

CoCo MIDI Pro



a 16 track MIDI recording studio
for the Tandy Color Computer 3
written by Lester Hands

TABLE OF CONTENTS

INTRODUCTION	5
What CoCo MIDI Pro Can Do	5
Setting Up CoCo MIDI Pro	5
A Brief Survey	6
The Main Screen	6
Dialog boxes and how they work	7
How CMPro handles keyboard input	7
How the menu system works	7
The FILE menu	8
The PERFORM menu	11
The EDIT menu	15
A SHORT TUTORIAL	17
EDITING	20
How time is displayed in CMPro	20
How note pitches are displayed	21
How the different MIDI events are displayed	21
The INSERT command	22
The DELETE command	22
The PLAY command	22
The SPACE (play single event) command	23
An example of correcting a mistake	23
The RECORD command	23
Punching in/out	23
The GOTO command	24
The SLIDE command	24
An example of using the SLIDE command	25
The ALL tracks command	25
The block commands -- the effect of the FILTER	25
Marking a block with the "M" key	25
Marking All Events	25
The Directory Command	26
The Block Menu	26
Block QUANTIZE	26
Block SCALE	27
An example of the block SCALE command	28
Block CHANNEL change	28
Block LOAD	29
Block SAVE	29
Block CREATE	29
An example of using block CREATE	29
An example of using block SCALE	30
Block EXTRACT	30
An example of using Block EXTRACT	31
Block TRANSPOSE	31
Block CLIP	31
Block MAP NOTES	32
Block NOTE LENGTH	32
Block UNDO	32
USING THE SLAVE CLOCK MODE	33
An example of using the Song Position Pointer message	33
COCO MIDI PRO AND MIDI EVENTS	35
The NOTE event	35
The CONTROL CHANGE event	35
The PROGRAM CHANGE event	35
The PITCH WHEEL event	36
The KEY PRESSURE and CHANNEL PRESSURE events	36
The SYSTEM events	36
The TEMPO system event	36

An example of using the TEMPO event	37
An example of deleting unwanted events	37
The CLOCK system event.	37
The LINK system event.	37
The MESSAGE system event.	38
The PAUSE system event.	38
The BYTE system event.	38
The SYX system event.	38
TECHNICAL DETAILS	40
Use With a Hard Disk	40
Accessing 40 Track Double Sided Disks.	40
File Format.	40
Disk Error Numbers.	41
DECIMAL/HEX CONVERSION TABLE	43
SUMMARY OF MIDI STATUS BYTES.	44
INDEX	45

CoCo MIDI Pro
Level III

a MIDI sequencer/recorder
for the Tandy Color Computer

written by Lester Hands

Copyright (C) 1990 by Lester Hands

All rights reserved. No part of this book or the accompanying
program may be copied for any purpose except the personal
use of the registered owner. Support the future of music on
the Color Computer!

INTRODUCTION -----

CoCo MIDI Pro (CMPro) is a full featured MIDI recorder/sequencer written for the Color Computer 3 with 512K of memory and a disk drive or cassette tape recorder. CMPro requires a hardware MIDI interface such as CoCo MIDI or Colorchestra plugged into slot 3 of a MultiPak (or a Y-cable).

CMPro is designed to be easy to use as well as powerful. It can turn your Color Computer into a recording studio, complete with a sixteen track recorder, punch in/out capability, automatic synchronization, and extensive editing capabilities.

MIDI synthesizers have revolutionized the performance of music. Capabilities that were only dreams just a few years ago are now realities for almost any musician. CMPro lets the real musician in you blossom forth. No longer are your fingers or lips in the way because now you can record as many times as you need to get the perfect "take". And then you can edit and manipulate the music until you come up with just the right effect.

What CoCo MIDI Pro Can Do

CoCo MIDI Pro can be thought of as a 16 track tape recorder. Working with a MIDI synthesizer, it can record what you play on the synthesizer. Then you can play the music back through the synthesizer. If you find that the music needs to be modified, CoCo MIDI Pro provides you with a set of editing tools. Mistakes can be deleted and sections re-recorded. Special effects such as fade in/out or tempo changes can easily be added. Once you have the music just right, you can save it on tape or disk.

CoCo MIDI Pro has a recording resolution of 240 ticks per beat, supports 16 tracks, and editing is done with a standard event list type display. The maximum number of notes is 16384; the maximum song time is about 4000 beats.

Record and playback function in both master and slave modes with full support for the Song Position Pointer convention. Up to 24 simultaneous notes may be recorded and played back.

Each track may be muted to prevent music on it from being played. In addition, one or more tracks may be set to "solo" which automatically mutes all other tracks.

There is no limit on the number of channels recorded on each track. Combine this with the editing function which can "extract" a given channel to any other track, there is an enormous amount of flexibility in how you record and edit music. In addition, recorded music is merged with existing music on a track. In this way you can easily over-dub music. Traditional "punch in" and "punch out" is also supported.

Setting Up CoCo MIDI Pro

CMPro requires the use of a hardware MIDI interface in order to connect to your synthesizer. Currently supported devices include the CoCo MIDI pack formerly produced by Speech Systems,

Colorchestra formerly produced by Horizon Software, and the CoCo MIDI pack produced by Rulaford Research.

Be sure that you have correctly installed your MIDI interface into your Multi-Pak interface in any slot before turning the power on. Connect the MIDI IN connector on the interface to the MIDI OUT connector on the synthesizer, and the MIDI OUT connector on the interface to the MIDI IN connector on the synthesizer. Double check to make sure those connections are right.

If you are using a "Y" cable instead of a Multi-Pak, be sure that you have set up your computer in a place where it is unlikely to be bumped or moved.

Make a backup copy of the master CoCo MIDI Pro disk. Put the master copy in a safe place. The copy that you use should NOT have a write protect tab on it.

Run CMPro by typing `LOADM"CMP"` (or `CLOADM"CMP":EXEC` if you are using a tape system). In a few seconds an introductory screen will display; press any key to continue. If the program does not appear to load correctly, make sure that the disk you are using does not have a write protect tab on it!

If you are using CMPro with a Multi-Pak, you need to tell the program which slot of the Multi-Pak the MIDI interface is plugged in before you go any further. Press the F and then the C keys; a box listing different configuration items will appear. Press the down arrow key (at the right hand side of the keyboard) until the cursor is on the line labeled "MULTIPAK SLOT #". Type the number of the slot (1-4) and then press the ENTER key. If you are using a "Y cable" or a cassette tape recorder then you don't need to worry about this. We'll talk more about configuration later.

CoCo MIDI Pro makes use of "tracks" into which you can record music. You can think of a track as pretty much the same thing as you would a track on a tape recorder. The difference is that you have more tracks available and you can easily edit every note and detail on a track.

A Brief Survey: The main screen

The main screen displays 10 of the 16 tracks of music plus some other useful information. There are 4 columns arranged as track number, track size (number of MIDI events), status (play, solo or mute) and room for a comment. You can select a track by moving the cursor up and down with the arrow keys. When you reach the bottom of the screen, the tracks will scroll up to show the remaining 11 through 16 tracks. While the cursor is positioned on the status column, you can change the track status from play to solo to mute by simply pressing the ENTER key repeatedly. When one or more tracks are set to "solo", then only those tracks will sound during recording or playback. When a track is muted, it will not sound during playback even though there is MIDI data on it. Now move the cursor to the right by pressing the right arrow key. Press ENTER and the long bar will change to a small block. Now you can type a track comment. You can put anything you want here; such as the instrument sound used, or the channels used, or a title. Press

ENTER when you are done and you can move around as before.

At the bottom left-hand corner of the screen is a number following the word "FREE:" that tells you how much free memory is available in the edit buffer.

At the bottom right-hand corner of the screen are three words with the first letter of each word displayed in reverse color. These words are reminders of the available command menus. Each menu is accessed by pressing the first letter of the word. More about this later.

Dialog boxes and how they work

Many of the commands will display a box with a border and a request for information or a warning in the middle. These boxes are called "dialog boxes". If the program is requesting information, type it in and press the ENTER key. When a box requests more than one Line of information, you can move around by using the arrow keys, When you press the ENTER key, the command will be performed using the data you have already entered. Remember not to press the ENTER key unless you have entered all needed information. Pressing the BREAK key will abort without performing the command. If the dialog box is just a warning (like a disk error code), press any key to continue with the program. Most dialog boxes will preserve your input. If you call the command again, you will find your previous entry still there. You can easily change the input by simply typing over what is already there. Remember, what you see is exactly what you will get!

How CMPro handles keyboard input

Every time you press a key, you should hear a click through your TV or monitor speaker. If you press and hold down a key, it will repeat until you release the key. You can select Lower case by pressing the SHIFT key and "0" key together. Lower case is displayed with characters in reverse color. You can change case temporarily by simply pressing the SHIFT key with any key. If you are currently in the upper case mode (the default mode), then you will get a lower case Letter if you press the SHIFT key. If you are set in the lower case mode, then you will get an upper case letter. Please remember that CMPro expects upper case letters when you are selecting menus and commands. If CMPro doesn't seem to be responding to you, try changing the case by pressing the SHIFT and "0" keys.

Wow the menu system works

CoCo MIDI 3 uses a menuing system that is designed to be easy for the beginner without getting in the way of the more experienced user. In addition, almost all the available commands are clearly displayed at all times or a help screen can be easily accessed. Since CMPro does not use graphics, the joystick or mouse is not supported; you will find, however, that this is no impediment to the fast intuitive operation of the program.

At the bottom of the main screen is a line containing three words.

Each word corresponds to a "menu" or list of related commands. The FILE menu has a group of commands that mostly operate on disk files; the PERFORM menu has commands that have to do with recording, playback, clock tempo and filtering; the last menu, EDIT, has several editing commands. You can access each menu by simply pressing the key corresponding to the first letter of each menu name. To access the PERFORM menu, press the "P" key. When the menu appears, press the first letter of a line to access the desired command. For example, to access the LOAD command in the FILE menu, you would press the "F" and then the "L" keys. If you change your mind and decide not to access a command in a menu, just press the BREAK key.

Some menus have more than one command that start with the same letter. When this happens, a letter in each command displays in reverse colors. This is the letter you should type to access the command.

Here is a List of the menus with their commands:

FILE	PERFORM	EDIT
Load	Record	Edit Track
Save	Play	Track Erase
Kill	Kill Notes	Clear All
Info	Clock	Restore
Config	Beats/Bar	Beats/Bar
Tape	Filter	Key
About	Monitor	Annotation
Exit	Sys Excl.	

