

## LIMITED ONE YEAR WARRANTY

MAXTEC INTERNATIONAL CORPORATION warrants to the original purchaser that its **EK 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, at its option, defective product or component parts upon delivery to an authorized **EK 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 **EK 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 damages, 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 **EK 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 **EK Precision** Service Department, 6470 West Cortland Street, Chicago, Illinois 60635, properly packaged to avoid damage in shipment.

**EK Precision** Test Instruments only warrants products sold in the U.S.A and its overseas territories. In other countries, each distributor warrants the **EK Precision** products which it sells.

## CUSTOMER SUPPORT

1-800-462-9832

**EK Precision** offers courteous, professional technical support before and after the sale of their test instruments. The following services are typical of those available from our toll-free telephone number:

- Technical advice on the use of your instrument.
- Technical advice on special applications of your instrument.
- Technical advice on selecting the best instrument for a given task.
- Information on optional accessories for your instrument.
- Information on instrument repair and recalibration services.
- Replacement parts ordering.
- Information on other **EK Precision** instruments.
- Requests for a new **EK Precision** catalog.
- The name of your nearest **EK Precision** distributor.

Call toll-free 1-800-462-9832  
Monday through Friday, 8:00 A.M. to 5:00 P.M.  
Central Standard Time  
(Central Daylight Time in summer)



# **EK PRECISION**®

MAXTEC INTERNATIONAL CORP.

6470 W. Cortland St. • Chicago, IL 60635

© 1995 MAXTEC INTERN.

480-755-9-001 B

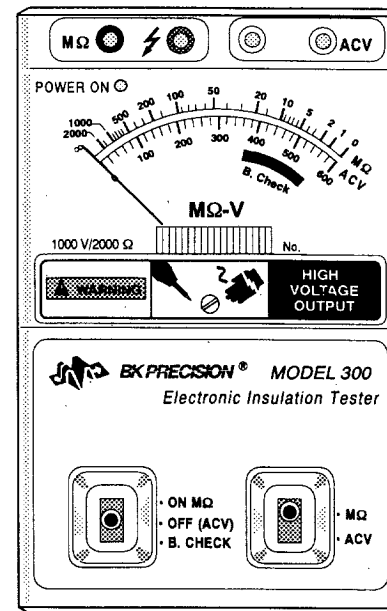
Test Equipment  
  
Depot  
1-800-517-8431

## INSTRUCTION MANUAL



# **EK PRECISION**®

### ELECTRONIC INSULATION TESTER MODELS 300, 305 & 306



## INSULATION TEST

Accuracy is specified with the meter in the horizontal position.

### INSULATION TEST

Output Voltage [Model]:

- Infinity [300], open circuit ..... 1000 V DC,  $\pm$  10%
- Infinity [305 & 306], open circuit ..... 500 V DC,  $\pm$  10%
- Center Scale ..... > 90% of open circuit

Maximum Current [Model]

- Short Circuit [300] ..... 250 micro amperes
- Short Circuit [305] ..... 500 micro amperes
- Short Circuit [306] ..... 1000 micro amperes

Resistance [Model]:

- Range [300] ..... 1 M $\Omega$  to 2000 M $\Omega$
- Range [305] ..... 0.2 M $\Omega$  to 1000 M $\Omega$
- Range [306] ..... 0.05 M $\Omega$  to 100 M $\Omega$
- Center Scale [300] ..... 50 M $\Omega$
- Center Scale [305] ..... 20 M $\Omega$
- Center Scale [306] ..... 2 M $\Omega$

Accuracy:

- Infinity ..... Within 1% of scale length
- Zero ..... Within 1% of scale length
- All Points .....  $\pm$  5% of reading

### AC VOLTAGE TEST [300, 305, 306]

- Range ..... 0 to 600 V ac
- Frequency Response ..... 10 Hz to 100 kHz
- Accuracy .....  $\pm$  4% of full scale

## LOW RESISTANCE TEST [Model 306 only]

Output Voltage:

- Infinity (Open Circuit) ..... 1.5 V DC,  $\pm$  10%

Maximum Current:

