250MS/s Single-Channel Arbitrary Waveform / Function Generator

TABOR'S NEW WONDER WAVE SERIES



MODEL WW2571A

- Single-channel 250 MS/s waveform generator
- Sine and Square waves generated to 100MHz
- 16 Bit amplitude resolution
- 1M waveform memory, 2M waveform memory, optional
- 16 Vpp into 50Ω, double into open circuit
- Multiple run modes including trigger, re-trigger and trigger delay
- AM, FM, Arbitrary FM, FSK, ASK, (n)PSK, Frequency Hop and sweep modulation
- Powerful sequence generator links and loops segments in user-defined fashion. Stores up to 10 different sequence tables
- 16 Bit LVDS parallel output
- High resolution 3.8" LCD, color display
- Ethernet 10/100, USB 2.0 and GPIB interfaces
- Multi-Instrument synchronization
- ArbConnection software for easy waveform creation&control

Model 2571, is a single-channel frequency agile waveform synthesizer combine industry leading performance, frequency agility and modulation capability in a stand-alone, bench-type product. Signal output in the range of 1Hz to 250MHz and 16-bit vertical DAC resolution provide the test stimuli required for the decades to come. It can be used as an arbitrary waveform generator, modulating generator, as well as function and pulse generator.

250MS/s Performance

Higher performance test equipment and systems are needed as products which use increasing signal bandwidths are developed. The sample rate generator can be programmed from frequencies as low as 1Hz to 250MS/s with superior waveform quality and purity. For example, phase noise is typically below 120dB/Hz at 10kHz offset for a 10MHz sine wave.

High Speed Function Generator

Interested in standard functions? There are 10 built-in functions that cover most routine requirements. These are sine, triangle, square, pulse, ramp, sinc, Gaussian, exponential, noise, as well as DC. Sine and square waves can be generated from frequencies as low as 100μHz to frequencies as high as 100MHz. All functions and their respective parameters are accessible via the front panel.

Waveform Memory

Longer waveform memory minimizes test duration by allowing multiple waveforms to be loaded simultaneously and retrieved as needed for the specific test. Both channels come with 1M points of memory as standard. Optional 2M memory is available for applications requiring longer memory.

Digital Outputs

16-bits are available as digital patterns from a rear-panel VHDC connector. Output level is LVDS which is efficient and sufficient for high speed digital data transmissions.

Digital patterns are built the same way as arbitrary waveforms; thus the immense power of the waveform generator with all its functions and features is harnessed behind this output turning the 2571 into the most powerful pattern generator in its class.

Frequency Agility

Decrypting radio transmission often employs frequency hopping. The 2571 provides breakthrough technology that allows simulation of 12-bit decrypted code as easy as writing a simple hop table. The frequency hop mode is fast, coherent and provides a great tool for simulating code transmission without loosing speed and integrity.

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Memory Segmentation and Sequencing
Solving almost every complex application, powerful segmentation and sequencing produce an endless variety of complex waveforms. The waveform memory can be divided into multiple waveform segments and sequenced in user-selectable fashion to create complex waveforms that have repeatable segments and thus saving precious memory space. Five different advance modes are available for the 2571A series to step through the sequence table, including stepped and mixed advance modes and thus increasing efficiency of the test system. To solve even the toughest application, the products allow generation of up to 100 different sequences, each capable of linking 16k waveform fragments and looping each waveform up to 1M times.

Accurate Output
As standard, the instrument is equipped with an internal frequency reference that has 1ppm accuracy and stability over a period of 1 year. An external frequency reference is provided on the rear panel for applications requiring greater accuracy or stability, supported by the instrument's 14 digits resolution.

Modulation Capability
Agility and modulation capabilities open the door to diverse applications. In addition to the capability of generating any shape and style of waveform with the arbitrary waveform generation power, the products can also do standard modulation schemes such as FM, AM, FSK, PSK, and frequency hops without sacrificing the power of the instrument control and output run modes.

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 function and features as well as downloading waveforms and sequences are 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.

Multi-Instrument Synchronization
Multiple 2571A can be synchronized using a Master-Slave arrangement allowing users to benefit from the same high quality performance in their multi-channels needs.

Automated External Self-Calibration
Normal calibration cycles in the industry range from one to three years where instruments are sent to a service center, opened to allow access to trimmers, calibrated and certified for repeated usage. Leading-edge technology was implemented to allow calibration from any interface, USB, GPIB or LAN. Calibration factors are stored in a flash memory thus eliminating the need to open instrument covers.