The FILE menu

The FILE menu has eight commands. LOAD is used to get a music file from tape or disk and put it in memory where you can use it. If you are using a disk drive, the program asks you for a disk drive number (0-3); type the correct number and press the ENTER key. CMPPro then reads the directory of CMPPro files on that disk and displays them on the screen. Type the name of the file you wish to Load at the bottom of the screen and press ENTER. Even though the full filename with extension and drive number is displayed (if you are using a disk drive), you can enter only the first 8 Letters of the filename. If you have the tape version, and you Leave the file name blank, the program will simply Load the next file on the tape, While the file is being Loaded, a box with the word "Working" in it will appear; as data is being read, a small box to the right of the word will flash.

If there is an error in the file (garbled data), a box with the warning "ERROR: FILE CORRUPTED" will display. Press any key to continue. Most likely there still will be music in one or more tracks.

SAVE is used to save the music you currently have in memory on either a disk drive or tape. A dialog box is displayed which lets you give a filename. Note that you can change not only the first 8 letters of the filename but also the extension and the drive number (disk drive users only). If you choose to change the extension to something other than "CMP", the file will be invisible to CMPPro. If you have already loaded a file from a disk, that file's

name and the disk drive number will already be copied into the SAVE filename. When you press ENTER, the music in memory will be saved to the disk or tape file name you give. If you give a name that has already been used, CMPro will ask you if you want to write over the existing disk file. If you do, press the "Y" key; any other key will abort the SAVE command,

KILL works the same as LOAD except that the named file will be deleted from the disk. This command is not available for tape users. Be careful when you use this command as the killed file can't be retrieved!

INFO gives you detailed information about the file that is currently in memory. It gives you the file name, the total number of events, the length (in bars/beats:ticks), what the block markers are (in bars/beats:ticks), and then a listing of all sixteen tracks with what channels are on each track. If there are more than four channels on a given track, a "+" will follow the last channel to indicate that there are more. If there are system events on a track, then an "S" will appear in the channel list. The currently selected track number is displayed in reversed colors.

CONFIG lets you set up some information that affects how CMPro works which usually has to be done only once. If you have a disk drive, this information is saved on the disk in a file called "CONFIG/DAT". When you load CMPro, it looks for this file. If it is on the disk, it is automatically loaded and the appropriate changes are made.

The first input line asks for the MIDI code that is required to turn all notes off. This code is sent when recording or playing is halted. It can be used to shut all notes off or zero all controllers. Not all synthesizers use the same code, so provision has been made to change it. The numbers you enter must be in the hexadecimal format and two digits long (most synthesizer manuals will give the right numbers); the last number MUST be an "FF". If you wish to delete this feature, just enter an "FF" as the first number. The spaces between numbers are optional. The MIDI events you enter will be sent on all channels whenever music playback is stopped. Note that only channel dependent messages can be entered here; a system exclusive command would not work properly.

If you are using a 40 track disk drive and the disk controller can access all 40 tracks, then enter "Y" for the next question. This affects only the amount of free space displayed when you load a file.

The next three parameters are used to select colors for the background, foreground, and dialog box border that look best on your monitor. If for some reason you manage to select colors that make the display unreadable, exit the program. If you're using a disk drive, kill the file called "CONFIG/DAT" by typing "KILL CONFIG/DAT*¹". Now when you re-load CMPro, you can reset the colors to what looks best.

If you have a color monitor (RGB or composite) then type "C" following COLOR/MONOCHROME. If you have a monochrome monitor, type an

The next parameter, "SONG POSN POINTER" lets you enable the MIDI song position pointer function and to specify the amount of delay to give between sending the song position pointer and the continue signals. If you are not familiar with song position pointer, just set it to "N". This will disable transmitted song position pointer messages. Otherwise, enter the number of 60ths of a second you want CMPro to wait before sending the "continue" signal. For example, entering the number 60 will make CMPro wait one second from the time it sends the MIDI song position pointer message until it sends the MIDI continue signal and starts playing music.

The next line is used to set the correct slot you have the MIDI interface plugged in the Multi-Pak. This is very important for receiving MIDI signals. If you are using a "Y cable" instead of a Multi-Pak, then the number you enter here has no effect on the operation of CMPro.

"SCREEN BLANK", is used to set a time delay. When CMPro senses no key presses for a certain time, it will blank the screen (so your monitor will last longer). The larger the number entered here, the longer the delay. The screen is automatically restored as soon as you press any key. Since the program acts upon the key you press, it is suggested that you press the SHIFT key to restore the display. That way the screen will return without any action being taken by the program. Screen blanking will not happen during play or record.

"HIGH SPEED TAPE" Lets you select the speed at which data is saved to tape. Normally this should be set to "Y" as most cassette recorders are capable of recording this way. If you find that you are having a lot of errors (music won't load properly) then try changing this line to "N". It will take twice as long to save music but is more reliable. You also might try using a higher quality tape. Interestingly, changing the recorder to a music quality deck usually will have detrimental effects. The best cassette recorder to use is the relatively inexpensive type.

"METRONOME" has space for three numbers. When the first number is set to zero ("0"), the metronome will click through the TV or monitor speaker. If you set it to a note pitch (see the section on Editing for the correct format), then the metronome will be a note on message sent to your synthesizer. The next number is the channel and the last number is the velocity (loudness). Channel can be number from 1 to 16 and velocity from 0 to 127.

For example, setting the following values

A#6 10 127

will cause a note on message to be sent to your synthesizer at the beginning of every beat; the pitch will be A-sharp, the octave above middle C, channel 10, and maximum loudness.

After you have entered all the information, press the ENTER key. A new box will appear asking you if you wish to save this information (disk version only). If you press the "Y" key, the data will be written out to a file called "CONFIG/DAT". The next time you load CMPro, this file will be read and CMPro adjusted appropriately. Just make sure that this disk is in drive 0 since that is where CMPro looks for the configuration file.

If you have the tape version, you can access the CONFIG menu but will not be able to save it, nor will CMPro look for it immediately after loading it.

Now, returning back to the description of the FILE menu commands.

ABOUT gives you a little information about the program.

EXIT will return you to Basic. If you wish to preserve your work, first save it on disk or tape. As long as you do not use a high resolution screen (80 columns or high resolution graphics) while in Basic, or do not run a program that uses extended memory, your music should be intact when you reload CMPro. Of course, if you turn the power off, then everything is erased.

A program that requires a CoCo 3 to operate almost certainly makes use of extended memory. Any of the basic commands that use high resolution graphic or text screens also use extended memory. You should be safe, though, to do disk operations such as directory, file copy, and disk format.

If at any time you should press the computer reset button (at the back right-hand side of the computer), CMPro will return and your music should be intact. Most functions should work normally except for all disk commands. I recommended that you immediately exit to Basic after a reset. Reload the program; your music should be intact.

The PERFORM menu

The PERFORM menu begins with the RECORD command. This command is used to record any MIDI data that is being received from your synthesizer or other MIDI device. Before you access the PERFORM menu, select the correct track by moving the cursor on the main screen to the right line. Access the PERFORM menu by pressing "P", then press "R". Enter the time at which you wish to begin recording. Time is entered as bar/beat. If you want to start at bar 5, beat 3, then enter "5/3". (Note that you cannot start between beats,) You can tell CMPro how many beats there are in a measure through the BEATS/BAR command in the PERFORM menu. If you wish to start at the time displayed, just press the ENTER key. A box with "RECORDING ON" and a number below it indicating the current bar/beat will appear.

There will be a metronome click through the TV or monitor speaker for each beat. You can turn the click on or off by turning the TV or monitor speaker volume up or down. The metronome click is useful for keeping time during recording.

As you press keys on the synthesizer, the number at the bottom of the box will decrement. This number tells you how much space is left in the record buffer. CMPro uses separate areas of memory to record and to edit music. Even though you may have already recorded some music so that the FREE number at the bottom of the screen is less than 16384, you will always have 16384 free in the record box when you start recording.

If you already have music in memory, CMPro will automatically play

that music while it also records. None of the music already in memory is erased during the recording process, even if you record on the same track that already has music in it.

When you're done recording, press any key (except Y or N), You will be asked if you wish to keep this take; answer "Y" if you do, otherwise "N", and the recorded music will be discarded and you will return to the main menu. If you press the "Y" key to stop recording, CMPro will go ahead and keep this take without asking you; similarly, pressing the "N" key will discard the new recording.

If you have already marked a block of music (more on this later), CMPro will ask you if you want to punch in/out before recording starts. For now, just press the N key. We'll talk more about punching in and out later.

If you run out of memory while recording, a box will alert you to that fact and recording will halt. There is room for 16384 MIDI events in this version which is enough for most medium sized compositions. The number of notes that can be recorded at a time is about half of this, however. This is because the note off events sent by the synthesizer are not merged into single note events by CMPro until after recording is stopped.

If you have recorded more music than what will fit in the main buffer (because it is already more than half full), you will get the message "EDIT BUFFER TOO FULL". Part of your music will be lost. You can retrieve it, though, by using the block undo command (more details in the section on block commands). This command will restore the main music buffer to what it was before you recorded. The paste buffer where the music is can be saved to disk or tape with the block save command.

The PLAY command is used to play music that you have in memory. It first asks for the starting time. Enter the time as measure/beat. For example, if you wish to start playing at measure 4, beat 2, enter 4/2. You may omit the measure number if you wish and just enter the beat (such as 40). Or you can enter just the measure (such as 25/). If you wish to enter just the measure, be sure you have the "/" after the measure number. You can tell CMPro how many beats there are in a measure through the BEATS/BAR command in the PERFORM menu. All tracks that are set to PLAY in the status column will be played (unless one or more tracks are set to SOLO; more about that later). A box will display the current measure/beat as the music plays.

MIDI clock signals are also sent unless the MIDI clock has been disabled (see below). A MIDI "start" signal is sent at the start and a "stop" signal is sent at the end of music. If you have a drum machine hooked up, this will start it playing at the beginning of its sequence. If you have started CMPro playback in the middle of the music or not on the start of a measure, the drum machine should still be synchronized with CMPro provided that it responds correctly to the song position pointer message. We'll discuss this important detail in a later section.

KILL NOTES will turn all notes off and zero all controllers (such as sustain pedal, master volume, etc.). You can customize what data is sent to your synthesizer by using the CONFIG command in

the FILE menu. Not all synthesizers are capable of recognizing "all notes off" commands; check your synthesizer manual. In addition to sending the "NOTES OFF" command that is set in the CONFIG command, KILL NOTES also sends note off MIDI commands for all notes on all channels.

