IT-VCM MODULE

Serial Protocol Manual
Firmware Version 3.04
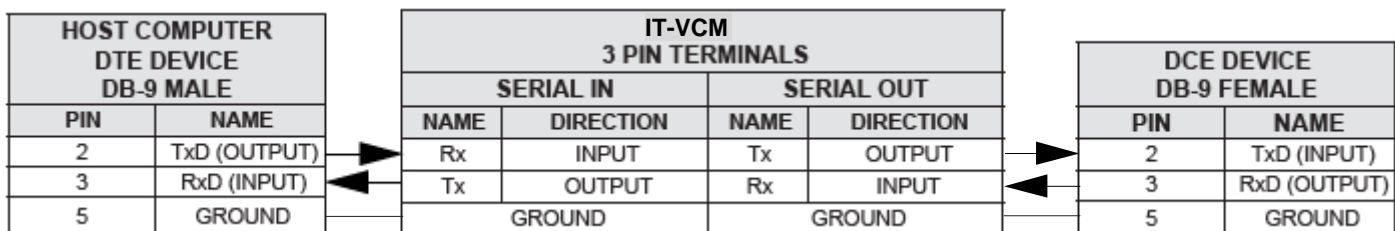
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Serial Protocol

The protocol for the IT-VCM is a pure ASCII protocol. Each serial command begins with a three character serial request. An ASCII space character " " is used between fields in the request except for the last field that is immediately followed by a carriage return (<CR>, 0x0D). Only one space will be accepted between the fields, any less or more spaces, or tabs will result in an error message being returned.

After the IT-VCM responds to a controller request, it will send a prompt to the controller. The prompt is a carriage return (0x0D), line feed (0x0A), and a right arrow character ">". The purpose of the prompt is to keep the display legible while typing on a terminal, hyper-terminal, or controller terminal program.

The Serial-In port is configured for 38,400 baud, 8 data bits, 1 stop bit, and no handshaking. Serial-In configuration cannot be changed. The Serial Output baud rate can be changed via the Serial baud rate request "SBA".

Typical RS-232 Device Interconnections

The table below details the typical hookup for RS-232 control of the IT-VCM module. Connections for loop through applications are included.

HOST COMPUTER DTE DEVICE DB-9 MALE		IT-VCM 3 PIN TERMINALS				DCE DEVICE DB-9 FEMALE	
		SERIAL IN		SERIAL OUT			
PIN	NAME	NAME	DIRECTION	NAME	DIRECTION	PIN	NAME
2	TxD (OUTPUT)	Rx	INPUT	Tx	OUTPUT	2	TxD (INPUT)
3	RxD (INPUT)	Tx	OUTPUT	Rx	INPUT	3	RxD (OUTPUT)
5	GROUND	GROUND		GROUND		5	GROUND

Version Request:

The controller sends a request for the version number to the IT-VCM.

"VER"	<CR>

Where:
VER   Version Request

The IT-VCM will respond as follows:

Ver. x.xx

Volume Request:

Note: These commands are only valid if the pot is disabled (dip switch 3 up), except for the "?" volume inquiry. If the pot is enabled, an error message will be returned as follows "Volume Request not allowed while POT is enabled"

The Controller sends Volume Control commands to the IT-VCM.

"VOL"	Function	Value(optional)	<CR>

Where:
"VOL"   Volume Level Request.
Function:

"+"   Raises volume 1 step, may use optional value to increment 2-9 steps

"-"   Lowers volume 1 step, may use optional value to decrement 2-9 steps

"=xx"   Sets volume to a specific step number, 0 to 63, where 0 is the minimum volume and 63 is the maximum volume. Used to initialize volume to a known level.

"?"   Returns current setting in dB or step number dependent on dip switch 4 setting. Dip switch 4 down reports value in dB (-63dB to 00dB), dip switch 4 up reports value as step number (0-63). Note that dip switch 4 also sets the audio taper of the pot input.

Optional Values
        "2" to "9"   A single ASCII character between 2 and 9 which is used to increment or decrement volume a specified number of steps, and follows the "-" or "+" immediately.
EXAMPLE 1:

        VOL +5<CR>   Volume up command, increment the volume by 5 steps.

The Controller can also set a step number by sending the following command:

EXAMPLE 2:

                VOL =33<CR>

This command will set the step number by following the equal (=) sign with an ASCII value from "0" to "63". For maximum volume the controller would enter =63, for minimum value the Controller would enter =0.

Note that the VOL =6 sets the absolute level to step number 6 whereas VOL -6 decrements the volume level 6 steps from the current setting.
        To set the maximum level use VOL =63 (Sets the level to 0dB)
        To set the minimum level use VOL =0 (Sets the attenuation to ≤ -63dB. Also see the MUTE command.)

The IT-VCM will respond to any Volume Request command with a status message that is dependent upon the setting of dip switch 4.

