

Owner's Manual

Model

4030/4035

SYNCHRONIZER/SYNCHRONIZER CONTROLLER



FOSTEX[®]

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**WARNING: To avoid possible electric shock hazard,
do not expose this appliance to rain or moisture.
There are no user serviceable parts inside.
Refer servicing to qualified service personnel.**

1. INTRODUCTION

This manual explains unpacking, installation and operation of the Fostex 4030 SYNCHRONIZER and the 4035 SYNCHRONIZER CONTROLLER.

For the sake of convenience, explanations on recorders to be connected to the 4030 have been limited to Fostex 20, 80, E-2, E-22, B-16 and B-16D, which do not require an interface unit. All other decks (VTR, ATR, MTR, film recorder), require additional interface units. Please ask your nearest Fostex dealer or service station for assistance.

2. SPECIFICATION

Synchronization accuracy	$\pm 50\mu\text{S}$
" resolution	$2\mu\text{S}$
Typical lock-up time	5 sec. from STOP
Lock-up rate	1/2 ~ 2 times of PLAY speed
INPUT:	
Time code signal	SMPTE 30 F.P.S., SMPTE DROP FRAME, EBU 25 F.P.S. and FILM 24 F.P.S.
Level	100mV p-p ~ 10V p-p
Read speed range	1/2 ~ 2 times
Input impedance	10K Ω
Video signal (master only) -	
Type	PAL or NTSC, negative sync composite video or sync
Level	0.5 ~ 2V p-p composite video signal 0.2 ~ 8V p-p composite sync signal
Reference (master only)-	
Level	0.2 ~ 8V p-p
Machine status (Tallies)	PLAY, STOP, F.FWD, RWD, REC +3.5 ~ +15v, with low level true
Tape speed pulses (TACH)	Higher than 4Hz at PLAY Less than 5KHz at maximum speed High level --- +3.5 ~ +15V Low level ---- Less than +0.8V
Direction sense	High level --- +3.5 ~ +15V Low level ---- Less than +0.8V

OUTPUT:

Machine controls	PLAY, STOP, F.FWD, RWD, REC
Level	High level, open collector, less than 30V
	Low level, 0.4V, less than 20mA
Servo (SLAVE only)	
External pull-up voltage	+24V max.
Voltage output	+18V ~ -14V
Output impedance	1K Ω
Frequency output	2KHz ~ 30KHz
Output level	High --- 4V, Low --- 0.4V
Output impedance	22 Ω nominal
Communication buss	Quasi-RS232C, DIN 8 pin connector
Controller I/O	30 pin flat cable connector
Power	85 ~ 132V AC, 50/60Hz, 12W
	170 ~ 264V AC, 50/60Hz, 12W
Dimensions	19"(W) x 1-3/4"(H) x 10"(D)
	[482(W) x 44(H) x 255(D)mm]
Weight	Net 7-3/4 lbs. (3.5Kg)
	Shipping 8-1/2 lbs. (3.9Kg)

3. PREPARATION

3.1 Unpacking

Unpack the unit, and, before making any electrical connections, inspect for any evidence of possible shipping damage. Save all packing materials at least until you have verified that the unit is working properly. If there is any evidence of damage due to rough handling, consult your FOSTEX dealer before connecting or operating the unit.

CAUTION: Always be sure power is applied only after all cable connections are made.

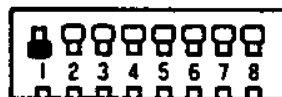
3.2 Setup

The rear panel 8 pole DIP switch must be set in accordance to the operating situation related to the Model 4030 Synchronizer such as the type of tape decks used for the master and slave, whether the 4035 controller is to be used or not, etc. The damping control must be set to match the performance of each deck. Be sure these are properly set according to explanations.

Setting the DIP switches

DIP switches 1 through 8 each have specific functions. Set these in accordance with the application. Switches 1 through 3 is must be set before turning on the power.

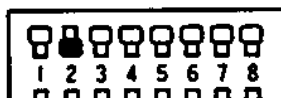
(BAUD RATE)



Switch 1, Baud rate

This is for selecting the baud rate of the RS-232-C communication buss. It will be 9600 baud at the up position and 4800 baud at the down position. Either position is selected in accordance to capability of the computer to be connected to the 4030. It does not matter at which position it is set, if the communication buss is not used.

(MODE A)



Switch 2, Mode A

The AUTO LOCK mode is determined by this switch when the 4030 is to be operated without the 4035 controller. AUTO LOCK mode is the up position, the down position is off. The setting of this switch will be over-riden by the 4035 controller, and the AUTO LOCK mode is then selected by the AUTO LOCK switch on the 4035.

(MODE B)



Switch 3, Mode B

This switch determines whether synchronization is to be by FRAME LOCK or SYNC LOCK when the 4030 is operated without the 4035 controller. The up position is FRAME LOCK and the down position is SYNC LOCK. In this latter case, DIP switch 2 (Mode A) must be set to the down position. When the 4035 is connected, lock selection is then determined there.

(MODE C)



Switch 4, Mode C

The down position is for the Fostex B-16 or B-16D as the master deck. The up position is for other decks.

(MODE D)



Switch 5, Mode D

The down position is for the Fostex B-16 or B-16D, when used as the slave deck. The up position is for other decks. Both switches 4 and 5 will function even if they are set after power is switched on.

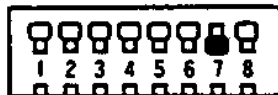
(MODE E)



Switch 6, Mode E

This switch is not used at this time. Therefore, it does not matter if it is set up or down.

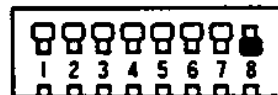
(GAIN)



Switch 7, Gain

This switch is for adjusting the servo system by connecting the slave deck. Refer to "Adjusting the servo", page 18.

(OFFSET)



Switch 8, Offset

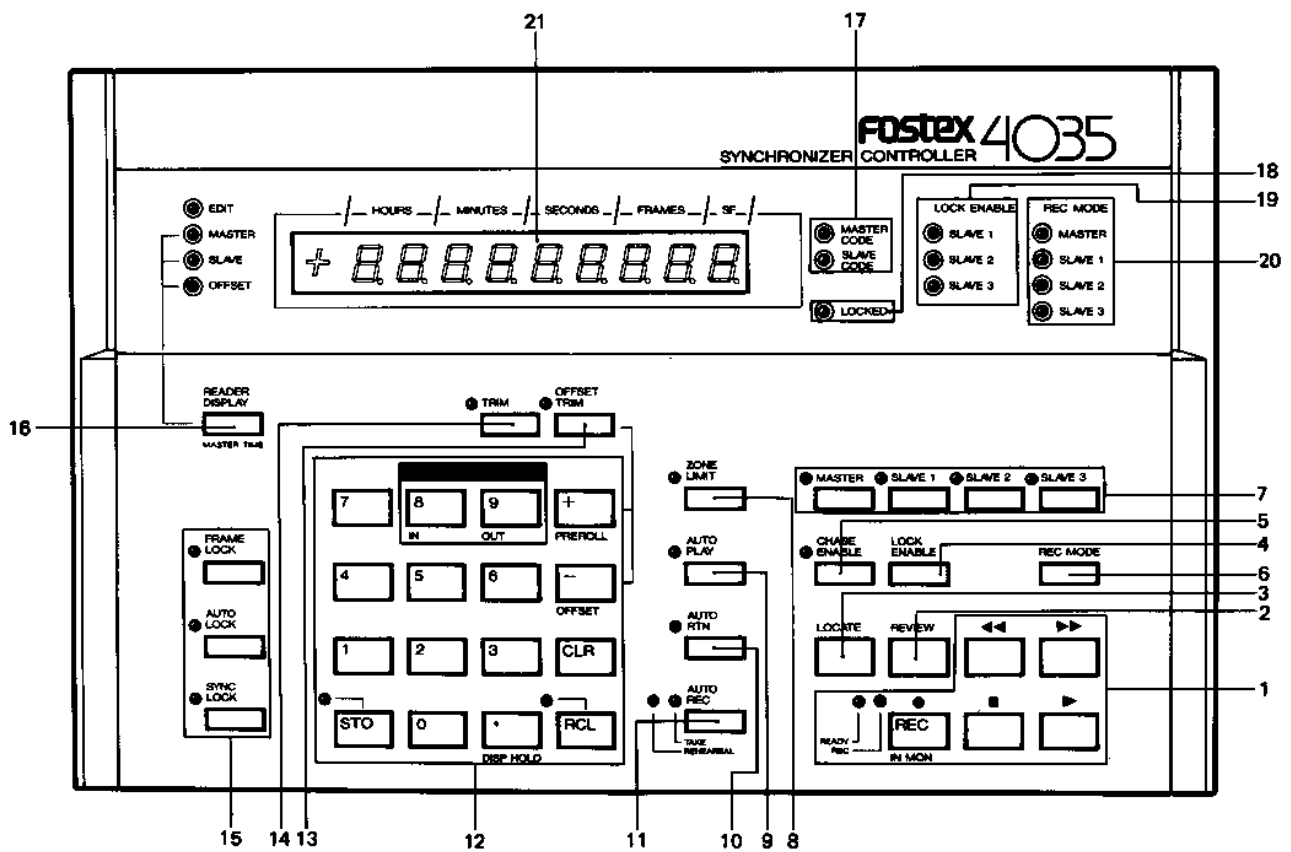
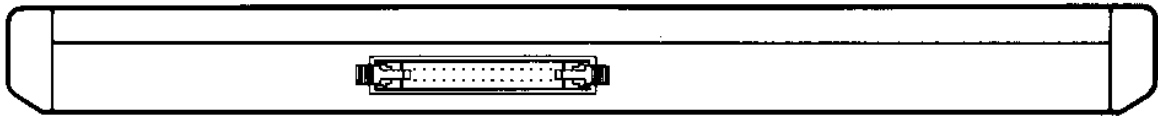
This switch is for adjusting the servo system by connecting the slave deck. Refer to "Adjusting the servo", page 18.

SAFETY INSTRUCTIONS

WARNING

"READ BEFORE OPERATING"

1. **Read Instructions**—All the safety and operating instructions should be read before the appliance is operated.
2. **Retain Instructions**—The safety and operating instructions should be retained for future reference.
3. **Heed Warnings**—All warnings on the appliance and in the operating instructions should be adhered to.
4. **Follow Instructions**—All operating and use instructions should be followed.
5. **Water and Moisture**—The appliance should not be used near water—for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
6. **Ventilation**—The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
7. **Heat**—The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
8. **Power Sources**—The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
9. **Power-Cord Protection**—Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.
10. **Cleaning**—The appliance should be cleaned only as recommended by the manufacturer.
11. **Nonuse Periods**—The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
12. **Object and Liquid Entry**—Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
13. **Damage Requiring Service**—The appliance should be serviced by qualified service personnel when:
 - A. The power-supply cord or the plug has been damaged; or
 - B. Objects have fallen, or liquid has been spilled into the appliance; or
 - C. The appliance has been exposed to rain; or
 - D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
 - E. The appliance has been dropped, or the enclosure damaged.
14. **Servicing**—The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.



