UNOFFICIAL X32/M32
OSC REMOTE PROTOCOL

Initiated from version 1.01 (Oct-17-2012)
version 0.64 (June 27th , 2016)

An unofficial OSC protocol document for the X32/M32 Digital Mixing Console families

Acknowledgements

This document regroups data contained in version 1.01 of the OSC protocol for the X32 family of products released by Behringer in Oct. 2012, and a large number of additional OSC messages for communicating with the X32, their syntax and use, along with practical examples and explanations as to how and in which context they should be used. This document should also apply to M32, a product from Midas, very similar to X32.

Behringer is not associated to the redaction of this document and no support will be provided by the company.

I have tried to make the information contained here as accurate as possible. A few areas are still prone to inaccuracies or uncertainties as to how to best use them. Please do not hesitate to provide feedback on the X32 user forum on errors or inaccuracies. They will be corrected in futures updates.

I want to thank X32 forums well known **Paul Vannatto** for his invaluable support during the redaction, his generous time and his advice in reviewing early versions of this document.

As you read through this document, you may like a "hands on" experience with OSC commands, it is recommend you use a utility to send/read commands to/from the X32. Such utilities ensure the commands will be properly formatted and offer better support for reading dat back from X32/M32.

> ***X32_Command***[1] is a terminal based utility running on Windows, Linux, OSX and Raspberry platforms, supporting batch and interactive modes, timed commands, multi-tag parameters, and also scenes, snippets, and presets. Download it from https://sites.google.com/site/patrickmaillot/x32.
>
> ***X32 Live Toolbox***[2] is a GUI based utility running in Windows, Linux and OSX. It also offers additional features such as EQ copy. Download it from http://sourceforge.net/projects/x32livetoolbox/

With my purchase of an X32 digital mixer and as I started to find out more about OSC and ways to achieve more with the X32 via programs, I have spent quite some time designing several applications for the M/X32 family of systems. Late 2015, I decided to open-source the code for the programs I wrote. These can be found at https://bitbucket.org/pmaillot/pmaillot-git or https://github.com/pmaillot/X32-Behringer. I'll continue to add programs as I finally "clean" them before publishing.

Patrick-Gilles Maillot

[1] X32_Command: © 2014-2015 Patrick-Gilles Maillot
[2] X32 Live Toolbox: © 2014-2015 Paul Vannatto

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DESCRIPTION

X32 & M32 are using a communication protocol that is compatible to standard OSC with some MUSIC Group specific extensions (e.g. parameter enquiry, subscriptions). OSC packets are received on **UDP** port **10023** and replies are sent back to the requester's IP/port[3].

In the following, the X32/M32 (rack, console) is also called server, and a connected device or application is typically called client. Connections to the server take place over Ethernet network, UDP port 10023. The server replies on the UDP port used by the client when establishing communication.

Due to the nature of UDP communications, buffer overflows situations should be taken into consideration. A typical example of critical situation is sending a large number of `/node` requests to an X32 connected to a 2.4GHz/54Mb/s WIFI router. The 100Mb/s link between the X32 and the router will enable the X32 to send a lot more data than the router will be able to propagate via WIFI to its connected clients, with possibly missing data at the client level due to UDP packets being silently lost by the router. Indeed no errors will be reported in UDP for loss of data.

There are different modes of operation for the X32/M32 to communicate OSC protocol:

- **Immediate**: a client such as a network connected tablet or PC application sends a request with or without parameters and the server immediately acts or replies with the respective data.
  Note: a single request from the client can result in several replies from the server (this is typically the case with `/showdump`)

- **Deferred**: a client such as a network connected tablet or PC application sends a specific request without parameters (`/xremote`). When changes take place either from the server UI or from a connected client, several notification messages are returned for a period of time, until a timeout is reached.
  Note: a single action at the server can result in several messages from the server.

X32 internal variables are driving the behavior of the console. These can be read (Get) or written (Set) with OSC commands mapping variables with addressable parameters. Parameters are internally organized in logical groups, I will refer to as "**X32nodes**". X32nodes are widely used in scenes, snippets, and presets. They can be read using the `/node` command presented later in this document[4]. X32nodes can be written or sent to X32 using the `/` command, also presented later in this document. Parameters of an X32node can also be updated as a group (complete or not) by using the combined (multiple Type Tags) form of OSC Set commands.

The list of <OSC Address Pattern> parameters commands, enabling an interactive control of all features of the X32/M32 mixer family is listed below:

<OSC Address Pattern> :=

```
/config | /ch | /auxin | /fxrtn | /-insert | /bus | /mtx | /main/st |
/main/m | /dca | /fx | /outputs | /headamp | /showdump | /-show |
/-libs | /copy | /add | /save | /load | /rename | /delete | -undo |
/-prefs | /-usb | /-action | /-stat | /subscribe | /formatsubscribe |
/batchsubscribe | /renew | /unsubscribe
```

[3] See Appendix for an example of communication program
[4] See chapter "X32nodes (/node & /) commands"

Client initiated messages (client → X32 console)

Operation	OSC address	Parameters	Comments
Info request	/info	None	Server responds with */info* message
Status request	/status	None	Server responds with */status* message
Set X32 parameter	<OSC Address Pattern>	<string | int | float | blob value>	Sets the value of a console parameter, e.g.: */ch/01/mix/fader~~~~,f~~<float>* If it exists and value is in range, the new value takes place in the X32.
Get X32 parameter	<OSC Address Pattern>	None	Requests the value of a console parameter, e.g. */ch/01/mix/fader~~~~* If it exists , the current value is echoed back by server, e.g.: */ch/01/mix/fader~~~~,f~~<float>*
Set X32 node data	/	<string>	Updates the values of a set of console parameters. A full set of X32node values can be sent to the server as plain text and matching /node formats, e.g.: */~~~,s~~~prefs/iQ/01 none Linear 0~~*
Get X32 node data	/node	<string>	Requests the values of a set of console parameters, e.g.: */node~~~,s~~~prefs/iQ/01~~~~* The current values for the full set corresponding to the request are returned by the server in plain text (string of characters, ending with a linefeed), e.g.: *node~~~,s~~*/-prefs/iQ/01 none Linear 0\n~~~~
Get X32 meters	/meters	<string> <optional int: chn_meter_id> <optional int: grp_meter_id> <optional int: priority>	Results in regular updates meter values as a single binary blob. Timeout is 10 seconds, e.g. */meters ,s meters/1* will return bursts of 96 float meter values (32 input, 32 gate and 32 dynamic gain reductions) for 10s. see “Meter requests” for additional details
Subscribe to data from X32	/subscribe	<string> < optional int>	Client describes to X32 server what information it is interested in receiving, and at which frequency the update is reported, until a timeout of 10 seconds is reached.eg: */subscribe ,s /-stat/solosw/01* or */subscribe ,si /-stat/solosw/01 1* Will report about 200 updates of the state of solo switch for channel 01 over the span of 10s. */subscribe ,si /-stat/solosw/01 50* Will report about 4 updates of the state of solo switch for channel 01
Subscribe to data formats from server	/formatsubscribe	<string>…<string><int>…<int>	Client describes to X32 server what information it is interested in receiving, e.g.: */mfm_c/dca/*/on 1 8 8* Reports a blob of 36 bytes for about 10s.

			The last <int> specifies the frequency factor of the report.
Subscribe to batch data from server	/batchsubscribe	<string>…<string><int>…<int>	Client request from X32 server data to receive, e.g.: */x_meters_0 /meters/0 0 69 1* Reports a blob of 70 floats for about 10s. */x_meters_8 /meters/8 0 5 1* Reports a blob of 6 floats for about 10s. */mfm_a /mix/on 0 63 8* Reports a blob of 276 bytes for about 10s. The last <int> specifies the frequency factor of the report.
Renew data request	/renew	<string>	Requests renewing of data described in <string>, e.g. */renew~~,s~~meters/5~~~~* */renew~~,s~~hidden/states~~~*
Register for updates	/xremote	None	Triggers X32 to send all parameter changes to maximum four active clients. Timeout is 10 seconds, e.g. the */xremote* command has to be renewed before this delay in order to avoid losing information from The X32 console.

Multiple client management

A single X32 can manage updates from and to several simultaneous UDP clients.

In order to keep being synchronized with changes happening at the X32 level, either from a change at the desk itself or requested by another remote client, each client must register for receiving updates from the X32. This is possible with the */xremote* command. After sending */xremote*, the X32 will update the client with changes taking place in the X32, such as fader movements, bank change, and screen update. Some changes or user actions will not be reported as they do not directly affect the connected clients.

Registering for desk updates with a */xremote* command maintains updates for approximately 10 seconds, after which a new */xremote* command should be sent by the client to keep the updating process alive.
Please refer to the examples given at the end of this document on how to use */xremote* in client applications (X32Saver.c (Linux or Windows), X32 data echo in Go)

Note: other commands such as */subscribe*, */formatsubscribe*, */batchsubscribe* also enable receiving regular updates form the server; details are available in the paragraph “Subscribing to X32/M32 Updates”.

Server replies or server initiated messages (X32 console → client)

Operation	OSC address	Parameters	Comments
Info request	/info	<string server_version> <string server_name> <string console_model> <string console_version>	Returns names and version numbers, e.g. : */info~~~,ssss~~~V2.05~~~osc-server~~X32C~~2.08~~~~* (~ stands for null character)
Status request	/status	<string state> <string IP_address > <string server_name >	Returns console status and IP , e.g. : */status~,sss~~~~active~~192.168.0.64~~~~osc-server~~* (~ stands for null character)
Console changes	<OSC Address Pattern>	<string | int | float>	If */xremote* is active, the X32 console echoes the value of a console parameter in response to a set command from another client or X32 parameter change, e.g. */-stat/solosw/01~~~~,i~~[1]* */-stat/solo~,i~~[1]* */ch/01/mix/01/pan ,f <float>*

X32/M32 OSC Protocol Parameters

The table below lists the type and associated characteristics of parameters used for <OSC Address Pattern> and X32node commands.

types →		[string, enum(integer), int(integer), linf(float), logf(float), level(float), bitmap(integer)] All data is on 4 bytes or multiples of 4 bytes
range →	string	A string of characters with up to [max. characters], padded to a multiple of 4 with *\0* (null) characters
	enum	An int corresponding to an element in a [list of all possible strings]
	int	An int with value in [min. value, max. value], step size = 1
	linf	A float with value in [min. value, max. value, step size], following a linear scale
	logf	A float with value in [min. value, max. value, steps], following a log scale
	level	A float with value in [0.0…1.0 (+10 dB), steps]: 4 'linear' dB ranges: 0.0…0.0625 (-oo, -90…-60 dB), 0.0625…0.25 (-60…-30 dB), 0.25…0.5 (-30…-10dB) and 0.5…1.0 (-10…+10dB) *(see conversion help in appendix)*
	%int	An int corresponding to the bitwise OR of multiple bits (0 or 1)

Type rules (Get/Set parameter) and data formatting

With very few exceptions (clearly mentioned in this document when needed), the X32/M32 follow the guidelines as set by the Open Sound Control (OSC) 1.0[5], implementing the 4 basic OSC type tags for int32, float32, string, and blob.

- all parameters must be big-endian and 4-byte aligned/padded, as per OSC specification.
- padding is done with null bytes.
- float parameters must be in range 0.0 – 1.0, e.g:

  0.0 → 0x00000000 (big-endian)
  0.5 → 0x3f000000 (big-endian)
  1.0 → 0x3f800000 (big-endian)
- integer and float parameters are signed 32-bit values.
- strings must be null-terminated.
- enum parameters can be sent as strings or integers (see below).
- boolean parameters will map to enum type *{OFF, ON}* (or OSC integer *{0, 1}*)
- blobs (arbitrary binary data) follow specific rules depending on the section they apply to (see later in this document)

An OSC command typically consists in a 4-byte padded OSC message, followed by a 4-byte padded type tag string, and if a non-empty type tag string is present, one or more 4-byte aligned/padded arguments.

The OSC 1.0 specification mentions some older implementations of OSC may omit the OSC type tag string. […] OSC implementations should be robust in the case of a missing OSC type tag string, which is the case of X32/M32 systems.

Examples:

A simple OSC command, with no tag string and no arguments:

/info~~~,~~~ correct format (OSC 1.0 compliant) command

The following will also work

/info~~~ non OSC 1.0 compliant command, but accepted as older form of OSC

And the reply from different X32 systems (X32 FW and SW versions may vary):

X32 Standard: */info~~~,ssss~~~V2.05~~~osc-server~~X32~2.12~~~~*
X32 Rack: */info~~~,ssss~~~V2.05~~~osc-server~~X32RACK~2.12~~~~*
TBV:
X32 Compact: */info~~~,ssss~~~V2.05~~~osc-server~~X32COMPACT~~2.12~~~~*
X32 Producer: */info~~~,ssss~~~V2.05~~~osc-server~~X32PRODUCER~2.12~~~~*
X32 Core: */info~~~,ssss~~~V2.05~~~osc-server~~X32CORE~2.12~~~~*

An OSC command with a single type tag string and argument:

/ch/01/config/name~~,s~~name~~~~

An OSC command with a more complex tag string and multiple arguments:[6]

/ch/01/eq/1 ,ifff [2] [0.265] [0.5] [0.4648]

[5] Please refer to http:// http://opensoundcontrol.org/ for further information on the OSC full spec.

[6] In the case of X32/M32 "node" commands, this only applies to combinations of int or floats (*,i* or *,f*); strings (*,s*) sent to a node address (rather than a parameter address) are interpreted differently (internally used for X32-edit). As a result of such choice, the command /ch/[01..32]/config ,siii [name] [1] [3] [1], although semantically correct and OSC compliant, does not work on X32/M32 when it does work fine on XAIR series.

This is equivalent to the following 4 simpler commands:

```
/ch/01/eq/1/t~~~,i~~[      2]
/ch/01/eq/1/f~~~,f~~[0.2650]
/ch/01/eq/1/g~~~,f~~[0.5000]
/ch/01/eq/1/q~~~,f~~[0.4648]
```

Or in hexadecimal for the last command:

```
 / c h / 0 1 / e q / 1 / q ~ ~ ~ , f ~ ~[0.4648]
2f63682f30312f65712f312f71000000 2c66 0000 3eedfa44
```

Where `3eedfa44` is the hex for a 32bit float, big endian representation of `0.4648`, and where `~` stands for null character *(`\0`)*

Responses from X32/M32:

Sending to port 10023 the UDP request `/info~~~,~~~` to a standard X32 will be replied with 48 bytes back to the sender's UDP port:

```
/info~~~,ssss~~~V2.05~~~osc-server~~X32~2.10~~~~
```

Sending to port 10023 the UDP request `/status~,~~~` will be replied with 52 bytes back to the sender's UDP port:

```
/status~,sss~~~~active~~192.168.0.64~~~~osc-server~~
```

Sending to port 10023 the UDP request `/fx/4/par/23~~~~,~~~` will be replied with 24 bytes back to the sender's UDP port, for example:

```
/fx/4/par/23~~~~,f~~[float 0.5]
or, in hexadecimal:
2f6678 2f34 2f706172 2f3233 00000000 2c66 0000 3f000000
```

Special considerations for the enum type.

As stated before, enums can be sent as strings or integer; for example the value of channel 01 gate mode is listed as an "enum" type with possible values of {EXP2, EXP3, EXP4, GATE, DUCK}.

The setting "GATE" can be enabled for channel 01 by sending either one of the following:

```
/ch/01/gate/mode~~~~,s~~GATE~~~
```

or

```
/ch/01/gate/mode~~~~,i~~[3]
```

in hexadecimal:

```
2f63682f30312f676174652f6d6f6465 00000000 2c73 0000 47415445 00000000
```

or

```
2f63682f30312f676174652f6d6f6465 00000000 2c69 0000 00000003
```

Please note this only applies to the "enum" type; for example it does not apply to the key source setting of dynamics which only accepts an "int" value between 0 and 64.

```
/ch/[01…32]/dyn/keysrc
```

Note: The X32/M32 only considers a subset of discrete values of the floating point range [0.0, 1.0], depending on the destination the float value applies to; a number of steps determines the values "known" by X32/M32.

Example: In EQ frequencies, applicable values are listed as `[20.0, 20k, 201]`, meaning the frequency range 20Hz to 20kHz is divided into 201 discrete values, and the same applies to the "known" floating points values in the range [0.0, 1.0] used to change or control EQ frequency). An OSC floating point value outside of the known values will be rounded to the nearest known value.

This is particularly useful to convert text to float values when X32/M32 returns data in the form of text, such as with the */node* commands used in scene and snippets, or when having to send data as text, for example in the case of OSC data sent over MIDI Sysex commands[7].

Tables in appendix to this document list common cases for frequencies, levels, etc. following a log scale.

[7] See appendix for section on sending OSC commands over MIDI sysex messages

Meter requests

The */meters* OSC command is used for obtaining Meter data, or to get a specific set of meter values. Update cycle frequency for meter data is 50 ms, and may be variable according to console's ability to fulfill requests. Timeout is 10 seconds.
Meter values are returned as floats in the range 0.0 – 1.0, representing the linear audio level (digital 0 – full-scale; internal headroom allows for values up to 8.0 (+18 dBfs)).

The data returned by the X32/M32 server for */meters* is an OSC-blob, an abitrary set of binary data. As a result, the format differs from what is typically returned by the X32/M32. This is essentially for efficiency/performance reasons. The format of a returned blob is as follows:

<meter id> ,b~~<int1><int2><nativefloat>…<nativefloat>

<meter id>:	see possible values below (padded with null bytes)
,b~~:	indicates a blob format, padded with null bytes
<int1>:	the length of the blob in bytes, 32 bits big-endian coded
<int2>:	the number of <nativefloats>, 32 bits little-endian coded
<nativefloat>:	data or meter value(s), 32 bits floats, little-endian coded

***Example*:**
The following meter request is sent to an X32/M32 server:

/meters~,si~/meters/6~~~16

Where ~ stands for null character, and "16" is actually sent as a big-endian 32bit integer, i.e. 0x00000010.

```
2f6d6574657273002c7369002f6d65746572732f3600000000000010
 / m e t e r s ~ , s i ~ / m e t e r s / 6 ~ ~ ~[    16]
```

The X32/M32 server will returns for approximately 10 seconds and approximately every 50ms the 4 channel strip meters (pre-fade, gate, dyn gain reduction and post-fade) values of channel 17, in a single blob, as shown in the reply message below:

```
2f6d65746572732f360000002c6200000000001404000000fd1d2137fdff7f3f0000803f6ebbd534
 / m e t e r s / 6 ~ ~ ~ , b ~ ~[ int1 ][ int2 ][nfloat][nfloat][nfloat][nfloat]
```

List of all Meter IDs:

/meters/0

Returns meter values from the **METERS** page (not used for X32-Edit):
32 input channels
8 aux returns
4x2 st fx returns
16 bus masters
6 matrixes
→ returns 70 float values as single binary blob

/meters/1

Returns meter values from the **METERS/channel** page:
32 input channels
32 gate gain reductions
32 dynamics gain reductions
→ returns 96 float values as a single OSC blob

/meters/2

Returns meter values from the **METERS/mix bus** page:
16 bus masters
6 matrixes
2 main LR
1 mono M/C
16 bus master dynamics gain reductions
6 matrix dynamics gain reductions
1 main LR dynamics gain reduction
1 mono M/C dynamics gain reduction
→ returns 49 float values as a single OSC blob

/meters/3

Returns meter values from the **METERS/aux/fx** page:
6 aux sends
8 aux returns
4x2 st fx returns
→ returns 22 float values as a single OSC blob

/meters/4

Returns meter values from the **METERS/in/out** page:
32 input channels
8 aux returns
16 outputs
16 P16 ultranet outputs
6 aux sends
2 digital AES/EBU out
2 monitor outputs
→ returns 82 float values as a single OSC blob

/meters/5 <chn_meter_id> <grp_meter_id>

Returns meter values the **Console Surface VU Meters** (channel, group and main meters):
16 channel meters: <chn_meter_id> 0: channel 1-16; 1: channel 17-32; 2: aux/fx returns;
3: bus masters
8 group meters: <grp_meter_id> 1 : mix bus 1 -8; 2: mix bus 9-16; 3: matrixes
2 main LR
1 mono M/C
→ returns 27 float values as a single OSC blob

/meters/6 <channel_id>

Returns meter values from **Channel Strip Meters** (pre-fade, gate, dyn gain reduction and post-fade):
4 channel strip meters: <channel_id> channel 0…71]
➝ returns 4 float values a as single OSC blob

/meters/7

Returns meter values from the **Bus Send** meters:
16 bus send meters
➝ returns 16 float values (from Bus sends 1-16) as a single OSC blob

/meters/8

Returns meter values from **Matrix Send** meters:
6 Matrix send meters
➝ returns 6 float values (from Matrix sends 1-6) as a single OSC blob

/meters/9

Returns meter values from **Effect Send** and **Return** meters:
2 effects send and 2 effects return meters for each FX slot (8 slots)
➝ returns 32 float values (4 x FX1, 4 x FX2, … 4 x FX8) as a single OSC blob

/meters/10

Used for some **Effects**, for example Dual DeEsser, Stereo DeEsser, Stereo Fair Compressor
➝ returns 32 float values

/meters/11

Returns meter values from the **Monitor pages**
➝ returns 5 float values (Mon Left, Mon Right, Talk A/B level, Threshold/GR, Osc Tone level) as a single OSC blob

/meters/12

Returns meter values from the **Recorder page**
➝ returns 4 float values (RecInput L, RecInput R, Playback L, Playback R) as a single OSC blob

/meters/13

Details TBD
➝ returns 48 float values

/meters/14

Used for some **Effects**, for example Precision Limiter, Combinator, Stereo Fair Compressor
➝ returns 80 float values

/meters/15

Used for **RTA** and some **Effects**, for example Dual GEQ, Stereo GEQ
➝ returns 50 32bits values as a single OSC blob.

The 32bits values returned are representing 100 successive *little endian coded short ints*, in the range [*0x8000*, *0x0000*]; each short int value provides a floating point RTA db level in the range [*-128.0*, *0.0*], by dividing the short int (converted to float) by *256.0*.
For example a 32bit value of *008000c0* will represent two values, the first one being *0x8000* (or -128.0 after conversion), and the second one being *0xc000* (or *-64.0* after conversion). Similarly, a 32bits value of *40e0ffff* will represent two successive RTA values of *-31.75db* and *-0.004db*, respectively.

Note: a short int value of *0x0000* (or *0.0db)* means signal clipping occurred.

The 100 short ints (or RTA db values) correspond to frequencies listed in the table (values in Hz) below, respectively.

20	21	22	24	26	28	30	32	34	36
39	42	45	48	52	55	59	63	68	73
78	84	90	96	103	110	118	127	136	146
156	167	179	192	206	221	237	254	272	292
313	335	359	385	412	442	474	508	544	583
625	670	718	769	825	884	947	1.02K	1.09K	1.17K
1.25K	1.34K	1.44K	1.54K	1.65K	1.77K	1.89K	2.03K	2.18K	2.33K
2.50K	2.68K	2.87K	3.08K	3.30K	3.54K	3.79K	4.06K	4.35K	4.67K
5.00K	5.36K	5.74K	6.16K	6.60K	7.07K	7.58K	8.12K	8.71K	9.33K
10.00K	10.72K	11.49K	12.31K	13.20K	14.14K	15.16K	16.25K	17.41K	18.66K

X32/M32 ↔ Client communications

The following tables (a long list) describe communication messages that can be initiated by the client, by the server as a response to the client or as update data.

Configuration (/config) data

<path>	<type>	<range>	<unit>
config data			
/config/chlink/1-2	enum	{OFF, ON}, int with value 0 or 1 indicating whether channels 1 and 2 are linked or not	
/config/chlink/3-4	enum	{OFF, ON}	
/config/chlink/5-6	enum	{OFF, ON}	
/config/chlink/7-8	enum	{OFF, ON}	
/config/chlink/9-10	enum	{OFF, ON}	
/config/chlink/11-12	enum	{OFF, ON}	
/config/chlink/13-14	enum	{OFF, ON}	
/config/chlink/15-16	enum	{OFF, ON}	
/config/chlink/17-18	enum	{OFF, ON}	
/config/chlink/19-20	enum	{OFF, ON}	
/config/chlink/21-22	enum	{OFF, ON}	
/config/chlink/23-24	enum	{OFF, ON}	
/config/chlink/25-26	enum	{OFF, ON}	
/config/chlink/27-28	enum	{OFF, ON}	
/config/chlink/29-30	enum	{OFF, ON}	
/config/chlink/31-32	enum	{OFF, ON}	
/config/auxlink/1-2	enum	{OFF, ON}	
/config/auxlink/3-4	enum	{OFF, ON}	
/config/auxlink/5-6	enum	{OFF, ON}	
/config/auxlink/7-8	enum	{OFF, ON}	
/config/fxlink/1-2	enum	{OFF, ON}	
/config/fxlink/3-4	enum	{OFF, ON}	
/config/fxlink/5-6	enum	{OFF, ON}	
/config/fxlink/7-8	enum	{OFF, ON}	
/config/buslink/1-2	enum	{OFF, ON}	
/config/buslink/3-4	enum	{OFF, ON}	
/config/buslink/5-6	enum	{OFF, ON}	
/config/buslink/7-8	enum	{OFF, ON}	
/config/buslink/9-10	enum	{OFF, ON}	
/config/buslink/11-12	enum	{OFF, ON}	
/config/buslink/13-14	enum	{OFF, ON}	
/config/buslink/15-16	enum	{OFF, ON}	
/config/mtxlink/1-2	enum	{OFF, ON}	
/config/mtxlink/3-4	enum	{OFF, ON}	

/config/mtxlink/5-6	enum	*{OFF, ON}*	
/config/mute/[1…6]	enum	*{OFF, ON}*: Mute Group selection	
/config/linkcfg/hadly	enum	*{OFF, ON}*: Sets Delay + HA link	
/config/linkcfg/eq	enum	*{OFF, ON}*: Sets EQ link	
/config/linkcfg/dyn	enum	*{OFF, ON}*: Sets Dynamics link	
/config/linkcfg/fdrmute	enum	*{OFF, ON}*: Sets Mute/Fader link	
/config/mono/mode	enum	int with value 0 or 1 representing {LR+M, LCR}	
/config/mono/link	enum	*{OFF, ON}* Sets M/C Depends on Main L/R	
/config/solo/level	level	[0.0…1.0 (+10 dB), 161]	dB
/config/solo/source	enum	Int [0…6] representing *{OFF, LR, LR+C, LR PFL, LR AFL, AUX 56, AUX 78}*	
/config/solo/sourcetrim	linf	[-18.000, 18.000, 0.500]	dB
/config/solo/chmode	enum	int with value 0 or 1 representing *{PFL, AFL}*	
/config/solo/busmode	enum	*{PFL, AFL}*	
/config/solo/dcamode	enum	*{PFL, AFL}*	
/config/solo/exclusive	enum	*{OFF, ON}*	
/config/solo/followsel	enum	*{OFF, ON}*	
/config/solo/followsolo	enum	*{OFF, ON}*	
/config/solo/dimatt	linf	[-40.000, 0.000, 1.000]	dB
/config/solo/dim	enum	*{OFF, ON}*	
/config/solo/mono	enum	*{OFF, ON}*	
/config/solo/delay	enum	*{OFF, ON}*	
/config/solo/delaytime	linf	[0.300, 500.000, 0.100]	ms
/config/solo/masterctrl	enum	*{OFF, ON}*	
/config/solo/mute	enum	*{OFF, ON}*	
/config/solo/dimpfl	enum	*{OFF, ON}*	
/config/talk/enable	enum	*{OFF, ON}*	
/config/talk/source	enum	int with value 0 or 1 representing {INT, EXT}	
/config/talk/A/level	level	[0.0…1.0 (+10 dB), 161][8]	dB
/config/talk/A/dim	enum	*{OFF, ON}*	
/config/talk/A/latch	enum	*{OFF, ON}*	
/config/talk/A/destmap	%int	[0, 262143] (bitmap)	
/config/talk/B/level	level	[0.0…1.0 (+10 dB), 161]	dB
/config/talk/B/dim	enum	*{OFF, ON}*	
/config/talk/B/latch	enum	*{OFF, ON}*	
/config/talk/B/destmap	%int	[0, 262143] (bitmap)	
/config/osc/level	level	[0.0…1.0 (+10 dB), 161]	dB
/config/osc/f1	logf	[20.000, 20000, 121][9]	Hz
/config/osc/f2	logf	[20.000, 20000, 121]	Hz

[8] See Appendix section for detailed values
[9] See Appendix section for detailed values

/config/osc/fsel	enum	int with value 0 or 1 representing *{F1, F2}*	
/config/osc/type	enum	int with value [0…2] representing *{SINE, PINK, WHITE}*	
/config/osc/dest	int	int with value [0…25] representing *{MixBus1…16, L, R, L+R, M/C, Matrix1…6}*	
/config/routing/IN/1-8 /config/routing/IN/9-16 /config/routing/IN/17-24 /config/routing/IN/25-32	enum	int with value [0…19] representing *{AN1-8, AN9-16, AN17-24, AN25-32,* *A1-8, A9-16, A17-24, A25-32, A33-40, A41-48,* *B1-8, B9-16, B17-24, B25-32, B33-40, B41-48, CARD1-8, CARD9-16, CARD17-24, CARD25-32}*	
/config/routing/IN/AUX	enum	int with value [0…12] representing *{AUX1-4, AN1-2, AN1-4, AN1-6, A1-2, A1-4 A1-6,* *B1-2, B1-4, B1-6, CARD1-2, CARD1-4, CARD1-6}*	
/config/routing/AES50A/1-8 /config/routing/AES50A/9-16 /config/routing/AES50A/17-24 /config/routing/AES50A/25-32 /config/routing/AES50A/33-40 /config/routing/AES50A/41-48 /config/routing/AES50B/1-8 /config/routing/AES50B/9-16 /config/routing/AES50B/17-24 /config/routing/AES50B/25-32 /config/routing/AES50B/33-40 /config/routing/AES50B/41-48 /config/routing/CARD/1-8 /config/routing/CARD/9-16 /config/routing/CARD/17-24 /config/routing/CARD/25-32	enum	int with value [0…25] representing *{AN1-8, AN9-16, AN17-24, AN25-32,* *A1-8, A9-16, A17-24, A25-32, A33-40, A41-48,* *B1-8, B9-16, B17-24, B25-32, B33-40, B41-48,* *CARD1-8, CARD9-16, CARD17-24, CARD25-32,* *OUT1-8, OUT9-16, P161-8, P16 9-16, AUX1-6/Mon, AuxIN1-6/TB}*	
/config/routing/OUT/1-4 /config/routing/OUT/9-12	enum	int with value [0…25] representing *{AN1-4, AN9-12, AN17-20, AN25-28,* *A1-4, A9-12, A17-20, A25-28, A33-36, A41-44,* *B1-4, B9-12, B17-20, B25-28, B33-46, B41-44,* *CARD1-4, CARD9-12, CARD17-20, CARD25-28,* *OUT1-4, OUT9-12, P161-4, P169-12, AUX/CR, AUX/TB}*	
/config/routing/OUT/5-8 /config/routing/OUT/13-16	enum	int with value [0…25] representing *{AN5-8, AN13-16, AN21-24, AN29-32,* *A5-8, A13-16, A21-24, A29-32, A37-40, A45-48,* *B5-8, B13-16, B21-24, B29-32, B37-40, B45-48,*	

