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ZT1428VXI Release Notes

This release note provides a summary of known errors or problems with the ZTEC ZT1428VXI instrument. Since this instrument is a drop-in replacement for the Hewlett-Packard E1428A, this release note also lists any known incompatibilities or discrepancies in operation.

Advanced Feature Mode

The ZT1428VXI supports the complete SCPI and COMP command languages of the Hewlett-Packard E1428A. The ZT1428VXI advanced feature mode provides additional capabilities beyond the Hewlett-Packard E1428A compatible mode, including:

- 1) Changes to A32 VXIbus address space for large waveform download
- 2) Disables the command hang-up while waiting for a trigger after a DIG command
- 3) Enables variable record sizes between 100 points and 1,000,000 points
- 4) Supports slower sample rates of 5 S/s, 2 S/s and 1 S/s.
- 5) Supports programmable voltage to BNC Comp/Cal/Trig Output
- 6) Supports additional 1 MHz lowpass filter on input channels
- 7) Supports additional lowpass and highpass filters on channel triggers
- 8) Supports phase-locked timebase reference to VXIbus 10 MHz CLK10
- 9) Supports additional commands to access these additional features

The advanced feature mode setting is controlled with the SYSTem:ADVance command and its state is stored in non-volatile memory. When the advanced feature mode is changed, the VXIbus resource manager must be rerun to reassign the A32 address space. The advanced feature commands require the COMPatible language to be selected.

User-defined ID information

The ZTEC ZT1428VXI allows the user to define the identification information of the ZT1428VXI including the Manufacturer ID register, Device Type Register, Vendor Name and Model Name for the *IDN? response. The non-volatile protection must be disabled to change these values. The following ZT1428VXI commands are used to set these user-defined values:

USER:ID <id>	sets the 12-bit Manufacturer ID register, id = 000 ₁₆ to FFF ₁₆
USER:DEV <dev>	sets the 12-bit Device Type register, dev = 100 ₁₆ to FFF ₁₆
USER:VEN <ven>	sets the vendor string for *IDN? response (up to 16-character string), ven = "vendor name"
USER:MOD <mod>	sets the model string for *IDN? response (up to 14-character string), mod = "model name"
USER:RES	resets all user-defined ID information to the manufacturer-default values. This includes the four user-defined values listed here and the user-defined serial number set with the SERial command.

Error message strings always return ERROR or NO ERROR

In response to the SYSTem:ERRor? STRing query, the ZT1428VXI always returns an error message of "ERROR" or "NO ERROR". The Hewlett-Packard E1428A provides more detailed error string information.

The error codes used are always the SCPI error codes (COMP codes not used)

Unlike the Hewlett-Packard E1428A which has different error codes for each command language, the ZT1428VXI only supports the error codes associated with the Standard Commands for Programmable Instruments (SCPI) language. When using the Compatible (COMP) language, SCPI error codes are returned. In addition to the Hewlett-Packard E1428A SCPI-language error codes, ZTEC has defined additional device-specific error codes ranging from –500 to –699. Refer to the ZT1428VXI manual for a complete list and description of error codes.

Command header and long form syntax not used for responses. Long form commands accepted but not returned.

The Hewlett-Packard E1428A uses the SYSTem:HEADer and SYSTem:LONGform commands enable the header and long form response syntax. The ZT1428VXI accepts these commands but they do not affect the response syntax. The ZT1428VXI always responds using the default header off syntax. Note that the ZT1428VXI does accept commands in the long form syntax.

The command syntax shows most commands as a mix of upper and lower case letters. The upper case letters indicate the abbreviated spelling for the command. For shorter program lines, send only the abbreviated form. For better program readability, you may send the entire long form command. The instrument will only accept either the abbreviated form or the entire command.

For example, if the command syntax shows IMPedance?, then IMP? and IMPEDANCE? are both acceptable forms. Other forms of IMPedance?, such as IM? will generate an error. You may use upper or lower case letters. Therefore, IMPEDANCE? and IMPeDaNcE? are acceptable.

Password protection not provided for non-volatile memory

The ZTEC ZT1428VXI does not support password protection of the non-volatile memory.

The non-volatile memory would be supported by the SYSTem:NVPRotect: series of commands in the Hewlett-Packard E1428A. These commands will not generate an error if sent to the ZTEC ZT1428VXI but they will have no affect on the instrument.

