

8 MIDI Section

PRELIMINARY DOCUMENTATION

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GBL

INTRODUCTION

What does the MIDI Section do ?

What is a Tempo Map ?

Tempo Map example

MIDI GROUP DISPLAYS

The "Main" display - bars and beats

Adjusting the bar/beat position

The "Time Code" display

The "Offset" display

The "Error" display

The "Slew" display

MIDI MENU DISPLAYS

FRAMES-PER-BEAT TEMPOS

RUNNING THE TEMPO MAP

LOCKING TO MASTER TIME CODE

OVERRIDING THE CURRENT MAP TEMPO

ENTERING A NEW TEMPO INTO THE MAP

CHANGING MAP TIME SIGNATURES AND METRONOME CLICK LENGTHS

INSERTING, DELETING AND COPYING

Inserting bars

Deleting bars

Copying bars

LEARNING TEMPOS

Mode 1. Averaged capture tap

Mode 2. Exact capture tap

Mode 3. MIDI clock in

Mode 4. Aux in timebase

Common considerations for modes 2, 3, and 4

Learn quantization

THE TIMEBASE OUTPUT

SAVING THE TEMPO MAP TO TAPE

MERGING

INTRODUCTION

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WHAT DOES THE MIDI SECTION DO ?

The objective here is to SYNCHRONIZE a MIDI controlled sequencer to the current Master device. The sequencer is then the second Slave device controlled by the Zeta Three. (For "sequencer" also read "drum machine".)

In order to do this, the Zeta must know song TEMPOS for every part of the song.

This information is stored in the Zeta Three TEMPO MAP.

When the Master begins to play, the Zeta can calculate from the MAP exactly where in the song the sequencer should be - send it there - give it a Start command - and keep it precisely locked to the Master for the remainder of the song, or until the Master is stopped.

WHAT IS A TEMPO MAP ?

"500 bars of 4/4 at 120 beats per minute" is a Tempo Map.

Of course, vastly more complicated Maps can be created - the Zeta can hold between 400 and 500 tempo and/or time signature changes in its Map.

A new tempo can be specified at any 1/16 note in the song.

New time signatures can be specified at any bar boundary.

Along with the time signature, the user may specify a "Metronome Click Length". This determines the type of beat used in the beats-per-minute specification. For example, it is usually preferable in a 6/8 bar to specify tempo in "dotted quarter notes per minute".

TEMPO MAP EXAMPLE

Here is a (not terribly typical) musical example . .

Tempo	= 120		= 150		= 148.50		= 108			
Bar 1		9		17		20	21	33		
	4	8 bars	6	8 bars	3	3 bars	rall	4	12 bars	
	4	-----	8	-----	4	-----	/ / /	4	-----	

Here's how the Zeta Three Tempo Map describes the same song . .

Beats-per-Minute	Time Sig.	MM Click	Bar / Beat . 1/16'th
120.00	4 / 4	4	0001 / 01 .1
150.00	6 / 8	4+	0009 / 01 .1
148.50	3 / 4	4	0017 / 01 .1
144.00	..	4	0020 / 02 .1
139.50	..	4	0020 / 02 .2
135.00	..	4	0020 / 02 .3
130.50	..	4	0020 / 02 .4
126.00	..	4	0020 / 03 .1
121.50	..	4	0020 / 03 .2
117.00	..	4	0020 / 03 .3
112.50	..	4	0020 / 03 .4
108.00	4 / 4	4	0021 / 01 .1
108.00	..	4	+033 / 01 .1

* A plus sign (+) following the Click number indicates that the Click Length is a "dotted" value.

MIDI GROUP DISPLAYS

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Before doing anything PRACTICAL with the Zeta MIDI section, we shall take a quick "walk" through the MIDI displays themselves - having your Zeta Three at your side would be good. No attempt is made here to explain ALL of the operating functions available through these displays - this is done in later sections.

E "MAIN" DISPLAY - BARS AND BEATS

This is the first MIDI display you will see after dialling the GROUP key past the Generator, Master and Slave display groups . .

D _ B 1 2 0 . 0 0 0 0 0 1 / 0 1 . 1

The "B" in the ident portion stands for "Beats-per-minute", and the 5 numbers following it specify beats-per-minute at the current 1/16 note. (i.e. 120 BPM)

The 7 numbers to the right of the display identify the current bar, beat and 1/16 note. i.e. 1st BAR / 1st BEAT . 1st 16th note.

You will notice that the cursor is blinking at in the ident portion at the letter "B" (no other Zeta display does this !). By pressing the UP/DOWN arrow key now, you may obtain more information about the current beat . .

D _ F 1 2 . 0 0 0

"F"rames-per-Beat for film work
(See FRAMES-PER-BEAT TEMPOS).

D _ C 0 4

Metronome "C"lick Length (4 = 1/4 note)

D _ T 0 4 / 0 4

"T"ime Signature
("numerator"/"denominator")

Time Signature "numerators" may be any number from 1 to 15.

