig. 1: Block diagram of network Zurich

Cable TV started with cable radio

At least for Rediffusion, the cable adventure started during the early thirties, based on an ingenious idea. At that time Europe was in a deep recession and unemployment was very high. Many people did not have the money to buy a radio set.

On the one hand, the installation of a cable network created jobs and on the other hand the subscribers were able to receive three radio programs without having to buy an expensive receiver. The high reception quality was one of the principal reason why RF wire broadcast receivers became so popular. During the year of its inception, Rediffusion received a license from the responsible Swiss ministry. One year later, in 1932, there were 134 subscribers in Zurich, who were supplied additionally with a program created by Rediffusion. Seen in this light, it could be defined as the very first Swiss local radio (cable) station.

The popularity of the new medium increased steadily and in 1941 there were over 17 000 subscribers in four Swiss cities. Ten years later there were 50 000 subscribiers in six cities.

At that time TV was just round the corner. In the United States cable TV (CATV) was available since 1948. In Switzerland, the first TV program went on the air in 1953. Rediffusion shifted into high gear. RF wire broadcasting was expanded to cable TV. In 1961 the network was put into service, initially with two programs and later with three TV and six music programs. Of particular technical interest is that during these pioneering days the existing HF wire broadcast lines were used for distributing TV signals! Because of the 2-wire lines with paper insulation, special signal preparation was necessary. For example a video carrier frequency of only 6.85 MHz was used.

But Rediffusion soon realized that this low-frequency transmission had its advantages because it was possible to convert the signal to higher frequency bands for the fine distribution. This technology is still used today. The low-frequency line is referred to as «Super Trunk».

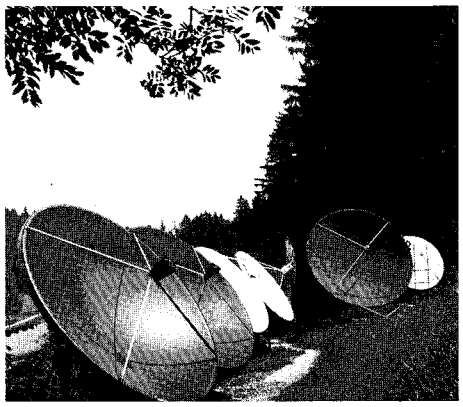


Fig. 3: Receiving station «Felsenegg»

1961 was another milestone for Rediffusion: the first radio and television appliance stores (there are now more than 60) were opened.

Today, Rediffusion has over 1000 employees and achieves an annual turnover of approx. SFr. 200 million. Rediffusion is a founding member represented on the board of the «International alliance for distribution by cable», A.I.D. the top organization of the European cable network operators.

The distribution of video and audio signals via cable networks.
Rediffusion operates cable networks in the cities of Zurich, Bern, Biel, St. Gallen, Olten, and holds an interest in Basel and in cable networks abroad. The current program availability in Switzerland is illustrated by the following table:

Network:	Subscribers	Cities and boroughs	TV Programs	FM Radio Programs
Zurich	290 000	52	25	27
Bern	85 000	8	21	22
Biel	25 000	1	19	18
St. Gallen	23 000	6	20	17
Olten	12 000	3	19	18

The design of the underlying network is subsequently explained based on the central and largest network in Zurich (block diagram, Fig. 1).

Fig. 4: The Rediffusion cable radio station

a) Control room Zurich-Leimbach
The center of the network is the control room located in Zurich-Leimbach. All incoming program lines terminate here and are redistributed through the subscriber network that has an aggregate length of several thousand kilometers. In this control center (Fig. 2) all incoming signals (TV and FM radio programs) are monitored via the «Super Trunk», and the in-house radio program and the local newspaper via the optical links. TV monitors, TV analyzers, video preparation equipment (e. g. digital Teletext preparation) and FM monitors with RDS display (Studer Revox) are available on the reception side.

On the output side, the status of the entire network can be monitored in the control room because the cables operate bidirectionally, and the function of the individual cable amplifiers is continuously checked and displayed based on the feedback signals. When an alarm occurs due to an amplifier failure, the fault can be quickly isolated. The field engineers are quickly informed via the company's own radio network so that a well-equipped measurement van can be dispatched to the failing location.

The preparation of the incoming signals of various types, the control, and the coherent, phase-locked decoupling into the distribution network takes place in an air-conditioned room. This is where the Studer Revox FM tuners also fulfill their monitoring functions.

b) Receiving stations
Over many decades, Rediffusion has built receiving stations that pick up signals from all directions of the compass. Fig. 3 illustrates the receiving station «Felsenegg» that picks up TV and FM radio programs from a westerly direction (France) and several satellite orbit positions.

