TIME DOMAIN®

THE PULSE OF THE FUTURE℠

RadarVision® 2™

User's Guide
Preliminary

TDC Document 320-0098-A

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THE PULSE OF THE FUTURE℠

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- Parties operating this equipment must hold a license issued by the FCC to operate a transmitter in the Public Safety Radio Pool under Part 90 of CFR Title 47. The license may be held by the organization for which the UWB operator works on a paid or volunteer basis.
- Changes or modifications not expressly approved by Time Domain Corporation could void the user's authority to operate this equipment.
- FCC ID: NUF –RV2-0804
- Please consult with Time Domain Corp. if you have any questions, prior to use.

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Table of Contents

1.0   Quick Start

1.1   What's in the box

Each RadarVision 2 (RV2) is shipped in a custom protective case with a foam insert to protect during shipping and in normal use. Store the RV2i in the RadarVision case when not in use.

The case contains:

- A RadarVision 2
- 2 rechargeable batteries
- Battery charger
- RV2 User's Guide
- Basic Operation Guide

1.2   Powering Up the RV 2

The battery compartment is located on the end of the unit nearest the auxiliary connector as shown in **Figure 1.1**.   RV 2 uses rechargeable lithium ion batteries.   There are three acceptable batteries for the RV 2.

- **Ultralife UBBL04** (Shipped as standard with the RV 2)
- U.S. military battery **BB2847/U**
- U.S. military battery **BB2847/A**

 The batteries are normally shipped with an initial charge but may lose that charge with time. If the unit fails to turn on after a battery is installed, remove the battery and charge it. See *Section 1.4* for charging instructions.

Figure 1.1: Inserting the battery

To insert or change batteries, twist the tabbed quarter-turn connector on the battery door counter-clockwise, then swing the door open and disengage the tabs from the slots in the unit casing. Insert the battery with the metal contacts innermost. Locking the cover is the reverse process: engage the door tabs, then swing the door to spring-load the battery in its compartment. Twist the quarter-turn connector clockwise to secure the door

Pushing the red button on the back (operator's) side of the RV 2 will turn the unit on. It takes about 10 seconds for the unit to boot and begin operating.

1.3   Scanning

The RV 2 will begin radar scanning when the boot up process is complete. No operator action is needed to see radar information. A display with wedge-shaped reticle depicting the radar's field of view appears on the operator's screen. This is a "top-down" view or map of the target area being scanned. The operator and radar are located at the angled bottom of this wedge shaped reticle. Targets farther away from the operator show up toward the top of the reticle.

 Also prominent are white bars with blue text on the lower sides of the screen. These bars are the menu and each describe the functions of a corresponding green control button above the left or right handles.

The radar will scan for *moving* targets immediately. These targets may appear as orange "blobs" on the screen. Although there are controls to optimize the scanning image, no harm can be done by using the radar and experimenting with it.

For further information on
- Overview of the RadarVision 2 and controls see *Section 2.0*.
- Basic operation and controls see *Section 3.0*.
- Detailed explanation and instructions on the control menu see *Section 4.0*.

1.4   Charging the Batteries

Batteries should be charged with the appropriate external charger applicable to the battery model.. Use only the charger provided with the RV 2 to charge the **Ultralife UBBL04** batteries. The battery cannot be charged while in the RV 2.
There are three parts to the charger:
- Standard three-prong socket (computer equipment) power cord.
- Power converter module with power cord that inserts into charge control module.
- Charge control module with connector lead that plugs into the battery

The charge control module has an LED on the top which indicates the state of the charging process.
- Off: No battery
- Green Flash: Fast charging
- Green Solid: Fully charged

- Yellow Solid: Standby
- Red Flash: Error

If an error indication appears, unplug the battery from the control module. Unplug the control module from the power converter. Reattach the power converter, then plug the control module into the battery. If the red flashing light reappears, the battery may be faulty. Contact RV 2 customer support. See the regulatory and conditions pages in the front of this guide for contact information.

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2.0   Getting Familiar with RadarVision 2

The RadarVision 2 (RV 2) is an ultra wideband-enabled device that detects motion through most common building materials.

RadarVision 2 radar units provide through-wall intelligence vital to law enforcement and search and rescue teams. Time Domain's RadarVision® units have been sold to the U.S. military, U.S. domestic law enforcement agencies, Federal law enforcement agencies and foreign security agencies.

Applications of RadarVision® include:

- **Tactical Operations -**
  Providing knowledge of where people are before law enforcement officers enter a building, potentially preventing death and injury
- **Search Operations -**
  Revealing when people in hiding need to be located, without alerting them to the search.
- **Covert Operations & Urban Warfare-**
  Providing the ability to assess an enemy position and risk while remaining undetected.

