

Safe Work Practices



V-Watch	Reference:	SWP-2.03	Revision:
	Page:	1 of 3	
	Date	7/30/2018	
	Revised:		

1.0 GENERAL DESCRIPTION

The V-Watch Personal Voltage Detectors detect the strong electric fields surrounding high voltage conductors and power distribution equipment. It is a small pocket size device worn on the outside of the clothing or other protective gear by users operating near power lines or high voltage equipment. It provides an extra level of safety for personnel trained in the use and application while working on or near high voltage systems.

2.0 The V-Watch Personal Voltage Detector detects electric fields. Make sure you understand these points before proceeding:

- 2.1 Electric fields surround every energized AC conductor.
- 2.2 The closer you are to a conductor, the stronger the field will be.
- 2.3 Higher voltage means a stronger electric field and a greater warning distance.
- 2.4 Lower voltage means a reduced warning distance.
- 2.5 Electric fields are NOT blocked by plastics, dry wood or clothing.
- 2.6 Electric fields ARE blocked by ANY conductor such as a metal cabinet or door, wet wood, metal fences, green trees, a growing shrub or hedge and tall wet grass.
- 2.7 The detector will not find cables buried under the ground. The ground is a conductor and will block electric fields.
- 2.8 Insulation on a wire does not block the electric field and does not affect warning distances.
- 2.9 Underground primary cables are both insulated AND shielded. The shield is a conductor, is grounded, and will block the electric field.
- 2.10 Molded cable terminators such as elbows are, like the cables they are installed on, both insulated and shielded and will block electric fields.
- 2.11 Your body will block electric fields. Wear the detector front and center and do not walk backwards.
- 2.12 Do not use the detector while holding it in your hand. Wrapping your fingers around the device will block electric fields, preventing it from working properly.

3.0 SAFETY

- 3.1 Always use proper high voltage procedures, including personal protective equipment, when working near or around high voltage equipment or conductors.
- 3.2 Do not rely on the detector as your sole source of high voltage detection. Risk of electrocution is inherent in or around high voltage.
- 3.3 Never contact high voltage with the detector.
- 3.4 Always use proper high voltage procedures for testing and grounding.
- 3.5 Because the human body is a good electrical conductor, electric fields are distorted or blocked by the body. Thus, positioning of the detector on the body and its location relative to the voltage source can have a large effect on its sensitivity to electric fields.
- 3.6 Grounded equipment can appear to be live in close proximity to energized conductors.
- 3.7 The V-Watch Personal Voltage Detector is not sensing electric fields when it is inside its closed carrying case.

4.0 WARNINGS

- 4.1 All V-Watch Personal Voltage Detector carrying cases are electrically shielded; therefore, the device does not work when inside its closed carrying case.

Safe Work Practices



V-Watch	Reference:	SWP-2.03	Revision:
	Page:	2 of 3	
	Date:	7/30/2018	
	Revised:		

5.0 OPERATIONAL IMPAIRMENT

- 5.1 If the detector is used in a manner not described in this instruction manual, the protection and effective operation of this equipment may be impaired.
- 5.2 The detector will not detect DC voltage or stored charge such as in charged capacitors or underground cable.
- 5.3 When the detector is inside its closed case, it will not detect or warn of nearby high voltage.
- 5.4 Always use proper high voltage procedures, including personal protective equipment, when working near or around high voltage equipment or conductors.
- 5.5 Never contact high voltage.
- 5.6 Always use proper high voltage procedures for testing and grounding.
- 5.7 Do not rely on the V-Watch Personal Voltage Detector as your sole source of high voltage detection.
- 5.8 Risk of electrocution is inherent in or around high voltage.

6.0 HOW IT WORKS

- 6.1 The V-Watch Personal Voltage Detector works by sensing the presence of the electric field surrounding anything that potentially conducts high voltage electricity and sounds an alarm.
- 6.2 It measures the strength of the electric field; a higher voltage or stronger field will cause the detector to alarm from a greater distance.
- 6.3 It emits a series of loud beeps and flashing lights when an electric field is first detected.
- 6.4 The beeps and flashing lights increase in frequency as the user approaches the source of the high voltage electric field.
- 6.5 A steady tone indicates very close proximity to high voltage and the need for extreme caution.
- 6.6 This variable beeping rate helps the user to determine if they are approaching the high voltage source or moving away from it to safety.
- 6.7 The detector has a self-test button to verify battery power and proper functioning of the device.
- 6.8 It will also sound an alarm to warn the user of a low battery.
- 6.9 Whenever the detector is being used, it is always on, checking for the presence of high voltage electric fields.
- 6.10 A standard 9-volt alkaline battery powers the unit for about one year.

7.0 HOW TO WEAR IT

- 7.1 The V-Watch Personal Voltage Detector should always be worn mid-torso on the front of the body and face in the direction of movement. Because it is sensitive to electric fields in front of the user, and to a lesser extent on either side, proper positioning is important.

- 7.2 V-Watch Personal Voltage Detectors can be worn in three different ways:

- i. When using the detector with the C-10 Case Lanyard, fully unzip the carrying case so that the case opens downward and the detector is now facing forward. Extend the lanyard from the top of the case and hang it around your neck. Adjust the lanyard so the detector in the case is located at mid-torso and facing forward.