From the microwave relay station «Albis» of the PTT, the three Swiss programs are fed into the network directly via a 70 MHz cable link. This ensures not only outstanding signal quality but also provides the capability to offer Teletext information to the subscribers even after the PTT transmitter has gone off the air.

c) Local radio studio
Also decentralized is the company's own radio studio (Fig. 4) which is connected to the control room via a fiber optic link. The radio studios differs in no

way from ordinary local studios. Also here the disc jockey uses Studer Revox products (mixing console, tape recorders, CD players, and peripheral devices such as telephone hybrid and balancing units). The radio channel is active 24 hours a day but at certain times the program is contributed by SWF 1 (for western Switzerland) and Couleur 3 (Zurich).

d) Distribution network
Except for a few above-ground amplifier and converter booths, the distribution network with a length of several thousand kilometers is totally invisible. From the arm-thick 7-conductor coaxial Super Trunk (5 ... 40 MHz) down to the finger-thick house connection, all cabling is run under ground. The top-quality cable amplifiers developed by Rediffusion (RF double power push-pull amplifiers and feed-forward amplifiers with equalization compensation) guarantee immaculate video and audio quality even at the end of the cable or the amplifier cascade.

Also the future developments are highly interesting. For example the newest network in Basel will be equipped with digital fiber-optic trunk distribution.

By means of OVID 4 from Standard Telephon & Radio, Zurich, 4 TV and 6 FM radio programs can be transmitted over a single fiber-optic link. The capacity of the optical fiber cable is 678 MB/s (!).

Additional interesting facts
In addition to the «usual» special programs such as weather forecasts with meteo satellite images, and Teleclub (Pay-TV) for film fans, other services are worth mentioning that exploit the TV blanking intervals. In Zurich this is the local newspaper «Teleziitig» (290 000 subscribers). Recently, Swiss radio and television (SRG) has introduced a service called «Telesofttext» through which computer programs can be distributed and complete TV screen pages can be printed out.

Technologies such as the data distribution service «Datacast», TV transmission by means of the MAC process, and later also high-definition TV (HDTV) can be expected.

It should not be too difficult to imagine that even greater perspectives will be opened up with the implementation of digital transmission.

Marcel Siegenthaler

Studer bargraph output meter

Brilliant precision

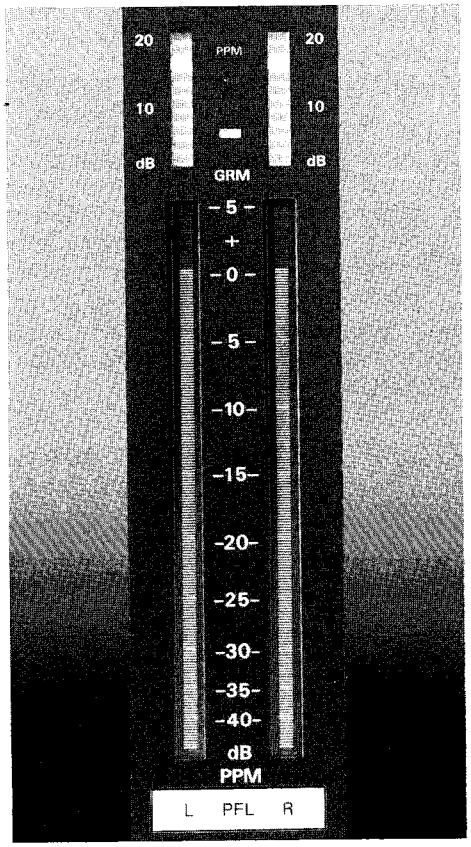


Fig. 1: The new Studer Bargraph output meter

The output meter, whatever it may be called, is one of the most important tools in audio engineering. Wherever audio signals are being processed, they are an essential tool, because the output level is an important criterion. On the one hand, maximum output level is needed for achieving the best signal-to-noise ratio, on the other hand the reference level should not be exceeded, particularly in digital recordings, otherwise distortion will increase dramatically. In the following report the project manager describes the design of the new bargraph output meter.

Two types of output meters with different dynamic characteristics haven proven themselves for use in recording studios:

a) Volume Unit meter (VU)
The most frequently used instrument for measuring audio frequency signal levels is the VU-meter. In the ANSI standard (American National Standards Institute, Inc.), the mechanical and electrical behavior of the VU-meter was already defined in 1954. The rule is that the indication shall be 99 % of the ultimate value (0 VU) when a signal of 0.3 s (300 ms) duration is applied. The overshooting of the indication shall be between 1 ... 1.5 %.

The rise and decay time are identical in the VU-meter.

In the conventional version a VU-meter consists of a suitable moving coil instrument and a full-wave rectifier connected to the input.

b) Peak Program Meter (PPM)
The PPM is a more recent instrument. Its behavior is defined in the applicable DIN or IEC standards. The principal difference to the VU-meter is in the integration time: the PPM is a quasi peak value instrument with a long resetting time. A peak value will be indicated even for very short peaks in a music program.