		CARD5-8, CARD13-16, CARD21-24, CARD29-32, OUT5-8, OUT13-16, P165-8, P1613-16, AUX/CR, AUX/TB}	
/config/userctrl/A/color /config/userctrl/B/color /config/userctrl/C/color	enum	int with value [0…15] representing *{OFF, RD, GN, YE, BL, MG, CY, WH, OFFi, RDi, GNi, YEi, BLi, MGi, CYi, WHi}*	
/config/userctrl/A/enc/1…4 /config/userctrl/B/enc/1…4 /config/userctrl/C/enc/1…4	string	String up to 7 characters representing encoder assignment and unction. See User Control Chapter for full details.	
/config/userctrl/A/btn/5…12 /config/userctrl/B/btn/5…12 /config/userctrl/C/btn/5…12	string	User assignable set A, B, or C: Button 5 to 12 See User Control Chapter for full details.	
/config/tape/gainL	linf	[-6.000, 24.000, 0.500]	dB
/config/tape/gainR	linf	[-6.000, 24.000, 0.500]	dB
/config/tape/autoplay	enum	*{OFF, ON}* USB recorder play mode: single or folder	

Channel (/ch) data

channel [01…32] (channel id 0…31)			
/ch/[01…32]/config/name	string	[12]	
/ch/[01…32]/config/icon	int	[1…74] (see appendix for a list of icons)	
/ch/[01…32]/config/color	enum	int with value [0…15] representing *{OFF, RD, GN, YE, BL, MG, CY, WH, OFFi, RDi, GNi, YEi, BLi, MGi, CYi, WHi}*	
/ch/[01…32]/config/source	int	int with value [0…64] representing *{OFF, In01…32, Aux 1…6, USB L, USB R, Fx 1L…Fx 4R, Bus 01…16}*	
/ch/[01…32]/delay/on	enum	*{OFF, ON}*	
/ch/[01…32]/delay/time	linf	[0.300, 500.000, 0.100]	ms
/ch/[01…32]/preamp/trim	linf	[-18.000, 18.000, 0.250] (digital sources only)	dB
/ch/[01…32]/preamp/invert	enum	*{OFF, ON}*	
/ch/[01…32]/preamp/hpon	enum	*{OFF, ON}* Sets Phantom power off or on	
/ch/[01…32]/preamp/hpslope	enum	*{12, 18, 24}*	
/ch/[01…32]/preamp/hpf	logf	[20.000, 400.000, 101][10]	Hz
/ch/[01…32]/gate/on	enum	*{OFF, ON}*	
/ch/[01…32]/gate/mode	enum	int [0…4] representing *{EXP2, EXP3, EXP4, GATE, DUCK}*	
/ch/[01…32]/gate/thr	linf	[-80.000, 0.000, 0.500]	dB
/ch/[01…32]/gate/range	linf	[3.000, 60.000, 1.000]	dB
/ch/[01…32]/gate/attack	linf	[0.000, 120.000, 1.000]	ms
/ch/[01…32]/gate/hold	logf	[0.020, 2000, 101][11]	ms
/ch/[01…32]/gate/release	logf	[5.000, 4000.000, 101][12]	ms
/ch/[01…32]/gate/keysrc	int	int with value [0…64] representing *{OFF, In01…32, Aux 1…6, USB L, USB R, Fx 1L…Fx 4R, Bus 01…16}*	
/ch/[01…32]/gate/filter/on	enum	*{OFF, ON}*	
/ch/[01…32]/gate/filter/type	enum	int with value [0…8] representing Keysolo (Solo/Q) *{LC6, LC12, HC6, HC12, 1.0, 2.0, 3.0, 5.0, 10.0}*	
/ch/[01…32]/gate/filter/f	Logf	[20.000, 20000, 201][13]	Hz
/ch/[01…32]/dyn/on	enum	*{OFF, ON}*	
/ch/[01…32]/dyn/mode	enum	*{COMP, EXP}*	
/ch/[01…32]/dyn/det	enum	*{PEAK, RMS}*	
/ch/[01…32]/dyn/env	enum	*{LIN, LOG}*	
/ch/[01…32]/dyn/thr	linf	[-60.000, 0.000, 0.500]	dB
/ch/[01…32]/dyn/ratio	enum	int with value [0…11] representing *{1.1, 1.3, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.0, 10, 20, 100}*	

[10] See Appendix section for detailed values
[11] See Appendix section for detailed values
[12] See Appendix section for detailed values
[13] See Appendix section for detailed values

/ch/[01…32]/dyn/knee	linf	[0.000, 5.000, 1.000]	
/ch/[01…32]/dyn/mgain	linf	[0.000, 24.000, 0.500]	dB
/ch/[01…32]/dyn/attack	linf	[0.000, 120.000, 1.000]	ms
/ch/[01…32]/dyn/hold	logf	[0.020, 2000, 101]	ms
/ch/[01…32]/dyn/release	logf	[5.000, 4000.000, 101]	ms
/ch/[01…32]/dyn/pos	enum	*{PRE, POST}*	
/ch/[01…32]/dyn/keysrc	int	int with value [0…64] representing *{OFF, In01…32, Aux 1…6, USB L, USB R, Fx 1L…Fx 4R, Bus 01…16}*	
/ch/[01…32]/dyn/mix	linf	[0, 100, 5]	%
/ch/[01…32]/dyn/auto[14]	enum	*{OFF, ON}*	
/ch/[01…32]/dyn/filter/on	enum	*{OFF, ON}*	
/ch/[01…32]/dyn/filter/type	enum	int with value [0…8] representing Keysolo (Solo/Q) *{LC6, LC12, HC6, HC12, 1.0, 2.0, 3.0, 5.0, 10.0}*	
/ch/[01…32]/dyn/filter/f	logf	[20.000, 20000, 201]	Hz
/ch/[01…32]/insert/on	enum	*{OFF, ON}*	
/ch/[01…32]/insert/pos	enum	*{PRE, POST}*	
/ch/[01…32]/insert/sel	enum	int with value [0…22] representing *{OFF, FX1L, FX1R, FX2L, FX2R, FX3L, FX3R, FX4L, FX4R, FX5L, FX5R, FX6L, FX6R, FX7L, FX7R, FX8L, FX8R, AUX1, AUX2, AUX3, AUX4, AUX5, AUX6}*	
/ch/[01…32]/eq/on	enum	*{OFF, ON}*	
/ch/[01…32]/eq/[1…4]/type	enum	int [0…5] representing *{LCut, LShv, PEQ, VEQ, HShv, HCut}*	
/ch/[01…32]/eq/[1…4]/f	logf	[20.000, 20000, 201]	Hz
/ch/[01…32]/eq/[1…4]/g	linf	[-15.000, 15.000, 0.250]	dB
/ch/[01…32]/eq/[1…4]/q	logf	[10.000, 0.3, 72]	
/ch/[01…32]/mix/on	enum	*{OFF, ON}*	
/ch/[01…32]/mix/fader	level	[0.0…1.0(+10dB), 1024]	dB
/ch/[01…32]/mix/st	enum	*{OFF, ON}*	
/ch/[01…32]/mix/pan	linf	[-100.000, 100.000, 2.000]	
/ch/[01…32]/mix/mono	enum	*{OFF, ON}*	
/ch/[01…32]/mix/mlevel	level	[0.0…1.0 (+10 dB), 161]	dB
/ch/[01…32]/mix/[01…16]/on	enum	*{OFF, ON}*	
/ch/[01…32]/mix/[01…16]/level	level	[0.0…1.0 (+10 dB), 161]	dB
/ch/[01…32]/mix/01/pan	linf	[-100.000, 100.000, 2.000]	
/ch/[01…32]/mix/01/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/ch/[01…32]/mix/03/pan	linf	[-100.000, 100.000, 2.000]	
/ch/[01…32]/mix/03/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/ch/[01…32]/mix/05/pan	linf	[-100.000, 100.000, 2.000]	
/ch/[01…32]/mix/05/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	

[14] This command is available starting with FW 2.10

/ch/[01…32]/mix/07/pan	linf	[-100.000, 100.000, 2.000]	
/ch/[01…32]/mix/07/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/ch/[01…32]/mix/09/pan	linf	[-100.000, 100.000, 2.000]	
/ch/[01…32]/mix/09/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/ch/[01…32]/mix/11/pan	linf	[-100.000, 100.000, 2.000]	
/ch/[01…32]/mix/11/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/ch/[01…32]/mix/13/pan	linf	[-100.000, 100.000, 2.000]	
/ch/[01…32]/mix/13/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/ch/[01…32]/mix/15/pan	linf	[-100.000, 100.000, 2.000]	
/ch/[01…32]/mix/15/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/ch/[01…32]/grp/dca	%int	[0, 255] (bitmap)	
/ch/[01…32]/grp/mute	%int	[0, 63] (bitmap)	

Aux In (/auxin) data

auxin [01…08] (channel id 32…39)			
/auxin/[01…08]/config/name	string	[12]	
/auxin/[01…08]/config/icon	int	[1…74] (see appendix for a list of icons)	
/auxin/[01…08]/config/color	enum	int with value [0…15] representing *{OFF, RD, GN, YE, BL, MG, CY, WH, OFFi, RDi, GNi, YEi, BLi, MGi, CYi, WHi}*	
/auxin/[01…08]/config/source	int	int with value [0…64] representing *{OFF, In01…32,Aux 1…6,USB L, USB R, Fx 1L…Fx4R, Bus 01…16}*	
/auxin/[01…08]/preamp/trim	linf	[-18.000, 18.000, 0.250]	dB
/auxin/[01…08]/preamp/invert	enum	*{OFF, ON}*	
/auxin/[01…08]/eq/on	enum	*{OFF, ON}*	
/auxin/[01…08]/eq/[1…4]/type	enum	int [0…5] representing *{LCut, LShv, PEQ, VEQ, HShv, HCut}*	
/auxin/[01…08]/eq/[1…4]/f	logf	[20.000, 20000, 201]	Hz/dB
/auxin/[01…08]/eq/[1…4]/g	linf	[-15.000, 15.000, 0.250]	
/auxin/[01…08]/eq/[1…4]/q	logf	[10.000, 0.3, 72]	
/auxin/[01…08]/mix/on	enum	*{OFF, ON}*	
/auxin/[01…08]/mix/fader	level	[0.0…1.0(+10dB), 1024]	
/auxin/[01…08]/mix/st	enum	*{OFF, ON}*	
/auxin/[01…08]/mix/pan	linf	[-100.000, 100.000, 2.000]	
/auxin/[01…08]/mix/mono	enum	*{OFF, ON}*	
/auxin/[01…08]/mix/mlevel	level	[0.0…1.0 (+10 dB), 161]	
/auxin/[01…08]/mix/[01…16]/on	enum	*{OFF, ON}*	
/auxin/[01…08]/mix/[01…16]/level	level	[0.0…1.0 (+10 dB), 161]	
/auxin/[01…08]/mix/01/pan	linf	[-100.000, 100.000, 2.000]	
/auxin/[01…08]/mix/01/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/auxin/[01…08]/mix/03/pan	linf	[-100.000, 100.000, 2.000]	
/auxin/[01…08]/mix/03/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/auxin/[01…08]/mix/05/pan	linf	[-100.000, 100.000, 2.000]	
/auxin/[01…08]/mix/05/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/auxin/[01…08]/mix/07/pan	linf	[-100.000, 100.000, 2.000]	
/auxin/[01…08]/mix/07/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/auxin/[01…08]/mix/09/pan	linf	[-100.000, 100.000, 2.000]	
/auxin/[01…08]/mix/09/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/auxin/[01…08]/mix/11/pan	linf	[-100.000, 100.000, 2.000]	
/auxin/[01…08]/mix/11/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/auxin/[01…08]/mix/13/pan	linf	[-100.000, 100.000, 2.000]	
/auxin/[01…08]/mix/13/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/auxin/[01…08]/mix/15/pan	linf	[-100.000, 100.000, 2.000]	

/auxin/[01…08]/mix/15/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/auxin/[01…08]/grp/dca	%int	[0, 255] (bitmap)	
/auxin/[01…08]/grp/mute	%int	[0, 63] (bitmap)	

FX Return (/fxrtn) data

fxrtn [01…08] (channel id 40…47)			
/fxrtn/[01…08]/config/name	string	[12]	
/fxrtn/[01…08]/config/icon	int	[1…74] (see appendix for a list of icons)	
/fxrtn/[01…08]/config/color	enum	int with value [0…15] representing *{OFF, RD, GN, YE, BL, MG, CY, WH, OFFi, RDi, GNi, YEi, BLi, MGi, CYi, WHi}*	
/fxrtn/[01…08]/eq/on	enum	*{OFF, ON}*	
/fxrtn/[01…08]/eq/[1…4]/type	enum	int [0…5] representing *{LCut, LShv, PEQ, VEQ, HShv, HCut}*	
/fxrtn/[01…08]/eq/[1…4]/f	logf	[20.000, 20000, 201]	Hz
/fxrtn/[01…08]/eq/[1…4]/g	linf	[-15.000, 15.000, 0.250]	dB
/fxrtn/[01…08]/eq/[1…4]/q	logf	[10.000, 0.3, 72]	
/fxrtn/[01…08]/mix/on	enum	*{OFF, ON}*	
/fxrtn/[01…08]/mix/fader	level	[0.0…1.0(+10dB), 1024]	dB
/fxrtn/[01…08]/mix/st	enum	*{OFF, ON}*	
/fxrtn/[01…08]/mix/pan	linf	[-100.000, 100.000, 2.000]	dB
/fxrtn/[01…08]/mix/mono	enum	*{OFF, ON}*	
/fxrtn/[01…08]/mix/mlevel	level	[0.0…1.0 (+10 dB), 161]	dB
/fxrtn/[01…08]/mix/[01…16]/on	enum	*{OFF, ON}*	
/fxrtn/[01…08]/mix/[01…16]/level	level	[0.0…1.0 (+10 dB), 161]	dB
/fxrtn/[01…08]/mix/01/pan	linf	[-100.000, 100.000, 2.000]	
/fxrtn/[01…08]/mix/01/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/fxrtn/[01…08]/mix/03/pan	linf	[-100.000, 100.000, 2.000]	
/fxrtn/[01…08]/mix/03/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/fxrtn/[01…08]/mix/05/pan	linf	[-100.000, 100.000, 2.000]	
/fxrtn/[01…08]/mix/05/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/fxrtn/[01…08]/mix/07/pan	linf	[-100.000, 100.000, 2.000]	
/fxrtn/[01…08]/mix/07/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/fxrtn/[01…08]/mix/09/pan	linf	[-100.000, 100.000, 2.000]	
/fxrtn/[01…08]/mix/09/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/fxrtn/[01…08]/mix/11/pan	linf	[-100.000, 100.000, 2.000]	
/fxrtn/[01…08]/mix/11/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/fxrtn/[01…08]/mix/13/pan	linf	[-100.000, 100.000, 2.000]	
/fxrtn/[01…08]/mix/13/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/fxrtn/[01…08]/mix/15/pan	linf	[-100.000, 100.000, 2.000]	
/fxrtn/[01…08]/mix/15/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST, GRP}*	
/fxrtn/[01…08]/grp/dca	%int	[0, 255] (bitmap)	
/fxrtn/[01…08]/grp/mute	%int	[0, 63] (bitmap)	

Bus (/bus) data

bus [01…16] (channel id 48…63)			
/bus/[01…16]/config/name	string	[12]	
/bus/[01…16]/config/icon	int	[1…74] (see appendix for a list of icons)	
/bus/[01…16]/config/color	enum	int with value [0…15] representing *{OFF, RD, GN, YE, BL, MG, CY, WH, OFFi, RDi, GNi, YEi, BLi, MGi, CYi, WHi}*	
/bus/[01…16]/dyn/on	enum	*{OFF, ON}*	
/bus/[01…16]/dyn/mode	enum	*{COMP, EXP}*	
/bus/[01…16]/dyn/det	enum	*{PEAK, RMS}*	
/bus/[01…16]/dyn/env	enum	*{LIN, LOG}*	
/bus/[01…16]/dyn/thr	linf	[-60.000, 0.000, 0.500]	dB
/bus/[01…16]/dyn/ratio	enum	int with value [0…11] representing *{1.1, 1.3, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.0, 10, 20, 100}*	
/bus/[01…16]/dyn/knee	linf	[0.000, 5.000, 1.000]	
/bus/[01…16]/dyn/mgain	linf	[0.000, 24.000, 0.500]	dB
/bus/[01…16]/dyn/attack	linf	[0.000, 120.000, 1.000]	ms
/bus/[01…16]/dyn/hold	logf	[0.020, 2000, 101]	ms
/bus/[01…16]/dyn/release	logf	[5.000, 4000.000, 101]	ms
/bus/[01…16]/dyn/pos	enum	*{PRE, POST}*	
/bus/[01…16]/dyn/keysrc	int	int with value [0…64] representing *{OFF, In01…32, Aux 1…6, USB L, USB R, Fx 1L…Fx 4R, Bus 01…16}*	
/bus/[01…16]/dyn/mix	linf	[0, 100, 5]	%
/bus/[01…16]/dyn/auto[15]	enum	*{OFF, ON}*	
/bus/[01…16]/dyn/filter/on	enum	*{OFF, ON}*	
/bus/[01…16]/dyn/filter/type	enum	int with value [0…8] representing Keysolo (Solo/Q) *{LC6, LC12, HC6, HC12, 1.0, 2.0, 3.0, 5.0, 10.0}*	
/bus/[01…16]/dyn/filter/f	logf	[20.000, 20000, 201]	Hz
/bus/[01…16]/insert/on	enum	*{OFF, ON}*	
/bus/[01…16]/insert/pos	enum	*{PRE, POST}*	
/bus/[01…16]/insert/sel	enum	int with value [0…22] representing *{OFF, FX1L, FX1R, FX2L, FX2R, FX3L, FX3R, FX4L, FX4R, FX5L, FX5R, FX6L, FX6R, FX7L, FX7R, FX8L, FX8R, AUX1, AUX2, AUX3, AUX4, AUX5, AUX6}*	
/bus/[01…16]/eq/on	enum	*{OFF, ON}*	
/bus/[01…16]/eq/[1…6]/type	enum	int [0…5] representing *{LCut, LShv, PEQ, VEQ, HShv, HCut}*	
/bus/[01…16]/eq/[1…6]/f	logf	[20.000, 20000, 201]	Hz
/bus/[01…16]/eq/[1…6]/g	linf	[-15.000, 15.000, 0.250]	dB
/bus/[01…16]/eq/[1…6]/q	logf	[10.000, 0.3, 72]	
/bus/[01…16]/mix/on	enum	*{OFF, ON}*	

[15] This command is available starting with FW 2.10

/bus/[01…16]/mix/fader	level	[0.0…1.0(+10dB), 1024]	dB
/bus/[01…16]/mix/st	enum	*{OFF, ON}*	
/bus/[01…16]/mix/pan	linf	[-100.000, 100.000, 2.000]	
/bus/[01…16]/mix/mono	enum	*{OFF, ON}*	
/bus/[01…16]/mix/mlevel	level	[0.0…1.0(+10dB), 161]	dB
/bus/[01…16]/mix/[01…06]/on	enum	*{OFF, ON}*	
/bus/[01…16]/mix/[01…06]/level	level	[0.0…1.0(+10dB), 161]	dB
/bus/[01…16]/mix/01/pan	linf	[-100.000, 100.000, 2.000]	
/bus/[01…16]/mix/03/pan	linf	[-100.000, 100.000, 2.000]	
/bus/[01…16]/mix/05/pan	linf	[-100.000, 100.000, 2.000]	
/bus/[01…16]/mix/01/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST }*	
/bus/[01…16]/mix/03/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST }*	
/bus/[01…16]/mix/05/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST }*	
/bus/[01…16]/grp/dca	%int	[0, 255] (bitmap)	
/bus/[01…16]/grp/mute	%int	[0, 63] (bitmap)	

Matrix (/mtx) data

mtx [01…06] (channel id 64…69)			
/mtx/[01…06]/config/name	string	[12]	
/mtx/[01…06]/config/icon	int	[1…74] (see appendix for a list of icons)	
/mtx/[01…06]/config/color	enum	int with value [0…15] representing *{OFF, RD, GN, YE, BL, MG, CY, WH, OFFi, RDi, GNi, YEi, BLi, MGi, CYi, WHi}*	
/mtx/[01…06]/config/preamp/invert	enum	*{OFF, ON}*	
/mtx/[01…06]/dyn/on	enum	*{OFF, ON}*	
/mtx/[01…06]/dyn/mode	enum	*{COMP, EXP}*	
/mtx/[01…06]/dyn/det	enum	*{PEAK, RMS}*	
/mtx/[01…06]/dyn/env	enum	*{UN, LOG}*	
/mtx/[01…06]/dyn/thr	linf	[-60.000, 0.000, 0.500]	dB
/mtx/[01…06]/dyn/ratio	enum	int with value [0…11] representing *{1.1, 1.3, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.0, 10, 20, 100}*	
/mtx/[01…06]/dyn/knee	linf	[0.000, 5.000, 1.000]	
/mtx/[01…06]/dyn/mgain	linf	[0.000, 24.000, 0.500]	dB
/mtx/[01…06]/dyn/attack	linf	[0.000, 120.000, 1.000]	ms
/mtx/[01…06]/dyn/hold	logf	[0.020, 2000, 101]	ms
/mtx/[01…06]/dyn/release	logf	[5.000, 4000.000, 101]	ms
/mtx/[01…06]/dyn/pos	enum	*{PRE, POST}*	
/mtx/[01…06]/dyn/mix	linf	[0, 100, 5]	%
/mtx/[01…06]/dyn/auto[16]	enum	*{OFF, ON}*	
/mtx/[01…06]/dyn/filter/on	enum	*{OFF, ON}*	
/mtx/[01…06]/dyn/filter/type	enum	int with value [0…8] representing Keysolo (Solo/Q) *{LC6, LC12, HC6, HC12, 1.0, 2.0, 3.0, 5.0, 10.0}*	
/mtx/[01…06]/dyn/filter/f	logf	[20.000, 20000, 201]	Hz
/mtx/[01…06]/insert/on	enum	*{OFF, ON}*	
/mtx/[01…06]/insert/pos	enum	*{PRE, POST}*	
/mtx/[01…06]/insert/sel	enum	int with value [0…22] representing *{OFF, FX1L, FX1R, FX2L, FX2R, FX3L, FX3R, FX4L, FX4R, FX5L, FX5R, FX6L, FX6R, FX7L, FX7R, FX8L, FX8R, AUX1, AUX2, AUX3, AUX4, AUX5, AUX6}*	
/mtx/[01…06]/eq/on	enum	*{OFF, ON}*	
/mtx/[01…06]/eq/[1…6]/type	enum	int [0…5] representing *{LCut, LShv, PEQ, VEQ, HShv, HCut}* For /mtx/01/ and mtx/06/ type extends to int [0…13] adding *{BU6, BU12, BS12, LR12, BU18, BU24, BS24, LR24}*. In that case /mtx/02/ and /mtx/05/ are ignored, repectively.	
/mtx/[01…06]/eq/[1…6]/f	logf	[20.000, 20000, 201]	Hz
/mtx/[01…06]/eq/[1…6]/g	linf	[-15.000, 15.000, 0.250]	dB
/mtx/[01…06]/eq/[1…6]/q	logf	[10.000, 0.3, 72]	

[16] This command is available starting with FW 2.10

/mtx/[01…06]/mix/on	enum	*{OFF, ON}*	
/mtx/[01…06]/mix/fader	level	[0.0…1.0(+10dB), 1024]	dB

Main Stereo (/main/st) data

main stereo (channel id 70)			
/main/st/config/name	string	[12]	
/main/st/config/icon	Int	[1…74] (see appendix for a list of icons)	
/main/st/config/color	enum	int with value [0…15] representing *{OFF, RD, GN, YE, BL, MG, CY, WH, OFFi, RDi, GNi, YEi, BLi, MGi, CYi, WHi}*	
/main/st/dyn/on	enum	*{OFF, ON}*	
/main/st/dyn/mode	enum	*{COMP, EXP}*	
/main/st/dyn/det	enum	*{PEAK, RMS}*	
/main/st/dyn/env	enum	*{LIN, LOG}*	
/main/st/dyn/thr	linf	[-60.000, 0.000, 0.500]	dB
/main/st/dyn/ratio	enum	int with value [0…11] representing *{1.1, 1.3, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.0, 10, 20, 100}*	
/main/st/dyn/knee	linf	[0.000, 5.000, 1.000]	
/main/st/dyn/mgain	linf	[0.000, 24.000, 0.500]	dB
/main/st/dyn/attack	linf	[0.000, 120.000, 1.000]	ms
/main/st/dyn/hold	logf	[0.020, 2000, 101]	ms
/main/st/dyn/release	logf	[5.000, 4000.000, 101]	ms
/main/st/dyn/pos	enum	*{PRE, POST}*	
/main/st/dyn/mix	linf	[0, 100, 5]	%
/main/st/dyn/auto[17]	enum	*{OFF, ON}*	
/main/st/dyn/filter/on	enum	*{OFF, ON}*	
/main/st/dyn/filter/type	enum	int with value [0…8] representing Keysolo (Solo/Q) *{LC6, LC12, HC6, HC12, 1.0, 2.0, 3.0, 5.0, 10.0}*	
/main/st/dyn/filter/f	logf	[20.000, 20000, 201]	Hz
/main/st/insert/on	enum	*{OFF, ON}*	
/main/st/insert/pos	enum	*{PRE, POST}*	
/main/st/insert/sel	enum	int with value [0…22] representing *{OFF, FX1L, FX1R, FX2L, FX2R, FX3L, FX3R, FX4L, FX4R, FX5L, FX5R, FX6L, FX6R, FX7L, FX7R, FX8L, FX8R, AUX1, AUX2, AUX3, AUX4, AUX5, AUX6}*	
/main/st/eq/on	enum	*{OFF, ON}*	
/main/st/eq/[1…6]/type	enum	int [0…5] representing *{LCut, LShv, PEQ, VEQ, HShv, HCut}*	
/main/st/eq/[1…6]/f	logf	[20.000, 20000, 201]	Hz
/main/st/eq/[1…6]/g	linf	[-15.000, 15.000, 0.250]	dB
/main/st/eq/[1…6]/q	logf	[10.000, 0.3, 72]	
/main/st/mix/on	enum	*{OFF, ON}*	
/main/st/mix/fader	level	[0.0…1.0(+10dB), 1024]	dB
/main/st/mix/pan	linf	[-100.000, 100.000, 2.000]	
/main/st/mix/[01…06]/on	enum	*{OFF, ON}*	

[17] This command is available starting with FW 2.10

/main/st/mix/[01…06]/level	level	[0.0…1.0(+10dB), 161]	dB
/main/st/mix/01/pan	linf	[-100.000, 100.000, 2.000]	
/main/st/mix/03/pan	linf	[-100.000, 100.000, 2.000]	
/main/st/mix/05/pan	linf	[-100.000, 100.000, 2.000]	
/main/st/mix/01/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST }*	
/main/st/mix/03/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST }*	
/main/st/mix/05/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST }*	

Main Mono (/main/m) data

main mono (channel id 71)			
/main/m /config/name	string	[12]	
/main/m /config/icon	Int	[1…74] (see appendix for a list of icons)	
/main/m /config/color	enum	int with value [0…15] representing *{OFF, RD, GN, YE, BL, MG, CY, WH, OFFi, RDi, GNi, YEi, BLi, MGi, CYi, WHi}*	
/main/m /dyn/on	enum	*{OFF, ON}*	
/main/m /dyn/mode	enum	*{COMP, EXP}*	
/main/m /dyn/det	enum	*{PEAK, RMS}*	
/main/m /dyn/env	enum	*{LIN, LOG}*	
/main/m /dyn/thr	linf	[-60.000, 0.000, 0.500]	dB
/main/m/dyn/ratio	enum	int with value [0…11] representing *{1.1, 1.3, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.0, 10, 20, 100}*	
/main/m/dyn/knee	linf	[0.000, 5.000, 1.000]	
/main/m/dyn/mgain	linf	[0.000, 24.000, 0.500]	dB
/main/m/dyn/attack	linf	[0.000, 120.000, 1.000]	ms
/main/m/dyn/hold	logf	[0.020, 2000, 101]	ms
/main/m/dyn/release	logf	[5.000, 4000.000, 101]	ms
/main/m/dyn/pos	enum	*{PRE, POST}*	
/main/m/dyn/mix	linf	[0, 100, 5]	%
/main/m /dyn/auto[18]	enum	*{OFF, ON}*	
/main/m/dyn/filter/on	enum	*{OFF, ON}*	
/main/m/dyn/filter/type	enum	int with value [0, 8] representing Keysolo (Solo/Q) *{LC6, LC12, HC6, HC12, 1.0, 2.0, 3.0, 5.0, 10.0}*	
/main/m/dyn/filter/f	logf	[20.000, 20000, 201]	Hz
/main/m/insert/on	enum	*{OFF, ON}*	
/main/m/insert/pos	enum	*{PRE, POST}*	
/main/m/insert/sel	enum	int with value [0…22] representing *{OFF, FX1L, FX1R, FX2L, FX2R, FX3L, FX3R, FX4L, FX4R, FX5L, FX5R, FX6L, FX6R, FX7L, FX7R, FX8L, FX8R, AUX1, AUX2, AUX3, AUX4, AUX5, AUX6}*	
/main/m/eq/on	enum	*{OFF, ON}*	
/main/m/eq/[1…6]/type	enum	int [0…5] representing *{LCut, LShv, PEQ, VEQ, HShv, HCut}*	
/main/m/eq/[1…6]/f	logf	[20.000, 20000, 201]	Hz
/main/m/eq/[1…6]/g	linf	[-15.000, 15.000, 0.250]	dB
/main/m/eq/[1…6]/q	logf	[10.000, 0.3, 72]	
/main/m/mix/on	enum	*{OFF, ON}*	
/main/m/mix/fader	level	[0.0…1.0(+10dB), 1024]	dB
/main/m/mix/[01…06]/on	enum	*{OFF, ON}*	
/main/m/mix/[01…06]/level	level	[0.0…1.0(+10dB), 161]	dB

[18] This command is available starting with FW 2.10

/main/m/mix/01/pan	linf	[-100.000, 100.000, 2.000]	
/main/m/mix/03/pan	linf	[-100.000, 100.000, 2.000]	
/main/m/mix/05/pan	linf	[-100.000, 100.000, 2.000]	
/main/m/mix/01/type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST }*	
/main/m/mix/03/ type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST }*	
/main/m/mix/05/ type	enum	int [0…5] representing *{IN/LC, <-EQ, EQ->, PRE, POST }*	

DCA groups (/dca) data

dca groups (no channel id)			
/dca/[1…8]/on	enum	*{OFF, ON}*	
/dca/[1…8]/fader	level	[0.0…1.0(+10dB), 1024]	dB
/dca/[1…8]/config/name	string	[12]	
/dca/[1…8]/config/icon	Int	[1…74] (see appendix for a list of icons)	
/dca/[1…8]/config/color	enum	int with value [0…15] representing *{OFF, RD, GN, YE, BL, MG, CY, WH, OFFi, RDi, GNi, YEi, BLi, MGi, CYi, WHi}*	

Effects (/fx) data

effects fx [1…4]		
/fx/[1…4]/type	enum	int [0…60] representing *{HALL, AMBI, RPLT, ROOM, CHAM, PLAT, VREV, VRM, GATE, RVRS, DLY, 3TAP, 4TAP, CRS, FLNG, PHAS, DIMC, FILT, ROTA, PAN, SUB, D/RV, CR/R, FL/R, D/CR, D/FL, MODD, GEQ2, GEQ, TEQ2, TEQ, DES2, DES, P1A, P1A2, PQ5, PQ5S, WAVD, LIM, CMB, CMB2, FAC, FAC1M, FAC2, LEC, LEC2, ULC, ULC2, ENH2, ENH, EXC2, EXC, IMG, EDI, SON, AMP2, AMP, DRV2, DRV, PIT2, PIT}*[19]
/fx/[1…4]/source/l	enum	int with value [0…17] representing *{INS, MIX1, MIX2, MIX3, MIX4, MIX5, MIX6, MIX7, MIX8, MIX9, MIX10, MIX11, MIX12, MIX13, MIX14, MIX15, MIX16, M/C}*
/fx/[1…4]/source/r	enum	int with value [0…17] representing *{INS, MIX1, MIX2, MIX3, MIX4, MIX5, MIX6, MIX7, MIX8, MIX9, MIX10, MIX11, MIX12, MIX13, MIX14, MIX15, MIX16, M/C}*
/fx/[1…4]/par/[01…64]	linf/logf	Up to 64 parameters, depending on selected effect type. See Effect Parameters Chapter

effects fx[5…8]		
/fx/[5…8]/type	enum	int [0…33] representing *{GEQ2, GEQ, TEQ2, TEQ, DES2, DES, P1A, P1A2, PQ5, PQ5S, WAVD, LIM, FAC, FAC1M, FAC2, LEC, LEC2, ULC, ULC2, ENH2, ENH, EXC2, EXC, IMG, EDI, SON, AMP2, AMP, DRV2, DRV, PHAS, FILT, PAN, SUB}*[20]
/fx/[5…8]/par/[01…64]	linf/logf	Up to 64 parameters, depending on selected effect type. See Effect Parameters Chapter

