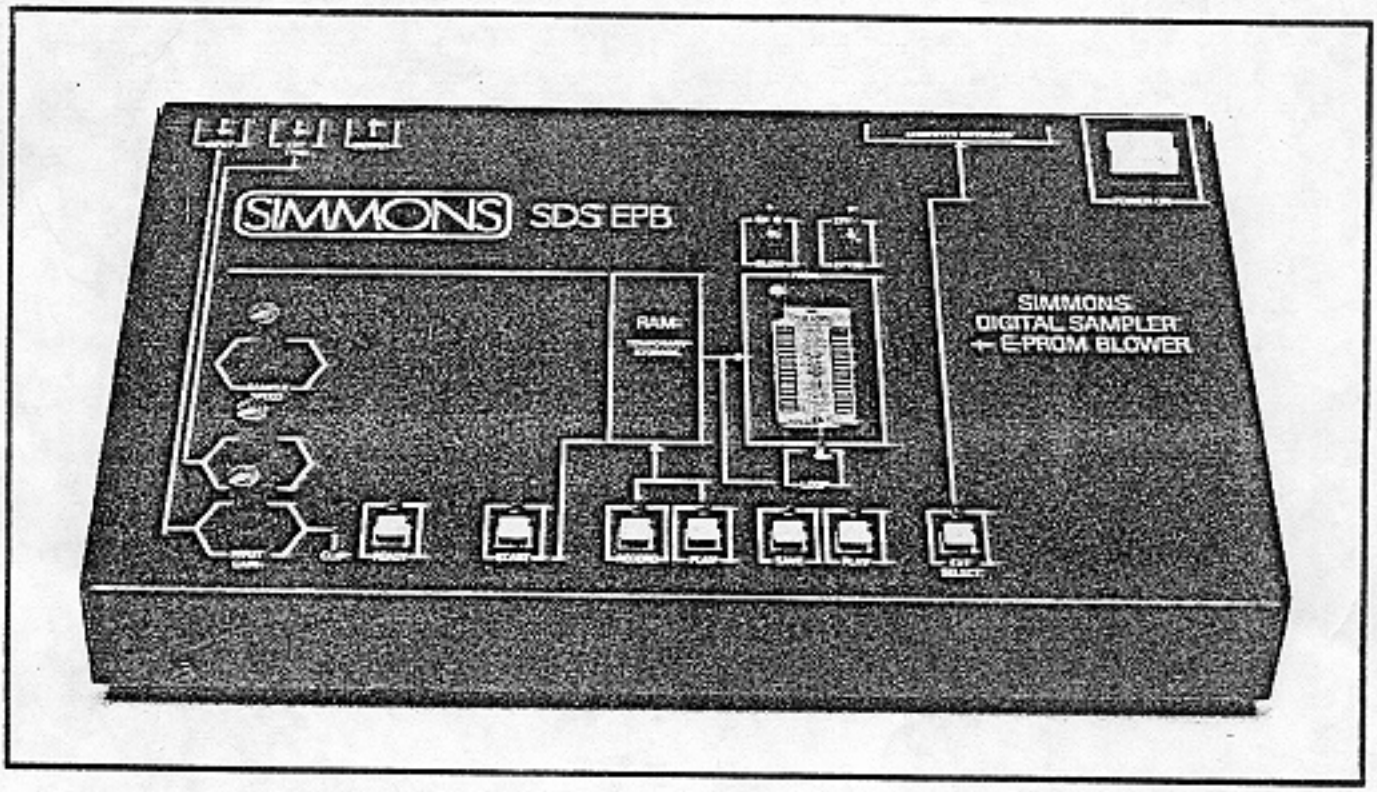
SIMMONS



SDS EPB

OPERATING INSTRUCTIONS

Introduction

The SDS EPB is a digital sampler/Eprom blower capable of recording sounds digitally and storing them in an Eprom for use in the SDS7 and SDS1.

Depending on the capacity of the Eprom selected, the EPB can record sounds of between 0.4 and 3 seconds duration making it ideal for percussion synthesis.

The EPB is an invaluable tool to the SDS7 or SDS1 owner, further increasing the scope of what is already the worlds' most versatile drum system.

Please read the owners manual carefully and remember the world of digital sampling/synthesis is at the tip of your drumsticks!

