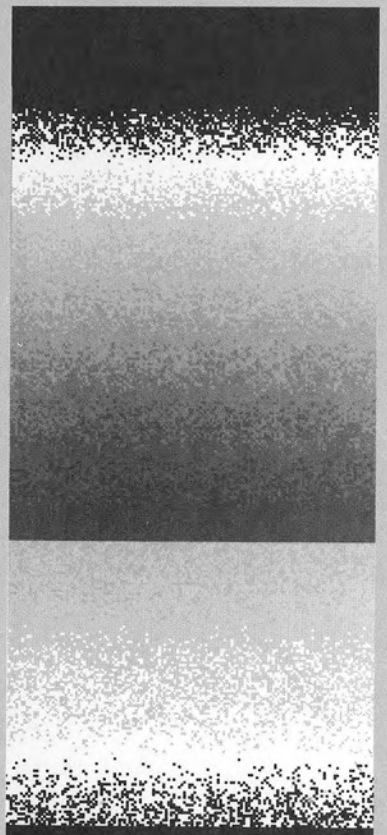
SYNETIC
SYSTEMS
MIND TECH FOR A NEW AGE

Plus

MindEye™

USER GUIDE II



Congratulations! You are about to begin an adventure of self discovery and exploration aided by the most sophisticated audio/visual instrument available. The MindsEyePlus employs the latest in computer technology to provide you with carefully controlled and totally flexible light and sound manipulation, all fully programmable, yet designed to be completely user friendly. As with any fine electronic instrument, a certain amount of attention should be given to understanding the features of the MindsEye Plus and the terminology related to its use before you begin.

WE RECOMMEND THAT YOU READ THIS MANUAL
BEFORE USING THE MINDSEYE PLUS.

All programming capabilities and the use of the controls are explained, in a step by step manner, in the following pages. You will also find examples and illustrations to clarify many points. When you are ready to begin, select a space free of distractions where you feel at ease.

BE SURE TO KEEP YOUR EYES CLOSED
DURING YOUR SESSION.

No special posture or breathing ritual is required, although you may want to experiment in this regard. Relax and enjoy the experience! The MindsEyePlus is a window to a new understanding of self and reality. *May it assist you in discovering all that you are.*

SYNETIC
SYSTEMS ™
MIND TECH FOR A NEW AGE

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I. INTRODUCTION

The MindsEye Plus is a member of a growing class of "mind machines" referred to as "audio/visual synchronizers." Utilizing light and sound pulses at specified frequencies, these machines stimulate the electrical brainwave activity of the user, leading the mind from its normal waking consciousness to deeper, more relaxed states. This process of guiding the brainwaves to altered states through the use of audio/visual stimuli is known as "entrainment."

The specific frequency ranges and the associated mental states that may be synthesized with the MindsEye Plus are as follows:

BETA 13-30 Hz: Normal waking state; attention directed to surroundings.
ALPHA 8-13 Hz: Relaxed, tranquil, daydreaming, inward awareness.
THETA 4-8 Hz: Borderline sleep; meditation state with access to the unconscious; fantasy, creativity, inspiration, learning.
DELTA 1-4 Hz: Deep, dreamless sleep; trance state.

The MindsEye Plus can rapidly create the sort of high efficiency mental states produced traditionally by slower techniques such as meditation, yoga, and other mental disciplines. Psychologists, therapists, researchers, as well as individual experimenters are exploring awareness expansion and sensory stimulation with this leading edge technology.

II. THE MINDSEYE PROGRAMMING CONCEPT

1. THE SESSION

The software for the MindsEye Plus is written around the idea of the "session," which consists of the following elements:

STARTING RATE in pulses/second
START RAMP TIME in minutes
TARGET RATE in pulses/second
TARGET TIME in minutes
END RAMP TIME in minutes
PATTERN NUMBER for lights
SOUND NUMBER for audio
END ALARM NUMBER select alarm sound

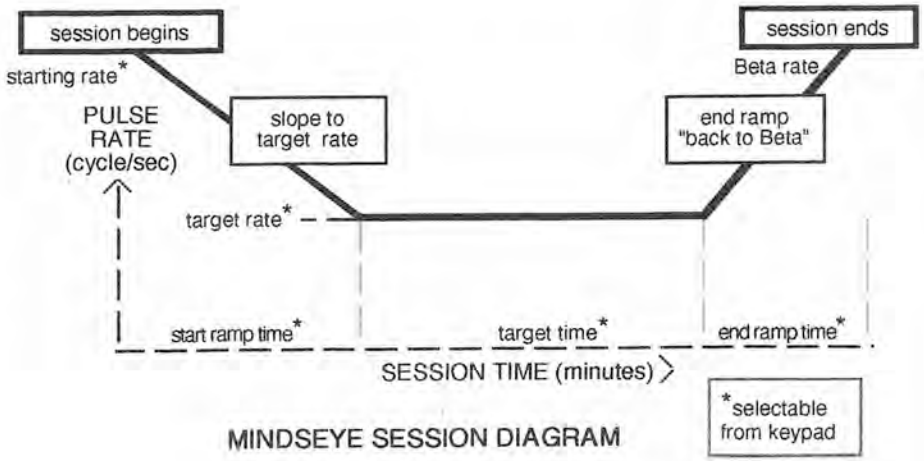
There are three approaches to the use of the MindsEye Plus:

1. You can select one of the 16 factory programmed presets (#00-15) and start to experience a session quickly;

2. You can modify the settings in the factory preset sessions to your preference, and save your changes to permanent memory as a new preset;

3. You may select all new program parameters for completely custom sessions, and save your creation to permanent memory as a new preset.

Slots #16-31 are available to save new preset session information.



MINDSEYE SESSION DIAGRAM

III. GETTING STARTED

1. POWER-ON

When you turn the power on, you activate the "Master Mode." The number in the display is the current start rate, and will generally vary from session to session. The MindsEye Plus always "remembers" the exact settings of your system when you turn it off, and reloads those settings automatically the next time you turn it on.

> WARNING: UNDER NO CIRCUMSTANCES SHOULD YOU ATTEMPT TO USE A POWER SUPPLY OTHER THAN THE ONE SUPPLIED WITH YOUR MINDSEYE PLUS. SUCH USE MAY DAMAGE YOUR UNIT AND WILL VOID YOUR WARRANTY!

2. THE CONTROLS

The ON/OFF power switch is located on the back of the unit; also on the back is the "POWER" input, and the "STEREO" and "MOD" inputs, which will be discussed below. Control knobs are logically grouped for clarity and ease of use. The top three knobs control the sound source inputs. Just below them is the "LIGHT/SOUND SYNCHRONIZATION" control, a three-position rotary switch which varies the routing of the audio and visual signals. Two pairs of knobs at the bottom of the panel control "LIGHT INTENSITY" and "SOUND VOLUME" of the two output channels. The "LIGHTS PWM" control knob (in the center) varies the ratio of lamp ON time to lamp OFF time. Two headphone output jacks are mounted on the front, located immediately below the related "channel one" and "channel two" controls. The two unlabled modular jacks at the left side of the front panel are the left ("channel one") and right ("channel two") goggle output connectors.

There are three sound source possibilities with the MindsEye Plus. These are the internal synthesizer, external stereo input, and external modulated sound input. Volume control for the internal sound, labeled "INTERNAL SYNTHESIZER," is the leftmost of the top three knobs. We recommend that you begin your session or experimentation with this volume control set fairly low, increasing it to a comfortable level. Notice that the top/center and right/center control knobs are grouped together in the "Modulation" box. The "DEPTH," knob controls the amount of modulation added to the sound, both from the "MOD" audio input and from the internal synthesizer. "EXT MOD VOLUME," is the volume control for the "MOD" audio input.

3. THE KEYPAD

The keypad is where you reconfigure the MindsEye Plus with changes in session instructions. It is also the control panel for the built in sound synthesizer and as such is "remapped" to give access to custom sound creation, (more about that later). Numbers are entered into the MindsEye Plus by pressing the desired key on the keypad. Numerals are always shifted towards the left. If you wish to enter a single digit number (like "7") you will need to enter "0", then "7" (07). The characters "A" thru "F" serve special functions by routing user numerical input in the appropriate way to build session instructions.

4. STEREO INPUT

You may use any stereo source such as radio, tape or compact disk in the "STEREO" input jack. The sound simply "flows through" the MindsEye, and is mixed with the internal synthesizer sound. Control the stereo sound volume with the volume control on your audio source. If the sound is distorted, turn down the volume on your audio source. For best results connect the headphone output of your source to the input of the MindsEye; a stereo patch cord for this purpose is provided with your accessory kit.

5. MODULATION INPUT

This unique input allows an external audio source to be modulated at the current pulse rate. This means that the loudness of the sound will rise and fall in sync with the lamp brightness. This effect is often referred to as "amplitude modulation." The "DEPTH" knob varies the degree of modulation from none (fully counter-clockwise) to nearly on/off pulses (fully clockwise). The "EXT MOD VOLUME," knob controls the modulated sound volume. This powerful modulation feature allows you to utilize virtually any sound source as an audio synchronization source! Examples would typically be New Age (or other) music, personal growth tapes, Neuro-Linguistic Programming (NLP)tm, and language tapes. As with the stereo input, if the sound is distorted, you probably have the external source turned up too high.

