Technical Specifications

Max. Carrier Freqy.: The smaller of 2.5MHz or the maximum for the selected waveform.

Carrier Waveforms: All standard and arbitrary except pulse and pulse train.

are expanded or condensed to exactly 4096 points and DDS techniques are used to

software for Windows is supplied.

User's external filter defines bandwidth and response.

Digital noise generated by a 35-bit linear feedback register clocked at 100MHz.

Output Filter: Selectable between 40MHz Elliptic, 20MHz Bessel or none.

Waveform Size: 65536 (64K) points maximum, 8 points minimum.

Digital noise generated by a 35-bit linear feedback register clocked at 100MHz.

Amplitude Flatness: ±0.2dB to 1MHz; ±0.4dB to 40MHz.

Non-harmonic Spurii: <-60dBc to 1MHz, +6dB/octave 1MHz to 40MHz.

Trigger Rate: 0.005Hz to 100kHz internal, dc to 1MHz external.

Rise and Fall Times: <8ns

Range (Resolution): 0.1 mHz to 500 kHz. (0.1mHz or 7 digits)

Triangle

Range (Resolution): 1 mHz to 50 MHz. (1mHz or 7 digits)

Sine, Cosine, Haversine, Havercosine

Temperature Stability: Typically <1 ppm/

Frequency Accuracy: Better than 10 ppm for 1 year.

Phase Lock Out: Used to phase lock two or more generators. Produces a positive

channel.

Dotted line offset.

START/STOP PHASE: ± 360° settable with 0.1° resolution, subject to waveform fre-

quency step at end of sweeps, with a narrow 1V pulse at the marker point.

Note: The expressions used for each section of a waveform are retained and can be

stored in libraries. A default library is created for each project which includes a number of useful examples in-

cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

Ramp

EXPRESSION LIBRARIES

The following mathematical operators are available within the expression editor: Add, sub-

tract, multiply, divide, square, square root, floor, ceil -

ln, log10, loge, e

sin, cos, arcsin, arccos, abs, log 10 , log e ,e

Note: The expressions used for each section of a waveform are retained and can be

stored in libraries. A default library is created for each project which includes a number of useful examples in-

cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

WAVEFORM BUILDING TOOLS

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
cluding common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.

The mathematical expressions used for waveform creation can be stored in libraries. A
default library is created for each project which includes a number of useful examples in-
including common waveforms.
40MHz sinewaves from a low cost DDS generator

The TG4001 provides high purity sinewaves at up to 40MHz and square waves at up to 50MHz. No other DDS generator offers this performance at this price. The output amplifier has a bandwidth approaching 100MHz ensuring that waveform quality is excellent right up to the frequency limits. Amplitude flatness is better than ±0.2dB to 1MHz and ±0.4dB to 40MHz. Low noise design ensures minimum waveform aberrations and provides high waveform quality even at minimum output amplitude.

High speed arbitrary waveforms

In addition to its eleven ‘standard’ waveforms, the TG4001 can generate arbitrary waveforms of any length between 8 and 65,536 points at speeds up to 100M/s. Up to four arbitrary waveforms can be stored within the instrument.

Waveform Manager Plus software for Windows is supplied for waveform creation and editing on a PC. Waveforms are downloaded to the generator using RS232, USB or GPIB.

Pulse train generation

As well as standard and arbitrary waveforms, the TG4001 can generate pulse trains.

A pattern of up to 10 pulses can be quickly defined with each pulse having its own amplitude, width and delay. The whole pulse train pattern can then be re-played at a user defined repetition rate.

RS-232, USB or GPIB interfaces

The TG4001 includes both an RS-232 interface and USB interface as standard.

These interfaces can be used for remote control of all of the instrument functions and for storing instrument set-ups as well as downloading arbitrary waveforms.

A GPIB (IEEE-488) interface is also available as a retro-fittable option.

Synchronisation

The auxiliary output socket can provide any one of six different Synchronisation signals.