EPB Applications

The SDS EPB was primarily designed to allow SDS 7 owners to record their own drum sounds for use in the SDS 7. It is or course a recording instrument in its own right, and has many applications, some of which are listed below.

Drum sound re-inforcement

Drum sounds (ie. snare, toms etc). already recorded can be sampled. The sampled sound in the EPB can be overdubbed at a different speed (by altering the playback speed) giving the effect of two drums being played at once.

The sampled sound can be triggered manually or synced to the original by triggerring the EPB by the original drum sound via the external trigger unit.

Vocal and instrumental harmonies

Single note sounds can be recorded,sped up or slowed down during playback and overdubbed to the original to produce harmonies.

Disco jingles and special effects.

Disc Jockeys can use the EPB, build up a library of jingles, phrases noises etc that can be used during a live performance.

Creating Rythms

If the EPB is recording in the 'loop' mode and a sequence of music, or a rythm machine is playing constantly, a section of the music or rythm will be sampled and when played back and looped will create a new rhythm which can be used as the basis for new music.

Experiment Experiment Experiment ! !

USERS MANUAL

Simmons Digital Sampler and E-Prom Blower

SDS EPB

What is an E-Prom?

E-Prom stands for erasable programmable read only memory.

The memory itself consists of 'cells' of information. Each 'cell' can be either 1 or a logic zero (ie. on or off).

These 'cells' are referred to as a 'Bit'. These bits of information are stored together in groups of eight. Each 8 bits being a 'byte' or 'word'.

This byte can represent any number in the range zero (all bits = Ø) to 255 (all bits = 1) and these numbers can in turn represent a musical tone or wave form (see sampling).

The number of bytes of information that a prom can contain depends upon the size of the silicon chip inside, coupled with how small each cell can be manufactured.

Up until a year or so ago the largest prom available (affordable) could store only 2000 bytes but with ever advancing technology proms are now readily available which can store 4000, 8000, 16,000 and 32,000 bytes of information.

These chips are marked with a number that corresponds to the number of 'bits' that it contains. (Remember 1 byte = 8 bits), so:-

2K	(K=1000) E-Prom is marked		(27)	16	(16	=	2 x 8)
4K	"	"	(27)	32	(32	=	4 x 8)
8K	"	"	(27)	64	(64	=	8 x 8)
16K	"	"	(27)	128	(128	=	16 x 8)
32K	"	"	(27)	256	(256	=	32 x 8)

The number 27 is a type code, and this along with date codes, manufacturers trade marks, numbers and access speeds can be marked on the chip.

Read only memory means that the prom can only output data (Bytes). Once the prom is installed in a system, data can only be read from it. Data can never be stored in it, other than the original programmed data.

The SDS EPB will enable you to enter data into the prom initially (this data will represent an acoustic sound) - this is called blowing the prom.

E-Proms however, have a windowin the top of the chip which exposes the silicon wafer underneath. If the chip is exposed to ultra violet light for a length of time (approx 30 mins) any information stored in the chip is destroyed - clearing the chip, which can then be re-programmed as required.

Summary

1. An E-Prom can be programmed or 'blown' with numbers.

2. These numbers can represent an audio waveform.

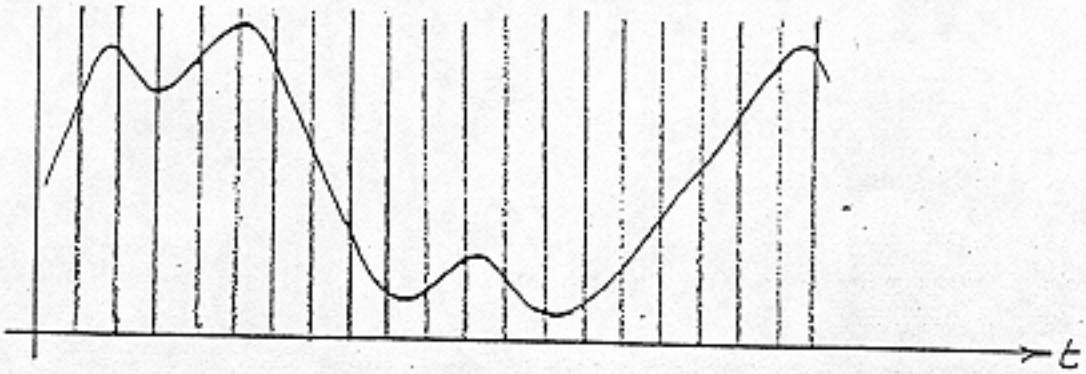
3. The larger the E-Prom, the more numbers it can store, and therefore it can contain a longer sound.

