

### Convenient, Compact Eddy Current Equipment

- Operates with encircling, sector, or rotary test sensors
- Differential and/or Absolute mode operation
- Up to 4 channels, any combination
- Broad test frequency selection - 1KHz to 5MHz
- Touch screen control
- Inspect tube or bar, magnetic or non-magnetic

### OVERVIEW

#### Coil or Rotary Probe Operation

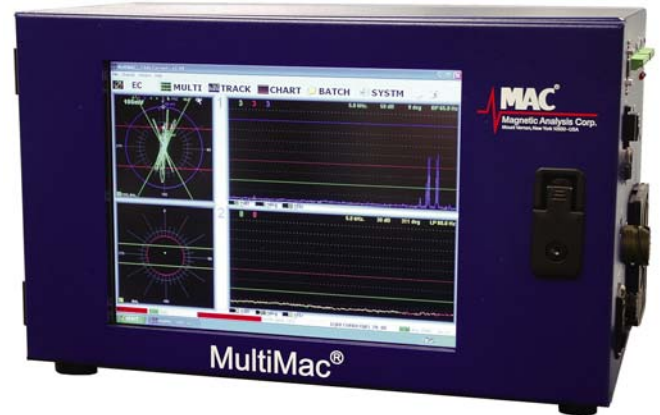
MultiMac<sup>®</sup> SM lets you configure your eddy current test application the way you want - all with just one compact tester. MultiMac SM test channels can be individually configured for use with encircling test coils, sector/tangent test coils, or rotating test probes.

#### Features

Features include a wide selection of test parameters and special circuits to enhance signal-to-noise, typical of MAC testers. The MultiMac SM is a high speed, computer with Windows<sup>®</sup> Operating System and MAC's latest proprietary software. The instrument is packaged in a compact cabinet that includes a built-in touch screen monitor. It is operated with a touch screen stylus, keyboard or mouse. There is no need to access the cabinet interior during setup and operation. Output connectors are included for an optional external monitor. The air conditioned CAB001 Multimac<sup>®</sup> AC is an even more compact alternative for applications requiring up to 2 channels.

#### Magnetic or Non-Magnetic Material

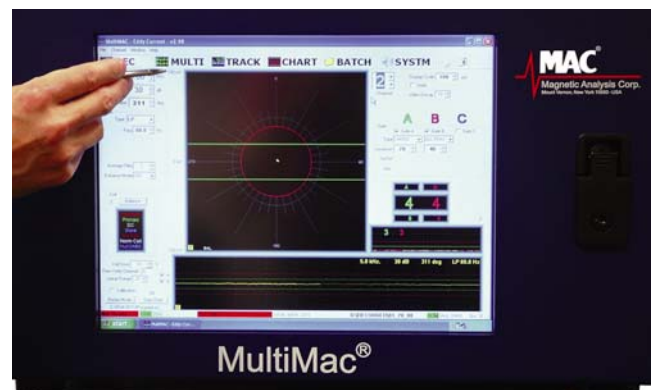
With these features, MultiMac SM can operate on a wide variety of non-magnetic products, or use Direct Current saturation systems to inspect magnetic material. Test speeds can range from one foot per minute up to several thousand. Installation can be in-line or at a separate test station. MultiMac SM end suppression circuitry with optional optical sensor can be used for testing cut lengths to prevent false signals from leading and trailing ends. User configurable reports containing customer and product information in addition to defect location, time, amplitude and phase can be stored locally or on a network server.



MultiMac SM Multi Test Screen, above, shows simultaneous polar and linear view of two channels.

#### Versatile

MultiMac SM's test channels can operate at the same- or different frequencies for special applications. One channel can be set as a differential (null) channel to detect short weld line defects, for example, while a second absolute channel simultaneously detects long, continuous surface flaws such as laps and seams. Up to 4 output modules can be used to operate a variety of devices, based on All Phase, Sector, or Chord thresholds, each of which can be assigned up to 3 threshold output levels.



All Setups and controls can be entered with a stylus on the built-in touch screen which is standard for this unit. A mouse and keyboard provide an alternate means of operation.