Waveform Sync provides square wave at the frequency of the main output.

Burst Done produces a pulse coincident with the last cycle of a burst.

Sweep Sync outputs a pulse at the start of each sweep to synchronise an oscilloscope or recorder.

Sweep Marker provides an additional output pulse for use as a marker in sweep mode.

Phase Lock Out can be used to phase lock two or more generators. Produces a positive edge at the 0° phase point.

Trigger Out provides a replica of the trigger signal which can originate from the trigger input socket, the internal trigger/gate generator, the manual trigger key, or the bus interface.

Wide range sweep

All waveforms can be swept over their full frequency range at a rate variable between 1 milliseconds and 15 minutes.

Sweep can be linear or logarithmic, single or continuous. Single sweeps can be triggered from the front panel, the trigger input, or the digital interfaces.

A sweep marker is provided that is adjustable whilst sweep is running. The markers can provide a visual indication of frequency points on a ‘scope or chart recorder.

Amplitude modulation and signal summing

Amplitude modulation (VCA) and suppressed carrier modulation (SCM) are available for all waveforms using the rear panel modulation input.

A separate signal summing input is also provided, allowing waveforms from an other signal source to be amplified and summed with the main output.

Triggered & gated modes, built-in trigger generator

All waveforms are available as a triggered burst whereby each trigger edge will produce one burst of the carrier. Start and stop phase is fully variable.

Both Triggered and Gated modes can be operated from the internal trigger generator, from an adjacent channel, an external source or a key press or remote bus command.

The trigger generator is variable between 5.005 Hz and 100kHz, and the signal is available as a separate output if required.

Tone switching & FSK

The TG4001 can provide triggered switching between up to 16 frequencies of standard or arbitrary waveforms.

Tone switching modes can be gated, triggered or FSK using any trigger source.

Frequency Shift Keying provides phase coherent switching between two selected frequencies at a rate defined by the switching signal source.

In tone switching mode the generator is set to switch between a number of different frequencies in response to a trigger signal.

Quick recall of settings

The TG4001 provides nine memories for storing settings (plus one memory for automatically storing the settings at switch off).

Because all parameters are controlled electronically, the memories store the complete set-up of the instrument.

Ease of use

The TG4001 is particularly easy to use. All of the main information is clearly displayed on a backlit LCD with 4 rows of 20 characters. Sub menus are used for the modulation modes and other complex functions.

All parameters can be entered directly from the numeric keypad. Alternatively most parameters can be incremented or decremented using the rotary encoder for quasi-analogue control.

Frequency or period entry

The generator frequency can be set in terms of either frequency or period.

Numeric entry can be floating point using whatever units the operator prefers, or can be done in exponent format.

Flexible amplitude entry

Amplitudes can be entered in terms of peak to peak voltage, RMS voltage or dBm.

The output amplitude can be set in terms of either the voltage into a 50Ω or 600Ω termination, or in terms of the source EMF (for a high impedance load).

Waveform Manager Plus

Waveform Manager Plus (supplied) provides all of the features needed for the creation, manipulation and management of arbitrary waveforms within a single Windows based program.

Choice of interfaces

The program supports RS232, USB and GPIB interfaces for download and upload.

Upload from DSOs

The program can read several file formats and supports waveform import via clipboard allowing it to accept waveform files from most DSOs and digisets.

A full suite of tools

Powerful mathematical functions are combined with on-screen drawing tools and clipboard functions to enable virtually any waveform to be created either from scratch, or from the editing of existing waveforms.

Waveforms can be built in any number of sections using any combination of the following: Standard waveforms, mathematical expressions, drawn waveforms, uploaded waveforms, imported waveforms (using clipboard), existing stored waveforms.

