



# **TINKER & RASOR**

CORROSION MITIGATION INSTRUMENTATION

P. O. Box 1667 SAN BERNARDINO, CA 92402

TEL: (909) 890-0700

FAX: (909) 890-0736

## **PRODUCT INSTRUCTIONS**

### **MODEL AP/W**

**(OLD AP to serial # 8043)**

## **HOLIDAY DETECTOR**

### **WARNING!!!!**

THIS TYPE HOLIDAY DETECTOR GENERATES HIGH VOLTAGES FROM 800 TO 40,000 VOLTS. THE OUTPUT VOLTAGES GENERATED ARE WITHIN THE SAFE LIMITS OF **FATAL "SHOCK HAZARD"** ACCORDING TO THE U.S. GOVERNMENT STANDARDS. EXTREME CARE BY THE OPERATOR OF THESE HOLIDAY DETECTORS MUST BE EXERCISED TO PREVENT ELECTRICAL SHOCK. ELECTRICAL SHOCK FROM THIS EQUIPMENT CAN CAUSE SEVER DISCOMFORT AND MAY CAUSE OPERATOR INJURY THROUGH FALLING OR OTHER MEANS.

ACCIDENTS DO NOT JUST HAPPEN; THEY ARE CAUSED!!!!

### **HOLIDAY DETECTOR FUNCTION**

The Tinker & Rasor Models AP and AP/W Holiday Detectors are portable, all purpose, inspection instruments. They are adaptable for use on both large and small diameter pipe as well as flat surfaces when such surfaces are coated with a high electrical resistant material and the surface beneath the coating is electrically conductive. The Models AP and AP/W Holiday Detectors work equally well on damp surfaces; they are especially desirable when humid conditions exist or when it has recently rained.

### **UNPACKING & INSPECTION**

Upon opening the carrying case, notice where the various components are located; repack them in the same manner when not in use. Then remove all components from the carrying case.

Inspection should be performed upon receipt. If damage has occurred in shipment, file a claim with the carrier immediately. Check components (against packing slip) to be sure nothing is missing.

If it is necessary to contact your supplier or Tinker & Rasor concerning damaged or missing items, be sure to include all information such as serial number, purchase order number and invoice number.

## **Safety Information for User**

### **Unpacking and Reviewing your Tinker & Rasor Holiday Detector Before Every Use**

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## PRODUCT INSTRUCTIONS

- Make certain the inside of the case is clear and dry.
- Inspect each component for damage, such as cables, instrument & wand handles.
- Make sure all of the electrodes are clean.
- Verify the unit is fully charged.
- Verify that the output voltage is correctly set to the coating manufacturers recommend inspection voltage.
- If manufacturers requirements are not stated, NACE International, SSPC or ASTM Standards can be followed.

**AND..... ALWAYS READ THE INSTRUCTIONS THROUGHLY PRIOR TO USING ANY TEST EQUIPMENT!**

***WARNING! This is a HIGH VOLTAGE device capable of producing an electrical shock if not properly grounded and/or operated in accordance with the instructions and procedures prescribed in this manual!***

### **DANGER! IF YOU HAVE A PACEMAKER DO NOT USE THIS DEVICE.**

If you have a pacemaker, life critical electronic medical devices or any medical condition effected by High Voltage, DO NOT use this type of equipment. Only trained and responsible personnel should operate high voltage equipment. Alert all personnel nearby prior to testing and display warning signs. It is important to realize you are now using a high voltage, low energy holiday detector. Tinker & Rasor holiday detectors, APS & AP/W, are designed to generate between 800 to 35,000 volts, pulsating DC. While these voltages are high, the energy emitted is well within US, OSHA guidelines. <https://www.osap.org/page/GuideOSHA> Rubber or plastic gloves and non-conductive footwear can minimize potential shock. Keep in mind that the shock prevention effectiveness of the rubber or plastic glove and footwear is limited to the condition of their protective surface. Make sure your gloves and footwear are in good condition and have no holes or tears. Most Portable Holiday Detectors are limited to finding defects in nonconductive coating materials. Testing should ONLY be conducted clear of personnel not involved in the testing procedure. Personnel operating Holiday Detectors should always be aware of their environment and the safety limitations imposed by same. Operator should have an alert assistant, to ensure that all unauthorized personnel are kept clear of the testing area.

