nardalert® ULTRA-WIDEBAND PERSONAL MONITORS

- **300 kHz to 45 GHz Detection in One Monitor**
- **Patented Design***
- **Alarm Threshold Varies with Frequency to Conform to Standard or Guidance**
- **High Power Overload**
- **Fail-safe Operation**
- **Optional Earphone Assembly**

*U.S. Patent No. 4518912, 5168265, 5600307
International Patents Pending

DESCRIPTION

The 8846 and 8848 series are the latest in the Nardalert family of RF personal monitors.† Their "shaped" frequency response is designed to closely conform to four major standards and guidances. Models are available to conform to:

FCC Regulations, Occupational

Canadian Safety Code 6, RF Workers

International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998 Guidance, Occupational

United Kingdom NRPB Revised 4.5 Guidance, Adults

They accurately detect all types of electric fields from 300 kHz to 3 GHz or from 300 kHz to 45 GHz. The microwave portion of the sensor employs thermocouple detectors so that radar signals are accurately converted to true RMS values while the patented diode design used for the lower frequencies provides RMS detection even in very complex, multi-signal environments. These monitors respond equally to all polarizations.

The Nardalert case has a protective cap over its alarm LED and a heavy duty spring mounting clip. An optional earphone is available for use in high noise environments. It mounts securely to the case and features non-collapsible tubing that stays flexible in the coldest weather. The ear cushion is replaceable.

The entire monitor is supplied with a padded, belt-mountable carrying case that allows operation in any environment.

When the Nardalert detects an emission higher than its preset alarm, the LED exposure indicator will flash and the audible alarm will sound, alerting the wearer simultaneously through sight and sound that a potentially hazardous environment has been encountered. The LED exposure indicator will remain on (latch) but will not flash when the wearer moves to an area where the RF field level is below the alarm threshold. This alerts the wearer who has passed through a potentially hazardous environment but did not hear the audible alarm.

† Some people refer to these devices as RF dosimeters which is erroneous since the exposure rate is not determined by a dose measurement. The correct technical term for these personal monitors is densitometers because they are incident equivalent power density monitoring devices.

Personal and Area Monitors

TECHNICAL DESCRIPTION

The 8846 and 8848 series Nardalerts combine two sensor technologies to detect electric fields over the bandwidth of the monitor. The frequency response of the monitor is "shaped" to closely conform to one of four major standards or guidances.

At microwave frequencies, thermocouple detectors are used to detect true RMS average electric field levels for every possible signal type, including radar pulses. Thermocouple detectors use many dissimilar junctions that generate a voltage based on the energy dissipated across each junction. Since energy is deposited close to the speed of light, no pulsed signal is too narrow for the elements to detect. The thermocouple adheres to a square law type of operation across its dynamic range, which means it will always sound its alarm when the *average* power exceeds the preset threshold. This is important because the human body responds to *average* power levels and *average* power levels are the basis of all major standards.

Narda's patented surface area electric field sensor detects lower frequencies. This unique diode detector maintains square law operation in multi-signal environments. The design makes it possible to accurately detect the field strength that the body is subjected to without reacting to the body's interaction with the field that occurs with a typical dipole sensor. The monitor responds to the field generated by a current induced into the body from either the electric or magnetic field component.

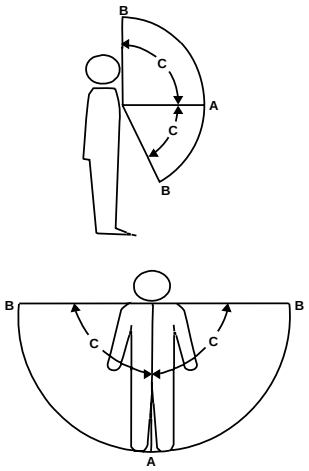
It accurately detects the radial electric field component directly from the radiating antenna or a secondary radial field component created by the current induced in the wearer or the personal monitor who is illuminated by the electromagnetic field. The measurement of low frequency electric fields in the presence of a human is difficult because of the field perturbation caused by the human body. This monitor uses the very same mechanism for the perturbation of the field to monitor the level of the illuminating field. The radial field is the major energy component of the electromagnetic field near a radiator. It predominates for approximately 1/6 of a wavelength. At low frequencies and at close distances to the radiating antenna, the radial field from the antenna induces a surface charge on the sensor, which results in a displacement current that is measured and compared to a preset threshold value. At farther distances from the antenna, where the radial field component is not as prominent, the vertical E field becomes the significant field illuminating the person wearing the monitor. This field induces a current in the person that, in turn, creates a secondary radial E field close to the surface of that person. The surface area sensor senses this secondary radial E field and again compares it to a preset threshold value.

Lossy material isolates the two sensors and the shielded electronic circuitry. A light filter and a static charge shield are employed to guard against false alarms during outside operation.

