*** PUBLISON * INFERNAL MACHINE 90 ***

*** USER GUIDE ***

SUMMARY OF THE ENGLISH EDITION

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♠ 1 - CHANNEL SELECTION:

◆ Push the keys SET A or SET B, one or twice, so that to select one or the two channels on which you wish to do the new function.

✚ To call a function on the A channel only, the SET A LED must be lighted and the SET B LED switched off.

✚ To call a function on the B channel only, the SET B LED must be lighted and the SET A LED switched off.

✚ To call simultaneously the same function on channels A and B, LED's SET A and SET B must be both lighted.

♠ 2 - TO CALL A FUNCTION WITH DISPLAY OF ITS NAME:

✚ When you do not know the machine, it is useful to visualize the name of the function selected and to proceed as follows :

◆ Push the FUNCTION key -> The Machine displays:

SET No, THEN ENTER OR PARAMETER

◆ Dial the number of the selected function ; for instance, 4
◆ Press the ENTER key -> The machine shows the N. with the name of the function :

04 = PITCH-SHIFTING

◆ Press the PARAMETER key -> the function is validated, and the display shows the the first parameters of the function :

PITCH-RATIO=1,260 DEL= 10,00ms

♠ 3 - TO CALL A FUNCTION WITHOUT DISPLAY OF THE NAME:

◆ When you are familiar with the functions, you can save time, by jumping above the name display step, and proceed as follows :

✚ Press the FUNCTION key
✚ Dial the number of the selected function
✚ Press the PARAMETER key

✚ You have gained one handling (the ENTER key)

♠ 4 - DISPLAY OF THE FUNCTIONS' TABLE:

✚ To display the functions table, proceed as follows :

◆ Press the FUNCTION key
◆ Press the USER GUIDE key -> The Machine shows the first function :

*** FUNCTIONS TABLE ***	

01 = DELAY	

✚ If you make nothing else, the machine shows gradually all the existing functions. Each name of function is displayed during about 2 seconds, before the next one.

✝ You can move yourself into the table as follows :

◆ Press the key "+" -> You display the following function.
◆ Press the key "-" -> You display the previous function.
◆ Press the key "0" -> You stop the unrolling of the guide.

♠ *5 - FUNCTIONS' TABLE:*

✝ At the time of that manual the INFERNAL MACHINE lays the following functions out :

01 = DELAY
02 = ECHO
04 = PITCH-SHIFTING
* *05 = SMPTE PITCH-TRACKING*
07 = REVERBERATION PRESET PROGRAMS
08 = REVERBERATION PARAMETRIC
09 = SOUND MEMORY HANDLING
50 = LANGUAGE SELECTION
* *60 = SMPTE/EBU GENERATOR SELECTION*
* *61 = SMPTE/EBU INPUT DISPLAY*
* *62 = SMPTE/EBU SYNCHRO PROGRAMMING*
* *63 = SMPTE/INPUT REAL TIME OFFSET*
* *64 = TIME RECALIBRATION OF EVENTS*
* *65 = SMPTE/EBU BANK ERASE*
* *66 = SMPTE SYNCHRO DISPLAY MODE*

(*) THIS FUNCTION NEEDS THE SMPTE/EBU INTERFACE BOARD.

♠ 1 - SUMMARY OF THE ADJUSTMENT OF THE PARAMETERS:

♣ Each function of the INFERNAL MACHINE is controlled by one or several parameters adjustable by the user. Those adjustments can be effected in several modes. Whatever the kind of method selected, the adjustment is effected on one or two channels. A channel is adjusted when the corresponding "SET" LED is lighted.

♥ 1-1 Numeric adjustment:

♣ The parameter value is directly entered from the numerical keyboard of the machine or its remote control.

♥ 1-2 Incremental/decremental adjustment:

♣ The selected parameter can be incremented or decremented at adjustable speed.

♥ 1-3 Adjustment with the numeric potentiometer of the remote control:

♣ The selected parameter can be incremented or decremented by the potentiometer of the remote control.

♥ 1-4 Adjustment from the RS232 interface:

♣ The parameters can be adjusted from a terminal or a computer if the machine is fitted with RS232 interface (in option).

♠ 2 - MODE SELECTION:

♣ The PARAMETER LED has two states, and by pushing the PARAMETER key you pass from one state to the other.

♣ When the PARAMETER LED is lighted permanently, you are in the numeric mode position.

♣ When the PARAMETER LED is blinking, you are in the INCREMENTAL/DECREMENTAL mode.

EXCEPTION : Concerning the function 9 there is an additional state regarding the graphic display. Refer to FUNCTION 9 of the present manual.

♠ 3 - NUMERIC MODE:

♣ By pressing on the "-" key, you display the previous parameter and its value blinks.
♣ By pressing on the "+" key, you display the following parameter and its value blinks.

♣ When you have selected the parameter you wish to adjust :
◆ Dial the new numeric value of this parameter with the numeric keyboard -> The new value is blinking, but is not yet validated.

♣ To make valid the new value :
◆ Either you press the ENTER key.
◆ Either you press the "-" key, which makes valid the parameter in progress and then goes to the previous.
◆ Either you press the "+" key, which makes valid the parameter in progress and then goes to the following parameter.
◆ Either you leave the mode in progress.
◆ Either you turn the potentiometer of the remote control -> The parameter is validated and then follows the potentiometer control.

✦ If the selected value exceeds the limits (lower or higher) of this parameter, the machine displays an error message :

TOO HIGH I SET THE MAXIMUM

or

TOO LOW I SET THE MINIMUM

The parameter is then adjusted on its limit value (low or high), the error message disappears after about 1 second and we find again the parameter display.

Example: If you want to adjust for the function 4:
- PITCH RATIO: 1,059
- ARPEGGIO FEEDBACK: 85%

◆ Press the FUNCTION key
◆ Press the key 4
◆ Press the PARAMETER key -> The PARAMETER LED is lighting permanently and the Machine displays :

PITCH-RATIO=1,260 DEL= 10,00ms

The value 1,260 blinks.
◆ Dial 1 0 5 9
◆ Press the "-" key -> 1,059 is validated and the Machine displays the new parameter which blinks:

ARPEGGIO FEEDBACK = 0%

◆ Dial 8 5
◆ Press the ENTER key -> The Machine displays:

ARPEGGIO FEEDBACK = 85%

♠ 4 - *INCREMENTAL/DECREMENTAL MODE:*

(The PARAMETER LED is blinking)

◆ Press the "+" key -> The actual parameter is incremented of 1 unit.
◆ Press a figure from 1 to 9 -> The parameter increases gradually, at a speed which depends on the figure selected: 1 for the smallest speed, 9 for the highest.
◆ Press an other key from 1 to 9 -> the speed changes according to the figure selected.
◆ Press the "-" key: the value of the parameter goes decreasing.
◆ Press the "0" key: the parameter stops on its current value.

✦ If the parameter reaches a limit value (lower or higher), the parameter stops on the limit value.

♠ 5 - *ADJUSTMENT FROM THE POTENTIOMETER OF THE REMOTE CONTROL:*

✦ The remote control has an endless numeric potentiometer with optical coding which allows a flexible adjustment of the parameters at a variable speed, according to one turns more or less quickly. By turning clockwise the parameter increases, in the opposite way it decreases.
✦ It is only efficient when the PARAMETER LED is permanently lighted.

♠ 1 - SUMMARY OF FUNCTIONS AND PARAMETERS MEMORIES:

✝ The INFERNAL MACHINE has 400 memories of functions and parameters.

✝ Those memories are intended to store the functions adjusted by the user, with all their parameters.

✝ They are non volatile, i.e. their content is not damaged when the power is off.

✝ They enable to safeguard specific adjustment effected by the user, with the purpose to find them again later on.

✝ In the continuation of that manuel we shall use only the abridged designation : FUNCTION MEMORIES.

♠ 2 - SELECTION OF ONE OR TWO CHANNELS:

✝ At each channel of the Machine a number of function memory is given.
✝ The number of the FUNCTION MEMORY of the A channel is displayed by a red LED display, the one of the B channel by a yellow LED display.
✝ The 400 function memories are common to the A AND B channels, which allows transfers of function from one channel to another.
✝ The three basic controls: selection of the number, load of the memory or calling memory, are effected on only one of the channels A or B, or on both simultaneously, according to the channel selection.
✝ To drive one channel by one of those three controls, it needs and it is sufficient that the LED SET A or SET B corresponding be lighted.

◆ To select the LEDs SET A and SET B, press one or twice on the keys SET A or SET B.

♠ 3 - SELECTION OF THE NUMBERS OF FUNCTION MEMORIES:

♥ 3-1 Numeric method:

◆ Press the key MEMORY SELECT -> The display(s) of the selected channel(s) blink(s).
◆ Dial the wanted number.
◆ Press the ENTER key -> The selected number is validated on the selected channel(s).

Example: If you wish to select the number 101 for the A channel, 201 for the B channel:
◆ Press the SET A key, zero, one or twice according to the initial state, in order to light only the SET A LED (SET B is switched off).
◆ Press the MEMORY SELECT key -> The red display blinks.
◆ Dial 1 0 1
◆ Press the SET B key -> 101 is validated the SET A LED is switched off, the SET B LED lights and the yellow display blinks.
◆ Dial 2 0 1
◆ Press the ENTER key -> 201 is validated, and the Machine displays:

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	101
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	201

(x = previous display unchanged)

♥ *3-2 Incremental/decremental mode:*

- Press the MEMORY SELECT key (only if th MEMORY SELECT LED was OFF)-> The MEMORY SELECT LED is ON.
- Press the "-" key -> on each selected channel, the number of the function memory is decremented.
- Press the "+" key -> on each selected channel, the number of the function memory is incremented.

Example: Let us take again the continuation of the previous example:

- Press the "-" key -> The Machine displays:

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	100
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	200

- Press the "+" key twice -> The Machine displays:

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	102
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	202

♠ *4 - LOADING OF FUNCTION MEMORIES:*

- Press the MEMORY IN key

  -> For each selected channel the current function is loaded with all its parameters in the selected function memory.

CAUTION:

1 - Before loading a function memory, make sure it does not already contain datas to be preserved. In such a case, change the N°.
2 - If you make a simultaneous loading on both channels (with the SET A and SET B LED both ON), verify that the selected numbers are different for both channels ; if the numbers were equal, the functions and the parameters of the B channel would "crush" in the memory those of the A channel.

♠ *5 - RECALL OF THE FUNCTION MEMORY:*

- The MEMORY OUT key is a toggle key ; by pressing that key once the MEMORY OUT LED state is toggled : if it was OFF it becomes ON, if it was ON it becomes OFF.

- When you light the MEMORY OUT LED, on each selected channel, the contents of the displayed memory is loaded in the relative channel: You call one function with all its parameters.

- If the MEMORY OUT LED is already ON, when you change the number of a function memory, then for each selected channel the contents of the new selected memory is loaded in the selected channel(s). This is applied in the numeric mode and in the incremental/decremental mode.

♠ 1 - SUMMARY OF THE FUNCTION DELAY:

♥ The FUNCTION DELAY allows to obtain an adjustable delay on the audio signal

♠ 2 - HOW TO CALL THE FUNCTION DELAY:

◆ Press the FUNCTION key
◆ Press the 1 key
◆ Press the PARAMETER key

✢ -> The machine displays:

DELAY = 49,00ms

◆ Adjust the delay as stated in the PARAMETERS ADJUSTMENT section

✢ In the above case, the audio signal available on the output N° 1 of the selected channel is delayed of 49 milliseconds comparatively to the input signal.

✢ The minimum delay is of 0,04 milliseconds (40 microseconds)

✢ The maximum delay depends on the memory option:

- In the case of "short" option, maximum delay = 5 242,00 milliseconds
- In the case of "long" option , maximum delay = 20 930,00 milliseconds

♠ 3 - APPLICATIONS OF THE FUNCTION DELAY:

♥ 3-1 For recording: equalization of the phase-shift between microphone

When you record with several microphones in the same space, it happens effects of shifting phase due to the speed of the sound in the air: The sound being propagated at the speed of 340 meters per second, for each meter covered in the atmosphere the sound takes a delay of 2,94 milliseconds. The machine being fitted with two divided channels, you can put in phase up to 3 microphones. The adjustment depends on the relative position of the sound sources and microphones, as well as of the sound sources that you wish to reinforce.

♥ 3-2 For mixing: Phasing:

By mixing an original sound with the same sound slightly delayed, you obtain a filtering effect which is called PHASING. The frequency response of the phasing mode is going up and down many times, from low to high frequencies. The medium adjustment regarding that effect goes from 0,04 to 10 milliseconds.

♥ 3-3 In mixing: double and triple voices:

If you mix an original audio signal with the same delayed signal you can obtain a subjective effect of two voices. If you take for example a play back singer, you will have a feeling that two people are singing the same thing together. That effect is more efficient if you use the two channels of the Machine set in function delay with different adjustments, mixed with the direct signal: This makes a total of three voices. The adjustment bracket for that effect goes from 10 to 150 milliseconds. (NOTE: This effect can be amplified with the FUNCTION 4: refer to application of the function 4).

♥ *3-4 In mixing: Space effect:*

By mixing the origine signal with the same delayed signal one or twice, you can obtain a space effect, which is different from echo or reverberation. The range of adjustments regarding that effect goes from 150 to 500 milliseconds.

♥ *3-5 In video and cinema post synchronization:*

First you read the original sound with a constant advance on the corresponding picture, then you compensate that advance with the INFERNAL MACHINE in function delay. This gives you the possibility to change the value of the delay in order to compensate the difference between sound and picture at each time where such a difference occurs. When the value of the delay changes, the transition comes with a cross fading effect between the previous delay and the new one, in such a way that this transition is very little audible if it comes on the signal and is unaudible if it takes place during a silent.

You can make an optimum use of that function by taking the synchronization by the SMPTE/EBU code, so that the delay evolving automatically in synchronization with the picture.

♥ *3-6 For live:*

With the two delays you can compensate the phase-shifts and delays between three separate loud-speakers. The sound speed in the atmosphere being of 340 meters per second, any space between two loud-speakers will involve a time difference of 2,94 milliseconds by meter of space between the loud-speakers.

♠ 1 - SUMMARY OF THE ECHO FUNCTION:

♥ The ECHO FUNCTION allows to obtain on a sound an effect of repetition at regular intervals, with a gradual attenuation from one repetition to the following.

This effect is obtained with a digital delay and a digital feedback which sends back on the input of the delay a part of the output signal.

♠ 2 - HOW TO CALL THE ECHO FUNCTION:

◆ Press the function KEY
◆ Press the 2 key
◆ Press the PARAMETER key
✣ -> The Machine displays

ECHO LOOP= 250,00ms FEEDB=84%

♠ 3 - DURATION OF THE LOOP:

♥ *LOOP* = Abbreviation for: Duration of the LOOP
This parameter allows to adjust the interval of time between two successive reflections.

✣ MINIMUM LOOP TIME = 0,04 milliseconds
✣ MAXIMUM LOOP TIME = 5 242 milliseconds for short option
✣ MAXIMUM LOOP TIME = 20 930 milliseconds for long option

♠ 4 - FEEDBACK:

♥ *FEEDB* = Abbreviation for FEEDBACK
The FEEDBACK parameter defines the part of the output signal which is sent back in the input. This feedback is digital and consequently perfectly linear in frequency, so that you can adjust a high ratio (99%) without taking a risk to produce unwanted whistlings.

