Release Notes

Tektronix

**CSA8000 & TDS8000 Instruments
CSA8000B & TDS8000B Instruments**

Product Software Release Version 1.5

061-4228-06

This document applies to firmware version 1.5
and above.

www.tektronix.com

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Release Notes

CSA8000 & CSA8000B Communications Signal Analyzer

TDS8000 & TDS8000B Digital Sampling Oscilloscope

This document contains information on new features, defect corrections, and limitations of the version 1.5 release of the product software for the CSA8000, CSA8000B, TDS8000, and TDS8000B instruments. This document also notes certain non-intuitive instrument behaviors present in this release. The information presented covers the user-interface (instrument) application software, as well as the Analysis and Connectivity software that this release provides to this family of instruments.

NOTE. On occasion, Tektronix makes new releases of the instrument software available. Please check the Oscilloscopes Web page at www.tektronix.com to determine the availability of instrument-software updates.

NOTE. These release notes appear in both the C:\Program Files\TDSCSA8000\System directory and this printed document. The printed document contains the latest information available, and, in case of conflicting information, the information in the printed document applies.

Notes

To Uninstall this Release

If you want to uninstall this release and revert back to a previous release, then you will need to take the following actions, depending on the version you wish to re-install:

- To revert to 1.0 or 1.1, you must use the O/S Rebuild CD-ROM.

- To revert to 1.2, please follow these steps:

CAUTION. *You must follow the steps below to revert to version 1.2. Do not insert the 1.2 version of the Product Software and let it uninstall the 1.5 version. While it will initially appear to work, it will generate errors because the 1.2 version does not fully account for all the new components of the 1.5 version. Furthermore, you may experience a reboot lockup where the TDS/CSA8000 product software will hang in the splash screen. If this happens, then use CTRL-ALT-DEL to kill the TDS/CSA8000 process, re-install the 1.5 version, and then follow the steps below to revert back to the 1.2 version.*

1. From the Start Menu, select Settings and then Control Panel.

2. From the Control Panel select Add/Remove Programs.

3. Scroll the list until you find the TDSCSA8000 entry. Select the entry, and then press the Add/Remove button.

4. You will be asked whether you want to continue with the uninstall, and if so, select the Yes button.

5. Reinstall version 1.2.

- To revert to 1.3, insert the 1.3 version of the Product Software, and it will uninstall version 1.5.

- To revert to 1.4, insert the 1.4 version of the Product Software, and it will uninstall version 1.5.

Potential Hardware Incompatibilities and Issues

As with any open system, incompatibilities can exist between the instrument and a particular hardware device and the driver that supports it. Please check the Sampling Oscilloscopes Web page at www.tektronix.com for the latest information on known compatibility issues.

⚠️ **CAUTION.** *Do not install any software component that includes a GPIB device driver. Installation of such a driver might disable the use of GPIB by the instrument application and could even prevent the instrument application from running. You can recover from accidentally installing a GPIB device driver by reinstalling this release of the product-software CD.*

NOTE. *While some previous releases required restoring Windows with the O/S Rebuild CD, you only need reinstall the product-software for instruments using the version 1.5 release. You do not need to restore the O/S.*

Other Information   You can search our Website for information about this and other products at http://www.tektronix.com. Information on sampling instruments is available by navigating to the Oscilloscope→Sampling Oscilloscopes page.

Benefits of Installing Release 1.5 of the Product Software

This version of the instrument software adds enhancements and fixes defects. Tektronix strongly recommends that you use the latest version of software available.

NOTE. *To allow more flexibility in installing the software for your instrument, this release separates the product software and the operating system restore software into two CDs, the Product Software CD and Operating System Rebuild Software CD. To install this software, follow the instructions in the separate instruction booklets that come with each CD.*

This release provides many new features and capabilities, which are listed below. See the *CSA8000 & TDS8000 Online Help* and the *CSA8000 & TDS8000 Programmer Guide* for more information on each feature. (Both of these online documents are accessed from the instrument Help menu.)

New Modules   Additional modules supported by this release follow:

80C07B. A 2.5 Gb/s Multi-rate Datacom and Telecom optical sampling module with reference receiver filter and clock recovery support for the following standards:

- OC3/STM1
- OC12/STM4
- 2G FibreChannel
- OC48/STM16

- FibreChannel
- Gigabit Ethernet

- 2G Ethernet
- InfiniBand

80C08C. A 10 Gb/s High-Sensitivity Multi-rate Datacom and Telecom optical sampling module (10 GHz bandwidth) with reference receiver support for the following standards:

- OC192/STM64
- 10GbE (10Gbase-W and 10Gbase-R)
- SONET FEC Rates (G.975 and G.709)

- 10G FibreChannel
- 10 GbE FEC
- Continuous rate clock recovery (optional)

80C11. A 10 Gb/s Multi-rate Telecom and Datacom optical sampling module (28 GHz bandwidth) with reference receiver support for the following standards:

- OC192/STM64
- 10GbE (10Gbase-W and 10Gbase-R)
- SONET FEC Rates (G.975 and G.709)

- 10G FibreChannel
- 10 GbE FEC
- Continuous rate clock recovery (optional)

Communications Standards and Rates

Improvements related to new communication standards and rates follow:

- Added support for IEEE P802.3ae-2002 (10GbE) XAUI rate of 3.125 Gb/s

- Added support for IEEE P802.3ae-2002 10GBASE-R (10.3125 Gb/s) Forward Error Correction rate of 11.096 Gb/s

- Added support for 2xGbE rate of 2.5 Gb/s

The following table summarizes the software support for the various rates and standards. Note that not all standards are supported by available hardware sampling modules. Changes from the previous release are in bold type.