4. The larger the E-Prom the more expensive it is.

5. Once programmed, the data can only be changed by exposing the chip to ultra violet light, which erases all the information stored.

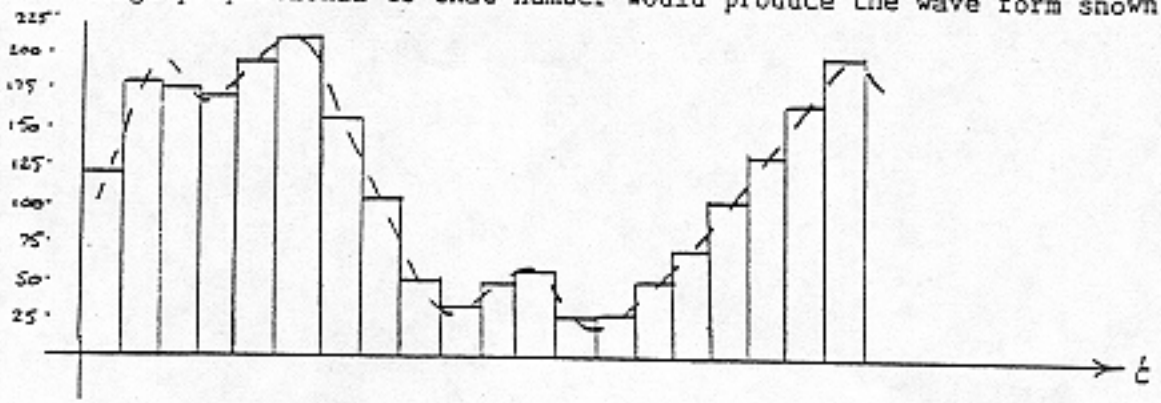
6. Once erased then the E-Prom can be re-programmed.

Fig. 1 is a graph of amplitude against time of somebody singing 'Ahhh'.



The amplitude of the signal can be represented by a number and if the wave form is measured at regular intervals these numbers would represent the change in amplitude of the signal over time.

These numbers can be stored in a prom and when cycled out and converted into a voltage proportional to that number would produce the wave form shown in Fig.2.



With the addition of filtering, a fairly accurate representation of the original wave form is produced. (Dotted line).

It can be seen that the faster the sampling the more accurate the reconstruction will be.

A rule of thumb being that you need a minimum of two samples for the highest frequency that you wish to sample. Eg. If the highest frequency in a tom tom sound was 8KHZ the minimum sample rate for a reasonably good sound would be 8K X 2 = 16KHZ.

