



RAM[®] Manual

1. RAM[®] Ultra
2. RAM[®] Prime
3. RAM[®] Prime XL
4. RAM[®] ETDRS

AMA Optics, Inc.
11 Island Ave, Suite 1001.
Miami Beach, FL 33139
1-877-744-EYES (3937)
www.amaoptics.com
www.visionperformance.store

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RAM® Prime★

Retinal Acuity Meter

Clinically Proven

21 Years of Clinical Use

~ Measure with Confidence ~



- ✓ Quick-Change Chart Option
- ✓ Choice of Charts
- ✓ 20/20 to 20/400
- ✓ Low Vision to 20/1600
- ✓ Dial-in Brightness
- ✓ Rechargeable
- ✓ Lanyard Switch Option
- ✓ Tripod Mount
- ✓ Three Years Warranty

Pre-op RAM® informs... **Inform**s... **informs**

Change unpleasant to pleasant outcomes by disclosing hidden co-morbid disease.
Suboptimal outcomes become pleasant when expected.



71 Clinicians judge the *Retinal Acuity Meters*

Reviews



Improves Patient Care*	.....	100% (71/71)
Improves Informed Consent	.....	100% (71/71)
Improves Surgical Cases Selection****	.....	100% (71/71)
Identifies Operable Surgical Cases “Thought” Inoperable*****	.....	92% (65/71)
Changed My Practice Pattern******	.....	**100% (71/71)

*Knowing macular function prevents unnecessary tests, long discussions, and conjecture.

**Informs the destiny of cataract surgery; good, medium or poor. Prevents surprises.

***Macula appears abnormal but the function is actually good.

(The appearance of the macula is not a predictor of visual function)

****Use the RAM on all patients with less than 20/20 vision. Separates macula from media issues .

The **RAM**® measures the function of the macula for (1) diagnostic purpose and for (2) forecasting the outcome of cataract surgery. In comparison, OCT does not predict outcomes (function), the scan shows the shape of the eye in fine detail. The **RAM**® predicts function best when pre-op acuity is 20/200 or better.

Ease of Operation: The **RAM**® is simple to operate and takes only 1 minute per eye. The **RAM**® is used in conjunction with a multi-perforated Pinhole-Lens Clip-on and near vision correction.

Push-Button Switch: Momentary function with a touch, full ON with a deep press (may need to use the small finger).

Chart Brightness: The standard **RAM**® brightness is 3000 cd/m² for potential vision testing, lower brightness is used to measure current acuity and higher brightness is available to penetrate more opaque cataracts. By adjusting the slide-switch the voltage changes to achieve the desired brightness. A data graph illustrates the relation between voltage and brightness.

Testing Distance: Two retracting cords, 16 and 8 inches are built-in and rest in the retractor cave. Testing at 16 inches measures acuity from 20/20 to 20/200. Testing at 8 inches measures acuity from 20/200 to 20/400. Parking the retractor out of the cave, keeps the retractor handy for easy reuse. A Low Vision adaptor is available for acuities to 20/1600.

Quick-Change Charts: **RAM**® Prime XL has the option of exchangeable charts. Charts are available for either potential vision (brighter) or current acuity (dimmer). The chart types are Letters, Numbers, Tumbling E, Landolt C, custom, and ETDRS series of 5 charts.

Chart Label: The label on the back shows the acuity index and Volts/Brightness graph. The label is reversible: on the standard model, one side has letters and the reverse side has Landolt C.

Lanyard Option: Maintaining the precise testing distance is easy with the adjustable lanyard. From around the patient's neck, the lanyard attaches to lanyard switch of the **RAM**®. Use the retractable cord of the **RAM**® to set the testing distance, then slide the lanyard fastened to fix the distance. With the patient holding the **RAM**®, the chart light turns on when the lanyard is extended and taunt. Lanyards are sold separately.

RETINAL ACUITY

Retinal acuity is the functional capacity of the retina. It is the vision that would occur after correcting all anterior segment problems and refracting the eye perfectly.

