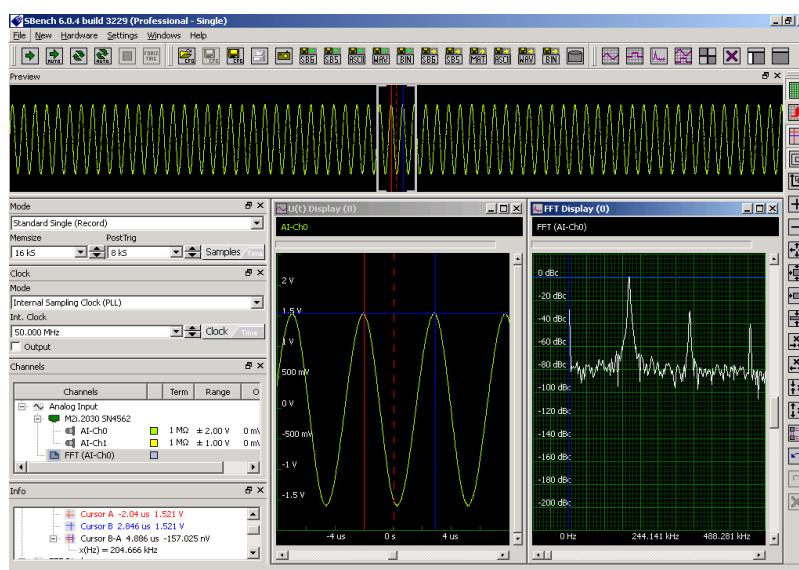


## SBench 6 – The fast and easy data acquisition software

### General Information

SBench6 provides a way for the user of Spectrum hardware to have a powerful and versatile software package for viewing, logging and post processing of captured signals, it is also able to output signal data from file, via Spectrum's analogue and digital generator cards. No text programming is required and the set up is very rapid, an easy-to-use pull down menu allows full control over the hardware set up, logging settings, type and size of displays, export functions and post processing. Here is a summary of the features:-

- No text programming required, quick and easy pull down menus
- Designed to handle GBytes of data both for signal acquisition and output.
- Fast data preview function of big files; isolate areas and zoom in!
- Handles analog, digital and frequency spectrum data
- Y(t), FFT and logic analyzer displays
- Enhanced display cursor functions with dynamic XY values
- Integrated signal analysis functions
- Import and export filter for data files
- Free Base version, (free Professional version with digitizerNETBOX!)
- Free telephone and e-mail technical support
- Fully functional 30 starts Professional version trial available, easily upgrade from Base.
- Available for Windows XP/Vista/Win7, 8 & 10 plus Linux KDE/Gnome



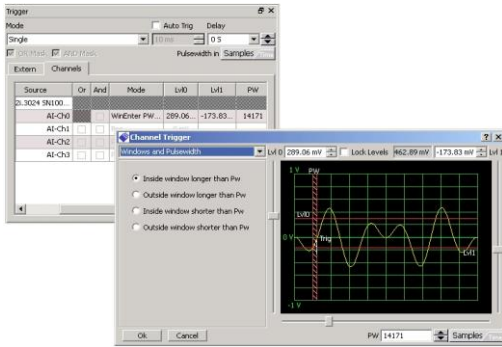
SBench6 supports all current *Spectrum* analogue and digital cards (current list follows on page 3). Windows and the Linux version are equally provided for, both versions being based on the same source code.

### Using SBench6

#### Hardware set up windows

All hardware settings can be accessed using neat yet sophisticated setup windows for many aspects of the card operation, this includes sample (clock) rate, desired number of samples, trigger type and card mode (short duration capture/generation or continuous streaming). Individual card channel amplification and impedance can be set and any channel disabled to reduce memory requirements. The target for data storage can be selected, be it cards own memory or the PC memory. If more than one card is used in a system individual sampling rate and memory settings can be assigned (licence option *SBench6-Multi required*).

## Triggers



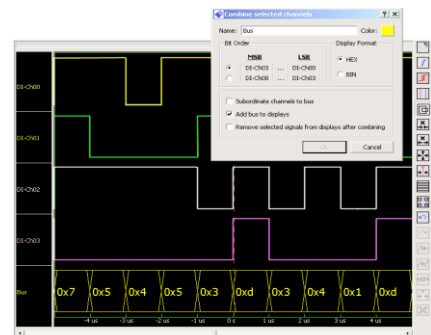
One of the main strengths of Spectrum hardware is the versatility and variety of available trigger options. SBench allows access to all the trigger options including edge, level, steepness, pulse width and window. New for version 6 are illustrative windows to help in the selection of trigger type, level(s) and time (pulse width).

