



```
VirtualLJ off  
MasterPause Toggle  
WaitForMidi 0x90, 10, Any
```

## Math operations (expressions)

Standard: + - / \* % Inversion: ! bit OR: | bit AND: & bit XOR: ^ bit right shift: » bit left shift: «

## Operators

IF operator.

Syntax: if ( expression ) operator

expression - covered with brackets. Must be an expression with numerical result that gives "0" or not a "0". So, for numerical variable it's possible to write "if (variable) ...".

Compare operators are: ">" ">=" "<" "<=" "=" "<>". They produces numerical result "0" or "1".

You can combine comparing operations with "&" and "|" bit-wise operators (but be sure that left and right side are "0" or "1"). It's recommended to cover complex operations into brackets - like "if <sup>1)</sup>"

operator will be executed if condition gets non-zero result. If you want to place other operator after "if (condition) operator" - it must be divided with ";" - but it's better to place next operator on the next line



## GOTO operator

Syntax: goto label

"label" is a name of position for a jump. The label can be placed before any operator and separated by ":" character. As example:

```
mylabel: WaitForBeat 4 ... do something... goto mylabel
```

Operator GOTO can work with the labels inside the string variables. It means that you declare string variable, assign a label name to variable, and then you a variable in GOTO. Example:

```
var s s="mylabel" goto s
```

```
DisplayPopup "It does not work" exit
```

```
mylabel: DisplayPopup "It works"
```

## VAR operator

PangoScript allow define local variables. The lifetime for the local variable defined by lifetime of the Scripiter that execute PangoScript. As soon as the Scripiter freed, all its local variables are removed as well.

All variables must be declared before the using. No need to specify the type of variable. The variable automatically adjust the type depending on value. Internally supported integer, float and string variables. The declaration start from VAR operation and the follow one or more variable names. As example:

```
var MyVariable var a,b,c
```

Before using the variable must be initialized by some value. Otherwise BEYOND will generate error and stop script execution. Example: var MyInteger, MyString MyInteger = 10 MyString = "Hello!"

All variables declared as VAR are local.

GLOBALVAR operator The variable can be declared as global. In this case, it visible in ALL scripts of BEYOND.

## General functions

intstr(value:number):string - transform number to string value - number or float number result - string

floatstr(value:number):string - transform number to string value - number result - string

abs(value:number):number - value by modulus value - integer or float number result - same type as argument. result is absolute value

int(value:number):integer - return integer part of float value value - a float point number

frac(value:number):float - return fractional part of float point value value - float

round(value:float):integer - return rounded float point value (to integer) value - a float point number

sqr(value:number):number - return a square of argument value - a float point number or integer

sqrt(value:number):float - return a square root of argument value - a float point number or integer

cos(value:float):float - co-sinus value - a float point number or integer. angle in radians

sin(value: float):float - sinus value - a float point number or integer. angle in radians

tan(value:float):float - tangents value - a float point number or integer. angle in radians

arcsin(value:float)float - arc sinus value - a float point number or integer. angle in radians

arccos(value: float):float - arc cosinus value - a float point number or integer. angle in radians

arctan(value: float):float - arc tangents value - a float point number or integer. angle in radians

arctan2(dx, dy:float):float - arc tangents dx, dy - ....

min(a,b:number):number - return a minimum of two numeric values a,b float or integer

max(a,b:number):number - return a maximum of two numeric values a,b float or integer

pi:float - return PI value - 3.1415926...

invert(value:number):integer - invert value. Boolean operation, but can be used with float point numbers. If value more than 0.5 then function return 0, otherwise return 1.

## Date and Time

now:float - date&time, calls now() function of Delphi

tickcount: integer - return number of millisecond from start of PC.

hms(hour, minute, second):integer - transform hour, minute and second into seconds.

GetYear:integer - function return current year by PC clock. Result

GetMonth:integer - function return current month by PC clock

GetDay:integer - function return current day by PC clock.

timestr(now:float) :string now - is variable representing time. Function return string with time in short format such as "11:53", without seconds

timestrlong(now:float):string - now - is variable representing time. Function return string with hours, minutes, seconds, such as "11:53:10"

datestr(now:float):string -  ,  - now - is variable representing date. Function return string short date format such as "21.11.2012"

datestrlong(now:float):string -  ,  - now - is variable representing date. Function return string long date format such as "21  2012 .

dayofweek(now:float):string - short version day of the week

dayofweeklong(now:float):string - long version day of the week

## String functions

uppercase(string):string - transform input string to upper case. Result is a string.

lowercase(string:string):string - transform input string to lower case. Result is a string.

crLf:string - return a string, line separator (13,10)

## Clock And Metronome

b2s(beats) - transform beats to seconds

b2ms(beats) - transform beats to milliseconds

s2b(seconds) - transform seconds to beats

b2s(seconds) - transform beats to seconds

## Functions

There are a few functions for access of incoming data

Dmx ( Channel, OutputMin, OutputMax ) Parameters: Channel - index of DMX channel, acceptable value from 1 to 2048 OutputMin, OutputMax - defines the range resulting value of the function. Output value will start from OutputMin and increase up to OutputMax result = OutputMin + (DmxChannelValue / 255) \* (OutputMax-OutputMin)

Example:

```
Position Dmx(10, -100, 100), Dmx(11, -100, 100), Dmx(12, -100, 100)
```

in this example we use Position command that has 3 arguments - X,Y,Z and we use DMX IN values (three channels, 10,11,12), and map the values range -100 to +100.

Dmx ( Channel ) or Dmx( Channel, OutputMin, OutputMax) Parameters: Channel - index of DMX channel, acceptable value from 1 to 2048 Result of the function is value of DMX channel as it is, without any range adjustments

OutputMin, OutputMax - defines the range resulting value of the function. Output value will start from OutputMin and increase up to OutputMax. Internally channels are normalized to 0...1 range result = OutputMin + (ChannelValue) \* (OutputMax-OutputMin) Example:

```
DisplayPopup Dmx(10) // display the value of 10th DMX channel.
```

Note: version with min/max used for simplification of use of function in operators where you may need to transform DMX value range (0..255) to some other range. As example Size operator, you may want to use size range like 0...100, or 10...100, or -100..100.

Channel ( Channel, OutputMin, OutputMax ) or Channel( Channel )

Parameters: Channel - index of Channel, acceptable value from 1 to 255 OutputMin, OutputMax - defines the range resulting value of the function. Output value will start from OutputMin and increase up to OutputMax. Internally channels are normalized to 0...1 range result =  $\text{OutputMin} + (\text{ChannelValue}) * (\text{OutputMax} - \text{OutputMin})$

If function has one argument then result is normalized channel value (range from 0 to 1)

Example:

```
Size Channel(10, 5, 100), ChannelIn(10, 5, 100), ChannelIn(10, 5, 100),
```

in this example we use Size command that has 3 arguments - X, Y,Z and we use Channel 10 value for all 3 axis.

Channel ( Channel ) Parameters: Channel - index of Channel, acceptable value from 1 to 255 Result of the function is channel value. Channel value is normalized, the range from 0 to 1.

CC (Channel, Controller, OutputMin, OutputMax) Get a value of of MIDI controller. BEYOND memorize all values of incoming MIDI controllers (Contrl Change Message) and you can get an access to it. Channel - value 0..15 Controller - value 0..127. This is Data1 in MIDI messages OutputMin, OutputMax - defines the range resulting value. Result =  $\text{OutputMin} + (\text{ChannelValue}/127) * (\text{OutputMax} - \text{OutputMin})$

ExtValue( OutputMin, OutputMax ) There are a few pretty big tables of code-sources. A tables such as DMX, ArtNet, ControlChange, PitchBand, NoteOn initiated by channel/message that has a value. This function allow get access to the channel that initiate the code. Better explain on example. Lets say I want to connect DMX channel to Master Live Control, Position X. In this case, code that will do this is this:

```
PositionIndex 1, ExtValue(-100,100)
```

In this example PositionIndex is a live control command, see below. 1 is index of axis. And finally ExtValue() is a fuction that take DMX channel value in map to rangle -100 to 100.