Safe Work Practices



V-Watch	Reference:	SWP-2.03	Revision:
	Page:	3 of 3	
	Date:	7/30/2018	
	Revised:		

ii. When using the detector with the VW-LAN Lanyard, remove the detector from its case and securely affix it using the metal clip on the back of the detector to the hanging loop on the front of the lanyard. Hang the lanyard around your neck and adjust by using the Velcro so the detector is located at mid-torso and facing forward.



iii. The last option is using the detector with the metal mounting clip and securing it on clothing or other devices such as fall protection gear so it is located at mid-torso and facing forward.



8.0 WHEN AND HOW TO USE IT

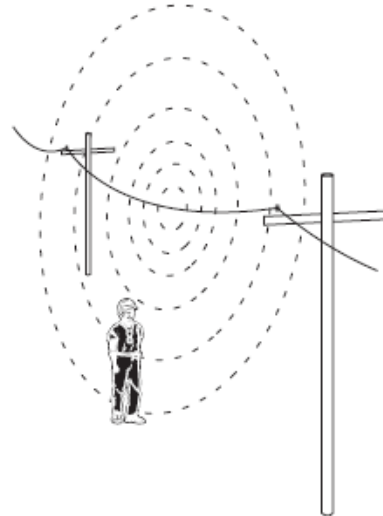
- 8.1 The V-Watch Personal Voltage Detector can be used anytime, any place and for any reason.
- 8.2 When used properly, the detector can provide an additional warning to users exposed or working around energized high voltage electricity and equipment. Awareness of the presence of a high voltage electric field allows the user to take additional precautions against accidental contact with energized equipment.
- 8.3 The variable frequency beeping gives the user an indication of the source and direction of the high voltage.
- 8.4 The detector provides an early warning of the proximity of potentially hazardous high voltage electricity and equipment. It will start to beep slowly as an electric field is first detected and will then beep faster, increasing to a steady tone if the user continues to approach the source of the high voltage electric field.
- 8.5 A steady tone indicates the need for extreme caution, as the source of the high voltage electric field is close.
- 8.6 When should/shall the V-Watch be worn (VPSM 2.8.5.11):
 - a. All employees who may work in the proximity of high voltage energized wires/equipment while performing the duties of their position shall be provided access to a V-Watch Personal Voltage Detector (PVD). Additionally any employee who feels the need to have a PVD to fulfill their duties with the company may request one from the safety department.
 - b. Before an employee is assigned or provided use of the instrument, they will be trained in its use and proper application.
 - c. Employees that have been provided and trained in the use and application of a PVD shall use it when performing foot patrols during service restoration.

Developed by: Osrose, Joseph Eremita, Mark Deschesne, Brian Gould	Approved by: SWP Committee Brad Flannery, Stan Hartin, Scott Richards, Neil Lyons, Brian Gould
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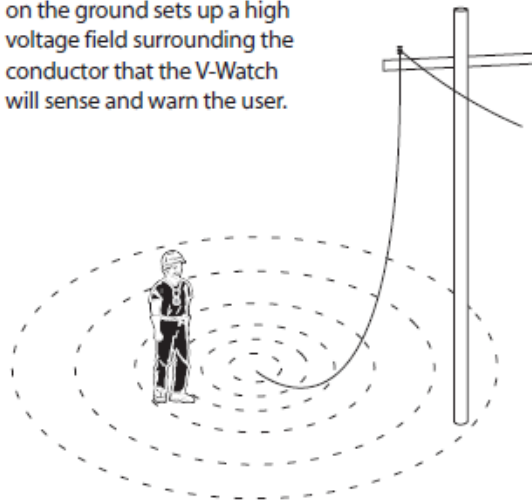
<p>Title:</p> <h2 style="margin: 0;">V-Watch</h2> <h3 style="margin: 0;">Operating & Instruction Manual</h3>	Reference:	Revision:
	SWP-2.03	
	Page:	2.03A - pg 1
	Date:	7/30/2018
Revised:		

A WORD ABOUT ELECTRIC FIELDS

Electric fields surround every energized conductor. The V-Watch measures the strength of these electric fields to warn the user when fields are strong enough to indicate the presence of nearby high voltage conductors.

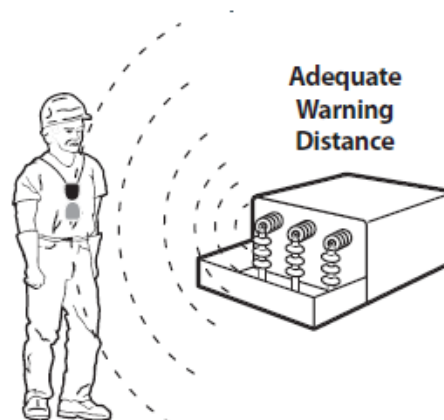


A downed power line is a typical hazardous situation where the V-Watch can provide a warning. This power line lying on the ground sets up a high voltage field surrounding the conductor that the V-Watch will sense and warn the user.



The V-Watch is designed to be worn on the body and it measures the electrical fields typically found in close proximity to the body. Because the human body is a good electrical conductor, electric fields are distorted or even blocked by the body. Thus, positioning of the V-Watch on the body and its location relative to the voltage source can have a large effect on its sensitivity to electric fields.

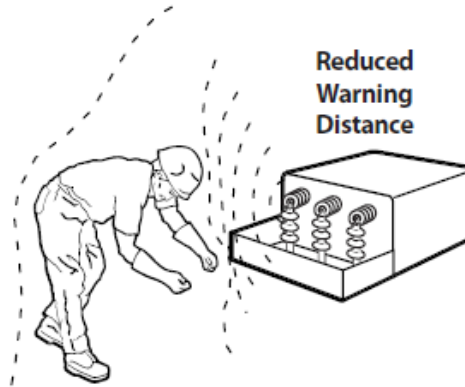
When properly worn on the front of the body, as shown, and with the user facing a waist height energized conductor, such as a terminal on a pad mount transformer or switch, the V-Watch will start to alarm about 10 feet from a 7kV conductor. If the user were to approach this energized terminal by backing up to it, the warning distance may be reduced to 3 feet or less.