Table 1: Supported Rates and Standards

GPIB Token	Rate (MB/s)	Standard or Recommendation	Type	Filter[1]	Clock Recovery[2]	Mask (O/E)[3]
OC1	51.84	SONET/SDH OC-1/STM-0	SONET	Yes	Yes	Combined
OC3	155.52	SONET/SDH OC-3/STM-1	SONET	Yes	Yes	Combined
OC9	466.56	SONET OC-9	SONET	Yes	Yes	Combined
OC12	622.08	SONET/SDH OC-12/STM-4	SONET	Yes	Yes	Combined
OC18	933.12	SONET OC-18	SONET	Yes	Yes	Combined
OC24	1244.2	SONET OC-24	SONET	Yes	Yes	Combined
OC36	1866.2	SONET OC-36	SONET	Yes	Yes	Combined
OC48	2488.3	SONET/SDH OC-48/STM-16	SONET	Yes	Yes	Combined
FEC2666	2666	ITU-T G.975 Recommendation	SONET w/ FEC	Yes	Yes	Combined
OC96	4976.6	SONET/SDH OC-96/STM-32	SONET	Yes	Yes	None
OC192	9953.3	SONET/SDH OC-192/STM-64	SONET	Yes	Yes	Combined
FEC10664	10664	ITU-T G.975 Recommendation	SONET w/ FEC	Yes	Yes	Combined
FEC10709	10709	ITU-T G.709 Draft Recommendation	SONET w/ FEC	Yes	Yes	Combined
OC768	39813	SONET/SDH OC-768/STM-256	SONET	Yes	No	Combined
FEC42657	42657	ITU-T G.975 Recommendation	SONET w/ FEC	No	No	Combined
FEC43108	43018	ITU-T G.709 Draft Recommendation	SONET w/ FEC	Yes	No	Combined
ENET1250	1250	IEEE 802.3	GbE	Yes	Yes	Combined
ENET2500	**2500**		**2xGbE**	**Yes**	**Yes**	**Combined**
ENET3125	3125	IEEE P802.3ae-2002	10GbE	Yes	Yes	Combined
XAUIFar	**3125**	**IEEE P802.3ae-2002**	**10GbE**	**No**	**No**	**Electrical**
XAUINear	**3125**	**IEEE P802.3ae-2002**	**10GbE**	**No**	**No**	**Electrical**
ENET9953	9953.3	IEEE P802.3ae-2002	10GbE	Yes	Yes	Combined
ENET10313	10313	IEEE P802.3ae-2002	10GbE	Yes	Yes	Combined
ENET11096	**11096**		**10GbE w/ FEC**	**Yes**	**Yes**	**Combined**
FC133	132.81	ANSI X3.230-1994	Fibre Channel	No	No	Optical
FC266	265.6	ANSI X3.230-1994	Fibre Channel	No	No	Optical
FC531	531.2	ANSI X3.230-1994	Fibre Channel	No	No	Optical
FC1063	1062.5	ANSI X3.230-1994	Fibre Channel	Yes	Yes	Optical
FC133E	132.81	ANSI X3.230-1994	Fibre Channel	No	No	Electrical
FC266E	265.6	ANSI X3.230-1994	Fibre Channel	No	No	Electrical
FC531E	531.2	ANSI X3.230-1994	Fibre Channel	No	No	Electrical
FC1063E	1062.5	ANSI X3.230-1994	Fibre Channel	No	No	Electrical

Table 1: Supported Rates and Standards (Cont.)

GPIB Token	Rate (MB/s)	Standard or Recommendation	Type	Filter[1]	Clock Recovery[2]	Mask (O/E)[3]
FC2125	2125	ANSI Fibre Channel Physical Interface (FC-PI) Rev 11 draft	Fibre Channel	Yes	Yes	Optical
FC4250	4250	ANSI Fibre Channel Physical Interface (FC-PI) Rev 11 draft	Fibre Channel	Yes	Yes	Optical
FC10519	10519	10 Gigabit Fibre Channel (10GFC) Rev 2.0 draft	Fibre Channel	Yes	Yes	Optical
INFIniband	2500	InfiniBand standard	InfiniBand	Yes	Yes	**Optical**

[1] **"Yes" indicates that the GPIB token is supported by the CH<x>:FILTer:VALue command.**

[2] **"Yes" means this token is supported by the TRIGger:CH<x>:CLKRec:VALue command.**

[3] **"Combined" means this mask may be applied to optical and electrical.**
"Optical" means the mask only applies to optical signals.
"Electrical" means the mask only applies to electrical signals.
"None" means this token is not supported by the MASK:STANdard and HORizontal:BITS:STANdard commands.

Masks   Improvements related to the Mask Testing features follow:

■   Added IEEE P802.3ae-2002 (10GbE) XAUI near-end and far-end eye templates (3.125 Gb/s)

■   Added 11.096 Gb/s mask (IEEE P802.3ae-2002 10GBASE-R 10.3125 Gb/s Forward Error Correction rate)

■   Added 2xGbE mask (2.5 Gb/s)

■   Added mask autoset High/Low Method control (Mode or Mean) for use in vertical alignment of input signal to an NRZ mask.

Math and Measurements   Improvements related to the Math and the Automatic Measurements features follow:

■   Added OMA (Optical Modulation Amplitude) measurement

■   Added AOP (Average Optical Power) measurement reference level method (the default for the OMA measurement)

■   Measurement statistics, when enabled, are now calculated and available for both Infinite and Variable Persistence Waveform Databases.

■   Improved precision for some measurements in the Show Statistics Dialog.

■   Improved reliability of Extinction Ratio measurements on eye patterns.

Trigger Added support for optical modules that support continuous rate, user definable clock recovery, the 80C08C--CR4 and 80C11--CR4.

Waveform Databases Improvements related to the Waveform Database features follow:

- The number of Waveform Databases has been increased from two to four.

- Each Waveform Database has a selectable persistence accumulation mode— Infinite (existing) or Variable (new).

- Variable persistence accumulation can be controlled according to number of waveforms.

- The color/intensity grading method is selectable from one of four methods–Emphasized 8 (existing), Emphasized 7 (new), Binary 8 (new), and Binary 7 (new).

- An Emphasized Counts numerical control has been added in conjunction with the existing slider control.