Waveforms can be viewed with variable zoom and printed with annotation. Waveform management tools include Projects and Libraries for professional organisation.
A high performance 40MHz function generator with arbitrary waveform capability up to 100MS/s

40MHz sinewaves from a low cost DDS generator

The TG4001 provides high purity sine waves at up to 40MHz and square waves at up to 50MHz. No other DDS generator offers this performance at this price. The output amplifier has a bandwidth approaching 100MHz ensuring that waveform quality is excellent right up to the frequency limits. Amplitude flatness is better than ±0.2dB to 1MHz and ±0.4dB to 40MHz. Low noise design ensures minimum waveform aberrations and provides high waveform quality even at minimum output amplitude.

High speed arbitrary waveforms

In addition to its eleven ‘standard’ waveforms, the TG4001 can generate arbitrary waveforms of any length between 8 and 65,536 points at speeds up to 100MS/s. Up to four arbitrary waveforms can be stored within the instrument. Waveform Manager Plus software for Windows is supplied for waveform creation and editing on a PC. Waveforms are downloaded to the generator using RS232, USB or GPIB.

Pulse train generation

As well as standard and arbitrary waveforms, the TG4001 can generate pulse trains. A pattern of up to 10 pulses can be quickly defined with each pulse having its own amplitude, width and delay. The whole pulse train pattern can then be re-played at a user defined repetition rate.

RS-232, USB or GPIB interfaces

The TG4001 includes both an RS-232 interface and USB interface as standard. These interfaces can be used for remote control of all of the instrument functions and for storing instrument set-ups as well as downloading arbitrary waveforms. A GPIB (IEEE-488) interface is also available as a retro-fit able option.

Synchronisation

The auxiliary output socket can provide any one of six different Synchronisation signals. Waveform Sync provides square wave at the frequency of the main output. Burst Done provides a pulse coincident with the last cycle of a burst. Sweep Sync outputs a pulse at the start of each sweep to synchronise an oscilloscope or recorder. Sweep Marker provides an additional output pulse for use as a marker in sweep mode. Phase Lock Out can be used to phase lock two or more generators. Productions a positive edge at the 0° phase point. Trigger Out provides a replica of the trigger signal which can originate from the trigger input socket, the internal trigger/gate generator, the manual trigger key, or the bus interface.

Wide range sweep

All waveforms can be swept over their full frequency range at a rate variable between 1 millisecond and 15 minutes. Sweep can be linear or logarithmic, single or continuous. Single sweeps can be triggered from the front panel, the trigger input, or the digital interfaces. A sweep marker is provided that is adjustable whilst sweep is running. The markers can provide a visual indication of frequency points on a scope or chart recorder.

Amplitude modulation and signal summing

Amplitude modulation (VCA) and suppressed carrier modulation (SCM) are available for all waveforms using the rear panel modulation input. A separate signal summing input is also provided, allowing waveforms from another signal source to be amplified and summed with the main output.

Triggered & gated modes, built-in trigger generator

All waveforms are available as a triggered burst whereby each trigger edge will produce one burst of the carrier. Start and stop phase is fully variable. Both Triggered and Gated modes can be operated from the internal trigger generator, from an adjacent channel, an external source or a key press or remote bus command. The trigger generator is variable between 0.005 Hz and 100kHz, and the signal is available as a separate output if required.

Tone switching & FSK

The TG4001 can provide triggered switching between up to 16 frequencies of standard or arbitrary waveforms. Tone switching modes can be gated, triggered or FSK using any trigger source. Frequency Shift Keying provides phase coherent switching between two selected frequencies at a rate defined by the switching signal source. In tone switching mode the generator is set to switch between a number of different frequencies in response to a trigger signal.

Quick recall of settings

The TG4001 provides nine memories for storing settings (plus one memory for automatically storing the settings at switch off). Because all parameters are controlled electronically, the memories store the complete set-up of the instrument.

Ease of use

The TG4001 is particularly easy to use. All of the main information is clearly displayed on a backlit LCD with 4 rows of 20 characters. Sub menus are used for the modulation modes and other complex functions. All parameters can be entered directly from the numeric keypad. Alternatively most parameters can be incremented or decremented using the rotary encoder for quasi-analogue control.