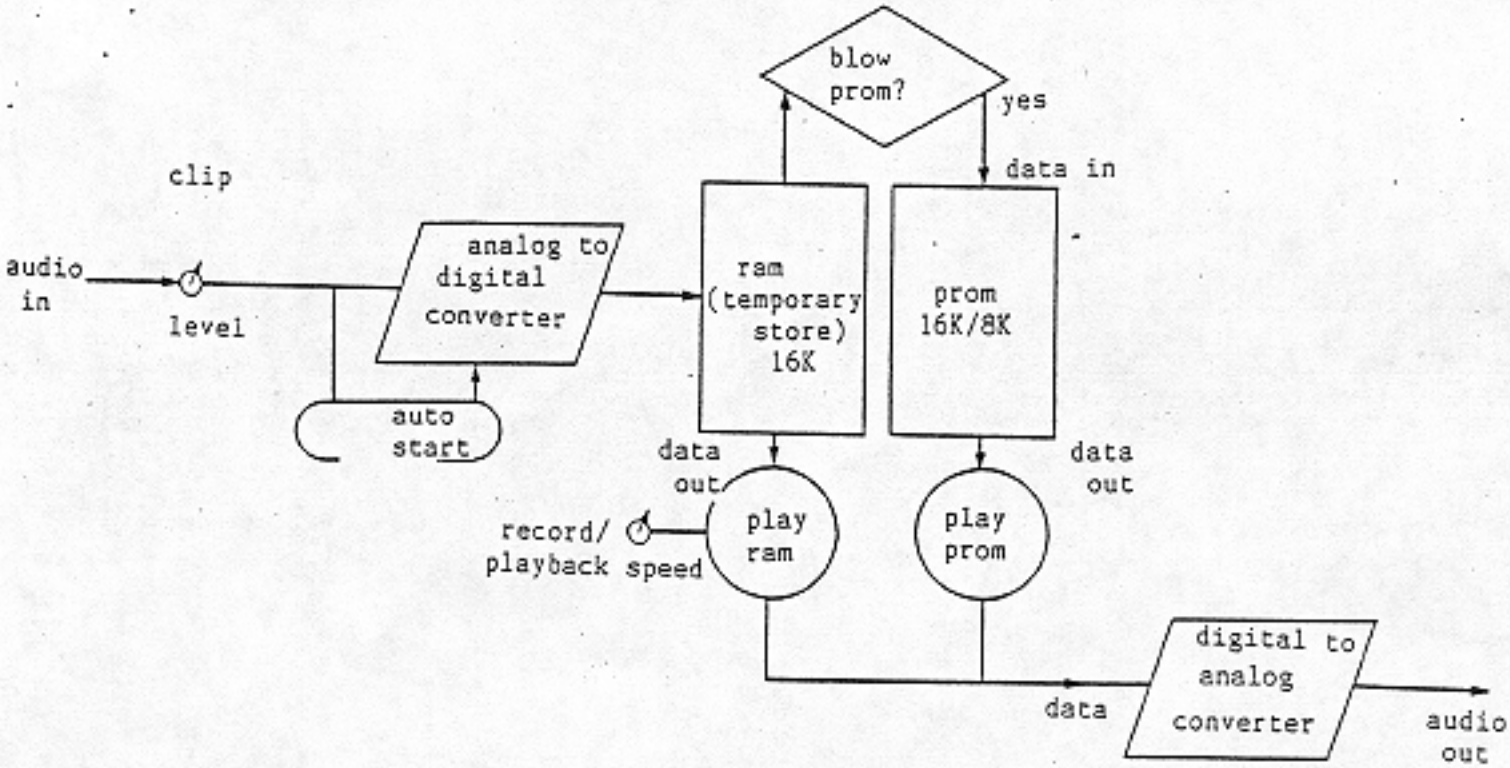
ie. The sound is sampled 16,000 times a second.

If a 16K E-Prom is used then it can be seen that the sample will only last for one second.

If the sound is longer than a second there are two things that you can do; increase the size of the prom or slow the sample rate, with a subsequent loss in bandwidth and quality.

The slower the sample rate the poorer the quality of the sound during playback. (It will sound dull, distorted or crunchy).

Operation of the SDS EPB



The EPB has 16K Bytes of sample ram which is used when a sound is sampled. This ram is arranged in 2 x 8K blocks. So that if you wish to sample a short sound you can switch to 8K and save on the cost of proms. (8K proms being approx half the price of 16K proms).

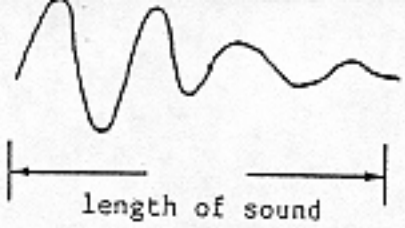
The process of recording a sound is as follows:-

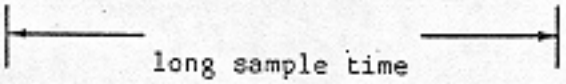
Select record ram.
Sample Sound.
Playback the sample sound in ram.
If sound is ok insert prom in socket.
'Save' ram data in prom.
Playback E-Prom.

The trick in recording is in matching the length of the sample with the actual length of the sound to be sampled and recording with maximum level into ram before distortion.

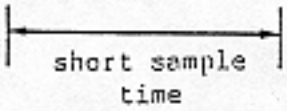
The end of the sample should coincide with the end of the sound to be sampled, if on playback there is a gap between the end of the sound and the end of the available ram, then the sample rate could be increased which will improve the quality of the recording.

