QUICKSILVA

RUNS ON BBC MODEL A OR B

BBC MUSIC PROCESSOR

INTRODUCTION

Welcome to MuProc — a 'Music Processor' which enables anyone to produce highly complex music quickly and easily.

MuProc works like hardware, simulating the operation of a synthesiser, 4-track recorder and editing desk. Over 30 functions are provided for envelope selection, sound effects, 'tape' controls, mixing, editing etc., all of which operate instantly. There is no need to type in commands — everything works at the touch of a button, as you would expect from the real thing.

In addition to these functions, an envelope editor is provided, allowing any envelopes to be modified or redefined very easily. Music and envelopes may be loaded and saved using the filing routine.

All these facilities and more are explained in detail on the following pages. These should be read carefully to realise the full potential of this sophisticated program. Each section concludes with a summary of functions, to clarify the text.

When you are familiar with the operation of MuProc, the list of functions in appendix 5 provides a quick reference to the various controls.

MuProc is recorded twice on side 1 of the tape, at 1200 baud. To load the program, type:

CHAIN "MUPROC"

and push RETURN. The program will load in 1½ minutes, and will automatically run.

1 THE DISPLAY

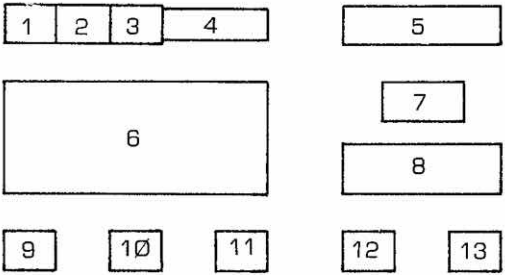
The main areas of the display are here shown in simplified form.

In the instructions which follow, each area will be referred to by the numbers shown in the diagram.

Basically, the function of each area is:

1 Selected channel
2–4 Envelope selection
5 Counter
6 Playback information
7 Playback speed
8 'Tape' controls
9 Keyboard selection

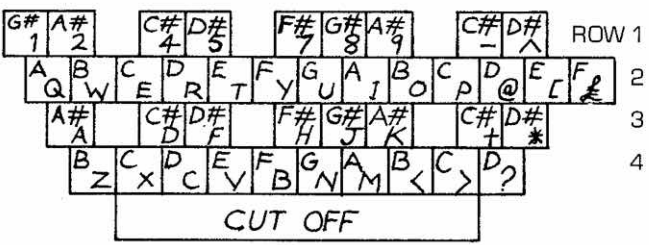
10 Noise option
11 Metronome speed
12–13 Editing functions



2 THE KEYBOARD

2·1 Layout

The QWERTY section is organised as a music keyboard as shown below. 'White' keys are located on rows 2 and 4, with the 'black' keys (sharps and flats) above these.



In the diagram, each note (A to G) is shown above the corresponding keyboard symbol. A full scale can be played between keys E to P and X to >.
Notes above and below the scale on each row may also be played, and any note can be terminated prematurely by pressing the space bar.
After some practice, the keyboard becomes quite easy to use for music, and the QWERTY symbols can aid identification of the required notes.
There is no auto-repeat when the keys are held down, as notes can be lengthened using the 'sustain' function. This will be explained later.

2·2 Octave selection

Page 181 of the BBC User Guide shows a table of pitch values corresponding to each octave available. Initially, the keyboard covers octaves 4 and 5 on the higher and lower rows. Pushing the TAB key will increase the keyboard range by 2 octaves. So 3 keyboards (k0, 1 & 2) are available, with the selection indicated in display area 9.
k0 selects octaves 2 and 3, k1 gives 4 and 5, and k2 gives octave 6. In this case, only the top half of the keyboard is used.
A table of frequenceis for each key is given in appendix 2.

SUMMARY

E–P	Lower octave
X–>	Higher octave
SPACE	Terminate note on current channel
TAB	Increase keyboard range

3 DRIVE CONTROLS

The computer can simulate the operation of a tape recorder by use of the cursor keys. These are represented in display area 8 as four symbols in blue.