The RAM® is simple to operate. The RAM® is used in conjunction with a RAM® multi-perforated pinhole clip and near vision correction. The multiple pinholes allow the patient to find the clearest visual opening in the cataract or posterior capsule for aligning the visual target and the best part of the retina.

The ability of the instrument to measure retinal acuity in the presence of media opacity and co-morbidity depends on three optical principles:

1. Pinhole resolution plus near correction

The pinhole aperture places the eye at almost universal focus and the near lens sharpens near focusing.

2. Correct visual angle of the letters

The correct visual angles are achieved by the combination of the appropriate working distance and standard sized letters

3. Bright and uniform calibrated retro-illumination.

The bright illumination more than compensates for the light attenuated by the cataract and the reduced aperture pinhole. Adjustable illumination is standard on all Prime Models.

IMPORTANT NOTE ABOUT REFRACTION

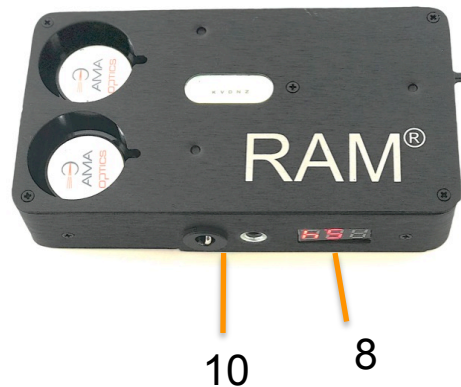
Refraction can never overestimate retinal acuity!

Exact retinal acuity or underestimation of retinal acuity are the only possible conclusions of refraction. A good retinal acuity tester should be less affected by the aberrations that cause refraction to underestimate retinal acuity; therefore, on average, the retinal acuity should be slightly better than the refracted acuity. This should not be interpreted as overestimation by the retinal acuity tester, but as an underestimation by refraction.

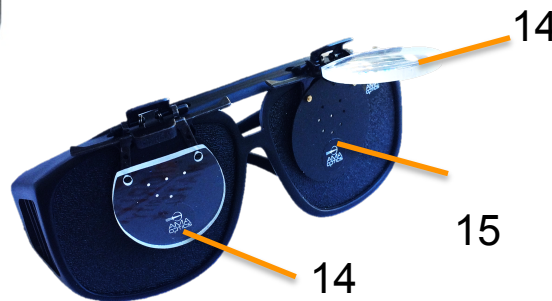
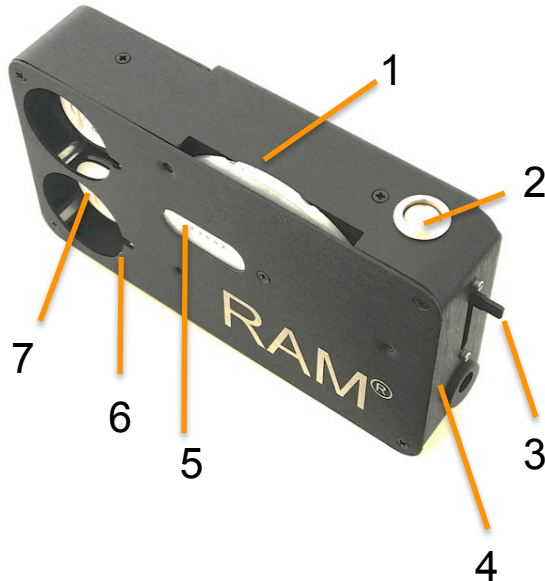
When comparing retinal acuity to refraction, it is important to calibrate the distance Snellen Eye Chart. When using the RAM[®], it is important to maintain the 16 inch testing distance.