Title: V-Watch Operating & Instruction Manual	Reference: SWP-2.03	Revision:
	Page:	2.03A - pg 2
	Date:	7/30/2018
	Revised:	

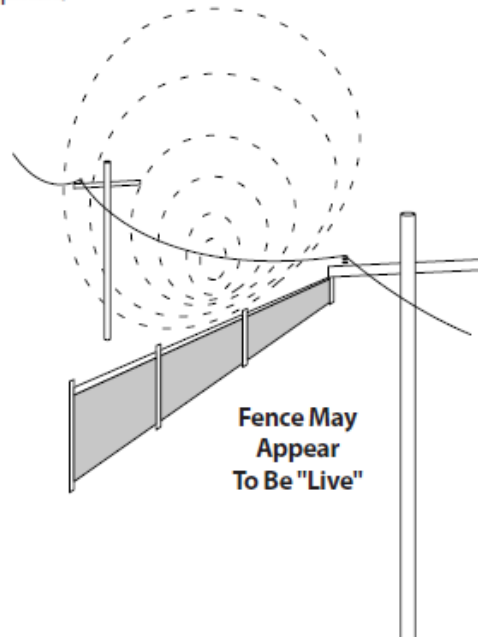
If the V-Watch user bends over from the waist to reach towards an energized high voltage terminal, the warning distance may also be significantly reduced. In both cases, the high conductivity of the body acts as a shield to conduct the electric field around the V-Watch.

The V-Watch measures only the strength of the electric field. It cannot directly measure distance to the source of the electric field such as an energized conductor. The higher the voltage, the stronger the field and the greater the alarm distance. The reverse is also true; the V-Watch may alarm due to the very close proximity of low voltage when the user walks past a typical factory machine such as a running drill press, an office computer terminal or a desk lamp. The V-Watch may even alarm if it is placed up against a typical 120 volt wall outlet.



Electrically conductive objects located underneath power lines can appear to the V-Watch to be live. A metal fence or a growing hedge can cause a distortion of the electric field under these lines and result in high electric field strength near the ground. The V-Watch will provide an early warning of high electric fields, but not all fields are directly caused by nearby energized objects. To prevent the V-Watch from issuing too many false alarms, it should not be used or worn in typical office or factory environments where all the equipment is low voltage and there is no danger of contacting energized high voltage conductors.

As an additional protection against false alarms from transient voltages, the V-Watch has a built-in time delay and may take up to one second to emit an alarm warning of high voltage. For this reason, a user running towards an energized high voltage source may find the warning distance reduced.



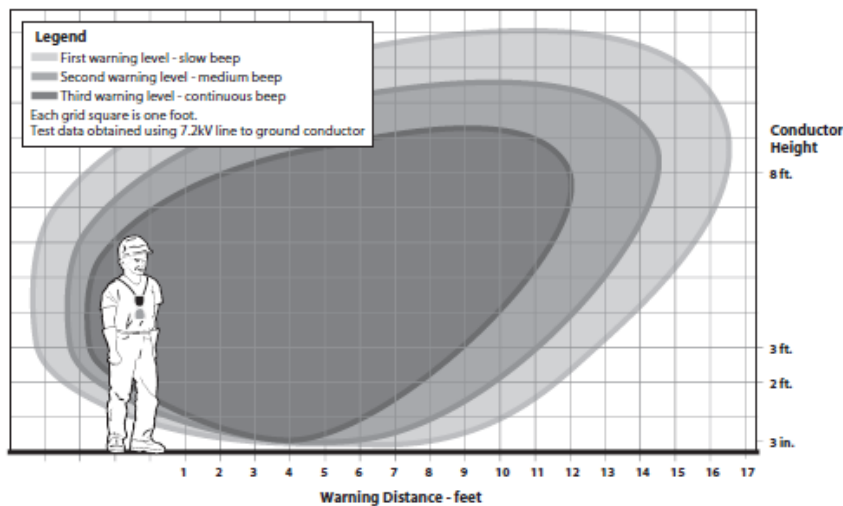
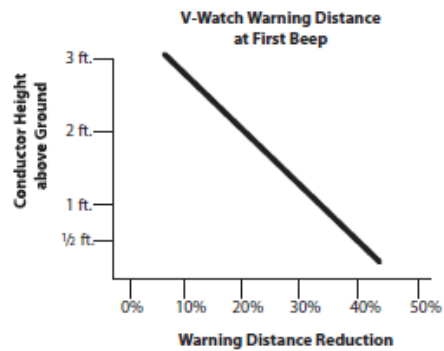
Safe Work Practices

<p>Title:</p> <h2 style="margin: 0;">V-Watch</h2> <h3 style="margin: 0;">Operating & Instruction Manual</h3>	Reference:	Revision:
	SWP-2.03	
	Page:	2.03A - pg 3
	Date:	7/30/2018
Revised:		

LIMITATIONS FOR USE



WARNING: Conductors lying on the ground or very close to it will result in reduced warning distances.



Conductors of different phases in close proximity will also reduce warning distances due to field cancellation effects.

Wearing the V-Watch in environments such as substations or under transmission lines may result in the V-Watch alarming continuously.



