



# MASTERSCAN SERIES 700M & D70

HIGH PERFORMANCE NARROW BAND DIGITAL ULTRASONIC FLAW DETECTORS



Masterscan D-70



Masterscan 700M

Choose, Customise, Perform.

# 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/DGS
- 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 transfective 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. The TFT does not suffer the typical black out problems or temperature limitations of LCD, providing full weather capability.

## .....and choose your hardware.



Masterscan 700M Dryscan Mode

### 3Rs - Reliable, Rugged & Robust

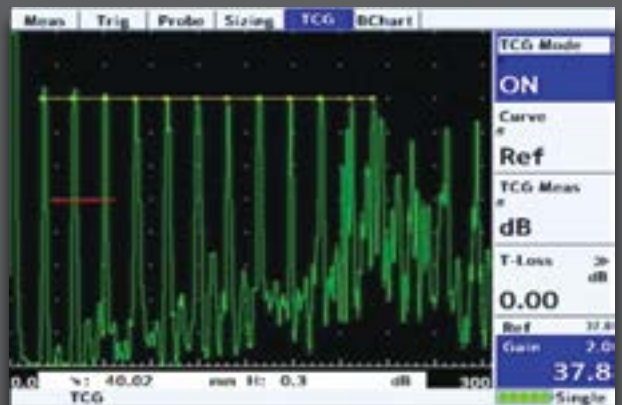
The ability to perform in harsh environments with proven reliability is an important aspect of flaw detector ownership. Maximum operational time is promoted by outstanding battery performance, up to 18 hours from full charge. The Masterscan's enclosure is constructed using automotive grade impact resistant 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 has confirmed the instrument fully functioning at temperatures above 55°C.

# Features



## NEW - Corrosion Software Option

Thickness measurement is a major application of the Mastersan 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.



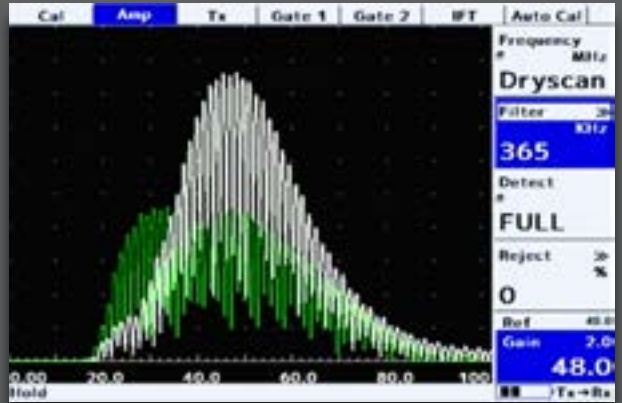
## TCG

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 (IL), 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.

## UTility Lite / UTility Pro (Data Management Software)

UTility 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 UTility 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 & export Thickness logging data to spreadsheets/asset management software.
- Update the Flaw Detector Software & Firmware as and when updates become available on our website.

UTility 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.



# DAC

Up to 20 reference points can be used to construct a digital DAC curve, with selectable JIS/ASME and EN1714 curves. 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

- EN1714 (-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

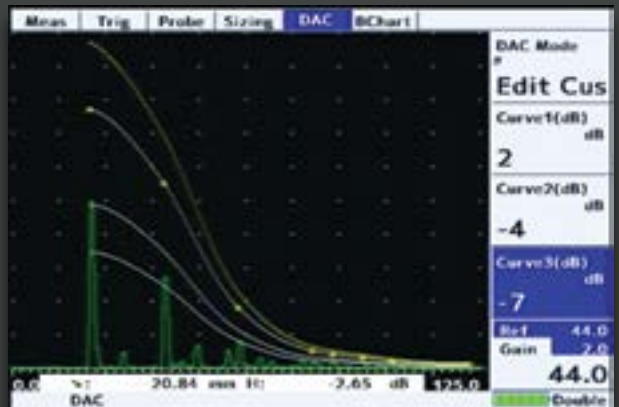
The wide dynamic DAC range can be used for better measurement resolution of distant echoes. The height of the DAC curves can be adjusted using the Reference Gain control. The relationship between DAC curve and reference indications is preserved throughout and the additional T-loss control manages transfer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