4. THE CONTROLS AND THEIR FEATURES

4.1 SYNCHRONIZER CONTROLLER (Model 4035)

- 1) Remote transport control buttons for controlling the recorder in PLAY, STOP, F.FWD, RWD and REC.

- 2) REVIEW button

The REVIEW mode can be entered from any mode. When the REVIEW button is depressed, the tape on the deck selected by the Deck Control Select button (7), is rewound for a length of 5 seconds, and then enters the play mode.

If the REVIEW button is depressed for longer than 5 seconds, the transport will automatically enter the play mode as soon as the REVIEW button is released.

- 3) LOCATE button

When this button is depressed, the tape on the recorder selected by the Deck Control Select button (7), is automatically run in F.FWD or RWD to the previously designated position (CUE position), then stops.

- 4) LOCK ENABLE button

When this button is depressed, the slave deck selected by the Deck Control Select button (7), will run in synchronization with the master deck via time code.

The slave deck in the LOCK ENABLE mode will be indicated by the LOCK ENABLE LED (19).

- 5) CHASE ENABLE button

When the power is switched ON, the Deck Control Select button (7) will automatically go to SLAVE 1.

Then, depressing this button simultaneously triggers CHASE, SLAVE 1 will enter LOCK ENABLE, and the SLAVE 1 deck will follow the tape control modes of the MASTER deck. When this is depressed once more, the CHASE ENABLE mode is cancelled (LOCK ENABLE will remain unchanged).

- 6) REC MODE

When this button is depressed, the deck selected by the Deck Control Select button (7) will be ready to accept the REC MODE command, and this ready state will be indicated by the REC MODE LED (20).

7) Deck Control Select button (MASTER/SLAVE 1/SLAVE 2/SLAVE 3)

When the MASTER button is depressed, the MASTER LED will be lit, and the master deck can then be controlled.

When the SLAVE 1 button is depressed, the SLAVE 1 LED will be lit, and the slave deck can then be controlled.

SLAVE 2 and 3 buttons will become operational by connecting a 4030 unit to each slave deck, and inserting a 8071 INTERFACE UNIT between each 4035 and 4030 combination.

8) ZONE LIMIT button

ZONE LIMIT is the function of specifying any length of a section on the tape and in the ZONE LIMIT on (LED lit) condition, the tape will stop and the LED blink when it reaches the preset position while the tape is in either the play or fast wind mode.

Depressing the ZONE LIMIT button again will cancel this mode. This function keeps the tape from running off the end of the reel when in rewind or fast forward modes, as well as protecting already recorded passages from further use.

9) AUTO PLAY button

When AUTO PLAY is on, the transport will automatically go to the PLAY mode after the LOCATE or AUTO RTN mode is completed, and after the tape comes to a momentary stop.

10) AUTO RETURN button

During the play or record mode, AUTO RETURN automatically locates the first cue position upon reaching the second of two previously set cue memory positions.

Depressing the AUTO RETURN button again cancels this mode.

11) AUTO REC button

The section preset in CUE memory No. 8 and 9 will be automatically recorded by depressing AUTO REC.

Rehearsing of AUTO REC is also possible by entering the auto punch in/out preset section in the play mode.

12) DATA entry key

The key for reading and writing CUE memory, measure set and tempo set, during the EDIT MODE (EDIT LED in DISPLAY MODE is lit).

13) OFFSET TRIM key

If this key is depressed when the display is in the OFFSET mode, offset of the tape position between the master deck and the slave deck can be trimmed by the (+) and (-) key.

14) TRIM key

When this key is depressed while in the EDIT mode (EDIT LED in DISPLAY MODE is lit), the up or down value for the unit indicated by the flashing dot in the display can be changed for each digit by the (+) and (-) key.

15) LOCK mode selectors

The buttons for selecting FRAME lock, AUTO lock or SYNC lock modes as required.

FRAME lock: The time code figures of the master deck and slave deck will be matched and tightly locked within the range of $\pm 10 \sim 20 \mu\text{sec}$.

In this lock mode, the master deck W & F will affect the slave deck W & F.

SYNC lock : Lock will be applied, regardless of the time code figure, by the time code phase between the master deck and the slave deck.

In this lock mode, changes in the master deck W & F will not affect the slave deck W & F.

AUTO lock : Either the FRAME lock or SYNC lock is automatically selected as a result of the amount of mismatch in time codes between the master and slave decks.

Consequently, the time code mismatch figure will be within a constant range.

We suggest using the AUTO lock mode most of the time.

16) READER DISPLAY/MASTER TIME

The switch for selecting the numerical display at reading the MASTER code, SLAVE code and OFFSET data.

If this switch is depressed while in the EDIT mode, the present mode will be indicated by the LED on the panel.

Refer to item 5.11 for details on MASTER TIME.

17) MASTER code/SLAVE code LED

When a tape deck begins to read time code, the LED for that deck will be lit.

18) LOCKED LED

Will be lit when the slave deck becomes locked in synchronization with the master deck via time code.

19) LOCK ENABLE LED

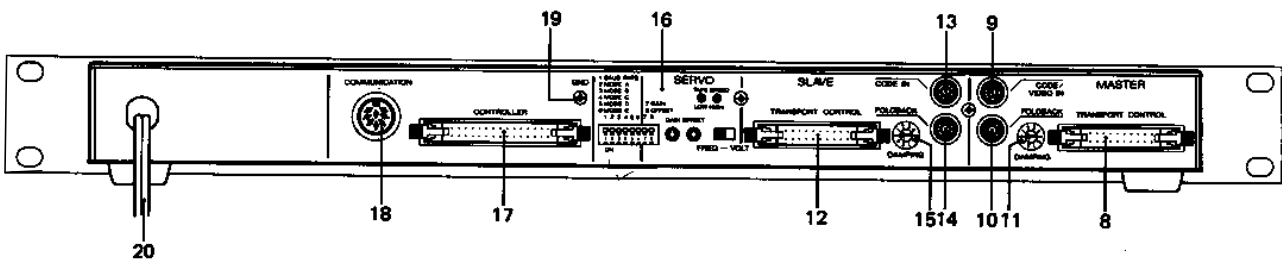
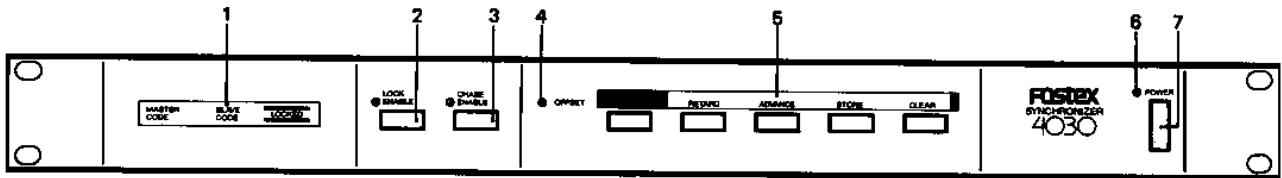
Will indicate the slave deck to be locked with the synchronization signal.

20) REC MODE LED

Will indicate the deck to be put in the record mode.

21) Display

Time code read out of the master deck and slave deck, the amount of offset with the master deck, and the numerical figures at edit mode are displayed here.



4.2 SYNCHRONIZER (Model 4030)

1) Display

The following three indicators will be lit when the MASTER DECK and SLAVE DECK are running in synchronization.

MASTER CODE: This LED lights when the master deck reads the time code, video signal or pilot tone.

SLAVE CODE : This LED lights when the slave deck reads the time code.

LOCKED : This LED lights when the slave deck locks in synchronization with the master deck time code.

2) LOCK ENABLE button

When this switch is depressed, the LOCK ENABLE indicator lights and the slave will be synchronized with the master time code while it is running. When this switch is depressed again, LOCK ENABLE will be cancelled together with CHASE ENABLE (3).

3) CHASE ENABLE button

When this switch is depressed, the CHASE ENABLE lights and LOCK ENABLE will be ON. When CHASE ENABLE is switched on, the slave deck will follow the various functions (PLAY, STOP, FF, REW, etc) of the master deck VTR. The CHASE ENABLE mode is cancelled when this button is depressed once more,

4) OFFSET LED

It is possible to synchronize with a constant time code difference between the master and slave. This difference is called the "offset" and when any value is set, this indicator lights.

5) OFFSET MODIFY keys

OFFSET MODIFY: Press this key to begin the modifying process. The LED at the upper left of this key is lit during modifying operation. (Offset will be set to zero when turning the power on.)

RETARD : When this key is depressed, the slave deck will run slower than the master deck, and the OFFSET LED will blink.

ADVANCE : When this key is depressed, the slave deck will run ahead of the master deck, and the OFFSET LED will blink.

STORE : At the instant this key is depressed, the offset time of the master and slave decks will be stored in the memory.

With each tape on the master and slave decks separately set to their starting points, and the time code difference between them stored as the offset value, the two decks can be synchronized while maintaining this offset difference.

CLEAR : Offset is cleared and the OFFSET LED is extinguished when this key is depressed.

6) POWER LED

7) POWER switch

8) MASTER - TRANSPORT CONTROL connector

This is connected with the master deck synchronizer terminal by the Model 8540 cable.

When connecting to a synchronizer terminal of an MTR or VTR other than the Fostex 20, 80, E-2, E-22, B-16 or B-16D, an interface cable or an interface unit specified for each model will be necessary. Please ask your nearest Fostex dealer or service station for information on these cables and units.

9) MASTER - CODE IN jack

This jack is for receiving the SMPTE time code playback signal from the master deck. When a composite video signal from a VTR is connected, the vertical sync signal will be accepted as the sync pulse, and thus will be resolved.

10) FOLDBACK jack

The signal from this jack is used to apply the CODE IN (9) signal to other equipment.

11) DAMPING selector

This switch is for selecting the deceleration response during the tape locate mode of the master deck.

12) SLAVE - TRANSPORT CONTROL connector

This is connected to the slave deck synchronizer terminal by the Model 8540 cable.

When connecting to a synchronizer terminal of an ATR, MTR or VTR other than the Fostex B-16, B-16D, 80, or 20, please ask your nearest Fostex dealer or service station for assistance.

13) SLAVE - CODE IN jack

The SMPTE time code playback signal from a slave deck is connected here.

14) FOLDBACK jack

The signal from this jack can be used to apply the CODE IN (13) signal to other equipment.

15) DAMPING selector

The switch for selecting the deceleration response during the tape locate mode of the slave deck.

16) SERVO section

The section for selecting or adjusting the SERVO specs in accordance to the slave deck specifications.

Refer to 3.3 for detailed method on select/adjust.

17) CONTROLLER jack

The connector for interconnection between the 4035 CONTROLLER and the 4030 main unit. The interconnecting cable is included with the 4035.