✣ MINIMUM FEEDBACK = 0%. In this case you have a simple delay.
✣ MAXIMUM FEEDBACK = 99%. In this case the sound is looping for a longer time, and the output level exceeds clearly the input level: It can be useful to decrease the input level in order not to saturate the output.

♠ 5 - APPLICATIONS OF THE ECHO FUNCTION:

♥ *5-1 Emphasized phasing* - By adjusting:
LOOP from 0,04 to 10 milliseconds - FEEDBACK from 50% to 99%
You get a phasing effect more accentuated than the one obtained with the DELAY function.

♥ *5-2 Tube effects* - By adjusting:
LOOP from 5 to 100 milliseconds - FEEDBACK from 85% to 99%
You get a tube effect: You have the feeling that the sound went through a tube.

♥ *5-3 Space effects* - By adjusting:
LOOP from 100 to 1000 milliseconds - FEEDBACK from 50 to 90%
You get spaces effects

♥ *5-4 Accumulator effects* - By adjusting:
LOOP = 1 second and over - FEEDBACK = 99%
You get an accumulator effect: The sounds are accumulating in the Machine memory and last very long before diseappearing.

♠ 1 - SUMMARY OF FUNCTION 4:

♥ With the FUNCTION 4 you can perform simultaneously the following functions on an input audio signal: Pitch-shifting (which shifts the frequency of the input signal), evolving vibrato, automatic arpeggio (with feedback), added delay, and you can control it by an external MIDI keyboard.

♥ *Parameters list:*

♣ ***PITCH RATIO*** (output frequency/input frequency)
♣ ***ADDED DELAY***
♣ ***PITCH-SHIFTING ALGORITHM***
♣ ***MIDI CHANNEL***
♣ ***MIDI VOICE*** (N° of voice for MIDI polyphony)
♣ ***TOTAL OF VOICES IN POLYPHONY*** (Selection of the priority logic for MIDI mode)
♣ ***VIBRATO FREQUENCY***
♣ ***VIBRATO DEPTH***
♣ ***VIBRATO DELAY AT THE ATTACK OF THE NOTE***
♣ ***FEEDBACK FOR AUTOMATIC ARPEGGIO***

♠ 2 - HOW TO CALL THE FUNCTION 4:

◆ Press the FUNCTION key
◆ Press the 4 key
◆ Press the PARAMETER key -> The Machine displays:

```
PITCH-RATIO=1,260 DEL=     10,00ms
```

♠ 3 - PITCH-RATIO:

♥ ***PITCH-RATIO*** = Abbreviation for PITCH-RATIO BETWEEN OUTPUT AND INPUT SIGNAL. All the input frequencies are multiplied by this ratio. In the above example if you send in the input of the Machine a frequency of 1000 Hz, you will get on the output a frequency of 1260 Hz.

♣ - If PITCH-RATIO = 1,000, the pitch of the sound is not modified
♣ - If PITCH-RATIO < 1,000, the sound is lower in frequency
♣ - If PITCH-RATIO > 1,000, the sound is higher in frequency

♣ - The effect obtained gives the same auditive effect as a magnetic tape the speed of which is changed. The difference is that in the INFERNAL MACHINE the process is made in real time.

♣ - The basic principle is to make a continuous variation of the delay (Doppler effect). The sound is memorized at a rate of 50000 samples per second, and then is read with a variable speed. In order to remain in real time and not to have an excessive delay, the Machine uses improved algorithms which tests the phase of the signal and keep permanently the delay at its mean value while keeping the phase of the signal, in order to reduce the effects of "glitches" inherent to that kind of effects.

♣ - The pitch-ratio can be expressed in semi-tones. The following table gives the semi tones versus the pitch-ratio. It uses an equal temperament scale (The ratio between a semi-tone and the preceeding one is equal to 1,05946).

SEMI-TONES	PITCH-RATIO
-24	0.250
-23	0.265
-22	0.281
-21	0.297
-20	0.315
-19	0.334
-18	0.354
-17	0.375
-16	0.397
-15	0.421
-14	0.446
-13	0.472

SEMI-TONES	PITCH-RATIO
-12	0.500
-11	0.530
-10	0.561
-9	0.595
-8	0.630
-7	0.667
-6	0.707
-5	0.749
-4	0.794
-3	0.841
-2	0.891
-1	0.944

SEMI-TONES	PITCH-RATIO
0	1.000
+1	1.059
+2	1.122
+3	1.189
+4	1.260
+5	1.335
+6	1.414
+7	1.498
+8	1.587
+9	1.682
+10	1.782
+11	1.888
+12	2.000

♣ MINIMUM PITCH-RATIO = 0,250 = minus two octaves
♣ MAXIMUM PITCH-RATIO = 2.000 = plus one octave

♠ 4 - *ADDED DELAY:*

♥ *DEL* = Abbreviation for ADDED DELAY
♥ This paramater gives you the possibility to add a delay to the pitch-shifted sound. It sets a mean value of the delay; the principle of the pitch-change is to use a variable delay, therefore this one cannot be absolutely fixed. The actual delay, compared with the displayed delay, can vary in a range of 15 milliseconds.

♣ MINIMUM ADDED DELAY = 1 millisecond
♣ MAXIMUM ADDED DELAY = 5,242 seconds for the short option
♣ MAXIMUM ADDED DELAY = 20,930 seconds for the long option

♠ 5 - *PITCH-SHIFTING ALGORITHM:*

♥ The pitch-shifting effect is obtained by a continuous variation of a delay. In order to prevent this delay from becoming infinite, it is necessary to have algorithms which bring it back permanently to its mean value. The Machine has 4 improved algorithms, which make a phase analysis of the audio signal, in order to bring back permanently the delay to its mean value while reducing the effects of "glitches" in the sound inherent to this kind of process. Each algorithm is more specially fitted to a type of sound :

PITCH-ALGO=1 FOR HUMAN VOICE A

PITCH-ALGO=2 FOR STRINGS

PITCH-ALGO=3 FOR HUMAN VOICE B

PITCH-ALGO=4 FOR COMPLEX SOUND

♥ *PITCH-ALGO* = Abbreviation for ALGOrithm of the PITCH-SHIFTING.
♣ For each sound you can test the different algorithms and select the one giving the cleanest sound.

♠ 6 - MIDI CHANNEL NUMBER:

MIDI - CHANNEL No= 1 VOICE No=1

♥ *MIDI* = Abbreviation of "Musical Instrument Digital Interface".
This is a serial Interface which sends numerical datas at the speed of 32500 bits per second. This interface is now universal in the musical field, where it allows to connect together the synthesizers, sequencers, keyboards and other electronic musical devices.

♣ The INFERNAL MACHINE is fitted with a MIDI codes receiver which allows to control it from a keyboard or a MIDI sequencer.

♥ *CHANNEL No* = Abbreviation for MIDI CHANNEL Number

♣ The MIDI codes include a channel number from 1 to 16. The INFERNAL MACHINE will receive these codes only if it is adjusted on the channel number corresponding to the received code. This allows you to adress a channel of the INFERNAL MACHINE with dedicated MIDI codes; when several units are connected on the same MIDI source, the MIDI CHANNEL NUMBER allows you to control the INFERNAL MACHINE independently of the other units.

♣ MINIMUM CHANNEL NUMBER = 1

♣ MAXIMUM CHANNEL NUMBER = 16

♠ 7 - MIDI VOICE NUMBER:

♥ *VOICE No* = VOICE Number assigned to this channel of the Machine in MIDI polyphony .

♣ This parameter allows you to work in polyphony from a MIDI keyboard. The INFERNAL MACHINE includes a priority logic which manages the numbers of the notes received from the MIDI interface, and dispatches them on the channels of the connected MACHINE (s).

♣ We assume that the voice N°1 is the one that is operated when only one note is played. The voice N°2 is the one that is operated when a second note is played, the note N°1 being still pressed . And so on, up to 8 voices. Each Machine includes two channels. With two Machines you can play with 4 voices, and so on... until 8 voices. In polyphony, each channel of Machine must have a different voice number. For 8 voices this gives :

MIDI - CHANNEL No= 1 VOICE No=1	Channel A MACHINE No 1
MIDI - CHANNEL No= 1 VOICE No=2	Channel B
MIDI - CHANNEL No= 1 VOICE No=3	Channel A MACHINE No 2
MIDI - CHANNEL No= 1 VOICE No=4	Channel B
MIDI - CHANNEL No= 1 VOICE No=5	Channel A MACHINE No 3
MIDI - CHANNEL No= 1 VOICE No=6	Channel B
MIDI - CHANNEL No= 1 VOICE No=7	Channel A MACHINE No 4
MIDI - CHANNEL No= 1 VOICE No=8	Channel B

♠ 8 - POLYPHONIC TOTAL VOICE NUMBER:

POLYPHONIC TOTAL VOICE NUMBER= 2

- This parameter shows the total number of MACHINE channels which are used in MIDI polyphony.

- Its value by default is 2, and it is not useful to adjust it if you use only one MACHINE: with only one MACHINE, the response of the priority' logic is completely defined by the adjustement of the numbers of the voices (as mentioned above).

- But when you use several MACHINES in polyphony, it is necessary to inform each MACHINE of the total number of used channels. In the case of the above example, this parameter must be set to 8, and this in each MACHINE.

- This parameter optimises the priority logic, which assigns each channel of the MACHINE to the keys which are played. This priority logic is submitted to the following rules :

  1 - The first played note is assigned to the MACHINE voice N°1

  2 - When a new note is played, the priority logic searches what are the available MACHINE voices, (not assigned), and assigns to the played note the channel which has the lowest found voice number.

  3 - When a channel of MACHINE is assigned to one note, it remains assigned to it as long as the corresponding key is pressed. When the key is released, the MACHINE voice which was assigned to it becomes again available.

  4 - Consequence of the above rules : when all the MACHINE voices are assigned, the additional notes which are played are not taken into account.

  5 - When all the voices are assigned, and when one or several notes are pressed exceedingly, as soon as one of the assigned voices is available, it is assigned to one of the notes which was in excess. This rule allows to miss no notes, when one plays very quickly on a MACHINE voice, while keeping a tune on all the other MACHINE voices.

  6 - EXCEPTION: When you play with only one MACHINE voice, each new note played is immediately taken into account, even if previous notes are still pressed: This in order to avoid to miss any note when you play quickly.

♠ 9 - EVOLVING VIBRATO:

```
VIB F=10,0Hz DEP= 5 DEL=0,2s M=0
```

✝ The vibrato effect is obtained by a sine wave modulation of the pitch-ratio (frequency modulation). This modulation is centred on the mean value of the pitch-ratio, adjusted by the pitch-ratio parameter (refer to section 3).

✝ It can evolve with the time. This evolving shape is triggered by each new MIDI note or by pressing the AUX key. With the 0 mode you obtain a delayed vibrato, with the 1 mode you obtain an appogiature.

♥ 9-1 FREQUENCY:

✝ *F* = Abbreviation for *F* REQUENCY

✝ This parameter allows you to adjust the number of vibrations per second. It is adjustable between 0,1 and 50,0 vibrations per second.

♥ 9-3 DEPTH:

✝ *DEP* = Abbreviation for *DEP* TH

✝ This parameter allows you to adjust the peak value of the frequency shift on a scale from 1 to 99.

♥ 9-3 DELAY OF MODULATION:

✝ *DEL* = Abbreviation for *DEL* AY OF MODULATION

✝ This parameter adjusts the time which runs between the hit on one MIDI key (or the AUX key), and the appearance of the vibrato (for mode 0) or the disappearance of the vibrato (for mode 1). It is adjustable from 0,0 to 9,9 seconds.

♥ 9-4 MODULATION MODE:

✝ *M* = Abbreviation for *M* ODULATION MODE :

✝ - If M=0, the vibrato is delayed and comes after a delay adjustable by the previous parameter. The start point of this delay is defined either by sending a MIDI note, either by pressing on the AUX key. In the case of a MIDI keyboard, there is no vibrato at the attacks of the notes: It appears only if the note is maintained long enough. The AUX key allows you to make disappear manually the vibrato at selected times of the sound material.

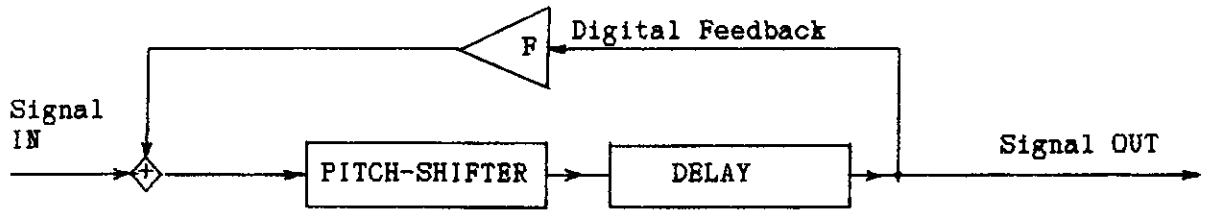
✝ - If M=1, the vibrato appears at the attack of the MIDI notes, or when pressing on the AUX key, and disappears after a delay adjustable by the previous parameter: It is an APPOGIATURE effect.

✝ - If the frequency is adjusted low enough, the coming effect is perceived as a single impulse which shifts the sound when the notes are hitted (or when the AUX key is pressed on).

♥ You can obtain a large variety of effects, according to the arrangement of the adjustments of these four parameters.

♠ *10 - AUTOMATIC ARPEGGIO:*

♥ The AUTOMATIC ARPEGGIO effect is obtained by connecting together a pitch-shifter and a serial delay, and by sending back to the input a part of the output signal with a digital feedback:



♣ The obtained effect is similar to an echo, with the difference that the pitch of the repeated sounds becomes lower and lower or higher and higher, according to the pitch-ratio (less or more than 1.000).

♣ The basic parameters of this effect are the FEEDBACK, the PITCH-RATIO and the ADDED DELAY.

ARPEGGIO FEEDBACK = 85%

PITCH-RATIO=1,059 DEL= 50,00ms

♣ The FEEDBACK adjusts the part of the signal which is sent back in the input of the pitch-shifter. It defines the level attenuation between each reflection and the following one. It is adjustable from 0 to 99%. It is a digital feedback, so that it is possible to have a great number of reflections (case of a 99% feedback) without any alteration of the signal. It acts also on the release time of the effect.

In the case of high feedback ratios (higher than 90%), the output signal level is clearly higher than the input level. In this case it can be useful to reduce the input gain, in order to avoid a saturation of the output of the MACHINE.

♣ The PITCH-RATIO adjusts the pitch difference between each reflection and the following one (Refer to section 3).

♣ The ADDED DELAY adjusts the time running between two successive reflections (Refer to section 4).

♥ *APPLICATION 1*: Example of rising arpeggio:

FEEDBACK = 80%
PITCH-RATIO = 1.059
ADDED DELAY = 100 ms

This effect gives a rising arpeggio with one semi-tone interval, with clearly separate and howerer closely related reflections.

♥ *APPLICATION 2*: Example of falling arpeggio:

FEEDBACK = 80%
PITCH-RATIO = 0.944
ADDED DELAY = 100 ms

This effect is similar to the previous one, but with one semi-tone falling intervals.

