Control Interface Description Document for the Nuvo E6D Main Unit
Revision B
November 26, 2003

DB9M PORT PINOUTS: Nuvo Transmit to System Controller on pin 2.
                                    Nuvo Receive from System Controller on pin 3.
                                    Ground on pin 5.

SERIAL PORT PARAMETERS: RS232, RTS/CTS or software flow control (XON/XOFF) NOT required, 9600 baud, 8N1 protocol.

RULES OF PROTOCOL:
    (1) For alpha ASCII characters, always use UPPER CASE. In this document, actual characters in a string are presented in BOLD type.
    (2) All numerical fields are coded as ASCII digit characters.
    (3) Each Command string is STARTED with an ASCII "*****" character and terminated by a <CR> character (0D hexadecimal). Each response string issued by the E6D will START with an ASCII "**#**" and be terminated with a <CR> character (0D hexadecimal).
    (4) If a command has an error in it (does not adhere to exact command syntax), the E6D will respond with a "**#?<CR>"** string.
    (5) Whenever queuing multiple commands to the E6D, the host program should pause for 50 milliseconds between commands to prevent buffer overruns.

NUVO POWER-ON STATE:
    (1) Each zone is OFF until ON command is received.
    (2) Each zone's ZoneSet status will be as set by the local keypad DIP switches
    If no keypad is connected with a given zone address, then ZoneSet will default to:
          A. OR0 (No override)
          B. BASS+0 (Bass FLAT)
          C. TREB+0 (Treble FLAT)
          D. GRP0 (SOURCE GROUPING OFF)
          E. VRST1 (VOLUME RESET TO –50 dB ON)
    If these zone settings are overridden by the commands which follow in this document, the overridden values will reset to the default values above upon cycling power on the Main Unit.
    (3) For the first four seconds after power-on, a series of non-control related characters will be issued at a wide range of baud rates. These are necessary queries to a program that may be running on a connected PC for the purpose of firmware field upgrades. They should be ignored by the host control system.

NON-VOLATILE COMMANDS AND ASSOCIATED RESPONSES With the exception of commands associated with setting the IR carrier frequency, the effect of all commands is non-permanent; i.e. when power is cycled on the main unit, it will return to default values.   The commands that are an exception to this rule follow in this section.

****
COMMAND: ***IRSETSR<CR>** – Reads status of SOURCE IR carrier frequency settings.
RESPONSE: **#IRSET:aa,bb,cc,dd,ee,ff<CR>** where:
              aa = IR carrier frequency of SOURCE 1 ("38" or "56")
              bb = carrier frequency of SOURCE 2 ("38" or "56")
              cc = carrier frequency of SOURCE 3 ("38" or "56")
              dd = carrier frequency of SOURCE 4 ("38" or "56")
              ee = carrier frequency of SOURCE 5 ("38" or "56")
              ff = carrier frequency of SOURCE 6 ("38" or "56")

NOTE – the Main Unit ships with the carrier frequency DEFAULT setting of
38 KHz for all six sources.

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COMMAND: ***IRSETDF<CR>** – Restores DEFAULT SOURCE IR carrier frequency settings
(38 KHz for all six sources).
RESPONSE: Same response as for **#IRSETSR<CR>**

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COMMAND: ***SxIR56SET<CR>** - sets SOURCE x to 56 KHz IR repeat carrier (x is 1 to 6).
RESPONSE: Same response as for **#IRSETSR<CR>**

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COMMAND: ***SxIR38SET<CR>** - sets SOURCE x to 38 KHz IR repeat carrier (x is 1 to 6).
RESPONSE: Same response as for **#IRSETSR<CR>**

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COMMAND/RESPONSE DESCRIPTIONS.
NOTE – zone number field xx should ALWAYS
Include a lead zero ("0") for zone numbers less than 10.

COMMAND: ***ZxxCONSR<CR>** - Connect STATUS REQUEST where xx is zone # from 1 to
                                12.
RESPONSE: **#ZxxPWRppp,SRCs,GRPt,VOL-yy<CR>**   -ppp = "ON" (2 characters)
                                                          or "OFF" (3 characters)

                                                       -s = SOURCE NUMBER 1 to 6
                                                       -q = 0 if SOURCE GROUP is ON
                                                           1 if SOURCE GROUP is OFF

                                                       -yy = level below max in dB: -00 to -79 dB
                                                             (include lead 0 for all single-digit values)
                                                       -yy = "MT" if in MUTE state
                                                       -yy = "XM" if external MUTE is being held
                                                             active

This response will also be issued in response to pressing the ON/OFF, VOLUME, or SOURCE
 keys on a KEYPAD. NOTE – the response will be issued if a SOURCE key is press`ed on a
zone that is powered OFF even though the key press has no effect on the system. It will be
output at every increment during a volume ramp initiated by HOLDING a VOLUME UP or
VOLUME DOWN key on a keypad. It will also be issued at every increment of a volume
ramp commanded by the ***ZxxVOL+<CR>** and ***ZxxVOL-<CR>** commands (see below).

