

mini rad-D™ User Manual



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1.0 General Description of Operation

The mini rad-D is a highly portable, rugged, all-weather radiation detector that's small enough to wear on a belt yet powerful enough to quickly locate low-level radioactive sources, even in a warehouse full of boxes. Designed to discreetly monitor any environment without intrusion or disruption of civilian activities, the mini rad-D can be set to notify the user by vibration or audible alarm whenever gamma radiation exceeds natural background levels. The Mini's simple operation and highly readable display provide an automatically updated strength indicator in less than 1 second, allowing a rapid area sweep to identify the exact location of any radiation source.

When activated, the mini rad-D measures the background radiation count for 30 seconds, and then uses that value to establish a noise floor. Any radiological isotope that comes within range of the mini rad-D will activate the audio or vibration alarm, and the mini rad-D display will show a value from "1" to "9" to indicate the radiation detected. The audio and vibration alarms increase in repetition rate the closer the mini rad-D is brought to the radiation source. The source of the radiation (package, vehicle, etc....) can be quickly found by waving the mini rad-D around and using the alarm as a hot/cold indicator. The range of detection can vary from hundreds of meters to just a few, depending on how large and powerful the radiation source is and how much material is between the source and the mini rad-D.

1.1 Features and Benefits

- All-temperature, all-weather detector
- Self-powered, with 2 year battery life
- Rugged (can survive a 3 foot drop onto concrete)
- Audible alarm or discreet silent operation
- Easy to use; no training required
- Automatic calibration to filter background radiation
- Adaptable for operation near x-ray machines
- Bright display operates in day or night



2.0 Specifications

Function:	Gamma ray detection
Detector:	Cesium Iodide Scintillator
Battery Life:	2+ years @ 48 hrs/week
Batteries:	2 AA Alkaline
Response Time:	< 1 second
Notification:	<i>Audio alarm; beeps increase based on radiation strength</i> <i>Vibration; vibration pulses increase based on radiation strength</i> <i>Flashing LED; flashes increase based on radiation strength, color changes from orange to red</i> <i>LED with readout "1" through "9" with "9" highest</i>
Calibration:	Automatic when turned on
Calibration:	16-position switch; allows manual
Biasing:	setting for operation in high-radiation environments (i.e., near X-ray machines)
Placement:	Belt clip or belt pouch
Size:	3.75" x 2.5" 1.25"
Weight:	6.4 oz w/batteries
Environment:	Heavy rain; -10°F to 122°F; Day or night; In loud or quiet environments; 3 feet drop onto concrete

3.0 Operating Instructions

The mini rad-D is shipped with batteries installed and is ready to use (See Battery Management section on page 9). Remove it from the shipping carton and familiarize yourself with the controls and displays on top of the unit and operating instructions on back label. To begin operation, move the mini rad-D power switch from the "Off" position to SPK (the "on" position) and the unit will begin a power up and calibration sequence. During the 30 second calibration interval, the unit will measure naturally occurring background radiation and will calculate a threshold above which a radiological alert will be indicated to the operator. The LED display will flash during the 30 second calibration sequence. Following completion of calibration, a beep is sounded indicating the threshold level has been successfully calculated for that particular environment. Every 15 seconds thereafter, a small LED in the lower right hand location of the main display window will flash, indicating the unit is operating properly and is in detection mode. Because the mini rad-D auto-calibrates to the ambient radiation level, maximum sensitivity will be obtained if you turn the mini rad-D on at the location where you are planning to inspect. If the mini rad-D finds that it is no longer detecting the background radiation levels that it expects over a period of time (such as if the operator takes it into a concrete building), the mini rad-D will recalibrate itself. The mini rad-D will beep and the LED will show a "racetrack" pattern for 30 seconds. When complete, the mini rad-D will beep and go into detection mode. This is performed to keep the mini rad-D at maximum sensitivity levels in all environments.

3.1 Alarms

The mini rad-D will alarm (either audibly if in SPK mode or will vibrate if in VIB mode) when the presence of gamma radiation exceeds the natural background levels. Alarms are visually displayed (LED window on top left of unit) in levels from 1 (low level of gamma particles present) to 9 (high level of gamma particles present) and will also change to a more intense color. In addition, when in SPK mode, an audible alert will sound in increasing intensity as the alarm level goes from 1 to higher levels. When unit is on, calibrated and in VIB mode, the mini rad-D will alarm by displaying the level on the LED window and activating the vibra-sender feature and the intensity of vibration will increase proportionately as the level of gamma presence increases.