♥ ***APPLICATION 3:*** Example of "rocket" arpeggio:

FEEDBACK = 98%
PITCH-RATIO = 1,003
ADDED DELAY = 10 ms

Here the reflections are very closely related and they are not perceived as separated reflections. When a sound occurs, it seems to "break out" continuously towards the treble . This effect is interesting for example on short percussions.

♥ ***APPLICATION 4:*** Combination ARPEGGIO + VIBRATO:

The arpeggio effect can be very amplified and diversified by introducing the vibrato function inside the pitch-shifting section. It's up to you to create your own effects, by working on the different parameters of the vibrato and the arpeggio.

♠ 11 - SPECIAL USE OF THE AUX KEY FOR THE FUNCTION 4:

♣ For the FUNCTION 4, the AUX key has a special use :

1 - First it can be used, as we have seen it in the VIBRATO section, to trigger manually the evolving shape of the VIBRATO modulation wave.

2 - Then it can be used to retrieve the unity gain for the sound, when this one has been muted after a MIDI note. As a matter of fact, when you play a note with the MIDI keyboard, the sound appears with the corresponding pitch, and disappears when the key is released. So when you push the AUX key, the sound appears again, with the last played pitch-ratio.

♠ 1 - SUMMARY OF THE PRESET REVERBBERATION :

✣ The preset reverberation includes 52 programs of preset reverberation which allow you to obtain very quickly effects which were preset in factory.

✣ These reverberations are made from the FUNCTION 8: PARAMETRIC REVERBBERATION, which is programmed by the FUNCTION 7 in order to obtain the wanted effects.

✣ Each of these programs can be modified in its parameters, and then the new adjustment can be loaded in the functions memories so that it can be found again quickly in the future.

♠ 2 - HOW TO CALL THE PRESET REVERBBERATION:

◆ Press the FUNCTION key
◆ Press the 7 key
◆ Press the PARAMETER key -> The MACHINE displays:

REVERB 38=CONCERT HALL B EDI=0

✣ 38 is the reverberation number, adjustable from 1 to 52
✣ CONCERT HALL shows the name of the simulated space.
✣ B is the indice of the considered space.
✣ EDI allows to pass in edition mode when one adjusts it to 1.

♠ 3 - EDITING OF A PRESET REVERBBERATION :

✣ Let us take the above example:
◆ Press the "+" -> The "0" blinks.
◆ Press the 1 key
◆ Press the ENTER key. The MACHINE displays the first parameters of the considered effect:

SIZE = 9= 10 000 M3 DEC= 2,1s

✣ You are now in parametric mode, and you are able to modify each of the actual parameters. The performing is similar to the one of the FUNCTION 8 section of the present manual.

♠ 4 - SAFEGUARD OF A USER ADJUSTMENT:

✣ The safeguard technic is described on page M2.
✣ EXAMPLE: The following example describes the modification of the reverberation 38, the treble coefficient of which is modified to a new value of 0,45; this new adjustment is afterwards safeguarded in the functions memory N° 260.
✣ Initial function:

REVERB 38=CONCERT HALL B EDI=0	xxx

◆ Press the "+" -> key. The "0" blinks.
◆ Press the key 1
◆ Press the ENTER key -> The MACHINE displays:

SIZE = 9= 10 000 M3 DEC= 2,1s	xxx

x = Any previous number.

◆ Press the "+" key three times on end -> The MACHINE displays:

BASS COEF=1,00 TREBLE COEF=0,60	xxx

0,60 blinks
◆ Dial 0,45
◆ Press the ENTER key -> The MACHINE displays:

BASS COEF=1,00 TREBLE COEF=0,45	xxx

◆ Press the MEMORY SELECT key -> The previous "xxx" blinks
◆ Dial 2 6 0
◆ Press the MEMORY IN key -> The new reverberation is stored in the function memory N°260 and the MACHINE displays:

BASS COEF=1,00 TREBLE COEF=0,45	260

♣ If you want to call further this adjustment, proceed as follows:

◆ Press the MEMORY SELECT key
◆ Dial 2 6 0
◆ Press the MEMORY OUT key -> The corresponding reverberation is loaded in the selected channel with all its parameters.

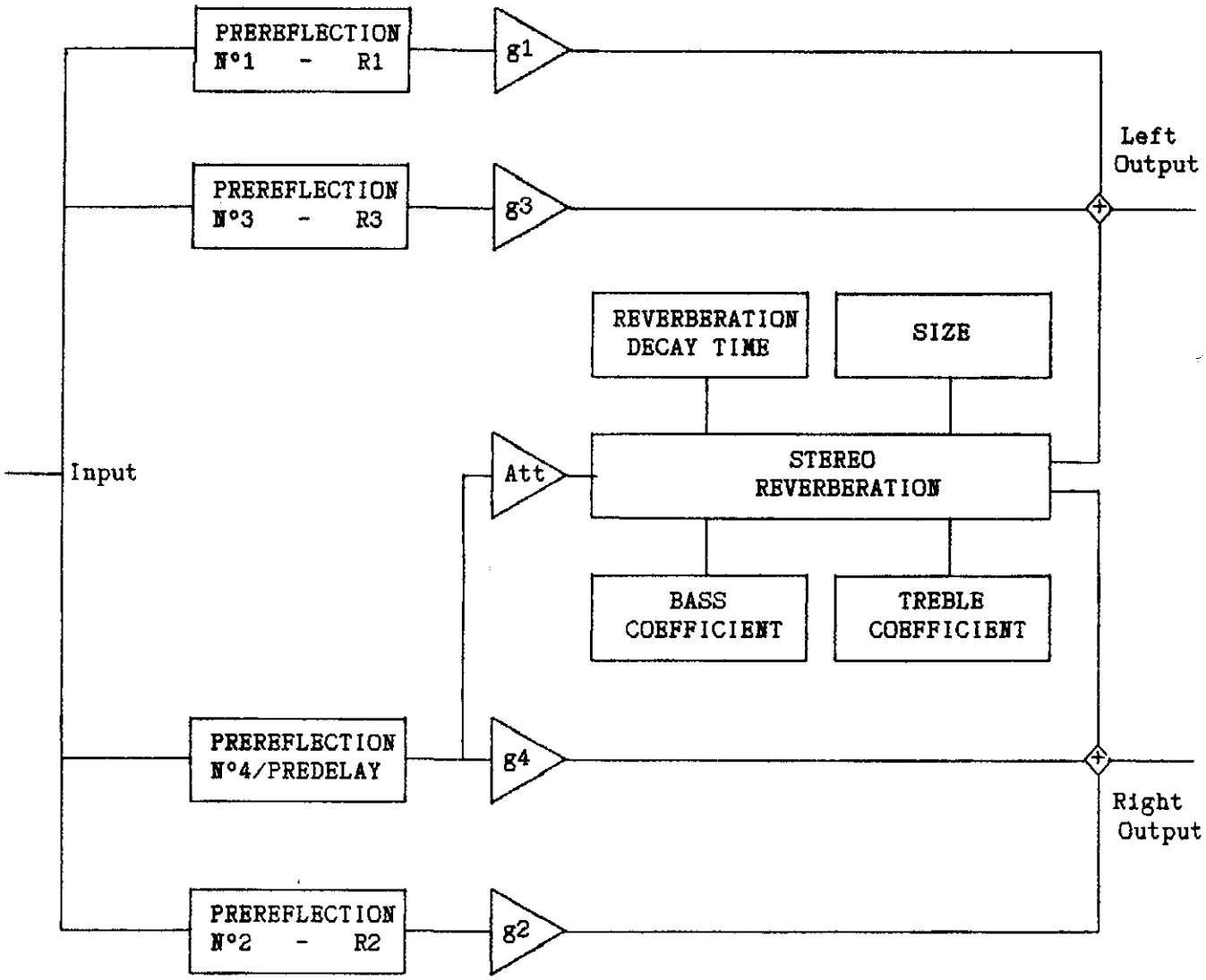
♠ *5 - PRESET REVERBERATIONS LIST:*

1 = SPRING A	27 = SMALL ROOM C
2 = SPRING B	28 = SMALL ROOM D
3 = SPRING C	29 = LARGE ROOM A
4 = SPRING D	30 = LARGE ROOM B
5 = TUBE A	31 = LARGE ROOM C
6 = TUBE B	32 = LARGE ROOM D
7 = TUBE C	33 = PLATE A
8 = TUBE D	34 = PLATE B
9 = CASK A	35 = PLATE C
10 = CASK B	36 = PLATE D
11 = CASK C	37 = CONCERT HALL A
12 = CASK D	38 = CONCERT HALL B
13 = TANK A	39 = CONCERT HALL C
14 = TANK B	40 = CONCERT HALL D
15 = TANK C	41 = CHURCH A
16 = TANK D	42 = CHURCH B
17 = CELLAR A	43 = CHURCH C
18 = CELLAR B	44 = CHURCH D
19 = CELLAR C	45 = CATHEDRAL A
20 = CELLAR D	46 = CATHEDRAL B
21 = BATH-ROOM A	47 = CATHEDRAL C
22 = BATH-ROOM B	48 = CATHEDRAL D
23 = BATH-ROOM C	49 = SOUND HOARDER A
24 = BATH-ROOM D	50 = SOUND HOARDER B
25 = SMALL ROOM A	51 = SOUND HOARDER C
26 = SMALL ROOM B	52 = SOUND HOARDER D

♣ The different selections of a given room change the reverberation time.

♠ 1 - SUMMARY OF THE PARAMETRIC REVERBERATION:

♥ 1-1 Block diagram:

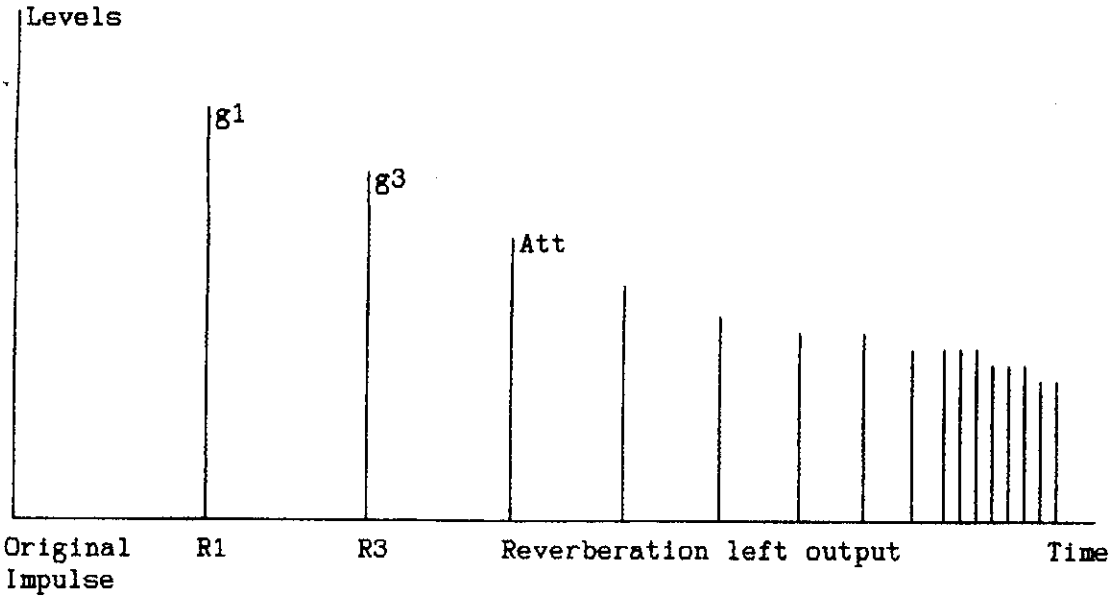


♥ 1-2 Parameters list:

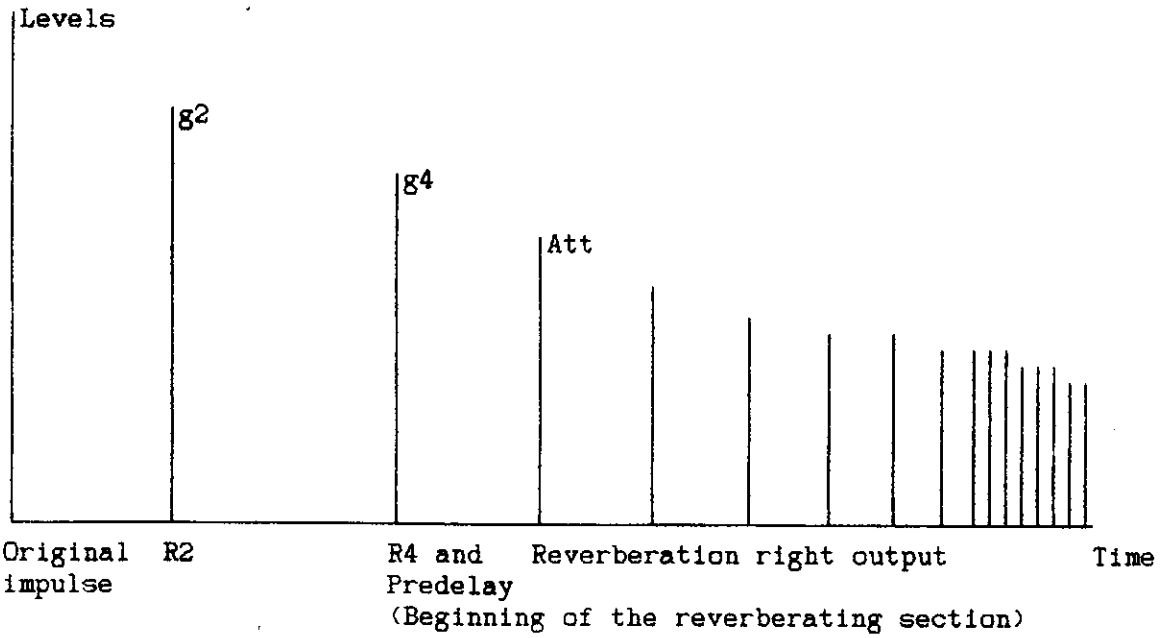
- Size from 1 m³ à 1 000 000 m³
- Decay time from 0,1 à 200 secondes
- Bass decay time coefficient from 0,25 à 4,00
- Treble decay time coefficient from 0,25 à 4,00
- Prereflection N°1 assigned to left - Delay from 1 to 999 ms
- " " " - Attenuation from 0 to 99 dB
- Prereflection N°2 assigned to right - Delay from 1 to 999 ms
- " " " - Attenuation from 0 to 99 dB
- Prereflection N°3 assigned to left - Delay from 1 to 999 ms
- " " " - Attenuation from 0 to 99 dB
- Prereflection N°4 assigned to right and predelay from 1 to 999 ms
- Prereflection N°4 assigned to right - Attenuation from 0 to 99 dB
- Attenuation of the reverberating section from 0 to 99 dB

♥ *1-3 Basic principle:*

♣ The following graphs show the impulse response of the left and right outputs:



IMPULSE RESPONSE OF THE LEFT OUTPUT



IMPULSE RESPONSE OF THE RIGHT OUTPUT

♣ The first four reflections are adjusted separately in delay and in attenuation. They allow to simulate the geometry of a room, and to adjust the stereophonic "width". The fourth prereflection points also the beginning of the reverberating section, and is therefore used to adjust the delay of this one (Predelay).

♣ The reverberating section has two outputs completely discorrelated in phase.