Example Response:

Volume = -03dB (if dip switch 4 is down)
Volume =60 (meaning step number 60, if dipswitch 4 is up)

VCM Status Request:

The Controller can request the status of all the parameters in the IT-VCM with the VCM status request:

"VCM"	<CR>

Where:

"VCM"   VCM Status Request

The VCM responds with the VCM system status response:

vcm
Ver 3.04
Serial Out Baud = 38400
Volume   = -20dB
Mute On
POT Disabled
Pro Audio
Stereo Set
Treble = +10dB
Bass = +10dB
Balance = CTR

VCM	VCM Status Response.
Ver.	Current Version number
Serial Out Baud	Serial Out Baud Rate (2400, 4800, 9600, 19200, 38400, 57600).
Volume**	Volume current Level in dB (-63dB to 0dB). (See note **)
Mute	Mute Status (On, Off).
Pot	Pot Enabled or Disabled (set by dipswitch).
Audio	Pro or Consumer Audio type (set by dipswitch).
Stereo/Mono	Stereo or Mono audio output (set by dipswitch).
Treble	Treble Level in dB (-15dB .. 00dB .. +15dB).
Bass	Bass Level in dB (-15dB .. 00dB .. +15dB).
Balance	Balance Setting (L16..CTR..R16).

**- Format of volume level field depends on dip switch 4 setting. If dip switch 4 is "DOWN", volume is reported in dB as shown.   If "UP", it is reported as a volume step number from 0 to 63.

Mute Request:

The Controller has the ability to serially mute the audio output. The mute request is used to turn on and off the mute function.

NOTE: Adjusting volume up, either through the volume up switch or serially will automatically turn off the mute. Adjusting the volume down will lower the volume setting while maintaining the mute condition. When the mute is turned off, the volume will return to the current volume setting.

"VMU"	Function	<CR>

Where:
"VMU"   VCM Mute Request.

Function   "1"   "1" = VCM Mute On request
                "0"   "0" = VCM Mute Off request
                "?"   VCM Mute Status Request Returns Mute Status

The IT-VCM will respond with a status message that reflects the mute status after performing the request (see below).

Example:
VMU 1<CR>   Turns Mute on.
VMU 0<CR>   Turns Mute off.

Treble Adjustment Request:

Adjusts treble serially, from -15dB to +15dB.

"VTR"	Function	<CR>

Where:
"VTR"   VCM Treble Request.

Function   "+"   "+" = VCM Treble up request
                  "-"   "-" = VCM Treble down request
                  "?"   VCM Treble Status Request Treble Status

The increment and decrement (+,-) requests may contain a single digit that indicates how many dB steps to increment or decrement. The range of increase or decrease is 2 to 9.

The IT-VCM will respond with a status message that reflects the treble setting after performing the request (see below).

Example:
VTR +<CR>   Adjusts treble up 1dB.
VTR -<CR>   Adjusts treble down 1dB.

The response will be:
VTR <value>
Where:
Value = -15dB to +15dB

Bass Adjustment Request:

The Controller will be able to adjust bass serially, from -15dB to +15dB.

"VBS"	Function	<CR>

Where:
"VBS"   VCM Bass Request.

Function   "+"   "+" = VCM Bass up request
                "-"   "-" = VCM Bass down request
                "?"   VCM Bass Status Request Bass Status

The increment and decrement (+,-) requests may contain a single digit that indicates how many dB steps to increment or decrement. The range of increase or decrease is 2 to 9.

The IT-VCM will respond with a status message that reflects the bass setting after performing the request (see below).

Example:
VBS +<CR>   Adjusts bass up 1dB.
VBS -<CR>   Adjusts bass down 1dB.

The response will be:
VBS <value>
Where:
Value = -15dB to +15dB

Balance Adjustment Request:

Adjusts the balance serially, from Center to Right or Left.

"VBL"	Function<value>	<CR>

Where:
"VBL"   VCM Balance Request.

Function	"R"	"R" = VCM Balance Right request
	"L"	"L" = VCM Balance Left request
	<value>	number of steps to move (2 – 9) right or left
	"?"	VCM Balance Status Request Balance Status

The right and left (R,L) requests may contain a single digit that indicates how many steps to shift the balance to the right or left. The range of increase or decrease is 2 to 9.

The IT-VCM will respond with a status message that reflects the balance setting after performing the request (see below).

Example:

VBL R<CR>	Adjusts balance to the right channel one step.
VBL L<CR>	Adjusts balance to the left channel one step.
VBL L5<CR>	Adjusts the balance 5 steps left.

The response will be:

VBL <value>
Where:
Value = From L16 (Left 16) to CTR (Center) to R16 (Right 16)

Serial 2 Baud Rate Request:

It may be necessary to change the baud rate on the last pass-through device serial port. This may happen if the last device doesn't have the baud rate at 38400, and doesn't have a method to change it.