ExtDelta( Delta ) Function equal to ExtValue but made specially for MIDI encoders. There are many controlled with wheels and knobs that generate Control Change message and the data2 value is 00 or 7F. That is all, no values in between. For such cases has a sense to use "delta" version of commands and ExtDelta() for getting exact value of delta. Function return -Delta or +Delta. Only two values, no exceptions. Example of use

PositionDelta 0, ExtDelta(1), 0 *move vertically. another example: AngleDelta 0,0, ExtDelta(45) rotate by Z on 45 degrees.*

Random( MaxValue ) Function return random value in range 0..MaxValue. Note, MaxValue included into the range

RandomIn( MinValue, MaxValue ) Functino return random value in range MinValue..MaxValue

Param( ParamIndex ) - newer name of OscParam() function. It get the value of parameter supplied into the script. See commend about OscParam()

OscParam( ParamIndex ) Specialty designed for use in "OSC to CODE" table.. When BEYOND receive OSC message and supply it into interpreter to execution, then we can supply up to 10 parameters with OSC message. BEYOND put them into local array, and you may use it inside the Code. Note, data is there only during execution of current script. As soon we exit from execution of this script, data will be lost. OK, parameter index is from 1 up to 10. BEYOND check how many parameters the OSC message has, and if you will try to access non existing parameter then script will stop with error. So, if OSC message has 3 parameters, then you can use index from 1 to 3. Accepts f, i, and s type of OSC parameters. You can freely mix float and integer.

ParamRange( MinValue, MaxValue) function return TRUE (1) if the first parameter inside the specified range.

ParamRange(ParamIndex, MinValue, MaxValue) function return TRUE (1) if the specified parameter (param index) inside the specified range (from MinValue to MaxValue)

GetTransitionName( index ) function return string, the name of transition. Index is number of transition. Range 0..23

BeatTime Function has no arguments. The result of function is float point number. Integer part of function is number of beat from the start of BEYOND. The fractional part is progress inside the beat.

GetMidiDeviceIndex function return currently selected MIDI Device pair, Value range 1..4.

ObjectExists( AObjectName ) - function get object name a s string and return 1 if object exists, or zero if object is not found.

## Timecode input

GetTimeCode - return latest timecode value as a float point value, value in seconds

GetTimeCodeTick - return the tick when the last timecode value arrived. Use function GetTick for getting the current tick value.

## Cue related functions

CuePlaying( PageIndex, CueIndex) - function return 1 if cue is currently playing in the Grid, otherwise return 0. Indexing of page and cue starts from 1. Example: CuePlaying(1,1) return state of first cue on a first page. Note, function is not applicable for ProTracks and DMX server. CueEmpty(PageIndex, CueIndex) - function return 1 if cue is empty, otherwise return 0. Indexing of page and cue starts from 1. GetCueCaptionColor(PageIndex, CueIndex) - return cue caption color in GDI format. Format is 24bit RGB, red is LSB. Overall formula  $Blue * 256 * 256 + Green * 256 + Red$ . Indexing of page and cue starts from 1. ===== Misc ===== GetBeyondBuild - return integer value, build of BEYOND application. GetMidiDeviveIndex - return current MIDI device index associated with this script. BEYOND can use 4 MIDI devices. By default script associated with 1st device. There is a command for change device index. This function allows to check current association. Indexing from 1. GetMidiDeviceLayer - return current layer of MIDI device mapping. Indexing from 1. Layering introduced because BEYOND has big number of

functions, and at the same time, MIDI device has limited number of sliders and buttons. MIDI settings allow to organize several layers, and as a result, MIDI controller will do several functions (depending on current layer). GetMidiDeviceLayer return currently active layer of MIDI device associated with this script. ===== User Interface ===== GetLcTabMode:integer - function return mode (destination of control) of Live Control tab. Basically, it tell what button selected - Master, Cue, Zone or ProTrack Values are: 1 - Master 2 - Cue 3 - Zone 4 - ProTrack GetTcTabMode:integer - function return mode of Time Control tab.Constant is same as in GetLcTabMode GetFxTabMode:integer - function return mode of FX tab.Constant is same as in GetLcTabMode GetGrid1Mode:integer - function return currently selected click mode of main Grid. Result is one of following values 0 - Select mode 1 - Flash mode 2 - FlashSolo mode 3 - Toggle mode 4 - Restart mode 5 - ProTrack mode GetGrid2Mode:integer - function return currently selected click mode of secondary Grid. Constants same as for function GetGrid1Mode ===== Timeline mode functions ===== GetTimelinePos:float - function return time position of current timeline. Value in seconds. Fractional part contain millisecond part. GetTimelineDuration:float - function return duration of current timeline. Value in seconds. Fractional part contain millisecond part. GetTimelineOnline:integer function return 1 when "Enable laser output" is enabled in Timeline mode, otherwise return value is 0. GetTimelinePlaying:integer function return 1 when timeline is currently playing, otherwise return value is 0. GetTimelineTabIndex:integer. Timeline editor can work with multiple timelines. Function return index of currently selected timeline. GetTimelineTabName:string - function return tab name of currently selected timeline. ===== General commands ===== StartCue Page, Cell or StartCue "cue name" Parameters: Page - page index, 1..100,. Cell - cell index, 1..100; Parameters: "cue name" is a string that define cue name as we see it in the grid. At first BEYOND search for cue name in the current page. If not found than the search starting from the first page of the grid. Purpose: Start the cue. If cue already started the no action StopCue Page, Cell or StopCue "cue name" Parameters: Page - page index, 1..100,. Cell - cell index, 1..100; Parameters: "cue name" is a string that define cue name as we see it in the grid. At first BEYOND search for cue name in the current page. If not found than the search starting from the first page of the grid. Purpose: Stop the cue. If cue is not started then no action. ToggleCue Page, Cell or Toggle "cue name" Parameters: Page - page index, 1..100,. Cell - cell index, 1..100; Parameters: "cue name" is a string that define cue name as we see it in the grid. At first BEYOND search for cue name in the current page. If not found than the search starting from the first page of the grid. Purpose: Start cue if it is not currently playing, or stop a cue if it is currently playing. StopCueType mask, time mask: 1- Image 2-Timeline 4-DMX 8-Fixture Sequence 16-Beams 32-Capture time  optional value, this is for soft stop. Zero means "right now". PauseCue Page, Cell, State Parameters: Page - page index, 1..100,. Cell - cell index, 1..60; State - recommended to use predefined constants OFF, ON or TOGGLE. Values - 0,1,2 Purpose: allow to pause or unpause the cue RestartCue Parameters: Page - page index, 1..100,. Cell - cell index, 1..60; Purpose: restart the cue if it already playing. Otherwise, no action. CueDown Page, Cell Parameters: Page - page index, 1..100,. Cell - cell index, 1..60; Purpose: does a "mouse down" on the cue CueUp Page, Cell Parameters: Page - page index, 1..100,. Cell - cell index, 1..60; Purpose: does a "mouse up" on the cue StopCueNow Page, Cell Parameters: - page index, 1..100,. Cell - cell index, 1..60; Purpose: Stop cue immediatelly without soft ending what is default option StopCueSync Page, Cell Parameters: page index, 1..100,. Cell - cell index, 1..60; Purpose: Stop cue softly and wait for completion HoldClick state Parameters: state - 0,1,2 or the constants ON, OFF, TOGGLE Purpose: This is additional modifier for coming "click" command. It allow to start the Cue in "HOLD" mode. HoldClick command designed for with MIDI. You can use a special button on MIDI Controller and inside the button down you will enable hold mode, and on button release you will disable hold mode. StopAllNow Parameters: none Purpose: Stop all running cues. Equal to click on menu "Run" → "Stop All Cues". This version stop all cues immediatelly Example: StopAllNow StopAllSync Time Parameters: time in seconds. Purpose: Stop all running cues with specified soft-stop time. Also, wait for completion Example: StopAllSync 0.2 StopAllAsync Time

