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GEIT-50022EN (10/11)

GE
Measurement & Control Solutions

Apollo™

Multi-Channel/Multi-Frequency Eddy Current Tubing Inspection System

Elevating Productivity

Decrease inspection turn-around-time and increase productivity with Apollo™— GE Sensing & Inspection Technologies' multi-channel/multi-frequency eddy current tubing inspection system.

Technical Specifications

Power		
Voltage	100 to 240 VAC	
Frequency	50 to 60 Hz Self Switching	
Size and Weight		
Size	300 mm W x 290 mm H x 249 mm D (11.8 in W x 11.4 in H x 9.8 in D)	
Weight	8.7 kg (19.2 lb)	
Operating Environment		
Operating Temperature	5°C to 40°C (41°F to 104°F)	
Storage Temperature	-20°C to 70°C (-4°F to 158°F)	
Relative Humidity	90%, no condensation	
Computer Interface		
Ethernet Speed	10/100Mbps	
Encoders		
Numbers	6 outputs (A,B,C)	
Level	LVTTL	
Type	Incremental with A & B signals	
Digital Inputs	Number	8
	Level	LVTTL
	Modes	Input Bit, Enable ACQ, Trigger
	Width	Programmable
Digital Outputs	Number	8
	Level	LVTTL
	Modes	Output Bit, Alarm, ACQ, Trigger, Time-Slot
	Width	Programmable
Analog Inputs	Number	2
	Range	+/- 15V
	Bandwidth	20 kHz
Analog Outputs	Number	2
	Range	+/- 10V
	Bandwidth	20 kHz

Eddy Current Inspection	
Probe Inputs	8
Channels	Up to 256; Expandable to 1024 channels
Number of Frequencies	32
Frequency Range	1 Hz to 10 MHz
Generators	2
Generator Output	(2) direct outputs and (16) 100-Ohm outputs
Generator Injection Mode	Multiplex and Simultaneous
Drive Voltage	0 to 24 V peak-to-peak
Gain	Manual and Automatic
Gain Range	0 to 40 dB
Sampling Rate	50,000 samples/sec
Remote Field Inspection	
Probe Inputs	8
Channels	8 simultaneous
Number of Frequencies	4
Eddy Current Array Inspection	
Probe Inputs	8
Channels	Up to 256; Expandable to 1024 channels
Number of Frequencies	32
Frequency Range	1 Hz to 10 MHz
Generators	2
Generator Output	(2) direct outputs and (16) 100-Ohm outputs
Generator Injection Mode	Multiplex and Simultaneous
Drive Voltage	0 to 24 V peak-to-peak
Gain	Manual and Automatic
Gain Range	0 to 40 dB
Sampling Rate	50,000 samples/sec
Probe Balancing	Electronic probe balancing (hardware null)
Multiplexer	Compatible with external multiplexer

High-Quality Probes

Tubing Inspection Probes for Power Generation, Oil & Gas, and HVAC

GE Sensing & Inspection Technologies tubing probes are designed to meet the stringent inspection needs of Balance-of-Plant applications in the Power Generation, Oil & Gas, and Air Conditioner industries for non-ferrous and ferrous tubing. GE is a dedicated manufacturer, providing customers with high-quality and cost-effective probes for their inspection needs.

Features and benefits

- ID tubing probes are made with high performance materials and adhesives for excellent abrasion resistance and long life.
- Proprietary long-life kink resistant poly shafts increase probe life, improve durability, and ensure inspection ease.
- Many common eddy current and remote field probe are on the shelf and ready for shipment; rapid turn-around time for orders of up to 10 probes.

Remote Field Probes (RFT) for Ferrous Tubing

Designed for inspection of ferrous tubing in the Oil & Gas and Petrochemical industries

- All probes encased in a stainless steel sleeve.
- Probe diameters from 0.312 inch (7.92 mm) to 0.750 inch (19.1 mm).
- Probes available with standard poly shaft length of 65 ft (19.8 m).
- Probes come with three- and six- pin Amphenol® connectors.

