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AUDIOBOX 1616HD

In the last quarter of 1998 my company Activated Space Pty Ltd
installed a Richmond Sound Design AudioBox into the Immigration
Museum (IMHAM), Flinders Street, Melbourne. This is the first
AudioBox to be installed in Australia. As it is a piece of
equipment that I am sure will be of interest and use to the
electroacoustic community, I am providing here a brief review and
a number of URL references.

The AudioBox DM1616HD is a 16 input, 16-output matrix mixer. It
has programmable equalisation and delays on all inputs and
outputs and has 8 channels of hard disk playback, which are fed
into the input channels 9 to 16. Input channels 1 to 8 consist
of eight synchronous channels of 20 bit analogue to digital
conversion fed by female XLR at 15K ohms, accepting a signal as
hot as +20 dbu.   The outputs consist of 16 synchronous channels
of 20 bit digital to analogue conversion fed to 16 male XLRs at
600 ohms, again running as hot as +20 dbu.

All inputs and outputs are provided with high audio quality
electronically balanced line receivers and drivers. The AD, DA
converters are 20 bit linear, fourth order delta-sigma, with a
sampling frequency of 48 kHz. The stated frequency response is
20 Hz to 20 kHz plus or minus 0.1 db with a stated dynamic range
of 102 db, unweighted across the above noted frequency response
spectrum.

The programmable equalisation allows up to 12 bands of true
parametric equalisation to be assigned to any input and any
output with a centre frequency anywhere between 20 Hz and 20 kHz,
a Q from 0.5 to 50, and a 20db cut or boost. There is processing
power to accommodate a total of 96 bands of EQ across the entire
box. The delays are programmable from 0 to 5.2 seconds in one
one-hundredth of a frame increments, however the total delay
assignable across the entire box at any one time is 5.2 seconds.

The AudioBox is equipped with control protocols for midi-in,
midi-out, midi-through and SCSI.

You will see from the above specifications that the AudioBox is
capable of delivering very sophisticated control of multi-channel
sound dispersion. It is possible, using the 256 matrix
cross-points to programme the movement of audio on a single
input, across the 16 outputs over time with varying gain
structures.

In my use of the AudioBox at the Immigration Museum (IMHAM - see
www.activatedspace.com.au), I tried to establish unity gain
setting for all inputs and outputs, approaching the setting of
levels using the cross-points. The cross-points are individually
programmable and may be faded over time, which, depending on
speaker placements, causes an illusion of the physical movement
of the sound source in the time domain. Use of programmable
equalisation in synchronisation with the changing of gain
structures will augment the sense of perspective.

The AudioBox is programmable using Midi Show Control. Midi Show Control developed, by Charlie Richmond, is a protocol extension, to the standard midi set.

Midi Show Control addresses sounds on the hard disk as clips. The clips are programmed into a path which is itself a part of a list. It is possible to have up to two lists open at any one time with any number of paths open and active within those two lists. It is therefore possible to have a great number of audio elements playing simultaneously with control only limited by the number of inputs and outputs available.

The show control cues are stored on the internal hard-disk providing virtually unlimited non-volatile show programming capacity. A show is the overall structure containing the programmed lists, paths and clips. A number of shows can exist on the AudioBox simultaneously, however, only one show can play at a time. A selected show is assigned as the default to be loaded when the AudioBox is turned on. Any show can be called up at any time using Midi Show Control commands.

The AudioBox can be programmed from a PC or Macintosh. The PC software ABedit (supplied with the box for free) presents a less user-friendly interface requiring the programmer to open parameter windows for each control input. The Macintosh software ABControl provides all parameters on a single interface (much like a mixing desk) with an added Cue list window with columns for each kind of control data. Clicking on the appropriate column opens the data edit window associated with that parameter. It is possible to draw speaker positions and dispersion angles within the Macintosh software, a function not available within the PC software.

Each of the gain structures established, as a cue within the AudioBox is stored as a preset. The programming therefore requires simply the recall of a gain preset number. A preset may be allocated a submaster control so that all gain structures with that preset can be increased or attenuated through the movement of the allocated submaster.

The programming and the dumping of audio files into the Audio Box, takes place over SCSI. Audio is prepared as mono AIFF files and is transferred using a software utility from either a PC or a Macintosh. The AIFF files must be at 48 kHz.

GAIN CONTROL

The AudioBox provides two forms of automated gain ramping, sub-mastering capability, muting and soloing, and downloadable gain curve tables. The two forms of gain ramps are exponential and table driven and may be selected as part of the programmable gain command. The duration of the gain ramp is adjustable from a few milliseconds up to one hour. The gain changes are always ramped at the DSP level on a per sample basis ensuring that the gain changes are artefact free.

Up to 32 submasters are available for live input and output level

control. Each sub master can be independently assigned up to 32
input and output points and each control point can have any
number of submasters assigned to it. All of the programming
functions of the AudioBox are driven by 4 synchronised DSP chips
configured in a shared memory architecture, coordinated by a
separate micro-controller running a real time multi-tasking
operating system.

The programming command set for the AudioBox is contained in an
on board EPROM. This means that firmware upgrades are possible
from a host computer. The MIDI Show Control system is a little
bit cryptic. For those of you unfamiliar with it, I recommend
John Huntington's Control Systems for Live Entertainment, (Focal
Press 1994).

I am sure when you have examined the URLs provided you will agree
that the AudioBox is a very sophisticated and useful piece of
equipment for electroacoustic music.

Some of you may have noticed that Darren Copeland has organised a
touring concert of Canadian electroacoustic music in which he
uses the AudioBox as the primary audio playback and sound
dispersion system. He is using the Macintosh ABControl software,
which allows real time changes of gain structures, EQ delay and
dispersion assignments.

It is my hope that such a system would be available in a public
(possibly outdoor) performance space in Melbourne within the next
couple of years. It is certainly a project into which I have
already put a good deal of energy and for which I continue to
seek opportunities.

As stated at the beginning of this brief article, this is really
only an overview. The intention is to alert those of you
interested in sound dispersion and spatialisation to a useful
tool, and provide some URL's for further research.

It is worth noting that the AudioBox installed at IMHAM has been
running daily from 8:00AM to 9:00PM since October 1998 without
failure of any kind. The AudioBox is part of a much larger
installation under the control of an Alcorn Mcbribe V4+ show
controller. You can find a system design schematic on my site at

http://www.activatedspace.com.au

The AudioBox is available from Peter Jago at System Sound in
Melbourne, Australia.

Other references:

Richmond Sound Design
http://www.show-control.com/abspecs.html

Third Monk Software
www3.bc.sympatico.ca/hfi/dm16.html

www3.bc.sympatico.ca/hfi/ABControl.html

Cheers,

Garth

Listen to some of the tracks from my latest CD at
http://www.activatedspace.com.au
See my MAP1 installation
http://www.activatedspace.com.au/Map1/map1.html (RealVideo)