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QUARTET



THE DIGITAL MUSIC MACHINE

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IMPORTANT

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EXAMPLE

**THE MUSIC IN THIS PROGRAM WAS
PRODUCED USING QUARTET FROM
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Chapter 1

Introduction

Introduction

Welcome to QUARTET. I believe QUARTET to be the best program of its type available. QUARTET gives you a similar sound quality to that of the Amiga from your ST's sound chip.

This manual is really three manuals in one, it takes you through QUARTET, VOICES and DIGITAL.

This section of the manual describes QUARTET and is in three main parts. Firstly the GETTING STARTED section will take you through loading QUARTET, playing the supplied demonstration songs and basic editing. The second part of the manual describes each of QUARTET'S FUNCTIONS in detail, giving examples where applicable. The remaining section contains a note from me and a quick KEY GUIDE.

It is almost impossible to use any package to its fullest from the instant you first load it. QUARTET is no exception. By simply reading the GETTING STARTED section of this manual though you should be able to create songs without problems. Working through the rest of this manual should allow you to use the more complicated of QUARTET'S features. Hopefully this will allow you to become adept at using QUARTET as quickly as possible.

GETTING STARTED

Loading QUARTET

Insert the QUARTET main disk (disk 1) into your disk drive and turn on your computer. The computer will boot showing a list of files in the main window. If you are using a monochrome monitor then double-click on QUARTETM.PRG, if you are using color monitor then make sure you are in medium resolution and double-click on QUARTET.PRG. The program will now load. After a short delay the QUARTET screen will appear showing a copyright message. Press RETURN or click on the OK box to start using QUARTET.

Disk 1 Program disk, contains mono, color and default set of samples, and demo songs.

Disk 2 Contains voices mono & color, digital mono & color & routines for using quartet in your own programs also some instrument samples.

Disk 3 Contains all instrument samples.

(All disks are single sided)

Loading a demo song

Now move the mouse to the top left hand corner of the screen (Area 1 on the diagram) and a menu should appear (The Function menu). This menu will act just like GEM, but will disappear whenever the mouse is moved off it. Move the mouse down the menu to the Load option and select it. A GEM file selector has now appeared showing a list of demonstration songs. Select the first of these and click on the OK box. The stave display in the center of the screen now shows a line of notes, ignore this for now and try not to press the mouse buttons in this area (You would

change the notes.). Go back up to the Function menu and select the PLAY option. The tune will now play, looping when the end is reached.

Pressing the F2 button now selects the REPLAY cartridge if you have one. Pressing the F1 button will select internal sound once more.

Having listened to the song, pressing the SPACE bar will stop it.

The other demonstration songs can be loaded similarly.

Basic editing

I will just explain how to move notes on the stave here, any other symbols you can see in the demonstration song will be explained in the appropriate sections in the second part of this manual.

Area 5 is the Note display and consists of a line of notes. Select one with the left mouse button and it will become highlighted. Now whenever you click on the stave window (Area 4) with the left mouse button, the note under the arrow will be changed to the note you have selected. Clicking with the right mouse button causes that note to be inserted at the pointer.

At the top of the stave window there is a triangular pointer which moves along with the mouse pointer. This shows which note you will currently change by pressing the mouse button.

Holding down the left mouse button will allow you to drag a note up and down the stave window before deciding where to place it.

Pressing either mouse button will allow you to add a note to the end of a line of notes.

Any note can be sharpened by pointing at it and pressing the # key.

To remove a note from your song place the pointer on to it and press the BACKSPACE key. The notes to the right will be moved to the left in order to fill the gap.

You can scroll along the line of notes by pointing the arrow on or above the two arrows in the stave window border and pressing the left mouse button.

Each of the four voices can be separately selected by clicking on the boxes in the lower right hand corner labelled VI, V2, V3 and V4 (Area 8). Ignore the box labelled B for now, if you select it by accident just click on one of the boxes labelled V1-V4.

Make sure you try all of these things before going on to more complicated functions. These are basics and must be understood.

AN OVERVIEW OF FUNCTIONS

Moving around your song

Up to twelve notes can be displayed on the screen at a time. To view more of the currently selected line of notes (Voice), place the arrow above the left or right pointing arrows in the stave window border and press the left mouse button. The display will now scroll to the left or right (assuming that there are more notes in that direction).

You will have noticed that QUARTET places numbered bar lines throughout your composition. Go to the Function menu (Area 1) and select the GOTO option. A small box

will appear next to the menu, type in the number of the bar line you wish to go to (using Backspace to correct mistakes) and press the RETURN key. The display immediately jumps to that bar line if it exists.

QUARTET only allows you to edit one line of notes at a time (one Voice). The other three voices can be selected by placing the arrow over the VI, V2, V3 or V4 boxes (Area 8) and pressing the left mouse button. The stave window then displays the start of the appropriate voice. The B box in this area is a separate work space and is not played (see Cut and Paste for more details). You should now be comfortable, moving around QUARTET'S four voices.

Entering and Deleting notes

First lets get rid of the demonstration tune. Go to the function menu and select the CLEARALL option. Select OK on the warning box and you should be presented with voice 1 containing just VC BDRU this shows that the current instrument is a base drum. Not very musical so go to the instrument menu (Area 2 of the screen) and select PIAN (a piano like sample). It is possible to have more than one VC command in a piece of music but this will be explained later in the INSTRUMENTS section.

Now point the mouse at the crotchet (quarter note) icon on the note display and press the button. If it was not already highlighted the crotchet becomes so. Watching the triangular cursor at the top enter a few random notes by pointing at the stave and pressing the left mouse button. Scroll the display to the right and enter a few more notes. Return the note display to the start by either scrolling it there or by selecting the VI box again.

Any note can be sharpened by pointing to it and pressing e # key.

Now you want to change the pitch of the third note you entered. Point the mouse at where you want the third note to be and press the left mouse button. Holding down the left mouse button allows you to drag the note up and down to the correct position. Maybe that second note should have been a quaver (eighth note). Select the quaver icon as you did the crotchet one, point at the position you wish to place the second note and press the left mouse button. It becomes a quaver.

Note: The left mouse button replaces the current note (signified by the triangular cursor at the top of the display) with the currently selected note icon at the height specified by the mouse pointer.

You want to insert another quaver before the second note. Make sure the quaver icon is selected and point at the second note at the height you wish and press the right mouse button. This will insert a quaver before the second note. This note can now be dragged to the correct place if necessary by holding down the left mouse button, having released the right mouse button.

Note: The right mouse button inserts the selected note icon before the current note.

To remove an unwanted note, position the mouse pointer on it and press the BACKSPACE key. The notes to the right of this note will all be moved left to fill in the hole left by the note.

PLAY and PLAYONE

These are the first two commands on the function menu.

PLAY is very simple. It plays all four voices repeating a voice from the beginning when its end is reached. To stop the Play command press the SPACE BAR.

PLAYONE allows you to play just part of one voice. The currently selected voice is played from the left-hand side of the stave window repeating from that point when the end is reached.

Instruments and voices

It is possible to change the sample being used by a given voice at any point in mat voice. The VC at the start of each voice shows four letters to identify the current sample. Selecting another sample from the instrument menu while the first VC is on the screen will cause the text underneath it to change, signifying the new sample (or instrument).