Be aware of unique conditions that may be present around three phase delta systems. Unlike grounded Y systems, a single phase of a delta system can become grounded without causing an outage and the delta system can continue to operate with this grounded phase. If this phase is grounded as a result of a downed conductor or other storm damage, it may be grounded only temporarily and could become reenergized if moved or disturbed. **The V-Watch will not detect any grounded conductor, whether it is a grounded delta phase conductor, a guy wire or a pole ground.**



WARNING: Treat all conductors as live unless or until there is a visible break from a live source and a ground is in place.

<p>Title:</p> <h2>V-Watch</h2> <h3>Operating & Instruction Manual</h3>	Reference:	Revision:
	SWP-2.03	
	Page:	2.03A - pg 4
	Date:	7/30/2018
Revised:		

V-WATCH MODELS

There are two models available of the V-Watch Personal Voltage Detector. Both feature audible and visual alarms, a low battery indicator, built-in self-test, field replaceable 9V battery, ruggedized housing, belt clip and carrying case.

The V-Watch Pro includes all of the same features as the V-Watch, but also includes a Mute button which temporarily silences the beeper. The Mute feature may be used when it is necessary to work for a prolonged period in or around high voltage electricity while wearing the V-Watch.



INSTRUCTIONS FOR USE



THE V-WATCH IS NOT FOR USE BELOW 2400 VOLTS AC.

Before using V-Watch, read the instruction manual, review product labeling and both sides of the instruction card located in the V-Watch case. Do not proceed if the instruction card is missing. Make certain that the V-Watch is equipped with a 9-volt battery. Press the Test button on the front of the V-Watch before and after each use. The test circuitry generates an internal voltage which the V-Watch then detects by turning on the lights and sounding the beeper. **DO NOT USE** the V-Watch if the Test button fails to activate the lights and beeper. Remove from service and contact the factory to arrange for repair.



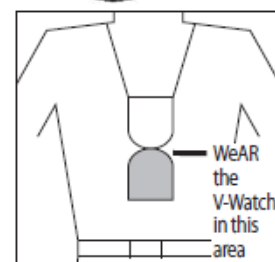
CAUTION – Press and hold the V-Watch Test button before and periodically during as well as after each use to ensure proper operation.

The V-Watch should always be worn facing any potential high voltage electricity. Wear the V-Watch in the center of the front of your body as shown in the illustration and always wear the V-Watch in the direction of movement or work. Do not walk backwards or sideways when wearing the V-Watch as it will not detect high voltage behind you or as effectively to the sides. Wear the V-Watch on the outside of all clothing. Keep it away from all other large metal objects such as belt buckles, tool belts or electronic items such as radios, pagers, cell phones or any other electrical devices which may interfere with the V-Watch.

Instruction Cards - Front & Back



The V-Watch will emit a series of beeps and flashing lights when it detects high voltage. It will beep and flash faster as it gets closer to high voltage. Very rapid beeping and flashing or a steady tone and lights indicates close proximity to high voltage and requires extreme caution. For more details, refer to V-Watch Warning Distances beginning on page 12.



<p>Title:</p> <h2>V-Watch</h2> <h3>Operating & Instruction Manual</h3>	Reference:	SWP-2.03	Revision:
	Page:	2.03A - pg 5	
	Date:	7/30/2018	
	Revised:		

The V-Watch Pro model includes an added mute feature. The Mute button temporarily silences the beeper. This feature may be used when it is necessary to work for a prolonged period in or around high voltage conductors. The Mute will operate only if activated during a warning beep or a few seconds after a warning beep has occurred. While the beeper is Muted, the lights will continue to flash. The Mute can be canceled by pressing the Test button. Use the Mute with extreme caution as high voltage is nearby. After 3 to 5 minutes, the Mute function is canceled and the V-Watch returns to normal alarm operation.

When the V-Watch is in use, it is always on, always ready to warn of potentially hazardous high voltage. The battery life is approximately one year on the job or two years in storage. When the job requiring the protection of the V-Watch for the user is completed, the V-Watch should be closed inside its protective carrying case. The carrying case is electrically shielded and turns the V-Watch off when it is stored inside.



CAUTION: The V-Watch is not sensing electric fields when it is inside its closed carrying case.

The V-Watch will indicate if it has a low battery. When the battery gets low, the V-Watch activates the beeper and lights. The beeper will give a constant tone and the lights remain lit indicating the battery needs to be replaced (the same indication as pressing the Test button). The low battery signal will continue until the battery is completely discharged or removed. When this happens, the V-Watch is no longer operational until the 9-volt battery is replaced.

To replace the battery, completely remove the V-Watch from the case and access the battery through the door on the back of the V-Watch. Disconnect and dispose of the old battery, replacing it with a fresh, new 9-volt lithium or alkaline battery. Be sure to connect the proper battery polarity and carefully manage the wire leads to avoid pinching between the battery door and the body of the V-Watch while replacing the cover. Press and hold the Test button on the V-Watch to confirm proper operation. If after changing the battery the test button fails to confirm proper operation, DO NOT USE the V-Watch. Remove it from service and contact the factory to arrange for repair.

SPECIFICATIONS

SENSITIVITY: Factory set at 50/60 Hz sensing threshold (first beep). The V-Watch will only detect AC voltage. Do not use below 2400 Volts.

TYPICAL WARNING DISTANCE: 7 feet (2.13m) from a 4kV AC conductor. For more details, refer to V-Watch Warning Distances beginning on page 12.