[19] See Appendix for table of enum/name/type
[20] See Appendix for table of enum/name/type

Output sets (/output) data

outputs main [01…16]			
/outputs/main/[01…16]/src	int	int value [0…76] representing *{OFF, Main L, Main R, M/C, MixBus 01…16, Matrix 1…6, DirectOut Ch 01…32, DirectOut Aux 1…8, DirectOut FX 1L…4R, Monitor L, Monitor R, Talkback}*	
/outputs/main/[01…16]/pos	enum	int [0…8] representing *{IN/LC, IN/LC+M, <-EQ, <-EQ+M, EQ->, EQ->+M, PRE, PRE+M, POST}*	
/outputs/main/[01…16]/delay/on	enum	*{OFF, ON}*	
/outputs/main/[01…16]/delay/time	linf	[0.300, 500.000, 0.100]	ms

outputs aux [01…06]			
/outputs/aux/[01…06]/src	Int	int value [0…76] representing *{OFF, Main L, Main R, M/C, MixBus 01…16, Matrix 1…6, DirectOut Ch 01…32, DirectOut Aux 1…8, DirectOut FX 1L…4R, Monitor L, Monitor R, Talkback}*	
/outputs/aux/[01…06]/pos	enum	int [0…8] representing *{IN/LC, IN/LC+M, <-EQ, <-EQ+M, EQ->, EQ->+M, PRE, PRE+M, POST}*	

outputs P16 [01…16]			
/outputs/p16/[01…16]/src	Int	int value [0…76] representing *{OFF, Main L, Main R, M/C, MixBus 01…16, Matrix 1…6, DirectOut Ch 01…32, DirectOut Aux 1…8, DirectOut FX 1L…4R, Monitor L, Monitor R, Talkback}*	
/outputs/p16/[01…16]/pos	enum	int [0…8] representing *{IN/LC, IN/LC+M, <-EQ, <-EQ+M, EQ->, EQ->+M, PRE, PRE+M, POST}*	
/outputs/p16/[01…16]/iQ/group[21]	enum	Int [0…2] representing the group the iQ speaker is associated to, in the range *{OFF, A, B}* *0: OFF* *1: A* *2: B*	
/outputs/p16/[01…16]/iQ/speaker[22]	enum	int [0…6] representing the type of Turbosound iQ speakers connected to the output, in the range *{none, iQ8, iQ10, iQ12, iQ15, iQ15B, iQ18B}* *0: none* *1: iQ8* *2: iQ10* *3: iQ12* *4: iQ15* *5: iQ15B* *6: iQ18B*	
/outputs/p16/[01…16]/iQ/eq[23]	enum	int [0…4] representing a frequency response setting for	

[21] This command is available starting with FW 2.12
[22] This command is available starting with FW 2.12
[23] This command is available starting with FW 2.12

		the respective speaker. Possible values are: *{Linear, Live, Speech, Playback, User}* *0: Linear (default setting)* *1: Live(typical live sound setting)* *2: Speech (optimal speech intelligibility setting)* *3: Playback (ideal setting for music playback)* *4: User(response curve set in the iQ speaker sub-menu)*	
/outputs/p16/[01…16]/iQ/model[24]	int	An integer representing a sound Model, either a Turbosound signature voicing or a DSP model of an industry standard product. The value is within a range depending on the type of speaker modeling set for the respective speaker: *iQ8 : [0…5]: iQ8, E8, F8+, UPJunior, PS8, NuQ8-DP* *iQ10: [0…4]: iQ10, F10+, UPJ-1P, PS10-R2, NuQ10-DP* *iQ12: [0…7]: iQ12, E12, JF29NT,ELX112P, PRX612M,F12+, UPA-1P, NuQ12-DP* *iQ15: [0…7]: iQ15, JF59NT, ELX115P, PRX615M, F15+, UPQ-1P, PS15-R2, NuQ15-DP* *iQ15B: [0…3]: iQ15B, E15X, S15+, B-15DP* *iQ18B: [0…4]: iQ18B, ELX18P, PRX6118S, S18+, B-18DP*	

outputs AES [01…02]			
/outputs/aes/[01…02]/src	int	int value [0…76] representing *{OFF, Main L, Main R, M/C, MixBus 01…16, Matrix 1…6, DirectOut Ch 01…32, DirectOut Aux 1…8, DirectOut FX 1L…4R, Monitor L, Monitor R, Talkback}*	
/outputs/aes/[01…02]/pos	enum	int [0…8] representing *{IN/LC, IN/LC+M, <-EQ, <-EQ+M, EQ->, EQ->+M, PRE, PRE+M, POST}*	

outputs REC [01…02]			
/outputs/rec/[01…02]/src	int	int value [0…76] representing: *{OFF, Main L, Main R, M/C, MixBus 01…16, Matrix 1…6, DirectOut Ch 01…32, DirectOut Aux 1…8, DirectOut FX 1L…4R, Monitor L, Monitor R, Talkback}*	
/outputs/rec/[01…02]/pos	enum	int [0…8] representing *{IN/LC, IN/LC+M, <-EQ, <-EQ+M, EQ->, EQ->+M, PRE, PRE+M, POST}*	

[24] This command is available starting with FW 2.12

Headamp (/headamp) data

headamp [000…127]			
/headamp/[000…127]/gain	linf	[-12.000, 60.000, 0.500]	dB
/headamp/[000…127]/phantom	enum	*{OFF, ON}* */headamp index:* *000…031: local XLR inputs* *032…079: AES50 port A connected devices* *080…127: AES50 port B connected devices*	

Inserts (/-insert) data[25]

insert			
/-insert/fx[1-8]L	int	Channel the FX L input[1…8] is inserted into	
/-insert/fx[1-8]R	int	Channel the FX R input [1…8] is inserted into	
/-insert/aux[1…6]	int	Channel the aux input [1…6] is inserted into	

[25] */node ,s -insert* reports 22 inserts in the following order: *fx1L, fx1R, fx2L, …, fx8R, aux1, …, aux6*

Show, Cue, Scene, Snippet, and Preset Management

This section covers the */showdump, /-show, /-libs, /add, /copy, /save, /load, /delete, /rename,* and */-undo* commands typically used to manage Show, Cues, Scenes, Snippets and Presets.

Shows, Cues, Scenes, Snippets (/showdump, /-show)

The X32/M32 family of products is capable of handling a single show at a time.
A show is made of a list of Cues, referencing Scenes and Snippets. A show can contain up to 100 distinct cues. Cue numbering consists of 3 numbers in the form xxx.x.x to offer a hierarchy scheme. Cues can also have a flag to skip them at read/execute time.

X32/M32 systems can manage 100 different Scenes and 100 different Snippets, each numbered 0 to 99. Scenes files consist in a large collection of data resulting from and with a similar format as the output of */node* commands. Snippets are similar in structure but applied to smaller sets, with finer granularity to what can be controlled (saved or restored).

When restoring Scenes, a series of flags will enable protection of existing (already in place) parameters. These flags are listed as "Scene Safes" and address rather large groups of elements.
A different set of flags enables what is actually saved with Snippets, controlling the affected areas in a much finer manner.

A complete list of elements found in Scenes and Snippet files is given in appendix of this document.

Scene *0* cannot have scene safes associated to it.

Presets (/-libs)

The X32/M32 familly of products can accept 3 different types of presets: Channel, Effects and Routing.
Presets are files which can be loaded in one of the 3 x 100 preset memory slots of the X32/M32. They consist of X32node like commands dedicated to the domain they address.

- Channel presets contain */node* commands used for X32/M32 channels (i.e. beginning with [*/*]*ch/[01…32]/…*)
- Routing presets contain */node* commands used for X32/M32 Routing (i.e. stating with [*/*]*config/routing/…)*
- Effects presets contain */node* commands used for X32/M32 Effects (i.e. beginning with [*/*]*fx/[1…8]/…)*

In the case of Channels and Effects, the corresponding header is not present as Channel and Effect presets are not dedicated to specific channels or effect slots.

A complete list of elements found in Channel, Effects and Routing preset files is given in appendix of this document.
Shows, Scenes, Snippets and Presets can be saved to and retrieved from memory or the USB drive with appropriate controls available on the different systems. They can also be controlled with the OSC commands below.

The */showdump* command can be a way to read from the server all information related to Cues, Scenes, and Snippets for the current Show.

The */-show/…* commands are used to get/set elements and values related to Shows, Cues, Scenes and Snippets.

The */-libs/…* commands are used for listing and dealing with presets.

The */add, /copy, /save, /load, /delete* and */rename* commands are used to manage or update internal entities such as cues, scenes, snippets and presets within the X32/M32. A scene will save all data while a snippet will save small changes made to an existing scene. If the scene, snippet or preset already exists at the index provided in the command, the element at that given index is updated with new information. Otherwise, a new internal entity is created at the given index. These operators manage data between the X32/M32 internal storage (not the USB drive) and the X32/M32 audio engine state or preset libraries in memory.

Finally, the */-undo* command is used to get back to a previous state/time.

Show, Cue, Scene, Snippet, and Preset Management			
/showdump	none	Request the X32/M32 to send all Cue, Scene and Snippet related data. Cues, Scenes and Snippets data are returned using one or more X32node messages (see below). If no cues, scene, or snippets exist, only the first line is reported by the command (see below).	
/-show/prepos/current	int	Scene page cue, scene or snippet slot highlighted line/index is <int> value. int = [1-099] ***Note***: selection of cue/scene/snippet depends on the */-prefs/show_control* command value. Scene 0 always exists and has no safes. It is a good practice not to change it, and use it as a start point for copy to another scene location before editing. It will also ensure by reloading it that your system will be back to an X32/M32 known factory state (unless you change scene 0 to reflect your own default state, of course).	
/-show/showfile/show/name **Note/Bug**: In 2.08 the name changes only after the "utility" screen has been selected within the Scene/home screen	string	Name of the current show	
/-show/showfile/show/inputs	%int	Param safe page Scene safe parameters Input channels selection: *bit 0: Preamp* *bit 1: Config* *bit 2: EQ* *bit 3: Gate & Comp* *bit 4: Insert* *bit 5: Groups* *bit 6: Faders, Pan* *bit 7: Mute* e.g.: <int> = *0x00000024*: EQ and Groups are safe	
/-show/showfile/show/mxsends	%int	Param safe page Scene safe parameters Input channels selection:	

		bit 0: Mix 1 Sends … *bit 15: Mix 16 Sends* e.g.: <int> = *0x00008001*: mix 1 and 16 are safe	
/-show/showfile/show/mxbuses	int	Param safe page Scene safe parameters Mix Buses selection: *bit 0: Mix Sends* *bit 1: Config* *bit 2: EQ* *bit 3: Comp* *bit 4: Insert* *bit 5: Groups* *bit 6: Faders, Pan* *bit 7: Mute* e.g.: <int> = *0x00000024*: EQ and Groups are safe	
/-show/showfile/show/console	%int	Param safe page Scene safe parameters Console selection: *bit 0: Configuration* *bit 1: Solo* *bit 2: Routing* *bit 3: Outpatch*	
/-show/showfile/show/chan16	%int	chan safe page Chanel safe parameters selection: *bit 0: chan 1* … *bit 15: chan 16* e.g.: <int> = *0x00001002*: chan 2 and 16 are safe	
/-show/showfile/show/chan32	%int	chan safe page Chanel safe parameters selection: *bit 0: chan 17* … *bit 15: chan 32* e.g.: <int> = *0x00000001*: chan 17 is safe	
/-show/showfile/show/return	%int	chan safe page Return & Aux safe parameters selection: *bit 0: Aux 1* … *bit 7: Aux 8* *bit 8: FX 1L* … *bit 15: FX 4R*	
/-show/showfile/show/buses	%int	chan safe page Buses safe parameters selection: *bit 0: Mix 1* … *bit 15: Mix 16*	
/-show/showfile/show/lrmtxdca	%int	chan safe page Buses safe parameters selection: *bit 0: Mtx 1* … *bit 5: Mtx 6* *bit 6: L/R* *bit 7: Mono/Center* *bit 8: DCA group 1* … *bit 15: DCA group 8*	

/-show/showfile/show/effects	%int	chan safe page Effects Slots safe parameters selection: *bit 0: FX1* … *bit 7: FX8*	
/-show/showfile/cue/[000-099]/numb	int	number of cue in the form xxx.x.x, saved at position [000-099] A value of 10327 means cue 103.2.7 A value of 49999 means cue 499.9.9 A value of 50000 means 500.0.0 (displayed as 500)	
/-show/showfile/cue/[000-099]/name	string	Name of cue at position [000-099]	
/-show/showfile/cue/[000-099]/skip	int	*0* (no Skip) or *1* (Skip) for cue at position [000-099]	
/-show/showfile/cue/[000-099]/scene	int	Associate Scene <int> with cue at position [000-099]	
/-show/showfile/cue/[000-099]/bit	int	Associate Snippet <int> with cue at position [000-099]	
/-show/showfile/cue/[000-099]/miditype	int	Associate MIDI type <int> with cue at position [000-099]. <int> can be one of: *0: none* *1: program change* *2: control change* *3: note*	
/-show/showfile/cue/[000-099]/midichan	int	Set MIDI channel number to <int>	
/-show/showfile/cue/[000-099]/midipara1	int	Set Midi parameter 1 value to <int>	
/-show/showfile/cue/[000-099]/midipara2	int	Set Midi parameter 2 value to <int>	
/-show/showfile/scene/[000-099]/name	string	Scene “Name” parameter for scene [000-099]	
/-show/showfile/scene/[000-099]/notes	string	Scene “Notes” parameter for scene [000-099]	
/-show/showfile/scene/[000-099]/safes	%int	Scene “Scene Safes” parameters selection for scene [000-099] *bit 1: Talkback* *bit 2: Effects* *bit 3: Mix Buses* *bit 4: Chan Process* *bit 5: Configuration* *bit 6: Preamp (HA)* *bit 7: Output Patch* *bit 8: Routing I/O* e.g.: <int> = *0x00000106*: Routing I/O, Talkback and Effects are safe	
/-show/showfile/scene/[000-099]/hasdata	int	Scene at position [000-099] has valid data *0: No* *1: Yes*	

/-show/showfile/snippet/[000-099]/name	string	Snippet “Name” parameter for Snippet [000-099]	
/-show/showfile/snippet/[000-099]/eventtyp	%int	Parameter Filters & Effects affected by snippet in the form of bitwise operation: *bit 0: Preamp HA* *bit 13: FX 1* *bit 1: Config* *bit 14: FX 2* *bit 2: EQ* *bit 15: FX 3* *bit 3: Gate & Comp* *bit 16: FX 4* *bit 4: Insert* *bit 17: FX 5* *bit 5: Groups* *bit 18: FX 6* *bit 6: Fader, Pan* *bit 19: FX 7* *bit 7: Mute* *bit 20: FX 8* *bit 8: Send 1-8* *bit 9: Send 9-12* *bit 10: Send 13-16* *bit 21: Config* *bit 11: Send M/C* *bit 22: Solo* *bit 12: Send Matrix* *bit 23: Routing* *Bit 24: Out Patch*	
/-show/showfile/snippet/[000-099]/channels	%int	Channels affected by snippet in the form of bitwise operation: *bit 0: channel 1* … *bit 31: channel 32*	
/-show/showfile/snippet/[000-099]/auxbuses	%int	Returns and Buses affected by snippet in the form of bitwise operation: *bit 0: Aux 1* … *bit 15: FX 4R* *bit 16: Mix 1* … *bit 31: Mix 16*	
/-show/showfile/snippet/[000-099]/maingrps	%int	Main/Matrix/Group affected by snippet in the form of bitwise operation: *bit 0: Matrix 1* … *bit 15: DCA Group 8*	
/-show/showfile/snippet/[000-099]/hasdata	int	Snippet at position [000-099] has valid data *0: No* *1: Yes*	
/-libs/ch/[001-100]/pos	int	The position of the channel preset number [001-100]	
/-libs/ch/[001-100]/name	string	Name of the channel preset	
/-libs/ch/[001-100]/type	int	Type of the channel preset	
/-libs/ch/[001-100]/flags	%int	Lists the scope elements for the channel preset index [001-100] in the form of bitwise operation: *bit 0: preamp phantom ON* *bit 1: config: delay ON* *bit 2: LoCut ON* *bit 3: Gate ON* *bit 4: EQ ON* *bit 5: Dyn ON* *bit 6: 0* *bit 7: 0* *bit 8: preset has a preamp section* *bit 9: preset has a config section*	

		bit 10: preset has a LoCut section *bit 11: preset has a Gate section* *bit 12: preset has a EQ section* *bit 13: preset has a Dyn section* *bit 14: 0* *bit 15: 0*	
/-libs/ch/[001-100]/hasdata	int	*{0, 1}* depending on the validity of the channel preset.	
/-libs/fx/[001-100]/pos	int	The position of the effect preset number [001-100]	
/-libs/fx/[001-100]/name	string	Name of the effect preset	
/-libs/fx/[001-100]/type	int	Type of the effect preset	
/-libs/fx/[001-100]/flags	%int	Use as an int to list the effect type "Ambiance", Plate Reverb", etc. at the right of the effect name on the X32/M32 screen. [26] ***Note**: int values do not match with FX enums!*	
/-libs/fx/[001-100]/hasdata	int	*{0, 1}* depending on the validity of the effect preset.	
/-libs/r/[001-100]/pos	int	The position of the routing preset number [001-100]	
/-libs/r/[001-100]/name	string	Name of the effect routing	
/-libs/r/[001-100]/type	int	Type of the effect routing	
/-libs/r/[001-100]/flags	%int	Unused (all *0*).	
/-libs/r/[001-100]/hasdata	int	*{0, 1}* depending on the validity of the routing preset.	
/copy	string, int, int, [%int]	Copies an X32/M32 internal set to another. The type of internal set is listed with the first *<string>* parameter and can be *scene*, *libchan*, *libfx* or *librout*[27] for scene, snippet, channel, effect and routing presets respectively. The next *<int>* is the source index, and is followed by another *<int>* representing the destination index. ***Index values start at 0.*** In the case of channel copy, the last *<%int>* is a bitmap field specifying which attribute or subset is copied: *bit 0: headamp* *bit 1: config* *bit 2: gate* *bit 3: dynamics* *bit 4: EQ* *bit 5: sends* Upon completion, the server returns a status indicating if the operation failed [0] or was successful [1], e.g.: *->X: /copy ,sii libchan 45 48* *X->: /copy~~~,si~libchan~[1]*	
/add	string, int,	Adds a cue element to the current show in the X32/M32 internal memory.	

[26] See Appendix for table of enum/name/type

[27] */copy* does not enable copying snippets; */load* and */save* should be sed instead

	string	The first parameter is a string: *cue*
		The second parameter is an *<int>* representing the cue index and subindex. For example
		cue index data *1.0.0* will have int=*100* for value;
		cue index data *12.5.2* will have int=*1252* for value;
		The third parameter is a *<string>* representing the cue name.
		
		The added cue will save the current values of *skip*, *scene*, *snippet*, *midichan*, *midipar1* and *midipar2* associated with the cue	

/save	string, int, [int | string, …]	Saves or updates in the X32/M32 internal memory a scene, snippet or preset at a given index with information specific to the object saved; The first parameter is a string representing the type of element to save. It can be one of: *scene*, *snippet*, *libchan, libfx or librout* for saving a scene, a snippet, a channel preset, an effect preset or a routing reset, respectively. The other parameters depend on the object to save. **Scenes**: the first parameter is followed by *<int>*, *<string>*, *<string>* representing respectively the scene position **index** in the range [000-099] and the **name** and **note** given to the scene. **Snippets**: the first parameter is followed by *<int>*, *<string >* representing respectively the snippet position **index** in the range [000-099] and the **name** given to the snippet. The snippet is saved accordingly to parameter filters set for *eventtyp*, *channels*, *auxbuses* and *maingrps* associated with the snippet. **Channel presets**: the first parameter is followed by *<int>*, *<string>*, *<int>* representing respectively the channel preset position **index** in the range [000-099], the **name** of the preset, and the last <int> parameter specifies the channel **index** relevant to the preset starting at 0 / ch01. **Effect presets**: the first parameter is followed by *<int>*, *<string>*, *<int>* representing respectively the effect preset position **index** in the range [000-099], the **name** of the preset, and the last <int> parameter specifies the effect slot **index** relevant to the preset starting at 0, in the range [0…7].	

		Routing presets: the first parameter is followed by <*int*>, <*string*> representing respectively the routing preset position **index** in the range [000-099], and the **name** of the preset.
		
		Upon completion, the server returns a status indicating if the operation failed [0] or was successful [1], e.g.:
		`->X: /save ,siss scene 45 test note`
		`X->: /save~~~,si~scene~~~[1]`	

/load	string, int [,int[, int]]	Loads from the X32/M32 internal memory a scene, snippet or a preset listed at a given index with information specific to the state/audio engine;
		
		The first parameter is a string representing the type of element to save. It can be one of: `scene`, `snippet, libchan, libfx or librout` for loading a scene, a snippet, a channel preset, an effect preset or a routing preset, respectively.
		
		The second parameter represents the **index** of the element to load, in the range [000-099].
		
		The next two parameters are not necessarily present, depending on the type of element being loaded
		
		Channel presets:
		The third parameter represents the channel **index** the preset is loaded to, in the range [0-71]
		
		The fourth parameter, a value [0…63] represents the **scope** of elements being loaded to the channel, built from "or"ing bits as follows:
		`Bit 0: Head Amp`
		`Bit 1: Configuration`
		`Bit 2: Gate`
		`Bit 3: Compressor`
		`Bit 4: Equalizer`
		`Bit 5: Sends`
		
		Effects presets:
		The third parameter represents the effect **index** the preset is loaded to, in the range [0…7]
		
		Routing presets:
		No additional parameters
		
		Upon completion, the server returns a status indicating if the operation failed [0] or was successful [1], e.g.:
		`->X: /load ,si scene 99`	

		X->: /load~,si~scene~~~[1]	
/rename	string, int, string	Renames in the X32/M32 internal memory a scene, snippet or a preset listed at a given index; The first parameter is a string representing the type of element to save. It can be one of: *scene*, *snippet, libchan, libfx or librout* for loading a scene, a snippet, a channel preset, an effect preset or a routing reset, respectively. The second parameter represents the **index** of the element to load, in the range [000-099]. The third parameter, a string, is the new **name** assigned to the element Upon completion, the server returns a status indicating if the operation failed [0] or was successful [1], e.g.: *->X: /rename~,sis~~~~scene~~~[99]myScene~* *X->: /rename~,si~scene~~~[1]*	
/delete	string, int	Deletes from the X32/M32 internal memory an element at given index; The first parameter is a string: *scene, snippet, libchan, libfx or librout*, giving the type of element to delete. The second parameter is an **index** of the element to delete in the range [000-099]. Upon completion, the server returns a status indicating if the operation failed [0] or was successful [1], e.g.: *->X: /delete ,si scene 99* *X->: /delete~,si~scene~~~[1]*	
/-undo/time **Note**: It seems there's only 1 undo step in X32	string	Display/Set [TBV] a time value for changes, for example in selecting a scene. Time is coded as string, e.g. *18:36:54* *If string is empty: there are no more undo steps available*	

Note/bug: in *FW 2.08*, it seems that Scenes and Snippets numbers associated to Cues are not always listed correctly on the X32 LCD SCENES screen, under home page; they can appear listed on the first line rather than respective of their associated Cue index. Selecting/Associating Scenes and Snippets to Cues AFTER cues are created seem to avoid this issue.

Note/bug: in *FW 2.08, specifically on X32 CORE,* it seems that upon asking to load a show from a USB drive, the last snippet from the show is not loaded; it is therefore advisable to add an empty snippet at the end of the list of

snippets. This does not happen on X32 standard.

Note: The OSC data resulting from a */node* command does not comply to OSC standard (no leading "/"); the returned string is "\n" (a.k.a *0x0a)* terminated, which makes it suitable for direct printing or editing with a standard text editor.

Notes on the use of /showdump

/showdump will trigger the X32/M32 server to dump all Scene and Snippet data back to the requesting client. This can generate a large amount of data back to the client, with possible overruns in UDP packets. It is important to ensure a very reliable connection is in place between the X32/M32 and the receiving device.

By experience, 54Mbits/s WIFI is not recommended for Shows with more than 20 lines (cues, scenes or snippets) as there is a high probability of UDP buffer overflow/overrun. Higher data throughput rate are recommended, or better, a 100Mbis/s wired connection.

Replies to client are formatted as per X32node commands format, as shown in the examples below.

X32/M32 does not have any scene or snippet, the answer to a */showdump* request is:

```
node~~~~,s~~/-showfile/show "MyShow" 0 0 0 0 0 0 0 0 0 0 "2.08"
```

X32/M32 has a single scene (in scene slot 01, name: AAA, note: aaa) with Routing IO and Output Pach selected as Scene Safes, no snippet, the answer to a */showdump* request is:

```
node~~~~,s~~/-show/showfile/show "MyShow" 0 0 0 0 0 0 0 0 0 0 "2.08"
node~~~~,s~~/-show/showfile/scene/001 "AAA" "aaa" %110000000 1
```

X32/M32 has a single scene (in scene slot 01, name: AAA, note: aaa) with all items selected as Scene Safes, no snippet, the answer to a */showdump* request is:

```
node~~~~,s~~/-show/showfile/show "MyShow" 0 0 0 0 0 0 0 0 0 0 "2.08"
node~~~~,s~~/-show/showfile/scene/001 "AAA" "aaa" %111111110 1
```

We now add a new scene (in scene slot 02, name: BBB, note: bbb) with Talkback selected as Scene Safes, no snippet, the answer to a */showdump* request is:

```
node~~~~,s~~/-show/showfile/show "MyShow" 0 0 0 0 0 0 0 0 0 0 "2.08"
node~~~~,s~~/-show/showfile/scene/001 "AAA" "aaa" %111111110 1
node~~~~,s~~/-show/showfile/scene/002 "BBB" "bbb" %000000010 1
```

Keeping the 2 scenes created above, we create a snippet in slot 00, with name: Aaa, selecting Parameter Filter Preamp(HA) and Channels Ch. The answer to a */showdump* request is:

```
node~~~~,s~~/-show/showfile/show "MyShow" 0 0 0 0 0 0 0 0 0 0 "2.08"
node~~~~,s~~/-show/showfile/scene/001 "AAA" "aaa" %111111110 1
node~~~~,s~~/-show/showfile/scene/002 "BBB" "bbb" %000000010 1
node~~~~,s~~/-show/showfile/snippet/000 "Aaa" 1 1 0 0 1
```

Updating snippet in slot 00 with selecting Main/Matrix/Group parameter DCA 8, and saving the snippet to slot00 with no other changes, the answer to a */showdump* request is:

```
node~~~~,s~~/-show/showfile/show "MyShow" 0 0 0 0 0 0 0 0 0 0 "2.08"
node~~~~,s~~/-show/showfile/scene/001 "AAA" "aaa" %111111110 1
node~~~~,s~~/-show/showfile/scene/002 "BBB" "bbb" %000000010 1
node~~~~,s~~/-show/showfile/snippet/000 "Aaa" 1 1 0 32768 1
```

Keeping all data unchanged, we create a cue, name it “CCC”, at index 1, selecting scene = -1 (none) and snippet = -1 (none). The answer to a */showdump* request is:

```
node~~~~,s~~/-show/showfile/show "MyShow" 0 0 0 0 0 0 0 0 0 0 "2.08"
node~~~~,s~~/-show/showfile/cue/000 100 "CCC" 0 -1 -1 0 1 0 0
node~~~~,s~~/-show/showfile/scene/001 "AAA" "aaa" %111111110 1
node~~~~,s~~/-show/showfile/scene/002 "BBB" "bbb" %000000010 1
node~~~~,s~~/-show/showfile/snippet/000 "Aaa" 1 1 0 32768 1
```

Keeping all data unchanged, we create a new cue, name it “Ccc”, at index 1.1, selecting scene 01 and snippet = -1. The answer to a */showdump* request is:

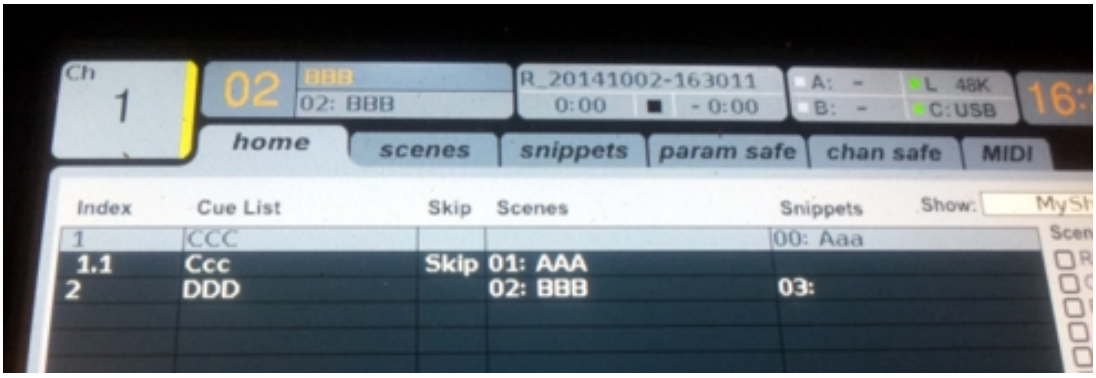
```
node~~~~,s~~/-show/showfile/show "MyShow" 0 0 0 0 0 0 0 0 0 0 "2.08"
node~~~~,s~~/-show/showfile/cue/000 100 "CCC" 0 -1 -1 0 1 0 0
node~~~~,s~~/-show/showfile/cue/001 110 "Ccc" 0 1 -1 0 1 0 0
node~~~~,s~~/-show/showfile/scene/001 "AAA" "aaa" %111111110 1
node~~~~,s~~/-show/showfile/scene/002 "BBB" "bbb" %000000010 1
node~~~~,s~~/-show/showfile/snippet/000 "Aaa" 1 1 0 32768 1
```

Selecting “skip” on cue Ccc, the answer to the X32node command appears as:

```
node~~~~,s~~/-show/showfile/cue/001 110 "Ccc" 1 1 -1 0 1 0 0
```

Updating cue CCC with snippet 0 (Aaa) selected, the X32node command answer appears as:

```
node~~~~,s~~/-show/showfile/cue/001 100 "CCC" 0 -1 0 0 1 0 0
```



Keeping all data unchanged, we create a new cue at index 2, name it “DDD”, selecting scene 02 and snippet = 03. The answer to a */showdump* request is:

```
node~~~~,s~~/-show/showfile/show "MyShow" 2 2 1 1 0 0 1 1 0 0 "2.08"
node~~~~,s~~/-show/showfile/cue/000 100 "CCC" 0 -1 0 0 1 0 0
node~~~~,s~~/-show/showfile/cue/001 110 "Ccc" 1 1 -1 0 1 0 0
node~~~~,s~~/-show/showfile/cue/002 200 "DDD" 0 2 3 0 1 0 0
node~~~~,s~~/-show/showfile/scene/001 "AAA" "aaa" %111111110 1
node~~~~,s~~/-show/showfile/scene/002 "BBB" "bbb" %000000010 1
node~~~~,s~~/-show/showfile/snippet/000 "Aaa" 1 1 0 32768 1
```