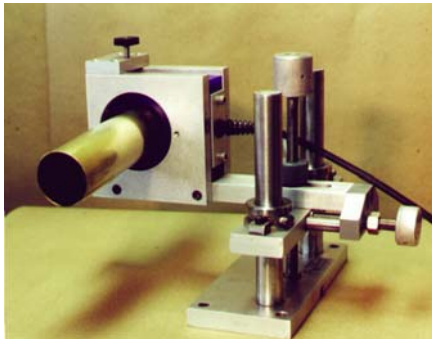
#### Simple Setup

The main test display provides all the information needed to set up and operate MultiMac SM. Polar and linear signal traces can be simultaneously displayed, along with all test parameters.

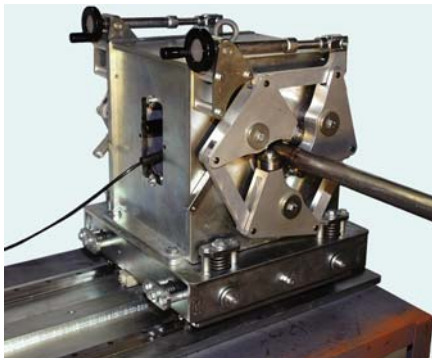
# MultiMac® SM

## for Encircling & Sector Test Coil Inspection

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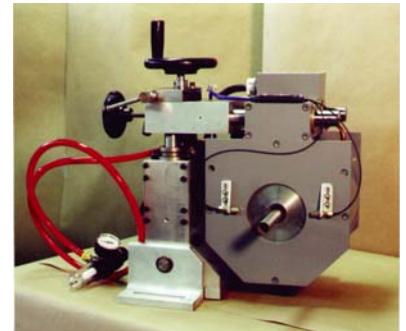
Series 30 Coil Platform Encircling Test Coil



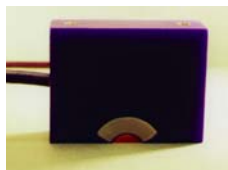
A 65 mm Coil Platform with optional Floating Head allows the coil platform to follow the movement of the tube or bar under test. This feature is useful for tube weld mills, bar and wire drawing benches where the material under test tends to move around.

**ENCIRCLING TEST COILS** can be used for testing non-magnetic or magnetic tube, bar or wire for short, intermittent surface flaws. For non-magnetic material, Coil Platforms, such as the CP-30, shown at left, provide accurate horizontal and vertical adjustment to obtain proper centering of the material in the coil. Test coils and Coil Platforms are available in a range of types and sizes. Standard coil sizes range from 1/8" (3.18 mm) up to 7-3/4" (196.9 mm) ID.

Direct current saturation is required to suppress permeability variations which can interfere with the eddy current test where the material is magnetic. MAC includes suitable DC saturation as part of the Coil Platform. The Series 352 Coil Platform, for example, is supplied with a DC power supply. It is air cooled and is suitable for thin and medium wall carbon steel tubing. Water cooling is utilized for larger, more powerful saturating Coil Platforms. The 65 mm Coil Platform, shown at left, can use standard or segmented encircling test coils.



Series 352 Air Cooled Saturation Coil Platform with test coil



Where only the weld zone or a similar localized area requires inspection, **TANGENT (Sector) COILS**, shown at left), can be used. A tangent coil often improves the signal-to-noise ratio of the test by limiting the area of the tube or bar under inspection. Coil Platforms for tangent coil testing of non-magnetic and magnetic material are available.

# MultiMac® SM

## for Rotary Test Inspection

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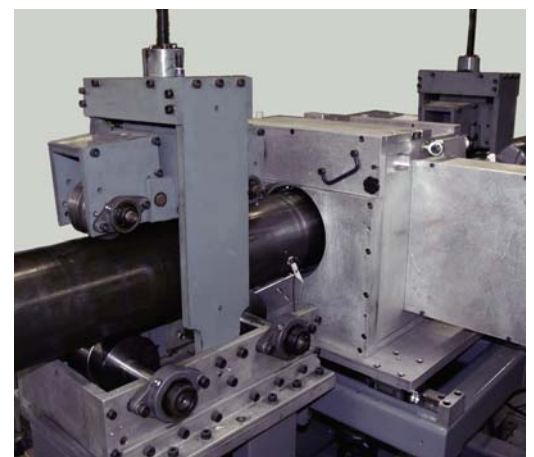
**TEST PROBES MOUNTED ON ROTATING HEADPLATES** are used to inspect non-magnetic and magnetic tube, wire and bar for long, surface seam type defects.

