



THE D. E. STEARNS COMPANY

D. E. Stearns Company, Shreveport, Louisiana U.S.A.

OPERATING INSTRUCTIONS

D. E. STEARNS MODEL 14/20 REGULATED VOLTAGE HOLIDAY DETECTOR (OLD STYLE)

1. HOLIDAY DETECTOR FUNCTION

The D. E. Stearns Model 14/20 Voltage Regulated Holiday detector is a portable, all-purpose electrical inspection instrument which maintains a given inspection voltage in spite of the electrical load on the circuit or the charge on the battery. It is recommended for use on any pipe diameter as well as on flat surfaces when such surfaces are coated with a highly electrical resistance material, and when the surface beneath the coating is electrically conductive. The detector works equally well on damp or dry surfaces and is especially desirable where humid conditions prevail.

2. INSTRUCTIONS FOR UNPACKING & INSPECTION

A. Open the carrying case and make note of where the various accessories are located. To ensure proper storage, repack accessories in the same manner when not in use.

- | | |
|------------------------------------|--------------------------|
| (1) Instrument w/ (2) Batteries | (1) Screwdriver |
| (1) Battery Charger (115v or 230v) | (1) Belt |
| (1) Ground Cable (20') | (1) Carrying case |
| (1) Power Output Cable | (1) Instruction Manual |
| (1) Wand Handle (18") | (1) Electrode of Choice* |

B. INSPECTION should be made upon receipt. If damage has occurred during shipment, file a claim with the carrier immediately.

C. If it is necessary to contact your supplier or the manufacturer concerning damaged or missing items, be sure to include the serial number, purchase order number, and invoice number of the instrument in question.

Safety Information for User

Unpacking and Reviewing your Stearns Holiday Detector Before Every Use

- 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.

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- If manufacturers requirements are not stated, NACE International, SSPC or ASTM Standards can be followed.

AND..... ALWAYS READ THE INSTRUCTIONS THOROUGHLY 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. Stearns Holiday Detectors, Model 14/20 & Model 10/20, 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, Stearns Pulse Type Holiday Detectors, Model 14/20 & Model 10/20 will generate radio frequency emissions which are within the limit defined by the Electromagnetic Compatibility Directive. Due to its method of operation however, the 14/20 and 10/20 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 contaminant will cause water to become more conductive. If water covers the wand

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handle while connected to the 14/20 Power-Pak or the 10/20 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, Stearns 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 Stearns Holiday Detectors or any other high voltage test equipment.

3. CHECK-OUT INSTRUCTIONS.

A. Remove all accessories from the carrying case with the exception of the battery charger. (The instrument is shipped with two batteries, one of which is already in the unit).

B. Make sure that the detector is turned OFF.

C. Using the VOLTAGE SELECTION TABLE on the back panel, select the specific voltage required. Unscrew the protective cap on the SELECTOR and use a screwdriver to turn the switch to the HI or LO position. Replace black plastic cap cover. Use same procedure to adjust voltage settings. CAUTION: ALWAYS CHANGE HI-LO SWITCH WITH DETECTOR TURNED OFF.

D. Connect high voltage cable and ground cable to detector (insert and twist clockwise).

E. Attach probe handle to voltage cable.

F. Attach electrode to the voltage probe assembly and apply to the structure to be inspected. The electrode should always make intimate contact with the surface under inspection.

G. The Model 14/20 Holiday Detector is now ready to operate.

4. OPERATING METHODS

A good ground return system for both the pipe and the detector will always provide the best and most reliable inspection. The pipe to be inspected must be grounded from the bare pipe to earth at some point along the pipe. If individual joints of the pipe are to be inspected that are not electrically connected, each joint must be grounded. The speed of the electrode's travel along the

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pipe should never be excessive, since faulty inspection may result. Occasional checks of the detector operation should be made, particularly if no holidays are being found. This can be accomplished by testing for the spark and signal at the edge of the coating where bare pipe exists, or by touching the probe end to the bare pipe and noting the length of the spark and the signal effectiveness. If the signal does not occur when the spark discharges from the electrode into a known holiday, the ground return (i.e. the path between the metallic pipe and earth and the earth to the ground trail of the detector) is of high resistance. In this case, a better ground is required and a direct connection between the metal pipe and the ground wire may be necessary. This type of grounding is extremely uncommon unless the soil is very dry of the detectors output is low. Correct voltage output for a given thickness of coating has long been a matter of controversy.

Recent formulas have been suggested which may be used as a guide for correct peak voltages on various coating thickness. The calculation is as follows:

$$V = K \sqrt{T} \text{ WHERE}$$

V = Peak voltage in volts.

\sqrt{T} = Squareroot of the Thickness of bonded coating in mils (not including outer wrappers).

K = Constant of 1,250 for coatings over 30 mils and 525 for fusion bonded epoxy coatings.