CLOCK lets you set a number of tempo and MIDI clock related parameters* Enter a number from 20-400 for the metronome tempo (in beats per minute). You can vary the speed at which music is played with this command. Because of small errors that occur when the number you enter is converted to a binary format used by the computer, you will find that the number you enter is not quite the same when you check the metronome setting later. Typically the error is small and should not make much difference in the way the music sounds.

MIDI CLOCK signals can be turned ON or OFF. These signals are used to synchronize MIDI instruments together as well as to drive certain types of instruments, such as drum machines. When the MIDI clock is on, MIDI clock signals are sent while music is being played or recorded. In addition, the MIDI "start" and "stop" signals as well as song position pointer messages are sent at the start and end of playback or record. When the MIDI clock is on, the MASTER/SLAVE must be set to M (master).

MASTER/SLAVE can be set to either M or S. When set to M, then CMPro is the "master" of your MIDI setup. As long as MIDI CLOCK is set to "ON", it acts as the conductor and sends all the timing information to any other MIDI devices you may have hooked up (such as a drum machine). All tempo changes are given by CMPro, If MIDI CLOCK is set to off, then CMPro will play music on its own but won't send any timing signals.

When set to S, or "slave", then CMPro becomes a passive listener and responds to MIDI timing signals generated by some other MIDI device hooked up to it. You can vary the tempo, start and stop playback or record remotely. This could be especially useful if your drum machine does not have a "slave" mode or if you have another sequencer. CMPro will correctly respond to song position pointer messages, as will be discussed later. When you select the slave mode, MIDI CLOCK is automatically set to "OFF".

When you are in the slave mode, CMPro will wait for a MIDI "start" or "continue" signal before recording or playing music. CMPro must receive MIDI clock signals while in the slave mode to operate. Set your drum machine or whatever master MIDI device you are using to send a "start" signal. When CMPro receives a "stop" signal, playback or recording will halt. You can abort by pressing any key.

When you record or play music while in the slave mode, the box that gives you the current bar/beat as well as the amount of remaining memory has some new information at it's bottom. A new line appears, "AS: CL: IN:". As long as you have a synthesizer hooked up, you should see a blinking box beside "AS:". This means that the program is receiving MIDI active sensing bytes. When MIDI clock signals are being received, a rapidly blinking box will appear beside the "CL:". As other MIDI data is received (such as notes, pitch wheel bends, etc.) a box will blink beside the "IN:". This line of information will help you determine what the problem

may be if you are having difficulty making the slave mode work properly.

BEATS/BAR is used to tell CHPro how many beats there in a bar of music. This can be any number from 1-99. If you wish to display music only in terms of the number of beats since the start of music, then set this to 1. Please note that CMPro does not care whether an eighth note or a quarter note gets a beat; just how many beats there are per measure.

The FILTER affects what type of MIDI data will be recorded and how editing is done. When an "X" is placed beside a MIDI event type, then that event will be filtered out. The filtering effect will be cancelled by changing the "X" to a space (" ").

When you record and an event has been selected to be filtered out (an "X" is beside it), that event will not be recorded. This could be used to filter out pitch bend or control events, for example.

When the filter is on, those MIDI events that are filtered will not be displayed during editing, though the event is not erased. You can use the filter to prevent the display of certain types of MIDI data while editing. For example, you might want to edit just the control changes; use the filter to mark all of the event types except control change. Now the edit display shows just the control changes. It doesn't erase the others; it just makes them invisible. The filter also affects how block commands work. More about this later.

The MONITOR command displays the actual MIDI bytes as they are received from your synthesizer on the screen. The numbers are displayed in the hexadecimal format. ALL clock bytes (\$F8) and active sensing bytes (\$FE) are displayed by a flashing box just to the right of the appropriate marker at the top right hand side of the screen. All status bytes (greater than \$7F) are displayed in reverse colors. If you press BREAK, you are returned to the main screen. Pressing any other key will cause the screen to freeze until you release the key. Pressing the "R" key will clear the screen.

This command is useful for determining what the cause of a problem may be in the operation of CMPro, or if you are just curious as to what the raw MIDI data looks like.

SYS EXCL. Lets you record system exclusive data from your synthesizer. This type of data is usually used for synthesizer setup. In conjunction with the SYX event (to be discussed), this command Lets CMPro act as a limited voice librarian.

When you access the SYS EXCL. command, a box asks you if you wish to continue since the command will clear the paste buffer. If you have used a block copy or cut command in the edit mode and are planning to use the paste command, either go back and finish the job or make sure that you have saved the paste buffer to disk or tape (see the section on block commands). Otherwise, press the "Y" key. A box with "WORKING" will appear. Now instruct your synthesizer to perform a system exclusive data dump (no handshaking). As data is being received, a small box to the right of WORKING will flash. When you are done, press any key. A new box will appear.

asking for the name of the file where the data will be stored. Note that you can change the filename extension as well as the drive number. The extension can be anything you want; it just helps to be consistent. This file can now be transmitted back to your synthesizer by the use of the FILE event.

A system exclusive data file contains the raw data received from your synthesizer. It may contain one or more standard system exclusive blocks that start with \$F0 and end with \$F7. The last byte in the file immediately following the last \$F7 should be 0.

The EDIT menu

The EDIT menu has mostly editing commands. EDIT TRACK is used to make changes to the notes and other MIDI data on a single track. Before you select this command, make sure that the cursor is on the track you want to edit. Upon entering the edit mode, the screen will change and show a page of MIDI events (if you have recorded or loaded music). Each event is listed on a single line starting at the top of the screen. If you have not recorded or loaded any music yet, then the message END OF BUFFER will display at the top of an otherwise blank screen. Here is an example of a track that has three notes:

```
1/1:0 NO=C5 1 40 0:45
1/1:48 NO=D5 1 40 0:48
1/2:0 NO=E5 1 40 1:0
END OF BUFFER
```

From left to right, is the start time of the event, the event type (such as a note, control, program change, etc.) followed by the primary value associated with that event (for a note, it is the pitch; for a program change, it is the program number, etc.), then the channel number, an additional data byte if applicable (such as velocity, pressure, etc.), and finally for notes, a note length. Notice that all numbers are displayed in the familiar decimal format.

A flashing cursor indicates what your position is and where you can edit. Press the ENTER key and the cursor stops flashing; enter whatever data you need and press ENTER. The cursor will resume flashing. Pressing the BREAK key before pressing the ENTER key for the second time will abort data entry. If you press the ENTER key while the cursor is over the event name ("NO" in this case), a box will pop up with a list of the possible event types; type the letter corresponding to the highlighted letter of the event you wish to change to. For example, typing a "U" will change the note to a pitch wheel event.

Move the cursor around with the arrow keys. Pressing the SHIFT key and the up or down arrow keys will move you up or down a page at a time. Pressing the BREAK key will return you to the main menu.

TRACK ERASE lets you delete all the music from a given track. Make sure that you have selected the right track first by positioning the cursor in the main screen on the correct track.

CLEAR ALL will erase all music on all tracks. Again, use care

with this command.

RESTORE can be used to undo a TRACK ERASE or CLEAR ALL command. It will get your music back as well as the track comments and annotation.

BEATS/BAR lets you set the number of beats per bar. Notice that this is not the same thing as the numerator in a time signature. A 6/8 time signature can have either 2 or 3 beats per bar, depending on how it is played. This command is here to make editing more easy for you and does not actually affect the music in memory.

KEY changes the display mode when you are editing notes. You can choose to display accidentals as either sharps or flats. This is strictly for your convenience and makes no difference in the actual music. For example, if you recorded some music that was in the key of E-flat, it would be much easier to edit the notes if the accidentals (B_b, E_b and A_b) were displayed as flats rather than sharps. CMPro displays sharps with the "#" symbol, and flats with the "-" symbol. For example, a-sharp and b-flat are displayed as "A#" and "B-".

ANNOTATION brings up a special box with twelve lines that can be filled with any type of information. You can type in a copyright notice, or performance information, for example.

The following section is a brief guided tour of CMPro, I'll try to point out some of the most important features so you can get started as quickly as possible.

As soon as CMPro has loaded and the title screen has changed to the main screen which shows the tracks and their status, you are ready to begin. Press the "P" key to access the PERFORM menu at the top of the screen. A small box will pop down, listing several possible commands. Let's try recording, so press "R". The box will erase and a new box will appear in the middle of the screen asking for the time at which to start recording. Just press ENTER to start at the beginning (1/1, which means measure 1, beat 1). A new box will appear with "RECORD ON" in the middle of it. Now try pressing some keys on your synthesizer. You should see number at the bottom of the screen changing.

If you don't, turn everything off and recheck your connections. Have you plugged the program pak into the same slot of the Multi-Pak as specified on the configuration list (in the FILE menu) or is the "Y" cable connected correctly? Have you connected the "MIDI IN" connector on the MIDI interface pak to the "MIDI OUT" connector on the synthesizer, and vice versa? Is your synthesizer correctly set up? Turn your equipment back on and try again.

Assuming that you have successfully got CMPro and your synthesizer to talk to each other, and that you are done recording, press any key except Y or N on the computer to stop. The box will change to "KEEP THIS TAKE?" Go ahead and press Y. Notice that the SIZE column has changed to reflect the number of notes that have been recorded. If you had pressed "Y" to stop recording, CMPro would not ask if you wanted to keep the recording; it would go ahead and keep it. Similarly, pressing "N" would have aborted the recording and discarded the music.

Try playing the music back. Press "P" to get into the PERFORM menu, and then select PLAY by pressing "P" again. CMPro will ask you where you want to start playing the music. Since you want to start at the beginning, just press the ENTER key. You should hear your synthesizer playing back the same notes that you pressed while recording.

You can easily vary the tempo of the music; select the PERFORM menu again and then the CLOCK command by pressing the "C" key. The first line in the box that appears lets you set the "metronome" for CMPro. Enter a number corresponding to the number of beats per minute that you want, and press ENTER. For now, change the 100 to 200 and press the enter key. Now when you play music, the tempo will be twice as fast. You could take advantage of this to record a particularly difficult passage of music at a slow tempo. Then when you play everything back at a normal tempo, you would amaze all your friends with your virtuosity!

A track is much the same as a track on a multi-track tape recorder. It allows you to organize music data so that a solo part is on a track while the accompaniment is on another, and the percussion is on yet another. You could record everything onto the same track, but then it would become difficult to figure out what is what when you try to edit things.

Now Let's try recording on another track. Don't change anything on your synthesizer. Move the cursor down by pressing the down arrow key to the next track. Assuming you made your first recording on track 1, you should now be on track 2. Begin recording as you did before. Play whatever you want; try to harmonize with what you played before, or ignore it. Notice that what you recorded previously is played back as you record on the new track.