OPERATING TEMPERATURE: -20 to +120°F (-29 to +49°C).

OPERATING FREQUENCY: 50Hz/60Hz

BATTERY: 9V alkaline 1604A, IEC 6LR61. Life 2 years in storage, one year typical usage.

BEEPER SOUND PRESSURE LEVEL: 100 db.

WATER WITHSTAND: Protected from falling rain per IEC-529, Level 2.

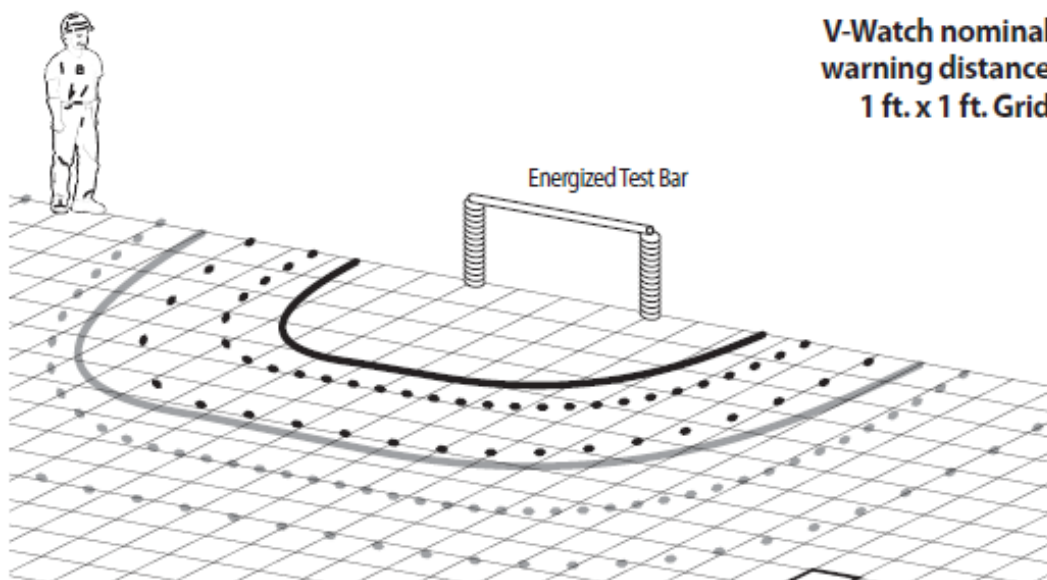
WEIGHT WITH BATTERY: 5.2 oz (147g)

DIMENSIONS: 3.5" (18.89cm) x 2.8" (7.32cm) x 1.2" (3.18cm)

VOLTAGE RANGE: 2400VAC and above.

Title: <h2 style="margin: 0;">V-Watch</h2> <h3 style="margin: 0;">Operating & Instruction Manual</h3>	Reference:	Revision:
	SWP-2.03	
	Page:	2.03A - pg 6
	Date:	7/30/2018
Revised:		

V-WATCH WARNING DISTANCES



Test Details

All of the warning distances are shown on a 1 foot grid and all distances are to scale.

The energized bar is 4 feet long and 30 inches above the ground on insulators. It is energized from behind and the indicated voltage is line to ground.

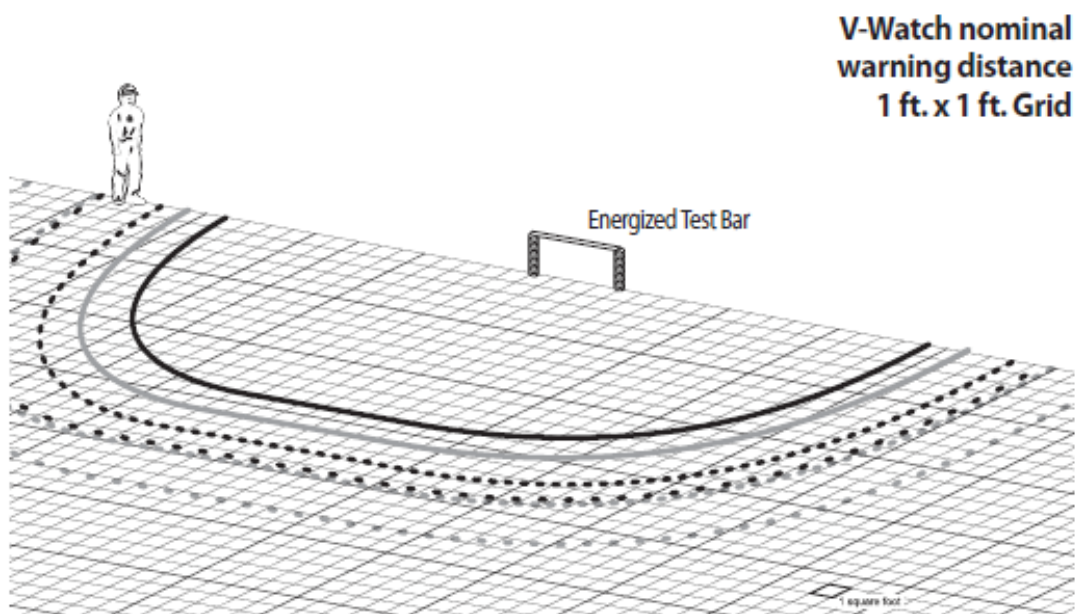
For this test, the V-Watch VW-20/WWP-20 was worn on the shirt front as pictured. Warning distances will be reduced slightly if it is worn on the belt and will be reduced substantially if an arm is extended toward the energized source or if the user approaches the energized source backwards.