Now take a voice 1 making sure there are a number of notes in it and point the mouse at the first note you would like to be played by the new sample. Press the V key, you should now have another VC before that note. Making sure that there are no more VC's on screen to the left of this one, you can now change the sample by selecting a new one from the instrument menu.

When there are several VC's on the screen the one changed by selecting from the instrument menu is always the left-most one on screen.

EXAMPLE - A basic drum track.

Select ClearAll from the function menu and select OK when QUARTET asks you if you are sure. You are presented with a blank score with a VC at the start. That's the base drum. 3DRU

Put a minim on the top line of the bass staff (The A below middle C, this is the frequency the drums were sampled). Make sure you are pointing at the third note on the staff (It's blank) and press the V key, a second VC selecting a bass drum is now there.

The next part is a bit tricky to start with but after a while becomes very simple. You have got to scroll the notes so that the second VC is the left-most VC on the screen (one or two places to the right - a very quick tap on the mouse button). You probably had to scroll forwards and backwards a bit before you got it right (it gets easier). Now select SNAR from the instrument menu (The snare drum) and the text below VC should now read SNAR. Put two crotchets after that VC on the same line as the minim. That should complete our very simple drum track. Select Play from the function menu and listen to the drum track repeated over and over. When you get bored just press Space to exit play mode. Look at the demonstrations to see how they use VC's later on.

The scroll left/right difficulty only arises on drum tracks or where there are a large number of VC's in a small number of notes. Normally there will only be one VC on the display at a time, making it simple to change the instrument.

Loops

Very flexible looping has been implemented in QUARTET, you are not limited by bar lines, and you can loop individual voices at different points if necessary.

Loops can seem a little confusing to start with but are very simple. A loop start is signified by { and a loop end by } with the number of repeats under it.

Note: It's the number of repeats! *01 repeats means play twice, 02 means three times etc.*

Loops can be nested to a depth of about 100. That is you can have loops inside loops up to a hundred times. They work just like ordinary brackets for matching of left right pairs.

e.g. { { } } 01 03 A# F G D

Would give A# F F G A# F F G A# F F G A# F F G D.

To put loops into the current voice, point the cursor at the first note to be repeated and press (. Now point the cursor at the first note after the repeat and press). You are now expected to type in the number of repeats as a 2 digit number and Press Return.

Note: Use the (,) keys on the numeric keypad, otherwise you will need to use the shift key.

Note: To change a number of repeats, point to the } and press backspace (its been deleted) followed by) (and inserted again), now just type in the number again.

Note: If you have different numbers of starts and ends, the program will assume that the extra ends repeat from the beginning, and ignore any extra starts there are.

Note: PlayOne assumes that the start is its left most displayed note and will deal with what it sees as unmatched loops appropriately.

Example - More Drums

You want to play 7 bars of our previous drum beat and then play a fill in bar of four snare's (Not very inspired but still). This presents a problem. You can't put loop start before

the initial VC, and putting one after it would mean that the currently selected instrument would be snare when it plays the first note, for the second time. There are two possible solutions to this, either put another VC immediately after the first and place the loop start before this or place a VC at the end of the bar and place the end loop after this. In this example we use the first method because its meaning is clearer.

Position the cursor immediately after the first VC and press V on the keyboard, it should default to BDRU which is what we want. With the cursor in the same place press (and { should appear before the VC. Position the cursor after the end of the drumbeat so far and press), } now appears with a cursor under it ready to type in the number of repeats. Type 6 Return (The number of repeats, not the number of times played) and this should be displayed as 06 underneath the }.

Scroll the screen all the way right to make the next bit easier. Press the V key while pointing at the first available space. Select SNAR from the instrument menu (You don't actually need this VC as QUARTET is already using SNAR here but it makes it clearer). Place four crotchets on the A below middle C (Top line on the Bass Clef) and try playing it. You should hear the first bar repeat 7 times followed by the four snares and then the whole thing will repeat.

This is a simple use of the repeat command, another is to repeat immediately after a VC, placing another VC (a different instrument) at the end of the repeat. This results in a piece being played twice on different instruments. Look at the demonstration songs if you don't understand.

Slides and Links

You have probably heard slides in computer music used to great effect. I thought it would be good to have a simple but powerful way of implementing them in QUARTET. After much deliberation the way chosen was an extension of the link command.

Position the cursor pointing at the second of the pair of notes to be linked and press the - key. A line will be drawn between the two notes. If both notes are the same pitch then this is a link. And the first note is extended to be the combined length of the two notes while the second is not sounded.

If the notes are of different pitches then QUARTET will slide between them. The first note will sound and at its end the slide will begin, it will take half of the length of the second note to reach it's final pitch.

Combinations of links and slides can be used to create different speed slides, e.g. if you want to slide more quickly between two minims. Instead of just having the first sliding to the second, you could slide the minim to a crotchet and then link that to another crotchet. This means that the overall length of the combination is not altered, but the speed of the slide is governed by the first crotchet and not a minim as before effectively doubling the speed of the slide.

Note: Some samples are not suitable for slides, they finish playing before the slide starts (Playing silence throughout the slide).

Load, Save and VoiceSet

The load and save commands on the function menu use the GEM file selector to allow you to load and save your compositions. There are some problems with at least one alternative file selector, the HiSoft file selector 1.5. Apparently there were problems with this which were cleared up in the 1.6 release (Which I still haven't seen).

Songs are saved with a .4V file extension. Loading none song files as songs will almost always cause problems (possibly even crashes).

The VoiceSet command loads in a group of samples. Normally when you load up QUARTET a set of samples called VOICE.SET are loaded by default. These are the samples on the instrument menu that you have been using until now. The program used to construct these voice sets is supplied on the second disk with some samples (see Voices.prg documentation later on). I will be releasing more sample discs on the P.D. and hope other users will do the same. Selecting the VoiceSet option displays a file selector just like load and allows you to load a new set of samples (More instruments to choose from).

Quit and ClearAll

When either of these options are selected a dialog box will ask you to confirm your selection. Having confirmed, there is no way to get your work back! You have been warned.

Quit exits the program and returns you to the calling program (GEM in most cases).

ClearAU deletes all four voices but not the block area (see Cut and Paste).

Time Signatures

QUARTET handles Time Signatures in two ways.

The Time Signature menu

This menu is to the right of the instrument menu (Area 3) and shows a list of time Signatures. You simply select the appropriate time Signature and everything is done for you.

The TSig Option

TSig is provided for those of you who want odd time Signatures. Select it on the function menu and a box appears next to it (Like the Goto option) enter the number of semiquavers per bar. The bar line positions are now recalculated, the display at the start is not changed. Example 16 semiquavers per bar is 4/4 time 13 semiquavers per bar is 13/16 time

Transpose

There are two boxes marked with up and down arrows next to the word TRANSPOSE in the bottom left of QUARTET'S display. These give a convenient way of moving an individual voice up or down by one semitone.

The Up arrow moves all the notes in the currently selected voice up one semitone.

The Down arrow moves all the notes in the currently selected voice Down one semitone.

Any note that would have been moved off the stave is not moved.