Unlike a tape recorder, CMPPro does not erase music when you record new music. Even if you record on a track that already has music in it. You must specifically tell CMPPro to erase a track if that is what you want.

With two tracks recorded, you are ready to try a few tricks. The MUTE function will disable the play-back of a track. Just highlight the PLAY of the desired track by using the cursor keys, press the ENTER key, and the PLAY changes to SOLO, then to MUTE when you press the ENTER key once more. Now when you play the music, that track will not be heard. Use this feature to make as many recordings on different tracks of a particular part as you need. Mute everything but the tracks you want to hear. When you're sure you have the right take, erase all but the ones you like best.

When a track is set to SOLO, then only those tracks that are set to SOLO will be played. This can be used to good effect if you have music on numerous tracks and you need to single out just one or a few tracks to listen to.

A short title or comment can be added to each track by moving the cursor over to the COMMENT column and pressing the ENTER key. Type whatever you want, and press the ENTER key. You can use this to remind yourself of what type of music is in that particular track. Such as "BASS", "STRINGS", "MELODY", etc.

Obviously when you change a track's status from PLAY to MUTE, you don't lose any music; it just doesn't play. You can erase the music in a track if you want, though. Make sure the cursor is on the desired track and select the EDIT menu by pressing the "E" key. Select the TRACK ERASE command by pressing the "T" key. You will hear a beep and a box with the message "ARE YOU SURE?" will appear. Press the "Y" key to confirm your intentions, or any other key if you change your mind. The track size will change and show that the track is now empty. If you should change your mind, just select the RESTORE command.

If you want to clear everything and start over, select the CLEAR ALL command from the EDIT menu. If you change your mind, you can select the RESTORE command from the EDIT menu to bring back your music.

Now that you have had a chance to record some music, you probably would like to save it on your disk drive. Access the FILE menu by pressing the "F" key and then the SAVE command by pressing the "S" key. Enter up to 8 letters for the file name and press the ENTER key. CMPPro will save your file and return to the main screen. If you already have a file on the disk with the same name, CMPPro will tell you and ask if you want to write over it. If some sort of error should occur during disk access (such as wrong drive number, write protected drive, etc.), a box will display an error

number. Full explanations of the error numbers can be found at the back of this manual or in your computer manual (page 27 of the "Quick Reference Guide").

Retrieving music from the disk is just as simple. Select the LOAD command in the FILE menu. Enter the drive number you want to access, and the screen will display a directory of the available files. Type the file name down at the bottom of the screen, press ENTER, and the file will be loaded. You will notice that a music file contains not only the music in each track, but also such information as the track status (PLAY/MUTE/SOLO), the track comments, and the tempo.

EDITING -----

CMPPro's editing mode is fast and easy to use. But in order to make sense of what you are editing, you first have to know a little about how MIDI works. There are just 6 types of MIDI data you will have to worry about, and one type is much more common than all the others put together. Since MIDI data describes certain types of actions taking place at a certain time, we will refer to these actions as "events". Each event describes a note, control change, or pitch wheel change occurring at a certain time.

Whenever you strike a key on your synthesizer, numbers are generated by the synthesizer's circuitry and sent out the MIDI connector and into your computer where CMPPro can process them. When you release the key, another set of numbers is generated so CMPPro can determine the length of the note. These numbers for "note on" and "note off" are combined into a single event called a "note event" in CMPPro. The information that makes a note event includes the time, the channel, the pitch, the velocity (how hard you struck the key if you have a velocity sensitive keyboard), and the Length of the note.

Let's play around with the editor to get an idea of what is being talked about. If at any time you forget what editing commands are available, just press the "?" or "/" key and a dialog box will pop up, listing all the commands. When this "help" box is displayed, you can access any of the Listed commands by pressing the key corresponding to the highlighted letter of the desired command.

Assuming that you have just loaded the program and you are looking at the main screen, press the "E" key to access the EDIT menu, then "E" to enter the editor. The screen will clear and the words "END OF BUFFER" will be at the top. Press the "I" key and a new line will appear. This new line is actually a note event, and describes a note. It Looks like this:

```
1/1:0 NO=E5 1 40 1:0
```

Starting from left and reading right, the 1/1:0 is the starting time for the note (more on how time is notated in a moment), NO=E5 means "this is a note of value or pitch E5", 1 tells you that the channel is 1, 40 means the velocity is 40, and 1:0 tells you the Length of the note. All notes have these bits of information.

If you have already been in the edit mode and have exited back to the main screen, CMPPro will remember where your position in music, When you re-enter the edit mode, the screen will be about the same as it was before.

How time is displayed in CMPPro

In CMPPro, time is notated in terms of measures, beats and "ticks". A tick is a subdivision of a note. CMPPro divides beats into 240 equal parts. A note starting midway between beat 2 and 3 in measure 5 would be written as 5/2:120, The "2" means beat 2, and the ":120" means 120 ticks out of 240, or a half beat.

Note length uses slightly different notation. A measure number is

never used for note lengths. Note Lengths can be less than 1 beat in duration, such as 0:120 (half a beat). A dotted quarter note would be written as 1:120 (one beat plus half a beat).

How note pitches are displayed

Note pitches are described by the letter name of the pitch (A, B, C, D, E, F, G), an accidental if present, and the octave number. Middle C is written as "C4". An octave higher is "C5". The A-sharp above middle C would be "A#4". Flats are displayed with a "-". Thus, the B-flat below middle C would be "B-3".

Going back to what is on your computer screen, let's try editing that note a bit. The flashing box (called the "cursor") tells you where you are. Move it back and forth by pressing either the right or left arrow keys. Position it over the note length at the extreme right (1:0). Press the ENTER key. The flashing will stop and you can type in new numbers. Press the ENTER key once more and the cursor will start flashing again.

How the different MIDI events are displayed

Move the cursor once to the Left so it is over the "N". Now when you press the ENTER key, a box appears Listing the different types of events that can be selected. Select an event by pressing the key corresponding to the letter displayed in reversed color. For example, to select a Note event, press "N"; to select a channel pressure event, press "R". Here is how the box looks and what each line means:

NOTE	Note
KEY PRES	Key pressure
CTRL CHG	Control change
PROG CHG	Program change
CHN PRES	Channel pressure
PCH WHL	Pitch wheel
SYS EVNT	System event

This is how you change a note to some other type of MIDI event. Each event is displayed as a two Letter abbreviation. The letters are abbreviations for the following:

NO = Note
KP = Key pressure
CC = Control change
PC = Program change
CP = Channel pressure
PW = Pitch wheel
SE = System event

(For those of you who are already seasoned MIDI users, the 'System event' is not the same thing as a MIDI system exclusive message.) Don't worry too much about what these other events mean for the moment.

The INSERT command

When you pressed the "I" key, you used one of the editing commands: insert. This command inserts a new MIDI event identical to the one that the cursor was positioned on when you pressed the "I" key, unless it was on the "END OF BUFFER" marker, when a note event is inserted.

Press "I" once more. Now you have two identical note events both starting at time 1/1:0. Change the time for the second to 1/3:0 and the pitch to D4. Do this by moving the cursor down to the second line (using the up or down arrow keys) and then over to the event time at the extreme left (using the left or right arrow keys). Press the ENTER key and type in the new time. Press then ENTER key once more then move to the note pitch by pressing the right arrow key twice. Press the ENTER key, type in the new pitch, and then press ENTER once more.

Move the cursor back up to the first note and press the "P" key. You should hear both notes sound on your synthesizer.

Now let's try inserting a note between the two existing ones with a time of 1/4:0. Position the cursor on the first note and press "I", you will find that when you try to change the time to 1/4:0, CMPRO automatically decides where the note should go so that the correct progression of event times goes from smallest to largest. When it does this, though, the screen is completely re-written and the cursor goes to the stop of the screen.

The DELETE command

Suppose that you now decide that you really don't want to start the music on beat 1/1:0 with a pitch of E5. Go to the first note and press the "D" key. That note disappears, or is deleted.

You can use the insert and delete commands to easily enter new notes. These commands are just two of many others that are available while you are in the edit mode. To see what is available, press the "?" or "/" key. A box will pop up, displaying the available commands.

The PLAY command

You have already tried the Play command. This command lets you play music back from any point in the score starting at where the cursor is positioned. Pressing any key (other than the ENTER key) will cause the playback to stop. A box will appear and ask you if you wish to update the display. If you type "Y" and press the ENTER key, the display will change so that the last event played will be at the top of the screen. If you type any other letter and ENTER, the display will not change. If you stop playback with the ENTER key, then the UPDATE DISPLAY? box will be bypassed and the value you typed in previously will be used.

If the cursor is positioned on an event that has a time between beats (such as 5/1:35 or 1/2:3), then CMPRO will begin playing at the start of that beat.

The SPACE (play single event) command

Pressing the space bar will play just the note or program change event that the cursor is on. This command is very useful to check changes you have made to the score and to make corrections as needed.

An example of correcting a mistake

Here's an example of how you can correct a mistake. You have recorded some music and while playing it back you hear a "thumbed" note. Quickly press any key and hold it down. Note the time displayed and then release the key. Enter the edit mode for the correct track and use the GOTO (the "G" key) to go to the time of the error. Most likely the error is just before the time you got from the play box, so press SHIFT and the up arrow key to back up a page. Play the music by pressing the "P" key. Once again, stop the music as soon as you hear the error. Back up if necessary and play until you are pretty sure you have located the note you're looking for. To make sure, you can back up a few notes and play each note one by one by pressing the space bar. Once you've located the errant note, you can delete it. If you want to make sure you've got the right one before you lose it for good, you can change the channel to some value that your synth won't respond to. Back up a few notes, play, and see if the music sounds right now. If it does, go back and delete the note.

The RECORD command

You can even record from the edit mode. Put the cursor where you want to start, press "R", and recording will start. Press any key to stop. Note that any music already in memory is never erased and the new music is merely added to what is already there. You can use this command to re-record sections of music or to add new parts.

When recording on an empty track from the edit mode, recording starts at time 1/1:0 unless you insert a "dummy" event at the desired starting time. After you're finished recording, go back and delete the "dummy" event.

Punching in/out

CMPro gives you a very simple way of punching in/out. If you are not familiar with punching in and out, it simply is a way to automate the recording process so that the sequencer starts recording at a given time, and stops at a given time. Unlike the usual way of recording, punching in and out REPLACES music instead of overlaying it.

Set the starting time by positioning the cursor on the edit screen where you want to start recording and then pressing the "M" key. Set the ending time by pressing the "H" key again on the ending time. You will notice that the events between the two times change colors. This is the same process used in marking a block of music (to be discussed). If you wish to change the start or stop times, first clear the block with the "C" key and start over.

