

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Astronics / EADS / Racal 3152* at our website: *Click HERE*



Racal Instruments™ 3152B

VXI Precision PLL Waveform Synthesizer

The Racal Instruments™ 3152B Waveform Synthesizer combines 250 MS/s waveform generation performance, versatility, and compact size into a single-slot VXIbus format.

The 3152B is a greatly improved version of a field-proven instrument ideal for VXI test stimulus generation. It replaces the 3152A which is standard on many military and commercial test platforms.

Key Features

- **Phase locks to external analog signals: 500 Hz to 10 MHz, 100 mV to 30 V_{rms}**
- **Sine and square waves up to 50 MHz at amplitudes up to 16 V_{pk-pk} into 50 Ω**
- **Built-in functions: Triangle(X), Sine(X), Sinc, Square, Ramp, Pulse, DC, Exponential & Gaussian Pulse**
- **Linear/log sweep features arbitrary and DDS) up to 100 MHz**
- **High-performance frequency synthesis: 11-digit resolution and 1 ppm accuracy**
- **VXI replacement for legacy pulse and function generators**

Product Information

Compatibility Mode

The 3152B default operational mode is a compatibility mode which makes the 3152B accept and execute programming as though it were a 3152A for all modes including (and not limited to) PLL, PM, sequenced mode, trigger delay, and multi-module synchronization. The 3152B provides a front panel interface which is identical to that of the 3152A.

Extended Performance Mode

The extended performance mode of the 3152B provides a synergistic combination of a swept function generator, pulse generator, programmable sequencer, and arbitrary waveform synthesizer into one instrument. In addition, the 3152B integrates a phase lock loop, modulation, sweep, hopping (amplitude and frequency) and a high-performance frequency counter into a single-slot VXI module, saving valuable space.

Frequency Sweep

The 3152B sweeps sine (now using Direct Digital Synthesis or DDS), square or triangle waveforms between any two frequencies up to 100 MHz for sine or square, 16 MHz for triangle. Sweep may be performed either up or down and linearly or logarithmically.

11-Digit Frequency Resolution

The 3152B DDS frequency synthesizer (CW mode) provides high frequency resolution, high signal-to-noise ratio (70 dB, typical) and the low phase-noise and jitter needed for telecommunications test applications.

Phase Locking and Phase Modulation

The 3152B incorporates external analog Phase Modulation (PM) and Phase Locking to external analog waveforms. The PM feature is useful in real-time phase offset control and telecom applications. The phase-lock feature automatically locks the 3152B's output to external signals at frequencies up to 10 MHz and voltages up to 30 V_{rms}. Phase offset is programmable with 0.01° resolution, and the trigger threshold is programmable with 10 mV resolution.

WaveCAD Compatible

The 3152B is compatible with WaveCAD 3.4 (Figure 1) for the 3152 and 3152A, so you can continue to use this program if desired. The 3152 and 3152A VXI*plug&play* drivers are also compatible with the 3152B.

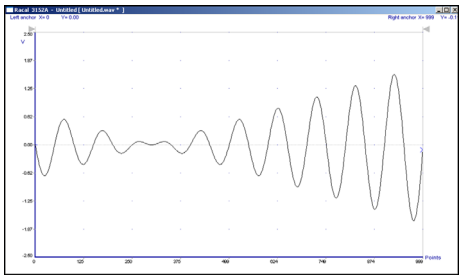


Figure 1: WaveCAD 3.4

ArbConnection™ Software

The 3152B is provided with ArbConnection™ software for control and waveform creation that lets you unlock the enhanced modes of the 3152B.

ASTRONICS TEST SYSTEMS

949.859.8999; 800.722.2528; atssales@astronics.com; www.astronicstestsystems.com

Copyright © 2014 Astronics Test Systems Inc.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Product Information
continued

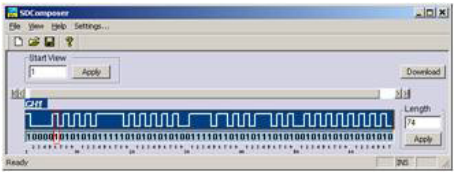


Figure 2: Serial Composer

The ArbConnection™ software includes composers to help you design arbitrary waveforms, pulse waveforms, frequency modulated waveforms, 3D waveforms (user-defined combinations of amplitude, frequency and phase modulation) and serial waveforms.

