EYE BALL R1
COMPACT WIRELESS
360° MOBILE DISPLAY SYSTEM

OWNER'S MANUAL

IMPORTANT!
READ ALL INSTRUCTIONS IN THIS MANUAL BEFORE USING THIS PRODUCT.

Page 2.....Specifications
Page 3.....About
Page 8.....Charging
Page 10.....Using
Page 21.....Training
Page 22.....Maintaining

Specifications

Remote Viewer specifications

Camera	1/4" color (without infrared filter)
Lens	3.6mm focal length, 55° field of view
Digital zoom	2x
Sensitivity	0.05 lux
Audio and video output power	400 mW
Audio input	Microphone
Data transceiver	902–928 MHz
Motor rotation	3.5 RPM
Illumination frequency	810 nm
Battery	7.4 V, 1100 mAh
Charger	110/220 VAC auto-sensing
Dimensions	3.35 in diameter
Weight	20.5 oz

Personal Display Unit specifications

Display	960x240, color, 6.4", TFT
Audio/video channels/frequencies	1: 2.414 GHz; 2: 2.432 GHz; 3: 2.450 GHz; 4: 2.468 GHz
Audio output	3.5mm jack
Data transceiver	902–928 MHz
Data transmit output power	70 mW
Antenna gain	2 dBi omnidirectional
Battery	7.4 V, 3600 mAh
Charger	110/220 VAC auto-sensing
Dimensions (without antennas)	7.87 x 6.50 x 1.57 in
Weight (without antennas)	2.75 lb
Operating temperature	14°F to 113°F (–10°C to 45°C)
Storage temperature	–4°F to 158°F (–20°C to 70°C)

Specifications subject to change for improvement.

Manual version 1.0, December 2005

Eye Ball FCC ID:TII-EBR1

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device has been authorized by the Federal Communications Commission for sale only directly to law enforcement organizations that are eligible for licensing under the provisions of Section 90.20 of the Commission's rules. This device has not been authorized and may not be offered for sale or lease, or sold or leased, to any other entities.

The Eyeball transmitters shall be used only by law enforcement agencies for emergencies involving safety-of-life and for training purposes. The transmitters shall not be used for permanent or fixed operations. In order to comply with FCC radio frequency (RF) exposure limits, PDU antennas should be held at a minimum of 7.9 inches (20 cm) or more from the body of all users. Please refer to page 11 of this manual.

This device operates at the 2.4 GHz band, a frequency band used by radio local area network equipment, cordless telephones, and other unlicensed devices that are certified by the Federal Communications Commission (FCC). Such other devices operating in the same vicinity as the Eyeball R1 could cause degradation or loss of its signal. **Operation of this device could cause other 2.4 GHz devices and systems in the vicinity to lose their ability to transmit packets or digital signals, or may slow packet transmission rates and their operation could interfere with this device.** Where repetitious use of the device is planned in a specific geographic area (e.g., a security perimeter), and when it will not compromise the mission, frequency coordination with existing 2.4 GHz systems is desirable to minimize the potential for mutual interference. Where possible and not mission compromising, Eye Ball R1 users should select a channel that is not in use by other 2.4 GHz devices in the vicinity, or should notify area 2.4 GHz users how to adjust frequencies if their systems experience degradation in packet delivery rates.

The Eye Ball R1 is developed and manufactured by ODF Optronics Ltd.

ODF optronics Ltd.