18) COMMUNICATION jack

If this jack is connected to a personal computer with an RS232C communication buss and software is compiled for controlling the 4030, then, the computer will function effectively as the 4035 controller.

19) GND terminal

20) AC cord

5. OPERATION

5.1 Audio tape recorder lock system

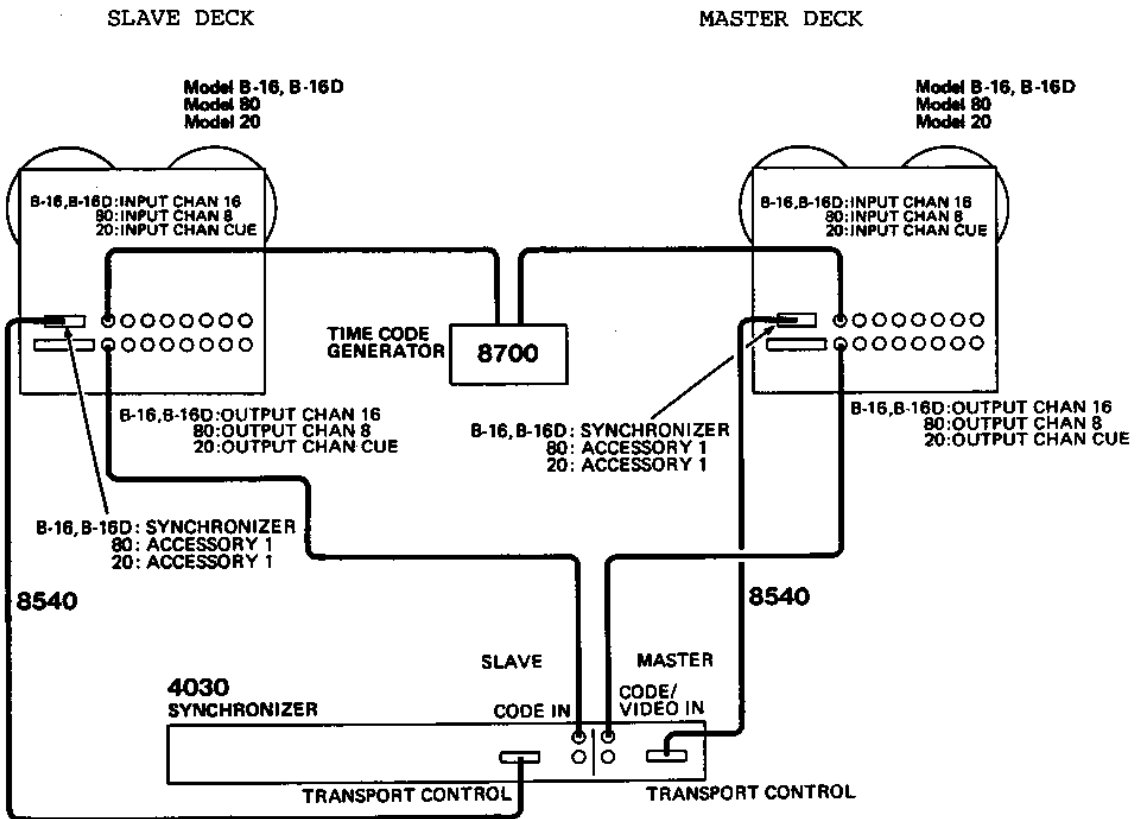
A system of synchronizing two or more tape recorders, using one as the master and the other(s) as slaves.

If the Model 8710 Interface Unit for expanding the system is used, a system consisting of a maximum of 3 slaves and one master can be made, but for ease of explanation, a basic system consisting of one master and one slave will serve in the following example.

5.1.1 Necessary equipment

Model 4030 Synchronizer, tape recorders (master and slave), Model 8540 cables (two cables), Model 8700 Time Code Generator, Pin cords (two cords) for time code signals.

A special interface unit is necessary when the Fostex Models 20, 80, E-2, E-22, B-16 or B-16D, tape recorders are not to be used as the master.



5.1.2 Interconnections (First, be sure to turn off all power switches)

- 1) Interconnect the synchronizer terminal of the tape recorder and the transport control terminals (8) and (12) of the Model 4030, with the special cable Model 8540. Be sure to match the connectors with their correct polarity: the triangle mark should be at right, and the square protrusion should be at the top. After plugging in the connector, lock the levers on both sides.
- 2) Interconnect the tape recorder time code track output and the 4030 time code input, (9) and (13), respectively. Designate the time code track as an edge track in Models B-16, B-16D and 80; and as the cue track in the Model 20.
- 3) Check the above interconnections, then switch the power on.

5.1.3 Operation

Time code recording

The SMPTE time code signal must be recorded on the previously designated time code tracks. We suggest using the last track on a multitrack audio recorder or the center track of a stereo recorder (if equipped) for the time code.

- 1) Connect the Model 8700 time code generator's output (both same signal) to the time code track inputs of the master and slave machines.
- 2) First, the signal levels must be set. Put the tape recorder in the input mode and switch on power to the 8700. In a deck without an input control pot (Model B-16, etc.), adjust the 8700 output level trimmer with a screwdriver for a 0 ~ -3dB reading on the deck level meter. In a deck with an input control pot (Model 20, etc.), adjust the level to 0 ~ -3dB.
- 3) Next, time code frame is set up. In this case, set the 8700 frame selector to DF (Drop Frame).
- 4) Before recording the time code, switch off the 8700 power momentarily. After making sure the 4030 lock enable is extinguished, start both recorders in the record mode. Upon recording about 10 seconds, switch on the 8700 power. This starts recording of the time code.
- 5) Time code must always be continuous. Never stop the deck or switch on/off power to the 8700 (or any other SMPTE/EBU generator) until the entire tape has been "striped."

After finishing the time code recording, rewind the tape, switch off the 8700 time code generator and disconnect the cable to the deck. Finally, set the time code track recording mode switch to "SAFETY" to prevent accidental erasure of the time code track.

In addition to the Model 8700, the Fostex Model 4050 also contains a time code generator. The starting time can be preset in this time code generator.

Both Models 8700 and 4050 cannot generate time codes synchronized with an external signal.

Slave deck speed adjustment

Follow the procedures below to match the 4030 synchronizer control function to the characteristics of the tape deck used as the slave. Once this initial adjustment is made, there is no need to do it again as long as the same slave is used.

A: For Models 80, 20 and B-16 belt driven capstan (or other recorder where capstan speed is changed by voltage)

- 1) Switch to VOLT, the "SERVO" section FREQ-VOLT selector, on the 4030 rear panel. Be sure power is off when switching this selector.
- 2) Set DIP switch (7) to up, and (8) to down. Use a tool, such as the tip of a screwdriver, to positively set these at the correct position. Other DIP switches (1) ~ (6) can be at any position.
- 3) Put the slave deck in the play mode and check whether HIGH or LOW, or both tape speed indicators are lit or blinking. If neither one is lit, check the interconnections.
- 4) Slowly rotate the OFFSET trimmer with a small screwdriver until the LOW tape speed indicator is lit.
- 5) Change the setting of DIP switch (7) to down, and (8) to up. Slowly rotate the GAIN trimmer to adjust tape speed to maximum (but not exceeding twice the speed) and without allowing the tape speed indicator HIGH to start blinking. In other words, it is suggested that a signal be recorded on the tape to allow detection of speed.
- 6) Set DIP switches (7) and (8) to up position upon completing these adjustments.

B: For Models E-2, E-22, B-16 and B-16D

- 1) Switch to FREQ, the "SERVO" section FREQ-VOLT switch, on the 4030 rear panel. Be sure power is OFF when switching this selector.
- 2) Set DIP switch (7) to up, and (8) to down. Use a tool, such as the tip of a screwdriver, to positively set these at the correct position. Other DIP switches (1) ~ (6) can be at any position.
- 3) Put the slave deck in the play mode and check whether HIGH or LOW, or both tape speed indicators are lit or blinking. If neither one is lit, check the interconnections.
- 4) Slowly rotate the OFFSET trimmer with a small screwdriver until the HIGH tape speed indicator is lit.
- 5) Change the setting of DIP switch (7) to down, and (8) to up. Slowly rotate the GAIN trimmer until the tape speed indicator LOW is lit (so that tape speed becomes 1/2).
- 6) Set DIP switches (7) and (8) to up position upon completing these adjustments.

This completes servo adjusting. The slave can now be positively driven by the control signal from the 4030 synchronizer.

CAUTION: Always record the time code before beginning the above procedure as the slave deck time code is utilized in this adjustment.

Speed indicator

The two TAPE SPEED LED's indicate at what speed the slave tape recorder is running in comparison with its normal tape speed by the blinking, lit or extinguished state of the HIGH and LOW LED's. Referring to the table below, for example, if HIGH is lit and LOW is blinking, tape speed will be less than 1/2 that of normal speed; if HIGH is lit and LOW is extinguished, tape speed will be exactly twice that of normal. It must be noted that this speed indicator will be active only when (A) DIP switch (7) or (8) is ON (down position), and (B) time code is connected to the slave time CODE IN jack (13).

Tape speed	HIGH	LOW
More than double	Blinking	OFF
Double	ON	OFF
1/2 ~ double	ON	ON
1/2	OFF	ON
Less than 1/2	OFF	Blinking

Damping selector for the master and slave decks

Damping selectors (11) and (15) on the master and slave decks, respectively, must be set to match each recorder.

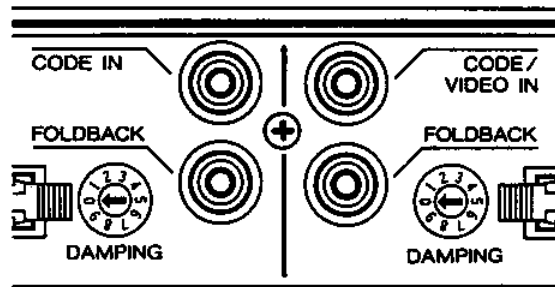
For Postex Models 20 and 80	Set to 1 or 2
" " " B-16 and B-16D	" " 2 or 3

Damping selectors (11) and (15) are switches for setting the starting points of tape deceleration when "auto location" is used to run the tape to any desired point in the ATR, MTR and VCR used for the master and slave. If damping is set to "zero", the stop command will be issued from the 4030 at the location point, and at F.F. (or RWD) mode, the tape will naturally overshoot the location point. On the other hand, the larger the damping figure is, that much more time will be needed to reach the location point as the tape will start decelerating far in advance. Therefore, make several trials with the suggested figures below and set to the best compromise setting.

1/4" tape recorder	:	1 ~ 3
1/2" " "	:	2 ~ 4
1" " "	:	3 ~ 6
2" " "	:	4 ~ 7

NOTE 1: "Auto location" is not possible without the 4035 controller.

NOTE 2: Set damping figure to "0" for Video Cassette Recorders.



Starting the synchronized run

Synchronized running of two decks.