***LRN strings not supported**

The *LRN command that returns a string that contains the current oscilloscope setup is not supported on the ZTEC ZT1428VXI

Cannot access off-module A24 memory

The ZTEC ZT1428VXI cannot access external off-module A24 memory. All data downloads must be to on-board A24 memory (or A32 memory in advanced feature mode).

Digitize continuous and power-up running

The Hewlett-Packard E1428A must be started upon power up with a POW 1 or RUN command. Consequently, if the Hewlett-Packard E1428A is powered off during a capture, a DIG CONT command must be sent to restart the instrument to be able to acquire new waveform data. The ZTEC ZT1428VXI does not have this requirement for power-up condition and will always be able to acquire new waveform data upon power-up. Consequently, the DIG CONT command does not apply to the ZT1428VXI and is not accepted.

Delay by events and holdoff by events limited to 65536 events

The ZTEC ZT1428VXI is limited to 65536 events when the delay by events or holdoff by events are used. The Hewlett-Packard E1428A limits event counts to 16000000.

SCPI sweep time command bugs fixed

In contrast to its manual, the SWEep:TIME:START, SWEep:TIME:STOP, SWEep:TIME:CENTer commands do not function on the Hewlett-Packard E1428A. On the ZT1428VXI, these commands do function properly as defined in the Hewlett-Packard E1428A manual.

SCPI voltage upper and lower command bugs fixed

In contrast to its manual, the Hewlett-Packard E1428A SCPI voltage upper and lower commands are reversed and do not function properly. On the Hewlett-Packard E1428A, the SENS:VOLTn:RANG:UPP sets the lower voltage level, and the SENS:VOLTn:RANG:LOW sets the upper voltage level. On the ZT1428VXI, these commands do function properly as defined in the Hewlett-Packard E1428A manual.

TNULL adjustment limited to <1 sample clock interval

The channel-to-channel skew adjustment with the CALibrate:TNULLI command is limited to the lesser of ± 1 sample clock interval or ± 10 ns.

Video line number

When using video triggering, the ZT1428VXI triggers reliably on the selected line as defined in the PAL and NTSC standards. The Hewlett-Packard E1428A triggers on either the selected line or on the line preceding the selected line.

***TRG command recognized**

In order to maintain compatibility with the Hewlett-Packard E1428A, the ZT1428VXI does not accept VXI bus commands while it is waiting for a trigger event. Because the ZT1428VXI does not accept commands while it is waiting for a trigger, a *TRG command cannot be recognized to cause a software trigger event. This functionality is similar to the Hewlett-Packard E1428A.

External trigger slew rate limit

The slew rate limit of the external trigger input is 250V/ μ s

Increase the allowable offset for 10.008V range

In contrast to its manual, the Hewlett-Packard E1428A only allows +/-50V offset when the 10.008V range is selected. The ZTEC ZT1428VXI allows +/-250V offset for the 10.008V range as listed in the Hewlett-Packard E1428A manual.

Fixed the ECL trigger polarity bug

On the Hewlett-Packard E1428A, the ECLTRG0 and ECLTRG1 polarities are tied together, and setting one affects the other. The ZTEC ZT1428VXI allows these polarities to be set independently, as defined in the Hewlett-Packard E1428A manual.

Averaging sizes not multiple of 2

The Hewlett-Packard E1428A requires waveform averaging to use average count numbers that are multiples of 2 between 1 and 2048. The ZTEC ZT1428VXI allows all integers between 1 and 2048 for averaging counts.

Extended pre and post trigger delay ranges

The ZTEC ZT1428VXI extends the pre-trigger delay range to $500e3 * \text{sample clock interval}$ and the post-trigger delay range to 500s.

Measurement resolution

The ZTEC ZT1428VXI measurement responses have 5 digits of resolution, whereas the Hewlett-Packard E1428A measurement responses have 6 digits of resolution.

Status/Summary condition registers implemented

All Status/Summary Condition Registers on the Hewlett-Packard E1428A are not implemented. Consequently, all queries to these registers return 0, regardless of the register condition. The ZTEC ZT1428VXI has implemented the Status/Summary Condition Registers, which do return the current status condition information.

Multiple-acquisition Raw Data mode not supported

When operating in Raw Data mode, the Hewlett-Packard E1428A allows the multiple capture of raw waveform data to A24 memory. The ZTEC ZT1428VXI only allows the single capture of raw waveform data to A24 memory.

Minimum trigger event holdoff

The Hewlett-Packard E1428A limits the minimum trigger holdoff by events to 2 events. The ZTEC ZT1428VXI allows a holdoff by events of 1 event.

Fine trigger position locator disabled when trigger outside of capture window

The ± 1 sample fine trigger position locator is disabled when the trigger position is outside of the capture window (trigger does not occur within the captured waveform). Under these conditions the trigger position accuracy is degraded to less than the greater of ± 1 sample or ± 1 ns. Note that the channel-to-channel timing and trigger jitter for a single captured set of waveforms is still less than ± 100 ps.

Expanded the resolution and range on pulse width triggering (-524 error)

The Hewlett-Packard E1428A provides 10 ns resolution within a 20 ns to 160 ms range for pulse width triggering. The ZTEC ZT1428VXI provides additional resolution on pulse width triggering up to 4 ns. The pulse width triggering resolution for the ZT1428VXI is the greater of 1 sample clock interval or 4 ns. The pulse width range is $(1 \text{ to } 65536) \times \text{the pulse width resolution}$. For example, with a 1 GS/s sample rate, the pulse width resolution is 4ns and the range is 4 ns to 262.144 μs . When a requested trigger pulse width is outside of the range for the selected sample rate, the ZT1428VXI coerces the requested width value and returns the ZT1428VXI device-specific error code of -524.

Two-function math operation on envelope waveforms or un-equal size waveforms (-523 error)

The two-function math operations (add, subtract, multiply) require the two waveforms to be equal in length. On the Hewlett-Packard E1428A, this was not a problem because only 500 point waveforms were allowed. Note that an envelope waveform is twice the length of its source (minimum and maximum values) and should not be used for two-function math operations. On the ZTEC ZT1428VXI, a requested math operation on unequal size waveforms is aborted and the -523 error is reported.

Reference waveform size limit (-522 error)

Reference waveforms on the ZT1428VXI are limited to 32,754 points. On the Hewlett-Packard E1428A, this was not a problem because the maximum waveform size was 8000 points. On the ZTEC ZT1428VXI, attempt to store a waveform larger than 32,754 points is aborted and the -522 error is reported.

Most self-calibration functions not implemented

On the Hewlett-Packard E1428A, there are a number of internal self-calibration routines. The ZTEC ZT1428VXI design requires very limited regular self-calibration, and should be returned to the factory for a yearly calibration. All Hewlett-Packard E1428A calibration commands are accepted by the ZT1428VXI, but most have no affect. The one exception is the vertical DC offset calibration which is initiated with a CAL:SCAL:VERT command. Note that all external connections should be disconnected before issuing a self-calibration command.

Acquisition count query returns 1 in realtime mode

Both the ZTEC ZT1428VXI and the Hewlett-Packard E1428A return 1 in response to an acquisition count query when in repetitive normal acquisition mode. When in realtime normal acquisition mode, the Hewlett-Packard E1428A returns the acquisition count associated with the repetitive average mode, although the actual realtime acquisition count is 1. The ZT1428VXI fixes this bug and returns the actual realtime normal acquisition count of 1.

Preamble query returns correct acquisition count value in repetitive mode

The Hewlett-Packard E1428A returns an acquisition count of 1 in response to a preamble query in all cases, even when the acquisition count is not 1 in repetitive mode. The ZT1428VXI fixes this bug and returns the actual acquisition count in response to a preamble query.

Waveform points query returns correct points for selected waveform source

The Hewlett-Packard E1428A returns the sweep point size in response to a waveform point query, instead of the actual point size for the selected waveform source. This is a problem with the variety of waveform sizes allowed with the ZT1428VXI. The ZT1428VXI fixes this bug and returns the actual point size for the selected waveform source in response to a waveform point query.

Disabling external trigger output sets output to 0 Volts DC calibration

In response to disabling the external trigger output with a OUTP:EXT 0 command, both the ZTEC ZT1428VXI and the Hewlett-Packard E1428A. reset the BNC output to 0 Volts DC calibration.

Setting standard measurement mode resets the user-defined measurement parameters

Setting standard measurement mode resets the user-defined measurement parameters to the power-on default standard values. These standard values are used for all measurements in standard measurement mode. After setting the mode back to user-defined measurement mode, the user-defined measurement parameters must be commanded to the desired values.

CVI driver memory size setup

Because the ZTEC ZT1428VXI supports waveform memory sizes up to 1 MSample, the default CVI environment memory setting may not be adequate, and may cause an insufficient memory error. The default CVI memory can be changed to 64Meg using the following CVI pull-down menus:

Options → Environment → Interactive Window Memory Size