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General information

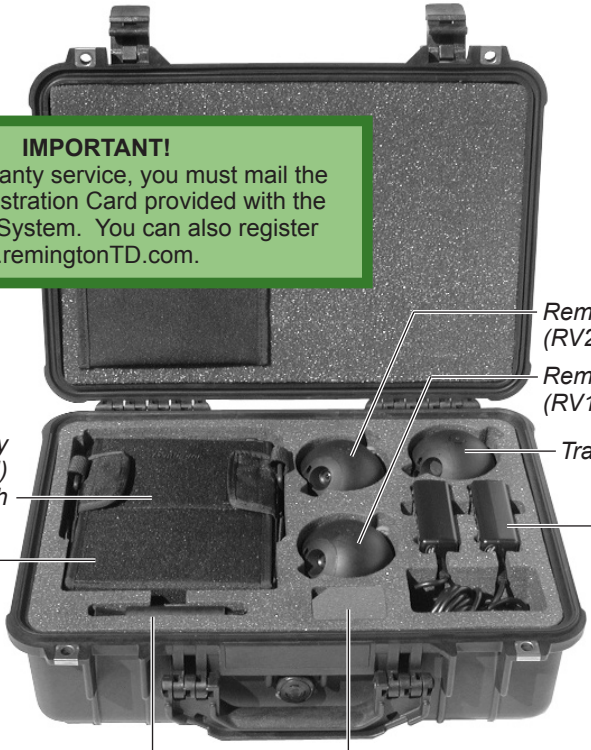
The Eye Ball R1 is a unique system that provides live video and audio surveillance of indoor and outdoor locations that otherwise can't be directly observed. The Eye Ball R1 System reduces the danger associated with gathering information in small hazardous and confined spaces, such as buildings, caves, tunnels and alleys. It is well-suited for counter-terrorism and law enforcement operations in urban, rural and wilderness areas.

The Eye Ball R1 consists of two main components:

- Remote Viewer (RV). Two RVs are supplied with the system.
- Personal Display Unit (PDU).

About the size of a standard baseball, each rugged RV can be placed, rolled, dropped or lowered into a hazardous location. When active, each RV sends video and audio to the PDU, which enables a user to monitor the RV's surroundings from a distance.

IMPORTANT!
To obtain warranty service, you must mail the Warranty Registration Card provided with the Eye Ball RV1 System. You can also register online at www.remingtonTD.com.



Remote Viewer

- Slightly larger than a standard baseball. Can be tossed, rolled, dropped or lowered into a hazardous location. Rugged construction prevents internal damage from reasonable impact. (**Note:** The RV is not a breaching tool.)
- Self-righting. Weighted base turns the RV upright from any orientation (unless there are local obstacles).
- Internal video camera provides 55° horizontal and 41° vertical field of view, and user-controlled 2x digital zoom. Unlimited rotation in either direction enables full 360° surveillance.
- Internal near-infrared (NIR) LEDs illuminate the scene. LEDs can be remotely set to on, off or automatic (i.e., on or off as determined by the RV's light sensor).
- Internal microphone provides audio surveillance.
- Powered by a rechargeable battery (up to 2 hours operation if illumination LEDs are off, up to 2 hours operation if illumination LEDs are on, and up to 24 hours of operation in Standby Mode).
- Can be operated from charger (connected to 110/220VAC power source) for continuous surveillance operations.

Front view

Rear view

Pull Pin (remove from Charging Jack when using and charging RV)

Personal Display Unit

- Lightweight handheld unit displays video received from one or two RVs, and enables user to control one or two RVs.
- Can be used up to 200 yards away from RV outdoors, line of sight; up to 40 yards indoors through walls, floors and other obstructions.
- Channel selection eliminates interference from other devices operating nearby.
- Provides audio output through 3.5mm earphone jack.
- Composite video output for connection to head up display or other video displays.
- Powered by rechargeable battery (up to 3 hours of operation).
- Can be operated from charger (connected to 110/220VAC power source) for continuous surveillance operations.

Additional components supplied with the Eye Ball R1 include:

- Two chargers (110/220VAC auto-sensing wall plug-in type).
- PDU cover and shoulder sling.
- Lowering wire adapter.
- Pole/spike adapter.
- Lens brush.
- Cleaning cloth.
- Spares: base screws, pull pins and lens cover.

Optional components (available from Remington Technologies Division, 301-208-8686, www.remingtonTD.com):

- Telescoping pole.
- RV spike.
- RV duty belt and holsters.
- Lowering wire holster.
- Canvas carrying case.
- Additional pull pins.