Programmer Interface Improvements related to the instrument programming interface follow:

- New commands:

    - MASK:AUTOSet:HILow:METHod { MEAN | MODE } (set and query)

    - TRIGger:CH<x>:CLKRec:USEr (set and query)

    - TRIGger:CH<x>:CLKRec:RANge? (query only)

    - SYSTem:PROPerties:CH<x>:CLKUser? (query only)

    - WFMDB:DISPlay:GRADMethod { EMPH8 | EMPH7 | BIN8 | BIN7 } (set and query)

    - WFMDB:WFMDB<x>:PERSistence:COUNt (set and query)

    - WFMDB:WFMDB<x>:PERSistence:MODe { INFPersist | VARPersist } (set and query)

    - WFMDB:WFMDB<x>:PERSistence:SAMPles? (query only)

- New arguments to existing commands:

    - CH<x>:FILTer:VALue { ENET2500 | ENET11096 }

    - HORizontal:BITS:STANdard { ENET2500 | XAUINear | XAUIFar | ENET11096 }

    - MASK:STANdard { ENET2500 | XAUINear | XAUIFar | ENET11096 }

- MEASUrement:MEAS<x>:TYPE { OMA }

- MEASUrement:MEAS<x>:REFLevel<x>:METHod { AOPt }

- TRIGger:CH<x>:CLKRec:VALue { ENET2500 | ENET11096 | USEr }

■ Default SYNC:TIMEOUT value increased from 2 to 3 seconds

■ Enhanced error propagation to virtual GPIB interfaces

■ Corrected potential :MASK count query timeouts (which returned –1)

Display and Instrument Application

Improvements related to the instrument user–interface application follow:

■ Added OMA (Optical Modulation Amplitude) measurement icon

■ Added variable persistence Waveform Database icon

■ Waveform Database entries in the Waveform group of the readout area are now selectable (including relevant mouse right–click operations).

Other

Miscellaneous improvements follow:

■ Corrected some anomalies with floppy drive operations

■ Corrected some small memory leaks

■ Corrected potential edge autoset lock–up on very noisy signals

■ Improved the integrity/accuracy of setup recalls in several areas

■ Setting the waveform label in the Waveform Properties dialog now works consistently

Analysis and Connectivity Software

Several optional software components are available to support control and data transfer between the instrument and numerous software-development and data-analysis tools.

Overview

The Analysis and Connectivity software provided with this instrument may be used to:

■ Gather instrument data (waveforms, measurements) and export it to familiar, off-the-shelf analysis tools, such as Microsoft Excel, MathWorks' MatLab and MathSoft's MathCad.

■ Interface with numerous software development environments, such as Micorosoft's Visual C++ and Visual Basic, National Instruments' LabVIEW and LabWindows, along with many other Microsoft-Windows-compatible development tools.

The following software components are available with this release:

■ VXI Plug-and-Play Instrument Driver

■ TekVISA

■ TekVISA ActiveX Control (TVC)

■ TekVISA Excel Toolbar

■ VXI 11.2 LAN Server

Updates   Tektronix periodically makes Analysis and Connectivity Software updates available at www.tektronix.com. Information on sampling instruments is available by navigating to the Oscilloscope–>Sampling Oscilloscopes page. Additionally, Tektronix may occasionally update the Web site with demonstration and example applications that enhance instrument functionality.

Instrument Installation   The Analysis and Connectivity Software (except the VXI PnP Driver) is pre-installed on the CSA8000B and TDS8000B instruments and is included in this release of the product-software CD. By default, the Analysis and Connectivity Software is installed when reinstalling the product software from the CD, or when installing from the CD as part of a Customer Software Upgrade to release 1.5. The product-software CD also provides for installing the Analysis and Connectivity Software on any personal computer running Microsoft Windows (see *PC Installation* on page 10).

Installing the Analysis and Connectivity Software will add a TekVISA folder and a VxiPnp folder to the Start→Programs Menu. In the TekVISA folder, you will find the following items that provide additional information:

■ Release Notes

■ TekVISA ActiveX Control API

■ TekVISA Configuration tool

■ TekVISA Programming Manual

■ TekVISA Quick Reference Card

■ VXI-11 Server Control

To install the VXI PnP Driver:

1. Open a Windows Explorer and open folder: C:\Program Files\Tektronix\VXIPNPInstall.

2. Double-click on setup.exe in this folder and it will install the VXI PnP driver.

   After installation, a Vxipnp folder will be created for you. In the Vxipnp folder, you will find the following items that provide additional information:

   - tktds8k Help

   - tktds8k PDF Function Reference

   - Uninstall for the tktds8k Instrument Driver

PC Installation   You may install TekVISA and the VXI PnP driver on a PC running Windows 98, Windows NT 4.0, Windows 2000, and Windows XP.

1. Insert the product-software CD into your PC and open a Windows Explorer to your CDROM drive. You will see several top-level folders and you will use the TekVisa and VxiPnp folders.

2. To install TekVisa, run the TekVisa\Setup.exe program.

3. To install VXI PnP driver, run the VxiPnp\setup.exe pro as described above.

Once these have been installed, your PC will have Start→Programs→TekVISA and Start->Programs->VXIPNP folders as described above. (The VXI–11 Server Control is instrument-specific and will not appear on the PC.)

Excel Toolbar   The Toolbar was developed using Excel 2000 and runs under Office 2000. Preliminary testing has shown the Toolbar runs under Office XP, but note that the testing under Office XP has been very limited. The Toolbar does not currently run under Excel 97.

Improvements in Release 1.4

New Modules   Additional modules supported by this release follow:

- 80E06 – High Bandwidth, Single Channel Electrical Sampling Module

- 80C10 – High Bandwidth, Single Channel Optical Sampling Module

■ 80C08B – Multi-rate, Datacom Optical Sampling Module

  ■ CR1 clock recovery option: OC–192/STM–64, 10GBASE–W, and 10GBASE–R

  ■ CR2 clock recovery option: 10GBASE–R and 10GFC

Communications Standards and Rates

Improvements related to new communication standards and rates follow:

■ Added support for ITU–T G.709 Draft Recommendation OC–768/STM–256 Forward Error Correction rate of 43.018 Gb/s

■ Added support for 10 Gigabit Fibre Channel (10GFC) Revision 2.0 Draft rate of 10.519 Gb/s

Masks

Updated the 10GBE masks according to the 802.3ae draft standard version 4.1.