- 1) Put the master in the play mode and read the time code. Stop it for a moment upon confirming that the master time code indicator is lit.
- 2) Put the slave in play mode and read the time code. Stop it for a moment upon confirming that the slave time code indicator is lit.
- 3) Depress the LOCK ENABLE (2) button and start both master and slave in play mode. After a short moment, the lock indicator will light to indicate synchronized running of the slave locked with the master.

In this condition, the two tape recorders can now be handled as a single tape recorder having the added number of tracks minus two (for control). In other words, if both master and slave are B-16's, 30 channels are available for audio.

Next, stop the master deck, just for testing. Although the speed of the slave will be reduced, it will not stop. The lock indicator will go out. The lock enable function will run both master and slave in the play mode, but cannot follow changes in other modes.

If it is also necessary to have the slave follow changes in the master deck mode (play, stop, etc.), the chase enable button (3) must also be depressed.

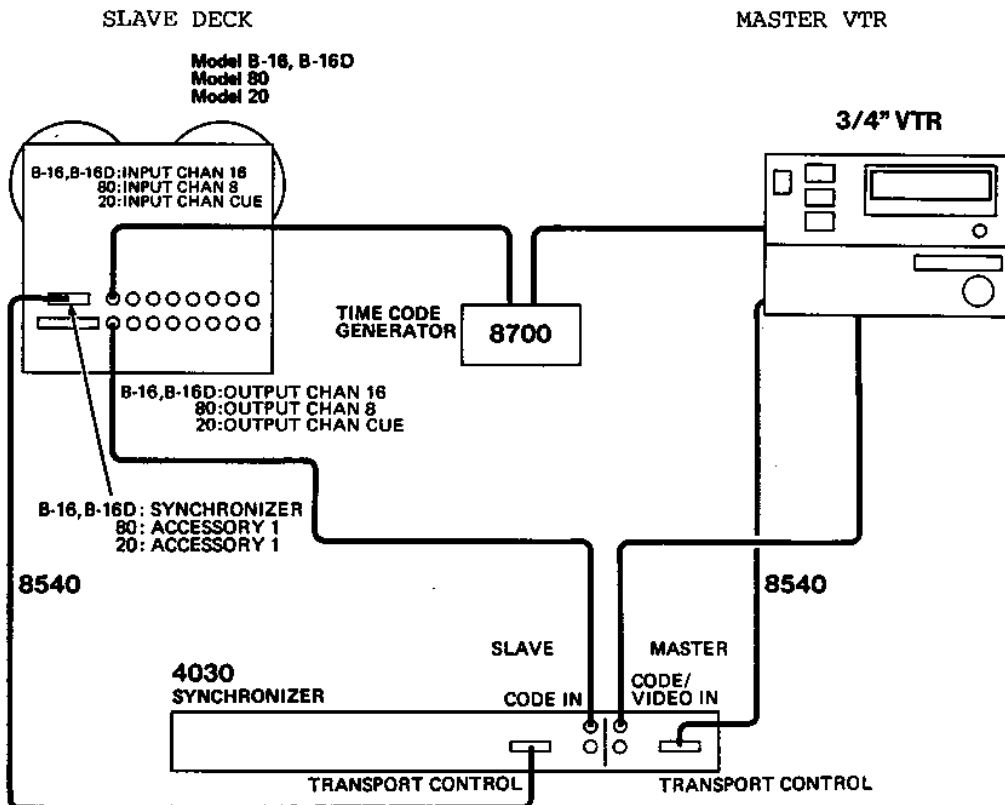
- 4) The slave deck only is allowed to run slightly longer, then stopped. There should now be a considerable difference in the time code between the master and slave.
- 5) Next, depress the chase enable button (3). The slave will automatically enter the rewind mode and should stop near the point where the master was stopped. At this point, the time code difference between master and slave should be within 2 seconds.
- 6) The master deck is put in the play mode. The slave deck also will automatically enter the play mode and a short moment later, the lock indicator will light, indicating that it is locked-in.
- 7) Check to see that the slave deck follows the master deck motions as it is stopped or put in the fast wind modes.

CHASE ENABLE is effective only when LOCK ENABLE is switched on. Therefore, when CHASE ENABLE (3) is switched on, if LOCK ENABLE is on, it will also switch on; or when LOCK ENABLE (2) is switched off, CHASE ENABLE will also switch off.

5.2 MA VTR/AUDIO TAPE RECORDER system

There are only 2 channels available for sound in the 3/4 inch VTR (U-matic format). Even though an attempt is made to add sound to the recorded picture, only 2 channels of sound is usually insufficient for a well balanced perspective. A better technique is to use a multi-track recorder, then mix to stereo and transfer to the VTR. This way gives you much more flexibility in the creation of sound. For this purpose, however, it is necessary for the multi-track recorder to run in synchronization with the VTR, as if the VTR had acquired additional sound tracks.

In the following example, a basic system consisting of one VTR and one slave will be explained. The VTR shall be the U-matic type with the time code already recorded on the picture track and the unit shall have a time code output.



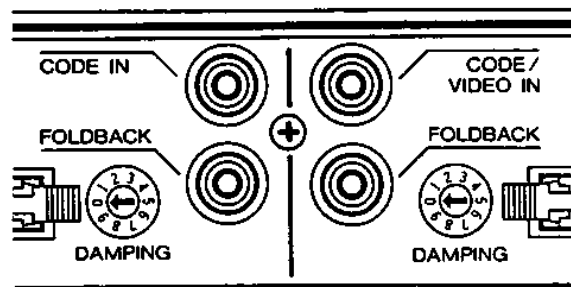
5.2.1 Necessary equipment

The basic system shall consist of the Model 4030 Synchronizer, a VTR for the master deck, a tape recorder for the slave deck, 2 interconnecting cables Model 8540, an interface unit for the VTR and 2 pin cords for the time code.

NOTE: VTR units will differ. Determine your exact system needs before you begin. Also, tape recorders other than Fostex Models E-2, E-22, B-16, B-16D, 80 and 20, require an interface unit. Refer to "VTR for the system," (page 26) for details on the VTR.

5.2.2 Interconnections (First, be sure the power is switched off)

- 1) Connect the interface unit to the VTR, then to the 4030 master transport control receptacle (8). The tape recorder synchronizer jack is connected to the 4030 slave transport control receptacle (12). When plugging the cables into the receptacles, be careful to check the top/bottom positioning of the plug. After the plug is correctly fitted, lock the levers on both sides of the receptacle.
- 2) Time code track outputs of the VTR and tape recorder are respectively connected to the 4030 time code input jacks (9) and (13). Be careful to distinguish between the master cable and slave cable. An edge track is selected for the time code signal.
- 3) Switch on power to all equipments after checking the cable interconnections.



5.2.3 Operating procedures

- 1) Recording the time code

There are two methods for recording the time code.

One method is to record the time code by connecting the Model 8700 time code generator to the slave deck only (time code is already recorded on the VTR); the other method is to make a whole copy of the VTR time code output onto the slave deck time code track.

This method is very practical if the time code is a multi-magnetic layer recording (Video signals are recorded on audio signal track).

Step 1) Be sure the VTR time code output is connected to the 4030 master time code input jack (9) and the foldback output jack (10) below it, is connected to the slave deck time code track input.

Step 2) The VTR is temporarily put in the stop (still picture) mode, not at the picture start point but at the time code start point.

Step 3) Making sure the 4030 lock enable (2) is off, start the slave deck in the record mode.

Step 4) After about 30 seconds, put the VTR in the play mode. This starts the copying procedure. The time code recording level is best set at about 0 ~ -3dB. During this process, if there is a sound in the VTR sound track that could be a guide in creating the sound, it would be a good idea to also copy it onto another track of the slave deck.

The time code recording must always be continuous.

Step 5) Stop the VTR not at the picture end point but at the time code end point, after which stop the slave deck. This completes the copying procedure.

Both tapes are rewound to the time code start point.

2) Slave deck speed adjustment

At this point, the 4030 rear panel servo section is adjusted to match the 4030 control functions to the characteristics of the tape deck to be used as the slave. Refer to "Slave deck speed adjustment", page 18, of the item on "Audio tape recorder lock system" for adjusting procedures. Once this adjustment is made, it need not be repeated so long as the same deck is used as the slave.

Damping select

Refer to DAMPING SETTING of the audio tape recorder used for the master and slave decks (page 20).

3) Starting the synchronized run

- Step 1) Put the VTR in the play mode and read the time code. If the master time code indicator (1) is lit, it is stopped (still picture) temporarily.
- Step 2) Put the slave deck in the play mode and read the time code. If the slave time code indicator (2) is lit, it is temporarily stopped.
- Step 3) Depress (switch on) the 4030 LOCK ENABLE button and simultaneously put both VTR and slave deck in the play mode. After a few moments, the LOCK ENABLE indicator will light, indicating that the slave has locked in synchronization with the VTR. In this condition, it's as if the VTR had acquired a number of additional sound tracks (number of slave deck tracks minus one). The VTR is stopped here to test settings. The slave deck has slowed down but does not stop completely; the lock indicator has also gone out. In this case, as it was explained for the audio tape recorder lock system, CHASE ENABLE (3) must be switched on in order to make the slave deck follow the VTR modes (play, stop, etc.).
- Step 4) The slave deck only is allowed to run for a few moments, then stopped. In this state, the time codes for the VTR and the slave deck should be considerably far apart.
- Step 5) While in the present condition, depress the 4030 CHASE ENABLE button (3). The slave deck should automatically enter the rewind mode, rewind near the point the VTR was stopped, then come to a stop. In this condition, the time code difference between that for the VTR and the slave deck should be within 2 seconds [damping (7) = 0].
- Step 6) Put the VTR in the play mode. This time, the slave deck will also automatically enter the play mode, and after a few moments, the lock indicator will light, indicating it has been locked.
- Step 7) Check to see that the slave deck follows the stop or fast winding modes of the VTR. It requires several seconds for the lock indicator to light (more, if the time code difference is extremely large) after the VTR and slave deck are put in the play mode. When the

VTR tape is rewound to its starting point, it is recommended that an additional 10 seconds or more of the picture (called 'pre-roll') be rewound, thereby providing a margin of error in starting the picture. The slave deck is now fully synchronized with all operating modes of the VTR.

In the final process, the multi-track recording is mixed to stereo and recorded onto the VTR sound track.

5.2.4 Connections to the VTR

Basically, an interface unit is required between the VTR when making an ATR-VTR system with the Model 4030. In cases where the interface unit is not used, the time code may not be read correctly. In regards to the time code, if it is not a deep layer recording compounded with the picture signal, and the VTR has no exclusive time code in/out terminals, it will be extremely difficult to handle. In other words, as the VTR has only 2 sound tracks, if one is used for the time code, the final tape will be monaural sound (time code is necessary until completion of copy back).

Furthermore, if the time code is to be deep layer recorded, by theory it must be recorded together with the picture signal. Therefore, the time code cannot be deep layer recorded on a tape already recorded with a picture.

