**BATTERY REPLACEMENT**

This meter uses three batteries: two 1.5 V "AA" batteries for the X1/X10/X1k ranges and one 9 V battery for the X10k range. The illustration below shows the location of the batteries and a protective fuse.

Test batteries when you are near the full adjustment limit of 100 ADJ in any of the resistance ranges. Be sure to replace low or discharged batteries promptly. Low batteries leak corrosive acid.

- **Remove rear case,** held by a single Philips screw.
- **Note polarity and arrangement of batteries,** then remove batteries and replace cover.
- **Plug back test lead into COM jack,** red test lead into BAT+ jack.
- **Set Function/Range to DCV BAT+ 1.5 V** to test "AA" batteries. **Dedine and replace if pointer rests in BAD or 0 area of scale.** When replacing, be sure to replace both batteries of set.
- **Set Function/Range to DCV 13.2 V** test 9 V battery. **Dedine and replace if pointer rests less than 9 V.**
- **After servicing,** replace cover and securing screw.

**FUSE REPLACEMENT**

This meter is protected by a 250 V, 500 mA, 5 x 20 mm ceramic fuse. If the meter is inoperative, the fuse is probably blown. **To replace the fuse,** remove rear cover which is held by a single Philips screw. Only replace fuse with the original type.

**TEST LEADS**

Periodically examine the test leads to ensure they are not intermittent or broken. Also, make sure that good contact pressure exists between the jack and receptacles. Keep contact areas clean and free from dirt.

**LIMITED ONE YEAR WARRANTY**

MAXTEC INTERNATIONAL CORPORATION warrants the original purchaser that its BK Precision product, and the component parts thereof, will be free from defects in workmanship and materials for a period of one year from the date of purchase.

MAXTEC will, without charge, repair or replace, as at its option, defective product or component parts upon delivery to an authorized BK Precision service contractor or to the factory service department, accompanied by proof of the purchase date in the form of a sales receipt.

To obtain warranty coverage in the U.S.A., this product must be registered by completing and mailing the enclosed warranty registration card to MAXTEC (BK Precision), 6470 West Cortland Street, Chicago, Illinois 60635 within 15 days from the date of purchase.

Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. It is void if the serial number is altered, defaced or removed.

MAXTEC shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitation of incidental or consequential damage, so the above limitation or exclusion may not apply to you.

This warranty gives you specific rights and you may have other rights which vary from state to state. For your convenience, we suggest you contact your BK Precision distributor, who may be authorized to make repairs or can refer you to the nearest service contractor. If warranty service cannot be obtained locally, please send the unit to BK Precision Service Department, 6470 West Cortland Street, Chicago, Illinois 60635, properly packaged to avoid damage in shipment.

BK Precision test instruments only warrants products sold in the U.S.A. and its overseas territories. In other countries, each distributor warrants the BK Precision products which it sells.

**WARRANTY SERVICE**

For (U.S.A. and its Overseas Territories)

1. Refer to the MAINTENANCE section of this manual for any applicable instructions.
2. If the above-mentioned point does not correct the problem, pack this unit securely (preferably in its original carton or double-pack it).
3. Enclose a letter describing the problem and include your name and address. Deliver or ship prepaid (U.S.P.S. preferred in U.S.A.) to the nearest BK Precision authorized service agency.

For all inquiries, or if your list of authorized BK Precision service agencies has been misplaced, contact your distributor for the name of your nearest service agency, or write or phone to:

BK Precision Factory Service Operations
Precision Corporation
Segovia Circle
Placentia, CA 92870
Telephone: 714-237-9220

**ANALOG MULTIMETER MODEL 114A**

BK Precision®

931 Segovia Circle - Placentia CA 92870

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400-727-9810 Printed in Taiwan
Accuracy specifications apply from +18°C to +28°C

DC VOLTS

| Range | Sensitivity | Accuracy%
|-------|-------------|-------------
| 0-300 mV, 3 V, 12 V | 20.00000 mV per volt | ±5% of full scale

AC VOLTS

| Range | Sensitivity | Accuracy%
|-------|-------------|-------------
| 0.4 V, 200 V, 300 V, 1200 V | 8.00000 mV | ±5% of full scale

