

Chapter 5 - General Operations

Using this Chapter...

Each ZETA-THREE operator function is described in this chapter. Many sections of this chapter begin with a list of Group Selections and/or Menu numbers to be accessed, and keys to be pressed, to implement the function being discussed.

NOTE

IT IS ASSUMED THAT THE USER IS COMFORTABLE
WITH ALL THE FUNCTIONS AND OPERATIONS
DISCUSSED IN CHAPTERS 2, 3 AND 4.

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5.1 Reading Time Code

5.1.1 Reading Master Time Code

To read Master Time Code, the time code output of the tape transport must be connected to the MTC IN jack [29] on the ZETA-THREE's rear panel. When the master tape is playing, the ZETA-THREE will read time code from the tape and display the numbers in the M_TC Selection.

The master transport does not need to be ENABLED when the ZETA-THREE is reading time code. M_TC will always display time code numbers which are coming in through the MTC IN jack.

5.1.2 Reading Slave Time Code

To read Slave Time Code, the time code output of the tape transport must be connected to the STC IN jack [31] on the ZETA-THREE's rear panel. When the slave tape is playing, the ZETA-THREE will read time code from the tape and display the numbers in the S_TC Selection.

The slave transport does not need to be ENABLED when the ZETA-THREE is reading slave time code. S_TC will always display time code numbers which are coming in through the STC IN jack.

5.1.3 Tach/Control Track Updating

Many transports do not recover time code at other than play speed. If time code is being read from a transport while it is in Play, and that transport is put into Rewind, time code will disappear providing that: the transport's time code channel is not wide-banded; tape lifters operate (ATRs); or the tape unwraps (VCRs). In such a situation, the ZETA-THREE will update the last accurately read time code address by counting incoming control track or tach pulses from the transport, if control track/tach and direction lines from the transport have been properly connected to a transport connector on the rear panel of the ZETA-THREE. When tach/control track updating is taking place, the M_TC (or S_TC) Selection will show a "T" at the extreme right of the display.

5.2 Operating the Time Code Generator

Basic time code generation and recording, and the external connections used therein, are described in Section 4.2. This section describes additional generator operation. Any additional cables needed for a given procedure are listed.

5.2.1 Generator Preset

Access Selection: G_TC
Press keys: CAPTURE

If a time code address has been entered into the G01 display, then pressing CAPTURE while G TC is displayed causes the ZETA-THREE to copy the number from the G01 PRESET Menu to the G_TC display.

5.2.2 Resolving the Generator to an External Source

Access Selection: none

Access Menu number: Z05, Z06. Set Z05 to SYSTEM=RESOLVED;
set Z06 to resolve reference choice.

Press key(s): GEN COPY

NOTE

Setting Z05 to SYSTEM=RESOLVED resolves the entire system, not merely the time code generator. This has important implications for the use of video tape recorders as explained later in this section.

Time code must be generated at a specific rate. In the ZETA-THREE, this rate is derived either from an internal quartz crystal (Z05 SYSTEM=UNRESOLVED, the default condition), or, if the entire ZETA-THREE system has been resolved, from an external reference (Z05 SYSTEM=RESOLVED). This reference can be:

- 1) a video signal from a sync pulse generator (composite video, composite sync, black burst, bars).

This signal is fed to the ZETA-THREE through either of its rear panel's VIDEO IN jacks. The other VIDEO IN loopthrough jack is provided either to output the video signal to additional video equipment or to terminate the video signal by a 75 Ohm load.

- 2) the "video out" signal from a video transport. THIS REFERENCE MAY BE UNSUITABLE IF THE VIDEO IS AT ALL UNSTABLE.

This signal is fed to the ZETA-THREE through either of its rear panel's VIDEO IN jacks. The other VIDEO IN loopthrough jack is provided either to output the video signal to additional video equipment or to terminate the video signal by a 75 Ohm load.

- 3) composite sync from an Adams-Smith MODEL 2600 RG Reference Generator.

This signal is fed to the ZETA-THREE through either of its rear panel's VIDEO IN jacks. The other VIDEO IN loopthrough jack is provided either to output the video signal to additional video equipment or to terminate the video signal by a 75 Ohm load.

- 4) mains (AC line) frequency.

When resolved to MAINS, the ZETA-THREE automatically derives a reference rate of 30 frames per second (60Hz mains) or 25 fps (50Hz mains).