Voltage: 2,4kV Line-Ground			
Location	Slow Beep	Fast Beep	Continuous
Side of Bar	7 ft.	5 ft.	4 ft.
End of Bar	5 ft.	3.5 ft.	2.5 ft.

Test Voltage 7,2kV Line-Ground			
Location	Slow Beep	Fast Beep	Continuous
Side of Bar	11 ft.	9 ft.	7 ft.
End of Bar	10 ft.	7 ft.	6 ft.

<p>Title:</p> <h2>V-Watch</h2> <h3>Operating & Instruction Manual</h3>	Reference:	Revision:
	SWP-2.03	
	Page:	2.03A - pg 7
	Date:	7/30/2018
Revised:		

V-WATCH WARNING DISTANCES



Test Details

All of the warning distances are shown on a 1 foot grid and all distances are to scale.

The energized bar is 4 feet long and 30 inches above the ground on insulators. It is energized from behind and the indicated voltage is line to ground.

For this test, the V-Watch VW-20/VWP-20 was worn on the shirt front as pictured. Warning distances will be reduced slightly if it is worn on the belt and will be reduced substantially if an arm is extended toward the energized source or if the user approaches the energized source backwards.

Voltage: 14.4kV Line-Ground			
Location	Slow Beep	Fast Beep	Continuous
Side of Bar	20 ft.	18 ft.	14 ft.
End of Bar	20 ft.	18 ft.	14 ft.

Test Voltage 19.9kV Line-Ground			
Location	Slow Beep	Fast Beep	Continuous
Side of Bar	23 ft.	20 ft.	16 ft.
End of Bar	23 ft.	20 ft.	16 ft.

Title: V-Watch Operating & Instruction Manual	Reference: SWP-2.03	Revision:
	Page:	2.03A - pg 8
	Date:	7/30/2018
	Revised:	

ACCESSORIES

The V-Watch units come standard with either a C-10 Case Lanyard or a B-10 Carrying Pouch, a 9-volt battery, instruction card and instruction manual.

VW-LAN Lanyard and Neck Strap

Adjustable lanyard allows V-Watch to be worn around the neck and positions unit at mid-chest level. Color is safety orange.

VW-K-BAG Carrying Bag

Safety orange zippered carrying bag (included in V-Watch kits). Holds V-Watch unit in case, VW-LAN lanyard and instruction manual.

C-10 Carrying Case Lanyard

Zippered, shielded carrying case with built-in lanyard and belt clip for V-Watch units.

B-10 Shielded Carrying Pouch

Shielded pouch with Velcro flap closure and belt strap for V-Watch units.



VW-LAN LANYARD AND NECK STRAP



VW-K-BAG CARRYING BAG



C-10 CARRYING CASE LANYARD



B-10 SHIELDED CARRYING POUCH

Safe Work Practices



Title: V-Watch Operating & Instruction Manual	Reference: SWP-2.03	Revision:
	Page: 2.03A - pg 10	
	Date: 7/30/2018	
	Revised:	

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

DANGER: Fatal if inhaled or absorbed through the skin. May be fatal if swallowed. Corrosive. Causes irreversible eye damage and skin burns. When applying in enclosed areas, wear a mask or pesticide respirator jointly approved by the Mining Enforcement and Safety Administration and National Institute for Occupational Safety and Health. Applicators and other handlers must wear: long-sleeved shirt and long pants; socks and chemical resistant footwear; goggles or face shield; chemical-resistant gloves (such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, polyvinyl chloride, vitron). Follow manufacturers' instructions for cleaning/maintaining PPE. If no such instructions exist for washables, use detergent and hot water. Keep and wash PPE separately from other laundry. When applying to in-service poles and ties, chemically resistant footwear is not required.

Users must wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. Users must remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Users must remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

STORAGE:

- Store only in closed original container to prevent leakage.
- Store only in cool, well-ventilated, locked areas, away from food and feedstuff, out of reach of children and irresponsible persons.
- Avoid exposure to heat and/or direct sunlight.
- Do not drop container onto or slide across sharp objects.

CONTAINER DISPOSAL:

- Triple rinse (or equivalent). Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill, or by other approved state and local procedure.
- Do not reuse container for any purpose.

PESTICIDE DISPOSAL:

- Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture or rinsate is violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

ENVIRONMENTAL HAZARDS

This product is toxic to fish and wildlife. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark.

PHYSICAL OR CHEMICAL HAZARDS

Do not use, pour, spill or store near an open flame.

Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 1	
	Date: 7/30/2018	
	Revised:	



V-Watch Personal Voltage Detector



Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 2	
	Date: 7/30/2018	
	Revised:	



Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 3	
	Date: 7/30/2018	
	Revised:	

V-Watch History

- ★ First V-Watch developed over 10 years ago.
- ★ Demand was created by a linemen fatality at large Midwest utility.
- ★ Safety team at utility participated in joint development of V-Watch.
- ★ It's now a safety standard with a number of utilities, arborists, cable/telecom, contractor crews & first responders around the world.
- ★ Focus is on providing extra level of safety from a low (**2.4kV**) to all distribution (**35kV**) and transmission (**69kV to 765kV**) voltages.
- ★ Product made & assembled in the USA

Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 4	
	Date: 7/30/2018	
	Revised:	

V-Watch Personal Voltage Detector

GENERAL DESCRIPTION

- ♦ Detects electrical fields surrounding energized high voltage conductors and equipment.
- ♦ V-Watch only detects AC fields, not DC fields.
- ♦ Produces a series of audible and visual warnings (Slow, Fast, Continuous).
- ♦ The beeps and flashing lights increase in frequency as the user approaches the source-electrical field.
- ♦ Provides an extra level of awareness and safety.

