



PRODUCT INSTRUCTIONS
MODEL RF/IT
PIPELINE INSULATOR TESTER

IMPORTANT NOTE: Do not use this instrument in an explosive environment.

Contents of the shipping package:

Model RF/IT Instrument Kit Includes:

- (1) 9v Battery (installed)
- Probe, Red with lead wire and needle point tip (factory installed backwards for safety)
- Probe, Black with needle point tip (factory installed backwards for safety)
- Additional needle tips (in small baggie, between foam and case in the lid)
- Instruction manual
- Warranty Card & Quality Statement

Inspection of the instrument should be performed upon receipt. If damage has occurred in shipment, file a claim with the carrier immediately. If it is necessary to contact your supplier or Tinker & Rasor, be sure to include all information such as serial number, purchase order number and invoice number.

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DESCRIPTION

The Model RF/IT Insulator Tester is a highly sensitive device, designed to test above ground pipeline insulators individually to determine their effectiveness. The Model RF/IT Insulator Tester is effective in the testing of pipeline insulators in parallel or series installations, even if one or more of the insulators are not operating properly. The tests conducted are fast and accurate.

METHOD

Two common methods used to measure a pipeline insulator are DC resistance and Radio Frequency Skin Effect. Radio Frequency Skin Effect is the phenomenon where the apparent resistance of a conductor increases as the frequency increases. With DC, the charge carriers have an even distribution throughout the area of the conductor. However, as the frequency increases, the charge carriers subsequently move towards the edge of the wire, decreasing the effective area and increasing the apparent resistance.

Because the Radio Frequency meter does not use a DC voltage, it is unaffected by DC or AC voltages under 50 volts and there is no need to disconnect the cathodic protection voltage applied to the pipe and/or structure. Another advantage of the skin effect is that errors due to diameter, relative permeability of the pipe and insulator distance are negligible.

To measure an insulator using the Radio Frequency method is similar to that of the DC measurement. The probes are placed across the insulator and the technician reads the display. Maximum deflection of the meter (100 or all the way to the Right) indicates a resistance of a high enough value as to indicate a good insulator, whereas if the insulator is shorted or has a low electrical resistance, the meter will only show reads to the left of top center (older analog meter shows one or two bars from the Left).

EQUIPMENT

The Model RF/IT Insulator Tester consists of a portable battery powered electronic instrument with detachable probes for making positive electrical contact across the insulator. The instrument is packaged in a plastic case complete with batteries ready to operate. Two extra steel needle points are supplied with the Tester (stored in a small bag between foam insert and instrument lid).

Due to the design and method of operation, a certificate of calibration with traceability to NIST standards is not available for this equipment. A certificate of calibration showing test results with a statement of conformity can be provided upon request at time of purchase or repair. The RF/IT is recommended for annual inspection by Tinker & Rasor trained repair technicians.

The Model RF/IT Insulator Tester is factory tuned and needs no field adjustments. The length and size of the probe wire conductors are critical to the tuning and performance of the Model RF/IT Tester. **Do not make changes or substitutes for probes & wires.**

Push the "RED" button on the panel to turn the Tester "ON". Push again for the "OFF" position. If tester is not turned off manually, it will turn off automatically after 10 minutes. If Tester seems to fail during testing, the first thing to check is the "ON-OFF" switch. The built-in timer is designed to save batteries in case the operator fails to turn the Tester "OFF" after each usage.

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Battery condition indicated on the LCD meter when replacement needed. For best results, use with a fresh 9v battery. (Older RF/IT use (6) "AA" size alkaline batteries) The Tester will operate properly until output battery voltage drops to 7 volts DC.

Note: The display will flash when the batteries are low.

Pre-operation check of the Model RF/IT Tester

- A. Remove Black probe from lid of case and "INSERT" into either port locator on the front end of Tester.
- B. Remove red probe from lid of case and "INSERT" into the other port on the front end of Tester.
- C. Unscrew the knurled end of each probe to loosen the tip. Remove the tip and invert it back into the probe. Each probe uses a very sharp, needle point tip, which are shipped and stored backwards for safety. The sharp point of each tip is necessary to get under any coatings on the surface to be tested. Tighten the knurled end back down.
- D. Turn Tester "ON"
- E. Observe LCD meter. The indicators should be all the way to the Right or the "100" end of the scale. (On older models, the meter should show solid black square dots completely across the top and the bottom of the meter face. Between the bars, at each side, two black arrows should flash slowly.)

The tester is equipped with audible signal and tone frequency varies from slow to fast according to resistance across probes. The lower the electrical resistance of the insulator the faster the frequency of the audible signal. A short will sound as a continuous beep. Test this by shorting the two probe tips to one another, and hear the continuous beep, and the meter deflect all the way to the Left.

- F. Tester is now ready to operate.

