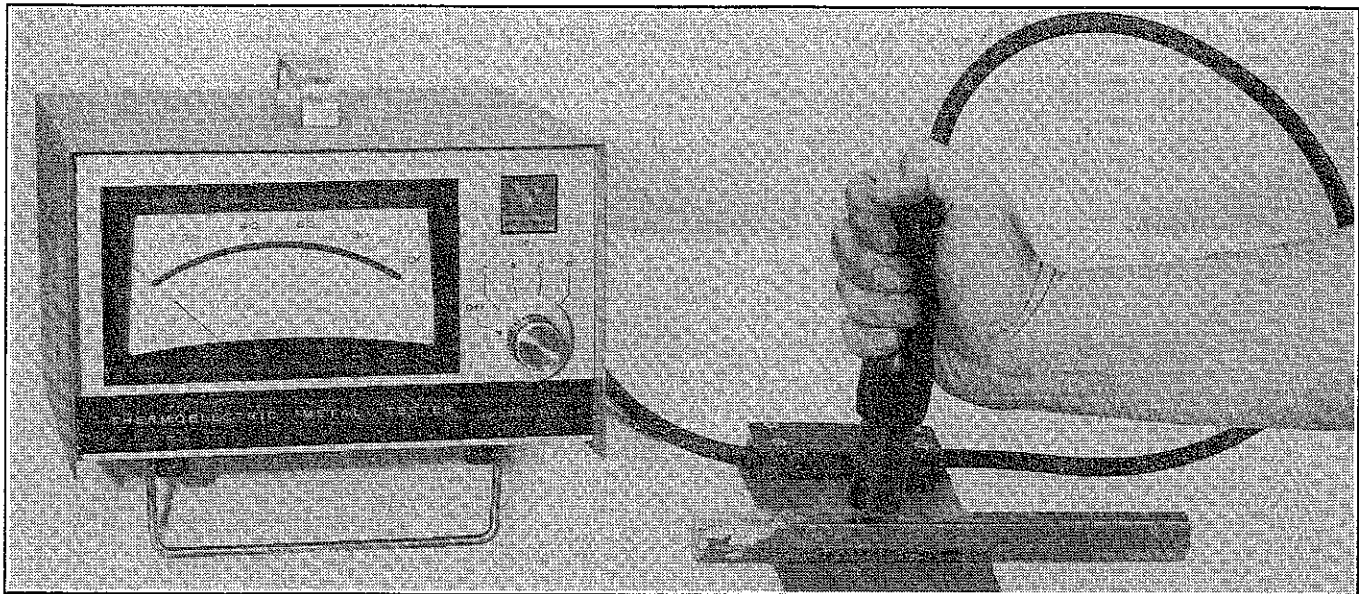


Model 1101-B User's Manual: Thermoelectric Metal Tester



- 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

The Acromag Model 1101-B 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 often the Metal Tester is supply useable 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 operates using the same theory as a thermocouple, the Seebeck Effect. A thermocouple is formed by paired junctions of two different metals, and one junction is at a higher temperature than the other, a small voltage is produced between the two. The amount of voltage varies with the type of metal and with the treatment that has been applied to it, such as rolling drawing, heat-treating, 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 Model 1101-B Metal Tester

1. Attach the hot probe and cold plate to the connectors at the rear of the cabinet, and crew 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 meter should light up immediately showing the power is on.
4. After approximately five minutes, the red-orange light under the Acromag Nameplate will start to flicker on and off. This means that the instrument is warmed-up and ready for 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 downscale, 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 sterel, and many of the the high temperature Stellites, Hastealloys, 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, re-clean 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

