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# GS WORKS 8

Real-time and post-test data visualization and analysis software

CURTISSWRIGHTDS.COM



## Key Features

- Interactive interface which allows custom data displays, parameter definitions, analysis options and test setup
- Exports to CSV, Microsoft Excel and MathWorks MATLAB®
- XidML® compatible (versions 2.41 and 3.0)
- Supports Packet CAPture (PCAP) format
- Supports avionic bus standard IRIG-106 PCM
- Supports packetizers for ARINC-429, CAN, MIL-STD-1553, and TTP XidML 3.0 only
- Supports MPEG-4 and H.264 video coding formats and audio decommutation
- Client/Server Mode
- Supports CVSD audio

## Applications

- Real-time/post-test ground stations

## Overview

GS Works 8 is a complete real-time and post-test display and analysis software suite based on SYMVIONICS, Inc. IADS. GS Works 8 is scalable from a laptop to a large workgroup through its client/server software architecture.

GS Works 8 provides an interactive interface which allows you to quickly customize displays, parameter definitions, analysis options and test setup in a matter of seconds. You can then send these customizations to multiple monitors via multi-port graphics processors and other networked GS Works clients. Every data point is cached, allowing real-time scrollback through the time history. Derived equations can be added or modified as required for use throughout the system. The same features are available for real-time and post-test processing GS Works 8's ease of use, depth of display capability, and powerful analysis techniques can be used to save time and effort on any test program.

GS Works 8 provides an interactive interface which allows you to quickly customize displays.

GS Works 8 facilitates real-time mission analysis and monitoring as well as data playback. (The same GUI is available for both real-time and post-test processing, supporting features such as ActiveX controls, derived parameters (formulas) and time/frequency-domain data analysis.)

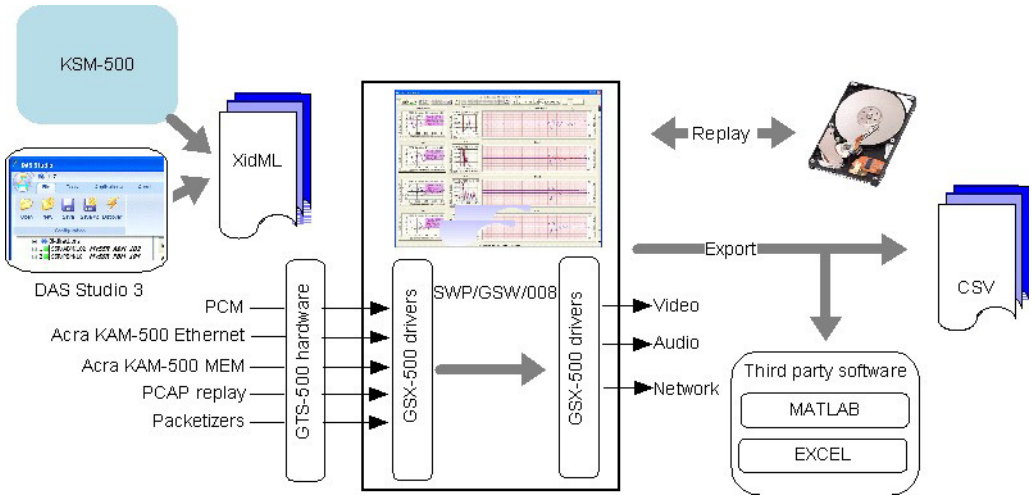



Figure 1: GS Works 8 system overview

# Getting the most out of GS Works 8

## Client/server mode

When running in client/server mode, a GS Works 8 server can have up to five clients. In this mode, data is saved only on the server. Connected clients can view live data, or can pause and replay saved data without affecting operation for other clients.

## Licensing

GS Works 8 is licensed software. For details on obtaining a license key, see the release notes.

## Latency

Although GS Works 8 is a real-time system, it experiences latency when used with Microsoft Windows, and also due to buffering time.