In making a work tape for the U-matic from a one inch master tape during MA work in general post productions, the ideal method is to copy the time code at the same time. If the master tape time code is not continuous but broken at several points, a continuous time code in the JAM sync mode must be regenerated using a time code generator that is GEN locked and recorded in the work tape side. As the Model 8700 time code generator does not have the JAM sync function, a general type time code generator must be used.

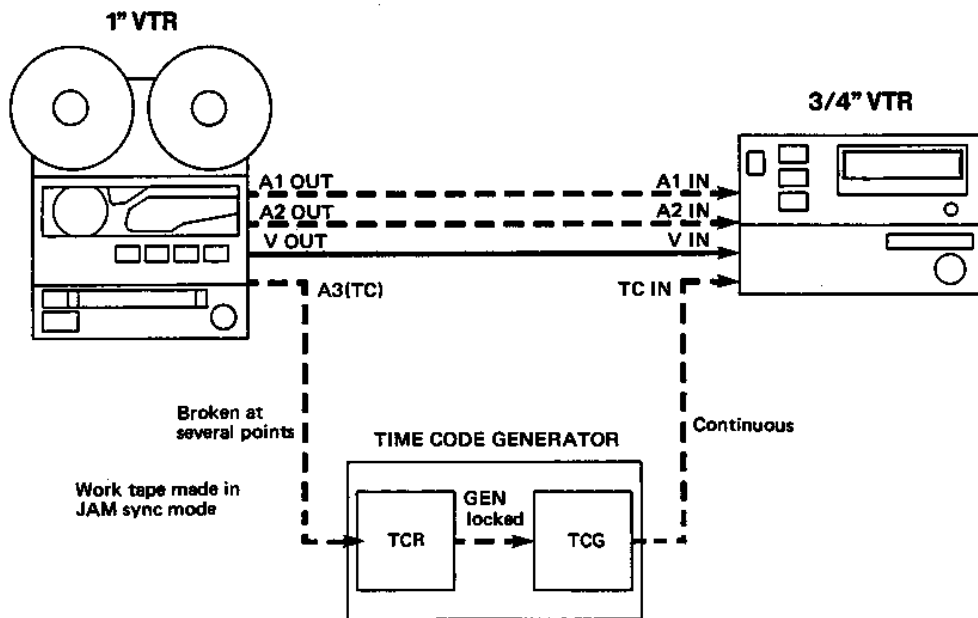
Even for a video tape with no time code recorded including a multi-magnetic layer recording, a simplified synchronous operation is possible by the following method.

If, instead of the time code signal, a composite video signal is input to the MASTER TIME CODE/VIDEO IN jack (9), the 4030 will automatically detect it and switch the internal circuit. In other words, the vertical synchronizing signal of the video signal, is picked out and processed as if

it were the time code sync pulse, thus making it possible to sync lock the slave deck.

However, this is nothing but a string of pulses and as it does not have the absolute address of a time code, the time code indicated on the display will be accepted as a new pulse and proceed straight forward when the master is rewound and played back again. The time code shown on the display, is simply the value being advanced at the input pulse rate and is not an absolute value.

This master time code can start from any value by using the Model 4035 Controller. The time code value is established by using the numerical key pad, then depressing STO [Reader Display Selector Master Code Key (16)] to register it as the master time code.



6. How to operate the 4035 controller

All functions of the Model 4030 Synchronizer can be controlled by the Model 4035 Synchronizer Controller by connecting it to the CONTROLLER receptacle (17) on the 4030 rear panel. Synchronized run only was explained at the basic connection in the previous section but as the time code value can be read by connecting the 4035 to the 4030, more complicated techniques become possible: Advancing the tape to any desired point (auto location), repeating the run between 2 preset points (auto return/auto play), auto punch in/out, etc. Moreover, a maximum 3 slave decks can be controlled by one Model 4035 Controller. Work efficiency is remarkably improved.

6.1 Connections (Building the system)

The cable for interconnecting to the 4030 is included in the 4035. With the 4030 power switched off, the connector with the 'ground' wire is plugged into the CONTROLLER receptacle (17) of the 4030. Be careful to plug the connector with the correct side at top. Then, lock the levers on both sides of the receptacle. Insert the 'ground' wire in the GND terminal (19) at the upper right of the receptacle and firmly tighten the screw.

Upon completing all interconnections, turn on the power.

The 4035 is initialized as follows immediately after the power is switched on.

* Time code display (21) = 00_H 00_M 00_S 00_F 00_{SF} [H: Hour, M: Minute,
S: Second, F: Frame, SF: Sub Frame]

* READER DISPLAY Indicator = MASTER

* Deck control selectors (7) = SLAVE 1

* Lock mode selectors = FRAME LOCK /AUTO LOCK

All other indicators will be off.

These are the software default values.

6.2 Remote control

The deck to be remote controlled is selected by the blue deck control selectors (7) at right center of the 4035 front panel. Select the master for this test. After depressing the MASTER and checking that its indicator is lit, depress [▶] Play among the yellow remote control buttons (1). The master recorder will go into the play mode and the master time code indicator (17) will be lit. If the READER DISPLAY indicator (16) for MASTER is lit, time codes from the master deck will be shown by the time code display (21).

6.3 Record mode

Depress the REC MODE button (6) and the MASTER LED, among the REC MODE indicators (20) at top right, will light, indicating record ready. While depressing REC, depress [▶] PLAY and it will start in the record mode. (Be careful not to erase the time code.)

The master and slave, respectively, are assigned to the REC mode. To record on SLAVE 1, select SLAVE 1 by the deck control selector (7), then depress the REC mode button (6). If you wish to simultaneously record both the master and slave 1, depress at the same time MASTER and SLAVE 1 in the deck control selector (7), then, depress the REC MODE button (6). If the REC MODE button (6) is depressed when the REC MODE indicator (20) is lit, the indicator is extinguished and recording is cancelled.

NOTE: The switches and indicators related to SLAVE 2 and SLAVE 3 will not operate unless the slave deck is actually connected. Although the 4035 can handle up to one master and three slave decks simultaneously, one Model 8710 expansion interface unit is required if you are going to run two or more slaves (two or more 4030's).

The slave deck can be remote controlled in the same way as mentioned in the master deck remote control example. Any desired deck can be remote controlled by presetting the Deck Control Select button (7). If more than one deck are to be remote controlled, preset by simultaneously depressing all desired buttons.

If you are running all slaves in chase mode, any command to the master (via the 4035 or directly on the master) will cause all slaves to follow. This feature may not work if you: 1) do not use a Fostex interface, 2) run a "code only" master, or 3) the transport of the master deck cannot supply all the motion information to the 4030 (typically VHS and Beta machines).

6.4 Cue memory

* Time code storing

The 4035 has 10 cue memories to store any desired time code values, and they are numbered from 0 to 9.

There are two methods for storing the time code. There is the method of directly storing the presently indicated master and slave time codes and the other is using the numerical key pad to set the time codes, then storing them in the memory.

Here is the first method:

- Step 1) Enter the master recorder in the PLAY mode.
- Step 2) Be sure the display is in NORMAL mode and depress the STO key to set the position while monitoring the tune or picture. The display will indicate the position at the instant the key was depressed.
- Step 3) The indicated data will be entered in the memory when the "0" key of the CUE memory is depressed and the display will return to the NORMAL mode.
- Step 4) After depressing the RCL key to set the CUE position while monitoring the picture or tune in the PLAY mode, depress the (.) DISP HOLD key and the CUE position can be held. While in this state, the value displayed at depressing the TRIM key can be corrected by the (+), (-) and other keys. When a new value is stored in the cue memory, the previously stored value in that cue memory will be erased. Also, this cue memory and (to be explained later) mentioned 'zone limit memory', 'auto return memory', etc. will not disappear when the 4030 power is switched off. These are called "Backed up memory."

* Here is the second method:

Example: Storing in cue memory 1, time code values -

00_H 12_M 34_S 12_F 3_{SF}

- Step 1) Depress the CLR key. READER DISPLAY (21) will all indicate "0" and the EDIT LED will be lit.

- Step 2) When a number is entered by the keypad, the blinking dot of the lowest digit will show this number.
- The number entered next will be shown at the second digit. A number from the keypad can be entered any number of times until the period (.) is depressed.
- Step 3) The blinking dot will shift to the next digit to standby for the next input when the (.) key is depressed. If there is no need to change the presently displayed number, simply depress the (.) key and it will go to the next digit in the input standby mode.
- Step 4) STO key is depressed upon completing the input of the numbers. The STO LED will then be lit, the dot will change from flashing to a continuous light and be at standby for input of the memory destination.
- Step 5) Memory destination is accomplished by the keypad. This completes the input procedure and the display will return to NORMAL mode.
- Step 6) If the input numbers are not correct (For example, 65 minutes or 70 seconds), depressing the STO key will show an ERROR on the display.

Example 1:

(*) indicates flashing of the dot.

	REAL:	HR	MIN	SEC	FRAME	SF
	1 2	3 4	5 6	1 2	3	
CLR	*0 0*	0 0.	0 0.	0 0.	0 0.	0
1	0 1.	0 0.	0 0.	0 0.	0 0.	0
2	1 2*	0 0.	0 0.	0 0.	0 0.	0
.	1 2.	0 0*	0 0.	0 0.	0 0.	0
3	1 2.	0 3*	0 0.	0 0.	0 0.	0
4	1 2.	3 4*	0 0.	0 0.	0 0.	0
.	1 2.	3 4.	0 0*	0 0.	0 0.	0
5	1 2.	3 4.	0 5*	0 0.	0 0.	0
6	1 2.	3 4.	5 6*	0 0.	0 0.	0
.	1 2.	3 4.	5 6.	0 0*	0 0.	0
1	1 2.	3 4.	5 6.	0 1*	0 0.	0
2	1 2.	3 4.	5 6.	1 2*	0 0.	0
.	1 2.	3 4.	5 6.	1 2.	0 0*	0
3	1 2.	3 4.	5 6.	1 2.	3*	0
STO	1 2.	3 4.	5 6.	1 2.	3	
n	To NORMAL mode					

Example 2:

(*) indicates flashing of the dot.

	HOUR	MIN	SEC	FRAME	SF
DATA	0 1	2 3	4 5	1 2	3
CLR	0 0*	0 0.	0 0.	0 0.	0
-	- 0 0.	0 0.	0 0.	0 0.	0
.	- 0 0.	0 0.	0 0.	0 0.	0
1	- 0 1*	0 0.	0 0.	0 0.	0
.	- 0 1.	0 0*	0 0.	0 0.	0
2	- 0 1.	0 2*	0 0.	0 0.	0
3	- 0 1.	2 3*	0 0.	0 0.	0
.	- 0 1.	2 3.	0 0*	0 0.	0
4	- 0 1.	2 3.	0 4*	0 0.	0
5	- 0 1.	2 3.	4 5*	0 0.	0
.	- 0 1.	2 3.	4 5.	0 0*	0
1	- 0 1.	2 3.	4 5.	0 1*	0
2	- 0 1.	2 3.	4 5.	1 2*	0
.	- 0 1.	2 3.	4 5.	1 2.	0*
3	- 0 1.	2 3.	4 5.	1 2.	3*
STO	- 0 1.	2 3.	4 5.	1 2.	3
n	To NORMAL mode.				

