

STUDER INTERNATIONAL

a division of STUDER REVOX AG

TAPE LOCK SYSTEM 2000 MK II
SYNCHRONIZING AND EDITING SYSTEM
FOR A80 VU and A800

PI 19/79 E

Product Information

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This product information describes the main features and several applications of the Tape Lock System 2000 MK II synchronizing system. These

features being lock, edit mode, loop control of slave and master, address start and built-in generator.

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1.
MAIN FEATURES

<p>2 x 24 $\hat{=}$ 46 Channels</p> <p>Audio/Audio Synchronization</p>

<p>Video + Audio $\hat{=}$ TLS 2000</p> <p>Video/Audio Synchronization</p>

The synchronization accuracy of typ. 30 μ s makes it easy to obtain any number of tracks. TLS 2000 features such as programmable inserts (edit mode) in combination with the rehearse possibilities leave every sound engineer's dream become true.

Synchronizes to any SMPTE-code source and with any offsets.

SMPTE-code generator built-in, user bits can be set.

Synchronizing and editing system ideally suited for sound post productions of film and video. Main features:

Programmable inserts with an accuracy of 1 ms. Automatic loop operation (edit mode).

Simulation of an insert in connection with edit mode (rehearse).

Programmable loop operation of master (VTR) and slave (ATR) together allowing insert jobs (master control).

Starts and stops automatically up to 4 effect machines (address start).

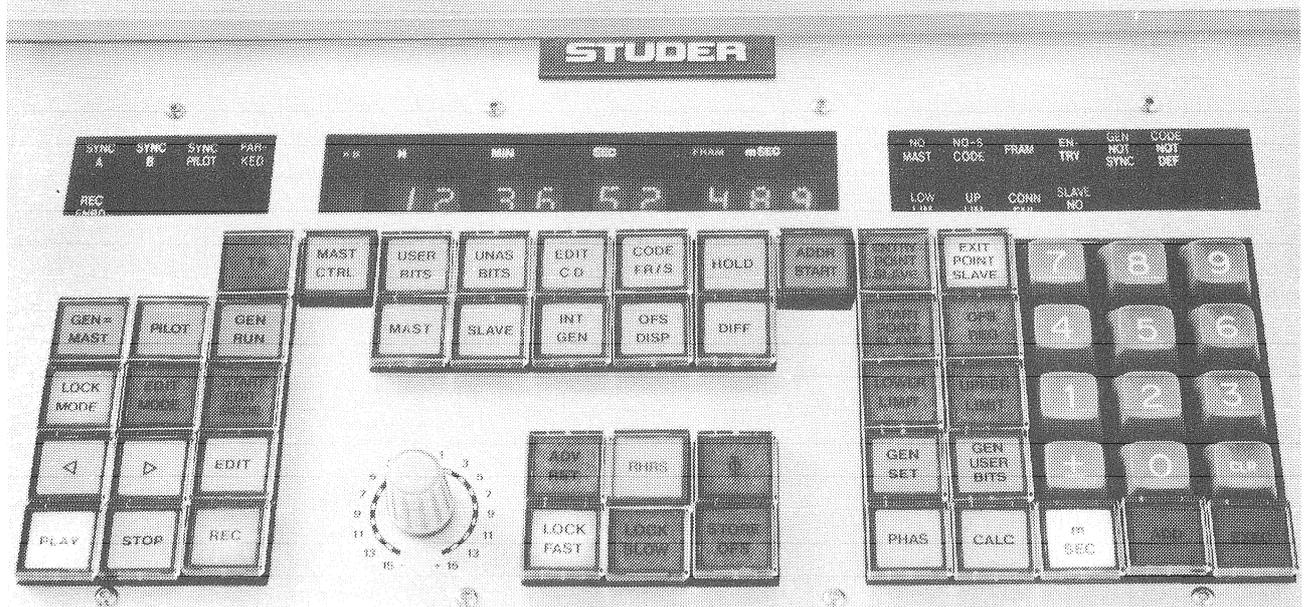


Fig. 1
 TLS 2000 with optimized software adapted to STUDER A80 and A800

2.
IMPORTANT OPERATION MODES

The Tape Lock System 2000 is a synchronizing system for fast, economical coupling of sound with picture and sound with sound. This requires a flexible system structure, easily adaptable to specific needs. The result is that, starting from the simplest kind of synchronization (coupling a video recorder to a STUDER A80 VU multitrack audio machine), the system offers all characteristics necessary to control an entire audio dubbing complex.

The system TLS 2000, already well-introduced in connection with the STUDER A80 VU recorder, has now been adapted to the new STUDER A800 multi-channel recorder. The system has been optimised for the very fast response time of the A800 transport.

The TLS 2000 features can be summarized as follows:

LOCK

Slave searches for master address and synchronizes immediately. Synchronizes

to any SMPTE-code (80 bits/frame) source. The only link to the master recorder is a code line which allows to change the master easily. Once LOCK is pressed the slave machine will follow the actions of the master automatically.

OFFSET

Any offset between 1 ms and 24 hours can be entered. Display possibility of the actual offset.

PILOT

After synchronization is achieved an external pilot tone source can be used as a reference signal thus allowing transfers back onto magnetic film.

EDIT MODE

Programmable record drop-in and drop-out points (entry and exit point) down to 1 ms accuracy. Hard inserts are not a problem any longer. The transport operates automatically in a loop using the entry point as the "start" point (or park) and the exit point as the "return point". As illustrated in the following picture.

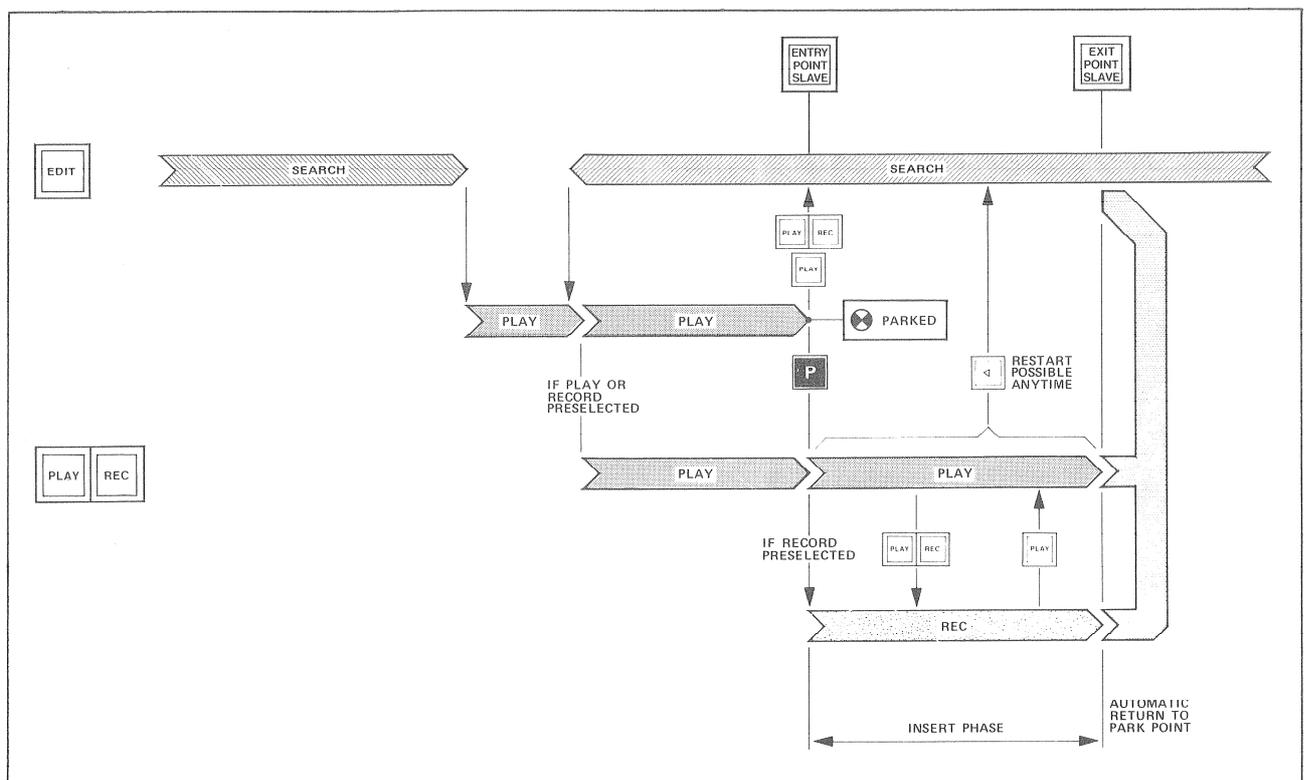


Fig.2
 Loop operation in EDIT MODE

In combination with LOCK the slave parks automatically 8 s ahead of the entry point. The slave will start when the master passes through this

park point. The 8 seconds give enough lock-up time to reach synchronism before arriving at the entry point. Loop operation as shown below.

