100MS/s Single-Channel Arbitrary Waveform / Function Generator

TABOR'S NEW WONDER WAVE SERIES

MODEL WW1071

- Single-channel 100MS/s waveform generator
- 1M waveform memory, 2M/4M memory, optional
- 14 digits frequency resolution (limited by 1μHz)
- 14 Bit amplitude resolution
- 1 ppm clock accuracy and stability
- Sine and Square waves to 50MHz
- 10 Built-in popular standard waveforms library
- Sophisticated Memory Management, including segmentation and sequences
- AM, FM, Arbitrary FM, FSK, Ramped FSK modulations
- Linear and Logarithmic Sweep
- User-friendly 3.8" color LCD display
- Multi-Instrument synchronization
- DDS technology for extremely low phase noise signals
- Ethernet 10/100, USB 2.0 and GPIB interfaces

The 1071 system represents a new dimension in arbitrary waveform generator design. With an unprecedented combination of arbitrary generator and synthesizer, versatility, high resolution and wide frequency range, and outstanding performance-to-price ratio, the 1071 delivers diverse benefits that will facilitate tasks in many fields.

100MS/s Sample Rate

New technology requirements are driving communications systems to use increasingly narrow channel widths. A high sample rate of 100MS/s makes the 1071 an ideal modulation source for troubleshooting new encoding schemes. The 1071 also provides high-speed waveforms to simulate signal distortion, video signals, component failures, and power supply line cycle dropouts and transients.

High Performance

Each channel of the 1071 delivers precise waveforms with 14 bits of amplitude resolution and 14 digits of frequency resolution with extremely low phase noise.

Exceptional electrical performance includes up to 10Vp-p into 50Ω over the full frequency range. Selectable filters ensure clean stimulus waveforms enabling the generator to simulate modulation waveforms.

14 Bit Resolution

The 14-bit resolution provides 16,384 output levels. This means that even audio waveforms can be generated with excellent fidelity. It also allows video-and other complex waveforms-to be generated with small details superimposed on large signals, in order to test the response of receiving systems.

Function Generator

When used as a simple function generator the instrument offers ten basic waveforms with adjustable parameters all of which are accessible from the front panel. These are sine, triangle, square, pulse, ramp, sinc, Gaussian, exponential (up and down), noise, as well as DC. Sine and square waves can be generated at up to 50MHz.

2M Memory

The 1071 offers 1M word (2M/4M word optional) memory for arbitrary waveforms. In addition, the memory can be divided into as many as 4096 segments, which can be looped and linked in many different ways. Using 1M word at 25MS/s to generate a video signal, for example, the duration is 0.04 seconds, 25Hz, even without any looping of repetitive elements.

Sequence Generator

When the sequencing facilities are employed, the 1071's uniqueness is obvious. The memory segments can be linked and repeated in any combination both manually and under programmed control. This allows test software to switch between many different waveforms rapidly without the need to download multiple times, enhancing test throughput in a way that is unmatched by competing products. The sequence generator has four advanced modes: automatic, stepped, single and mixed, which make it even a more powerful tool.

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High-Quality Modulation Signal Source
One of the many attractive features of the 1071 is the sample clock modulation function. In ordinary arbitrary waveform generators, to make a frequency modulated sine wave you have to enter the complete mathematical function. Not so with the 1071: all that is necessary is generating the carrier signal, and then modulating the clock to obtain the required result. The sample clock modulation can be done using internal waveforms such as sine, square, triangle, and ramp or using downloaded arbitrary modulating waveforms. This allows you to generate signals that would be difficult or impossible to define using an equation. AM, Linear and Logarithmic Sweeps, FSK and Ramped FSK are available as well.

Triggering Facilities
However versatile the waveform generation systems are made, the need for external control of generation is vital. The triggering facilities of the 1071 match the generation functions in versatility. In the simplest mode, signals are output continuously. The 1071 also offers the triggered mode, gated mode, external burst mode, and internal burst mode, all of which can use an external trigger signal or an internal trigger. The use of external sources to prompt the switching of segments has already been mentioned.

Easy to use
Large and user-friendly 3.8" back-lit color LCD display facilitates browsing though menus, updating parameters and displaying detailed and critical information for your waveform output. Combined with numeric keypad, cursor position control and a dial, the front panel controls simplifies the often complex operation of an arbitrary waveform generator.