Time Signature "denominators" may be any of 2, 4, 8 or 16.

Available Click Length values are . .

2+	Dotted half note
2	Half note
4+	Dotted quarter note
4	Quarter note
8+	Dotted eighth note
8	Eighth note
16	Sixteenth note

Return to the "B"eats-per-minute display before continuing.

ADJUSTING THE BAR/BEAT POSITION

Move the cursor to the "Beats" digit. [D_B120.00 0001/01.1]

Pressing the UP/DOWN key now will adjust your position in the song, beat by beat.

Go to beat 3.

Move the cursor back to the "Bars units" digit. [D_B120.00 0001/03.1]

Press the UP key.

We are now at Bar 2.

Notice that the "Beats" have been reset back to 1. This is common to all numeric adjustments in the MIDI Bar/Beat display - when any digit is adjusted, all the digits to the right of it are reset to their lowest value.

Now move the cursor to the "Bars hundreds" digit. [D_B120.00 0002/01.1]

Successively pressing the UP key takes us through bars 101, 201, 301, 401 and finally to bar "+501". The "+" sign here indicates that we have reached the end of the song recorded in the Tempo Map. We cannot move the bar or beat numbers any higher with the UP key.

(The Zeta Three has powers up with a default Tempo Map 500 bars in length.)

It is also possible to see a "-" (minus) sign just before the Bar number. This shows that the Zeta is positioned before the starting time of the Map. However, this condition is normally produced only when locking or cueing to Master time code, and cannot be produced with the UP/DOWN key.

Back to the display - the fastest way to return back to Bar 1, Beat 1 is to move the cursor to the "Bars thousands" position (now occupied by the "+" sign) and press the DOWN key (Shift UP). [D_B120.00 +501/01.1]

This backs us up a thousand bars at a time !

THE "TIME CODE" DISPLAY

Press SELECT (Shift DISPLAY) at the "MAIN" MIDI Display to arrive at the "TIME CODE" Display.

D _ T C 0 0 0 0 0 0 0 0

This time code is purely artificial - it is the current SONG TIME, assuming that the song starts at time 00:00:00:00. If the sequencer controlled by the Zeta Three were a tape transport, then this is the code that would be recorded on the tape.

It is always in NON-DROP FRAME mode.

NOTE that this code has NOTHING WHATSOEVER TO DO WITH MIDI TIME CODE, which is an entirely different animal.

THE "OFFSET" DISPLAY

Press SELECT (Shift DISPLAY) at the "TIME CODE" Display to arrive at the "OFFSET" Display.

D _ O F S 0 0 0 0 0 0 0 0 . 0 0

This display performs EXACTLY the same function as the Offset display in the Slave Synchronizer group.

Here however, the Offset is calculated as the Song Time Code (see previous display) minus the Master Time Code.

NOTE that an Offset may also be established by setting a number in the "START TIME" menu display (see below). These two displays are interactive.

THE "ERROR" DISPLAY

Press SELECT (Shift DISPLAY) at the "OFFSET" Display to arrive at the "ERROR" Display.

D _ E R R 0 0 0 0 0 0 0 0 . 0 0

This display performs EXACTLY the same function as the Error display in the Slave Synchronizer group.

Lock up time for MIDI devices controlled by the Zeta Three is intentionally not instant. The locking process requires changing the tempo fed to the slaved sequencer, which must itself lock to the tempo received. The Zeta Three ensures that these changes are relatively smooth, and you may observe the resultant locking process by dialling up this display.

THE "SLEW" DISPLAY

Press SELECT (Shift DISPLAY) at the "ERROR" Display to arrive at the "SLEW" Display.

D _ S L E W 0 0 . 0 0

This display performs EXACTLY the same function as the Slew display in the Slave Synchronizer group.

Press SELECT (Shift DISPLAY) to return to the "MAIN" Display.

MIDI MENU DISPLAYS

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1st LEVEL MENU		2nd LEVEL MENU	DESCRIPTION
D01 EDIT	->	.1 INS 000 BARS AT X .2 DELETE A -> B .3 COPY A -> B TO X .4 MARK A ----/--.- .5 MARK B ----/--.- .6 MARK X 0001/	This section controls bar insertions, deletions, and copying one section to another. (See INSERTING, DELETING AND COPYING)
D02 SONG SETUP	->	.1 START 00000000.00 .2 END ACTION=RUN STOP .3 SONG NUMBER=001	Song starting time, expressed as a Master Time Code number. (May be Captured or entered digit by digit.) Interacts with Offset. Choice of actions taken at the end of the Song. Numeric label of the current song (may be transmitted as a MIDI Song Select message.)
D03 LEARN MODE	->	.1 AVRG CAPTURE TAP .2 EXACT CAPTURE TAP .3 MIDI CLOCK IN .4 AUX IN TIMEBASE	Selects mode for Tempo Learning. (see LEARNING TEMPOS)
D04 LEARN QNTIZE=8			Sets threshold for tempo averaging in the Learn mode. (see LEARNING TEMPOS)
D05 FPB FRM=24		25 30 24/25 24/25/30	Selects the frame rate to be used in Frames-Per-Beat tempo calculations. (see FRAMES-PER-BEAT TEMPOS)