Front view

Bottom view

Using a charger

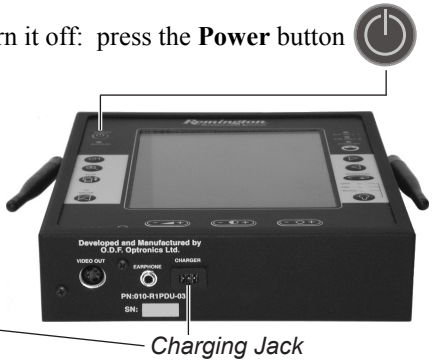
IMPORTANT: Use the chargers only within a temperature range of 32°F to 113°F (0°C to 14°C).

Tip: The two chargers are identical. They can be used to charge both the PDU and RVs.

- Before charging: Attach the power cord to the charger. Do not connect the charger to a power receptacle until directed to do so in the charging instructions.
- After charging: Detach the power cord from the charger. Store the charger and power cord in the R1 carrying case.

To charge the Personal Display Unit

1. If the Personal Display Unit (PDU) is on, turn it off: press the **Power** button (in the upper left corner) for 2 seconds.

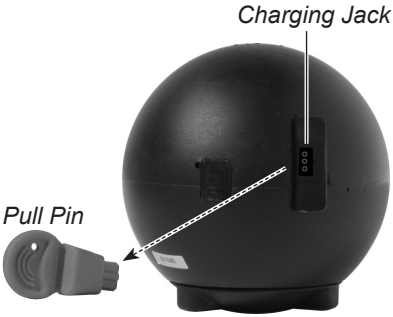


2. Connect the Charger Plug to the PDU's Charging Jack.
3. Plug the Charger into a 110 or 220VAC receptacle (the charger automatically adjusts to the available voltage).
4. Charge the PDU for at least 5½ hours. Charger LED is red during charge, and green when finished. Charging will stop automatically when the battery is fully charged.

Tip: You can use the PDU while it is charging, but the PDU must be off when the charger is first turned on.

5. Remove the Charger from the receptacle.
6. Disconnect the Charger Plug from the PDU.

To charge a Remote Viewer



1. Remove the Pull Pin from the Charging Jack on the rear of the RV.

   Removing the Pull Pin turns on the RV. The Illumination LEDs will flash briefly.

2. Connect the Charger Plug to the RV's Charging Jack.

3. Plug the Charger into a 110 or 220VAC receptacle (the charger automatically adjusts to the available voltage).

4. Charge the RV for at least 2 hours. Charger LED is red during charge, and green when finished. Charging will stop automatically when the battery is fully charged.

Tip: You can use the RV while it is charging.

5. Remove the Charger from the receptacle.

6. Disconnect the Charger Plug from the RV.

7. **Insert the Pull Pin in the Charging Jack on the rear of the RV.**

IMPORTANT: When charging is complete, you must insert the Pull Pin in the Charging Jack to turn off the RV. If you leave the Pull Pin out the RV will discharge.

Using

Five sections in this chapter provide step-by-step instructions for using the Eye Ball R1 System:

A. Check operation

B. Deploy the Remote Viewer

C. Optimize video reception

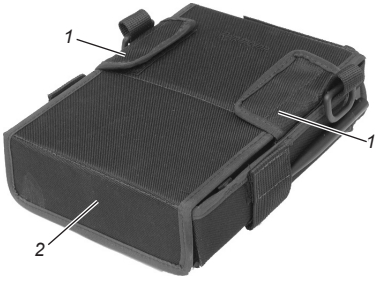
D. Control the Remote Viewer

E. Complete the mission

IMPORTANT: Before using the Eye Ball R1 System for the first time, charge the PDU and both RVs. Instructions are in the previous chapter.