Creating Arbitrary Waveforms

The ArbConnection™ software provides a Waveform Composer application which is useful for creating test stimuli for the 3152B. The Waveform Composer allows you to import waveforms from a scope, .csv or text file, choose from a variety of pre-defined waveforms, or to enter an equation. Any waveform can then be manually edited with a variety of tools.

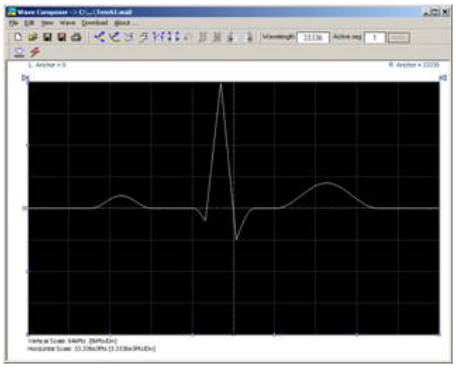


Figure 3: Cardiac Waveform in the Waveform Composer

Creating Pulse Waveforms

The ArbConnection™ software also provides a Pulse Composer for the creation of arbitrary pulse trains. You can specify the characteristics of each pulse in terms of time, amplitude and repetitions. The ArbConnection™ software then "programs" the 3152B to create exactly the pulse that you need, saving you valuable time.

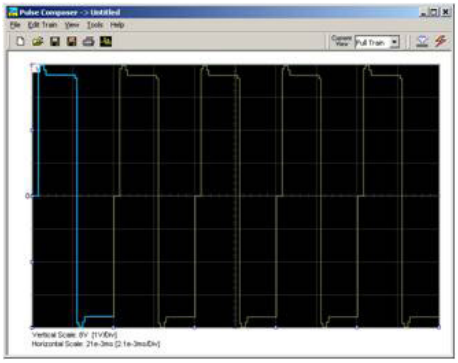


Figure 4: Custom Pulse Waveforms in the Pulse Composer

Creating Modulated Waveforms

The 3D waveform composer allows you to selectively combine three types of modulation profiles, amplitude, frequency and phase, into one signal.

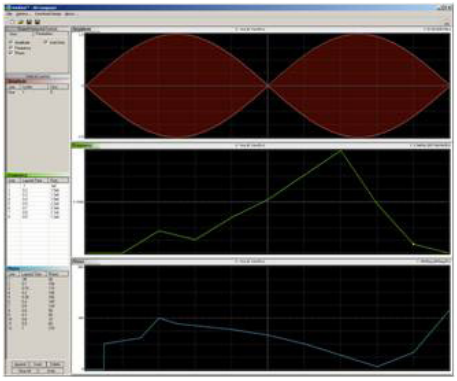


Figure 5: Combined AM, FM and Phase Modulation in 3D Composer

Specifications

Note: The Astronics Test Systems policy is one of continuous development and improvement. Consequently, the equipment may vary in detail from the description and specifications in this publication.

Amplitude Characteristics

Amplitude
- 20 mV to 32 V_{pk-pk}, output open circuit
- 10 mV to 16 V_{pk-pk}, into 50 Ω

Resolution
- 4 digits

Accuracy (at 1 kHz into 50 Ω)
- 1.6 V to 16 V_{pk-pk}: ±(1% + 25 mV)
- 160 mV to 1.59 V_{pk-pk}: ±(1% + 5 mV)
- 10 mV to 1.599 mV_{pk-pk}: ±(1% + 2 mV)

DC Offset
- Range: 0 to ±7.995 V
- Resolution: 1 mV
- Accuracy: ±(1% ± 1% of Amp. ±5 mV)

Output Impedance
- 50 Ω ± 1%

Low-Pass Filters (selectable)
- 25 MHz: Bessel
- 50 MHz: Bessel
- 60 MHz: Elliptic
- 120 MHz: Elliptic

Standby (Output disconnected)
- Output On or Off

Output Protection
- Short circuit to case (10 s max)

Standard Waveforms
(Sine, Triangle, Square, Pulse, Ramp, Noise, DC.)