D06 MERGE=OFF
REAL TIME
NO REAL TM
ALL

Tells Zeta Three which types of data received at the MIDI In port should be Merged with Zeta data and re-transmitted from the Output port.
(see MERGING)

D07 MIDI OUT=ON
ON+SSEL
OFF

Enables the Zeta to transmit MIDI messages, with or without Song Select commands.
(Has NO EFFECT on D06 MERGEing requests)

D08 MIDI THRU=IN
OUT 2

Assigns the MIDI Thru port to directly copy the MIDI In port (as specified by the MIDI standard), or to act as a second Output port, in parallel with the normal Output port.

D09 LOCK MODE=ADR
FWL
AUTO

Lock modes - see Synchronizer section.

D10 SLOW RELOCK=OFF
ON

Slow Relock mode - see Synchronizer section.

D11 SPLICE TRAP=OFF
ON

Splice Trap enable - see Synchronizer section.

D12 TIMEBASE -> .01 12 PER BEAT
.02 16 PER BEAT
.03 20 PER BEAT
.04 24 PER BEAT
.05 32 PER BEAT
.06 40 PER BEAT
.07 48 PER BEAT
.08 60 PER BEAT
.09 80 PER BEAT
.10 96 PER BEAT
.11 120 PER BEAT
.12 160 PER BEAT
.13 240 PER BEAT

Establishes the frequency (cycles per beat) appearing at the Timebase output (AUX OUT, Tip, if assigned). Also sets the expected frequency when Learning from a timebase input (via AUX IN).

D13 MAP LOAD/SAVE ->	.1 SAVE TO TAPE		Initiates saving the
	.2 LOAD FROM TAPE		Tempo to tape and
			Loading it back again.
			(see SAVING THE TEMPO
			MAP TO TAPE.)
D14 MIDI CONSTS ->	01 - /LKERR	06	MIDI "Constants"
	05 LOCK LIMITS	72	(see MIDI CONSTANTS)
	06 WIDE/NARROW	F3	
	34 LOCK EXIT	20	
	37 - /SMS TYPE	00	
	38 AUTO DELAY	01	
	45 S-PTR WAIT	00	
	46 S-PTR SPACING	00	
	51 - /1=NVRAM	00	
	52 NO MSG/FPB.125	01	

MES-PER-BEAT TEMPOS

Frames-Per-Beat tempo calculations present somewhat of a dilemma to the system designer.

The simple logic of this method of tempo specification is that musical beats can be directly mapped to available film frames, thus enabling very precise timing.

However, as film has been running at 24 frames per second for many years, we now have several generations of film composers who have come to know the various frames-per-beat tempos by "feel" as opposed to by calculation. This is true particularly in the US.

For this reason, the Zeta Three allows the frame rate for FRAMES-PER-BEAT calculations to be specified separately from the TIME CODE frame rate. (See MIDI menu "D05 FPB FRM=xx").

The traditional film composer may leave the Zeta set permanently at its default setting of "D05 FPB FRM=24".

European composers may prefer the "D05 FPB FRM=25" setting.

And, allowing for the very real possibility of film running at 30 frames per second in the future, the setting "D05 FPB FRM=30" is also available.

No other selections are also available which track, or partially track, the current TIME CODE frame rate.

All are summarized in the following table of frame rates to be used in the Frames-Per-Beat calculation . . .

	TIME CODE Frame Rate		
	24	25	30
D05 FPB FRM=24	24	24	24
D05 FPB FRM=25	25	25	25
D05 FPB FRM=30	30	30	30
D05 FPB FRM=24/25	24	25	24
D05 FPB FRM=24/25/30	24	25	30

RUNNING THE TEMPO MAP

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Return to the "MAIN" MIDI Display, preferably with Beats-per-Minute in the display.

Press the MIDI switch in the ENABLE section. Keep the Master and Slave disabled.

Press the STOP/CONTINUE switch - your Map should now be "running". Moreover, if you have a sequencer or drum machine attached to the MIDI Out port, it should also be playing. (Don't forget to put the sequencer/drum machine in EXTERNAL clock mode !)

Press the STOP/CONTINUE switch again to stop.

By adjusting the Bar and/or Beat numbers in the display, you may position the sequencer anywhere in the Map and Start from there.

As with the tape machine sections of the Zeta Three, you may capture GOTO points and use the GOTO key (Shift STOP/CONTINUE) to quickly re-position the sequencer. If no GOTO point has been set up (GOTO register shows all dashes), then the sequencer will be cued to Bar 1, Beat 1.