X32/M32 console status commands

Preferences (/-prefs) data

Preferences data			
/-prefs/style	string	Name given to your prefs ex: “Patrick”. Will be “ablesque” after factory reset	
/-prefs/bright	linf	[10., 100., 5.], Main LCD Brightness	
/-prefs/lcdcont	linf	[0., 100., 2.], Channel LCD Contrast	
/-prefs/ledbright	linf	[10., 100., 5.], LED Brightness	
/-prefs/lamp	float	[10., 100., 10.], Lamp dim value	
/-prefs/lampon	enum	{OFF. ON} Lamp is : *0: off* *1: on*	
/-prefs/clockrate	enum	int *{0, 1}* representing the global “Sample Rate” (in Global screen) *0: 48K* *1: 44K1*	
/-prefs/clocksource	enum	int [0…3] representing the “Synchronization” (in Global screen) *0: INT* *1: AES50A* *2: AES50B* *3: Exp Card*	
/-prefs/confirm_general	enum	*{OFF, ON}* “General” in Config->Confirm Pop-ups	
/-prefs/confirm_overwrite	enum	*{OFF, ON}* “Overwrite” in Config->Confirm Pop-ups	
/-prefs/confirm_sceneload	enum	*{OFF, ON}* “Scene Load” in Config->Confirm Pop-ups	
/-prefs/viewrtn	enum	*{OFF, ON}* “Return to Last” in Config->View Preferences	
/-prefs/selfollowsbank	enum	*{OFF, ON}* “Sel follows Bank” in Config->View Preferences	
/-prefs/sceneadvance	enum	*{OFF, ON}* “Scene Go Next” in Config->General Prefs	
/-prefs/safe_masterlevels	enum	*{OFF, ON}* “Safe Main Levels” in Config->General Prefs	
/-prefs/haflags	%int	Global parameters: <int> is a bitmask *bit 0: Lock Stagebox* *bit 1: X32 HA Gain split mode* *bit 2: AES50/A HA Gain split mode* *bit 3: AES50/B HA Gain split mode*	
/-prefs/autosel	enum	*{OFF, ON}* “Auto Select” in Config->View Preferences	
/-prefs/show_control	enum	int [0…2] representing “Show Control” in Config *0: CUES* *1: SCENES* *2: SNIPPETS*	
/-prefs/clockmode	enum	*{24h, 12h}* “12h Clock Mode” in Config->General Prefs	
/-prefs/hardmute	enum	*{OFF, ON}* “Hard Mutes” in Config->Mute System	
/-prefs/dcamute	enum	*{OFF, ON}* “DCA groups” in Config->Mute System	
/-prefs/invertmutes	enum	*{NORM, INV}* “Invert Leds” in Config->Mute System	
/-prefs/??????	string	? read-only ? reports “X32-02-4A-53”	
/-prefs/remote/enable	enum	*{OFF, ON}* set or report X32/M32 remote enable state	
/-prefs/remote/protocol	int	Protocol type for X32/M32 Remote *0: Mackie HCU [MC]* *1: Mackie HUI [HUI]* *2: Generic CC [CC]*	
/-prefs/remote/port	int	Port used for MIDI remote	

		0: MIDI in/Out [MIDI] *1: Card MIDI [CARD]* *2: RTP MIDI [RTP]*	
/-prefs/remote/ioenable	%int	Enables X32/M32's Remote mode <int> defines the set of Remote features, using bitwise OR operator, *bit 0: MIDI In/Out,* *bit 1: Card MIDI* *bit 2: RTP MIDI* *bit 3: Rx PrgC* *bit 4: Tx PrgC* *bit 5: Rx Fader* *bit 6: TX Fader* *bit 7: Rx Mute* *bit 8: Tx Mute* *bit 9: Rx Pan* *bit 10: Tx Pan* *bit 11: X/OSC*	
/-prefs/iQ/[01-16]/iQmodel	enum	int [0…6] representing a type of Turbosound iQ speakers *0: none* *1: iQ8* *2: iQ10* *3: iQ12* *4: iQ15* *5: iQ15B* *6: iQ18B*	
/-prefs/iQ/[01-16]/iQeqset	enum	int [0…4] representing an EQ for Turbosound iQ speakers *0: Linear* *1: Live* *2: Speech* *3: Playback* *4: User*	
/-prefs/iQ/[01-16]/iQsound	int	Int representing the emulated sound profile for the attached iQ model: *iQ8 : [0…5]: iQ8, E8, F8+, UPJunior, PS8, NuQ8-DP* *iQ10: [0…4]: iQ10, F10+, UPJ-1P, PS10-R2, NuQ10-DP* *iQ12: [0…7]: iQ12, E12, JF29NT,ELX112P, PRX612M,F12+, UPA-1P, NuQ12-DP* *iQ15: [0…7]: iQ15, JF59NT, ELX115P, PRX615M, F15+, UPQ-1P, PS15-R2, NuQ15-DP* *iQ15B: [0…3]: iQ15B, E15X, S15+, B-15DP* *iQ18B: [0…4]: iQ18B, ELX18P, PRX6118S, S18+, B-18DP*	
/-prefs/card			
/-prefs/card/UFifc	enum	Int[0…] representing the card type in the extension slot *0: FW* *1: USB* *2: … tbd*	
/-prefs/card/UFmode	enum	X-UF card settings *0: 32in/32out* *1: 16in/16out* *2: 32in/8out* *3: 8in/32out*	

/-prefs/card/USBmode	enum	X-USB card settings *0: 32in/32out* *1: 16in/16out* *2: 32in/8out* *3: 8in/32out* *4: 8in/8out* *5: 2in/2out*	
/-prefs/card/ADATwc	enum	*{IN, OUT}*	
/-prefs/card/ADATsync	enum	*{WC, ADAT1, ADAT2, ADAT3, ADAT4}*	
/-prefs/card/MADImode	enum	*{56, 64}*	
/-prefs/card/MADIin	enum	*{1-32, 9-40, 17-48, 25-56, 33-64}*	
/-prefs/card/MADIout	enum	*{1-32, 9-40, 17-48, 25-56, 33-64}*	
/-prefs/card/MADIsrc	enum	*{OFF, OPT, COAX, BOTH}*	
/-prefs/rta/visibility	enum	int [0…12] representing RTA EQ Overlay value *{OFF, 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 80%}*	%
/-prefs/rta/gain	linf	[0.0, 60.0, 6] RTA gain value (steps of 6dB)	dB
/-prefs/rta/autogain	enum	*{OFF, ON}* RTA autogain *0: disabled (OFF)* *1: set/enabled (ON)*	
/-prefs/rta/source	int	RTA source: *0: none* *1: Monitor* *2…33: Ch01…Ch32* *34…41: Aux1…Aux8* *42…49: FX1L…FX4R* *50…65: Bus01…Bus16* *66…71: Mtx1…Mtx6* *72: Main* *73: Mono* *(see also /-stat/rtasource)*	
/-prefs/rta/pos	enum	*{PRE, POST}* RTA chain position *0: Pre EQ* *1: Post EQ*	
/-prefs/rta/mode	enum	*{BAR, SPEC}* RTA display mode selection *0: Bar[graph]* *1: Spec[trograph]*	
/-prefs/rta/option	%int	Describes which RTA options are set, using bitwise OR operator, *bit 0 = Pre EQ* *bit 1 = Spectrograph* *bit 2 = Use RTA source* *bit 3 = Post GEQ* *bit 4 = Spectrograph* *bit 5 = Solo Priority* e.g. int = *0x0021*: solo priority and Pre EQ are set	
/-prefs/rta/det	enum	*{RMS, PEAK}* RTA detector selection	
/-prefs/rta/decay	logf	[0.25, 16, 19] RTA adjustable decay time[28]	

[28] See Appendix section for detailed values

/-prefs/rta/peakhold	enum	*{OFF, 1…8}* RTA peak hold	
/-prefs/ip/dhcp	enum	*{OFF, ON}*. *Use with Caution!*	
/-prefs/ip/addr/[0…3]	int	IP address value. *Use with Caution!*	
/-prefs/ip/mask/[0…3]	int	IP mask value. *Use with Caution!*	
/-prefs/ip/gateway/[0…3]	int	IP gateway value. *Use with Caution!*	

USB (/-usb) data

This section enables accessing and setting some of the parameters of the USB stick.

Note: all options may not be enabled or documented.

USB (/-usb)			
/-usb/path	string	Name of the current directory, e.g.: */-usb/path~~,s~~Dblues 48kHz~~~~*	
/-usb/title	string	Name of a file in the current directory of USB stick, e.g.: */-usb/title~,s~~Candy-DB~~~~*	
/-usb/dir/dirpos	int	Current directory entry number	
/-usb/dir/maxpos	int	Number of entries of the current directory in USB stick, e.g.: */-usb/dir/maxpos~~~~,i~~<int=16>*	
/-usb/dir/001…999/type	string	The name of file at position 000…999 of current directory in USB stick, e.g.: */-usb/dir/006/type~~,s~~~~~~*	
/-usb/dir/001…999/name	string	The name of file at position 000…999 of current directory in USB stick, e.g.: */-usb/dir/006/name~~,s~~Candy.wav~~* *The file "candy.wav" is at position 6 in the current directory* Can also return the name of a directory in the usb stick, e.g.: */-usb/dir/001/name~~,s~~[…]~~~~* */-usb/dir/002/name~~,s~~[DBlues 41Khz]~~* */-usb/dir/003/name~~,s~~[Dblues 48kHz]~~*	

Status (/-stat) data

Status data (screen, tape, fader groups, solo, etc.)			
/-stat/selidx	enum	Select channel index *0-31: Ch 1-32* *32-39: Aux in 1-8* *40-47: FxRtn 1-8* *48-63: Bus master* *64-69: Matrix 1-6* *70: L/R* *71: Mono/Center*	
/-stat/chfaderbank	int	Select Main channel fader bank: *0: CH 1-16* *1: CH 17-32* *2: Aux in / USB / FX returns* *3: Bus masters*	
/-stat/grpfaderbank	int	Select Group channel fader bank: *0: DCA 1-8* *1: BUS 1-8* *2: BUS 9-16* *3: Matrix 1-6, Main C*	
/-stat/sendsonfader	enum	*{OFF, ON}* state of Sends on Faders	
/-stat/bussendbank	int	Select Bus Sends bank: *0: rotary buttons map to Bus 1-4* *1: rotary buttons map to Bus 5-8* *2: rotary buttons map to Bus 9-12* *3: rotary buttons map to Bus 13-16*	
/-stat/eqband	int	Select EQ band (in the HOME->EQ screens) *0: Low* *1: Low2* *2: Lo-Mid* *3: Hi-Mid* *4: High2* *5: High* *Low2* and *High2* are only available with 6 band equilizers, such as used in Bus, Matrix, M, and L/R strips.	
/-stat/solo	enum	*{OFF, ON}* (read only) State of CLEAR SOLO button *0: no SOLO selected* *1: at least one SOLO selected*	
/-stat/keysolo	enum	*{OFF, ON}*	
/-stat/userbank	int	Display User ASIGN bank settings on X32/M32 (pressing on SET A/B/C buttons): *0: User bank A* *1: User bank B* *2: User bank C*	
/-stat/autosave	enum	*{OFF, ON}* X32/M32 saves automatically its state (every 2mns?)	
/-stat/lock	int	X32/M32 Lock status: *0: unlocked* *1: locked*	
/-stat/usbmounted	enum	*{OFF, ON}* USB drive mount status: *0: not mounted* *1: mounted*	
/-stat/remote	enum	*{OFF, ON}* Remote mode:	

		0: X32 in Audio Console mode *1: X32 in DAW mode*	
/-stat/rtamodeeq	enum	*{BAR, SPEC}* RTA display mode for channel EQ *0: Bar[graph]* *1: Spec[trograph]*	
/-stat/rtamodegeq	enum	*{BAR, SPEC}* RTA display mode for GEQ, Dual EQ, True EQ effect *0: Bar[graph]* *1: Spec[trograph]*	
/-stat/rtaeqpre	enum	*{OFF, ON}* RTA chain position for channel EQ *0: Off* *1: On*	
/-stat/rtageqpost	enum	*{OFF, ON}* RTA chain position for GEQ, Dual EQ, TrueEQ effect *0: pre* *1: post*	
/-stat/rtasource	int	RTA source: *0…31: Channel 01…32, PRE-EQ* *32…39: Aux 01…08, PRE-EQ* *40…47: Fxrtn 1L…4R, PRE-EQ* *48…63: Bus 01…16, PRE-EQ* *64…69: Matrix 01…06, PRE-EQ* *70: L/R, PRE-EQ* *71: Mono, PRE-EQ* *72: Monitor, PRE-EQ* … *98…129: Channel 01…32, POST-EQ* *130…137: Aux 01…08, POST-EQ* *138…145: Fxrtn 1L…4R, POST-EQ* *146…161: Bus 01…16, POST-EQ* *162…167: Matrix 01…06, POST-EQ* *168: L/R, POST-EQ* *169: Mono, POST-EQ* *170: Monitor, POST-EQ* !! after Console Reset, the value of RTA source may not reflect the *METERS/RTA* screen settings *(see also /-prefs/rta/source)*	
/-stat/xcardtype	int	Type of card installed (seems to be informative only) Valid values: *0: none* *1: X-UF 32in/32out Firewire/USB Card* *2: X-USB 32in/32out USB Card* *3: X-DANTE 32in/32out Dante Card* *4: X-ADAT 4in/4out 32ch ADAT Card* *5: X-MADI 32ch MADI Card* *6: DN32-USB 32in/32out USB Card* *7: DN32-DANTE 32in/32out Dante Card* *8: DN32-ADAT 4in/4out 32ch ADAT Card* *9: DN32-MADI 32ch MADI Card*	
/-stat/xcardsync	enum	*{OFF, ON}*	
/-stat/geqonfdr	enum	*{OFF, ON}* for EQ on faders: *0: off* *1: on*	
/-stat/geqpos	int	EQ on faders window position	

		Bitwise OR between the FX number and the 8 band window start position: <FX#> | <start pos>, e.g.: *0x100…0x800 | 0x00…0x17* */-stat/geqpos~~~,i~~<0x00000105>* *Means EQ on faders for effect slot #1, fader window starting at fader 5, covering bands 50…250Hz*	
/-stat/screen/screen	int	X32/M32 LCD active screen: *0: HOME screen* *1: METERS screen* *2: ROUTING screen* *3: SETUP screen* *4: LIBRARY screen* *5: EFFECTS screen* *6: MONITOR screen* *7: USB RECORDER screen* *8: SCENES screen* *9: ASSIGN screen* *10: LOCK screen* (get only, can only be set via */-stat/lock* command)	
/-stat/screen/mutegrp	enum	*{OFF, ON}* *0: Turn off mutegrp screen* *1: Turn on mutegrp screen*	
/-stat/screen/utils	enum	*{OFF, ON}* *0: Turn off utils screen* *1: Turn on utils screen*	
/-stat/screen/CHAN/page	int	X32/M32 page in “Home”screen *0: home [HOME]* *1: config [CONFIG]* *2: gate [GATE]* *3: dyn [DYN]* *4: eq [EQ]* *5: sends [MIX]* *6: main [MAIN]*	
/-stat/screen/METER/page	int	X32/M32 page in “Meters” screen *0: channel [CHANNEL]* *1: mixbus [MIXBUS]* *2: aux/fx AUX/FX]* *3: in/out [IN/OUT]* *4: rta [RTA]*	
/-stat/screen/ROUTE/page	int	X32/M32 page in “Routing” screen *0: home [HOME]* *1: out 1-16 [ANAOUT]* *2: aux out [AUXOUT]* *3: p16 out [P16OUT]* *4: card out [CARDOUT]* *5: aes50-a [AES50A]* *6: aes50-b [AES50B]* *7: xlr out [XLROUT]*	
/-stat/screen/SETUP/page	int	X32/M32 page in “Setup” screen *0: global [GLOB]* *1: config [CONF]* *2: remote [REMOTE]*	

		3: network [NETW] *4: scribble strip [NAMES]* *5: preamps [PREAMPS]* *6: card [CARD]*	
/-stat/screen/LIB/page	int	X32/M32 page in “Library” screen, loading presets and options is translated into individual settings. *0: channel [CHAN]* *1: effects [EFFECT]* *2: routing [ROUTE]*	
/-stat/screen/FX/page	int	X32/M32 page in “Effects” screen *0: home [HOME]* *1: fx1 [FX1]* *2: fx2 [FX2]* … *7: fx7 [FX7]* *8: fx8 [FX8]*	
/-stat/screen/MON/page	int	X32/M32 page in “Monitor” screen *0: monitor [MONITOR]* *1: talkback A [TALKA]* *2: talkback B [TALKB]* *3: oscillator [OSC]*	
/-stat/screen/USB/page	int	X32/M32 page in “USB Recorder” screen *0: home [HOME]* *1: config [CONFIG]*	
/-stat/screen/SCENE/page	int	X32/M32 page in “Scene” screen *0: home [HOME]* *1: scenes {SCENES]* *2: snippets [BITS]* *3: param safe [PARSAFE]* *4: chan safe [CHNSAFE]* *5: MIDI [MIDI]*	
/-stat/screen/ASSIGN/page	int	X32/M32 page in “Assign” screen *0: home [HOME]* *1: Set A [SETA]* *2: Set B [SETB]* *3: Set C [SETC]*	
/-stat/solosw/[id]	enum	*{OFF, ON}* 0/1 for on/off of solo switch *[id]: 01-32: Ch 01-32* *33-40: Auxin 1-8* *41-48: FxRtn 1-8* *49-64: Bus master 01-16* *65-70: Matrix 1-6* *71: L/R* *72: Mono/Center* *73-80: DCA 1-8*	
/-stat/aes50/A	string		
/-stat/aes50/B	string		
/-stat/aes50/state	int		
/-stat/tape/state	Int	Tape state: *0: Stop* *1: Pause* *2: Play*	

		3: Pause Record *4: Record* *5: FF* *6: REW*	
/-stat/tape/file	string	File path, ex: *"/dir000/R_20130105-205752.wav"*	
/-stat/tape/etime	int	Elapsed time in seconds during playback or recording file (every second)	
/-stat/tape/rtime	int	Remaining time in seconds of playing media or file (every second)	
/-stat/osc	enum	*{OFF, ON}* 0/1 for on/off of oscillator generation	

Action (/-action) data

Action data			
/-action/setip	int	0 by default; changing to 1 resets Network parameters. *Use with Caution!*	
/-action/setclock	string	Set clock value	
/-action/initall	int	Initialize X32 Console, 0 by default *0: no-op* *1: init console*	
/-action/initlib	int	Initialize X32 Libraries, 0 by default *0: no-op* *1: init libraries*	
/-action/initshow	int	Initialize X32 Show data, 0 by default *0: no-op* *1: init show data*	
/-action/savestate	int	Save X32/M32 state *0: no-op* *1: save state (before power off)*	
/-action/undopt	int	Sets checkpoint to get back to upon issuing an undo command	
/-action/doundo	int	0…1…?	
/-action/playtrack	int	Plays track from USB recorder, 0 by default *-1: previous track* *0: not playing* *1: next track*	
/-action/newscreen	int	Renew LCD screen display *0: no* *>0: yes*	
/-action/clearsolo	int	Clear all solo buttons *0: no-op* *1: clear solo (as if pressing the CLEAR SOLO button)*	
/-action/setprebus	int	0	
/-action/setsrate	int	0	
/-action/setrtasrc	int	Selects the source used for RTA display: <int> represents the channel # *0-31: Ch 1-32* *32-63: Ch 33-64* *64-47: Aux in /USB* *48-63: Bus master* *64-69: Matrix 1-6* *70: L/R* *71: Mono/Center* *72: Monitor*	
/-action/newscreen	int	Renew LCD screen display *0: no* *>0: yes*	
/-action/recselect	int	Select and execute record <int> in the current directory. Records are numbered 1…n	
/-action/gocue	int	Loading a saved cue; the Cue number to load is given as an int parameter ranging from 0 to 99	

/-action/goscene	int	Loading a saved scene; the Scene number to load is given as an int parameter ranging from 0 to 99	
/-action/gosnippet	int	Loading a saved snippet; the Snippet number to load is given as an int parameter ranging from 0 to 99	

Subscribing to X32/M32 Updates

There may be situations when you (or the application you write) may not want to receive all data sent by the X32/M32 resulting of mainaining a */xremote* command active, as this may represent a lot of data to parse.

Besides the */xremote* command which enables clients to receive pretty much all X32/M32 changes or updates resulting from an <OSC Address Pattern> Set parameter command sent from a different client, there are a series of commands a client can use to manage specific updates from X32/M32: */subscribe*, */formatsubscribe*, */batchsubscribe*, */renew*, and */unsubscribe*

If not renewed within 10 seconds, the */subscribe*, */formatsubscribe*, */batchsubscribe* commands names and attributes are forgotten and lost. Indeed an attempt to renew one of the above commands received past the 10s delay will have no effect.

The */subscribe* command enables getting regular updates for a single <OSC Address Pattern> command. A typical use would be: */subscribe ,si <command> [tf]*, where

> *<command>* is an X32/M32 <OSC Address Pattern> parameter command, for example: */ch/01/mix/on*
>
> *[tf]* is an integer which affects the number of updates received over a 10 seconds period:
> *[tf]:* 0 → 200 updates
> 2 → 100 updates
> […]
> 40 → 5 updates
> 80 or more → 3 updates

The */formatsubscribe ,ss[s…]iii <name> <command> [<command>…] [i0][i1][tf]* goes one step further and enables receiving regular updates for a series of commands, optionnaly using wildcard '*' characters to represent variable ranges.

> *<name>* is an alias (string) given to the command, and can be later used for requesting specific renews for additional rounds of updates.
>
> *<command>* is an <OSC Address Pattern> command. There can be several commands in a single */formatsubscribe.* Some X32/M32 commands refer to range attributes, such as in a channel number: [01-32]. Range data characters digits can be replaced by '*' characters. For example */dca/[1-8]/on* is replaced by */dca/*/on*, */ch/[01-32]/mix/on* will be replaced by */ch/**/mix/on*, and so on.
>
> *[i0]* and *[i1]* are integers to represent the start and end range numbers, respectively.
>
> *[tf]* as previously, is an integer affecting the number of updates received over a 10 seconds period.

```
X32_Command - v1.29 - (c)2014-15 Patrick-Gilles Maillot

Connecting to X32. Done!
/formatsubscribe ,ssiii testme /ch/**/mix/on 6 9 80
X->,   36 B: 746573746d6500002c6200000000001414000000010000000100000001000000010000000
             t e s t m e ~ ~ , b ~ ~20 chrs:
X->,   36 B: 746573746d6500002c6200000000001414000000010000000100000001000000010000000
             t e s t m e ~ ~ , b ~ ~20 chrs:
X->,   36 B: 746573746d6500002c6200000000001414000000010000000100000001000000010000000
             t e s t m e ~ ~ , b ~ ~20 chrs:
```

(Each response from X32 above is spaced by about 3 seconds)

The previous example asks for receiving during the next 10s about 3 updates of the states of mutes for channel 06 to channel 09 inclusive. The commande is called “testme” and can be renewed using a */renew ,s testme* command sent within the 10s following the call to */formatsubscribe*. The 4 values of channel mutes are returned as an OSC blob, as shown above with the hex dump, the responses are made of the name of the command: *testme*, a blob tag *,b* followed by a 32bit big endian integer with value 20 representing the number of chars in the OSC blob payload. The blob itself consists of 32bit little endian integers; the first int is the blob length in bytes (20 again), from which the total number of ints of the blob can be computed (20/4 = 5), meaning there are 4 ints following the first one. If the channel [06-09] mute states were to change during the effective time of the command, the values of the respective ints (all ‘1’ here) would have been changed to ‘0’.

The next example below starts with Bus 01 & 02 linked, and Channels 09 to 13 being muted. With */xremote* being maintained active, a */formatsubscribe* command is issued, requesting 10 updates for buslink/1-2, and channel [10-12] mutes updates. As the command executes, Bus/1-2 is unlinked, then channels 09 to 13 are successively unmuted. The command does repeatedly report mute status only for channels 10 to 12, as requested.

For easier reading, the X32 data resulting of user action reported thanks to the */xremote* command being active is displayed in red, while the data resulting from the */formatsubscribe* command is displayed in blue.

```
X32_Command - v1.29 - (c)2014-15 Patrick-Gilles Maillot

Connecting to X32. Done!
xremote on
/formatsubscribe ,sssiii www /config/buslink/1-2 /ch/**/mix/on 10 12 20
X->,    32 B: www~,b~~20 chrs:
X->,    32 B: www~,b~~20 chrs:
X->,    28 B: /config/buslink/1-2~,i~~[     0]
X->,    32 B: www~,b~~20 chrs:
X->,    24 B: /ch/09/mix/on~~~,i~~[     1]
X->,    32 B: www~,b~~20 chrs:
X->,    24 B: /ch/10/mix/on~~~,i~~[     1]
X->,    32 B: www~,b~~20 chrs:
X->,    24 B: /ch/11/mix/on~~~,i~~[     1]
X->,    32 B: www~,b~~20 chrs:
X->,    24 B: /ch/12/mix/on~~~,i~~[     1]
X->,    32 B: www~,b~~20 chrs:
X->,    24 B: /ch/13/mix/on~~~,i~~[     1]
X->,    32 B: www~,b~~20 chrs:
X->,    32 B: www~,b~~20 chrs:
X->,    32 B: www~,b~~20 chrs:
```

(Each response in blue from X32 above is spaced by about 1 second)

/batchsubscribe is a command to display meter data only [TBV]. The format is close to */formatsubscribe*: The command is aliased to a name, and accepts a single meter command followed by two ints for the meter command parameters (ints are 0 if the meter command does not take arguments); as for the other commands the last int represents a time factor.

```
X32_Command - v1.29 - (c)2014-15 Patrick-Gilles Maillot

Connecting to X32. Done!
/batchsubscribe ,ssiii yyy /meters/6 0 0 40
X->,    32 B: yyy~,b~~4 flts: 000.00 001.00 001.00 000.00
X->,    32 B: yyy~,b~~4 flts: 000.00 001.00 001.00 000.00
X->,    32 B: yyy~,b~~4 flts: 000.00 001.00 001.00 000.00
X->,    32 B: yyy~,b~~4 flts: 000.00 001.00 001.00 000.00
X->,    32 B: yyy~,b~~4 flts: 000.00 001.00 001.00 000.00
```

```
X32_Command - v1.29 - (c)2014-15 Patrick-Gilles Maillot

Connecting to X32. Done!
/batchsubscribe ,ssiii rrr /meters/5 3 1 40
->X,    52 B: /batchsubscribe~,ssiii~~rrr~/meters/5~~~[     3][     1][    40]
X->,   124 B: rrr~,b~~27 flts: 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00
000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00
000.00 000.00 000.00 000.00 000.00 000.00

[…]

X->,   124 B: rrr~,b~~27 flts: 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00
000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00 000.00
000.00 000.00 000.00 000.00 000.00 000.00
```

Refer to the */meter/5* meters command for the meaning of the two arguments *[3]* and *[1]*.

As already mentioned, the above subscription commands are valid for 10s. In order to keep receiving data from the X32/M32, subscriptions have to be renewed with the */renew* command. The command takes one optional argument, a string type to specify the subscription to renew. This will be either ne name of the actual command or the name of the command alias for renewing */formatsubscribe* and */batchsubscribe* commands. It is possible to renew all active subscriptions by not providing any name to the */renew* command.

The X32/M32 can manage multiple subscriptions. Data from different subscriptions will be mixed. Shown below, 3 different subscription requests are made for a period of 10s. Commands are in black and the X32 replies are in 3 different colors for easier reading.

```
X32_Command - v1.29 - (c)2014-15 Patrick-Gilles Maillot

Connecting to X32. Done!
/subscribe ,si /ch/01/mix/on 2
/formatsubscribe ,sssiii AAA /config/buslink/1-2 /ch/01/mix/fader 0 0 5
X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
/batchsubscribe ,ssiii BBB /meters/6 0 0 10
X->,    24 B: AAA~,b~~12 chrs:              Ç ?
X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
X->,    32 B: BBB~,b~~4 flts: 000.00 001.00 001.00 000.00
X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
X->,    24 B: AAA~,b~~12 chrs:              Ç ?

[…]

X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
X->,    24 B: AAA~,b~~12 chrs:              Ç ?
X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
X->,    32 B: BBB~,b~~4 flts: 000.00 001.00 001.00 000.00
X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
X->,    24 B: /ch/01/mix/on~~~,i~~[     1]
```

At anytime, subscriptions can be stopped using the */unsubscribe* command. As several subscriptions can be active at one time, the command takes a string argument to select which subscription should be stopped. An */unsubscribe* command with no argument will stop all active subscriptions.

Subscribing to data updates

Subscribe to data			
/subscribe	string int	String: an X32/M32 command, int is a time_factor	
/formatsubscribe	string string [string…] int int int	The first string is the alias name for the command; the scond string is one or more commands with possible wildcards. The two first ints represent the wildcards range, and the last int is the time_factor	
/batchsubscribe	string string int int int	The first string is the alias name for the meter command; the scond string the meter commands. The two first ints can be used for the meter command arguments if needed, and the last int is the time_factor	
/renew	[string]	Element to be renewed (can be an alias of a command). Absence of parameter means renew “all” active subscriptions	
/unsubscribe	[string]	Subscription to be stopped (can be an alias of a command). Absence of parameter means: stop “all” active subscriptions	

X32node (/node, /) commands

X32/M32 nodes are collections of parameters grouped in logical sets. They enable sending or receiving complex commands by grouping several parameters, optimizing the communication between X32/M32 and its clients (less I/O operations and less data to transmit). For some of them they also serve as the base to scene and snippet files through the use of */node* or */* commands, explained below.

The */* command is used to send X32node formatted commands (i.e. the resulting form of a */node* command) to the X32/M32, thus updating all parameters of a node at once and using clear text data. The command follows the standard OSC specification and takes a single string as argument. The data to send should conform to X32/M32 formats and known values, but the X32 will keep the closest value to the one sent if that is not the case; for example, sending */ ,s "ch/01/mix/fader -85.4"* will be kept as *-85.3*, as *-85.4* is not one of the 1024 "known values" for faders.
The leading *'/'* of the command to be sent to X32 is not mandatory, i.e. sending */ ,s "/ch/01/mix/fader -85.4"* is the same as sending */ ,s "ch/01/mix/fader -85.4"*.

The X32/M32 will echo back the *"/"* commands it receives enabling a better control of the flowof data and helping avoid overruns by ensuring an application does read the UDP buffer before sending the next command.

The */node* command can be used by clients to request values and data for the X32node provided with the request. The server returns the full set of data associated to the request in a single string of text, ending with a linefeed.