Non-Ferrous Tubing Probes for Balance-of-Plant

Designed for inspection of non-ferrous tubing in balance-of-plant applications in the Oil & Gas and Power Generation industries.

- Probe diameters from 0.380 inch to 1.5 inch (9.65 mm to 38.1 mm) in 0.010 inch (0.254 mm) increments.
- Small diameter probes also; diameters from 0.270 inch (6.86 mm) to 0.370 inch (9.40 mm); probes on 0.25 inch poly shaft in 50 ft length.
- Probes available with standard poly shaft lengths of 65 ft, 80 ft, 100 ft & 120 ft (19.8 m, 24 m, 30.5 m & 36.5 m).

Probes for Air Conditioner Tubing

Designed for inspection of non-ferrous tubing in industrial HVAC units.

- All probes are encased in a stainless steel sleeve.
- Cross-wound coil design for detection of omni-directional defects.
- Probe sizes: 0.409 inch (10.4 mm) to 0.800 inch (20.32 mm)
- Probes available with standard poly shaft length of 35 ft (10.7 m).
- Probes come with standard 4-pin Amphenol connectors.

Enhance Durability and Lifespan

Probes are manufactured using superior wear-resistant materials to achieve extended overall probe life and added durability. All probes are constructed with our proprietary kink-resistant shafts.

Dedicated Manufacturing Facility Provides Rapid Turnaround

We manufacture all ID tubing probes in our Lewistown, PA, USA facility. We have a dedicated manufacturing cell designed to enable high quality and rapid manufacturing with short delivery times. Many common probe sizes are stocked for quick delivery. For probe sizes not in inventory, GE Sensing & Inspection Technologies offers rapid turnaround time for orders of up to ten probes.

Custom Builds and Special Applications

Our facility contains an in-house applications lab to provide custom solutions for special applications. Backed by more than 75 years of experience, our talented Applications team can provide solutions for standard tubing and surface inspection applications with traditional eddy current or eddy current array technologies.

Flexible Eddy Current Solution for ID Tubing Inspection

Demanding Solutions

Apollo™ was developed to take on the most demanding heat exchanger inspections. It supports industry standard eddy current (ET), remote field (RFT), and special application ID tubing probes as well as surface scanning arrays.

Flexibility for Multiple Applications

Apollo™ can operate in either multiplexed or simultaneous injection mode meeting the eddy current tubing inspection needs for the power utility, petrochemical, pulp & paper, chemical processing, pharmaceutical, and food & beverage industries.

The multi-channel/multi-frequency capabilities of Apollo™ can also solve a vast array of surface solutions. These solutions include aerospace airframe and engine inspection, automotive in-line testing of bar, tube and wire, and any application that requires high-speed inspection with wide area coverage.

Flexible and Easy-to-Use Inspection Software

Combined with field proven acquisition and analysis software, Apollo™ is adaptable from the smallest to most complex inspections making it well suited for small two-man operations to scope-of-work requiring multiple testers and data rooms.

Features and benefits

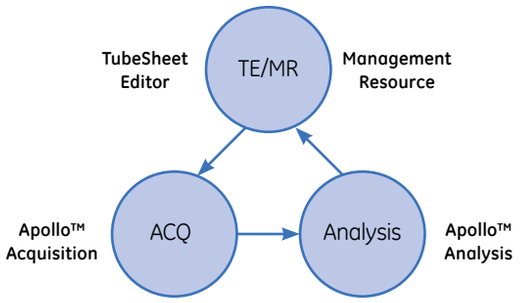
- 100% digital data acquisition ensures full signal capture
- Configurable up to 1024 channels and 256 frequencies for tubing inspection and array applications
- Supports multiplexed, simultaneous injection, and context switching inspection modes
- Wide frequency range of 1 Hz to 10 MHz with automatic gain control

Dedicated Customer Support

GE Sensing & Inspection Technologies continues to invest in technology and people to solve customer applications through our innovation and customer support. When investing in Apollo™, organizations are receiving more than a world class eddy current solution. Each organization is also investing in a full support system that includes personnel with years of eddy current application experience.