DETECTION ANGLES

One of the most critical features of a non-ionizing radiation personal monitor is its ability to detect energy from sources at a wide angle to the person wearing it. Unlike ionizing radiation which passes through the body and can be detected by common film badges, non-ionizing radiation has a much lower energy level (more like light) which means that it will enter the body but not readily pass through it. Therefore, a monitor worn on the front of the body cannot detect non-ionizing radiation directed at the back of the body. For this reason, the widest angle of accurate detection is essential and must be consistent over the frequency range of operation.

Nardalert Monitors provide a wide angle of detection for signals coming from the side, above or below the wearer. Note that the detection angle is defined at the points where the sensitivity has dropped to half (3dB) of what it is perpendicular to the unit. For emissions from most conceivable directions, Nardalert Personal Monitors detect all polarizations equally—which is critical in an unknown environment—since an acute failure will not have predictable polarization. This critical parameter is defined as the "*ellipse ratio*". The physical size of the Nardalert has been optimized to maintain minimum ellipse ratio errors across its entire operating range.



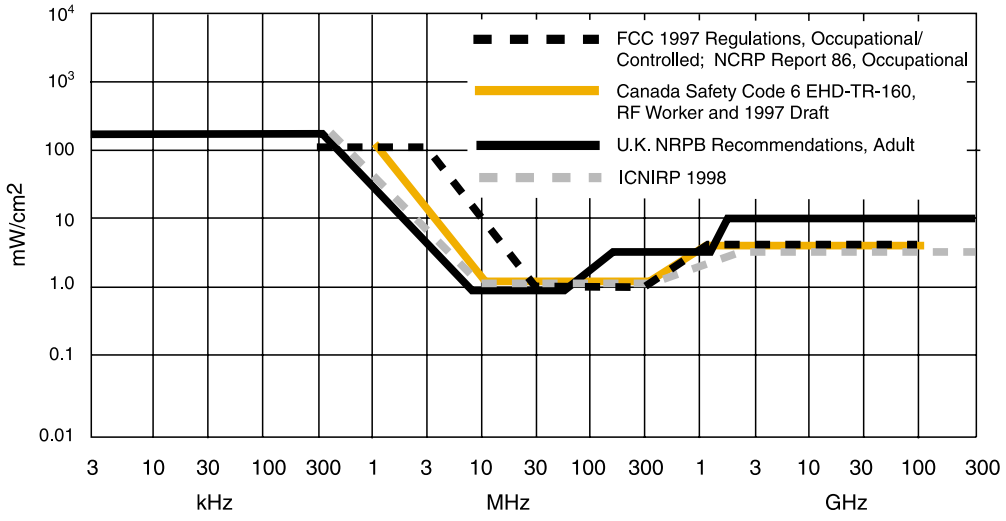
Note: Assuming that the Nardalert is worn on the chest, points "A" define the direction of maximum rated sensitivity. The sensitivity gradually decreases to 50% at points "B". "C" are the detection angles. Consult specifications table for detection angles.

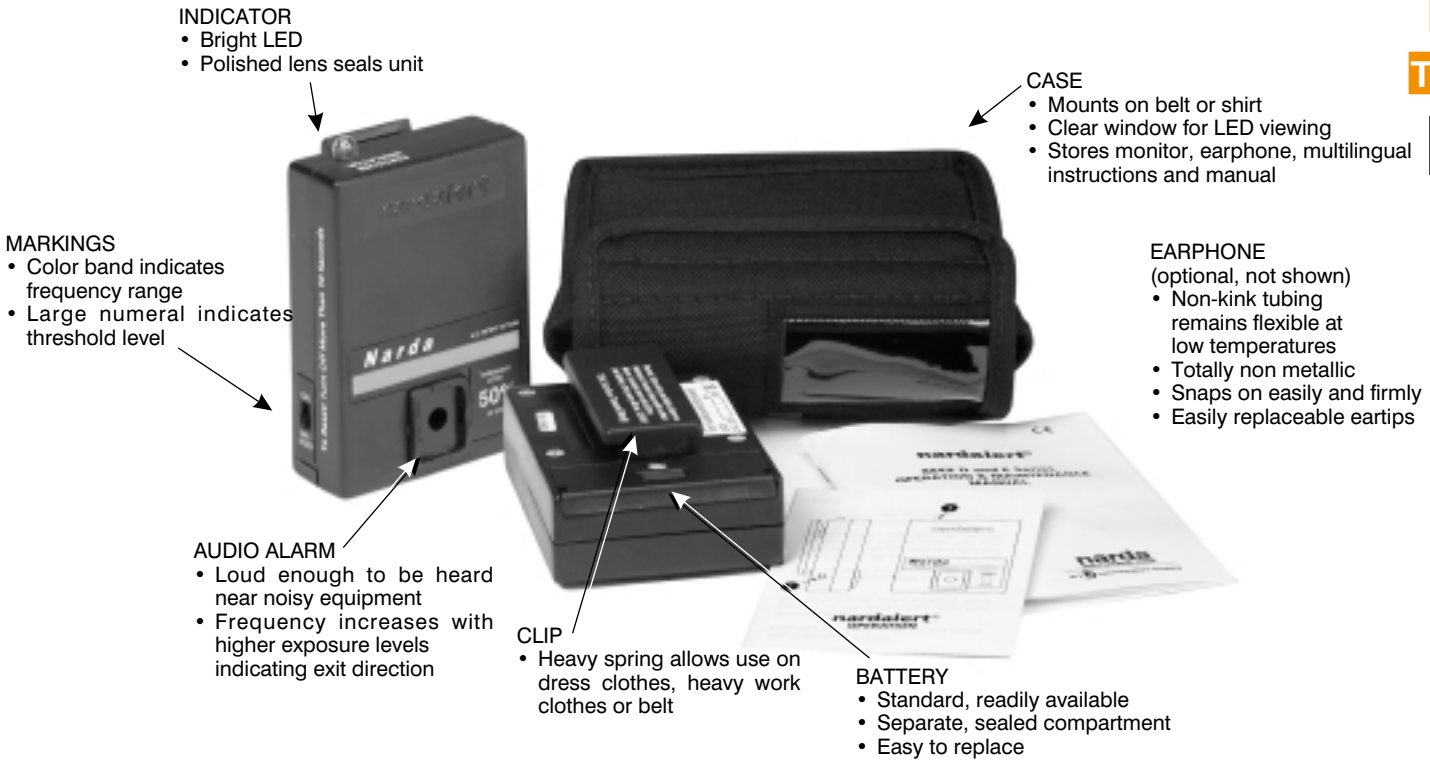
narda
an L3 communications company
USA TEL: (1) 631 231-1700 • INT'L TEL: (1) 631 231-1390 • FAX (1) 631 231-1711
E-MAIL: nardaeast@L-3COM.com • www.nardamicrowave.com