Math and Measurements

Improvements related to the Math and the Automatic Measurements features follow:

■ Rise/Fall measurement improvement when High/Low references are equal or close together

■ Measurement Gates and Annotations for second source are now correctly displayed

■ Improvements in RZ jitter measurements to accommodate wider range of signal characteristics

■ NRZ Gain measurement Eye Aperture Region control panel is now available

■ ACRMS now works correctly for all gating values

Other Areas

Fixed a potential compensation failure (instrument lock-up) in TDS8000B and CSA8000B instruments.

Improvements in Release 1.3

New Modules

The additional modules supported by this release follow:

■ 80C07 & 80C07-CR1 (Multi-rate Telecom Optical Sampling Module for OC–3, OC–12, and OC–48)

■ 80C08 & 80C08-CR1 (Multi-rate Datacom Optical Sampling Module for 10G Ethernet)

■ 80C09 & 80C09--CR1 (High-performance Telecom Sampling Modules, with G.709 FEC support)

Autoset   Improvements related to the Autoset feature follow:

■ Fixes some failures with extender cables

■ Fixes the edge or period failure on slower signals with narrow pulses

■ Corrects vertical setting when Horizontal Mode set to "Lock to Int 10MHz"

■ Removed dependency on initial instrument settings (this dependency produced incorrect horizontal settings for signals having periods of greater than ~1 us)

■ Fixes Set Trigger to 50% failures with large Horizontal scales

■ Forces Autoset to return quicker when executing with no signal applied

Acquisition   Removes data (samples) anomalies when using additive (for example, C1+C2) or subtractive (C1-C2) math expressions with common or differential mode signals.

Save/Recall Setups   Improvements related to the Save/Recall Setups feature follow:

■ Vertical scale, offset, and position for TDR waveform are now recalled correctly

■ Math Autoset & histogram Pk-Pk (on math) recall is now correct

■ Acquisition state is now recalled correctly

■ External Attenuation for dB is now recalled correctly

■ Horizontal scale is no longer coerced to the mask standard on recall

■ Vertical position is now recalled correctly if the setup included a mask

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NOTE. *Using setup files from previous releases may not exhibit these corrections, and you might need to generate new setup files to obtain the correct behavior.*

TDR   A nonpassive TDR system with negative step no longer inverts Rho & Ohm waveforms

Math and Measurements   Improvements related to the Math and the Automatic Measurements features follow:

- Includes RZ measurements

- Includes new NRZ measurements (crossing level, bit time, bit rate, and crossing time)

- Access to Hi/Low measurement parameters is enabled for Pk-Pk jitter

- Improvements in NRZ rise and fall measurements

Programmer Interface   Improvements related to the instrument programming interface follow:

- Added the following new commands:

  - TRIGger:GATEd [ON | OFF | <nr1>] and TRIGger:GATEd? (available only for CSA8000B and TDS8000B instruments that ship with the GT option)

  - HARDCopy:INKSaver {ON | OFF | <nr1>} and HARDCopy:INKSaver?

  - SYNC:TIMEOUT <nr1> and SYNC:TIMEOUT?

  - CH<x>:WFMLabel and CH<x>:WFMLabel?

  - REF<x>:WFMLabel and REF<x>:WFMLabel?

  - MATH<x>:WFMLabel and MATH<x>:WFMLabel?

  - HARDCopy:FORMat PNG

- GPIB Export to non-existing device and path no longer hangs GPIB

- DATE and TIME is not returned with SET?

- Measurement direction for source2 is settable from GPIB

- The system no longer crashes when an invalid path is specified for HARD-COPY

- Decreased the delay between the changing of a mask margin and the mask count update

Display and Instrument Application   Improvements related to the instrument user-interface application follow:

- Supports the Gated Trigger option when ordered with a CSA8000B or TDS8000B instrument at time of purchase

- Ink-saver Mode printing (select from Page Setup dialog)

■ Support for the PNG (Portable Network Graphics) image file format

■ Improves the automatic-measurement readouts, adding icons that illustrate the signal type of measurement source and that indicate whether a waveform database is being used

■ Improves the automatic-measurements toolbar and Measurement Setup dialog box

■ Waveform label is steadier

■ Optical Modules with Clock Recovery no longer indicate locked triggering when free-running

■ Added retention of the last printer selected to the Print dialog box

■ Added a virtual keyboard to support naming target files to the Print to File dialog box

■ Copy Waveform now handles NULL samples

■ Export Histogram to a non-existing or write-protected disk will no longer fail

Other Areas   Miscellaneous improvements follow:

■ Adds the following Analysis and Connectivity Support tools:

   ■ VXI Plug-and-Play Instrument Driver

   ■ TekVISA

   ■ TekVISA ActiveX Control (TVC)

   ■ TekVISA Excel Toolbar

   ■ VXI 11.2 LAN Server

■ Adds ability to control the instrument from the Ethernet

■ Adds ability to control instrument from built in PC

Improvements in Release 1.2

New Modules   Additional modules supported by this release follow:

■ Supports the 80C04 with option CR2 – a 10 Gb/s Optical Telecom Sampling Module with 9.953/10.66 Gb/s Clock Recovery

■ Supports the 80C05 – 40 GHz Optical Sampling Module

■ Supports the 80C06 – 50 GHz Optical Sampling Module

Autoset   Improvements related to the Autoset feature follow:

■ Fixes Mask & Bit/Eye Pattern Autoset to work better with over and under range data

■ Fixes Autoset so that it works with external attenuation

■ Fixes Autoset to work on signals with large negative offset

Math and Measurements   Improvements related to the Math and the Automatic Measurements features follow:

■ Adds enhanced measurement qualifiers, available through the programmatic interface, signal anomalies in the target data, such as regions with very low point populations, over-range or under-range points, that could make measurement results questionable

■ Adds a new automatic measurement that expresses the Average Optical Power in dBm units.

