Sonatest

Masterscan Series
700M & D-70

HIGH PERFORMANCE NARROW BAND DIGITAL ULTRASONIC FLAW DETECTORS

Simplicity | Capability | Reliability

Masterscan Series

The choice is yours, customise your software...

The Sonatest heritage in product design and Masterscan name has always assured the technician of robust instrument construction combined with exceptional performance. The Masterscan series carries the baton of all these desirable features, but now, thanks to innovative internal redesign, new features can be added and upgrades performed in the working environment, reducing downtime and increasing working flexibility. High levels of near surface resolution, penetrating power (450V pulser - square and spike) and excellent signal to noise ratio are key functions in the Masterscan range. Typical applications are Weld Fabrication, Corrosion Detection, Composite Inspection, Bond Testing, Forgings & Castings, Power Generation (including EMATS) and general UT inspection.

Masterscan Series Features

- Configurable on-board software.
- Customisable & intuitive menus.
- Split DAC/AVG.
- Angle measurement mode.
- Dryscan capability.
- Field upgradeable.
- Encoded B-Scan.
- A-Scan fade.
- 4GByte on-board memory.
- USB interface for PC import/export.

Masterscan D-70
DAC Curve functionality shown in Full Screen Mode.

High Visibility Display

For any flaw detector the display is a crucial element. The Masterscan series has a colour transflective VGA display, providing high visibility in any lighting conditions. Maximum readability is achieved through adjustable brightness and the choice of 9 colour palettes, including a black on white LCD emulation mode. Simplicity reigns with the enhanced user interface and a full screen A-Scan display is available at the touch of a button, so that every detail of the A-Scan can be easily seen.

...and choose your hardware.

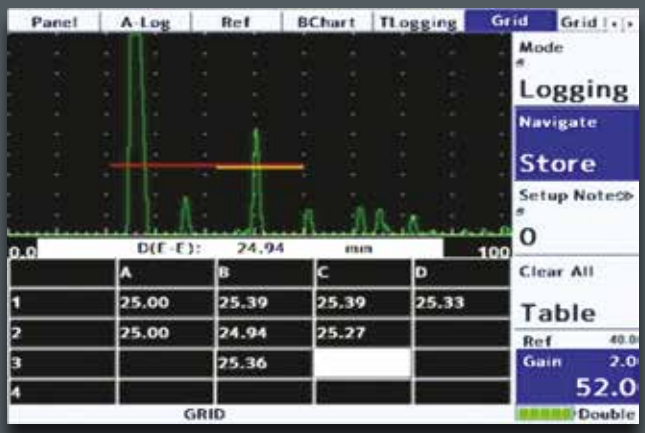
Masterscan 700M Dryscan Mode

3Rs - Reliable, Rugged & Robust

The ability to perform in harsh environments with proven reliability is an important aspect of flaw detector ownership. Maximum operational time is promoted by outstanding battery performance. Up to 18 hours from full charge. The Masterscan's enclosure is constructed using automotive grade impact resistant materials and is designed to meet IP67 standards, offering excellent water resistance.

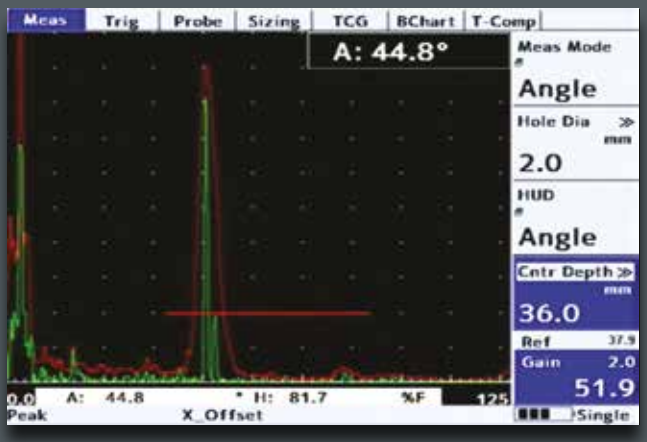
Explosive testing MIL810-G standards have been passed, together with environmental testing which have confirmed the instrument fully functioning at temperatures above 55°C.

