Model 1101-C Thermoelectric Metal Tester

- Sorts Alloy Scrap
- Verifies Parts in Receiving
- Inspection for proper alloys
- Uses 115V AC, 60 CPS Wall outlet

- Checks critical welds for location and material
- Easy-to-Use
- Lightweight

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IMPORTANT SAFETY CONSIDERATIONS

It is very important for the user to consider the possible adverse effects of power, wiring, component, sensor, or software failures in designing any type of control or monitoring system. This is especially important where economic property loss or human life is involved. It is important that the user employ satisfactory overall system design. It is agreed between the Buyer and Acromag, that this is the Buyer’s responsibility.

Description

The Acromag Model 1101-C Thermoelectric Metal Tester saves valuable time, and helps prevent costly mistakes in mixed-up stock, parts, and heat-treat. It is a low-cost way to help sort expensive alloy scrap, verify precision machined parts in receiving inspection and check welds.

The Acromag Metal Tester tests each part in less than 5 seconds. It is a non-destructive test that can be used on precision bearing surfaces. Readings can be done on any size and shape of object. Best results are obtained when clean, uncorroded and unplated surface finishes are used. Readings taken from dirty or corroded scrap may differ from readings on clean metal, but with care the Metal Tester can supply usable results.

The Acromag Metal Tester uses a high precision solid-state transistor reference temperature controlled probe. Drift is avoided by using a special magnetic amplifier which provides extremely stable, and reliable results.
The Acromag Metal Tester requires less than five minutes for the hot probe to reach operating temperature.

**Principle of Operation**

The Acromag Metal Tester utilizes the same theory as a thermocouple, the Seebeck Effect. A thermocouple is formed by paired junctions of two different metals, and when one junction is at a higher temperature than the other, a small voltage is produced. The amount of voltage varies with the type of metal and how it has been treated, such as rolling, drawing, annealing, etc.

The Acromag Metal Tester creates a thermocouple junction on the specimen by means of copper electrodes. One electrode, the plate, is at room temperature, and the other, a probe, is heated to about 125°C. When the unknown metal specimen is placed on the copper plate, and touched with the hot probe a complete electric circuit with a small voltage is created. A magnetic amplifier drives the built-in voltmeter, which has several ranges for easier reading.

**How to use the Acromag Metal Tester Model 1101-C**

1. Attach the hot probe and cold plate to the connectors at the rear of the cabinet, and screw on firmly.

2. Plug the unit into a 115V AC, 60 CPS power source. The unit uses only 30 Watts.

3. Rotate the function switch from OFF to position B. The green “Power” led should light up immediately showing the power is on.

4. After approximately five minutes, the yellow “Ready” led will start to flicker on and off. This means that the instrument is warmed-up and ready to use.

5. Place a clean metal specimen on the cold plate and gently place the hot probe on the specimen. Then apply a moderate pressure of a few pounds. IMPORTANT: Do not strike or hit the specimen as this tends to flatten the smooth round tip on the hot probe which causes erratic readings and excessive wear.

6. Read the meter and record. If the meter reads upwards off-scale, change the function switch from B to A for the reading. If the meter reads downside, switch from B to C for your reading. If the meter reads upwards off-scale, switch from C to D. In general, read specimens on the B and C ranges whenever possible. If readings are off-scale, read on A and D ranges.

7. Report readings as C-40, D-52, A-12, etc.

**Limitations**

Just as metal identification by spark, chemical or magnetic tests is not 100 per cent effective, neither is thermoelectric testing perfect. Some alloys differ only slightly in one or two elements and the change in voltage on the tester is too slight to produce a different reading. Some alloys have elements in them which may offset one another to produce nearly identical readings over all. Alloys of identical chemical makeup, but in different physical hardness structure, usually have different readings. In spite of these limitations, the Acromag Metal Tester has proved a valuable aid to identify a wide variety of alloys, for hardness, etc. For example, distinctions have been made between such alloys as: 300-series stainless, monel, K-monel, cobalt base, 400-series stainless, Inconel, carbon steel, and many of the high temperature stellites, Hasteallys, and Nimonics.

**Hints for Repeatable Readings**

1. Hold the probe as shown in the photo. Rocking the probe changes reading slightly. Avoid striking or hitting the probe.

2. Clean metal specimens well. If necessary, clean the hot probe tip with very fine sandpaper, and wipe clean with a clean dry cloth. Avoid cleaning the probe tip more often than needed as this hastens wear and replacement. Be sure to clean metal specimen well, and wipe very clean. Failure to remove metal and dirt particles from the specimen causes them to imbed into the tip. This causes very erratic readings. It is then necessary to re-polish and clean the probe tip with fine sandpaper. Never use emery cloth.

3. It is necessary to clean the hot probe tip occasionally with very fine sandpaper. Then wipe clean. This removes normal surface oxides, and surface contamination picked up from metal specimens.

4. At least 25,000 measurements are practical before the hot probe needs rebuilding. With care,
more than 100 thousand measurements are possible before complete probe reconditioning is necessary.

5. Some specimens, such as aluminum, may appear clean, but actually have surface oxides that cause false and erratic readings. Three preliminary readings within a one-inch circle of cleaned specimen should agree within two or three fine scale markings. If these readings do not agree, reclean the specimen and/or the probe tip.

6. Painted, anodized, passivated, and plated specimens must have protective coatings removed prior to testing. Otherwise the instrument reads a mixture of the surface and underneath metal, and readings tend to drift erratically. Experimental tests of cleaned and non-cleaned specimens have determined the need for cleaning.

Free Test Specimen Service

Acromag offers a special testing to assist you in determining if an Acromag Metal Tester will solve your particular needs. Simply send a reasonable number of small specimens to the Acromag Sales Department. We will report the Metal Tester readings to you for evaluation.

Specimen size and shape are not critical, but they should be smooth, and at least as large as a dime. Please identify each one clearly. If specimens are cut from larger pieces, avoid using heat. This sometimes causes localizes heat treat which alters the Metal Tester readings.

Calibration Procedure

Acromag Model 1101-C Metal Testers have an adjustment to allow calibration to obtain a specific reading on a specific sample. This adjustment allows gain trim of several percent on the internal meter amplifier. To calibrate, turn instrument on allowing several minutes to warm up. Once the ready light begins cycling, the unit is ready to calibrate. One adjustment effects all ranges. Place the known specimen on the plate and apply the probe. Insert a small screwdriver through the hole and adjust the range potentiometer to give the desired reading. An adjustment of approximately 10 percent is possible.

Repair and Warranty Service

The Acromag Metal Tester contains solidstate components and requires very little maintenance except annual cleaning and check-up. If problems do arise, return the unit with a full description of the problem.

All units returned to Acromag for repair must be shipped prepaid. The Metal Tester should be packaged with at least six inches of material to protect it. Repairs caused by shipping damage or normal wear, are not covered by warranty. Contact Acromag Customer Service Department for ordering information, and estimates on repair time.