The *CM50* MIDI Locator

User Manual

Welcome to the CM50 MIDI Locator!

The Display

The CM50 comprises a single 8-digit display organised to show time in hours, mins, secs and frames. It is also used to display various messages and also cue times. The original CM50 had two 5-digit displays which are not suitable for showing a full time-code frame, so we had to make the decision whether to double the number of digits to 16 (creating a much larger box) or to use a single 8-digit display and retain the same popular box shape as before. The processor we now use is far more powerful and flexible than the original 6802 so we are able to use a number of ways to show you what you need to know within the space of the display.

The basic display mode is either Tape Time or Target Time (apart from other messages which appear from time to time). As you read through the text, you will see that we have used flashing LEDs for displays which do not show tape time, for example, cue times and numeric entry. The display switches automatically from tape time to numeric entry or cue entry and then switches back either on a time-out (ie, no key entry after 10 seconds) or when the cue entry has been completed. Also, operating any of the transport keys will return the display to showing tape time.

The Controls

Apart from the usual transport controls, there are three buttons to the right of the unit. These are Find, Enter and Cue and are described in the various sections below. The blue key to the right of the display is the ‘Mode’ key and is used in combination with numeric keys to order up a number of simple menus. ‘Mode’ is a wonderful general purpose word - it can be used for functions that we hadn’t thought of when we designed the box!

Note*: in the text below, two keys shown separated by ‘/’ indicate that the second key should be pressed while holding down the first - eg Mode/1 selects loop cues if the Mode key is held down and then key ‘1’ is pressed while the Mode key is held down. If this is done in the reverse order, nothing disastrous will happed but the required function may not be selected. Other operations such as ‘Cue, 1’ are in two steps, press the Cue button and then press key ‘1’ after releasing the Cue key.*

Operations which involve pressing the Mode key at the same time as one of the numeric keys (for example, changing loop cues) should not be carried out while the tape machine is in Find mode. The reason for this is that these operations change the mode of operation and will normally cancel any current Target Time.

Operating modes

The CM50 has three basic operating modes:

1. As a single machine autolocator

In this mode, the CM50 controls a single tape machine using the conventional parallel port on the 25 way connector on the rear of the unit. This mode is virtually the same as the earlier CM50 autolocator with certain differences:

a. It reads SMPTE/EBU time code if present via its balanced time-code input
b. It has a single 8 digit display which doubles as tape time and target time
c. All interfaces are stored in the main software so it is not necessary to change chips.

To operate in Mode 1, select ‘No slave’ as a slave - Interface number 1 (see below).

2. As a Master/Slave controller

In this mode, the master is a conventional multitrack machine and the slave is a serially controlled tape machine or video recorder. At present, we offer a MIDI Machine Control (MMC) interface to the Tascam DA88 but more will follow, using interface numbers 4-10.

To operate in Mode 2, select DA88 as a slave - Interface number 2 (see below).

3. As a Cubase or Desk Automation slave.

In this mode, the CM50 connects to a conventional multitrack machine as in Mode 1. However, the MIDI port connects to Cubase (or similar sequencer) and the CM50 acts as a slave to Cubase, making the mulitrack 'look like' an MMC tape machine. The multitrack will therefore accept MMC commands and translate them into commands to the multitrack. It also, of course, responds to Cubase by sending status messages and MIDI Time Code converted from the SMPTE/EBU code on tape. Also, with the addition of an extra interface card, the CM50 enables control of track record-selects on a few machines such as the B16.

In this mode, you may still operate the transport from the CM50.

To operate in Mode 3, select Cubase as a 'slave' - Interface number 3 (see later).

4. As a Master/Slave controller with additional control from our Windows Control pad.

In this mode, all settings are as in Mode 2. However, you may connect the internal RS232 port to a COM port on a Windows PC. This is completely separate from the MIDI port. The CM50 Windows software enables greatly enhanced display of tape time and cue points. This enables text to be added to identify cue points, for example.

Selecting the Interfaces

The first thing you will need to know therefore is how to select your master and slave transports. Unlike the earlier CM50, all information on the many tape transports is stored inside the CM50 MIDI Locator, so there is no need to change chips.

As mentioned in the earlier paragraphs describing Modes of operation, first select your slave interface by pressing the blue Mode key and 9 at the same time. Use the +/- keys to select the required interface and then press Enter to store the selection. You may also enter the interface number as two numeric digits.