Features



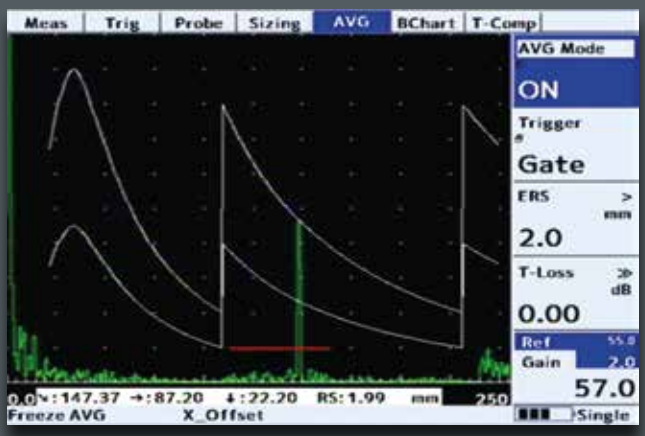
NEW - Corrosion Software Option

Thickness measurement is a major application of the Masterscan series and good data logging tools are essential to productivity. The popular block/location/Reading-Number format is available as standard. With the corrosion software option, users can create and populate two-dimensional grids of readings, with A-Logs, B-Scans, historical readings and notes optionally attached to each thickness log.



TCG

With the Time-Controlled Gain (TCG) option, the gain of the receiver can be varied along the beam path to compensate for beam-spread and attenuation. This brings equivalent reflectors at different depths to equal heights on the A-Scan and allows a simple gate to act as the reporting level for the inspection. TCG can be generated from reference echoes in the same way as DAC, or can be converted from a pre-existing DAC curve.



AWS

With this option enabled, measurements of indication level (L), Attenuation Factor (AF), and indication rating (IR) are calculated and displayed in accordance with AWS D1.1

Dryscan Mode

The Dryscan option adds a tuned pre-amplifier to the received signal, allowing comparative transmission testing of composite materials which cannot be inspected using traditional techniques. Used in conjunction with soft-tip and roller probes, no couplant is required, so honeycomb structures or carbon fibre panels are easily assessed for delaminations and disbonds.

UTLity Lite / UTLity Pro (Data Management Software)

UTlity Lite Software provides everything you need to manage your inspection data. The standard (Lite) version is FREE with every instrument and gives you the ability to view, move and manage Calibrations, A-Scans, B-Scans and Thickness Logs both on the instrument and on your PC. With UTLity Lite you can also create customised inspection report templates, cut and paste information to other applications, and create printable PDF documents.

- Load, store, manage files both on the PC and on a connected flaw detector.
- Save, analyse, colour code and export thickness logging data to spreadsheets/asset management software.
- Update the Flaw Detector Software and Firmware as and when updates become available on our website.

UTLity Pro is the professional version and works in conjunction with the Corrosion Software option, providing the end user with the ability to create and manage inspection plans, location notes, historical thickness readings and other asset management information as required.

- Set up inspection plan (grid) templates, notes and labels.
- Import previous readings into an inspection plan.
- Export Inspection plan data to spreadsheets and plant maintenance databases.
- Backup and recover your DVDs.

DAC

Up to 20 reference points can be used to construct a digital DAC curve. The user can choose whether the DAC curve or Gate 1 is used as the monitoring level. Echo amplitude can be displayed as either dB DAC, % DAC, or % full screen height.

Library of DAC Curves

There are pre-programmed dB levels corresponding to:

- EN (-6dB, -14dB)
- ASME (-2dB, -6dB, -10dB)
- JIS DAC (+6dB, -6dB, -12dB)

Any of the available levels can be used as monitor gate. The level selected for monitoring is highlighted in a different colour to the other curves on screen.

Customisable DAC

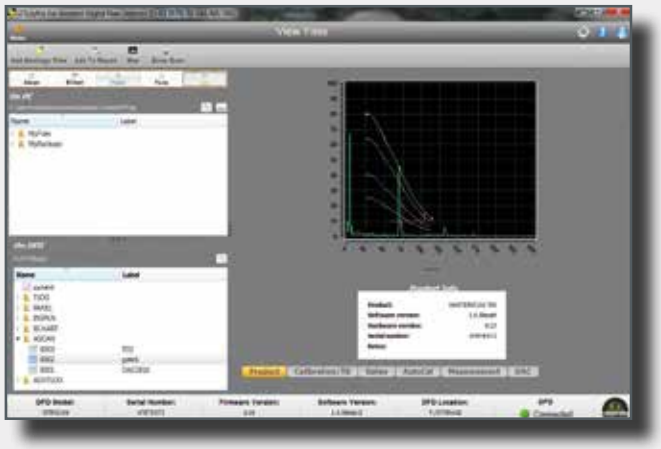
Up to 3 custom curves can be used in addition to the pre-programmed library. The user can enter custom levels between +/- 20dB for each of the 3 curves. In this way, all international standards are supported.