Note: if you wish to connect a stereo sound to the Modulation input, set the output of your sound source to "mono," or use the provided "stereo to mono" adaptor for best results. (To use, plug your patch cord into the adaptor before inserting it into the MOD input.) Highest fidelity sound is obtained by using the

STEREO input for critical listening where no modulation of the sound is desired.

6. AUDIO/VISUAL SYNCHRONIZATION

The three-position rotary switch labeled "LIGHT/SOUND SYNCHRONIZATION" controls the manner in which the internal and modulated sound sources interact with the lamp patterns. There are three possible settings: "OUT," BOTH" and "IN." If you select "BOTH," the sound will be pulse simultaneously in both ears. Selecting "IN" causes the sound to normally alternate from left to right, relative to the beginning of a light pattern. Setting "OUT" has the opposite effect, alternating right/left. For example, light pattern #1 causes the lamps on the left side of the goggles to light, then the right, alternately. If the synchronization is set to "IN," then the sound will be present in the left ear while the left eye is illuminated; if set to "OUT," the lights and sound are always on opposite sides of the head. The synchronization effect will vary with the lamp pattern selected.

7. OUTPUT CHANNELS

The MindsEye Plus, unlike other devices, allows two users to find their own light brightness and sound volume comfort levels. We encourage you to start with a dim setting for the lights, increasing brightness to your own comfort level. The volume control adjusts the overall loudness of the three sound sources via an internal mixer.

8. LIGHTS/PWM

The MindsEye Plus incorporates Pulse Width Modulation (PWM) of the lights. Pulse width modulation is the ratio of light ON to light OFF time during each pulse. Shorter pulse widths are more strobe-like, and often seem to generate crisper, more crystalline imagery. This control was designed for frequencies below 15 hz; setting it at or near maximum at a fast pulse rate can cause an odd brightness inversion, known as "retriggering." This is in no manner harmful to the circuitry. Both channels are affected by the setting of this knob.

IV. USING PRESET SESSIONS

1. YOUR FIRST SESSION.

Your MindsEye Plus arrives with 16 factory preset sessions installed. One of these (#00) is th "default session," which means that if you have made no alterations to the settings, this session will load automatically the first time you turn on the power. To start this session turn on the machine and press the "F" (Start) key. If you have changed any settings, the session last saved into memory will load automatically when you restart your machine.

The software for the MindsEye Plus may be described as an interlationship of MODES. (See the graphic chart at the center of the manual). When you turn on the power you are in the Master Mode. By pressing different character keys and inputting numbers on the keypad you navigate from one mode to another, giving instructions for creating a session.

Try the following:

1) Switch the MindsEye Plus on. You will be in the "Master Mode."

2) Press the "B" key. This takes you into the "Preset Mode."
The display will blank, then display a number ranging from 0 to 31.

3) Enter the number "01", then press the "A" key. This loads the parameter settings for session 01 into active memory. The display will briefly display the total number of minutes in your session, then display your new session number. If you have your headphones on, you will also hear the sound associated with your new session.

4) Press "F" to return to Master Mode; the display will show the starting rate of your new session. Notice too that you can no longer hear any sound.

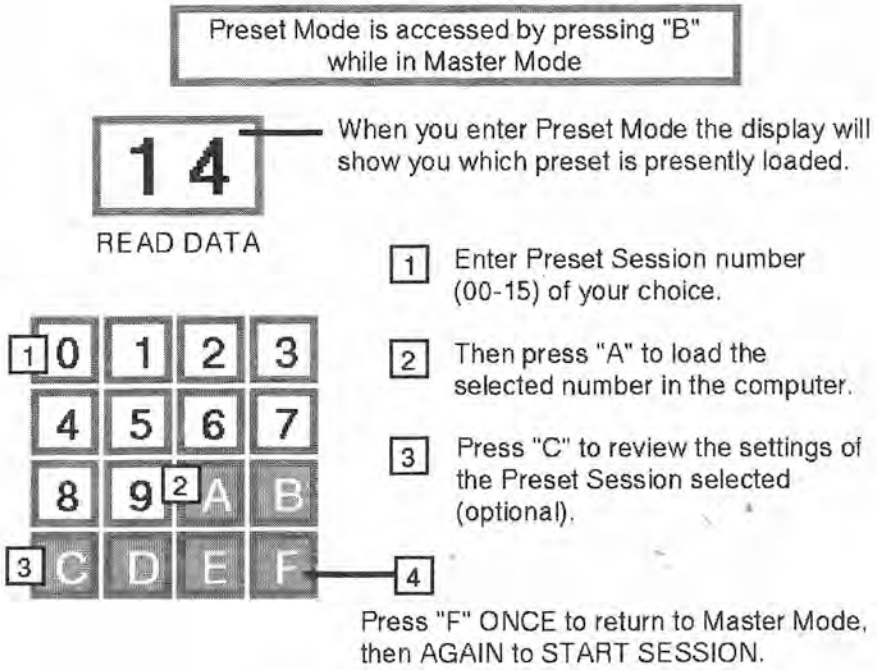
5) Press "E". The parameter settings for preset 01 will each be displayed in turn. You have just loaded a new session!
Step 5 is optional.

At this point, you may run session 01 by pressing "F".

2. WHAT ARE PRESETS?

Preset sessions consist of a sequence of numbers representing the starting rate, start ramp time, target rate, target time, end ramp time, light pattern number, sound number, and alarm number. These data are loaded from machine memory and are "PRESET." Taken together, they determine the various aspects of your session. Appendix Three contains a table of settings for the factory presets.

The MindsEye Plus has two categories of preset sessions: factory presets, and user presets. Factory presets include preprogrammed information controlling times, rates, sounds, light patterns, etc. that comprise a session that may be run directly. All but the light patterns may be altered to suit your preference. User presets can be sessions or sounds that you create, or they can be partially modified factory presets that you save as new presets.



STARTING A PRESET SESSION

3. LOADING PRESET SESSIONS.

Preset sessions may be accessed from the Master Mode by pressing the "B" key. The number which appears in the display corresponds to the currently selected preset. If you enter a number between 00 and 15, then press the "A" key (while in Preset mode), the corresponding factory preset will be loaded into active memory. If you wish to save the current MindsEye Plus settings as a preset, entering any number from 16-31 and pressing "B" will store those settings as a custom preset session. If you try to save your settings to a location less than 16, the MindsEye microprocessor will ignore you. Likewise if you load, say, preset number 07 and attempt to save it to location number 02, the display will flash the number 07, which indicates that you've made a mistake. If you load a session in the range 16-31 before having stored valid information to it, a random string of numbers will be loaded as a session, and will probably not run at all.

4. PRESET LIGHT PATTERNS.

These are best visualized by examining Appendix Two. Patterns consist of sequences of two to sixteen steps. Each step consists of a (usually) different collection of lamps switched on or off. For example, pattern number 00 is a two step pattern. During the first step, all lamps are switched on, and all lamps are off during the second step. We refer to these individual steps as "pulses." Similarly, pattern number 01 alternates between the left three lamps and the right three lamps, another two step sequence. Use appendix #2 to identify the lamp sequence for each pattern. At present, patterns may be selected only as part of a preset. Also note that some lengthy sequences require a higher pulse rate to generate visual imagery. For example, a sequence which consists of a "figure eight" requires eight pulse steps to complete, and is therefore effective at higher pulse rates. Setting a pulse rate of 40 would then cause five complete "figure 8's" per second, which is 40 (#pulses per second) divided by 8 (the number of steps in the sequence). Note that preset session #00 will alternate between on/off and left/right lamp patterns every few seconds.

5. PRESET SOUNDS.

Sixteen sounds have been preprogrammed into the MindsEye Plus. These may be varied widely or completely reprogrammed. Sounds may be loaded and saved by pressing "D" while in Master Mode. This takes you into Auxiliary Mode. Enter a number from 00 through 15, then press "A" to load a factory preset sound into active memory. Pressing "B" attempts to save the current sound to the memory module, and is possible only for slot numbers 16 to 31. As with the preset session mode, attempting to save a preset sound to one of the

factory slots will fail. If you have your headphones on, you can immediately hear a sound as you load it.

6. HOW TO MODIFY A PRESET SESSION

You can easily access and modify any preset session. Below is an example of how to activate preset session #02, change the session parameters and then save the new settings as a new user preset session.

From the Master Mode, press "B" to get into the Preset Mode.

Enter "02," to select session #02, then "A" to load that preset into active memory. Notice that the display will briefly show the total minutes in your session, then re-display the new session number.

Press "F" to return to the Master Mode.

Now preset session #02 is in active memory and could be started at this point by pressing "F" (start); But let's continue....

Press "A" to get into the Program Mode.

Let's say you want to change the starting rate from "60" to "45." To do this press "00," to enter the "starting rate" parameter function, then press "A" to make the function "active." Next enter the new value you've chosen, in this case "45," and press "B" to store this new rate as the session start rate.