If a sine wave voltage is applied for 10 ms that yields a level of 0 dB, the indication should be –1 dB. A resetting time of 1.7 s is desired for levels up to – 20 dB (IEC).

Wide range of instrument types: moving coil, light spot, LED strip, fluorescence and plasma bar.
For VU-meters and PPM, only moving coil instruments were originally available. Later these evolved into the costly but virtually zero inertia light spot meter. In place of a needle they feature a series of mirrors by which a narrow light beam is projected on a transparent scale. This type of instrument with a bright light spot on a long, straight scale was an enormous progress.

Digital indication has become possible through modern electronics. However, digital values in the form of numbers are not usable because the values to be displayed change very rapidly. In addition, analog indication is preferred wherever the trend of a measured value is of interest.

With the advent of the LEDs a new method for representing a signal became feasible. By arranging individual LEDs in a row it was possible to represent the signal pattern in analog form.

However, neither the resolution (individual LEDs have a width of several mm) nor the light spectrum (fatigue effect due to monochromatic light) was satisfactory. For this reason LEDs are used principally as pilot lamps.

Fluorescence displays are special tubes in which a fluorescent coating acts as the anode (magic eye). Visible light is emitted when this coating is impacted by electrons. A light bar is created by designing the tube in such a way that many individually controllable surfaces are strung closely together.

An additional alternative to electromechanical analog displays are the gas discharge bargraph displays. Neon gas that is induced to glow between two glass plates emits visible light. The plasma display has some decisive advantages over all the other displays described above. For example: large reading angle and high contrast combined with low power consumption and long life. Its disadvantages are: high anode voltage (250 V), high price, and sophisticated electronic circuitry. Despite these drawbacks this excellent type of display has become the de-facto standard in professional studio applications.

Implementation of the Studer bargraph output meters.
The design specifications for a precision metering instrument (Fig. 1) that would not be too costly but still have a modular design resulted in the following arrangement; two individual circuit boards, one for the two signal processing paths and one for the digital section with the switching power supply. In this way it became feasible to achieve a modular design: four signal modules for eight channels but only one digital module.

We shall now explain the operating principle of the individual elements that make up the bargraph display:

Plasma tube (Fig. 2). After the 250 VDC supply voltage has been applied, a continuous glow discharge is triggered between the pre-ionization anode and cathode. Since the area around the pre-ionization segment is not physically isolated from the neighboring segments, the charge carriers diffuse into the area of the reset cathode. When the latter is energized first, a glow discharge occours also here. The same effect causes the first segment to light up (ignite), if the reset cathode is switched off while cathode 1 is switched on. Although each 5th segment is electrically interconnected, only the lowest one glows because sufficient charge carriers are located in its vicinity.

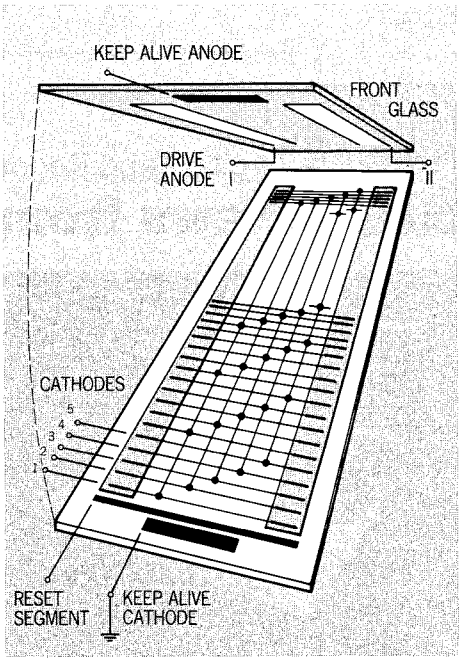


Fig. 2: Bargraph construction

Cathodes 1–2–3–4–5 / 1–2–3–4 ... etc. are now controlled in this order. The glow discharge migrates segment by segment to the last segment. A new cycle is then initiated by means of the reset segment.

The length of the bargraph is controlled by the power-on duration of the corresponding anode while the cathodes are controlled cyclically in the dark segment. This design requires only 8 connections or driver stages (2 anodes, 1 reset cathode and 5 write cathodes) for controlling the 2 x 200 segments. In order to create a flicker-free bargraph, the refresh rate must be at least 70 Hz. Unnoticeable to the viewer is, however, that only one segment glows at any one moment!

Analog electronics. The audio section is shown in the block diagram (Fig. 3). The isolated AF signal is taken to the level stage; the large working range permits the connection of almost any level. For very small levels a + 20 dB amplifier is provided. The low-pass filter of the 3rd order attenuates frequencies of over 20 kHz. This circuit is followed by a rectifier stage that compensates very carefully with respect to the offset voltages.