- Short Circuit ..... 40 mA

Resistance

- Range ..... 0 to 2000  $\Omega$
- Center Scale ..... 30  $\Omega$

Accuracy

$\pm$  3% of scale arc

### BATTERY CHECK [300, 305 & 306]

Scale ..... Indicates when batteries should be replaced

Test Load ..... 75 ohms

### GENERAL SPECIFICATIONS [300, 305 & 306]

- Power Requirements ..... Six "AA" cells (supplied)
- Battery Life ..... 4 hours continuous (w/Alkaline batteries)
- Operating Temperature ..... 0 to 50 °C,  $\leq$  70% R.H.
- Storage Temperature ..... -20 to +60 °C,  $\leq$  80% R.H. w/batteries removed
- Dimensions (H x W x D) ..... 6.66" x 4.18" x 1.42" (169 x 106 x 36 mm)
- Weight ..... 15 oz. (430 g) w/batteries
- Accessories Supplied ..... Batteries  
Carrying Case  
Test Leads  
Instruction Manual

## TEST INSTRUMENT SAFETY

### WARNING

*An electrical shock causing 10 milliamps of current to pass through the heart will stop most human heartbeats. Voltage as low as 35 volts dc or ac rms should be considered dangerous and hazardous since it can produce a lethal current under certain conditions. Higher currents are even more dangerous. Observe the following safety precautions:*

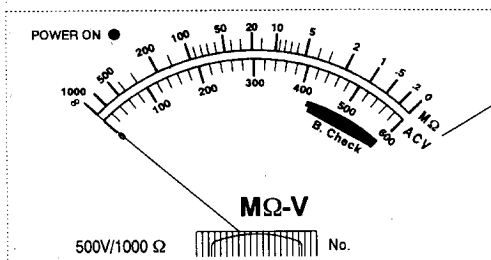
1. Output in the M $\Omega$  mode is 1000 V for instrument model 300 and 500 V for models 305 and 306. Current is limited and its shock should not be fatal. However, it does produce a "strong" electrical shock. Do not touch the test leads.
2. When the case and protective insulator are removed for servicing, 1,000 volts (model 300) or 500 V (models 305 and 306) are present at several points on the circuit board. Some points can supply a higher current than the output probe and produce a "very strong" electrical shock. Take precautions to avoid contact.
3. When using the ACV function, do not apply more than 600 V AC to the instrument.
4. When making insulation checks, make sure equipment under test is turned off and disconnected from input power source.
5. Use the time proven "one hand in pocket" technique while handling an instrument probe. Be particularly careful to avoid contacting a nearby metal object that could provide a good ground return path.
6. Avoid touching a high voltage point. Remember that ac line voltage may be present in equipment under test (for example, at an on-off switch, fuses, transformer, etc.), any time the equipment is connected to an ac outlet, even if it is turned off. If possible, familiarize yourself with the equipment being tested and the location of its high voltage points. However, remember that high voltage may appear at unexpected points in defective equipment.
7. When using a probe, only touch the insulated portion; keep your fingers in back of the finger guard. Never touch the exposed tip.
9. Never work alone. Someone should be nearby to render aid if necessary. Training in CPR (cardio-pulmonary resuscitation) first aid is highly recommended.

## INTRODUCTION

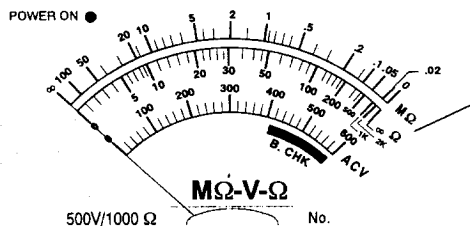
This instrument is a compact insulation tester, sometimes called a megohmmeter or megger, that also serves as an ac voltage meter. Two direct reading analog scales are provided (three scales on model 306). The upper scale is used for insulation resistance measurements. It provides resistance readings in megohms from 0 (zero) to 2000 MΩ and then to infinity (0 to 1000 megohms model 305, 0 to 100 megohms model 306). A lower scale is used for ac voltage readings from 0 to 600 volts. The model 306 (only) has a middle scale that is used for low resistance readings, up to about 2000 ohms.

When used as an insulation tester, power is supplied by six "AA", 1.5 V batteries. These batteries are connected in series providing a 9 V supply. This supply is stepped up to 1000 V (model 300) or 500 V (models 305 and 306) through a dc to dc converter for the insulation resistance measurements. Battery condition can be checked through a selector switch providing a good/bad reading of the battery power.