Dynamic DAC

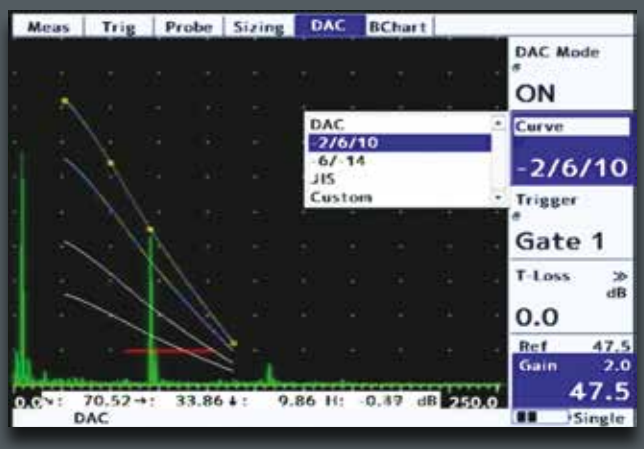
The wide dynamic DAC range can be used for better measurement resolution of distant echoes. The height of the DAC curves can be adjusted using Reference Gain Control. The relationship between DAC curve and reference indications is preserved throughout and the T-Loss control manages transfer loss from test-block to specimen.

DAC to TCG

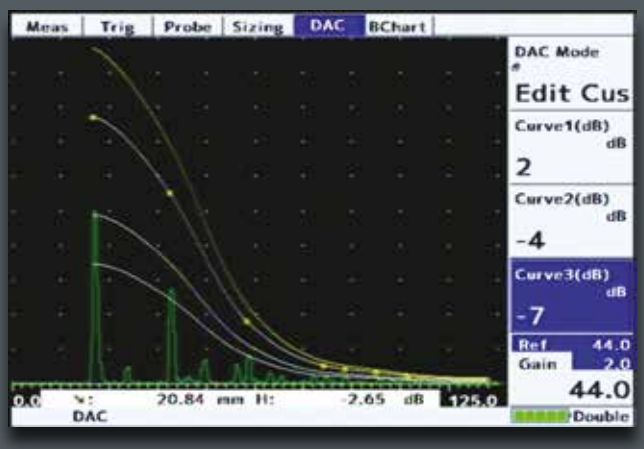
A DAC curve can be converted to a TCG curve, and back again. The conversion uses the references points already collected and preserves the reference gain for the left-most reference point, so that all reference echoes are set to 80% FSH.



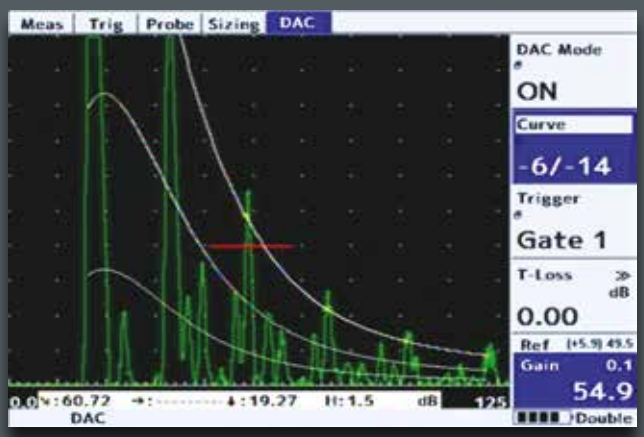
PLUS! In case your Sonatest flaw detector ever needs a software update, UTLity can collect the latest version over the internet and upgrade your flaw detector without ever having to return it to a service centre.