Record the sound at a level so that the overload light just flickers, this means that maximum level is going into ram, which will minimise sampling noise imposed during playback.

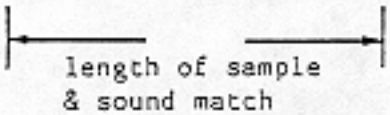




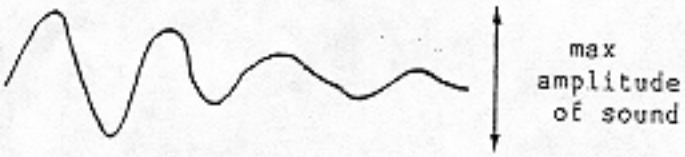
= Poor recording quality and wasted prom space.



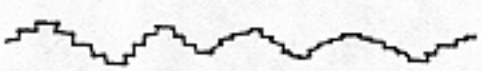
= Good quality but end of sound missing.



= Reasonable quality and whole sound sampled.



= Playback of sample - Recording sounds distorted (clipped) because level control set too high.



= Playback of sample - recording is quiet and sounds hissy and distorted due to errors - level control or signal low. adjust level so that overload LED just flickers at loudest part of sound.

Recording a sound

Plug a microphone or signal from any source ie. guitar, tape deck etc, into the audio input of the EPB, switch the E-Prom switch to safe and E-Prom size to 27128 (16K).

Connect the output of the EPB to a suitable amplifier to enable monitoring of the sample. This output is always 'live' - in other words a digital version of the signal appearing at the input of the EPB will always appear on the output whilst the 'play' LED is lit (unless you are playing back recordings stored in ram or prom).

Power up the EPB by connecting to your domestic mains supply and switching the power switch to on.

Turn the input gain and sample speed controls halfway.
Press the record ram button.
Make a noise into the microphone and adjust the gain control so that the clip LED just glows. At any time you can press the start button, which will start the digital recording.
Monitor the output to listen to the digital version of the sound.
Experiment with the sample speed control to demonstrate the signal degradation as the sample speed is slowed down.

When the start LED is glowing, any signals appearing on the input jack will be sampled and stored in ram.
This process proceeds at the speed set on the sample speed control.
At the end of the sample period (8K or 16K depending upon the prom select switch) the start light will go out.
Press the ram play button to hear the sample played back - experiment with different playback speeds. (Sample speed).

Automatic start

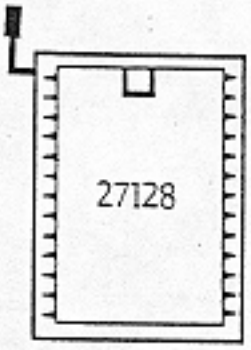
Pressing the ready button switches in the automatic recording facility. The EPB waits until a signal appears on the input and then starts recording.
Press Record Ram.
Press Ready.

When a noise is made near the microphone, the ready LED will go out, the start LED will glow and the recording will commence.
The input gain control adjusts the sensitivity of the automatic start.

Saving sample. (Blowing the Prom)

Proms come in many shapes and sizes. Many have different programming characteristics as well as varying access speeds and power consumption.
The SDS EPB is only guaranteed to program proms supplied by Simmons Electronics.
Proms are freely available, it's up to you to experiment if you wish with proms supplied from alternative sources.

The E-Prom to be programmed is placed in the zero insertion force socket (Zifs).
Make sure the lever on the left hand side of the zifs is in the up position.
Place the prom in the zifs with the notch (in the prom) at the top of the zifs.



WARNING

MAKE SURE THE SAFE/BLOW SWITCH IS

SWITCHED TO SAFE

BEFORE INSERTING OR REMOVING EPROMS OTHERWISE YOUR SAMPLES WILL GO 'CRUNCHY'!

If the prom is 27128 (16K) switch the selector to 27128. If it is 2764 (8K) switch to 2764.

If a 16K sample has been recorded but a 2764 is to be programmed only the first half of the recording will be blown into the prom.

During the prom programming process the original ram data is retained so that you can make multiple copies if you require.