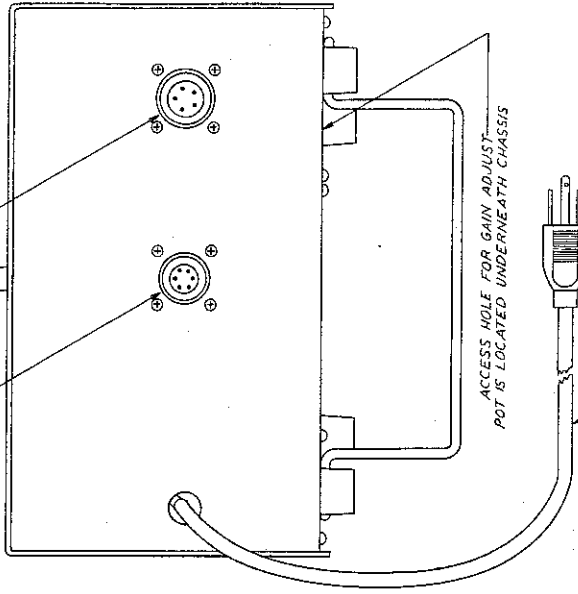
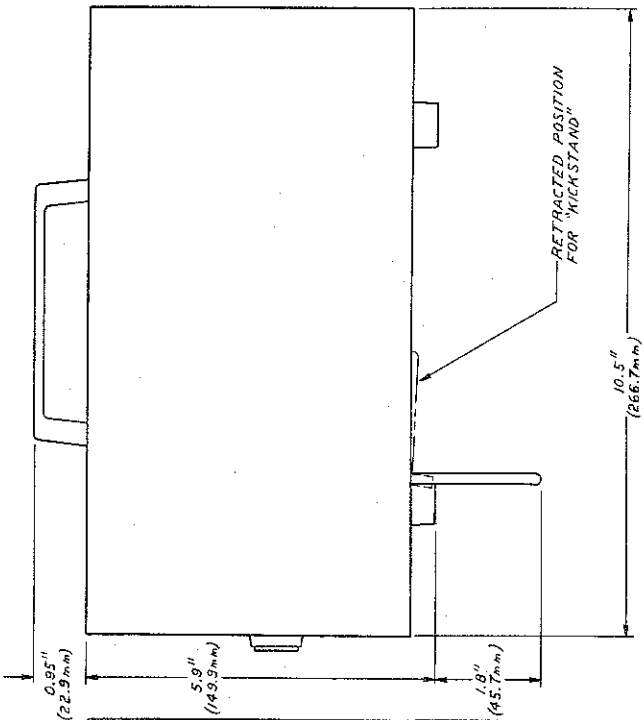
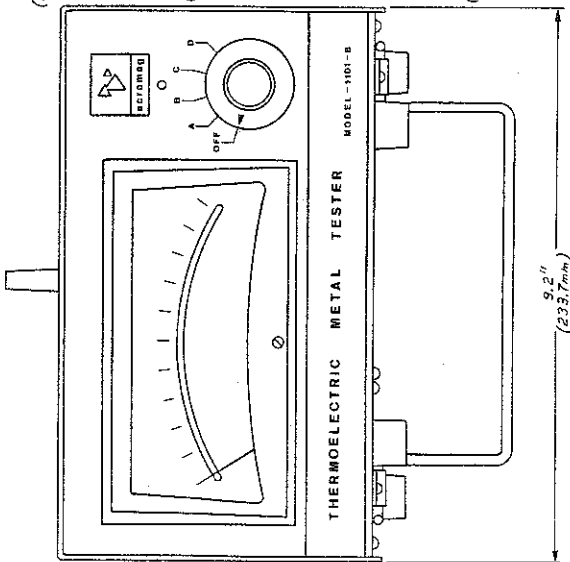
Acromag offers a special testing service to assist you in determining if an Acromag Metal Tester will solve your particular needs. Simply send a reasonable number of small specimens to the Acromag Sales Department. We will report the Metal Tester readings to you for evaluation.

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 localized heat treat which alters the Metal Tester readings.

REV.	DATE	BY	CHKD.