Tempo

The two arrows next to the word TEMPO in the bottom left of QUARTET'S display change the speed at which the song is played.

The number next to the word TEMPO is the speed in crotchets per minute. The higher this number the faster the song is played. The up arrow increases the speed, the down arrow decreases it.

The Block (Cut and Paste)

We come now to the box marked B next to the voice boxes. This is simply a work area, any of the previously described editing features work on the block, but it is not played. This on its own would be pretty useless, but there are of course commands for transferring part of a voice to the block (cutting) and for copying the block into a voice (pasting).

Cutting

This removes the specified area from the voice and places it in the block for editing. Point the cursor at the first note to be cut and press [on the keyboard, now place the cursor on the note after the last one to be cut and press the] key. The block has now been cut, the left most note on the display is now the note after where the block was.

Pasting

Copies the block work space into a voice, leaving the block unchanged. Point the cursor at the note that the block is to be inserted before and press the P key. The block is now inserted.

Note: The moving of the note display when a block is cut can be confusing. But if you want to just copy an area into the block then having this cutting procedure means that it can be immediately pasted back in by pointing at the left-most note on the display and pressing the P key.

Example

Transposing a Bar select voice 2 and put in 15 or 16 random crotchets. Select voice 2 again to return to the beginning. Now you want to transpose the first bar of four notes down 1 semitone. Using transpose on voice 2 would also transpose the other notes.

Point the cursor at the first of the four notes and press the [key, now point it at the first note in the next bar (the one after the last one you want to cut) and press]. The note display jumped to show the start of the next bar on the left of the display. Click on the B box and the four notes just cut into the block will be shown. Now click once on the down arrow next to the word TRANSPOSE, moving the four notes down 1 semitone.

Now your ready to paste it back in again, select voice 2 and point at the first note (It was the fifth until you cut out the first four) and press the P key. The four transposed notes are now inserted before that note, finishing the operation. The block still contains the four notes so you could paste in another copy anywhere you want.

MIDI compatibility

QUARTET provides two midi modes Poly Play and Record mode. In either mode you can change the current sample with the instrument select keys on your synth.

Poly Play mode

This is the simplest of the two midi modes to use. Selecting PolyPlay from the function menu takes the sample selected by the first VC on the current voice and allows you to play it from your keyboard using up to four channels. Pressing the instrument select keys on your synthesizer will change the sample currently being played.

Record mode

Possibly the easiest way of inputting your songs into QUARTET, it allows you to record each voice in real time. There are limitations though. QUARTET will attempt to correct your timing to the nearest quaver, this means that some fast playing will be missed unless you increase the TEMPO.

Record mode clears the current voice and allows you to listen to the other three voices while you record the current voice from the keyboard. The first VC in the current voice is the default instrument, but the instrument select keys on your synth will insert extra VC's while you are recording.

The way I recommend you use this feature is :-

1. Put in a simple drum track on voice 1, just to let you keep time.
2. Select voice 2 and select an appropriate instrument.

3. Go into Record mode and record Voice 2.
4. Repeat stages 2+3 for voices 3+4.
5. Tidy up the recording by hand.
6. Put in a more complicated drum track if necessary.

Note: Record can also be used to delete just one voice. By select the voice and then Record. Press Space without touching your midi keyboard and the current voice will be deleted.

Set Freq

This is the only command left to cover. It sets the frequency at which the samples will be played back (between 4 and 16).

In the center at the bottom of the QUARTET screen, two values are displayed, Playback frequency and Voiceset frequency. It is important that both be the same, in order for samples to be played at the correct pitch.

This allows the user to type in a two digit number for the Playback frequency. It will be of little use to those people using only the supplied set of samples. But those who want to use lower frequency samples will find it useful.

Using Replay for playback

This is simplicity itself. Pressing key F2 during playback will send all further output to the replay cartridge. Pressing key F1 will send all further output to the ST's internal sound chip. Pressing F3 selects Replay Professional.

QUICK KEY GUIDE

- (. Insert Start Loop
-) Insert End Loop
- Link two notes (current and previous)
- F1 Select sound chip output during playback
- F2 Select Replay output during playback
- F3** **Select Replay Professional Output**
- [. Start of block
-] End of block and cut block
- P Paste block
- V** **Insert VC command**
- # Add or remove sharp from note
- Backspace . Delete current note

Chapter 2

Adding Your Own Sounds

Chapter 2

In creating your own songs you may want to add some new sounds of your own to the list of samples you can use in a song. For example you may wish to play a tune using sounds from your favorite music synthesizer, or use the sound of a dog barking in a song. To do this you must add the sounds you want to use to the VOICE SET. The voice set is the list of sounds that you can use in a song. Up till now you will have been using the voice set called VOICE.SET, which is loaded from the Quartet disk whenever you run QUARTET.PRG. This file contains all the sound that appear on the instruments menu. If you want to use new sounds in your songs you must create a new voice set. This new voice set can then be loaded into Quartet using the VOICE SET option from the options menu. When you select this option you will be given a list of all the voice sets on the disk, and you can select which one you wish to load. The only voice set supplied with the program is VOICE.SET, which should already be in memory.

Samples

The sounds used by QUARTET are called samples. These are recordings of real sounds held in the computers memory or on disk. The sample consists of a list of numbers corresponding to voltage levels produced by a microphone. The number of times this voltage is measured each second is the sampling frequency. When you play a sample the highest frequency that can appear in the sample is half the sampling frequency. Thus if the sampling frequency is 16Khz (i.e. 16000 numbers are sent to the loudspeaker each second), then the highest frequency that can be present in the sound is 8Khz. The higher the sampling the frequency the better a sampled sound will sound. However as the sampling frequency increases the amount of memory used per second of sound stored also

increases. Thus we have a trade off between sound quality and memory.

Making a New Voice Set

To create a new voice set you must first have samples of the sounds you want to use on disk. You can buy disks of samples from various places, or if you have a sampler of your own you can sample sounds directly from an amplifier and store them on disk. We recommend the use of ST REPLAY 5 for samples of the highest quality.

Once you have your samples, you must load them into DIGITAL.PRG. This program is used to modify the samples so that they can be used by Quartet. There are various options available in DIGITAL for manipulating the sound to reduce noise and to change its length and frequency. These options are explained in chapter 5. When you are satisfied with the sound you can then save it in a special file, called an AVR (Audio Visual Research) file, which contains the sample and some additional information about how to play it back.