ArbConnection
ArbConnection is a graphical tool that provides an unlimited source of Arbitrary Waveforms. With the ArbConnection software you can control instruments functions, modes and features. You can also create a virtually infinite amount of test waveforms. Freehand sketch allows you to draw your own custom waveform for quick analysis of analog signals. You can use the built-in equation editor to create your own exotic functions. Add or subtract components of a Fourier series to characterize digital or analog filters or inject random noise into a signal to test immunity to auxiliary noise.

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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.

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Specification
250MS/s Single-Channel Arbitrary Waveform / Function Generator

Model WW2571A



STANDARD WAVEFORMS

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

SINE

Frequency Range: 100µHz to 100MHz
Start Phase Range: 0-359.95°
Start Phase Resolution: 0.05°

Harmonics Distortion:

	≤ 3Vpp	≤5Vpp	≤10Vpp
DC to 1MHz	-55dBc	-48dBc	-37dBc
1 to 10MHz	-50dBc	-43dBc	-35dBc
10 to 50MHz	-35dBc	-30dBc	-28dBc
50 to 100MHz	-28dBc	-25dBc	-23dBc

Non-Harmonic Distortion:

DC to 50MHz	-65dBc
50 to 100MHz	-60dBc

Total Harmonic Distortion:

DC to 20MHz	0.1%

Flatness (1kHz):

DC to 1MHz	1%
1MHz to 10MHz	3%
10MHz to 25MHz	5%
25MHz to 80MHz	10%
80MHz to 100MHz	15%

Phase Noise - Internal SCLK

100Hz Offset	-70dBc/Hz
1kHz Offset	-85dBc/Hz
10kHz Offset	-92dBc/Hz
100kHz Offset	-112dBc/Hz
1MHz Offset	-140dBc/Hz

TRIANGLE

Frequency Range: 100µHz to 32MHz
Start Phase Range: 0-359.9°
Start Phase Resolution: 0.05°

SQUARE

Frequency Range: 100µHz to 100MHz
Duty Cycle Range: 0% to 99.9%
Rise/Fall Time:
DC to 10Vpp <4ns
10Vpp to 16Vpp <5ns
Aberration:
DC to 10Vpp <5%+10mV
10Vpp to 16Vpp <7%

PULSE

Frequency Range: 100µHz to 32MHz
Delay, Rise/Fall Time, High Time Ranges: 0%-99.9% of period (each independently
Rise/Fall Time:
DC to 10Vpp <4ns
10Vpp to 16Vpp <5ns
Aberration:
DC to 10Vpp <5%+10mV
10Vpp to 16Vpp <7%

RAMP

Frequency Range: 100µHz to 32MHz
Delay, Rise/Fall Time Ranges: 0%-99.9% of period (each independently)

SINC (Sine(x)/x)

Frequency Range: 100µHz to 32MHz
"0 Crossings": 4-100

GAUSSIAN

Frequency Range: 100µHz to 32MHz
Time Constant: 10-200

EXPONENTIAL PULSE

Frequency Range: 100µHz to 32MHz
Time Constant: -100 to 100

REPETITIVE NOISE

Bandwidth: 50MHz

DC

Range: -16V to 16V

HALF-CYCLE WAVEFORMS

Function Shape: Sine, Triangle, Square
Frequency Range: 100Hz to 2MHz
Phase Start Range (Sine/triangle only): 0 to 359.9°
Start Phase Resolution: 0.05°
Run Modes: Continuous, Triggered
Delay Between Half Cycles (Continuous only): 500ns to 21s
Delay Resolution 20ns

ARBITRARY WAVEFORMS

Sample Rate:
Continuous Mode 1.5S/s to 250MS/s (typically 300MS/s)
All Other Modes 1.5S/s to 225MS/s (typically 250MS/s)
Vertical Resolution: 16 bits
Waveform Memory: 1M points (2M optional)

MEMORY SEGMENTATION

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

SEQUENCED WAVEFORMS

Operation: Segments may be linked and repeated in a user-selectable order to generate extremely long waveforms. Segments are advanced using either a command or a trigger

ADVANCE MODES

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

Stepped Sequence Advance: Current segment is sampled continuously until a trigger advances the sequence to the next programmed segment and sample clock rate.

Single Sequence Advance: Current segment is sampled the specified number of repetitions and then idles at the end of the segment. Next trigger samples the next segment the specified repeat count, and so on.

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).

