



# MB Win475

## Automated Calibration System

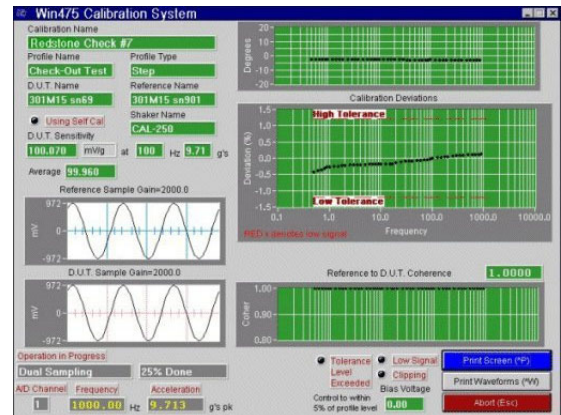
- Accelerometers and velocity transducers
- Expanded System Uncertainty as low as 0.6%
- System Transfer Uncertainty as low as 0.25%
- Designed to operate from 0.1 Hz - 10 kHz
- One exciter: 1 Hz to 10 kHz, 25mm p-p, 40 g's pk
- Swept & step sine, random excitation, and shock
- FFT filtered at driven frequency via PC board
- PC-controlled signal conditioner minimizes errors
- Runs under Windows 2000 and Windows NT



The MB Win475 is an automated calibration system that slashes calibration costs, maximizes productivity, assures consistent quality, and manages transducer data - automatically! It is cost-justified with as few as 50 transducers. System Transfer Uncertainty matches or surpasses more expensive alternatives. Labs can use the Win475 to comply - for calibration of vibration transducers - with ANSI/NCCL Z540-1-1994 "Calibration Laboratories and Measuring and Test Equipment - General Requirements" and relevant requirements of ISO 9000 (ANSI/ASQC Q90 Series), ISO/IEC 17025, ISO 16063-1 and ISO 5347. Win475 satisfies ASME CODE-1998; SUBSECTION ISTB (invoked by NRC). The Win475 is a proven product with a sizable installed base.

### Key Benefits

- Excellent Expanded System Uncertainty – see Table below
- Small uncertainty and affordable price = outstanding value
- Saves money, by replacing out-sourced calibration services
- Keeps calibration in-house; shortens turnaround time
- Proper calibration process and accurate records aid compliance during ISO audits
- Allows more frequent calibrations to assure good test data
- Automation eliminates human errors with manual systems
- Speeds-up calibration that frees-up users for other tasks
- Simplifies record-keeping
- Intuitive and self-tutorial -- ideal for infrequent users



### System Configurations

Win475 Systems are characterized by key performance specifications: their Expanded System Uncertainty (ESU), method used to calibrate the Reference Standard Accelerometer (REF), frequency range of use, and mass of the transducer being calibrated (DUT).

MB defines System Transfer Uncertainty (STU) as the uncertainty of the Win475 measurement and vibration generation system, including the PC, data acquisition board, software, Model 405 signal conditioner, calibration exciter, and power amplifier, but excluding the REF. MB measures STU using the "Redstone Check", rather than computing it from component uncertainties making up the system. STU is a measure of the ability of the calibration system to accurately transfer the uncertainty of the REF to the DUT.

The uncertainty of the REF is separately reported on its Calibration Certificate by the entity that calibrated it. MB offers two sources for the REF's sensitivity data: absolute calibration using laser interferometry and secondary calibration. Absolute calibration provides smaller REF uncertainties, but is more expensive. However, REF uncertainty dominates ESU of the Win475 so there are real advantages to have low REF uncertainty values. User choices are provided to meet uncertainty needs.

Expanded System Uncertainty (ESU) combines STU and REF uncertainty, using the “square root of the sum of the squares” method (since they are independent parameters). ESU assesses the uncertainty inherent to the Win475 calibration system itself. The uncertainty and repeatability of DUT calibrations using the Win475 depend on the quality, resolution, sensitivity, etc. of the DUT, on operator skill and training, on human errors, and on many other factors unrelated to ESU. These factors do not impact STU or ESU.

## Win475 System Configurations

System Name	ESU at 100 Hz	Ref Calibration	Frequency Range	Mass of DUT
Win475-Standard	0.6 %	Absolute	1 – 10,000 Hz	< 900 gm
Win475-Basic	2.2 %	Secondary	1 – 10,000 Hz	< 900 gm
Win475-Low Frequency	0.6 %	Absolute	0.2 – 200 Hz	< 500 gm
Win475-Ultra Low Frequency	0.6 %	Absolute	0.1 – 100 Hz	< 4,500 gm
Win475-Heavy Transducer	2.2 %	Secondary	0.75 – 2,500 Hz	< 4,500 gm
Win475-Multiple DUT	2.2 %	Secondary	1 – 500 Hz	< 50 gm each
Win475-Transverse Sensitivity	2.2 %	Secondary	5 – 2,500 Hz	< 100 gm