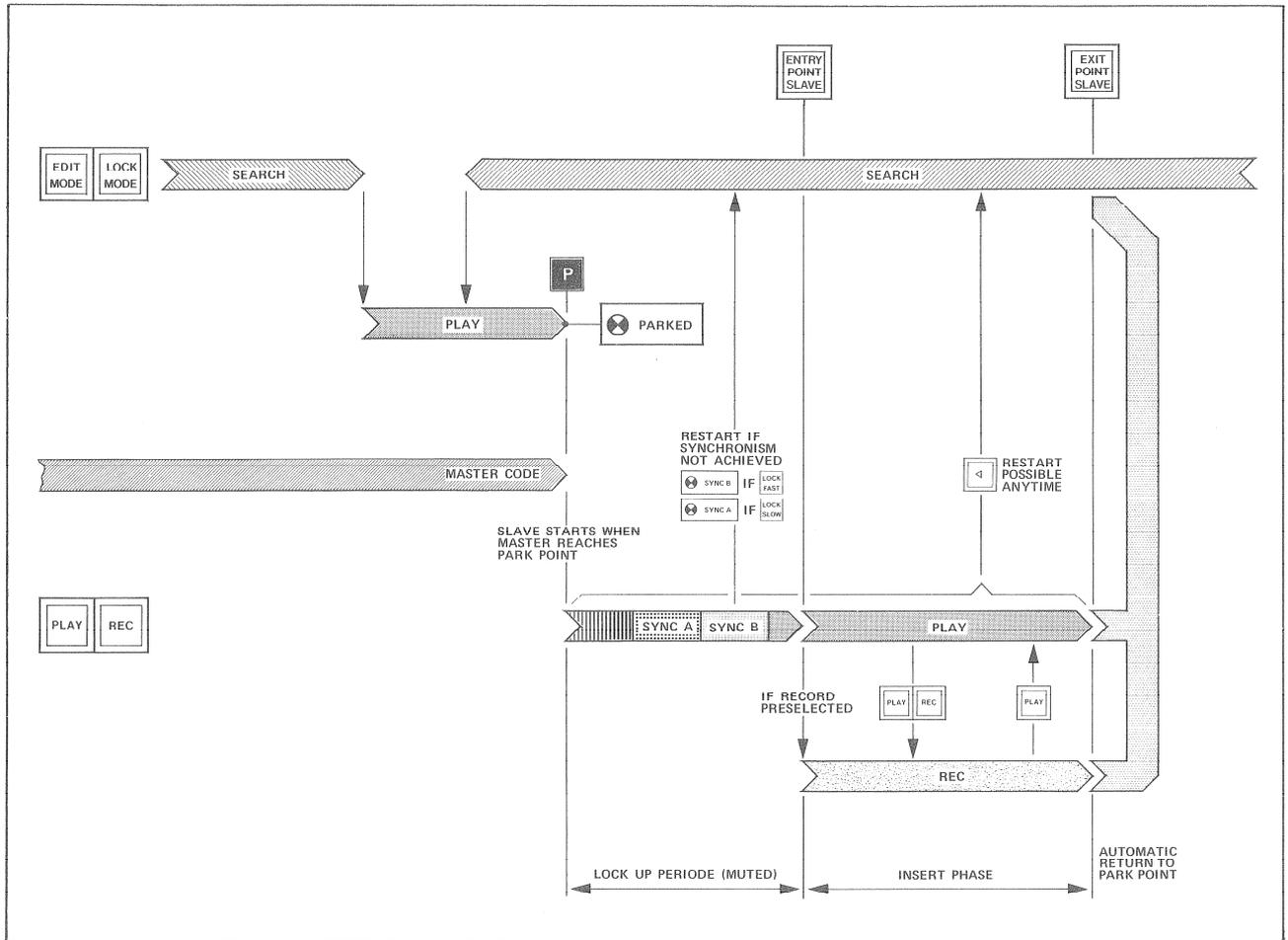


Fig. 3
Loop operation in EDIT/LOCK MODE

Additionally a pre- and after-listening time (start point and upper limit) can be programmed. Pre-listening means monitoring the tape from the start point on. Between entry and exit point the insert takes place. Differently to the edit mode, the machine remains in play. This allows an after-listening until the upper limit is reached. The transport returns now to the exit point. The slave will synchronize to the master (like in the edit mode) by activating the LOCK key. See picture on the following page.

MASTER CONTROL

Loop operation of master and slave machines. The master machine is also controlled by the TLS 2000 in order to operate in a loop: both machines

are automatically "rolled back" to a common park point.

REHEARSE

Together with the A800 it is possible to rehearse an insert by using the programmable edit mode: perfect simulation of an electronic edit.

ADDRESS START

Programmable start and stop points for up to four playback machines for sound effects: highly efficient sound productions.

SMPTE-code generator

A code generator is built-in to the synchronizer. Possibility of setting

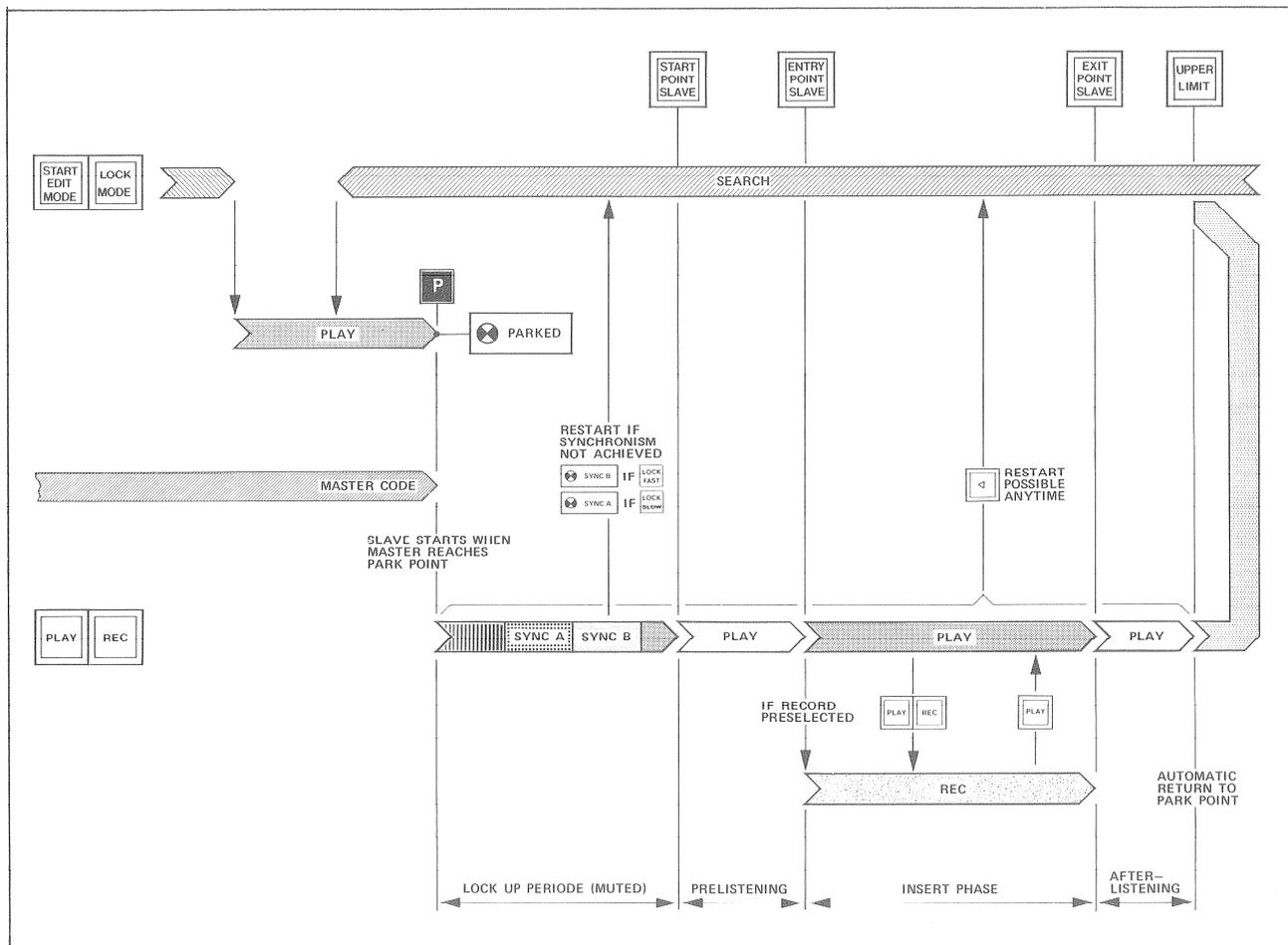


Fig.4
Loop operation in START-EDIT/LOCK MODE

the generator to any start address. Additionally the user bits in the code can be set or changed whilst the generator is running.