Frequency or period entry

The generator frequency can be set in terms of either frequency or period. Numeric entry can be floating point using whatever units the operator prefers, or can be done in exponent format.

Flexible amplitude entry

Amplitudes can be entered in terms of either frequency or period. The output amplitude can be set in terms of either the voltage into a 50Ω load or 600Ω termination, or in terms of the source EMF (for a high impedance load).

0.1mHz to 40MHz range, 10 digits or 0.1mHz resolution.

1ppm stability and <10 ppm absolute accuracy for one year.

11 standard waveforms including sine, square, triangle, haversine, ramp, pulse, sin(x)/x.

Low distortion, high spectral purity sine waves.

Pulse train pattern generation for up to 10 pulses.

Arbitrary waveforms of up to 64K points at up to 100MS/s.

Internal sweep, linear or logarithmic, phase continuous, 0.1mHz to 40MHz in one range.

Modulations modes of burst, gated and tone switching; built-in trigger generator.

5mV to 20V pk-pk output from 50 Ω; ± plus multi function auxiliary output.

Storage for nine instrument set-ups in non-volatile memory.

Programmable via RS-232 or USB interfaces; GPIB optional.

Waveform Manager Plus

Waveform Manager Plus (supplied) provides all of the features needed for the creation, manipulation and management of arbitrary waveforms within a single Windows-based program.

Choice of interfaces

The program supports RS232, USB and GPIB interfaces for download and upload.

Upload from DSOs

The program can read several file formats and supports waveform import via the clipboard allowing it to accept waveform files from most DSOs and digitisers.

A full suite of tools

Powerful mathematical functions are combined with on-screen drawing tools and clipboard functions to enable virtually any waveform to be created either from scratch, or from the editing of existing waveforms. Waveforms can be built in any number of sections using any combination of the following: Standard waveforms, mathematical expressions, drawn waveforms, uploaded waveforms, imported waveforms (using clipboard), existing stored waveforms.

Waveform Manager Plus provides all of the features needed for the creation, manipulation and management of arbitrary waveforms within a single Windows-based program.

Waveform Manager Plus

Waveform Manager Plus (supplied) provides all of the features needed for the creation, manipulation and management of arbitrary waveforms within a single Windows-based program.

Choice of interfaces

The program supports RS232, USB and GPIB interfaces for download and upload.

Upload from DSOs

The program can read several file formats and supports waveform import via the clipboard allowing it to accept waveform files from most DSOs and digitisers.

A full suite of tools

Powerful mathematical functions are combined with on-screen drawing tools and clipboard functions to enable virtually any waveform to be created either from scratch, or from the editing of existing waveforms. Waveforms can be built in any number of sections using any combination of the following: Standard waveforms, mathematical expressions, drawn waveforms, uploaded waveforms, imported waveforms (using clipboard), existing stored waveforms.

Waveform Manager Plus provides all of the features needed for the creation, manipulation and management of arbitrary waveforms within a single Windows-based program.

Choice of interfaces

The program supports RS232, USB and GPIB interfaces for download and upload.

Upload from DSOs

The program can read several file formats and supports waveform import via the clipboard allowing it to accept waveform files from most DSOs and digitisers.

A full suite of tools

Powerful mathematical functions are combined with on-screen drawing tools and clipboard functions to enable virtually any waveform to be created either from scratch, or from the editing of existing waveforms. Waveforms can be built in any number of sections using any combination of the following: Standard waveforms, mathematical expressions, drawn waveforms, uploaded waveforms, imported waveforms (using clipboard), existing stored waveforms.

Waveform Manager Plus provides all of the features needed for the creation, manipulation and management of arbitrary waveforms within a single Windows-based program.

Choice of interfaces

The program supports RS232, USB and GPIB interfaces for download and upload.