■ Adds horizontal distance units for cursors readouts

■ Deactivates automatic measurements when measurement type selected is NONE. Measurements are now deactivated when set to NONE

■ Adds capability to the Integrate and Differentiate functions on Reference waveforms so they now work for horizontal scales less than 500ps

■ Corrects unusual Duty Cycle Distortion measurement failures

■ Improves RISE and FALL time measurements on eye diagrams

■ Adds High/Low annotations for source2 of delay and phase measurement

■ Improves Rise measurement on WfmDB (previously it sometimes returned NaN when selecting Use WfmDB)

■ Fixes a crash in math Log(Meas1) expression

Programmer Interface   Improvements related to the instrument programming interface follow:

■ Adds these new Programmer Interface (PI) commands

   ■ FILESystem:READFile? <file path>

   ■ HARDCopy:FORMat {JPEG | BMP | TIFF | TARGA}

   ■ HORizontal:UNIts {S | BITS | FT | IN | M}

- HORizontal:DISTance:DIELectric <NR3>

- HORizontal:DISTance:PVELocity <NR3>

■ Adds several tokens to previous PI commands:

- MASK:STANdard   Added: OC768 and FEC42657

- HORizontal:BITS:STANdard   Added: OC768 and FEC42657

- MEASurement:MEAS<x>:TYPE Added: AOPTPWRDBM

■ Fixes the PI command VERBOSE OFF so that it no longer truncates the token NONE in lists

■ Fixes the PI command CH<x>:WLEN:VAL <nr3>,USER

■ Fixes Device Clear commands to now work when using *OPC?

■ Corrects the DISPLAY command so that it no longer crashes a minimized application

■ Fixes some problems with the CURVE? command and WFMInPre:BYT_Or and BN_FMT commands

Display and Instrument Application

Improvements related to the instrument user-interface application follow:

■ Increases precision in waveform copy

■ Removes graticule display wrap for persistence data

■ Fixes an instrument application crash caused by certain printer drivers

■ Improves the scaling of vertical units by the Integrate function

Other Areas

Miscellaneous improvements follow:

■ Improves the accuracy of recomputed results that occur when a User Defined Mask is changed

■ Corrects offset range offsettable probes and 80E01

Improvements in Release 1.1

New Modules

Additional modules supported by this release follow:

■ Supports the 80C04 - 10 Gb/s Optical Telecom Sampling Module

■ Supports the 80A01 - Pre-scaled Trigger Amplifier

Acquisition

This release fixes a synchronization error that could cause signals that should be acquired on the same trigger event to be acquired on different triggers. This error exhibits itself as a failure when trying to examine differential eye patterns by adding/subtracting differential signals.

Performance

Improvements related to performance follow:

- Significantly improves responsiveness of instrument to signal changes.

- Significantly improves waveform acquisition rate when measurements mask testing, or histograms are enabled.

- Removes requirement to stop acquisition prior to minimizing sampling oscilloscope application and/or shutting down the instrument.

- Enhances measurement throughput.

- Reduces power-up time by ~1 minute.

Display and Instrument Application

Improvements related to the instrument user-interface application follow:

- Enhances the virtual keypad. It is no longer necessary to clear field prior to entering new data.

- Installs a default print driver so user no longer has to install printer prior to attempting to print screen to a file.

- Tunes sensitivity of coarse and fine controls for various front panel knobs and GUI controls (Horizontal Position being a prime example).

- Redefines acquisition and trigger status readouts.

- Fixes flashing display anomaly.

- Fixes minor inconsistencies between cursor, histogram, measurement, and mask readouts.

- Adds support for mask entry in absolute units

- No longer requires the stopping of acquisitions prior to changing a stop-on condition.

- Removes the error message "no events to report," when printing screen to printer.

- Installs a default printer driver to allow printing to file without first installing a printer driver.

Math and Measurements Improvements related to the Math and the Automatic Measurements features follow:

- Improves the crossing-finding algorithm for eye diagrams.

- Enabled timing measurements on eye diagrams to now use eye aperture when determining HIGH and LOW values.

- Changes the measurement statistics to a non-modal dialog box. This means you can leave this dialog up while changing other instrument controls.

- Measurements performed on waveform databases are statistical in nature, so no additional statistical data is provided.

- Fixes and/or adds a number of measurement annotations.

- Increases search limits for high-slew rate signals.

- Adds support for Integration/Differentiation of constants

Programmer Interface Improvements related to the instrument programming interface follow:

- Adds support for doing curve queries on magnification views of acquired signals

- Fixes the LOCK command so that it is now functional

- Fixes the *PSC command so it is now functional

Masks Improvements related to the instrument Masks follow:

- User masks no longer have to be sequentially numbered.

- Vertical scale and offset are no longer changed when selecting a standard mask.

- Enhances accuracy of standard mask definitions.

Other Areas Miscellaneous improvements follow:

- Improves period Autoset algorithm.

- Replaces 200 point records lengths with 250 point acquisitions.

- Eliminates boot failures caused by some printer drivers.

- Instrument now waits for the state to settle prior to printing results on a conditional stop.

- Copying math waveforms to the Microsoft Windows clipboard now copies correct data.

- Attempting to save data, setups or screen shots to a floppy disk with no floppy present no longer crashes the application, rather an error dialog is displayed.

- Adds the Backup tool to the default Microsoft Windows installation.

- Adds the Network Neighborhood icon to desktop.

General Limitations

This release has the following general limitations:

- Performing an NRZ or RZ Autoset without a standard mask requires that the approximate bit rate be set before initiating the Autoset. This can be done from the Horizontal Setup dialog box by setting the units to Bits to enable input into the Bit Rate field. Alternatively, you can set the bit rate via the programmer interface with the command: HORizontal:BITS:BITRate <NR3>. Additionally, you must specify the signal type for Autoset. This can be done by selecting the type of signal= (under the Utilities menu, select Define Autoset) or by using the :AUTOSet:TYPE command.

- While backward compatibility for recalling setup files from previous releases is desirable, such compatibility cannot be guaranteed because of several system parameters and constraints. Setup files from previous releases should be verified, and, if the results are not desirable, then a new setup file should be generated.

- A Dark Level Calibration should be performed on optical channels before obtaining measurement results. In particular, Extinction Ratio requires this calibration for meaningful results. Additionally, the Extinction Ratio measurement is no longer supported on electrical channels.