OPERATION TO CHECK SINGLE IN-LINE INSULATOR

- A. Place solid "black" probe's steel point on one side of insulator, making positive electrical contact to the metal pipe.
- B. Place the flexible cable "red" probe's steel needle to the opposite side of the insulator, making positive electrical contact to the metal pipe.
- C. If insulator is "shorted", (low electrical resistance" the LCD meter will show down low (Left) towards the "0". (On older meters, only one or two black square dot on both top and bottom rows on the LCD meter).
- D. If the LCD meter reads all the way to the "100", the insulator is performing extremely well. (Older meter shows black square dots completely across the top and bottom rows)
- E. LCD meter readings between these two extremes gives the operator the degree of quality of the insulator. The lower the LCD meter readings, the lower the electrical resistance of the insulator. Low resistance reading may be cause to watch for impending failure.
- F. It is recommended that the RF/IT probes be used to take multiple measurements at locations around the circumference of the flange. On large diameter flanges, greater than 16" diameter, readings should be made at each clock position around the circumference. (12 o'clock, 1 o'clock, 2 o'clock, etc)

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OPERATION FOR CHECKING INSULATED FLANGE BOLT(S)

- A. On single insulated pipeline flange type insulators (where the bolts are insulated only halfway through the flange), make positive contact with the fixed probe of the Tester to the insulated flange and make positive contact with the flexible probe to each bolt on the same side of the flange. Read meter for every bolt. Meter readings will be same as when checking single in-line insulators described above.
- B. On double insulated pipeline flange type insulators, make positive contact with fixed probe of the Tester to one side of a double flange and the flexible probe to each bolt, individually, on the opposite flange side. Read meter for every bolt. Meter readings will be the same as when checking single in-line insulators described above.

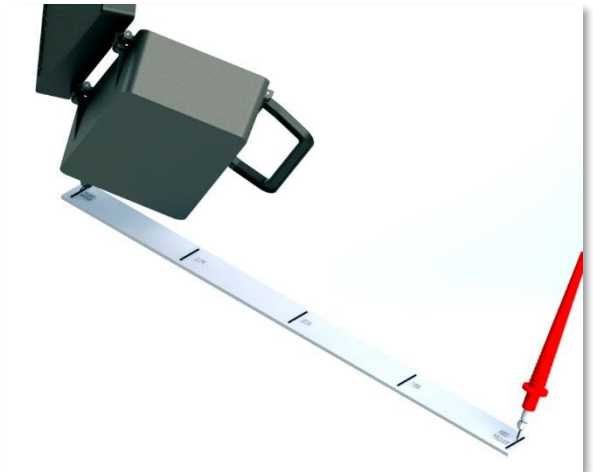
In the event an insulated flange indicates a definite electrical short, but all bolts indicate they are insulated properly, the electrical short exists across the flange insulator.

TROUBLESHOOTING

TUNING TEST

The model RF/IT is factory tuned to display the intensity of the radio signal being received. As the intensity of the signal increases, the display moves farther to the Left. The RF/IT can be field tested to check the tuning of the LCD display.

- A. Find a single electrical conductor to use for the test. A length of aluminum bar, or other bare (uncoated) length of metal, approximately 18" (450 mm) in length will suffice.
- B. Prepare the RF/IT for use, by inserting the probes into the main instrument.
- C. Turn RF/IT on. Note the LCD shows bars to the "100" mark at the far Right of the display.



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- D. Place the stationary Black probe needle point against the metal at one end of the conductive material.
- E. Place the Red probe approximately 1" (25 mm) away from the Black probe. The LCD shows one or two bars only, very close to the "0" at the far Left of the display.
- F. Move the Red probe as far away from the Black probe as the wire will allow. Note the LCD shows bars almost all the way to the Right, near the "100". There should be one bar not shown on the display.
- G. Mark the position of the Black probe and the far position of the Red probe.
- H. Find the center point between the marks. Place the Black probe at the Black probe mark and move the Red probe to the center mark. The LCD should show bars to the center point of the display.
- I. In the same manner as above, make marks at the 25% and 75% distances between the Black and Red probe marks. At these distances, the LCD should show bars at about 25% to the Right and 75% to the Right, respectively.
- J. If the meter agrees with the where the needle points are located on this scale, to an approximation of +/- 2 bars, then the RF/IT is considered to be tuned correctly. If there is a discrepancy, the RF/IT should be returned to Tinker & Rasor for factory tuning.

USE OF SOLID STATE DECOUPLERS

An insulating joint protected by a solid state decoupler may show as a short to the Model RF/IT. To ensure a proper test with the RF/IT, the decoupler should be removed and retested. Please refer to the decoupling device manufacturers recommendations and instructions for removal.

SERVICE & SHIPPING INSTRUCTIONS

All instruments being returned for repair should be sent PREPAID to either address below:

Tinker & Rasor
ATTN: Repair
791 S. Waterman Ave
San Bernardino, CA 92408

Or by USPS:
P.O. Box 1667
San Bernardino, CA 92402

Include with shipment information the nature of the problem, purchase order, serial number and return delivery address. Immediate service is guaranteed!
There is an online form to fill out, print and return with your repair / calibration. You can find the form on the Tinker & Rasor website, under Contact Us menu: www.tinker-rasor.com

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