LOCKING TO MASTER TIME CODE

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Disable Master, Slave and MIDI sections of the Zeta (using the ENABLE switches).

Set up a tape transport as the Zeta system Master in the usual manner. (You may also use the Generator as a temporary Master by looping its code back into the Master Code Reader, or by assigning it as Master in the Master menus.)

Make sure that the Zeta Three has read Time Code from the Master tape at least once. (If the tape has no Time Code, then stripe some now !)

Stop the tape machine near the beginning of its code.

Locate the "MAIN" MIDI display and set the Bar/Beat section to 0001/01.1 .

Locate the MIDI Offset display and CAPTURE the current Offset.

ENABLE both the Master and MIDI sections.

Play the Master Tape deck.

Your Zeta Three Tempo Map should now "chase" and lock the the Master. If you have a sequencer or drum machine attached, then it too should be playing along.

NOTES:

1. Notice that, when the Master is in rewind or fast forward, the Zeta Three keeps both its Map and the sequencer correctly aligned.
2. If the Master is cued to a point BEFORE the beginning of the Song, then the Bar/Beat display will contain a NEGATIVE quantity of Bars and Beats. The sequencer, on the other hand, will be waiting at Bar 1, Beat 1.

When the Master plays from a "negative" bar/beat, then the display will count down to the beginning of the Song, and a Continue command will be sent to the sequencer when Bar 1, Beat 1 is reached.

3. If the Master is played or cued to a point AFTER the end of the Song, then the display will show a "+" sign before the Bar number.
4. VERY IMPORTANT ! . . . The MIDI section can lock either to the Master or to the Slave tape machines. Locking to the Slave will take place if only the SLAVE and MIDI keys are set to ENABLED (i.e. Master disabled).

During the switching between "Master master" and "Slave master", the MIDI Offset is automatically adjusted.

Thus, ANY COMBINATION of the three machines controlled by the Zeta may be operated locked together, simply by ENABLING and DISABLING appropriately.

OVERRIDING THE CURRENT MAP TEMPO

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Disable the Master for now.

Locate the "MAIN" Bar/Beat MIDI Display, and set it to show Beats-per-Minute.

Move the cursor to the Beats-per-minute units digit. [D_B120.00 0001/01.1]

Press the UP key.

As expected, the tempo has been changed to 121 beats-per-minute.

In addition, an asterisk has appeared in the center of the display.

[D_B121.00* 0001/01.1]

This indicates that a tempo OVERRIDE is in effect.

No change has been made to the Tempo Map yet, allowing us to audition different tempi first. Note that this new tempo is now being transmitted from the MIDI port.

Pressing the Zeta STOP/CONTINUE key sets the Map (and sequencer) in motion AT THE NEW TEMPO. (Local Start/Stop at the sequencer should also respect the new tempo, provided that receiving of EXTERNAL Clocks has been enabled.)

The override will stay in effect until either it is entered into the Map (see next section), or cleared by pressing CLEAR (Shift CAPTURE). When CLEARED, the display will indicate that overrides have been cancelled, and the tempo will revert to the original Map tempo.

[- CANCEL OVERRIDES -]

For comparison between new tempos and Map tempos, the previous override may be recalled by pressing CLEAR again.

[- RECALL OVERRIDES -]

ENTERING A NEW TEMPO INTO THE MAP

=====

To change a tempo in the Map, it is necessary to tell the Zeta three things :

- (a) The new tempo
- (b) Where the new tempo starts
- (c) Where it finishes

We have already seen how to set up a tempo OVERRIDE. This new tempo will be used for entry into the Map.

To specify start and end points, the Zeta uses two marker registers "MARK A" and "MARK B". These registers contain the Bar/Beat values for the start and end points for the new tempo.

Using these markers to change tempos is extremely simple. In the following example, we shall change the tempo of the first 8 bars from 120 to 126 BPM . . .

Start by setting a tempo override of 126.00 BPM. [D_B126.00* 0001/01.1]

Set the Map to Bar 1, Beat 1 (if not there already). [D_B126.00* 0001/01.1]

Press the CAPTURE key - this sets MARK A. [----- MARK A -----]

Note that the CAPTURE key LED is now flashing. This indicates that we have begun the process of entering the tempo change.

Set the Map to Bar 9. [D_B126.00* 0009/01.1]

Press the CAPTURE key again. [---- CHANGES OK ----]

This action has at the same time set MARK B, and entered the new tempo between MARK's A and B.

i.e. from the beginning of Bar 1

up to (but not including) the beginning of Bar 9.

The CAPTURE key LED has stopped flashing, indicating completion of the change.

Notes :

1. The position of the cursor is not relevant to the MARKing process - it may be anywhere in the display.

2. Once MARK A has been captured and the CAPTURE key LED is flashing, we may abort the change in progress by pressing CLEAR (Shift CAPTURE).

[-- CANCEL CHANGES --]

This does not cancel the tempo OVERRIDE however, and a second press of CLEAR may be required.