Now position the cursor to before the start time and press the "R" key. A dialog box will ask you if you wish to punch in/out; press the "Y" key. CMPro will first delete the marked area of music, then play back until the start time, when it will switch into the record mode, then switch back into the play mode when it reaches the end time. The box displayed when you press the "R" key will say RECORD OFF until the start time is reached, then change to RECORD ON. When the end time is reached, it will change back to RECORD OFF.

Punch in/out is used to re-record a section of music. It has the advantage of letting you play along with the music before the recording actually starts.

If you start recording after the punch out (or end) time, CHPro will not let you punch in/out. Obviously, you need to start with the cursor positioned before the punch in (start) time!

As you can see, CHPro gives you a lot of flexibility in how you can do things. At first this may seem difficult to understand, but I think you will find that with a little practice, you will find CHPro to be unusually powerful.

The GOTO command

You can quickly move to any point in the music by pressing the "G" key (GOTO) and then entering the right time value. The time value can be one of 3 formats.

You can give just the beat number, or you can give the familiar beat:tick, or you can give measure/beat:tick. If you use the last format, be sure that the number of beats per measure is correct {it is set from the PERFORM or EDIT menus}.

In addition to specifying a time to go to, you can use one or two letter abbreviations to move to the start or end of music ("S" or "E"), or to the start or end of a block ("BS" or "BE").

The GOTO (the "G" key) command can be used to good advantage when you are working with a block of music or if you are trying to locate an error. In both situations, you will be moving forward through the music, then back to a starting point, then forward again. Moving back to the starting point with GOTO will put you back quickly and exactly.

The SLIDE command

The SLIDE (the "S" key) is used to "slide" all music up or down, starting at the cursor position. When you press the S key, a box appears asking you to give a "SLIDE TIME". This is entered exactly as for note lengths (don't use a bar number), except that you can add a "minus" (-) sign. Generally speaking you will be working with just ticks, which can be entered as :10 (ten ticks) or whatever you need. The slide time is added to all events starting at the cursor position. The effect of the SLIDE command is to delay music a certain amount, or to advance it if a negative slide time is entered.

An example of using the SLIDE command

This will make more sense with an example. Suppose you have recorded several bars of music and realize after looking at the music in the edit mode that you have consistently played ahead of the beat by about 10 ticks. The SLIDE command makes that easy to fix. Just put the cursor on the first event affected, press the "S" key and enter ":10". Now ten ticks have been added to each event time so that the music plays exactly on the beat.

The ALL tracks command

When you have more than one track of music, it is occasionally helpful to be able to see the notes from the other tracks. This can be accomplished by pressing the "A" key. Now you can edit all events in all tracks that are not blocked by the filter.

The block commands -- the effect of the FILTER

Let's discuss the block commands next. The FILTER command (accessed by pressing the "F" key while in the edit mode) has a very important effect on all block commands. Whenever an "X" is placed beside an event type on the FILTER, that event type will not display on the edit screen. The event is still there, but is not affected by the editing process. All of the block commands will affect only those events that are displayed. This can be put to good use when you wish to edit only certain types of events. The filter command works exactly as the FILTER command on the PERFORM menu.

Marking a block with the "M" key

The block commands operate on blocks of music instead of individual notes as the insert and delete commands do. A block is defined by pressing the "M" (for "mark") key on the beginning and end points of the block. When marked, the block will be displayed in inverted colors.

If you have already marked a block and you press the "M" key, a box will appear titled CHANGE MARKERS. This is to remind you that you have already marked a block. The start and end times for the block are given; if you wish to change them, you can enter new times for each. Just be careful to enter a start time that is less than or equal to the end time!

You can erase the block markers by pressing the "C" key.

When CMPRO sets marks for the start and end of a block, it remembers the time of the start and end, not the actual event position. This will be clear if you try to mark just a single event when there is another event on the same time. Both events will be marked since they are on the same time.

Marking All Events

Many times you will want to mark all music; there is a special

command that will do this automatically for you. Just press the "L" key.

The Directory Command

Several system events make use of file names; to help you remember what files you have on a disk, the DIRECTORY command has been added. Press the "E" key, the disk drive number (0-3), then the ENTER key, and a two column listing of all the files on the disk will be displayed.

The Block Menu

To access the block commands, press the "B" key. The block menu will pop up. All of the block commands work on "blocks" of music rather than individual events. Most of the commands require that you have already marked a block of music. This is done by positioning the cursor on the first event and pressing the "M" key, then positioning the cursor on the last event and pressing the "M" key. The block will be displayed in reversed colors.

The first three commands, copy, cut, and paste, are the most frequently used, COPY takes the marked block and copies it to a special area in memory (called the paste buffer) where it can be used later with the paste command. CUT does the same thing except that the notes in the marked block are deleted as well. PASTE takes the music in the paste buffer and puts it back at a specified time. If you have worked with a word processor, these operations are undoubtedly familiar.

Block QUANTIZE

Quantize is used to round off the event times to some given fraction of a beat. This can be used to good effect if the notes in a passage are a little uneven. Quantization will make the notes sound even and smooth.

When you press the "Q" key, a box will appear with "QUANTIZE=48 TICKS" and "PERCENT=100". The value 60 is the number of ticks you want to round the time values to. In this case, 60 corresponds to 60/240 or 1/4 of a beat. If you are using a time signature of 4/4, then 60 is the same as a 16th note. The right hand side of the box has a list of commonly used quantization values and their equivalent note names (assuming a that a quarter note gets one beat). Remember that quantization works ONLY on the block of marked music within the track. If you need to quantize the music in all tracks, then use the "ALL" command so all the tracks are displayed.

The PERCENT normally should be left at 100. If you change it to a value less than 100 (never more), then the quantization process will be dampened. Instead of a note being moved to exactly the right quantized time, it will be moved a certain percentage towards the desired time. Setting percent to 50 will mean that notes will be only halfway quantized. The PERCENT value then is used to lessen the effect of quantization. The smaller the number, the less quantization. It is of special value to clean up a passage but to leave some "human" feel.

The best results are obtained when you quantize to the smallest

note value in a block. For example, if you know that the smallest note value in a block of music is the 8th note, and the time signature is 3/4 (a quarter note gets one beat), then you should quantize with a value of 120. If you quantize using too large a value, you will find that notes will be "lumped" together, producing a rather unpleasant effect.

Normally you should use only quantization values that will divide evenly into 240. These values are listed here with the equivalent note length (assuming a quarter note gets one beat):

240	quarter note
120	eighth note
80	eighth triplet note
60	sixteenth note
40	sixteenth triplet note
30	thirty-second note
20	thirty-second triplet note
15	sixty-fourth note
10	sixty-fourth triplet note
7	128th note (approximate)
5	128th triplet note

If you use a number that does not divide evenly into 240, you can get some interesting results. By properly manipulating the quantization value and the percentage, you can introduce a variation into the event times that makes the music sound less mechanical.

Block SCALE

The SCALE command is fairly complicated. This command lets you vary different types of data smoothly over a given range. For example, you could smoothly increase the volume of notes from 10 to 100, or you could gradually slow the tempo from 150 to 80.

When you press the "S" key the SCALE will appear. Four different types of MIDI data may be scaled and are listed on the menu. You can scale velocities (or the loudness of notes), tempo (by using the tempo system event), pitch wheel, or controller (which controls a number of different synthesizer parameters such as volume through the MIDI control change event).

Unlike the other block commands, the scale command should be used only with blocks that are less than 132 beats long. If the block is too long, the command will abort and a box displaying "BLOCK TOO LARGE" will appear.

When you select the type of MIDI data you wish to scale, a new dialog box will ask you to enter the starting and ending scale values. The start value is the value that CMPro will assign to events at the start of a block. The end value is the maximum value used at the end of the block.

The actual scaled values generated by CMPro depend on the event's time position in the block. For example, two events that are two beats apart will have scaled values that differ twice as much as two events that are just one beat apart.

If the first event to be scaled does not begin at the start of a

block, then its scaled value will not be equal to the scale start value. For example, if the first event in a block is a program change event, and the first note occurs 2 beats later, and you are scaling note velocities, then the note velocity will be somewhere between the start and end values that you gave the scale command.

An example of the block SCALE command

Perhaps this will all make more sense with an example. Make sure that you've cleared all music by using the CLEAR ALL command on the TRACK menu. Enter the following notes on any track:

```
1/1:0 NO=E5 1 64 1:0
1/2:0 NO=E5 1 64 1:0
1/4:0 NO=E5 1 64 1:0
2/1:0 NO=E5 1 64 1:0
END OF SUFFER
```

Notice that all of these events have the same pitches, channels, velocities, and note lengths, Just press the insert key ("I") four times then change the event times for the last 3 notes.

Mark all four notes in a block by putting the cursor on the first event, pressing the "M" key, then moving down to the last event and pressing the "M" key again. All four events should change to inverted colors. If not, press the "C" key to clear any previous block markers and mark the first and last events again. Press the "B" and then "V" keys to scale note velocities. Enter 10 for the start value and 100 for the ending value. Now you should see this:

```
1/1:0 NO=E5 1 10 1:0
1/2:0 NO=E5 1 32 1:0
1/4:0 NO=E5 1 77 1:0
2/1:0 NO=E5 1 100 1:0
END OF BUFFER
```

Note that the velocity for the first event is 10, and the last is 100, as expected. The velocity of the second note (32) differs from the first note by 22, whereas the third and second notes differ by 45, about twice as much. The reason for this, of course, is because the first two notes are only a beat apart, but the second and third notes are two beats apart.

How much the velocity changes from note to note is dependent on the amount of time between notes. For example, if two notes are twice as far apart as the next two, then the velocity will change twice as much for the first two.

Block CHANNEL change

You can change the channel assignment of all the events in a marked block by pressing the "H" key. Of course, only those events displayed are modified. You can use the FILTER command to good effect if you wish to change the channel assignments of only certain types of events.

Block LOAD

This command is used to Load a file created by the block SAVE command and put it in the paste buffer. You then could the PASTE command to insert the music at any point. You could create a "library" of music or rhythm sequences that could be accessed as often as you wished to build up a song.

Block SAVE

This command writes the contents of the paste buffer to disk. Just be sure that you have use the block COPY or CUT command so there really is something in the paste buffer to save!