Parameters: time in seconds. Purpose: Stop all running cues with specified soft-stop time. Do not wait for command completion Example: StopAllAsync 0.5 BlackOut Parameters: none Purpose: The same action as click on "Blackout" button on a mail toolbar of BEYOND Example: Blackout EnableLaserOutput Parameters: none Purpose: Access to "Enable Laser Output" button on mail toolbar. This command

enable output 😊 Example: EnableLaserOutput DisableLaserOutput Parameters: none Purpose: Access

to "Enable Laser Output" button on main toolbar. This command enable output 😊 . There is no "toggle" version. Example: DisableLaserOutput MasterPause Parameters: On or Off or Toggle Purpose: Control of "Pause" button on main toolbar. Of course it does an action same as a button. Example: MasterPause On MasterPause Toggle MasterSpeed Speed Parameter: Speed, normalized value in range from 0 to 1. 0 represent full stop, 1 means normal speed Purpose: It is global speed multiplier for players from Grid VirtualLJ Parameters: On or Off or Toggle Purpose: Control of "Virtual LJ" button on main toolbar. Of course it does an action same as a button. Example: VirtualLJ OFF ===== VLJFX ===== OneCue Parameters: none Purpose: Control of "One Cue" button on main toolbar. This command enable "One cue" mode Example: OneCue OnePer Parameters: none Purpose: Control of "One Per Zone" button on main toolbar. This command enable "One Per Zone" mode. Note, this mode share the button with OneCue mode Example: OnePer MultiCue Parameters: none Purpose: Control of "Multi Cue" button on main toolbar. This command enable "Multi cue" mode Example: MultiCue Transition Parameters: On or Off or Toggle Purpose: Control of "Transition" button on main toolbar. This command enable or disable the transition. Example: Transition On ClickSelect Parameters: none Purpose: Control of "Select" button on main toolbar. This command enable "Select" mode. Example: ClickSelect ClickToggle Parameters: none Purpose: Control of "Toggle" button on main toolbar. This command enable "Toggle" mode. Example: ClickToggle ClickRestart Parameters: none Purpose: Control of "Restart" button on main toolbar. This command enable "Restart" mode. Example: ClickRestart ClickFlash Parameters: none Purpose: Control of "Flash" button on main toolbar. This command enable "Flash" mode. Example: ClickFlash ClickSoloFlash Parameters: none Purpose: Control of "SoloFlash" button on main toolbar. This command enable "SoloFlash" mode. Example: ClickSoloFlash ClickLive Parameters: none Purpose: This button is currently invisible, but t active mode of LivePRO - like tracks. Example: ClickLive ClickTrack - enable ProTrack click mode. StartPrevious - start previously started cue. Command is for button Back of the main toolbar (Grid mode). TogglePrevious - stop current cue and start previously stated cue. Command is for button Swap of the main toolbar (Grid mode). TimerBeat Parameters: none Purpose: Simulate Timer beat (BPM timer on the main toolbar) Example: TimerBeat AudioBeat Parameters: none Purpose: Simulate Audio beat what usualy comes from AudioIn and FFT. Example: AudioBeat ManualBeat Parameters: none Purpose: Manual beam comes from keyboard. Now it is possibl to initiate it from code. Example: ManualBeat SetBPM value- set master Beat timer value in BPM (beat per minute). The talk about BPM (Metronome) panel on the main toolbar in the Grid mode. SetBpmDelta value - increase or decrease the BPM. This is relative version of SetBPM command. It designed for use with MIDI controllers, where MIDI button can be used for change of tempo. BeatTap Parameters: none Purpose: This is tap-tempo. It work in BPM panel in a main toolbar and allow enter beat-per-minute by means of tapping. Command work same as click on BMP panel. Or "space" key. Example: BeatTap BeatResync Parameters: none Purpose: Synchronize Beat timer to the moment of this command execution. Same as "backspace" key Example: BeatResync ===== FX and Live Control commands ===== The Destination A few words about commands of BEYOND. Each command of BEYOND has information about: Sender - who initiated the command Server - who is recipient / server of the command. As example - zone, cue, master, and so on Server index - index of server, of there are many such servers. As example - Projection Zone Command - the command itself Arguments - depends on exact commands. Lets consider example. We

want to set the size of second projection zone to 50%. In this case, command will have such values  
Sender - BEYOND set it automatically, no worry about Server - Zone Server index - 2 Command - Size  
Arguments - 50,50,50 For the script, to make a complex command that include all fields is not practical.  
Because the process has two parts. The first part - you define the destination. By default it is Master. The  
second part is a Command itself. BEYOND memorize the setting of destination and all consequent  
commands will use it. ControlMaster Parameters: none Purpose: Select Master LiveControl as a  
destination for Live Control commands ControlCue PageIndex, CellIndex Parameters: PageIndex  
(1..PageNumber) and Cell Index 1..100. By default the grid has 60 cells (10x6 mode). But the grid may  
have another dimension with 100 cells as max. Purpose: Select Cue LiveControl as a destination for Live  
Control commands ControlZone ZoneIndex Parameters: Zone index, 1..ZoneNumber; Purpose: Select  
Zone LiveControl as a destination for Live Control commands ControlProTrack ProTrackIndex Parameters:  
lindex, 1 to number of ProTracks created in the BEYOND/ Purpose: Select ProTrack LiveControl as a  
destination for Live Control commands. Possible to select only one ProTrack ControlSelZones Parameters:  
none Purpose: In opposite to ControlSelZones, this command address all selected zones of BEYOND.  
BEYOND keep the zones in list and each zone has Selected property. The command normally goes to only  
one destination - one zone, one cue, one track. But specially for external control, added ability to send  
the Live Control command to multiple destinations. Technically, BEYOND will send many command, by  
one for each selected zones. Also, this command address selected ProTracks. ControlSelCues  
Parameters: none Purpose: Control currently selected Cues. This command allow to address Live Control  
to multiple (currently selected) cues. The action of command limited to one page only. If BEYOND in Grid  
mode, then will be used the page of Main grid. If BEYOND in Timeline/PlayList mode, then will be used  
page from bottom side grid. ControlFromUI Note: commands above are local commands, and modify  
internal register of interpreter that execute this code. It means, that the setting work only for this code,  
and till ===== FX Control ===== FX Index1, (Index2,...) Parameters: At least one argument that define  
state of FX layer. Number of arguments should be equal, but can be less than number of layers in FX  
grid. Command designed to setting all FX layers at once, by means of one command. For setting each  
Layer separately use SetFX Purpose: Control of FX register of cues, zones, and master 0 - stop. 1..100:  
Effect indexing start from zero and in current version up to 100 Example: FX 0,0,0,0 stop four FX layers  
FX 10 set 1st later to effect number 10. Example: FX 2,3,4,5 lineary select 2th, 3rd, 4th, 5th FXs  
FX 0,0,0,0 stop all FXAction Action1, (Action2,...) Parameters: At least one argument that define state of FX  
layer action. "Action" define a morph between original frame and frame after effects. Number of  
arguments should be equal, but can be less than number of layers in FX grid. Command designed to  
setting all FX layers at once, by means of one command. For setting each Layer separately use  
SetFXAction 0 - OFF, no action at all 100 - norma;. full action. Example: FXAction 0,0,0,0 set action for  
four FX layers

Note: Action parameter is not same as "stop" effect. It relatively slow operation because of calculation of  
morph, extra buffers, and relating calculations.