[- CANCEL OVERRIDES -]

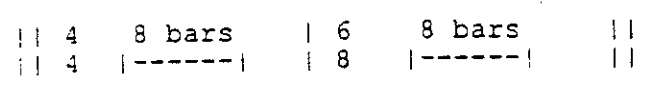
3. All tempos in the above examples may of course be specified using the Frames-per-Beat display.

CHANGING MAP TIME SIGNATURES AND METRONOME CLICK LENGTHS
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Time signatures and Click lengths are entered in exactly the same way as tempi. When either is first changed, the OVERRIDE asterisk will appear in the display. The same MARK A, MARK B process is used to enter changes into the Map.

NOTES:

1. Time Signature and Click Length changes CAN ONLY BE MADE AT BAR BOUNDARIES.
2. Click length overrides and changes DO NOT affect the song tempo, but they DO affect the tempo specification. For example, if a 1/4 note click at 120 BPM is changed to an 1/8th note click, then the Beats-per-Minute display will automatically change to 240 BPM. However, there will be NO CHANGE to the actual tempo being produced at the MIDI OUT jack.
3. Time Signature overrides have no effect on the tempo !
4. Combinations of Time Signature, Click Length AND Tempo may all be set up and changed together.
5. Click Lengths MUST match Time Signatures. For example, if you specify a half note click in a 3/4 bar, the Zeta will give you an error message as soon as you attempt to enter this change into the Map . . .
[*17* CLICK/SIG CLASH]
6. Changes in Click Lengths cannot be made across Time Signature changes. Attempting to change the Click Length to 1/8 notes for all 16 bars of the following example will produce the error message . . .
[*22* SIG VARIATION]



INSERTING, DELETING AND COPYING

These actions require the use of the menus in the "D01 EDIT" menu section. (To get there, press the MENU key while in any of the MIDI Group displays; find the "D01 EDIT ->" menu; press the MENU key again.)

However, setting up the parameters for these actions will usually be done from the "MAIN" MIDI Display. (To return from menus, hit the DISPLAY key !)

Inserting, Deleting and Copying make use of various combinations of the Bar/Beat registers MARK A, MARK B, and a new register, MARK X.

The concept behind MARK X is exceptionally simple - whenever you enter the MIDI menus, the Zeta Three takes your current Bar/Beat song position and loads it into the MARK X register.

In other words, MARK X is equivalent to "current position".

INSERTING BARS

Let's start with an example . . .

We wish to insert 4 bars of 3/4 time between bars 8 and 9 of our existing song.

First, stop any Map motion (disabling the Master transport is also good.)

Set a Time Signature OVERRIDE of 03/04.

Set the Bar/Beat section of the display to 0009/01.1 - in other words to the bar that we are going to insert IN FRONT of.

Enter the ".1 INSERT 000 BARS AT X" menu via the "D01 EDIT" menu.

Set that display to ".1 INSERT 004 BARS AT X".

Press the CAPTURE key.

The job is done ! The Zeta will display . . . [-- BARS INSERTED ---]

Now let's look quickly at what has just happened . .

Setting the Time Signature OVERRIDE established the type of bar to be inserted. We could also have set Click Length and Tempo overrides, and these would have been used in the inserted bars. As our example specified no Click Length or Tempo overrides, the Zeta used the Click Length and Tempo values which were in effect AT THE INSERT POINT (i.e. at the beginning of bar 9).

Moving the Bar/Beat display to bar 9 allowed the Zeta to load "Bar 9" into the MARK X register as soon as we entered the EDIT menus.

Adjusting to "INSERT 004 BARS" established the number of bars to insert.

Pressing the CAPTURE key inserted 4 bars of 3/4 at MARK X, i.e. at the bar 9 bar line.

Notes:

1. Only quantities of BARS may be inserted. Insertion of single beats is not supported.
2. To add an "Intro" to an existing song, insert bars at Bar 1, Beat 1.
3. To extend an existing song, insert bars at the first bar which has a "+" sign.
4. After any insertion, the Zeta will position its Map at the END of the inserted section, ready to insert more bars, perhaps with different tempos or time signatures. It is important to realize that all bar numbers AFTER the insertion will have been incremented by the number of bars inserted.

In our example, the Zeta positioned itself, after the insertion, at bar 13. Bars 9,10,11 and 12 are the new 3/4 bars, and bar 13 corresponds to what used to be bar 9. In the same way, what used to be bar 10 has become bar 14, and so on.

5. It is NOT essential, before inserting bars, to set the Bar/Beat display to EXACTLY the beginning of the bar at the insertion point. The Zeta will ignore any beat or 1/16 note values and load only the BAR number when it loads MARK X.

DELETING BARS

Once again, an example . .

We wish now to delete bars 5,6,7 and 8.

At the "MAIN" display, set Bars/Beats to 0005/01.1
i.e. the start of the section to be deleted.

Press the CAPTURE key.