Library of DAC Curves



Customisable DAC



Dynamic DAC

DAC to TCG conversion

Sizing Techniques & Software Options

Sizing Technique	Description	Standard or Optional
DAC	Defined by up to 20 reference points or converted from TCG curve and digitally drawn on the screen. DAC curves meet the requirements of EN, ASME JIS and many other standards. Custom DAC curves can be selected. DAC dynamic range can be extended automatically adjusting the reference curve to match the reference gain. Scanning Gain, and T-Loss available as separate controls. Amplitude readout is selectable between % FSH, % DAC or relative dB.	Standard
TCG	Time corrected or "Swept" gain, defined by up to 20 reference points or converted from a DAC curve. All points converted to 80% screen height.	Option
Backwall Echo (BEA) Attenuation	0-40dB attenuation applied to the latter part of the time base, to improve the detectability of defects near the back wall and loss of BWE due to porosity.	Option (requires TCG)
AWS	Built in calibration and display of factors and parameters required by AWS D1.1	Option
AVG/DGS	Enables the calculation of pseudo "DAC" curve and equivalent reflector size of UT indications, based on user input of transducer parameters.	Option
API	On-board flaw sizing method in accordance with API 5UE	Option
Interface Trigger	Unlocks the interface trigger gate controls, which hold off the A-Scan acquisition and display until an interface echo is detected within a specific range and amplitude. Used for the elimination of water-path.	Option
Corrosion Software Option	Enables complex inspection plans to be uploaded from a PC using the on board UTLity software. Features include 2 dimensional thickness logging, storing A-Logs and B-Logs with thickness values, taking multiple readings per location and note creation for each grid location. B-Scan option available to display bar-growth views of thickness readings taken by Gate 1 against distance or time.	Option (Includes B-Scan)
Split DAC & DGS/AVG	Adds up to 3 zones of added gain (+12, +24 and +36) to the DAC or DGS/AVG curve to enable single-pass scanning of large sections and attenuative materials conforms to EN583-2:2001.	Option

Masterscan Standard Kit

- MS700M, D70 or D70 digital flaw detector
- Battery, charger, charger mains cable.
- User guide & calibration certificate.
- Certificate of conformance
- Carry bag.
- UTLity & USB cable.
- Display window cover.
- Ultrasonic couplant.

B-Scan Encoder Option

B-Scan Encoder available on request.

Rubber Boot Accessory

Customised rubber "shell" that fits around the instrument for extra protection and insulation. (D-50 only)

Site Pack Option (D70 only)

- Masterscan standard kit
- Rugged shipping case
- Airplane carry on size
- 488 Mm x 386 mm x 229mm
- 19.2 In x 15.2 In x 9.0 In
- Centre of gravity bracket
- Webbing bracket
- Magnetic bracket
- Webbing/two karabiners strap/hook

UTLity Pro (Advanced User Software)

Advanced user software, partners with the corrosion software option enhancing data manipulation, presentation and analysis.

Masterscan Series D-70 & 700M

Specifications (subject to change without notice)

Test Range	0-1mm (0.04in) up to 0-20,000 mm (787 in.) in steel at 5930m/s (19455f/s)
Velocity	256 - 16000 m/s continuously variable.
Probe	Zero 0 to 1000 µs.
Delay	0-20,000m (800in) in steel at 5930m/s.
Gain	0 to 110dB adjustable in 0.1, 0.5, 1, 2, 6, 14 and 20dB steps.
Test Modes	Pulse echo and transmit/receive. Single Crystal, Double Crystal and Pitch-Catch.
Damping	50 and 400 Ohm damping selectable.
Pulser	100-450V -ve spike and square wave. Pulse Width from 30nS to 2500nS. Rise/Fall times <5nS into 50R load.
P.R.F.	Adjustable 5Hz to 6kHz. External sync also available.
Screen Update Rate	60Hz
Rectification	RF, Full wave, +ve half-wave and -ve half-wave.
Frequency Range	8 selectable filter bands. i) 100kHz - 500kHz ii) 200kHz - 800kHz iii) 0.4MHz - 1.6MHz iv) 1.4MHz - 3MHz v) 3MHz - 8MHz vi) 7MHz - 15MHz vii) 9MHz - 21MHz viii) 1.6 MHz - 33 MHz (Wideband) Additional tuned low frequency pre-amp with Dryscan option.
System Linearity	Vertical = 0.5% Full Screen Height (FSH). Horizontal +-0.2% Trace Full Screen Width (FSW).
Reject (Selectable)	Up to 80% Linear reject (removes baseline noise without affecting indication amplitude) Or Up to 50% Suppressive reject (increase zero offset and reduces amplitude of all echoes) LED Warning when active.
Units	Metric (mm), inch (in) or microseconds.
Display	Colour Transflective VGA (640 x 480) TFT Display area: 116.16 x 87.2 mm (4.57 x 3.43 in). A-Scan Area: 400 x 510 pixels (normal), 460 x 620 (FS). Colours: 9 colour options with variable brightness.
Gate Monitor	Two independent gates for measurement and monitoring. Start and width fully adjustable over the entire range of the instrument. Levels adjustable from 0% to 100%, positive or negative triggering on each gate with audible & visual alarms. Gate resolution is 5nS.
Zoom	Expands range and delay to cover the area set by Gate 1 start & width controls.
AGC	Automatic Gain Control automatically sets the signal in Gate 1 to a level between 10% and 90% FSH, tolerance between 5% and 20%.
MEASUREMENT MODES	
Mode 1	Signal monitor, Gate alarms can be active but no measurements are displayed.
Mode 2	Depth and amplitude of first signal in gate.
Mode 3	Echo-Echo distance measurements.
Mode 4	Trigonometric display of beam-path, surface distance (including X-offset) and depth of indication from the inspection surface together with echo amplitude. Curved surface correction can be applied for convex and concave surfaces. Half-skip can be indicated on screen.
Mode 5	Gate to Gate distance measurement
Mode 6	Flank to Flank
Mode 7	Beam Angle, calculated from beampath, hole radius and hole centre depth.
Measurement Display	Live display and updates on screen at 3 times per second. Large display of a single measurement available.