## Data sources

### Ethernet data from:

XidML 2.41 configuration files (KSM-500 only)
IENA packets

XidML 3.0 configuration files (DAS Studio only)
IENA packets
iNET-X placed packets
iNET-X parser packets: ARINC-429 (KAD/ABM/102), MIL-STD-1553 (KAD/MBM/101), CAN (KAD/CBM/105), and TTP (KAD/TBM/101)

PCAP files[1]: from network recorder packets (NET/REC/xxx, SSR/CHS/xxx)

### PCM data from:

SAM/DEC/007

PCI bit synchronizers and PCM decommutators

Ground station PCI boards[2] supported include the following:

| | | |
|---|---|---|
| GTS/BSC/003/C | GTS/BSC/004/C | GTS/BSC/005/C |
| GTS/BSC/006/C | GTS/DEC/003/C | GTS/DEC/004/C |
| GTS/DEC/005/C | GTS/DEC/006/C | GTS/FSC/003/C |
| GTS/FSC/004/C | GTS/FSC/005/C | GTS/FSC/006/C |

1. PCAP files generated by Acra network recorders contain IENA and iNET-X (placed) parameters. For details on packet structure, see TEC/NOT/067 - IENA and iNET-X packet payload formats.

### CompactFlash® data from:

KAM/MEM/003[3]
KAM/MEM/004[4]
KAM/MEM/103

NOTE: GS Works 8 supports two ground station boards in the same PC.

## GS Works 8 displays

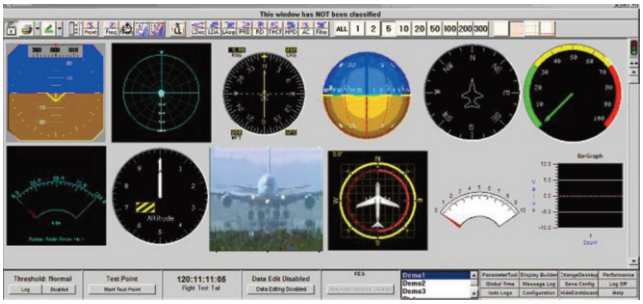


Figure 2: Standard GS Works 8 display screens

## ActiveX controls

- Altimeter
- Altitude indicator
- Audio player
- Bar graphs
- Dial graphs
- Event monitor
- GPS clock
- HTML viewer
- LED display
- Stop watch
- Video player (KAD/VID/103.and KAD/VID/106 parameters can be played back using ActiveX. There is no audio support for KAD/VID/106. For video codec details, see GS Works 8 release notes)
- CVSD audio player (KAD/VDC/001 parameters can be played back using ActiveX)

2. GTS SDK must be installed when using ground station boards. For more information, see GS Works 8 release notes.
3. KAM/MEM/003 from revision /C onwards supported.
4. KAM/MEM/004 supported only when using raw data files extracted with the kFlashcardXID utility.

### Situational awareness

- Altitude direction indicator
- Horizontal indicator
- Heading indicator
- Stick force
- Force gauge
- Standard gauge

### Input objects

- Action control
- Button
- Dial
- Drop down
- Slider
- Spin box
- Text
- Toggle switch

### Drawing primitives

- Circle
- Mesh
- Polygon
- Rectangle
- Triangles
- Text
- Picture
- Line
- Overlays

### Core analysis displays[5]

| PARAMETER | AUTO SCALE | PEAK HOLD | ENVELOPES | THRESHOLDS |
|---|---|---|---|---|
| Digital strip chart | * | - | - | * |
| Cross plot | 2D | Maximum load | 2D LL | - |
| Frequency plot | * | * | 1D | - |
| Nyquist | 2D | - | - | - |
| Octave band | * | * | - | - |
| Slider | * | * | 1D | * |
| Alphanumeric | - | * | - | * |
| Annunciator | - | * | - | * |
| Frequency response | * | * | 1D | - |

5. * = Supported.

## Miscellaneous

- Display panels
- Display folders
- Summary plots
- Labels

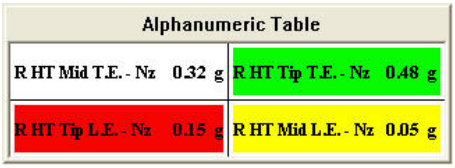



Figure 3: Sample GS Works 8 information panels

## Display building

- Display builder drag and drop user interface
- Easily add or modify displays at any time
- Save complex objects to the toolbox library
- Build complex screens with layers
- Generate visual signals via the dynamics wizard
- Use ActiveX properties as parameters
- Create text inputs that drive displays
- Dynamic display customization via the property sheet
- Zoom, translate and point selection reset
- Alignment, Z order and grouping
- Global menu options