Upload from DSOs

The program can read several file formats and supports waveform import via the clipboard allowing it to accept waveform files from most DSOs and digitisers.

A full suite of tools

Powerful mathematical functions are combined with on-screen drawing tools and clipboard functions to enable virtually any waveform to be created either from scratch, or from the editing of existing waveforms. Waveforms can be built in any number of sections using any combination of the following: Standard waveforms, mathematical expressions, drawn waveforms, uploaded waveforms, imported waveforms (using clipboard), existing stored waveforms.

Waveform Manager Plus provides all of the features needed for the creation, manipulation and management of arbitrary waveforms within a single Windows-based program.
### Technical Specifications

**Modulation Modes**

- **Sawtooth**
  - Variable within limits of the product to provide a range of 50%.
  - Symmetrical output from 0.5V to ±10V.
  - 20% - 100% Duty Cycle.
- **Square**
  - Asymmetrical output from 0.5V to ±10V.
  - 20% - 100% Duty Cycle.
- **Triangle**
  - Asymmetrical output from 0.5V to ±10V.
  - 20% - 100% Duty Cycle.
- **Ramp Up & Down**
  - Ramp Up: 0.5V to ±10V.
  - Ramp Down: 0.5V to ±10V.
  - Ramp Up/Down: 0.5V to ±10V.

**Gated**

- The expression for any waveform can be stored and recalled at any time.
- The mathematical expression for any standard waveform can be examined by the user.

**Signal Range**

- **VCA**:
  - ±1V pk-pk for 100% level change.
  - ±5V pk-pk for 50% level change.
- **Threshold**:
  - Nominal TTL level.
  - Maximum input ±10V.

**Frequency**

- **DC - 30MHz**.
- **DC - 1MHz**.
- **DC - 50MHz**.

**Rise and Fall Time**

- <8ns

**Note:**

- The information provided is applicable only to the TG4001 model.

### Technical Specifications continued

**GPIB Interface**

- **Retro-fit interface board conforming to IEEE-488.2**.
- **Driver Software**:
  - Drivers for LabWindows CVI and Labview on CD.
- **AC Line Cable**
  - **230V, 115V or 100V nominal 50/60Hz, adjustable internally**.

**Safety**

- **Complies with EN61010-1**.

**Calibration Period**

- **12 months**.

**Included**

- **All of the waveform building tools previously mentioned can be used to edit existing waveforms**.
- **Waveforms can be imported to the program and exported from the program using the**
  **Waveform Manager Plus software for download/upload**.

**40MHz DDS Function / Arbitrary Generator**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 mHz to 50 MHz</td>
<td>Frequency list: up to 16 frequencies from 1 mHz to 40 MHz.</td>
</tr>
<tr>
<td>0.1 mHz to 100 kHz</td>
<td>Frequency range: DC - 1 MHz.</td>
</tr>
</tbody>
</table>

**Sine, Cosine, Haversine, Havercosine**

- The following mathematical operators are available within the expression editor:
  - Add, subtract, multiply, divide, mod, power, square root, floor, ceil, round, log, exp, sign, sgn, neg, abs, int, 
  - trig functions, trig inverse, hyperbolic, hyperbolic inverse.

**Multiple waveform windows can be open simultaneously. Each window is fully scaleable.**

**Note:**

- The TG4001 model is capable of performing various functions such as scaling, offsetting, and combining waveforms.

**Voltage Reference**

- The instrument setup screen enables options for the waveform generator to be set from
  - Voltage and current options for the waveform generator to be set from
  - Voltage and current options for the waveform generator to be set from
  - Voltage and current options for the waveform generator to be set from

**Software**

- **Driver Software**:
  - Drivers for LabWindows CVI and Labview on CD.

**Options**

- **Options**:
  - Full details of its capabilities are on our website or within the Waveform Manager Plus tool.