Sequencer Steps: 1 to 4096
Segment Loops: 1 to 1Meg
Minimum Segment Duration: 500ns
Multi Sequence: Selectable sequence from 1 to 10

DIGITAL PULSE GENERATOR

Channel Dependency: Both channels share pulse parameters except level, polarity, delay and state
Pulse State: On/Off
Pulse Mode: Single or double, programmable
Polarity: Normal, inverted or complemented
Period: 80 ns minimum, programmed with 4 ns increments

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Pulse Width:	4 ns minimum
Rise/Fall Time:	
DC to 10Vpp	<4ns
10Vpp to 16Vpp	<5ns
High Time:	0 ns minimum
Delay:	0 ns minimum
Double Pulse Delay:	0 ns minimum
Amplitude Window:	16mVp-p to 16Vp-p
Low Level	-8V to +7.992V
High Level	-7.992V to +8V

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 1,000,000 to 1. With the 2M option, the ratio is extended to 2,000,000 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

DIGITAL PATTERN OUTPUT

Pattern Size:	16-bits, LVDS levels differential
Update Frequency:	100µpps to 250Mpps

COMMON CHARACTERISTICS

FREQUENCY

Resolution:	14 digits (limited by 1µHz)
Accuracy & Stability:	Same as reference

10MHz REFERENCE CLOCK

Internal	0.0001% (1 ppm 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:	16mV to 16Vp-p into 50Ω; Double into open circuit
Resolution:	4 digits
Accuracy (1kHz):	
16mV to 159.9mVp-p	±(1% + 5mV)
160mV to 1.599Vp-p	±(1% + 10mV)
1.6V to 11.99Vp-p	±(1% + 70mV)
12V to 16Vp-p	±2%

OFFSET

Range:	0 to ±7.992V, into 50Ω
Resolution:	1mV
Accuracy:	±(1%+1% of Amplitude +5mV)

FILTERS

Type:	25MHz Bessel 50MHz Bessel 60MHz Elliptic 120MHz Elliptic

OUTPUTS

MAIN OUTPUT

Connector:	Front panel BNC, each channel
Impedance:	50Ω ±1%
Protection:	Short Circuit to Case Ground, 10s max
Standby:	Output On or Off (Output Disconnected)

SYNC OUTPUT

Connector:	Front panel BNC
Level:	TTL
Sync Type:	Pulse with Arbitrary and Standard Waves; LCOM in Sequence and Burst Modes (including Burst Modulation); Marker with Modulation Mode only, programmable position

DIGITAL WORD OUTPUTS

Connector:	Rear panel SCSI-2, 68-pin VHDC
Word Width:	16 bit differential outputs, channel 1 only
Level:	LVDS

SAMPLE CLOCK OUTPUT

Connector:	Rear panel SMB
Level:	400mVp-p
Impedance:	50Ω

COUPLE OUTPUT

Connector:	Rear panel SMB
Level:	LVPECL
Impedance:	50Ω, terminated to +1.3V

INPUTS

TRIGGER INPUT

Connector:	Rear panel BNC
Impedance:	10kΩ
Slope:	Positive or Negative (selectable)
Programmable Level:	±5V
Sensitivity:	100mV
Damage Level:	±12V
Pulse Width:	≥10ns minimum

EXTERNAL REFERENCE INPUT

Connector:	Rear panel SMB
Frequency:	10MHz
Impedance&Level:	
Default	10kΩ ±5%, TTL, 50% ±2%
Option	50Ω ±5%, 0dBm Sinewave

SAMPLE CLOCK INPUT

Connector:	Rear panel SMB
Input Level:	300mVp-p to 1Vp-p
Impedance:	50kΩ
Min. Pulse Width:	4 ns

COUPLE INPUT

Connector:	Rear panel SMB
Input Level:	LVPECL
Impedance:	50Ω, terminated to +1.3V
Minimum Pulse Width:	4 ns

MODULATION

Carrier Waveform:	Sinewave
Modulation Source:	Internal
Run Modes:	Off (Outputs CW), Continuous, Triggered, Delayed Trigger, Burst, Re-trgger and Gated
Advance Source:	Front panel button, Software commands, Rear panel TRIG IN

FM

Carrier Waveform:	Sine wave
Carrier Frequency:	10mHz to 100MHz
Modulating Waveforms:	Sine, square, triangle, ramp
Modulating Frequency:	10mHz to 100kHz
Peak Deviation:	Up to 50MHz
Marker Position:	Programmable at a selected frequency

ARBITRARY FM

Carrier Waveform:	Sine wave
Carrier Frequency:	10mHz to 100MHz
Modulating Waveform:	Arbitrary waveform
Modulating Waveform	
Sample Clock:	1S/s to 2.5MS/s
Frequency Array Size:	4 to 20000 frequencies
Marker Output:	Programmable at a selected frequency