SetFX LayerIndex, EffectIndex,[EffectIndex,EffectIndex...] A bit more compact version. First parameter  
index of layer 1 to 4, and Effect index of 1..100. Set state of one layer. If EffectIndex is not defined, then  
command will stop the layer If there are multiple Effectindex then command will activate multiple effects  
in this layer

SetFXAction LayerIndex, Action Purpose: set Action parameter of one layer Layer index - index of FX  
layer, 1..N Action - 0..100, in percents

SetFXAction1 ActionValue SetFXAction2 ActionValue SetFXAction3 ActionValue SetFXAction4 ActionValue

Purpose: set Action parameter of one layer Action - 0..100, in percents

SetFXActionDelta ActionDelta1, [ActionDelta2,..] Shift the action value by delta. For each layer value of delta is personal. At least one argument required, Starts from 1st layer and up.

FXTimeScale Layer, ClockSale, BeatScale

FXTimeScaleDelta Layer, ClockSale, BeatScale

FXTimeShift Layer, ClockValue, BeatValue

FXTimeShiftDelta Layer, ClockValue, BeatValue

ShiftFX LayerIndex, Direction Delta version of control. Allow to shift effect index on N

ToggleFX LayerIndex Toggle between internal LC register and current state. Layer index is optional. If Layer not defined that will be swapped all layers

ShiftFX LayerIndex, IndexDelta LayerIndex - 1..N IndexDelta - how to shift current index

DropFX Layer, Effect, DurationMS Layer - index of effect later in grid Effect - index of effect in grid  
DurationMS - define how long effect will be executed

FXClick Layer, Index - click on effect of FX grid, with absolute effect index, 1..N

FXCellClick Layer, CellIndex - click on effect of FX grid, but effect index based on left corner, so, click on visible area


FXScroll BaseIndex Base index - control scrollbar of FX grid, define left corner. 0 - default state.

## Live Control

Size X, Y, Z Parameters: X, Y and Z are size in %. 100% means a full size. Max value 400%. Purpose: Access to Size of LiveControl object. Example: Size 100,100,100

SizeDelta X, Y, Z Parameters: X, Y and Z are deltas that will be added to Size values. Value in %. Purpose: Access to Size of LiveControl object. Good to incremental control Example: SizeDelta 0,1,0

Zoom 100 Parameter - zoom value, 0..100 ZoomDelta 0 Parameter - zoom delta,

Position X,Y,Z Parameters: X, Y and Z are value of Position. Value in %. 0,0,0 is a center , 100% is boundary. Max value 400%. Purpose: Access to Position of LiveControl object. Example: Position 100,0,0 move to the right corner  
PositionDelta X,Y,Z Parameters: X, Y and Z are deltas for Position. Value in %  
Purpose: Access to Position of LiveControl object. Example: PositionDelta -5,0,0 move to the left on 5%

PositionIndex AxisIndex, Value Parameters: Axis Index means: 0 is X, 1 is Y, 2 is Z. Value is value of

position, in %, as usual  Purpose: Access to Position of LiveControl object. Example: PositionDelta 2,

*1 move by Z axis on 1% AngleX angle Parameters: Angle in degrees Purpose: Access to Rotation of LiveControl object. Example: AngleX 45 AngleY angle Parameters: Angle in degrees Purpose: Access to Rotation of LiveControl object. Example: AngleY 0 AngleZ angle Parameters: Angle in degrees Purpose: Access to Rotation of LiveControl object. Example: AngleZ 180 Angle X, Y, Z Parameters: X,Y and Z are angle in degrees. Directly define a value of rotation angles Purpose: Access to Rotation of LiveControl object. Example: Angle 0, 0, 90 AngleDelta X, Y, Z Parameters: X,Y and Z are deltas of angle in degrees. Purpose: Access to Rotation of LiveControl object. Example: AngleDelta 0, 0, 5 increment Z rotation angle*

**RotoSpeedX** Value Parameters: Value - speed. Degrees per second. Purpose: Access to Rotation of LiveControl object. Example: RotoSpeedX 0

**RotoSpeedY** Value Parameters: Value - speed. Degrees per second. Purpose: Access to Rotation of LiveControl object. Example: RotoSpeedY 0

**RotoSpeedZ** Value Parameters: Value - speed. Degrees per second. Purpose: Access to Rotation of LiveControl object. Example: RotoSpeedX 0

**RotoSpeed X, Y, Z** Parameters: X,Y and Z are rotation speed for corresponding axis Purpose: Access to Rotation of LiveControl object. Example: RotoSpeed 0, 0, 0 *turn off rotation RotoSpeedDelta X, Y, Z Parameters: X,Y and Z are deltas of rotation speed. Purpose: Access to Rotation of LiveControl object. Example: RotoSpeedDelta 0,0, -1 decrement of rotation speed*

**Brightness** Value Parameters: Brightness, 0..100% Purpose: Access to Brightness of LiveControl object. Example: Brightness 50 *half dimmed image BrightnessDelta Value Parameters: delta-version of brightness control Purpose: Access to Brightness of LiveControl object. Example: BrightnessDelta +1 positive increment*

**VisiblePoints** Value Parameters: percentage of visible points, 0%..100%. Purpose: Access to VisiblePoints of LiveControl object. Example: VisiblePoints 100

**VisiblePointsDelta** Value Parameters: delta-version of brightness control Purpose: Access to VisiblePoints of LiveControl object. Example: VisiblePointsDelta 0

**ColorSlider** Value Parameters: Value range is 0..255. Purpose: Access to Color Slider of LiveControl object. Example: ColorSlider 0

**ColorSliderDelta** Value Parameters: Value is delta to be added to ColorSlider Purpose: Access to Color Slider of LiveControl object. Example: ColorSliderDelta 5

**AnimationSpeed** Value Parameters: Value range is 25..200 Purpose: Access to AnimationSpeed Slider of LiveControl object. Example: AnimationSpeed 100 *default value AnimationSpeedDelta Value Parameters: Value is delta to be added to AnimationSpeed Purpose: Access to AnimationSpeed Slider of LiveControl object. Example: AnimationSpeedDelta -10 ScanRate Value Parameters: Value range is 25..200 Purpose: Access to ScanRate Slider of LiveControl object. Example: ScanRate 100 default state*

**ScanRateDelta** Value Parameters: Value is delta to be added to ScanRate Purpose: Access to ScanRate Slider of LiveControl object. Example: ScanRateDelta 10

**RGBA** Red, Green, Blue, Alpha RGBA Red, Green, Blue RGBA Index, Value

If 4 parameters: Red, Green, Blue are color channels, values 0..255. Alpha is transparency control, range 0..255 If 3 parameters: Red, Green, Blue are color channels, values 0..255. Same as four parameters, but alpha channel stay unchanged If 2 parameters then Index define what parameter to change, and Value define the value of corresponding channel. Index values are 0 - Red 1 - Green 2 - Blue 3 - Alpha