PLATE CONNECTOR
X4

PROBE CONNECTOR
X3

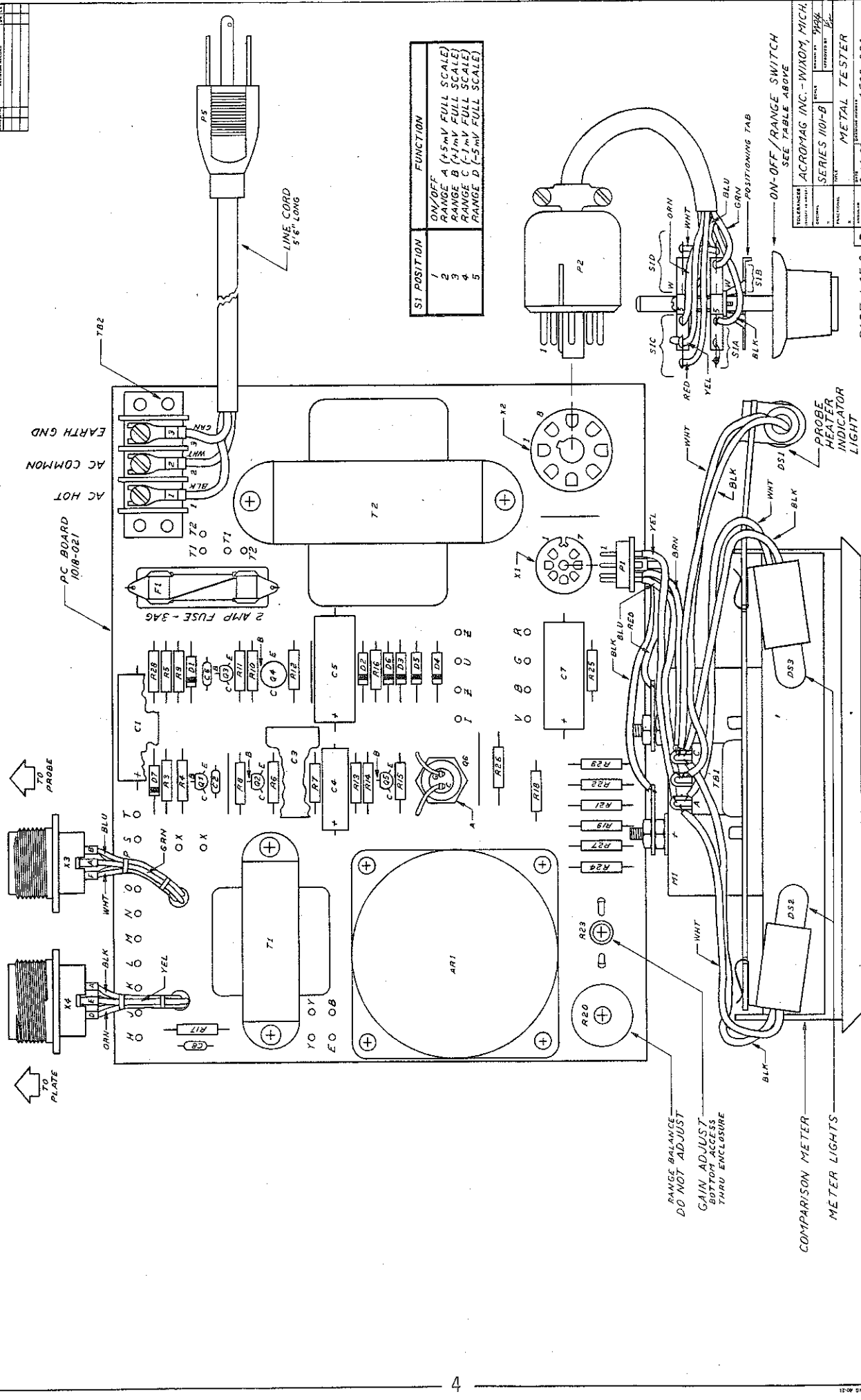


LINE CORD
5 1/2" LONG
(1.37 m)

MANUFACTURER	ACROMAG INC. - WIXOM, MICH.
MODEL	101-B
SERIAL NO.	7000
DATE	2-14-80
REVISION	4500-225
TESTER	METAL TESTER DIMENSIONS
TESTER	2-14-80
TESTER	4500-225

D

REV. 1	1
REV. 2	1
REV. 3	1
REV. 4	1
REV. 5	1
REV. 6	1
REV. 7	1
REV. 8	1
REV. 9	1
REV. 10	1
REV. 11	1
REV. 12	1
REV. 13	1
REV. 14	1
REV. 15	1
REV. 16	1
REV. 17	1
REV. 18	1
REV. 19	1
REV. 20	1