3·1 Playback

When ↑ is pressed, the appropriate symbol on the display will light up to indicate playback operation. In addition, the tape counter in area 5 will begin to count forward at about 3 counts per second. There is, of

course, no music yet recorded in memory. Pushing RETURN will stop playback and return the counter to zero.

3·2 Record

To record music, press key ↑ together with SHIFT. Operation is as before, but the symbol shows magenta instead of white. This shows that music entered at the keyboard will be recorded in memory.
Play something at the keyboard, then push RETURN. Now push key ↑ and the music will play back. Details of the notes will also be displayed in area 6, the playback section of the display. The meaning of these values will be explained later.
An important feature is the ability of play and recorded notes while existing music is being played back. This allows music to be built up gradually and altered very easily.

3·3 Rewind

Key ← may be pressed at any time to rewind all or part of the music, at about 60 notes per second. This will stop as soon as the key is released. The tape counter will follow the notes during rewind, to indicate the position in the recording.

3·4 Fast forward

Key → provides fast forward, and operates as rewind above. Any required position can be reached in the recording using these two keys.

3·5 Single-stepping

Pressing ← or → together with SHIFT will allow you to step through the recording note by note, backwards or forwards. In this way, together with the fast wind functions, any note can be located exactly. This is important when deleting or altering notes (section 8).

3·6 Return

The RETURN key can be pressed at any time to jump instantly to the beginning of the recording, and return the counter to zero.

Pressing RETURN together with SHIFT will perform a jump to the end of the music. Again, the counter displays the position as normal.

3·7 Stop

Pressing key ↓ will stop the music at any point during playback or record. While this key is depressed, the 3-digit couter converts to a 4-digit indicator showing the number of notes which can still be recorded. This can be checked at any time when recording music.

SUMMARY

	↑	Playback only
SHIFT	↑	Playback and record
	←	Rewind
SHIFT	←	Single-step backwards
	→	Fast forward
SHIFT	→	Single-step forward
	RET	Jump to start
SHIFT	RET	Jump to end
	↓	Stop/notes free

4 FUNCTION KEYS

4·1 Selection

Function keys 0 to 8 select options which need a parameter, such as channel number, playback speed, etc. As the QWERTY keyboard is required for music, the numeric keys are not used to input values. Instead, the following method is used:
An option is selected by pushing the appropriate function key. The current value will then be flashing on the display, indicating that MuProc is waiting for the new value to be entered. This is inserted by pressing a function key again, and the appropriate value will appear on the display.
The advantage of this is that music may be recorded, played, rewound etc. while the program is waiting for the new value, without pausing for input.

4·2 Cancel

If a function is selected by mistake, this can be cancelled without entering a value by pressing ESCAPE. MuProc

will continue normal operation.

4·3 Shift-lock

If using the series 1 operating system, SHIFT LOCK should not be set when selecting functions, as this will result in incorrect selections. If this occurs, pushing BREAK will resume normal operation.

SUMMARY

f0–f8	Select function
f0–f9	Select parameter
ESCAPE	Cancel selection

5 CHANNEL SELECTION

5·1 Tone channels

MuProc allows use of all 4 channels (0 to 3), the default recording channel being channel 1. The current channel number appears in display area 1, above symbol 'ch'. To alter the channel being used for recording, push f0. The new channel number can now be entered as explained in section 4, and will appear on the display.

5·2 Noise channel

Channels 1, 2 and 3 are the normal tone channels used for music production. Channel 0 is a special channel used to produce periodic or 'white' noise. If this channel is selected, 8 frequencies are available, which are repeated throughout the keyboard, keys F–K being examples:

KEY	
F	High frequency periodic noise
V	Medium frequency periodic noise
B	Low frequency periodic noise
H	Periodic noise following channel 1 frequency
N	High frequency 'white' noise
J	Medium frequency 'white' noise
M	Low frequency 'white' noise
K	'White' noise following channel 1 frequency

Used in conjunction with suitable envelopes, this channel can provide effective percussion sounds.

