



VauxProtocol 4.00

RS-232 Command/Message Language

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VauxProtocol Commands & Messages (RS-232)

Connection of a computer or control system to the VC-232 serial port allows you to fully control the system using a selection of Commands, and to obtain immediate feedback on system status by listening to Messages. This Command/Message language is called VauxProtocol.

VauxProtocol Commands begin with an asterisk (*), followed by two letters, then one or more comma-delimited decimal number parameters, and finally a carriage-return and/or line-feed char (CR/LF). The numbers are ascii-encoded-decimal number strings which may range from 0 to 255. The decimal numbers may be one, two, or three digits total, and may include leading zeroes, or not, as desired (ie: 001, 01, and 1, are all equivalent). A comma must be used to delimit fields, and the command requires a CR, LF, or CR/LF as termination delimiter -- indicated by <cr>. Spaces may be removed, or inserted if desired (they are ignored).

Note: the following commands are all identical:

	*PW,001,017 <cr>	(this is how we will list cmds)
or:	* P W, 001 , 017 <cr>	(extra spaces are ignored)
or:	*PW,1,17 <cr>	(leading zeros also optional)

Similarly, VauxProtocol Messages begin with an exclamation (!), followed by two letters, and then one or more comma-delimited decimal number parameters, and a terminating CR/LF.

Control-Command & Status-Message Summary:

- For zones 1 to 255, Status-Messages are sent in response to Control-Commands.
- Many commands return the same status message – simplifying message parsing programming.
- For zone 0 (all zones), no messages returned (multiple controllers would be responding together).
- Note that volume/bass/treble/mute commands will only affect zones that are not off, even if the requested zone is 0.
- A muted zone will be unmuted if 1) a new route command is received, or 2) a stereo volume command (*CW,20/23/24/25/35/36) is received.

Coding Tip: You will likely only need to implement a handful of commands/messages in a typical application!

Coding Tip: Status messages are also sent in response to remote-control or keypad control – by parsing the messages independently of the command programming, and updating internal variables in your program, you will close the loop on the whole system. You may then send commands blindly, and allow you message-handler to update your variables/displays. If you wish to ensure that your command resulted in an action, you may monitor internal variables after sending your command (instead of waiting for the actual message), and implement timeout/retry/alert code as desired for your application. This is a more generalized technique than simply sending a command and then waiting to parse an ack mssg.