X32node commands		
/	string	Send X32node data passed as a string argument to X32/M32. Example: */~~~,s~~-prefs/iQ/01 none Linear 0~~* *or* */~~~,s~~/-prefs/iQ/01 none Linear 0~* Will set the Turbosound iQ speaker parameters at address 01 with the settings listed with the command The */* command works for all X32nodes. X32node commands sent this way will be echoed back by the X32/M32.
/node	string	Request the X32/M32 to return the data associated with the X32node given in argument. Example of request: */node~~~,s~~headamp/124~* ***!! note: no '/' before the request string*** Example of associated response from the server: *node~~~~,s~~/headamp/124 +0.0 OFF\n~~~~* List of accepted/known X32node parameters. All the items below follow a */node~~~,s~~* "header". *config/chlink* *config/auxlink* *config/fxlink* *config/buslink* *config/mtxlink*

		config/mute *config/linkcfg* *config/mono* *config/solo* *config/talk* *config/talk/A* *config/talk/B* *config/osc* *config/routing/IN* *config/routing/AES50A* *config/routing/AES50B* *config/routing/CARD* *config/routing/OUT* *config/userctrl/{A,B,C}* *config/userctrl/{A,B,C}/enc* *config/userctrl/{A,B,C}/btn* *config/tape* *ch/[01…32]/config* *ch/[01…32]/delay* *ch/[01…32]/preamp* *ch/[01…32]/gate* *ch/[01…32]/gate/filter* *ch/[01…32]/dyn* *ch/[01…32]/dyn/filter* *ch/[01…32]/insert* *ch/[01…32]/eq* *ch/[01…32]/eq/[1…4]* *ch/[01…32]/mix* *ch/[01…32]/mix/[01…16]* *ch/[01…32]/grp* *auxin/[01…08]/config* *auxin/[01…08]/preamp* *auxin/[01…08]/eq* *auxin/[01…08]/eq/[1…4]* *auxin/[01…08]/mix* *auxin/[01…08]/mix/[01…16]* *auxin/[01…08]/grp* *fxrtn/[01…08]/config* *fxrtn/[01…08]/eq* *fxrtn/[01…08]/eq[1…4]* *fxrtn/[01…08]/mix* *fxrtn/[01…08]/mix/[01…16]* *fxrtn/[01…08]/grp* *bus/[01…16]/config* *bus/[01…16]/dyn* *bus/[01…16]/dyn/filter* *bus/[01…16]/insert* *bus/[01…16]/eq* *bus/[01…16]/eq[1…6]* *bus/[01…16]/mix* *bus/[01…16]/mix/[01…06]* *bus/[01…16]/grp* *mtx/[01…06]/config*

		mtx/[01…06]/preamp *mtx/[01…06]/dyn* *mtx/[01…06]/dyn/filter* *mtx/[01…06]/insert* *mtx/[01…06]/eq* *mtx/[01…06]/eq[1…6]* *mtx/[01…06]/mix* *main/st/config* *main/st/dyn* *main/st/dyn/filter* *main/st/insert* *main/st/eq* *main/st/eq[1…6]* *main/st/mix* *main/st/mix/[01…06]* *main/m/config* *main/m/dyn* *main/m/dyn/filter* *main/m/insert* *main/m/eq* *main/m/eq[1…6]* *main/m/mix* *main/m/mix/[01…06]* *dca/[1…8]* *dca/[1…8]/config* *fx/[1…8]* *fx/[1…8]/source* *fx/[1…8]/par* *outputs/main/[01…16]* *outputs/main/[01…16]/delay* *outputs/aux/[01…06]* *outputs/p16/[01…16]* *outputs/p16/[01…16]/iQ* *outputs/aes/[01…02]* *outputs/rec/[01…02]* *headamp/[000…127]* *-insert* *-show* *-show/prepos* *-show/prepos/current* *-show/showfile* *-show/showfile/inputs* *-show/showfile/mxsends* *-show/showfile/mxbuses* *-show/showfile/console* *-show/showfile/chan16* *-show/showfile/chan32* *-show/showfile/return* *-show/showfile/buses* *-show/showfile/lrmtxdca*

		-show/showfile/effects -show/showfile/cue -show/showfile/cue/[000…099] -show/showfile/cue/[000…099]/numb -show/showfile/cue/[000…099]/name -show/showfile/cue/[000…099]/skip -show/showfile/cue/[000…099]/scene -show/showfile/cue/[000…099]/bit -show/showfile/cue/[000-099]/miditype -show/showfile/cue/[000-099]/midichan -show/showfile/cue/[000-099]/midipara1 -show/showfile/cue/[000-099]/midipara2 -show/showfile/scene -show/showfile/scene/[000…099] -show/showfile/scene/[000…099]/name -show/showfile/scene/[000…099]/notes -show/showfile/scene/[000…099]/safes -show/showfile/scene/[000…099]/hasdata -show/showfile/snippet -show/showfile/snippet/[000…099] -show/showfile/snippet/[000…099]/name -show/showfile/snippet/[000…099]/eventtyp -show/showfile/snippet/[000…099]/channels -show/showfile/snippet/[000…099]/auxbuses -show/showfile/snippet/[000…099]/maingrps -show/showfile/snippet/[000…099]/hasdata -libs/ch -libs/ch/[001-100] -libs/ch/[001-100]/pos -libs/ch/[001-100]/name -libs/ch/[001-100]/flags -libs/ch/[001-100]/hasdata -libs/fx -libs/fx/[001-100] -libs/fx/[001-100]/pos -libs/fx/[001-100]/name -libs/fx/[001-100]/flags -libs/fx/[001-100]/hasdata -libs/r -libs/r/[001-100] -libs/r/[001-100]/pos -libs/r/[001-100]/name -libs/r/[001-100]/flags -libs/r/[001-100]/hasdata -prefs -prefs/style -prefs/bright -prefs/lcdcont -prefs/ledbright -prefs/lamp -prefs/lampon -prefs/clockrate

		-prefs/clocksource *-prefs/confirm_general* *-prefs/confirm_overwrite* *-prefs/confirm_sceneload* *-prefs/viewrtn* *-prefs/selfollowsbank* *-prefs/sceneadvance* *-prefs/safe_masterlevels* *-prefs/haflags* *-prefs/autosel* *-prefs/show_control* *-prefs/clockmode* *-prefs/hardmute* *-prefs/dcamute* *-prefs/invertmute* *-prefs/rta* *-prefs/rta/visibility* *-prefs/rta/gain* *-prefs/rta/autogain* *-prefs/rta/source* *-prefs/rta/pos* *-prefs/rta/mode* *-prefs/rta/option* *-prefs/rta/det* *-prefs/rta/decay* *-prefs/rta/peakhold* *-prefs/ip* *-prefs/ip/dhcp* *-prefs/ip/addr* *-prefs/ip/mask* *-prefs/ip/gateway* *-prefs/remote* *-prefs/remote/enable* *-prefs/remote/protocol* *-prefs/remote/port* *-prefs/remote/ioenable* *-prefs/iQ* *-prefs/iQ/[01-16]* *-prefs/iQ/[01-16]/iQmodel* *-prefs/iQ/[01-16]/iQeqset* *-prefs/iQ/[01-16]/iQsound* *-prefs/card* *-usb* *-usb/path* *-usb/title* *-usb/dir* *-usb/dirpos* *-usb/maxpos* *-usb/dir/[000…999]* *-usb/dir/[000…999]/name* *-stat*

		-stat/selidx -stat/chfaderbank -stat/grpfaderbank -stat/sendsonfader -stat/bussendbank -stat/eqband -stat/keysolo -stat/userbank -stat/autosave -stat/lock -stat/usbmounted -stat/remote -stat/rtamodeeq -stat/rtamodegeq -stat/rtaeqpre -stat/rtageqpost -stat/rtasource -stat/xcardtype -stat/xcardsync -stat/geqonfdr -stat/geqpos -stat/solosw -stat/solosw/[01…80] -stat/screen -stat/screen/screen -stat/screen/mutegrp -stat/screen/utils -stat/screen/CHAN -stat/screen/METER -stat/screen/ROUTE -stat/screen/SETUP -stat/screen/LIB -stat/screen/FX -stat/screen/MON -stat/screen/USB -stat/screen/SCENE -stat/screen/ASSIGN -stat/tape -stat/tape/state -stat/tape/file -stat/tape/etime -stat/tape/rtime -action -action/setip -action/setclock -action/initall -action/initlib -action/initshow -action/savestate -action/undopt -action/doundo -action/platrack -action/newscreen

		-action/clearsolo *-action/setprebus* *-action/setsrate* *-action/setrtasrc* *-action/newscreen* *-action/recselect* *-action/gocue* *-action/goscene* *-action/undopt* *-action/gosnippet*

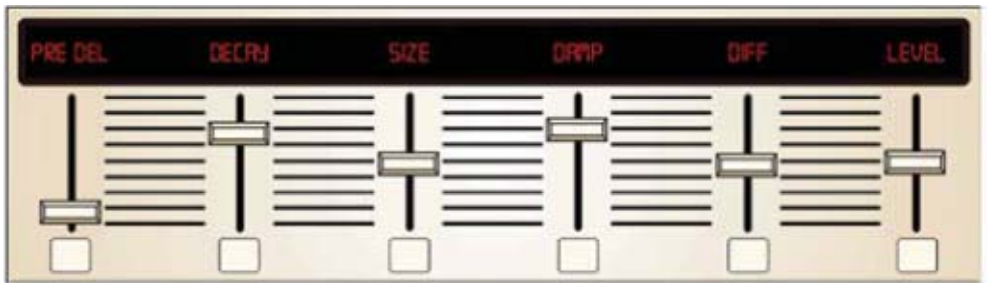
Note/bug: the response from the Server is "*node…*" and not "*/node…*" as one could expect. This is not OSC compliant.

EFFECTS
Effects Parameters

This section describes the parameters' list, order, name, type and value range for the different effects available with the X32/M32. The parameters described here correspond to the up to 64 parameters that can follow a `/fx/[1…8]/par/[01…64]` message.

Parameters can be sent one by one, or combined in lists -alternating types as needed-, which is generally more efficient.

Hall Reverb

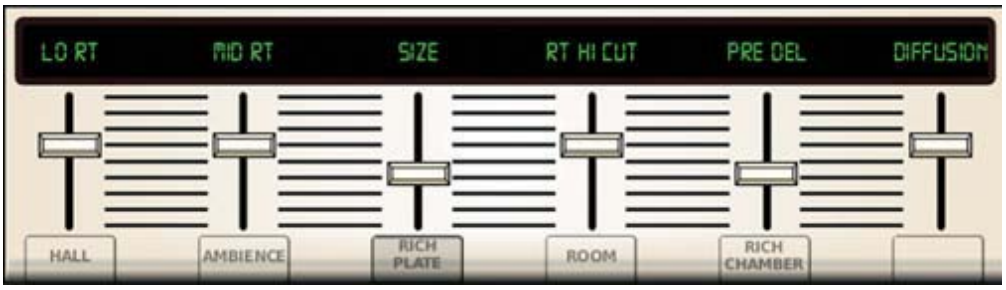


Effect Name	Parameters	Parameter Name	Type & Range
HALL (hall reverb)	fffffffffff	Pre Delay	linf [0…200]
		Decay	logf [0.2…5]
		Size	linf [2…100]
		Damping	logf [1k…20k]
		Diffuse	linf [1…30]
		Level	linf [-12…+12]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Bass Multi	logf [0.5…2]
		Spread	linf [0…50]
		Shape	linf [0…250]
		Mod Speed	linf [0…100]

Plate Reverb

Effect Name	Parameters	Parameter Name	Type & Range
PLAT (plate reverb)	fffffffffff	Pre Delay	linf [0…200]
		Decay	logf [0.2…10]
		Size	linf [2…100]
		Damping	logf [1k…20k]
		Diffuse	linf [1…30]
		Level	linf [-12…+12]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Bass Multi	logf [0.5…2]
		Xover	logf [10…500]
		Mod	linf [0…50]
		Mod Speed	linf [0…100]

Ambiance Reverb



Effect Name	Parameters	Parameter Name	Type & Range
AMBI (ambiance reverb)	fffffffff	Pre Delay	linf [0…200]
		Decay	logf [0.2…7.3]
		Size	linf [2…100]
		Damping	logf [1k…20k]
		Diffuse	linf [1…30]
		Level	linf [-12…+12]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Modulate	linf [0…100]
		Tail Gain	linf [0…100]

Rich Plate Reverb

Effect Name	Parameters	Parameter Name	Type & Range
RPLT (rich plate reverb)	ffffffffffffff	Pre Delay	linf [0…200]
		Decay	logf [0.3…29]
		Size	linf [4…39]
		Damping	logf [1k…20k]
		Diffuse	linf [1…30]
		Level	linf [-12…+12]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Bass Multi	logf [0.25…4]
		Spread	linf [0…50]
		Attack	linf [0…100]
		Spin	linf [0…100]
		Echo L	linf [0…1200]
		Echo R	linf [0…1200]
		Echo Feed L	linf [-100…+100]
		Echo Feed L	linf [-100…+100]

Room Reverb

Effect Name	Parameters	Parameter Name	Type & Range
ROOM (room reverb)	ffffffffffffff	Pre Delay	linf [0…200]
		Decay	logf [0.3…29]
		Size	linf [4…72]
		Damping	logf [1k…20k]
		Diffuse	linf [1…30]
		Level	linf [-12…+12]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Bass Multi	logf [0.25…4]
		Spread	linf [0…50]
		Shape	linf [0…250]
		Spin	linf [0…100]
		Echo L	linf [0…1200]
		Echo R	linf [0…1200]
		Echo Feed L	linf [-100…+100]
		Echo Feed L	linf [-100…+100]

Chamber Reverb

Effect Name	Parameters	Parameter Name	Type & Range
CHAM (chamber reverb)	ffffffffffffff	Pre Delay	linf [0…200]
		Decay	logf [0.3…29]
		Size	linf [4…72]
		Damping	logf [1k…20k]
		Diffuse	linf [1…30]
		Level	linf [-12…+12]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Bass Multi	logf [0.25…4]
		Spread	linf [0…50]
		Shape	linf [0…250]
		Spin	linf [0…100]
		Reflection L	linf [0…500]
		Reflection R	linf [0…500]
		Reflection Gain L	linf [0…100]
		Reflection Gain L	linf [0…100]

4-Tap Delay

Effect Name	Parameters	Parameter Name	Type & Range
4TAP (4-tap delay)	fffffifififiii	Time	linf [1…3000]
		Gain Base	linf [0…100]
		Feedback	linf [0…100]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Spread	linf [0…6]
		Factor A	enum [1/4, 3/8, 1/2, 2/3, 1, 4/3, 3/2, 2, 3]
		Gain A	linf [0…100]
		Factor B	enum [1/4, 3/8, 1/2, 2/3, 1, 4/3, 3/2, 2, 3]
		Gain B	linf [0…100]
		Factor C	enum [1/4, 3/8, 1/2, 2/3, 1, 4/3, 3/2, 2, 3]
		Gain C	linf [0…100]
		Cross Feed	enum [OFF, ON]
		Mono	enum [OFF, ON]
		Dry	enum [OFF, ON]

Vintage Reverb

Effect Name	Parameters	Parameter Name	Type & Range
VREV (vintage reverb)	fffiiffffff	Pre Delay	linf [0…120]
		Decay	logf [0.3…4.5]
		Modulate	linf [0…10]
		Vintage	enum [OFF, ON]
		Position	enum [FRONT, REAR]
		Level	linf [-12…+12]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Lo Multiply	logf [0.5…2]
		Hi Multiply	logf [0.25…1]

Vintage Room

Effect Name	Parameters	Parameter Name	Type & Range
VRM (vintage room)	fffffffffffi	Reverb Delay	linf [0…20]
		Decay	logf [0.1…20]
		Size	linf [0…10]
		Density	linf [1…30]
		ER Level	linf [0…190]
		Level	linf [-12…+12]
		Lo Multiply	logf [0.1…10]
		Hi Multiply	logf [0.1…10]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		ER Left	linf [0…10]
		ER Right	linf [0…10]
		Freeze	enum [OFF, ON]

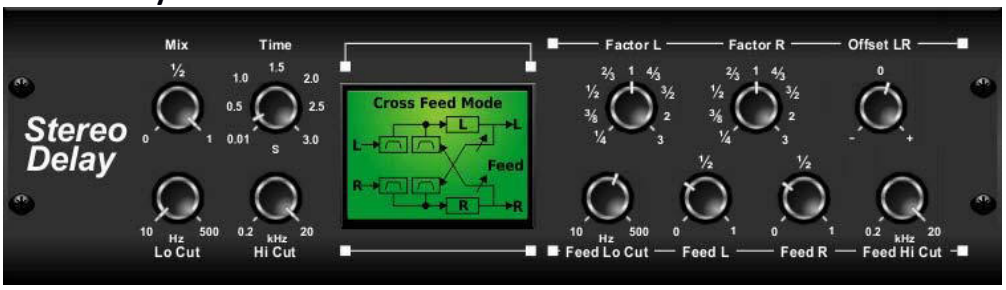
Gated Reverb

Effect Name	Parameters	Parameter Name	Type & Range
GATE (gated reverb)	fffffffff	Pre Delay	linf [0…200]
		Decay	logf [140…1000]
		Attack	linf [0…30]
		Density	linf [1…30]
		Spread	linf [0…100]
		Level	linf [-12…+12]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Hi Shv Gain	linf [-30…0]
		Diffuse	linf [1…30]

Reverse Reverb

Effect Name	Parameters	Parameter Name	Type & Range
RVRS (reverse reverb)	fffffffff	Pre Delay	linf [0…200]
		Decay	logf [140…1000]
		Rise	linf [0…50]
		Diffuse	linf [1…30]
		Spread	linf [1…100]
		Level	linf [-12…+12]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Hi Shv Gain	linf [-30…0]

Stereo Delay



Effect Name	Parameters	Parameter Name	Type & Range
DLY (stereo delay)	ffiiiffffffff	Mix	linf [0…100]
		Time	linf [0…3000]
		Mode	enum [ST, X, M]
		Factor L	enum [1/4, 3/8, 1/2, 2/3, 1, 4/3, 3/2, 2, 3]
		Factor R	enum [1/4, 3/8, 1/2, 2/3, 1, 4/3, 3/2, 2, 3]
		Offset L/R	linf [-100…+100]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Feed Lo Cut	logf [10…500]
		Feed Left	linf [1…100]
		Feed Right	linf [1…100]
		Feed Hi Cut	logf [200…20k]

3-Tap Delay

Effect Name	Parameters	Parameter Name	Type & Range
3TAP (3-tap delay)	fffffiffiffiii	Dry	linf [0…3000]
		Gain Base	linf [0…100]
		Pan Base	linf [-100…+100]
		Feedback	linf [0…100]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Factor A	enum [1/4, 3/8, 1/2, 2/3, 1, 4/3, 3/2, 2, 3]
		Gain A	linf [0…100]
		Pan A	linf [-100…+100]
		Factor B	enum [1/4, 3/8, 1/2, 2/3, 1, 4/3, 3/2, 2, 3]
		Gain B	linf [0…100]
		Pan B	linf [-100…+100]
		Cross Feed	enum [OFF, ON]
		Mono	enum [OFF, ON]
		Dry	enum [OFF, ON]

Stereo Chorus

Effect Name	Parameters	Parameter Name	Type & Range
CRS (stereo chorus)	fffffffffff	Speed	logf [0.05…5]
		Depth L	linf [0…100]
		Depth R	linf [0…100]
		Delay L	logf [0.5…20]
		Delay R	logf [0.5…20]
		Mix	linf [0…100]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Phase	linf [0…180]
		Wave	linf [0…100]
		Spread	linf [0…100]

Stereo Flanger

Effect Name	Parameters	Parameter Name	Type & Range
FLNG (stereo flanger)	ffffffffffff	Speed	logf [0.05…5]
		Depth L	linf [0…100]
		Depth R	linf [0…100]
		Delay L	logf [0.5…20]
		Delay R	logf [0.5…20]
		Mix	linf [0…100]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Phase	linf [0…180]
		Feed Lo Cut	logf [10…500]
		Feed Hi Cut	logf [200…20k]
		Feed	linf [-90…+90]

Stereo Phaser

Effect Name	Parameters	Parameter Name	Type & Range
PHAS (stereo Phaser)	fffffffffff	Speed	logf [0.05…5]
		Depth	linf [0…100]
		Resonance	linf [0…80]
		Base	linf [0…50]
		Stages	linf [2…12]
		Mix	linf [0…100]
		Wave	linf [-50…+50]
		Phase	linf [0…180]
		Env. Modulation	linf [-100…+100]
		Attack	logf [10…1000]
		Hold	logf [1…2000]
		Release	logf [10…1000]

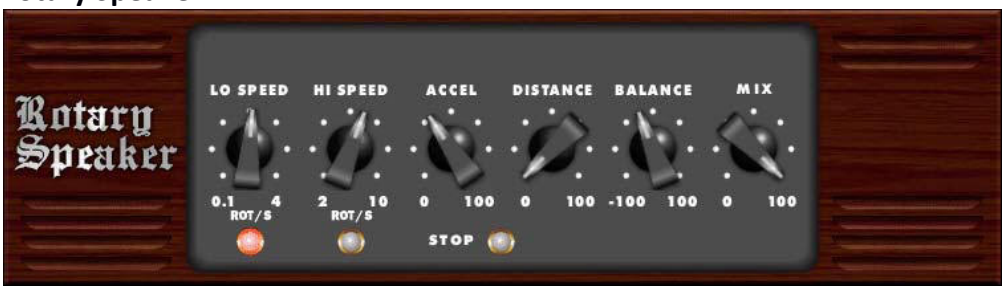
Dimensional Chorus

Effect Name	Parameters	Parameter Name	Type & Range
DIMC (dimensional chorus)	iiiiiii	Active	enum [OFF, ON]
		Mode	enum [M, ST]
		Dry	enum [OFF, ON]
		Mode 1	enum [OFF, ON]
		Mode 2	enum [OFF, ON]
		Mode 3	enum [OFF, ON]
		Mode 4	enum [OFF, ON]

Mood Filter

Effect Name	Parameters	Parameter Name	Type & Range
FILT (mood filter)	ffffifffffii	Speed	logf [0.05…20]
		Depth	linf [0…100]
		Resonance	linf [0…100]
		Base	logf [10…15000]
		Mode	enum [LP, HP, BP, NO]
		Mix	linf [0…100]
		Wave	enum [TRI, SIN, SAW, SAW-, RMP, SQU. RND]
		Phase	linf [0…180]
		Env. Modulation	linf [-100…+100]
		Attack	logf [10…250]
		Release	logf [10…500]
		Drive	linf [0…100]
		4 Pole	enum [OFF, ON]
		Side Chain	enum [OFF, ON]

Rotary Speaker



Effect Name	Parameters	Parameter Name	Type & Range
ROTA (rotary speaker)	fffffii	Lo Speed	logf [0.1…4]
		Hi Speed	logf [2…10]
		Accelerate	linf [0…100]
		Distance	linf [0…100]
		Balance	linf [-100…+100]
		Mix	linf [0…100]
		Stop	enum [OFF, ON]
		Slow	enum [OFF, ON]

Tremolo / Panner

Effect Name	Parameters	Parameter Name	Type & Range
PAN (tremolo / panner)	fffffffff	Speed	logf [0.05…4]
		Phase	linf [0…180]
		Wave	linf [-50…+50]
		Depth	linf [0…100]
		Env. Speed	linf [0…100]
		Env. Depth	linf [0…100]
		Attack	logf [10…1000]
		Hold	logf [1…2000]
		Release	logf [10…1000]

Sub Octaver

Effect Name	Parameters	Parameter Name	Type & Range
SUB (suboctaver)	iifffiifff	Active	enum [OFF, ON]
		Range	enum [LO, MID, HI]
		Dry	linf [0…100]
		Octave -1	linf [0…100]
		Octave -2	linf [0…100]
		Active	enum [OFF, ON]
		Range	enum [LO, MID, HI]
		Dry	linf [0…100]
		Octave -1	linf [0…100]
		Octave -2	linf [0…100]

Delay / Chamber

Effect Name	Parameters	Parameter Name	Type & Range
D/RV (delay / chamber)	fiffffffffff	Time	linf [1…3000]
		Pattern	enum [1/4, 1/3, 3/8, 1/2, 2/3, 3/4, 1, 1/4X, 1/3X, 3/8X, 1/2X, 2/3X, 3/4X,1X]
		Feed Hi Cut	logf [1000…20000]
		Feedback	linf [0…100]
		Cross Feed	linf [0…100]
		Balance	linf [-100…+100]
		Pre Delay	linf [0…200]
		Decay	logf [0.1…5]
		Size	linf [2…100]
		Damping	logf [1000…20000]
		Lo Cut	logf [10…500]
		Mix	linf [0…100]

Delay / Chorus

Effect Name	Parameters	Parameter Name	Type & Range
D/CR (delay / chorus)	fiffffffffff	Time	linf [1…3000]
		Pattern	enum [1/4, 1/3, 3/8, 1/2, 2/3, 3/4, 1, 1/4X, 1/3X, 3/8X, 1/2X, 2/3X, 3/4X,1X]
		Feed Hi Cut	logf [1000…20000]
		Feedback	linf [0…100]
		Cross Feed	linf [0…100]
		Balance	linf [-100…+100]
		Speed	logf [0.05…4]
		Depth	linf [0…100]
		Delay	logf [0.5…50]
		Phase	linf [0…180]
		Wave	linf [0…100]
		Mix	linf [0…100]

Delay /Flanger

Effect Name	Parameters	Parameter Name	Type & Range
D/FL (delay / flanger)	fiffffffffff	Time	linf [1…3000]
		Pattern	enum [1/4, 1/3, 3/8, 1/2, 2/3, 3/4, 1, 1/4X, 1/3X, 3/8X, 1/2X, 2/3X, 3/4X,1X]
		Feed Hi Cut	logf [1000…20000]
		Feedback	linf [0…100]
		Cross Feed	linf [0…100]
		Balance	linf [-100…+100]
		Speed	logf [0.05…4]
		Depth	linf [0…100]
		Delay	logf [0.5…20]
		Phase	linf [0…180]
		Feed	linf [-90…+90]
		Mix	linf [0…100]

Chorus / Chamber

Effect Name	Parameters	Parameter Name	Type & Range
CR/R (chorus / chamber)	fffffffffff	Speed	logf [0.05…4]
		Depth	linf [0…100]
		Delay	logf [0.5…50]
		Phase	linf [0…180]
		Wave	linf [0…100]
		Balance	linf [-100…+100]
		Pre Delay	linf [0…200]
		Decay	logf [0.1…5]
		Size	linf [2…100]
		Damping	logf [1k…20k]
		Lo Cut	logf [10…500]
		Mix	linf [0…100]

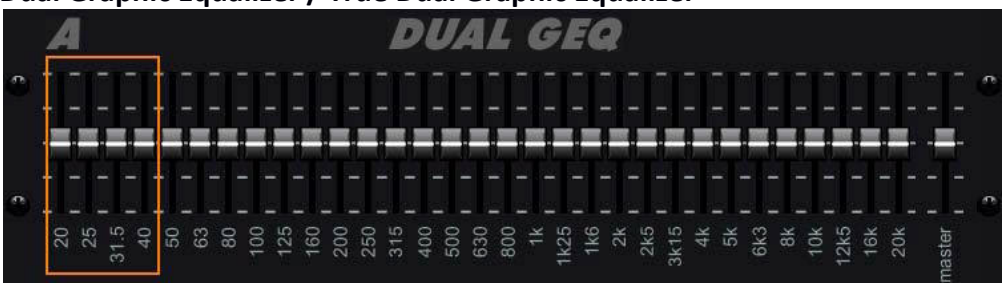
Flanger / Chamber

Effect Name	Parameters	Parameter Name	Type & Range
FL/R (flanger / chamber)	fffffffffff	Speed	logf [0.05…4]
		Depth	linf [0…100]
		Delay	logf [0.5…20]
		Phase	linf [0…180]
		Feed	linf [-90…+90]
		Balance	linf [-100…+100]
		Pre Delay	linf [0…200]
		Decay	logf [0.1…5]
		Size	linf [2…100]
		Damping	logf [1k…20k]
		Lo Cut	logf [10…500]
		Mix	linf [0…100]

Modulation Delay

Effect Name	Parameters	Parameter Name	Type & Range
MODD (modulation delay)	fiffffiiffff	Time	linf [1…3000]
		Delay	enum [1, 1/2, 2/3, 3/2]
		Feed	linf [0…100]
		Lo Cut	logf [10…500]
		Hi Cut	logf [200…20k]
		Depth Rate	linf [0…100]
		Rate	logf [0.05…10]
		Setup	enum [PAR, SER]
		Type	enum [AMB, CLUB, HALL]
		Decay	linf [1…10]
		Damping	logf [1k…20k]
		Balance	linf [-100…+100]
		Mix	linf [0…100]

Dual Graphic Equalizer / True Dual Graphic Equalizer



Effect Name	Parameters	Parameter Name	Type & Range
GEQ2 (dual graphic eq)	64 f	31 x Eq Level A	linf [-15…+15]
		Master Level A	linf [-15…+15]
TEQ2 (true dual graphic eq)		31 x Eq Level B	linf [-15…+15]
		Master Level B	linf [-15…+15]

Graphic Equalizer / True Graphic Equalizer

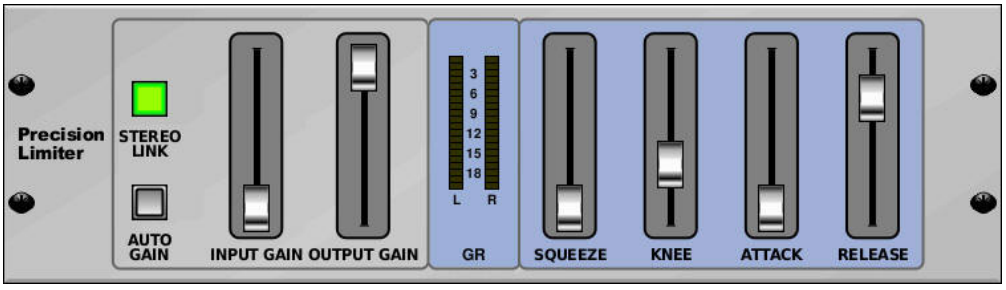
Effect Name	Parameters	Parameter Name	Type & Range
GEQ (stereo graphic eq)	32 f	31 x Eq Level L/R	linf [-15…+15]
		Master Level L/R	linf [-15…+15]
TEQ (true stereo graphic eq)			

Stereo / Dual De-Esser

Effect Name	Parameters	Parameter Name	Type & Range
DES (stereo deesser)	ffffii	Lo Band L	linf [0…50]
		Hi Band L	linf [0…50]
		Lo Band R	linf [0…50]
		Hi Band R	linf [0…50]
		Voice	enum [FEM / MALE]
		Mode	enum [ST / M/S]

Effect Name	Parameters	Parameter Name	Type & Range
DES2 (dual deesser)	ffffii	Lo Band A	linf [0…50]
		Hi Band A	linf [0…50]
		Lo Band B	linf [0…50]
		Hi Band B	linf [0…50]
		Voice A	enum [FEM / MALE]
		Voice B	enum [FEM / MALE]

Precision Limiter



Effect Name	Parameters	Parameter Name	Type & Range
LIM (precision limiter)	ffffffii	Input Gain	linf [0…18]
		Out Gain	linf [-18…+18]
		Squeeze	linf [0…100]
		Knee	linf [0…10]
		Attack	logf 0.05…1]
		Release	logf [20…2000]
		Stereo Link	enum [OFF, ON]
		Auto Gain	enum [OFF, ON]

Stereo / Dual Program EQ

Effect Name	Parameters	Parameter Name	Type & Range
P1A (stereo program eq)	iffiffifii	Active	enum [OFF, ON]
		Gain	linf [-12…+12]
		Lo Boost	linf [0…10]
		Lo Freq	enum [0, 30, 60, 100]
		Mid Width	linf [0…10]
		Mid Boost	linf [0…10]
		Mid Freq	enum [3k, 4k, 5k, 8k, 10k, 12k, 16k]
		Hi Attenuation	linf [0…10]
		Hi Freq	enum [5k, 10k, 20k]
		Transformer	enum [OFF, ON]

Effect Name	Parameters	Parameter Name	Type & Range
P1A2 (dual program eq)	iffiffifiiiffiffffifii	Active A	enum [OFF, ON]
		Gain A	linf [-12…+12]
		Lo Boost A	linf [0…10]
		Lo Freq A	enum [0, 30, 60, 100]
		Mid Width A	linf [0…10]
		Mid Boost A	linf [0…10]
		Mid Freq A	enum [3k, 4k, 5k, 8k, 10k, 12k, 16k]
		Hi Attenuation A	linf [0…10]
		Hi Freq A	enum [5k, 10k, 20k]
		Transformer A	enum [OFF, ON]
		Active B	enum [OFF, ON]
		Gain B	linf [-12…+12]
		Lo Boost B	linf [0…10]
		Lo Freq B	enum [0, 30, 60, 100]
		Mid Width B	linf [0…10]
		Mid Boost B	linf [0…10]
		Mid Freq B	enum [3k, 4k, 5k, 8k, 10k, 12k, 16k]
		Hi Attenuation B	linf [0…10]
		Hi Freq B	enum [5k, 10k, 20k]
		Transformer B	enum [OFF, ON]