6.5 Recall

Step 1) RCL LED will be lit when the RCL key is depressed and will be at standby for input of the calling point.

Step 2) When either CUE memory, (+) PRE ROLL, (.) DISP HOLD, MASTER TIME, OFFSET, LOCATE, ZONE LIMIT, or AUTO RTN key is depressed, the 4030 will be at EDIT mode, and the display will show the memory content of the assigned mode.

CUE memory/LOCATE key: The memory position data will be displayed.

(+) PRE ROLL key: When this key is depressed, the PRE ROLL time will be displayed.

(.) key: Position data at the instant this key is depressed will be displayed in the current time.

MASTER TIME/READER DISPLAY button: When this button is depressed, MASTER TIME (Refer to item 5.2.4 for details on MASTER TIME) will be displayed.

OFFSET key: When this key is depressed, OFFSET time will be displayed.

ZONE LIMIT or AUTO RTN key: When either key is depressed, the section preset in CUE memory by n-m, will be displayed.

* Trimming the time code

Slight modifications can be made in the recalled data and stored in another cue memory. If an extensive modification is required, it is quicker if it is newly entered; but if it is a simple word, it can be done by depressing TRIM (14) and using the (+) and (-) keys.

Example: Changing 34S to 32S in the cue memory 1 content and storing it in cue memory 2.

Step 1) The display will automatically return to the previous indication if a certain length of time elapses after calling the cue memory.

Step 2) Depress TRIM button (14) and the red indicator will light.

Step 3) Repeatedly depress the (.) key to bring the blinking dot to the digit that must be changed. The digits that need not be changed will be skipped if the (.) key is depressed without entering any number.

Step 4) The numerical value will increase or decrease as the (+) or (-) keys are depressed.

The value will continuously change at slow speed if the (+) or (-) key is held down.

Step 5) The time code thus modified is stored in the cue memory.

Check the data thus stored by depressing the RCL key.

* Trimming the RCL and DISP HOLD

The time code value can be held at any point during tape run, for the purpose of editing.

Step 1) Depress RCL and (.)[DISP HOLD].

Step 2) This procedure will allow correcting the data as the display will be in the EDIT mode and the corrected data can be stored in any one of the memories; the locating point is set by depressing the LOCATE key (3).

Step 3) The display will be held by directly depressing STO at storing in the cue memory, but it cannot be EDITED.

6.6 Locating

The transport will automatically enter the F.FWD or REWIND mode and stop the tape at the preset point when the LOCATE switch is depressed.

Step 1) Depress the CLR key after selecting the deck by the Deck Control Select button.

Step 2) Depress the RCL key, then the required memory number "n" key.

Step 3) Tape will automatically locate the memory number "n" position when the LOCATE key (3) is depressed.

* Direct assigning of the point

Locating is possible without using the cue memory.

For instance, if the tape is to be located at 00^H 05^M 43^S 21^F 0^{SF}:

Step 1) Display these time codes by using the keypad -

CLR . . 5 . 4 3 . 2 1 .

Step 2) Directly depress the LOCATE key (3).

* AUTO PLAY

If the AUTO PLAY button (9) is depressed for the locating operation, the deck will automatically enter the play mode after stopping at the locate point.

6.7 AUTO RETURN and REPEAT

AUTO RETURN is the function of automatically locating the start of a section, preset by two CUE memory points, upon reaching the end point during the PLAY (or REC/PLAY) mode. In addition, it will go to the REPEAT mode if the AUTO PLAY button (9) is depressed.

Step 1) Depress the CLR key, then, keys (n), (-) and (m), in that order.

Step 2) Depress STO, then AUTO RTN to set the section by numbers (n) and (m) in the memory.

Step 3) When first the RCL, then the AUTO RTN keys are depressed, the display will show in what part of the CUE memory it is stored.

Step 4) The front and back relation between (n) and (m) will be determined automatically. Even though (n) and (m) are entered in reverse order, they will be correctly displayed at recall.

Step 5) If the LOCATE key is depressed, the tape will automatically locate to (n) which is the start of the section.

Step 6) Depress the AUTO PLAY button (9) for the REPEAT mode.

The tape will either locate the starting point of the AUTO RTN section, or, upon reaching the AUTO RTN end point in the PLAY mode, it will enter the REPEAT mode.

Step 7) Example of setting in memories 3 & 4

CLR	00. ^H	00. ^M	00. ^S	00. ^F	0 ^{SF}
3	03*	00.	00.	00.	0
-	3	-0			
4	3	-4*			
STO	3	-4			
AUTO RTN	To normal mode				

AUTO RTN can be set in different sections of the master and slaves but execution will take place only on the deck selected by the deck control selector (7). When in the synchronous run mode, the master deck operation will have priority, thus auto return of the slave will be pre-empted.

6.8 ZONE LIMIT

ZONE LIMIT is the function of limiting tape travel. For example, ZONE LIMIT can be used to keep the tape from winding off the end of the reel. For this purpose, we suggest you set the zone limits to about 15 ~ 20 seconds from each end of the tape. This feature can also be used to protect previously recorded sections. For example, if you have already used the first 5 minutes for one take and want to be certain that it won't be recorded over, all you do is set the beginning zone limit at 5 minutes, 15 seconds, and the end-of-tape zone limit 20 seconds from the end of the tape.

Following are the procedures for setting zone limits.

Step 1) Depress the CLR key.

Step 2) Enter the start and end of the section in the CUE memory.

Step 3) Depress these key in order: CUE memory (m), (-), then CUE memory (n). Be sure the relative position on the tape is that "m" is the start and "n" is the end.

Step 4) The section between "m" and "n" will be set by depressing the STO key and then the ZONE LIMIT key.

Step 5) The preset section in the ZONE LIMIT memory will be displayed by depressing the RCL key, then depressing the ZONE LIMIT key.

Step 6) Example of setting in memories 2 ~ 5.

CLR	00* ^H	00. ^M	00. ^S	00. ^F	0 ^{SF}
2	02.	00.	00.	00.	0
-	2	-0*			
5	2	-5*			
STO	2	-5			

ZONE LIMIT To normal mode

6.9 PREROLL

A position ahead of the locate position can be located by setting PREROLL for the LOCATE and AUTO RETURN modes. This PREROLL is inserted to prevent the tape from reaching the CUE point before it is fully locked. PREROLL time will be defaulted at "0" second when the work area is reset.

Step 1) Depress the CLR key.

Step 2) Enter the PREROLL time from the keypad. 0 through 59 seconds can be entered.

Step 3) Depress the STO key, then the PREROLL (+) key.

Step 4) The PREROLL time can be displayed by depressing RCL and (+).

Step 5) "0" (zero) will actually be stored when PREROLL time is reset to "0".

CLR STO + (PREROLL)

6.10 OFFSET

The tape can be locked with a fixed difference between the master and slave time codes. This difference is called OFFSET.

Offset is set as follows.

Example: The slave shall be set 10 minutes 30 seconds behind the master.

Step 1) The offset value is set and stored in the offset memory.

CLR - . . 1 0 . 3 0 . STO - (OFFSET)

As the slave time code is minus 10 minutes 30 seconds against that of the master, the offset value sign is minus. The (-) after CLR represents this sign. On the other hand, if plus (ahead) 10 minutes 30 seconds of the master time code is to be the slave time code, the offset sign must be (+). The plus sign can be omitted if necessary.

Step 2) Depress CHASE ENABLE (3) for the slave. The slave will start in the F.FWD or RWD mode and stop after a few moments. Depress the READER DISPLAY button (16) and set its LED to OFFSET. The value thus shown on the display is, not the offset memory content, but simply the time code difference between the master and slave. The polarity sign will be (+) if the slave time code is larger than the master, or (-) if it is smaller.

The offset value shown by the display should be very near to the value initially set. If you should watch the display during the synchronized run, notice that $-00^{\text{H}}10^{\text{M}}30^{\text{S}}00^{\text{F}}0^{\text{SF}}$ is shown and with the decks running, this difference is constantly maintained.

1) Simple method of offset storing

As the Model 8700 time code generator always starts from "0" (zero) when the power is switched on, time code starting from zero will be recorded on the slave tape.

After completing the recording, read the master (VTR) time code (near to the start) and stop it. Then, read the slave time code near the start and stop it. Using the READER DISPLAY selector (16), the difference (OFFSET) between the two time codes is put on display.

The last step is to enter this in the offset memory by depressing the STO and (-)OFFSET buttons.

2) Checking the OFFSET

The offset value stored in the offset memory will be checked here.
The RCL key is used.

RCL - (OFFSET)

3) Changing the OFFSET value

There are two methods for changing the previously set OFFSET value. One method is to change it directly by the keypad and TRIM button (14), and the other is making minute changes with the OFFSET TRIM button (13) while checking drift between the synchronized picture and sound. Here is the first method:

Example: Offset value shall be changed to 10 minutes 25 seconds 6 frames.

Step 1) The offset value is called in.

RCL - (OFFSET)

Step 2) The blinking decimal point is moved to the "S" digit by depressing the (.) key 3 times.

Step 3) (2)(5) is punched in from the keypad or after depressing the TRIM button (14), the (-) key is depressed 5 times to enter 25 in the "S" digit.

Step 4) Depress the (.) key once to move the blinking dot to "F". Then, enter "6" or depress TRIM and hit the (+) key 6 times.

Step 5) Always store in the offset memory after making changes.

STO - (OFFSET)

The following explanation (second method) is on how to delicately correct the offset value in real time by actually watching the picture to check the drift. (This is the same procedure as the Model 4030 offset adjusting function.)

Step 1) Run the master and slave in synchronization. Check for lighting of the LOCK ENABLE indicator (18).

Step 2) Depress the OFFSET TRIM button (13). The red indicator will be lit.

Step 3) Hold down the (+) or (-) key and the offset value will change in small increments. The (+) key is depressed to raise speed or the (-) key to slow the speed. The actual changes can be seen by putting the display in the offset indication mode.

This adjusting method is very delicate as it is the change in sub-frame units. The OFFSET TRIM indicator will blink during the change. When this method is used for changing, it need not be stored again in the offset memory.

4) Clearing the OFFSET

Either the 4030 offset CLEAR button is used or zero is stored to clear the previously set offset to zero.

Step 1) Depress the OFFSET MODIFY button.

Step 2) Depress the offset CLEAR button. OFFSET indicator (4) is extinguished to indicate that the offset has been cleared.

Step 3) If it is to be cleared from the 4035, 0 (zero) is stored.

CLR STO - (OFFSET)

When an offset within 2 seconds is cleared during the synchronized run, it will not be able to follow if the lock mode is in SYNC LOCK, and may run in synchronization at the offset value. In this case, either temporarily put the master in the stop mode or manually change the lock mode to FRAME LOCK.

6.11 Auto recording (Auto punch in/out)

During PLAY mode, it is possible to punch in and punch out at any point on the tape, automatically.

6.11.1 Setting CUE memory No. 8 and No. 9

1) Memory setting while monitoring the tune in PLAY

Step 1) Depress the STO key --- STO LED is lit and display will be in EDIT mode.

Step 2) The position on display will go into the memory and the display will return to NORMAL mode when key 8 (AUTO REC IN) is depressed.

Step 3) Repeat the operation for AUTO REC OUT (Key 9).

2) Setting of recording section by the keypad

Step 1) Depress the CLR key.

Step 2) Record section starting data is entered by the keypad and (.) period key.

Step 3) Depress the STO key (STO LED is lit) and put in memory by depressing key 8 (AUTO REC IN).

Step 4) Enter record end data by the keypad.

Step 5) After depressing the STO key, depress key 9 (AUTO REC OUT).

3) Method of trimming the record section by the TRIM key

Step 1) Depress the RCL key --- RCL LED lights.

Step 2) Depress key 8 to correct AUTO REC IN.

Step 3) Depress TRIM key (14) --- TRIM LED lights.

Step 4) The digits before the blinking dot is corrected by the (+) or (-) key.

Depress the (.) period key when the unit to be corrected is changed.

Step 5) Depress STO key to put into memory the corrected value.

Step 6) The procedure is the same for AUTO REC OUT.

6.11.2 Record track select

The deck to be used for auto recording is assigned by the deck control selector (7) and enters record ready. Recording is accomplished by depressing the REC MODE button (6) and the REC MODE indicator (20) for the assigned deck lights.

6.11.3 Rehearsal and the take

The 'rehearsal mode' is to check the in/out point or for practicing, and the 'take mode', for the auto recording function. In the rehearsal mode, the deck does not enter the recording mode and the monitor of the track set in the recording standby (ready) mode is switched to input. This function, however, is effective only in decks such as the Fostex Models B-16, B-16D, 80 and 20, in which the record ready tracks' monitor will switch to input even when the REC button only is depressed in the SYNC playback mode.

- Step 1) The 'take' is practiced several times in the rehearsal mode.
Depress the AUTO REC button (11). The green REHEARSAL LED will be lit.
- Step 2) The tape is advanced and stopped a short distance before the punch in point.
- Step 3) Depress (play button) only to start the deck in the play mode.
- Step 4) The green READY indicator lights at the punch in point. As the deck monitor will also switch to input, this point can be checked and you can practice your performance by listening to the track sound.
- Step 5) Then, the READY indicator will go off at the punch out point and the deck monitor return to (SYNC) playback.
If you should wish to slightly change the punch in/out point as a result of the rehearsal, it can be easily done by recalling cue memories 8 and 9, then using the TRIM button (14).

After rehearsal, you are now ready for the 'take.'

- Step 6) First, depress the (Play) button, and without releasing it, depress the REC (record) button (make it a habit to always depress the play button first).
- Step 7) The green REHEARSAL indicator at left of the AUTO REC button will go out and the red TAKE indicator lights.
- Step 8) The deck will enter the recording mode at the punch in point. This time, the red REC indicator only will be lit.
- Step 9) The deck will return to the play mode at the punch out point and both TAKE and REC indicators will go out.

6.11.4 Slave deck auto recording

The method of auto punch in/out at the slave during synchronized playback of the master and slave decks is explained in the following example.

The method of storing the punch in/out points is the same as explained before in item 6.11.3.

1) Rehearsal

- Step 1) The auto recording deck is selected by the deck control selector (7) and REC MODE button (6). Check the REC MODE LED to see that the correct slave deck has been selected.
- Step 2) Depress AUTO REC and the REHEARSAL LED will light.
- Step 3) Depress the buttons for both MASTER and SLAVE in the deck control selectors (7).
- Step 4) Depress the CHASE ENABLE button (3). The LOCK ENABLE indicator will light for the slave deck selected.
- Step 5) Locate and stop the master deck at about 10 seconds before the slave deck punch in time.
- Step 6) Run the slave deck until it reaches the master deck locate point and stops. Then, depress the (play) button (1).
- Step 7) The slave deck will enter the rehearsal mode at punch in and the record channel monitor will switch to input. At the same time, READY LED at left of the REC button will light.
- Step 8) The READY LED is extinguished at punch out and rehearsal is completed.

2) TAKE

- Step 1) With the decks set at the rehearsal mode, depress the (play) button.
- Immediately switch the deck control selector (7) to SLAVE and wait until the LOCKED indicator (18) is lit, and the REC and (play) buttons are depressed.

CAUTION: If the REC and (play) buttons are depressed for the TAKE mode, when the LOCKED indicator is not lit, the locating point is still far apart. As it is in the CHASE mode, the system reverts to the play mode at which it has to cancel the AUTO REC mode.

- Step 2) The REC LED at left of the REC button is lit at punch in and extinguished at punch out.
- Step 3) Auto recording is possible with more than one slave deck by the same method as above but each slave must be put in the TAKE mode by depressing the REC and button after selecting one slave by the deck control selector (7), then selecting the next slave deck by button (7) and depressing the REC and buttons. Each slave will then punch in and out automatically.

6.12 The lock mode

When the master and slave are in synchronized run, there are two modes of locking inside the synchronizer - FRAME LOCK and SYNC LOCK.

In the frame lock mode, the synchronizer directly compares the master and slave time code values to apply the lock. This is a very effective mode to make the slave chase the master upon detecting the big difference between the two time codes or quickly synchronize them by applying a strong lock. On the other hand, the lock will be too strong for regular sync operations and the master deck wow flutter will be transferred to the slave deck.

In the sync lock mode, the synchronizer applies the lock by detecting the phase only, not the time code value. For this reason, the master deck wow flutter rarely affects the slave. However, as it is not reading the time code value, it is unable to detect the time code difference, if any.

Each lock mode has its merits and demerits. The auto lock mode, then, comes into play which is in frame lock at start up or when in the chase mode but once the sync becomes stable, it automatically switches to the sync lock mode.

It will always switch to the optimum lock mode if the AUTO LOCK button is switched on at normal use and the switching action can be observed by the FRAME LOCK button and SYNC LOCK button indicators.

If it is necessary to manually switch the mode, the AUTO LOCK button must be momentarily switched off before the manual operation.

6.13 MASTER TIME

When the signal from the master recorder to the 4030 is not a time code but a timing clock such as a VTR video signal or the recorder reference signal (pilot tone), a MASTER TIME can be setup for convenience in locating.

At switch on of the 4030, the MASTER READER DISPLAY will show -

0^H 0^M 0^S 0^F 0^{SF}

If the recorder is started at an intermediate point in the tape, it will then be impossible to locate a position beforehand of 0 position (for example, if an attempt is made to locate 23^H 50^M, it will locate 23^H 50^M, which is near the end of the tape) but this problem can be solved by setting up the MASTER TIME.

Step 1) Depress the CLR key.

Step 2) Setup the MASTER TIME from the keypad.

Step 3) Depress the STO key.

Step 4) Depress the READER DISPLAY/MASTER TIME button.

Display of the MASTER TIME data in the memory

Step 1) Depress the RCL key.

Step 2) Depress the READER DISPLAY/MASTER TIME button.

Step 3) Data can be corrected as it is in the EDIT mode.

6.14 Operation by Master Code only

When an interface between the master video recorder and the 4030/4035 is not available, and the master recorder cannot be controlled from the 4035, the master recorder and slave recorder can be sync locked for the master recorder play mode only by making the following preparations and putting the slave recorder in the chase mode.

1) Install a dummy plug, with a jumper soldered-in between pins 7 and 17, into the multi-connector on the 4030 MASTER TRANSPORT CONTROL. This is to provide a master recorder phantom play tally signal to the 4030. The 4030 cannot read the time code unless this signal is provided.

This dummy plug (P/N 8245270000) will be supplied from the Service Department upon request.

2) Solder-in a jumper between pins 4 and 7 of U305 on the 4030 main board. When the play tally signal is sent to the 4030, it accepts the (1) SMPTE/EBU time code, (2) composite video signal and, (3) clock sync signal, in this sequence.

If noise or video signal leaks into the input when no time code is arriving, the 4030 could interpret this noise as a signal and malfunction. Therefore, pins 4 and 7 of U305 are jumpered so that signals other than the time code is not accepted and thus prevent malfunctioning.

The condition here, of course, is that a time code be recorded in the master recorder signal.

3) The above procedure on the U305 cannot be used when a time code cannot be recorded in the video recorder signal or a signal other than the time code (composite video signal or clock sync signal) must be used.

In such a case, the slave recorder cannot be used in the chase mode as it has no address such as in the time code, and the only alternative is to sync lock by matching the start point.

7. Trouble shooting

It is said that 90% of apparent equipment malfunctions are due to "Pilot error." Please check the Operating Manual once again before condemning an apparent malfunction as a breakdown. Fostex service stations are always prepared for questions from the users.

Troubles thought to occur most often are selected and listed below for your reference.

- 1) No power at depressing the power switch: Be sure the power cord plug is firmly plugged into the mains socket. This trouble occurs in surprising numbers.
- 2) Master and slave time codes cannot be read: Check the master and slave time code connections to see that the proper cable goes to the correct receptacle and the plug is not turned upside down. Also, check for the correct time code track and that the deck output is not in the input mode.
- 3) It does not seem to lock; it takes too long to lock: Are the LOCK ENABLE and CHASE ENABLE switched ON? It is difficult to lock by LOCK ENABLE only if the time code between master and slave is greatly offset.
- 4) It cannot lock because the slave deck speed is too fast (or too slow): Incorrect adjustment of the SERVO section located at the 4030 rear panel can be assumed. Read the setup section in the Owner's Manual and make readjustments.
- 5) There is a considerable difference between the location point and the actual stop point: Readjust the damping selector to match the deck in use. An error of 2 or 3 frames need not be heeded. Also, be sure you have not forgotten to set the proper preroll time.
- 6) Auto return does not function: Not only check auto return but also check whether the deck control selector is correctly selected.
- 7) The deck does not enter the input monitor mode at punch in: If it does not enter input at rehearsal too, it is possible that it is already at input and have switched to REPRO (playback) at punch in. In this case, put the deck in playback manually, then to punch in. Recorders other than Fostex may have design limitations and not function properly.
- 8) Time code cannot be trimmed: Each time code for the master, slave and offset are absolute values for those points and cannot be changed. Time codes stored in each memory are the only ones that can be changed.
- 9) Lock indicator is lit even though the time code value does not match: Do you remember that offset was set? Are you sure the lock mode is not in sync lock? Normally, the lock must be in auto lock.