**Specifications - Waveform Manager Plus**

**Arbitrary Waveform**

- Arbitrary waveforms up to 64K words and 100MS/s

**High resolution, high purity standard waveforms**

**Arbitrary waveforms up to 64K words and 100MS/s**

**Radio Frequency Generator**

- Designed and built in the Europe by:
  - Thurlby Thandar Instruments Ltd
  - Tel: +44 (0)1480 412451
  - Tel: +44 (0)1480 412451
  - GPO Box 141, St Neots, Cambridgeshire, PE19 2HS, UK
  - Email: sales@ttinst.com
  - Web: www.ttinst.com
Technical Specifications

Gate

Each active edge of the trigger signal will produce one burst of the waveform.

Marker: Variable during sweep.

1mHz to 40 MHz in one range. Phase continuous. Independent setting of start/stop.

Sweep Direction: Up, down, up/down or down/up.

Sweep Mode: Linear or logarithmic, continuous or triggered.

Carrier Waveforms: All standard and arbitrary except pulse and pulse train.

Sweep Repetition Rate: 0.005Hz to 100kHz internal, dc to 1MHz external.

Number of Cycles: 1 to 1048575

Gate Signal Source: Internal from keyboard or trigger generator. External from 10MHz to 1GHz.

Gate Delay: 0 to 1000 units.

Gate Width: 1-10ms in 10ns steps.

Gate Level: 0-3V.

Gate Frequency: 0-10kHz in 10Hz steps.

Gate Phase: 0-360°.

Sync is a 3-level waveform: low at start of sweep, high for the duration of the last frequency step at end of sweep, with a narrow 1V pulse at the marker point.

Phase Lock Out: Used to phase lock two or more generators. Produces a positive or negative phase shift as required.

Output Signal Level: Logic levels of <0.8V & >3V, except for Sweep Sync. Sweep Sync is a 3-level waveform: low at start of sweep, high for the duration of the last frequency step at end of sweep, with a narrow 1V pulse at the marker point.

Sweep Marker: Additional output pulse for use as a marker in sweep mode. Can be set to Output: Buffered version of the internal 10MHz clock. Output levels are expanded or condensed to exactly 4096 points and DDS techniques are used to perform the sweep.

Gated and/or Synchronized output are expanded or condensed to exactly 4096 points and DDS techniques are used to perform the sweep.

DIGITAL INTERFACES

USB: Conforming with USB 1.1

GPIB Interface: Retro-fit interface board conforming to IEEE-488.2

AC Line Cable

RS-232 and USB interfaces. GPIB is available as an option.

Full remote control and waveform download facilities are available through the

Main Output

Output Connector: BNC, female (N4003A or equivalent)

Output Impedance: 50Ω.

Available for external use from the SYNC OUT socket.

Amplitude can be specified open circuit (Hi Z) or into an assigned load to suit the assigned load of 50Ω.

Phase can be specified as well as the number of points to average.

Signal Range: Threshold nominally TTL level; max. input ±10V.

The following waveforms are available directly from the Waveforms dialogue box: Sine, Square, Triangular, Sawtooth, PRBS, and DC.

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

CLIPBOARD FUNCTIONS

WAVEFORM DOWNLOAD/UPLOAD

Waveforms can be read from and saved as any of the following formats: WFM(binary), WFM(ASCII), SHL(ASCII), SHL(Metafile), BMP(png/jpeg/gif), WGN, CWM.

The following are available for download:

WAVEFORM MATHEMATICS

WAVEFORM BUILDING TOOLS

The mathematical expressions used for each section of a waveform are retained and can be stored in libraries. All standard and arbitrary waveforms and expressions can be imported and/or exported from other projects.

WAVEFORMS

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

WAVEFORM CREATING/EDITING

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

The following waveforms are available directly from the Waveforms dialogue box: Sine, Square, Triangular, Sawtooth, PRBS, and DC.

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

CLIPBOARD FUNCTIONS

WAVEFORM DOWNLOAD/UPLOAD

Waveforms can be read from and saved as any of the following formats: WFM(binary), WFM(ASCII), SHL(ASCII), SHL(Metafile), BMP(png/jpeg/gif), WGN, CWM.