HOLD

Pressing one button at the right point captures the time code "on the fly". Such a held address can then be stored directly into one of the various memory registers (park point, entry point etc.).

Sampling of code in search mode

If the slave is rolled back to a programmed start point or sent to an other edit point, the machine is sampling the code in wind mode every 2 seconds. This leads to a much reduced head wear.

STORE OFFSET

The effect of this key is that a

difference arising in lock mode (e.g. time jumps in master or slave code) is not eliminated, but transferred as an extra offset value to an internal offset correction memory. Synchronizing becomes possible even with discontinued time codes.

TRANSMISSION

Safety feature, mainly for on-air or transfer operations. STORE OFFSET is automatically selected in this mode.

Wow and flutter compensation

An existing wow or flutter of the master machine is automatically compensated in order that the slave do not follow such a wow.

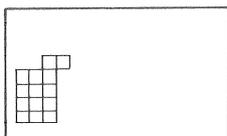
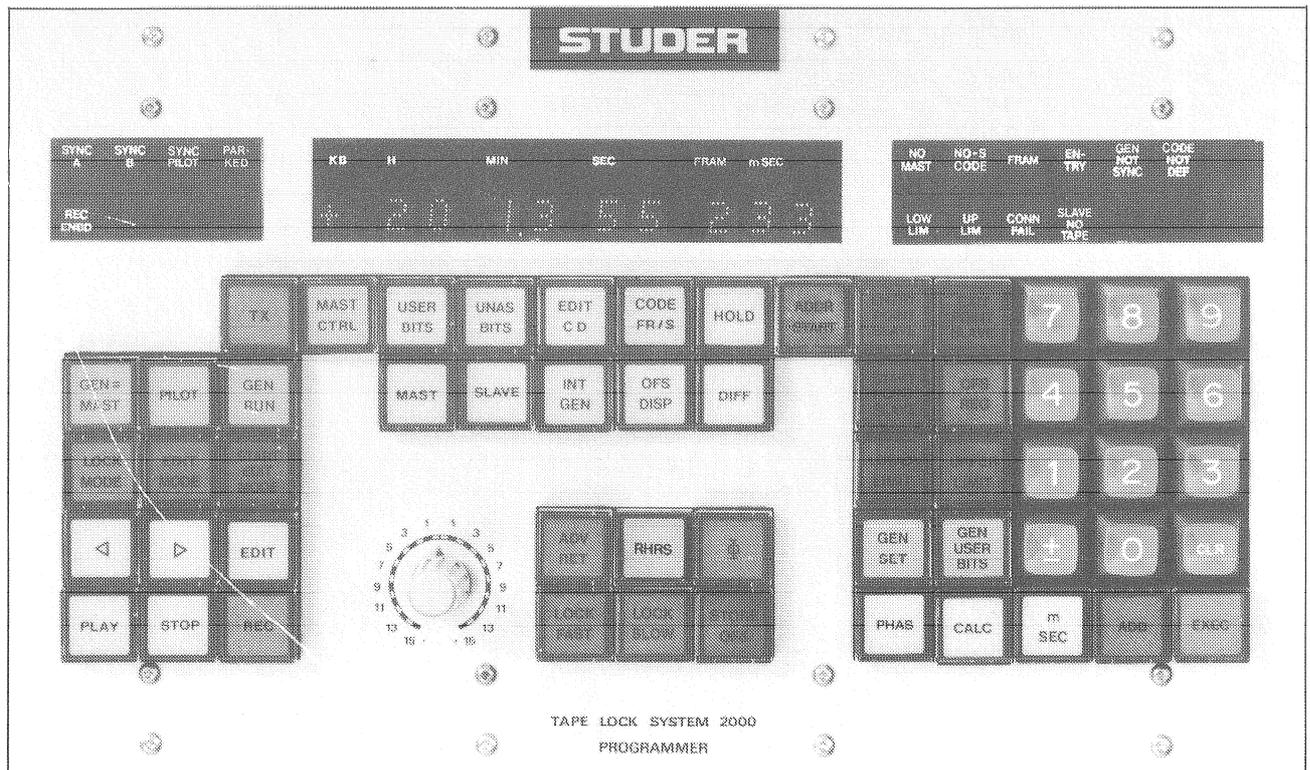
Other standard features:

- Operates at all existing frame standards (24, 25, 29.97, 30 fr/s).
- Synchronization accuracy typically

30 µs, makes even an audio-audio synchronization possible.

- Lock-up time approx. 3 s (SYNC A)
- Automatic muting of all playback-amplifiers during lock-up period. Mute is also effective before reaching the entry point in edit mode.
- Accurate parking: adjustable + 5 ms (+ 1 ms can be achieved with repark command). Thus allowing precise manual editing.
- Built-in calculator using the keyboard for adding or subtracting
- Built-in vari-speed control $\pm 15/8$ tones.
- Phasing possibility. By automatically varying the play speed of the slave machine in comparison to the master the system acts as a phaser.
- Address limits can be set (lower and upper limit) in order that the tape never thread out.
- All machine status indications are displayed on the main programmer.

3.
MAIN PROGRAMMER FUNCTIONS (Fig.5)



TAPE DECK AND SYNCHRONIZATION SECTION



Transmission mode. No commands can be entered from the tape deck. Slave continues also if code is not present.

Facility can be used to override all other tape deck commands.



Allocates the remote control push buttons to the master machine thus allowing to control the master machine manually.



Loop operation of master and slave machine. The master machine is also controlled from the system in order to operate in a loop. The master is automatically parked 10 s ahead of the start point. The slave 8 s ahead of the start point. These 8 s give enough time to achieve synchronization before reaching the start point. The programmable entry and exit points make possible a repetition of an insert with an accuracy of 1 ms.



Master code is replaced by time code generator, which becomes the master.



After synchronization is achieved an external time code or pilot tone source can be used as a reference signal.



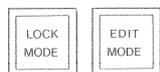
Starts and stops the internal time code generator.



Slave searches for master address and synchronizes immediately.



Slave repeats "take" defined between entry point and exit point. Audio channels are muted before entry point and after exit point.



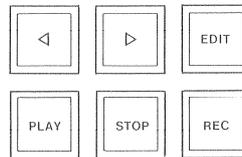
Slave parks 8 s ahead of entry point and starts automatically when master passes this park point.



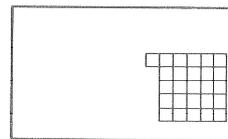
Slave passes start, entry and exit points and upper limit in a loop. Audio channels remain muted until the start point is passed. Preselected record commands are given at entry and exit point for assembling or insert work.



Restart. Makes an interruption possible at any point in a programmed loop. The machine returns to the park point.



Remote control for slave transport (or master, if master control selected).



KEYBOARD AND MEMORY SECTION



Up to 4 effect machines can be started and stopped automatically.



Enters entry point



Enters exit point



Enters start point



Any desired master-slave offset between 1 ms and 24 hours can be entered.



The preselected point which the tape does not pass, e.g. beginning of reel.



The preselected point which the tape does not pass, e.g. end of reel.



For setting of the internal time code generator.



The user bits can be set or changed in the internal code generator.



Sets the time in phase mode for the slave to find back to the synchronization point.



For time code calculations. Can be used in all operation modes.



Switches display and keyboard to ms or frames/s.



Adds any time correction to the selected memory.



Enters all keyed in addresses into the selected memory.



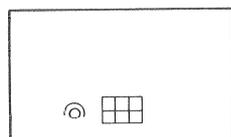
Changes sign



Clears display



Number keys



INPUT PANEL FOR TRACKING BEHAVIOUR



Speeds up or slows down slave relatively to the master. The speed can be varied by means of a rotary knob. Speed variation $\pm 15/8$ tones.