8. The RS-232C option

An external computer, etc. can be connected to the 4030 at its rear panel communication receptacle (18) upon exchanging the internal ROM (Read Only Memory) with the optional ROM.

See your Fostex dealer or call Fostex service station for detail.

9. TECHNICAL INFORMATION Model 4030 Transport Interface

9.1 Interconnections

Connectors provided on the 4030 are, a reference signal (time code, video and pilot signals in case of a master, and time code signal for a slave) RCA pin jack pair (One jack of the pair is 'foldback') for each master and slave, and a 20 pin flat cable connector for the control signal. Following are explanations on how these connectors are utilized.

9.1.1 Equipments which can be connected

Fostex tape recorders provided with the synchronizer connector, listed below, can be directly connected to the 4030 using the Model 8540 cable set. The Fostex model numbers provided with this connector are:

A-20, A-80, B-16, B-16D, B-16M, E-2, E-22

These models can be connected either way as a master or a slave, and all functions of the 4030/4035 can be utilized. The content of the Model 8540 cable set is, a cable with RCA pin plugs for the reference signal and a 20 conductor flat cable with MIL spec 20-pin flat cable connectors on both ends. The length of both are 5 meters and the same pin numbers are connected with each other between the 20-pin connectors on both ends.

Tape recorders other than listed above can be used as a master if it can, at least, output a reference signal. The minimum requirement of a tape recorder to be used as a slave is the ability to be externally speed controlled electrically in the play mode, in addition to be able to output a reference signal. These minimum requirements are related to locking two transports in the play mode. If the control signal is not perfectly connected, functions other than this could be subjected to limitations. Connecting the reference signal only to use it as a master is called 'code only master'.

When it is necessary to make a connection other than the 'code only master' method with a transport not in the above listed "Fostex synchronizer models", a direct connection cannot be made with the 8540 cable and consequently, some form of interface adaptor is required.

Interface adaptors presently available or in the stage of development is listed in the "Interface List" (Please ask your Fostex dealer for this list). It must be noted that the functions of the 4030/4035 could be limited depending on the functional characteristics of some tape recorders.

9.1.2 Reference signal

As the reference signal is necessary to know tape positions in the play mode and for reference in measuring the tach pulse cycle, it must always be connected. Any one of the following for the master, and only (1) for the slave, must be applied.

(1) SMPTE/EBU specification time code

Nondrop frame

Drop frame

25 frame/sec

24 " "

100mVpp ~ 10Vpp

(2) Video signal

Composite video signal 0.5 ~ 2Vp-p

Composite sync signal 0.2 ~ 8Vp-p

(3) Pilot signal, 48 ~ 60Hz, sine or square wave, 0.2 ~ 8Vp-p

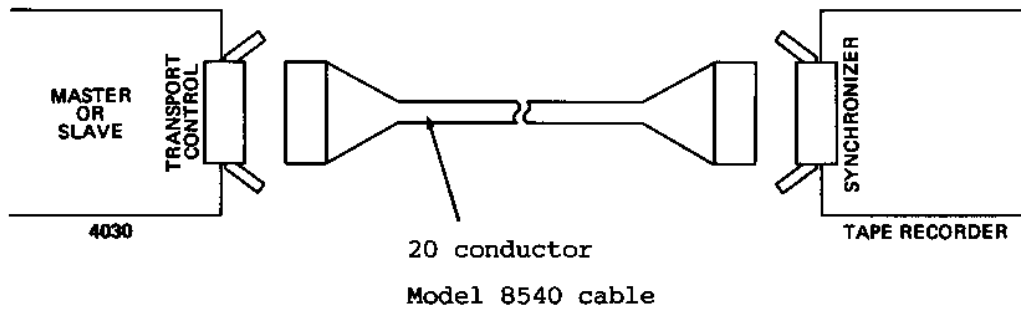
The reference signal must be the type which can display the playback speed of the recorder, etc. In short, the playback signal, of the above listed signal recorded on the tape, is normally input as the reference signal.

The foldback connector is directly wired to the code in connector and allows parallel access to the signal input at code in.

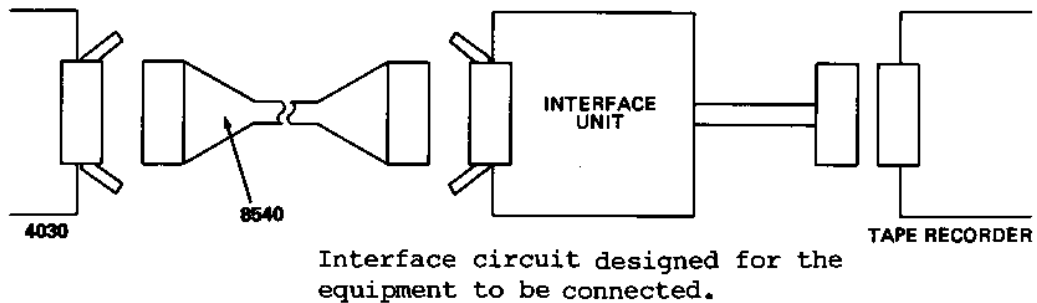
9.1.3 Control signal

CAUTION: Always switch off power to the 4030 and tape recorder when the connectors are plugged or unplugged. Also, do not switch on power before the SERVO TYPE switch is set according to type of slave to be used.

The 'Fostex Synchronizer Tape Recorders' listed in item 1.1 are connected as shown below.



The connection will be as shown below for those not in the above mentioned list.



CAUTION: Always set the SERVO TYPE switch (FREQ-VOLT) when the slave is connected. It must be set to VOLT when the slave playback speed control is by analog voltage, and FREQ when controlled by frequency. Fostex products must be set as listed below:

VOLT	FREQ
A-20	E-2, E-22,
A-80	B-16D, B-16M
B-16	

9.2 Control signal specifications

Control signal specifications and the in/out circuit schematic for the 4030 are detailed below for reference in assembling an interface.

The following signals are carried by the 4030 rear panel MIL spec 20 pin flat cable connector (male).

9.2.1 Logic input/output

- 1) Logic input terminal, Pin 1 ~ 3, 7 ~ 10, 18, 20

Input voltage range : 0 ~ 15V
Logic high level : Higher than 3.5V
Logic low level : Less than 0.8V
Low level input current (flow out) : About 0.5mA

Each pin of the terminal is connected to point (P), in the circuit schematic, through a 10K Ω , 1/8W resistor.

Status of the logic input signals

Pin No.	Name of signal	
1	Tach pulse	Signal for detecting tape speed. Whether at playback or fast winding modes, the pulse created at each given tape length is input here. Minimum pulse width (The shorter time of the high or low period) is 10 μ S. NOTE: Signals not created at a given length such as the reel rotation detecting pulse, cannot be used. Permissible frequency is, higher than 4Hz at playback and less than 5KHz at fast winding. Should this signal not be input, tape location display at fast winding, tape position display, locate, review and chase locate will not function.
3	Direction	Tape travel direction indicating signal. If tach pulse is to be input, this signal must also be input. The logic level at the normal tape direction, can be either high or low.

Status of the logic input signals

Pin No.	Name of signal	
7	<u>Play tally</u>	<p>These are low true signals to inform 4030 of the various modes the transport is in (Record Tally 1 only is high true). No definite interference in fundamental functions such as synchronize and locate will be encountered even though tape deck modes other than Play Tally is not input.</p>
8	<u>Stop tally</u>	
9	<u>Rewind tally</u>	
10	<u>Fast forward tally</u>	
2	<u>Record tally 2</u>	
20	<u>Record tally 1</u>	<p>The 4030 will not read the reference signal unless the play tally signal is true. Therefore, pin #7 must be fixed at zero volt (this potential need not be changed in accordance to the transport status) when the play tally signal from the transport is not connected.</p> <p>In a transport that can select the track to be put in the record mode, there are two conditions in the record mode - (A) any one track is selected and is in the record mode, or (B) no track has been selected. Record tally 1 represent the (A) condition. Record tally 2 is a signal which will be true when in the record mode, regardless to conditions (A) or (B).</p> <p>If a signal corresponding to record tally 2 only can be obtained from the tape transport, this should be applied to the record tally 1 pin.</p> <p>Pins not in use, must be fixed to false condition. False condition means, high level or open for low true signals and low level for high true signals.</p>

2) Logic output terminal, Pins 6, 13 ~ 16

Output circuit: Collector output, NPN transistor. This output is pulled up through a 10K Ω , 1/8W resistor connected to point (P) in the circuit schematic.

External pullup maximum voltage: +30V, recommended voltage, +5V.

Logic level output voltage: Less than 0.2V (At less than 10mA sink current).

Maximum sink current: 100mA

Pin No.	Name of signal	Low true command signals for various modes sent to the transport.
6	<u>Record</u>	
13	<u>Rewind</u>	
14	<u>Stop</u>	
15	<u>Fast forward</u>	
16	<u>Play</u>	

3) Pullup supply terminal

Input voltage range: 0V ~ 15V or open

Recommended voltage: 5V

Current : Maximum 6mA (At 5 volts)

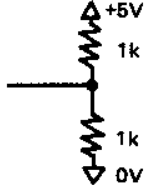
All logic input and logic output terminals are pulled up by 10K Ω resistors.

If a voltage lower than the voltage deemed logic high is applied to the transport side input circuit or it is set open, switching on the transport power and switching off power to the 4030 may result in unusual behavior of the transport.

9.2.2 Slave speed control, Pins 5, 11, 12

These are connected to the slave transport control connector only. These pins at the master are not connected.

Care must be taken in setting the servo type switch (FREQ-VOLT) as the tape recorder operation will differ between the two positions.

Pin No.	Name of Signal	Servo Type	
12	Servo out	VOLT	<p>Analog voltage output for speed control</p> <p>Load resistance : More than 10KΩ</p> <p>Output voltage range: -14V ~ +14V (No external pullup) ~ +18V (External pullup=24V, 1.5KΩ)</p>
		FREQ	<p>Frequency output for speed control</p> <p>Output voltage high: Higher than 4V (These low : Lower than 0.2V voltages against the load shown in circuit below):</p> <p>Output freq. range: 2KHz ~ 30KHz</p> <div style="text-align: right;">  </div>
			<p>NOTE: At either VOLT or FREQ, it will be zero volt when servo is off (when 4030 is not controlling the speed)</p>
5	Servo X	VOLT	Connected to the analog voltage input circuit GND of the transport.
		FREQ	No connection.
11	Servo Y	VOLT	<p>External pullup terminal of analog output voltage</p> <p>If the servo out positive output voltage (Max. about 14V) is insufficient, it can be pulled up externally. The external voltage must be less than 24V. Be sure it is applied to the 4030 through a series resistor to limit the sink current to less than 5mA.</p> <p>Leave this open if external pullup is not used.</p>
		FREQ	This is connected to 0V through a 3.3K Ω resistor at assembly. This has no meaning as a signal.

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