All available trigger sources can be accessed from SBench 6, including OR and AND combinations of channel triggers and external sources. Even trigger sources that are only available as an option, such as BaseXIO, have been incorporated into SBench 6 allowing the set up any trigger combination that is supported by the hardware.

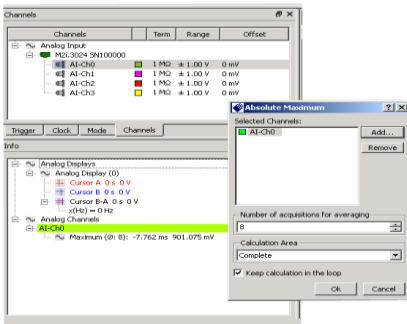
## Signal display

The SBench screen is comprised of a signal overview window and one or more additional windows to zoom in on interesting sections. Whilst zoomed in, the overview window has an active frame giving the user the location of zoom, this makes searching for interesting / anomalous events fast and easier. The displays in SBench can deal with signals from **analogue Spectrum A/D**, D/A and digital I/O cards. For later more specialised analog signal analysis **Fast Fourier** and **histogram** displays are provided. All zoom windows have Precise XY cursors, with two simultaneous cursors allowing amplitude max/min comparisons and frequency analysis.

For SBench version 6 the introduction of a **logic analyzer** enhancement to the digital vs. time display allows signals from any digital inputs to be combined into a bus timing diagram, so allowing the logic state on individual bits to be compared, not just in trace form but with bus-wide hexadecimal or binary values too - which ever the viewer prefers. The user can individually colour and name traces for best clarity.

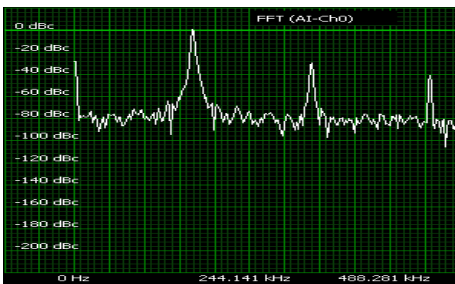


## Analysis, calculation and measurement



A special window shows extended information on the current cursor positions on the signal trace. With only one mouse click it is possible to use additional calculation routines on any signal. The signal used as calculation base can be any acquired signal, any loaded signal or even a freshly calculated signal like FFT. The calculation area can be selected to be the whole signal, visible display window area, or that defined by two cursor positions. The version overview on the next page shows the available calculation routines and suggestions for new calculation routines are always welcome!

## FFT Analysis and Display (Professional Version)



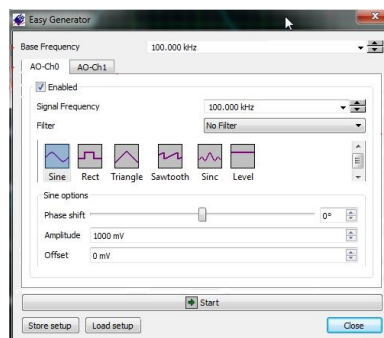
Using the FFT calculation adds a **Spectrum analyzer** to SBench's time-based oscilloscope functionality, with FFT analysis providing the frequency domain information of the signal. The input signal can be weighted by different window functions such as Hanning, Hamming, Blackman, (many being available). The resulting FFT plot is shown as dBc, dBFS, dBuV, dBm or plain voltage. The FFT signal can be used for further calculations, such as SNR, THD, MAX value – with others available. A harmonics cursor is available for FFT display in addition to the standard measurement cursor. This cursor shows a programmable number of harmonics based on the current cursor position.

## Data Storage

The SBench6 Engine controls the complete data transfer to the PC. This software component has been designed for fast data transfer. The strict separation within SBench between the display layer and hardware control provides maximum performance for data acquisition; this allows the same average streaming speed that is also possible with standard C++ text programming. Data is stored in an intelligent and compact data format allowing maximum system performance. To make post-processing of data even more manageable, the Professional version allows data to be automatically split into multiple files at set size intervals. Capture to the limit of the cards on-board memory can be utilised with no restriction on sample speed. Long-term continuous multi-GBYTE data storage to computer drives is also possible and when combined with RAID real-time transfer speeds in excess of 100 MB/s are easily achieved. Data exports are possible, currently SBench5 & 6, MATLAB, ASCII, Wave (\*.wav) and binary.