## DAC to TCG

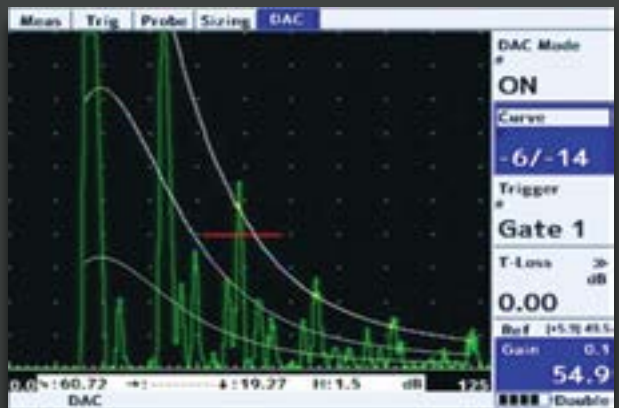
A DAC curve can be converted to a TCG curve, and back again. The conversion uses the reference points already collected and preserves the reference gain for the left-most reference point, so that all reference echoes are set to 80% FSH.



Library of DAC Curves



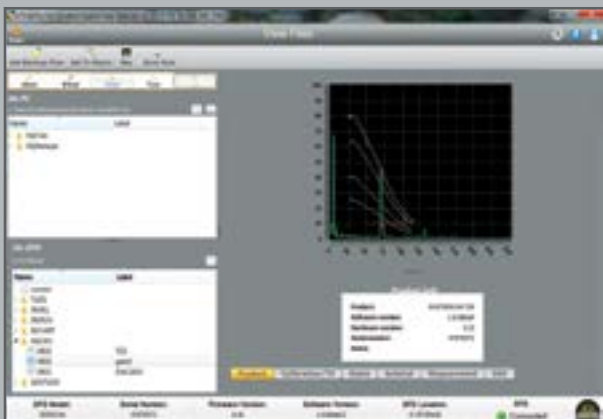
Customisable DAC



Dynamic DAC



DAC to TCG conversion



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

# MASTERSCAN Series D-70 & 700M

Specifications (subject to change without notice)