Figure 2.1: RadarVision 2

The device has a signal range of up to 30 feet in through-wall applications. The signal penetrates common building materials such as:

Reinforced concrete
Concrete block

   Sheetrock
   Brick
   Wood and wood composites
   Plaster
   Tile
   Fiberglass

This manual will explain the basic features and functions of the device, describe the controls and options, provide tips for operation and give troubleshooting assistance.

Figures 2.1 and **2.2** show the RV 2 from the operator's side of the unit. The device is activated with a single Power On/Off [red] button. The green buttons aligned below and to either side of the display screen control other radar and display functions. When powered on the display screen shows objects detected by the radar. The auxiliary connector is used to perform diagnostics and software updates at the manufacturer, see *Appendix A*.

2.1   Overview of Controls

The RV 2 powers up in scanning mode as shown in **Figure 2.2**. Button function descriptions appear in blue text on white bars. The unit must be powered on to view the menu function bars on the display screen. Each green function control button selects options for a corresponding function bar. The outermost, middle, and innermost control buttons operate the outermost, middle, and innermost display function bars respectively. Depress the corresponding green button to select an operation parameter. Options displayed on the six menu function bars may vary as you navigate the menu.
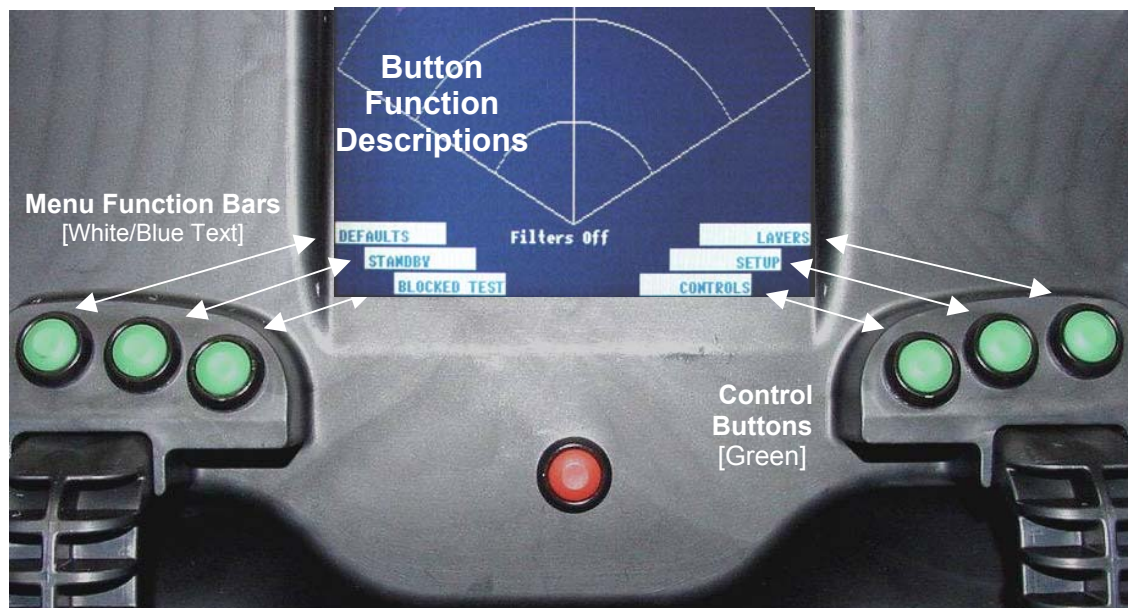

Figure 2.2: Display and Function Control Buttons

Text describing parameter options is displayed on the menu function bars. This text will change depending on where one is in the menu structure. Choices are implemented with either arrows or highlighting text centered between the function bars, see **Figures 2.3, 2.4, and 2.5**. As the user adjusts various options, the new settings are immediately activated within the radar. Only two parameters require the user specifically to *accept* the modification in order to activate the selection: noise filter and codefile settings, see *Sections 4.3.2* and *4.3.5* respectively.