Now select the master transport by pressing the blue Mode key and 8 and repeat as above. See the the end of this manual for the complete list of interfaces.

Note, the + and - keys will only operate if there is already valid data in the master and slave memory in the range of interfaces in the list below. If you accidentally enter a master interface number as (eg) 89, then you can recover from this error by entering two numeric digits within the correct range. The display will show '————' if there is invalid data.

Parameters

To give you the greatest possible control over the operation of the CM50, we have allocated an area of memory for variables which affect the performance of the CM50. A table of parameter information is listed in appendix A:

The Controls:

The transport controls are directed either to the master or slave (or both) depending on the status of the Master and Slave LEDs to the right of the main display. Note that when Cubase is selected, only the Master transport may be controlled from the CM50 as the MIDI port is used to receive commands from Cubase. This also applies, of course, if no slave (interface 1) is selected.

To switch the transport controls between master and slave, just press the blue Mode key and the controls will toggle between Master and Slave (assuming you have selected a slave, otherwise it will not toggle). To switch to Locked mode where both transports are controlled together, press Mode/4. This will light both LEDs, and both transports will receive exactly the same commands - the master will receive relay closures and the slave will receive serial MIDI. The master time code must be fed directly to the DA88 as well as to the CM50. This enables the DA88 to lock to the master transport once the CM50 has put it into play, having located it as accurately as possible.

To swich out of Locked mode, press the Mode key on its own or press Mode/4 both of which will unlock the transports. If the slave is currently searching for a tape position, it will be stopped.

Most of the transport controls act exactly the same as on the tape machine itself with the exception of Record drop-out. To drop out of record on the CM50, press the Play key only. The CM50 will then translate this command into the relevant ‘pulses’ which the specific transport is used to. By keeping the Play key down for a moment, the time display will ‘freeze’ to show the exact point at which you dropped in.

To drop into Record, you may use one of two methods. Pressing Play and Record together will put the CM50 into Record just in the same way as with the tape transport itself. However, for an alternative solution, you can select Bit 2 in the Parameters memory location (see Mode 3 below). If this bit is set, you can drop into Record simply by pressing the Record button providing you are already in Play, of course. If this bit is not set, then nothing will happen when the Record key is pressed on its own

In common with the earlier CM50, the control relays are fed from the same source as the LEDs on the command switches. Ie, if the earlier CM50 was in play, then it used to hold the play command line active to the transport in order to illuminate the Play LED. The exception was with the Stop LED which flashed momentarily. In some cases, this method of holding a transport into a particular state meant that the operator had to press Stop on the tape transport to release the command from the CM50. In the case of the M79, even this would not work and tended to endanger the tape. Since the controls and LED’s on the new CM50 can apply to either of the transports (master or slave), all relay operations are momentary and the LED’s will be seen to flash momentarily as a command is sent. The two digits which are normally used to show frames are now used to indicate the tape mode, ie Play is ‘]’; Rewind is ‘[[‘; Fast Forward is ‘]]‘. The CM50 only displays frames while in play. One useful feature is that, when the CM50 is stopped out of Play, it will recalculate the frames count from the tacho pulses that it receives after it is no longer able to read code. This ensures that the frame display corresponds very accurately with the actual frame count on tape.

The Find Command

The Find Command is used to send the transport(s) either to a pre-selected cue point or to a time which has been entered manually into the Target time.

Note, all times shown are in the format hh:mm:ss.ff. The CM50 does not operate in time intervals smaller than frames.

To search for a time (eg, 00:05:00.00), enter ‘500’. Numerals shift right to left from the seconds digit, not from frames as this would be tedious and it would be over optimistic to expect the transport to locate to frame accuracy on tacho! When you enter the first digit (‘5’) you will see the display switch to show the Target Time by flashing either the Master or Slave transport LED next to the blue Mode key. When you press the Find key, the display will switch back to show the transport as it searches for your entered time. If you want to remind yourself where the transport is being sent, then press the Find key while in Find mode and the display will switch back for a moment to show the cue point (or what we used to call the ‘target time’).

Cue Points

Cue points are stored to frame accuracy as they are also used to drop in and out of record while in play. You may enter a cue point either on the fly or manually - normally, this would be done on the fly and then trimmed.