An excellent rectifier that works across the entire frequency range and a dynamic range of over 60 dB cannot be built without considerably effort.

For the VU representation, the rectified signal is taken to a filter that duplicates the charactersitic of mechanical moving coil instruments.

For the PPM representation, the peak value of the rectified signal is formed.

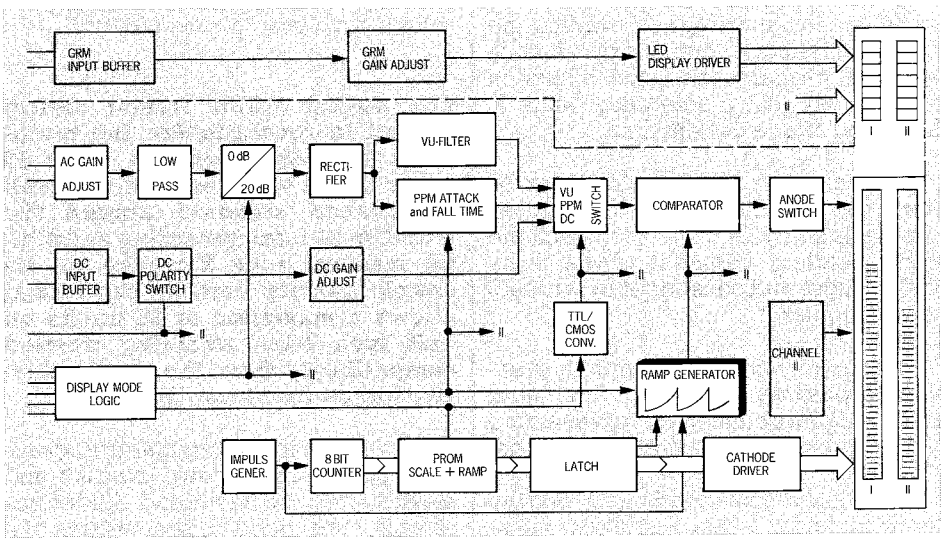


Fig. 3: Simplified block diagram for channel I

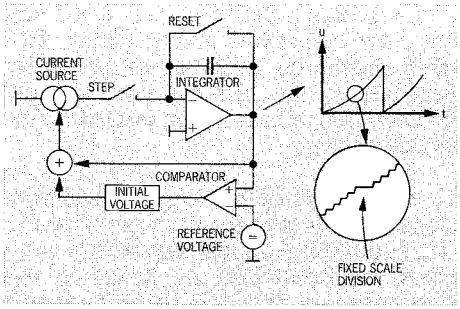


Fig. 4: Function diagram of ramp generator

Digital Electronics. The digital section performs various functions. Not only does it process the signals for the plasma tube, it also is responsible for generating the ramp.

A totally new approach has been selected for the ramp generation. Normally the audio signal is converted to logarithmic charactersitic in an amplifier in order to achieve dB representation. The resulting signal is subsequently compared with a time-linear ramp. However, the same can be accomplished by comparing the linear AF signal with an exponential ramp, without the typical problems of a logarithmic circuit (temperature dependence, offset). In addition, more instruments can be controlled by means of a ramp (in the digital section); no logarithmic circuits are required.

Principle of the ramp generation (Fig. 4): If we charge a capacitor with a constant current, the terminal voltage rises linearly. If this source is equipped with a positive feedback that converts the continually rising voltage to a continually increasing current, we obtain an exponentially progressing terminal voltage.

If we discharge the capacitor after a while, the initial voltage for starting the cycle is missing. A control circuit is available that prepares the initial voltage in such a way that a reference value is achieved after a certain time.

For inserting fixed scale divisions, the capacitor charging is interrupted during three cycle units. As a result the corresponding segment glows three times longer and consequently appears to be brighter.

By disconnecting the above mentioned positive feedback, the linear ramp is again obtained for representing VU values or representable DC values.

The ramp oscillator also supplies the input signal for a binary counter that increments until reset. The outputs of the counter are address lines for an EPROM which generates the 5-phase signal and a reset signal for creating the fixed scale divisions as well as a reset signal for the counter. With the two remaining address lines it is possible to insert different scale divisions.

Built-in future
The new bargraph instrument also features a LED column for indicating limiter or compressor signals.

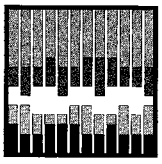
With the externally controllable selection of VU or PPM characteristic it is also possible to display DC voltages on linear or logarithmic scale.

The built-in switching power supply supports a large range of DC supply voltages.

For PCM recordings the instrument does not (yet) have a digital input, but in the decisive aspect it is really future-safe: the switch-controlled and even faster response time (T = 0.1 ms).