**DANGER!!!** Portable Holiday Detectors create an arc or spark. Use of a Portable Holiday Detector in or around combustible or flammable environments can result in an explosion. When operating in any potentially hazardous area, consult with the plant or site safety officer before proceeding with a holiday detection test in any potentially hazardous or suspect area.

**CAUTION! DO NOT USE AROUND SENSITIVE ELECTRONICS OR RADIO EQUIPMENT.** When "on" but not in use, Tinker & Rasor Pulse Type Holiday Detectors, APW and APS will generate radio frequency emissions which are within the limit defined by the Electromagnetic Compatibility Directive. Due to its method of operation however, the APW and APS Pulse Type Holiday Detector will generate broadband RF emissions when the unit is generating high voltage or when a spark is produced at the electrode. It is therefore recommended that the user does not activate the high voltage within the vicinity of sensitive electronics or radio equipment.

**DO NOT SHORTEN THE GROUND CABLE. NEVER TOUCH THE BARE GROUND WIRE WHEN THE DETECTOR IS TURNED ON.**

**WARNING! USE CAUTION WHEN RAINING.** If it is raining then there is a safety concern for the operator. Surface water on the sub straight is usually not conductive enough to transmit voltage, but almost any

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## **PRODUCT INSTRUCTIONS**

contaminant will cause water to become more conductive. If water covers the wand handle while connected to the APW Power-Pak or the APS Instrument, then the operator could become the return path for the high voltage. While the output voltage will cause harm to a healthy person, according to OSHA, your environment must be taken into consideration when operating this type of equipment. For example; if you are standing on top of a flag pole and receive a jolt of high voltage, it will most likely cause you to jump, and you will fall off the flag pole. ***Stay Alert, Stay Aware and Stay Alive.***

If it isn't raining, but the coating surface is wet, Tinker & Rasor Holiday Detectors are designed to minimize the effects of damp or wet coatings. In extreme cases, "ghost" holidays might be witnessed, should a continual path of water reach a holiday. If this continues, dry the sub straight and continue testing.

***It is important to note that all accidents are preventable. Take caution when using Tinker & Rasor holiday detectors or any other high voltage test equipment.***

## **CHECK-OUT INSTRUCTIONS**

Assure that Holiday Detector "ON/OFF" switch is in the "OFF" position.

Using the Battery Tester, insert test plug (on Battery Tester) into Holiday Detector "charge plug" receptacle. Observe LED light, if "ON" battery has sufficient charge to operate the detector. The battery tester is to be used only to test battery in case holiday detector does not operate properly. It is not designed to test the true condition nor the amount of charge left in the battery.

### **FOR MODEL AP HOLIDAY DETECTOR (ONLY)**

- A. Turn output voltage selection switch (on Detector) to desired voltage. (Voltages are listed on the inside and outside of Detector back cover).
- B. Insert leather belt into slide loops on back of Detector if belt mounted method is to be used.
- C. Uncoil high voltage cable and plug the long connector (3" collar) into one end of adapter and screw wand handle onto other end of adapter; plug the short connector (1-1/2" collar) into the Detector high voltage port.
- D. Assemble the desired electrode to the wand assembly and apply to the pipe, tank, or other structure to be inspected. An inspection electrode should always make intimate contact with the surface to be inspected.
- E. Turn "ON/OFF" switch to "ON" position. (Note: When the switch is "ON", a buzzing should be heard coming from the Detector).

### **FOR MODEL AP/W HOLIDAY DETECTOR (ONLY)**

- A. Turn output voltage selection switch (on Detector) to desired voltage.

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## **PRODUCT INSTRUCTIONS**

Voltages are listed on the individual PowerPak in ascending order, left to right.

- B. Insert leather belt into slide loops on back of Detector if belt mounted method is used.
- C. Uncoil ground wire and plug connector end into Detector port marked "ground". (The ground wire will trail on bare earth).
- D. Attach wand to threaded, male end of PowerPak. Insert PowerPak cable (male connector) into female connector of PowerPak. Insert other end of PowerPak cable into "HighVoltage" port on Detector.