Instrument	RAM® ULTRA	RAM® PRIME	RAM® PRIME XL
Device			
# Chart Included	1	1	1
Extra Chart Option	No	No	Yes
Carrier Frames	Yes	Yes	Yes
Pinhole-Lens Clip	2 ea.	2 ea.	2 ea.
Panoramic Pinhole-lens Clip	Option	Option	Option
Magnetic Occluder	Yes	Yes	Yes
Low Vision Adaptor	No	Option	Option
Charger	Yes	Yes	Yes
Lanyard Switch	No	Option	Yes
Lanyard	Option	Option	Option
Lens Cloth	Yes	Yes	Yes
Trial Frame Pinhole	Yes	Yes	Yes

RAM® Prime



Quick-Change Top (XL Model)



1. Chart Disc
2. On-Off Switch
3. Slide switch (rheostat)
4. Charging connector
5. Viewing window
6. Slit for cord
7. Retracting cord
8. Voltmeter
9. Tripod mount
10. Lanyard switch
11. Quick-Change Top
12. Panoramic Pinhole-Lens Clip-on
13. Occluder, magnetic
14. + 2.5 D Lens of Pinhole-Lens Clip-on
15. Traditional Pinhole-Lens Clip-on

Carrier Frames with Pinhole-Lens clip-ons

Specifications

Brightness (adjustable)

- ETDRS 85 cd/m²
- RAM® (Potential Vision) 3000 cd/m²
- Super Bright RAM® >3000 cd/m² (adjustable)

Testing Distance

- 16 inches (Up to 20/200)
- 8 inches (Up to 20/400)
- 2 inches (Up to 20/1600) (with low vision adaptor)

Battery: 9 volt NiMH rechargeable

Chart Options

1. Potential Vision Charts
2. Current Vision Charts (more opaque)

Chart Types

1. Letters
2. Numbers
3. Landolt C
4. Tumbling E
5. ETDRS
6. Custom

Battery Charging:

Use only the charger provided. Simply attach the charging cable to the RAM®. Recharge before the maximum voltages declines below 6.5 volts. When fully charged, the voltmeter will read between 8.7 and 9.2 volts.

Depending upon the use, weekly recharging is usually sufficient.

For 220, use a simple connecting adaptor between the wall electrical outlet and the prongs of the charger.

Charger is indoor use only
Keep away from children

TESTING PROTOCOL

A. Retinal Acuity Measurement (Potential Vision)

Pre Test details

- Test in a semi dark room.
 - Avoid Bright Light Exposure Prior To Testing
- (No retinal exam or glare testing within 5 minutes of retinal acuity testing).
- Pupil dilation is optional

Setup

- Use Potential Vision Chart with ≥ 3000 cd/m² brightness
- Distance lens correction plus +2.5 lens
 1. Trial frames with corrective lenses
 2. Pinhole-Lens Clip-on over
 1. Distance glasses or bifocals (Clip-on Lens Down)
 2. Reading glasses (Clip-on Lens Up)
 3. Occlude the opposite eye
- Pinhole, Traditional or Panoramic
- Position RAM®
 1. 16 inches for up to 20/200 acuity
 2. 8 inches for low vision, worse than 20/200 acuity

Test

Instruct the patient to find the bright light through the pinholes and read the line of letters. Inform the patient that some of the pinholes provide a better view of the letters. Ask the patient to select the clearest view. Start with the 20/200 letters and progress to the smallest letters. Challenge the patient to read smaller letters because some letters are more readable. For example, if letters are missed on the 20/60 line, try the 20/50 and 20/40 lines before stopping.

Either the Non-transparent traditional pinhole disc or the Panoramic Pinhole disc may be used. The Panoramic pinhole disc is transparent between the pinholes. The benefit of the Panoramic pinhole disc is that the patient views their current vision between the pinholes and their potential vision through the pinhole. This allows the patient to compare their current acuity to the acuity they can expect after cataract surgery. Normal: better acuity between the pinhole. Defective media: better vision within the pinhole.