ALARM THRESHOLD LEVEL

All 8846 and 8848 Series personal monitors feature alarm thresholds that vary over their operating frequency range. The alarm levels are factory set at 50% of the applicable standard or guidance. The 50% level is used to account for a gradual loss in sensitivity for signals coming from the side or directly overhead. Therefore, under virtually all conditions the monitor will sound its alarm at field levels that are no higher than the limits imposed by the applicable standard or guidance. Taking both frequency deviation and angle of detection into consideration, the Nardalert monitors activate an alarm at field strengths from 25% to 100% of the standard or guidance.

ALARM THRESHOLD vs FREQUENCY





Personal and Area Monitors

SPECIFICATIONS

Model	A8846-0.5	A8848-0.5	C8846-0.5	C8848-0.5	D8846-0.5	D8848-0.5	E8846-0.5	E8848-0.5
Standard / Guidance	FCC Occupational[a]		Safety Code 6[b]		ICNIRP Occupational[c]		NRPB Adults[d]	
Frequency Range	300 kHz to 3 GHz	300 kHz to 45 GHz	300 kHz to 3 GHz	300 kHz to 45 GHz	300 kHz to 3 GHz	300 kHz to 45 GHz	300 kHz to 3 GHz	300 kHz to 45 GHz
Alarm Threshold	50% of Standard or Guidance[e]							
Frequency Sensitivity[f]	-1, +3dB							
Detection Angles[g] Left to Right Above/Below	 ±60° ±60°							
CW Overload	3000% of Standard or Guidance							
Peak Overload	32 dB above Standard or Guidance							
Ellipse Ratio (max)	± 0.75 dB							
Battery Sensitivity Life Type	 <10% at 7.5V Cutoff 500 Hours (Est.)[h] 12V (Type 23)							
Temperature Operating Non-operating	 -10°C to +55°C -20°C to +60°C							
Weight (approximate)	3.8 oz., 108 gm							
Size	2.74" x 3.80" x 1.06" 6.96cm x 9.64cm x 2.69cm							
Color	Black							
Accessories Supplied	Battery, Weatherproof Carrying/Operating Case, Manual							
Optional Accessories	Earphone (P/N 21703701)							

[a] FCC 1997 Regulations, Occupational
[b] Canadian Safety Code 6, RF Workers and 1997 Draft
[c] International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998 Guidance, Occupational
[d] United Kingdom NRPB Revised 4.5 Guidance, Adults
[e] Other alarm threshold levels available
[f] For example, over the frequency range, the 8846 and 8848 series will sound an alarm at levels up to 1 dB higher or as much as 3 dB lower than their rated threshold level
[g] Minimum detection angle where sensitivity is half of rated value
[h] Estimated battery life is based on 2-4 hours use per day. Continuous operation results in shorter battery life.

ALARM OPERATION

	Audible	Visual
Turn-on Test	Chirps after 4 seconds	LED Flashes
Alarm	Continuous Chirping (4 Chirps per Second)	Continuous LED Flashes (1 Flash per Second)
Low Battery	Audible Chirp Every 40 Seconds	———
Sensor Failure	Continuous Chirping	———

narda
an L3 communications company
USA TEL: (1) 631 231-1700 • INT'L TEL: (1) 631 231-1390 • FAX (1) 631 231-1711
E-MAIL: nardaeast@L-3COM.com • www.nardamicrowave.com