Note: Never turn the AP/W on without plugging in the "HIGH VOLTAGE" cable or unplug the cable while the unit is in the on position! Doing so will damage internal components.

- E. Assemble the desired electrode to the wand assembly and apply to the pipe, tank, or other structure to be inspected. An inspection electrode should always make intimate contact with the surface to be inspected.
- F. Turn "ON/OFF" switch to the "ON" position. (Note: When the switch is "ON", a buzzing sound may be heard coming from the Detector).
- G. The AP/W is now ready to operate.

## **OPERATING CONDITIONS**

The structure to be inspected should be clean and free of any debris.

The surface should be dry. Some moisture or heavy humidity should not effect the inspection.

The electrode used for the inspection should be suitable for the type of structure and the type of coating on the structure.

The exploring electrode must maintain intimate contact with the coating at all times. Coatings with significant "peaks and valleys", where the max. height and min. height of the coating is greater than 10 mils, may require a wire brush electrode, opposed to a coiled spring or flat conductive rubber electrode.

Do not use the holiday detector if the operator may be in contact with standing water on a surface of the structure (tanks, internal pipes, etc.)

It is not required that the operator wear any special equipment or clothing. It is recommended that the operator wear clothing suitable for field work, such as

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## **PRODUCT INSTRUCTIONS**

jeans or work pants, work shirt and work boots with non-conductive soles.

### **OPERATING METHODS**

#### **A. Grounding**

1. A good ground system will always give the best and most reliable inspection.  
The structure to be inspected must itself be grounded to earth at some point.
2. If individual joints of pipe are to be inspected which are not electrically connected, each joint must be grounded.

#### **B. Inspection Speed**

Speed of the electrode travel over the inspection surface should be moderate. Moving the electrode at an excessive speed can result in a faulty inspection.

#### **C. Operating Checks**

1. Occasional checks of the Detector can be made if no holidays are being found. Move the inspection electrode to the coating's edge (where the bare conductive surface is); note that spark and signal should both occur.
2. If the signal does not sound when the spark jumps, the "ground return" resistance is exceptionally high. (Example: very dry soil or very large diameter pipe). To improve the "ground", make a direct connection between the structure under inspection and the Detector's ground wire. Remember, the structure itself must have a connection to earth ground, too.

## **ABOUT YOUR HOLIDAY DETECTOR**

#### **A. Sensitivity Switch**

The sensitivity of the Holiday Detector may be adjusted by turning the 4-position switch; access the switch with a screwdriver through the porthole located on the back panel in the belt recess. (See paragraph 6C).

#### **B. Output Voltages**

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## **PRODUCT INSTRUCTIONS**

Output voltages are measured direct-connected, "open-circuit" using Tinker & Rasor Model "PRM" Peak Reading Voltmeter (calibrated).

**CAUTION:** Before disassembly of components, turn the "ON/OFF" switch to "OFF" position.

## **INSTRUMENT SERVICING**

### **A. Cleaning**

Keep instrument clean and dry. Clean instrument case with soft cloth dampened with kerosene, then wipe dry. Do not use solvents: (lacquer thinner, Methyl-Ethyl-Ketone, etc.)

### **B. Voltage Output Checks**

#### **1. Low output voltage:**

- a. Check position of voltage selector switch.
- b. Check battery condition using Battery Tester. (See later comments on Battery).
- c. Check for "parted" conductor in wand and ground wire(s).

#### **2. No Output Voltage:**

- a. Check battery condition using Battery Tester. (See later comments on Battery).
- b. Check fuse located on printed circuit board inside instrument. If fuse is blown, look for shorted wire in primary circuit. Replace fuse with 2.0 amp fuse, type 3AG.
- c. Check battery leads and the power switch for open circuit. Proper input current is .7 to .9 amperes.

### **C. False Signal Indication Check**

1. Adjust 4-position rotary signal sensitivity switch through porthole provided on back panel in the belt recess.
  - a. Electrical "load" conditions vary greatly through pipe sizes, coating

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## **PRODUCT INSTRUCTIONS**

thickness and climatic conditions. The counter-clockwise position is the most "signal sensitive".