In a similar manner you may change other functions by entering the appropriate parameter number, pressing "A," entering a new value, and pressing "B" to store the new value. The template for this process from the program mode is as follows:

1. Enter [parameter #] + A + [new value #] + B
2. Repeat until done.

To exit the Program Mode press "F."

Now that you're back to the Master Mode you may press "E" to enter the Review Mode. The Review Mode will display your settings so you may verify that new values have been accepted. (You may also review by pressing "C" while in the Preset Mode). You can save your sessions at any time by going back to the Preset Mode ("B,") entering one of the available slot numbers (16-31), then "B" to save your settings to that slot. For example, to save the active session to slot 20, press "20" and "B" while in the Preset Mode. Your session can now be retrieved at any time in the future by loading session #20.

7. SAVING A CUSTOM SESSION.

Suppose you have changed the parameters of a session (in this example session number 03) and want to save the current settings to slot location 16 for later recall. You would do the following:

1) Enter the "Select Preset" mode as above; the number "03" will reappear, reminding you that this is the session currently loaded.

2) Now enter the number "16," followed by "B". Notice that the display blanks, then re-displays the number 16. You have just saved a copy of preset 03 to location 16.

When you are through, you can press "F" to return to Master Mode, then "F" again to start your session.

8. LIGHTS: PULSE WIDTH MODULATION.

The "LIGHTS PWM" control varies the ratio of ON to OFF time during each pulse cycle of the LED lamps. Short pulse widths are more strobe-like and may be more efficient at inducing brainwave entrainment. It appears that the fast rise time (time it takes to change from fully OFF to fully ON) and maximum brightness of the lamps are the most important factors for inducing brainwave entrainment, and not the total brightness setting of the lights. In other words, if you set the "LIGHT INTENSITY" control to maximum and vary the "PWM" control, the lights will appear to be growing brighter or dimmer, depending on their overall "on" time, but the entire range may be equally effective.

Changing the pulse width can also change the kind of imagery you perceive. Shorter pulse widths seem to generate crisper, more crystalline patterns. Note that setting the pulse width to maximum at higher frequencies can cause an odd brightness inversion ("retriggering"). This control was designed for, and works best at, frequencies below 15 hz.

9. CHANGES DURING THE SESSION.

By pressing keys 1-4 during a session, you can switch between goggle patterns. Key 1 selects on/off, 2 selects left/right, 3 alternates between the middle LED's and the top/bottom ones, and 4 adds a new pattern not included as a preset: on/off/on/off/left/right/left/right. Alternating patterns generates the most interesting visual effects in the 5-15 hz range; try this during preset #01. Pressing these keys too rapidly at higher frequencies may cause the session to reset. Use the "Reset" function key #9 to reset to start condition.

V. CREATING CUSTOM SESSIONS

1. MASTER MODE.

When you turn on the MindsEye Plus it is in the Master Mode. From this mode you may enter one of the six Function Modes by pressing keys A through F. When in the Master Mode entering numbers has no effect on the state of the machine. *This is only true while in Master Mode!*

2. PROGRAM MODE.

Enter the Program Mode by pressing "A" while in master mode. This allows you to create custom sessions. Setting a parameter value requires two steps:

FIRST ENTER THE PARAMETER NUMBER--from 00 to 07--to select the parameter you wish to change. Choose and enter one of these nunbers--then PRESS THE "A" KEY. The display will blank, indicating that the computer is ready to accept a value for that parameter.

SECOND ENTER A *RANGE VALUE NUMBER* (from the range indicated) AND PRESS "B" to store the value in the computer's memory. Below is listed the programmable parameters preceeded by their ID numbers and followed by acceptable range values, *in italics*, for each parameter :

00 (Start Rate):	*04 to 60.*
01 (Start Ramp Time):	*05 to 99.*
02 (Target Rate):	*04 to 60.*
03 (Target Time):	*00 to 99.*
04 (End Ramp Time):	*05 to 15.*
05 (Light Pattern):	*00 to 15.*
06 (Sound Number):	*00 to 31.*
07 (Alarm Number):	*00 (no alarm) or 01 (alarm).*

For example, pressing "00" then "A" allows you to access the "Start Rate" parameter; then entering a number from 4 to 60 (the range for Start Rate) and pressing "B" will store a number from that range in memory.

In most cases the computer will not accept input outside the specified range, or it will attempt to correct the input to fall within the accepted range. For example, if you press "08" then "A," that is, if you try to enter a nonexistent parameter number, the display will flash "08" at you, indicating that it has ignored your choice. There is no preferred sequence for entering parameters; you could enter Sound Number first, then Start Rate, if you wanted to. PRESS "F" TO RETURN TO THE MASTER MODE. The display will revert to the current starting rate.

3. PRESET MODE.

Enter the Preset Mode by pressing the "B" key while in Master Mode. When you enter this mode, the display will show you which preset is presently loaded. This number will range from 0-31. To select a new preset, simply enter the appropriate number and press the "A" key. Press "C" if you would like to view the current settings, and "F" to return to Master Mode.

You can save up to sixteen of your own preset sessions to preset slots numbered 16-31. Entering one of these numbers and pressing "B" saves the current settings. The MindsEye Plus will not accept numbers outside of this range. This safely preserves all factory presets. Note, however, that any user session slots (#16-31) may be overwritten (erased). If you develop a set of new parameters which you find preferable to those previously stored, you can "record over" the old settings, much as you would record over a tape. Pressing "C" will cause the display to step through the parameter settings in sequence. Each number is displayed for about one second, allowing you sufficient time to write the settings down if you so choose.

A few words of caution: if you have never saved settings into a slot but load the contents of that slot as a preset, the MindsEye Plus will run whatever contents happened to be there. Since those contents are likely to be unpredictable, the MindsEye Plus will most likely behave in novel and/or unexpected ways.

4. SOUND (SYNTHESIZER) MODE.

Enter the Synthesizer Mode by pressing "C" while in the Master Mode. The synthesizer mode offers you a set of easy to use tools for crafting custom sounds. In this mode, the keypad is "remapped" and each key is assigned a new function; *we suggest that you start your experiments in conjunction with the synthesizer keypad reference chart.*

In the Synthesizer Mode the keys have the following functions:

0: FAST PITCH INCREASE. Press and hold to rapidly increase sound pitch.

1: SLOW PITCH INCREASE. Press and hold to slowly increase sound pitch.

2: FAST PITCH DECREASE. Press and hold to rapidly decrease sound pitch through the internal synthesizers eight octaves

3: SLOW PITCH DECREASE. Press and hold to slowly decrease sound pitch.

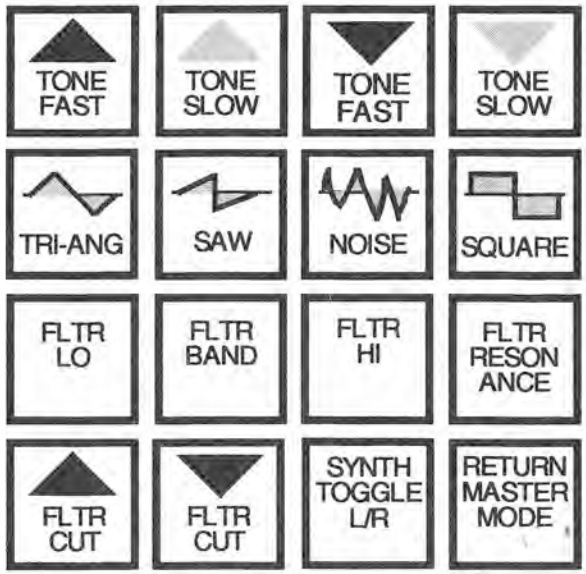
4: WAVEFORM SELECT: Triangle wave. This is the most "mellow" of the synthesizer waveforms. It is very close to a "pure pitch," or sine wave.

5: WAVEFORM SELECT: Sawtooth wave. A reedier, buzzier sound.

6: WAVEFORM SELECT: Noise (called "surf" by some manufacturers) varying the pitch and filter settings allows the creation of white noise and sound effects.

7: WAVEFORM SELECT: Square wave. The most complex, "rich" waveform available. The personality of this sound depends upon its pulse width; the pulse width is automatically swept during a session, creating sound effects.