Through local customer and sales support located around the world, GE Sensing & Inspection Technologies demonstrates its commitment to providing each customer with the service and support necessary to ensure our solutions are exceeding your expectations.

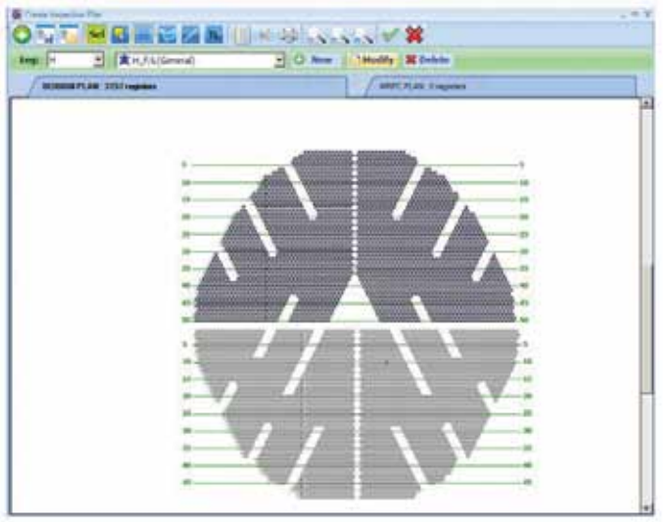
Flexible and Easy-to-Use Inspection Software



Apollo™ software allows the operator to completely manage his inspection from generation of the tube sheet diagram & inspection plan through data acquisition, analysis, and reporting. All with one easy-to-use integrated software application.

TubeSheet Editor

The inspection starts with generation of a tube sheet diagram to meet the requirements of the test plan. The menu drive application walks the inspector through set-up of the tube map. TubeSheet Editor accommodates simple and complex heat exchanger designs including variable tube pitch configurations.

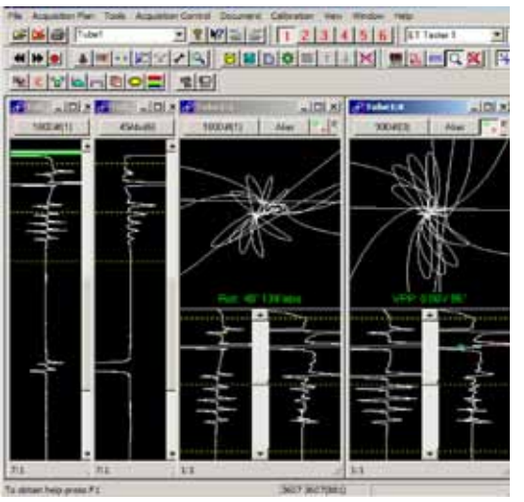


Complex Tube Map

Acquisition Software

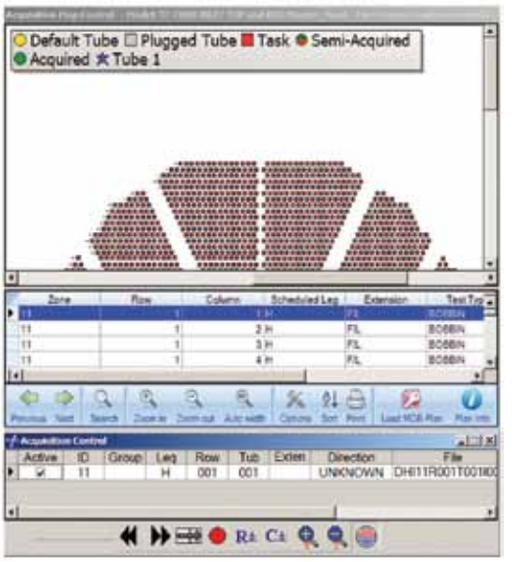
Apollo™ aquisition allows collection and permanent storage of eddy current and RFT data. Recorded data is readily available for data analysis, generation of inspection reports, and archiving records.

Simultaneous display of user-defined channels and probe configurations are also possible. The screen presentation's null, span, and rotation are all controlled with the computer's mouse. The automatic user-defined system calibration allows for quick setup times and makes more time available for conducting inspections.