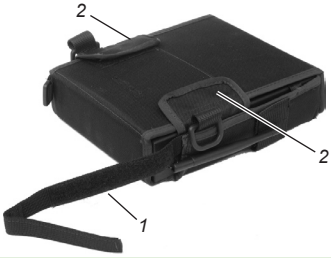
Setting up the PDU hood

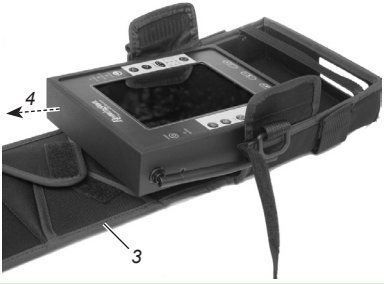
1. Release and lift side flaps.
2. Release and lift front flap.
3. Unfold inner flaps and stick them to side flaps.
4. Fold front flap back and stick it to itself.



Removing the PDU from the pouch

1. Release strap across top of pouch.
2. Release side flaps.
3. Release and unfold front flap.
4. Slide PDU out of pouch.





A. Check operation

If the Eye Ball RV and PDU are fully charged, they should be ready for use at any time (see section B). If conditions permit, however, check system operation before deploying the Remote Viewer.

1. Remove the Remote Viewer (RV) and the Personal Display Unit (PDU) from their carrying case.

2. Turn on the PDU: press and hold the **Power** button (in the upper left corner) for about 2 seconds.

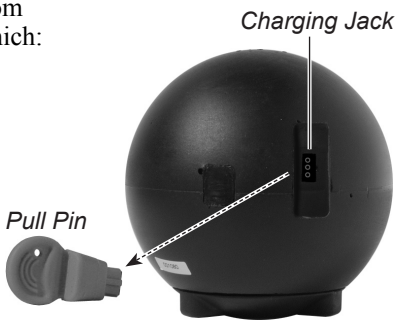
3. **Rotate the PDU antennas into the approximate positions shown at right.**

Notice: PDU antennas should be held at a minimum of 7.9 inches (20 cm) or more from the body of all users.

Note: Leaving the antennas folded along the PDU sides drastically reduces operating range.

4. Turn on **one** of the RVs: remove the Pull Pin from the rear of the RV. The RV initializes, during which:
   - Illumination LEDs flash briefly.
   - RV transmits video and audio for about 2 seconds.
   - RV rotates right, then left.
   - RV enters Standby mode.

5. Repeat step 4 for the other RV.



Note: The Eye Ball R1 System is now ready for use. To perform a more thorough check, continue with steps 6–13.

continued

6. Select one RV: press the **Standby** button once, quickly (each press toggles between the RVs).
   - If you don't see video from the RV, verify that the RV and PDU are charged.
   - If there is video interference:
     - Reorient the video/audio antenna (on the right side of the PDU).
     - Press the **Channel** button CH on the PDU. (Each RV can operate on one of four radio channels.)
7. Verify RV movement:
   a. Nudge the RV by about 10º: momentarily press one **Direction** button.
   b. Repeat step a for the other direction.
   c. Nudge the RV by about 30º: press one **Direction** button for about 2 seconds.
   d. Repeat step c for the other direction.
8. Verify RV rotation:
   a. Initiate continuous rotation: press the **Rotation On/Off** button . The RV should rotate in the direction it was last nudged.
   b. Stop continuous rotation: press the **Rotation On/Off** button , or press either **Direction** button.
9. Verify illumination operation:
   a. Place the RV in a dark area.
   b. Press the **Illumination** button on the PDU to turn the Illumination LEDs on (as indicated above the button). You should see the scene clearly on the PDU.
   c. Press and hold the **Illumination** button (about 2 seconds) to select Auto Illumination Mode (as indicated above the button). You should see the scene clearly on the PDU.

continued

d. Press the **Illumination** button to turn the Illumination LEDs off.

> **Tip:** The RV camera is extremely sensitive, and illumination may not be required in some low-light situations. Thus, there may not be a noticeable change between images with and without illumination.

10. Verify audio operation:

a. Verify that muting is off: the **Mute Indicator** (just above the **Mute** button) should be off. If the **Mute Indicator** is on, press the **Mute** button once.

b. Plug headphones into the Headphone Jack on the PDU's bottom panel. Have a helper take the RV a few yards away and speak into the microphone on the front of the RV. You should hear the helper's speech in the headphones.

c. If you don't hear audio, press the + button on the **Volume Control** to increase audio volume. Test audio again.