High Speed Access
Access speed is an increasingly important requirement for test systems. Included with the instrument is a variety of interfaces: Ethernet 10/100, USB 2.0 and GPIB so one may select the interface most compatible to individual requirements. Using any of the external interfaces, controlling instrument functions and features as well as downloading waveforms and sequences is fast, time saving and easily tailored to every system regardless if it is just a laptop to instrument or full-featured ATE system. IVI drivers and factory support will speed up system integration thus minimizing time-to-market and reduce system development costs significantly.

Multiple Environments to Write Your Code
Model 1071 comes with a complete set of drivers, allowing you to write your application in various environments such as: Labview, CVI, C++, VB, MATLAB. You may also link the supplied dll to other Windows based API's or, use low level SCPI commands (Standard Commands for Programmable Instruments) to program the instrument, regardless if your application is written for Windows, Linux or Macintosh operating systems.

MODULAR
Tabor's MODULAR software package supplies wireless design and manufacturing engineers with virtually all their test stimulus needs at baseband or IF/RF levels, whether required signals are analog or digital. With none of the limitations of traditional generators, Tabor's Wonder Wave Series allow any signal, simple or composed, clean or noisy, ideal or impaired, to be downloaded and played back.

ArbConnection
The ArbConnection software provides you with full control of instrument functions, modes and features. ArbConnection is a powerful editorial tool that allows you to easily design any type of waveform. Whether it is the built in wave, pulse or Serial data composers, or the built in equation editor with which you can create your own exotic functions, with ArbConnection virtually any application is possible.

Multi-Instrument Synchronization
Multiple 1071s can be synchronized using a Master-Slave arrangement allowing users to benefit from the same high quality performance in their multi-channels needs.

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Service and Support
Beyond providing precision Test & Measurement instruments, Tabor Electronics provides unparalleled service and support, and is continuously finding new ways to bring added value to its customers.

Our after-sales services are comprehensive. They include all types of repair and calibration, and a single point of contact that you can turn to whenever you need assistance. As part of our extensive support, we offer individualized, personal attention Help Desk, both online and offline, via e-mail, phone or fax.

Tabor Electronics maintains a complete repair and calibration lab as well as a standards laboratory in Israel and USA. Service is also available at regional authorized repair/calibration facilities.

Contact Tabor Electronics for the address of service facilities nearest you.

Applications
For expert technical assistance with your specific needs and objectives, contact your local sales representative or our in-house applications engineers.

Manuals, Drivers, and Software Support
Every instrument comes equipped with a dedicated manual, developer libraries, IVI drivers, and software. However, if your specific manual is lost or outdated, Tabor Electronics makes it possible to log-on to its Download Center and get the latest data “in a click”.

Product Demonstrations
If your application requires that you evaluate an instrument before you purchase it, a hands-on demonstration can be arranged by contacting your local Tabor Electronics representative or the Sales Department at our Corporate Headquarters.

Five-year Warranty
Every instrument from the Wonder Wave series comes with a five-year warranty. Each one has full test results, calibration certificate, and CD containing product's manual and complete software package. Our obligation under this warranty is to repair or replace any instrument or part thereof which, within five years after shipment, proves defective upon examination. To exercise this warranty, write or call your local Tabor representative, or contact Tabor Headquarters and you will be given prompt assistance and shipping instructions.

Specification
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STANDARD WAVEFORMS

Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC.
Frequency Range: Waveform dependent
Source: Internal synthesizer

SINE

Frequency Range: 100µHz to 50MHz
Start phase: 0 to 360°

Harmonics Distortion (at 5Vpp):

DC to 1MHz	-50dBc
1 to 5MHz	-45dBc
5 to 10MHz	-35dBc
10 to 50MHz	-22dBc

Non-Harmonic Distortion:

DC to 10MHz	-60dBc
10 to 50MHz	-50dBc

Total Harmonic Distortion:

DC to 100kHz	0.1%

Flatness (1kHz):

DC to 1MHz	1%
1MHz to 25MHz	5%
25MHz to 50MHz	20%

TRIANGLE

Frequency Range: 100µHz to 15MHz
Start phase: 0 to 360°

SQUARE

Frequency Range: 100µHz to 50MHz
Duty cycle: 1% to 99%
Rise/Fall time: <8ns, typically < 6ns
Aberration: <5%