The MUTE value will be asserted if a ***ZxMTON<CR>** command has been received, OR if the
volume is run all the way to the lowest possible point (volume off).   An active EXTERNAL
MUTE input, however, will always override other volume response values with the "XM"
response.

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COMMAND: ***ZxxSETSR<CR>** – ZoneSet STATUS REQUEST where xx is zone # from 1 to
        12.
RESPONSE: **#ZxxORp,BASSyy,TREByy,GRPq,VRSTr**   -p = 1 if DIP switches are
                                                            overridden*
                                                          0 if DIP switches are in control

-yy = EQ level, dB, –8 to +0 (flat) to
+8 in 1 dB increments

-q = 0 if SOURCE GROUP is ON
1 if SOURCE GROUP is OFF
(This follows DIP switch definition.)

-r = 0 if VOLUME RESET is ON
1 if VOLUME RESET is OFF
(This follows DIP switch definition.)

*override set to 1 FOR THIS ZONE only if one of commands *ZxxBASSyy<CR>, *ZxxTREByy<CR>, *ZxxGRPq<CR>, or *ZxxVRSTr<CR> are issued (see descriptions below).
Once it is SET by one of these commands:
a. It will remain set until power is cycled on the unit.
b. Non-address DIP switch changes on a connected KEYPAD connected to this zone will be ignored.

If override state is "0", this response is also issued whenever non-address KEYPAD DIP switches are changed.

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COMMAND: *ZxxON<CR> – Turn zone xx ON.
RESPONSE: Same response as for *ZxxCONSR<CR>

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COMMAND: *ZxxOFF<CR> – Turn zone xx OFF.
RESPONSE: Same response as for *ZxxCONSR<CR>

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COMMAND: *ALLOFF<CR> – Turn ALL zones OFF.
RESPONSE: #ALLOFF<CR>

This RESPONSE is also issued when ALL OFF is pressed on any KEYPAD.
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COMMAND: *ALLV+<CR> – Ramp ALL zones UP at a 10 dB/second rate in 1 dB steps.
RESPONSE: #ALLV+<CR>

The ramp action will be cancelled when all zones reach MAXIMUM volume, or when an *ALLHLD<CR> Command is received. Note that to stop the ramp with this command before maximum volume, one reference zone must be periodically polled with a *ZxxCONSR<CR> Command to determine when the desired volume point has been reached. Note that ramps in different zones may start at different levels and will all ramp at the same rate.

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COMMAND: *ALLV-<CR> – Ramp ALL zones DOWN at a 10 dB/second rate in 1 dB steps.
RESPONSE: #ALLV-<CR>

The ramp action will be cancelled when all zones reach MINIMUM (OFF) volume, or when an *ALLHLD<CR> Command is received. Note that to stop the ramp with this command before the minimum volume, one reference zone must be periodically polled with a *ZxxCONSR<CR> Command to determine when the desired volume point has been reached. Note that ramps in different zones may start at different levels and will all ramp at the same rate.

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COMMAND: ***ALLHLD\<CR\>** – Stops ramp action initiated by ***ALLV+\<CR\>** Or ***ALLV-\<CR\>**
RESPONSE: **#ALLHLD-\<CR\>**

This results in a HOLD of the level at time of command receipt.

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COMMAND: ***ALLMON\<CR\>** – ALL MUTE ON.
RESPONSE: **# ALLMON\<CR\>**

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COMMAND: ***ALLMOFF\<CR\>** – ALL MUTE OFF.
RESPONSE: **#ALLMOFF\<CR\>**

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COMMAND: ***ZxxSRCp\<CR\>** – Switch zone xx to SOURCE p (1 to 6).
RESPONSE: Same response as for ***ZxxCONSR\<CR\>**

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COMMAND: ***ZxxVOLyy\<CR\>** – Set volume of zone xx to level yy below max in dB from –0
to –78 dB (include lead 0 for all single-digit values).
RESPONSE: Same response as for ***ZxxCONSR\<CR\>**

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COMMAND: ***ZxxVOL+\<CR\>** – STARTS zone xx volume ramp UP at the rate of +10 dB per
second in +1 dB steps. (This is the same as holding VOLUME UP key on a KEYPAD for 1
second).
RESPONSE: Same response as for ***ZxxCONSR\<CR\>, updated 10 times per second.**