Synthesizer Mode is accessed by pressing "C" while in Master Mode



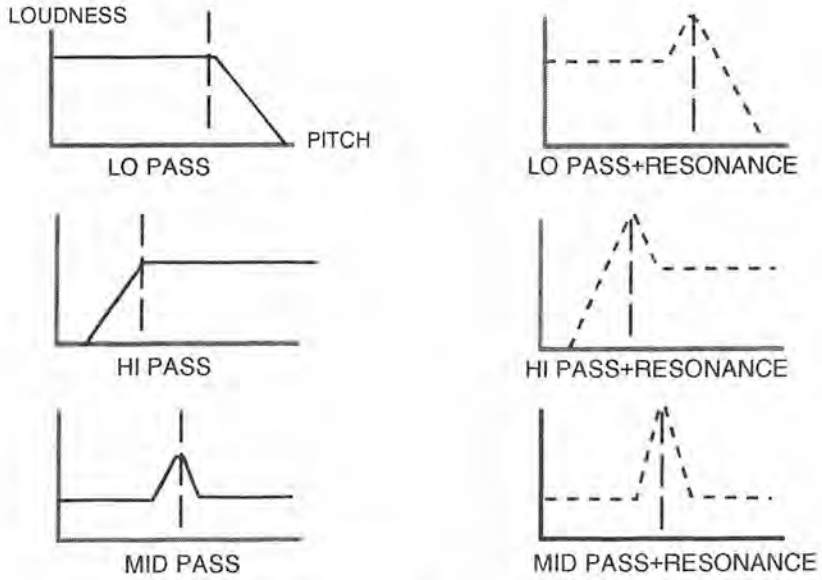
KEYBOARD IN SYNTHESIZER MODE

8: FILTER SELECT: Low Pass. This filter setting lets low frequency sound through to the headphones, but smoothly attenuates higher pitched sounds. Use this setting to remove some or all of the "buzziness" from certain sounds.

9: FILTER SELECT: Band Pass. This setting allows only a narrow range of sounds to pass. Use to create "reedy" or "hollow" sounds.

A: FILTER SELECT: High Pass. This setting functions in a manner opposite to the low pass filter, allowing only high pitched sounds through and smoothly attenuating lower pitched ones.

B: FILTER RESONANCE: This controls the amount of sound passing at the filter cutoff frequency (see Appendix Five on synthesizer theory), and has a range of 16 values, numbered 0 through 15. Pressing and holding this key will continuously increment through this range and show the value in the display.



FILTER TYPES

C: FILTER CUT/INCREMENT: Pressing and holding this key causes the cutoff frequency of the filter to increase. This can generate the familiar "wahwah" effect when used in conjunction with the lowpass filter, or the sound of blowing wind when used with the noise waveform.

D: FILTER CUT/DECREMENT: Pressing and holding this key causes the filter cutoff frequency to decrement.

E: SYNTHESIZER SELECT: Pressing this key will cause the display to alternately display "01" and "02", indicating that either synthesizer #1 (right ear) or #2 (left ear) is being programmed. To exit Sound mode from synthesizer #2, you must first toggle to synthesizer #1.

F: RETURN TO MASTER: Pressing this key returns you to Master Mode and re-displays the current starting rate.

The pitch, filter and resonance controls all "roll over" at their extreme settings. For example, when an increasing pitch reaches its maximum setting, it will start over at the lowest pitch.

5. AUXILIARY MODE.

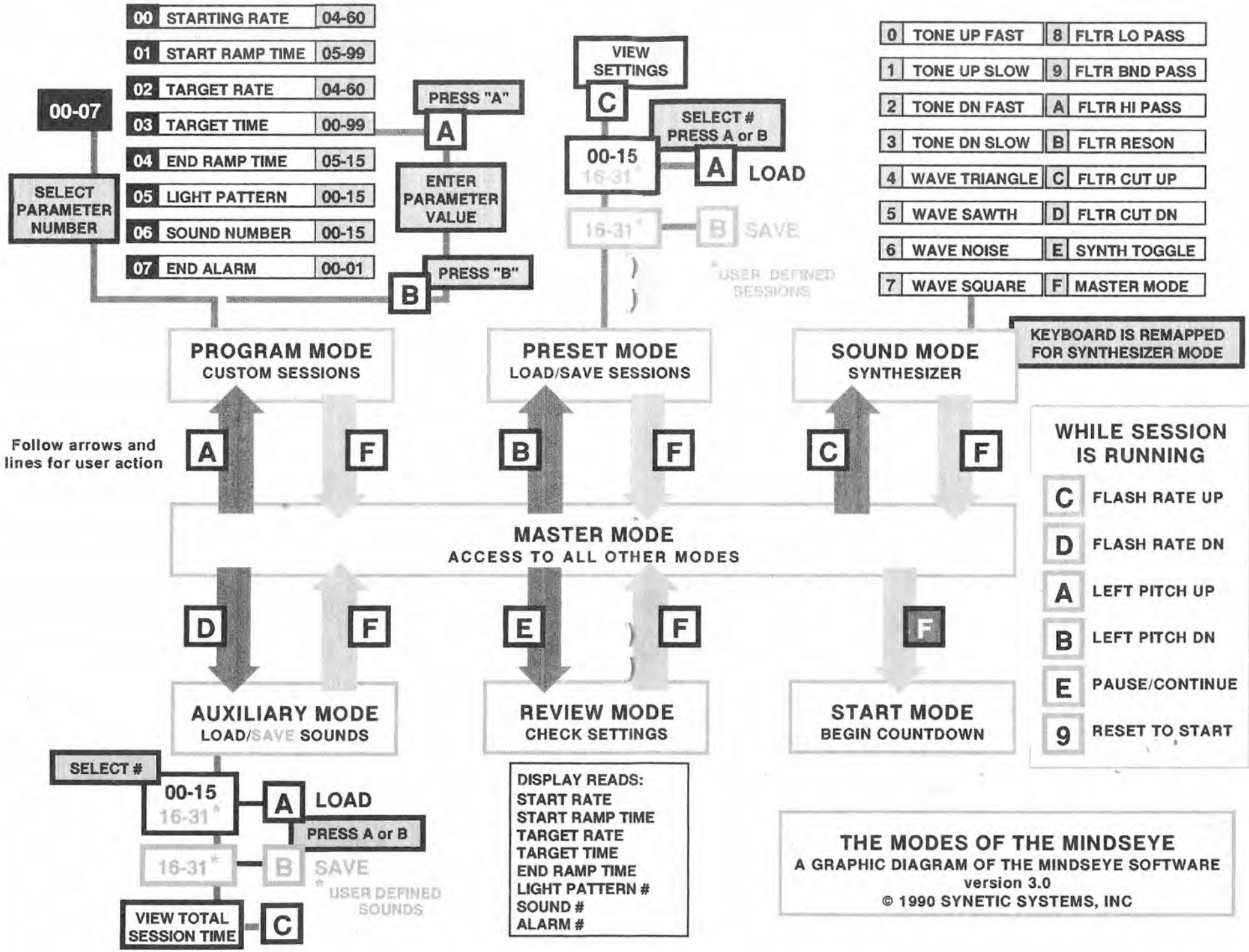
A: Load Sound: Loads the sound number indicated in the display into active memory. Once loaded, you can hear the selected sound in your headphones; do this as many times as is necessary to find the sound of your choice. Numbers can range from 0-31, though attempting to load a custom sound (#16-31) from a slot to which you have not saved a sound will probably result in no sound being heard.

B: Save Sound: Saves the current sound as a custom sound, to selected locations in the range #16-31.

C: Total Min: Causes the total number of minutes in the current session to be briefly displayed. This consists of the sum of (START ramp time) + (TARGET time) + (END ramp time). Because the display has two digits, this feature works for total times of 99 minutes or less.

F: Return to Master Mode: The current start rate is re-displayed.

Like most MindsEye modes, the software does its best to correct any entry mistakes you might make. For example, if you attempt to save a sound into locations 0-15, the display will blink and refuse to accept your entry. As with the preset mode, you can always erase sounds, replacing them with current or updated versions.


00 STARTING RATE 04-60
01 START RAMP TIME 05-99
02 TARGET RATE 04-60
03 TARGET TIME 00-99
04 END RAMP TIME 05-15
05 LIGHT PATTERN 00-15
06 SOUND NUMBER 00-15
07 END ALARM 00-01
00-07
SELECT PARAMETER NUMBER
PRESS "A"
A
ENTER PARAMETER VALUE
PRESS "B"
B
VIEW SETTINGS
C
SELECT # PRESS A or B
00-15
16-31*
A LOAD
B SAVE
* USER DEFINED SESSIONS
0 TONE UP FAST
1 TONE UP SLOW
2 TONE DN FAST
3 TONE DN SLOW
4 WAVE TRIANGLE
5 WAVE SAWTH
6 WAVE NOISE
7 WAVE SQUARE
8 FLTR LO PASS
9 FLTR BND PASS
A FLTR HI PASS
B FLTR RESON
C FLTR CUT UP
D FLTR CUT DN
E SYNTH TOGGLE
F MASTER MODE
KEYBOARD IS REMAPPED FOR SYNTHESIZER MODE
PROGRAM MODE
CUSTOM SESSIONS
PRESET MODE
LOAD/SAVE SESSIONS
SOUND MODE
SYNTHESIZER
Follow arrows and lines for user action
A
F
B
F
C
F
MASTER MODE
ACCESS TO ALL OTHER MODES
D
F
E
F
F
AUXILIARY MODE
LOAD/SAVE SOUNDS
REVIEW MODE
CHECK SETTINGS
START MODE
BEGIN COUNTDOWN
SELECT #
00-15
16-31*
A LOAD
PRESS A or B
16-31*
B SAVE
* USER DEFINED SOUNDS
VIEW TOTAL SESSION TIME
C
DISPLAY READS:
START RATE
START RAMP TIME
TARGET RATE
TARGET TIME
END RAMP TIME
LIGHT PATTERN #
SOUND #
ALARM #
WHILE SESSION IS RUNNING
C FLASH RATE UP
D FLASH RATE DN
A LEFT PITCH UP
B LEFT PITCH DN
E PAUSE/CONTINUE
9 RESET TO START
THE MODES OF THE MINDSEYE
A GRAPHIC DIAGRAM OF THE MINDSEYE SOFTWARE
version 3.0
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6. REVIEW SETTINGS MODE.