11. Check communication range:

a. Have a helper hold the RV and walk away from the PDU while you watch the video image. You and the helper should be able to directly see each other during this range check.

b. When the video image becomes poor, tell the helper to stop walking. Adjust the antennas for best reception, then tell the helper to walk farther. When the video image becomes poor, have the helper walk back toward you about 4 yards and stop. This is the maximum reliable operating range for the Eye Ball R1 system under good conditions.

> **Note:** Useful range will vary depending on the presence of walls, floors, vehicles and other obstructions, as well as PDU antenna orientation, and distance between the PDU and RV.

continued

Common problems

If an RV fails to respond to a command, or if you see video from two RVs at the same time, simply reissue the last command.

12. Repeat steps 6 through 11 with the other RV.

13. If you will not be using the system immediately:
    a. Turn off the RVs.
    b. Turn off the PDU.

Status indicators

PDU Status Indicator

- Fast flashing: PDU is communicating with an RV. Pressing a PDU button during this time has no effect.
- Slow flashing: battery will power PDU for about 1 hour; if 120VAC is available, you can power PDU using the Charger.

RV Status Indicators

- Slow flashing: battery will power RV for about 20–30 minutes.

  Flashing only appears when the RV is active.

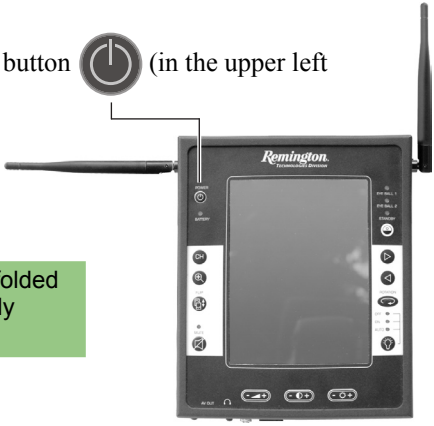
B. Deploy the Remote Viewer

1. Remove the Remote Viewer (RV) and the Personal Display Unit (PDU) from their carrying case.

2. Turn on the PDU: press and hold the **Power** button (in the upper left corner) for about 2 seconds.

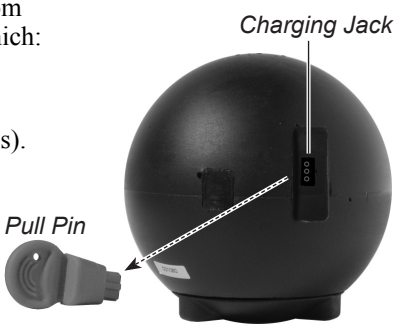
3. **Rotate the PDU antennas into the approximate positions shown at right.**

   Notice that the antennas are *not parallel*.



Note: Leaving the antennas folded along the PDU sides drastically reduces operating range.

4. Turn on **one** of the RVs: remove the Pull Pin from the rear of the RV. The RV initializes, during which:
   - Illumination LEDs turn on constantly or flash (flashing indicates battery is nearly depleted, and will power the RV for about ½ hour or less).
   - RV transmits video and audio for about 2 seconds.
   - RV rotates right, then left.
   - RV enters Standby mode.



5. Repeat step 4 for the other RV.

6. Press the **Standby** button once or twice to display video from the RV.

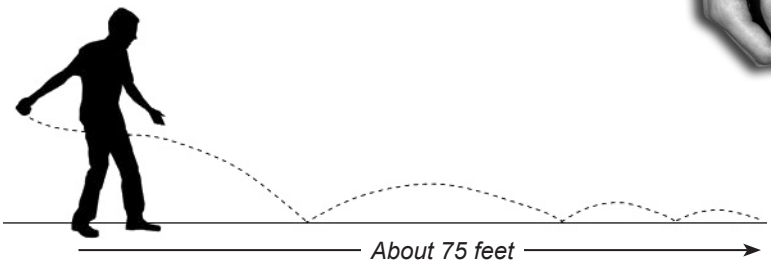
7. Verify that the PDU is receiving video from the RV.