- b. Coated concrete pipes would use this position. In other cases, it is best to start out using position

2. or the next position in

- a. clockwise direction.
- b. check for "parted" conductor in wand and ground wire.

- D. No signal with Spark Discharge

1. Check position of signal sensitivity switch.
2. Read item 3 --C under "Instrument Servicing".
3. Refer to paragraph on "Operating Checks".

## **BATTERY CHARGING - CAUTION**

Place Holiday Detector "ON/OFF" Switch in "OFF" position while charging battery.

- A. Use only the Battery Charger provided (Part #031-005).
- B. Recharge battery in the instrument. Ventilation holes in front and back of instrument case should be kept open.
- C. Plug charger into polarized receptacle of instrument.

*Note: Battery cannot be tested or charged if instrument power switch is in the "ON" position.*

- D. Plug A.C. power cord into any 120 volt 60 Hz outlet..
- E. Charge battery for no more than 14 hours. 14 Hours is recommended only on completely discharged or new replacement batteries.
- F. Charge battery at temperatures above 45 degrees for best results.
- G. If charger pilot light "out": (indicates Charger is not operating).
  1. Check position of power switch.

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## **PRODUCT INSTRUCTIONS**

2. Check for "shorted" battery cell(s).
- H. Disconnect charger from battery and A.C. outlet when not in use.

## **BATTERY MAINTENANCE**

- A. When instrument fails to operate in normal manner, battery maybe fully discharged.  
Recharging before this happens can extend the useful life of the battery considerably.
- B. Store at normal room temperature when not in use.
- C. If battery has not been used for six month or more, discharge completely and recharge for 14 hours minimum.

*Note: If Holiday Detector fails to operate in normal manor, the first step is to test the battery condition.*

## **SHIPPING INSTRUCTIONS**

All instruments being returned for repair should be sent PREPAID to Tinker & Rasor address below:

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

Include with shipment: Information on the nature of the problem, purchase order, serial number and return delivery address.

Immediate service is guaranteed!



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## PRODUCT INSTRUCTIONS MODEL AP/W HOLIDAY DETECTOR POWERPAK SETTINGS

The Model AP/W, pictured at right, is a high voltage holiday detector. It can provide output voltages from 900volts to 35,000 volts, DC. The Model AP/W is a pulse –type holiday detector, meaning that the output voltage comes in pulses instead of continuous current. Pulse – type holiday detectors are safer to use, do not track through moisture to nearby holidays, and do not damage coatings as a continuous output instrument may.

The Model AP/W uses a PowerPak to determine the output voltage of the instrument. There are four (4) PowerPaks to choose from, each with a range of six (6) voltage settings.

Because the output voltage is determined by which PowerPak is being used, the Model AP/W does not have a voltage guide on the instrument itself. The instrument has a voltage selector in the upper right corner of its face, which shows the following settings:

**L – (Low), 2, 3, 4, 5, H – (High)**

Each of these settings corresponds directly to the range engraved on the PowerPak being used. As shown in the picture to the right, each PowerPak is engraved with its range of output voltages. The output voltages are engraved in Kilovolts. This means that 900 volts is shown as .9, and 3,400 volts is shown as 3.4 K-V.

For the PowerPak shown at right, the settings on the Model AP/W would correspond to the PowerPak output in this way:



**.9 – 3.4 K.V.**

**L = .9 (900v), 2 = 1.4 (1,400v), 3 = 2. (2,000v), 4 = 2.5 (2,500v), 5 = 3. (3,000v), H = 3.4 (3,400v)**

The other PowerPaks available are:

**3.5 – 10 K.V.**

**L = 3.5 (3,500v), 2 = 5. (5,000v), 3 = 6. (6,000v), 4 = 7.5 (7,500v), 5 = 8.5 (8,500v), H = 10. (10,000v)**

**6 – 16 K.V.**

**L = 6. (6,000v), 2 = 8. (8,000v), 3 = 10. (10,000v), 4 = 12.5 (12,500v), 5 = 15. (15,000v), H = 16. (16,000v)**

**12.5 – 35 K.V.**

**L = 12.5 (12,500v), 2 = 17.5 (17,500v), 3 = 20. (20,000v), 4 = 27. (27,000v), 5 = 31. (31,000v), H = 35. (35,000v)**

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