Block CREATE

The CREATE command, accessed by pressing the "R" key, is used to create new MIDI events at regular time intervals. The type of MIDI event you want to create must be the first event in a marked block. When you press the "R" key, a new box will appear asking for the spacing for the new events. New events will be inserted into the music at the time interval you specify. The time interval is given in the same format as note lengths (no measure number). If you set the interval to 1:0, then a new event will be inserted every beat. Enough new events will be created to fill the block; no new events will be created with times equal to or Larger than the block end time.

This command is particularly useful when used with MIDI control changes, pitch wheel, or tempo changes. You can then use the Scale command to achieve special effects such as changing the master volume, making a pitch wheel bend, or accelerandos or ritardandos.

An example of using block CREATE

Here's an example of how to use the CREATE command. Enter the edit mode on an empty track. Press the "I" key to insert a note. Press the "I" once more and change the time for the second note to 4/5:0. This is what you should see:

```
1/1:0  NO=E4  1  64  1:0
4/5:0  NO=E4  1  64  1:0
```

Position the cursor on the first line, press the "M" key, then move down to the second line and press the "M" key. Both note events should reverse colors to indicate that you've marked a block. If that doesn't happen, you probably have already marked a block and need to clear it before proceeding. Press the "C" key and repeat the marking process. Now press the "B" key to access the block commands, then the "R" key. A box will appear asking you to enter the spacing for the new events. Type in 2:0 and press the ENTER key. The screen will change, showing 9 new note events, all spaced two beats apart.

An example of using block SCALE

Now that you have some notes in memory, let's try using the SCALE command. Press the "B", "S", and "V" keys in that order to get into the velocity scale command. As you will remember, the velocity of a note affects its loudness. Let's create a crescendo effect starting with a soft velocity of 32 and a loud ending velocity of 127, Enter 32 for the START value and 127 for the END value and press the ENTER key. The screen will show that the first note has a velocity of 32 and each successive note getting louder by 9 or 10 until the Last note is reached, which has a velocity of 127.

If your synthesizer can respond to the volume control change command, you can change volume even within a single long note. Changing velocities works fine provided that you have plenty of notes. If you have just a few notes and you need to make a gradual volume change, then this is the way to go.

Starting with all tracks empty, insert a single note at time 1/1:0. Press the "I" key and change the second note event time to 1/2:0. Press the "I" key once more and change the third note event time to 4/1:0. Move the cursor up to the first note and over one space and change the event type to control change (CC) by pressing the ENTER key twice. Move the cursor to the number past the CC and enter 7. This is the control change code that will change the master volume for most synthesizers. In the same way change the last note to a control change. Move up to the note event and change the note Length to 10:0. The screen should look like this:

```
1/1:0  CC=7  1  32
1/2:0  NO=E4  1  64  10:0
4/1:0  CC=7  1  32
```

Now mark the first and Last events as before. Create new control change events one beat apart by pressing the "B" and "R" keys, then entering 1:0. Finally, access the control change scaling command by pressing the "B", "S", and "C" keys. Type in the number of the controller you wish to scale (7 in our case) and press ENTER. Type in the correct starting and ending volumes (try 32 and 64) and press ENTER, Move the cursor back to the top of the screen and try playing what you have. You should hear the volume of the note change gradually from a soft to a louder sound. Make sure you have an instrument sound that produces a long continuous tone such as an organ.

Block EXTRACT

The EXTRACT command is used to split a track into multiple tracks, or merge a track with another. This feature is very easy to use, and gives you considerable flexibility in the editing process. You will find that the extract command makes the sixteen available tracks more functional than 32 tracks in a sequencer without this command.

To split a track, the events you wish to move must all be on a unique channel. If the music uses channels 1 and 2 in track 1, you can move all the channel 2 (or channel 1) events to a new track. If the track you are moving events to already has music in it, the new events are merely added to them. Nothing is erased.

When used carefully, the block extract command gives you the equivalent of 256 tracks! This is because CMPPro does not limit the number of channels used in a track. If you have recorded music using all 16 channels in a track, you can edit just the events on a single channel by extracting them to an empty track.

Notice that since system events do not have a channel assignment, they cannot be moved from one track to another.

An example of using Block EXTRACT

Suppose that you have recorded a song, complete with program changes. You have more than one synthesizer and would like to have a way to put all those program changes in a separate area so they could be easily modified. Put an "X" marker in front of all the lines on the MIDI filter except for "PROGRAM CHANGE". Use the MARK ALL command to mark the entire track. Edit the track that has the program changes in it. Use the EXTRACT command to move the displayed program changes to an unused track. If the program changes are on more than one channel, repeat the EXTRACT command until you've got them all. Go back to the FILTER and change all the X's to spaces (" "). Now edit the track that has the program changes on it.

You could extend this idea even further. You could have several tracks with just program changes in them. All but one of those tracks would be muted for a given synthesizer. To change synthesizers, just change the proper track's status to PLAY and the others to MUTE.

Block TRANSPOSE

You can move the pitch of all the notes in a block up or down with the TRANSPOSE command. You MUST set the first character in the transpose amount to either "+" (for sharp or higher pitch) or "-" (for flat or lower pitch). The next two characters are digits giving the number of half steps you wish the transpose to change pitches.

Block CLIP

CLIP is used to trim all note event velocities so that they are equal to or above a minimum value and equal to or below a maximum value that you specify. In addition, you can multiply each velocity by a number called a "FACTOR", This can be used to increase the velocity of all notes but still preserve differences in loudness between notes.

If you set MIN to 0, MAX to 127 and FACTOR to 0.5, then all note velocities in the marked block will be half of what they were.

If you set MIN to 0, MAX to 80, and FACTOR to 1.5, the note velocities will be one and one-half times as large as long as the final value is less than 80; all velocities larger than 80 are trimmed to 80.

You should always keep the MAX value at 127 or less. Note

velocities higher than this will totally confuse your synthesizer.

Block MAP NOTES

MAP NOTES allows you to change the pitches or channel assignments for up to eight notes. You specify the notes you want changed and the new pitches or channels they will get "mapped" into. Enter the present pitch first, then the new pitch or channel number on the right after the "-->". For example, suppose you wish to change all middle "C" notes to C-sharp, and all E-flats above middle C to channel 3. The first two lines in the REMAP NOTES box would look like this:

```
C4  -->  C#4
E-4 -->  3
```

This command is of particular use in editing drum machine parts. You can easily change a snare drum note to a cymbal note, for example. Re-assigning channels to certain notes can be used for special effects.

Block MOTE LENGTH

Note lengths can be modified with this command. You can double or halve all note lengths in a block. By shortening the lengths you will produce a staccato effect. If you lengthen, be careful not to exceed CMPRO's internal limit of 12 simultaneous notes. Host synthesizers also have a limit on how many notes they can play at once.

The first two lines let you specify the MINimum and MAXimum values that each note length can have.

The FACTOR is a number that each note length is multiplied by. If you enter 1.00, then no change will be made. If you enter 0.5, then all note lengths will be halved. If you enter 2.45, then all notes will be 2.45 times longer than before. You can enter up to two decimal places (the number 0.53 is ok, but 0.531 is not since it has three decimal places).

Block UNDO

The UNDO command is useful for reversing the effect of certain block commands. Please note that it does not work for all of them, though! It does not affect QUANTIZE, LOAD, or SAVE.

OK, that is all for the edit mode! Don't worry if you don't understand everything yet. There is a lot here and it will take some experimentation to get the feel for how things work.

As you probably noticed in the discussion about the CLOCK command, CMPPro supports both the "master" and "slave" clock modes. The "master" mode is usual mode that you will use, but you need to become fully familiar with the "slave" mode as well since it has some unique capabilities.

All MIDI devices operate in either the master or slave mode. When in the master mode, the device will generate timing information. Any other MIDI devices connected to the master device are expected to be in the slave mode (one "master", but many "slaves!"). The devices in the slave mode will take all their timing cues from the master device.

The main purpose of the slave clock mode is to allow multiple MIDI devices to be synchronized with each other. The simplest form of this is synchronizing a drum machine with a synthesizer/sequencer setup. More complex applications include synchronization to a timing signal recorded on a tape deck, or with video images.

The easiest way of synchronizing two MIDI instruments is to start them both playing at the same time, at the start of music. The MIDI standard takes care of this easily by specifying the start signal code. After the start signal is given, the slave keeps time with the master by waiting for MIDI clock signals.

A little more complicated situation arises when you want to start playback or recording in the middle of music. CMPPro supports the MIDI song position pointer convention in which the master device sends a message before sending a start signal that tells the slave how far from the beginning it should start.

When CMPPro is set so the MIDI CLOCK is ON and it is in the master mode, it will generate a song position pointer message before sending a start signal, provided that you have set the configuration so that "SONG POSN POINTER" is set to some number. If it is set to "N" then no song position pointer messages will be sent. Not all synthesizers are as fast when responding to a song position pointer (SPP) message. Some can do it in less than a second, and some require several seconds depending on the length of the sequence. This is why provision has been made to adjust the length of the delay between the SPP and the "continue" message that actually starts the music.

When CMPPro is in the slave mode, it will correctly respond to a SPP message. This means that instead of starting at the beginning of music, playback or recording will begin at the correct number of beats from the start.

An example of using the Song Position Pointer message

Let's suppose that you have a 4 track tape recorder, and a special convertor box that converts clock MIDI signals into an audio signal that can be recorded on tape, and also converts the audio signal back to MIDI clocks. CMPPro will work well with such a setup so that you can make multiple recordings and still keep everything

synchronized exactly together.

The first step is to record the timing signal produced by the convertor box on one of the tape recorder tracks. Next, record a sequence of music into CMPro, operating CMPro in the master mode.

Now record that music on the tape recorder. Set CMPro to the slave mode. Set the tape track that has the timing signal on it to "play". Using the MIDI timing signals generated from the tape by the convertor box to drive CMPro operating in the slave mode, record the music on an empty tape track.

Once you have laid down a track of music on tape, you can add additional tracks in the same way. Just be sure that CMPro is kept in the slave mode. All the timing information that it needs will be produced by the convertor box. In this way, any variations in the speed of the tape recorder will be cancelled out, and the start times of each track will be exactly synchronized. Using a multi-track tape recorder in this way allows you to overcome limitations inherent in your synthesizer and CMPro. A 4 track recording could have 36 simultaneous notes even though CMPro allows only 24, and probably more than your synthesizer can play at a time!

The song position pointer comes into play when you decide that you need to record a sequence starting at bar 100, beat 2. Without the song position pointer, you would have to back the tape up all the way to the start and wait until it reached the desired point. The song position pointer lets you start the tape where you need to, and the convertor box will generate the correct message to tell CMPro where it should start.

You have probably noticed that there is a lot more to MIDI than just turning notes on and off. This section will discuss each of the event types in detail.