continued

8. Deploy the RV as close as possible to the area of interest. You can:

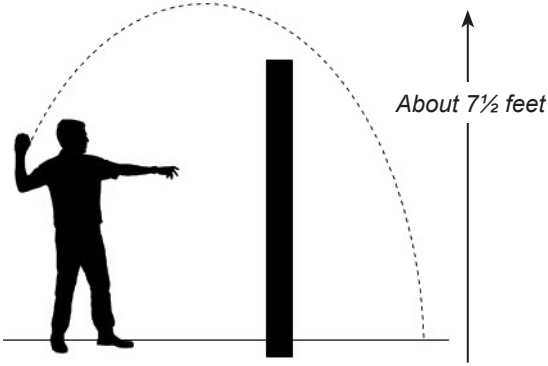
- **Roll the RV into position.**

  When deploying the RV to a distant location (about 75 feet), this method often results in the most accurate placement. Hold the RV firmly as shown in the photo at right, then toss it horizontally toward the destination (similar to throwing a bowling ball) as shown below.



- **Toss the RV into position.**

  This method is useful when deploying the RV over a wall or fence, or through an open window. Hold the RV firmly as shown in the photo at right, then throw it upward at a 45º angle toward the destination (similar to throwing a grenade) as shown below.



continued

Note: The RV is not a breaching tool.

Note: Do not start rotation while the RV is in motion, as this could damage the rotation mechanism. Wait until the RV is in position to begin rotation.

- **Lower the RV into position.** See “Lowering Wire Adapter” on page 20.
- **Raise the RV into position.** See “Telescoping Pole” on page 20.

9. When the RV is in position, observe the video on the PDU. If you think the RV is not upright, rotate it using the **Rotation On/Off** button . Rotating should help the RV to roll onto its base.

C. Optimize video reception

If video from a selected RV is poor or not present:

- Reorient the video antenna (on the right side of the PDU).
- Move the PDU to a different location to minimize the effects of walls, floors, vehicles and other obstructions.
- Move the PDU closer to the selected RV.

D. Control the Remote Viewer

To do this...	Do this...
Switch between RVs	Momentarily press **Standby** button .
Resume operation from Standby	Momentarily press **Standby** button to select RV.
Reduce RV power consumption when video isn't needed	Press and hold **Standby** button (about 3 seconds) until **Standby** indicator is on (places both RVs in Standby Mode).
Nudge RV about 10°	While RV is not rotating, momentarily press a **Direction** button or .
Nudge RV about 30°	While RV is not rotating, press and hold (about 2 seconds) a **Direction** button or .
Start continuous rotation	Momentarily press **Rotation On/Off** button . (Rotation will be in last direction in which RV was nudged.)
Stop continuous rotation or scan	Momentarily press **Rotation On/Off** button or either **Direction** button .
Turn illumination on or off	Momentarily press **Illumination** button until indicator shows desired state.
Set illumination to auto	Press and hold **Illumination** button until **Auto** indicator turns on.
Mute or hear audio	Press **Mute** button .
Adjust audio volume	Press – or + **Volume** button .
Adjust video contrast	Press – or + **Contrast** button .
Adjust video brightness	Press – or + **Brightness** button .
Zoom in or out	Press **Zoom** button .
Flip display vertically	Press **Flip** button .
Turn off display to conserve power	Press and hold **Flip** button for 5 seconds.
Turn on display	Press and hold **Flip** button for 1 second.
Turn off PDU and place RVs in standby	Press **Power** button .
Change channel to optimize video/audio or avoid interfering with another device	Press **Channel** button CH (there are 4 channels).

E. Complete the mission

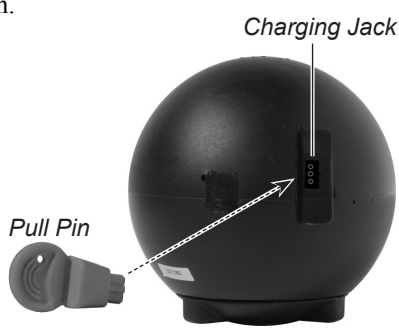
1. When the RV deployment area is safe, retrieve all deployed RVs.