Slave is synchronizing as fast as possible. All channels remain muted until SYNC B is achieved.



Slave is synchronizing slowly in order that no wow is audible. All channels remain muted until SYNC A is achieved.



Any code difference arising in the lock mode is stored as an additional offset without effecting synchronization.



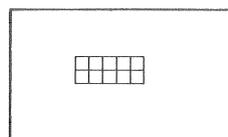
This key causes the dissociation of the slave from the master in lock mode. The system acts as a phaser.



The tape speed of the slave can be increased or reduced manually.



Together with the A800 an insert can be practiced by using the programmable loop operation (start-edit mode). When satisfied the hot edit takes place.



KEY SELECTOR FOR DISPLAY SECTION



Displays the user bits according to selected source (hexadecimal)



Displays the user bits according to selected source (hexadecimal)



Slave: Count down to entry and exit point.
Master: Count up from beginning of take.



Displays which type of code is in use. The system operates with 24, 25, 30 F/s including drop frame code.



Holds display at any desired address on the fly. Can be used to transfer any address into the required register.



Displays master code



Displays slave code



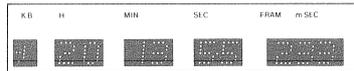
Displays current address of internal generator.



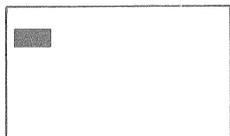
Displays the offset between master and slave.



Displays the difference between the nominal value and the actual value of the slave.



Indicates the address code in hours, minutes, seconds, frames or ms, including an indication for keyboard entry.



DISPLAY PANEL LEFT

SYNC
A

Illuminates if synchronization accuracy is within 1 frame/s.

SYNC
B

Illuminates if synchronization accuracy is within the selected limits (typ.960µs)

SYNC
PILOT

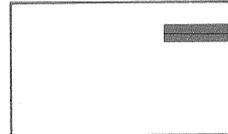
Illuminates as soon as the system is running to an external reference.

PAR-
KED

Indication that slave is parked.

REC
ENBD

Record enabled.



DISPLAY PANEL RIGHT

NO
MAST

No master time code

NO-S
CODE

No slave time code

FRAM

Illuminates if code type of master is different to that of the slave. No synchronization possible.

EN-
TRY

Wrong entry

CODE
NOT
DEF

System needs to identify code type in use.

LOW
LIM

Lower limit exceeded

UP
LIM

Upper limit exceeded

CONN
FAIL

Indication for missing cable connection.

SLAVE
NO
TAPE

No tape loaded onto slave transport

4.
SEVEN TYPICAL APPLICATIONS

Controlling and synchronizing an audio recorder to a video or film recorder:

- matching audio to video for perfect lip synchronization.
- sweetening audio to improve program quality in a sound post production.
- dubbing of finished, edited film and video productions.
- live recording of big TV-shows.
- FM stereo simulcast transmissions.
- re-record of sweetened audio onto final video master.

Synchronizing an audio recorder to another audio recorder:

- expanding the total number of synchronous channels. E.g. using two 24 multitrack machines (46 available tracks).
- precise synchronization during mix-down.

The following figures illustrate more in detail the different TLS 2000 system applications.

Application 1

Sound post production

In this typical dubbing system the

video machine and the audio multi-channel transport are synchronized and both can be controlled in loop mode. Additionally up to 4 effect machines can be started and stopped at pre-programmed address points. Precise transfers to the multichannel machine can be achieved when employing a resolving unit.

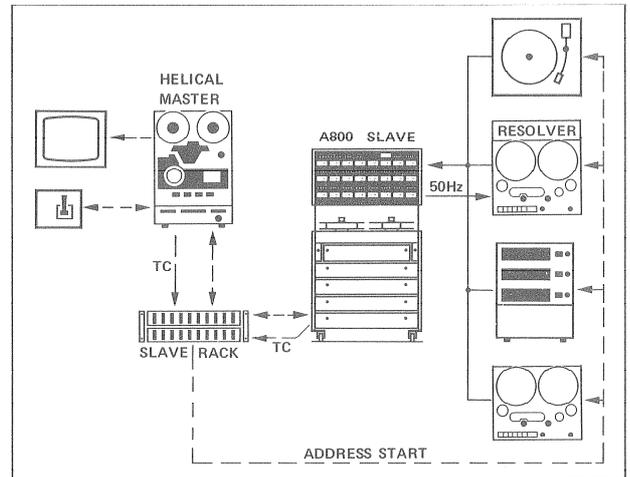
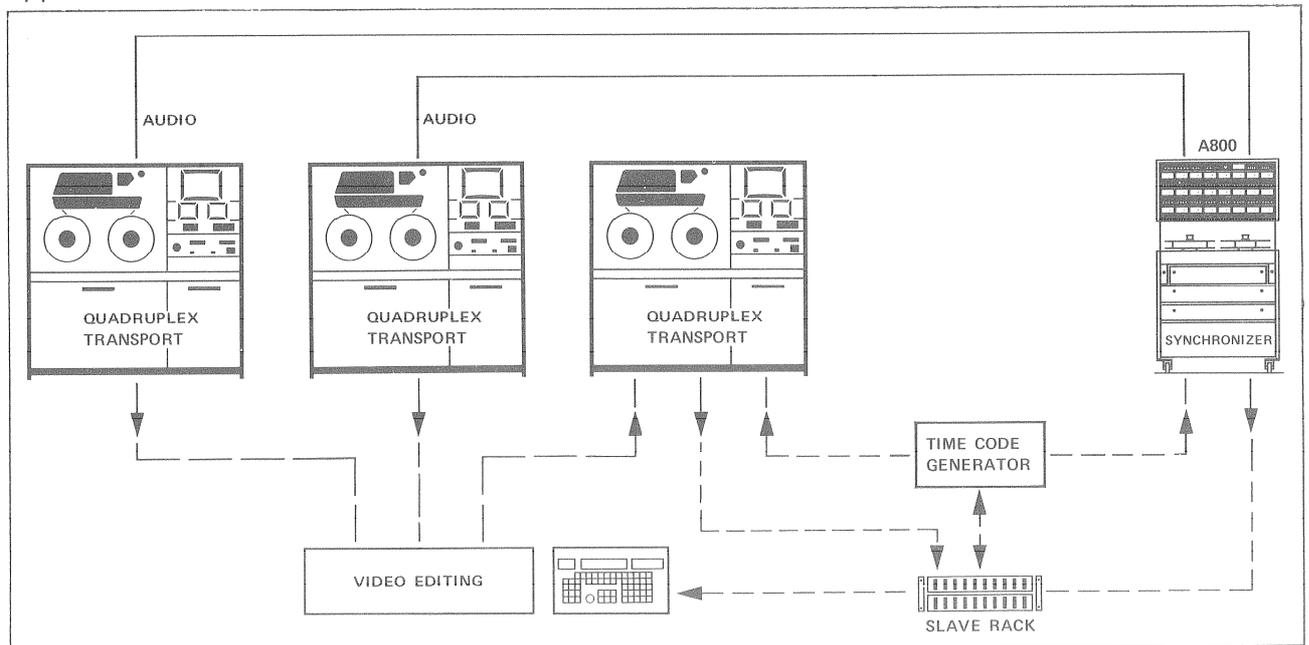


Fig.6
Application 1

The main advantage of such a sound dubbing system is that low cost video transports (Helical, U-Matic) can be used as master machines. With an appropriate master interface the loop control leads to important time saving production methods.

This system lay-out is ideally suited for all sound post productions for video and film.

Fig.7
Application 2



Application 2

Audio transfer in the video dubbingsuite

In this application the original audio information is copied onto different tracks of the multichannel audio machine whilst video editing takes place.

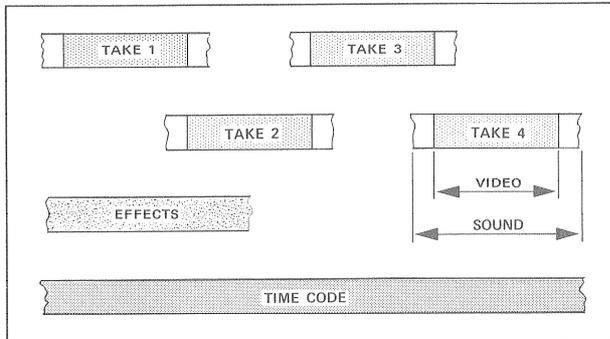


Fig.8
Overlapping audio transfer

Further dubbing or sweetening work is done according to application 1.