PULSE

Frequency Range: 100µHz to 15MHz
Delay, Rise/Fall Time, High Time Ranges: 0%-99.9% of period (each independently)
Rise/Fall time: <8 ns, typically < 6ns
Aberration: <5%

RAMP

Frequency Range: 100µHz to 15MHz
Delay, Rise/Fall Time Ranges: 0%-99.9% of period (each independently)

SINC (SINE(x)/x)

Frequency Range: 100µHz to 6.25MHz
"0" Crossing: 4 to 100 cycles

GAUSSIAN PULSE

Frequency Range: 100µHz to 6.25MHz
Time Constant: 1 to 200

EXPONENTIAL FALL/RISING PULSE

Frequency Range: 100µHz to 6.25MHz
Time Constant: -100 to 100

REPETITIVE NOISE

Bandwidth: 25MHz

DC

Range: -100% to 100% of amplitude

ARBITRARY WAVEFORMS

Sample Rate: 100mS/s to 100MS/s
Vertical Resolution: 14Bits
Waveform Memory: 1M points standard, 2M/4M points optional

MEMORY SEGMENTATION

No. of Segments: 1 to 2048
Min. Segment Size: 16 points
Resolution:: 4 points size increments from 16 to 1M points (2M/4M optional)

SEQUENCED ARBITRARY WAVEFORMS

Operation: Permits division of the memory bank into smaller segments. Segments may be linked, and repeated in user-selectable fashion to generate extremely long waveforms.

ADVANCE MODES

Automatic Sequence Advance: No triggers required to step from one segment to the next. Sequence is repeated continuously through a pre-programmed sequence table

Stepped Sequence Advance: Current segment is sampled continuously, external trigger advances to next programmed segment. Control input is TRIG IN connector.

Single Sequence Advance: Current segment is sampled to the end of the segment including repeats and idles there. Next trigger advances to next segment. Control input is TRIG IN connector.

Mixed Sequence Advance: Each step of a sequence can be programmed to advance either: a) automatically (Automatic Sequence Advance), or b) with a trigger (Stepped Sequence Advance)
Advance Source: External, rear panel BNC; Internal; GPIB
Sequencer steps: From 1 to 2048
Segment loops: From 1 to 1M
Minimum Segment Duration: 1µs for more than one loop.

COMMON CHARACTERISTICS

FREQUENCY

Resolution: 14 digits limited by 1µS/s
Accuracy & Stability: Same as reference

10MHz REFERENCE CLOCK

Internal	0.0001% (1ppm TCXO) initial tolerance over a 19°C to 29°C temperature range; 1ppm/°C below 19°C and above 29°C; 1ppm/year aging rate
External	10MHz TTL, 50% ±2% duty cycle

AMPLITUDE

Range: 10mV to 10Vp-p, into 50Ω; Double into open circuit
Resolution: 4 digits
Accuracy (1 KHz):

1.000V to 10Vp-p	±(1% + 25mV)
100mV to 999.9mVp-p	±(1% + 5mV)
10mV to 99.99mVp-p	±(1% + 2mV)

OFFSET

Range: 0 to ±4.5V Independent to amplitude setting as long as (amplitude/2) + (offset) does not exceed 5Vp-p
Resolution: 2.2 mV
Accuracy: ±1%

FILTERS

Type: 50MHz Elliptic
25MHz Elliptic

OUTPUTS

MAIN OUTPUT

Connector: Front panel BNC
Stand-by: Output Off or Normal
Impedance: 50Ω, ±1%
Protection: Protected against temporary short to case ground

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SYNC/MARKER OUTPUT

Connector: Front panel BNC
Impedance: 50Ω, ±1%
Level: >2 V into 50Ω, 4V nominal into 10kΩ
Validators: BIT, LCOM
Protection: Protected against temporary short to case ground
Position: Point 0 to n, Programmable with 4-point resolution
Width Control: Programmable
Range: 4 to 100000 waveform points
Resolution: 4 points
Source: Main output

SINEWAVE OUTPUT

Connector: Rear panel BNC
Impedance: 50Ω, ±1%
Level: 1V into 50Ω
Protection: Protected against temporary short to case ground
Source: Sample clock frequency
Frequency Range and Resolution: Same as Sample clock
Total Harmonic Distortion: 0.05% to 100KHz
Harmonics and non-related spurious: < -30dBc to 100MHz

SAMPLE CLOCK OUTPUT

Connector: Rear panel SMB
Level: ECL
Impedance: 50Ω, terminated to –2V

INPUTS

TRIG INPUT

Connector: Rear panel BNC
Impedance: 10kΩ, ±5%
Threshold Level: TTL

Min Pulse Width: 20ns
Slope: Positive or negative going edge.