With the exception of detection sensitivity, timeout, and symbol settings (*Sections 4.5.4, 4.3.4,* and *4.3.1),* the unit will always power up with the option selections that were last active when powered off. Users may save a particular set of option settings as described *Section 3.6*.
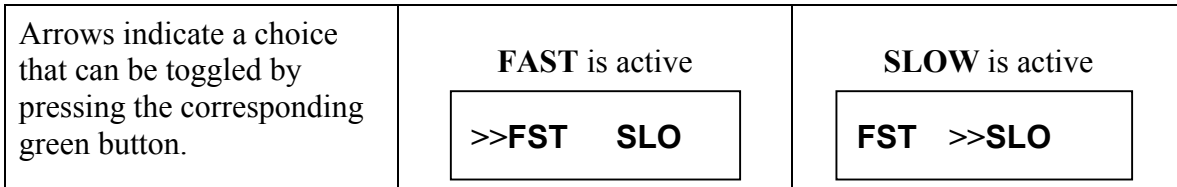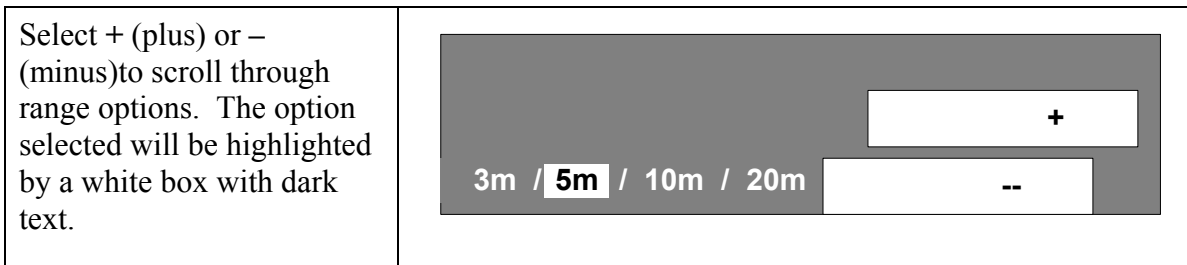
Arrows indicate a choice that can be toggled by pressing the corresponding green button.	**FAST** is active >>**FST SLO**	**SLOW** is active **FST >>SLO**

Figure 2.3: Arrow Selection Indicators

Select + (plus) or – (minus)to scroll through range options. The option selected will be highlighted by a white box with dark text.	+ -- 3m / **5m** / 10m / 20m

Figure 2.4: Option selection indicators

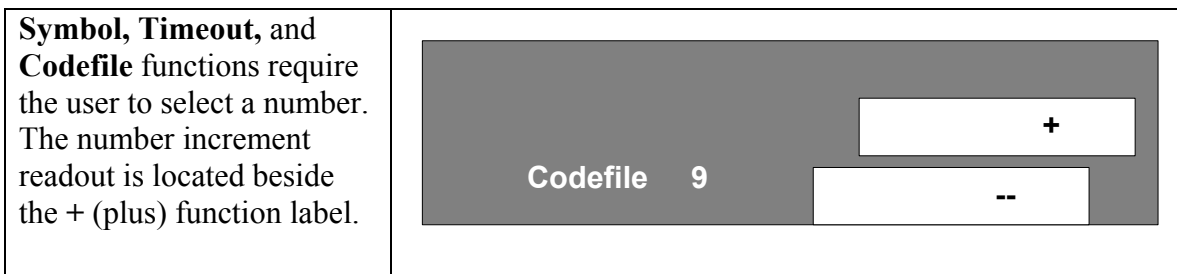| **Symbol, Timeout,** and **Codefile** functions require the user to select a number. The number increment readout is located beside the + (plus) function label.	+ -- Codefile 9