- 5) a square wave or pulse signal.

The signal is fed to the ZETA-THREE rear panel's AUX IN jack. Resolving the system via the AUX IN jack is very unusual; an example of its use would be setting up to generate off-speed time code.

One example of the need to resolve the ZETA-THREE system when generating time code is when recording new time code on video tape. In this case, a video sync reference (see above) must be fed to the ZETA-THREE (see above), and the same reference must be used as an external reference for the video tape recorder on which the time code the time code is to be recorded. This will insure that both the ZETA-THREE's time code generator and the video recorder are operating at the same rate, and that the frame edges of the newly generated time code accurately coincide with the frame edges of recorded video.

To resolve the ZETA-THREE (to a video signal, for this example):

- 1) set Menu number Z05 to SYSTEM=RESOLVED. If no external reference has been fed to the ZETA-THREE, the XREF status LED will begin to blink unless Z06 RESOLVE=MAINS.
- 2) Set Z06 to RESOLVE=VIDEO (default setting) if it has not already been done. If no external reference has yet been fed to the ZETA-THREE, the XREF status LED will blink.
- 3) If it has not yet been done, feed an external reference (as described above) to the ZETA-THREE. Once the external reference connection is made, the XREF LED will turn on solidly.
- 4) Set Z04 to the rate compatible with the standard of the incoming video sync reference.
- 5) Set up for striping time code as explained in previous sections. When GEN RUN is pressed, the newly generated time code sent out through the GEN CODE OUT jack will be at the same rate as the video reference, and will have frame edges aligned to those of the reference.

5.2.3 Generating Time Code

Access Selection: G_TC

Access Menu number: G01, Z04. Set G01 to desired preset; Set Z04 to desired frame rate.

Press keys: GEN RUN

The ZETA-THREE is always generating time code, whether or not the generator is "running". If the generator is not running, the same time code address is generated continuously.

See section 4.2 for instructions on generating time code.

5.2.4 Generating User Bits

Access Selection: G_UB. Set to desired User Bit information (see below).

Access Menu number: none

Press keys: GEN RUN

In addition to always generating time code, the ZETA-THREE will also generate user bits. The user bits generated may be any eight hexadecimal digits, and those eight digits are a part of each time code address that the generator generates.

Enter the desired user bits information into the G_UB display (default: 00:00:00:00) by CURSORing and Indexing. Whatever is set into the G_UB Selection will be generated as a part of the time code.

5.2.5 Copying Time Code and/or User Bits

Access Selection: none

Access Menu number: G02, G03. Set copy mode in G02; set copy choice in G03.

Press keys: GEN COPY

Sometimes it is convenient to copy time code from one tape to another. For example, when preparing tapes for synchronizing with a zero offset (S_OFS = 00:00:00:00), the exact same time code number stream must be on both tapes; if one tape already has time code on it, that time code can be copied to the other tape.

The ZETA-THREE provides two types of copy modes, Jam Sync and Transfer. In both modes, the ZETA-THREE reads the incoming time code number stream (from the left-most ENABLED device) and generates a new, but identical time code number

stream. The user bits from the same time code source may also be copied, if desired (see below).

There is only one difference between jam syncing and transferring, but it is a very significant one.

When jam syncing, if the COPY source stops, the newly generated time code (and user bits, if desired) will continue to be output through the GEN CODE OUT jack, continuing the time code number sequence without skipping or pausing.

Jam syncing can be used to reconstruct defective sections of time code on a tape. The tape is positioned at the start of the earliest sequence of good time code and is copied in the jam sync mode. When the copy source time code fails at the defective section, the new time code will continue the original time code sequence.

When transferring, if the COPY source time code sequence stops, the newly generated time code sequence will also stop. If the source sequence starts again, the newly generated time code sequence will also continue, and will again output the COPY source time code number stream.

To copy time code, connect the "time code out" or "audio out" jack of the device from which time code is to be copied to either the ZETA-THREE's MTC IN or STC IN jack. Then connect the ZETA-THREE's GEN CODE OUT jack (through which the new copy of the time code is to be generated and sent) to the "time code in" (or "audio in") jack of the machine which is to record the copied time code. The addresses coming from the GEN CODE OUT jack can then be recorded onto tape in the same manner that was described in section 4.2.