10 MHz REFERENCE INPUT

Connector: Rear panel BNC
Impedance: 10kΩ, ±5%
Threshold Level: TTL
Duty Cycle: 50%, ±5%

AM INPUT

Modulation Input: Rear panel BNC
Impedance: 1MΩ, ±5%
Max Input Voltage: 12V

SAMPLE CLOCK INPUT

Connector: Rear panel SMB
Input Level: ECL
Impedance: 50Ω, terminated to –2V
Range: DC to 100MHz
Min. Pulse Width: 4 ns

SYNCHRONIZATION CONNECTOR

Connector: Rear panel 9-pin DSUB
Interconnecting Cable: Optional, consult factory at the time of purchase

MODULATION

Carrier Waveform: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Run Modes: Continuous, Triggered, Burst and Gated
Trigger Advanced Mode: Automatic, Triggered, Gated or Software Command
Marker
Output & Level: Same as SYNC output.
Position: Programmable for selected frequency

FM

Carrier Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Carrier Frequency: Waveform dependent
Modulating Waveforms: Sine, Square, Triangle and Ramp
Modulation Source: Internal
Modulating Frequency: 1mHz to 100KHz
Deviation Range: 100mS/s to 100MS/s
Frequency Distortion: <0.1%
Resolution: 14 digits, limited by 1µHz
Accuracy: 0.1%

ARBITRARY FM

Carrier Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Carrier Frequency: Waveform dependent
Modulating Waveform: Arbitrary waveform, 10 to 20000 waveform points
Modulation Source: Internal
Modulating Waveform
Sample Clock: 1mS/s to 2MS/s
Deviation Range: 100mS/s to 100MS/s
Frequency Distortion: <0.1%
Resolution: 14 digits, limited by 1µHz
Accuracy: 0.1%

AM

Carrier Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Carrier Frequency: Waveform dependent
Modulation Source: External
Envelop Frequency: 1µHz to 500kHz
Sensitivity: 0V to +5V (5Vp-p) produce 100% modulation
Modulation Depth: 0% to 100%

FSK

Carrier Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Carrier Sample Clock Range: 100mS/s to 100MS/s
Modulation Source: External, Rear panel Trigger input BNC.
Low level: Carrier sample clock
High level: Hop frequency
Baud Rate Range: 1bits/sec to 10Mbits/sec
Minimum FSK Delay: 1 waveform cycle + 50ns

RAMPED FSK

Ramp Time Range: 10µs to 1s
Resolution: 3 digits
Accuracy: ±0.1%

SWEEP

Carrier Waveforms: Sine, Square, Triangle, Ramp, Arb
Sweep Step: Linear, Logarithmic or Arb
Sweep Direction: Up or down
Sweep Range: 100mS/s to 100MS/s
Sweep Time: 1ms to 1000s
Resolution: 9 digits
Accuracy: ±0.1%

WIRELESS SIGNAL GENERATION

EVM (Error Vector Magnitude)

	0.1 MS/s	1 MS/s	5 MS/s
10 MHz	0.33%	0.60%	1.28%
20 MHz	0.36%	0.78%	1.50%
40 MHz	0.50%	0.90%	1.63%

Test conditions:
Sample Clock Frequency = 100 MS/s
Internal
Modulation = QPSK
Baseband Filter = Raised Cosine
Alfa = 0.35

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ACLR (Adjacent Channel Leakage Power Ratio)

	0.1 MS/s	1 MS/s	5 MS/s
10 MHz	63 dB	62 dB	47 dB
20 MHz	56 dB	53 dB	45 dB
40 MHz	45 dB	45 dB	42 dB

Test conditions:

Sample Clock Frequency = 100 MS/s
Sample Clock = Internal
BW = Symbol Rate;
Offset = 1.35 x Symbol Rate