Pressing the "E" key while in Master Mode steps through the various settings in proper sequence, i.e., Start Rate, Start Ramp Time, Target Rate, Target Time, End Ramp Time, Light Pattern Select, Sound Select, Alarm Number.

7. START MODE.

Finally, pressing the "F" key while in Master Mode will start your session, beginning with a countdown from 9 to 0, allowing you time to settle back, adjust your goggles and headphones, CLOSE YOUR EYES and relax!

8. WHILE THE SESSION IS RUNNING.

You may increase or decrease the flashrate and sound pitch during a session, as well as "pausing" at the current flashrate and altering sessions. Like all of the programming capabilities of the MindsEye Plus, these functions are accessed via the keypad. Here's how they work:

Pressing "1" causes the LED's to flash pattern #0 (on/off).

Pressing "2" causes the LED's to flash pattern #1 (left/right).

Pressing "3" causes the LED's to flash pattern #2 (vertical/horizontal).

Pressing "4" causes the LED's to flash a new pattern:
on/off/on/off/left/right/left/right.

Pressing "9" causes the session to stop. The MindsEye Plus resets to the Master Mode, and the current Start Rate is displayed.

Pressing "C" causes the flashrate to increase.

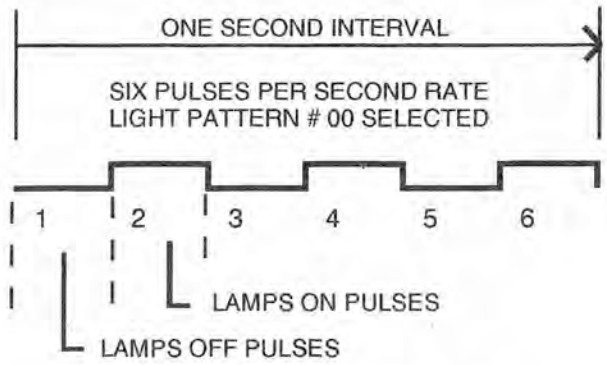
Pressing "D" causes the flashrate to decrease.

Pressing "E" pauses the MindsEye Plus at the current flashrate.

8.a CHANGING THE FLASHRATE. Pressing and holding the "C" or "D" keys will cause the flashrate to increase or decrease. The current flashrate is shown in the display. The rate of change is slower at low flashrates. Also, the indicated number should be taken as a rough current flashrate rather than a precise one. For example, while increasing the rate from "5" to "6", the number "5" will be displayed until "6" is reached. The reverse would be true while ramping down with "6" being displayed until "5" is reached.

8.b PAUSING. Pressing the "E" key will pause the machine at the current flashrate. The cue provided is that the number "99" will briefly appear in the display, to be replaced by the current flashrate. Pressing the key again will cause "00" to appear briefly, a cue that the ramp has been resumed. The length of time that either number is displayed is longer at slower flashrates.

8.c CHANGING THE LAMP PATTERN. You may change the lamp pattern during a session by pressing key #'s 1-4. This feature is optimized to work below approximately 12 hertz; rapidly changing patterns above that rate may cause the MindsEye Plus to reset to the start of the session. Should this happen, simply press F to restart your session. Once you select one of these four patterns, you cannot return to your original pattern, if it was #3-15. If you have selected preset session #0, the session will alternate between pattern #0 and pattern #1.



FLASH RATE/ PULSE RATE

While the "flash rate" represents the number of lamp flashes per second, and will vary with the light pattern selected, the "pulse rate" may be thought of as the internal clock. All lamp patterns and sound pulses are tied to this internal pulse rate, which is selected and displayed when programming a session. The flash rate is displayed only while a session is running. You may calculate the lamp flash rate for the most popular light pattern (00) by dividing the pulse rate by 2. To specify a target rate below 4 flashes per second, use pattern #00 and divide the pulse rate by 2 to get the flash rate. For instance, setting the rate to "6" would result in a flash rate of 3. For most other light patterns the flash rate will equal the pulse rate, since at least one lamp is on during each clock pulse.

VI. SOUNDPLAY

One of the most intriguing and powerful tools contained within the MindsEye Plus is the programmable stereo sound synthesizer. Although other synchronizers will typically allow only the selection of one note tones or noise ("surf"), the MindsEye Plus allows you to alter factory preset sounds or construct your own. And you can save up to sixteen of your own favorite sounds!

In this section we will concentrate on becoming familiar with the controls and what they do. Then we'll conduct a few experiments to demonstrate how rapidly and easily you can create your own sounds. *For additional information on sound synthesis please refer to Appendix Five.*

1. LOADING AND SAVING SOUNDS.

Although a preset sound is automatically loaded when you load a session, you can load other preset sounds into the currently selected session. Try this by pressing the "D" (Auxiliary Mode) key from the Master Mode. The display will blank, then a new number will appear in the display. This number is the currently selected preset sound. Enter the number "07", then press "A" to load sound #07 into the current session. You will now hear sound #07 through the headphones. Now enter the number "00" and press "A"; you will immediately hear sound #00.

You can also save the current sound as a custom preset sound. To do this, you must save it as any sound number in the range #16 to #31 (the custom preset sound slots). Try this by entering "16" on the keypad. Then press "B" to store the sound to slot #16. The display will blank briefly, then re-display the number #16. You have just saved a copy of sound #00 to slot #16. The custom sound slots, like the custom preset slots, function somewhat like a tape recorder in that they will store information until you record something new over them. For example, if you were to load preset sound #12 and save it as #16, it would "erase" any sound that you had previously saved to location #16. So if you are tired of a particular custom sound, you can easily replace it.

A few pointers about controlling volume before we experiment further. You can alter the volume with the "SOUND VOLUME" control knob, the "INTERNAL SYNTHESIZER VOLUME" knob, and, perhaps less obviously, the modulation "DEPTH" knob. The "LIGHT/SOUND SYNCHRONIZATION" switch controls the position of the sound. That is, if you are not running a session and if the modulation depth knob is turned up, then setting the "sync" switch to "IN" or "OUT" will cause the sound to come from either the left or right ear. Setting the

"SYNC" knob to the "BOTH" position and the modulation "DEPTH" knob to about the three o'clock position will generally provide the most pleasing results.

2. SOUND TUTORIAL

Sound Mode is accessed from the Master Mode by pressing the "C" key. There are two things which immediately happen: the display will blank, and the sound will switch on. Set the output volume control to maximum, and set the synth volume to a comfortable level. Now you're ready to begin sculpting sound!

WAVEFORMS

It will help for you to refer to the Synthesizer Keypad Reference Chart for this section. *(See page 13.)*

Press the "4" key to select the Triangle Wave. If no change occurs, then that sound was already selected. Now press and hold the "0" key. Notice how rapidly this "coarse" control sweeps the pitch upward? Although of little use in selecting a specific tone, this control allows you to quickly select the approximate pitch you wish to reach. Once you are fairly close, press "1" to fine tune your sound. Key "2" provides a coarse downward pitch sweep, while "3", like "1", allows you to fine tune your sound. Practice with these fours keys in the top row until you feel comfortable with the tuning process.

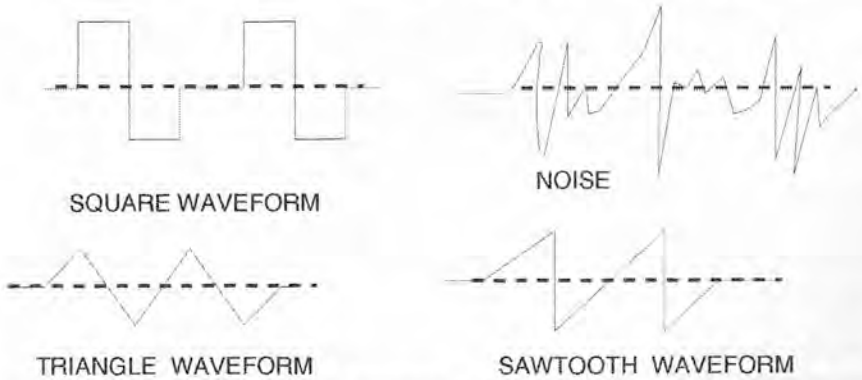
There are four "waveforms" available for processing in your synthesizer. These have been assigned to the second row on the keypad (#'s 4 through 7), and are called triangle wave, sawtooth wave, noise and square wave. These names relate to the appearance of the waveforms on the screen of an oscilloscope.