The NOTE event

There are actually 8 different types of MIDI events. The first two, Note Off and Note On, are grouped into the single Note event by CMPPro. (Actually, almost every synthesizer never uses the Note Off event; instead a Note On event with a velocity of zero is used.) The note event, which you are undoubtedly familiar with now, looks like this:

```
1/1:0 NO=C4 1 64 1:0
```

Reading from left to right, you have the event time {measure 1, beat 1, tick 0}, pitch of C5 (middle C), channel 1, velocity of 64, and a note length of 1 beat.

The CONTROL CHANGE event

Control change is used to control certain "system" type of actions, such as master volume, sustain, and the Like. The control type is assigned a number from 0 to 127 (this immediately follows the "CC=" in CMPPro) to identify exactly what type of action is to be taken. This is followed by a number which is used to tell how much to change the controller. For example, most newer synthesizers respond to the event CC=7 by changing the master volume. The following example of a control change event contains the following information:

```
1/1:0 CC=1 1 64
```

The 1 following the CC= gives the control type. This number is not standardized and you must check your synthesizer manual to see what it does, if anything. The 1 following the CC=1 indicates that the event is on channel 1, The 64 means that 64 is the actual data value that this particular control change will have.

The PROGRAM CHANGE event

Program change is used to change the sound or timbre that is produced by the synthesizer. Exactly what sound is produced depends on how the synthesizer is made. On multitimbral synthesizers (capable of producing multiple different sounds on each channel simultaneously), only the notes played in the channel on which the program change occurred will be affected. CMPPro displays program changes as "PC=" followed by the program number (0 to 127), and then the channel number. The following example shows a program change event that sets program #1 on channel 1:

```
1/1:0 PC=1 1
```

The PITCH WHEEL event

Pitch Wheel events are used to change the tuning of all notes played on a given channel. Most synthesizers have a wheel on the left side of the keyboard that can be rotated to give this effect. Pitch wheel values can vary from 0 to 16384. Here is an example of a pitch wheel event that sets the pitch wheel to 8199 on channel 1:

```
1/1:0 PW=8199 1
```

The KEY PRESSURE and CHANNEL PRESSURE events

Key Pressure and Channel Pressure is used by specially equipped synthesizers to tell how much pressure is being applied to a key after it is struck. This pressure information is used to modify certain parameters such as modulation or vibrato. Key Pressure changes only a single key, whereas Channel Pressure changes all the notes on a given channel. The events are displayed this way:

```
1/1:0 KP=C5 1 32
1/1:0 CP=64 1
```

Notice that the key pressure specifies a pitch as well as a pressure value, but the channel pressure just gives the pressure value and channel.

The 'SYSTEM' events

Another group of MIDI event contains about 10 different types of information, some related to operating the MIDI clock. These events are recognized by CMPro but are not assigned an editable event type. Instead, a new group of 'System Events' (not to be confused with MIDI system exclusive events!) has been created unique to CMPro. You can see what these are by changing the event type to "SE", moving the cursor one space to the right, and pressing the ENTER key again. A box will pop up, listing the possible system events. Typing the highlighted letter corresponding to the desired event will change the current event to what you want. Currently, there are seven system event types: tempo, clock, link, message, pause, byte, and system exclusive.

The TEMPO system event

Tempo is used to set the MIDI clock from within the music score. It can be used to vary how fast the music is played. The following event sets the tempo to 100:

```
1/1:0 SE=TMPO 100
```

Note that no channel information is given with this event. Obviously the tempo for all channels and tracks will change regardless of which track you have this event on.

An example of using the TEMPO event

When used with the editor's Create and Scale commands, you can achieve smooth accelerandos and ritardandos. Here is how to do it: First decide where you want the tempo change to start. Insert an event at that point and change it to an "SE=TEMPO" event. Press the "M" key to mark the starting point of a block. Now move the cursor down to the point where the tempo change will end. Press the "M" key once more. Now access the block menu by pressing the "B" key. Press the "R" key to access the Create command. This will insert new tempo events every beat or whatever interval you choose. The interval you choose depends on how smoothly you want the tempo change to be and how long the change lasts for. If the changes lasts for 4 beats and you want it to sound moderately smooth, then setting the "SPACING" probably should be set to 8th notes (0:96). Press then enter key and you will see that CMPro has inserted a bunch of new tempo events. Now press "B", "S", and "T" to access the scale tempo command. Enter the starting and ending tempos and press the ENTER key. Finally, move the cursor to the start of the block and trying playing it so make sure you have achieved the effect you desire.

An example of deleting unwanted events using the Filter command

Let's suppose that you have decided that you did it all wrong, and want to remove the tempo change. You could go through the entire block and delete each tempo event, but there is an easier way. Access the FILTER by pressing the "F" key. Type an "X" in front of every Line except the SYSTEM EVENT line. You should see only system events displayed. Press the "U" key to cut the block. Go back to the FILTER and change all the "X"'s to spaces (" "), You will see that all of the system tempo events have been removed.

The CLOCK system event

The Clock System event is used to turn the MIDI clock signals on (when set to 1 or more) or off (when set to 0), The Clock event does not affect the tempo at which the music is played; just the actual clock signals sent to the synthesizer are affected. In addition, a "clock continue" signal is sent when the clock is turned on, and a "clock stop" signal is sent when the clock is turned off. This event is useful for controlling your drum machine. Here's an example of a clock system event that turns the clock off:

```
1/1:0 SE=CLCK 0
```

The LINK system event

The Link System event lets you Link several music files together so that one is played after the other. CMPro recognizes this event only when you play music from the main screen. If you play music from the edit mode, this event is ignored. The link event should be used at the end of a file because anything after it will be lost when the new file is Loaded in. This event tells CMPro to load a new file called "MINUET/CMPro":

100/1:0 SE=LNK MINUET/CMPro

The MESSAGE system event

The Message System event is for your convenience. You can enter a comment of up to 14 characters Song. There is a maximum of 16 message and link events; when you exceed this number, the last message or file name will appear when you try to enter another. Changing this will change the previous event (not a good idea!). The message events will cause the message to be displayed on the middle line of the PLAY or RECORD box that appears when music is being played. You could use the messages to give performance instructions or information about the music, or anything else you like. The following event will display the message "HELLO THERE" on the play box at time=10/1:0:

10/1:0 SE=MSG HELLO THERE

The PAUSE system event

The Pause System event will make CMPro to halt playback or recording until you press any key. While it is halted, the play box will display the Line "PAUSED -- TAP A KEY". This event is to facilitate synchronization in real-time performances. For example, you may be using CMPro with a synthesizer to provide background music to a play. Each act or section of the play has its own music in a separate disk file. To give time for the actors to change scenery or whatever between acts, make the event in each file a Pause event. The last event would be a Link event. That way as soon as an act is over, CMPro loads the next file into memory and waits until you press a key. At the same time you press a key, you could be giving a signal to the actors. The Pause event looks quite simple:

1/1:0 SE=PAUS

The BYTE system event

The Byte system event is used to send up to 4 bytes directly to your synthesizer- This can be used to send short system exclusive messages or whatever else you want- Obviously, if 4 bytes is not enough for your purposes, just use more than one Byte event.

The bytes must be entered in the same format as used with the CONFIG command: the number must be in hexadecimal, two digits long {"03" and not "3") with an optional space between bytes. If you wish to use less than 4 bytes, make the last byte "FF".

Here is an example of a Byte system event that will send a "note on" message to your synthesizer:

1/1:0 SE=BYTE 90 40 40 FF

The SYX system event

The SYX (system exclusive) system event is used to send the

contents of a file (always containing system exclusive data) unmodified to your synthesizer. While the file is being sent, the main clock is stopped. For this reason, this event should be used only at the beginning of a song or during a pause-
When used with the SYS EXCL. command under the PERFORM menu, it gives CPro a limited voice librarian capability.

An example of an event that sends the contents of the file "DUHP/SYX" to your synthesizer looks Like:

```
1/1:0 SE=SYX DUMP/SYX
```

Use With a Hard Disk

CMPPro calls only two ROM addresses: the DSKCON routine at \$C004, and an entry point into the Basic interpreter at \$ADC6. Other than use of the standard 256 byte disk buffers at \$600, \$700, and \$989, and the screen memory at \$400, no memory below \$E00 is reserved by CMPPro.

CMPPro makes use of extended memory blocks 0 through 55. The RAM above \$8000 that is used by the CoCo 3 for Basic and disk control is not modified.

You may wish to try CMPPro with a hard disk; MusicWare makes no claims as to compatibility and so the results are entirely up to you. If you do find that the program works with a particular system, please Let us know so we can pass the word on to other users.

Accessing 40 Track Double Sided Disks

CMPPro will work with most custom disk ROM chips (such as ADOS, etc.) except for JDOS. If you would like to access all 40 tracks on your disk drive, or use a double sided drive, then you should purchase one of these custom ROMs for your disk controller. If your custom ROM allows access to a RAM disk on a CoCo 3, be aware that CMPPro uses the same memory used by a RAM disk and most Likely will erase or modify the contents of a RAM disk.

File Format

Following is a description of the format of a CoCo MIDI Pro file. This information will be of use only to the technically minded.

CoCo MIDI Pro uses a basic file structure that can be described as "tagged-segmented". The data in a file is broken up into segments and each segment has a tag which identifies the type of data to follow, and how much there is. Each tag is exactly 8 bytes long. The first 4 bytes are an ASCII name, and the Last 4 bytes are the number of bytes in the segment. The tag is followed by the actual data.

The first segment identifies the type of data to follow and gives some system type of information. The tag name is "CMP0".

The next segment is the tempo header; the tag name is "TMPO" and the Length is 2 bytes. The data (2 bytes) is actually a binary word representing the number of beats per minute.

Next is the status segment. The tag name is "STAT" and the Length is 16 bytes. Each of the data bytes describes the status (PLAY/MUTE) of the 16 tracks of music.

The comment segment has a tag name of "CMNT" and is 304 bytes Long. The data is ASCII data with each string terminated with a zero byte.

The messages are stored in the message segment, which has the name of "MSGs" and has a Length of 256. Each message is 15 bytes Long and is terminated with a zero byte.

The annotation is stored in the annotation segment. The name is "ANNO" and has a length of 348.

The actual MIDI data is stored in the event segment. The tag name is "EVNT"; the length is variable. Each event is 8 bytes long. The first 2 bytes are the starting time of the event. Bytes 6 and 7 are the length if the event is a note. Byte 8 is the track {lower 4 bits} as well as the extended time (upper 4 bits). The remaining 4 bytes are used for MIDI code or "system events".