The Zeta will display . . .

[----- MARK A -----]

This is very similar to the process of changing
tempos, click lengths and time signatures.

Set Bars/Beats to 0009/01.1, the end of the section
to be deleted.

Press the CAPTURE key.

The Zeta Three will display . .

[----- MARK B -----]

This is now different to changing tempos etc,
because NO OVERRIDES were specified.

Enter the ".2 DELETE A -> B" menu via the "D01 EDIT" menu.

Press the CAPTURE key. Zeta displays . .

[--- BARS DELETED ---]

COPYING BARS

This process starts like a deletion, and ends like an insertion !

Example . .

We wish to copy bars 5,6,7 and 8 (our 3/4 bars, if you have followed the previous examples) to a spot between bars 16 and 17.

At the "MAIN" display, set Bars/Beats to 0005/01.1 i.e. the start of the section to be copied.
Press the CAPTURE key.

The Zeta Three will display . . [----- MARK A -----]

Set Bars/Beats to 0009/01.1, the end of the section to be copied.

Press the CAPTURE key.

The Zeta Three will display . . [----- MARK B -----]

Set Bars/Beats to 0017/01.1, the bar IN FRONT OF WHICH we want to insert our copied section.

Enter the ".3 COPY A -> B TO X" menu via the "D01 EDIT" menu.

Press the CAPTURE key. Zeta displays . . [--- BARS COPIED ----]

Note:

1. Copying does not delete the bars copied from.

LEARNING TEMPOS

There are 4 distinct ways to learn tempos and enter them into the Tempo Map.

All 4 modes require a REFERENCE TIME against which beat lengths may be measured.

If the Zeta is in UNRESOLVED mode, then the selection of this reference time is made, with one exception, in exactly the same way that a Master is selected in the MIDI section to chase.

If the Zeta is in RESOLVED mode, then the reference time will actually be the frame rate being used for the resolving process (e.g. video sync). Starting times (hence Offsets) will however still be calculated relative to the unresolved mode reference time.

Here is a chart showing the (unresolved mode) REFERENCE TIME for each configuration of the ENABLE switches . . .

----- ENABLE -----			REFERENCE TIME
MASTER	SLAVE	MIDI	
-	-	-	Master Time Code
M	-	-	Master Time Code
M	S	-	Master Time Code
M	-	D	Master Time Code
M	S	D	Master Time Code
-	S	-	Slave Time Code
-	S	D	Slave Time Code
-	-	D	GENERATOR Time Code

MODE 1. AVERAGED CAPTURE TAP . .

This mode is quite unlike the other three modes in that no tempos are actually entered into the Map (at least not automatically).

In this mode, the operator may tap a tempo on the CAPTURE key, and a tempo OVERRIDE will be set up, loaded with the average of the tapped tempo.

This tempo may subsequently be entered manually into the Map (see ENTERING A NEW TEMPO INTO THE MAP).

Example . .

Enter the ".1 AVRG CAPTURE TAP" menu via the "D03 LEARN MODE" menu. Press the CAPTURE key to select the mode. (Note: It is not necessary to establish the learning mode every time learning is to take place. The mode stays in effect until changed.)

Return to the "MAIN" Bar/Beat display.

Stop all tape transport and Map motion.

Disable Master and Slave, enable the MIDI section, using the ENABLE keys. (The Generator now provides the reference time.)

Enable the LEARN mode by pressing the Shift MIDI ENABLE key. The red LED in this key will flash until learning is commenced.

Tap the desired tempo at the CAPTURE key.

Notice that a tempo OVERRIDE has been set up, and the averaged tempo is being displayed on the Beats-per-Minute (or Frames-per-Beat) display. The red LED in the MIDI ENABLE key is lit solidly, indicating that the learn mode has begun.

To end the learn mode, simply stop tapping the CAPTURE key, the red LED in the MIDI key will extinguish shortly thereafter.

You now are left with a tempo OVERRIDE exactly as if you had just set it manually, only its value is the average of the tempo just tapped.

MODE 2. EXACT CAPTURE TAP . .

This mode appears similar to Mode 1, except that the tempos tapped at the CAPTURE key are entered DIRECTLY into the Tempo Map.

Example . .

We wish to manually tap a tempo starting from bar 9, beat 3 and finishing at the beginning of bar 11 (i.e. return to the original tempo at bar 11). This example assumes that bars 9 and 10 are both 4/4 and have a Click Length of a quarter note (04).

Enter the ".2 EXACT CAPTURE TAP" menu via the "D03 LEARN MODE" menu. Press the CAPTURE key to select the mode.

Return to the "MAIN" Bar/Beat display.

Stop all tape transport and Map motion.

Disable Master and Slave, enable the MIDI section, using the ENABLE keys. (The Generator now provides the reference time.)

Set the BAR/BEAT display to 0009/03.1 (our starting point).

Enable the LEARN mode by pressing the Shift MIDI ENABLE key. The red LED in this key will flash until learning is commenced.