Press the prom contact lever down (this makes contact with all the prom pins).
Switch the prom protect switch to blow.
Press save.
Press start.
The start LED will glow whilst the transfer of data takes place.
You will also hear the transfer if you are monitoring the EPB output.
(A series of low frequency clicks).

When the start LED goes out, the prom is blown. Switch the prom protect switch to safe - this protects the prom from being blown twice - which usually results in garbage being stored in the prom. To play the prom press play prom and then start.

External trigger

The ram or prom can be played back from an external trigger signal ie. A clicktrack, pick up, or any 'clicky' sound.

Plug the trigger signal into the ext trigger input socket - select play ram or play prom, adjust the trigger sensitivity so that the incoming trigger signal starts the playback process.

Loop

The normal playback mode plays the sample in ram or prom once on command of the start button, or an external trigger.

If the loop switch is switched down the sample will be cycled out continuously at the rate set on the sample speed control.

Note - The start light stays on continuously during the loop.
Pressing the start button will start the sample from the beginning (or external trigger).

To stop the sample looping switch the loop switch off (up).

Care of E-Proms

Once you have blown an E-Prom, cover the window with one of the self adhesive labels supplied and write on the label a description of the sound ie. ambient snare, woof woof, breaking glass etc.

If the proms are to be stored, use the plastic container supplied by Simmons, carefully pressing the proms legs to the foam.

The black foam supplied with the prom is a special antistatic foam, always store the proms in this foam - proms can be destroyed by a static build up.

Be careful not to bend the legs of the prom as they break off if they are bent more than once or twice.

Changing SDS 7 E-Proms

Once you have re-loaded your original sounds, they can of course be substituted for the factory proms in the SDS 7.

The SDS 7 uses 2764 (8K) proms for bass and snare drum, 27128 (16K) for tom toms, and either 2 x 27128 or 1 x 27256 (32K) for cymbals.

When replacing proms in the SDS 7 ensure that the prom type matches. If a 2764 is plugged into a 27128 socket, the sample will be played twice, every time the pad is struck.

If a 27128 is placed in a 2764 socket only half the sample will be played.

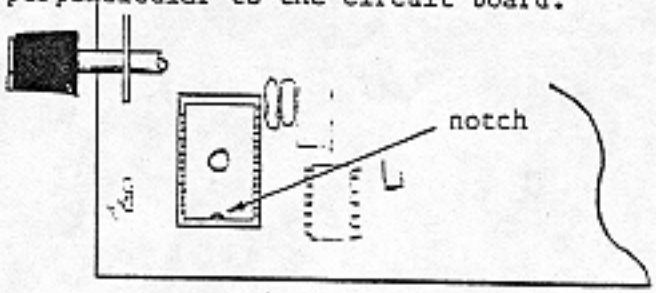
How to replace proms on the SDS7 module board.

Ensure that the SDS7 is switched off and the mains cable is disconnected.

a. Loosen and remove the four fingertight, knurled screws fastening the front panel to the rack. Remove the front panel. There is no necessity to remove the two knobs on the front of each module as they protrude through the front panel from behind.

b. Remove the relevant module by grasping the top and bottom of the circuit board between thumb and forefinger and easing slowly forwards. The module will slide out on its guide.

c. The prom which generates the digitally stored sound is located in a plug-in mounting at the bottom left hand corner of the board. Ease this component out of its socket by use of the I.C. extractor provided. Ensure that the fingers of the extractor mate correctly with the legs of the prom and pull perpendicular to the circuit board.



d. Replace the new prom. First ensure that the legs line up with the locating holes in the socket and that the prom is the right way up. (Refer to the diagram above). Locate the legs into the socket, press firmly home with the thumb.
NB. If a leg is not lined up correctly it will bend and the prom will not function.

e. Replace the module by sliding it into the card guide and when it reaches the back of the rack, ease gently up and down until the groove on the circuit board mates with the key in the socket, ensuring that the correct connections are made. It is advisable to check first that the tiny black key is correctly in place in the locating socket at the back of the rack. If you are in any doubt, consult your dealer.

f. Repeat this action until all the desired proms are replaced.
NB. It is important that bass proms go only in bass modules, toms in toms etc. Replace the front panel and tighten the securing bolts with your fingers.

8. Programming with the new proms in the SDS7

To output the 'straight' sound of the prom when the drum pad is struck, analog level and digital modulation controls should be set at 0 and the

g. Cont...