5.2.5.1 Copying

Access Selection: none

Access Menu number: G02, G03. Set G02 to copy mode choice;
set G03 to copy choice.

Press key(s): GEN COPY

ENABLE only the transport which contains the original time code, and rewind it to the beginning of the time code numbers which are to be copied.

When GEN COPY is pressed:

- 1) If G03 COPY=TIME CODE, new first-generation time code, exactly COPYING the time code of the copy source, will be sent out through the GEN CODE OUT jack.

The newly-generated time code will contain the user bit information entered in the G_UB Selection display.

- 2) If G03 COPY=USER BITS, newly generated time code, starting with the time code address entered in the G_TC display will be sent out through the GEN CODE OUT jack. This time code will contain the exact same user bit information as was contained in the user bits of the copy source.
- 3) If G03 COPY=TC AND UB'S, newly generated time code, containing the exact same time code number stream and user bit information as is contained in the copy source, will be sent out through the GEN CODE OUT jack.

5.2.5.2 Resolving when Copying

When copying time code from a video recorder to another video recorder, recommended practice is to reference the ZETA-THREE to the same video rate signal as the source is referenced to. This may be accomplished by resolving the ZETA-THREE to composite video from the source transport, or, more elegantly, by resolving the ZETA-THREE to an external video rate reference signal which is also fed to both video recorders.

When copying time code from an audio recorder to a video recorder, it is recommended practice: to resolve the ZETA-THREE to a video signal; to feed the same external reference to the video recorder; and to resolve (synchronize as a slave) the audio recorder to the same reference signal.

When copying time code from a VTR to an ATR, or from one ATR to another, the ZETA-THREE may be run unresolved.

5.3 Transport Control from the ZETA-THREE's Front Panel

Through the use of the SYSTEM key, it is possible to send commands to the left-most ENABLED device. All possible commands are listed in this section.

5.3.1 Stop and Play Commands

Access Selection: none

Access Menu number: none

Press keys: SYSTEM STOP/CONT

The SYSTEM STOP/CONT key is a two-way toggle. Pressing SYSTEM STOP/CONT sends either a Stop or Play command to the left-most ENABLED transport.

If the transport is Stopped (or Paused), pressing the SYSTEM STOP/CONT will cause its amber LED to blink, indicating that the ZETA-THREE has issued the command to the transport but it has not yet begun to Play. When the transport reaches Play speed, the amber LED on the SYSTEM STOP/CONT key will light solidly. An ENABLEd slave will follow, synchronize, and maintain synchronism.

If the left-most ENABLEd transport is in Play, pressing the SYSTEM STOP/CONT key will turn off its amber LED and will Stop (or Pause) the transport.

5.3.2 The GOTO Command

Access Selection: Z_GO

Access Menu number: none

Press keys: SYSTEM GOTO [SHIFT SYSTEM STOP/CONT]

The SYSTEM GOTO address may be either entered or CAPTUREd into the Z_GO Selection display.

Entering an address directly into the Z_GO Selection is accomplished by CURSORing and Indexing.

To capture a number into the Z_GO Selection display:

- 1) Access the Z_GO Selection display.
- 2) Press the CAPTURE key. The number which is in the left-most ENABLEd transport's Time Code Selection (either M_TC or S_TC) will be copied into the Z_GO Selection whenever the CAPTURE key is pressed.

NOTE

For the purpose of capturing an address in the Z_GO Selection display, the ZETA-THREE will default to capturing from the M_TC display if none of the ENABLE keys have been pressed.

NOTE

The address in the Z_GO Selection display will automatically adjust to left-most ENABLEment. For example, if only the Slave had been ENABLEd, and the GOTO address captured from Slave time code, the address will change when the

Master transport is ENABLEd. The new GOTO address will be the captured-from-slave address adjusted by the offset value in the S_OFS Selection display.

Pressing the SYSTEM GOTO key, once a GOTO address has been either entered or CAPTUREd, will cause its red LED to light and the left-most ENABLEd device to GO TO (cue to) the GOTO address (cue point). An ENABLEd slave will follow a cueing ENABLEd master, and the CHASE status LED will turn on. When both transports have stopped after cueing, the CHASE LED and the red SYSTEM GOTO LED will both turn off.

If it is desired to stop the left-most ENABLEd transport while it is cueing to a Z_GO address, press the SYSTEM GOTO key again (it is a two-way toggle). Its red LED will turn off and the transport will stop.