## STU, REF and ESU of Popular Win475 Systems

Frequency Range	System Name	STU	REF	ESU
5 – 2,000 Hz	Win475-Standard CAL50 exciter (25mm p-p)	0.25 %	0.5 %	0.6 %
2,000 – 8,000 Hz	Win475-Standard	0.25 %	1.0 %	1.1 %
9,000 – 10,000 Hz	Win475-Standard	0.5 %	1.0 %	1.2 %
1 - 2 Hz	Win475-Standard	1.0 %	0.5 %	1.2 %
3 - 4 Hz	Win475-Standard	0.5 %	0.5 %	0.8 %
5 – 2,000 Hz	Win475-Basic, CAL50 exciter (25mm p-p)	0.25 %	2.1 %	2.2 %
0.4 - 0.9 Hz	Win475-Low Freq, CAL20 exciter (150mm p-p)	1.5 %	0.5 %	1.6 %
1.0 - 200 Hz	Win475-Low Freq	0.25 %	0.5 %	0.6 %

## Standard Features, Designed with Users in Mind

- Calibrates virtually all accelerometers regardless of size and weight including: Charge, Low impedance, Voltage, Servos, Strain Gage, Piezoresistive and Capacitive – AC- and DC-coupled
- Calibrates displacement and velocity transducers, even those with a built-in meter and no AC output
- No operator adjustments required for gain, vibration levels, etc. Software-control virtually eliminates operator error, enhances repeatability and ensures optimum signal-to-noise ratio and minimizes uncertainty
- Operator is not required to adjust amplifier gain levels, knobs or switches to perform a calibration
- Combination charge, displacement, voltage and low impedance voltage mode dual-channel signal conditioner
- System Transfer Uncertainty (STU) is measured as a “total system”, rather than computing it from a “summation of many independent components” approach
- STU provides frequency-domain values, not one number
- Users can measure and re-verify STU at any future time
- Repeatability of nominal sensitivity at 100 Hz, 40 runs, @ 95% confidence level = average  $\pm$  0.075%
- Uses “back to back” mounting where each transducer is bolted to a fixture that attaches to the exciter’s moving element. Uses “single-ended” REF.
- Widest frequency range with one exciter, 1 – 10,000 Hz
- Longest stroke for broadband exciter, 25mm p-p
- Highest acceleration level of broadband exciter, 40 g’s pk
- Calibration range not limited by DUT mass
- Compact bench-top package, conserves floor space
- NIST traceability
- Turnkey solution
- Real time display of waveforms

- Software performs amplitude linearity checks
- Internally compensated "total channel" calibration
- 100dB signal gain-ranging maximizes signal-to-noise at every signal level, using software-controlled Model 405 Signal Conditioner and plug-in board
- Diagnostic software performs real-time monitoring and alarm of critical areas of operation and signal paths
- Unique "Self Check" quickly verifies system operation
- Manual Mode allows for "quick check" of transducers with full measurement accuracy
- Win475-Standard supports a Test Accuracy Ratio (TAR) of 4:1 while calibrating 5% devices
- Win475-Low Frequency Option delivers excellent performance on low sensitivity DUTs that must be accurately calibrated below 10 Hz, and for sub-1.0 Hz calibrations
- Latest-generation Pentium PC with ample hard drive and CD to store data locally or archive on a network server
- Conventional Windows file structure, folders, etc.
- National Instruments LabWindows GUI
- Menu-driven application software under mouse control
- Integrated test information database
- Aids scheduling and recall of transducers for calibration
- Permits comparison against historical results
- Password protection of critical set-up data
- English and SI units
- Several report formats (customizable)
- Automates repetitious and boring calibration tasks
- Computerizes and standardizes calibration procedures
- Manuals written for users who are not vibration or electronics technicians/engineers
- Outputs ASCII file formats for use with any Windows-compatible application, such as Excel or Access

## SYSTEM SPECIFICATIONS

<b>Configuration:</b>	Desktop PC running under Windows 2000 or Windows NT Dual channel signal conditioner, Model 405 Dual channel signal processor, Model AT-MIO E-1 Calibration shaker, Model CAL50 Power amplifier, Model SL500VCF Two reference transducers, traceable to NIST	
<b>Calibration Method:</b>	User selectable: back-to-back or piggyback	
<b>Inputs:</b>	<b>Charge:</b>	0.01 pC/g to 99,999 pC/g (limited by 10 V max)
	<b>ICP/Voltage:</b>	0.01 mV/g to 99,999 mV/g (limited by 10 V max)
	<b>Velocity:</b>	0.1 mV/ips to 99,999 mV/ips (limited by 10 V max)
<b>Input Impedance:</b>	<b>Charge:</b>	> 10 ohm
	<b>Voltage:</b>	> 100 M ohm
	<b>ICP:</b>	> 100 K ohm
<b>Frequency Range:</b>	<b>Acceleration:</b>	DC to 10 kHz
	<b>Velocity:</b>	60 CPM and above
<b>Operating Temperature:</b>	10 to 40°C ambient air, without loss of performance	
<b>Operating Humidity:</b>	20% to 50% relative humidity	

## Options

- NIST-traceable Calibration Re-Certification Kit
- Automation Package for existing manual system
- Excitation using random vibration
- Shock calibration with classical waveforms using CAL50 exciter, up to 40 g's pk at 5.0 to 0.5 msec durations

## ***Options cont'd***

- Desk-style workstation consoles
- Simultaneous calibration of seven (7) accelerometers
- Printers
- Other reference accelerometers (user choice)
- Can calibrate heavy transducers and switches up to 4.5kg at 10 g's pk with Win475-Heavy transducer system option
- Remote temperature/humidity sensor
- Temperature and humidity chamber
- Chamber interface kit
- User Training - at MB or on site



**Family of Calibration Shakers**