S1 POSITION	FUNCTION
1	ON/OFF
2	RANGE A (45mV FULL SCALE)
3	RANGE B (11mV FULL SCALE)
4	RANGE C (1mV FULL SCALE)
5	RANGE D (-5mV FULL SCALE)

TOLERANCE	ACROMAG INC. - WIXOM, MICH.
REVISION	9904
DATE	2-14-80
DESIGNED BY	WJ
CHECKED BY	WJ
FUNCTIONAL	METAL TESTER
PROJECT NO.	4500-224

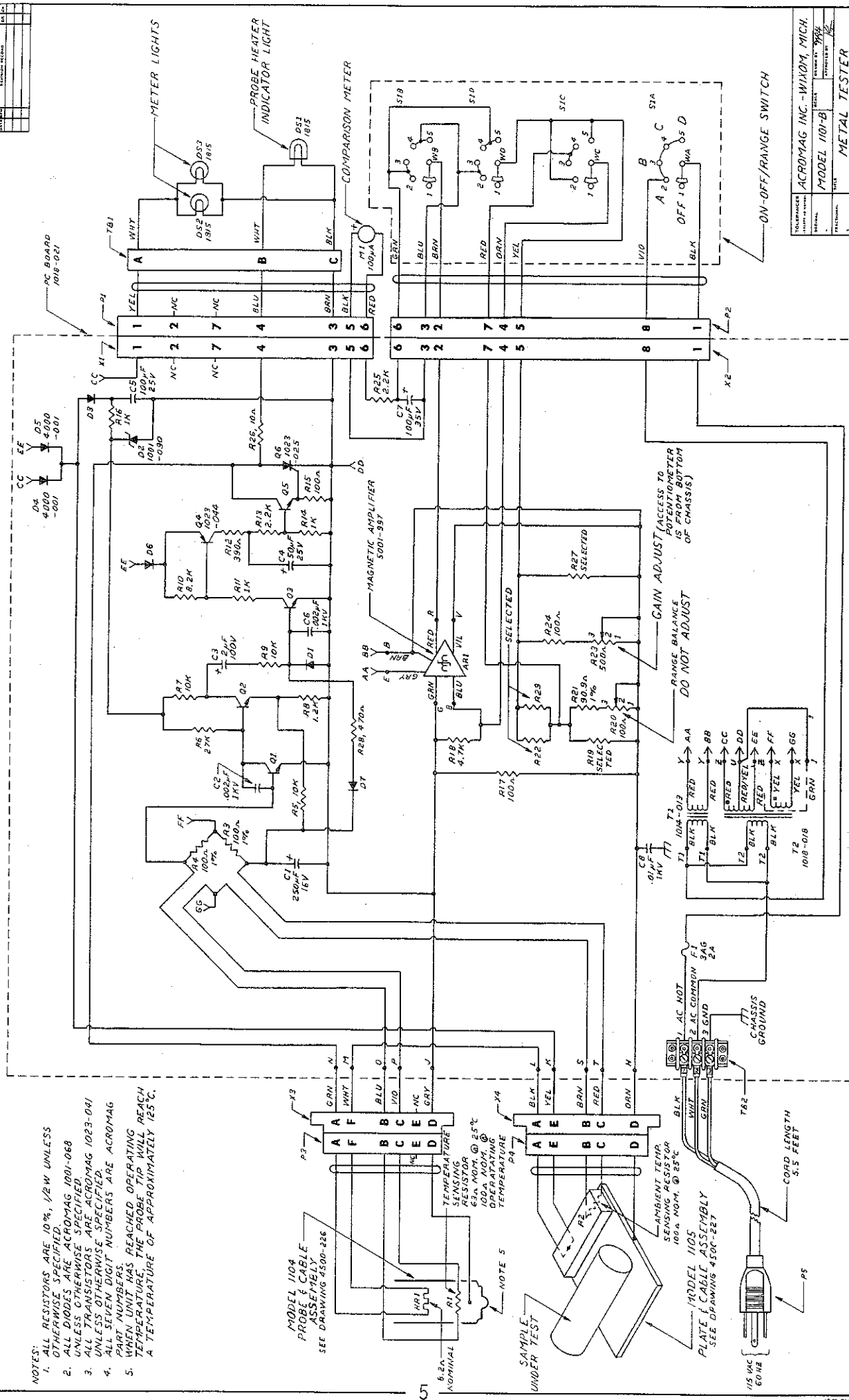
PAGE 1 OF 2 D

RANGE BALANCE
DO NOT ADJUST
GAIN ADJUST
DIAL ACCESS
THRU ENCLOSURE

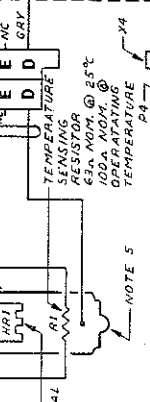
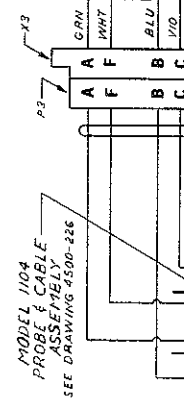
COMPARISON METER
METER LIGHTS

PROBE
HEATER
INDICATOR
LIGHT

REV.	DATE	DESCRIPTION



- NOTES:
1. ALL RESISTORS ARE 10%, 1/2 W UNLESS OTHERWISE SPECIFIED.
 2. ALL DIODES ARE ACROMAG 1001-06B UNLESS OTHERWISE SPECIFIED.