CoCo MIDI Pro does not require all segments to be in the exact order described.

Disk Error Numbers

The present version of CHPro uses simple numbered messages should an error occur during disk access. These numbers are described in more detail here. These error numbers are the same that BASIC uses.

17: Bad file data.

18: Already open. A disk file has already been opened (should not happen!).

20; Input/output error. This may occur because of an open disk drive door, or a defective or unformatted floppy disk.

21: Bad file mode.

22: File not open.

23: Input past end of file. Usually is of no consequence; press any key to continue and the music should be intact.

26: File not found.

27: Bad record.

28: Disk full. There is no room on the floppy disk for any more files. Either use a new disk or kill some existing files to make room.

29: Out of buffer space.

30: Disk write protected. You have a write protect tab on the disk; remove it.

31: Bad filename. You have tried to enter a filename that Basic considers illegal. Check your computer manual for the correct syntax for a filename.

32: Damaged directory. Some sort of error has occurred that has damaged the directory of the disk. You may be able to copy off some of the files to a freshly formatted disk. The

damaged disk should be reformatted before using it again.
Prevent this sort of error by making backups of all your
work!

37: Write or input past end of record.

DECIMAL/HEX CONVERSION TABLE -----

0 - 0	56 - 38	112- 70	168- A8	224- E0
1 - 1	57 - 39	113- 71	169- A9	225- E1
2 - 2	58 - 3A	114- 72	170- AA	226- E2
3 - 3	59 - 3B	115- 73	171- AB	227- E3
4 - 4	60 - 3C	116- 74	172- AC	228- E4
5 - 5	61 - 3D	117- 75	173- AD	229- E5
6 - 6	62 - 3E	118- 76	174- AE	230- E6
7 - 7	63 - 3F	119- 77	175- AF	231- E7
8 - 8	64 - 40	120- 78	176- B0	232- E8
9 - 9	65 - 41	121- 79	177- B1	233- E9
10 - A	66 - 42	122- 7A	178- B2	234- EA
11 - B	67 - 43	123- 7B	179- B3	235- EB
12 - C	68 - 44	124- 7C	180- B4	236- EC
13 - D	69 - 45	125- 7D	181- B5	237- ED
14 - E	70 - 46	126- 7E	182- B6	238- EE
15 - F	71 - 47	127- 7F	183- B7	239- EF
16 - 10	72 - 48	128- 80	184- B8	240- F0
17 - 11	73 - 49	129- 81	185- B9	241- F1
18 - 12	74 - 4A	130- 82	186- BA	242- F2
19 - 13	75 - 48	131- 83	187- BB	243- F3
20 - 14	76 - 4C	132- 84	188- BC	244- F4
21 - 15	77- 4D	133- 85	189- BD	245- F5
22 - 16	78 - 4E	134- 86	190- BE	246- F6
23 - 17	79 - 4F	135- 87	191- BF	247- F7
24 - 18	80 - 50	136- 88	192- C0	248- F8
25 - 19	81 - 51	137- 89	193- C1	249- F9
26 - 1A	82 - 52	138- 8A	194- C2	250- FA
27 - 1B	83 - 53	139- 8B	195- C3	251- FB
28 - 1C	84 - 54	140- 8C	196- C4	252- FC
29 - 1D	85 - 55	141- 8D	197- C5	253- FD
30 - 1E	86 - 56	142- 8E	198- C6	254- FE
31 - 1F	87 - 57	143- 8F	199- C7	255- FF
32 - 20	88 - 58	144- 90	200- C8	
33 - 21	89 - 59	145- 91	201- C9	
34 - 22	90 - 5A	146- 92	202- CA	
35 - 23	91 - 5B	147- 93	203- CB	
36 - 24	92 - 5C	148- 94	204- CC	
37 - 25	93 - 5D	149- 95	205- CD	
38 - 26	94 - 5E	150- 96	206- CE	
39 - 27	95 - 5F	151- 97	207- CF	
40 - 28	96 - 60	152- 98	208- D0	
41 - 29	97 - 61	153- 99	209- D1	
42 - 2A	98 - 62	154- 9A	210- D2	
43 - 2B	99 - 63	155- 9B	211- D3	
44 - 2C	100- 64	156- 9C	212- D4	
45 - 2D	101- 65	157- 9D	213- D5	
46 - 2E	102- 66	158- 9E	214- D6	
47 - 2F	103- 67	159- 9F	215- D7	
48 - 30	104- 68	160- A0	216- D8	
49 - 31	105- 69	161- A1	217- D9	
50 - 32	106- 6A	162- A2	218- DA	
51 - 33	107- 6B	163- A3	219- DB	
52 - 34	108- 6C	164- A4	220- DC	
53 - 35	109- 6D	165- A5	221- DD	
54 - 36	110- 6E	166- A6	222- DE	
55 - 37	111- 6F	167- A7	223- DF	

SUMMARY OF MIDI STATUS BYTES -----

Status (Hex)	# Data Bytes	Description
80	2	Note Off
90	2	Note On (if velocity is 0, then Note Off)
A0	2	Polyphonic Key Pressure/After Touch
B0	2	Control Change
C0	1	Program Change
D0	1	Channel Pressure/After Touch
E0	2	Pitch Wheel Change
F0	varies	Start of System Exclusive
F2	2	Song Position Pointer
F7	0	End of System Exclusive
F8	0	MIDI Clock (1/24th of a beat)
FA	0	MIDI Clock Start (beginning of sequence)
FB	0	MIDI Clock Continue
FC	0	MIDI Clock Stop
FE	0	Active Sensing

Note: Status bytes 80 through E0 have the channel encoded in the lower 4 bits- Thus, 93 is a note on status byte for channel 4 (assuming that we number channels from 1-16)

INDEX

ABOUT	11	ERASE TRACK	18
accidentals	16	erase, screen	10
ALL TRACKS	25	error	8
ANNOTATION	16	error, correcting	23
AS:	13	error, disk	18
backup	6	errors, disk	41
Basic	11	event type, editing	21
BEATS/BAR	14,16	example, CREATE	29
blank, screen	10	example, EXTRACT	31
block clear	25	example, filter	37
block marking	25	example, scale	28,30
BLOCK MENU	26	example, SLIDE	25
BLOCK TOO LARGE	27	example, song posni	33
boxes, dialog	7	example, tempo	37
buffer, record	11	EXIT	11
byte event	38	EXTRACT	30
CC	21	FACTOR	32
CHANGE MARKERS	25	FACTOR, clip	31
CHANNEL	28	features	5
channel	32	file error	8
channel pressure	36	FILE menu	8
CHN PRES	21	FILTER	14
CL:	13	filter, editing	25
CLEAR ALL	15,18	flats	16
CLIP	31	format, file	40
CLOCK	13	GOTO	24
clock event	37	H key	28
clock signals	12	hard disk	40
colors, display	9	help, edit	20
comment, track	6,13	hex conversion	43
CONFIG/DAT	10	IN:	13
configuration	9	info, file	9
control change	35	insert	22
COPY	26	interface	5
Copyright	2	Introduction	5
CP	21	KEY	16
CREATE	29	KEY PRES	21
CTRL CHG	21	key pressure event	36
CUT	26	keyboard input	7
delete	22	kill file	9
delete file	9	KILL NOTES	12
dialog boxes	7	KP	21
DIRECTORY	26	L key	25
disk drive	40	librarian	14
disk load	8	License	2
disk save	8	link event	37
drum machine	12,13,32	LOAD	19
edit	20	load music	8
edit buffer too full	12	LOAD, BLOCK	29
EDIT TRACK	15	loading CMPPro	6
editing events	15	M key	25
editing with filter	14	M key	26
erase block	25	MAP NOTES	32
erase file	9	MARK ALL	25

marker erase	25	SLAVE	13
marking block	25	slave	33
MASTER	13	SLIDE	24
MAX	32	slot, Multi-Pak	6
memory map	40	solo	6,18
memory, free	7	song position ptr	9,33
menu operation	7	space bar	22
merge track	30	specifications	5
message event	38	speed	17
METRONOME	10	split track	30
metronome	11	SPP	33
MIDI CLOCK	13	staccato	32
MIN	32	status	18
mistake, correcting	23	status byte	14
MONITOR	14	status bytes, MIDI	44
monochrome	9	status, track	6
Multi-Pak	6,10	summary	5
mute	6,18	synchronization	12,33
NO	21	SYS EVNT	21
NOTE	21	SYS EXCL.	14,39
note event	20,35	system events	36
note length	20	system exclusive	14
NOTE LENGTH	32	syx event	38
notes off	9	tape load	8
out of memory	12	tape speed	10
PASTE	26	tempo	17
pause event	38	tempo event	36
PC	21	ticks	20,27
PCH WHL	21	time	20
PERCENT	26	time format	24
PERFORM menu	11	time signature	16
pitch	21,32	title, track	18
pitch wheel event	36	track	17
PLAY	12	TRACK ERASE	15
play	22	track merge	30
playing music	17	track selection	6,17
PROG CHG	21	track split	30
program change event	35	TRANSPOSE	31
punch in/out	12,23	tutorial	17
PW	21	UNDO	32
Q key	26	Warranty	2
R key	29	Y cable	6,10
ram disk	40		
randomization	27		
RECORD	11		
record	23		
RECORD OFF	24		
RECORD ON	24		
recording music	17		
recording with filter	14		
reset	11		
RESTORE	16,18		
SAVE	18		
save music	8		
SAVE, BLOCK	29		
SCALE	27		
screen blank	10		
screen description	6		
SE	21		
sharps	16		

ACKNOWLEDGMENTS

This project would never have gotten started
or been carried through to completion without
the generous support of the following individuals:

John and Nanette Mueller
For getting me started
and loaning me equipment

Mike Bridges
For loaning me equipment
and keeping me going

Mike Ward
For patiently telling me what needed fixing
and providing encouragement extraordinaire

Val Burke
For patient beta testing
and bearing with the "fruit flies"

COPYRIGHT LICENSE INFORMATION AND WARRANTY

MusicWare licenses the accompanying program "CoCo MIDI Pro" and this manual for the personal use of the owner. Copies may be made only for personal use- Under no circumstance may copies be given to anyone else.

CoCo MIDI Pro is guaranteed to perform as described in this manual- If the user finds a significant error in the operation of CoCo MIDI Pro, MusicUare will make every reasonable effort to rectify the problem.

No other warranty is given or implied- MusicUare will not be responsible for any damage of any kind, special, indirect, or consequential, caused by CoCo MIDI Pro- MusicUare reserves the right to make changes in the program without notification.