♠ 2 - HOW TO CALL THE FUNCTION 8:

- Press the FUNCTION key
- Press the 8 key
- Press the PARAMETER key -> The MACHINE displays:

SIZE = 9= 10 000 M3 DEC= 2,0s

✠ When you call the function 8, the original values of the parameters correspond to a CONCERT HALL space with damped trebles.

✠ Afterwards you can adjust the parameters as you like. When you have obtained the adjustment of your choice, think of to keep it in a function memory (see page M1) in order to find it again rapidly further.

♠ 3 - SIZE:

✠ You can adjust the size from 1 m³ to 1 000 000 m³ into 13 steps.

✠ For this you adjust a space number between 1 and 13; then the MACHINE displays the corresponding size in cubic meters.

✠ TABLE OF SIZES:

Step 1 -> Size =	1	m³
Step 2 -> Size =	3	m³
Step 3 -> Size =	10	m³
Step 4 -> Size =	30	m³
Step 5 -> Size =	100	m³
Step 6 -> Size =	300	m³
Step 7 -> Size =	1 000	m³
Step 8 -> Size =	3 000	m³
Step 9 -> Size =	10 000	m³
Step 10 -> Size =	30 000	m³
Step 11 -> Size =	100 000	m³
Step 12 -> Size =	300 000	m³
Step 13 -> Size =	1 000 000	m³

✠ When you adjust the size, you change on the reflections density of the beginning of the reverberation.

✠ Small sizes give a high density from the beginning, because in a small space, the sound reverberates itself very quickly from a wall to the other; from one reflection to the next one it runs a short distance. From 1 to 30 cubic meters, you obtain tube and tun effects.

✠ With large sizes, the first reflections of the reverberating section are at very wide intervals, and the reflection density is increasing progressively.

✠ Technically the adjustment of the size operates on the value of the used delays in the algorithms of reverberation. At each change of size, all these delays are modified, which involves a complete reconfiguration of the memory field. The sound disappears during this reconfiguration, what is producing a "hole" in the sound when the size is changing.

✠ NOTE: The minima and maxima reverberation decay times depend on the selected size. See the detail in the following section.

♠ 4 - DECAY TIME:

SIZE = 9 10 000 M3 DEC= 2,0s

DEC = Abbreviation for *DEC* AY TIME

✣ The DECAY TIME is defined as the time for the output signal to fall from 0 to -60 dB, when the input signal is removed. The decay waveform is exponential.

✣ The decay time is adjustable between 0,1 and 200 seconds. It is independent of the size adjustment, and for the same decay time one can select different sizes, which modifies the subjective sensation of the size of the simulated space. However the limit values of the decay time depend on the selected size. The small sizes do not allow to obtain the highest decay times, and the largest sizes do not allow to obtain the smallest decay times. The following table gives, for each size, the limit values of the decay time.

Limit values of the decay time versus the size:

SIZE	MINIMUM TIME (Seconds)	MAXIMUM TIME (Seconds)
1	0,1	2,0
2	0,1	3,0
3	0,1	4,0
4	0,1	7,0
5	0,1	9,0
6	0,1	15,0
7	0,1	20,0
8	0,1	30,0
9	0,1	45,0
10	0,2	70,0
11	0,3	90,0
12	0,4	150,0
13	0,5	200,0

♠ 5 - ATTENUATION OF THE REVERBERATION:

REVERBERATION ATTENUATION = 8dB

✣ This adjustment defines the attenuation of the signal which is sent in the reverberating section.

✣ It allows you to make a balance between the reverberated signal level and the pre-reflections levels.

✣ If the relative level of the reverberation is high, one obtains a "farther" sound. If on the other hand the level of the reverberation is adjusted between 10 to 20 dB under the prereflections levels, the sound is "nearer".

✣ SPECIAL CASE: The 99 dB attenuation is in fact an infinite attenuation, because it exceeds the A/D conversion dynamic range of 95 dB. Therefore the reverberated signal disappears completely, there remains only the prereflections, two on the left output and two on the right output. In such case you have a "PING PONG DELAY" effect.

♠ 6 - BASS DECAY TIME COEFFICIENT:

BASS COEF=1,00 TREBLE COEF=0,73

♣ *BASS COEF* =Abbreviation for bass decay time coefficient.

♣ The bass decay time coefficient shows the ratio between the decay time of the low frequencies and the decay time of medium frequencies (at 1000 Hz). The transition frequency being adjusted on 300 Hz.

♣ It is not just only a simple equalization: as a matter of fact an equalizer or a filter has a constant response curve which does not change with the time (unless one changes the adjustments). In the case of the bass coefficient, the frequency spectrum of the output signal evolves in time for the low frequencies.

♣ EXAMPLE: If decay time (at 1000 Hz) = 2,0 sec
and if bass coefficient = 0,5,
then the low frequencies have a reverberation decay time of 1,0 second.

♣ This parameter allows to simulate the normal conditions, where the reverberation time of a room frequency dependent.

♣ For many natural spaces, this coefficient remains around 1,00 ; extreme values are used for effects.

♠ 7 - TREBLE DECAY TIME COEFFICIENT:

♣ *TREBLE COEF* = Abbreviation for TREBLE DECAY TIME COEFFICIENT.

♣ This parameter is similar to the previous one, but operates for frequencies above 5 000 Hz.

♣ EXAMPLE: If decay time (at 1000 Hz) = 2,0 seconds
and if treble coefficient = 0,4
then the high frequencies have a reverberation time of 0,8 seconds.

♣ For many natural spaces, this coefficient has to be adjusted under 1,00 (from 0,40 up to 0,80). Because many natural materials are inclined to absorb the treble frequencies.

♠ 8 - PREREFLECTIONS:

LEFT REFLECTION R1 = 32ms - 6dB

RIGHT REFLECTION R2= 36ms - 6dB

LEFT REFLECTION R3 = 57ms -11dB

PREDELAY / RIGHT 4 = 45ms -11dB

- The four first prereflections are adjustable separately in delay as well as in level. Two are assigned to the right output, and two to the left output. Their adjustment allows to simulate the space geometry, as well as the degree of opening of the stereo effect.

- If you adjust R1 = R2 and R3 = R4, the beginning of the reverberation is monophonic: the sound is very "present".

- You can "open" the stereo effect by increasing on the one hand the difference R1 - R2, on the other hand R3 - R4. Practically this difference may have a mean value of 3 to 10 milliseconds.

- If you adjust, on the same output, time intervals between reflections under 30 milliseconds, you will get phasing effects which will give to the reverberation a metallic feature.

♥ ***Special case: "PING-PONG DELAY":***

- By suppressing the reverberating part, there remains two delays on the left and two delays on the right, which can produce effects where the sound bounces between the left and right sides. For instance:

LEFT REFLECTION R1 = 80ms - 0dB
RIGHT REFLECTION R2= 130ms - 0dB
LEFT REFLECTION R3 = 170ms - 0dB
PREDELAY / RIGHT R4 =210ms - 0dB
REVERBERATION ATTENUATION = 99dB

♠ 1 - SUMMARY OF THE FUNCTION 9:

♥ 1-1 PRINCIPLE:

✝ The FUNCTION 9 allows to record in solid state memories one or several sounds, and then to handle the sounds thus memorized, with a total of 21 parameters which allows a large variety of effects.

✝ The recording is a high quality one: The original sound is sampled 50 000 times per second and converted into 16 bits numbers, which provides a 20 kHz frequency response and a dynamic range of 95 dB. The recording time is twice 5,240 seconds for the short option and twice 20,930 seconds for the long option (20,930 seconds by channel). The memory capacity is 8 388 608 bits for the short option, and 33 554 432 bits for the long option.

♥ 1-2 MAIN APPLICATIONS:

- *IN RECORDING STUDIO: TRIGGERING AND SYNCHRONIZATION OF THE MEMORIZED SOUNDS BY THE "TRIGGER".*
- *IN MUSIC: MULTI-SAMPLING WITH THE MIDI INTERFACE.*
- *TIME COMPRESSION/EXPANSION (TO CHANGE THE DURATION OF A MESSAGE WITHOUT CHANGING ITS PITCH).*
- *TIME REVERSAL OF THE SOUNDS.*
- *CINEMA AND VIDEO : TRIGGERING OF THE SOUNDS BY SMPTE/EBU INTERFACE (IN OPTION).*
- *SOUND EFFECTS, SPECIAL EFFECTS, "JINGLES".*

♥ 1-3 PARAMETERS LIST:

- *TRIGGERING MODE OF RECORDING*
- *STOP MODE OF RECORDING*
- *DURATION OF RECORDING*
- *READING MODE (Loop, Trigger A or B, play and selection of samples through MIDI, MIDI chromatic stack).*
- *ADJUSTMENT OF THE CHROMATIC STACKING.*
- *SELECTION OF THE MIDI CHANNEL.*
- *SELECTION OF MIDI VOICE (FOR POLYPHONY).*
- *SELECTION OF THE TOTAL NUMBER OF VOICES IN MIDI POLYPHONY.*
- *SELECTION OF ALGORITHM OF TRANSPOSITION.*
- *RE-RECORDING OF A MEMORY SECTION ALREADY RECORDED.*
- *RECORDING IN THE BLANK MEMORY FROM THE READING MODE.*
- *ATTACK TIME.*
- *START POINT OF THE READING.*
- *END POINT OF THE READING.*
- *VIBRATO: FREQUENCY.*
- *VIBRATO: DEPTHNESS.*
- *VIBRATO: DELAY OF MODULATION.*
- *VIBRATO: MODE (DELAYED OR APPOGIATURE).*
- *SPEED LINK (WITH OR WITHOUT).*
- *PITCH-RATIO.*
- *ADJUSTMENT OF THE SPEED.*

♠ 2 - MODEL SESSION N°1: TRIGGERED RECORDING:

♣ By doing the following steps, you will get familiar with a basic utilization of the function 9, which records and reads only one sound on the A channel. The recording is triggered by the sound itself:

♥ 2-1 Function memory selection:

♣ First select the function memory which is used to store the parameters of this sample, for example N°301.

◆ Press the SET A key (one or twice, according to the initial state) ~~state~~ so as to light only the SET A LED (SET B is off).
◆ Press the MEMORY SELECT key.
◆ Dial 3 0 1.
◆ Press the ENTER key -> The red display shows: 301

♥ 2-2 Now call the FUNCTION 9:

◆ Press the FUNCTION key -> The FUNCTION LED is lighting.
◆ Press the 9 key -> The blue display of the A channel mentions 9.
◆ Press the PARAMETER key -> The MACHINE displays :

2=START BY AUX RECORD SAMPLE 1	301

The figure 2 blinks and shows the starting mode of the recording: In the 2 mode, the recording starts if you press on the AUX key. It is also a wait mode, which allows you to adjust the level without triggering the recording.

The figure 1 on the right shows the number of the sound to record: Actually it is equal to 1 since it is the first sound of this session.

♥ 2-3 Now proceed to the level adjustment:

◆ Send on the A input of the MACHINE the signal to record.
◆ Adjust the level of the signal so as to read a level of about 0 dB on the LED scale of the A input. You can either adjust the signal from its origin (mixing table, tape recorder, and so on...) or adjust the input gain of the MACHINE.

♥ 2-4 Now proceed to the recording itself:

◆ No more signal must be sent on the input of the MACHINE. The beginning of the useful signal must be preceded by a silent period.
◆ Press the 0 key to select the mode 0 for the start of recording mode.
◆ Press the ENTER key -> The MACHINE displays:

0= IN A TRIGGER RECORD SAMPLE 1	301

This means that the recording of the sound N°1 will start when the sound will appear on the A input of the MACHINE.

◆ Send the signal to be recorded. When the signal comes in, the recording starts. The blue display then goes into the graphic mode, and a bargraph shows the progression of the recording:

!!!!!!!!!!!!!!!!. 1	301

- The left part of the display represents the beginning of the memory.
- The right part of the display represents the end of the memory.
- The vertical bars move progressively forwards to the right and show the recorded area.
- The points of the right part show the blank area of the memory.

♥ *2-5 Automatic branch into reading mode:*

◆ It is sufficient to wait until the memory is completely recorded. At that time the MACHINE goes automatically into the reading mode and the display becomes:

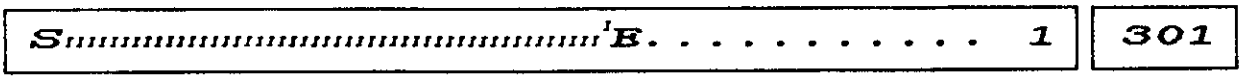
✦ Now you can work in reading mode: go to section 2-7.

♥ *2-6 Interruption of the recording:*

- If your sound is completely recorded and if available memory still remains, you can save time by stopping the recording in the following way:

◆ Press the AUX key -> The MACHINE stops the recording and displays:

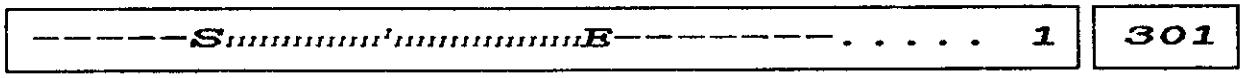
◆ Press the PARAMETER key -> The MACHINE goes into the reading mode and displays:



♥ *2-7 Three modes of display for the reading mode:*

◆ By pressing on the PARAMETER key, you go successively from a mode of display to the other. You have the choice between three modes:

- GRAPHIC MODE: the general aspect of the display is the following:



- In graphic mode the display is used as a time scale of the recorded sounds, and of the memory containing these sounds. The left end of the scale represents the beginning, and the right end the termination of the sound.
- The letter S shows the beginning of the reading.
- The letter E shows the end of the reading.
- The horizontal bars show the part of the recorded memory, which is not read.
- The lower vertical bars show the part of the recorded memory, which is not read.
- The raised vertical bar is a cursor which shows the immediate place of the reading. This cursor moves from S to E.
- The points show the blank memory area.
- On the right the blue figure shows the number of the recorded sound.

- NUMERICAL MODE, ADJUSTMENT BY FIGURES (The parameter LED is lighted):
- The parameters are represented by their name and their numerical value. One adjusts them by typing their value on the keyboard, and then by pressing on the ENTER key.
- One moves from one parameter to the following by typing on the "+" key, or to the previous by typing on the "-" key".

- NUMERICAL MODE, INCREMENTAL/DECREMENTAL ADJUSTMENT (PARAMETER LED blinking):
- The display is similar to the previous one.
- By pressing on the "+" key, one adds 1 to the parameter value.
- By pressing on the "-" key, one subtracts 1 from the parameter value.
- By pressing on a figure, the parameter increases or decreases at a speed which depends on the pressed figure: 1 for the lower speed, up to 9 for the higher speed, 0 for stopping the variation.

♥ *2-8 Triggering of the reading by the AUX key:*

◇ Press the AUX key -> The MACHINE reads the sound from the start point up to the end point. If you are in the graphic mode, when you press on the AUX key, the cursor jumps at the letter S, and moves to the letter E. The triggering by AUX is always available, whatsoever the kind of reading selected.

♥ *2-9 Reading controlled from a MIDI keyboard:*

◆ Just after the recording, press the PARAMETER key.
-> The MACHINE displays:

MODE=3= MIDI - KEY SAMPLE SELECT	301

- The reading mode by default is the mode 3: the recorded sound can be directly controlled by a MIDI keyboard. The meaning of "KEY SAMPLE SELECT" will appear in the section 3, which gives an example of multisampling.