Select the Triangle wave by pressing the "4" key. The sound has a rather pure, uncomplicated tonal quality. This tone is most appropriate to the generation of binaural beat frequencies. Pressing "5" sets up the Sawtooth wave. Depending on the pitch (and filter) settings, this waveform may have a buzzy or hollow sound. Pressing "6" selects the noise waveform. Although the pitch control obviously "tunes" this sound in some sense, you would find it impossible to tune to a specific note. Pressing "7" selects the Pulse waveform. Although also rather buzzy like the sawtooth wave, the tone color of the square wave is gradually altered, or "swept" during a session. This can generate a very pleasing, shifting effect.

The third row contains three filter select keys (8, 9 and A) plus a "resonance" control key (B). Try selecting the three filters: low pass, band pass and high pass in turn, with both low pitched and high pitched sounds. Next, select the low pass

filter, noise, and a fairly low pitch. Press and hold the "C" key. This causes the filter to "sweep" upwards. At some point it will sound a bit like the wind is blowing. Several preset sounds, such as #4, will do this automatically during a session. When you reach this point, try pressing the "D" key. With a little practice, you can "play" these two keys, creating your own wind! What you have just done is vary the filter cutoff point. Again, it's not necessary to understand what this means in terms of the physics of acoustics to develop a firm, intuitive sense of how the sound is being affected. Try this again with the square waveform selected, tuned to a low pitch. Now press and hold the "B" (resonance) key. Notice that numbers appear in the display, counting to fifteen, resetting to zero, then repeating the process. Settings at the upper range can lend a "hollow" quality to some sounds, whereas others will not seem to change at all. The numbers in the display are simply provided to you as a visual aid in recreating a certain tone color.

Try varying the filter cutoff keys with different waveforms and filters selected. The variety of sounds you can create with this synthesizer is large indeed!



WAVEFORM TYPES

3. GOING FURTHER.

Most of the preset sounds contain two tones. When you select one of these sounds, you will find that one of the two tones remains fixed in pitch, while the other one may be varied. This unique feature allows you to create a large number of "harmonic intervals." Try the following:

Load preset sound #03 by pressing the D key (from master mode), entering the number "03", and pressing the A key. Now return to Master Mode by pressing the F key, and enter Sound Mode by pressing C. Press and hold any of the top

row of keys; notice that the harmonic interval in your right ear is changing? Some intervals are much more pleasing than others, as you will discover. Suppose you want to listen only to the right ear while doing this? Turn the Modulation control all the way up, then switch the Synchronization control to "IN" and "OUT". What happens? This feature allows you to seperate the two channels for just such a purpose.

When you first enter Sound Mode, the display will read "01." This indicates that any changes made to your sound will affect synthesizer #01, which is assigned to the right ear. When you want to alter synthesizer #02 (left ear), press the E key. In fact, pressing the E key simply toggles back and forth between the two synthesizers.

When you have found a comfortable setting, exit the sound mode and start a session by pressing the "F" key. Turn the modulation depth control all the way down, and listen to how the sound is changing. We have imposed a gradual pulsewidth modulation upon the sound, giving it a complex, rich character. Remember that only the square wave may be modulated in this manner.

4. BINAURAL BEAT FREQUENCY GENERATION.

Because your MindsEye Plus provides a separate synthesizer for each ear, it is possible to create your own binaural beat frequencies. These beat frequencies result when two tones which are almost (but not exactly) the same pitch are played one to the left and the other to the right ear. The brain itself generates a frequency which is the difference of the two. For example, if a tone of 440 hz (concert "A") is played into one ear, and 444 hz played into the other, you will perceive a 4 hz "beat" frequency. Although this effect has been recognized for many years, it has been popularized by Robert Monroe and his Monroe Institute. Research conducted there and elsewhere has indicated that brainwave entrainment is aided by such beat frequencies. We call our beat frequency generation "HemiTone" (tm). Preset sounds #9 and 13 are HemiTone sounds. These sounds are available in factory preset sessions #5 and 10. The multiplicity of tones provides a complex pattern of beat frequencies.

Try experimenting first with single tones. Do this by loading preset session #01. Now enter Sound Mode (press "C"), and use the pitch tune controls (keys 0-4) to tune the right ear to a pleasant tone. Switch to synthesizer #02 (press "E"), and repeat this process, trying to tune to the same tone. You'll need to use the fine pitch controls to get close. Notice the appearance of the binaural beat frequency? The audible range for this effect is typically in the range of interest to us- about 0 to 20 hz. The slowest frequencies, not surprisingly, are most soothing and subtle. The triangle wave, because of its purity, is most effective.

APPENDIX ONE: SUMMARY OF MINDSEYE FUNCTIONS.

The functionality of the MindsEye Plus may be described as an interrelationship of seven "modes" or states of operation. Each mode provides its own set of functions. A graphic diagram of these functions is shown in the "Modes of the MindsEye Plus" chart. The listing below gives a template of entries and their results for each mode. By referring to this list and the diagram, the relationships should become clear. In each case, a mode is given, followed by a keystroke or sequence of keystrokes and the intended result.

MASTER MODE TEMPLATE

Master Mode + [A] = Program Mode
Master Mode + [B] = Preset Mode
Master Mode + [C] = Synthesizer Mode
Master Mode + [D] = Auxiliary Mode
Master Mode + [E] = Review Mode
Master Mode + [F] = Start session

PROGRAM MODE TEMPLATE

[parameter # (00-07)] + [A] + [value #] + [B] = new setting

Here is a list of acceptable values numbers for above:

00 (Start Rate): 04 to 60. Less than 4 will be corrected to 4, greater than 60 to 60.

01 (Start Ramp Time): 05 to 99. Less than 5 will be corrected to 5.

02 (Target Rate): 04 to 60. Less than 4 will be corrected to 4, greater than 60 to 60.

03 (Target Time): 00 to 99.

04 (End Ramp Time): 05 to 15 minutes. Less than 5 will default to 0, or no final ramp.

05 (Light Pattern): 00 to 15.

06 (Sound Number): 00 to 31. 0-15 are factory presets, 16-31 are custom presets. Greater than 31 defaults to 00.

07 (Alarm Number): 00 (no alarm) or 01 (alarm).

PRESET MODE TEMPLATE

[session #] + [A] = load new session

[session/slot #] + [B] = save current session
Session # = 00-15 for factory presets, 16-31 user created sessions.

SYNTHESIZER MODE TEMPLATE

[0] = tone pitch rises fast
[1] = tone pitch rises slow
[2] = tone pitch falls fast
[3] = tone pitch falls slow
[4] = select triangle waveform
[5] = select sawtooth waveform
[6] = select noise waveform
[7] = select pulse waveform
[8] = change lo-pass filter
[9] = change band-pass filter
[A] = change hi-pass filter
[B] = change filter resonance
[C] = move filter cut-off up
[D] = move filter cut-off down
[E] = change pulse width
[F] = return to Master Mode

AUXILIARY MODE TEMPLATE

[sound #] + [A] = load sound to active memory
[sound #] + [B] = save active sound to EyeRemember module
[C] = display total session time
load from sound slots #00-31; save to sound slots #16-31.

REVIEW SETTINGS MODE No action required- display will show in turn:

start rate
start ramp time
target rate
target time
end ramp time
light pattern number
sound number
alarm number (alarm off = 00, alarm on =01)

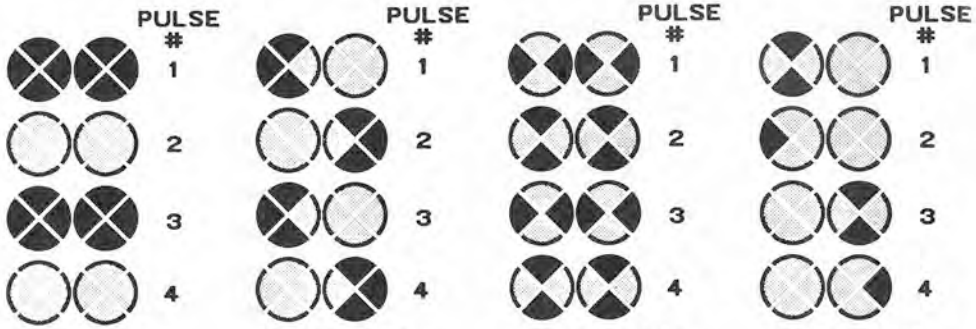
After displaying these settings, Master Mode is automatically re-entered, and the current Start Rate is displayed.

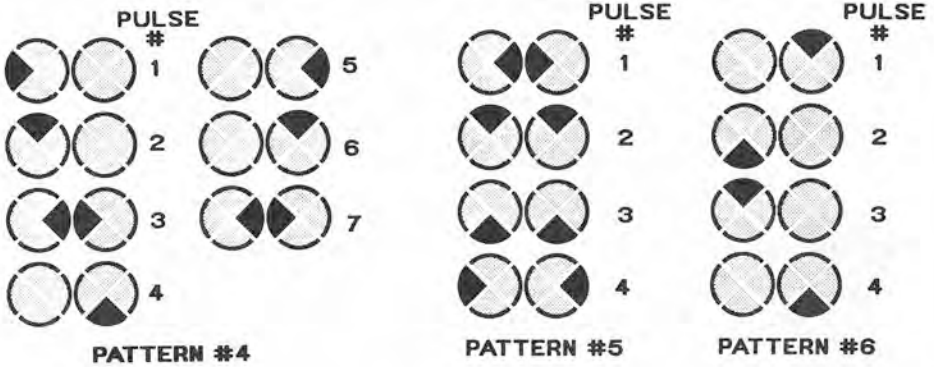
[F] = returns to Master Mode from Program Mode, Preset Mode, Synthesizer Mode, and Auxiliary Mode.