 3. ALL TRANSISTORS ARE ACROMAG 1003-041 UNLESS OTHERWISE SPECIFIED.
 4. ALL SEVEN DIGIT NUMBERS ARE ACROMAG PART NUMBERS.
 5. TEMPERATURE HAS TO BE REACHED OPERATING TEMPERATURE HAS TO BE REACHED. ALL REACH A TEMPERATURE OF APPROXIMATELY 125°C.



MANUFACTURER	ACROMAG INC. - WILSON, MICH.
MODEL	MODEL 100-B
TESTER	METAL TESTER
DATE	2-14-80
REVISION	4500-224

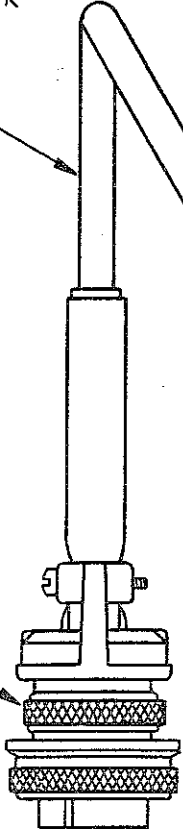
PAGE 2 OF 2

D

DATE	BY	REVISION	RECORD

P3

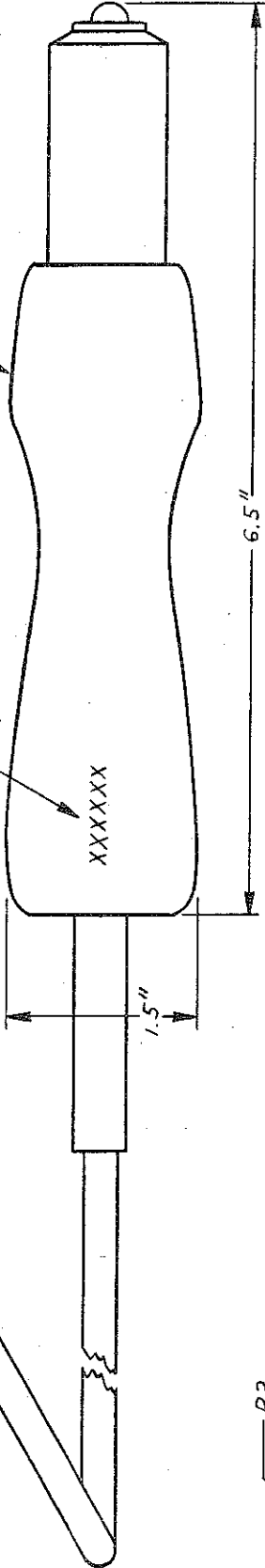
CABLE LENGTH
7'10"



PROBE ASSEMBLY
5002-032

ACROMAG
SERIAL NUMBER

MATERIAL:
WOOD, PAINTED BLACK



TEMPERATURE SENSITIVE RESISTOR
(COPPER WIRE) $R \approx 63 \Omega$ NOM. @ 25 °C,
 $R \approx 100 \Omega$ AT OPERATING TEMPERATURE.