# Analysis

## Data reduction techniques

- Random decrement (real time and fixed block)
- Pseudo randomdec (auto and fixed block)
- Auto correlation (fixed block)
- Wavelet denoise (fixed block)

## Frequency plots

- Fast fourier and chirp-zoom transform
- Multiple block sizes 64 through 65,536
- Selective area sum algorithm
- Half-power damping with peak picking
- 2D, 3D or waterfall
- Peak hold can hold indefinitely or decay
- Rational fraction polynomial curve fit
- Phase and gain margin assessment
- Octave and 1/3 octave band displays
- Magnitudes scaled in RMS or SP-dBL
- Coherence for FRF data validity assessment
- Frequency plot options
- Power spectral density and auto spectrum scaling

## General features

- Data comparison
- Global cursor
- Matlab plug-ins
- Bus messages
- Load limits

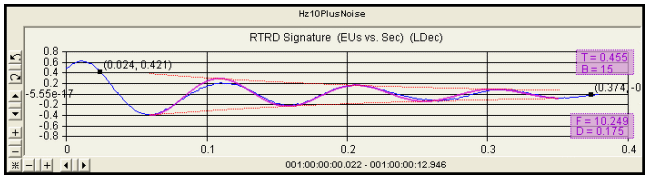



Figure 4: Sample GS Works 8 frequency plot

## Feedback/stability analysis

- Nyquist plot unit circle
- Phase and gain margins
- Closed/open loop analysis

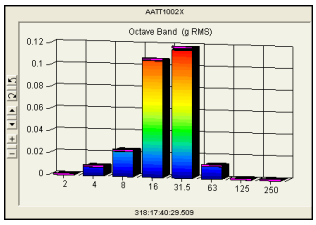



Figure 5: Sample GS Works 8 graph for analysis of acquired data

## Windowing types

- Rectangular
- Hanning
- Hamming
- Blackman
- Flat top
- Kaiser-bessel

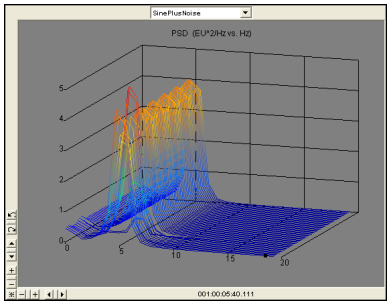


Figure 6: Sample GS Works 8 graph for analysis of acquired data

## Derived equation engine




Figure 7: Sample derived parameter

- Arithmetic
- Conversions
- Boolean
- Byte swap
- Concatenation
- Bitwise
- Interpolation
- Signal generation
- Statistics
- Time functions
- Conditional
- Parameter default get/set
- Exponential/logarithmic
- Trigonometric
- Decimation
- Add-in functions

## Data editing

### Spike detection/correction

- Correct single spurious data points
- Slope detection
- Absolute value change detection

### Wild point editing

- Replaces bad data with user specified value

### Digital filtering

- Butterworth
- Elliptic
- Sign change
- Nulling
- Custom

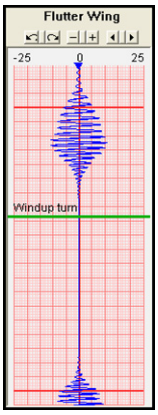



Figure 8: Sample horizontal stripchart

In addition to units displayed, stripcharts are accompanied by a legend (displaying the legend displays the parameter unit beside the parameter name, along the top of the stripchart).

## Data marking

### Event marking

- Create visual markers dynamically
- Add dynamic event markers
- Add a pre-defined comment
- Go to time feature

### Test point/maneuver marking

- Mark by test point ID, maneuver, description or none
- Auto stop
- Log settings
- Drop down settings
- Actions on start
- Actions on stop
- Group settings

## Data export

- Define data groups in advance
- Export of Comma-Separated Values (CSV) files

## Export to Excel

- Specify number of rows; multiple worksheets

### Export to Matlab

- Export directly into Matlab or .mat file
- GS Works 8 can produce Matlab EXecutable (MEX) files from GS Works 8 data files. When compiled, MEX files can be run from within Matlab.