Application 3

Direct recordings onto an audio multi-channel machine.

For productions where a high audio quality is needed, the audio is directly recorded onto a synchronized multichannel transport. This can be in the studio or in the field.

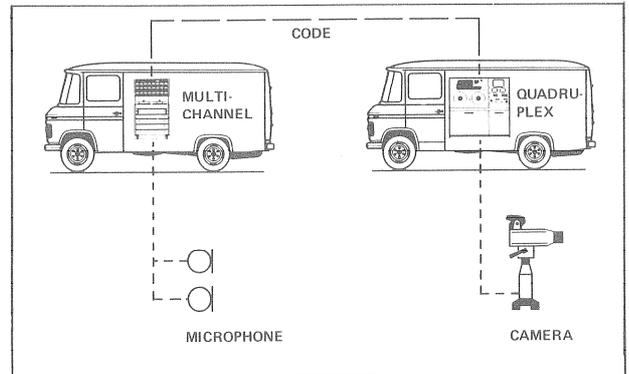


Fig.9
Field recordings

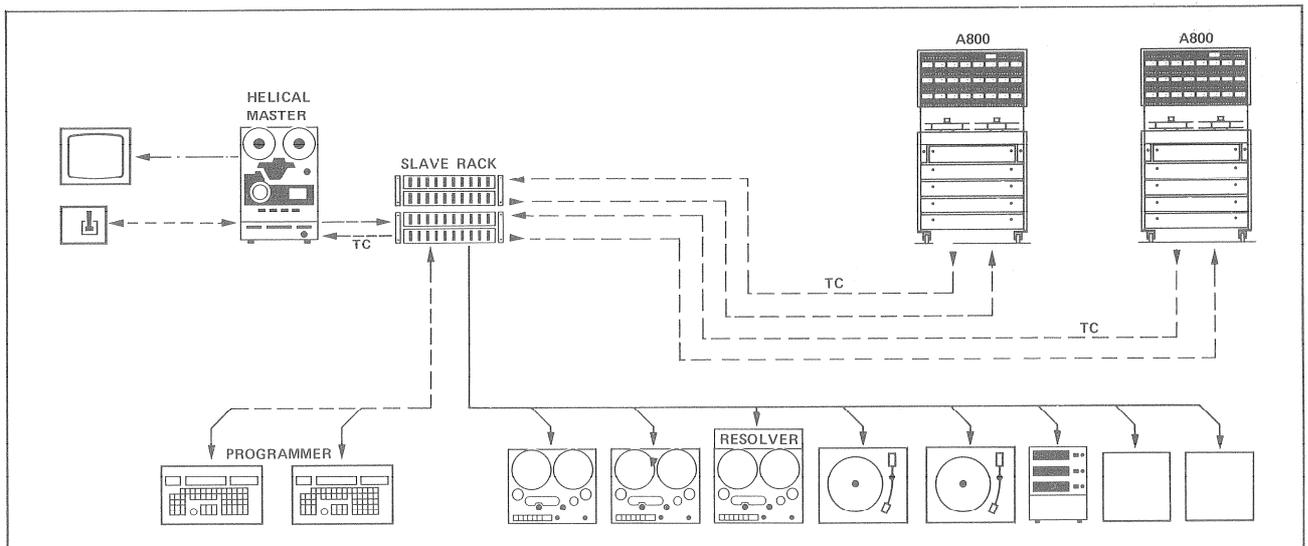


Fig.10
Application 4

Application 4

Audio assembling and dubbing with directly recorded audio

Sequence changes of direct audio recordings can be realized with the above system lay-out. By using STUDER A800 transports precise and gap-free assembling and insert work can be achieved also with critical program material.

Application 5

FM-Stereo simulcast transmission

By synchronizing an audio recorder to a quadruplex machine a simulcast transmission of picture and FM-Stereo can easily be realized. If, for tape capacity reasons, a second slave should be needed, the crossover from one audio transport to the other can be preprogrammed.

For international program exchange the 4 track format was standardized.

The usual track configuration looks as follows:

- track 1 stereo program
- track 2 stereo program
- track 3 mono mix
- track 4 time code

Obviously, existing 8, 16, or 24 track machines combined with the TLS 2000 can be used for simulcast transmission as well.

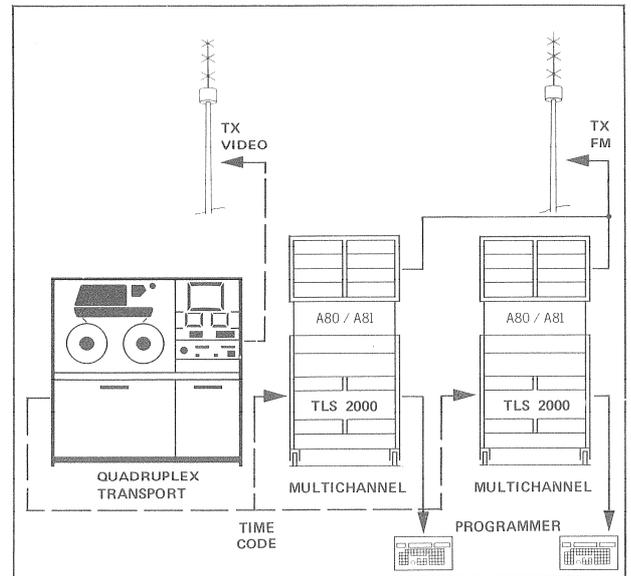


Fig. 11
Application 5

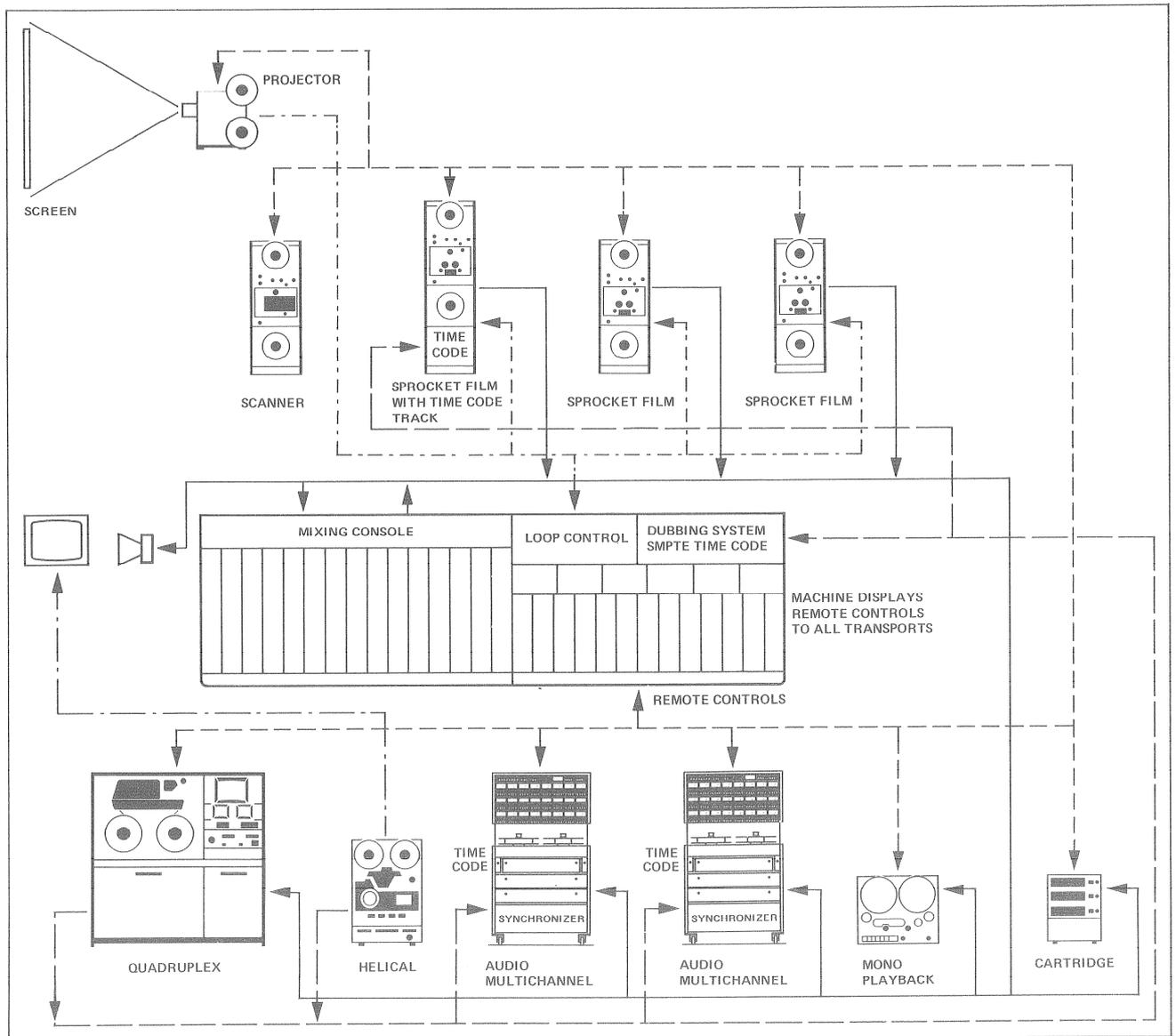


Fig. 12
Application 6

Application 6

Dubbing complex synchronizing video, film and audio tapes

This system lay-out includes all existing video and film formats. All transports can be synchronized in what ever way desired.