AM

Carrier Waveform:	Sine wave
Carrier Frequency:	10mHz to 100MHz
Envelop Waveform:	Sine, square, triangle, ramp and Arbitrary(TBD)
Envelop Frequency:	10mHz to 100kHz
Modulation Depth:	0% to 100%

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FSK

Carrier Waveform:	Sine wave
Carrier Frequency:	100µHz to 100MHz
Baud Rate Range:	1bits/sec to 10Mbits/sec
FSK Data Bits Length:	1 to 4096
Marker Output:	Programmable marker at a selected frequency

PSK

Carrier Waveform:	Sine wave
Carrier Frequency:	100µHz to 100MHz
Carrier phase:	0 to 359.99°
Baud Rate Range:	1bits/sec to 10Mbits/sec
FSK Data Bits Length:	1 to 4096
Marker Output:	Programmable marker at a selected phase

FREQUENCY HOPPING

Carrier Waveform:	Sine wave
Carrier Frequency:	100µHz to 100MHz
Hop Table Size:	1 to 4096
Dwell Time Mode:	Fixed or Programmable for each step
Dwell Time:	200 ns to 21 s
Dwell Time Resolution:	20 ns
Hop Frequency:	100µHz to 100MHz
Marker Position:	Programmable on a selected frequency step

SWEEP

Carrier Waveform:	Sine wave
Sweep Step:	Linear, log or Arb
Sweep Direction:	Up or Down
Sweep Range:	10mHz to 100MHz
Sweep Time:	1.4s to 40s
Marker Output:	Programmable marker at a selected frequency.

TRIGGER CHARACTERISTICS

EXTERNAL

Source:	Rear panel BNC
Trigger Level:	±5V
Resolution:	1mV
Input Frequency:	DC to 5MHz
Min. Pulse Width:	>10ns
Slope:	Positive/Negative transitions, selectable
Trigger Jitter:	±1 sample clock period

DELAYS (Trigger input to waveform output)

System Delay:	6 sample clock cycles+150ns
Trigger Delay:	[(0; 200ns to 20s) + system delay]
Trigger Resolution:	20ns
Trigger Delay Error:	6 sample clock cycles+150ns +5% of setting

INTERNAL

Retrigger Delay:	200ns to 20s, Waveform end to waveform restart
Retrigger Delay Error:	3 sample clock cycles+20ns +5% of setting
Retrigger Delay Resolution:	20ns

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 comple

BURST

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

FREQUENCY COUNTER / TIMER

Measurements:	Frequency, Period, Avaraged Period, Pulse Width and Totalize
Source:	Trigger Input
Range:	10Hz to 100MHz (typically 120MHz)
Sensitivity:	500mVpp
Accurcay:	1ppm
Slope:	Positive/Negative transitions
Gate Time:	100µSec to 1 Sec
Input Range:	±5V
Trigger Modes:	Continious, Hold and Gated
Period Avaraged	
Range	10ns to 0.1 Sec
Resolution	7 digits / Sec
Period and Pulse Width	
Range	200ns to 400 Sec
Resolution	100ns
Totalize	
Range	10^{12}-1
Overflow	Led indication

MULTI-INSTRUMENT SYNCHRONIZATION

Description:	Multiple instruments can be daisy-chained together and synchronized to provide multi-channel synchronization.
Initial Skew:	<15 ns + 1 sample clock cycle, depending on cable length and quality, typically with 1m cables

Waveform Types:	Standard, Arbitrary and Sequenced using the automatic sequence advance mode only
Run Modes:	Continuous, Triggered, Gated and Counted Burst

LEADING EDGE OFFSET

Description:	Leading edge offset is programmable for master and slave units.
Run Mode:	Continuous run mode only
Offset Range:	200 ns to 20 s
Resolution&Accuracy:	20 ns

GENERAL

Power Supply:	85 to 265Vac, 48-63 Hz
Power Consumption:	60W
Front Panel Display:	Color LCD, 3.8" reflective, 320 x 240 pixels, back-lit
Operating temperature:	0°C - 50°C
Humidity (non-condensing):	11°C - 30°C 85% 31°C - 40°C 75% 41°C - 50°C 45%
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 415 mm (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 Std:	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	**WW2571A**

250MS/s Single-Channel ArbitraryWaveform Generator

OPTIONS

2Meg:	2 Meg Memory

ACCESSORIES

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.