### Export default options

- Decimation factor
- Time format
- Time precision
- Disable filters
- Name modification
- Set sample rate
- Parameter naming
- Export directory
- Data precision
- Header type
- Separator character

## Information logging

- Information from analyses automatically recorded
- Recall and display logged data
- Record data values of pre-selected parameters
- Save logged data to a file, window or clipboard

### GS Works 8 logs

- Event markers
- Test points
- Thresholds
- Data edit
- Selections
- Analysis
- Loads summary
- Flutter summary

## The Configuration Tool

- Single database system
- File can be accessed by multiple users simultaneously
- Organized by tables
- Import/export table information
- Editing capabilities similar to Excel

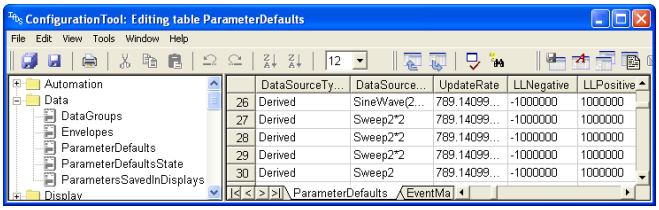



Figure 9: Sample setup in Configuration Tool window

### Tools

- Create mission attribute parameters
- Global parameter search and replace
- Automate parameter selection for data groups
- Validate equations, data to parameters, and displays
- Test point import wizard
- Create desktop summary reports
- Create dynamic envelopes

### The parameter defaults table

- Stores all default parameter attribute information
- Apply equation changes to all applicable displays

## Organization

### The desktop

- Create multiple analysis windows on a desktop
- Create multiple desktops in the same config file
- Import/export

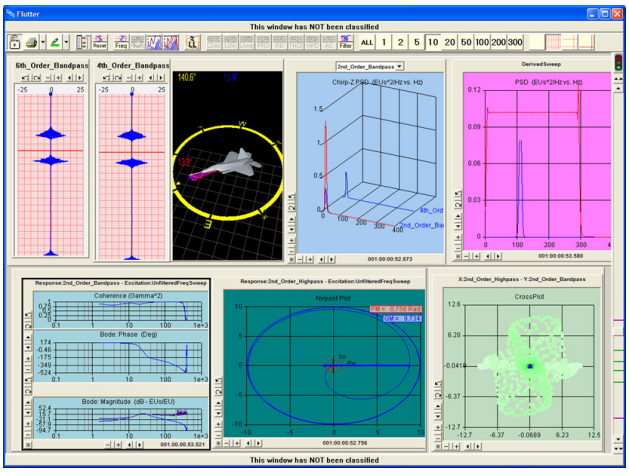



Figure 10: Sample customization of the GS Works 8 desktop

### Analysis windows

- Create multiple displays
- Assign classifications

- Print display or window
- Add-in tools
- Freeze/unfreeze
- Toolbar buttons
- Play speed
- Import/export

### Analysis window scroll bar

- Go to time
- Global scroll bar
- Data search tool
- Play from here

### Dashboard - GS Works 8 task bar

- Access tools quickly
- Enable thresholds
- Start/stop test points
- Monitor performance
- View IRIG time
- Enable data editing
- Change windows
- Save config file

### The parameter tool

- Add parameters to displays and controls easily
- Identify displays with a selected parameter
- View parameter defaults for a selected parameter
- Quick find feature