Alfred Eckert (35) Following his training as precision mechanic he studied electrical engineering. After graduating from the Engineering School of Basel in 1979 he joined Willi Studer AG. Initially he worked principally on the analog circuits of mixing consoles but his field of activity today increasingly encompasses software engineering.

Alfred Eckert



Digital Tape Recorder Studer D 820 MCH

News from the DASH Camp

48-track Digital Tape Recorder D 820 MCH

The digital DASH format slowly started to revolutionize the multitrack recording practice some 10 years ago. It has now become a well established standard around the world for 24 track recording and digital mastering on 2 tracks. In its double density version, the format allows a maximum of 48 tracks on half inch tape, retaining upward compatibility from the single density format for 24 tracks.

Last year the first digital 48 track recorder came down the pike and started the new trend. Studer has already announced its own version of it and plans to introduce the first machine at the AES convention in New York. Based on the legendary Swiss precision tape transport system, the D820MCH will perfectly fit into Studer's concept to combine digital and analog tape recorder technology.

The machine control is in Studer's traditional way: with big buttons. Comprehensive local control for channel status, ping-pong, and recording functions are provided on the display panel together with level metering. Locator, synchronizer and general setup functions are accessible through a small menu driven display with a dedicated keyboard. However, to make full use of the built-in autolocator and synchronizer, a remote control unit is available that can be used on the same bus like the remote channel control or the remote interface for parallel channel control.

In «advanced output» mode internal or external delays due to processing or mixing can be compensated for, in ping-pong mode any track can be bounced to any number of other tracks simultaneously and in test mode the built-in signal processor generate a variety of waveforms. The on-board time code generator can be set to any standard and may also be jam-synced with an external code. The 3 head system allows two different record modes: «advanced» and «sync» mode.

An easy integration into a digital studio can be achieved with various digital interfaces. Of course, the analog world can also be connected to the multitrack through the built-in A/D and D/A converters, the performance of which is only equalled by those well accepted converters of the 2 track machine, the D820X.

For later version a sound memory is planned opening new editing features that have never been seen on a tape based machine.

Andreas Koch

Revox Tape Recorder PR 99 in MKIII version

Why a third PR 99 generation?

With the introduction of the new tape recorders of the top premium series C 270, the market position of the PR 99 has been redefined. On the one hand this machine with its attractive price is predestined to round off the lower end of the product range, on the other hand it will still be a viable product due to its ease of operation in a broad field of application.

The design of the MKIII version fully corresponds to the new Revox style. The audio electronics has been largely taken over from the MKII version. The same applies to the digital tape deck control.

The audio connections are limited to balanced line inputs and outputs with transformers. There are no input selectors and microphone inputs. This trim PR 99 MKIII configuration corresponds even better to the customary studio operation. If a balanced microphone input is needed, this is available as an option in the C 270 series.

The calibration facilities CAL/UNCAL have been retained but with some changes that are of no consequence to the operation. The mono mix facility for single-track recording is also still available but the SYNC circuit for synchronous monitoring of the signal from the recording head has been eliminated.

The MKIII series offers different two-track versions (high-speed CCIR – with 2 mm or 0.75 mm track separation – or NAB) and the usual NAB version with standard speeds. In addition there are in/out versions in stereo and mono.

The power toggle switch has been replaced by a push button in order to prevent possible confusion with other toggle switches. Also the power inlet has been changed to 3-wire connection (with protective ground).

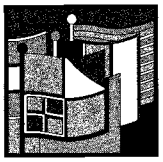
MKIII version of the Revox PR 99

No SERIAL LINK has been implemented because the very slow bidirectional communication was never fully satisfactory. Of course the fader start has been retained; rear-panel connectors for the fader start as well as a parallel remote control have been provided.

The metal case has been retained but, it is now finished with decorative varnish. Rack-mount brackets are standard equipment. Optional wooden side panels give the MKIII an elegant appearance; they can be fastened to the metal case after the rack-mount brackets have been removed. Support pads on a new base plate are available so that the recorder can be operated in vertical position. When these support pads are removed, the trimmer potentiometer and the audio electronics become accessible.

The new PR 99 MKIII ideally fills the gap between the traditional B 77 and the new C 270 series, both with respect to price and features.

Bruno Baronio



Golden Sound Award for Professional CD Player Studer A730

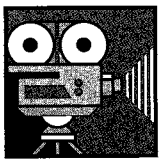
STEREO SOUND, a professional audio magazine of highest Japanese prestige, has awarded Studer with its annual gold prize for the A730 CD Player as the best foreign audio component of its kind made in 1988.

Some 500 Japanese and overseas audio components of 1988 manufacture were presented for nomination. Of these components, 62 were classified as «superior» because of their individual design, technical characteristics and sonic performance. 24 of these modes were selected as the «Components of the Year». Finally, the Golden Sound Award of 1988 went to Studer A730 as the best foreign component.

