

GE  
Inspection Technologies

# USIP 40

Multi-Channel Ultrasonic  
Inspection Instrument



The USIP40 is a precision, multi-channel inspection platform that can be configured as a remote ultrasonic unit, an integrated rack-mountable instrument, or as a portable battery-powered instrument. All USIP 40 versions take advantage of the same basic ultrasonic hardware, graphical user interface, and application specific software tools.



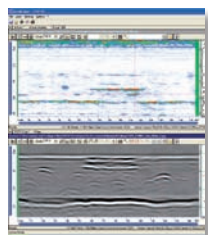
GE imagination at work

# Performance and Productivity by Design.

The USIP 40 delivers precision, multi-channel ultrasonic testing performance you can rely on. It is available with up to ten ultrasonic channels and comes in three different package options – a remote ultrasonic unit, an integrated rack-mount instrument, or a fully portable, battery-powered instrument. All of these versions utilize the same core electronic hardware and Graphical User Interface. When you combine its outstanding ultrasonic performance with optional application specific imaging and analysis tools, you can see that the USIP 40 is the ultimate solution for your current and future inspection needs.

## The Ultimate Inspection Confidence

### Application specific GUI



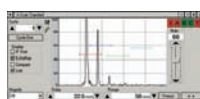
The USIP 40 takes full advantage of its Microsoft Windows™ based operating environment. Each of its instrument functions is designed as a separate plug-in.

This allows the operator to set-up a customized display showing the right information for a particular application.

Several levels of graphical user interface

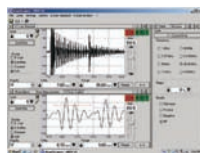
can be created with their own password protection to control access to specific functions.

### EchoMAX



Screen update rates on digital instruments are not able to keep up with the pulse repetition frequency of high performance ultrasonic instruments. As a result, previous digital flaw detectors had difficulty displaying an alarmed defect's actual A-Scan. GE's exclusive EchoMAX technology is designed to overcome this issue and offers the ultimate in A-Scan display for reliable echo visualization by completely digitizing the A-Scan of each ultrasonic pulse. The EchoMAX uses advanced algorithms to capture and display the exact A-Scan of every alarm condition, ensuring real time visual alarm verification. The operator can be confident to never miss a shot and has the ability to pass a defect standard through at full test speed.

### Multi A-Scan



With the USIP 40's Multi A-Scan feature, you can view up to ten channels of ultrasonic data on the same screen simultaneously. Each A-Scan can be controlled independently with different gain, range and delay and include up to four colored bar gates. Because each window is independent, the operator can size the A-Scan as large or small as required for easy viewing. The Multi A-Scan feature also allows you to simultaneously display two A-Scans from the same cycle using different display ranges. You can now display an overall A-Scan and zoom in to inspect details at the same time.

### Multi-Cycle operation



A USIP 40 can be provided with up to 10 ultrasonic channels depending on inspection needs. In addition to this channel flexibility, the USIP 40 provides up to 20 separate ultrasonic setups (cycles) to automatically drive single or multiple channels complete with DAC or TCG compensation during an inspection sequence. As each cycle is independent, gain and gate positions can be varied between cycles. This allows the operator to carry out multiple tests using a single probe.





## Feature Summary

- Up to 10 ultrasonic channels
- Up to 20 kHz PRF
- Aero version qualified to GE and RRAE specifications
- Independent pulser and receiver for each channel
- 20 Programmable cycles for multi-zone inspection
- EchoMAX A-Scan display function
- View up to 10 A-Scans at once
- Available strip chart , C-Scan imaging, and TOFD weld inspection software
- Interface gate synchronizing for surface following
- Back-wall echo attenuator
- Direct 3-axis encoder input
- Automatic Gain Control
- User configurable in English, French, German, Spanish, Japanese, Chinese

## Wide Fields of Application

### Aerospace

The USIP 40 Aero configuration is qualified to GE DFO P3TF22, P3TF30, P3TF35, and RRAE RPS705 specifications for jet engine component inspections. USIP 40 instruments are also extensively used for airframe composite inspection by leading aircraft manufacturers.