- This release does not allow you to exit the application while leaving the underlying Windows operating system running. To close down the application and shutdown the instrument:

  1. Press the RUN/STOP button to ensure acquisition is stopped.

  2. Press and release the On/Standby button on the front panel. This will cause the instrument to do a graceful shutdown of Windows and power off the instrument.

  Note that, if the instrument ever hangs for any reason, you can always force a shutdown by depressing and holding the Power/Standby button on the instrument front panel for five seconds.

Note also that you can minimize the application (reduce it to an icon on the Windows Task bar) by using the minimize button in the upper-right corner of the application. Minimizing the application allows you to view other applications running on the instrument display. When minimized, any front-panel button press or knob turn maximizes the application and causes it to regain focus.

Note that, as an alternative to minimizing the application, you can connect an external monitor to the second display adapter port of the instrument. This connection enables you to view other applications on the external monitor while still viewing the instrument application on its built-in display.

■ This release does not automatically restore the setup in effect at the time the instrument was powered off. Even though the User Preferences dialog box under the Utilities menu includes a selection to specify that the instrument restart with the configuration present at shutdown, that capability is not supported in this release.

Note that you can easily save the last setup before powering the instrument off by saving your setup to a specific file and recalling the setup file after restarting the instrument.

■ This release requires that, for TDR testing, the trigger source must be set to the Internal Clock. The trigger source is not coerced to Internal Clock when TDR Step generators are manually turned on (see the TDR setup menu).

■ Tektronix recommends using TDR Preset when setting up TDR. TDR Preset not only sets the trigger source to Internal Clock, it also turns on the TDR step generator and acquisition hardware for the selected channel, and scales and positions the signal so that the incident edge of the TDR pulse is visible on screen. The recommended process follows:

1. Connect the channels to be used (the instrument supports TDR on up to eight channels simultaneously) to the Device-Under-Test.

2. Press the TDR Preset button in the TDR setup menu for each channel used.

3. Following any TDR preset, you can specify step polarity and display units for each TDR channel as desired.

■ This release may require that you rebuild certain Math waveform and measurement definitions, rather than just save and recall them. For example, this instrument allows you to define such sophisticated math waveform and automatic measurements as follows:

■ Example 1: MATH1 = AVERAGE(C1-MEAS1); where MEAS1 = MEAN(R1)

■ Example 2: MEAS1 = AVERAGE(M1)

While this flexibility makes for very powerful math and measurement systems, it also complicates the saving and restoring of the instrument state when using either Save and Recall Setups or the *LRN? GPIB command. For our math waveform example above (Example 1), it is critical to restore the MEAS1 definition prior to restoring the MATH1 definition. However, for our automatic measurement above (Example 2), it is critical to restore the math definition prior to the measurement definition.

This release of the Product Software does not attempt to rationalize the order in which it restores instrument settings using a Recall Setup operation or *LRN? command. As a result, it may be necessary to rebuild definitions such as those just discussed rather than just saving and recalling them.

- When the instrument is in a stopped state, changing the waveform position will not update the histogram readouts.

- This release does not support PCMCIA GPIB cards. Due to resource conflicts, this release of software does not support installing a GPIB PC Card in the instrument.

- The 8000 and 8000B series instruments do support the National Instruments USB-GPIB controller (the USB-GPIB-A version is **not** supported) If you desire to use this controller, please note the following:

  1. The USB-GPIB controller receives power from the USB connection and therefore *must* be connected either directly to the USB port of the TDS/CSA8000 or to a powered USB hub.

  2. Due to resource conflicts, *it is critical that you not install the USB-GPIB driver* that comes with this controller. Installing this driver may disable your instrument GPIB port.

  3. In order to communicate with the USB-GPIB controller, you should install the latest NI VISA driver.

- This release does not support more than one PCMCIA card at a time.

- For more PCMCIA information, see *Installing PCMCIA Cards* on page 29.

- The online help topic *Autoset Properties dialog box* defines the RZ Eye selection incorrectly. The correct definition follows:

  RZ Eye – Sets the default autoset for the instrument to acquire the waveform data as follows:

  - three rise/fall edges displayed approximately over the center 6 horizontal divisions, with the first rising edge placed near the 20% horizontal location (second division)

  - amplitude (the high/low values) displayed approximately over the center 5 vertical divisions

GPIB-Specific (Programmer Interface) Limitations and Changes

The program-command interface of this release of the CSA8000 and TDS8000 software User Interface application has the following limitations:

■ This release supports the MAV (message available) bit. It no longer supports the EAV (event available) bit (NOTE: this was changed in the 1.1 release).

■ This release requires that you take a precaution when controlling the instrument from the GPIB and the front panel and/or graphical user interface simultaneously. Before attempting GPIB control of the instrument, make sure you do not have any dialog on screen that requires confirmation. In such a case, a GPIB time out will occur as the instrument application will not acknowledge any other control activities until the user has responded to its confirmation request.

■ This release requires that, when you are defining a user mask over GPIB, you first send the MASK:STANdard USERMask command. After sending this command, you may specify the polygons with the MASK:MASK commands.

■ All programming commands and queries for horizontal position and scale use time units. Bit and distance units are not supported in this release.

■ Releases 1.3 and above include a mechanism to prevent a response to certain data value queries before the query is ready to provide a value consistent with the instrument state. The SYNC:TIMEOUT command sets or queries the default synchronization timeout for commands that rely upon data production by the instrument. The default timeout value of 3 seconds should be appropriate for most applications, but the user may need to adjust this timeout under certain conditions:

  ■ Slow waveform acquisition rate: When a related query is issued to the instrument, if the combination of record length, averaging, frame-scan, trigger hold-off and trigger source repetitive rate result in a waveform acquisition rate which is slow compared to the synchronization time out, the synchronization time out may expire before results are produced by the instrument.

  ■ Unforeseen user configurations: Any configuration that significantly influences the rate at which the instrument produces results could potentially result in a time out. This could include installation of third party software that consumes a significant amount of CPU cycles or system resources.