TRIGGERING CHARACTERISTICS

System Delay: 3 to 4 Sample Clock+150ns
Trigger Start, Stop, Phase Control: 0 to 1M points, (2M/4M optional)
Resolution: 4 points
Breakpoint Error: ±4 points
Breakpoint Source: External (Rear Panel Trigger Input BNC), Manual, or software command through Ethernet, USB or GPIB

EXTERNAL

Connector: Rear panel BNC
Level: TTL
Slope: Positive or negative
Frequency: DC to 2MHz
Impedance: 10kΩ, DC coupled

INTERNAL

Range: 100mHz to 2MHz
Resolution: 14 digits, limited by 1µHz
Accuracy: 0.1%

MANUAL

Source: Soft trigger command through the front panel or external interface

GATED MODE External signal enables generator. First output cyclesynchronous with the active slope of the triggering signal. Last cycle of output waveform always completed

BURST

Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian Pulse, Exponential Fall, Rising Pulse, Noise, DC, Arb
Counted Burst Cycles: 1 to 1M, programmable
Source: Manual, Internal or External

MULTI-INSTRUMENT SYNCHRONIZATION

Description: Multiple instruments can be connected together and synchronized to provide multi-channel synchronization.

PHASE (LEADING EDGE) OFFSET

Description: Leading edge of master output trails the leading edge of the slave output by a programmable number of points. Each slave can be programmed to have individual offset.
Range: 0 to 1M points (2M/4M optional)
Resolution and Accuracy: 4 point
Initial Skew: < ±15ns, depending on cable length and quality, typically with 0.5 meter coax cables

DIGITAL PULSE GENERATOR OPTION

Pulse State: On/Off
Pulse Mode: Single or double, programmable
Polarity: Normal, inverted or complemented
Period: 160 ns minimum, programmed with 4 ns increments
Pulse Width: 10 ns minimum, 1e3 Sec max.
Rise/Fall time: <8 ns, typically < 6ns
High Time: 0 ns minimum, 1e3 Sec max.
Delay: 0 ns minimum, 1e3 Sec max.
Double Pulse Delay: 0 ns minimum, 1e3 Sec max.
Amplitude Window: 10mVp-p to 10Vp-p
Low Level -5V to +4.990V
High Level -4.990V to +5V

NOTES:

1. All pulse parameters, except rise and fall times, may be freely programmed within the selected pulse period provided that the ratio between the period and the smallest incremental unit does not exceed the ratio of 512,000 to 1. With the 1M option, the ratio is extended to 1,000,000 to 1, hence the specifications below do not show maximum limit as each must be computed from the above relationship.
2. Rise and fall times, may be freely programmed provided that the ratio between the rise/fall time and the smallest incremental unit does not exceed the ratio of 100,000 to 1.
3. The sum of all pulse parameters must not exceed the pulse period setting

GENERAL

Power Supply: 85 to 265V, 48 to 63Hz,
Power Consumption: 60W max
Display: Color LCD, 3.8" reflective, 320 x 240 pixels, back-lit
Operating temperature: 0 - 50°C
Humidity (non-condensing): 11°C to 30°C: 85 %
31°C to 50°C: 75 %
Storage temperature: -40°C to + 70°C.
Interface: Ethernet 10/100, USB 2.0 and GPIB standard
Language: IEEE-488.2 - SCPI – 1993.0
Dimensions: 212 x 88 x 415mm (WxHxD)
Weight: Approximately 7 lb
Safety: EN61010-1, 2nd revision
EMC: CE marked. Designed to meet VDE 0411/03.81 and UL 1244
Reliability: MTBF per MIL-HDBK-217E, 25°C, Ground Benign
Workmanship Standards: Conform to IPC-A-610D
Supplied Accessories: Power Cord, USB cable, CD containing Operating Manual, ArbConnection software and developer libraries.
Warranty: 5 years standard

ORDERING INFORMATION

MODEL	WW1071

100MS/s Single-Channel ArbitraryWaveform Generator

OPTIONS

Option 1: 2 M Memory
Option 2: 4 M Memory

ACCESSORIES

Sync cable: Sync cable for multi instrument synchronization
S-Rack mount: 19" Single Rack Mounting Kit
D-Rack mount: 19" Dual Rack Mounting Kit
Case Kit: Professional Carrying Bag

Note: Options and Accessories must be specified at the time of your purchase.