The left-most ENABLEd transport may be put into Play immediately upon reaching the SYSTEM GOTO address; this is called Play Preset. To invoke Play Preset:

- 1) press SYSTEM GOTO. Its red LED will light solidly and the left-most ENABLEd transport will begin cueing.
- 2) after SYSTEM GOTO has been pressed (Step 1 above), press the SYSTEM STOP/CONT key. Its amber LED will blink, and the transport will continue to cue. When the transport has parked at the Z_GO address, the SYSTEM GOTO key's red LED will turn off, the transport will begin to play, and the SYSTEM STOP/CONT key's amber LED will light solidly.

5.3.3 LOOPing

Access Selection: Z_GO, Z_END. Enter or CAPTURE the starting address of a Loop into the Z_GO display; enter or CAPTURE the ending address of a Loop into the Z_END display.

Access Menu number: Z03. Index to desired Loop type.

Setting the LOOP function determines the action of the left-most ENABLEd transport between the Z_GO and Z_END points.

When set to CYCLE, the ZETA-THREE, upon the left-most ENABLEd transport's reaching the Z_END address, will cue the left-most ENABLEd transport to the Z_GO address, and will then put the transport into Play. The transport will play until the Z_END address is reached, and then repeat the cycle. The cycle will continuously repeat until stopped.

NOTE

If any other device is ENABLEd, the left-most ENABLEd device, while cycling, will wait for the other devices to chase and park before returning to Play from a cued position.

When set to AUTO REWIND, the ZETA-THREE, upon the left-most ENABLEd transport's reaching the Z_END address, will cue the left-most ENABLEd transport to the Z_GO address, and park the transport there. Press SYSTEM STOP/CONT to repeat the sequence.

When set to AUTO STOP, the ZETA-THREE, upon the left-most ENABLEd transport's reaching the Z_END address, will stop the transport and park it. Press SYSTEM GOTO, and then SYSTEM STOP/CONT (to invoke Play Preset) to repeat the sequence.

To stop or interrupt a CYCLE:

- 1) while cueing is taking place and Play Preset is invoked (SYSTEM GOTO red LED lighted and SYSTEM STOP/CONT amber LED blinking), a cycle can be stopped by pressing SYSTEM GOTO again. Both LEDs will turn off and the transport will stop. Cycling will resume if the SYSTEM GOTO key is pressed again.
- 2) while cueing is taking place and Play Preset is invoked (SYSTEM GOTO red LED lighted and SYSTEM STOP/CONT amber LED blinking), the cycle can be stopped by pressing SYSTEM STOP/CONT. The red LED will turn off, the amber LED will light solidly, and the transport will go into Play.
- 3) while the transport is in Play (amber LED on solidly), the cycle can be stopped by pressing SYSTEM STOP/CONT. The amber LED will turn off and the transport will stop.

5.4 Synchronizing

The ZETA-THREE is capable of synchronizing one slave transport to one master. Basic synchronizing operation is described in section 4.5. The following sections describe specific requirements for synchronizing various combinations of audio and video transports.

5.4.1 Generator as Master

It is possible to use the ZETA-THREE's time code generator as the master for a synchronized slave. This procedure is useful when first setting up a synchronizing system, as it removes one complete set of variables (i.e., quality of master time code, master cable, etc.). To make the ZETA-THREE's time code generator the master:

- 1) Access menu number M01 and set its display to MASTER=GENERATOR.
- 2) Enter or CAPTURE an appropriate offset to prevent the slave from winding its tape off the reel while attempting to cue and park.
- 3) Press ENABLE MASTER and ENABLE SLAVE. The slave will cue to the G_TC address and park.
- 4) Access G_TC; the time code addresses appearing in this display will be considered master time code by the ZETA-THREE. Press either GEN RUN or SYSTEM STOP/CONT; the ZETA-THREE will now synchronize the slave transport to the time code generator.

As an alternative to Steps 1 through 4:

- A) route time code from the ZETA-THREE's GEN CODE OUT jack to the MASTER CODE IN jack.
- B) enter or CAPTURE an appropriate offset.
- C) access M_TC or G_TC to observe master time code.
- 3) Press ENABLE MASTER and ENABLE SLAVE. The slave will cue to the M_TC/G_TC address and park.
- D) press GEN RUN. The ZETA-THREE will synchronize the slave to master time code (which, in this case is also the generator time code).