Purpose: Direct color control of of LiveControl object. RGBA is additional and independent layer to ColorSlider parameter Example: *RGBA 255, 255, 0, 128 makes image yellow-shaded (on 50%) RGBADelta Red, Green, Blue, Alpha RGBADelta Red, Green, Blue RGBADelta Index, Value* If 4 parameters: *Delta (relative change) by Red, Green, Blue and Alpha channels* If 3 parameters: *Delta (relative change) by Red, Green, Blue and Alpha channels* If 2 parameters then *Index* define what parameter to change, and *Value* define the delta of value of corresponding channel. Index values are 0 - Red 1 - Green 2 - Blue 3 - Alpha Example: *RGBADelta 0, 0, 0, -16 decrease alpha channel value* *ResetAllRoto Parameters: none Purpose: reset all rotation to zero, and clear accumulator* Example: *ResetAllRoto* *ResetLiveControl Parameters: none Purpose: reset all sparameters of LiveControl object to default* Example: *ResetLiveControl* *==== Live Control - UI surface* *==== Live Control tab contain a sliders like a Size, Color, etc. Each such slider has two button that scroll the slider to minimum or to maximum value. What the button does - define a speed of motion. As soon as slider hit the boundary, motion will stop. Speed means a shift of slider during one iteration. Speed can be positive, or negative. Value zero means stop the motion now. In total, we have 11 functions, each ClickScrollZoom speed. ClickScrollSize speed. ClickScrollFade speed ClickScrollVPoints speed ClickScrollScanRate speed ClickScrollColor speed ClickScrollAniSpeed speed ClickScrollR speed ClickScrollG speed ClickScrollB speed ClickScrollA speed* Each function control corresponding slider in Live Control tab. Note, that this is control of UI slider. This is not a control of some exact LiveControl object. *ClickLCTabMode Index Parameters: Index represent mode of Live Control tab. (In UI mode controlled by Master,Cue,Zone, and Protrack buttons on toolbar. Values of Index are: 1 - Master 2 - Cue 3 - Zone 4 - ProTrack Purpose: Control of Live Control tab mode* Example: *ClickLCTabMode 2* control currently selected cue in the grid

*ClickTCTabMode Index Parameters: Index represent mode. See constants of ClickLcTabMode above. Purpose: Control of Time Control tab mode* Example: *ClickTCTabMode 1* control master *ClickFXTabMode Index Parameters: Index represent mode. See constants of ClickLcTabMode above. Purpose: Control of FX tab mode* Example: *ClickFXTabMode 1* control master

*ClickFXStopAll Parameters: no arguments Purpose: Same as click on Stop All button on FX tab (stop all effects in currently selected Live Control)* Example: *ClickFXStopAll*

*ClickFxVlj Index, State Parameters: Index of FX line. Indexing from 1. Up to 8 lines. State is optional parameter and represent state of VLJ for this FX line (on or off). State values are 0 - Off, 1 - On, 2 - Toggle. Purpose: Enable or disable VLJ for FX line. Example: ClickFxVlj 2, 0 disable VLJ for second FX line* *==== WaitFor command group* *==== Sleep Time Parameters: Time measured in milliseconds Purpose: Allow to pause execution to defined time* Example 1: *Sleep 100* this will cause pause in execution on 1/10 of a second. Example 2: *MidiOut 0x90, 0x40, 0x7F Sleep(500); MidiOut 0x90, 0x40, 0x00 Sleep(500); Restart*

*WaitForMidi Command, Data1, Data2 Parameters: Command, Data1, Data2. MIDI messages contain 3 bytes. 1st known as Command, and has range 0x80h, up to 0xFF. Data1 and Data2 are parameters of command, max value is 0x7F (127 decimal). It is possible to use special value "minus one", (-1), it will mean "any value". As example: WaitForMidi 0x90,-1,-1 this command will wait for any NoteOn message, any note (Data1 is -1), any volume (Data2 is -1). Purpose: Allow to make reaction on incoming MIDI*

event. Example: WaitForMidi 0x90, 0x01, -1 NextPage Restart Note: See SelectMidi command that allow select a MIDI device from what expect the message. SelectMidi control input and output operations

WaitForArtNet ChannelIndex Parameters: ChannelIndex Purpose: Wait for change of value in incoming ArtNet packet. ChannelIndex values from 1 to 512. Special value "-1" means any channel index Example: WaitForArtNet 2

WaitForDmx ChannelIndex Parameters: ChannelIndex Purpose: Wait for change of value in incoming DMX packet. ChannelIndex values from 1 to 512. Special value "-1" means any channel index Example: WaitForArtDMX 512

WaitForChannel ChannelIndex Parameters: ChannelIndex Purpose: Wait for change of internal Channels. BEYOND has 256 channels that typically used in effects, shapes, abstracts. ChannelIndex values from 1 to 255. Special value "-1" means any channel index Example: WaitForChannel 512

WaitForCueStart PageIndex, CellIndex. Parameters: PageIndex, CellIndex. Purpose: Wait for start of exact Cue. Cue address composes of Page and Cell. BEYOND has up to 64 pages, and 60 cell (cues) per page. So, address is two numbers - page and cell. Special value "-1" means "any" Example: WaitForCueStart -1, 10

WaitForCueStop PageIndex, CellIndex. Parameters: PageIndex, CellIndex. Purpose: Wait for stop of exact Cue. Cue address composes of Page and Cell. BEYOND has up to 100 pages, and 60 cell (cues) per page. So, address is two numbers - page and cell. Special value "-1" means "any" Example: WaitForCueStop -1, 10

WaitForCellDown CellIndex. Parameters: CellIndex. Purpose: Main storage of cues is a Grid. When we click on the grid cell then we start a cue, at least this is initial, and default action. But, click itself is just a click. There is special "input manager" that transform mouse down, mouse up events into commands to start to stop the cues. Manager takes into account current mode, current page, state of the cue (playing or no) and after this generate a command to start (or stop) the cue. OK, this version allow to wait and react on clicks Example: WaitForCellDown 1

WaitForCellUp CellIndex. Parameters: CellIndex. Purpose: OK, this version allow to wait and react on "release" the cell. Example:

WaitForCellUp 1 MidiOut 0x90, 0x40, 127 Sleep 100 MidiOut 0x80, 0x40, 0 Restart

WaitForTime Hour, Minute, Seconds, Milliseconds Parameters: Hour - 0..23, Minute - 0..59, Seconds - 0..59, Milliseconds - 0..999; Purpose: Wait for "real" time defined by PC clock Example: WaitForTime 21,00,0,0 wait for 9 PM, and then allow code for go forward WaitForTimePos Hour, Minute, Seconds, Milliseconds Parameters: Hour - 0..23, Minute - 0..59, Seconds - 0..59, Milliseconds - 0..999; Purpose: wait for time from beginning of the script execution. Time is relative to the script start. "Restart" command clear local script time Example: WaitForTime 0,1,45,0 wait for 1 minute, 45 seconds from the script start.

WaitForHotkey no arguments Parameters: none Purpose: Each script in Code list has a hotkey that can activate it. Waiting for hotkey what allow create multiple reaction, or reaction loop by means of restart command Example: WaitForHotkey DmxOut 1, 255 set first channel to 255 Sleep 500 wait a half of second DmxOut 1, 0 zero first channel WaitForAudioBeat no arguments Parameters: none Purpose: what for audio beat, same as does VLJ WaitForManualBeat no arguments Parameters: none Purpose: what for