These formulas when applied to a coating of 3/32" thickness and with a constant of 1,250 would indicate an applied voltage of 12,500 volts peak or a coating of 16 mil thickness and with a constant of 525 would indicate an applied voltage of 2,100 volts peak. A common practice used in setting inspection voltages in the field is to adjust the output voltage by visual observation. It is the general consensus that spark discharge at least twice the thickness of the coating will give adequate inspection voltage and compensate for any irregularity in coating thickness and grounding conditions. If this practice is desired for determining inspection voltage, it should be done while the electrode is in the normal operating position and under actual grounding conditions. The formulas and suggestions for setting voltage are supplied as a guide, and are not recommended by the manufacturer of this detector. Unless output voltage is specified, the voltage is factory set at 14,000 volts at time of shipment. Consult the coating manufacturer for recommended voltage applications.

5. INSTRUMENT SERVICING INSTRUCTIONS.

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A. Cleaning: Keep the instrument clean and dry. Clean the instrument case with a soft cloth dampened with kerosene, then wipe dry. Do not use solvents such as lacquer thinner, methyl ethyl keytone, etc. **KEEP ALL ELECTRICAL CONTACTS CLEAN.**

B. Voltage Output Checks

1. In case of LOW output voltage:

- a. Check position of voltage selector switches.
- b. Check battery (is it fully charged?).
- c. Check for "parted conductor in voltage probe and/or ground trail.

2. In case of NO output voltage:

- a. Check battery.
- b. Check for "parted" conductor in voltage probe and/or ground trail.
- c. Check battery contacts. **MAKE SURE THEY ARE CLEAN.**

6. BATTERY CHARGING INSTRUCTIONS

A. Use **ONLY** the battery charger provided.

B. Charge battery nightly after use.

C. To charge battery in the instrument.

- a. Connect plug of the battery charger to jack on battery through access door.
- b. Plug AC power cord into proper outlet.
- c. Charger indicator light is on during charging. It will begin to flash on and off when battery is fully charged.

D. To charge battery **OUTSIDE** the instrument:

- a. Remove battery through battery access door.
- b. Connect battery charger plug to battery jack and follow steps b and c above (C).

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E. Charge battery at temperatures above 45 degrees F for best results.

F. Always disconnect charger from battery and AC outlet when not in use.

7. BATTERY MAINTENANCE INFORMATION

A. When instrument fails to operate normally the battery may be fully discharged. Recharging battery nightly will extend battery life.

B. Store at room temperature 68 degrees F (20 degrees C) or below when not in use.

NOTE: DO NOT STORE BATTERY IN A DISCHARGED STATE. RECHARGE AT LEAST EVERY 30 DAYS WHEN NOT IN USE.

8. FACTORY REPAIRS

Holiday Detectors returned to the factory for repairs should be sent **TRANSPORTATION PREPAID**. The Detector can be repaired and returned the same day it is received at the factory.

WHEN ORDERING PARTS FOR YOUR DETECTOR OR REQUESTING FURTHER INFORMATION ALWAYS GIVE THE DETECTOR'S SERIAL NUMBER.

Mailing Address

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Shipping Address

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103-119

SPECIFICATIONS

Holiday Detector Type	Pulse –type DC
Battery Type	Lithium (LiFePO4)
Battery Output	6 volts DC
Battery Charger Voltage Input	110v - 240v A/C Auto Sensing
Battery Charger Output	7.4V, 2A DC
Max. Voltage Output	35,000 volts (35kV)
Min. Voltage Output	800 volts (0.8kV)
Max. Current Output	1.3 mA (0.0013A)

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Integrated Peak Voltmeter	
Accuracy	+/- 5% of voltage shown
Calibration Cycle	Annual

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Grounding Procedures

A proper ground is necessary for the detector to identify a holiday. If the ground is inadequate, the detector will not spark or signal with a beep tone. When grounding is a problem, the detector operator will often increase the voltage to compensate. This is an unsound practice which you should avoid. The correct procedure is to improve the ground to the detector.

The following guidelines will help in establishing a good ground.

General guidelines

1. Do not allow the ground-trail cable to twist or crimp.
2. Keep the ground wire in contact with the soil. Avoid grassy and rocky areas, surface debris such as mulch, and dry soil when possible.
3. Keep the ground-trail clean.

Normal to damp soils

Place the twenty-foot long ground-trail on the dirt with the entire length of bare cable in contact with the soil.

Dry, sandy or rocky soil options

1. Connect the ground-trail directly to a bare portion of the pipe using a set of jumper cables or similar clamp.
2. Wet the soil around the ground-trail, and place a sandbag over the bare wire to increase the contact with the wet soil.
3. Drive a metal rod about two feet into the ground to contact moist soil, and clamp the ground-trail to the rod. Move the rod as necessary to maintain proper grounding while advancing down the length of pipe.
4. If a track-driven machine, such as a bulldozer, is parked nearby, connect the detector ground to the machine via a set of jumper cables or similar clamps.

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