HEATER RESISTANCE
ELEMENT $R \approx 8.2 \Omega$ NOMINAL

P3



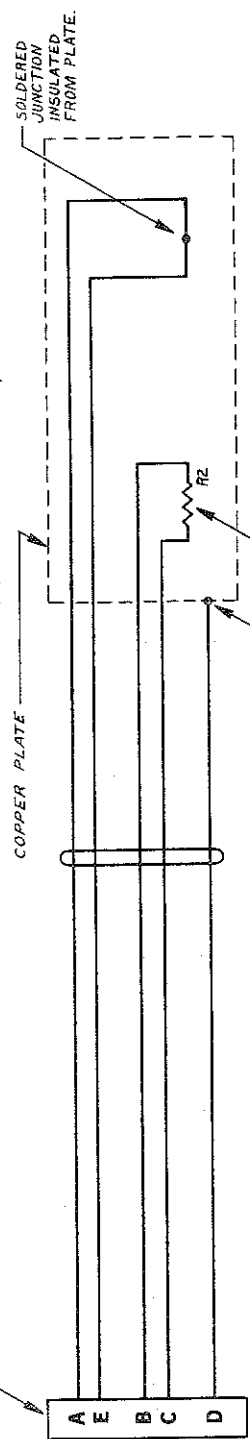
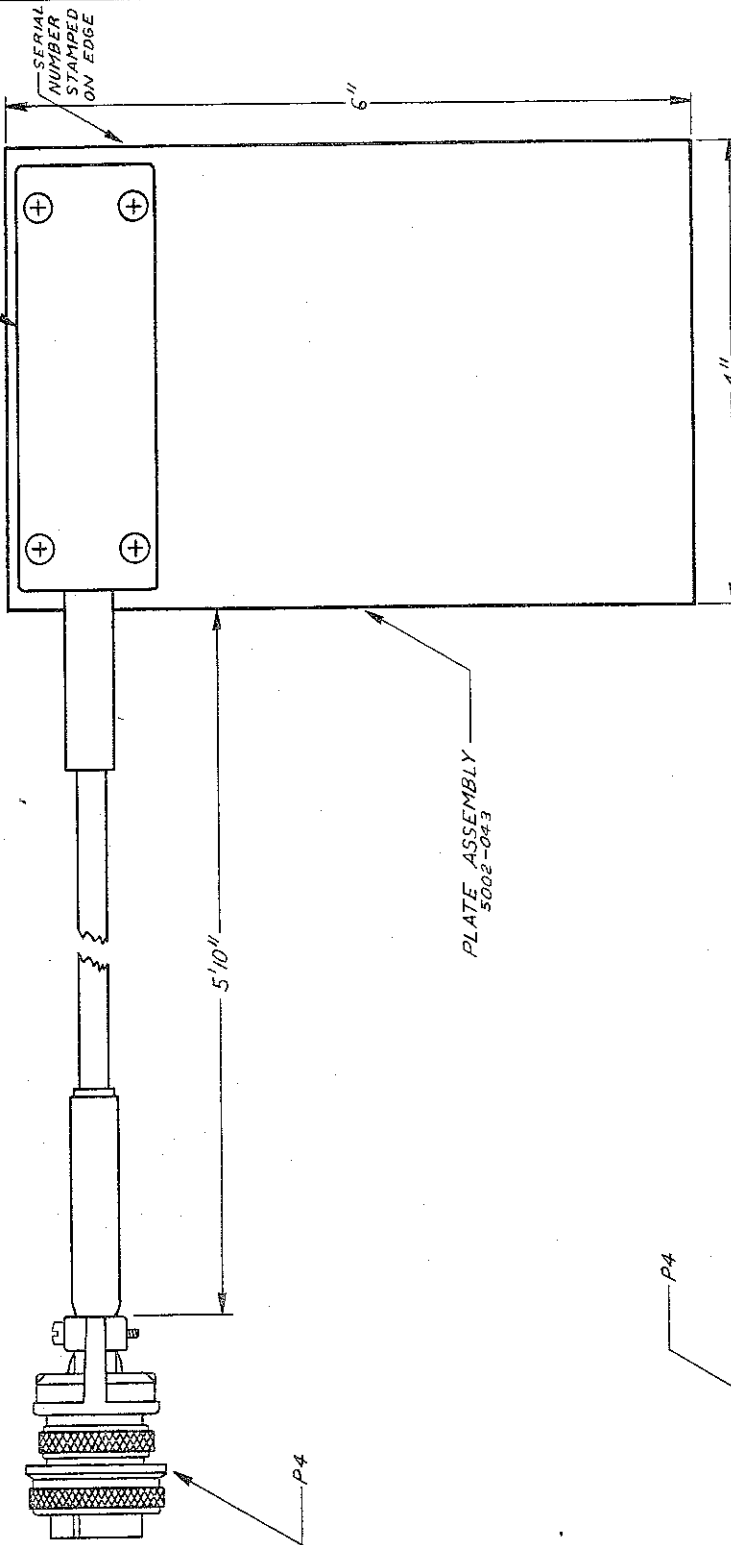
ELECTRICAL CONNECTION
TO COPPER PROBE TIP