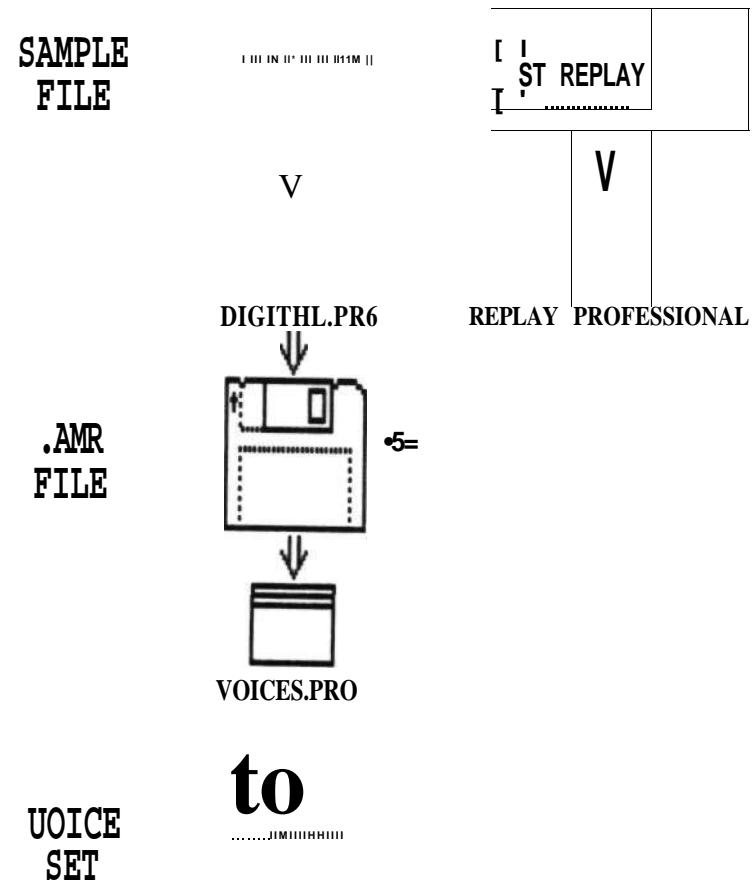
Note: If you have created your sample with ST REPLAY 5 then you can save it directly as an AVR file, in which case you do not need to use DIGITAL to modify the sample.

Note: If you load an AVR format file from REPLAY 5 into DIGITAL you will lose the loop point, unless the right hand loop point has been set to the end of the sample.

When you have converted all your samples to AVR files, you are ready to make them into a voice set. To do this you must use the program VOICES JRG. This program allows you to load AVR sample files from disk and combine them into one big voice set file which you can use with Quartet.

You can also load existing voice set files and add or delete samples from them.

To create a new voice set then, you must go through the following steps:



Chapter 3
*Manipulating Sounds
With DIGITAL*

DIGITAL.PRG is a program to allow you to manipulate samples and convert them into AVR file format. It provides a variety of options, in particular digital filtering of samples to reduce aliasing noise on playback. To run the program on a color system make sure you are in medium res, and then double click the file DIGIT AL.PRG. If you are using the Atari Hi-res monochrome monitor, then double click the file DIGITALM.PRG.

DIGITAL allows you to manipulate samples of up to 40 Kbytes on a 520ST machine, or up to 64 Kbytes on a larger machine. These limitations on size are imposed by the digital filtering algorithms, which require considerable extra memory for the accurate storage of samples. This should not present a problem as samples are generally individual instruments lasting no more than a second, thus QUARTET can not use samples of more than 32 Kbytes.

The Main Screen

The computer should now display the main screen of the digital filtering program, as shown in figure 3.1.

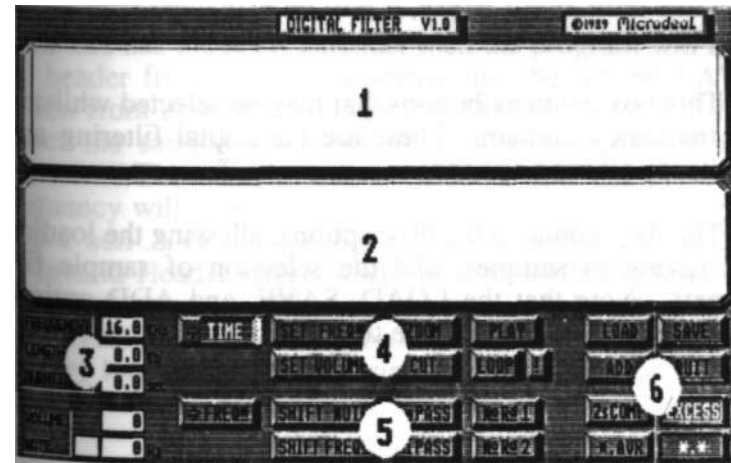


Figure 3.1: The Main Screen

This screen contains a lot of information, so it is worth looking at it in a little more detail. The screen is divided into 6 main areas, as shown labelled above. These areas are used as follows:

- (1) This is the main sample window. It shows a graph of the entire sample currently held in memory. It should be blank at the moment, as no sample has been loaded.
- (2) This is a secondary sample window. It is used if you wish to zoom in on (or magnify) a section of sample. It is also used for generating looped samples, and for displaying the frequency spectrum of a sample.
- (3) This box contains information about the sample in memory and the current settings of the Digital Filter program.
- (4) This box contains buttons that may be selected in the time domain. It contains options such as cutting and zooming the sample, changing its volume and playing it. The button marked =>TIME is selected, this tells you that you are currently in the time domain. If you are not familiar with this term, don't worry, it will be explained later in the chapter.
- (5) This box contains buttons that may be selected whilst in the frequency domain. These are the digital filtering and frequency shifting options.
- (6) This box contains the disk options, allowing the loading and saving of samples, and the selection of sample file formats. Note that the LOAD, SAVE, and ADD options can only be selected from the time domain.

Disk Options

Various options are available involving the transfer of samples between the computer's memory and disk. These options are arranged in area (6) of the screen. Note that the LOAD, SAVE, and ADD options can only be selected from the time domain.

Loading Samples

Before you load a sample from disk you must first specify how the sample is stored in the file. The sample may take up the whole file, or the file may also contain some other information about the sample. This will usually be held in a header at the start of the file. The sample may also be stored in 2's compliment form (i.e. numbers from -128 to +127) or excess form (numbers from 0 to 255).

AVR Samples

If the file has the AVR extender then the program will read the header from the file automatically. Select the *.AVR option from area (6) and the click LOAD. You can then select the sample you wish to load from the GEM file selector. The sample will be loaded, and the playback frequency will be set to that of the sample. Attempting to load a non-AVR sample file using this option will lead to an Invalid Header error, as will loading a file too large for the sample memory. The maximum sample length is 40Kb on a 512K machine, or 64Kb on a 1Mb machine. In either case try loading the sample using the *.* option.

Other Samples

If the sample is not held in a AVR file then you must select the *.* option from area (6). You must also indicate whether the sample is held in 2's compliment or excess form, by selecting the 2's or EXCESS box before clicking on LOAD. If you do not know what format the sample is held in, then try each option in turn. When you have selected the correct format the sample will be shown as a graph along the center of the main sample window (1). If you select the wrong format you will see a broken graph running along the top and bottom edges of the sample window. Note that AVR samples will automatically load in the correct format. The sample may also have a header of some sort. This will usually appear as a few random points at the beginning of the sample, and sound like a tick when the sample is played. You will need to cut the header off of the sample using the CUT option. Note that if the file is larger than the sample memory then a warning message will be produced and the end of the sample will be lost. Samples which are not held in an 8-bit format may not be loaded into DIGITAL.

Saving Samples

To save a sample you must have a sample in memory. First select the format in which you wish to save the file. You will usually want to save samples as AVR files for future loading into either DIGITAL or VOICES. In this case select the *.AVR box, and then click on SAVE. Alternatively you can save the sample in headerless 2's compliment or excess format, in which case select *.* and the desired format as required.