Hit the Capture key 7 times at the desired tempo(s).

i.e. Bar 9, Beat 3
 4
 Bar 10, Beat 1
 2
 3
 4
 Bar 11, Beat 1

The final "hit" at the beginning of bar 11 is necessary for the Zeta to complete the measurement of Bar 10, beat 4.

Notice that, while the learn was in progress, the Bar/Beat display counted along with the CAPTURE key taps.

Also, if the display had been set to Beats-per-minute or Frames-per-beat, then it will have switched automatically to the Time Signature display for the duration of the learning process.

You may now step back through the Map and observe the new tempos which have been created.

Notes:

1. This type of learning follows the Time Signature and Click Length patterns already set up in the Tempo Map. If the Time Signatures in our example had been 3/4, then only 5 taps would have been required to take us to the beginning of bar 11. On the other hand, if the Time Signatures had remained at 4/4, but the Click Length had been changed to an 1/8th note, the 13 taps would have been required.
2. In this mode, the Map can be RUNNING, even running LOCKED, when learning is started.
For example, it may be necessary to manually tap a tempo to match some action on a Master video. To do this, lock the MIDI section to the Master tape as usual, but have Learn Mode enabled (Shift MIDI) - the red MIDI key LED will be flashing.
When the video (and the sequencer) arrives at the starting beat, simply commence tapping the CAPTURE key as before.
The sequencer will be stopped during the learn sequence.
3. Learning commences from nearest Click boundary to the bar and beat on display when the CAPTURE key is tapped for the first time.
4. Learning finishes at the bar and beat that is on display when the CAPTURE key is hit for the last time.

MODE 3. MIDI CLOCK IN . . .

This mode allows the Zeta to learn tempos from MIDI Clocks appearing at its MIDI In port.

Method . . .

Create or load a sequence in your sequencer (or drum machine).

Connect the sequencer's MIDI Out to the Zeta Three MIDI In.

Enter the ".3 MIDI CLOCK IN" menu via the "D03 LEARN MODE" menu. Press the CAPTURE key to select the mode.

Return to the "MAIN" Bar/Beat display.

Stop all tape transport and Map motion.

Disable Master and Slave, enable the MIDI section, using the ENABLE keys. (The Generator now provides the reference time.)

Enable the LEARN mode by pressing the Shift MIDI ENABLE key. The red LED in this key will flash until learning is commenced.

Press the START key on the SEQUENCER.

Learning will begin from Bar 1, Beat 1 (unless the sequencer does not transmit a MIDI "Start" command - see Notes).

Learning will cease when a MIDI "Stop" command is received from the sequencer, OR IF MIDI LEARN IS DISABLED by the ENABLE keys.

Notes:

1. MIDI Clock In learning does not change any Time Signature or Click Length information already set up in the Tempo Map. A new tempo may be learned for each 1/16th note.
2. There are two kinds of MIDI start commands which may be issued by a sequencer - "Start" and "Continue". If "Start" is issued, then the Zeta will commence learning at Bar 1, Beat 1. If "Continue" is sent, then learning will commence at the 1/16 note being displayed when "Continue" is received.

The Zeta is not currently recognising Song Pointer commands received at its MIDI In port.

MODE 4. AUX IN TIMEBASE . .

This mode allows the Zeta to learn tempos from a frequency appearing at its AUX IN jack. (Typically 96 cycles per beat from a non-MIDI device.)

Method . .

Connect the frequency source to the Zeta Three AUX IN.

Select a TIMEBASE FREQUENCY from the "D12 TIMEBASE" menus.

Enter the ".4 AUX IN TIMEBASE" menu via the "D03 LEARN MODE" menu. Press the CAPTURE key to select the mode.

Return to the "MAIN" Bar/Beat display.

Stop all tape transport and Map motion.

Disable Master and Slave, enable the MIDI section, using the ENABLE keys. (The Generator now provides the reference time.)

Enable the LEARN mode by pressing the Shift MIDI ENABLE key. The red LED in this key will flash until learning is commenced.

Start the frequency source.

Learning will commence at the 1/16 note being displayed when the Zeta receives its first frequency information at AUX IN.

Learning will cease when the input frequency stops, or if MIDI LEARN IS DISABLED by the ENABLE keys.

Notes:

1. TIMEBASE learning does not change any Time Signature or Click Length information already set up in the Tempo Map. A new tempo may be learned for each 1/16th note.
2. If the input frequency is running all the time, then learning will start as soon as LEARN is ENABLED.

MMON CONSIDERATIONS FOR MODES 2, 3, AND 4 . .

1. Learning relative to the Generator is useful if tapes are being striped with Time Code at the same time as Tempo learning is taking place.
If the Master and/or Slave tapes already have Time Code, then it would be advisable to learn all tempos relative to Master Code.