- A time out value of 0 (zero) will yield similar behavior as exhibited in previous releases. The following queries are affected:

  - :MEASUrement:MEAS<X>:ALL?

  - :MEASUrement:ALL:VALue?

  - :MEASUrement:LIST?

  - :MEASUrement:LISTValue?

  - :MEASUrement:MEAS<X>:MEAN?

  - :MEASUrement:MEAS<X>:MAXimum?

  - :MEASUrement:MEAS<X>:MINimum?

  - :MEASUrement:MEAS<X>:STDdev?

  - :MEASUrement:MEAS<X>:TYPe?

  - :MEASUrement:MEAS<X>:UNIts?

  - :MEASUrement:MEAS<X>:VALue?

  - :ACQuire:CURRentcount:ACQWfms?

  - :ACQuire:CURRentcount:HISTHits?

  - :ACQuire:CURRentcount:HISTWfms?

  - :ACQuire:CURRentcount:MASKSamples?

  - :ACQuire:CURRentcount:MASKTHits?

  - :ACQuire:CURRentcount:MASKHits<X>?

  - :ACQuire:CURRentcount:MASKWfms?

  - :MASK:COUNt:SAMPles?

  - :MASK:COUNt:TOTal?

  - :MASK:COUNt:WAVeforms?

  - :MASK:MASK<X>:COUNt?

  - :HIStogram:MEAN?

  - :HIStogram:MEDIAN?

  - :HIStogram:STATistics?

  - :HIStogram:STDdev?

- :HIStogram:PKTOPK?

- :HIStogram:SIGMA<Y>?

- :HIStogram:PEAKHits?

- :HIStogram:HITS

- :HIStogram:WAVeforms?

■ On error conditions, the following commands return different values than in previous releases.

Command	Releases 1.0, 1.1, & 1.2 Values	Release 1.3, 1.4, & 1.5 Values
:ACQuire:CURRentcount:ACQWfms?	0	-1
:ACQuire:CURRentcount:HISTWfms?	0	-1
:ACQuire:CURRentcount:HISTHits	0	-1
:ACQuire:CURRentcount:MASKWfms	0	-1
:ACQuire:CURRentcount:MASKSamples?	0	-1
:ACQuire:CURRentcount:MASKTHits<X>?	0	-1
:ACQuire:CURRentcount:MASKTHits?	0	-1
:MASK:COUNt:TOTal?	0	-1
:MASK:COUNt:WAVeforms?	0	-1
:MASK:COUNt:SAMPles?	0	-1
:MASK:MASK<X>:COUNt?	0	-1

■ The HIStograms:STATistics command now returns data in only time units. Previous releases 1.0 & 1.1, would return the data in either time or bits, depending on the horizontal (X-axis) unit.

General Behavior Changes from Previous Releases

■ This release will show ??? instead of NaN when the measurement cannot be computed.

■ Recalling setups saved from previous releases, which include a standard mask, may result in the mask being recalled as USER. The problem can be corrected by:

- Reloading the standard mask

- Saving setup again

■ For saving image files, the selected format and file extension can be inconsistent. The following table shows the behavior for all releases:

Filter Type	Selected File Type	Actual Filename		Actual Format	
		Previous Releases	Release 1.3, 1.4, & 1.5	Previous Releases	Release 1.3, 1.4, & 1.5
bmp	output.bmp	output.bmp	output.bmp	bmp	bmp
bmp	output.jpg	output.jpg	output.jpg	bmp	jpg
bmp	output.xxx	output.xxx	output.xxx.bmp	bmp	bmp
bmp	output	output.bmp	output.bmp	bmp	bmp

Performance-Enhancement Tips

While the 8000 and 8000B Series instruments provide the highest acquisition rates of any ultra-high performance oscilloscope available today, observing the following recommendations can enhance this performance:

■ For the highest data acquisition rate, set the Record Length to its maximum value, using the RESOLUTION knob on the front panel.

■ For doing mask testing or creating histograms, make sure that the Use Wfm Database checkbox in the MASK and/or HIST setup dialogs is **not** checked.

■ Turn off all measurements until after you have completed data acquisition into the Waveform Database.

■ While Cursors can be used for approximate measurements, use the automated measurements for the most accurate measurement results.

■ For the best measurement results on signals with relatively fast transition times, increase the waveform record length beyond the default 500 points (use the RESOLUTION knob on the front panel). This will increase the number of points acquired on any rising or falling edge.

■ Enabling statistics (or to a lesser extent, annotations) for measurements on a vector trace may substantially reduce Waveform Database accumulation rates.

GPIB-Programming Tips

The 8000 and 8000B series instruments use a pipelined architecture for data acquisition and control and query commands. As a result, care must be exercised to ensure that the results returned from data or measurement queries are what were expected.

Several methods exist to flush the acquisition and control queues in these instruments and thereby guarantee the expected results. A few of these methods are listed as programming tips below:

- Be sure to set up the instrument to Stop After Acquisitions = 1 if you need to guarantee that you have acquired a new waveform. You do this using the following sequence of commands:

  1. ACQuire:STOPAfter:CONDition ACQWfms

  2. ACQuire:STOPAfter:COUNt 1

  Be sure to wait until the acquisition is complete by using any of the synchronization commands (*OPC, *OPC? *WAI, and BUSY?).

  The above actions are required because the amount of time required to acquire a complete waveform depends on a variety of factors: the periodic rate of the trigger signal; the specified record length; whether averaging and/or FrameScan acquisition is turned on (and, if so, how many acquisitions must be averaged); the requested Trigger Holdoff; and so on.

- Be sure to include at least 100 ms of delay in the loop that queries instrument status when synchronizing your test procedure to the instrument (using a BUSY? Query, for example). If you do not set sufficient time between status queries, the instrument will have very little time to acquire waveforms and process data.

- Be sure to wait for the time listed below after sending each of the following commands before querying for any results that depend on the command sent:

  - CH<x>:FILTer:VALue   6 seconds

  - CH<x>:BANdwidth:VALue   6 seconds

  - SAVe:WAVEform   3 seconds

Sample Programs

These sample programs illustrate methods you can use to control the instrument from the GPIB interface. Within the product-software CD, you will find the program listings for these examples, which were written in Visual C++, version 6.0, and generated using the AppWizard program.