Stereo / Dual Midrange EQ

Effect Name	Parameters	Parameter Name	Type & Range
PQ5 (stereo midrange eq)	ifififi fi	Active	enum [OFF, ON]
		Gain	linf [-12…+12]
		Lo Freq	enum [200, 300, 500, 700, 1000]
		Lo Boost	linf [0…10]
		Mid Freq	enum [200, 300, 500, 700, 1k, 1k5, 2k, 3k, 4k, 5k, 7k]
		Mid Boost	linf [0…10]
		Hi Freq	enum [1k5, 2k, 3k, 4k, 5k]
		Hi Boost	linf [0…10]
		Transformer	enum [OFF, ON]

Effect Name	Parameters	Parameter Name	Type & Range
PQ5S (dual midrange eq)	ifififiifififi fi	Active A	enum [OFF, ON]
		Gain A	linf [-12…+12]
		Lo Freq A	enum [200, 300, 500, 700, 1000]
		Lo Boost A	linf [0…10]
		Mid Freq A	enum [200, 300, 500, 700, 1k, 1k5, 2k, 3k, 4k, 5k, 7k]
		Mid Boost A	linf [0…10]
		Hi Freq A	enum [1k5, 2k, 3k, 4k, 5k]
		Hi Boost A	linf [0…10]
		Transformer A	enum [OFF, ON]
		Active B	enum [OFF, ON]
		Gain B	linf [-12…+12]
		Lo Freq B	enum [200, 300, 500, 700, 1000]
		Lo Boost B	linf [0…10]
		Mid Freq B	enum [200, 300, 500, 700, 1k, 1k5, 2k, 3k, 4k, 5k, 7k]
		Mid Boost B	linf [0…10]
		Hi Freq B	enum [1k5, 2k, 3k, 4k, 5k]
		Hi Boost B	linf [0…10]
		Transformer B	enum [OFF, ON]

Stereo / Dual Combinator

Effect Name	Parameters	Parameter Name	Type & Range
CMB (stereo combinator)	iiffffifiiiffffiffiffiffiffii	Active	enum [OFF, ON]
		Band Solo	enum [OFF, Bd1, Bd2, Bd3, Bd4, Bd5]
		Mix	linf [0…100]
		Attack	linf [0…19]
		Release	logf [20…3000]
		Autorelease	enum [OFF, ON]
		SBC speed	linf [0…10]
		SBC ON	enum [OFF, ON]
		Xover	linf [-50…+50]
		Xover Slope	enum [12, 48]
		Ratio	enum [1.1, 1.2, 1.3, 1.5, 1.7, 2, 2.5, 3, 3.5, 4, 5, 7, 10, LIM]
		Threshold	linf [-40…0]
		Gain	linf [-10…+10]
		Band 1 Threshold	linf [-10…+10]
		Band 1 Gain	linf [-10…+10]
		Band 1 Lock	enum [0, 1]
		Band 2 Threshold	linf [-10…+10]
		Band 2 Gain	linf [-10…+10]
		Band 2 Lock	enum [0, 1]
		Band 3 Threshold	linf [-10…+10]
		Band 3 Gain	linf [-10…+10]
		Band 3 Lock	enum [0, 1]
		Band 4 Threshold	linf [-10…+10]
		Band 4 Gain	linf [-10…+10]
		Band 4 Lock	enum [0, 1]
		Band 5 Threshold	linf [-10…+10]
		Band 5 Gain	linf [-10…+10]
		Band 5 Lock	enum [0, 1]
		Meter Mode	enum [GR, SBC, PEAK]

Effect Name	Parameters	Parameter Name	Type & Range
CMB2 (dual combinator)	iiffffifiiiffffiffiiffiiffiiiiiffffifiiiffffiffiiffiiffiiii	Active A	enum [OFF, ON]
		Band Solo A	enum [OFF, Bd1, Bd2, Bd3, Bd4, Bd5]
		Mix A	linf [0…100]
		Attack A	linf [0…19]
		Release A	logf [20…3000]
		Autorelease A	enum [OFF, ON]
		SBC speed A	linf [0…10]
		SBC ON A	enum [OFF, ON]
		Xover A	linf [-50…+50]
		Xover Slope A	enum [12, 48]
		Ratio A	enum [1.1, 1.2, 1.3, 1.5, 1.7, 2, 2.5, 3, 3.5, 4, 5, 7, 10, LIM]
		Threshold A	linf [-40…0]
		Gain A	linf [-10…+10]
		Band 1 Threshold A	linf [-10…+10]
		Band 1 Gain A	linf [-10…+10]
		Band 1 Lock A	enum [0, 1]
		Band 2 Threshold A	linf [-10…+10]
		Band 2 Gain A	linf [-10…+10]
		Band 2 Lock A	enum [0, 1]
		Band 3 Threshold A	linf [-10…+10]
		Band 3 Gain A	linf [-10…+10]
		Band 3 Lock A	enum [0, 1]
		Band 4 Threshold A	linf [-10…+10]
		Band 4 Gain A	linf [-10…+10]
		Band 4 Lock A	enum [0, 1]
		Band 5 Threshold A	linf [-10…+10]
		Band 5 Gain A	linf [-10…+10]
		Band 5 Lock A	enum [0, 1]
		Meter Mode A	enum [GR, SBC, PEAK]
		Active B	enum [OFF, ON]
		Band Solo B	enum [OFF, Bd1, Bd2, Bd3, Bd4, Bd5]
		Mix B	linf [0…100]
		Attack B	linf [0…19]
		Release B	logf [20…3000]
		Autorelease B	enum [OFF, ON]
		SBC speed B	linf [0…10]
		SBC ON B	enum [OFF, ON]
		Xover B	linf [-50…+50]
		Xover Slope B	enum [12, 48]
		Ratio B	enum [1.1, 1.2, 1.3, 1.5, 1.7, 2, 2.5, 3, 3.5, 4, 5, 7, 10, LIM]
		Threshold B	linf [-40…0]
		Gain B	linf [-10…+10]
		Band 1 Threshold B	linf [-10…+10]
		Band 1 Gain B	linf [-10…+10]
		Band 1 Lock B	enum [0, 1]
		Band 2 Threshold B	linf [-10…+10]
		Band 2 Gain B	linf [-10…+10]
		Band 2 Lock B	enum [0, 1]

		Band 3 Threshold B	linf [-10…+10]
		Band 3 Gain B	linf [-10…+10]
		Band 3 Lock B	enum [0, 1]
		Band 4 Threshold B	linf [-10…+10]
		Band 4 Gain B	linf [-10…+10]
		Band 4 Lock B	enum [0, 1]
		Band 5 Threshold B	linf [-10…+10]
		Band 5 Gain B	linf [-10…+10]
		Band 5 Lock B	enum [0, 1]
		Meter Mode B	enum [GR, SBC, PEAK]

Stereo / Dual Fair Compressor

Effect Name	Parameters	Parameter Name	Type & Range
FAC (stereo fair compressor)	ifffffff	Active	enum [OFF, ON]
		Input Gain	linf [-20…+20]
		Threshold	linf [0…10]
		Time	linf [0…6]
		Bias	linf [0…100]
		Gain	linf [-18…6]
		Balance	linf [-100…+100]

Effect Name	Parameters	Parameter Name	Type & Range
FAC2 (dual fair compressor) FAC1M (m/s fair compressor)	iffffffiffffff	Active	enum [OFF, ON]
		Input Gain	linf [-20…+20]
		Threshold	linf [0…10]
		Time	linf [0…6]
		Bias	linf [0…100]
		Gain	linf [-18…6]
		Balance	linf [-100…+100]
		Active	enum [OFF, ON]
		Input Gain	linf [-20…+20]
		Threshold	linf [0…10]
		Time	linf [0…6]
		Bias	linf [0…100]
		Gain	linf [-18…6]
		Balance	linf [-100…+100]

Stereo / Dual Leisure Compressor

Effect Name	Parameters	Parameter Name	Type & Range
LEC (stereo leisure compressor)	iffif	Active	enum [OFF, ON]
		Gain	linf [0…100]
		Peak	linf [0…100]
		Mode	enum [COMP, LIM]
		Gain	linf [-18…6]

Effect Name	Parameters	Parameter Name	Type & Range
LEC2 (dual leisure compressor)	iffiffiffif	Active A	enum [OFF, ON]
		Gain A	linf [0…100]
		Peak A	linf [0…100]
		Mode A	enum [COMP, LIM]
		Gain A	linf [-18…6]
		Active B	enum [OFF, ON]
		Gain B	linf [0…100]
		Peak B	linf [0…100]
		Mode B	enum [COMP, LIM]
		Gain B	linf [-18…6]

Edison EX1

Effect Name	Parameters	Parameter Name	Type & Range
EDI (edison ex1)	iiiffffff	Active	enum [OFF, ON]
		Stereo Input	enum [ST / M/S]
		Stereo Output	enum [ST / M/S]
		ST Spread	linf [-50…+50]
		LMF Spread	linf [-50…+50]
		Balance	linf [-50…+50]
		Center Distance	linf [-50…+50]
		Out Gain	linf [-12…+12]

Stereo / Dual Ultimo Compressor

Effect Name	Parameters	Parameter Name	Type & Range
ULC (stereo ultimo compressor)	iffffi	Active	enum [OFF, ON]
		Input Gain	linf [-48…0]
		Out Gain	linf [-48…0]
		Attack	linf [1…7]
		Release	linf [1…7]
		Ratio	enum [4, 8, 12, 20, ALL]

Effect Name	Parameters	Parameter Name	Type & Range
ULC2 (dual ultimo compressor)	ifffffiiffffi	Active A	enum [OFF, ON]
		Input Gain A	linf [-48…0]
		Out Gain A	linf [-48…0]
		Attack A	linf [1…7]
		Release A	linf [1…7]
		Ratio A	enum [4, 8, 12, 20, ALL]
		Active B	enum [OFF, ON]
		Input Gain B	linf [-48…0]
		Out Gain B	linf [-48…0]
		Attack B	linf [1…7]
		Release B	linf [1…7]
		Ratio B	enum [4, 8, 12, 20, ALL]

Sound Maxer

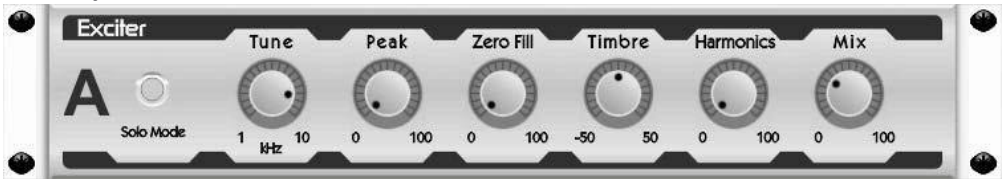
Effect Name	Parameters	Parameter Name	Type & Range
SON (sound maxer)	ifffffff	Active A	enum [OFF, ON]
		Lo Contour A	linf [0…10]
		Process A	linf [0…10]
		Out Gain A	linf [-12…+12]
		Active B	enum [OFF, ON]
		Lo Contour B	linf [0…10]
		Process B	linf [0…10]
		Out Gain B	linf [-12…+12]

Stereo / Dual Enhancer

Effect Name	Parameters	Parameter Name	Type & Range
ENH (stereo enhancer)	ffffffffi	Out Gain	linf [-12…+12]
		Speed	linf [0…100]
		Bass Gain	linf [0…100]
		Bass Freq	linf [1…50]
		Mid Gain	linf [0…100]
		Mid Freq	linf [1…50]
		Hi Gain	linf [0…100]
		Hi Freq	linf [1…50]
		Solo	enum [OFF, ON]

Effect Name	Parameters	Parameter Name	Type & Range
ENH2 (dual enhancer)	fffffffiffffffffi	Out Gain A	linf [-12…+12]
		Speed A	linf [0…100]
		Bass Gain A	linf [0…100]
		Bass Freq A	linf [1…50]
		Mid Gain A	linf [0…100]
		Mid Freq A	linf [1…50]
		Hi Gain A	linf [0…100]
		Hi Freq A	linf [1…50]
		Solo A	enum [OFF, ON]
		Out Gain B	linf [-12…+12]
		Speed B	linf [0…100]
		Bass Gain B	linf [0…100]
		Bass Freq B	linf [1…50]
		Mid Gain B	linf [0…100]
		Mid Freq B	linf [1…50]
		Hi Gain B	linf [0…100]
		Hi Freq B	linf [1…50]
		Solo B	enum [OFF, ON]

Stereo / Dual Exciter



Effect Name	Parameters	Parameter Name	Type & Range
EXC (stereo exciter)	ffffffi	Tune	logf 1k…10k]
		Peak	linf [0…100]
		Zero Fill	linf [0…100]
		Timbre	linf [-50…+50]
		Harmonics	linf [0…100]
		Mix	linf [0…100]
		Solo	enum [OFF, ON]

Effect Name	Parameters	Parameter Name	Type & Range
EXC2 (dual exciter)	fffffiffffffi	Tune A	logf 1k…10k]
		Peak A	linf [0…100]
		Zero Fill A	linf [0…100]
		Timbre A	linf [-50…+50]
		Harmonics A	linf [0…100]
		Mix A	linf [0…100]
		Solo A	enum [OFF, ON]
		Tune B	logf 1k…10k]
		Peak B	linf [0…100]
		Zero Fill B	linf [0…100]
		Timbre B	linf [-50…+50]
		Harmonics B	linf [0…100]
		Mix B	linf [0…100]
		Solo B	enum [OFF, ON]

Stereo Imager

Effect Name	Parameters	Parameter Name	Type & Range
IMG (stereo imager)	fffffff	Balance	linf [-100…+100]
		Mono Pan	linf [-100…+100]
		Stereo Pan	linf [-100…+100]
		Shv Gain	linf [0…12]
		Shv Freq	logf [100…1000]
		Shv Q	logf [1…10]
		Out Gain	linf [-12…+12]

Stereo / Dual Guitar Amp

Effect Name	Parameters	Parameter Name	Type & Range
AMP (stereo guitar amp)	ffffffffi	Preamp	linf [0…10]
		Buzz	linf [0…10]
		Punch	linf [0…10]
		Crunch	linf [0…10]
		Drive	linf [0…10]
		Low	linf [0…10]
		High	linf [0…10]
		Level	linf [0…10]
		Cabinet	enum [OFF, ON]

Effect Name	Parameters	Parameter Name	Type & Range
AMP2 (dual guitar amp)	fffffffiffffffffi	Preamp A	linf [0…10]
		Buzz A	linf [0…10]
		Punch A	linf [0…10]
		Crunch A	linf [0…10]
		Drive A	linf [0…10]
		Low A	linf [0…10]
		High A	linf [0…10]
		Level A	linf [0…10]
		Cabinet A	enum [OFF, ON]
		Preamp B	linf [0…10]
		Buzz B	linf [0…10]
		Punch B	linf [0…10]
		Crunch B	linf [0…10]
		Drive B	linf [0…10]
		Low B	linf [0…10]
		High B	linf [0…10]
		Level B	linf [0…10]
		Cabinet B	enum [OFF, ON]

Stereo / Dual Tube Stage

Effect Name	Parameters	Parameter Name	Type & Range
DRV (stereo tube stage)	fffffffff	Drive	linf [0…100]
		Even Ear	linf [0…50]
		Odd Ear	linf [0…50]
		Gain	linf [-12…+12]
		Lo Cut	logf [20…200]
		Hi Cut	logf [4k…20k]
		Lo Gain	linf [-12…+12]
		Lo Freq	logf [50…400]
		Hi Gain	linf [-12…+12]
		Hi Freq	logf [1k…10k]

Effect Name	Parameters	Parameter Name	Type & Range
DRV2 (dual tube stage)	fffffffffffffffffff	Drive A	linf [0…100]
		Even Ear A	linf [0…50]
		Odd Ear A	linf [0…50]
		Gain A	linf [-12…+12]
		Lo Cut A	logf [20…200]
		Hi Cut A	logf [4k…20k]
		Lo Gain A	linf [-12…+12]
		Lo Freq A	logf [50…400]
		Hi Gain A	linf [-12…+12]
		Hi Freq A	logf [1k…10k]
		Drive B	linf [0…100]
		Even Ear B	linf [0…50]
		Odd Ear B	linf [0…50]
		Gain B	linf [-12…+12]
		Lo Cut B	logf [20…200]
		Hi Cut B	logf [4k…20k]
		Lo Gain B	linf [-12…+12]
		Lo Freq B	logf [50…400]
		Hi Gain B	linf [-12…+12]
		Hi Freq B	logf [1k…10k]

Stereo / Dual Pitch Shifter

Effect Name	Parameters	Parameter Name	Type & Range
PIT (stereo pitch)	ffffff	Semitone	linf [-12…+12]
		Cent	linf [-50…+50]
		Delay	logf [1…100]
		Lo Cut	logf [10…500]
		Hi Cut	logf [2k…20k]
		Mix	linf [0…100]

Effect Name	Parameters	Parameter Name	Type & Range
PIT2 (dual pitch)	fffffffffff	Semitone A	linf [-12…+12]
		Cent A	linf [-50…+50]
		Delay A	logf [1…100]
		Lo Cut A	logf [10…500]
		Hi Cut A	logf [2k…20k]
		Mix A	linf [0…100]
		Semitone B	linf [-12…+12]
		Cent B	linf [-50…+50]
		Delay B	logf [1…100]
		Lo Cut B	logf [10…500]
		Hi Cut B	logf [2k…20k]
		Mix B	linf [0…100]

Wave Designer

Effect Name	Parameters	Parameter Name	Type & Range
WAV (wave designer)	ffffff	Attack A	linf [-100…+100]
		Sustain A	linf [-100…+100]
		Gain A	linf [-24…+24]
		Attack B	linf [-100…+100]
		Sustain B	linf [-100…+100]
		Gain B	linf [-24…+24]

ASSIGN Section
User Definable Controls

This chapter describes the different settings and options linked to User Definable Controls a.k.a OSC command */config/userctrl* .

The User Control section consists of 4 columns composed of a rotary encoder and two buttons. Encoders are numbered 1 to 4 and buttons are numbered 5 to 12. Question: Are the 8 buttons of the X32/M32 Compact known as 1 to 8 as labeled on the desk or 5 to 12, as on the X32/M32 Standard and Producer?

Rotary Encoders

Scribbles

Buttons

Layer Selection

A series of 3 buttons at the bottom of the section enables selecting one of 3 layers of user controls layers [A, B and C]. When addressing user controls to get or set data, the layer name and encoder or button number must be provided. A small LCD displays the functions the rotary encoders or buttons are assigned to.

Notes:

There are no OSC commands to update the 4 scribbles of the assign section. This and the lack of full user assignable data limit what can be achieved with the assign section.

There are no OSC commands to set an OSC only mode for the assign section in the current implementation (FW 2.14).

There are no “NC” (normally closed) push-type buttons in the current implementation (FW 2.10). “NC” push buttons types can still be implemented but do require a feedback from the receiving program to simulate a normally closed push button.

Rotary Encoders (X32/M32 Standard)

Note: TBD if this applies "as is" to Rack, Core, Compact and Producer

The data used to set encoder values is a string made of up to 7 characters. The first character (encoder assignment) selects the main functionality the encoder controls.

Target Type	Associated function
"-"	Not assigned
"F" Fader	Format "Fxx" xx: Channel/Bus "xx": *00…31: Channel 01 to Channel 32* *32…39: Aux 01 to Aux 08* *40…47: FX rtn 1L to FX rtn 4R* *48…63: MixBus 01 to MixBus 16* *64…69: Matrix 1 to Matrix 6* *70 : Main LR* *71 : Main M/C* *72…79: DCA 1 to DCA 8*
"P" Pan	Format "Pxx" xx: Channel/Bus "xx": *00…31: Channel 01 to Channel 32* *32…39: Aux 01 to Aux 08* *40…47: FX rtn 1L to FX rtn 4R* *48…63: MixBus 01 to MixBus 16* *64…69: Matrix 1 to Matrix 6* *70 : Main LR* *71 : Main M/C* *72…79: DCA 1 to DCA 8*
"S" Send	Format "Sxxyy" xx: Channel/Bus, yy: Sends "xx": *00…31: Channel 01 to Channel 32* *32…39: Aux 01 to Aux 08* *40…47: FX rtn 1L to FX rtn 4R* *48…63: MixBus 01 to MixBus 16* *64…69: Matrix 1 to Matrix 6* *70 : Main LR* *71 : Main M/C* *72…79: DCA 1 to DCA 8* "yy" - two characters representing a mix bus number: *00…15: MixBus 01 to MixBus 16*
"X" Effect	Format "Xxyy" x: Effects Slot, yy: Paramater "x": *0…7: Effect 1 to Effect 8* "yy": *00…63: Effect parameter number 01 to 64*
"M" Midi	Format "Mxyyzzz" x" Message, yy: Channel, zzz: Value "x": *C: Control Change* *N: Note* *P: Program Change* "yy": *00…16: Midi channel number 01 to 16* "zzz": *000…127: Midi note or Midi value*
"R" Remote	Format "Rxxx" xxx: Parameter "xxx" - three characters representing a remote assign:

	000…007: remote 1 to remote 8 *008: Jog*
"D" Selected Channel	Format "Dx" x: Parameter "x": *@: Fader* *A: Gate threshold* *B: Gate range* *C: Gate attack* *D: Gate hold* *E: Gate release* *F: Dyn. threshold* *G: Dyn. ratio* *H: Dyn. knee* *I: Dyn. mgain* *J: Dyn. attack* *K: Dyn. hold* *L: Dyn. release*

Buttons (X32/M32 Standard)

Note: TBD if this applies "as is" to Rack, Core, Compact and Producer

The data used to set buttons values is a string made of up to 7 characters. The first character (button assignment) selects the main functionality the button controls.

Button assignment	Associated function
"P" Jump to Page	Format: "Pxxyz", xx: Channel/Bus, y: Target, z: Page "y": 0: Channel "xx": *00…31: Channel 01 to Channel 32* *32…39: Aux 01 to Aux 08* *40…47: FX rtn 1L to FX rtn 4R* *48…63: MixBus 01 to MixBus 16* *64…69: Matrix 1 to Matrix 6* *70 : Main LR* *71 : Main M/C* "z": *0: Home, 1: Config, 2: Gate, 3: Dyn, 4: EQ, 5: Mix, 6: Main, S: sends on faders* 1: Meter "z": *0: Channel, 1: MixBus, 2: Aux/FX, 3: In/Out, 4: RTA* 2: Route "z": *0: Home, 1: ANAOUT, 2: AUXOUT, 3: P16OUT, 4: CARDOUT, 5: AESAOOUT, 6: AESBOUT, 7: XLROUT* 3: Setup "z": *0: Global, 1: Conf, 2: Remote, 3: Network, 4: Names, 5: Preamps, 6: Card* 4: Lib "z": *0: Chan, 1: Effect, 2: Route* 5: FX "z": *0: Home, 1: FX1, 2: FX2, 3: FX3, 4: FX4, 5: FX5, 6: FX6, 7: FX7, 8: FX8* "xx" : *00 to 04 for layer "-", 01 to layer 04* 6: MON "z": *0: Monitor, 1: Talk A, 2: Talk B, 3: OSC* 7: USB "z": *0: Home, 1: Config* 8: Scene "z": *0: Home, 1: Scenes, 2: Bit, 3: ParSafe, 4: ChnSafe, 5: Midi* 9: Assign "z": *0: Home, 1: Set A, 2: Set B, 3: Set C*

Button assignment	Associated function
"O" Mutes	Format: "Oxx", xx: Channel/Bus "xx": *00…31: Channel 01 to Channel 32* *32…39: Aux 01 to Aux 08* *40…47: FX rtn 1L to FX rtn 4R* *48…63: MixBus 01 to MixBus 16* *64…69: Matrix 1 to Matrix 6* *70 : Main LR* *71 : Main M/C*

	72…79: DCA 1 to DCA 8 *80…85: Mute group 1 to 6*

Button assignment	Associated function
"I" Inserts	Format: "Ixx", xx: Channel/Bus "xx": *00…31: Channel 01 to Channel 32* *32…39: Aux 01 to Aux 08* *40…47: FX rtn 1L to FX rtn 4R* *48…63: MixBus 01 to MixBus 16* *64…69: Matrix 1 to Matrix 6* *70 : Main LR* *71 : Main M/C*

Button assignment	Associated function
"X" Effect Button	Format: "Xxyy", x: Effects Slot, yy: Parameter "x": *0…7: Effect 1 to Effect 8 Params* "yy": *00…63: Parameter number*

Button assignment	Associated function
"M" Midi Push	Format: "Mxyyzzz", x: Message, yy: Channel, zzz: Value "x": *C: Control Change* *N: Note* *P: Program Change* "yy": *01…16: Channel Number* "zzz": *000…127: Value*

Button assignment	Associated function
"M" Midi Toggle	Format: "Mxyyzzz", x: Message, yy: Channel, zzz: Value "x": *c: Control Change* *n: Note* "yy": *01…16: Channel Number* "zzz": *000…127: Value*

Button assignment	Associated function
"R" Remote	Format: "Rxxx", xxx: Parameter "xxx": *000…007: F1 to F8* *008: Undo* *009: Save* *010: <Bank* *011: >Bank* *012: < CHN* *013: >CHN* *014…017: UP, DOWN, LEFT, RIGHT* *018: STOP* *019: PLAY* *020: REC* *021: FF*

	022: REW *023: MRK/RTZ* *024: CYCLE* *025: SCRUB* *026: NDG/SHUT* *027: DROP/IN* *028: REP/OUT* *029: CLI/OFF* *030: READ* *031: WRITE* *032: TOUCH* *033: TRIM* *034: LATCH*

Button assignment	Associated function
"S" Cue Recall	Format: "S4xx", xx: Cue Number "xx": *00…99: Cue number*

Button assignment	Associated function
"S" Scene Recall	Format: "S0xx", xx: Scene Number "xx": *00…99: Scene number*

Button assignment	Associated function
"S" Snippet Recall	Format: "S2xx", xx: Snippet Number "xx": *00…99: Snippet number*

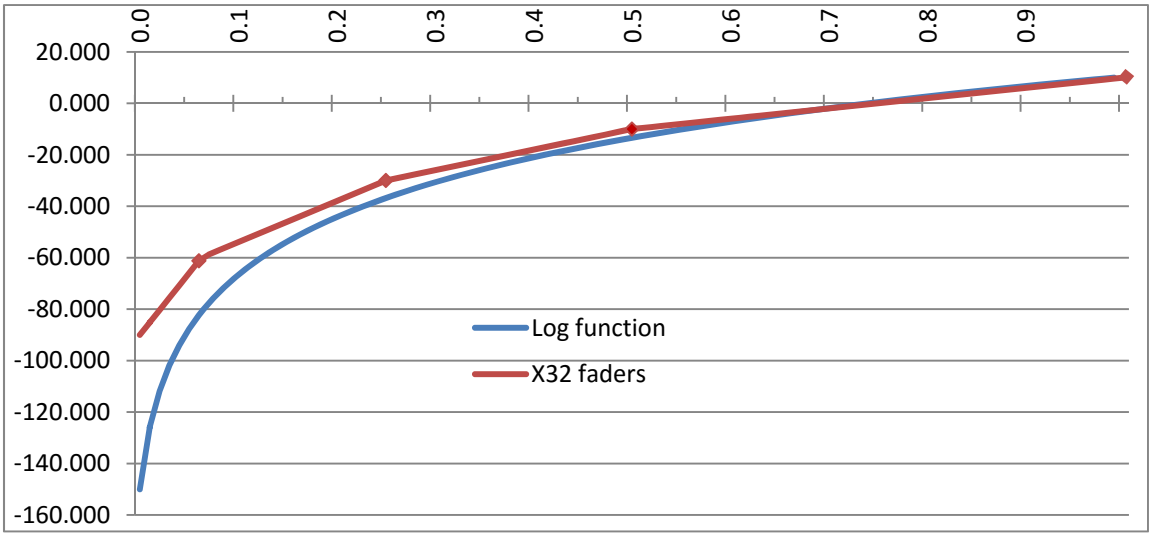
Button assignment	Associated function
"T" USB Recorder	Format: "Tx", xx: Function "x": *0: Stop* *1: Play* *2: Record* *3: Pause* *4: Play/Stop* *5: Play/Pause* *6: Rec/Stop* *7: Rec/Pause* *8: Prev. Track* *9: Next Track*

Appendix – Converting X32 fader data to decibels and vice-versa

As mentioned earlier in this document, X32 faders implement a 4 linear functions approach with cross points at -10, -30, -60 dB to emulate the log function one can expect to manipulate volume data. Fader controls typically follow a $\log_{10}$ function to match the human perception of loudness.

The volume ratio generic formula: *dB value = 20 * log (v2/v1)* produces a response curve in blue, as below. On the other hand, X32 faders are using 4 different linear functions with increasing slopes to approximate the dB log transfer shape; the figure below shows the 4 different X32 line segments in red.

In both representations, 0db maps to 0.75 and 10dB maps to 1.0



The paragraphs below show a C-like conversion to go from [0.0, 1.0] to dB [-90 ,+10] with value 0 matching –oo, and vice-versa. This can be useful to map with other programs or tools used, or for programmers who need to match the float values returned by OSC functions to dB values in their programs.

```
// float to dB
// "f" represents OSC float data. f: [0.0, 1.0]
// "d" represents the dB float data. d:[-oo, +10]
      if (f >= 0.5)           d = f * 40. - 30.;      // max dB value: +10.
      else if (f >= 0.25)     d = f * 80. - 50.;
      else if (f >= 0.0625)   d = f * 160. - 70.;
      else if (f >= 0.0)      d = f * 480. - 90.;     // min dB value: -90 or -oo[29].

// dB to float
// "d" represents the dB float data. d:[-90, +10]
// "f" represents OSC float data. f: [0.0, 1.0]
      if (d < -60.)           f = (d + 90.) / 480.;
      else if (d < -30.)      f = (d + 70.) / 160.;
      else if (d < -10.)      f = (d + 50.) / 80.;
      else if (d <= 10.)      f = (d + 30.) / 40.;
// Optionally round "f" to a X32 known value
      f = roundf(f * 1023) / 1023;
```

[29] Note: a forum member reported the X32/M32 have an internal –oo value of -144dB, but this doesn't appear in any data reported by X32.