Frequency Response: (1±DB)

| Frequency | Sensitivity | Accuracy%
|-----------|-------------|-------------
| 61 Hz | 40 Hz to 100 Hz | ±10% of full scale
| 30 V range | 120 V range | 15% | 10% |

DC CURRENT

<table>
<thead>
<tr>
<th>Range</th>
<th>Burden Voltage</th>
<th>Maximum Applied Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-400 μA, 3 mA, 30 mA, 300 mA, 12 A</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Resistance

| Resistance | Accuracy%
|------------|-------------
| ±3% of full scale |
| R X 1, 2 ohms, mid scale | ±20ème ohms |
| R X 1, 10 to 20 kOhms, mid scale | ±5% of full scale |
| R X 1, 20 to 50 kOhms, mid scale | ±10% of full scale |
| R X 1, 100 to 2000 mid scale | ±15% of full scale |
| R X 1, 2000 mid scale | ±20% of full scale |

There are 3 main sections: AC/DC VOLTS, DC CURRENT, and RESISTANCE. The specifications include the accuracy and sensitivity of the measurement in terms of percentage of full scale. The device is capable of measuring a wide range of currents and voltages, with accuracies varying from ±5% to ±20% of full scale.
### CONTROLS and INDICATORS

1. Scale Mirror
   - Helps eliminate measurement errors caused by parallax when viewing scales.
2. 12" Scale
   - Measurement scale for resistance readings.
3. DCV, AC, A & ACV Scale
   - Measurement scale for DC volts, DC amperes and AC volts above 6 volts.

### OPERATING INSTRUCTIONS

#### WARNING

Be sure to read, thoroughly understand and follow the practices given on the SAFETY section of this manual to reduce the risk of electrical shock.

#### GENERAL CARE and OPERATING TIPS

1. Make sure batteries are in good condition; see the MAINTENANCE section of this manual for battery replacement instructions.
2. Always view the meter pointer so that its reflection in the scale mirror is directly behind it. This eliminates parallax errors.
3. When the meter leads are removed, the pointer should be at zero or close to zero. If it is not, adjust the pointer to zero by tapping the meter face gently while adjusting the mechanical zero screw.
4. The greatest accuracy is achieved when readings are in the upper part of the meter scale. As a general rule, select the next lower range when readings are less than half scale.
5. After completing your measurements, set the Function/Range switch to ACV and remove leads from the meter. Never leave the Function/Range switch in the DC position to conserve battery power.

### DC VOLTAGE METERING

**Never try to measure voltages greater than 1200 V. Higher voltages could damage the meter and/or increase the risk of electrical shock.**

To prevent instrument damage, always set the Function/Range selector to a range higher than the maximum voltage you expect to measure. If the voltage is unknown, start with the highest range.

1. Plug black test lead into the ___COM jack and red test lead into the ___jack (plug the red test lead into the OUTPUT jack to measure only the AC portion when superimposed on a DC voltage).
2. Set Polarity selector to AC or DC position.
3. Set Function/Range switch to desired ACV range. If range is unknown, select ACV.
4. Connect black test lead to point of reference (common), red test lead to desired measuring point. The common should never exceed 600 V (DC + AC peak) with respect to earth ground.
5. Read voltage at selected scale. For best accuracy, try to get a reading of at least 1/3 scale deflection.
OPERATING INSTRUCTIONS

RESISTANCE MEASUREMENTS

Never apply a voltage to the meter terminals while the resistance function is selected to avoid damage to the meter. Before taking a resistance measurement, disconnect all circuitry connected to the meter. Do not exceed the specified voltage for safe operation. Never connect the meter leads to a circuit operated at a voltage in excess of 40 VDC, 20 VAC, or 20 VAC peak. 20 VAC peak is the X1, X10, X1K range and about 12 V in the X10K range.

OUT-OF-CIRCUIT DIODE TESTS (cont.)

3. Connect test leads across diode, then reverse connections. Resistance ratios should be at least 1,000:1, near infinity in one direction and low resistance in the other direction.