In addition to the visual LED window, audible alerts and vibration alerts, a small rectangular LED located directly below the D-tect Systems logo on top of the unit will flash slowly (and display an orange color) as a level 1 alarm is displayed on the larger LED and will increase in the rate of flashing as alarm levels increase through level 9. Finally, the color of this flashing LED will change from orange to red at level 6 through 9. In the event the operator changes work location during the course of their duties, it is recommended that the mini rad-D be turned off and turned back on (allows unit to automatically re-calibrate to the natural background radiation in the new location which can be significantly different from place to place). This simple and quick step will insure that the unit will be the most effective detecting unusual levels of gamma radiation.

3.2 Internal Switch

Inside the back of the battery compartment of the mini rad-D is a small 16-position switch that can be adjusted with a long hand held screwdriver. *The majority of mini rad-D users will not require adjustment of this switch.* The purpose of this adjustment and switch is to allow adjustment of the background level radiation value if the user is operating in an environment where the background radiation swings back and forth frequently (such as in close proximity to an operating X-ray machine). This switch auto adjusts the "1" to "9" scale so that the operator in those environments does not constantly get false alarms. *This switch should only be adjusted by an informed operator.* If the switch level is set too high, it will desensitize the mini rad-D and potentially allow low-level radiation sources through that would be detected under normal operation.



4.0 Accessories

A ballistic nylon case (with or without clear plastic window on top flap) is supplied with each mini rad-D. The belt loop has a snap fastener allowing the user to affix the case/mini rad-D to a belt of up to 3" in width. The top flap on the case opens and closes easily using a Velcro® fastener and allows removal of the mini rad-D if required. If the operator prefers to utilize the optional belt clip assembly shown below, please contact the D-tect Systems Customer Service department (866-593-8328) or your sales representative. The belt clip fastens directly to the back of the mini rad-D and swivels while worn on belt or garment and allows quick release of mini rad-D to allow handheld operation.



5.0 Maintenance

The mini rad-D is designed to Mil Spec environmental standards for rain, shock and vibration. The unit is sealed to reduce intrusion from dust, humidity and salt fog. The unit, including top display, may be cleaned safely with mild soap and water using a warm, wet cloth.

5.1 Battery Issues and Maintenance

The mini rad-D is powered by two AA Alkaline batteries (installed at factory) which under a normal duty cycle (on 8 hours a day in detection mode, off 16 hours) will operate in detection mode for two years without replacement. In the event there are occurrences of alarm indications and the mini rad-D is used to identify the source of such alarms, duty cycle times will be reduced. A low battery indicator (LED will display "L") will inform the operator that batteries should be replaced.

While a certain reserve is designed into the mini rad-D once a low battery alert is displayed, batteries should be replaced (use small Phillips head screwdriver to release battery door on back of unit) as soon as possible to allow robust operation in the event future multiple alarms are encountered. Failure Mode If the unit is unable to achieve detection mode for any reason, a FAIL indicator will be displayed. The mini rad-D will continually display each character in sequence – "F", then "A", then "I" and then "L". If failure mode occurs (most likely due to a significant change in location of operation), turn power off to the mini rad-D and then turn unit back on and allow it to re-calibrate (in new location). If the mini rad-D continues to go into failure mode following attempt to re-calibrate, notify customer service for assistance.

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5.1 Customer Service and Warranty Assistance

The design, engineering, and manufacturing teams at D-tect Systems strive to provide the most reliable and technologically advanced detection and identification products (100% designed, engineered, and manufactured in the USA) available at affordable prices. In an effort to ensure that the user receives the utmost in value and productivity in the use of D-tect Systems products, we give you a direct communications link to these individuals at www.dtectsystems.com. Please contact us if you require additional information about the products (please reference model, serial number, and date of purchase) or if you require immediate warranty assistance. We will use our best efforts to assist you in a timely manner.

6.0 Limited Warranty for Products

What this Warranty Covers and for How Long

D-tect Systems ("D-tect Systems") warrants this device (the "Product") against defects in materials and workmanship under normal use for a period of two years from the date of purchase. This warranty extends to the first end-user purchaser only, and is not transferable. This warranty does not extend to other ancillary and/or consumable products including but not limited to batteries, calibration sources, straps, and shipping cases. D-tect Systems, at its option, will at no charge either repair, replace or refund the purchase price of any Products that do not conform with this warranty. Repair may include the replacement of parts with functionally equivalent reconditioned or new parts. Replacement may include providing a functionally equivalent Certified Reconditioned/Pre-owned or a new Product. Products that have been repaired or replaced are warranted for the balance of the original warranty period or for 90 days from the date that the repaired or replaced Product is received by you, whichever is longer. All Products for which replacements have been provided will become D-tect Systems property.