Adding Samples

There is a third disk option available, the option to add a sample from disk to one currently held in memory. This allows you to create combined sounds, for example by adding three piano samples of different notes you can create a sample of a chord. Alternatively you may want to create a sample of a bass guitar and drum being played simultaneously. To add two samples you should have the longer sample in memory and the shorter one on disk. Select the format of the sample on disk as for loading a sample, and then click on ADD. Select the name of the sample you wish to load. This sound should then be added to the sound in memory.

Quitting the Program

The final button in area (6) is the QUIT option. Click on this box when you want to return to the GEM desktop. A dialog box will appear for you to confirm this selection.

Sample Information

Area (3) of the screen contains information about the sample currently in memory. It contains the following displays:

1. Playback frequency (in KHz): The speed at which data is sent to the loudspeaker when the sample is played. If this is set to the frequency at which a sound was sampled then it should sound like the original sound.
2. Sample length (in Kbytes): The amount of memory taken up by the sample. This is also the amount of space a sample will take on disk.

3. **Sample Duration (in seconds):** The time taken to play the current sample at the current playback frequency.
4. **Sample Volume:** The sample volume represents how loud it is on a scale of 1 (very quiet) to 127 (loud). It is equal to the value of the point in the sample furthest away from 0.
5. **Estimated Note:** This is the estimated frequency of the sample currently in memory, and the nearest note in the conventional music scale, where middle C corresponds to a frequency of 256 Hz.

Note: The estimated note for a sample is only calculated whilst in the frequency domain.

Time Domain Options

There are various operations that you can perform on samples in the time domain. This includes operations such as playing the sample, setting loop points, cutting the sample and changing the sample volume or playback frequency. These options are contained in area (4) of the main screen. There must be a sample in memory before you can use the CUT, ZOOM, PLAY, or LOOP options.

Set Playback Frequency

This option allows you to change the playback frequency of the sample, which is displayed in area (3). The default playback frequency is 16Khz. When you load in a sample you may want to set the playback frequency to the sampling frequency for the sample (this will be done automatically if you load a AVR file). Otherwise when you play the sample you will hear a different note to the

note that was sampled. To change the playback frequency click on the SET FREQU. option. A box will appear next to the current playback frequency display containing the current frequency in KHz. Use the Backspace or Esc keys to delete this number and enter your new playback frequency in KHz. The new playback frequency must be between 4 and 50 KHz.

Set Volume

This option allows you to set the volume of a sample. This determines how loud the sample will be when played back. When you save a sample it will be saved at the current volume. The current volume is displayed in area (3). When there is a sample in memory its volume will be displayed as a number between 1 (very quiet) and 127 (loud). To change the volume of a sample click on the SET VOLUME option and change the current volume to your new volume level.

CUT

This option allows you to cut a particular section of a sample, deleting the ends of the sample before and after the selected section. This operation requires the use of the two sample cursors, the two dotted lines appearing at either end of the main sample window. You must move the left hand cursor to the start of the section you want to keep, and the right hand cursor to the end of the section. The cursors are moved by dragging them (point the mouse at the cursor, hold down the left button, and move the cursor to where you want it to be). When you have positioned the sample cursors, click on the CUT button, and the sections of sample outside the cursors will be deleted.

ZOOM

The zoom option allows you to magnify a section of a sample for closer examination. To magnify a section of sample drag the left and right cursors to the start and end of the section and click on the ZOOM button. The section of sample between the cursors will be magnified and displayed in the secondary sample window (3).

PLAY

This option will play the current sample back through the loudspeaker on your T.V. or monitor at the current playback frequency. Make sure the volume control on the T.V. or monitor is set high enough that you can hear the sample. The sample will be played until it finishes, or until you press the space bar. In the case of looped samples, the sample will be played continuously until you press the space bar. Note that if you increase the playback frequency, the pitch of the sample will increase, and its duration will decrease. Similarly if you decrease the playback frequency the pitch of the sample will decrease and its duration will increase.

LOOP

This option allows you to set a loop point in a sample. A loop point is a point from which the sample is looped. Thus if a loop point is set in a sample then the sample is played as follows:

1. The section of sample before the loop point is played once.

2. The section of sample after the loop point is played, until the end of the sample is reached.

At this point playback continues from the loop point. Thus the section of sample after the loop point is repeated ad infinitum. A loop point therefore allows you to use short samples for very long sounds. However it will only sound right with sounds which do not decay in volume with time. Wind and bowed instruments tend to work well with loop points. Plucked instruments and percussion do not.

To set a loop point in the current sample click on the LOOP box. It will remain selected until you click on it again. In the secondary sample window (2) a short section at the end of the sample will be displayed. The left and right markers in the upper window will show the ends of this section. You can scroll the lower window left and right by clicking on the left and right hand side of the secondary sample window. You will then see two sections of the sample, one of which scrolls sideways and the other fixed at the end of the sample. You can also shift the moving section by dragging the right hand marker in the main sample window (1). The aim here is to scroll the moving section back through the sample until you find another section of sample which matches up with the end of the sample, particularly at the right hand edge of the screen. If the sample does not match up, you will get a noisy tick every time the sample repeats.

When you think you have matched the sample well, click on LOOP again. An R marker will appear in the main sample window showing the point from which the sample repeats. Test the loop point by clicking on PLAY. It will probably take a couple of attempts to find a loop point that sounds natural. In general look for a loop point around the middle of the sample. Loop points near the end of a sample will give rise to a very mechanical sound. To move a loop point simply repeat the above process, and the old loop point will be replaced. To delete a loop point from a sample simply click on LOOP twice.

Process Loop Point (!)

This facility allows you to remove clicks or modulation effects from looped samples. When you set a loop point in a sample you will often find that the resulting sound contains clicks or sudden changes in pitch. This can be alleviated by fading out the end of the loop section and fading in the start. A fast fade will remove clicks, and a slow fade makes pitch changes sound more natural. First set up a loop point in a sample, and play it. If the sample contains clicks then click on the ! button next to the LOOP button, and select the FAST ramp option. This should remove the click from the sample. If the sample pitch or volume changes sharply then set a loop point around the middle of the sample and click on the ! button. Select the SLOW option, and the sample should be improved. Note that use of either of these options will permanently alter the sample, so if you have already made major modifications to a sample then save it before application of this option.

Time and Frequency Domains

So far we have only looked at the options available for manipulating samples in the time domain. The most powerful features of DIGITAL are the digital filtering options, which work in the frequency domain. What are the time and frequency domains? In the time domain we plot a graph of the sample with time. This is the form in which the sample is sent to the loudspeaker. However we can also look at the various different notes, or frequencies, that are present in a sound. A graph of the sample with frequency is called a frequency domain plot.

The frequency domain plot is useful because most noise in samples is at high frequencies, and so by cutting the high

frequencies out of a sample noise can often be reduced. It also gives rise to powerful techniques for setting a sample to a particular note, and for changing the playback frequency without changing the note played. To convert a the sample to a frequency domain plot a complex calculation called a Fourier Transform is required. To Fourier Transform a sample simply click on the =>FREQ button in area (5).