"SBA"	Port	Baud rate number	<CR>

Where:

"SBA"   Change baud rate request
Port   Serial port number ("2" for IT-VCM)
Baud rate number   Which baud rate to change to:
                                 "1" = 2400
                                 "2" = 4800
                                 "3" = 9600
                                 "4" = 19200
                                 "5" = 38400
                                 "6" = 57600

The IT-VCM will respond to this request with a status message.

Help Request:

The Controller can request a help menu if the user forgets the formats of the commands. There are two types of help, a simple list of commands, and a detailed help with the request parameters.

The request for the full help list is:

"HLP"	<CR>

The IT-VCM will respond with the following:

IT-VCM HELP MENU

VER	Returns Version Number
	VER 3.04
VOL	Adjust Volume
	VOL F<CR>
	F=+, -, -xx, or? (up, down, set dB or status)
VCM	Returns VCM System Status
	Version
	Serial Out
	Volume
	Mute
	POT
	Pro/Consumer
	Stereo/Mono
	Treble
	Bass
	Balance
VMU	Mute Request
	VMU F<CR>
	F= 0, 1, ? (off, on, status)
VTR	Adjust Treble
	VTR F<CR>
	F= +, -, or ? (up, down, or status)
VBS	Adjust Bass
	VBS F<CR>
	F= +, -, or ? (up, down, or status)
VBL	Adjust Balance
	VBL B<CR>
	B= R, L, or ? (right, left, or status)
?	Simple Help
HLP	Full Help
SBA	Serial Out Baud Rate
	SBA 2 X<CR> Only Serial port 2 is allowed on VCM
	X = Baud Rate = 1=2400 2=4800 3=9600 4=19200 5=38400 6=57600

The format for the request list request (simple help) is as follows:

"?"	<CR>

The IT-VCM will respond with the following:

IT-VCM REQUEST LIST

VER	Returns Version Number
VOL	Adjust Volume
VCM	Returns VCM System Status
VMU	Mute Request
VTR	Adjust Treble
VBS	Adjust Bass
VBL	Adjust Balance
?	Simple Help
HLP	Full Help
SBA	Serial Out Baud Rate

Passing Serial Requests

Multiple RS-232 controlled devices can be present on the same serial port. This type of setup is a multi-drop configuration. The IT-VCM will be capable of passing strings down a drop through the use of a drop preamble that determines the position on the drop of the device for which the serial data is intended.

Passing serial requests down to a device will only work if FSR products that support passing requests are between the RN8200, RN1000, WPCS or other control system and the last device on the drop. Only the last device on the drop can be a non-multidrop FSR product or other manufacturer's product.

The message is made up of two parts, the drop preamble and the string data. The message is terminated with a carriage return (0x0D).

Drop Preamble

The drop preamble contains a skip indicator ('\S') for each device that will pass the string along. The preamble will be enclosed in braces ({}). For example, if the user wished to send a string to the third device on a drop, the preamble would be "{\S\S}".

For example; {\S\S}"Another test Message <0D>" <CR>.

The first device would, upon detecting the preamble start, strip off the \S and send the preamble down as "{\S}". The second device, detecting the preamble start would strip off the other \S. It would also sense the close brace "}" and would be responsible for removing it from the string. The second device would also be responsible for converting any ASCII-Hex characters into pure hex, and for sending the complete message to the third device.

String Data

The string data would be enclosed in double quotes; this allows a string of data to be virtually any length. Single Hex characters will be defined as <0D> (which is a carriage return). Multiple hex characters can be sent using the same scheme but with spaces between the two ASCII bytes that represent the hex value (example <0A 0D> which is a carriage return and line feed). A backslash character will be used preceding a "<" or ">" if the "<" or ">" is part of the string but not defining ASCII-Hex characters. An example of this might be "\< is a less than character" or "\> is a greater than character". If a backslash is part of a string a double backslash will be sent "\\". If a double quote is required in a string it would be sent as "\"".

In order to pass a request to a device connected to the IT-VCM, a pass through sequence must be sent from a RN8200, RN1000, WPCS or other control system. Using "\S" for each device on the drop enclosed in braces ({}). For example, in the case of an FSR IT-R4S; {\S\S}"R 1 1<CR>" would cause the first device on the drop to skip the request and send "[\S]R 1 1<CR>" to the second device on the drop. (continued on next page)

The second device seeing the "}" would process the request and send the message within the double quotes, with the ASCII hex (<CR>) replaced with the actual hex characters (R 1 1 *0D*) to the third device (which may be an FSR IT-R4S). Since the message to the third device hasn't a drop preamble it would handle the relay request.

Responses

Responses from the downstream device will just be passed up; the addition of the drops will only make for more complex and harder parsing for the control system. The characters will be assembled into messages and sent up as they come in. If a message doesn't have a terminator (<CR>, <00>, etc.) the receiver will time out after 1.5 seconds of receiver inactivity and send that message up.