◆ Connect the MIDI output of a MIDI keyboard on the "MIDI IN" input of the MACHINE.

◆ When you press on a MIDI keyboard key, the MACHINE begins to read the sound from the start point while shifting its pitch so as to follow the pitch of the played note. The sound stops when you release the note. You can in this way play of the sound you have recorded.

♥ *2-10 Reading in loop mode:*

◆ Choose the MODE 0 parameter -> The MACHINE displays:

MODE=0= LOOP	301

- In the loop mode, the MACHINE reads the sound permanently; when it reaches the end of the memorized sound it jumps at the beginning of the sound. It is also possible to play the looped sound from a MIDI keyboard: the difference compared with the MODE 3, is that you play of the sound (modification of the pitch) but without jumping back to its start point when you hit the note.

♥ *2-11 Reading triggered by the A input signal:*

◆ Select the MODE 1 parameter -> The MACHINE displays:

MODE=1= A INPUT SOUND TRIGGER	301

- When you send a sound on the A input of the MACHINE, it triggers the memory reading.
- The trigger sensitivity can be set by adjusting the input gain of the MACHINE.
- You can modify the pitch with the MIDI keyboard, without influence on the triggering.

♥ *2-12 Reading triggered by the B input signal:*

◆ Select the MODE 2 parameter -> The MACHINE displays:

MODE=2= B INPUT SOUND TRIGGER	301

- This mode is similar to the previous one, by using the B input instead of the A input.

♠ 3 - SECOND MODEL SESSION: MULTISAMPLING:

♣ Here is an example of multisampling, where you are recording on the same channel many different sounds:

♥ 3-1 Function memory selection:

♣ First select the function memory which will contain the parameters of the first sample. For instance let us take the N°301:

- ◆ Press the SET A key (once or twice, according to the first state) in order to light only the SET A LED (SET B is off).
- ◆ Press the MEMORY SELECT key -> The red display blinks.
- ◆ Dial 3 0 1
- ◆ Press the ENTER key -> The red display shows: 3 0 1

NOTE: The following process will cancel and then use the selected function memory and also the following ones (as many memories as samples). Therefore, be sure that the selected memories do not store functions and parameters you want to preserve.

♥ 3-2 Now call the FUNCTION 9:

- ◆ Press the FUNCTION key -> The FUNCTION LED lights.
- ◆ Press the 9 KEY -> The blue display of the A channel shows 9
- ◆ Press the PARAMETER key -> The MACHINE displays:

2=START BY AUX RECORD SAMPLE 1	301

The figure 2 blinks and shows the triggering mode of recording: With the mode 2, the recording starts if you press on the AUX key. It is also a wait mode, which is allowing you to adjust the level of the signal without triggering the recording.

On the right the figure 1 shows the number of the sound to record: Actually it is equal to 1 since it will be the first sound of this session.

♥ 3-3 Now proceed to the adjustment of the levels:

- ◆ Send on the A input of the MACHINE the signal to record.
- ◆ Adjust the level of the signal so as to read a level of about 0 dB on the A input scale. You can either adjust the signal from its source (Mixing table, tape recorder, and so on...) or adjust the input gain of the MACHINE.

♥ 3-4 Now proceed to the recording of the first sound:

- ◆ No more signal must appear on the input of the MACHINE. The beginning of the signal to be used must be preceded by a silent period.
- ◆ Press the 0 key to select the record triggering mode 0.
- ◆ Press the ENTER key -> The MACHINE displays:

0= IN A TRIGGER RECORD SAMPLE 1	301

This means that the recording of the sound N° 1 will start with the appearance of the sound on the A input of the MACHINE.

- ◆ Send the signal to record. When the signal appears, the recording starts. The blue display goes into the graphic mode, and a bargraph shows the progression of the recording:

,,,,,,,,,,,,,,,,,. 1	301

♥ *3-5 How to stop the recording of the current sound:*

◆ When the current sound is completely recorded, press the AUX key -> The record stops and the MACHINE displays:

AUX=NEW SAMPLE PARAMETER=PLAY	301

You are again in a waiting position. You can eventually proceed to a new level adjustment, if the new sound must have a level different from the previous one.
AUX=NEW SAMPLE means that for another recording it is necessary to press the AUX key.
PARAMETER=PLAY means that for going into the reading mode it is necessary to press on the PARAMETER key.

♥ *3-6 Recording of the following sound:*

◆ Press the AUX key -> The MACHINE displays:

O= IN A TRIGGER RECORD SAMPLE 2	302

- The blue right figure states that you will record the second sound of this session.
- The number of the function memory has been incremented: it is now equal to 302. The parameters of the sound N°2 are therefore to be stored in the memory N°302.

◆ Send the new sound -> The recording of the new sound starts and the MACHINE displays:

. . . . . !!!!!!!!!!. 2	302

The vertical bars show the position in the recording memory of the new sound.

♥ *3-7 Successive recordings:*

◆ Repeat the steps 3-5 and 3-6 as many times as there are different sounds to record.
◆ To go from one sound to the following one, it is sufficient to press twice on end on the AUX key.

- At each new sound, the number of the sound (blue figure on the right) is incremented, as well as the number of the function memory which contains the parameters of the new sound.
- You can record up to 99 different sounds, of any duration, in the limit of the memory space available. However in the practice we do not often record very short sounds and reach this figure of 99.

♥ *3-8 How to go in the READING mode:*

✣ There are two means to go into READING mode:

◆ Either you keep the last sound in recording until the memory is complete, at that time the MACHINE goes automatically into the READING mode.
◆ Or you press on the PARAMETER key, when you are at the end of a step 3-5. Then the MACHINE goes into the READING mode of the last recorded sample. If for instance you have recorded 5 sounds, the following figure shows an example of possible display (according to the length of the sounds recorded):

----------!!!!!!!!!!B. . 5	305

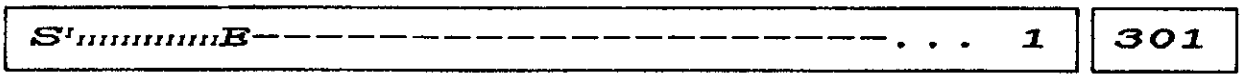
For the different kinds of display, refer to section 2-7 on page 9-3.

♥ *3-9 Samples selection without MIDI key:*

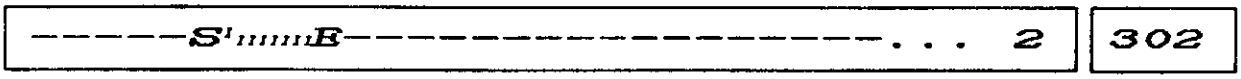
EXAMPLE: to select the sound N°1:

- Press the MEMORY SELECT key -> The MEMORY SELECT LED lights and the red display blinks.
- Press the MEMORY OUT key -> The MEMORY OUT LED lights.
- Dial 3 0 1
- Press the ENTER key -> The MACHINE responds as follows:

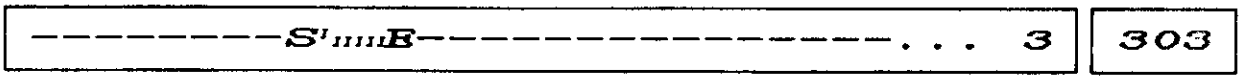
1 - The red display shows 301 (Parameters memory of the sound N°1)
2 - The blue display shows the sound parameter N°1.
3 - The reading of the sound N°1 is triggered, and if you are in graphic mode it gives you:

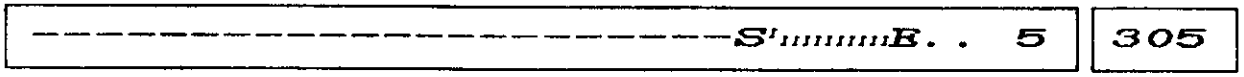


- Generally speaking, to select a sample, dial the function memory number in accordance and make it valid by pressing on the ENTER key.
- To select the next sample, press on the "+" key. If the previous sample was the N°1, this gives you:



- By pressing several times on the "+" key you can successively hear and see all the recorded samples:





- In the same way by pressing on the "-" key you can go to the previous sample.

- At each time when you change of sample, the new sample is automatically triggered and read from the start point (letter "S" in graphic mode).

- The use of the "-" and "+" keys allow a rapid checking and sweeping of all the recorded sounds.

♥ *3-10 Selection of a sample through the MIDI keyboard:*

- Connect the "MIDI OUT" output from a 5 octaves MIDI keyboard to the "MIDI IN" input, of the INFERNAL MACHINE.
- The 5 keys on the left allow you to select a sound among the 5 recorded, but without triggering it:

- The lower C selects the sound N°1
- The following C sharp selects the sound N°2
- The " D " " 3
- The " E flat " " 4
- Le " E " " 5

◆ The 51 remaining keys on the right allow you to play the selected sound. The original sound is read without modification by pressing the fifth C of the keyboard.

♠ 4 - THIRD MODEL SESSION: BIPHONIC CHROMATIC STACK:

♣ In the following example one records 5 sounds of a preset duration of 4 seconds. Each sound is assigned to a specific octave of the MIDI keyboard and can be played in biphony by this octave of the keyboard. This example is given for an INFERNAL MACHINE LONG TIME (twice 20,9 seconds).

♥ 4-1 Selection of the parameters memories:

♣ The first step consists to select the memories which are containing the parameters of the different samples. These memories must not crosscheck between themselves from one voice to the other, they are therefore selected with an interval higher than the number of expected samples. For instance, let us select the N°301 for the A channel and 321 for the B channel (BE CAREFUL ! The original contents of the memories 301 to 305, and 321 to 325, will be destroyed in your own application, select a working band which does not contain parameters to preserve).

◆ Press the SET A key, one or twice according to the original state, so as to light only the SET A LED.
◆ Press the MEMORY SELECT key -> The red display blinks.
◆ Dial 3 0 1 -> The red display shows 3 0 1 and blinks.
◆ Press the SET B key -> The red number is validated, the SET B LED lights and the yellow display blinks.
◆ Dial 3 2 1
◆ Press the ENTER key -> The MACHINE displays:

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	301

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	321

(x = Any previous display non modified)

♥ 4-2 Sélection of the function 9 on the 2 channels:

◆ Press the SET B key -> The SET A and SET B LEDS are both lighted
◆ Press the FUNCTION key -> The FUNCTION LED lights.
◆ Press the 9 key -> The figure 9 blinks on the two channels
◆ Press the PARAMETER key -> The MACHINE displays:

2=START BY AUX RECORD SAMPLE 1	301

2=START BY AUX RECORD SAMPLE 1	321

♥ 4-3 Preset of parameters before recording:

◆ Press the "+" key -> The MACHINE displays:

1=STOP BY AUX RECORD SAMPLE 1	301

1=STOP BY AUX RECORD SAMPLE 1	321

As the initial recording stop mode is: "stop by the AUX key".

- Press the 0 key
- Press the ENTER key -> The MACHINE displays:

0=STOP BY TIME RECORD SAMPLE 1	301
0=STOP BY TIME RECORD SAMPLE 1	321

You have just selected the mode which stops the recording after a period of recording that you will adjust as follows:

- Press the "+" key -> The MACHINE displays:

20930,00ms=RECORD TIME SAMPLE 1	301
20930,00ms=RECORD TIME SAMPLE 1	321

As the initial recording time is preset at its maximum value.

- Dial 4000 00
- Press the ENTER key -> The MACHINE displays:

4000,00ms=RECORD TIME SAMPLE 1	301
4000,00ms=RECORD TIME SAMPLE 1	321

You have just selected a recording time of 4 seconds per sample.

- Press the "+" key 11 times on end -> The MACHINE displays:

MODE=3= MIDI - KEY SAMPLE SELECT	301
MODE=3= MIDI - KEY SAMPLE SELECT	321

- Press the 4 key
- Press the ENTER key -> The MACHINE displays:

MODE=4= MIDI - CHROMATIC STACK	301
MODE=4= MIDI - CHROMATIC STACK	321

You have just preset the reading mode: CHROMATIC STACK.

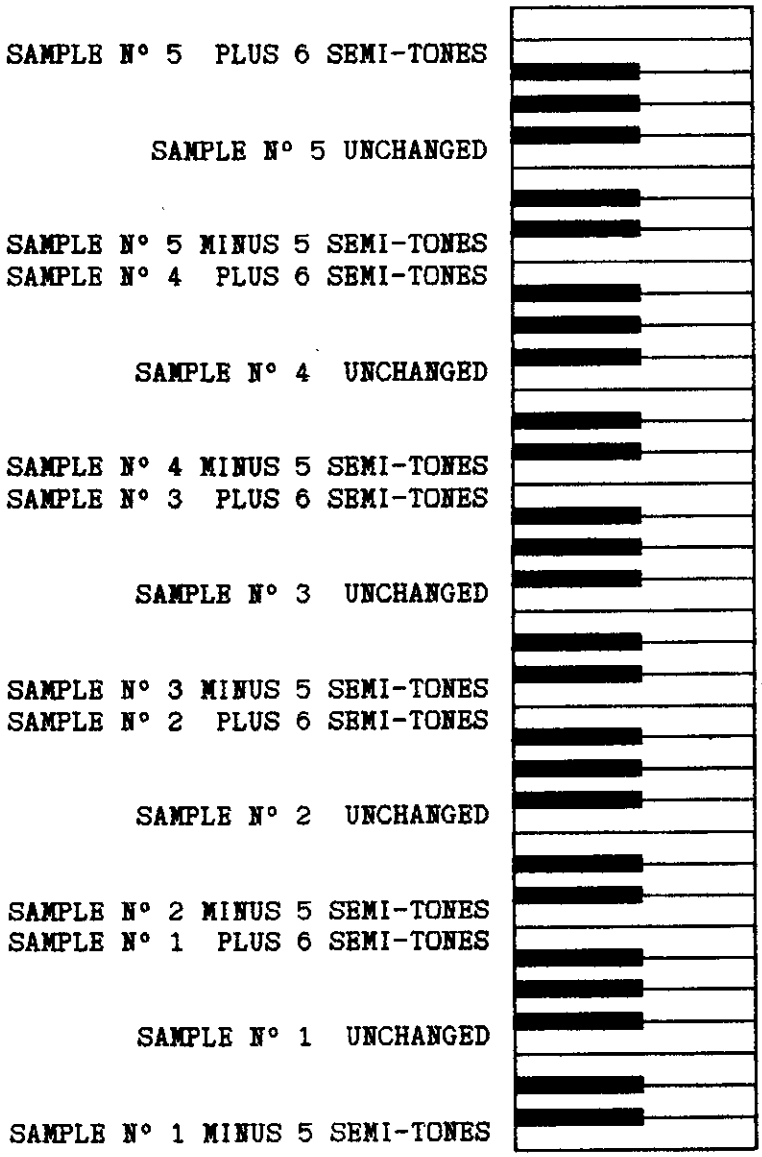
- Press the "+" key -> The MACHINE displays:

MIDI STACK SEMITONES= - 1 TO + 1	301
MIDI STACK SEMITONES= - 1 TO + 1	321

- Press the 5 key
- Press the "+" key
- Press the 6 key
- Press the ENTER key -> The MACHINE displays:

MIDI STACK SEMITONES= - 5 TO + 6	301
MIDI STACK SEMITONES= - 5 TO + 6	321

With these adjustments, the samples are assigned on the MIDI keyboard in the following way:



✢ With this special adjustment of the chromatic stack, each sample is played by a dedicated octave of the keyboard. Which allows you to get several different instruments on the same keyboard. You could have for example: on the left octave a bass, on the following a bass drum, then a clear drum, the cymbals, and so on...