SUMMARY

f0 Select recording channel
F–K Channel 0 frequencies

6 ENVELOPE SELECTION

6·1 Parameters

On the BBC Micro, 14 parameters are required to define a music envelope:

PARAMETER NO.	FUNCTIONS
1	Envelope no.
2	Step length
3–8	Pitch section
9–14	Amplitude section

In addition, a sustain parameter is required as part of the SOUND statement, which has the effect of modifying the amplitude envelope.

Using MuProc, only 5 parameters are required to specify any one of 100,000 envelopes. These consist of:

1 Pre-defined amplitude section
2 Sustain parameter
3 Pre-defined pitch section
4 Modifier for pitch section
5 Overall volume level

The step-length is fixed at a value of 1. These 5 parameters are selected by function keys f1 to f5, for the current recording channel. Each value ranges from 0 to 9.

6·2 Amplitude envelopes

This parameter is selected using f1, and is indicated on the display as the first digit in area 2, above 'am'. The effect is to vary the level of the note as it sounds, and ranges from a short burst (no. 4) to a longer, drawn-out sound (no. 9). The most 'natural' sounding envelopes are numbers 0 to 3. Number 7 gives a simple on-off effect, while 6 sounds like a bell-ring at high frequencies. Full details of these envelope shapes are given in appendix 1. f2 selects the second digit in area 2, the auto-sustain value. Sustain periods can be varied from 0·2 to 10 seconds. Some amplitude envelopes, such as no. 9,

1, as follows:

OPTION	EFFECT
0	Channels 0 and 1 separated
1	Periodic noise following channel 1 frequency
2	'White' noise following channel 1 frequency

With options 1 and 2, noise from channel 0 will sound automatically when channel 1 is played. When recording, the effect will be reproduced on playback.
As amplitude envelopes are defined separately for the two channels, volume settings can be selected to give the best effect. If channel 1 volume is set to zero, the noise channel will still sound. This allows music to be played through the 5 octaves using channel 0.
N.B. Notice that the periodic noise (noise option 1) goes out of tune after octave 3. This is due to the computer itself, not MuProc. This problem can be dealt with using the 'tuning' facility (section 9·3).
Here are some examples of the effects which can be obtained, when channel 1 is played with the noise options:

EFFECT	OPTIONS	ch	am	pi	level	
Banjo	1	0	20	00	9	Octaves 5 & 6
		1	00	00	0	
Bee	1	0	99	00	9	Octaves 5 & 6
		1	09	13	0	
Train	2	0	99	00	9	All octaves
		1	09	61	0	
Helicopter	2	0	99	00	9	All octaves
		1	09	00	0	

7·2 Metronome

A metronome with a realistic 'tick-tock' sound is provided, with variable speeds selected by key f7. The chosen value is displayed in area 11, values 1 to 9 giving speeds from 0·4 to 3·5 ticks per second. Value 0 switches off the metronome.
The metronome operates during record or playback, using channel 0 to produce the sound. This is not recorded with the music, and does not interfere with any recording on channel 0.

For a given playback and metronome speed, the metronome will never lose synchronisation with any recorded music. It will always beat with the correct notes when the music is played back from any start position, giving accurate timing when extra notes are added.

7·3 Playback speed

The current playback speed is indicated in display area 7, below the counter. This is normally 1·0, but can be varied between 0·5 and 5·0, using function key f8.
By selecting a low playback speed, music can be recorded slowly and carefully, using the metronome for accurate timing. The music can then be played back at a higher speed, as required. Alternatively, music can be slowed down for editing purposes.
When music is saved using the file option (section 7·4) the required playback speed should be set beforehand. When the music is subsequently reloaded, this will become the 'default speed', and will be automatically selected for playback. When the recording is erased (section 9·1), the default speed will revert back to 1·0.

7·4 Filing

Key f9 transfers control to the filing routine. Here, selection can be made to load a music file, save music to tape, or return to normal operation. Escape can be pressed at any time to cancel a selection.
The required playback speed should be set before saving music with the file option. This speed will be automatically selected when the music is subsequently reloaded.
Appendix 4 gives details of the music files supplied with MuProc.

SUMMARY

f6 Noise option
f7 Metronome
f8 Playback speed
f9 File option

8 EDITING

The DELETE and COPY keys are used for editing

previously recorded music, and are indicated on the display in areas 12 and 13. The appropriate symbol will light up during operation.