## CONTROLS AND INDICATORS

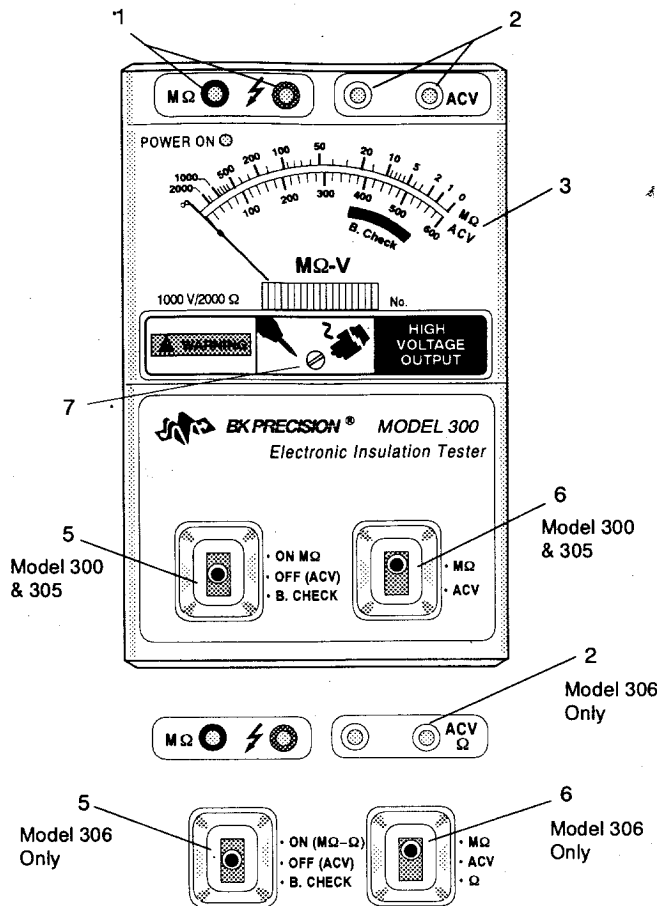


3 Model 305 Only



3 Model 306 Only

## CONTROLS AND INDICATORS



5 Model 300 & 305

6 Model 300 & 305

2 Model 306 Only

5 Model 306 Only

6 Model 306 Only

## CONTROLS AND INDICATORS

### 1. Output Jacks, MΩ

Output jacks for insulation checks. Plug-in black test lead into the black jack and red probe lead into the red jack.

### 2. Input Jacks, ACV (300, 305) or ACV (306 only)

Input jacks for making AC voltage measurements (models 300, 305) and for making AC voltage and low resistance measurements (model 306).

### 3. Meter Scales

Upper scale for high resistance (insulation) measurements (models 300, 305, 306); middle scale for lower resistance measurements (model 306); lower scale for AC voltage measurements (models 300, 305, 306).

### 4. POWER ON Indicator

Lighted when meter is switched ON for high resistance (insulation) measurements with models 300 and 305, and also for lower resistance measurements with model 306. Indicator off shows use for AC voltage measurements and battery condition check.

### 5. ON MΩ or ON MΩ-Ω /OFF (ACV)/B. CHECK Switch (left)

Use with MΩ/ACV switch or MΩ/ACV/Ω switch.

- ON MΩ [models 300 & 305]: Selects high resistance (insulation) measurements.
- ON (MΩ-Ω) [model 306 only]: Selects high resistance (insulation) and low resistance measurements.
- OFF (ACV) [models 300, 305 & 306]: Selects AC voltage measurement and turns off resistance measurements.
- B. Check [models 300, 305 & 306]: Checks condition of battery. If batteries are good, pointer enters black marker area on dial.

### 6. MΩ/ACV or MΩ/ACV/Ω Switch (right)

Use with ON MΩ or ON (MΩ-Ω)/OFF (ACV)/B. CHECK switch.

- MΩ [models 300, 305 & 306]: Selects insulation test mode.
- ACV [models 300, 305 & 306]: Selects AC voltage measurement mode.
- Ω [model 306 only]: Selects low resistance test mode.

### 7. Mechanical Zero Adjust

Mechanical adjustment for setting pointer to zero.

## INSULATION TEST CONSIDERATIONS

These insulation testers are typically used to measure insulation leakage in industrial transformers and motors. However, they can also be used to measure leakage in TV sets, appliances and other similar devices.

When used as an insulation tester, an ideal reading is infinity ( $\infty$ ), meaning no leakage at the applied voltage. Applied test voltage for model 300 is 1000 volts, for models 305 and 306 the test voltage is 500 volts. A high reading is desirable, 2,000 M $\Omega$  is also very good. Readings can be affected by external conduction paths; for example, moisture, high humidity, and dirt or contamination on the surface of the device under test.