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COMMAND: ***ZxxVOL-\<CR\>** – STARTS zone xx volume ramp DOWN at the rate of -10 dB
per second in -1 dB steps. (This is the same as holding VOLUME UP key on a KEYPAD for 1
second).
RESPONSE: **Same response as for *ZxxCONSR\<CR\>, updated 10 times per second.**

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COMMAND: ***ZxxVHLD\<CR\>** – STOPS zone xx volume ramp initiated by ***ZxxVOL+\<CR\>** or
*ZxxVOL-\<CR\> commands. This results in a HOLD of the level at time of command receipt.
RESPONSE: **#ZxxVHLD\<CR\>**

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COMMAND: ***ZxxMTON\<CR\>** – zone xx MUTE ON (mutes currently connected source)
RESPONSE: **Same response as for *ZxxCONSR\<CR\>**

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COMMAND: ***ZxxMTOFF\<CR\>** – zone xx MUTE OFF (returns zone output to currently
                                  connected source at previous volume setting).
RESPONSE: **Same response as for *ZxxCONSR\<CR\>**

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COMMAND: ***ZxxBASSyyy\<CR\>** – zone xx BASS EQ with yyy = EQ level, dB, –12 to
+0 (flat) to +12 in 2 dB increments. USE LEAD "0" IN TENS PLACE FOR VALUE LESS THAN
10.
RESPONSE: **Same response as for *ZxxSETSR\<CR\>**

NOTE: sending this command to the E6D will set override (lock out KEYPAD non-address DIP switches) for this zone until power is cycled.

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COMMAND: ***ZxxTREByyy<CR>** – zone xx TREBLE EQ with yyy = EQ level, dB, –12 to +0 (flat) to +12 in 2 dB increments. USE LEAD "0" IN TENS PLACE FOR VALUE LESS THAN 10.
RESPONSE: **Same response as for *ZxxSETSR<CR>**

NOTE: sending this command to the E6D will set override (lock out KEYPAD non-address DIP switches) for this zone until power is cycled.

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COMMAND: ***ZxxGRPON<CR>** – zone xx SOURCE GROUP ON.
RESPONSE: **Same response as for *ZxxSETSR<CR>**

NOTE: sending this command to the E6D will set override (lock out KEYPAD non-address DIP switches) for this zone until power is cycled.

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COMMAND: ***ZxxGRPON<CR>** – zone xx SOURCE GROUP ON.
RESPONSE: **Same response as for *ZxxSETSR<CR>**

NOTE: sending this command to the E6D will set override (lock out KEYPAD non-address DIP switches) for this zone until power is cycled.

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COMMAND: ***ZxxGRPOFF<CR>** – zone xx SOURCE GROUP OFF.
RESPONSE: **Same response as for *ZxxSETSR<CR>**

NOTE: sending this command to the E6D will set override (lock out KEYPAD non-address DIP switches) for this zone until power is cycled.

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COMMAND: ***ZxxVRSTON<CR>** – zone xx VOLUME RESET ON.
RESPONSE: **Same response as for *ZxxSETSR<CR>**

NOTE: sending this command to the E6D will set override (lock out KEYPAD non-address DIP switches) for this zone until power is cycled.

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COMMAND: ***ZxxVRSTOFF<CR>** – zone xx VOLUME RESET OFF.
RESPONSE: **Same response as for *ZxxSETSR<CR>**

NOTE: sending this command to the E6D will set override (lock out KEYPAD non-address DIP switches) for this zone until power is cycled.

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COMMAND: ***ZxxLKON<CR>** – zone xx KEYPAD LOCK ON – This will INHIBIT ANY keypad control input on the zone. This is the same as activating the Parental lock control at a keypad by holding down a SOURCE key for three seconds).
RESPONSE: **#ZxxLKON<CR>**

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COMMAND: *ZxxLKOFF<CR> – zone xx KEYPAD LOCK ON – This will RESTORE ALL keypad control input on the zone (useful as Parental lock control) . This is the same as de-activating the Parental lock control at a keypad by holding down a SOURCE key for three seconds).
RESPONSE: #ZxxLKOFF<CR>

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COMMAND: *VER<CR> – Firmware version query.

RESPONSE: #NUVO_E6D_vx.yy<CR> where x is the major version number and yy
                                        is the minor version number.

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RESPONSE: #EXTMON<CR> Issued whenever the External MUTE first activates (closure to ground) and 0 whenever the External MUTE de-activates (open connection to ground).

NOTE – there is no COMMAND associated with this response; it is always initiated by a change at the EXT. MUTE input.

****
RESPONSE: #EXTMOFF<CR> Issued whenever External MUTE de-activates (open connection to ground).

NOTE – there is no COMMAND associated with this response; it is always initiated by a change at the EXT. MUTE input.