The following are available for download:

WAVEFORM MATHEMATICS

WAVEFORM BUILDING TOOLS

The mathematical expressions used for each section of a waveform are retained and can be stored in libraries. All standard and arbitrary waveforms and expressions can be imported and/or exported from other projects.

WAVEFORMS

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

WAVEFORM CREATING/EDITING

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

The following waveforms are available directly from the Waveforms dialogue box: Sine, Square, Triangular, Sawtooth, PRBS, and DC.

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

CLIPBOARD FUNCTIONS

WAVEFORM DOWNLOAD/UPLOAD

Waveforms can be read from and saved as any of the following formats: WFM(binary), WFM(ASCII), SHL(ASCII), SHL(Metafile), BMP(png/jpeg/gif), WGN, CWM.

The following are available for download:

WAVEFORM MATHEMATICS

WAVEFORM BUILDING TOOLS

The mathematical expressions used for each section of a waveform are retained and can be stored in libraries. All standard and arbitrary waveforms and expressions can be imported and/or exported from other projects.

WAVEFORMS

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

WAVEFORM CREATING/EDITING

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

The following waveforms are available directly from the Waveforms dialogue box: Sine, Square, Triangular, Sawtooth, PRBS, and DC.

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

CLIPBOARD FUNCTIONS

WAVEFORM DOWNLOAD/UPLOAD

Waveforms can be read from and saved as any of the following formats: WFM(binary), WFM(ASCII), SHL(ASCII), SHL(Metafile), BMP(png/jpeg/gif), WGN, CWM.

The following are available for download:

WAVEFORM MATHEMATICS

WAVEFORM BUILDING TOOLS

The mathematical expressions used for each section of a waveform are retained and can be stored in libraries. All standard and arbitrary waveforms and expressions can be imported and/or exported from other projects.

WAVEFORMS

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

WAVEFORM CREATING/EDITING

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

The following waveforms are available directly from the Waveforms dialogue box: Sine, Square, Triangular, Sawtooth, PRBS, and DC.

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

CLIPBOARD FUNCTIONS

WAVEFORM DOWNLOAD/UPLOAD

Waveforms can be read from and saved as any of the following formats: WFM(binary), WFM(ASCII), SHL(ASCII), SHL(Metafile), BMP(png/jpeg/gif), WGN, CWM.

The following are available for download:

WAVEFORM MATHEMATICS

WAVEFORM BUILDING TOOLS

The mathematical expressions used for each section of a waveform are retained and can be stored in libraries. All standard and arbitrary waveforms and expressions can be imported and/or exported from other projects.

WAVEFORMS

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

WAVEFORM CREATING/EDITING

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

The following waveforms are available directly from the Waveforms dialogue box: Sine, Square, Triangular, Sawtooth, PRBS, and DC.

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

CLIPBOARD FUNCTIONS

WAVEFORM DOWNLOAD/UPLOAD

Waveforms can be read from and saved as any of the following formats: WFM(binary), WFM(ASCII), SHL(ASCII), SHL(Metafile), BMP(png/jpeg/gif), WGN, CWM.

The following are available for download:

WAVEFORM MATHEMATICS

WAVEFORM BUILDING TOOLS

The mathematical expressions used for each section of a waveform are retained and can be stored in libraries. All standard and arbitrary waveforms and expressions can be imported and/or exported from other projects.

WAVEFORMS

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

WAVEFORM CREATING/EDITING

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.

PROJECTS

The following waveforms are available directly from the Waveforms dialogue box: Sine, Square, Triangular, Sawtooth, PRBS, and DC.

The mathematical expressions used for waveform creation can be stored in libraries. A copy of the expression editor window is retained and can be imported and/or exported.

To maintain good housekeeping, waveforms can be organised into “projects” with separate project libraries.