The A730 received total admiration; ist sonic sound was marked «unparalleled as of today». STEREO SOUND magazine:

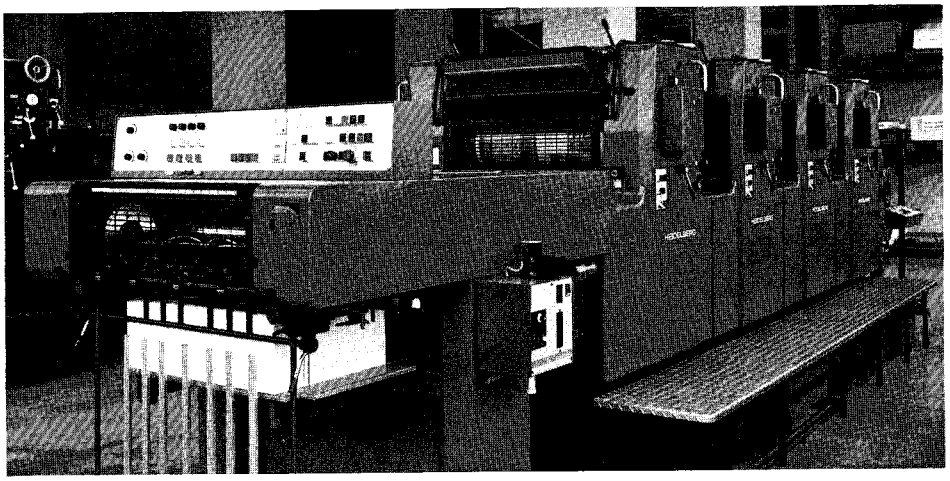
«The Studer A730 presents a level of sound reproduction whose artistic quality is so high that the theory of its basic design would seem to be totally different from any concept Japanese CD Players offer.»

Atsuko Nakayama, Tokyo



Four-color offset press at Studer Revox

Four at one time



Impressive, quiet and powerful – the new 4-color offset press in our in-house printing department.

It is not customary for a company engaged in the field of electronics to print its documentation in-house. It is even more unusual for a modern four-color press to be found in a place that is normally the home of mechanical precision engineering and sophisticated electronics. This report briefly explains the exceptional situation – which in part can be attributed to SWISS SOUND.

With the purchase of an A4 small offset machine "AB Dick" in 1960, Studer made the decisive initial step relatively early. Building up an in-house department for documentation and advertising was a logical, though not necessarily a simple consequence. Initially, only forms, stationery, and simple operating instructions were printed, but after 1965 maintenance instructions, more elaborate operating instructions, and brochures were also tackled. This expansion made it necessary to set up and expand various function groups within the documentation department in order to satisfy all the requirements for becoming largely independent in the print medium. This includes production teams for text, graphics, illustrations, photos, repro, and printing. With time the requirements changed and became more stringent. It also became clear that different printed goods such as documentation (operating and maintenance instructions) and brochures had to be handled by different teams.

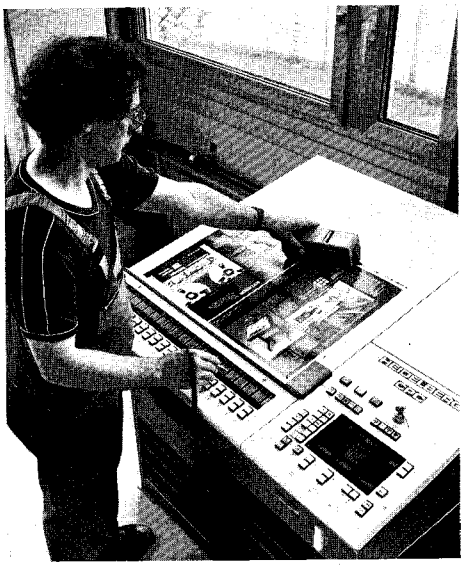
Since 1965 the situation has also changed with respect to the workload. Five years ago SWISS SOUND was introduced as a periodical. Later, color became an exceptionally important element in the brochures.

In order to cope with these developments and to permit more economical production of multicolor works, the printing department has now been equipped with a modern, 4-color offset press type "Heidelberg MOV-H" with CPC control station. For this investment our company had to pay SFr. 850000.–, an amount that is not negligible for a service rendering department. In addition to this 4-color press the following machines are in daily use: one AB-Dick (A4), one Dominant (A3) and one (A2), as well as a Heidelberg SORK-2 (A2 2-color press). The SORK uses the same plate format as the new machine which means that it is compatible (i.e. old orders can be transferred to the new machine).

4-color press with CPC control station

The new offset press prints all four colors (red, blue, yellow, black) with 4 identical printing units in a single pass on sheets (sheet-fed offset). It measures 5.6 m in length and 2.23 m in width, and is by far the largest machine in the in-house printing department. Its weight of 10 tons is as respectable as its output of up to 10000 sheets per hour. The sheet size or paper format is 480 x 650 mm, corresponding to the A2 format or four A4 pages. This means that four A4 pages can be printed in four colors on one side in a single pass.