*manual beat WaitForTimerBeat no arguments Parameters: none Purpose: what for main beat controlable from main toolbar. ===== Custom Events ===== WaitForEvent Name[, Name, Name] Parameters - at least one string that define name of event. May be used more than one event names. PulseEvent Name[, Name, Name] Parameter - at least one name of the event. It will reactive the scripts that suspended by WaitForEvent ===== Workspace Pages, Tabs, Category ===== SelectGrid Index Index allow to choose what grid will be used for executing commands below. Zero (0) means "recently selected" grid. 1 means main grid that in center of main form. 2 means secondary grid that is on bottom tabs. SelectTabName "Name" Select the tab of the grid by specified name. Name is a string. Function work within current category. SelectTab Index Select the tab by linear index. Counting starts from 1. Function work within current category. SelectNextTab Select the next tab relatively to current. No arguments. Function work within current category. SelectPrevTab Select the previous tab relatively to current. No arguments. Function work within current category. SelectPageName "Name" Select the page/tab of the grid by specified name. Name is a string. Function work independently on current category. SelectPage Index Select the page/tab by linear index. Counting starts from 1. Function work independently on current category. SelectNextPage Select the next page/tab relatively to current. No arguments. Function work independently on current category. SelectPrevPage Select the previous page/tab relatively to current. No arguments. Function work independently on current category. SelectAllCat No argumens. Select all categoris of pages, same as click on "All" SelectCatName CategoryName CategoryName - string. Select a category by name. Names of categories are completelly user defined, and may vary from workspace to workspace. SelectCat Index Select category by index. Counting from 1. -1 mean all, this is analog of SelectAllCat. SelectNextCat Select next category relatively to current. No arguments. SelectPrevCat Select previous category relatively to current. No arguments. ===== Zones ===== UnselectAllZones Unselect all projection zones. Analog of "use cue defined routing". No. arguments StoreZoneSelection Store information about currently selected zones in local buffer of interpreter. Lifetime of strong is limited to lifetime of time of executing this code ReStoreZoneSelection Restore previously store zone selection. SelectZone Index Select the zone by index. Argument - number. Counting from 1. UnSelectZone Index Select the zone by index. Argument - number. Counting from 1. ToggleSelectZone Index Toggle zone selection state. Argument - number. Counting from 1. SelectZoneName ZoneName Select zone by name. Argument - string. UnSelectZoneName ZoneName Unselect zone by name. Argument - string. ToggleSelectZoneName ZoneName Toggle zone selection state. Argument - string. ===== Cell Navigation ===== Command from this section designed to actiavte the cues within the page. Functionality affected by SelectGrid !!! FocusCell Col, Row Set focused cell by Column and Row. Columt range 1..10. Row range 1..6. FocusCellIndex Index Set focused cell by index (1..60) StartCell No arguments. Start focused cell StopCell No arguments. Stop focused cell ShiftFocus DeltaIndex Shift focused cell on DeltaIndex cells forward or backward. Positive value - go forward. Independently on step value the resulting index will be valid range. MoveFocus DeltaX, DeltaY DeltaX - how many cells to go horizontaly DeltaY - how many cells to go verticaly ===== Local Commands ===== Restart Parameters: none Purpose: start exection from a first line. Use it if you need to start from begining. Typical use - some WaitFor command at begining and Restart at the end Example: Restart Exit Parameters: none Purpose: stop the script execution Example: Restart Autostart Parameters: none Purpose: Automatically start the script execution. Suitable for PangoScript tab and MIDI background scripts. StopOnBlackout 0,1 or ON, OFF Purpose: this option define how the scripiter should react on blackout. By default (at least now), the script execution will not be interrupted. If to will enable this option then the script execution will stop. CodeName string Parameters: String. Allow define a program name in the Code list. This string is also used for identification of Code for StartCode and StopCode functions. Example: Name "my first code" CodeShortcut shortcut-string Paremeter: a string that contain a shortcut in text form. As example: ""Ctrl+A". Delphi has functions ShortcutToText and TextToShortcut. It allow transform. Main idea - allow code contain information about its name and shortcut as a text, inside the code. How to know shortcut text? right now - there is dialog*

that allow define a shortcut to Code, and you can see how it looks. StartCode CodeName Parameter: string that define code name to start. Could be used only code from the main pool (listbox in Code tab); Purpose: This allow to activate one code from another code, for making a complex reactions. In act, this is analog of subroutine Example: First script WaitForHotkey "F1" StartCode "Rotate Z" WaitForHotekey "F1" StopCode "Rotate Z" Restart

Second script CodeName "Rotate Z" WaitForBeat LCMaster AngleDelta 0,0, 5 Restart StopCode CodeName Parameter: string that define code name to stop. Purpose: Stop the execution of specified code, a pair for StartCode. (see above) ===== Output ===== SelectMidi DeviceNumber Parameters: DeviceNumber is from 1 to 4 and correspond to device number of MIDI settings dialog. Special value "-1" accepted for WaitForMIDI command only. MidiOut do not accept this value and will ignore it. Example: SelectMidi 1 WaitForMidi 0xC0, 00, ANY See also - GetMidiDeviceIndex. Function return currently selected device number SetMidiLayer MidiOut Message, Data1, Data2 Parameters: 3 parameters, standard for MIDI, Message is value in range of 80h up to FFh. Data1 and Data2 from zero to 7Fh. DmxOut Channel, Value Parameters: Channel is index of DMX channel, value range 1..512. Value is state of DMX channel, range 0..255 Example: DmxOut 1,255 DmxOutRange ChannelOut ChannelIndex, Value Parameters: ChannelIndex is index of internal BEYOND Channel, value range 1..255. Value is state of DMX channel, range 0..1000. Example: ChannelOut 1,1000 OscOut Address, [Agrument] The first parameter is osc message address. string. Second and other agruments are optional. Types - string or number. ===== Unsafe commands ===== RunApp File, Parameters, ShowCmd Purpose: This command use ShellExecute() function inside it. Please check MSDN:

[http://msdn.microsoft.com/en-us/library/windows/desktop/bb762153\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/bb762153(v=vs.85).aspx) . Reason of adding this command - ability to run extenal application from BEYOND. Internally, BEYOND use this code: ShellExecuteW(0,nil,PWideChar(FFile), PWideChar(FParameters), nil, round(FShowCmd)) Parameters: File - string. exe file name including path. Parameters - string. ShowCmd - number, see MSDN for details are optional. For more info please check MSDN. Default value is SW\_SHOWNORMAL (1) Example: RunApp "C:\Windows\notepad.exe", "", 1 IMPORTANT: This command is disabled by default because of security reasons. If you going to use this command, enable it in "Configuration" dialog, "Security" tab. ===== Limiters ===== SetLimiterProfile Index Parameter - index of profile. There are two profiles, the 1st for "One Cue" mode, and second for "Multi Cue" mode. You should select 1 or 2 before using SetLimiter commands. This also will affect the state of BEYOND and change the active profile. It is recommended to call OneCue, OnePer or MultiCue command after the profile. SetLimiterPerZone Value Value specify max number of cues per Zone. The range is 1..30. The range is big, and we recommend to keep the values in reasonable limits SetLimiterPerGrid Value Value specify max number of cues per Grid. The range is 1..30. SetLimiterFlash Value Value specify max number of cues that can be in Flash mode. The range is 1..30. SetLimiterHold Value Value specify max number of cues that can be in Hold mode. The range is 1..30. SetLimiterBeam Value Value specify max number of playing Beam cues. The range is 1..30. SetLimiterDMX Value Value specify max number of playing Beam cues. The range is 1..30. SetLimiterShow Value Value specify max number of playing Show cues. The range is 1..30. ===== Timeline control ===== PlayTimeline Start playback of current show in timeline editor StopTimeline Stop playback of current show in timeline editor TimelineMarker Add timeline marker. There are 3 modifications TimelineMarker (no arguments) - add marker at current position and current color TimelineMarker Color - addmarker with specified color at current time position TimelineMarker Color, Time - add marker with specified color at specified time Time - time in seconds, float point Color - index, 1..10; ===== QuickDMX Editor ===== SetDmxEditorChannel ===== Play List control ===== PlayListStop Stop playing of current show PlayListPlay Start playing of current show PlayListFirst Jump to first show in the list. Work in play and edit modes. PlayListLast Jump to last show in the list. Work in play and edit