2. Switch system to Standby Mode: press and hold (about 3 seconds) the **Standby** button until the Standby indicator turns on.

3. Turn off the RVs: insert the Pull Pins into the Charging Jacks.

4. Turn off the PDU: press and hold (about 2 seconds) the **Power** button .

5. As soon as possible, recharge the PDU and RVs, so they will be ready for the next mission.

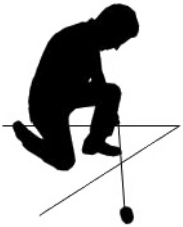


Lowering Wire Adapter

Use a lowering wire to perform surveillance from above a scene.

1. Thread the Lowering Wire Adapter into the center hole in the RV's base. Tighten gently.
2. Securely attach a wire or string to the Adapter.
3. Lower the RV into the surveillance location.
4. On the PDU, press the **Flip View** button to view the image right side up.

Lowering Wire Adapter



Telescoping Pole

Use the Telescoping Pole to raise the RV to a higher position and to bypass obstacles.

1. Thread the Pole Adapter into the center hole in the RV's base. Tighten gently.
2. Thread the Telescoping Pole into the Pole Adapter.
3. Move the RV into position with the Telescoping Pole.

Pole Adapter

Training is essential for rapid and effective use of the Eye Ball R1 System during field operations. This section suggests exercises to help users become familiar with Eye Ball procedures, functions and deployment.

General system operation

Work with the RV nearby so you can see how the PDU's controls affect the RV:

- Learn how to set up the PDU hood.
- Learn how to turn the RV on and off by removing and replacing the Pull Pin.
- Learn how to turn the PDU on and off.
- Learn how to check system operation.
- Review and understand all PDU controls.
- Learn how to control the RV with the PDU.
- Learn how to charge the RV and PDU.

Deploy the Remote Viewer

The Training Ball is the same size and weight as the Remote Viewer, but it does not contain electronics. Use the Training Ball during rolling, tossing, dropping and lowering exercises.

- Learn how to roll the Training Ball.
- Learn how to toss the Training Ball.
- Learn how to drop the Training Ball.
- Learn how to lower the Training Ball using a lowering wire.
- Learn how to elevate the Training Ball using the Telescoping Pole.

Simulate field operations

Work with the real RV and PDU to:

- Learn how to deploy the RV so you can see what is around a corner.
- Learn how to deploy the RV so you can see what is in an enclosed area, such as inside a garage or in a fenced yard.
- Learn how to deploy the RV through an open door or window so you can see what is inside a room.

Post-use maintenance

After each use:
- Clean each RV's external rubber surfaces with a clean cloth.
- Clean each RV's lens and illumination window with a lens cleaning cloth.
- Make sure each RV's base screws are tight.
- Charge the PDU and both RVs.

Scheduled charging

IMPORTANT: Fully charge the PDU and both RVs every three months. If this regular charging isn't performed, the units may be permanently damaged.

Internal inspection and cleaning

The Remote Viewer should be inspected and cleaned at the following times:
- If the RV does not rotate, or rotates sluggishly, when directed by the PDU.
- If the RV was exposed to mud, water, sand or heavy dust.
- As part of annual preventive maintenance.

1. Using a Philips screwdriver, remove three screws securing the RV's base.
2. Remove the base.
3. Clean accumulated dust, sand and dirt from the lower surface.

IMPORTANT: The RV is fully sealed. Do not lubricate!

4. Replace the base, then secure it using the three screws removed in step 1.

Note: For all other maintenance operations, return the system to Remington Technologies Division for service.

Maintenance records

Use the table on the next page to record maintenance activities.

Maintenance record

Date	Inspected	Cleaned lens	Cleaned base*	Performed by
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*Required only if RV deployed in dusty, sandy or muddy environment.

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