8·1 Deleting notes

If some notes are played incorrectly, these can be deleted from the recording by replaying the required section and pressing DELETE. Any notes on the current channel will be deleted as they are played back. This is signified by a 'beep' when a deletion is made. The process is stopped by releasing the DELETE key. The space remaining after deletion is instantly available for new notes to be recorded. This function does not operate with long-play files (section 9·4).

8·2 Altering notes

The envelope details for any notes on the current channel may be altered by use of the COPY key. When this is pressed, the envelope parameters shown in display area 2, 3 and 4 will be copied into the notes as they are played back. Any changes are instantly shown in the playback section of the display, area 6. The process stops when COPY is released. This facility will function with both normal and long-play files.

8·3 Editing single notes

If an individual note requires editing, this can easily be achieved as follows:
Locate the required note using the single-stepping facility (section 3·5). When the note has been located, press DELETE or COPY together with SHIFT. The appropriate function is now locked on, and shows yellow instead of white. When the music is played, the first note encountered on the current channel will be edited as required, no other notes being affected.
When single-stepping through the music, envelope details remain displayed in area 6 until the cursor key is released. This allows examination of the parameters, for subsequent alteration.

SUMMARY

	DELETE	Delete notes on current channel
SHIFT	DELETE	Delete single note
	COPY	Alter notes on current channel
SHIFT	COPY	Alter single note

9 CONTROL FUNCTIONS

The CTRL key can produce extra functions, when used in conjunction with DELETE, COPY, ↑, ↓, or RETURN. The facilities have significant effects, so should be used with care.

9·1 Erasing

An entire recording may be erased by pressing DELETE twice in quick succession, while at the same time pressing CTRL. A sound is produced to indicate erasure, and the counter returns to zero. The default playback speed (section 7·3) reverts back to 1·0 in preparation for the next recording.

9·2 Long-play

When music is entered into memory from the keyboard, 10 bytes are required for each note. This can be reduced to 6 bytes by sorting the notes into playing order and eliminating the 'pointers', when the recording is completed. This facility is provided by the long-play option, increasing memory capacity by 1·7, and reducing filing times.

After recording music in the 'normal' format, the long-play conversion will take place by pressing RETURN twice in quick succession, while at the same time pressing CTRL. Even with full memory, this will take a fraction of a second.

Notes cannot be added to, or deleted from, music in long-play format. Selecting record will have no effect, until the end of the long-play section is reached. This position can be jumped to instantly by pressing RETURN once, in conjunction with CTRL. More music can then be recorded, which can again be compressed, and so on. This can be repeated as often as required, until the maximum capacity is reached. In this way, about 3250 notes can be recorded in a 32K machine, instead of

1950.
The COPY function (section 8·2) will operate in either format. All the music files given in appendix 4 are recorded in long-play format, for shorter loading times.

9·3 Envelope editor

10 pre-defined amplitude and pitch envelopes are provided in MuProc, from which the complete range of 100,000 envelopes are produced. However, these envelopes can be modified or re-defined as required, using the envelope editor.
This can be selected by ressing COPY together with CTRL. The display will then change, showing two rows of six values in the central area of the screen. These are the amplitude and pitch envelope parameters as given on page 245 of the BBC User Guide. If a new envelope is selected as normal (section 6), the corresponding parameters will change accordingly. A full list of these values is given in appendix 1.
Any required value in the selected envelopes can be altered as follows:
Choose the value for alteration by pressing keys ← and ←. The parameter name will light up below the corresponding parameter. Keys ↑ and ↓ will then increase or decrease this value.
During alteration, the keyboard can still be used throughout the range, to test the effect of any modifications. In this way, pitch envelopes can be designed to remain in tune through all octaves. Noise options 1 and 2 can also be set if required, and ESCAPE can be pressed at any time to resume normal operation.
When recorded music is saved using the file option, these envelopes are saved along with the music data, for subsequent reloading. However, if no music data is present, the envelope values alone can be filed. In this way, a 'library' of envelopes can be built up gradually, tailored to you own requirements. Any one of these files can be reloaded, without disturbing existing music in memory.
All music files given in appendix 4 contain the default envelopes listed in appendix 1.