Apollo Acquisition with User Defined Inspection Screens

Easy-to-use configuration screens allow the user to select the working mode of the tester: multiplexed or simultaneous injection and number of frequencies, as well as desired sample rate.



Apollo Acquisition Control with Inspection Plan

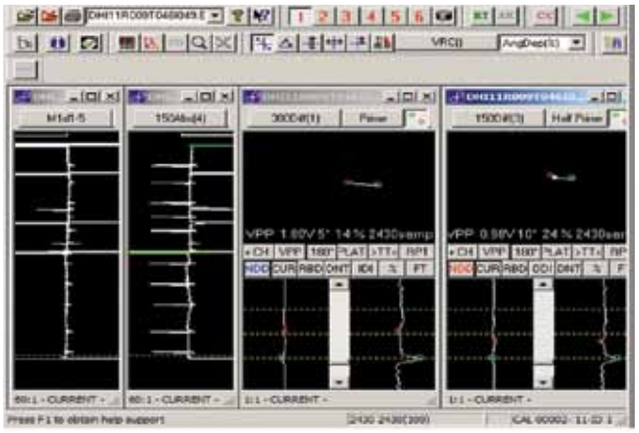
Analysis and Documentation Software

Apollo™ offers powerful software combining advanced eddy current data analysis and documentation capabilities with a user-friendly Windows®-based interface.

The software has easy-to-use display screens. Indications can be measured with respect to any user defined landmark table or structure. An option allows the system to identify the structure automatically when landmarks cannot be used.

Signal Processing

The Apollo™ has flexible signal processing features allowing the user to create numerous two-channel differential or absolute mixes for increased reliability detection of indications located near structures. Several filter options are also available. All information on the lissajous and strip charts update on the screen automatically.



Apollo Analysis with Multiple ABS and DIFF Channel Data

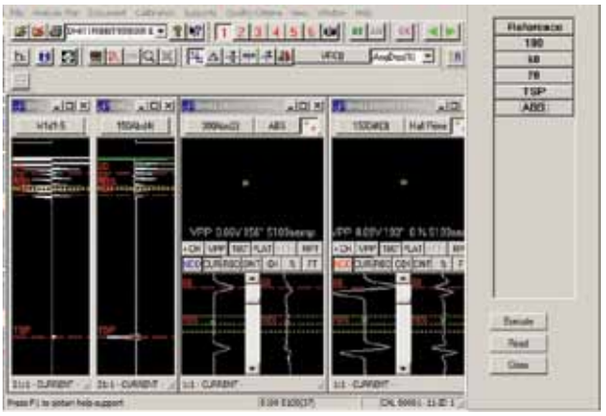
Indications Table

The Apollo™ software has a user defined indications table. The user defines the name of the indications, associated three letter code for each indication, which indications may require a secondary review, as well as those indications where only the tube information and three letter codes are required.

Calibration

Calibration of the inspection can be performed using manual and auto-calibration routines.

Auto calibration allows the user to populate and store calibration information for several components and then copy that information to other testers. Auto calibration is also capable of creating mixes, duplicate channels, calibration curves and span, rotations, and voltage setup for all channels required for the specific exam.

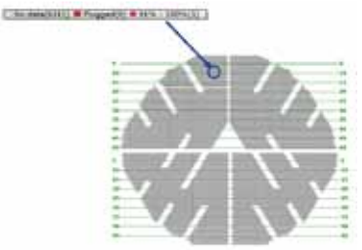


Apollo Calibration Screen

Report Editor

The Apollo™ report editor offers several useful features. All entries for tubes currently in analysis are populated in the tube report window. Entries may be edited and, upon completion of the tube analysis, are pushed to a final report with a simple button press. The final report contains numerous user definable options for display of tube or inspection information. Both the current tube and final report contain the *Recall Flaw* feature that allows recall of the indication selected to show the measurement dots in the exact location used to make the inspection decision.

Query Capability allows Three Levels of Data Sorting



Customer Report Indicating Location of Tube to Be Plugged