Entering a cue time manually

To enter a cue point on the fly, press Cue, followed by a single digit for the cue number (the display will show the current data). The display will attempt to combine the cue number to the left of the 8-digit cue time. If your hours display is '00' then the CM50 will use these two digits to indicate the cue number as 'C' followed by the cue number. If the hours display is being used but tens of hours is zero, then the CM50 will squeeze the cue number into the far left digit. Since the other possible digits in this display are 0, 1 or 2, the CM50 places the cue number if it is 3 to 9. To avoid using '1' or '2' the CM50 displays codes for cues 1 and 2. These are (1) a '1' shape but in the left hand side of the display and (2) two segments lit.

However, assuming you are using a 10" NAB reel of tape with time code starting around zero, cues will be displayed as in the following example:

Display	meaning
C3.10. 03. 03	Cue 3 is 10 mins, 03 secs, 03 frames

Obviously, this format holds good up to 1 hour of tape!

The Master/Slave LEDs, which previously indicated which mode you were in, will flash while a cue time is displayed. This is to indicate that the display is showing a cue time and not the tape time. The displayed cue will stay on the LED display until the Enter key is pressed - it will then revert to the tape time. To return to the cue display, just press the cue button a couple of times (a bit like the double mouse click on a PC) and the display will show the cue time. As soon as you start entering digits, the display will lock into the cue time and will not revert to the tape time until the Enter key is pressed. To quit the cue display without change, press any of the transport keys or the Mode key.

To enter a cue time 'on the fly'

Press Enter to store the current tape time to the cue memory immediately following the Cue number entry. Note that the tape transport time is as currently selected by the blue Mode key - cue times are shared between master and slave transports. For example, you can 'grab' a cue point from the slave transport and, with a deft click of the blue Mode key, send the master transport to the same location.

Instant Cue on the fly

If you don't pre-select a cue point, pressing Enter at any time will place the current time in Cue 0. This enables you to save a point on the tape very quickly. Subsequent operation of Enter will simply overwrite Cue 0 each time, leaving the latest entry stored.

If, after selecting a cue, instead of pressing the Enter key, you start to enter numeric digits, the CM50 will assume you wish to store a time from the keypad and not on the fly. Again, numerals enter from the Seconds digit but see the next paragraph.

To trim a cue point

Select a cue as before and use the +/- keys to trim the cue point in frame increments. When you have set the new time, press Enter to store it into the cue point.

The CM50 has a capacity of 36 cue points and these are arranged in 4 blocks of 9. This keeps the cue operations simple in that you only ever select a single digit in the range 1-9 as your cue number, having first pre-selected which memory block you are working with. This is a useful feature if you are working with more than one reel of tape. You may also use Cue 0 but this may be used for special functions in future software versions.

To set up a loop

The CM50 has the option to loop around two cue points, drop in to record at the first and drop out at the second. The pre-roll may be selected in Parameters, the post-roll is fixed at approximately 1 second.

Pre-roll

Select Mode/2 for pre-roll followed by a single digit and then Enter.

Loop Cues

To select the Loop Cues, press Mode/1 and enter two numeric digits to reprsent the start (drop-in) and end (drop-out) cues. Ensure that you have valid data in both these cue points and that Cue 1 is earlier than Cue 2 in tape time as the CM50 does not check this for you. Press the Enter key to store the cues or to retain the current selection.

To enter a loop

You have a choice of either rehearsing or recording the loop. To play through the loop without dropping into record, press the Cue key as if to enter a cue number but instead hit the '+' key after releasing the cue key. The CM50 will now play around the loop until you press the Stop key. The first stage of the loop is to search for the pre-roll point and go into play. This is identical to the normal Find operation except for the fact that the target (First Loop Cue 'minus' the pre-roll) is selcted for you automatically. When the CM50 goes into Play, it will show the first cue point together with a count-down to the first cue.

To drop into Record at the first cue point, you must hit the Record button on its own while the CM50 is in this pre-roll period, ie press Record just after the CM50 goes into Play at the start of the loop. The symbol at the left of the display will change to show that Record is 'armed'. If you don't hit Record, the CM50 will continue in Play, showing the count-down to the second cue point and will then loop back to the pre-roll point again. If you selected Record, the CM50 will issue the normal drop-out command to your tape transport and will repeat the loop after the brief post-roll period.