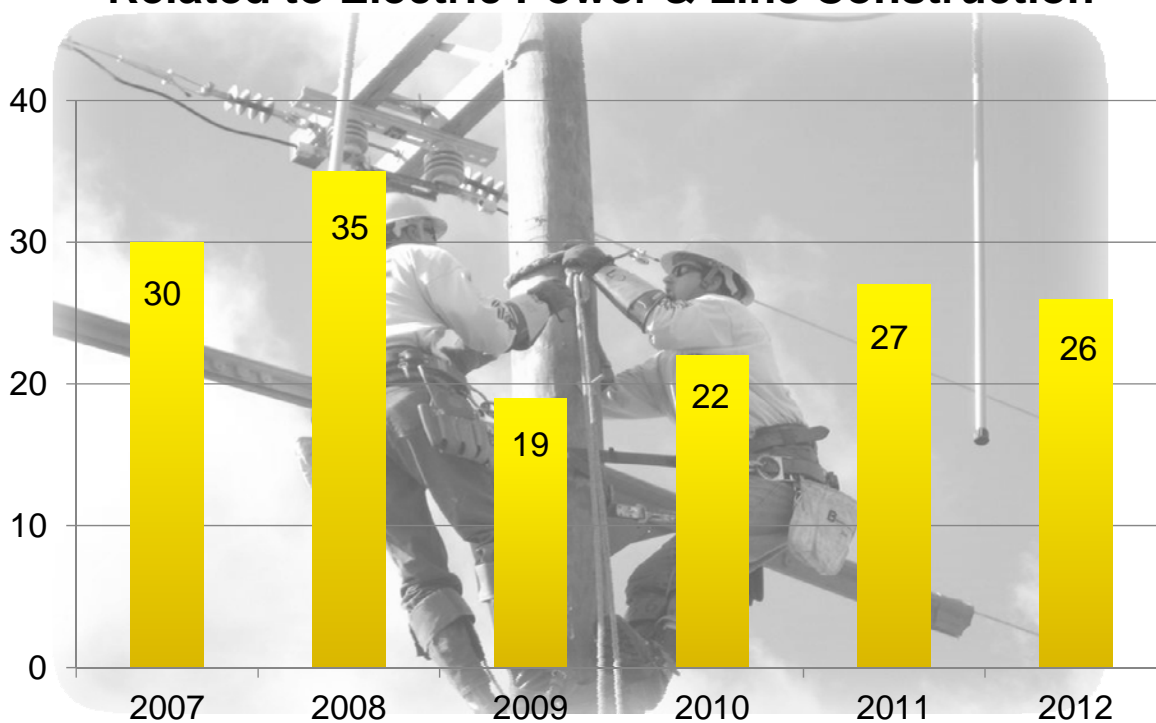
Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 5	
	Date: 7/30/2018	
	Revised:	

V-Watch & Electrical Fields

- Even though V-Watch is a personal voltage detector, the device detects and reacts to electrical fields (EF's) emitted by high voltage.
- Electrical Field's surround every energized AC conductor.
- The closer to the conductor, the stronger the EF's will be.
- Higher voltage=a stronger EF/greater V-Watch warning distance.
- The ground is a conductor and will block EF's. V-Watch will not detect cables under ground.
- Insulation on a wire does not block EF's and does not affect V-Watch warning distances.
- URD primary cable & elbows are both insulated and shielded blocking EF's.

<p>Title:</p> <h2>V-Watch Training Document</h2>	Reference:	SWP-2.03	Revision:
	Page:	2.03B - pg 6	
	Date:	7/30/2018	
	Revised:		

U.S. Bureau of Labor Statistics/Occupational Fatalities Related to Electric Power & Line Construction



Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 7	
	Date: 7/30/2018	
	Revised:	

*Contact with overhead lines is one of the **leading causes** of on the job fatalities with line crews related to electrical line construction and repair.*

- 43% of all occupational electrical fatalities have been attributed to contact with overhead power lines.
- Accidents involving energized power lines are far more likely to cause a worker fatality rather than injure a worker.



Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 8	
	Date: 7/30/2018	
	Revised:	



- According to [OSHA].... 60 to 100 linemen annually suffer "devastating" injuries that leave them permanently crippled, missing limbs, or severely burned.
- That's not counting the workers injured at publicly owned utilities such as those run by cities. Muni's which make up as much as one-third of the U.S. utility industry, don't have to report injuries to OSHA.

Safe Work Practices



Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 9	
	Date: 7/30/2018	
	Revised:	



Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 10	
	Date: 7/30/2018	
	Revised:	



- ANY employee acting as a scout or working in a line assessment function

- Storm Response Teams, Trouble Shooting Teams, Mutual Aid Assistance Crews, Damage Assessment Crews, Wire Sitters, Down Pole Assessment, Pole Setting Crews

- Linemen, Servicemen, Truck Crews, Substation repairmen, Relay men, Meter men

- Engineers, Management and Supervisory Teams

**Who
Should Wear a
Personal Voltage
Detector?**



Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 11	
	Date: 7/30/2018	
	Revised:	

When Should/Shall the V-Watch be Worn?