Appendix – Scene data elements

The following table lists the control elements that can be found in a scene file. A scene file *"name.scn"* is typically 2070 lines (2054 in FW versions prior to 2.12) of editable data representing the working state of the X32/M32 and controlling almost all X32/M32 parameters.

config/chlink	*ch/[01…32]/eq/[1…4]*	*mtx/[01…06]/eq*
config/auxlink	*ch/[01…32]/mix*	*mtx/[01…06]/eq[1…6]*
config/fxlink	*ch/[01…32]/mix/[01…16]*	*mtx/[01…06]/mix*
config/buslink	*ch/[01…32]/grp*	*main/st/config*
config/mtxlink	*auxin/[01…08]/config*	*main/st/dyn*
config/mute	*auxin/[01…08]/preamp*	*main/st/dyn/filter*
config/linkcfg	*auxin/[01…08]/eq*	*main/st/insert*
config/mono	*auxin/[01…08]/eq/[1…4]*	*main/st/eq*
config/solo	*auxin/[01…08]/mix*	*main/st/eq[1…6]*
config/talk	*auxin/[01…08]/mix/[01…16]*	*main/st/mix*
config/talk/A	*auxin/[01…08]/grp*	*main/st/mix/[01…06]*
config/talk/B	*fxrtn/[01…08]/config*	*main/m/config*
config/osc	*fxrtn/[01…08]/eq*	*main/m/dyn*
config/routing/IN	*fxrtn/[01…08]/eq[1…4]*	*main/m/dyn/filter*
config/routing/AES50A	*fxrtn/[01…08]/mix*	*main/m/insert*
config/routing/AES50B	*fxrtn/[01…08]/mix/[01…16]*	*main/m/eq*
config/routing/CARD	*fxrtn/[01…08]/grp*	*main/m/eq[1…6]*
config/routing/OUT	*bus/[01…16]/config*	*main/m/mix*
config/userctrl/{A,B,C}	*bus/[01…16]/dyn*	*main/m/mix/[01…06]*
config/userctrl/{A,B,C}/enc	*bus/[01…16]/dyn/filter*	*dca/[1…8]*
config/userctrl/{A,B,C}/btn	*bus/[01…16]/insert*	*dca/[1…8]/config*
config/tape	*bus/[01…16]/eq*	*fx/[1…8]*
ch/[01…32]/config	*bus/[01…16]/eq[1…6]*	*fx/[1…8]/source*
ch/[01…32]/delay	*bus/[01…16]/mix*	*fx/[1…8]/par*
ch/[01…32]/preamp	*bus/[01…16]/mix/[01…06]*	*outputs/main/[01…16]*
ch/[01…32]/gate	*bus/[01…16]/grp*	*outputs/main/[01…16]/delay*
ch/[01…32]/gate/filter	*mtx/[01…06]/config*	*outputs/aux/[01…06]*
ch/[01…32]/dyn	*mtx/[01…06]/preamp*	*outputs/p16/[01…16]*
ch/[01…32]/dyn/filter	*mtx/[01…06]/dyn*	*outputs/p16/[01…16]/iQ*[30]
ch/[01…32]/insert	*mtx/[01…06]/dyn/filter*	*outputs/aes/[01…02]*
ch/[01…32]/eq	*mtx/[01…06]/insert*	*outputs/rec/[01…02]*
		headamp/[000…127]

A scene file starts with a line such as:

```
#2.1# "Scene name" "Scene note" %000000000 1
```

This first line contains the *name* and *note* associated to the scene and ends with the list of scene safes in the form of 8 *[0/1]* characters terminated by a 0: *%000000000* and is terminated by a 1. It is then followed by (*/node* like commands, or X32nodes) lines from the table above; they are followed by the parameters they control;
A line beginning with *'#'* is treated as a comment line.

For example, *ch/[01…32]/config* will be followed by 4 parameters, as in

```
/ch/01/config "Kick Drum" 3 YE 1
```

[30] Starting with FW version 2.12

These parameters respectively correspond to the name given to the channel (as displayed on the Channel scribble), the icon associated with the channel scribble, the channel scribble color, and the channel source. These are detailed in their order of appearance after the corresponding `/node` commands, in this document and for the present case under the **Channel (/ch) data** chapter.

Appendix – Snippet data elements

The table below lists the control elements that can be found in a snippet file. A snippet file *"name.snp"* is variable in size and made of text editable data representing a subset of X32/M32 parameters.

A snippet file starts with a line such as:

```
#2.1# "Snippet name" 31473663 1 66305 449 1
```

The 4 numerical parameters following the snippet *name* and followed by *'1'* are the *eventtyp*, *channels*, *auxbuses*, and *maingrps* filters respectively, saved/present in the file.

This first line is then followed by the lines (*/node* like commands) in the table below; they are followed by the parameters they control; a line beginning with *'#'* is treated as a comment line.

/fx/[1…8]	*/outputs/aes/[01…02]*	*/fxrtn/[01…08]/mix/[01…16]*
/fx/[1…8]/source	*/headamp/[000…127]*	*/fxrtn/[01…08]/mix/mono*
/fx/[1…8]/par	*/ch/[01…32]/preamp*	*/fxrtn/[01…08]/mix/mlevel*
/config/solo	*/ch/[01…32]/delay*	*/bus/[01…16]/config*
/config/talk	*/ch/[01…32]/config*	*/bus/[01…16]/eq*
/config/talk/A	*/ch/[01…32]/eq*	*/bus/[01…16]/eq/[1…6]*
/config/talk/B	*/ch/[01…32]/eq/[1…4]*	*/bus/[01…16]/dyn*
/config/routing/IN/1-8	*/ch/[01…32]/gate*	*/mtx/[01…06]/config*
/config/routing/IN/9-16	*/ch/[01…32]/gate/filter*	*/mtx/[01…06]/eq*
/config/routing/IN/17-24	*/ch/[01…32]/dyn*	*/mtx/[01…06]/eq/[1…6]*
/config/routing/IN/25-32	*/ch/[01…32]/dyn/filter*	*/mtx/[01…06]/dyn*
/config/routing/IN/AUX	*/ch/[01…32]/insert*	*/mtx/[01…06]/dyn/filter*
/config/routing/AES50A/1-8	*/ch/[01…32]/grp*	*/mtx/[01…06]/insert*
/config/routing/AES50A/9-16	*/ch/[01…32]/mix/fader*	*/mtx/[01…06]/mix/fader*
/config/routing/AES50A/17-24	*/ch/[01…32]/mix/pan*	*/mtx/[01…06]/mix/on*
/config/routing/AES50A/25-32	*/ch/[01…32]/mix/on*	*/main/st/config*
/config/routing/AES50A/33-40	*/ch/[01…32]/mix/[01…16]*	*/main/st/eq*
/config/routing/AES50A/41-48	*/ch/[01…32]/mix/mono*	*/main/st/eq/[1…6]*
/config/routing/AES50B/1-8	*/ch/[01…32]/mix/mlevel*	*/main/st/dyn*
/config/routing/AES50B/9-16	*/auxin/[01…06]/preamp*	*/main/st/dyn/filter*
/config/routing/AES50B/17-24	*/auxin/[01…06]/config*	*/main/st/insert*
/config/routing/AES50B/25-32	*/auxin/[01…06]/eq*	*/main/st/mix/fader*
/config/routing/AES50B/33-40	*/auxin/[01…06]/eq/[1…4]*	*/main/st/mix/pan*
/config/routing/AES50B/41-48	*/auxin/[01…06]/grp*	*/main/st/mix/on*
/config/routing/CARD/1-8	*/auxin/[01…06]/mix/fader*	*/main/st/mix/[01…06]*
/config/routing/CARD/9-16	*/auxin/[01…06]/mix/pan*	*/main/m/config*
/config/routing/CARD/17-24	*/auxin/[01…06]/mix/on*	*/main/m/eq*
/config/routing/CARD/25-32	*/auxin/[01…06]/mix/[01…16]*	*/main/m/eq/[1…6]*
/config/routing/OUT/1-4	*/auxin/[01…06]/mix/mono*	*/main/m/dyn*
/config/routing/OUT/5-8	*/auxin/[01…06]/mix/mlevel*	*/main/m/dyn/filter*
/config/routing/OUT/9-12	*/fxrtn/[01…08]/config*	*/main/m/insert*
/config/routing/OUT/13-16	*/fxrtn/[01…08]/eq*	*/main/m/mix/fader*
/outputs/main/[01…16]	*/fxrtn/[01…08]/eq/[1…4]*	*/main/m/mix/on*
/outputs/main/[01…16]/delay	*/fxrtn/[01…08]/grp*	*/main/m/mix/[01…06]*
/outputs/aux/[01…06]	*/fxrtn/[01…08]/mix/fader*	*/dca/[1…8]/config*
/outputs/p16/[01…16]	*/fxrtn/[01…08]/mix/pan*	*/dca/[1…8]/fader*
/outputs/p16/[01…16]/iQ[31]	*/fxrtn/[01…08]/mix/on*	*/dca/[1…8]/on*

[31] Starting with FW version 2.12

Appendix – Channel, Library and Routing preset files data elements

The table below lists the control elements that can be found in a Channel, Library or Routing preset file.
Preset files are variable in size and consist of subset of X32/M32 parameters in the form of editable text (*/node* like commands).

A preset file starts with a line such as:

```
#2.1# <pos> "Preset name" <type> %<flags> 1
```

Where

<pos>: preset index value (can be chosen by the user)

<type>: a type number:

- Effects: used for sorting by type or by name and enable loading in FX slots [1…4] or [5…8]
- Channels and Routing: unused

<flags>: a list of 16 digits *[0 or 1]* representing:

- Channels: if a channel section is present in the preset *[digits 0…7]* and whether it is active or not *[digits 8…15]* (see */-libs/ch[001-100]/flags* for details)
- Effects and Routing: unused

This first line is then followed by the lines (*/node* like commands) in the table below; they are followed by the parameters they control; a line beginning with *'#'* is treated as a comment line.

Channel*	Effect*	Routing
/config */delay* */preamp* */gate* */gate/filter* */dyn* */dyn/filter* */eq* */eq/[1…6]* */mix* */mix/[01…16]* */headamp/[000…127]*	*/type* */source* */par*	*/config/routing/IN* */config/routing/AES50A* */config/routing/AES50B* */config/routing/CARD* */config/routing/OUT* */outputs/main/[01…16]* */outputs/main/[01…16]/delay* */outputs/aux/[01…06]* */outputs/p16/[01…16]* */outputs/p16/[01…16]/iQ*[32] */outputs/aes/[01…02]*

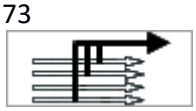
* In the case of Channel and Effect types, the typical */node* header (i.e. */ch/nn/* or */fx/n/*) is not present as the file does not apply to a specific channel or effect number.

[32] Starting with FW version 2.12

Appendix – X32/M32 Icons

X32/M32 Icons[33] are numbered *01…74* and shown in the table below.

01	02	03	04	05	06
07	08	09	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36
37	38	39	40	41	42
43	44	45	46	47	48
49	50	51	52	53	54
55	56	57	58	59	60
61	62	63	64	65	66
67	68	69	70	71	72
73	74				




[33] The icons have been extracted from the X32-edit application

Appendix – OSC over MIDI Sysex commands

Additionaly to Behringer's document/note "X32 MIDI Implementation (06 May 2014)"[34] which provides an overview of the MIDI RX, TX and MIDI assignments applicable to X32/M32 systems, OSC commands can be sent to the device over MIDI, using Sysex messages. Make sure your MIDI connection or device will support sending SYSEX messages; some devices do not provide (full) SYSEX support.

The general format for sending OSC commands over MIDI Sysex is:

```
F0 00 20 32 32 <OSCtext> F7
```

with `<OSCtext>` being the OSC command in text hex format, and up to 39 kbtyes in length. The space character `0x20` is used as separator between command and data, as shown below. Parameter data are converted from int or float to their string equivalent, respecting known X32 values where appropriate. Enums are sent as strings too.

Examples: (~ stands for the NULL character, \0; data within brackets are sent as 32 bits big endian values)

Setting channel 01 mute ON (muting the channel):
OSC: `/ch/01/mix/on~~~,i~~[0]`
OSC: `/ch/01/mix/on~~~,s~~OFF`
Sysex: `F0 00 20 32 32 2F 63 68 2F 30 31 2F 6D 69 78 2F 6F 6E 20 4F 46 46 F7`

Unmuting channel 01:
OSC: `/ch/01/mix/on~~~,i~~[1]`
OSC: `/ch/01/mix/on~~~,s~~ON`
Sysex: `F0 00 20 32 32 2F 63 68 2F 30 31 2F 6D 69 78 2F 6F 6E 20 4F 4E F7`

Setting channel 01, EQ 2 frequency to 1kHz (actually 1020Hz, due to known discrete values)
OSC: `/ch/01/eq/2/f~~~,f~~[0.57]`
Sysex: `F0 00 20 32 32 2F 63 68 2F 30 31 2F 65 71 2F 32 2F 66 20 31 30 32 30 F7`

Setting channel 01, dynamics Hold value to 100ms
OSC: `/ch/01/dyn/hold~,f~~[0.74]`
Sysex: `F0 00 20 32 32 2F 63 68 2F 30 31 2F 64 79 6E 2F 68 6F 6C 64 20 31 30 30 F7`

Setting User Assign Bank C, button 5 to send MIDI note 3 on MIDI channel 5, as a MIDI push command
OSC: `/config/userctrl/C/btn/5~~~~,s~~MN05003~`
Sysex: `F0 00 20 32 32 2F 63 6F 6E 66 69 67 2F 75 73 65 72 63 74 72 6C 2F 43 2F 62 74 6E 2F 35 20 4D 4E 30 35 30 30 33 F7`
As a result, Bank C button 5 will generate the following two MIDI sequences: `94 03 7F` and `94 03 00`

Please refer to the OSC commands descriptions in this document for command formats and applicable ranges for their respective parameters types and ranges, and tables in appendix for corresponding floating point data and X32/M32 known discrete values for different fields (EQ, Dynamics, Gate, etc).

[34] Available on Behringer web site, download section – MIDI Protocol

Appendix – Frequency Table – 201 log scale frequency values – [20 Hz, 20 kHz]

The data is presented as [float, node value] couples

0.0000 20.0	0.2050 82.4	0.4100 339.6	0.6150 1k39	0.8200 5k76
0.0050 20.7	0.2100 85.3	0.4150 351.6	0.6200 1k44	0.8250 5k97
0.0100 21.4	0.2150 88.3	0.4200 363.9	0.6250 1k49	0.8300 6k18
0.0150 22.2	0.2200 91.4	0.4250 376.7	0.6300 1k55	0.8350 6k39
0.0200 23.0	0.2250 94.6	0.4300 390.0	0.6350 1k60	0.8400 6k62
0.0250 23.8	0.2300 98.0	0.4350 403.7	0.6400 1k66	0.8450 6k85
0.0300 24.6	0.2350 101.4	0.4400 417.9	0.6450 1k72	0.8500 7k09
0.0350 25.5	0.2400 105.0	0.4450 432.5	0.6500 1k78	0.8550 7k34
0.0400 26.4	0.2450 108.7	0.4500 447.7	0.6550 1k84	0.8600 7k60
0.0450 27.3	0.2500 112.5	0.4550 463.5	0.6600 1k91	0.8650 7k87
0.0500 28.3	0.2550 116.4	0.4600 479.8	0.6650 1k97	0.8700 8k14
0.0550 29.2	0.2600 120.5	0.4650 496.6	0.6700 2k04	0.8750 8k43
0.0600 30.3	0.2650 124.7	0.4700 514.1	0.6750 2k11	0.8800 8k73
0.0650 31.3	0.2700 129.1	0.4750 532.1	0.6800 2k19	0.8850 9k03
0.0700 32.4	0.2750 133.7	0.4800 550.8	0.6850 2k27	0.8900 9k35
0.0750 33.6	0.2800 138.4	0.4850 570.2	0.6900 2k34	0.8950 9k68
0.0800 34.8	0.2850 143.2	0.4900 590.2	0.6950 2k43	0.9000 10k02
0.0850 36.0	0.2900 148.3	0.4950 611.0	0.7000 2k51	0.9050 10k37
0.0900 37.2	0.2950 153.5	0.5000 632.5	0.7050 2k60	0.9100 10k74
0.0950 38.6	0.3000 158.9	0.5050 654.7	0.7100 2k69	0.9150 11k11
0.1000 39.9	0.3050 164.4	0.5100 677.7	0.7150 2k79	0.9200 11k50
0.1050 41.3	0.3100 170.2	0.5150 701.5	0.7200 2k89	0.9250 11k91
0.1100 42.8	0.3150 176.2	0.5200 726.2	0.7250 2k99	0.9300 12k33
0.1150 44.3	0.3200 182.4	0.5250 751.7	0.7300 3k09	0.9350 12k76
0.1200 45.8	0.3250 188.8	0.5300 778.1	0.7350 3k20	0.9400 13k21
0.1250 47.4	0.3300 195.4	0.5350 805.4	0.7400 3k31	0.9450 13k67
0.1300 49.1	0.3350 202.3	0.5400 833.7	0.7450 3k43	0.9500 14k15
0.1350 50.8	0.3400 209.4	0.5450 863.0	0.7500 3k55	0.9550 14k65
0.1400 52.6	0.3450 216.8	0.5500 893.4	0.7550 3k68	0.9600 15k17
0.1450 54.5	0.3500 224.4	0.5550 924.8	0.7600 3k81	0.9650 15k70
0.1500 56.4	0.3550 232.3	0.5600 957.3	0.7650 3k94	0.9700 16k25
0.1550 58.3	0.3600 240.5	0.5650 990.9	0.7700 4k08	0.9750 16k82
0.1600 60.4	0.3650 248.9	0.5700 1k02	0.7750 4k22	0.9800 17k41
0.1650 62.5	0.3700 257.6	0.5750 1k06	0.7800 4k37	0.9850 18k03
0.1700 64.7	0.3750 266.7	0.5800 1k09	0.7850 4k52	0.9900 18k66
0.1750 67.0	0.3800 276.1	0.5850 1k13	0.7900 4k68	0.9950 19k32
0.1800 69.3	0.3850 285.8	0.5900 1k17	0.7950 4k85	1.0000 20k00
0.1850 71.8	0.3900 295.8	0.5950 1k21	0.8000 5k02	
0.1900 74.3	0.3950 306.2	0.6000 1k26	0.8050 5k20	
0.1950 76.9	0.4000 317.0	0.6050 1k30	0.8100 5k38	
0.2000 79.6	0.4050 328.1	0.6100 1k35	0.8150 5k57	

Appendix – Frequency Table – 121 log scale frequency values – [20 Hz, 20 kHz]

The data is presented as [float, node value] couples

0.0000 20.0	0.2333 100.2	0.4667 502.4	0.7000 2k51	0.9333 12k61
0.0083 21.2	0.2417 106.2	0.4750 532.1	0.7083 2k66	0.9417 13k36
0.0167 22.4	0.2500 112.5	0.4833 563.7	0.7167 2k82	0.9500 14k15
0.0250 23.8	0.2583 119.1	0.4917 597.1	0.7250 2k99	0.9583 14k99
0.0333 25.2	0.2667 126.2	0.5000 632.5	0.7333 3k16	0.9667 15k88
0.0417 26.7	0.2750 133.7	0.5083 669.9	0.7417 3k35	0.9750 16k82
0.0500 28.3	0.2833 141.6	0.5167 709.6	0.7500 3k55	0.9833 17k82
0.0583 29.9	0.2917 150.0	0.5250 751.7	0.7583 3k76	0.9917 18k88
0.0667 31.7	0.3000 158.9	0.5333 796.2	0.7667 3k99	1.0000 20k00
0.0750 33.6	0.3083 168.3	0.5417 843.4	0.7750 4k22	
0.0833 35.6	0.3167 178.3	0.5500 893.4	0.7833 4k47	
0.0917 37.7	0.3250 188.8	0.5583 946.3	0.7917 4k74	
0.1000 39.9	0.3333 200.0	0.5667 1k00	0.8000 5k02	
0.1083 42.3	0.3417 211.9	0.5750 1k06	0.8083 5k32	
0.1167 44.8	0.3500 224.4	0.5833 1k12	0.8167 5k63	
0.1250 47.4	0.3583 237.7	0.5917 1k19	0.8250 5k97	
0.1333 50.2	0.3667 251.8	0.6000 1k26	0.8333 6k32	
0.1417 53.2	0.3750 266.7	0.6083 1k33	0.8417 6k69	
0.1500 56.4	0.3833 282.5	0.6167 1k41	0.8500 7k09	
0.1583 59.7	0.3917 299.2	0.6250 1k49	0.8583 7k51	
0.1667 63.2	0.4000 317.0	0.6333 1k58	0.8667 7k96	
0.1750 67.0	0.4083 335.8	0.6417 1k68	0.8750 8k43	
0.1833 71.0	0.4167 355.7	0.6500 1k78	0.8833 8k93	
0.1917 75.2	0.4250 376.7	0.6583 1k88	0.8917 9k46	
0.2000 79.6	0.4333 399.1	0.6667 2k00	0.9000 10k02	
0.2083 84.3	0.4417 422.7	0.6750 2k11	0.9083 10k61	
0.2167 89.3	0.4500 447.7	0.6833 2k24	0.9167 11k24	
0.2250 94.6	0.4583 474.3	0.6917 2k37	0.9250 11k91	

Appendix – Frequency Table – 101 log scale frequency values – [20 Hz, 400 Hz]

The data is presented as [float, node value] couples

0.0000 20	0.3000 49	0.6000 121	0.9000 296	
0.0100 21	0.3100 51	0.6100 124	0.9100 305	
0.0200 21	0.3200 52	0.6200 128	0.9200 315	
0.0300 22	0.3300 54	0.6300 132	0.9300 324	
0.0400 23	0.3400 55	0.6400 136	0.9400 334	
0.0500 23	0.3500 57	0.6500 140	0.9500 344	
0.0600 24	0.3600 59	0.6600 144	0.9600 355	
0.0700 25	0.3700 61	0.6700 149	0.9700 366	
0.0800 25	0.3800 62	0.6800 153	0.9800 377	
0.0900 26	0.3900 64	0.6900 158	0.9900 388	
0.1000 27	0.4000 66	0.7000 163	1.0000 400	
0.1100 28	0.4100 68	0.7100 168		
0.1200 29	0.4200 70	0.7200 173		
0.1300 30	0.4300 73	0.7300 178		
0.1400 30	0.4400 75	0.7400 184		
0.1500 31	0.4500 77	0.7500 189		
0.1600 32	0.4600 79	0.7600 195		
0.1700 33	0.4700 82	0.7700 201		
0.1800 34	0.4800 84	0.7800 207		
0.1900 35	0.4900 87	0.7900 213		
0.2000 36	0.5000 89	0.8000 220		
0.2100 38	0.5100 92	0.8100 226		
0.2200 39	0.5200 95	0.8200 233		
0.2300 40	0.5300 98	0.8300 240		
0.2400 41	0.5400 101	0.8400 248		
0.2500 42	0.5500 104	0.8500 255		
0.2600 44	0.5600 107	0.8600 263		
0.2700 45	0.5700 110	0.8700 271		
0.2800 46	0.5800 114	0.8800 279		
0.2900 48	0.5900 117	0.8900 288		

Appendix – Q Factor Table – 72 log scale Q values – [10.0, 0.3, 72]

The data is presented as [float, node value] couples

0.0000 10	0.3521 2.9	0.7042 0.8		
0.0141 9.5	0.3662 2.8	0.7183 0.8		
0.0282 9.1	0.3803 2.6	0.7324 0.8		
0.0423 8.6	0.3944 2.5	0.7465 0.7		
0.0563 8.2	0.4085 2.4	0.7606 0.7		
0.0704 7.8	0.4225 2.3	0.7746 0.7		
0.0845 7.4	0.4366 2.2	0.7887 0.6		
0.0986 7.1	0.4507 2.1	0.8028 0.6		
0.1127 6.7	0.4648 2.0	0.8169 0.6		
0.1268 6.4	0.4789 1.9	0.8310 0.5		
0.1408 6.1	0.4930 1.8	0.8451 0.5		
0.1549 5.8	0.5070 1.7	0.8592 0.5		
0.1690 5.5	0.5211 1.6	0.8732 0.5		
0.1831 5.3	0.5352 1.5	0.8873 0.4		
0.1972 5.0	0.5493 1.5	0.9014 0.4		
0.2113 4.8	0.5634 1.4	0.9155 0.4		
0.2254 4.5	0.5775 1.3	0.9296 0.4		
0.2394 4.3	0.5915 1.3	0.9437 0.4		
0.2535 4.1	0.6056 1.2	0.9577 0.3		
0.2676 3.9	0.6197 1.1	0.9718 0.3		
0.2817 3.7	0.6338 1.1	0.9859 0.3		
0.2958 3.5	0.6479 1.0	1.0000 0.3		
0.3099 3.4	0.6620 1.0			
0.3239 3.2	0.6761 0.9			
0.3380 3.1	0.6901 0.9			

Appendix – Hold Table – 101 log scale Hold values – [0.02, 2000.00, 101]

The data is presented as [float, node value] couples

0.0000 0.02	0.3000 0.63	0.6000 20.0	0.9000 632	
0.0100 0.02	0.3100 0.71	0.6100 22.4	0.9100 709	
0.0200 0.03	0.3200 0.80	0.6200 25.1	0.9200 796	
0.0300 0.03	0.3300 0.89	0.6300 28.2	0.9300 893	
0.0400 0.03	0.3400 1.00	0.6400 31.7	0.9400 1002	
0.0500 0.04	0.3500 1.12	0.6500 35.5	0.9500 1124	
0.0600 0.04	0.3600 1.26	0.6600 39.9	0.9600 1261	
0.0700 0.04	0.3700 1.42	0.6700 44.7	0.9700 1415	
0.0800 0.05	0.3800 1.59	0.6800 50.2	0.9800 1588	
0.0900 0.06	0.3900 1.78	0.6900 56.3	0.9900 1782	
0.1000 0.06	0.4000 2.00	0.7000 63.2	1.0000 2000	
0.1100 0.07	0.4100 2.24	0.7100 70.9		
0.1200 0.08	0.4200 2.52	0.7200 79.6		
0.1300 0.09	0.4300 2.83	0.7300 89.3		
0.1400 0.10	0.4400 3.17	0.7400 100		
0.1500 0.11	0.4500 3.56	0.7500 112		
0.1600 0.13	0.4600 3.99	0.7600 126		
0.1700 0.14	0.4700 4.48	0.7700 141		
0.1800 0.16	0.4800 5.02	0.7800 158		
0.1900 0.18	0.4900 5.64	0.7900 178		
0.2000 0.20	0.5000 6.32	0.8000 200		
0.2100 0.22	0.5100 7.10	0.8100 224		
0.2200 0.25	0.5200 7.96	0.8200 251		
0.2300 0.28	0.5300 8.93	0.8300 282		
0.2400 0.32	0.5400 10.0	0.8400 316		
0.2500 0.36	0.5500 11.2	0.8500 355		
0.2600 0.40	0.5600 12.6	0.8600 399		
0.2700 0.45	0.5700 14.1	0.8700 447		
0.2800 0.50	0.5800 15.8	0.8800 502		
0.2900 0.56	0.5900 17.8	0.8900 563		

Appendix – Release Table – 101 log scale Release values – [5.00, 4000.00, 101]

The data is presented as [float, node value] couples

0.0000 5	0.3000 37	0.6000 276	0.9000 2050	
0.0100 5	0.3100 40	0.6100 295	0.9100 2192	
0.0200 6	0.3200 42	0.6200 315	0.9200 2343	
0.0300 6	0.3300 45	0.6300 337	0.9300 2505	
0.0400 7	0.3400 49	0.6400 361	0.9400 2678	
0.0500 7	0.3500 52	0.6500 385	0.9500 2864	
0.0600 7	0.3600 55	0.6600 412	0.9600 3062	
0.0700 8	0.3700 59	0.6700 441	0.9700 3273	
0.0800 9	0.3800 63	0.6800 471	0.9800 3499	
0.0900 9	0.3900 68	0.6900 504	0.9900 3741	
0.1000 10	0.4000 72	0.7000 538	1.0000 4000	
0.1100 10	0.4100 77	0.7100 576		
0.1200 11	0.4200 83	0.7200 615		
0.1300 12	0.4300 89	0.7300 658		
0.1400 13	0.4400 95	0.7400 703		
0.1500 14	0.4500 101	0.7500 752		
0.1600 15	0.4600 108	0.7600 804		
0.1700 16	0.4700 116	0.7700 860		
0.1800 17	0.4800 124	0.7800 919		
0.1900 18	0.4900 132	0.7900 983		
0.2000 19	0.5000 141	0.8000 1051		
0.2100 20	0.5100 151	0.8100 1123		
0.2200 22	0.5200 162	0.8200 1201		
0.2300 23	0.5300 173	0.8300 1284		
0.2400 25	0.5400 185	0.8400 1373		
0.2500 27	0.5500 198	0.8500 1468		
0.2600 28	0.5600 211	0.8600 1569		
0.2700 30	0.5700 226	0.8700 1677		
0.2800 32	0.5800 241	0.8800 1793		
0.2900 35	0.5900 258	0.8900 1917		

Appendix – Level Table – 161 pseudo-log scale Level values – [-oo, +10, 161]

The data is presented as [float, node value] couples

0.0000 -oo	0.2688 -28.5	0.5375 -8.5	0.8062 +2.3	
0.0063 -87.0	0.2750 -28.0	0.5437 -8.3	0.8125 +2.5	
0.0125 -84.0	0.2813 -27.5	0.5500 -8.0	0.8188 +2.8	
0.0188 -81.0	0.2875 -27.0	0.5562 -7.8	0.8250 +3.0	
0.0250 -78.0	0.2937 -26.5	0.5625 -7.5	0.8313 +3.3	
0.0313 -75.0	0.3000 -26.0	0.5688 -7.3	0.8375 +3.5	
0.0375 -72.0	0.3063 -25.5	0.5750 -7.0	0.8438 +3.8	
0.0437 -69.0	0.3125 -25.0	0.5813 -6.8	0.8500 +4.0	
0.0500 -66.0	0.3187 -24.5	0.5875 -6.5	0.8562 +4.3	
0.0562 -63.0	0.3250 -24.0	0.5938 -6.3	0.8625 +4.5	
0.0625 -60.0	0.3313 -23.5	0.6000 -6.0	0.8687 +4.8	
0.0688 -59.0	0.3375 -23.0	0.6062 -5.8	0.8750 +5.0	
0.0750 -58.0	0.3438 -22.5	0.6125 -5.5	0.8813 +5.3	
0.0812 -57.0	0.3500 -22.0	0.6187 -5.3	0.8875 +5.5	
0.0875 -56.0	0.3562 -21.5	0.6250 -5.0	0.8938 +5.8	
0.0938 -55.0	0.3625 -21.0	0.6313 -4.8	0.9000 +6.0	
0.1000 -54.0	0.3688 -20.5	0.6375 -4.5	0.9063 +6.3	
0.1063 -53.0	0.3750 -20.0	0.6438 -4.3	0.9125 +6.5	
0.1125 -52.0	0.3812 -19.5	0.6500 -4.0	0.9187 +6.8	
0.1187 -51.0	0.3875 -19.0	0.6563 -3.8	0.9250 +7.0	
0.1250 -50.0	0.3938 -18.5	0.6625 -3.5	0.9312 +7.3	
0.1312 -49.0	0.4000 -18.0	0.6687 -3.3	0.9375 +7.5	
0.1375 -48.0	0.4063 -17.5	0.6750 -3.0	0.9438 +7.8	
0.1437 -47.0	0.4125 -17.0	0.6812 -2.8	0.9500 +8.0	
0.1500 -46.0	0.4187 -16.5	0.6875 -2.5	0.9563 +8.3	
0.1563 -45.0	0.4250 -16.0	0.6938 -2.3	0.9625 +8.5	
0.1625 -44.0	0.4313 -15.5	0.7000 -2.0	0.9688 +8.8	
0.1688 -43.0	0.4375 -15.0	0.7063 -1.8	0.9750 +9.0	
0.1750 -42.0	0.4437 -14.5	0.7125 -1.5	0.9812 +9.3	
0.1813 -41.0	0.4500 -14.0	0.7188 -1.3	0.9875 +9.5	
0.1875 -40.0	0.4563 -13.5	0.7250 -1.0	0.9937 +9.8	
0.1937 -39.0	0.4625 -13.0	0.7312 -0.8	1.0000 +10.0	
0.2000 -38.0	0.4688 -12.5	0.7375 -0.5		
0.2062 -37.0	0.4750 -12.0	0.7437 -0.3		
0.2125 -36.0	0.4812 -11.5	0.7500 +0.0		
0.2188 -35.0	0.4875 -11.0	0.7563 +0.3		
0.2250 -34.0	0.4938 -10.5	0.7625 +0.5		
0.2313 -33.0	0.5000 -10.0	0.7688 +0.8		
0.2375 -32.0	0.5063 -9.8	0.7750 +1.0		
0.2438 -31.0	0.5125 -9.5	0.7813 +1.3		
0.2500 -30.0	0.5188 -9.3	0.7875 +1.5		
0.2562 -29.5	0.5250 -9.0	0.7937 +1.8		
0.2625 -29.0	0.5313 -8.8	0.8000 +2.0		

Appendix – RTA Decay Table – 19 log scale Decay values – [0.25, 16, 19]