Note that the loop will not go into Record if you are in Master/Slave locked mode as it will not know which machine you wish to put into record but there will be options on request from you, the user, later.

Warning: The CM50 will loop and activate record on whichever machine is selected by the Master/Slave LEDs so make sure you have the right machine selected.

Instant Pre-roll

By pressing Rewind and Stop at the same time, you can instantly wind the transport back by a distance as set in your pre-roll store. By pressing Rewind and Play at the same time, the transport will wind back by the pre-roll distance and go into Play. These operations can be used at any point on the tape, they do not relate to specific cue points.

Memory Bank Select

You have the choice of 4 memory blocks in which to work. Each block contains cues 1-9 giving you a total of 36 cues. To select different memory banks, Enter Mode and 7 at the same time. Enter a single digit in the range 0 to 3 followed by Enter. Although you can only enter cue numbers in the range 1-9, this memory expansion allows you to use three 'banks' of cues. The current memory bank always clears to zero when the CM50 is switched on.

ALT
Note changes: 13th Mar '03 - your setting of ALT now stored separately for each interface.

This numeric value controls the speed at which the autolocator approaches a cue point in Find mode - it is calculated from the tacho frequency of the transport. The Tascam 52 has a low tacho frequency of 12 Hz and an ALT figure of about 166. The ATR100 has a high tacho frequency of 300 Hz and a low ALT figure of about 7. We have adjusted this figure from past experience with various tape transports but sometimes it may prove either to be too cautious or for ever overshooting the cue point. Since we have still not perfected a 'learning' programme, we have placed control of this value in your hands. To set ALT, enter Mode/6 and enter 3 numeric digits followed by Enter (must be **3** digits - even if 006). Don't worry if you forget the original 'default' value. You can restore this by selecting ALT as above but enter 999 as the ALT figure. The CM50 will then re-load the default value for all interfaces.

Tape Guard

You can set end times beyond which the CM50 will not allow you to go. Normally these would be the beginning and end of your tape reel. The beginning of the work area is stored in Cue 8 in Block 3 of memory (eg 00:00:00.00) and the end of the work area (eg 00:16:40.00) is in Cue 9 in Block 3 of memory. When this mode is active, pressing Fast Forward or Rewind will effectively search for the beginning or end of the work area, so these may be used as 'instant' cue points as well as guards for the tape you are working on. Note that pressing Play while in this search mode will immediately put the machine into Play as opposed to the normal Find mode where the CM50 will continue to search for the cue before putting the tape machnie into Play (Find & Play mode). Tape Guard does not operate in Play - it will allows you to play off the end of a tape reel.

To use Tape Guard, you must firstly enable it - see Mode 3 on page 10.

Frame Rate

The CM50 reads all frame rates (24, 25, 30, 30df). On power-up, the CM50 defaults to 25 fps but latches an internal memory location if it sees 30 fps. You can confirm if the correct frame rate is selected by incrementing or decrementing a cue point.

If You are not using Timecode
The CM50 normally looks for timecode when in Play but, if there is just spurious noise on the input, it will waste processing time deciding that the noise is not actually timecode. This can slow the response to the keys. If you are not using timecode then you can tell the CM50 by placing a time of 11:11:11.00 in Cue 37 (block 3, cue 7). Place a time of 00:00:00.00 in Cue 37 if you are using timecode or if you want the CM50 to detect timecode automatically.

Library Wind for the ATR100

This wind mode can be activated by selecting the relevant bit in Mode/3. It can only be activated when the ATR100 interface is selected as it would produce strange results on any other transport!

A80 Mk1 Switch

The A80 Mk1 transport has a different tacho measurement to the Mk2 and Mk3. Instead of using up another interface for the Mk1, you should select Mk2 and then select Library Wind in Mode/3 to switch to Mk1 tacho. The CM50 will recognise that the A80 interface is selected and will use this option to change tacho frequency instead of activating Library Wind.

Software updates & the PC Windows interface

In order to load new software and gain access to the CM50 internal memory space, we have provided software which 'talks' to Windows Terminal (or HyperTerminal in Windows 95) which is accessible from the Windows Programme Manager. Normally COM1 is used for a mouse, leaving COM2 free as a serial port but you may be using COM2 as a modem port.