9·4 Tuning

The frequencies used to produce notes in MuProc are based on those recommended in the BBC User Guide. However, if the computer is used to accompany other instruments or recordings, it may be desirable to re-tune the keyboard slightly. This can be done when using the envelope editing facility (section 9·3). When this has been selected, display area 5 will normally show a value of 0. This signifies the offset value for the tuning, in quarter-semitones.

To alter the frequency of the keyboard, press key ↑ or ↓ together with CTRL. The value in area 5 will increase or decrease accordingly. The effect can be tested at any time by playing the keyboard as normal. 48 quarter-semitones will shift the keyboard by one octave.

This action will affect only the channel currently selected. Tuning each channel by different amounts can give effects such as a steel band, with appropriate envelopes.

As mentioned in section 7·1, the periodic noise option loses its tuning after octave 3. Re-tuning channel 1 by −6 quarter-semitones will compensate for this. Remember that this is only useful if channel 1 volume is set to zero.

Although envelope re-definition applies to a complete piece of music, the tuning facility will not affect notes already recorded. Changes can therefore be made at any time when compiling music.

9·5 Reset

With operating systems after issue 0·1, pushing BREAK together with CTRL will perform a hard-reset, resulting in loss of the program. In this event, type:

OLD (RETURN)
RUN (RETURN)

MuProc will then resume normal operation. All music data, envelope definitions and selections will be retained.

SUMMARY

CTRL	DELETE	Erase recording
CTRL	RETURN	
	RETURN	Perform long-play conversion
CTRL	RETURN	Jump to end of long-play section

CTRL	COPY	Enter envelope editor
CTRL	BREAK	Hard-reset

Envelope editor functions:

CTRL	↑	Increase current channel freq.
CTRL	↓	Decrease current channel freq.
	←	Move to next parameter
	→	Move to previous parameter
	↑	Increase envelope parameter
	↓	Decrease envelope parameter
	ESCAPE	Return to normal operation

APPENDIX 1
Default Envelopes

AMPLITUDE:

No.	AA	AD	AS	AR	ALA	ALD
Ø	126	−1	Ø	−1	126	63
1	32	−1	Ø	−1	126	63
2	126	−4	Ø	−2	126	63
3	32	−8	Ø	−2	126	63
4	126	−16	Ø	−16	126	18
5	5	−16	Ø	−16	126	63
6	7	63	Ø	−4	63	126
7	126	Ø	Ø	−126	126	126
8	81	2	Ø	−2	81	126
9	18	1	Ø	−1	72	126

The values of ALA and ALD apply to a volume level of 9, and are the maximum values.

PITCH:

No.	PI1	PI2	PI3	PN1	PN2	PN3
Ø	Ø	Ø	Ø	Ø	Ø	Ø
1	1	−1	1	1	2	1
2	Ø	−2	1	8	4	8
3	96	−144	48	1	1	1
4	−48	96	−96	1	1	1
5	48	−48	48	1	1	1
6	Ø	47	1	2	1	2
7	48	−68	2Ø	1	1	1
8	−16	48	16	3	1	3
9	16	16	16	1	1	1

These values of PN1, 2 and 3 apply to a 'modifier' value of Ø, and are the minimum values.

APPENDIX 2

Frequency Table

KEY	FREQ.	KEY	FREQ.	KEY	FREQ.
Ø	—	@	157	P	149
1	85	A	141	Q	89
2	93	B	169	R	1Ø9
3	—	C	157	S	—
4	1Ø5	D	153	T	117
5	113	E	101	U	129
6	—	F	161	V	165
7	125	G	—	W	97
8	133	H	173	X	149
9	141	I	137	Y	121
*	2Ø9	J	181	Z	145
+	2Ø1	K	189	[	165
<	193	L	—	/	—
−	153	M	185	]	—
>	197	N	177	^	161
?	2Ø5	O	145	£	169

These frequencies apply to keyboard No. 1, and correspond to those given in the BBC user guide for octaves 4 and 5.