Note: This calculation will take some time, depending on the length of the sample. Approximate times are listed below:

Sample Length	Calculation Time
5 Kbytes	20 seconds
10 Kbytes	30 seconds
15 Kbytes	50 seconds
20 Kbytes	1 min 20 seconds
30 Kbytes	2 mins
40 Kbytes	3 mins

When the transform is completed the frequency spectrum of the sample is displayed. This will be a graph with frequency from 0 Hz up to half of the playback frequency. If the original sample has a clear note (i.e. it is not distorted or percussive), then this graph should show a sharp peak at the frequency of the note. The program will attempt to estimate this note in area (3), otherwise the estimated note will remain at 0 Hz. If you wish to see the graph in more detail click on the secondary sample window (2). The frequency plot will be magnified to show a plot of frequency from 0 Hz to 2 Khz, labelled with the corresponding notes. On this plot middle C is slightly to the left of the center of the screen. Click on window (2) again to return to the frequency display.

Once you have finished manipulating the sample in the frequency domain, you can transform the sample back to

the time domain by clicking on the =>TIME button in area (4). The sample can then be played or saved as normal.

Note: Not all samples are suitable for treatment by this method. Any single note or combination of notes played simultaneously should benefit from digital filtering. However speech, percussion, or samples consisting of varying notes will not benefit from this treatment.

Frequency Domain Options

The six digital filtering options are given in area (5), and may only be selected from the frequency domain, i.e. when the =>FREQ button is selected. Particularly important in generating samples for QUARTET are the Shift Playback Frequency and Shift Note options, as these allow the generation of samples which are uniform in frequency. To avoid confusion over frequencies it is suggested that the playback frequency be shifted first (if required), then the note frequency set, and then any other digital filtering operations performed.

Shift Playback Frequency

This option allows the playback frequency to be changed in a similar way to the time domain option Set Playback Frequency; however the sample is adjusted so that its note and duration are unchanged. This option is useful if you have sampled a sound at one frequency and want to use it for playback from QUARTET at another frequency. In particular better sound quality can be obtained by sampling at a higher frequency (for example 30 KHz), for playback at a lower frequency (say 16 KHz). Note that when you change the playback frequency using this option the length of the sample will change. In particular, if the playback frequency of a long sample is increased then the program

may run out of memory, in which case a warning message will be produced and the operation aborted.

Shift Note Frequency

In contrast with the previous option this option allows the note frequency of a sample to be changed without changing the current playback frequency. Thus you can sample any note from a musical instrument and then normalize all your samples to the same note. In particular QUARTET assumes that all samples are of the note A, thus after setting the playback frequency to the frequency you intend to use in QUARTET you should set the note of a sample to an A, (i.e. 55Hz 110Hz, 220Hz, 440Hz etc).

Note that as with the previous option the length of the sample will change, and it is possible to run out of memory. In addition if no estimate of the note has been found then this option will not be available. In this case either you have shifted the playback frequency outside of reasonable bounds for the sample, or the sample is not suitable for treatment by digital filtering.

Hi-Pass Filter

High pass filtering is the process by which low frequency components are removed from a sound, i.e. only the high frequencies pass through the filter. This is generally useful to make up for maladjustment or bad design in the sampling hardware. By eliminating the zero frequency component of the frequency spectrum the mean value of the sample is set to zero. Removing very low frequency components eliminates the effect of drift in the sampling hardware. In some cases it may be desirable to filter out all frequencies below 60 Hz to eliminate the effect of pick up from the mains. To high pass filter a sample click on the

HiPASS button. You can then enter the desired filter cut-off frequency. The default frequency is 0.0 KHz, which will just result in the re-centering of the sample. Enter 0.01 KHz (i.e. 10 Hz) to remove the effects of drift in the hardware. A filter at 0.06 KHz (i.e. 60 Hz) will remove mains hum, but should not be used on bass samples.

Lo-Pass Filter

Low pass filtering is the process by which the high frequency components are removed from a sound, i.e. only the low frequencies are passed. Samples of real sounds tend to consist mostly of low frequencies, whereas noise is usually present at all frequencies. Thus removal of high frequencies from a sound can reduce noise. In addition aliasing noise (noise at above half the playback frequency) is reduced by low-pass filtering. Some sounds contain a significant proportion of high frequencies, and these will be degraded by filtering. For example, a bass guitar can be filtered at 2 KHz, but in general a violin should not be filtered at all. To select a frequency for filtering you will need to look at the frequency plot and decide at what frequency there are no more significant peaks in the plot, and then apply the low pass filter at that frequency.

When you have decided on a filter frequency click on the LoPASS button. You may then input the filter frequency in KHz (with a decimal point if necessary). Note that the maximum frequency for the low pass filter is half the current playback frequency, as this is the highest frequency that can be present in the sample.

Noise Reduction

Background Smoothing

This operation may in some cases be useful for improving particularly noisy samples. Noise is reduced by taking small values in the frequency spectrum and reducing them towards zero. To apply background smoothing to a frequency plot click on the NoRd 1 button. You will then be given a choice of the threshold below which smoothing will occur as a percentage of the highest amplitude in the plot. Select 1% for clean samples or 5% for noisy samples. Note that this operation will tend to corrupt the beginning and end of a sample when you transform back to the time domain, and so should only be used as a last resort to clean up a noisy sample. Better results can usually be obtained by sampling at a higher frequency and transforming the sample using the Shift Playback Frequency option.

Anharmonic Suppression

This operation can also be used to try and improve noisy samples. The frequency plot is weighted so that harmonics of the estimated note are unaffected, but frequencies between the harmonics are reduced. Click on NoRd 2 to perform anharmonic suppression, and select x1, x2, or x3 to filter around the estimated note or its subharmonics. Again use of this option tends to corrupt the start and end of a sample, and so this option should only be used as a last resort.

A Worked Example

To illustrate the use of this program an untreated sample has been provided on the DIGITAL disk. This sample is called GUITAR.SSS, was sampled at 20 KHz, and is stored

in 2's compliment format. Suppose we want to convert it to the note A sampled at 16 Khz. The following procedure should be followed:

Load the file into DIGITAL by clicking first on the .* button to select non-AVR file type, and the 2's button to select 2's compliment format. Now click on LOAD and select the file GUITAR.SSS from the file selector. Once the file has been loaded into memory you should see a graph of the sample in the main sample window. In area (3) you will see the length of the sample in Kbytes, its duration, and its volume. Click on the PLAY option to hear the sample.

Note that there is a little high frequency noise on the sample. The sample was originally sampled at 20 Khz, so click on the SET FREQU. button. Press Esc to clear the input line, and type 20 and press return. Now click on play again. This is the sound as it was originally sampled, as the playback frequency is now equal to the sampling frequency. However we want the final sample to be played at 16 Khz, so use SET FREQU. to set the frequency back to 16 Khz. Try dragging the left and right cursors about the main sample window. Use the ZOOM button to magnify the section of sample between the markers into the secondary sample window.

Now we want to transform the sample to a frequency plot. Click on the =>FREQ button in area (5). The mouse cursor will turn into a bee to indicate that the computer is working. The calculation should take less than a minute. When the computer has finished, a frequency plot of the sample will be produced. Note that it has sharp peaks, corresponding to the notes present in the original sample. The estimated note will be displayed in area (3), if you have the playback frequency set at 16 Khz this should read about 208hz, or the note G#.