*modes. PlaylistNext Jump to next show in the list. Work in play and edit modes. PlaylistPrev Jump to previous show in the list. Work in play and edit modes. PlaylistSetPos index Jump to specified show of the list. Index define a number of show in the list PlaylistSetTime time Jump to time position of the show, value defined in seconds. Work only in PLAY mode. ===== Debug messages ===== qLog string or numeric argument(s) Purpose: display message in QLog tab. Usefull for debug purposes. Write string or numeric argument(s) Purpose: create special output window and display message. WriteLn string or numeric argument(s) Purpose: create special output window and display message. ===== Player control ===== InvertPlayersTime No arguments. Invert time direction of all currently playing cues. Works for all dynamic players. Used in corresponding button on Master tab PlayersSetJump (no argument) No arguments. The first call memorize current player position and second call restore the time of player to that position. See PlayersResetTime that clear this time storage. Works for all dynamic players. Used in corresponding button on Master tab PlayersResetJump No arguments. Function is an addition for PlayersSetJump, it clear the saved time to zero,. Works for all dynamic players. Used in corresponding button on Master tab PlayersSetLoop No arguments. One more function of "time fun" groups. First call memorize time position A, second call memorize time position B, and after that, Player bounce the time within specified A-B range. Third call of this procedure clear the time variables, and player continue normal playback. Works for all dynamic players. Used in corresponding button on Master tab PlayersDisk SpeedMultiplier, PositionDelta PlayersDisk provide access to "DJ disk" from Master tab of BEYOND. Disk action based on two things - distance from center that define the slowdown of rotation (speed control) and second is position shift - what actually is time shift delta. SpeedMultiplier is normalized value within 0..1 range, where 1 is full speed, 0 a full stop PositionDelta is a shift of time, backward or forward. Value in radians. Each call add this value to time position of the players. Parameter is optional!, there is a special procedure for this if you plan to use it from MIDI. Works for all dynamic players. Used in corresponding button on Master tab PlayersDiskShift PositionDelta Command does the time shift (on delta) of all currently playing cue. It is simple action like  $Time = Time + Delta$ ; Command made for use with MIDI and action is equal to PlayersDisk command. ===== Property Animation ===== Property animation designed for linear change of property from one state to another during some period of time. Technically, this is sort of micro script, but BEYOND does this job automatically. Internally BEYOND has internal list of the tasks for object property animation. The list is dynamic. The only way to create request for property animation is a script. Note, the execution of property animation performed right after execution of all script by dedicated thread of BEYOND. The time resolution is ~ 40 "FPS". For animation of laser related properties it might be not perfect because laser projector frame rate may be much higher. AnimateProp PropertyName, StartValue, FinishValue, DurationMS, FinishEvent PropertyName - string that contain complete name of object and its property. The property must be numeric. StartValue - number. Specify start value of the property during animation FinishValue - number. Specify final value of the property during animation. DurationMS - duration of animation in milliseconds FinishEvent - optional parameter, string. Specify name of Event that will be activated at the end of animation. Action equal to call of PulseEvent() procedure. Exmaple: AnimapeProp "Master.Brightness", 100, 0, 1000 command change value of Master brightness from 100% to zero during 1000 ms (one second)*

*Example2 : AnimapeProp "Master.Brightness", Master.Brightness, 0, 500 command change value of Master brightness from current value to zero during 500 ms (0.5 second) AnimatePropDelta PropertyName, TotalDelta, DurationMS, FinishEvent PropertyName - string that contain complete name of object and its property. The property must be numeric. TotalDelta- number. Specify how much will change the value of specified property DurationMS - duration of animation in milliseconds FinishEvent - optional parameter, string. Specify name of Event that will be activated at the end of animation. Action equal to call of PulseEvent() procedure. Example: AnimatePropDelta "Master.Brightness", -25, 300 decrease master brightness on 25% during 0.3 second*

Example 2: AnimatePropDelta "Master.Color", -32, b2ms(1) *shift color "slider" of master on 32 during 1 beat* DeletePropAni *PropertyName, PropertyName, PropertyName,,,, Command delete existing animation-tasks from the pool. If no one parameter specified then command delete ALL tasks. Command can contain one or more names of properties. PropertyName - string that contain complete name of object and its property. The property must be numeric. Example1: DeletePropAni delete all*

Example2: DeletePropAni "Master.Brightness"

Example3: DeletePropAni "Master.Brightness", "Master.Color",

## MIDI Surface Layer (MSL)

BEYOND offer more functions that can be mapped to MIDI sliders/buttons of overage MIDI console has. The solution is map a few function to one slider, and enable only one of them. For making this possible BEYOND introduce conception of "layers". You organize some set of functions grouped into layers, and after that you can change the layer, what give quick access to the groups of functions.

MIDI Surface Layering allow connect multiple BEYOND features to one MIDI command (message). Layering work with Main Grid, Secondary Grid, Surface Buttons, Surface Sliders, FX and Zone selection. Currently available 12 layers. Counting starts from 1 and up to 12. The function of BEYOND may belong to more than one layer. In this case this function stay active in all layers where it enabled. If the function of BEYOND is not enabled in current layer, then it will not react on assigned MIDI message, same as will not generate a feedback messages.

Simplified Layer control.

Each MIDI Mapping object has property Layer. When you write to this property then it change Layer of all tables. Such operation equal to using of 12 commands described below.

Example: Midi1.Layer=1 Midi2.Layer=10 Midi3.Layer=5

Detailed control.

Each table has own Layer property that you can control independently.

## Triggers

"Trigger" is a special mode for the scripter. The trigger as two part - Definition and Action. The the Definition part you define the type of the trigger, range of values and labels for corresponding sections of code. In the Action part has one or more code sections that will be activated - depending on the definition. Lets talk a bit more about when trigger may be in help and why it done this way.

The simplest and classic example is when DMX come into some range of values, and the fact that the value is in range now it create some reaction. If the is not the same as "if value is in range then we do something". No., It is like - we do it every time as value come into the range. The next time it will happen when the value will go out of range and back to the range.

No doubt it is possible to make a trigger by means for “standard” PangoScript commands, but it requires much more complex script code, more lines, and at the end it will be more slow. The Trigger uses a hybrid method. You define what to check and the ranges, and BEYOND software does the idle job for you - BEYOND reads the state and compares with ranges, takes care about the state and other things. All it does in native code. If you will do it all in PangoScript then it will require much more CPU time. So, this part can be more optimal. What says in PangoScript is a reaction (action). You need to define a section(s) of code that will be activated.

### Trigger definition commands

**DefineDmxTrigger ChannelIndex** - this command sets the scripter into trigger mode, and defines that trigger reacts on DMX channel number “ChannelIndex”

**DefineMidiTrigger Message, Data1** - this command sets the scripter into trigger mode, and defines that trigger reacts on MIDI message. You need to specify the message `n`

**DefineTrigger String-Expression, Caption** - this command sets the scripter into trigger mode, and defines that trigger depends on expression. The expression is a math formula. It has a syntax of string. The dumb example: **DefineTrigger “2+2”**. In this example `2+2` is expression. But, according to syntax of this command we put expression inside “..”. The Caption is just a text string for PangoScript tab

The top level logic of these commands is this. The most possible, the triggers will work with MIDI and DMX consoles. The trigger must be fast, and effective, because it will work on a high speed, because we have a trigger specially made for MIDI and DMX. BEYOND precalculates values and does it all in native code. But, no doubt will appear a need in some universal method, and in this case will help universal command **DefineTrigger**. This command works with expression, it is more slow because BEYOND needs to calculate expression all the time, but it is very flexible, and works for all types of input data. You can use objects, variables, functions, expression and so on. It can work with Audio, Kinect or DMX, Universe or GamePad and any mix of this. So, for **DefineTrigger** we need to supply text of expression to trigger engine, and it is a string.

### Trigger range commands

Here is a formal description of commands, examples and logic after that.