Control-Cmd Description	Command	Status-Message
Route Audio/Video ssa/ssv (ZONE-0 OK)	*CW,10,zon,ssa,ssv <cr>	IS,10,zon,ssa,ssv <cr>
Route Audio Source ssa (ZONE-0 OK)	*CW,11,zon,ssa <cr>	IS,11,zon,ssa <cr>
Route Video Source ssv (ZONE-0 OK)	*CW,12,zon,ssv <cr>	IS,12,zon,ssv <cr>
Route Audio/Video src (ZONE-0 OK)	*CW,13,zon,src <cr>	IS,10,zon,ssa,ssv <cr>
Set L & R Volumes vvl/vvr (ZONE-0 OK)	*CW,20,zon,vvl,vvr <cr>	IS,20,zon,vvl,vvr <cr>
Set Left Volume vvl	*CW,21,zon,vvl <cr>	IS,21,zon,vvl <cr>
Set Right Volume vvr	*CW,22,zon,vvr <cr>	IS,22,zon,vvr <cr>
Set Volume (-64 to 0 dB) (ZONE-0 OK)	*CW,23,zon,vol <cr>	IS,20,zon,vvl,vvr <cr>
Volume-Up (2-dB/step) (ZONE-0 OK)	*CW,24,zon <cr>	IS,20,zon,vvl,vvr <cr>
Volume-Dn (2-dB/step) (ZONE-0 OK)	*CW,25,zon <cr>	IS,20,zon,vvl,vvr <cr>
Left Volume-Up (2-dB/step)	*CW,26,zon <cr>	IS,21,zon,vvl <cr>
Left Volume-Dn (2-dB/step)	*CW,27,zon <cr>	IS,21,zon,vvl <cr>
Right Volume-Up (2-dB/step)	*CW,28,zon <cr>	IS,22,zon,vvr <cr>
Right Volume-Dn (2-dB/step)	*CW,29,zon <cr>	IS,22,zon,vvr <cr>
Balance to Left (L-up/R-dn)	*CW,30,zon <cr>	IS,20,zon,vvl,vvr <cr>
Balance to Right (R-up/L-dn)	*CW,31,zon <cr>	IS,20,zon,vvl,vvr <cr>
Start Ramping Volume Up	*CW,35,zon <cr>	IS,20,zon,vvl,vvr <cr> (per step)
Start Ramping Volume Down	*CW,36,zon <cr>	IS,20,zon,vvl,vvr <cr> (per step)
Stop Ramping Volume	*CW,37,zon <cr>	(none)
NOTE: volume ramps at 2-dB/120-msec until stopped, or Max-Vol reached!		
Set Bass/Treble levels bas/trb	*CW,40,zon,bas,trb <cr>	IS,40,zon,bas,trb <cr>
Flat Bass/Treble (0-dB) (ZONE-0 OK)	*CW,41,zon <cr>	IS,40,zon,bas,trb <cr>
Bass-Up, relative (3-dB/step)	*CW,42,zon <cr>	IS,40,zon,bas,trb <cr>
Bass-Down, relative (3-dB/step)	*CW,43,zon <cr>	IS,40,zon,bas,trb <cr>
Treble-Up, relative (3-dB/step)	*CW,44,zon <cr>	IS,40,zon,bas,trb <cr>
Treble-Down, relative (3-dB/step)	*CW,45,zon <cr>	IS,40,zon,bas,trb <cr>
Audio Mute Toggle	*CW,50,zon <cr>	IS,50,zon,sta <cr>
Audio Mute On (ZONE-0 OK)	*CW,51,zon <cr>	IS,50,zon,sta <cr>
Audio Mute Off (ZONE-0 OK)	*CW,52,zon <cr>	IS,50,zon,sta <cr>

Request-Command & Status-Message Summary:

Status-Message are sent in response to above Control-Commands, but system status may also be determined at any time (by polling) using these optional Request-Commands (zon=0 not allowed).

Coding Tip: You probably do not need to need to use these commands, in most applications!

<u>Request-Command Description</u>	<u>Command</u>	<u>Status-Message</u>
Get Zone-Status	*CR,1,zon <cr>	!S,1,zon,sta,stv,ssa,ssv,vvl,vvr,bas,trb <cr>
Get Audio/Video ssa/ssv route source	*CR,10,zon <cr>	!S,10,zon,ssa,ssv <cr>
Get Audio Source ssa route source	*CR,11,zon <cr>	!S,11,zon,ssa <cr>
Get Video Source ssv route source	*CR,12,zon <cr>	!S,12,zon,ssv <cr>
Get Left/Right Volumes vvl/vvr	*CR,20,zon <cr>	!S,20,zon,vvl,vvr <cr>
Get Left Volume vvl	*CR,21,zon <cr>	!S,21,zon,vvl <cr>
Get Right Volume vvr	*CR,22,zon <cr>	!S,22,zon,vvr <cr>
Get Bass/Treble bas/trb	*CR,40,zon <cr>	!S,40,zon,bas,trb <cr>
Get Audio Mute state	*CR,50,zon <cr>	!S,50,zon,sta <cr>

Configuration-Commands & Configuration-Message Summary:

Coding Tip: In many applications, the factory settings are just right – you may want to tweak Initial Volumes.

<u>Config-Write-Cmd Description</u>	<u>Command</u>	<u>Factory setting</u>
Write controller's Base Zone	*PW,1,bzn <cr>	1
Write Minimum-Volume-Level	*PW,10,zon,vll <cr>	0 (-64 dB)
Write Maximum-Volume-Level	*PW,11,zon,vhh <cr>	32 (0 dB)
Write Initial-Left-Vol-Level	*PW,12,zon,vil <cr>	22 (-20 dB)
Write Initial-Right-Vol-Level	*PW,13,zon,vir <cr>	22 (-20 dB)
Write Mute-Volume-Level	*PW,14,zon,vmm <cr>	0 (-64 dB)
Write Bass-Level	*PW,15,zon,bas <cr>	4 (0 dB)
Write Treble-Level	*PW,16,zon,trb <cr>	4 (0 dB)
Write Zone Mode	*PW,17,zon,mod <cr>	1 (stereo)
Write Taper-Up-Delay	*PW,18,zon,tud <cr>	20 (ms/2-dB-step)
Write Taper-Down-Delay	*PW,19,zon,tdd <cr>	5 (ms/2-dB-step)
Write Config-Table	*PW,30,zon,vll,vhh,vil,vir,vmm,bas,trb,mod,tud,tdd <cr>	