◆ Press the "+" key twice on end -> The MACHINE displays:

MIDI - CHANNEL No= 1 VOICE No=1	*301*

MIDI - CHANNEL No= 1 VOICE No=1	*321*

◆ Press the SET B key -> The SET B LED remains lighted, SET A goes off
◆ Press the 2 key
◆ Press again the SET B key -> SET A and SET B are both lighted, and the MACHINE displays:

MIDI - CHANNEL No= 1 VOICE No=1	301
MIDI - CHANNEL No= 1 VOICE No=2	321

You have just adjusted the MACHINE in biphonic mode (The A channel is in voice 1, the B channel in voice 2).

◆ Press the "+" key 5 times on end -> The MACHINE displays:

2=START BY AUX RECORD SAMPLE 1	301
2=START BY AUX RECORD SAMPLE 1	321

You have just retrieved the parameter which selects the recording start mode, which was displayed before the parameters adjustment.

♣ It is useful to adjust the reading parameters before recording, because all adjustments are the same for all the samples which are going to be recorded: This avoids you to adjust them further one by one.

♥ 4-4 Adjustment of the levels:

◆ Enter the same signal on the A and the B channels (as we have choosen to work in biphony). Set the level in such a way that the input scales of the MACHINE are around 0dBm.

♥ 4-5 Recording:

◆ Be ready to send the sound N° 1 on the input of the MACHINE. Actually no signal must appear on the inputs.
◆ Press the "0" key.
◆ Press the ENTER key -> The MACHINE displays:

0= IN A TRIGGER RECORD SAMPLE 1	301
0= IN A TRIGGER RECORD SAMPLE 1	321

Which means that the two channels of the MACHINE will be simultaneously triggered in recording mode by the arrival of the sound on the A channel.

◆ Now send the sound N° 1 -> The MACHINE starts the recording of the sound N° 1, and the progression of the recording is displayed by two bargraphs:

,,,,,,,,,,,,,,,,,. 1	301
,,,,,,,,,,,,,,,,,. 1	321

♣ After 4 seconds, the recording stops automatically, and the MACHINE displays:

AUX=NEW SAMPLE PARAMETER=PLAY	301
AUX=NEW SAMPLE PARAMETER=PLAY	321

♥ *4-6 Recording of the following sample:*

✙ You are again in a waiting position; if necessary, you can proceed to the adjustment of the levels of the new sample.
- PARAMETER=PLAY means that to go into the READING mode, you should have to press on the PARAMETER key.
- AUX=NEW SAMPLE means that for recording the following sound, it is necessary to press on the AUX key.

◆ Be ready to send the following sample. Actually no more signal must appear on the inputs of the MACHINE.
◆ Press the AUX key -> The MACHINE displays:

O= IN A TRIGGER RECORD SAMPLE 2	302

O= IN A TRIGGER RECORD SAMPLE 2	322

✙ The number of the new sample (2) is displayed, and the parameter memory numbers are incremented (As the parameters of each sample are stored in different memories, in order to allow separated adjustments).
◆ Send the sound N°2 -> The MACHINE starts the recording of the new sound and the place of the sound in the memory as well as the progression of the recording are shown by two blue bargraphs:

. . . . . ;;;;;;;;;;;;;;;;;. 2	302

. . . . . ;;;;;;;;;;;;;;;;;. 2	322

The recording stops automatically after 4 seconds.

♥ *4-7 Successive recordings:*

◆ Repeat the step 4-6 until the fifth sound is recorded.
Between each sample, you need only to press on the AUX key. Each time the parameter memories and sample numbers are incremented.

♥ *4-8 Going into reading mode:*

◆ Press the PARAMETER key -> The MACHINE goes into reading mode and displays:

----------S';;;;;;;;;;;;;;E. 5	305

----------S';;;;;;;;;;;;;;E. 5	325

◆ Now you can play the recorded sounds in biphony with the MIDI keyboard. If for example you press simultaneously a key of the second octave and a key of the fourth octave, the MACHINE sends out the two corresponding sounds and displays their number and position in the memory:

-----S';;;;;;;;;;;;;;E----------. . 2	302

----------S';;;;;;;;;;;;;;E------. . 4	324

◆ You can adjust as you like the parameters of the reading mode, as they are discussed in detail in the following sections.

♠ ***The previous sections present three model sessions, which correspond to typic utilizations of the function 9. Many variations are however possible, according to the adjustments of the different parameters. The following sections describe these parameters.***

♠ *5 - SPECIAL USE OF THE FUNCTION MEMORIES FOR THE FUNCTION 9:*

♣ BEFORE RECORDING A SOUND, THE FIRST STEP IS ALWAYS TO ADJUST THE FUNCTION MEMORY NUMBER WHICH WILL BE ASSIGNED TO THIS SAMPLE.

♣ When you record a sound, all the parameters of this sample are stored in the function memory displayed for this channel at the time of the recording. From that time where the sound is recorded, it will always have the same FUNCTION MEMORY NUMBER you have selected before the recording.

♣ Any further adjustment of the parameters of this sample will be automatically stored in the function memory assigned to it.

♣ When you need to select a sample among many already recorded, it is enough to dial the corresponding function memory number and afterwards to load the channel selected by this memory. There are 5 ways for choosing a sample:

- 1 - Light the MEMORY OUT and MEMORY SELECT LEDS, and dial the memory number.
- 2 - Light the MEMORY OUT and MEMORY SELECT LEDS, and press the "-" or "+" key, in order to go to the previous or to the following sample.
- 3 - Selection of a sample through the MIDI Interface in mode 3.
- 4 - Selection of a sample through the MIDI Interface in mode 4 (chromatic stack).
- 5 - Selection of sample and synchronization through the SMPTE/EBU Interface.

♣ You cannot call a function memory number in reading mode if this function memory number has not been assigned to a recorded sample: If you try to call a "forbidden" number, the MACHINE will select the nearest "allowed" number. This is a safeguard allowing to avoid the accidental erasing of a recorded sound.

♣ When you record successively several samples, the function memory number is automatically incremented from a sample to the following: This allows to adjust different parameters for each sample.

♣ *BE CAREFUL:*

If you work simultaneously on both A and B channels, make certain to select your function memory numbers in such a way it does not exist a common number between the A and B channels.

EXAMPLE: If you choose for the A channel the number 301 and if you plan to record 10 samples, the number of the B channel will have to be either under 292, or above 310: as a matter of fact the A channel will use the numbers 301 to 310.

If the numbers had a common value, the two channels would disturb themselves each other: by adjusting one channel one would modify the adjustments of the other channel.

♠ 6 - SELECTION OF THE RECORDING STARTING MODE:

♣ It exists three ways to start the recording:

0= IN A TRIGGER RECORD SAMPLE 1	301
1= IN B TRIGGER RECORD SAMPLE 1	301
2=START BY AUX RECORD SAMPLE 1	301

♣ The figure 1 on the right represents the number of the sample which is to be recorded. When we have just called the function 9, it is always equal to 1, as the memory is still blank.

♣ The number 301 represents the function memory number, which has been selected before calling the function 9. It is arbitrary and can go from 1 to 400. In the practice it is easier that it ends by the figure 1, as in this way the unit figure will be similar for the sound number and for the function memory number containing its parameters.

♥ 6-1 Mode 2:

♣ When you call the function 9, the initial mode is the mode 2.

♣ In mode 2, the recording starts when you press on the AUX key.

♣ This mode is interesting when you have to record a sound which is not preceded by a silence (condition required for the 0 AND 1 modes). You press on the AUX key when the sound in which you are interested begins.

♣ It is also a waiting mode: when you use the 0 and 1 modes, it allows you to proceed to the adjustment of the level without triggering the recording.

♥ 6-2 Mode 0:

♣ In mode 0, the record starts when the sound appears on the input of the A channel. Before selecting the mode 0, make certain that there is no signal on the A input, otherwise the recording would start in advance and the beginning of the sound would be delayed in the memory.

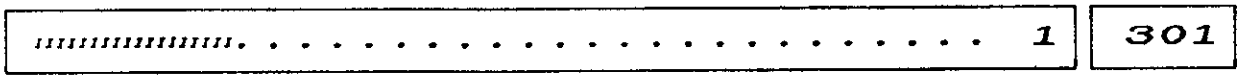
♣ You can for example trigger the A and B channels both by the A input (one channel can take the input of the other channel for its own triggering). This is interesting for the stereo recording, because it allows to have a good synchronization between the two channels.

♥ 6-3 Mode 1:

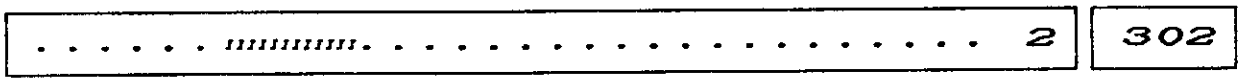
♣ The 1 mode is similar to the 0 mode, but the recording is triggered by the audio input of the B channel.

♠ 7 - RECORDING STEP:

♣ When the MACHINE is recording, the display goes into the graphic mode and a blue bargraph shows the progression of the sound writing in the memory. If it is the first recorded sound, the MACHINE displays:



♣ The figure 1 shows that it is the first sample; its parameters are stored in the function memory N°301.
♣ The vertical bars show the memory area filled by this sound.
♣ If it is another sample, for example the second one, the MACHINE displays:



♠ 8 - SELECTION OF THE STOP RECORDING MODE:

♣ When a sound is being recorded, you can :
- Either remain in recording mode until the memory is completely filled; at this time the MACHINE goes automatically into reading mode.
- Or interrupt it. There are two kinds of stop modes:

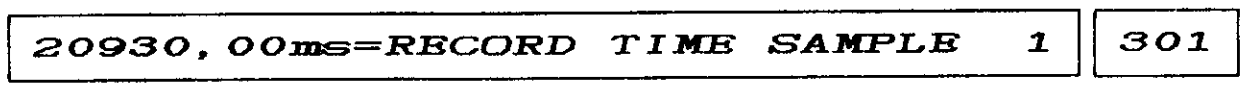
◆ By selecting the figure 0 or the figure 1, you can choose between one of these two modes.

♥ 8-1 Mode 1: Stop of the recording by the AUX key:

♣ It is the default mode, when you call the function 9.
◆ By pressing on the AUX key, the current recording stops, the MACHINE goes into the WAIT PHASE and displays:

♥ 8-2 Mode 0: Stop of the recording after a preset time:

♣ In this mode the recording stops automatically after an adjustable time, and then goes into the WAIT STATE.
◆ To adjust the time: after having selected the 0 MODE, press on the "+" key to select the following parameter which is the recording time. The MACHINE displays:



♣ The default value is equal to the maximum recording time, which depends on the memory option set in the MACHINE.
♣ Adjust the recording time as you like, and then record.
♣ If necessary, the recording time can be modified during the WAIT STATE, so that each sound can have a different recording time.
♣ This parameter is not used in the 1 mode: stop of the recording by the AUX key.

♠ 9 - WAIT STATE:

♣ The WAIT STATE comes after a recording period, except if the memory is filled, in which case the MACHINE goes immediately into the reading mode. In WAIT STATE, there remains blank memory areas. The MACHINE displays:

AUX=NEW SAMPLE PARAMETER=PLAY	301

♣ You have the choice between two possibilities:

- ◆ If you press on the AUX key, the MACHINE passes again into the pre-recording phase, in order to record a new sound. So you can, if necessary, modify the recording parameters if the new sound must have different parameters from the previous one.
- ◆ If you press on the PARAMETER key, you go out of the recording phase and go into the reading phase.

♠ 10 - IN READING PHASE, 3 DISPLAY MODES:

♣ In reading phase, you have the choice between three display and parameter adjustment modes.
♣ You go from one mode to the other by pressing on the PARAMETER key (for FUNCTION 9 this is different from the other functions, where the PARAMETER key has only two states).

♥ 10-1 Numerical display, numerical adjustment:

♣ The PARAMETER LED is permanently lighted. The parameters are displayed numerically, and are adjusted in numerical mode as shown on Page P1, or with the potentiometer of the remote control.

♥ 10-2 Numerical display, incremental/decremental adjustment:

♣ The PARAMETER LED blinks. The parameters are also displayed numerically, but are adjusted in incremental/decremental mode as shown on Page P2.

♥ 10-3 Graphic display, incremental/decremental adjustment:

♣ The PARAMETER LED blinks. The blue display shows a graphic representation of the position of the sound in the memory. The selected parameter is not evident on the display under numerical form, but can be adjusted in incremental/decremental mode.
EXAMPLE of graphic display:

------S'''''''''''''''''''''''''E--------. . . . 3	303

♣ The horizontal bars represent a memory area which is recorded, but which does not correspond to the current sample.
♣ The points represent the part of the memory which is blank.
♣ The letter "S" represents the position of the beginning of the read area. It blinks if the selected parameter is the start point of the reading.
♣ The letter "E" represents the position of the end of the read area. It blinks if the selected parameter is the end point of the reading.
♣ The lowest vertical bars represent the memory area used by the current sample.
♣ The above vertical bar shows the current position of the reading in the memory. It moves from the "S" letter towards the "E" letter.
♣ On the right the figure 3 displays the N° of the read sample.

♠ 11 - FIVE READING MODES:

- There are five reading modes, which represent five different ways to read the recorded sounds in the MACHINE.
- To select the reading mode:
  - Select the MODE parameter
  - Dial the N° of the selected mode.
  - Press the ENTER key -> The MACHINE displays the name of the selected mode.

♥ 11-1 Mode 0: LOOP:

MODE=0= LOOP	301

- In the LOOP mode, the MACHINE reads the sound without stopping. When the reading reaches the end point (adjustable), it comes back to the start point (also adjustable).
- The transition from the end point to the start point is made by a "cross fading process", i.e. in the transition area the end and the beginning of the sound are mixed. The final sound is reduced gradually, while the beginning sound is increased gradually. This transition area lasts about 3 milliseconds; this value has been selected because it gives the best result and the most pleasant to hear. Shorter times give a too sharp transition chocking the ear, longer times cause a phasing effect during the transition which is too long and is also perceived by the ear.

Short loops:

- This "cross fading process" allows to loop very short sounds without perceiving the transition area, at the following condition: It is necessary to adjust the start and the end points in such a way that the time of the loop is an integer multiple of the basic period of the looped sound.
  EXAMPLE: If you have recorded a vowel of human voice with a fundamental period of 8 milliseconds, you will obtain a very clear sound if the loop is adjusted with times of 24, 32, 40 and so on... milliseconds.
- If you adjust very short loop times (under 200 milliseconds), the sound has a "mechanical" effect, which can be softened by adding vibrato. With longer times, the natural variations of the original sound are perceived and contribute to give a less mechanical effect, more "lively".
- With short loops, IT IS STRONGLY ADVISED TO ADJUST THE SPEED LINK to 1: in the opposite, the speed regulation algorithm would not allow to keep a loop duration absolutely regular, and "glitches" could appear with the vibrato or with MIDI keyboard.