TESTING PROTOCOL

B. Visual Acuity Measurement (Current Vision)

Setup

- Trial Frames with near correction or Patient's distance plus +2.50 Diopter add.
 1. Use Current Acuity Chart
 2. Adjust light to 85 cd/m² using voltmeter and graph
 3. No pinhole
 4. Occlude opposite eye
- Position RAM®
 1. 16 inches for up to 20/200
 2. 8 inches for 20/200 to 20/400
 3. 2 inches for 20/400 to 20/1600 (with low vision adaptor)

Test

Start at 16 inches with the 20/200 letters and progress to 20/20 letters. Challenge the patient to read smaller letters because some letters are more readable. For example, if letters are missed on the 20/60 line, try the 20/50 and 20/40 lines before stopping.

RAM[®] Prime ETDRS Equivalent Chart

Twelve lines of letters are presented from -0.1 logMAR (20/16) to 1.3 logMAR (20/400) letter size in 0.1 logMAR increments. Each line has 5 letters with one letter-width separating the letters and each line has the same readability index as described by F. L. Ferris III, et al.: New Vision Acuity Charts for Clinical Research. AJO 94,1, 1982.

Both **Standard Acuity** (current corrected visual acuity) and **Retinal Acuity** (retinal function) can be measured with this instrument. For **Standard Acuity**, the window brightness is reduced to standard luminance with the attenuation filter and is viewed through a near add. For **Retinal Acuity**, the window is viewed at full brightness through a near add and a pinhole.

The scale is in logMAR as per the EDTRS chart. Snellen conversion is listed in parenthesis on the back label. Twelve letter sizes are achieved from 9 lines of letters by utilizing 3 lines of letters for testing at 2 distances, 8 and 16 inches. By halving the distance the visual angle is doubled. For focusing, an add of +2.5 diopters is used at the 16 inches and an add of +5 diopters is used at the 8 inches testing distance.

Packing List

- | | |
|---------------------------------|-------------------------------|
| 1. RAM [®] Prime ETDRS | 7. Occluder Clip |
| 2. Carrier Frames | 8. Charger |
| 3. Low Vision Adaptor | 9. Lanyard |
| 4. Vinyl Occluder Disc | 10. Certificate of Inspection |
| 5. +2.5 Diopter-Len Clip | 11. Case |
| 6. +5 Diopter-Lens Clip | 12. Operating Instructions |
| 7. ETDRS Charts, 5 ea. | |

ETDRS VISION TESTING

The standard vision is analogous to the vision obtained with the Standard ETDRS test as validated at a Wills Eye Hospital (RETINA 0:1-8, 2015). Special charts are used for ETDRS, the plastic discs are more opaque than those used for potential vision testing. The potentiometer is adjusted so that the brightness of the chart is 85 cd/m².

1. **Adjust** the potentiometer so that the illumination is 85 cd/m².
2. **Inspect** the position of the opaque occluder to insure that the visual axis of the eye not being tested is occluded.

3. Near Correction Options

- I. **Add +2.5 diopters and test at 16 inches for 0.7 to -0.1 logMAR acuities,**
 - A. If the patient wears **reading glasses**, attach the +2.5 D Lens Clip with the lens up.
 - B. If the patient wears **bifocal or distance glasses**, attach the +2.5 D Lens Clip with the lens down.
 - C. If the patient wears **trial frames**, use the distance corrective lenses, a +2.5 diopter lens and a trial frame pinhole (not supplied).

ETDRS VISION TESTING

II. Add +5.0 diopters and test at 8 inches for 1.0, 0.9, and 0.8 logMAR acuities,

- A.** If the patient wears **reading glasses**, attach the +2.5 D Lens Clip with the lens down. (total +5 D)
- B.** If the patient wears **bifocal or distance glasses**, attach the +5.0 D Lens Clip with the lens down).
- C.** If the patient wears **trial frames**, use the distance corrective lenses, a **+5.0** diopter lens and a trial frame pinhole (not supplied).

III. Add +20.0 diopter lens for testing at 5 cm using the Low Vision Adaptor for 1.1, 1.2, 1.3 logMAR acuities.