2. Other Warranty Conditions

This warranty is D-tect Systems' complete warranty for the Product. D-tect Systems assumes no obligation or liability for changes to this warranty unless made in writing and signed by an officer of D-tect Systems.

If D-tect Systems agrees to perform services requested and approved by the customer that are not included in either the Limited or Extended Warranty, these services will be billed to the customer at D-tect Systems' standard prices and terms.

D-tect Systems does not warrant any installation, maintenance, or service that it did not perform. SERVICE WORK PERFORMED BY SERVICE CENTERS NOT AUTHORIZED BY D-TECT SYSTEMS TO PERFORM SUCH WORK WILL VOID THIS WARRANTY.

3. What This Warranty Does Not Cover

- a. Defects or damage resulting from: use of the Products onto hard surfaces, contact with water, rain or extreme humidity, contact with sand, dirt or the like contact with extreme heat, spills of food or liquid, improper testing, operation, maintenance, installation, adjustment; or any alteration or modification of any kind.
- b. Scratches or other damage to plastic surfaces, cracked displays, or other externally exposed parts caused by use of the Products.
- c. Products disassembled or repaired in such a manner as to adversely affect performance or prevent adequate inspection and testing to verify any warranty claim.
- d. Products on which serial numbers or date tags have been removed, altered or obliterated.

4. How to Get Warranty Service

To get warranty service, please contact your distributor or D-tect Systems at www.dtectsystems.com. You will receive directions on how to mail the Product to D-tect Systems. All Products shipped to D-tect Systems must be shipped with freight and insurance prepaid. Along with the Product you must include a receipt, bill of sale, or some other comparable proof of purchase, a written description of the problem and, most importantly, your address and telephone number. If additional information is needed, please contact D-tect Systems at the web address indicated above.

5. General Provisions

THIS IS THE COMPLETE WARRANTY FOR THIS PRODUCT BY D-TECT SYSTEMS AND SETS FORTH YOUR EXCLUSIVE REMEDIES. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE GIVEN ONLY IF SPECIFICALLY REQUIRED BY APPLICABLE LAW. OTHERWISE, THEY ARE SPECIFICALLY EXCLUDED. IN NO EVENT SHALL D-TECT SYSTEMS BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT OR FOR ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT, TO THE FULL EXTENT THESE DAMAGES MAY BE DISCLAIMED BY LAW.

6. Patent and Software Provisions

D-tect Systems will defend at its own expense, any suit brought against you to the extent that it is based on a claim that the Products infringe a United States patent. D-tect Systems will pay those costs and damages finally awarded against you in any such suit which is attributable to any such claim. The defense and payments by D-tect Systems are conditioned on the following: (a) that you will notify D-tect Systems promptly in writing any notice of the claim; and (b) that D-tect Systems will have sole control of the defense of the suit and all negotiations for its settlement or compromise; and (c) should the Products become, or in D-tect System's opinion be likely to become, the subject of a claim of infringement of a United States patent, that you will permit D-tect Systems, at its option and expense, either: to procure for you the right to continue using the Products or parts; to replace or modify them so that they become non-infringing; or to grant you a credit for such Products or parts as depreciated and accept their return. The depreciation will be an equal amount per year over the lifetime of the Products, accessories, battery or parts as established by D-tect Systems. D-tect Systems will have no liability to you with respect to any claim of patent infringement which is based upon the combination of the Products or parts furnished under this limited warranty with software, apparatus or devices not furnished by D-tect Systems. D-tect Systems will have no liability for the use of ancillary or peripheral equipment or software not furnished by D-tect Systems which is attached to or used in connection with the Products. The foregoing states the entire liability of D-tect Systems with respect to infringement of patents by the Products, accessories, batteries or any parts of them. Laws in the United States and other countries preserve for D-tect Systems certain exclusive rights for copyrighted D-tect Systems software such as the exclusive rights to reproduce in copies and distribute copies of the D-tect Systems software. D-tect Systems software may be copied into, used in and redistributed with only the Products associated with such D-tect Systems software. No other use, including without limitation disassembly, of such D-tect Systems software or exercise of exclusive rights in such D-tect Systems software is permitted.

7. State and Jurisdiction Law Rights

Some states and jurisdictions do not allow limitation or exclusion of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state or from one jurisdiction to another.