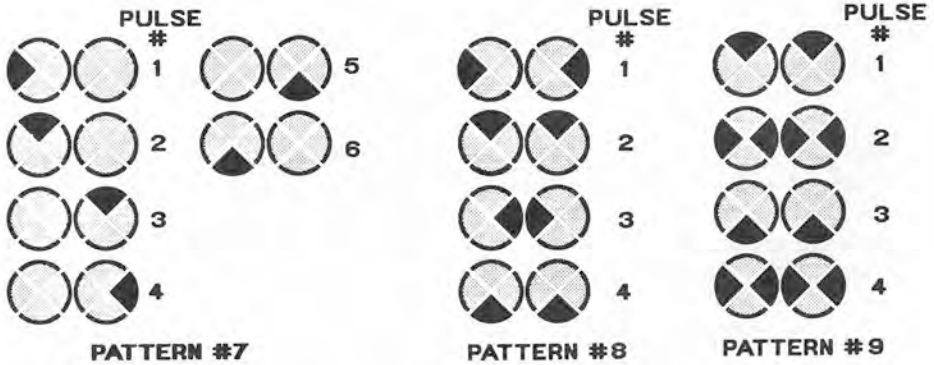
START MODE TEMPLATE

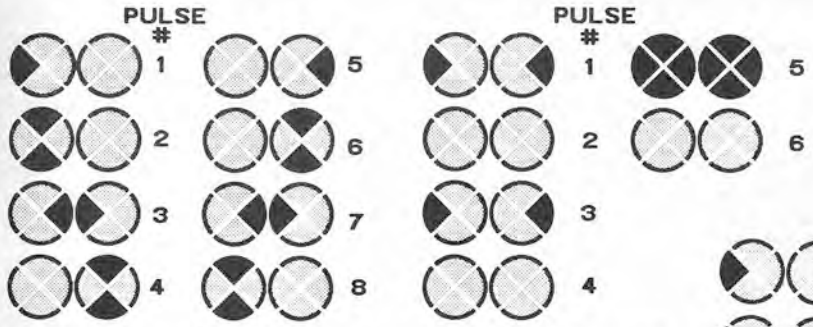
[F] = start countdown... adjust goggles and phones, REMEMBER TO KEEP YOUR EYES CLOSED, and enjoy your MindsEye Plus!

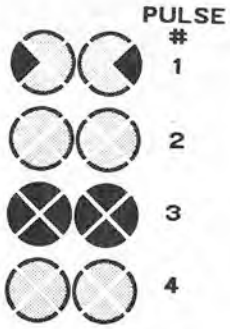
APPENDIX TWO: LIGHT PATTERNS OF THE MINDSEYE

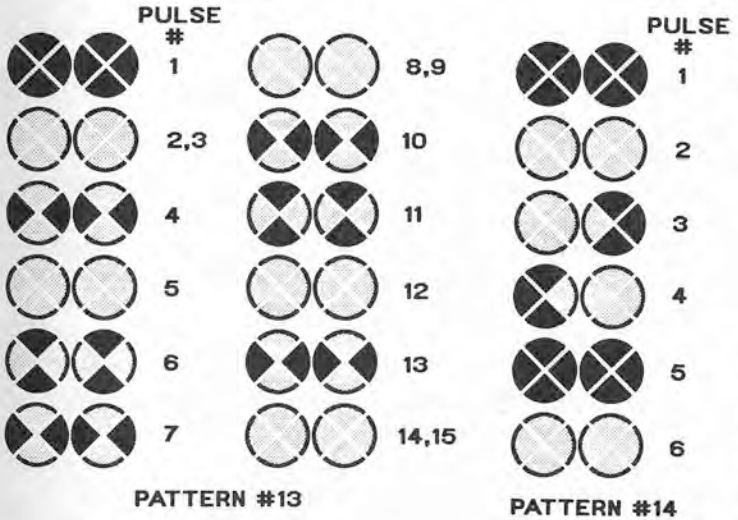


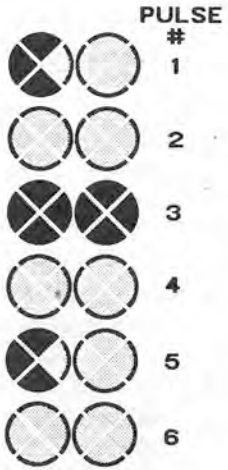












Sectors correspond to lamp positions

Black indicates lamp ON for pulse number

Grey indicates lamp OFF

APPENDIX THREE: PRESET SESSION PARAMETERS

The table below lists the parameters of the preset sessions.

SESSION NUMBER	0	1	2	3	4	*5	6	7	8	9	*10	11	12	13	14	**15
Start Rate	30	30	60	60	33	35	45	50	20	60	26	20	14	10	10	30
Start Ramp Time	10	15	15	25	10	17	5	15	5	10	10	5	5	5	10	20
Target Rate	16	10	8	16	28	7	10	12	20	20	20	18	16	50	40	30
Target Time	15	10	15	5	16	13	10	20	25	10	18	35	22	10	5	20
End Ramp Time	5	5	5	5	0	5	5	5	0	5	0	5	5	0	0	0
Light Pattern #	0	1	9	4	9	2	5	6	8	1	12	13	9	1	0	8
Sound #	1	2	7	3	12	9	6	5	8	2	13	4	15	11	10	2
Alarm #	1	1	1	1	0	1	1	0	0	1	0	0	1	1	0	0
TOTAL TIME	31	20	35	35	26	35	20	40	30	25	28	45	32	15	15	40

**Schumann Resonance session
*HemiTone session

APPENDIX FOUR: PRESET SESSION DESCRIPTIONS

The results one may expect with the preset sessions built into the MindsEye Plus falls into several categories. There are sessions for brainwave entrainment, relaxation and entertainment, and sessions for experimentation, creative visualization, and energy boosters. Use the [DESCRIPTIONS] in brackets as a general guide. Don't hesitate to change a sound or a light pattern or the length of a session to suit your own needs; after all, with the MindsEye Plus you are in control.

SESSION #00 [RELAXATION/ENTRAINMENT] Lamp pattern #00 (switches ON/OFF and L/R for this session only); sound #01- a harmonious major chord with moving overtones. Starts at 15 fps (flashes/sec) and ramps down to 8 fps with a total time of 31 minutes. Use this one when you need to relax without being lulled to sleep, after work or during a break for instance. Suggested synchronization setting- "Both." Extend the target time to create a longer session for playing self learning/programming tapes.

SESSION #01 [ENTRAINMENT] Lamp pattern #01 (switches L/R); sound # 02- smooth unison octave notes with filter sweep pulse. Starts at 30 pps and drops rapidly to 10 pps (Theta). Most effective with modulation "Depth" set high and "Synchronization" set to "In" or "Out." This session is good for experimenting with external audio modulation. (See page 17 for discussion of flash/pulse rate.)

SESSION #02 [ENTRAINMENT/ENTERTAINMENT] Lamp pattern #09 changes from vertical to horizontal vectors; Very effective for creating complex color patterns. Sound # 07 is an ocean surf simulation. Turn the modulation "Depth" off for this one. Start rate is 60 with ramp to 8 pps, but this is an effective session at most flash rates. Try changing the flash rate during the session with the "C" and "D" keys.

SESSION #03 [CREATIVE VISUALIZATION] Lamp pattern #04 traces an infinity symbol which can induce mandala-like imagery. The sound #03 is reminiscent of deep Eastern drones and chants with moving sweeps in octave patterns. Total session time is 35 minutes with a long, gradual slope from 60 pps down to Theta. We suggest you keep the "Sound Volume" low and the modulation "Depth" at about half maximum.

SESSION #04 [EXPERIMENTAL/VISUALIZATION] Lamp pattern #09 changes from vertical to horizontal vectors and is very effective for creating complex color patterns. Sound #12 combines several notes making up a complex pattern. Set modulation "Depth" at minimum and synchronization to "Both." When you turn the "Light Intensity" to maximum, you may notice a drum-like rhythm mixed with the tones at the flash rate of the lights. This rhythm provides a sharp audio cue as an aid to entrainment. If you want to eliminate rhythm, turn the "Light Intensity" down slightly.

SESSION #05 [HEMI-TONE/VISUALIZATION] Lamp pattern #02 changes up/down alignment; this pattern provides an intense visual experience for almost everyone. Sound #09 is a "HemiTone" (tm) binaural beat generator- a mellow unison that can be effective at all settings of the synchronization switch and modulation "Depth" control. Rate starts at 35 pps and ramps slowly to Theta. This is an easy session to enjoy and a good introduction to audio/visual entrainment.