4. Meter reading is near infinity in both directions, the diode is probably good.

5. Meter reading is very low in both directions, the diode is probably shorted.

TRANSISTOR MEASUREMENTS

This meter provides three transistor measurements: leakage, amplification factor (beta or hFE) and condition. These measurements are made with the use of two special leads, transistor functions select the transistor circuitry of the meter. Both NPN and PNP transistors can be tested. The measurements are made out-of-circuit. If the transistor is not a circuit, an open circuit component may cause a false reading. One of the transistor leads has two connectors, one red and one black. The other lead has a single black connector. All three connectors have small alligator clip ends. The meter leads jutted by these connectors are determined by the polarity of the transistor and the meter through the use of the wiring already being checked.

- If the transistor is not a transistor connect the test leads as follows: plug the dual connector lead into COM (N) jack, plug the single black lead into the - (P) jack. If PNP, suppress a direct reading on the transistor.

These connections are shown in the following illustration:

1. Remove code or similar device being tested from circuit.

2. Select desired resistance range, typically X1K.

1. Connect black test lead to the COM jack and red test lead to the + jack.

2. Select the desired ACV range. The DC voltage is calibrated for a maximum of 600 volts AC. Other ranges can be used by adding an appropriate factor as shown in the following chart:

3. Read value shown on DC scale and add any compensation factors as determined by your operating range and/or impedance if your value is not the correct value in diB.

4. Measure power from circuit under test. It must be electrically "off". Open circuit at a point that does not exceed 600 VDC (or AC peak) from each ground, or chassis of the equipment under test.

DC CURRENT MEASUREMENTS (cont.)

1. Connect meter in series with line opened, red test lead to positive (+) side, black test lead to negative (-) side of line.

2. Apply power to circuit and obtain current value by reading related scale at meter. For best accuracy, make sure range selected gives a reading of at least 1/3 scale deflection.

3. Adjusting the sensitivity factor (db) to the meter reading in (db) for the correct value in diB.

4. Always connect meter in series with load when measuring current. If you incorrectly connect it in parallel with the load, it provides a low impedance path, almost shorting the load. This high current path could damage the meter and/or equipment under test.

5. Always select a range high enough to pass the current you plan to measure. If current value is unknown, or in doubt, start with the 10A range. Never exceed the current range selected or range of the related jack.

6. Only use this meter to measure direct currents, never try to use it to measure alternating current.

7. Plug the test lead into the + jack.

8. Plug test lead into appropriate jack for current that you intend to measure. Use the DC+12A jack for current levels greater than 0.3 A and not exceeding 12 A.

9. Set the Function/Range switch to appropriate range and Polarity selector to DC+ (up).

10. Remove power from circuit under test. It must be electrically "off". Open circuit at a point that does not exceed 600 VDC (or AC peak) from each ground, or chassis of the equipment under test.

DC CURRENT MEASUREMENTS

1. Connect meter in series with line opened, red test lead to positive (+) side, black test lead to negative (-) side of line.

2. Apply power to circuit and obtain current value by reading related scale at meter. For best accuracy, make sure range selected gives a reading of at least 1/3 scale deflection.

3. Adjusting the sensitivity factor (db) to the meter reading in (db) for the correct value in diB.

4. Always connect meter in series with load when measuring current. If you incorrectly connect it in parallel with the load, it provides a low impedance path, almost shorting the load. This high current path could damage the meter and/or equipment under test.

5. Always select a range high enough to pass the current you plan to measure. If current value is unknown, or in doubt, start with the 10A range. Never exceed the current range selected or range of the related jack.

6. Only use this meter to measure direct currents, never try to use it to measure alternating current.

7. Plug the test lead into the + jack.

8. Plug test lead into appropriate jack for current that you intend to measure. Use the DC+12A jack for current levels greater than 0.3 A and not exceeding 12 A.

9. Set the Function/Range switch to appropriate range and Polarity selector to DC+ (up).

10. Remove power from circuit under test. It must be electrically "off". Open circuit at a point that does not exceed 600 VDC (or AC peak) from each ground, or chassis of the equipment under test.

AVGCURRENT: 6,50, 120, 200, 300, 500, 1000, 2000, 4000 AVG Current Compensation.