Rotary probe technology is the method of choice to detect this type of defect which may not be detected by encircling coils. Changes in speed, even dead stops, do not affect the test because the probes continually spin around the material.

Headplate designs are available for surface or air ride configuration to handle different surface conditions and test specifications. Continuous or cut length material can also be handled.



MAC's Rotomac® E-Rotary test head, shown above, tests tube, bar or rod in continuous operations such as drawing, parts forming, or straight and cut. The inspection can operate automatically as defective pieces can be identified, then marked or rejected further down line, after the cutting and forming operation. Models for small diameter rod and wire are also available.



Shown above is the Model 750 Rotomac® rotary test head for inspecting 7-1/2" (190.5 mm) diameter cut lengths, often in-line with straighteners or installed in a separate test station. Installations can be completely automatic, including marking and sorting devices. The rotary is usually mounted in conjunction with MAC Slide/Elevating and Drive Mechanisms to position the rotary housing and move the material accurately through the test head.

# MultiMac<sup>®</sup> SM

## Inspection Design Features

### FOUR CHANNELS

differential or absolute, each able to operate over the entire frequency range of 1 KHz to 5 MHz, with appropriate test coils or rotary probes.

### SIMULTANEOUS POLAR/ LINEAR DISPLAY

provides all the setup and test information on the built-in or external monitor. In the polar display, the amplitude and phase are represented by the length and angle of the signal. The linear display is a strip chart, real-time, scrolling portrayal of the vertical channel.

### TRACK SCREEN

shows a visual representation of the product, end sensors etc. that is useful during initial setup.

### CHART SCREEN

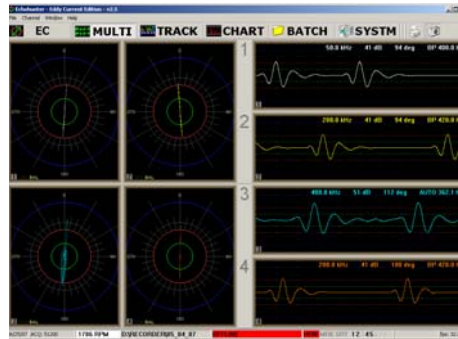
shows the linear test results from up to 4 channels at a time. Each channel can record up to 3 charts based on the type of thresholds.

### SOFTWARE CONTROL

of all functions, such as phase, filter, sensitivity, thresholds, outputs and end sensors, is handled by touch screen stylus, keyboard or mouse. Parameters can be locked out to prevent unauthorized changes.

### VERSATILE THRESHOLD SELECTION

including Chord, Sector or All Phase, at three different levels, individually and independently configured. The Sector threshold can be rotated 360°. The threshold selection feature allows complex gating for challenging test conditions. A counter is supplied on each active gate.



*MultiMac Multi Screen, shows simultaneous polar and linear displays for four channels. Up to 4 channels, with all thresholds, can be displayed simultaneously.*

### AUTO SPEED SHIFT FILTERING

when used with the optional encoder, automatically adjusts filters to the optimum frequency for the current line speed. For rotary applications, this filter is governed by the RPM and material diameter.

### ENHANCEMENT CIRCUITS

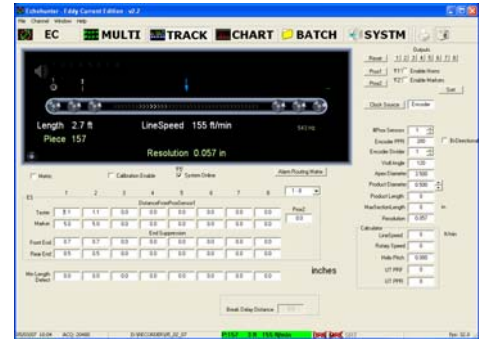
may be selected, if desired, to improve the apparent signal-to-noise ratio of signals in any phase. Circuits include A+, V+H- and V++H-. The H- has an adjustable H- factor. V+H- and V++H- are primarily for rotary applications.

### AUTO TRACKING BALANCE

for all differential channels, combines with system monitors to assure reliable tester function, even under adverse conditions. The System Ready Indicator on the display will identify if the power, coil condition and balance are not adequate.