Figure 2.5: Codefile Selection

2.2 Overview of Display

When the unit is in scanning mode, motion detection is displayed on a wedge shaped reticle depicting a top-down field of view, see **Figure 2.6** (next page). The radar scan originates at the bottom or narrow end of the reticle and motion contacts are displayed with distance and direction relative to the operator. This view is referred to as a horizontal view. A side-view, or display of motion in the vertical plane relative to the radar, is also user selectable as described in *Section 3.4.1*.
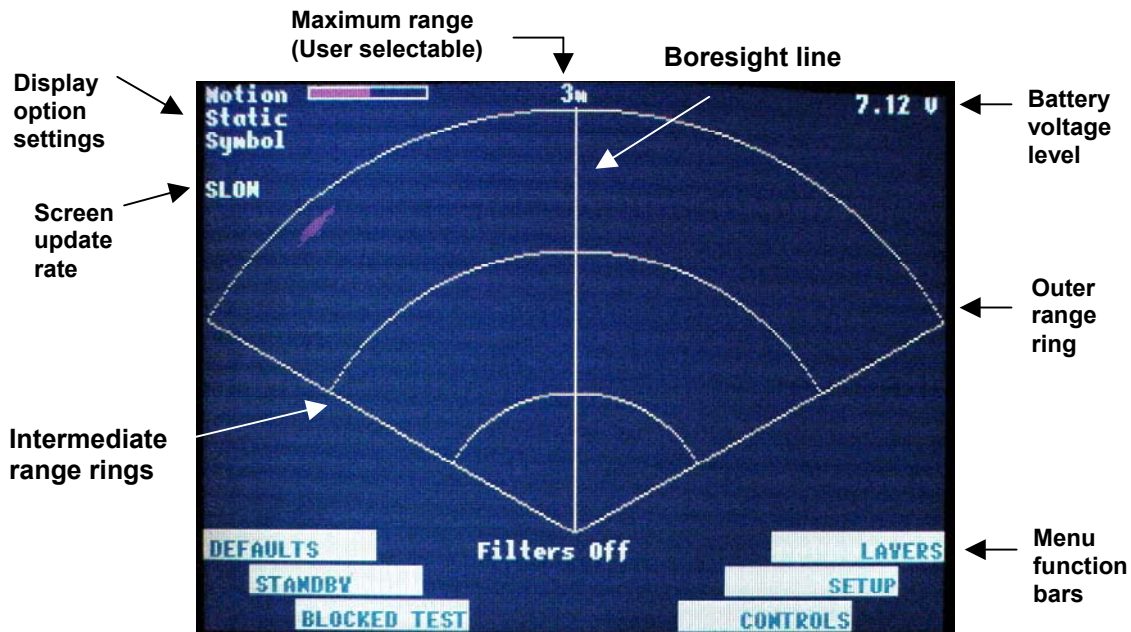
Figure 2.6: RadarVision 2 Display

- **Display option settings** area **(Figure 2.7)** indicates which display options (motion, static, and/or symbol) are active. Any combination of these options may be selected or 'layered' upon one another for display viewing. Because of this layering capability, when the radar is set for motion detection the 'motion layer' is active. Likewise if the radar is set for static detection, the 'static layer' is active. If a color bar appears next to the Motion and/or Static text this indicates that those functions are active. A '+' sign in a box next to the Symbol text indicates that Symbol display is activated. The color bars also indicate sensitivity levels for both Motion and Static displays These functions are selected and controlled with green control buttons as discussed in *Section 2.1*. See *Section 3.5.4* for more information on these settings.
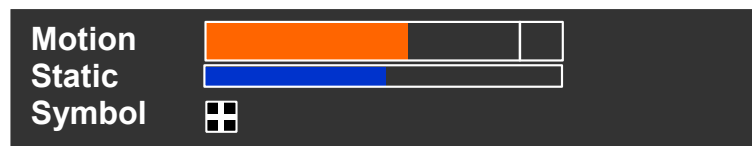

Figure 2.7: Display Option Indicators (Motion / Static / Symbol)

Note: Later models of RV 2 have a larger Motion bar than some earlier models. The illustrations in this User Guide use both types interchangeably. There is no difference in the function (described in *Section 4.5.4*) or in the other details of illustrations between the two versions. The size was increased to aid the operator in reading sensitivity levels.

- **Screen update rate** is the rate at which the radar updates detection information to the display.   For more information on update rate see *Section 3.4.3*.

- **Maximum range** indicates maximum distance for target detection and display. This range is user selectable for distances of 9ft., 15ft., and 30ft. as defined in *Section 3.5.2.*

- **Boresight line** indicates the center of the field of view.

- **Voltage level** is a real-time measurement of battery status. For more information on battery life refer to *Section 3.7.*

- **Range rings** indicate intermediate distances for more accurate assessment of motion location. The outer range ring represents the *maximum* range for the scale selected. The inner range ring represents *half* that scale distance. On the very short, 9 foot range, each intermediate range ring is one-third the distance.

- **Menu function bars** describe the functions of the six green control buttons. The text contents of the bars change as the operator changes positions in the menu as described in *Section 4.0.*

2.3   Feet and Meters in Figures an Illustrations

Linear measurement units for the RV 2 are indicated in *feet*. Some illustrations in this User Guide show distance indicators in meters. These screen shots are from the RV 2i, which is almost identical to the RV 2 but uses the metric measures. Range selection between the two units is roughly equivalent, with 3 meter range equivalent to the 9 ft. range, the 5 meter range equivalent to the 15 foot range and the 10 meter range equivalent to the 30 foot range.
Note: The RV2i screens used for illustration purposes show a 20m range option. *RV 2 does not offer this option and it does not appear on RV 2 screens.*

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