5.4.2 Transport as Master (one ZETA-THREE)

When using one Zeta-Three to synchronize a slave transport to a master transport, the following cables must be used:

- 1) The slave machine requires a ZETA-THREE interface cable between the slave transport and the ZETA-THREE's SLAVE TRANSPORT Connector.

- 2) An appropriate cable from the time code channel on the slave transport must be connected to the SLAVE CODE IN jack.
- 3) An appropriate cable from the time code channel on the master must be connected to the MASTER CODE IN jack.
- 4) If time code is not available at other than play speed (the master transport time code recovery amplifier is NOT wide-banded, and/or its tape does not remain against its heads during Fast Forward and Rewind), then tach (or control track) pulses, a direction signal, and a ground connection from the master transport must be sent to the ZETA-THREE's MASTER TRANSPORT connector. This wiring can be provided by a ZETA-THREE interface cable.
- 5) If it is desired to control the master transport with the ZETA-THREE's STOP/CONT and GOTO keys, a ZETA-THREE interface cable is **required** between the master transport and the MASTER TRANSPORT Connector.

5.4.2.1 Audio to Audio

To synchronize an audio slave transport to an audio master transport:

- 1) Set frame rate for system (Menu number Z04) to conform to proper local standard (any NTSC rate or 25-frame PAL).
- 2) Confirm that the system is not resolved to an external reference (Menu number Z05 SYSTEM=UNRESOLVED).
- 3) Ascertain that both master and slave tapes have been properly prepared for synchronizing; with a sufficient amount of known-good time code.
- 4) Make the proper ZETA-THREE interface cable connections between the transports' connectors and the ZETA-THREE's MASTER TRANSPORT and SLAVE TRANSPORT connectors.
- 5) Make the appropriate time code connections between the transports and the ZETA-THREE's MASTER CODE IN and SLAVE CODE IN jacks.
- 6) Press ENABLE MASTER. Confirm that master time code is appearing in the M_TC Selection during Play, Fast Forward and Rewind. Confirm that the

transport obeys SYSTEM STOP/CONT and SYSTEM GOTO commands. Confirm that tach/control track pulse updating is occurring correctly. Disable Master, press ENABLE SLAVE and repeat confirmation sequence.

- 7) Access the S_OFS Selection and enter or CAPTURE an acceptable offset between master and slave time codes.
- 8) Press both ENABLE MASTER and ENABLE SLAVE to initiate master transport control and synchronization of the slave.

5.4.2.2 Audio to Video

To synchronize an audio slave transport to a master video transport, follow Steps 1 through 8 in Section 5.4.2.1, except:

in Step 1, set frame rate for system (Menu number Z04) to either NTSC video rate, or to 25-frame PAL.

if an external video rate reference is available, it is recommended that it be fed to the video master (if the transport can accept it) and to the ZETA-THREE. This will ensure that the sync word of the time code on the audio tape will synchronize to the video frame edge, instead of to the sync word of the master time code (which may not be properly aligned to the video frame edge). If using an external reference, set Z05 SYSTEM=RESOLVED (Step 2), and set Z06 RESOLVE=VIDEO.

NOTE

If no external video rate reference is available, connect the Video Out of the master video machine to one of the VIDEO IN jacks of the ZETA-THREE, and connect the other VIDEO IN jack to the video monitor (or terminate it). If the video out is stable enough, this may be adequate as a system reference.

5.4.2.3 Video to Video

To synchronize a video slave transport to a master video transport, follow Steps 1 through 8 in Section 5.4.2.1, except:

in Step 1, set frame rate for system (Menu number Z04) to either NTSC video rate, or to 25-frame PAL.

feed the same external video rate reference to both video transports; this will insure that synchronism is not lost due to differences between the two transports' internal crystals. In addition, it is recommended that the same reference signal be fed to the ZETA-THREE (it may be looped through the ZETA-THREE on the way to one of the transports), to ensure that the sync word of the time code on the slave tape will synchronize to the video frame edge, instead of to the sync word of the master time code (which may not be properly aligned to the video frame edge). If feeding an external reference to the ZETA-THREE, set Z05 SYSTEM=RESOLVED.