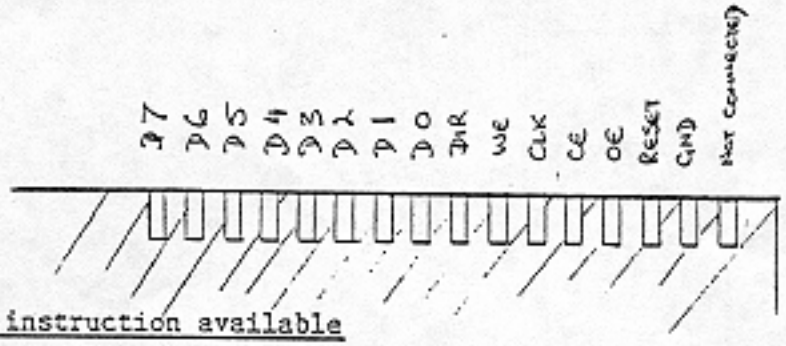
digital level at 255. The digital pitch should be set around 130 as should the bend control. The filter should be kept open for the duration of the sound to allow the full bandwidth of the sample to be outputted. However, the limitations of sampling gives rise to a certain amount of noise during and immediately after the sample has ended. It is therefore suggested that the decay control is utilised to wind back to the end of the sample closing off the noise. If analog tone and noise generation are being used to complement the digital sound, their level will be more than sufficient to mask the noise following the digital sample.

Computer Interface

On the back of the EPB is a 16 way edge connector which enables the external computer to access the various functions of the EPB.

The computer must have 2 8 bit input/output ports, one port to connect to the EPB data bus, the other to control the various EPB functions.

Top view EPB computer connections.



Transfer instruction available

EPB		Computer			
Ram	-	Ram	-	Transfers ram memory from EPB to computer.	Hold down ext select button and press play ram button.
Ram	-	Ram	-	Transfers ram memory from computer to EPB	
E-Prom	-	Ram	-	Transfers data stored in EPB E-Prom to computer ram.	Hold down ext select button and press play prom button.
E-Prom	-		-	Transfers EPB E-Prom data to EPB ram under computer control.	
ADC	-	Ram	-	Transfers real time data from EPB analog to digital convertor to computer.	Hold down ext select button and press record ram button.

Programmes to control the transfer function will have to be written for the specific computer that is being used.

Connect the EPB data bus (Pins 1 -8) to the computer's port.

Pin 9	=	Data Direction (DIR)	Low = Data from computer is transferred from computer to EPB. High = Data from EPB is transferred from EPB to computer.
Pin 10	=	EPB Ram Write Enable (WE)	Low = Enables EPB Ram to receive data from external computer.
Pin 11	=	Clock input to EPB (CLK)	The negative edge of a clock pulse from the computer advances EPB internal counters (which advances the address sequentially).
Pin 12	=	Chip Enable (CE)	High = EPB Ram is enabled.
Pin 13	=	Output Enable (OE)	Low = EPB Ram data is output.
Pin 14	=	Reset	High = EPB internal counters re-set to zero (address 0000 = start of prom/ram).
Pin 15	=	System 0 Volts (GROUND)	
Pin 16	=	Not connected	

NB Under computer control, both CE and OE must be pulsed when reading. CE must be pulsed when writing.

Technical Information SDS EPB

Dimensions. 320mm x 210mm x 75mm.
Weight. 2.35kg
Power requirements. Internally tapped 100v 115v 220v 240v. 50/60 Hz.
Internal Ram. 16K Bytes.

Prom blowing capability.
Time to blow 2764 (8K). 40 seconds
Time to blow 27128 (16K). 80 seconds
Maximum sample time. 1.6 seconds (16K) 0.8 seconds (8K).
Minimum sample time. 480ms. (16K) 240ms. (8K).
Maximum sample rate. 34KHZ
Minimum sample rate. 10KHZ
Digital quantization. 8 bits.

Input signal range. 20 mv - 3.5v.
External trigger sensitivity. No trig. gain = 3.4 minimum/full gain = 20 mv.
Output signal level. 5v peak to peak maximum.
Input signal impedance. 10K.
External trigger impedance. 10K
Output impedance. 600