The new machine from "Heidelberg", one of the world's leading press manufacturers, is equipped with a number of new features such as an Alcolor dampening unit, deep pile delivery etc., which permit high-quality printing at fast

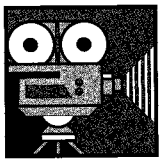


CPC station for controlling and storing important machine parameters such as inkage, ink zones or register (register tolerance of the individual colors).

speeds. Particularly interesting is the new printing control via a CPC (Computer Print Control) station. This printing-press features servo-controlled color registers that can be influenced externally by electronic controls. In this way electronic storage of various parameters has become possible. From his central control station the operator can check each individual color, the total ink quantity, the lateral register, and the circumferential register. And this with the push of a button or a light pen for quick setup of the ink zones. For repeat orders the procedure is even simpler: The operator simply inserts the tape cassette with the stored data – the inking is automatically adjusted to the corresponding order.

This new machine has already proven itself in practice. Particularly the setup time can be considerably reduced by the electronic system. Color and register corrections can be performed more quickly, and the printing quality is easier to control. The combination of a press with control electronics is particularly well suited to our in-house application environment where relatively little personnel is available.

Marcel Siegenthaler



USA

Studer A820 and the sounds of nature

The following is based on a report which appeared in «Pro Sound News». Use of this information is made by permission of «PSN».

It is quite a common sight for us to see Studer tape recorders being used in music recording studios to lay the tracks for what may hopefully become a golden record. Studer tape recorders also have their place in radio for a variety of different applications, but would you expect to find a Studer A820 in a University's Laboratory of Ornithology?

Surprising as it may sound, six A820 master recorders for ½" wide tape are in use in the Library of Natural Sounds at Cornell University in Ithaca, N.Y. to transfer and to maintain existing recordings for the Library. The Library also disseminates tapes to endusers which even includes the supplying of natural background sounds for Hollywood films. New material, which was recorded in the field, is being transferred and existing tapes are copied to keep them from getting damaged with use.

The possibility to control the A820 via its RS 232/422 port with the Library's own software was a decisive factor to chose that machine, so David Wickstrom, the Library's supervising engineer says. With its read-in programmability the machine can be checked easily by a reasonably skilled person, to see whether or not it is operating correctly.

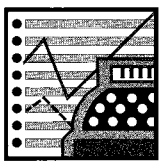
The recording of bird sounds can be extremely demanding, because often they are made up of two tones at fairly high pitch and in fairly short pulses, which is tough both on the recording engineer and on the equipment as well. Rigorous maintenance is essential for these archiving operations, because mistakes can go undetected for years.

Correct and easy programming of the A820 is of utmost importance, when it comes to preserving the naturalness of such difficult sounds by ensuring that they will be reproduced at exactly the same speed at which the original recording was made.

A Studer A820 in the Laboratory of Ornithology – a not so unusual application perhaps, as soon as one knows more about the work for which these tape recorders are being used.

National Archives and Phonotheques could also be areas, where a Studer Tape Recorder may be considered as being the perfect choice for preserving the true-to-life quality of historical sound events.

Joe Dorner



STUDER REVOX CANADA reports:

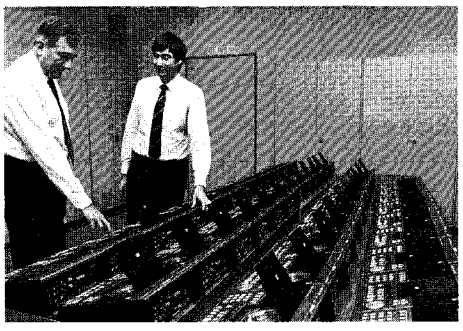
New Series 900 mixing consoles at CBC (Radio-Canada)

CBC Engineering recently took delivery of five Studer 904 mixing consoles. They have been purchasing Studer consoles over many years, mostly for outside Broadcast applications. The oldest unit is a 089, bought in 1973 for OB, and is still in operation.

Because of their ease of operation, the new 904 Mixing Consoles have been readily accepted by the French Radio technical staff of Montreal at CBC. Michel Borduas, French Radio Technical Training Supervisor of CBC (Radio-Canada), reports: «Among the many appreciated features are the four-band equalizer as well as the compressor/noise gate, which are permanently in-line in the output group section. Because of its instant recall feature, this set-up is particularly well suited for broadcast applications. The logic behind the ergonomics of the consoles is evident. The operator training period is one of the shortest I have seen».

We appreciate the compliment and wish CBC (Radio-Canada) continued success with Studer mixing consoles.