Modern audio dubbing methods as well as conventional post production philosophies can be realized.

The following tape formats are used in the above complex:

- film
- sprocket film
- video tape (quadruplex)
- video tape (helical)
- audio tape multitrack
- audio tape 1/4 inch

See also the detailed description of the above application on page 14.

Application 7

Audio - audio synchronization

Synchronization of two A800 machines (or A80) provide 46 audio channels (2 channels for code). The A800 multi-channel transports are prepared to be

used as masters or slaves. This results in a flexibility never achieved before.

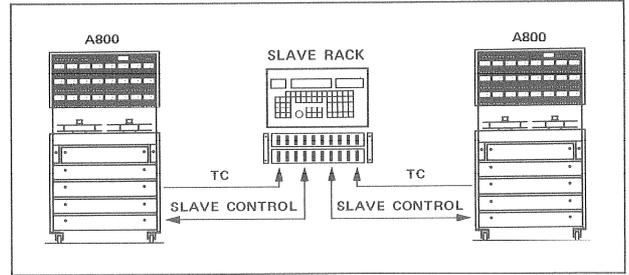


Fig. 13
Application 7

Electronic insert dubbing from one machine to the other, or insert bouncing on the same transport can be pre-programmed, rehearsed and recorded. Hard inserts are possible without audible change-over.

For large studio complexes access to one slave transport can be given to each studio.

Each studio needs therefore to be equipped with a programmer. An additional unit converts data from parallel into serial form. With a simple switch the access to the slave transport can then be selected.

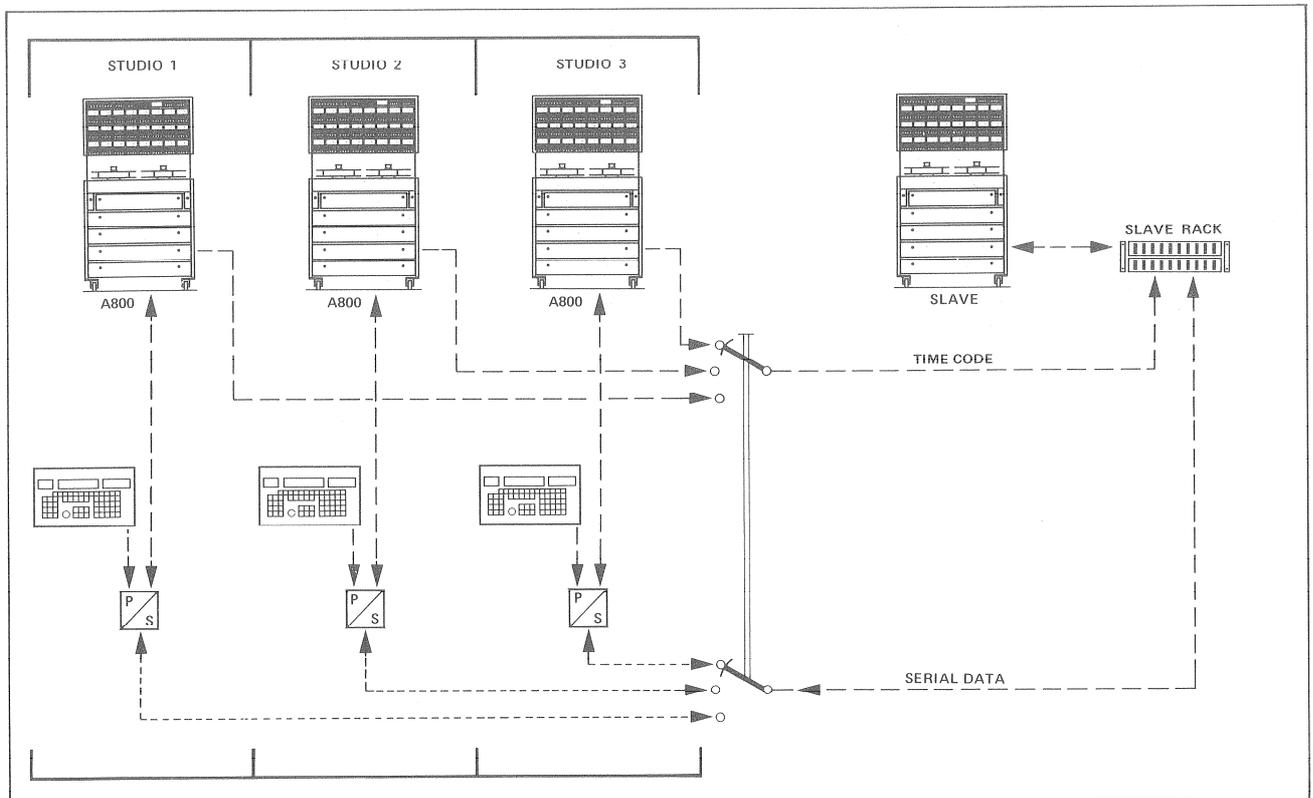


Fig.14
Access from 3 studios to one slave

5.
THE LJUBLIANA TELEVISION CENTER PROJECT

In the new television centre of RTV Ljubliana (YU) the project engineers, in close cooperation with the user, took the chance to install a new complex for sound processing.

Especially high demands had to be met for economic, time saving methods occupying a reduced number of employees, while investments had to be reasonable.

In this new plant the requirements for TV sound productions can be fulfilled most favorably now with the help of that new, flexible sound dubbing system capable to synchronize different video, film and audio tapes.

All sound work for the own requirements as well as adaptations of other productions can be carried out there:

- live productions, overdubbing and synchronization on tape, film and sprocket tape.

The users planned and realized all constructional needs for that new sound processing complex and, due to early discussions with manufacturers, the entire planning took only two years.

The principle design of a dubbing/sweetening studio is always the same: The various programme sources have to be mixed in order to obtain the final production.

These sources can be different tracks of a multichannel tape recorder or several tape reels or gramophone discs. For a TV or movie production the sound must, additionally be synchronized.

In order to work economically, e.g. to add sound to a TV production or a movie, the record/playback equipment must be programmable; one or more playback machines are started and

stopped at a precisely defined time and point (address) while a tape recorder moves forth and back from one preset address to the next one.

Audio monitoring is done via loudspeakers, the sound and picture addresses are shown by displays. These addresses can be stored manually or automatically and form the basis for the script, mixing design or other working papers. Based upon these data, programming of automatic sequences will then be possible.

The helical scan video recorder can record the time code addresses of the video signal. This time code can be read in fast wind mode or even in standstill.

The video recorders, sprocket tape and audio tape recorders are able to record and reproduce the EBU time code.

The STUDER 189 mixing console is equipped with 24 input units having both microphone and high level (line) inputs.

Each input unit is equipped with high and low pass filters, presence and absence filters, pre-fader listening facility and 4 auxiliary outputs for reverb and foldback, as well as insert facilities for effect filters, compressors or delay units either before or after the fader.

A built-in test oscillator can be switched to each input unit.

The outputs can be switched to the 8 busses by means of push buttons and a panorama potentiometer.

The audio remote control for the STUDER A80 VU 8-track tape machine is incorporated into the mixer. All microphone and playback lines end on a patch board.

