

# **ED-400 PORTABLE EDDY CURRENT UNIT**

## **EQUIPMENT SPECIFICATION ES-101**

- 1 -

### **1.0 Description**

- 1.1** The Model ED-400 is an eddy current test device which will locate surface and near-surface discontinuities in magnetic materials. Nonmagnetic metals may also be inspected for many types of defects. In magnetic steel products, cracks as small as 0.005" deep may be detected with ease, when open and normal to the surface.
- 1.2** The ED-400 instrument utilizes the eddy current principle, wherein the induced currents in the test part are affected by changes in homogeneity and uniformity. Variations in material conductivity, permeability, and thickness are ignored because of the special design features incorporated in the system. Discontinuities such as cracks, laps, or seams will disrupt the eddy current pattern induced in the material, and cause localized magnetic field changes near the probe which unbalance the instrument and create meter deflections.
- 1.3** Initially, the Balance Controls are adjusted with the probe in air to zero the meter. As the probe is then scanned across the test object, discontinuities will be indicated as changes in the reading. The Gain Control is adjusted to give the desired amount of deflection for the defects to be located. An Alarm Set Control may be adjusted to activate the threshold audio annunciator for a given meter deflection.
- 1.4** The state-of-art ED-400 is virtually insensitive to the background magnetic permeability changes. Thus, no lift-off adjustments are required when searching for defects through rust, oxide scale, paint and other coatings. Slight rocking of the probe during testing does not seriously affect the meter reading. The differential probe forms two legs of a bridge circuit contained within the instrument.

### **2.0 Mechanical and Construction**

- 2.1** Dimensions: Hand Held Unit - 3.5" (8.9 cm) x 7.1" (18 cm) x 1.9" (4.8 cm) high  
Carrying Case - 12" (30.5 cm) x 8" (20.3 cm) x 3.5" (8.9 cm) high
- 2.2** Weight: Overall (unit with carrying case) - 2.2 lb (1 kg)  
Hand Held Unit with Probe - .8 lb (1.8 kg)

## EQUIPMENT SPECIFICATION ES-101

- 2 -

- 2.3 Meter: 2.5" (6.4 cm); scale numbered from 0 to 500 in 50 divisions.
- 2.4 The instrument is housed in a light weight, impact resistant case. The carrying case is designed to protect the unit and accessories during shipping and when not in use. The foam cut-outs are for the units itself, probe, test block, adjustment screwdriver and operating manual.

### 3.0 **Electrical and Performance**

- 3.1 The instrument is solid state construction throughout and utilizes integrated circuits.
- 3.2 Frequency: 100 KHz.
- 3.3 Power Requirements: Batteries - Two "AA" alkaline cells only. DO NOT use nickel cadmium cells, as the voltage is too low. The new rechargeable alkaline cells are approved for use in this instrument.
- 3.4 Probes are interchangeable. Coarse Balance adjustments are simple for the operator to perform and are outlined in the operation manual.
- 3.5 Meter indicates probe unbalance as it passes over a flaw. Instrument shows full scale deflection for 0.008" (20.3 mm) deep mill slot in machined magnetic material (Steel Test Block, P/N 220004).

### 4.0 **Operation**

- 4.1 The Gain Control determines the sensitivity level and, therefore, the meter deflection for a given depth of defect.
- 4.2 The Balance Controls null the meter in air and are used in conjunction with one another.
- 4.3 The Power Switch provides power to the instrument. The square-faced LED will light when the batteries need to be replaced.

# **ED-400 PORTABLE EDDY CURRENT INSTRUMENT**

## **EQUIPMENT SPECIFICATION ES-101**

- 3 -

- 4.4 The Alarm Set is a continuously variable screwdriver control that adjusts threshold firing point as a function of meter deflection.
- 4.5 The Alarm provides an audio indication when meter deflection triggers the threshold circuit.
- 4.6 The Probe Connector is a miniature 4 pin screw-on for attachment of test probes.

### **5.0 Order Reference**

5.1 Model ED-400 Portable Eddy Current Instrument, **P/N 220000**, in plastic carrying case, including steel test block, adjustment screwdriver, standard probe, and 2 “AA” batteries (installed in the unit).

### **5.2 Standard Accessories**

- 5.2.1 Battery (two required to operate instrument), **P/N 517760**
- 5.2.2 Standard Crack Detection Probe, 7/16” (1.1 cm) diameter x 1.5” (3.8 cm) long, 60” (1.5 m) long cable attached, **P/N 220072**
- 5.2.3 Carrying Case, **P/N 220003**
- 5.2.4 Steel Test Block, 3.125” (7.9 cm) long x 1.375” (3.5 cm) wide x .125” (.3 cm) high, **P/N 220004**
- 5.2.5 Screwdriver for adjustment of coarse balance and alarm controls, **P/N 519929**

### **5.3 Addendum Accessories**

- 5.3.1 Bolt Hole Probe for 5/16” (.8 cm) to 3/8” (.9 cm) hole, approximately 4” (10.2 cm) long, **P/N 208294**

## EQUIPMENT SPECIFICATION ES-101

- 4 -

- 5.3.2** Bolt Hole Probe for 3/8" (.9 cm) to 1/2" (1.3 cm) hole, approximately 4" (10.2 cm) long, **P/N 208331**
- 5.3.3** Bolt Hole Probe for 1/2" (1.3 cm) to 5/8" (1.6 cm) hole, approximately 5" (12.7 cm) long, **P/N 208329**
- 5.3.4** Bolt Hole Probe for 5/8" (1.6 cm) to 3/4" (1.9 cm) hole, approximately 5" (12.7 cm) long, **P/N 208330**
- 5.3.5** Bolt Hole Probe for 3/4" (1.9 cm) to 1" (2.5 cm) hole approximately 6" (15.2 cm) long, **P/N 208290**
- 5.3.6** Pancake Probe, 5/16" (.8 cm) high, 6" (15.2 cm) long with attached cable, **P/N 220082**
- 5.3.7** Mini-Swivel Probe, 1/4" (.6 cm) tip diameter, 9.25" (23.5 cm) long (cable required), **P/N 220079**
- 5.3.8** Swivel Probe, 3/8" (.8 cm) tip diameter, 12" (30.5 cm) long with attached cable, **P/N 209005**
- 5.3.9** Spherical Probe, 5/16" (.8 cm) diameter, 1.5" (3.8 cm) long with attached cable, **P/N 220085**
- 5.3.10** Wedge Probe, 5/16" (.8 cm) diameter, 1.75" (4.4 cm) long with attached cable, **P/N 209400**
- 5.3.11** Encircling Coil, 1" (2.5 cm) ID, 3" (7.6 cm) square, cable required, **P/N 220084**
- 5.3.12** Pencil Probe, 1/8" (.32 cm) tip diameter, cable required, **P/N 220087**
- 5.3.13** Probe Cable, 60" (1.5 m) long, **P/N 220083**

Additional probes and coils may be designed to meet customers' requirements. contact factory with desired specifications.

## **6.0** References

- 6.1** Instruction Manual, Form No. 19962A, effective Feb. 1, 1995

# **ED-400 PORTABLE EDDY CURRENT INSTRUMENT**

## **EQUIPMENT SPECIFICATION ES-101**

- 5 -

- 6.2** Technical paper "A Solution to the Permeability and Lift-Off Problems in Electromagnetic Flaw Detection" by R.H. Kenton (1970)
- 6.3** Price Pages EC-4