Frequency Resolution
- 11 digits

Accuracy & Stability
- Same as frequency standard

Sine

Frequency Range
- 100 µHz to 100 MHz

Phase Adjustment
- Range: 0 to 359.95°
- Resolution: 0.05°

Power Range (sine raised to a power)
- 1 to 9

Total Harmonic Distortion
- <0.1% to 100 kHz, STD & CW

Harmonics & Spurious

Frequency	<5 V_{pk-pk}	<10 V_{pk-pk}
<100 MHz	-35 dBc	-30 dBc
<10 MHz	-50 dBc	-35 dBc
<1 MHz	-50 dBc	-40 dBc

Flatness

Frequency	<5 V_{pk-pk}	<10 V_{pk-pk}
<50 MHz	10%	15%
<10 MHz	5%	5%
<1 MHz	1%	

Copyright © 2014 Astronics Test Systems Inc.
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Specifications
continued

Square

Frequency Range
- 100 µHz to 100 MHz

Duty Cycle Range
- 0% to 99.99%

Rise/Fall Time (10%-90%)
- <5 ns

Aberration
- <6%

Triangle

Frequency Range
- 100 µHz to 16 MHz

Phase Adjustment
- Range: 0 to 359.95°
- Resolution: 0.05°

Power Range (triangle raised to a power)
- 1 to 9

Pulse and Ramp Functions

Frequency Range
- 100 µHz to 16 MHz

Delay, Rise/Fall Time, High Time Ranges
- 0% to 99.99% of period (each independently)

Gaussian Pulse Time Constant Range
- 1 to 200

Sinc Pulse "Zero Crossings" Range
- 4 to 100

Exponential Pulse Time Constant Range
- -200 to 200

DC Output Function

Range
- -100% to 100% of amplitude

Arbitrary Waveforms

Waveform Creation Software
- Included ArbConnection™ software allows instrument control and creation of custom waveforms and sequences using freehand mode, equations, built-in functions or imported from a spreadsheet, scope or text file.

Waveform Memory
- Legacy Mode: 512 k points
- Modern Mode: 1 Meg points

Vertical Resolution
- Legacy Mode: 12-bits
- Enhanced Mode: 16-bits

Number of Memory Segments
- 1 to 16 k

Minimum Segment Size
- Legacy Mode: 10 points
- Enhanced Mode: 16 points

Sequenced Waveforms

Operation
- Segments may be linked and repeated in a user-selectable fashion 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.

Sequencer Steps
- 1 to 4096

Segment Loops
- 1 to 1 Meg

Minimum Segment Duration
- 500 ns

Minimum Segment Size in a Sequence
- 10 points

Sweep Waveforms

Sweep Range
- Sine, square: 10 Hz to 100 MHz
- Triangle: 10 Hz to 16 MHz

Swept Waveform
- Sine, square or triangle

Spacing
- Linear or logarithmic

Direction
- Up or Down

Sweep Duration
- 1.4 µs to 40 s

Sampling Clock

Internal Source Range (worst case)
- Continuous Mode: 100 mS/S to 250 MS/s
- Other Modes: 100 mS/s to 225 MS/s

Internal Source Range (typical 25º C)
- Continuous Mode: 300 MS/s
- Other Modes: 240 MS/s

Resolution
- 11 digits

Accuracy and Stability
- Same as reference

Reference Clock

Internal Reference
- 10 MHz ±50 ppm

Reference Clock
- CLK10: 100 ppm (typical)
- Internal TCXO: 1 ppm, 19° C to 29° C
- Drift: 1 ppm/year

Operating Modes

Normal Mode
- Continuous output of a single waveform segment

Sequenced Mode
- Continuous or triggered output of a sequence of waveform segments (see Sequenced Waveforms)

Sweep Mode
- Continuous output of a swept waveform

Triggered Mode
- One waveform cycle or sequence or sweep is output

Delayed Triggered Mode
- Delays any trigger by up to 2 million waveform points

Gated Mode
- Generator is enabled when an external gate signal is active. The first gated output cycle is synchronous with the active slope of the gate signal. The last output cycle is always completed.

Burst Mode
- A segment is repeated up to 1 million times. In External Burst Mode, each burst begins with a trigger. In Internal Burst Mode, an internal timer is used to repeat the burst at a programmed interval.

Phase Lock Mode
- Phase locks a standard or arbitrary waveform to an external signal to 30 V_{rms}

Phase Modulation (external)
- PM Modulation Rate: 0 to 10 kHz

Copyright © 2014 Astronics Test Systems Inc.
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Specifications
continued

Counter/Timer
- Measures frequency, period, period averaged, pulse width and events.