NOTE

Some less expensive VTRs do not have sync inputs BUT some of these will lock to a video signal fed into their Video Input jacks. Rarely do the VTR manuals mention this feature.

Synchronizing two video machines without external sync, or using VTRs which do not accept an external sync reference, MIGHT work, but the situation is MARGINALLY ADEQUATE. If it is necessary to synchronize two video machines on a frequent basis, proper video machines should be used.

5.4.3 Synchronizing to an External Reference

Synchronizing an audio transport to an external sync reference is known as resolving. To resolve an audio transport, follow Steps 1 through 8 in Section 5.4.2.1, except:

in Step 2, set Z05 SYSTEM=RESOLVED.

if the external reference is mains frequency, set Z06 RESOLVE=MAINS.

if the external reference is a video rate reference signal, it must be fed to one of the ZETA-THREE's VIDEO IN jacks, and terminated at the other. Set Z06 RESOLVE=VIDEO.

if the external reference is to be a waveform from a function generator, set Z06 RESOLVE=AUX IN.

in Step 3, be concerned only with the preparation of the tape for the transport which is to be resolved.

in Step 4, connect the proper ZETA-THREE interface cable to the ZETA-THREE's SLAVE TRANSPORT connector.

in Step 5, connect the transport's time code output to the ZETA-THREE's SLAVE CODE IN jack.

in Step 6, confirm time code in the S_TC Selection only. Confirm SYSTEM STOP/CONT and SYSTEM GOTO commands for ENABLED slave transport only.

skip Step 7.

in Step 8, ENABLE slave only.

NOTE

The transport will resolve if it receives a Play command from the ZETA-THREE but not if it receives a Play command from its own control panel.

5.4.4 Resolved Transport as Master (two ZETA-THREEs)

It may occasionally be necessary to synchronize a slave transport to a master transport which is itself being resolved to an external reference. An example of this would be synchronizing a slave video transport to a master audio transport. Since the slave video transport will be locked to its own servo when playing after address synchronism has been achieved (or to an external reference, if frame-edge alignment is required), it is necessary to force the audio master to run at the same video rate (by resolving it) when playing. In this configuration, one ZETA-THREE would be used to resolve the master transport, and another ZETA-THREE would be used to synchronize a slave transport to the master.

To synchronize a video slave to a resolved audio master:

- 1) prepare the master audio transport to be resolved by one of the ZETA-THREEs, as described in Section 5.4.3. Note that this transport must be considered the slave of the ZETA-THREE which will be resolving it, notwithstanding the fact that it is the master transport in the overall synchronizing system.

- 2) feed the same external reference (to which the master is being resolved, and which should by this point have been fed to the resolving ZETA-THREE) to both the other ZETA-THREE (the synchronizing ZETA-THREE) and the video slave transport.
- 3) in the resolving ZETA-THREE, set G02 COPY MODE=XFER. Set G03 COPY=TIME CODE. Establish proper connections between the GEN CODE OUT jack of the resolving ZETA-THREE to the MASTER CODE IN jack of the synchronizing ZETA-THREE. Press GEN RUN, ENABLE SLAVE, and then SYSTEM STOP/CONT on the resolving ZETA-THREE to put the master transport into Play. Master time code will appear in the MTC Selection of the synchronizing ZETA-THREE.

NOTE

Remember that in this configuration, the master transport is the resolving ZETA-THREE's slave transport, and that there will be no ZETA-THREE interface cable between the master transport and the synchronizing ZETA-THREE. Therefore, to play, stop, or cue the master transport, it is necessary to ENABLE the slave transport of the resolving ZETA-THREE and use its SYSTEM STOP/CONT and SYSTEM GOTO keys.

- 4) prepare the slave video transport to be synchronized by the other ZETA-THREE, as described in Section 5.4.2.3. When this has been accomplished, pressing ENABLE SLAVE on the synchronizing ZETA-THREE will allow the slave transport to be played, stopped or cued by the synchronizing ZETA-THREE's SYSTEM STOP/CONT and SYSTEM GOTO keys. Pressing both ENABLE MASTER and ENABLE SLAVE on the synchronizing ZETA-THREE will allow synchronizing to begin. Be sure that a proper offset between master and slave time codes has been entered or CAPTURED into the S_OFS display of the synchronizing ZETA-THREE.

5.4.6 Lock Modes

When synchronism of a slave transport to its master has been achieved, the slave is said to be "locked" (as indicated by the ZETA-THREE's LOCK status LED). The ZETA-THREE has three lock modes, Address, Freewheel and Auto, selectable via Menu number S01 LOCK MODE.

5.4.6.1 Address Mode (default)

Address Mode (S01 LOCK MODE=ADR) is used under normal synchronizing situations, with both master and slave tapes containing known-good time code throughout. In Address Mode, the ZETA-THREE uses both time code addresses and frame edge references when maintaining the slave transport in synchronism with its master. Slave time code is specifically related to master time code, and the relationship is defined by the offset. The slave frame edge reference is derived from slave time code, and the master frame edge is derived either from master time code or from an external video sync reference.

Address mode is used for most transport-to-transport synchronizing, and provides lock accuracy to 1/1000 of a frame.

5.4.6.2 Freewheel Mode

In Freewheel Mode (S01 LOCK MODE=FWL), the ZETA-THREE refers only to master and slave frame edges when synchronizing; time code address numbers on both tapes are ignored. As with the address mode, the slave frame edges are derived from slave time code, and master frame edge is derived either from master time code or from an external video rate reference. When synchronizing in Freewheel Mode, the slave transport will run at the same speed as its master, but, since time code addresses are ignored, there will be no specific positional relationship between master and slave and therefore no meaningful offset.

When Freewheel Mode is invoked, and both master and slave transports are ENABLED, the ZETA-THREE will locate the nearest time code frame edge on the slave tape and lock it to the next master frame edge it receives.

Freewheel Mode is occasionally used to resolve an audio tape recorder to an external source of time code. When resolving to an external video rate reference with the ZETA-THREE, however, lock mode selection is automatic and Menu number S01 need not be considered. It is also used when it is desirable to play through discontinuous patches of time code, because the synchronizer will ignore breaks in time code addresses.

Freewheel Mode, since it does not use time code addresses, ignores offsets greater than one frame; however, because the ZETA-THREE synchronizes the frame edge of the slave time code to the master frame edge, the sub-frame portion of the offset is not ignored. To adjust the relative position of the tapes within a frame, slewing the transport is possible.

5.4.6.3 Auto Mode

The Auto Mode (S01 LOCK MODE=AUTO) is a combination of the Address and Freewheel Modes. When Auto Mode is used, the ZETA-THREE will operate in Address Mode while the slave is being synchronized to the master, and will switch automatically to Freewheel Mode a selected number of seconds after synchronism has been achieved. The ZETA-THREE returns to the Address mode whenever synchronous running ceases (i.e., transport is stopped, or put into Fast Forward or Rewind).

The Auto mode is useful while playing through sections of discontinuous or poorly-recorded time code when it is desirable to retain the initial offset. Retaining the initial offset in this manner is useful for re-synchronizing when the tapes are re-cued or stopped and started again.

5.4.6.4 Slow Relock

If a tape has been physically spliced, or if time code has been electronically edited without reference to time code frame edges, a frame edge phase error (a shift in position of frame edge with respect to the preceding frame edge) will probably occur creating a sub-frame offset error and, therefore, a loss of synchronism. The Slow Relock routine (Menu number S02 SLOW RELOCK=ON) can be used to provide sub-audible re-synchronization of the slave to the master following the splice. Slow Relock is especially useful when synchronizing in Freewheel or Auto Mode, to provide sub-audible re-synchronization following a time code discontinuity.

5.4.7 Recovering from Poor Time Code

Time code interruptions, discontinuities or drop-outs will cause loss of synchronism, disrupting synchronizing operations. The ZETA-THREE has two recovery routines to cope with such situations.

5.4.7.1 Lock Hold

If slave time code drops-out (becomes unreadable, but not discontinuous) the ZETA-THREE will automatically maintain slave tape speed very accurately, permitting the drop-out to be "played through" without an error occurring. When a slave transport is playing through such a time code drop-out, it is said to be in a "Lock Hold" condition.

5.4.7.2 Splice Trap

If a splice occurs in an area containing critical material, where no re-synchronization can be tolerated, the Splice Trap routine (S03 SPLICE TRAP=ON) can be used. Splice Trap allows synchronization to continue in the Address Mode without interruption by capturing a new offset following detection of the splice. Lock will be maintained, and no re-synchronization will occur. Since the new offset will replace the old offset in the S_OFS Selection, the old offset will be lost and must be re-entered or re-CAPTURED if it is to be used again.