The playback frequency is already correct, so there is no need to use the SHIFT FREQ. option. However we need to

shift the note to an A before the sample can be used in QUARTET. Click on the SHIFT NOTE button. Press Esc to delete the default frequency of 440 Hz and enter 220 in the input box, the frequency of the A below middle C. Press return, and the sample frequency will be adjusted. The estimated note should now be an A. Click on the secondary sample window, area (2). The frequency plot will be magnified to show a graph of notes. Note that the lowest note in the sample is now the A below middle C, but that the sample also contains the A and F an octave above this.

The sample also contains other higher frequencies. Click on the secondary sample window again, to get back to the full frequency plot. Note that there are very few frequencies present in the sample above 4 Khz, and so the use of a low pass filter is advisable. Click on LoPASS, press Esc, and then type 4 and press Return to apply a low pass filter with a cutoff at 4 Khz. At this point it is also worth using the high pass filter to center the sample. Click on HiPASS and press Return to apply a high pass filter at the default frequency of 0 Hz.

Now we are ready to transform the sample back to the time domain. Click on =>TIME. Again the transform will take less than a minute, although the sample is a little longer now than when we first transformed it. When the calculation is finished the sample will be redrawn in the main sample window. Click on play, and you will hear that the note of the sample has changed. Also there should be slightly less noise in the sample than before. If you want to use it in QUARTET you must save the sample in AVR format. Therefore click on the AVR button in area (6), and then click on SAVE. Type in a new name for the sample and press Return. This sample is now ready for incorporation in a voice set.

Chapter 4
*Making a Voice Set
with VOICES*

If you want to use new sounds in a QUARTET song then these sounds must be combined into a voice set. The voice set must contain ALL the sounds used in a particular song. To allow you to create a new voice set or modify existing sets the voice set editor is provided. This program will load an existing voice set or create a new set to which samples, which must be stored as AVR files, can be added. Up to 20 samples can be included in a voice set, which can be up to 256 Kbytes long.

To run the voice set editor on a color system make sure you are in medium res, and then double click the file VOICES.PRG. If you are using the Atari Hi-res monochrome monitor, then double click the file VOICESM.PRG. The program will load and you should see the Voice Set Editor screen.

The Voice Set Editor Main Screen

This screen is divided into 4 main regions, as illustrated in figure 4.1:

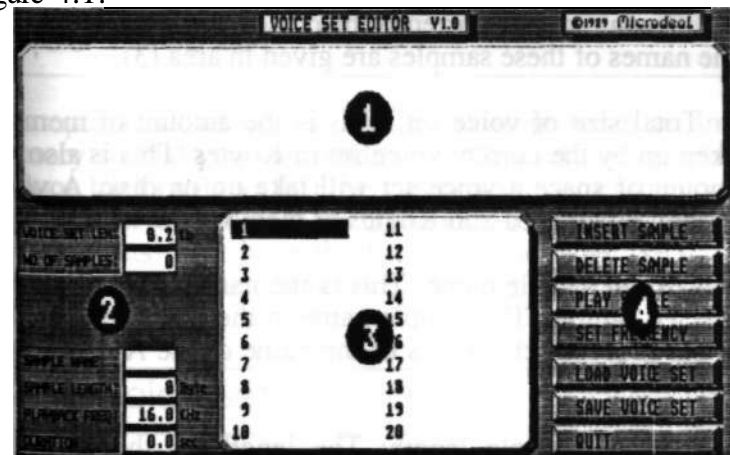


Figure 4.1: The main screen of VOICES
The four areas of the screen are used as follows:

(1) The Sample Display: This window is used to display the currently selected sample. Whenever you load a new sample, or select a sample from the voice set it will be displayed here.

(2) This box contains information about the voice set as a whole, and about the currently selected sample.

(3) The Voice Set Window: This window contains a list of the names of the samples in the current voice set, with their sizes in bytes.

(4) This box contains the various voice set editor options.

Voice Set Information

Area (2) of the screen contains information about the voice set currently in memory. The following information is available:

1. Number of samples in the voice set: This is the number of different sounds currently held in the current voice set. The names of these samples are given in area (3).

2. Total size of voice set: This is the amount of memory taken up by the current voice set in Kbytes. This is also the amount of space a voice set will take up on disk. A voice set may not exceed 256 Kbytes of memory.

3. Current sample name: This is the name of the currently selected sample. The sample name in the voice set is given by the first four characters of the name of the AVR sample file.

4. Current sample length: The length of the currently selected sample in bytes.

5. Playback frequency: The current playback frequency. Note that when you save a voice set the playback frequency will be saved with it, so it is important to set the playback frequency to the playback frequency you want to use in QUARTET.

6. Duration: The duration of the selected sample in seconds.

Loading and Saving Voice Sets

There are two ways of building a voice set; you can either build the voice set from scratch from a complete set of samples, or you can modify an existing voice set by adding and deleting samples from it. The only difference between the two methods is that when creating a new voice set you start with an empty voice set, whereas when editing an existing set you must first load the set to be modified from disk. When you have finished editing a voice set you must then save it to disk. Therefore the options for loading and saving voice sets will be dealt with first:

Load Voice Set

This option allows you to load an existing voice set into memory so that you can modify it. To load the voice set click on the LOAD VOICE SET button and select the voice set you wish to load from the GEM item selector. Note that all voice sets must have the file name extender .SET. If you try to load a file that is not a voice set an error message will be produced.

Save Voice Set

When you have finished editing a voice set you will want to save it to disk. To save the voice set click on the SAVE

VOICE SET button. Enter your new file name, or select an existing filename if you wish to replace a voice set already present on the disk.

Quit

When you have finished using the Voice Set Editor click on the QUIT button to return to the GEM desktop. A dialogue box will appear for you to confirm your selection.

EDITING A VOICE SET

Selecting a Sample

In the voice set window (area (3)), there are spaces for up to 20 samples. The space numbered 1 should be inverted. This is currently the selected sample. If you have loaded a voice set or sample into memory you will see a graph of sample number 1 in the sample display window. You can select another sample by simply pointing at its number in the voice set window and clicking the left mouse button. That sample should then be inverted, and if there is a sample in the place you selected it will be displayed in the sample display window. The selected sample can be played, deleted, or another sample inserted before it using the remaining options:

Play Sample

To listen to the currently selected sample click on the PLAY SAMPLE button. The sample will be played until it finishes or until you hit the space bar. In the case of looped samples, the sample will be played continuously until you hit the space bar.

Set Playback Frequency

When you start editing voice set the first thing to check is that the current playback frequency is set to the playback frequency you intend to use in QUARTET. All samples added to a voice set should also be adjusted to this playback frequency using DIGITAL. Failure to ensure that samples are set up to the correct playback frequency will result in a set of sounds which are out of tune with each other. To set the current playback frequency click on the SET FREQUENCY button. Use the Esc, Backspace, and digit keys to enter your new playback frequency in the input box, then press Return.