Test Range	0-1mm(0.05in) up to 0-20,000 mm(800 in.) in steel at 5930m/s (19455f/s)	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)
Velocity	256 - 16000 m/s continuously variable.	Persistence	Causes previous A-scans to “fade out” at a user-determined rate
Probe Zero	0 to 999.999 µs.	Auto-Cal	Provides automatic calculation of velocity and probe zero from 2 reference echoes.
Delay	0-20,000m (800in) in steel at 5930m/s.	Reference Waveform	Displays a previously stored A-log in a colour different from the active display: enabling a quick visual check of the differences.
Gain	0 to 110dB adjustable in 0.1, 0.5, 1, 2, 6,14 and 20dB steps.	Clock	Built in, battery-backed RTC keeps time and date. Visible on the status line, always stored with Panels, A-logs etc.
Test Modes	Pulse echo and transmit/receive. Single Crystal, Double Crystal and Pitch-Catch.	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
Damping	50 and 400 Ohm damping selectable.	Active Peak Memory	Retains all A-scans on screen for echo-dynamic pattern analysis, with the active A-scan displayed in a separate colour.
Pulser	100-450V -ve spike and square wave. Pulse Width from 30nS to 2500nS. Rise/Fall times <5nS into 50R load. Tunable.	Notes	Alphanumeric labelling for panel stores, A-logs, B-logs etc.
Active Edge™	Unique Active Edge Mode for improved near-surface resolution.	Display Freeze	Hold the current waveform on screen for off-line processing.
P.R.F	Adjustable 5Hz to 5kHz. External sync also available.	Help Key	Shows software and hardware information.
Screen Update Rate	60Hz	Language Support	Multiple languages are selectable from a list including: English, French, Spanish, Russian, Chinese (Modern). Others are available on request.
Rectification	RF, Full wave, +ve half-wave and -ve half-wave.	Encoder Connection	Lemo min 4-pin connector (D70) D-Sub 15 connector (700M)
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 - 22 MHz (Wideband) Additional tuned low frequency pre-amp with Dryscan option.	Video Output	Standard on 700M. Factory Option on D-70.
System Linearity	Vertical = 0.5% Full Screen Height (FSH). Horizontal +0.2% Trace Full Screen Width (FSW).	Proportional Outputs	Available on 700M.
Reject (Selectable)	Up to 80% Linear reject (removes baseline noise without affecting indication amplitude)	External Sync	Available on 700M.
Or	Up to 50% Suppressive reject (increase zero offset and reduces amplitude of all echoes) LED Warning when active.	USB Connection	Internal storage shown as Memory Device.
Units	Metric (mm), inch (in) or microseconds.	Transducer Sockets	BNC or LEMO (factory option).
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.	Power	Lithium Ion 14.4V battery pack. Typically 16 hours, max. 18 hrs. Indication of battery charge status. Recharge time 3-4 hrs. Battery can be charged separately. Mains pack optional.
Gate Monitor	Two independant 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.	Charger	100-240 VAC, 50-60 Hz.
Zoom	Expands range and delay to cover the area set by Gate 1 start & width controls.	Environmental	Designed to meet IP67
AGC	Automatic Gain Control automatically sets the signal in Gate 1 to a level between 10% and 90% FSH, tolerance between 5% and 20%.	Temperature	Operating -10°C to 55°C (14°F - 131°F). Survivable -20°C to 70°C (-4°F - 158°F). Storage -40°C to 75°C (-40°F - 167°F).
Measurement Modes		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).
Mode 1	Signal monitor, Gate alarms can be active but no measurements are displayed.	Weight	Masterscan D-70: 1.7 kg (3.7lbs) with battery. Masterscan 700M: 2.5kg (5.5lbs) with battery.
Mode 2	Depth and amplitude of first signal in gate.	Warranty	2 year unconditional.
Mode 3	Echo-Echo distance measurements.	Extended Warranty	Sonacover - extended 5 year warranty, including 4 calibrations.
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.	Calibration Standard	EN12668-1:2010 (Detailed Specification available on request).
Mode 5	Gate to Gate distance measurement	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
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.		



# 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 EN1714, ASME, JIS and many other standards. Custom DAC curves can be selected. DAC dynamic range can be extended by 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 10 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 the loss of BWE due to porosity.	Option (requires TCG)
AWS	Built-in calculation 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 (IFT)	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 UTILITY 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-graph views of thickness readings taken by Gate 1 against distance or time.	Option (includes B-Scan)
Dryscan Function	Tuned low frequency pre amplifier for dry-coupled techniques such as bond checking and delaminations in composite materials.	Option
Split DAC & DGS/AVG	Adds up to 3 zones of added gain (+12dB, +24dB) 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

Masterscan 700M or D-70 Digital Flaw Detector  
 Battery, Charger, charger mains cable.  
 User Guide & Calibration Certificate.  
 Certificate of Conformance  
 Carry Bag.  
 UTILITY & USB cable.  
 Display Window Cover.  
 Ultrasonic Couplant.

### Site Pack Option (D-70 only)

Sitescan 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

### B-Scan Encoder Option

The Sonatest series of flaw detectors are suitable for Corrosion Mapping using linear encoded scanners like the EZ-scan 4 (as seen on the right).

Ideal applications include Storage Tank bottom and side walls, flat plates and pipes with a 10cm (4") or greater outside diameter.



### Rubber Boot Accessory

Customised Rubber "shell" that fits around the instrument for extra protection and insulation. (D-70 only)

### UTILITY Pro (Advanced User Software)

Advanced user software, partners with the Corrosion Software Option enhancing data manipulation, presentation and analysis.



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