5.5 Record and Rehearse

5.5.1 Record

If Menu number Z01 IN/OUT=RECORD, the ZETA-THREE can send a Record signal to the master and/or slave transport.

To set-up the ZETA-THREE to "punch" an ENABLED master transport in and out of Record, press ENABLE M-REC [SHIFT ENABLE MASTER]. The ENABLE M-REC key's red LED will start blinking indicating that a record signal will be sent to the master when a time code address from the master transport matches the time code address which has been entered into the Z_IN Selection.

When the Record signal is sent (at the Record In point), the red LED will light solidly, indicating that the transport is in Record.

NOTE

The Record LED will indicate that the transport is in Record if a record tally is fed to the ZETA-THREE through the Interface cable. If the transport does not have a record tally output, then the Record LED will light solidly when the ZETA-THREE sends the Record command.

The ZETA-THREE will also send a "Stop Record" signal when the time code address in the Z_OUT Selection is reached. The red LED will begin blinking again when the Record Out occurs.

To disable Master Record, press ENABLE M-REC again. If Master Record has been ENABLED, pressing ENABLE MASTER will both disable the transport and disable Master Record. If recording is in process, disabling Master Record will not

cause recording to stop, but will merely turn off Master Record triggering at the Z_IN or Z_OUT time code addresses.

An ENABLED slave transport can be punched in and out of Record when a time code address from the left-most ENABLED transport coincides with the addresses in the Z_IN and Z_OUT Selections. The Slave Record function is turned on or off (for an ENABLED slave) by pressing ENABLE S-REC [SHIFT ENABLE SLAVE].

5.5.2 Rehearse

If Menu number Z01 IN/OUT=REHEARSE, the ZETA-THREE can send a Rehearse signal to the master and/or slave transport, IF THE TRANSPORT HAS A REHEARSE FUNCTION.

Z01 IN/OUT=REHEARSE allows transports which are capable of Rehearse functions to simulate Record without any actual recording taking place. The "Rehearse" function does not send a Record command to the transport.

Rehearsing is accomplished with the ENABLE M-REC and ENABLE S-REC keys, just as Record functions are.

5.6 Events

5.6.1 What is an Event?

An event is an action which occurs when a specific time code address on a tape is reached. Event outputs can be used to send a command signal to almost any device. For example, an event output might be used to trigger an effect, give a command to a transport, or turn on a cart machine -- or an electric coffee pot.

5.6.2 Events 1 and 2

The ZETA-THREE provides two momentary event outputs via the AUX OUT jack [19]. The Event 1 output will be sent to the "tip" of the AUX OUT mating plug (default -- Menu number Z10 XOUT TIP=EVENT 1); Event 2 to the "ring" (default -- Menu number Z11 XOUT RNG=EVENT 2). These outputs will trigger when a time code address from the left-most ENABLED transport coincides with the time code address entered into the display of either the E-01 Selection or the E-02 Selection.

5.6.3 Event Operation

To implement use of the ZETA-THREE's Event 1 output:

- 1) Confirm that Menu number Z10 XOUT TIP=EVENT 1.
- 2) Access the E_01 Selection, and enter or CAPTURE a time code address into the E_01 display.
- 3) Wire the ZETA-THREE's AUX OUT jack to the device which is to receive the event output signal. Use a 1/4-inch stereo phone plug at the ZETA-THREE end of the cable.
- 4) Access Menu number E01, Index to EV_01 and set to ARMED. The ZETA-THREE's Event 1 output will now trigger whenever incoming time code from the left-most ENABLED device coincides with the time code address in the E_01 Selection display.

To implement use of the ZETA-THREE's Event 2 output, follow the same procedure using Menu number Z11, the E_02 Selection display, and EV_02 in Menu number E01.

5.6.4 Event Output Duration

If the device being triggered by a ZETA-THREE event output fails to respond properly to the event output signal, it may be necessary to change the duration of the output signal.

The duration of the ZETA-THREE's momentary event outputs (the length of the pulse itself) is adjustable in increments of 8-1/3 milli-seconds. Adjustment is accomplished by setting the desired increment in EVENT CONSTANT 35 PULSE DURATION. The default value is 06, or 50 micro-seconds.