If neither COM1 nor COM2 are free, you will either need to disable the modem on COM2(1) or purchase an additional serial card to give you COM3. Once you have a spare port, you will find it worth the trouble as we are now writing much software which runs under Windows and which talks to our products such as the CM50.

Once you are inside Terminal (or HyperTerminal), you must set up the chosen serial port to the following:

Baud rate: 9.6 Kbaud 8bits, no parity, 1 stop bit.

You must connect the serial port as on the interface schematic which is supplied with your CM50. A sample schematic is also attached at the end of this manual. You may have to use either a 25 way or 9 way 'D' connector for the PC depending on how it has been set up.

To load a new software version, connect your PC as above and run Terminal in Windows, switch on the CM50 - you should see a '?' printed to the PC screen. Immediately enter an upper-case M. The screen will respond with an '*'. You are now in command mode and the normal running of the CM50 is suspended. The next step takes courage the first time but you will soon see how easy it is to load new software. Enter 'E' (for erase flash memory) and the CM50 will respond with a prompt as to which block to erase: P, C or D. You must erase each area of memory in turn - P is the main programme memory and C, D are areas for parameters. The 'boot block' (equivalent to the BIOS in a PC) cannot be erased, so will always run when you switch on the CM50.

The CM50 is now ready to receive the new software (you must always erase the memory before loading new software just in the same way as an EPROM must be erased by UV light before programming). The programme is in a text file (or to be accurate, an 'S-Record' file) and is supplied on a floppy disk (the name of the file may vary but will always be clearly marked on the disk). All updates are now supplied this way and therefore there is no need to replace an EPROM in the CM50. Initially, it is a bit un-nerving to erase the CM50 memory but as soon as you are confident, you will find it much more convenient. Remember that it is not possible to erase the CM50 memory unless the PC-CM50 link is operating correctly in the first place. It is probably wise to check that your PC can load the file from the floppy disk before erasing the memory.

Having erased all three memory blocks, you should now be back at the '*' prompt. You can even switch the CM50 off and on again at this stage and you will see that the LED display will remain on the row of dashes that you normally see when it powers up (the last digit is the boot-block software version - curently it is 3). It will not move from this display as it now sees that there is no programme loaded.

To load the new software, enter 'L' at the '*' prompt in Terminal (all commands are upper-case) and the CM50 will prompt on the PC screen with a request to download a text file. Select 'Transfer' in the menu at the top of the Terminal 'window' and then select Text File. Then enter the location (eg, Disk A:) and the name of the file. The Terminal programme will now download the programme into the CM50 which you previously erased and will respond with Ok and a return to the '*' prompt. You may now switch the CM50 off and then on again. It should now run normally from the programme which you just loaded.

Note: Your stored cues and other parameters such as master, slave, pre-roll etc are not affected by installing new programme software as these occupy a different area of memory.

The Applied Microsystems Interface List

Slave (serial port) transports

1 Select for no slave interface ie - parallel control port (master) used only
2 Tascam DA88
3 Cubase (see note 1)
4 VO9800 VTR
5 BVU800 VTR
6 reserved for ADAT
7 (6-12 reserved for serial transport control)