STUDER A730 for Denmark



Mr. Dan Popescu of Radio Danmark dismisses the equipment at the Regensdorf premises before shipment to Denmark is made.

After exhaustive tests, Radio Danmark placed an order with us for a substantial number of A730 CD players. Prior to the supply of the equipment, a thorough technical approval process was carried out to the satisfaction of the customer.

Most of the A730 CD players have been installed in the meantime and are now operated at the broadcast studios of the Danish radio company.

Kuno Lischer

New Patents

Method and arrangement for reproducing digitized signals

Digital signals such as audio PCM recordings on magnetic tape contain the information in the form of a jump in an electrical or magnetic state. The possible jumps have a time grid. When such signals are transmitted, the accuracy of this grid is lost. The grid must be recreated. To accomplish this the time moments of the jumps are compared with an accurate clock and rounded up or down. If also static and deterministic errors have occurred, it is possible that a jump is assigned to the incorrect time when the time moments are restored.

The patented process analyzes the signal to be restored for typical changes in the jump moments. The changes are compared with preceding and subsequent information. A correction table can thus be built. This table is loaded into the equipment so that typical time errors such as peak shift can largely be eliminated.

This patent of Dr. Roger Lagadec and Julien Piot was registered with the US patent office on April 11, 1989 under the number 4,821,298.

Method and apparatus for converting an input sampling sequence into an output sampling sequence.

Digital signals are assigned to a fixed sampling frequency. Various frequencies have been standardized such as 32 kHz, 41.1 kHz, 48 kHz, etc. Often it is desired to convert one sampling rate to another. This can be accomplished with a digital sampling frequency converter designed according to the Studer Patent EP 0 052 847. The method is based on computing the scanning values of the new frequency from the scanning values of the old frequency. The time relationship of the new scanning value to the old scanning value supplies the information for computing so-called filter coefficients. A second computing operation uses these coefficients and determines the new scanning value.

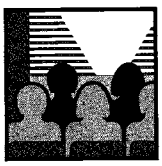
This process requires considerable computing power which means that its speed is limited.

The new method is based on shortening the computation of the filter coefficients. In this computation, stored basic values are used which are adjusted to the time relationship by a simple correction.

With this invention it is possible to build low-cost sampling rate converters.

This patent of Dr. Roger Lagadec, Andreas Koch, and Dr. Daniele Pelloni was registered on March 29, 1989 with the European patent office under the number 0 137 323 B1.

Paul Zwicky



Studer Training courses

30. 10. – 03. 11. 89 English
Mo 09.00 h – Fr 16.00 h
A827/A820 MCH Tape Recorders
Tape deck features, ports, disassembling/assembling and alignment of tape deck, explantation of various circuits, trouble shooting.

06. 11. – 08. 11. 89 English
Mo 09.00 h – We 12.30 h
A807 Tape Recorder
Tape deck features, ports, disassembling/assembling and alignment of tape deck, explanation of various circuits, trouble shooting.

08. 11. – 09. 11. 89 English
Wd 13.45 h – Th 16.45 h
A730 CD Player
Features, ports, explanation of circuits, transport alignment.

09. 11. – 10. 11. 89 English
Th 09.00 h – Fr 16.00 h
A810 Tape Recorder
Tape deck features, ports, disassembling/assembling and alignment of tape deck, explanation of circuits, trouble shooting, audio circuits and alignment.

10. 11. 89 English
Fr 08.30 h – Fr 16.00 h
A727 CD Player
Features, ports, explanation of circuits, transport alignment.

13. 11. – 16. 11. 89 English
Mo 09.00 h – Th 16.00 h
A80/R, A80/VU Tape Recorders
Tape deck features, disassembling/assembling, alignment, explanation of various PCB's, trouble shooting.

Courses will be held only after enrolment of at least 5 participants and require reasonable knowledge of electronics.

Correction:

Press release

From AEG to Studer

In the last Swiss Sound issue No. 26 there were several errors under this title. Due to an error in the mounting of the German edition, the complete header was omitted. For this reason it will be repeated in full (in the German edition).

Furthermore we had some difficulties with the historical accuracy. The well-known grand seigneur of German audio history, Dipl. Eng. Heinz Thiele, has brought it to our attention that the «breakthrough» for the Magnetophon K1 occurred not in 1936 but already in 1935 at the Berlin Radio Fair. And this unit was not produced by «AEG-Telefunken» but by AEG in its works at Drontheimer-Strasse in Berlin.

Additional information on the history of German audio technology can be found in the AES press release No. 2637 by H. H. K. Thiele. General information on this topic is also provided in the AES journal 1988 Vol. 5.

We apologize to our readers for this inaccuracy and would also like to thank Mr. Thiele for pointing it out to us.

The editor

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DROP OUT .....

The forthcoming edition of SWISS SOUND, volume 28, will exceptionally appear end of January 1990 only. The Editor