Contour	Trailing-Edge slew-rate control to reduce half cycles in rectified modes. Selectable from one of 6 levels.
Waveform Smoothing	Select from: i) None (both min and max values are displayed in the A-Scan) ii) Fill (Min values set to baseline value, produces a solid A-Scan) iii) Smooth (min values ignored, produces a clear outline A-Scan)
Persistence	Causes previous A-scans to "fade out" at a user-determined rate.
Auto-Cal	Provides automatic calculation of velocity and probe zero from 2 reference echoes.
Reference Waveform	Displays a previously stored A-log in a colour different from the active display: enabling a quick visual check of the differences.
Clock	Built in, battery-backed RTC keeps time and date. Visible on the status line, always stored with Panels, A-logs etc.
Internal Memory	4GByte storage available for A-scans, panels, T-logs, B-logs etc. 450,000 Panels, 200,000 A-Logs, 300,000 B-Charts, 440,000 T-Logs
Active Peak Memory	Retains all A-scans on screen for echo-dynamic pattern analysis, with the active A-scan displayed in a separate colour.
Notes	Alphanumeric labelling for panel stores, A-logs, B-logs etc.
Display Freeze	Hold the current waveform on screen for off-line processing.
Help Key	Shows software and hardware information.
Language Support	Multiple languages are selectable from a list including: English, French, Spanish, Russian, Chinese (Modern). Others are available on request.
Encoder Connection	Lemo min 4-pin connector (D70) D-Sub 15 connector (700M)
Video Output	Standard on 700M. Factory Option on D-70.
Proportional Outputs	Available on 700M.
External Sync	Available on 700M.
USB Connection	Internal storage shown as Memory Device.
Transducer Sockets	BNC or LEMO (factory option).
Power	Lithium Ion 14.4V battery pack. Typically 16 hours for Masterscan and 12 hours for D-70. Indication of battery charge status. Recharge time 3-4 hrs. Battery can be charged separately. Mains pack optional.
Charger	100-240 VAC, 50-60 Hz.
Environmental	Designed to meet IP67
Temperature	Operating -10°C to 55°C (14°F - 131°F). Storage -40°C to 75°C (-40°F - 167°F).
Size	D-70: H172mm x W238mm x D70mm (6.77in x 9.37in x 2.75in). 700M: H145mm x W255mm x D145mm (5.7in x 10 in x 5.7in).
Weight	Masterscan D-70: 1.7 kg (3.7lbs) with battery. Masterscan 700M: 2.5kg (5.5lbs) with battery.
Warranty	2 year
Extended Warranty	Sonacover - extended 5 year warranty, including 4 calibrations.
Calibration Standard	EN12668-1:2010 (Detailed Specification available on request).
Standards	Vibration to 514.5-5 Proc 1 Annex C Fig 6 Shock 516.5 Proc 1 15g/6ms Explosive atmospheres - MIL-STD 810G Method 511.5 Procedure I

Sonatest

Simplicity | Capability | Reliability

Distributed by:

Sonatest (Head Office)
Dickens Road, Old Wolverton
Milton Keynes, MK12 5QQ
t: +44 (0)1908 316345
e: sales@sonatest.com

Sonatest (North America)
12775 Cogburn, San Antonio
Texas, 78249
t: +1 (210) 697-0335
e: sales@sonatestinc.com

Part No: 147344 (Issue 2_July 2019)