### FOUR OUTPUTS

Choice of 3 thresholds per channel can be mapped to any of 4 outputs. Independently configurable for time or distance delay and normal, reject or latched mode.



*MultiMac End Suppression screen for inputting data for end sensors*

### REPORTING CAPABILITIES

built-in through Windows<sup>®</sup> Operating System. Data can be stored, printed, and annotated via stylus, keyboard or mouse, and transferred using normal computer interface procedures.

### NETWORKING

Test results and information are available through customer networks for quick and easy follow up and quality assurance of settings and results during testing. TCP/IP communication protocol is supported.

### STORE AND RECALL

All settings can be stored and recalled from a library on the internal storage device, or network. When networked, multiple instruments can share the same library for assurance of correct settings in multiple test lines.

Settings can be named and annotated using the touch screen stylus, keyboard or mouse. Setups can also be stored and recalled from internal or external drives, providing virtually unlimited storage capacity.

## SPECIFICATIONS

<b>CHANNELS</b>	Up to 4 channels of any combination Flaw (differential), Absolute, or Rotary.
<b>TEST FREQUENCY</b>	1KHz to 5 MHz. 20 pre-selected frequencies, or user selection of any frequency.
<b>FLAW BANDWIDTH</b>	Variable up to 5 KHz.
<b>FILTER</b>	High Pass, Low Pass, Band Pass, BP-Auto and Out are available. Fixed filter positions adjustable from 0.1 Hz to 5000 Hz flaw frequency. The bandwidth of the BP filter can be selected through a "Q" factor dictating the ratio of high to low pass filters.  Auto Speed Filter is operated from Line Speed utilizing optional encoder for coil applications, and from RPM meter and material diameter for rotary applications.
<b>PHASE</b>	0 - 359°, calibrated in 1° steps.
<b>SENSITIVITY</b>	0 - 99 dB, calibrated in 1dB steps.
<b>THRESHOLDS</b>	All Phase, Sector and Chord thresholds available for flaw tester, all assignable with up to three levels. The sector can be rotated to any phase angle. There are counters for active thresholds. Only active thresholds will be displayed on the screen.
<b>CALIBRATION</b>	Internally generated signal provides a system check for repeatability of all parameters.
<b>BALANCE</b>	Auto tracking continuous AC self-balance in the entire frequency range.
<b>DISPLAY</b>	Built-In 15" Touch Screen Display - Polar, linear and running charts are simultaneously displayed on the EC setup screen along with testing parameters and status indication for the current channel. MULTI screen simultaneously displays up to 4 channels polar and linear /chart display. Other screens include TRACK, CHART, BATCH, and SYSTEM  A back panel output connector is provided for optional external monitor.
<b>CONTROLS</b>	Software controls for all functions, set through a stylus, keyboard or mouse
<b>SYSTEM STATUS INDICATOR</b>	Software displayed in system status section of display, including indicators for Coil, Balance, Threshold and System Ready conditions.
<b>END SUPPRESSION</b>	Optional external switch end sensor and optional encoder to suppress end signals.
<b>OUTPUTS</b>	CE Units - four 24 V DC output modules are provided, each with a relay and an opto-isolated output. Outputs can be routed to accept any thresholds. Combined current draw for all outputs cannot exceed 2 amps.  Standard Non CE units come with two DC and two 120 AC outputs.
<b>STORE &amp; RECALL SETUPS</b>	An unlimited number of setups can be stored and recalled
<b>REPORT</b>	Test data report is managed in the BATCH screen. The report contains user and product information as well as defect location, time of the occurrence, amplitude and phase.
<b>DATA STORAGE</b>	Record linear strip charts
<b>MODE</b>	A Lockout Mode prevents unauthorized changes in equipment settings.
<b>COILS &amp; COIL DRIVE</b>	All Standard MAC coil types. Adjustable Primary/ Bridge drive up to 20 V pp.
<b>COIL CONNECTOR:</b>	Standard 7 pin for coil and 11 pin for rotary applications
<b>DIMENSIONS</b>	20" W x 12" H x 12" D (508 mm x 304.8 mm x 304.8 mm)
<b>CABINET WEIGHT</b>	50 lbs. (22.7 kg.)
<b>POWER REQUIREMENT</b>	120 /240 VAC, 50/60 Hz, single phase, 5 amps.

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