Master (parallel port) transports

13	Studer A803 Hi (15ips)	14	Studer A803 Lo (7.5ips)
15	Studer A810 Hi (15ips)	16	Studer A810 Lo (7.5ips)
17	3M M79 Hi (30ips)	18	3M M79 Lo (15ips)
19	Fostex E16	20	Fostex B16
21	Tascam 48 Hi (15ips)	22	Tascam 48 Lo (7.5ips)
23	Tascam MS16 Hi (15ips)	24	Tascam MS16 Lo (7.5ips)
25	Otari 5050 Hi (15ips)	26	Otari 5050 Lo (7.5ips)
27	Otari MX70 Hi (30ips)	28	Otari MX70 Lo (15ips)
29	Otari MX70 LL (7.5ips)		
30	Otari MTR90 Hi (30ips)	31	Otari MTR90 Lo (7.5ips)
32	Lyrec 533 Hi (30ips)	33	Lyrec 533 Lo (15ips)
34	Studer A80 Mk 2 Hi (30ips)	35	Studer A80 Mk 2 Lo (15ips)
36	Stellavox TD9 Hi	37	Stellavox TD9 Lo
38	Soundcraft SCM760 Hi (30ips)	39	Soundcraft SCM760 Lo (15ips)
40	MCI JH24 Hi (30ips)	41	MCI JH24 Lo (15ips)
42	1212		
43	Sony APR5000 Hi (30ips)	44	Sony APR5000 Lo (15ips)
45	Soundcraft Saturn Hi (30ips)	46	Soundcraft Saturn Lo (15ips)
47	Soundcraft SCM381 Hi (30ips)	48	Soundcraft SCM381 Lo (15ips)
49	14D Hi	50	14D Lo
51	Studer A800 Hi (30ips)	52	Studer A800 Lo (15ips)
53	Ampex ATR100 Hi (30ips)	54	Ampex ATR100 Lo (15ips)
55	Ampex ATR124 Hi (30ips)	56	Ampex ATR124 Lo (15ips)
57	Ampex MM1200 Hi (30ips)	58	Ampex MM1200 Lo (15ips)
59	Studer A80 Mk1 Hi (30ips)	60	Studer A80 Mk1 Lo (15ips)
61	Otari ADAM		

Appendix A

Parameters:

Mode/1 Loop Cues
Mode/2 Pre-roll (range 0-9 secs)
mode/3 Bit Store - see below
Mode/4 reserved
Mode/5 reserved
Mode/6 ALT (enter 999 to restore defaults)
Mode/7 Memory Block (0-3)
Mode/8 Master Transport
Mode/9 Slave Transport

Mode/3 is arranged into four ‘yes/no’ bits with their binary ‘weight’ in brackets

Bit 0 (1)	0=Library Wind off / A80 Mk2/3			1=Library Wind on / A80 Mk1
Bit 1 (2)	0=No Tape Guard	1=Tape Guard (set by cues 8 & 9 in Memory Block 3)		
Bit 2 (4)	Record	Drop in	0=Rec/Play	1=Rec key only (except for loop pre-roll)

The bits in Mode/3 operate as a binary code. Ie, if you are not using an ATR100 but require the tape guards to be set, you enter 2 into the Mode/3 ‘store’. If you are using an ATR100 in Library Wind and also want the tape guards to be on, then you add 1+2 and enter 3 into the Mode/3 ‘store’.

(For the uninitiated, ‘Library Wind’ refers to a special instruction which is sent to the ATR100 to reduce wind speed which can be fearsome!)

These codes enable up to 4 logical parameters (yes/no) to be stored using one instruction, in this case Mode/3. Select the combination of choices and enter the number on the far left.

	Single key Drop-in	**Tape Guard**	**Library Wind or A80 Mk1**
0	no	no	no
1	no	no	yes
2	no	yes	no
3	no	yes	yes
4	yes	no	no
5	yes	no	yes
6	yes	yes	no
7	yes	yes	yes

Typical CM50-MIDI Locator Cable Schematic

The ‘Deck’ connections will vary from machine to machine, of course.

DECK	FUNCTION	COLOUR	CM50	COMMENTS
	Gnd	Black	13	
	RL Com		1	
	Stop	Brown	2	
	Play	Orange	4	
	Rewind	Yellow	6	
	F/Forward	Green	8	
	Record	Blue	10	
	Tach	Grey	15	
	Direction	White	18	
	+24v	Red	14	
	Stop Tally	Violet	11	
	Play Tally		9	
	YPS-Move		17	A80 tacho (150r to +5v)
	RL Common		5	‘Free’ relay
	RL N/O		12	
	RL N/C		16	
	+5v		21	for external equipment

PC Com Port Interface 9k6 baud

9 Pin ‘D’				
3	S/data RX	L/Green	24	
2	S/data TX	Pink	25	
5	Gnd			loop to Gnd

If your PC port is a 25 way ‘D’ connector, reverse pins 2 & 3 above and connect Gnd to pin 7.

MIDI Port		DIN Pins
1	MIDI Out -	5
9	MIDI Out +	4
5	MIDI In +	4
6	MIDI In -	5

NOTES

Stop Tally & Play Tally are low active signals on CM50 connector.

Applied Microsystems Ltd, 111 School Lane Addlestone, Surrey KT15 1TF Phone: (01932) 854778