<u>Config-Read-Cmd Description</u>	<u>Command</u>	<u>Config-Message</u>
Read controller's Base Zone	*PR,1 <cr>	!C,1,bzn <cr>
Read Minimum-Volume-Level	*PR,10,zon <cr>	!C,10,zon,vll <cr>
Read Maximum-Volume-Level	*PR,11,zon <cr>	!C,11,zon,vhh <cr>
Read Initial-Left-Vol-Level	*PR,12,zon <cr>	!C,12,zon,vil <cr>
Read Initial-Right-Vol-Level	*PR,13,zon <cr>	!C,13,zon,vir <cr>
Read Mute-Volume-Level	*PR,14,zon <cr>	!C,14,zon,vmm <cr>
Read Bass-Level	*PR,15,zon <cr>	!C,15,zon,bas <cr>
Read Treble-Level	*PR,16,zon <cr>	!C,16,zon,trb <cr>
Read Zone Mode	*PR,17,zon <cr>	!C,17,zon,mod <cr>
Read Taper-Up-Delay	*PR,18,zon <cr>	!C,18,zon,tud <cr>
Read Taper-Down-Delay	*PR,19,zon <cr>	!C,19,zon,tdd <cr>
Read Config-Table	*PR,30,zon <cr>	!C,30,zon,vll,vhh,vil,vir,vmm,bas,trb,mod,tud,tdd <cr>

Command/Message Parameter Notes:

zon is zone	0 to 255 (0=all) (or 1 to 255, depending on command) (no !S mssg returned for zon=0 cmds)
src is audio/video source	0 to 8 (0=off) (or 0 to 16, depending on controller)
ssa is audio source	0 to 8 (0=off) (or 0 to 16, depending on controller)
ssv is video source	0 to 8 (0=off) (or 0 to 16, depending on controller)
vol is volume (left and right)	0 to 32 (2-dB/increment)
vv1 is left volume level	0 to 32 (2-dB/increment)
vv2 is right volume level	0 to 32 (2-dB/increment)
	32 0 dB (max/passthrough volume level)
	31 -2 dB
	30 -4 dB
	...
	2 -60 dB
	1 -62 dB
	0 -64 dB (min volume level)
bas is bass level	0 to 8 (3-dB/increment)
trb is treble level	0 to 8 (3-dB/increment)
	8 +12 dB (max bass/treble level)
	7 +9 dB
	6 +6 dB
	5 +3 dB
	4 0 dB (flat bass/treble level)
	3 -3 dB
	2 -6 dB
	1 -9 dB
	0 -12 dB (min bass/treble level)
sta is audio-state code	0=off, 1=on, 2=on/muted-audio
stv is video-state code	0=off, 1=on

NOTE: Independent Audio Left and Right Volume Commands:

Source is always the same for L&R channels, but these commands allow you to provide independent volume for two mono rooms, if the zone is programmed for mono operation.

If the zone is programmed for stereo operation, you may use these left and right commands to balance the zone, or you may use the balance commands.

The left and right volumes may be different -- the volume up/down commands operate on both channels, relative to the volume of each.

bzn is Base-Zone	1 to 248 for 8-zone controller (1 to 240 for 16-zone ctrl) (typical bzn: 1, 9, 17...) NOTE: Only connect to one controller when programming
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mod is Zone Audio Mode	0=mono, 1=stereo, 3=spatial-stereo
tud is Taper-Up-Delay	0 to 30 (ms/2-dB-step)
tdd is Taper-Down-Delay	0 to 30 (ms/2-dB-step)
vll is Minimum-Volume-Level	0 to 32 (2-dB/increment)
vhh is Maximum-Volume-Level	0 to 32 (2-dB/increment)
vmm is Mute-Volume-Level	0 to 32 (2-dB/increment)
vil is Initial-Left-Volume-Level	0 to 32 (2-dB/increment)
vir is Initial-Right-Volume-Level	0 to 32 (2-dB/increment)

NOTE: Min-vol has priority over mute-vol and init-vol, and is the absolute min volume zone will reach. If min-vol incorrectly set above max-vol, then min-vol will be presumed to be zero.