Loop and MIDI:

- In LOOP mode the MIDI interface is active, and can be used to modify the pitch of the sound. However with the difference of the 3 and 4 modes, it does not cause a triggering of the reading at the beginning of the sample.

Stereo loop:

- If you have a loop on the A and one on the B channel, you can synchronize them by LIGHTING SIMULTANEOUSLY the SET A and SET B LEDS; then the two loops start exactly at the same time, the shorter loop being the "master" one.
- If only one SET LED is lighted; both loops run independently.

♥ *11-2 MODE 1: Triggering by the audio input of the A channel:*

MODE=1= A INPUT SOUND TRIGGER	301

✝ The reading is triggered again, i.e. restarts at the beginning, every time that the signal on the A input exceeds a limit treshold.

✝ This treshold depends on the adjustment of the input gain: It is equal to -40 dBm if the input gain is adjusted on 0 dB, and can be adjusted from -50 dBm to +20 dBm by adjusting the gain of the A input (by using the GAINS key).

✝ Afterwards the reading continues until the end of the sample, and there it stops.

✝ The sound can be pitch-controlled by a MIDI keyboard; however with the difference of the 3 and 4 modes, the sound is not triggered by the MIDI keyboard: It is only triggered by the signal of the A input.

♥ *11-3 MODE 2: Triggering by the audio input of the B channel:*

MODE=2= B INPUT SOUND TRIGGER	301

✝ This mode is similar to the 1 mode, the only difference is that we use the audio signal of the B input to trigger the memory reading.

♥ *11-4 MODE 3: Triggering and selection of the samples by the MIDI interface:*

✝ In MODE 3, the triggering of the reading and the pitch-ratio are controlled by an external MIDI keyboard.

✝ The MIDI keyboard allows also to select the sample to play, when many samples are recorded.

✝ (NOTE: The present software is intended for a 5 octaves MIDI keyboard).

✝ The keyboard is divided into two areas:

1 - One area on the left, which includes as many keys as there are recorded samples and which allows the selection of the samples. The low C selects the sample N°1, the next sharp C selects the N°2, and so on...

2- The other keys, in the right side, allow to play the selected sound. If the pitch-ratio remains adjusted at 1,000, the original sound (no modified in pitch) takes place on the first C of the 5th octave.

✝ When you select a sample from the left keys, the MACHINE operates as follows:

1 - The corresponding function memory number is called and displayed on the red or yellow displays.

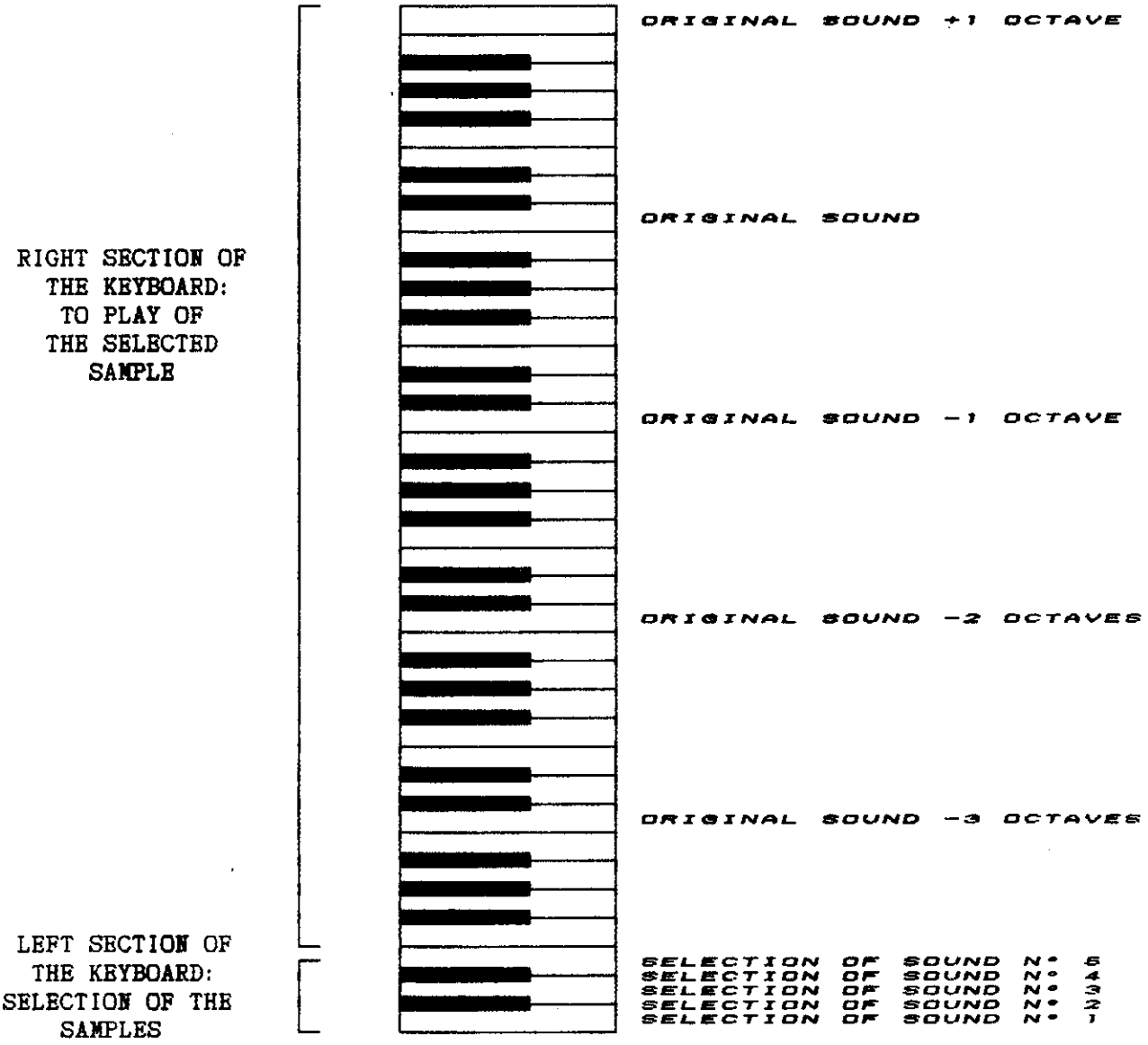
2 - The contents of this memory, which represents all the parameters of the selected sample, is loaded in the corresponding channel.

3 - The blue display shows the parameters of the selected sound, either in numerical mode, or in graphic mode according to the actual mode.

4 - No sound is issued: it is necessary for this to play on the right part of the keyboard.

Example:

- The following example shows the dispatching of the keys on the keyboard if 5 samples have been recorded. The pitch-ratio has not been modified (i.e = 1,000).



- The partition of the keyboard depends on the number of samples which have been recorded.

- The number of keys of the left section is automatically the same as the number of samples which have been recorded.

- All the remaining keys of the right part are assigned to play of the selected sound.

- The positioning of the original sound can be changed by adjusting the pitch-ratio; if for example PITCH-RATIO = 2,000, the whole game moves of 1 octave to the left (the original sound is then positioned on the low C of the third octave). This adjustment is separated for each sample.

♥ *11-5 MODE 4: Chromatic stack:*

MODE=4= MIDI - CHROMATIC STACK	301

MIDI STACK SEMITONES= - 1 TO + 1	301

♣ In MODE 4, each sound is assigned to a part of the keyboard. The sound N° 1 is played by the left section, the sound N° 2 by the next section to the right, and so on... and the last sound by the most on the right.

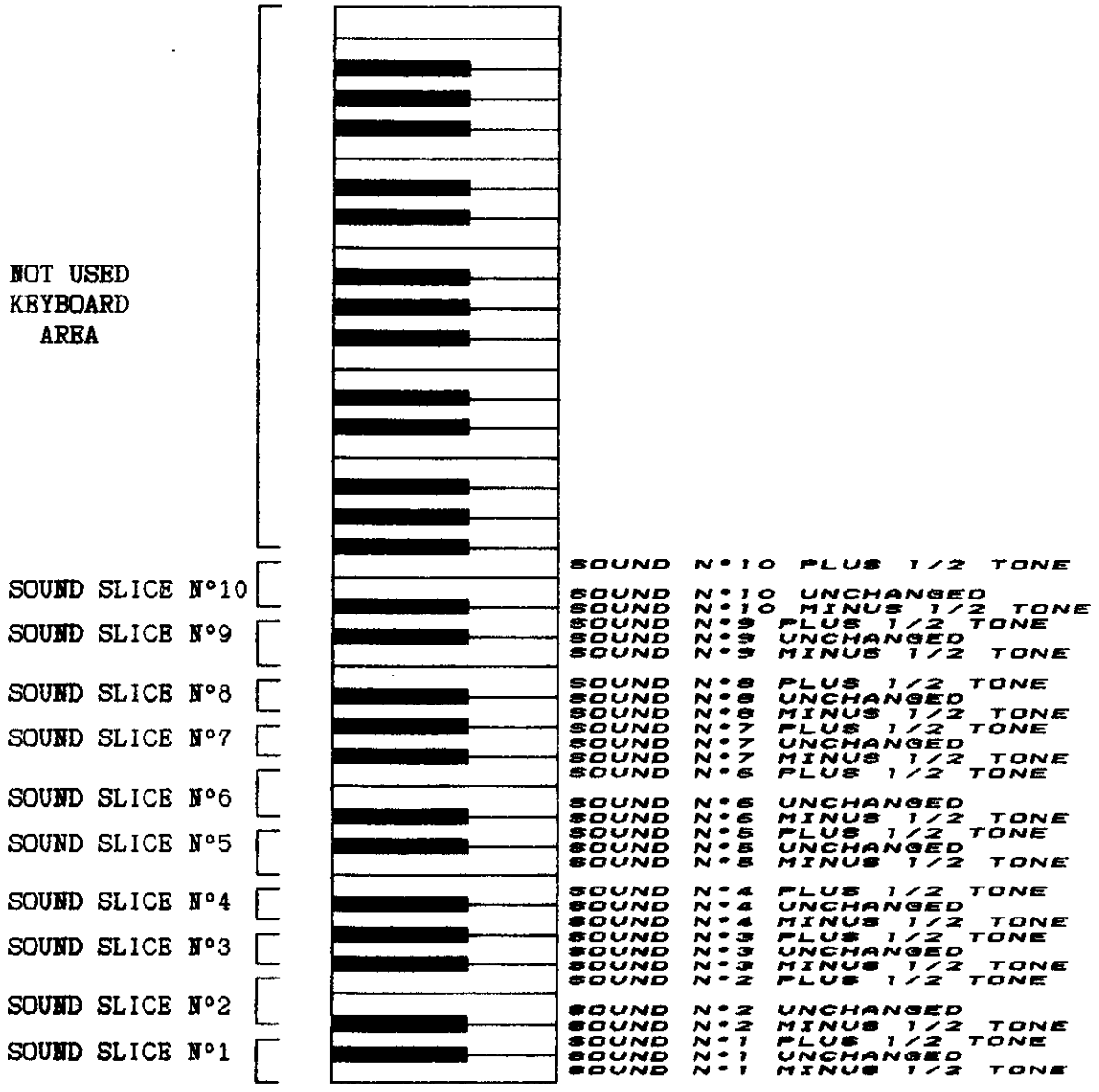
♣ Each section is adjustable in number of semi-tones, sample by sample. Each sample can have therefore a different width. For each sample one adjusts:
- 1 The BEGINNING of the section, expressed in number of semi-tones below the level of the original sound (= N-).
- 2 The END of the section, expressed in number of semi-tones above the level of the original sound (= N+).

♣ The total number of keys by section is therefore : N = (N-) + (N+) + 1

♣ Once adjusted the sections are automatically "stacked" the ones after the others on the keyboard.

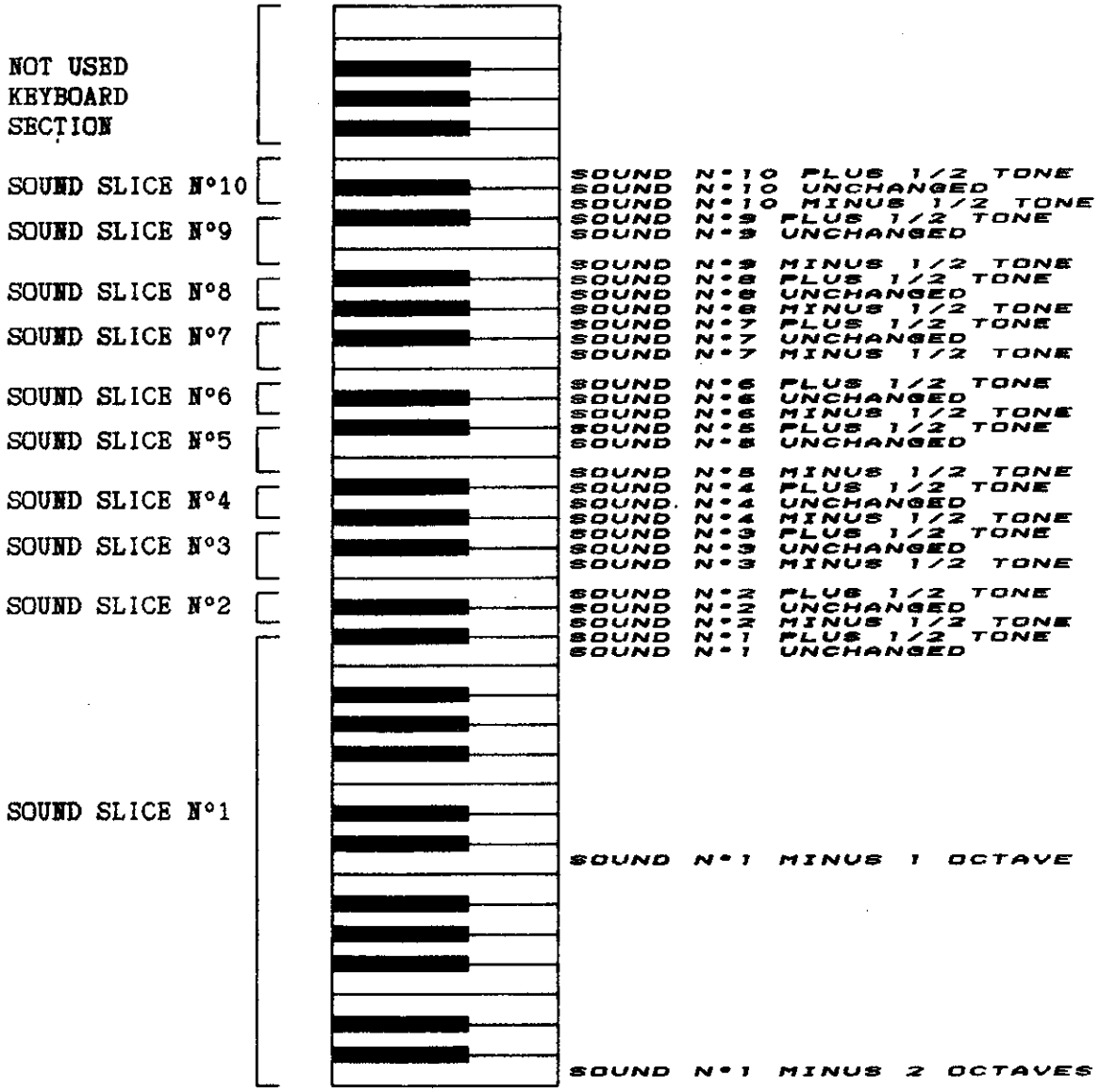
Example:

♣ The following example shows the dispatching of the samples on the keyboard, when 10 sounds have been recorded, each of them being adjusted from -1 to +1 semi-tones:



Variant of the previous example:

✚ In this variant one adjusts (N-) = -24 for the sample N°1 only. As a result all the sounds are shifted of two octaves towards the right on the keyboard. Which allows to use the two additional octaves in the bass:



✚ (N-) is adjustable from 0 to -24 semi-tones
✚ (N+) is adjustable from 0 to +12 semi-tones
✚ The adjustment of the pitch-ratio can be effected precisely, separately for each sample, to tune them each others, so as to each key plays right.