The data is presented as [float, node value] couples

0.0000 0.25 0.0556 0.31 0.1111 0.40 0.1667 0.50 0.2222 0.63 0.2778 0.79 0.3333 1.00 0.3889 1.26 0.4444 1.59 0.5000 2.00	0.5556 2.52 0.6111 3.17 0.6667 4.00 0.7222 5.04 0.7778 6.35 0.8333 8.00 0.8889 10.08 0.9444 12.70 1.0000 16.00			

Appendix – Effects enums, names and preset names table

The data is presented as [enum value, enum name, preset flags, preset name] quadruplets

FX1…FX4:

```
 0 "HALL"  %000000 Hall Reverb
 1 "AMBI"  %000101 Ambiance
 2 "RPLT"  %000011 Rich Plate Reverb
 3 "ROOM"  %000010 Room Reverb
 4 "CHAM"  %000001 Chamber Reverb
 5 "PLAT"  %000100 Plate Reverb
 6 "VREV"  %001001 Vintage Reverb
 7 "VRM"   %001000 Vintage room
 8 "GATE"  %000110 Gated Reverb
 9 "RVRS"  %000111 Reverse Reverb
10 "DLY"   %010100 Stereo Delay
11 "3TAP"  %010101 3-Tap Delay
12 "4TAP"  %010110 Rhythm Delay
13 "CRS"   %001010 Stereo Chorus
14 "FLNG"  %001011 Stereo Flanger
15 "PHAS"  %011011 Stereo Phaser
16 "DIMC"  %111010 Dimension-C
17 "FILT"  %101001 Mood Filter
18 "ROTA"  %011100 Rotary Speaker
19 "PAN"   %101000 Tremolo/Panner
20 "SUB"   %111001 Suboctaver
21 "D/RV"  %010000 Delay+Chamber
22 "CR/R"  %001110 Chorus+Chamber
23 "FL/R"  %001111 Flanger+Chamber
24 "D/CR"  %010001 Delay+Chorus
25 "D/FL"  %010010 Delay+Flanger
26 "MODD"  %010011 Modulation Delay
27 "GEQ2"  %011000 Dual Graphic EQ
28 "GEQ"   %010111 Stereo Graphic EQ
29 "TEQ2"  %011010 Dual TrueEQ
30 "TEQ"   %011001 Strereo TrueEQ
31 "DES2"  %101011 Dual DeEsser
32 "DES"   %101010 Stereo DeEsser
33 "P1A"   %101100 Stereo Xtec EQ1
34 "P1A2"  %101101 Dual Xtec EQ1
35 "PQ5"   %101110 Stereo Xtec EQ5
36 "PQ5S"  %101111 Dual Xtec EQ5
37 "WAVD"  %011101 Wave Designer
38 "LIM"   %011110 Precision Limiter
39 "CMB"   %111011 Combinator
40 "CMB2"  %111100 Dual Combinator
41 "FAC"   %110000 Fair Comp
42 "FAC1M" %110001 M/S Fair Comp
43 "FAC2"  %110010 Dual Fair Comp
44 "LEC"   %110011 Leisure Comp
45 "LEC2"  %110100 Dual Leisure Comp
46 "ULC"   %110101 Ultimo Comp
47 "ULC2"  %110110 Dual Ultimo Comp
48 "ENH2"  %100000 Dual Enhancer
49 "ENH"   %011111 Stereo Enhancer
50 "EXC2"  %100010 Dual Exciter
51 "EXC"   %100001 Stereo Exciter
52 "IMG"   %100111 Stereo Imager
53 "EDI"   %111000 Edison EX1
54 "SON"   %110111 Sound Maxer
55 "AMP2"  %100100 Dual Guitar Amp
56 "AMP"   %100011 Stereo Guitar Amp
57 "DRV2"  %100110 Dual Tube Stage
58 "DRV"   %100101 Stereo Tube Stage
59 "PIT2"  %001101 Dual Pitch Shifter
60 "PIT"   %001100 Stereo Pitch
```

FX5…FX8:

```
 0 "GEQ2"  %011000 Dual Graphic EQ
 1 "GEQ"   %010111 Stereo Graphic EQ
 2 "TEQ2"  %011010 Dual TrueEQ
 3 "TEQ"   %011001 Strereo TrueEQ
 4 "DES2"  %101011 Dual DeEsser
 5 "DES"   %101010 Stereo DeEsser
 6 "P1A"   %101100 Stereo Xtec EQ1
 7 "P1A2"  %101101 Dual Xtec EQ1
 8 "PQ5"   %101110 Stereo Xtec EQ5
 9 "PQ5S"  %101111 Dual Xtec EQ5
10 "WAVD"  %011101 Wave Designer
11 "LIM"   %011110 Precision Limiter
12 "FAC"   %110000 Fair Comp
13 "FAC1M" %110001 M/S Fair Comp
14 "FAC2"  %110010 Dual Fair Comp
15 "LEC"   %110011 Leisure Comp
16 "LEC2"  %110100 Dual Leisure Comp
17 "ULC"   %110101 Ultimo Comp
18 "ULC2"  %110110 Dual Ultimo Comp
19 "ENH2"  %100000 Dual Enhancer
20 "ENH"   %011111 Stereo Enhancer
21 "EXC2"  %100010 Dual Exciter
22 "EXC"   %100001 Stereo Exciter
23 "IMG"   %100111 Stereo Imager
24 "EDI"   %111000 Edison EX1
25 "SON"   %110111 Sound Maxer
26 "AMP2"  %100100 Dual Guitar Amp
27 "AMP"   %100011 Stereo Guitar Amp
28 "DRV2"  %100110 Dual Tube Stage
29 "DRV"   %100101 Stereo Tube Stage
30 "PHAS"  %011011 Stereo Phaser
31 "FILT"  %101001 Mood Filter
32 "PAN"   %101000 Tremolo/Panner
33 "SUB"   %111001 Suboctaver
```

Appendix – Programming Examples

Would you take on starting programming for the X32/M32 series, below is a small “Hello World” C program to open a communication stream with X32/M32, send a simple command, an receive an answer back from X32/M32.

HelloX32 (Unix)

```
//
// HelloX32.c
//
// Simple example of communication setup with an X32/M32
// Uses UDP protocol
// X32/M32 should be set at IP = 192.168.0.64
// Communication takes place on port 10023
//
#include <stdlib.h>
#include <stdio.h>
#include <string.h>
#include <sys/socket.h>
#include <arpa/inet.h>

int
main(int argc, char **argv)
{
char                Xip_str[20], Xport_str[8]; // X32/M32 IP and Port
struct sockaddr_in  Xip;
struct sockaddr*    Xip_addr = (struct sockaddr *)&Xip;
socklen_t           Xip_len = sizeof(Xip);     // length of addresses
int                 Xfd;                       // X32/M32 socket
int                 rec_len, i;
char                rec_buf[256];              // receive buffer
char                info_buf[8] = "/info";     // zeroes are automatically added
//
// Initialize communication with X32/M32 server at IP ip and PORT port
// Set default values to match your X32/M32 desk
       strcpy (Xip_str, "192.168.0.64");
       strcpy (Xport_str, "10023");
// Load the X32/M32 address we connect to; we're a client to X32/M32, keep it simple.
// Create UDP socket
       if ((Xfd = socket (PF_INET, SOCK_DGRAM, IPPROTO_UDP)) < 0)
              exit (EXIT_FAILURE);
// Construct server sockaddr_in structure
       memset (&Xip, 0, sizeof(Xip));                 // Clear struct
       Xip.sin_family = AF_INET;                      // Internet/IP
       Xip.sin_addr.s_addr = inet_addr(Xip_str);      // IP address
       Xip.sin_port = htons(atoi(Xport_str));         // server port
// All done. Let's establish connection with X32/M32 server
       printf(" HelloX32 - v0.9 - 2014 Patrick-Gilles Maillot\n\n");
       printf("Connecting to Console\n");
       if (sendto (Xfd, info_buf, sizeof(info_buf), 0, Xip_addr, Xip_len) < 0)
              exit (EXIT_FAILURE);
// Receive answer back from X32/M32
       if ((rec_len = recvfrom (Xfd, rec_buf, sizeof(rec_buf), 0, 0, 0)) <= 0)
              exit (EXIT_FAILURE);
       printf("Buffer data from Console: %d bytes,\n", rec_len);
       i = 0;
       while(rec_len--) {
              if (rec_buf[i] == 0) rec_buf[i] = '~';  // handle non-printable chars
              putchar(rec_buf[i++]);
       }
       putchar('\n');
// All done!
       exit(0);
}
```

X32 Connect, Send and Receive (Unix)

A set of 3 programs to connect to X32, send data to X32 and receive data from X32, with a timeout. This set of programs was initially created to help provide a set of UDP functions for handling communication with X32 from a Lazarus (pascal) environment as can be ran on a Raspberry Pi or even maybe on a Mac.
Lazarus indeed interfaces easily with C functions which can be compiled separately, and used at link time.

```
/*
 * X32UDP.c
 *     (POSIX compliant version, Linux...)
 *  Created on: June 2, 2015
 *      Author: Patrick-Gilles Maillot
 *
 *      Copyright 2015, Patrick-Gilles Maillot
 *      This software is distributed under he GNU GENERAL PUBLIC LICENSE.
 *
 *      This software allows connecting to a remote X32 or XAIR system using
 *      UDP protocol; It provides a set of connect, send and receive functions.
 *      The receive mode is non-blocking, i.e. a timeout enables returning from
 *      the call even if no response is obtained by the server.
 *
 *      Send and Receive buffers are provided by the caller. No provision is
 *      made in this package to keep or buffer data for deferred action or
 *      transfers.
 */

#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys/socket.h>
#include <arpa/inet.h>
#include <poll.h>
//
#define BSIZE 512           // MAX receive buffer size
//
struct sockaddr_in  Xip;
struct sockaddr*    Xip_addr = (struct sockaddr *)&Xip;
socklen_t           Xip_len = sizeof(Xip);           // length of addresses
int                 Xfd;                             // X32 socket
struct pollfd       ufds;
//
int          r_len, p_status;    // length and status for receiving
//
//
int X32Connect(char *Xip_str, char *Xport_str) {
//
// Initialize communication with X32 server at IP ip and PORT port//
// Load the X32 address we connect to; we're a client to X32, keep it simple.
//
// Input: String - Pointer to IP in the form "123.123.123.123"
// Input: String - Pointer to destination port in the form "12345"
//
// Returns int:
// -3 : Error on Sending data
// -2 : Socket creation error
// -1 : Error on polling for data
//  0 : No error, no connection (timeout)
//  1 : Connected (connection validated with X32)
//
char   r_buf[128];              // receive buffer for /info command test
char   Info[8] = "/info";       // testing connection with /info request (X32, M32)
//char Info[8] = "/xinfo";      // testing connection with /xinfo request (XR series)
//
// Create UDP socket
       if ((Xfd = socket (PF_INET, SOCK_DGRAM, IPPROTO_UDP)) < 0) {
```

```
            return -2; // An error occurred on socket creation
      }
// Server sockaddr_in structure
      memset (&Xip, 0, sizeof(Xip));                 // Clear structure
      Xip.sin_family = AF_INET;                      // Internet/IP
      Xip.sin_addr.s_addr = inet_addr(Xip_str);      // IP address
      Xip.sin_port = htons(atoi(Xport_str));         // server port
//
// Prepare for poll() on receiving data
      ufds.fd = Xfd;
      ufds.events = POLLIN; //Check for normal data
//
// Validate connection by sending a /info command
      if (sendto (Xfd, Info, 8, 0, Xip_addr, Xip_len) < 0) {
            return (-3);
      }
      if ((p_status = poll (&ufds, 1, 100)) > 0) {   // X32 sent something?
            r_len = recvfrom(Xfd, r_buf, 128, 0, 0, 0);    // Get answer and
            if ((strncmp(r_buf, Info, 5)) == 0) {          // test data (5 bytes)
                  return 1;    // Connected
            }
      } else if (p_status < 0) {
            return -1; // Error on polling (not connected)
      }
// Not connected on timeout
      return 0;
}

int X32Send(char *buffer, int length) {
//
// Sends data to X32 server at IP and PORT previously set
// with X32Connect()
//
// Input: String - Pointer to data buffer to send
// Input: integer - Length of data in bytes
//
// Returns int:
//   -1 : Error on Sending data
// >= 0 : Actual length of data sent, no error
//
// Just sending data
      return (sendto (Xfd, buffer, length, 0, Xip_addr, Xip_len));
}


int X32Recv(char *buffer, int timeout) {
//
// Receives data from X32 server
//
// Input: String  - Pointer to buffer to save data to,
//                  should be capable of receiving 512 bytes
// Input: integer - Timeout (in ms) for receiving data:
//                - a timeout value of 0 will always return no data
//                - a negative value for timeout means "infinite time"
//                - depending on systems capabilities, positive and non-zero
//                  values may also result in no data (start with a value of 10ms)
//
// Returns int:
// -1 : Error on polling for data
//  0 : No error, timeout reached or no data
// >0 : data length in the buffer
//
      if ((p_status = poll (&ufds, 1, timeout)) > 0) { // Data in?
            return recvfrom(Xfd, buffer, BSIZE, 0, 0, 0);// return length
      } else if (p_status < 0) {
            return -1; //An error occurred on polling
```

```
	}
	return 0; // No error, timeout
}


////
//// Test purpose only - comment when linking the package to an application
////
//#include <stdio.h>
//int main() {
//
//	char	r_buf[512];
//	char	s_buf[] = {"/status\0"};
//	int		r_len = 0;
//	int		s_len = 0;
//	int		status;
//
//	status = X32Connect("192.168.1.67", "10023");
//	printf ("Connection status: %d\n", status);
//
//	if (status) {
//		s_len = X32Send(s_buf, 8);
//		printf ("Send status: %d\n", s_len);
//		if (s_len) {
//			r_len = X32Recv(r_buf, 10);
//			printf ("Recv status: %d\n", r_len);
//			s_len = 0;
//			while (r_len--) {
//				if (r_buf[s_len] < ' ') putchar('~');
//				else putchar(r_buf[s_len]);
//				s_len++;
//			}
//		}
//	}
//	return 0;
//}
```

Compile and link with:

```
gcc –c -O3 -Wall -fmessage-length=0 X32UDP.c
```

X32Saver (Unix)

A slightly more complex example, where the program registers to receive updates from the Server. The program sets a screen saver mode, lowering the power of main LCD and LEDs of the X32/M32 after a given delay without activity.

Two versions are proposed below, the first one is aimed at POSIX compliant systems; the second version is for Windows environments.

```
/*
 * X32Ssaver.c
 *     (POSIX compliant version, Linux...)
 *  Created on: May 7, 2015
 *      Author: Patrick-Gilles Maillot
 *
 *      Copyright 2015, Patrick-Gilles Maillot
 *      This software is distributed under the GNU GENERAL PUBLIC LICENSE.
 *  Changelog:
 *      Use of select() rather than poll() for unblocking IO
 */

#include <stdlib.h>
#include <stdio.h>
#include <unistd.h>
#include <string.h>
#include <time.h>
//
#include <sys/socket.h>
#include <sys/select.h>
#include <arpa/inet.h>
//
#define BSIZE                   512          // receive buffer size
#define XREMOTE_TIMEOUT         9            // time-out set to 9 seconds
#define TRUE                    1
#define FALSE                   0
//
// Macros:
//
#define RPOLL                                                       \
    do {                                                            \
        FD_ZERO (&ufds);                                            \
        FD_SET (Xfd, &ufds);                                        \
        p_status = select(Xfd+1, &ufds, NULL, NULL, &timeout);  \
    } while (0);
//
#define RECV                                                \
    do {                                                    \
        r_len = recvfrom(Xfd, r_buf, BSIZE, 0, 0, 0);   \
    } while (0);
//
#define SEND(a,l)                                                   \
    do {                                                            \
        if (sendto (Xfd, a, l, 0, Xip_addr, Xip_len) < 0) { \
            perror ("Error while sending data");                    \
            exit (1);                                               \
        }                                                           \
    } while(0);
//
int main(int argc, char **argv)
{
struct sockaddr_in    Xip;
struct sockaddr*      Xip_addr = (struct sockaddr *)&Xip;
int                   Xfd;                      // X32 socket
char                  Xip_str[20], Xport_str[8];  // X32 IP and port
socklen_t             Xip_len = sizeof(Xip);      // length of addresses
fd_set                ufds;
```

```
struct timeval        timeout;
//
int                   r_len, p_status;            // length and status for receiving
char                  r_buf[BSIZE];               // receive buffer
//
char                  xremote[12] = "/xremote";   // automatic trailing zeroes
int                   X32ssdelay = 5;             // Default Ssaver time-out value
int                   keep_on    = 1;             // Loop flag
int                   ssave_on = 0;               // Screen Saver ON state
time_t                X32Rmte_bfr, X32Rmte_now;   // For /xremote timer
time_t                X32Ssav_bfr, X32Ssav_now;   // For Screen Saver timer
char                  LcdOldBright[24];           // value of X32 screen brightness
char                  LedOldBright[28];           // value of X32 LED brightness
//
char    LcdLowBright[] = "/-prefs/bright\0\0,f\0\0\0\0\0\0";
char    LedLowBright[] = "/-prefs/ledbright\0\0\0,f\0\0\0\0\0\0";
//
//
// Initialize communication with X32 server at IP ip and PORT port
// Set default values to match your X32 desk
    strcpy (Xip_str, "192.168.0.64");
    strcpy (Xport_str, "10023");
//
// Manage arguments
    while ((*r_buf = getopt(argc, argv, "i:d:h")) != (char)-1) {
        switch (*r_buf) {
        case 'i':
            strcpy(Xip_str, optarg );
            break;
        case 'd':
            sscanf(optarg, "%d", &X32ssdelay);
            break;
        default:
        case 'h':
            printf("usage: X32Ssaver [-i X32 console ipv4 address [192.168.0.64]\n");
            printf("                 [-d delay(s) [5], delay before entering Screen
Saver]\n");
            return(0);
            break;
        }
    }
//
// Load the X32 address we connect to; we're a client to X32, keep it simple.
    // Create UDP socket
    if ((Xfd = socket (PF_INET, SOCK_DGRAM, IPPROTO_UDP)) < 0) {
        perror ("failed to create X32 socket");
        exit (1);
    }
// Server sockaddr_in structure
    memset (&Xip, 0, sizeof(Xip));              // Clear structure
    Xip.sin_family = AF_INET;                   // Internet/IP
    Xip.sin_addr.s_addr = inet_addr(Xip_str);   // IP address
    Xip.sin_port = htons(atoi(Xport_str));      // server port/
//
// Prepare for select() call on receiving data
    timeout.tv_sec = 0;
    timeout.tv_usec = 100000; //Set timeout for non blocking recvfrom(): 100ms
    FD_ZERO(&ufds);
    FD_SET(Xfd, &ufds);
//
// Establish connection with X32 server
    printf(" X32Ssaver - v0.10 - (c)2015 Patrick-Gilles Maillot\n\n");
//
    keep_on = 1;            // Run forever, or until an error occurs
    X32Rmte_bfr = 0;
    X32Ssav_bfr = time(NULL);
```

```
    while (keep_on) {
        X32Rmte_now = time(NULL);    // register for X32 data echo
        if (X32Rmte_now > X32Rmte_bfr + XREMOTE_TIMEOUT) {
            if (sendto (Xfd, xremote, 12, 0, Xip_addr, Xip_len) < 0)
                exit (1);
            X32Rmte_bfr = X32Rmte_now;
        }
        RPOLL                 // X32 sent something?
        if ((p_status = FD_ISSET(Xfd, &ufds)) > 0) {
            RECV              // Exit screen saver if needed
            if (r_len && ssave_on) { // Restore main LCD and LED brightness
                SEND(LcdOldBright, 24)
                SEND(LedOldBright, 28)
                ssave_on = FALSE;    // S-saver mode is OFF
            }
            X32Ssav_bfr = time(NULL);    // remember time
            //
        } else if (p_status == 0) {      // no data back from X32, enter screen saver?
            X32Ssav_now = time(NULL);
            if (X32Ssav_now > X32Ssav_bfr + X32ssdelay) {
                if (!ssave_on) {         // No need to enter saver mode if already ON
                    SEND(LcdLowBright, 16)
                    RPOLL
                    if ((p_status = FD_ISSET(Xfd, &ufds)) > 0) {
                        RECV             // expected: /-prefs/bright...[float]
                        memcpy(LcdOldBright, r_buf, 24);
                    } // main screen brightness saved, ignore errors (p_status < 0)
                    SEND(LedLowBright, 20)
                    RPOLL
                    if ((p_status = FD_ISSET(Xfd, &ufds)) > 0) {
                        RECV             // expected: /-prefs/ledbright...[float]
                        memcpy(LedOldBright, r_buf, 28);
                    } // Leds and Scribbles brightness saved, ignore errors (p_status < 0)
                    // Set LCD screen and LEDs to their lowest values
                    SEND(LcdLowBright, 24)
                    SEND(LedLowBright, 28)
                    ssave_on = TRUE;     // S-saver is ON
                }
            }
        } else keep_on = 0; // Exit on error (p_status < 0)
    }
    close(Xfd);
    return 0;
}
```

Compile and link with:

```
gcc -O3 -Wall -fmessage-length=0 -o X32Ssaver.exe X32Ssaver.c
```

X32Saver (Windows)

Below is the Windows-only version of the same program. There are small differences in the way UDP commands are handled. It is important to note that Windows does not offer as a precise timing control as Linux does. This may have an impact on some programs relying on precise timings.

```
/*
 * X32Ssaver.c
 *    (Windows environment version)
 *  Created on: May 7, 2015
 *      Author: Patrick-Gilles Maillot
 *
 *      Copyright 2015, Patrick-Gilles Maillot
 *      This software is distributed under he GNU GENERAL PUBLIC LICENSE.
 *  Changelog:
 *      Use of select() rather than poll() for unblocking IO
 */

#include <stdlib.h>
#include <stdio.h>
#include <unistd.h>
#include <string.h>
#include <time.h>
//
#include <winsock2.h>
//
#define BSIZE             512        // receive buffer size
#define XREMOTE_TIMEOUT     9        // time-out set to 9 seconds
#define TRUE                1
#define FALSE               0
//
// Macros:
//
#define RPOLL                                                       \
    do {                                                            \
        FD_ZERO (&ufds);                                            \
        FD_SET (Xfd, &ufds);                                        \
        p_status = select(Xfd+1, &ufds, NULL, NULL, &timeout);  \
    } while (0);
//
#define RECV                                            \
    do {                                                \
    r_len = recvfrom(Xfd, r_buf, BSIZE, 0, 0, 0);   \
} while (0);
//
#define SEND(a,l)                                           \
do {                                                        \
    if (sendto (Xfd, a, l, 0, Xip_addr, Xip_len) < 0) { \
        perror ("Error while sending data");            \
        exit (1);                                       \
    }                                                   \
} while(0);
//
int main(int argc, char **argv)
{
struct sockaddr_in  Xip;
struct sockaddr*    Xip_addr = (struct sockaddr *)&Xip;
int                 Xfd;                        // X32 socket
char                Xip_str[20], Xport_str[8];  // X32 IP and port
WSADATA             wsa;
int                 Xip_len = sizeof(Xip);      // length of addresses
struct timeval      timeout;
fd_set              ufds;
//
int                 r_len, p_status;            // length and status for receiving
```

```
char                r_buf[BSIZE];               // receive buffer
//
char                xremote[12] = "/xremote";   // automatic trailing zeroes
int                 X32ssdelay = 5;             // Default Ssaver time-out value
int                 keep_on    = 1;             // Loop flag
int                 ssave_on = 0;               // Screen Saver ON state
time_t              X32Rmte_bfr, X32Rmte_now;   // For /xremote timer
time_t              X32Ssav_bfr, X32Ssav_now;   // For Screen Saver timer
char                LcdOldBright[24];           // value of X32 screen brightness
char                LedOldBright[28];           // value of X32 LED brightness
//
char    LcdLowBright[] = "/-prefs/bright\0\0,f\0\0\0\0\0\0";
char    LedLowBright[] = "/-prefs/ledbright\0\0\0,f\0\0\0\0\0\0";
//
//
// Initialize communication with X32 server at IP ip and PORT port
// Set default values to match your X32 desk
    strcpy (Xip_str, "192.168.1.13");
    strcpy (Xport_str, "10023");
//
// Manage arguments
    while ((*r_buf = getopt(argc, argv, "i:d:h")) != (char)-1) {
        switch (*r_buf) {
        case 'i':
            strcpy(Xip_str, optarg );
            break;
        case 'd':
            sscanf(optarg, "%d", &X32ssdelay);
            break;
        default:
        case 'h':
            printf("usage: X32Ssaver [-i X32 console ipv4 address [192.168.0.64]\n");
            printf("                 [-d delay(s) [5], delay before entering Screen
Saver]\n");
            return(0);
            break;
        }
    }
//Initialize winsock
    if (WSAStartup (MAKEWORD( 2, 2), &wsa) != 0) {
        printf ("Failed. Error Code : %d", WSAGetLastError());
        exit (EXIT_FAILURE);
    }
//
// Load the X32 address we connect to; we're a client to X32, keep it simple.
    // Create UDP socket
    if ((Xfd = socket (PF_INET, SOCK_DGRAM, IPPROTO_UDP)) < 0) {
        perror ("failed to create X32 socket");
        exit (1);
    }
// Server sockaddr_in structure
    memset (&Xip, 0, sizeof(Xip));              // Clear structure
    Xip.sin_family = AF_INET;                   // Internet/IP
    Xip.sin_addr.s_addr = inet_addr(Xip_str);   // IP address
    Xip.sin_port = htons(atoi(Xport_str));      // server port/
//
// Prepare for select() call on receiving data
    timeout.tv_sec = 0;
    timeout.tv_usec = 100000; //Set timeout for non blocking recvfrom(): 100ms
    ufds.fd_array[0] = Xfd;
    ufds.fd_count = 1;
//
// Establish connection with X32 server
    printf(" X32Ssaver - v0.10 - (c)2015 Patrick-Gilles Maillot\n\n");
//
    keep_on = 1;             // Run forever, or until an error occurs
```

```
    X32Rmte_bfr = 0;
    X32Ssav_bfr = time(NULL);
    while (keep_on) {
        X32Rmte_now = time(NULL);    // register for X32 data echo
        if (X32Rmte_now > X32Rmte_bfr + XREMOTE_TIMEOUT) {
            if (sendto (Xfd, xremote, 12, 0, Xip_addr, Xip_len) < 0)
                exit (1);
            X32Rmte_bfr = X32Rmte_now;
        }
        RPOLL                        // X32 sent something?
        if ((p_status = FD_ISSET(Xfd, &ufds)) > 0) {
            RECV                     // Exit screen saver if needed
            if (r_len && ssave_on) { // Restore main LCD and LED brightness
                SEND(LcdOldBright, 24)
                SEND(LedOldBright, 28)
                ssave_on = FALSE;    // S-saver mode is OFF
            }
            X32Ssav_bfr = time(NULL);// remember time
        //
        } else if (p_status == 0) {  // no data back from X32, enter screen saver?
            X32Ssav_now = time(NULL);
            if (X32Ssav_now > X32Ssav_bfr + X32ssdelay) {
                if (!ssave_on) {     // No need to enter saver mode if already ON
                    SEND(LcdLowBright, 16)
                    RPOLL
                    if ((p_status = FD_ISSET(Xfd, &ufds)) > 0) {
                        RECV         // expected: /-prefs/bright...[float]
                        memcpy(LcdOldBright, r_buf, 24);
                    } // main screen brightness saved, ignore errors (p_status < 0)
                    SEND(LedLowBright, 20)
                    RPOLL
                    if ((p_status = FD_ISSET(Xfd, &ufds)) > 0) {
                        RECV         // expected: /-prefs/ledbright...[float]
                        memcpy(LedOldBright, r_buf, 28);
                    } // Leds and Scribbles brightness saved, ignore errors (p_status < 0)
                    // Set LCD screen and LEDs to their lowest values
                    SEND(LcdLowBright, 24)
                    SEND(LedLowBright, 28)
                    ssave_on = TRUE;    // S-saver is ON
                }
            }
        } else keep_on = 0; // Exit on error (p_status < 0)
    }
    close(Xfd);
    return 0;
}
```

Compile and link with:

```
gcc -O3 -Wall -c -fmessage-length=0 -o X32Ssaver.o X32Ssaver.c
gcc -o X32Ssaver.exe X32Ssaver.o -lws2_32
```

X32 data echo in Go

Below is a program written in Go (see https://golang.org/) running on Mac, Unix, Windows, etc.; Go is an open source programming language. This small example establishes a UDP connection with X32 and echoing data changed by X32 while maintaining a /xremote request active every 9 seconds. In an infinite loop, UDP reads are non-blocking with a timeout of 100µs. (Use Go v 1.5 at a minimum).

```
package main

import (
    "fmt"
    "net"
    "time"
)

// Simple print function to echo X32 data
func prints(n int, p []byte) {
    fmt.Printf("%3d bytes - ", n)
    for i := 0; i < n; i++ {
        fmt.Printf("%c", p[i])          // Go replaces \0 chars with spaces
    }
    fmt.Printf("\n")
}

// Main
func main() {
    var n int
    var timeold = time.Now().Add(-10000000000) // sets time to 10s before start
    var timenow = timeold
    var timeout = time.Duration(100000)        // ReadFrom() timeout set to 100 microseconds
    p := make([]byte, 1024)                    // 1024 bytes buffer
    //
    // Change IP and port as needed below
    sAddr, err := net.ResolveUDPAddr("udp", "192.168.1.64:10023")
    // Validate UDP connection
    conn, err := net.DialUDP("udp", nil, sAddr)
    if err != nil {
        fmt.Printf("Connexion Error %v", err)
        return
    }
    defer conn.Close()
    // Dialog with X32
    _, err = conn.Write([]byte("/info"))       // /info request
    n, _, err = conn.ReadFromUDP(p)            // Read info data ignoring UDP address
    if err == nil {
        prints(n, p)
    } else {
        fmt.Printf("Error %v\n", err)
    }
    _, err = conn.Write([]byte("/status"))     // /status request
    n, _, err = conn.ReadFromUDP(p)            // Read X32 status
    if err == nil {
        prints(n, p)
    } else {
        fmt.Printf("Error %v\n", err)
    }
    for { // Loop forever echoing X32 changes
        timenow = time.Now()
        if (timenow.Sub(timeold)).Seconds() > 9 {     // every 9 seconds...
            conn.Write([]byte("/xremote"))            // Maintain X32 notifications
            timeold = timenow                         // update time (use time.Now()
                                                      // if need more accuracy)
        }
```

```
        conn.SetReadDeadline(timenow.Add(timeout))    // time.Now() could replace
                                                      // timenow
        n, _, _ = conn.ReadFromUDP(p)   // Non-blocking reads; Ignore errors (timeouts)
        if n > 0 {                      // check number of bytes
            prints(n, p)
        }
    }
}
```

Compile with:

```
$GOROOT\bin\go.exe install -v -gcflags "-N -l"
```

Appendix – Misceallaneous

Floating point data representation

An example of fader set command to change fader for channel 1 with a value of 0.9

```
 / c h / 0 1 / m i x / f a d e r ~ ~ ~ ~  f ~ ~ ? f f h
2f63682f30312f6d69782f666164657200000000 2c6600003f666668
```

Some floating point values converted to big endian data as sent by/to the X32/M32 console

0.0	00000000
0.1	3dcccccd
0.2	3e4ccccd
0.3	3e99999a
0.4	3ecccccd
0.5	3f000000
0.6	3f19999a
0.7	3f333334
0.8	3f4ccccе
0.9	3f666668
1.0	3f800000

Bug in FW 2.08 and 2.10: A Channel preset created from a matrix (mtx) channel does not report the right items: the preset reports a “LowCut” section flag instead of reporting a “Dyn” section. The */preamp* section (which is not reported with a presence flag) is present but incomplete.

For further information about the OSC protocol please visit http://opensoundcontrol.org