- All employees who may work in the proximity of high voltage energized wires/equipment while performing the duties of their position shall be provided access to a V-Watch Personal Voltage Detector (PVD). Additionally any employee who feels the need to have a PVD to fulfill their duties with the company may request one from the safety department.
- Before an employee is assigned or provided use of the instrument, they will be trained in its use and proper application.
- A PVD shall be used when performing foot patrols during service restoration.

Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 12	
	Date: 7/30/2018	
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Why Should V-Watch be Worn?

- Provides an extra level of awareness and safety protection.
- Provides an additional warning of the dangerous presence of a high voltage electrical field in the immediate vicinity.
- Indicates source & direction of the electrical field by body position.

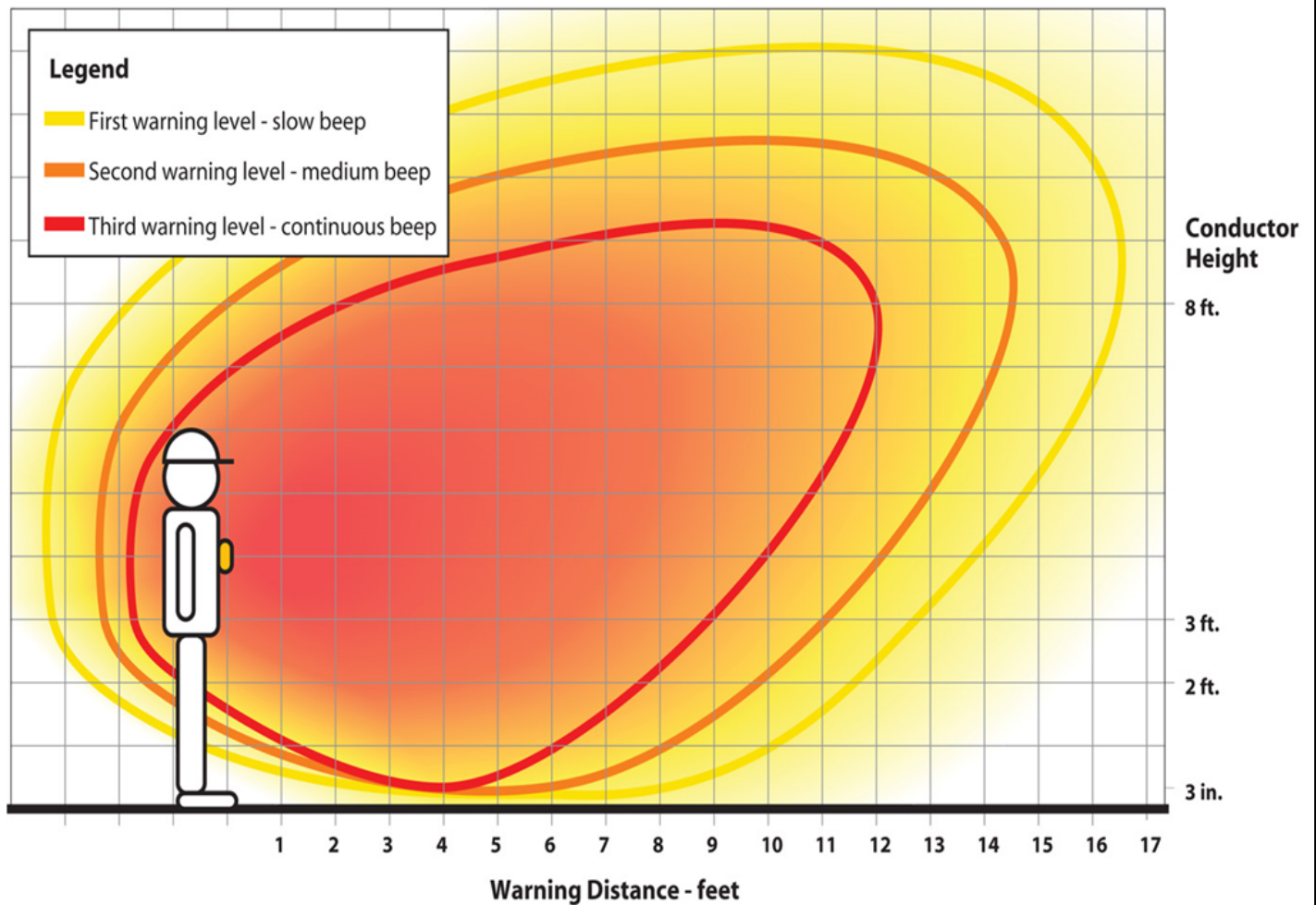


V-WATCH WILL NEVER REPLACE:

- Established industry and OSHA safety regulations.
- Versant Power's current procedures and guidelines for working safely.
- Most importantly, **THE BRAIN** and the safety practices you've been trained on over the years.

Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 13	
	Date: 7/30/2018	
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HD Electric V-WATCH Personal Voltage Detector



Title: V-Watch Training Document	Reference: SWP-2.03	Revision:
	Page: 2.03B - pg 14	
	Date: 7/30/2018	
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Instructions for Use of V-Watch

V-Watch is shipped with a 9v battery

When battery is installed, V-Watch will beep momentarily and may take a few seconds to stabilize

Use the test button to ensure V-Watch is ready for use

DO NOT use V-Watch if the test button fails to activate lights & beeper. Check battery connection or battery shelf life to diagnose

Always wear V-Watch in the direction of movement or work. Minimal detection of an EF behind you

Wear V-Watch in front and center of torso in supplied lanyard or clip on to safety harness or other clothing in front of body



SAFETY

Safe Work Practices



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	Page: 2.03B - pg 15	
	Date: 7/30/2018	
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