## Generating signals

Analogue of digital signal generation can be from data already captured by Spectrum card (as described in the section above), or by importing external file data (Professional version) from a number of common file formats such as binary .Wav and ASCII. For analogue waveform generation cards SBench also provides a powerful **Function Generator** capable of generating new arbitrary waveforms from user defined mathematical formulae. Signal frequency value, replay length and scaling are easily set from within numeric boxes. Last but not least there is also the **Easy Generator** interface (see image on the right). This can be used to set output waveforms of a standard type (sine, rectangle, triangle, sawtooth, sinc and level), with common parameters such as offset, amplitude or filter settings easily changed by simple numeric entry and mouse click. The generator setting can be stored too for simple fast retrieval.



## Supported Cards and Features

The following table lists all cards and features that are supported by SBench 6. Note that it may be necessary to purchase a Professional licence to use a feature, so please refer to the following version overview for more information. SBench 6 is under permanent development - please check the latest version of the data sheet on the Internet at [www.spec.de/sbench6.html](http://www.spec.de/sbench6.html) to see which new features are supported

### Supported Cards

M2i.20xx + M2i.20xx-Exp series	M2p.59xx series	digitizerNETBOX - all models
M2i.30xx + M2i.30xx-Exp series	M3i.21xx + M3i.21xx-Exp series	
M2i.31xx + M2i.31xx-Exp series	M3i.32xx + M3i.32xx-Exp series	
M2i.40xx + M2i.40xx-Exp series	M3i.41xx + M3i.41xx-Exp series	MI/MC/MX.20xx series
M2i.46xx + M2i.46xx-Exp series	M3i.46xx + M3i.46xx-Exp series	MI/MC/MX.30xx and 31xx series
M2i.60xx + M2i.60xx-Exp series	M3i.48xx + M3i.48xx-Exp series	MI/MC/MX40xx and MX.45xx series
M2i.61xx + M2i.61xx-Exp series	M4i & M4x.22xx series	MC/MX.46xx and 47xx series
M2i.70xx + M2i.70xx-Exp series	M4i & M4x.44xx series	MI/MC/MX.60xx series
M2i.47xx + M2i.47xx-Exp series	M4i & M4x.66x series	MI/MC/MX.70xx series
M2i.49xx + M2i.49xx-Exp series	M4i.77xx series	MX.9010

### Supported Features

All analogue input settings (range, termination, coupling, offset)	Multiple Recording/Multiple Replay
All analogue output settings (offset, range, filter, stop level)	Gated Sampling/Gated Replay (not M3i)
Synchronization Star-Hub (one system)	All trigger settings
Digital Inputs/Outputs	All clock settings
All card memory options up to 2 GSample (4 Gbyte)	Standard + FIFO Mode settings
BaseXIO Trigger Lines (M2i and M3i only)	All memory, pretrigger, posttrigger, segment settings
Multi-purpose I/O lines (M2p, M3i & M4i only)	Timestamp of trigger events (all except MI/MC/MX series)
ABA Mode (all except MI/MC/MX series)	

## Version Options

The Base version (with no time limit) is included in the delivery of each card and can also be freely downloaded from Web page [www.spec.de/sbench6.html](http://www.spec.de/sbench6.html). The Professional version requires a licence purchase, however it is included without extra charge with all digitizerNETBOX models. Updates within the SBench version can be downloaded from the web page at any time free of charge to take advantage of software operational improvements. The following table provides a summary of the functions and features provided within each of the versions.

### U.K. sales and support for SBench and all Spectrum instrumentation:

DataQuest Solutions Ltd. Redcroft House, 10 Holme Lane, Ruskington, Lincolnshire. NG34 9DN  
Tel: 01526 557171 Email: [info@dqsolutions.co.uk](mailto:info@dqsolutions.co.uk) Web: [www.dqsolutions.co.uk](http://www.dqsolutions.co.uk)