✚ ***Special cases:***

1 - If (N-) = (N+) = 0, then we obtain one sound by key. Each key controls a different sound.
2 - If (N-) + (N+) = 12, then we obtain one sample by octave. (Example: see the model session N°3, page 9-10).

♥ ***Applications of the MODE 4:***

✝ ***1 - Sampling of an instrument without changing its timber:***
(Multi-sampling)

When you play a recorded sound, the change of the pitch causes a timber-shift similar to the one we can hear when we change the speed of a magnetic tape. For instance a human voice pitch-shifted of plus 1 octave has a not very natural nasal appearance.

One can remedy to this effect with the MODE 4: CHROMATIC STACK, of the INFERNAL MACHINE. For this purpose you record several tones of natural sounds, with an interval of some semi-tones between each sound. In the previous example, there is an interval of 3 semi-tones between each sample, by recording 10 samples of 2 seconds each. The chromatic stack allows to dispatch these samples on the keyboard. Each original sample is pitched from -1/2 to +1/2 tone, which makes the timber change nearly inaudible. If any error appears in the pitch of one sample compared with the others (otherwise, if it plays wrongly) it is enough to adjust the samples badly tuned by adjusting the pitch-ratio, since each sample gets a separated adjustment.

The result is a sound very near of the natural sound.

A great deal of variants are possible: for instance, 8 sounds of 2,5 seconds recorded all every 5 semi-tones, and so on...The selection of the tone interval between each sample depends on the instrument or of the original sound: Some sounds hold up more important pitch than others. Each case is specific. You can also adjust different intervals for each sample: in this way you can optimize the pitch-range from one sample to the other.

✝ ***2 - Distribution of different instruments on the same keyboard:***

An example is given in the session N°3: In this case, 5 instruments have been recorded and each of them fills 1 octave of the keyboard. A typical application can be the whole lot of 5 percussions, available simultaneously on the same keyboard.

Many variants are possible: for example 2 different instruments, one on two and the other on three octaves, and so on ...

✝ ***3 - Combination of the two previous possibilities:***

The two previous applications can be combined: For example you can join on the same keyboard two different instruments recorded in multi-sampling.

♠ ***12 - MIDI PARAMETERS:***

MIDI - CHANNEL No= 1 VOICE NO=1	*301*
POLYPHONIC TOTAL VOICE NUMBER= 2	*301*

✝ The management of the MIDI codes is controlled by 3 parameters:

- ***N° OF MIDI CHANNEL***
- ***N° OF MIDI VOICE***
- ***POLYPHONIC TOTAL VOICE NUMBER***

✝ These parameters are the same as those of the FUNCTION 4: See pages 4-3 and 4-4.

♠ 13 - START POINT AND END POINT:

♣ For each sample of recorded sound, you can adjust the start and the end points of the reading in the memory. This allows to select precisely the part of the reproduced sound.

♣ EXAMPLE, with numerical display and corresponding graphic display:

MR FROM 12000,00ms TO 16000,00ms	304
----------S'''''''''''''E------. . 4	304

MR = Abbreviation for Memory Reading.

♥ 13-1 Adjustment of the start point:

♣ First selection of the START POINT parameter:

- Press one or several times the PARAMETER key in such a way that the PARAMETER LED is lighted permanently.
- Press the "-" key or the "+" key zero, one or several times (according to the initial state), so as to make appear the above numerical display with the left number blinking.

♣ Three ways to listen to the result of the adjustments:

1 - Choice of MODE 0 = LOOP, so as to hear the sound permanently. This method is useful for short sounds; for the long sounds operate as follows:
2 - Press on the AUX key as often as you want to test the start point. Each time that you press on AUX, the reading starts at the start point and you can immediately listen to the beginning of the sound.
3 - Press a key of the MIDI keyboard to listen to the beginning of the sound at each stricking.

♣ Four ways to adjust:

♣ 1st method (numerical):

- Dial the new value with the numerical keyboard
- Press the ENTER key to validate the new value.

♣ 2nd method: Incremental/decremental with numerical display:

- Press the PARAMETER key so as to be in numerical display with the PARAMETER LED blinking.
- Press the "-" key if you want to decrease the start point, "+" if you want to increase it. Press a figure between 1 and 9 to adjust the speed of variation. You can see the numerical display which varies. When you come close to the expected point, go to low speed. When you reach it press the "0" to stop.

♣ 3rd method: Incremental/decremental with graphic display:

- Press the PARAMETER key so as to make appear the graphic display-> The letter "S" blinks to show that the START POINT paramater can be adjusted in incremental/decremental mode.
- Proceed to the adjustment as for the 2 method above.
  As the START POINT progresses, you can notice the letter "S" going forwards or backwards so as to show the position of the start point.

✠ 4th method: With the remote control potentiometer:

- ◆ See to it that the PARAMETER LED is permanently lighted, by pressing on the PARAMETER key -> The remote control potentiometer can be used.
- ◆ You can move the START POINT forwards and backwards by turning the remote control potentiometer respectively clockwise or counter-clockwise.

♥ *13-2 Adjustment of the END POINT:*

- ◆ Select the END POINT so that the right number blinks:

MR FROM 12000,00ms TO 16000,00ms	304

- ◆ When you go into the graphic mode, the letter "E" blinks to show that the END POINT can be adjusted in incremental/decremental mode.
- ◆ To listen to the END point rapidly, you can adjust temporarely the START POINT around the END POINT.
- ◆ The methods of the END POINT adjustment are similar to the ones of the START POINT.

♥ *13-3 Reversed sound:*

✠ General rule: By adjusting the START POINT higher than the END POINT, the reading sound goes always from the START POINT to the END POINT, therefore the sound is read reversed in time. The methods of adjustment of the START and END points are the same as for the direct reading.

✠ ***Example:***

✠ To read the previous sample reversed, it is enough to reverse the START POINT and the END POINT, which gives:

MR FROM 16000,00ms TO 12000,00ms	304

----------E'''''''''''''S------. . 4	304

✠ Now the cursor moves from the right to the left.

♠ *14 - EVOLUTIVE VIBRATO:*

VIB F=10,0Hz DEP= 0 DEL=0,2s M=0	304

✠ The evolutive vibrato uses 4 parameters::

Frequency
Depthness
Duration of delay or of the appogiature
Mode (delayed or appogiature)

✠ These parameters are similar to the ones of the function 4. Refer to page 4-5.

♠ 15 - SPEED LINK:

♥ 15-1 Null speed link:

S-LINK=0 PITCH=1,059 SPEED=1,200	304

- S-LINK =Abbréviation for Speed LINK.
- When the SPEED LINK is null, the adjustments of PITCH-RATIO and SPEED-RATIO are completely different: In that case the reading speed of the memory depends only on the speed adjustment, and is independent of the pitch-ratio adjustment.
- You can change the pitch of the memorized sound without modifying its tempo (which is important when one plays with a MIDI keyboard).
- You can also change the duration of a message without modifying its pitch (TIME EXPANSION/COMPRESSION).
- In this mode, the MACHINE uses algorithms similar to the ones of the FUNCTION 4. You may have an algorithms adjustment, so as to reduce the effects of the "glitches" which are specific of this mode, according to the memorized sounds. It is advised to test, for each special case, which algorithm gives the best results. You have 4 possible algorithms:

PITCH-ALGO=1 FOR HUMAN VOICE A	304
PITCH-ALGO=2 FOR STRINGS	304
PITCH-ALGO=3 FOR HUMAN VOICE B	304
PITCH-ALGO=4 FOR COMPLEX SOUNDS	304

♥ 15-2 Active speed link (=1):

S-LINK=1 PITCH=1,059=SPEED=1,059	304

- If the SPEED LINK is equal to 1, the speed is no more independent: The SPEED-RATIO is forced equal to the PITCH-RATIO.
- To display this fact, an equal sign is displayed between these two parameters. The only active adjustment is the PITCH-RATIO, the SPEED-RATIO being the slave of this one.
- In this mode, the effect obtained is quite similar to the one of a magnetic band at variable speed: If the tape moves faster, the sound is higher and the speed quicker; if the tape moves slower, the sound is lower in pitch and the speed slower.
- This mode has the advantage of a linear reading of the memory, consequently there is no risk of "glitches" inherent to the previous mode. On the other hand it has the disadvantage to modify the tempo when we change the pitch, for example with a MIDI keyboard. Therefore you have to choose between the 0 LINK and the 1 LINK according to your preference: LINK 0 if it is important to preserve the tempo or to have an independent speed of the pitch, LINK 1 in the other cases.

♠ 16 - PITCH-RATIO:

♥ 16-1 Définition:

S-LINK=0 PITCH=1,059 SPEED=1,200	304

♣ *PITCH* = Abbreviation for PITCH-RATIO.

♣ The PITCH-RATIO represents the ratio between the pitch of the output signal and the pitch of the recorded signal; and this without MIDI signal. Its original value is 1,000 (no modification). It is adjustable between 0,250 (less two octaves) and 2,000 (plus one octave).

♣ When the pitch is controlled by the MIDI interface, the effects of the inside PITCH control of the MACHINE and of the MIDI pitch control are combined. In fact, mathematically, it is a multiplication. The formula is the following:

(OUTPUT-PITCH) = (ORIGINAL-PITCH) x (MACHINE-PITCH) x (MIDI-PITCH)

with:

OUTPUT-PITCH = Pitch of the output signal
ORIGINAL-PITCH = Pitch of the original signal
MACHINE-PITCH = Pitch of the MACHINE
MIDI-PITCH = MIDI pitch control

♣ The relation between PITCH and musical semi-tone is given by the table on Page 4-2.

♣ In MODE 3, the unit MIDI control (unchanged) is obtained with the low C of the 5th octave (MIDI KEY N° 84).

♣ In MODE 4, the unit MIDI control depends on the adjustment of the slices. See section MODE 4.

♥ 16-2 Applications:

♣ 1 - WITHOUT MIDI CONTROL: The inside adjustment of the MACHINE allows you to adjust manually the pitch of the output signal.

♣ 2 - WITH MIDI CONTROL, FINE ADJUSTMENT: You can set the pitch ratio of the MACHINE precisely so as to adjust the output pitch. You can for example tune the played sound with other instruments. This control is also very useful in MODE 4 (chromatic stack), to tune each others the different recorded sounds.

3 - WITH MIDI CONTROL IN MODE 3, KEYBOARD SHIFT: By adjusting the pitch-ratio of the MACHINE by semi-tones slices, you can shift on the MIDI keyboard the position of the original sound. For example by adjusting PITCH=2.000, the position of the game on the keyboard is left shifted by 1 octave.

♠ 17 - SPEED ADJUSTMENT:

♥ 17-1 Définition:

S-LINK=0 PITCH=1,059 SPEED=1,200	304

✠ *SPEED* = Abbréviation for SPEED ratio

✠ This adjustment is active only if S-LINK = 0. If S-LINK = 1, SPEED is the slave of the PITCH adjustment (See page 9-25).

✠ The SPEED-RATIO is the ratio between the memory reading speed and the memory recording speed. It is adjustable between 0,250 (4 times slower) and 4.000 (4 times quicker).

✠ When SPEED is different of PITCH, the sound is submitted to a complex handling to disjoin the reading speed and the pitch. You can choose between 4 handling algorithms, see page 9-25.

♥ 17-2 Applications:

(In these applications S-LINK = 0)

✠ 1 - IN MUSIC: You can adjust the tempo with the speed adjustment, then play wihout changing the tempo.

✠ 2 - TIME COMPRESSION/EXPANSION: By adjusting SPEED you can change the duration of a message without modifying its pitch.

♠ 18 - ATTACK TIME:

ATTACK TIME = 1,0ms	304

♥ 18-1 Définition:

✠ The attack time is the time taken by the sound to go from the null level up to its normal level, when one triggers the sound reading (whatever the kind of triggering). This transition is made progressively, according to a linear slope, by using a numerical gain control. The attack time is adjustable between 0,1ms and 999,9ms.

♥ 18-2 Applications:

✠ 1 - TO AVOID THE "CLICKS" AT THE TRIGGERING: If you adjust a start point of the sound which coincides with a high signal level, and if you trigger the reading with a very short attack time (under to the millisecond), this fast transition from the 0 level to a high level is to be perceived by the ear as an unpleasant "click". An attack time adjusted from 1 to 3ms avoids this phenomenum, without "smoothing" too much the beginning of the sound.

✠ 2 - FOR DRY PERCUSSION: If on the contrary you have recorded a percussion and if you need a very dry attack, it is preferable to adjust the attack time on 0,1ms.

♠ 19 TO RECORD AGAIN A SAMPLE:

♣ You have the possibility to record again a sample not suitable to you. To illustrate this possibility, let us take again the continuation of the model session N°3, page 9-12, and record again the sample N°4:

◆ Select the sample N°4. If you are in graphic mode, the MACHINE displays:

----------S'''''''''''''E------. . 4	304

◆ Press the PARAMETER key for going in numerical mode.
◆ Press the "-" key or the "+" key until the MACHINE displays:

RECORD AGAIN SAMPLE 4 ? 0=NO	304

♣ The "0" blinks (The N° 4 is a display of the selected sample N° and it can be modified only if you change the sample).
◆ Press the "1" key
◆ Press the ENTER key -> The MACHINE goes into the RECORDING mode
◆ Record the new sample, in the same way as the original sample (you can change the recording mode). The MACHINE displays:

. . . . . '''''''''''. 4	304

♣ When the recording is finished, the MACHINE goes automatically into reading mode and displays:

----------S'''''''''''''E------. . 4	304

♣ A new sound is recorded in the sample N°4 and is ready to be read.

♣ NOTE: If you had previously modified the START and the END points, the new sound is recorded in the memory section limited by these new adjustments.

♠ 20 - RECORDING OF THE BLANK MEMORY AREA:

♣ You can also record the memory section which is blank. To illustrate this procedure, let us take again the previous example:
◆ Go into numerical mode, and call the following parameter:

EMPTY MEMORY RECORD ? 0=NO	304

◆ Press the "1" key
◆ Press the ENTER key -> The MACHINE goes again into recording mode and takes again the continuation of the recording session of the last sample: A new sample number (6) is created following the previous one; a new FUNCTION MEMORY N° (306) is also created:

0= IN A TRIGGER RECORD SAMPLE 6	306

◆ You can again record one or several sounds, exactly like if the initial recording session had not been stopped. If for example you wait until the blank memory is filled, the MACHINE goes automatically into the reading mode of the last sample and displays:

----------S'''''E 6	306