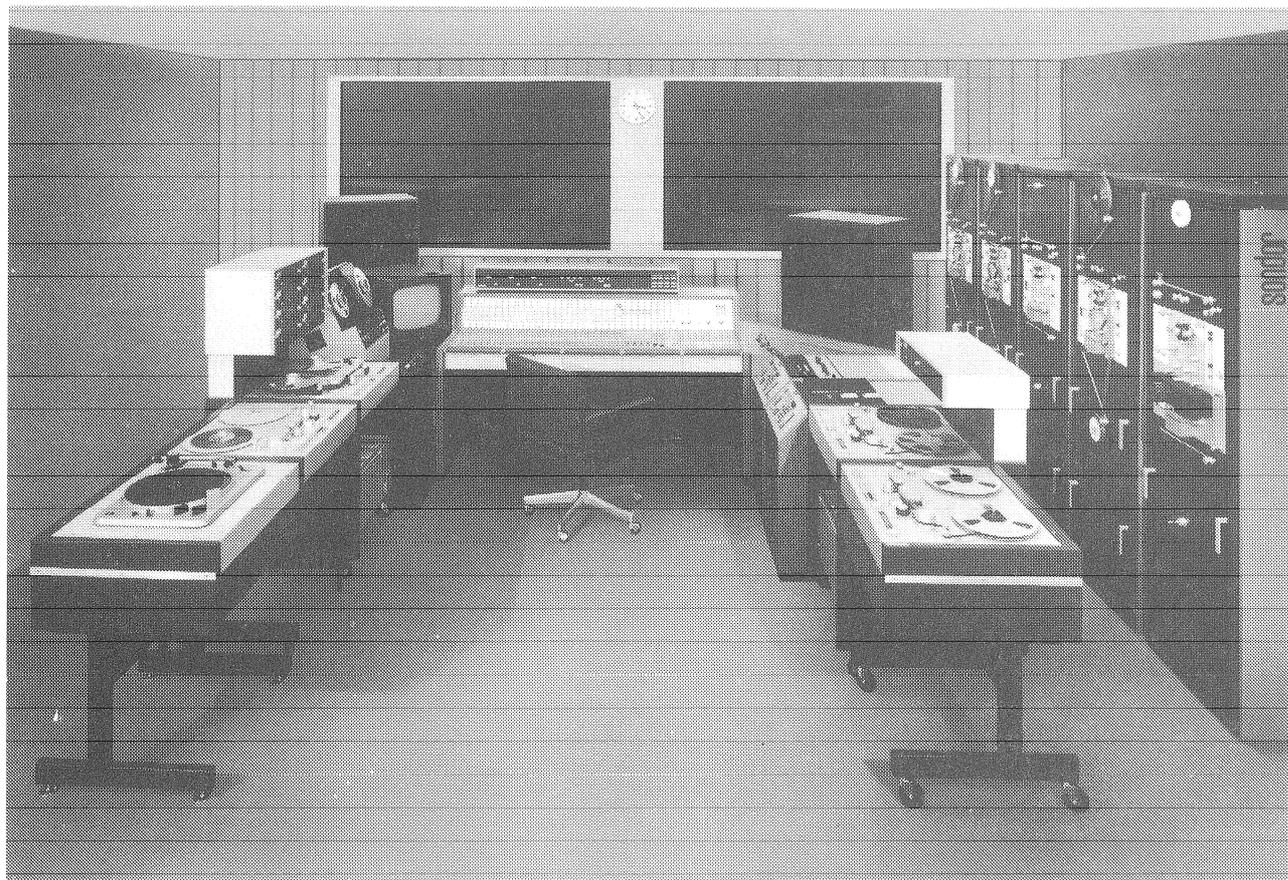
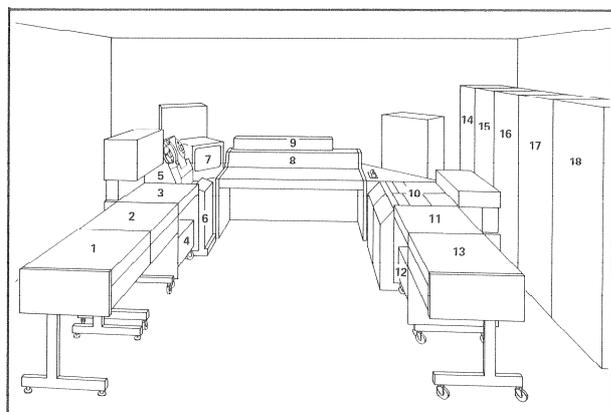


Fig.15
Ljubljana television center



- 1 EMT-930, turntable
- 2 STUDER A80 RC, effect machine for address start/stop
- 3 STUDER A80 VU 8-track 1" with
- 4 STUDER TAPE LOCK SYSTEM 2000 MK 2, MASTER CONTROL
- 5 Ampex VPR-1
- 6 EMT 250, electronic reverbator unit with digital processor
- 7 BARCO monitor
- 8 STUDER MIXING CONSOLE 189 with
- 9 Display units for code reader, frame counter etc.

- 10 Remote-console with two TLS 2000 PROGRAMMER
 - 1 video remote control VPR-1
 - 2 remote controls SONDOR OMA
 - 1 remote control for film scanner
 - 2 remote controls for A80 RC-1
 - 2 remote controls for EMT-930 record player
 - 1 additional equalizer
- 11 STUDER A80 VU 2-track 1/4" with
- 12 STUDER TAPE LOCK SYSTEM 2000 MK 2, MASTER CONTROL
- 13 STUDER A80 RC, effect machine for address start/stop
- 14/Two Sondor M2/OMA 3 studio magnetic
- 15 film (sprocket tape) recorder and reproducer
 - One with two channels on 16 mm sprocket tape (EBU 3086 DIN)
- 16/Two Sondor M2pr/OMA 3 studio magnetic film reproducer,
- 17 netic film reproducer, one and two channels
- 18 One Sondor fast film scanner colour with holoscope and 3-vidicon colour camera

Actual work

The ready-to-transmit productions usually are available as edited video or film tapes. Fundamentally new is the method of aftertreatment of such productions:

- First a continued time code must be recorded on the already edited video tape. According to the customers requirements either real time or elapsed time can be used.
- Secondly the pictures and the time code are copied on a 1" video recorder and the sound with time code on a multichannel recorder (or on a sprocket tape machine).

It is important that this copying procedure can be done without synchronizing the equipment; pictures with time code and sound with time code are recorded at the same time.

All further audio work is done either with the multichannel or with sprocket tape transports. The synchronization is realized as follows:

- video tape to sprocket tape by means of time code
- sprocket tape to sprocket tape by means of the SONDOR pulse system. Several sprocket tape recorders can be coupled to each other or to the video recorder.
- video tape to multichannel audio recorder and 1/4" tape recorder is done by means of time code with the STUDER Tape Lock System 2000.

Playback from sprocket tape is done by means of SONDOR loop control and from the multichannel machine with SMPTE-code by means of the STUDER TLS 2000. Any (SMPTE) time code can be recorded thanks to the offset possibility of the TLS 2000.

The SONDOR pulse system with a synchronizing precision of 1/4 of a frame allows exact programming of start and stop addresses without any correction; the SONDOR OMA3 sprocket tape recorder is capable to start and stop

within 1/8 of a frame. If required, the multitrack recorder can follow synchronously.

Because the TLS 2000 is an intelligent system, it is capable to control peripheral equipment, such as the 1" video recorder, too. Loop operation can be done automatically by the video recorder and the multichannel recorder together. When working with long loops, the 30 times rewind speed of the multichannel recorder cuts down working time remarkably.

Another advantage of the system is the possibility of using conventional (no time code channel) tape recorders, turntables or cassette tape decks as effect machines and starting them automatically when address coincidence with the multichannel tape recorder is reached. In this way inserts can be recorded onto the multichannel tape.

The audio mixdown from the multichannel tape recorder is either re-recorded on the original video tape or on a free sound track of the same multichannel recorder as an intermediate mixing.

If a film production needs an audio post production, it can be realized in the same way as with the video tape, provided that the film is equipped with a free magnetic track on which the time code can be recorded.

In some cases it might be necessary to copy a film onto a 1" video recorder. While copying the pictures, a time code, even readable in stop, can also be recorded.

The thus amended or completed programmes can be copied anywhere on VCR-cassettes. Finally, the conventional production can be executed with film programme control, loop simulation and programmed inserts, too.

6.
TLS 2000 SYSTEM ARRANGEMENT

Synchronizing unit, 19" rack

Contains the actual synchronizer with built-in SMPTE code generator, address start and master control (or instead of master control, A80 Locator).