NOTE: Max-vol has priority over all other settings, and is the absolute max volume zone will reach.

NOTE: Min-Vol and Max-Vol must be set before setting Initial-Volumes.
 If init-vol incorrectly set above max-vol, then init-vol will be presumed to be max-vol.
 If init-vol incorrectly set below min-vol, then init-vol will be presumed to be min-vol.

NOTE: Min-Vol and Max-Vol must be set before setting Mute-Volume.
 Mute always acts upon both L&R channels, even though L&R volume levels may differ; balance is preserved when zone is unmuted.
 Mute-vol is a ceiling, not a hard level. If mute-vol set above min-vol, zone volume levels may go below mute-vol level. When muting, volumes above mute-vol will lower to mute-vol level, but volumes below mute-vol will not change. If mute-vol incorrectly set above max-vol, then mute-vol will be presumed to be max-vol. If mute-vol incorrectly set below min-vol, then mute-vol will be presumed to be min-vol.

VC-232 Serial Port (EIA/RS-232)

The VC-232 Port is designed to connect directly to any computer or control system which has a standard RS-232 serial port. For the record, instead of RS-232 (RS stands for Recommended Standard), the proper term is actually EIA-232 or EIA/TIA-232 (for the standards bodies concerned). However, the EIA/TIA designation never really caught on, and virtually everyone retains the RS-232 terminology.

A cable (not supplied) is needed to connect the VC-232 Port to the control system or computer serial port. The VC-232 Port is a DB-9 F (female) connector – the connector pinout is defined below. Typically, only three wires are needed: TX, RX, and Ground. Depending on the setup of your control system serial port, you may need to connect other signals before the port becomes active. If your serial port expects handshake inputs (on CTS, DSR, and/or DCD), you may be able to either change your port configuration to ignore these signals, or you may provide the appropriate signals from the Vaux VC-232 connector. The Vaux end does not need special treatment – the VC-232 handshake input pins (RTS and DTR) are not used.

Vaux systems communicate at 9600 baud (bits-per-second) using 8 bits of data, no parity, and one stop bit.

The serial port on the controlling computer must be configured according to its manufacturer's instructions. Information transfer between the controlling computer and the Vaux system is in the VauxProtocol format – a Vaux-defined command language comprised of various commands and messages.

VC-232 Port (RS-232 Interface) (DB-9 F Connector):

Pin	Description	Signal Direction	Vaux Use
1	DCD (Data Carrier Detect)	Computer <→ Vaux	“Active” level output *
2	RXD (Receive Data)	Computer <→ Vaux	Data Out
3	TXD (Transmit Data)	Computer → Vaux	Data In
4	DTR (Data Terminal Ready)	Computer → Vaux	[not used]
5	Signal Ground	↔	Signal Ground
6	DSR (Data Set Ready)	Computer <→ Vaux	“Active” level output *
7	RTS (Request To Send)	Computer → Vaux	[not used]
8	CTS (Clear To Send)	Computer <→ Vaux	“Active” level output *
9	IRU (private Vaux signal)	DO NOT CONNECT	(special) **

- Typical Connections: TXD, RXD, and Signal Ground.
- Minimal Connections: TXD, and Signal Ground (commands only)
- * One or more of CTS/DSR/DCD may need to be connected to your serial port, if expected.
- ** Pin 9 should not be connected to a computer serial port, as it is sometimes used for the Ring Indicator (RI) input – the Vaux IRU (unmod IR) signal should be left open for proper system operation.
- Pins listed as not used, are not connected (to anything) in the Vaux system.
- The DB-9 shield rim (the “D”) is connected to signal ground.