### Automotive

Used in conjunction with Ultraproof imaging software, the USIP 40 is the perfect instrument for inspecting pistons and other safety critical parts. Configured in this way, the USIP 40 provides visualization and recording of alarm outputs as well as automatic evaluation and reporting of single flaws, interacted flaws, and total numbers of flaws per part and per batch.

### Pipe and tube

With the appropriate probe holders and imaging software, the USIP 40 is easily set up for weld inspection, multi-channel flaw detection and wall thickness measurement.

### Plate and billet

Combining inspection productivity and coverage requires multiple inspection channels. The 10-Channel USIP 40 fills this need in both manual and automated inspection environments.

### Roll testing

The multi-channel USIP 40 combined with C-Scan imaging provides rapid scanning of industrial rollers. GE's K-Scan software knits multiple ultrasonic channels to form one continuous C-Scan. In combination with the USIP 40's 20,000 Hz PRF, this package is perfect for high-speed defect evaluation and sizing.

### Vessel weld inspection

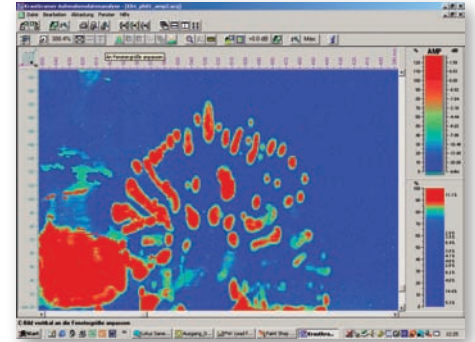
Combined with Ultramap Weld software, the USIP 40 can be configured to perform multi-channel inspections of welds on pressure vessels to ASME Case 2235 utilizing both Time of Flight Diffraction (TOFD) and pulse-echo B-Scan imaging and data archiving tools.

# Technical Specifications

USIP 40	
Number of Channels	Up to 10 Channels in Maximum 20 Cycles
Pulse Repetition Freq.	4 to 20000 Hz, Proportionally Divided for Each Cycle
Pulser	Spike Pulse 100 V, 400 V / Charging Capacitor, 1 nF, 220 pF / Rise Time, 10 ns
Wide-Band Filter (-3 dB)	0.2 – 30 MHz / 10 – 30 MHz / 1 – 10 MHz
Narrow-Band Filter	1 / 2.25 / 5 / 10 / 15 MHz
Gain	0 – 110 dB, in 0.5 dB Steps
Fine Gain Setting	1 dB, Continuously Variable in 10 Steps
Rectifier	Full-Wave, Negative, Positive Half-Wave, RF Mode
Reject	Linear, 0 – 80 % Screen Height
TCG	44 dB with Maximum 12 dB/ $\mu$ s
DAC/TCG	DAC or TCG with up to 16 Reference Echoes per Cycle, Multiple DAC Mode with up to Four Additional Curves at Variable Spacing from the Reference Curve, Individual Curves for Each Cycle Possible
Backwall Echo Attenuation	Full Dynamic Range of 110 dB
Sound Velocity	500m/sec - 20000m/sec (0.02 inch/sec - 0.78 "/sec)
Digital Upsampling	400 MHz, 9 bits
A-Scan Display	512 or 1024 Pixels, Range: 4.5 mm - 15 m in 0.1 mm Increments (0.1" - 590" in 0.004" Increments), Pulse Delay -10 mm - 15 m in 0.1 mm Increments (-0.4" - 590" in 0.004" Increments), Display Start with Initial Pulse or Interface Echo
Evaluation Gates	Four (Interface, A, B, C) Color Coded and Independent per Cycle, Coincidence or Anticoincidence Logic Selectable, Flaw Suppression per Counter (1 – 16), Trigger: Initial Pulse or Interface, Width 0.1 mm - 15 m in 0.1 mm Increments (0.003" - 590" in 0.004" Increments), Start 0.0 mm - 15 m in 0.1 mm Increments (0" - 590" in 0.004" Increments)
Amplitude Resolution	0.5 % of Display Range
Thickness Resolution	2.5 ns Corresponding to 0.007 mm (0.000275") at Sound Velocity of Steel
Thickness Measurement Modes	Measurements Selectable between Initial Pulse or Interface Echo and Gates A, B, or C or between Gates A and B. Start/Stop at Zero Crossing, Flank or Peak Echo Including Tolerance Monitor with 4 Thickness Values Min and Max per Cycle
Data Output	Measurement Readings Output as Max Amplitude or Min/Max Thickness Value. Alarm Output Amplitude Threshold or Min/Max Thickness Value.
Analog Outputs	10 User-Programmable for Measurement Readings (Active/Min/Max), Wall Thickness/Echo Amplitude 0 to 10 V, 12 Bit Resolution.
Alarm Outputs	16 User-Programmable for Cycle and Threshold, for Flaw Threshold via TTL (Coincidence/Anticoincidence), for Thickness Tolerance Monitor via TTL with Range Overflow and Underflow.
Test Data Release	4 User-Programmable Inputs for Each Test Channel.
Encoder Inputs	3 Inputs for Quadrature or Pulse/Direction Encoders, Compression of Ultrasonic Data on Path Grid.
Units	mm, inch, $\mu$ s
Operator Interface Languages	User Configurable in English, German, French, Spanish, Chinese and Japanese
Interconnects	Probes: Lemo 00 or BNC; RF Output: Lemo 00; I/O: 25-pin Sub D; 37-pin Sub D; Sync: 9-pin Sub D; Video: VGA Out 15-pin Sub D Rack and Portable Configuration also Include - Mouse and Keyboard: PS2 (Rack only); Serial Interface: 9-pin Sub D; 2 x USB
Network	Box with Ethernet – TCP/IP, 100 MB/s
Mains Operation	Rack and Box via Internal Power Supply (85 – 265 VAC); Power Consumption 40 W (Rack), 24 W (Box). Portable Version via External Power Supply (85 – 265 VAC), Battery Operation: Two Li-Ion Battery Packs (Hot Swap), 10.8 V, 7.2 Ah ea, 3.25 h Operation. 70 W During Charging
Operating Temperature	0 - 40° C (32 F - 104 F)
Size (HxWxD) and Weight	Rack: 310 mm x 450 mm x 375 mm (12.2" x 17.7" x 14.75") (7U), 16.5 kg (36.36 lb) Box: 125 mm x 450 mm x 430 mm (4.9" x 17.7" x 16.9") (3U), 7 kg (15.4 lb) Portable: 390 mm x 374 mm x 150 mm (15.3" x 14.7" x 5.9"), 8.2 kg (18.1lb) Incl. 2 Li-Ion Batteries