In combination with the A80 this 19" rack is installed into the A80 transport. The rack contains both the code read and record amplifiers.

Main programmer

Three versions are available:

- Programmer TLS - A800
- Programmer TLS - A80 Master Control
- Programmer TLS - A80 Locator

Interface rack (19")

19" rack to suit different interfacing needs:

- Master control interfaces (various VTR interfaces available).
- Address start and stop interface (for effect machines).

Parallel/serial converter rack (19")

Contains the necessary interface boards to convert from parallel into serial form. With this converter the programmer can be located several hundred meters away from the synchronizing unit.

For more information see our detailed ordering information.

7.
TECHNICAL SPECIFICATIONS

The Tape Lock System 2000 MKII fits both, A800 and A80 VU MKII tape recorders. It is matched by special software to both tape transport characteristics.

Codes

Accepts any SMPTE/EBU code of 24, 25, 29.97 and 30 frames per second.

External reference (PILOT)

Synchronizes to external frequency of 4x80xselected code type (frames/s).

Synchronization accuracy

50 microseconds (SYNC B)

($50 \mu\text{s} = 19 \times 10^{-3}$ mm length of tape at 15 ips).

Lock in time

From parked status until

Sync A is achieved:
4 s (1" tape)
5 s (2" tape)

Sync B is achieved:
6 s (1" tape)
8 s (2" tape)

Wow and flutter

Figures do not exceed values as quoted in tape transport specifications (modes: SYNC B or lock slow).

Parking accuracy

Adjustable minimum ± 5 ms

Line inputs and outputs

Balanced, minimum level 1 Vpp.

Code flux on code track

- 10 dB below 200 nWb/m (approx. 63 nWb/m).

8.
ORDERING INFORMATION

TLS 2000 - 800
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Synchronizing and editing system for multichannel recorder STUDER A800, consisting off:

- Synchronizer in 19" rack
- Programmer with 15 m cable
- Optional interface rack
- Optional parallel/serial converter rack 19"
- Power supply and all necessary inter-connection cables

The basic features include:

- Synchronizer to slave the A800
- Master control (optional interface for loop control required)
- Address start and stop for 4 effect machines (interface for stop required)
- SMPTE- code generator
- Editor with rehearse feature

TLS 2000-800 rack version

Complete system for installation in 19" rack, with 15 m connection cable from tape machine to synchronizer, and 15 m connection cable from synchronizer to programmer
1.228.950.00

TLS 2000-800 trolley version

Complete system, but installed in roll-around console with castors, with 15 m connection cable from machine to console
1.228.900.00

Options:

Interface rack (19")

Rack complete with voltage regulator,
1.228.890.00

equipped with:

- a) Master control interface, available for the following machines:
 - Sony U-matic VP 2850 1.100.011.00
 - Sony U-matic VP 2850 Joy (SM2 remote control) 1.100.017.00

The VP 2850 can only be used as master machine with the following modifications:

- SMPTE code head with record and read amplifiers (by g.t.c., Wöhrendamm 19, D-2070 Grosshansdorf).
- STUDER booster amplifier
- Sony U-matic BVU 200 1.100.012.00
- JVC U-matic CR 8500 1.100.016.00
- Sony BVH 1000 PS 1.100.015.00
- Ampex VPR 1 1.100.013.00

Interfaces for other brands upon request. The rack can also be equipped with 2 interfaces, therefore the following switch set is required:

- TLS master control switch set. 1.228.373.00

If a future expansion to 2 master controls is considered, the switch set 1.228.373.00 should be installed when initially ordering the interface rack 1.228.890.00.

Note:

When ordering a master control interface, the appropriate VTR-machine should be sent to Studer International AG, in order to allow a check of the complete system arrangement.

- b) Address start and stop interface suited to STUDER A80 recorders, consisting of:
- Interface board
 - Interconnection cable synchronizer to interface rack
 - 4x15 m connecting cable A80
1.228.374.00

- c) Time code amplifier TLS 2000
TLS 2000-G

Parallel/serial converter rack

consisting of:

- 19" rack containing the parallel/serial controller, complete with power supply
- Parallel/serial controller kit for installation into the synchronizer rack
1.228.490.00

A800 master control cable

interconnection cable for A800 master control (15m)
1.228.960.00

Note:

In an audio-audio synchronization one A800 is used as the master machine. The master A800 is therefore directly linked to the synchronizer. No interface rack needed. Address start interface is not necessary, relay contacts (normally-open) are provided for 4 events (start only).

Attention:

A800 machines have to be equipped with the option

- "code channel /TLS interface"
1.180.084.00

in order to operate as slave or master machines (with the TLS 2000-800 system).

TLS 2000-80

Synchronizing and editing system for multichannel recorder STUDER A80 VU, consisting of:

- Synchronizer in 19" rack
- Code read and record amplifier
- Programmer with 15 m cable
- Code channel remote control
- Optional interface rack (19")
- Optional parallel/serial converter rack (19")

The basic features include:

- Synchronizer to slave the A80
- Master control (optional interface for loop control required)
- Address start and stop for 4 effect machines (interface for stop required)
- SMPTE-code generator

TLS 2000-80 Master Control version

Complete system for installation into A80 VU tape transport, with 15 m connection cable from synchronizer (in A80) to programmer

TLS 2000-A

TLS 2000-80 Locator version

Same system as above but with an autolocator function instead of the master control. The code channel remote control is replaced by a basic programmer (in A80). This autolocator uses the real time from the tape timer on the A80 transport

TLS 2000-B

TLS 2000-80 Basic version

Basic synchronizer without programmer, consisting of:

- Synchronizer in 19" rack
- Basic programmer

- Code read and record amplifier
TLS 2000-F

Note:

This synchronizer version uses the software of the above TLS 2000-80 Locator version. A later upgrading to TLS 2000-80 Master Control is therefore not possible. Upgrading to TLS 2000-80 Locator version however is easily possible.

Options:

Interface rack (19")

rack complete with voltage regulator (only for TLS 2000-800 Master Control version)

1.228.890.00

equipped with:

a) Master control interface, available for following machines:

- Sony U-matic VP 2850
1.100.011.00
- Sony U-matic VP 2850 Joy (SM2 remote control)
1.100.017.00

The VP 2850 can only be used as master machine with the following modifications:

- SMPTE code head with record and read amplifiers (by g.t.c., Wöhrendamm 19, D-2070 Grosshansdorf)
- STUDER booster amplifier
- Sony U-matic BVU 200
1.100.012.00
- JVC U-matic CR 8500
1.100.016.00
- Sony BVH 1000 PS
1.100.015.00
- Ampex VPR 1
1.100.013.00

Interfaces for other brands upon request. The rack can also be equipped with 2 interfaces, therefore the following switch set is required:

- TLS master control switch set
1.228.373.00

If a future expansion to 2 master controls is considered, the switch set 1.228.373.00 should be installed when initially ordering the interface rack 1.228.890.00.

Note:

When ordering a master control interface, the appropriate VTR-machine should be sent to Studer International AG, in order to allow a check of the complete system arrangement.

b) Address start and stop interface suited to STUDER A80 recorders, consisting of:

- Interface board
- Interconnection cable synchronizer to interface rack
- 4x15 m connecting cable A80
1.228.374.00

c) Time code amplifier TLS 2000
TLS 2000-G

Parallel/serial converter rack

consisting of:

- 19" rack containing the parallel/serial controller, complete with power supply
- parallel/serial controller kit for installation into the synchronizer rack
1.228.490.00

With this parallel/serial converter the programmer can be several hundred meters away from the slave unit. Interconnection with a 2-wire line.

Master electronics for A80 VU

Electronics for A80 VU master operation for installation into A80 VU transport, consisting of:

- Master electronics (no loop control from TLS 2000 possible)
- Code read and record amplifiers

- Power supply and interconnection cables

1.228.700.00

Note:

In an audio-audio synchronization one A80 VU is used as the master machine. It is recommended to use a STUDER autolocator to control this master machine in a loop. The above master electronics fulfils the following tasks:

High speed code reading, muting of all audio channels during lock-up and waiting command until slave is parked.

Attention:

A80 VU machines have to be equipped with the option

- TLS 2000-80 pre-wiring
- in order to operate as slave or master machines (with the TLS 2000-80 system). Such pre-wired machines can easily be retrofitted with a TLS 2000-80 synchronizing system (slave) or with the master electronics (master).