	Base	Professional
<b>Operating Systems</b>		
Windows XP/Vista 32 Bit	Supported	Supported
Linux + KDE Environment	Supported	Supported
Linux + Gnome Environment	Supported	Supported
<b>Card + Configuration</b>		
Single Card	Supported	Supported
Multiple Cards (one system)	n.a.	Option -Multi
License	free	purchase
Configuration Load/Store	Supported	Supported
<b>Modes and Features</b>		
Standard Acquisition	Supported	Supported
FIFO Acq of several GSamples	n.a.	Supported
Multiple Recording	Simple display	Segmented display
Gated Sampling	Simple display	Segmented display
ABA Mode	Simple display	Segmented display
Timestamp	n.a.	Supported
Digital Inputs	Supported	Supported
BaseXIO trigger lines	n.a.	Supported
<b>Setup Functions</b>		
Channel Setup	Included	Included
Clock Setup	Included	Included
Trigger Setup	Included	Included
Mode + Memory Setup	Included	Included
Streaming Setup	n.a.	Included
<b>Display Functions</b>		
Preview Display	Included	Included
Analog Waveform Display	Included	Included
Digital Waveform Display	Included	Included
Digital Signals Bus Feature	n.a.	Included
Digital Signal Jumps	n.a.	Included
History Mode	Included	Included
FFT Display	n.a.	Included
FFT Signal Harmonics Cursor	n.a.	Included
Cursor Measurement Functions	Included	Included
Physical Units	n.a.	Included
Layout/Auto Layout Functions	Included	Included
Define Shortcuts	Fixed set	Configurable

	License
<b>File functions</b>	
Auto Storage	Prof.
Split Files	Prof.
<b>Acquisition format</b>	
SBench 6	Base.
Wave File (*.wav)	Prof.
Pure Binary File	Prof.
<b>Export Functions</b>	
Screenshot	Prof.
SBench 6	Base
MATLAB	Prof.
SBench 5.	Prof.
ASCII	Prof.
Wave File (*.wav)	Prof.
Pure Binary File	Prof.
Signal cut-off	Prof.
<b>Import Functions</b>	
SBench 6	Base
SBench 5	Prof.
ASCII	Prof.
Wave File (*.wav)	Prof.
Pure Binary File	Prof.

	License
<b>Basic Calculations</b>	
Min/Max	Base
Average	Base
Peak-Peak	Base
Effective	Base
Signal Info	Base
<b>Cycle based Calc</b>	
Number of Cycles	Prof
Frequency/Period	Prof
Duty Cycle	Prof
Pos/Neg Width	Prof
Cycle Min/Max	Prof
Cycle Average	Prof
Cycle Peak-Peak	Prof
Cycle Effective	Prof
Cycle Rise/Fall Time	Prof
<b>Math Signals</b>	
ADD/SUB/MUL/DIV	Prof.
AND/OR/XOR	Prof.
NAND/NOR/XNOR	Prof.
Copy as Reference	Prof.
Conversion A-to-D	Prof.
Conversion D-to-A	Prof.
Signal Averaging	Prof.
Multi Averaging	Prof.
<b>Frequency Calc</b>	
FFT	Prof.
SNR/THD/SINAD	Prof.
SFDR, ENOB	Prof.
<b>Enhanced Calc</b>	
RMS Noise	Prof.
Histogram	Prof.

SBench 6 can be used with a *Spectrum* virtual demo card to allow a test of all software options in the Professional version without time limitation. If you would like to test SBench 6 Professional with your pre-purchased *Spectrum* hardware it is possible to obtain a demo licence that can be used for 30 starts of the Professional version. Newly delivered cards automatically come with this Professional trial on CD.

A free download of this software plus a PDF copy of the manual is available at:-  
<http://www.spectrum-instrumentation.com/de/downloads/drivers>

### Order information

This shows all versions as well as the option for a system of multiple cards, please read the ordering hints below for further information.

Order no.	
SBench6	Base version which support standard mode for one card
SBench6-Pro	Professional version for one card: FIFO mode, export/import, calculation functions
SBench6-Pro3	3 licences of Professional version for one card each
SBench6-Pro5	5 licences of Professional version for one card each
SBench6-Pro10	10 licences of Professional version for one card each
SBench6-Multi	Option Multiple Cards: needs Professional version. Handles multiple synchronized cards in one system.
SBench6-Mul3	3 licences of option Multiple Cards
SBench6-Mul5	5 licences of option Multiple Cards
SBench6-Mul10	10 licences of option Multiple Cards

### Ordering hints

- The software licence is stored on-board the Spectrum card and cannot be transferred to another card
- Each single independent card or digitizerNETBOX needs its own Professional licence
- Systems with multiple synchronised cards (Star-Hub) only need one Professional (*Pro*) and one Multi (*-Multi*) licence
- Systems of multiple synchronised cards that are equipped with a Professional and Multi licence can be extended with no extra cost
- Licence packages – with multiple licences - can be combined in any way to get the desired number of licences

### **U.K. sales and support for SBench and all Spectrum instrumentation:**

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