When using this instrument to check leakage in TV chassis type circuits, examine the schematic of the circuit to get an estimate of the expected resistance. The arrangement of the circuit, isolated or one side earth ground, in addition to other factors, affects the readings obtained.

Frequently, maintenance takes and records periodic test measurements of certain critical devices to determine when service is needed. Each measurement should be taken under the same conditions; that is, eliminate any variance due to moisture and contamination. As the insulation deteriorates, resistance readings will be lower compared to earlier measurements. Sufficiently lower readings may indicate impending failure.

## PREMEASUREMENT CHECKS

1. Before performing insulation test or AC voltage measurements, check that the meter reads zero on the voltage scale ( $\infty$  infinity on the resistance scale). If necessary adjust the mechanical zero adjust with a small screw-driver.
2. Before performing insulation test measurements, perform a battery check. Set the left selector switch to **B. CHECK** (down) and the right selector switch to **M $\Omega$**  (up, indicator off). If the pointer is below the left edge of the black **B. Check** scale, replace the batteries. Measurements performed with low batteries will not meet the stated accuracy specifications.
3. Batteries are not used for AC voltage measurements; a battery check is not required.

## INSULATION TEST MEASUREMENTS

### WARNING

*Make sure that the circuit under test is turned OFF and disconnected from the ac input source. Observe high voltage precautions when operating in the high resistance (insulation) M $\Omega$  mode; model 300 produces 1,000 volts output and models 305 and 306 produce 500 volts in this mode.*

1. Models 300 and 305: Set the selector switches as follows, left to **ON M $\Omega$** ; right to **M $\Omega$**  (both up). Model 306: Set the left selector to **ON M $\Omega$  -  $\Omega$**  and right selector to **M $\Omega$**  (both up). POWER ON indicator should be lighted.
2. Plug black reference test lead into black jack and red High Voltage Probe into red jack of **M $\Omega$**  jacks (left pair of jacks).
3. Verify that circuit or component to be tested is "OFF" (voltage removed) and disconnected from input receptacle - pull plug out from receptacle. Remember, when checking for leakage in a chassis type TV circuit and the wiring is faulty, the chassis could be "hot" if the plug remains connected.
4. Connect the black (alligator) test lead to the common side of the circuit or component under test. Connect to chassis for TV set type circuits. Next, touch the red High Voltage Probe to the other point under test. Keep your fingers in back of the finger guard to avoid an electrical shock.
5. Reading shown on upper scale of meter is in megohms. Infinity ( $\infty$ ) is an ideal reading, but it is also the reading if the probes do not make good electrical contact. Make sure probes make good electrical contact.
6. For the highest accuracy, hold the meter in the horizontal position (meter face up)
7. Turn instrument OFF when not taking readings to conserve battery power.

## AC VOLTAGE MEASUREMENTS

1. Set the left selector switch to **OFF (ACV)**; set the right selector switch to **ACV**. POWER ON indicator must be off, unlit.
2. Plug test leads into **ACV** jacks (right pair).
3. Connect test leads across voltage measurement points. Read the AC voltage on the lower scale.

## LOW RESISTANCE MEASUREMENTS [Model 306 only]

1. Set the left selector to **ON M $\Omega$  -  $\Omega$  M $\Omega$**  (up); set right selector to  $\Omega$  (down). POWER ON indicator should be lighted.
2. Plug test leads into right pair of jacks, shown as **ACV**.  
 $\Omega$
3. Connect test leads across component or circuit being measured. Typically used for measurements up to 2000 ohms. Read measurement on the middle ( $\Omega$ ) scale.

## MAINTENANCE

### WARNING

*Disconnect test leads and set **ON M $\Omega$ /OFF (ACV)/B. CHECK** switch to **OFF (ACV)** before removing the back cover or performing any maintenance.*

## BATTERY REPLACEMENT

Replace batteries when the pointer no longer reaches the far left side of the **B. Check** marker scale. Replace discharged batteries promptly. Low batteries leak corrosive acid.

4. Remove the rear case cover which is held by a single Phillips screw.
5. Note the arrangement of the batteries, three "AA", cells at each side of the circuit board for a total of six cells. All six cells are in series.
6. Remove old cells and replace all six cells. Never replace only some of the cells; always replace the complete set. Observe polarity as marked. The illustration at the right shows this arrangement.
7. Replace cover and securing screw.