SESSION #06 [ENTRAINMENT/ENERGIZING] Lamp pattern #05 is a double rotation of the light sequence and is intense, especially at slower flash rates. Sound #06 is comprised of strong unison octave notes with a slow filter sweep of the harmonics. Set the modulation "Depth" at near maximum and the synchronization switch to "In" or "Out." This session makes an appropriate background to spoken word tapes that implore you to energize your life and increase your personal power.

SESSION #07 [ENTRAINMENT/RELAXATION] Lamp pattern #06 is a mild sequence and very relaxing. Sound #05 is three unison tones with a two octave

spread. The rate drops gently into Theta and remains there for 20 minutes with a total session time of 40 minutes. Set the modulation "Depth" to maximum and try retuning the tones, using the "A" and "B" keys, during the session.

SESSION #08 [RELAXATION/SLEEP INDUCING] Lamp pattern #08 has the L/R lamps rotating in opposite directions, which tends to accent every fourth flash. The effect is a dual flashing pattern with the program rate and the quarter-flash rate both perceptible. The sound (#08) is a rich combination of tones that may be utilized in almost any switch configuration with good results. The target rate is low Theta for 20 minutes which make this session a good candidate for replacing the sleeping pills.

SESSION #09 [ENTRAINMENT/VISUALIZATION] Lamp pattern #01 (switches L/R); sound #02- smooth unison octave notes with filter sweep pulse. Rate starts fast and drops rapidly to 10 pps., which give rise to a variety of visual imagery in a short time. Experiment with the "PWM" control during this session. This is also recommended as a backdrop for spoken word external audio. The usual setting for the modulation "Depth" control to less that half when using spoken word input.

SESSION #10 [HEMI-TONE/EXPERIMENTAL] Lamp pattern #12 stimulates L/R eyes with two flash rates, one being twice that of the other. This is matched to sound #13 a HemiTone (tm) binaural beat tone combination. For added interest you can experiment with the modulation "Depth" control.

SESSION #11 [ENTERTAINMENT/VISUALIZATION] Lamp pattern #13 flashes in a 3:4 ratio, (easier to experience than explain). Sound #04 provides suggestions of winds of the Himalayas. Start rate of 20 glides to 18 for a total trip time of 45 minutes. How's that for a mini vacation?

SESSION #12 [RELAXATION/MENTAL FOCUS] Lamp pattern #09 changes from vertical to horizontal vectors (effective for creating complex color patterns), an is coupled with gentle rain sounds (#15). This session is intense with the modulation "Depth" off, the synchronization set to "In," and the "Light Intensity" set high. Total session time is 32 minutes, most of which is spent at 16 pps., which is a most pleasant, yet alert and focused state of consciousness. Input your favorite relaxation music and mix with our rainstorm. This can be an intimate experience to share with a friend when possible.

SESSION #13 [INCREASED ENERGY] Lamp pattern #01 is a sleigh ride to the land of Beta. Sound #11 is energizing- turn the "Volume" down for this one. Session time of 15 minutes makes this a quick coffee break replacement or morning perk-upper.

SESSION #14 [INCREASED ENERGY/MENTAL FOCUS] Lamp pattern #00 is all lamps on then off (a simple but effective pattern). Sound #10 is a mellifluous chord with filter sweep motion. We suggest a modulation "Depth" of half maximum, but experiment. Total time of 15 minutes is convenient for quick sessions, but may be easily extended for longer experiences.

SESSION #15 [SCHUMANN RESONANCE- 7.83 HZ] This is a special experimental session built to match the average resonant frequency of the earth's magnetic field. Some researchers (Robert Beck among them) have suggested a relationship between this frequency and the brainwave patterns of persons with parapsychological talents. We include this session so that you may judge the effect for yourself. Most of the session parameters are "locked" for this session, so you should run it "as is" without attempting any reprogramming. The "Volume" and "Light Intensity" controls are still accessable. Also note that the session time does not correspond to the displayed value for this session.

Concerning "Flash Rate," "Hz," and "Pulses per Second."

The terms "Pulses/sec" and "pps," as used in this manual, describe the internal clock rate of the computer program. While the "Flash rate," or lamp flashes/sec, is tied to the clock rate, it is a direct correspondence only for light patterns that flash lamps ON/OFF in a regular manner- pattern #00, for example. The other more complicated patterns have some lamps ON most of the time, and therefore do not correspond directly to the pps rate. When you want a direct correspondence of Flashes/sec to the displayed pps rate, use lamp pattern #00. The Flash rate will then be *one-half* of the displayed pps rate. The term Hz (Hertz) means "cycles/sec" and may be accurately applied only to lamp pattern #00 as explained above; for this reason we prefer to use "Pulses/sec" to describe the session timing, with the exception of the Schumann resonance session (#15), which is software locked, and is commonly referred to as "7.83 Hz."
See page 17 for additional information.

APPENDIX FIVE: THE MINDSEYE SYNTHESIZER

The MindsEye Plus synthesizer generates tones via a technique known as subtractive synthesis (also known as analog synthesis). The essence of this approach is to hone a complex sound into a simpler one. This sculpting process is known as filtering.

As with most analog synthesizers, there are four tone colors available in the MindsEye Plus. These are called noise, squarewave, sawtooth and triangle waveforms, reflecting their appearance on the screen of an oscilloscope. Generation of noise is somewhat akin to combining many colored light beams to form a single, white beam. That is, noise is the sum of many different pitches, distributed equally throughout the audio spectrum. This is also commonly referred to as white noise. It is used to synthesize the sounds of wind, rain, surf, and similiar sounds. The remaining three waveforms, like noise, consist of the sum of many simpler tones. Unlike noise, these tones are related rather like the tones on a keyboard, in a structure known as the harmonic series. The loudest tone in this series is also known as the fundamental, which is also the lowest pitch in the series. For example, pressing the third "C" on a piano will produce not only C3, but a complex series of higher pitches. These overtones give the piano its unique sound quality, and in fact varies from piano to piano (and note to note).

The differences in the square, sawtooth and triangle waveforms is simply the result of A) which overtones are present, and B) how loud each of them is. The square waveform has a richer sound than the pure triangle because more energy is distributed in its overtone series. This results in a "fat," sometimes buzzy sound which often heard in popular music, for such sounds as synthesized bass. The sawtooth waveform falls somewhere in between, with a reedy sound more appropriate to the synthesis of clarinet-like tones.

Once one of these waveforms is selected, it is usually filtered. There are three filters currently available in the MindsEye Plus: Lowpass, Bandpass and Highpass. These all serve to alter the selected waveform's harmonic series. The lowpass filter smoothly eliminates overtones above a variable cutoff frequency, whereas the highpass filter has the opposite effect. The bandpass filter allows only those harmonics near the cutoff frequency to pass. The "Filter Types" diagram illustrates these properties.

Another property of the filter is its resonance. This is the amount of "boost" given to the sound at its cutoff frequency.

A FEW QUESTIONS AND ANSWERS

HOW IMPORTANT IS THE SOUND?

The entrainment mechanism is both visual and aural. Sound and music has been used for centuries in many cultures to manipulate consciousness. Drums, chants, and environmental sounds like wind and rain all provide strong mental pictures and associations. Pleasant tones are much more enjoyable and relaxing than one note beeps or tones, such as those used in other machines. The MindsEye incorporates the most sophisticated sound generation circuitry of any light-sound device, employing digital music synthesizers to generate complex waveforms, rich two and three note harmonies, and moving audio sculptures. Although the MindsEye Plus has carefully selected preprogrammed sounds, you may alter any or all the tonal qualities by simple input to the keypad, as described in the manual.

HOW DOES HEMI-TONE WORK?

Hemi-Tone sound generation is a feature of the newer MindsEyes which have two sound synthesizers in the circuit. By specifying slightly different sound frequencies for the left and right channels, it is possible to induce a third frequency, being the difference in the left and right, in the mind of the subject. This is known as binaural beat frequency generation. The perceived beat frequency is useful as an entrainment tool when paired with lights pulsing at the same frequency.

WHAT DOES "PULSE WIDTH MODULATION" OF THE LIGHTS MEAN?

It is a way to achieve a wider variety of visual stimulation without changing the light brightness setting. It may be thought of as a "tone control" for the lights. PWM varies the on-off time of the LEDs during each cycle. Short pulse widths are more strobe-like, generating more crystalline patterns, and are thought to be more effective at inducing entrainment.

WHY DOES THE MINDSEYE USE RED LEDS INSTEAD OF INCANDESCENT LIGHTS?

LEDs are state of the art devices for converting small amounts of electrical energy into light. They can be switched on and off much faster than incandescent lamps, producing sharp strobe-like pulses. Another real consideration is total life of the bulbs. Typically, an incandescent bulb will last a few hundred hours while an LED may survive 10,000 hours of use. As to color perception, with your eyes closed the filter effect of the tiny blood capillaries in the eyelids produces a soft red visual field, narrowing the full spectrum of any light source.