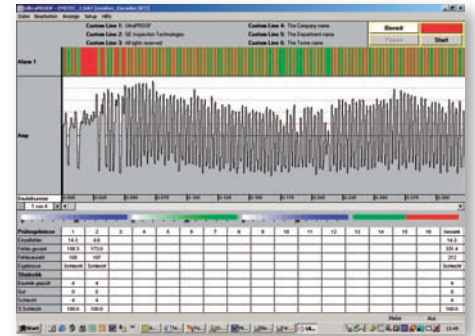
## K-Scan

Multi-featured C-Scan imaging option that, when combined with the USIP 40, provides a powerful inspection tool for immersion tank, roller and other applications.



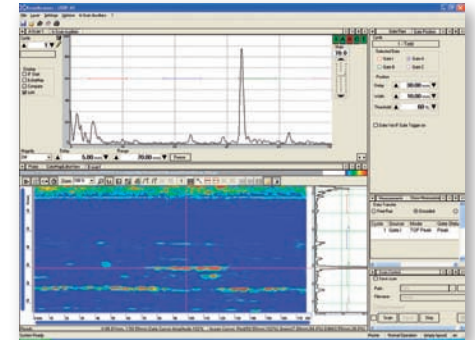
## Ultraproof

Strip chart data recording, imaging and analysis option for the USIP 40 provides a series of tools for applications requiring linear scans.



## Ultramap weld

Multi-channel imaging option for the USIP 40 providing TOFD and pulse echo tools for weld inspection.



## GE Inspection Technologies: productivity through inspection solutions

GE Inspection Technologies provides technology-driven inspection solutions that deliver productivity, quality and safety. We design, manufacture and service Ultrasonic, Remote Visual, Radiographic and Eddy Current equipment and systems. Offering specialized solutions that will help you improve productivity in your applications in the Aerospace, Power Generation, Oil & Gas, Automotive or Metals Industries.

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