If learning does commence at Bar 1, Beat 1 (and only if), then the REFERENCE TIME CODE current when the first beat is received will be entered into the START TIME register, and the appropriate Offset will be calculated.
3. Learning may be ABORTED at any time by pressing CLEAR (Shift CAPTURE). No changes will have been made to the Map if this is done.
4. Learning may be STOPPED at any time by disabling the LEARN mode, i.e. by pressing Shift MIDI ENABLE.
In this case, all tempos learned, up to the current beat, will be entered into the Map.

LEARN QUANTIZATION

The Zeta Three is always applying a quantization (averaging) routine to the learning process.

However, the DEGREE of quantization may be adjusted via the "D04 LEARN QNTIZE=" menu. When adjusted to its minimum ("MIN"), quantization is effectively disabled.

The trade-offs when using more or less quantization are as follows . .

If very little quantization is employed, then all the subtleties of the tempo to be measured will be captured.
HOWEVER, this will also use up the maximum amount of space in the Zeta's Tempo Map memory.

(It is also possible to capture "too much" subtlety ! For example, when learning from MIDI CLOCK IN, it is highly unlikely that a "constant" tempo created within a sequencer will appear quite so constant after it has been processed by the sequencer, transmitted on the MIDI line, and again processed by the Zeta. If minimum quantization is used for this learn mode, then the Zeta will likely record a series of very slightly fluctuating tempos - for example, 148.50, 148.64, 148.50, 148.64 and so on - thus needlessly using memory space for a tempo which should be specified ONCE as 148.57 !!)

If MAXIMUM quantization is employed, then the resultant Map will clearly use a minimum of memory space, but only gross tempo changes will be recognized. All other changes will be averaged with the tempos coming before and after the change.

We have found so far that the default quantization value of "8" is good for MIDI CLOCK and TIMEBASE learning.

Higher values (up to MAX) are good for CAPTURE key tapping. In fact, learn mode 1 (AVERAGED CAPTURE TAP) always uses maximum quantization.

THE TIMEBASE OUTPUT

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A controlled frequency, measured in cycles per beat, may be transmitted from the AUX OUT jack of the Zeta.

First, the 'Tip' of the AUX OUT jack must be assigned to the TIMEBASE generator via the Zeta System menu "Z10 XOUT TIP=TIMEBASE".

Second, the desired TIMEBASE frequency must be selected in the MIDI menus "D12 TIMEBASE ->".

This frequency will be started and stopped at the same times as start and stop commands are transmitted from the MIDI Out port.

SAVING THE TEMPO MAP TO TAPE

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To SAVE the current Tempo Map to tape, follow these steps . . .

1. Connect the Zeta Three Generator output to a tape recorder input.
2. Enter the ".1 SAVE TO TAPE" menu via the MIDI menu "D13 MAP LOAD/SAVE ->".
3. Put the tape recorder into record on the appropriate track.
4. Press the CAPTURE key.
The Zeta will display . . . [---- SAVING MAP ----]
And shortly after . . . [--- MAP SAVED OK ---]
5. Press the CAPTURE key again
- we recommend saving two copies.

Note: The Generator may be running or stopped while saving the Map.
(Map information is stored in MIDI File Format in the Generator User Bits.)

The save may be aborted at any time by pressing CLEAR
(Shift CAPTURE). Zeta displays . . . [- MAP SAVE ABORTED -]

To LOAD a Tempo Map from tape . .

1. (a) Connect the output of a tape track containing the desired Map to the MASTER CODE Input, and ENABLE the Master ONLY.

OR (b) Connect the output of a tape track containing the desired Map to the SLAVE CODE Input, and ENABLE the Slave ONLY.

2. Enter the ".2 LOAD FROM TAPE" menu via the MIDI menu "D13 MAP LOAD/SAVE ->".

3. Press the CAPTURE key. ***

Zeta displays . . [----- WAITING -----]

4. Put the tape machine into Play.

When the Map Header arrives . . [--- LOADING MAP ---]

When LOADING is complete . . [-- MAP LOADED OK --]

Note: The load may be aborted at any time by pressing CLEAR (Shift CAPTURE). Zeta displays . . [- MAP LOAD ABORTED -]

*** IMPORTANT: As soon as the CAPTURE key is pressed to initiate a load from tape, ALL CONTENTS OF THE CURRENT MAP ARE DESTROYED.

MERGING

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The Merge feature of the Zeta Three, if enabled, may be set to merge only selected types of MIDI messages. (See the "D06 MERGE=" display.)

1. "REAL TIME" - MIDI System Real Time messages which can be merged by the Zeta are . .

Start
Continue
Stop
Active Sensing

Timing Clocks will only be merged if the Zeta itself is NOT issuing Clocks - i.e. if the "D07 MIDI OUT=" menu is set to "OFF".

2. "NO REAL TIME" - All messages received EXCEPT the above System Real Time messages will be merged.

3. "ALL" - merge all messages.
The same restriction applies to MIDI Timing Clocks.