**InRangeTrigger MinValue, MaxValue, LabelName** The action will be activated when values come in range between `MinValue` and `MaxValue`. When it happens the scripter goes to `LabelName`. `MinValue` - number, a minimum value of the range `MaxValue` - number, a maximum value of the range `LabelName` - string that contains label name

**InRangeTriggerCmd MinValue, MaxValue, Command** The action will be activated when values come in range between `MinValue` and `MaxValue`. When it happens the scripter executes `Command`. `MinValue` - number, a minimum value of the range `MaxValue` - number, a maximum value of the range `Command` - string that contains a PangoScript command

**OutOfRangeTrigger MinValue, MaxValue, LabelName** The action will be activated when values come out of range of `MinValue` and `MaxValue`. When it happens the scripter goes to `LabelName`. `MinValue` - number, a minimum value of the range `MaxValue` - number, a maximum value of the range `LabelName` - string that contains label name

**OutOfRangeTriggerCmd** MinValue, MaxValue, Command The action will be activated when values goes out of range of MinValue and MaxValue. When it happen the scripiter execute Command. MinValue - number, a minimum value of the range MaxValue - number, a maximum value of the range Command-string that contain a PangoScript command

**IncreaseTrigger** MinValue, MaxValue, LabelName The action will be activated when value increase and stay in range of MinValue and MaxValue. When it happen the scripiter does goto to LabelName. MinValue - number, a minimum value of the range MaxValue - number, a maximum value of the range LabelName - string that contain label name

**DecreaseTrigger** MinValue, MaxValue, LabelName The action will be activated when value decrease and stay in range of MinValue and MaxValue. When it happen the scripiter does goto to LabelName. MinValue - number, a minimum value of the range MaxValue - number, a maximum value of the range LabelName - string that contain label name

### About the logic

The most simple is InRangeTrigger command. When values comes in range, then something happen. We can define a few ranges, and when value comes into the range then something will happen. What will happen? We considered a few options, and appeared that in simplest case one simple command will be enough. I mean, Blackout, or EnableLaserOutput, or StopAllCue , who knows. In many cases one command will be enough. But, what is not enough? I this case we should do goto to a second of code. In fact, you simply put a name of label, and BEYOND will do a goto (this process is optimized too). So, we have two options - Command or Label for Goto.

There is inverted version of InRangeTrigger - OutOfRange trigger. The only different is goes to be activated when value goes out of range. All the rest is equal. There in Min and Max value, and there version of command for Command and for Label.

The third variation of trigger allow define reaction on the increase or decrease of the value. it work like this: scripiter memorize current value, and if the new value is bigger (or smaller) than current state then it active the trigger. Command IncreaseTrigger create a reaction when new value is more than current. Command DecreaseTrigger create a reaction when new value is less than current.

No doubt, we can add more commands, add more functionality to trigger. The range oriented commands is a classic. The increase/decrease has a practical use too.

Rule of 3 words: Type, Range, Interaction T - type of the trigger - DMX, or MIDI, or universal R - range, when value in range the we do something I - interaction, the trigger is only a way to do some action, we need define what it will do.

### Example 1: Enable/Disable laser output from MIDI

```
DefineMidiTrigger 0xB0, 0x00, "Enable Laser test" InRangeTriggerCmd 0,63,"DisableLaserOutput"  
InRangeTriggerCmd 64,127,"EnableLaserOutput"
```

This trigger react in the MDI slider 0xB0, 0x00, and has values in range of 0..127. When slider in lower half the laser output will be disables, and when in higher half, then output will be disables. Now command bby comamnd:

DefineMidiTrigger 0xB0, 0x00, "Enable Laser test" DefineMidiTrigger is command 0xB0, 0x00 - this is slider parameter "Enable Laser test" - this is optional parameter - caption of this scripter

InRangeTriggerCmd 0,63,"DisableLaserOutput" InRangeTriggerCmd - command, define the range and command 0,63 - the range "DisableLaserOutput" - command as string.

InRangeTriggerCmd 64,127,"EnableLaserOutput" InRangeTriggerCmd - command that define second range 64,127 - second range "EnableLaserOutput" - command that will be executed.

Example 2: Same as example 1, but with goto

DefineMidiTrigger 0xB0, 0x00, "Enable Laser test 2" InRangeTrigger 0,63, "D1" *D1 is a name of label, see below InRangeTrigger 64,127, "D2" D2 is a name of label, see below exit we need to exit because we should stop script execution after the declaration D1: this is label used 1st range DisplayPreview "Disable" visual indication in Preview panel DisableLaserOutput Command exit we should stop script execution, otherwise it will do below D2: this is label used 2nd range DisplayPreview "Enable" visual indication in Preview panel EnableLaserOutput exit we should stop script execution. This is good practice to have it.*

Commentaries for this example. The script itself is bigger, and there are sections for definition and for corresponding scripts. There are two typical mistakes 1. Do not forget to put exit instruction 2. Ensure that label name in code and in definition is the same. Otherwise, it will not work. Label is case sensitive.

And general advice - use DisplayPreview, DisplayPopup or qlog for debug purpose. It might be good idea to create a trigger definition with all jumps, and put inside commands like DisplayPreview only, without real functionality. Once you see that the logic works fine, then put there the rest of code.

Example 3: Slider at first time do Enable Laser, and second time Disable Laser

This code based on previous, but it use variable. Variable organize a

DefineMidiTrigger 0xB0, 0x00, "Enable Laser test 3" InRangeTrigger 64,127, "Trick1" var counter *declare variable counter=0 initialize variable exit*

Trick1: DisplayPreview Counter *debug action if (Counter=0) EnableLaserOutput action when Count is 0 if (Counter=1) DisableLaserOutput action when Count is 1 Counter=(Counter+1) % 2 increment counter and divide by modulus 2, so, it will be 0,1,0,1,0,1 and so on exit stop this section Example 4: The same as example 4, but with Goto DefineMidiTrigger 0xB0, 0x00, "Enable Laser test 3" InRangeTrigger 64,127, "Trick1" var counter counter=1 exit Trick1: DisplayPreview Counter Counter=(Counter+1) % 2 if (Counter=0) goto When0 if (Counter=1) goto When1 exit When0: EnableLaserOutput exit When1: DisableLaserOutput exit Well, example, is similar, and show that you can use additional Goto instructions. Example 5 What I want to demonstrate by this example - BEYOND does a goto when it execute a trigger. It means this. You can do goto by means of script command. But trigger engine use the same goto. Look at the code, comments below DefineMidiTrigger 0xB0, 0x00, "Enable Laser test 3" InRangeTrigger 64,127, "Trick1" InRangeTrigger 0,63, "StopIt" exit Trick1: DisplayPopup "Yes" Sleep 1000 DisplayPopup "No" Sleep 1000 goto Trick1 StopIt: DisplayPopup "I dont care" exit Two ranges, and main action in range of 64..127. The main action is after label Trick1. It has a dead loop. At least, it looks like dead loop. You see message panel with Yes and No and it will work until you move the slider down. It will break this endless loop. Example 6: Lets try to use expressions... BPM notification DefineTrigger "Master.BPM" expression...*

InRangeTrigger 0,50,"WhenSlow" InRangeTrigger 250,500,"WhenFast" exit

WhenSlow: DisplayPopup "Hey, dont sleep" exit

WhenFast: DisplayPopup "Hey, too fast!" exit

This example use simplest expression - read the value of object property - Master.BPM, and depending on the BPM show the message.

Example 7: Out of range.

This example based on previous. The only change is OutOfRangeTrigger. This section will be activate when BPM is too slow or too fast. This is only example without big sense, but it it easy to test, because you can see BPM value on toolbar and have the slider that control it.

DefineTrigger "Master.BPM" expression... OutOfRangeTrigger 60,250,"WhenOutOf" exit WhenOutOf: DisplayPopup "Hmm, this is not normal" exit Example 8: Starts/Stop timeline DefineMidiTrigger 0xB0, 0x00, "Timeline control" InRangeTriggerCmd 0, 63, "StopTimeline" InRangeTriggerCmd 64,127, "PlayTimeline"

1)

$1 > 2$  &  $((3 + 2) > 1$

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