TOLERANCES (EXCEPT AS NOTED)	ACROMAG INC. - WIXOM, MICH.		
DRAWN BY	SCALE	APPROVED BY	
MODEL 1104			
FRACTIONAL	TITLE	DATE	DRAWING NUMBER
	METAL TESTER PROBE	4-5-80	4500-226
ANGULAR			

C

DATE	REVISION RECORD	DATE	BY
5-28-52	6-4-52	7-1-52	

HEIGHT OF ASSEMBLY 1.0" MAX.



TOLERANCES UNLESS OTHERWISE SPECIFIED	ACROMAG INC. - WIXOM, MICH.
1. DECIMAL	MODEL 1105
2. FRACTIONAL	TITLE METAL TESTER COLD PLATE
3. ANGULAR	DATE 2-14-80
	QUANTITY NUMBER 4500-22TA

C

Calibration Procedure

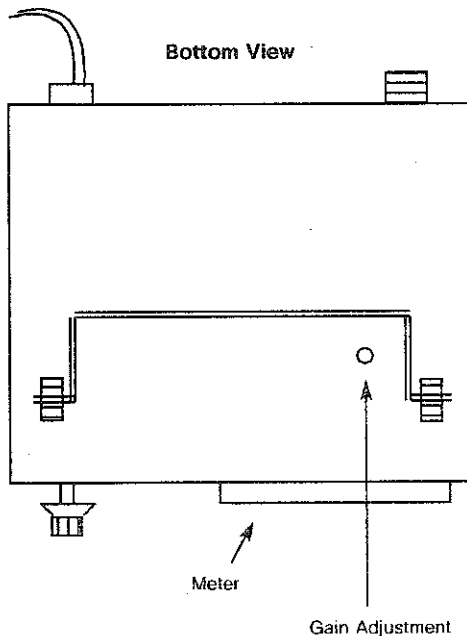
Acromag Model 1101-B Metal Testers have an adjustment to allow calibration to obtain a specific reading on a specific sample. This adjustment allows gain trim of several per cent on the internal meter amplifier.

To calibrate, turn instrument on allowing several minutes to warm up. Once ready light begins cycling, unit is ready to calibrate. There is one adjustment that affects all ranges. Use a specimen of the desired material. Place specimen on plate and apply probe. Using a small screwdriver through the hole adjust the range potentiometer to give the desired reading. An adjustment of approximately 10 per cent is possible.

Repair and Warranty Service

The Acromag Metal Tester contains solid-state 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.



Acromag ®
LEADER IN SIGNAL CONDITIONING

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Wixom, Michigan 48096 U.S.A.
(313) 624-1541 TELEX 247354

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Data and Specifications subject to change without notice.