Amplitude Modulation (internal)
- AM Carrier Range: 10 Hz to 100 MHz
- AM Rate: 10 mHz to 100 kHz
- AM Depth: 0% to 200%

Triggering Characteristics

Sources
- Internal: 1 µs to 20 s, programmable
- External Input Impedance: 10 kΩ nominal
- Damage Level: 30 V_{rms}
- Level (Programmable): ±10 V
- Resolution: 10 mV
- Sensitivity: 100 mV_{rms}
- VXI Backplane: TTLTRG0-7

Maximum Trigger Frequency
- Internal Timer: 50 mHz to 1 MHz
- External: DC to 5 MHz

External Trigger Pulse Width
- 10 ns, min

Trigger Slope
- Positive or negative

System Delay (Trig I/P to Waveform O/P)
- 150 ns + 6 clock periods

Trigger Delay (Trig I/P to Waveform O/P)
- Legacy Mode: 10 to 2 Meg points
- Modern Mode: 100 ns to 20 s + system delay
- Resolution: 20 ns
- Accuracy: 5% of setting + system delay

Re-trigger Delay (Waveform end to re-start)
- Resolution: 20 ns
- Accuracy: 20 ns + 3 clock periods + 5% of setting

Sync Output
- Front Panel BNC: TTL
- VXI Backplane: TTLTRG0-7

Sync Pulse
- Width Range: 4 to n - 8 clock periods
- Position Range: 0 to n (Where n is the number of points in the selected memory segment.)
- Resolution: 4 points

Sync Sources
- Any point, sequence complete, ½ clock period

PLL Characteristics

Operation
- Automatically locks to external signal

PLL Input Characteristics
- Same as TRIG IN

External Lock Frequency Range
- STD Waveforms: 500 Hz to 10 MHz
- ARB Waveforms: 500 Hz to 100 MHz divided by # of points in segment

Coarse Phase Offset Range
- ±180°

Fine Phase Offset Control
- Range: ±36°
- Resolution: 0.01°

Phase Control Accuracy
- 2% ±sample clock period

Counter Characteristics

Operation
- Counter/timer mode, when enabled, disables waveform generation

Measurement Functions
- Frequency, period, period averaged, pulse width and totalize

Input Characteristics
- Input BNC: Front panel TRIG/PLL IN
- Trigger Level Range: ±10 V
- Sensitivity: 500 mV_{pk-pk}
- Damage Level: ±12 V
- Slope: Positive or negative
- Minimum Pulse Width: 10 ns

Frequency, Period Averaged
- Frequency: 20 Hz to 100 MHz
- Period: 10 ns to 50 ms
- Resolution: 7 digits/s

Period, Pulse Width
- Range: 500 ns to 50 ms
- Resolution: 100 ns

Totalize
- Frequency: 20 Hz to 100 MHz
- Event Counting Range: 1 to 10^{12}-1

Gate Time
- Frequency: 100 µs to 1 s

Reading Modes
- Repetitive: Continuous measurements when signal is present
- Hold: Single measurement on command
- Gated: Active in Gated Totalize mode

PM Characteristics

Operation
- External signal offsets phase. The PM input is operational in PLL mode.

PM Input
- Impedance: 100 kΩ, ±5%
- Phase Range: ±80º
- Input Bandwidth: 100 Hz to 10 kHz
- External Lock Range: Same as PLL
- Sensitivity: 20º/V
- Accuracy: ±10%

Multiple-Module Synchronization

(Multiple modules can be daisy-chained and synchronized to provide multi-channel systems. Master/slave phase is programmable.)

Initial Skew
- <±75 ns + 4 sample periods

Synchronization Modes
- Waveform: STD, ARB, SEQ (auto advance only)
- Run: Continuous, triggered, gated, burst

Inter-Module Phase Offsets
- Availability: Continuous run mode only
- Resolution & Accuracy: 20 ns
- Range: <100 ns to 20 s

Synchronization Mechanism
- VXI LOCAL BUS

Frequency Range for Operation
- STD Waveforms: 1.5 kHz to 100 MHz
- ARB/SEQ Waveforms: 2.5 MS/s to 150 MS/s (subject to backplane limits)

Interface

(Single slot, Message Based, VXIbus 3.0 Compliant)

Front Panel I/O (Accessed with BNC connectors)

Inputs
- TRIG/PLL IN: 10 kΩ, ±10 V
- CLOCK IN: NECL, 50 Ω, ±5%
- PM IN: 100 kΩ, 30 V_{rms} max

Outputs
- OUTPUT: 50 Ω, 5.7 V_{rms} (28 dBm)
- SYNC OUT: TTL

General

Status Lights
- Red: Fail
- Amber: Module accessed on VXIbus
- Amber: PLL Locked
- Green: Output on