NOTE. *These sample programs do not use TekVisa. Samples that use TekVISA are found in directory: C:\VXIpnp\Win95\TEKvisa\VISASamples.*

The programs run only a PC-compatible system equipped with a Tektronix (National Instruments) GPIB board and associated drivers. The GPIB port on the

back of the instrument is configured as a device rather than a controller. To run the Sample programs you need to run them on a computer that has GPIB controller capabilities, such as a PC with a GPIB card installed as mentioned above. *These programs do not run from your instrument.*

The programs are located in a self-extracting zipped file on the CD, in the folder Samples\NI488.2 Samples. For example, if your CD-ROM drive designation is E:, then the file is located in E:\Samples\NI488.2 Samples.

To extract this zipped file, double click on the file Samples.exe in the folder. The programs will be extracted to C:\Samples by default. After unzipping this directory, you will find the source code for each example is in the Sources folder, and the programs are under a Programs folder.

All the example programs assume that:

■ The instrument is set as DEV1 with address of 1, and the PC (controller) set as GPIB0

■ A valid signal is connected to the instrument.

To reassign the name of your instrument, you can use IBCONF.EXE or you can enter your current device name into the Edit box within each program. This is true except for the Mask example, where the board address is 0 and it is hard coded.

The sample programs use any model of the 80E00 Electrical Sampling modules except for the following requirements:

■ Mask example uses an 80C00 Optical Sampling module, preferably the 80C01-CR module.

■ TDR example uses an 80E04 Electric module.

The example software includes:

■ Meas: Performs timing or an amplitude measurement on the selected waveform and displays the measurement.

■ WfmTransfer: Transfer out the selected waveform's horizontal timebase and its vertical scale into a file on your PC (controller).

■ Capture: Captures the screen into a selected file, or a printer. Note: The saved file will be on your instrument. Please make sure that you have a default printer selected before running this program.

■ TDR: Displays the attached cable length in centimeters. Note: Requires an 80E04 sampling module.

■ Mask: Makes an eye pattern evaluation against a mask; counts mask hits, and executes an action. Note: The saved file will be on your instrument.

Please make sure that you have a default printer selected before running this program.

Optional Features

You should only perform the procedures that follow if you need the features or functions they enable.

Enable Network Access

You can connect the instrument to a network to enable printing, file sharing, internet access, and other communications functions. Before you make the connection, do the following steps to enable network access to the instrument:

1. Begin with the instrument power off.

2. Attach a keyboard and mouse to the instrument.

3. Power on the instrument.

4. As the instrument begins to boot, press the F2 key on the keyboard repeatedly when the first Tektronix logo screen appears. The message "Loading SETUP" or "Entering Setup" will appear.

5. In the BIOS Setup Utility, use the right-arrow key on the keyboard to highlight the Advanced menu at the top of the screen.

6. Use the down-arrow key to highlight Peripheral Configuration in the Advanced screen, and then press Enter.

7. Use the down-arrow key to highlight "LAN Device" or "Embedded Ethernet Controller" in the "Peripheral" or "PCI" Configuration screens, and then press Enter.

8. Use the up- or down-arrow key to highlight Enabled, and then press Enter.

9. Press the F10 key to save and exit. Confirm the Save of Configuration changes when you are prompted on screen.

10. Use the Windows network setup utility to define the instrument as a network client and configure it for your network. You can find the network setup utility in the Windows Start menu if you select Settings > Control Panel and then double click Network. You should consult your network administrator for specific instructions to make these settings.

NOTE. If you want to disable network access for the instrument, perform the above procedure, selecting Disabled instead of Enabled in step 8. The instrument will boot faster with network access disabled.

Installing PCMCIA Cards   Instructions for installing PCMCIA cards follow. These instructions only apply to instruments with PCMCIA device capability.

To install the PCMCIA card, usage of a secondary external monitor must be disabled. If you want to use a PCMCIA card, follow the instructions below to disable the secondary monitor and to install the PCMCIA card:

1. Install a mouse if none is installed. You can plug the standard-accessory keyboard into the USB port at the rear of the instrument and plug the standard-accessory mouse into the rear of the keyboard. You do not need to shutdown the instrument to install these items.

2. With the instrument running, click the minimize button (-) to reduce the application to an icon on the Windows Task bar and expose the underlying Windows desktop.

3. Right click on the My Computer icon on the Windows desktop.

4. Choose Properties from the menu that pops up, and then select the Device Manager tab.

5. Select the View devices by type button if it is not already selected.

6. Click the + icon next to the Display adapters icon to expand its subentries.

7. Right Click on the "ATI 3D Rage Pro" or the "Intel 82810 Graphics Controller" subentry, and choose Properties from the menu list that pops up.

8. Under Device usage in the General tab, check the box labeled Disable in the hardware profile.

9. Click the OK button to accept the change and to dismiss the Properties dialog box.

10. Click the OK button in the Systems Properties dialog box to accept the changes and to dismiss the dialog box.

11. Press the On/Standby button to shut down the instrument.

12. Install the PCMCIA card, and restart the instrument.

Once the usage of a secondary external monitor has been disabled (see procedure above), follow the procedure that follows for installing PCMCIA cards or hot swapping them:

1. Let the instrument boot up. Wait until the instrument application is running, and then minimize it.

2. In Device Manager tab of System Properties, double click the "ATI 3D Rage Pro" or the "Intel 82810 Graphics Controller" from the Display Adapters. In the dialog box that pops up, check the labeled Disable in this hardware profile. Click OK.

3. Restore the instrument application. Select User Preferences from the Utilities drop down menu. Click the GPIB Configuration tab. Set GPIB Mode to GPIB Off Bus. Click OK.

4. Insert the card. Wait for the software to load if first time this card was inserted. Loading can take well over a minute).

5. If GPIB control of the instrument is required, select User Preferences from the Utilities drop down menu. Click the GPIB Configuration tab, and set GPIB Mode to GPIB Talk/Listen. Click OK.