## System extensibility

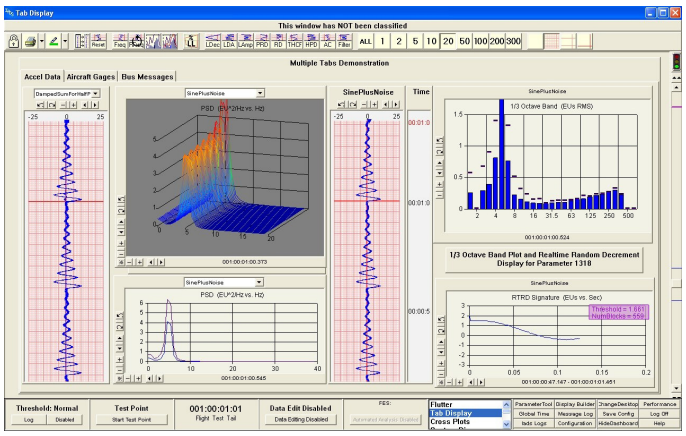
### Automation interface

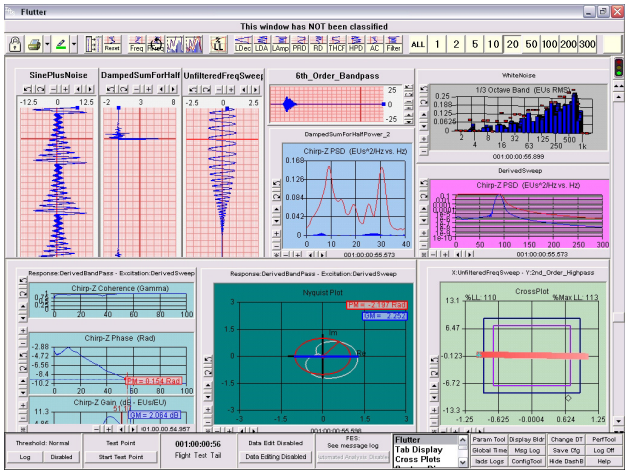
- Build scripts using VB, C++ or C#
- Create analysis plug-ins
- Add derived parameter functions
- Matlab interface

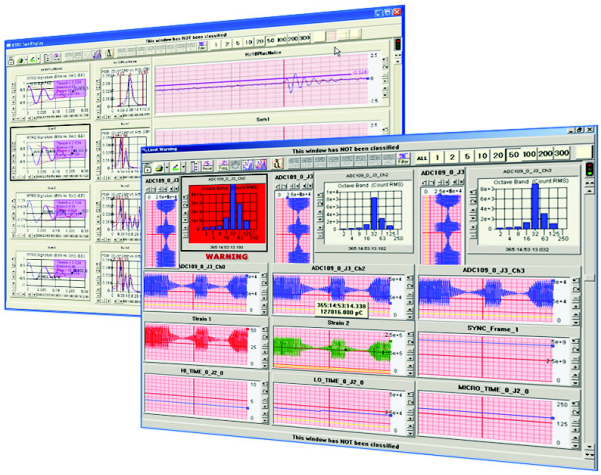
### Application Programming Interface (API)

- GS Works 8 configuration file API
- ActiveX displays
- GS Works 8 data file API
- Sample projects

# Typical user-defined displays




# Minimum recommended system requirements

| | |
|---|---|
| Operating system | Windows XP Professional SP3 32-bit or Windows 7 32-bit |
| Processor | 2.4GHz Dual Core |
| Hard-disk | 80GB |
| RAM | 2GB |
| Input device | Keyboard; mouse (if using GUIs) |
| Screen | 1024 x 768 (if using GUIs) |
| FSB speed | 1333MHz/1066MHz/800MHz |
| Graphics card | nVidia GeForce 6xxx+ or nVidia Quadro 3xxx Video (PCI Express x16) |

# Ordering information

| PART NUMBER | DESCRIPTION |
|---|---|
| SWP/GSW/008 | Real-time and post-test data visualization and analysis software |
| SVS/SWM/010 | GS Works 8 maintenance agreement (includes support and release upgrades), 12-month duration, 15% of installed software value |

# Revision history

| REVISION | DIFFERENCES | STATUS |
|---|---|---|
| GS Works 8.1.1 | Supports GTS/DEC/004 and GTS/DEC/006 (revision C onwards), ARINC-429 packetizers, CAN packetizers, MIL-STD-1553 packetizers, TTP packetizers, and H.264 video coding format | Recommended for new programs |
| GS Works 7.3 | Supports GTS/DEC/003 and GTS/DEC/005 (revision /C onwards), Acra network recorders and XidML 3.0 | Not recommended for new programs |
| GS Works 6.3 | Supports GTS/DEC/003 and GTS/DEC/004 | Not recommended for new programs |
| GS Works 6.0 | First release | Not recommended for new programs |

# Supporting software

| SOFTWARE | DETAILS |
|---|---|
| DAS Studio 3 | User interface for setup and management of data acquisition, network switches, recorders and ground stations in an integrated environment |
| GS Studio 3 | User interface for setup and management of ground stations products |
| GTS SDK | Software development kit for GTS-500 boards |
| KSM-500 | Supported by the KSM-500 suite of software tools |

# Related documentation

| MODULE | DETAILS |
|---|---|
| DOC/DBK/001 | KSM-500 Databook |
| DOC/MAN/030 | DAS Studio 3 User Manual |
| DOC/MAN/033 | GS Studio 3 User Manual |
| TEC/NOT/067 | IENA and iNET-X packet payload formats |

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