Insert Sample

This option is used to add a sample to the voice set. A new sample will be loaded from disk and inserted in the voice set at the selected space in the voice set. The sample occupying this space, and any samples below it will move down one place in the voice set to make room for the new sample. If the selected space is unoccupied then the new sample will be added to the end of the voice set. To insert a sample into the voice set click on the INSERT SAMPLE button. Select the sample to be loaded using the GEM file selector, the sample must be stored as an AVR file. The sample will be loaded into the voice set in the selected space, and you should see a graph of the sample in the sample display window. Note that you can not insert a sample into a voice set if there are already 20 samples in the voice set, or if the sample would make the length of the voice set exceed 256 Kbytes. An Invalid Header error message will be produced if you try to load a non-AVR sample file into the voice set.

Delete Sample

This option allows you to delete the currently selected sample from the voice set. The sample will be removed from the sample list and any samples below it in the voice set will move up one place to fill the space.

Using Voice Sets

You should now be able to create your own voice sets for use with QUARTET. It is probably best to start off by adding some new samples to the existing voice set VOICE.SET supplied on the QUARTET disk. Be careful to save the voice set on a different disk or with a new name so that you do not delete the original voice set. Once you have created a new voice set you can load it into QUARTET using the VoiceSet option.

Chapter 5

Incorporating Songs in Your Own Programs

Chapter 5

To allow you to incorporate songs in your own programs an additional program is provided called SINGSONG.PRG. This program can be called from any program written in a good BASIC, C, assembler or any other language providing good interfacing with GEM. Memory must be allocated for the voice set and song files, which must be loaded in from disk as binary files. The GEM function p_exec is then called to load and relocate (but not execute) SINGSONG.PRG. Pointers to the voice set and song data are copied into the appropriate locations in SINGSONG, then a call to the program will cause the song to be played.

Example programs to load and play a song using SINGSONG.PRG are provided in the EXAMPLES folder. There are examples written in assembler (HiSoft Devpac ST), BASIC (Atari BASIC) and C (Laser C). These all function in the same way, as described below.

To use SINGSONG from another program you must be sure that GEM has enough memory to load in the program. Most compiled programs will release any memory not used by the program or arrays back to GEM when they start up, however if you are writing in assembler you will need to do this yourself using the GEMDOS function m_shrink (sometimes called setblock, code \$4A, see the example program if you are not familiar with this routine). The next step is to allocate some memory for the song and voice set, using the GEMDOS function m_alloc (code \$48). You will probably need no more than 10 Kbytes for the song, but the voice set will usually require at least 50 Kbytes. Look at the size of your song and voice set files in the disk directory. Next the song and voice set files must be loaded into the program. This is a simple binary load into the areas you have allocated.

From assembler or C use the GEMDOS open (code \$3d), read (\$3f), and close (\$3e) functions. Finally, after all other memory has been allocated, the file SINGSONG.PRG can be loaded. This should be done by a

call to the GEMDOS function `p_exec` (code \$4b) with a mode word of 3 (load and relocate, but do not execute). This function will return a long word result which is a pointer to the base page of SINGSONG in memory, which will be assigned to a variable, say `play`. N.B. `Pexec` steals what's left of your memory. If you wish to allocate memory after the `Pexec` then the memory can be reclaimed by calling `m_shrink` (\$49) with the base address of `singsong+16384`.

To play any song in memory you must take the following steps:

1. Copy the address of the song to (`play+268`)
2. Copy the address of the voice set to (`play+272`)
3. Call the address (`play+256`).

This can be achieved from assembler using the `JSR` command, or from C using a function pointer. Hisoft Basic uses the `CALL LOC` command.

This will cause the specified song to be played continuously until the space bar is pressed, when control will be passed back to the main program. No other operations may be performed while the song is being played.

More Advanced Facilities

A second method of playing songs is available for assembler programmers. Instead of calling the address given, call (`play+260`) to start playing the song and (`play+264`) to stop playing it. You must be in supervisor mode to call these! While the song is playing control will be passed back to the calling program so that animation and other operations can be performed. Note that all interrupts except the keyboard and timers B and C are disabled. The address of a single byte keyboard buffer is returned in `a6` at

which the keyboard key code of the currently pressed key can be found. The mouse is disabled. There are in fact two versions of `singsong` on your disk, the one in the folder `SAFESONG` will not play back tunes at speeds greater than 14.6KHz (Tunes of greater speed playback at 14.6K), but will allow you access to most of the machine's facilities including all of the registers.

Running at 8KHz you have 45% of the CPU time. The other version of `Singsong` is the actual code used in `QUARTET` and will run at up to 19.5KHz (That's about 20% CPU time left while playing at 16KHz). Unfortunately you have to pay a price for this. Only registers `D6,D7,A5,A6 & A7` are useable, changing the value of any other register will cause a crash. This rules out GEM calls of any type. I detect the vertical blank by waiting for the bottom two bytes of the video address pointer (`$FF8207 & $FF8209`) to reach their value at the top of the screen (Obtainable from \$44e). With a little thought it becomes quite simple to write code for just 4 registers. Calling (`play+264`) will restore the interrupts, you must then restore user mode.

Use of these functions is only recommended for experienced assembler code programmers. If you must have the vertical blank enabled, make it short and efficient! Or run `singsong` slower. It is in fact possible using the safe version of `singsong` to re-enable the VBL, the mouse and GEM's keyboard routine and run GEM but it takes some doing and GEM runs even slower than normal and you can only run playback at about 8KHz. (You have to move the `TimerC` interrupt onto timer A or D, setting the interrupt speed to 200Hz.)

Note: Both `SingSongs` take the playback frequency from the saved song file.

Note: The examples given with the Safe version are identical to those for the unsafe version. They were both compiled from the same code.

A Word from the author

six or seven months, maybe a deluxe version, if you can suggest enough improvements.

The idea of multi voice sampled sound first occurred to me when I owned an amstrad CPC. Unfortunately the CPC doesn't have the power to achieve it with any great success.

Sometime after I bought my ST the idea resurfaced and I wrote a few test routines and played a few sine waves. That code got buried with a lot of other stuff until I started writing a game for the ST. That vertical scrolling game never had the finishing touches done to it. Having written a very basic type in number front end for the sample code, a friend suggested that maybe I ought to write a music editor using those routines.

I rather liked the idea and started knocking up a front end. When I got back to University, I talked to Kevin about samples and problems I'd had, Kevin had pretty soon joined me in the venture. We must have rewritten from scratch the entire playback code 4 times one week, each giving a slight speed improvement over the last. The one currently in use is Kevins, without the MIDI bits it will run at almost 20K. QUARTET limits the speed to 16K because MIDI is unpredictable and would crash QUARTET during MIDI input.

The original song format has proved to be a curse. It was originally designed to take as little space as possible and so held the information in peculiar ways. This made writing the front end tricky in places to say the least. We have slowly but surely been rewriting the format to make life simpler.

We supply with QUARTET the two programs that we used to modify samples for use with it and two routines to use songs in your own programs. These are described later in the manual. I for one would like to see lots of PD disks full of sample sets and demonstration songs. I enjoy listening to computer music and would like to hear your songs and your criticisms of QUARTET. Who knows, in

QUARTET

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