Copyright © 2014 Astronics Test Systems Inc.
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Specifications
continued

Peak Current & Power Consumption
- Total Power: <25 Watts

	I_{Pm}(A)	I_{Dm}(A)
+24	0.116	0.03
+12	0.07	0.011
+5	1.74	0.014
–2	0	0
-5.2	1.8	0.15
-12	0.06	0.01
-24	0.112	0.01

Software

Firmware Upgrades
- Stored in Flash using VXI utility

Drivers
- LabVIEW™, LabWindows™/CVI, VXI*plug&play* support for frameworks based on Microsoft Win32® application programming interface

Native Language
- SCPI 1993.0, IEEE 488.2

Waveform & Control Software
- WaveCAD 3.4, ArbConnection™ 4.2

Shared Waveform Memory
- D16/A24/A32 block transfer

Environmental

Temperature
- Operating: 0° C to 55° C
- Storage: -40° C to 70° C

Humidity (non-condensing)
- 11° C to 30° C: 95% ±5%
- 31° C to 40° C: 75% ±5%
- 41° C to 50° C: 45% ±5%

Altitude
- Operating: 10,000 ft
- Storage: 15,000 ft

Vibration (non-operating)
- 2 g at 55 Hz

Shock (non-operating)
- 30 g, 11 ms, half sine pulse

MTBF (MIL-HDBK-217F 25C, GB, GC)
- 76,104 hrs

Mechanical

Weight
- 2 lbs 9 oz (1.16 kg)

Cooling (10° C Rise)
- 3.7 l/s @ 0.5 mm H_2O

CE The CE Mark indicates that the product has completed and passed rigorous testing in the area of RF Emissions and Immunity to Electromagnetic Disturbances, and complies with European electrical safety standards.

Ordering Information

408151-001 : Racal Instruments™ 3152B
250 MS/s Waveform Generator with 1 M RAM & 1 ppm TCXO

408151-011 : Racal Instruments™ 3152B
250 MS/s Waveform Generator with 1 M RAM & 1 ppm TCXO (3152 *idn? response)

408151-021 : Racal Instruments™ 3152B
250 MS/s Waveform Generator with 1 M RAM & 1 ppm TCXO (3152A *idn? response)

408151-201 : Racal Instruments™ 3152B
250 MS/s Waveform Generator with 1 M RAM & 1 ppm TCXO, TEK

Copyright © 2014 Astronics Test Systems Inc.
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3152/3152A Cross-Reference Guide

Old Model	Old P/N	New Model	New P/N	Enhancements
3152 w/ 64 k	407510-001	3152B w/1 M, 1 ppm	408151-001	Sample Rate/BW/memory are ≥2x Full legacy command emulation New modulation/sweep capabilities New waveform generation software
3152 w/ 256 k	407510-002			
3152 w/ 512 k	407510-003			
3152 w/ 64 k, 1 ppm	407510-011			
3152 w/ 256 k,1 ppm	407510-012			
3152 w/ 512 k, 1 ppm	407510-013			
3152A w/ 64 k	407808-001			
3152A w/ 512 k	407808-003			
3152A w/ 64 k, 1 ppm	407808-011			
3152A w/ 512 k, 1 ppm	407808-013			
3152A w/ 512 k, TEK	407808-203	3152B w/1 M, 1 ppm, TEK	408151-201	
3152A w/ 512 k, 1 ppm, TEK	407808-213			
3152 w/ 512 k, 1 ppm	407510-213	3152B w/ 1 M, 1 ppm	408151-301	
3152A w/ 512 k, 1 ppm	407808-413	3152B w/ 1 M, 1 ppm	408151-401	
3152-S-1755	407510-003S1755	3152B w/ 1 M, 1 ppm, S1755	408151-501	Specials are fully incorporated in the standard unit. If legacy special ID codes are required, contact marketing.
3152-S-1619	407510-001S1619	3152B w/ 1 M, 1 ppm, S1619	408151-601	
3152-S-1619A	407510013S1619A			

All trademarks and service marks used in this document are the property of their respective owners.

- Racal Instruments is a trademark of Astronics Test Systems Inc. in the United States and/or other countries
- Microsoft and Win32 are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries
- LabVIEW and LabWindows are trademarks of National Instruments in the United States and/or other countries
- ArbConnection is either trademark or registered trademark of Tabor Electronics

Copyright © 2014 Astronics Test Systems Inc.
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP