Hand-Held Diagnostic Vision System
(DVS)

RAM-ETDRS

Measures Standardized Acuity

and

Retinal Acuity Meter (RAM®)

Measures Retinal Acuity
(Functional Capacity of the Retina)

Instructions

U.S. Patent No. 5,398,085
U.S. Trademark No. 2,776,911

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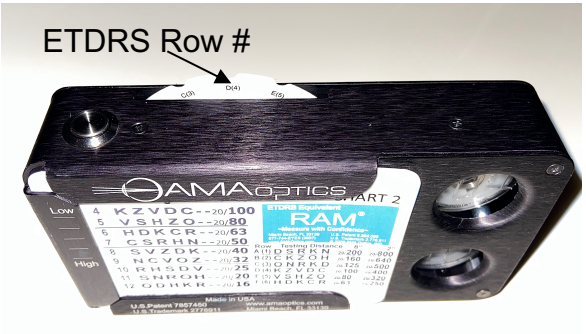

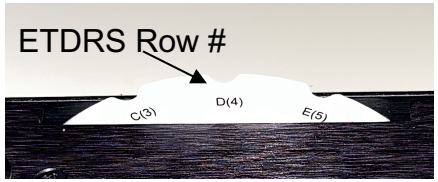

Illustration of the notation on the chart wheel

ETDRS Row #

ETDRS Chart

Letters

Snellen Notation

Row Testing Distance 16”

Made in USA

CHART 1

4 C Z R H S – 20/100
5 O N H R C – 20/80
6 D K S N V – 20/63
7 Z S O K N – 20/50
8 C K D N R – 20/40
9 S R Z K D – 20/32
10 H Z O V C – 20/25
11 N V D O K – 20/20
12 V H C N O – 20/16

ETDRS Equivalent
RAM®
~Measure with Confidence~
Miami Beach, FL 33139
877-744-EYES (3937)
www.AMAOptics.com
U.S. Patent 5,398,085
U.S. Trademark 2,776,911
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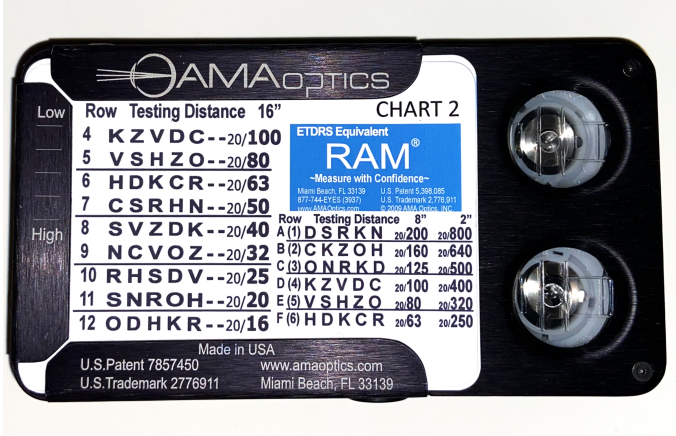
Row	Testing Distance	8”	2”
A	(1) N C K Z O	20/200	20/800
B	(2) R H S D K	20/160	20/640
C	(3) D O V H R	20/125	20/500
D	(4) C Z R H S	20/100	20/400
E	(5) O N H R C	20/80	20/320
F	(6) D K S N V	20/63	20/250

Testing Distance 16 “ 8” 2”

The Hand-Held Diagnostic Vision System (DVS) provides a wide variety of important vision function tests in a convenient and space-saving format. This booklet is covers standardized vision acuity testing in the ETDRS style and retinal acuity testing.

The **RAM-ETDRS test** is performed at one brightness (85 cd/m^2 average), the U.S.A. standard reading brightness. The slide-switch to adjust the light setting is located on the right end of the instrument. The top cover of the instrument is easily removed by grasping the separation between the two recesses on the left front and lifting up. Chart tops attach with magnets. There are five interchangeable ETDRS vision charts. Comparable to the original ETDRS system, RAM-ETDRS letter size is a function of visual angle based on the testing distance 20/16 to 20/800. Halving the distance doubles the visual angle and letter size.



Removable labels correspond with interchangeable vision charts. Simply slide in and out.

ETDRS Equivalent Charts

Twelve lines of letters (ETDRS rows 1 thru 12) are presented in logMAR scale from 20/16 to 20/800 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 and AJO 116, 1993.

RAM® ETDRS Equivalent Tester comes in five options: Chart 1, Chart 2, Chart 1 revised, Chart 2 revised, and Chart R. The charts have the identical lines of letters as reported in the above references.

Snellen notation and ETDRS row numbers are indexed on the back label and on the chart wheel. At the testing distance of **2 inches**, row A(1) (20/800), row B(2) (20/640), row C(3) (20/500), row D(4) (20/400), row E(5) (20/320), and row F(6) (20/250) are identified on the wheel and back label.

At the testing distance of **8 inches** row A(1) (20/200), row B(2) (20/160), row C(3) (20/125, row D(4) (20/100), E(5) (20/80), and F(6) (20/63) are identified on the wheel and back label.

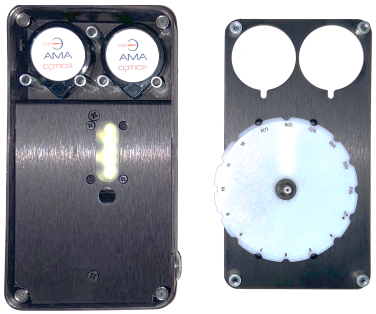
At the testing distance of **16 inches**, row #4 (20/100), row #5 (20/80), row #6 (20/63), row #7 (20/50), row #8 (20/40), row #9 20/30, row #10 (20/25). row #11(20/20), and row # 12 (20/16) are identified on the wheel and back label.

Changing Vision Charts

Top attached

Top; Face UP

Top removed

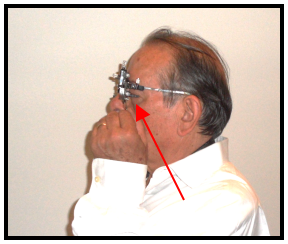


Top: Face Down

Top removed

Testing Distance

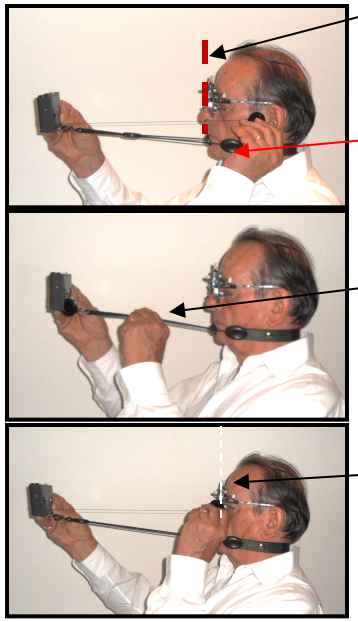
Like the original ETDRS charts, by halving the distance the visual angle is doubled. For focusing, a near correction add of +2.5 D is use at 16 inches testing distance, a near correction add of +5.0 diopter is used at 8 inches testing distance, and a near correction of +20 D mounted on the Low Vision attachment is used at 2 inches testing distance.



The near add lens is placed in the rear compartment of trial frames

1. Lanyard at 16 inches

Adjusting the lanyard:



Retractor should reach edge of trial frames

Retractor reaches past the trial frames, lanyard is too long

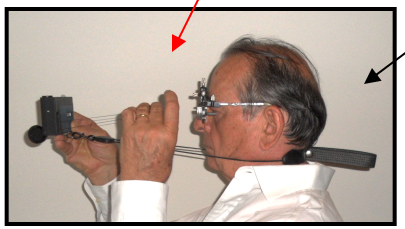
Slide adjuster to shorten the lanyard.

Retractor reaches trial frames (correct)

2. *Lanyard at 8 inches*

Adjusting the lanyard:

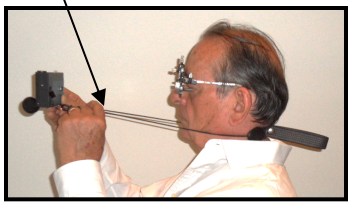
A. 8" Retractor doesn't reach forehead, lanyard need adjustment:

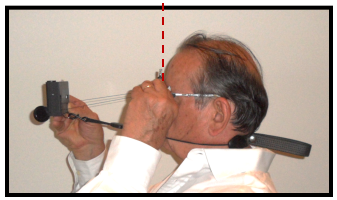


The collar of Lanyard snaps together to shorten for testing at 8 inches

B. Slide adjuster to shorten lanyard

Snap to shorten for testing at 8 inches





C. Pull reaches trial frames (correct)

Slide adjuster

Hook

Retractor is resting on cover

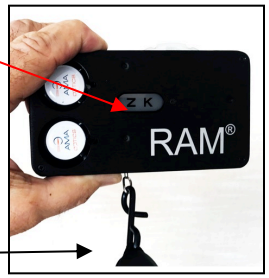
Ring connects to Lanyard Hook

Testing with the Lanyard

When using the lanyard to turn on the light, do not turn-on the power button on the top.

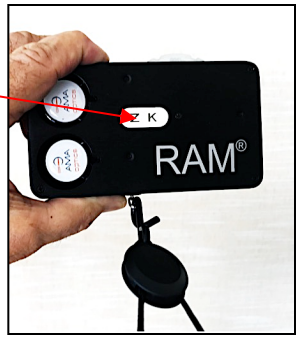
Attach the hook of the lanyard to the ring on the bottom of the RAM-ETDRS, set the testing distance by extending the cord, slide the adjuster of the lanyard until the extended cord touches the forehead or glasses. The lanyard insures the correct distance and prevents drift. The patient or examiner may hold the RAM®, a light turns on when the lanyard is taut and the testing distance is correct. (see photos below)

LIGHT OFF



Loose lanyard, incorrect distance

LIGHT ON



Lanyard is taut and light is ON (correct testing distance)

3. Low-Vision attachment at 2 inches

Align the Low-Vision attachment over the viewing window and attach with wing-nut. Use distance correction, touch frames to attachment

ETDRS testing Sequence

1. Turn **ON** the RAM-ETDRS
   Press the silver button on the top, use the TIP of the little finger to fully engage the switch, deeply press.

2. Start Testing at **16 inches** with +2.5 D add, test 20/100 to 20/16 until no letters are seen in a line of letters..

3. Test at **8 inches** with +5.0 D add, test 20/200, 20/160, & 20/125

4. Add the number of letters read at 8 and 16 inches, if the sum is 20 or more testing is complete. If the sum is less than 20, test at 2 inches

5. Test at **2 inches** with +20 D Low-Vision attachment, test 20/800 to 20/250. Add # of letters correctly read at 2 inches to the # of letters correctly read at 8 and 16 inches.

6. If patient read more than 30 letters at 2 inches, repeat refraction and re-measurement.

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

The RAM® is used in conjunction with a RAM® multi-perforated pinhole clip, full distance refraction plus near vision correction and a measuring cord. 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

In conjunction with best distance correction, the pinhole aperture places the eye at almost universal focus while reducing aberrations 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 reduced aperture pinhole and cataracts less than 20/200 severity.

Retinal Acuity Meter TESTING PROTOCOL

Test in a semi-darkened room.

Avoid Light Exposure Prior To Testing

To avoid light saturation of the macula do not examine the fundus with a bright light within 5 minutes of retinal acuity testing.

When To Dilate The Pupil

The dark Carrier Frames reduce ambient light and encourage dilation of the pupil. However, if potential vision testing finds poor retinal acuity, dilate the pupil and retest the retinal acuity.

Optical Correction

1. Trial frames, use full distance correction plus +2.5 D add and multi-perforated pinhole disc. (The RAM-ETDRS protocol could be followed for retinal acuity testing if 20/16 to 20/800 range is desired).

2. Patient's spectacles and the carrier frames with Pinhole-Lens clips attached. If the spectacles are bifocals or distance glasses, rotate the near lens down into the visual axis. The carrier frames are designed to block the add segment of bifocal lenses. If the spectacles are reading glasses only, do not rotate the lens down into the visual axis. (use full distance correction plus +2.5 D add)

Instruction for using the pinhole

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 will provide a better view of the letters. Ask the patient to look through different holes to find the clearest view. Start with the 20/100 letters and progress to the smallest letters.

Positioning The RAM®

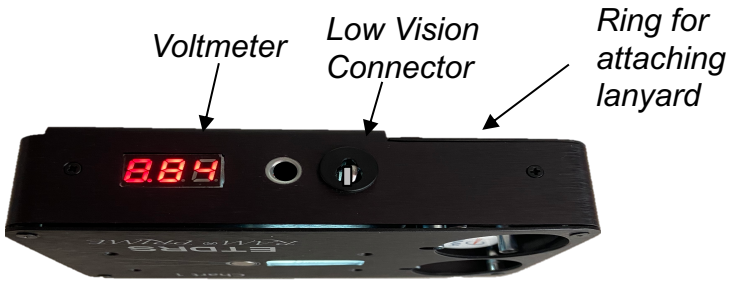
The retractable tape is 16 inches in length. Fully extend the tape and touch the tape to the patient's forehead while holding the RAM®. Periodically re-measure to confirm the correct working distance. If the RAM® is equipped with a lanyard, the patient may hold the RAM® and prevent drift.

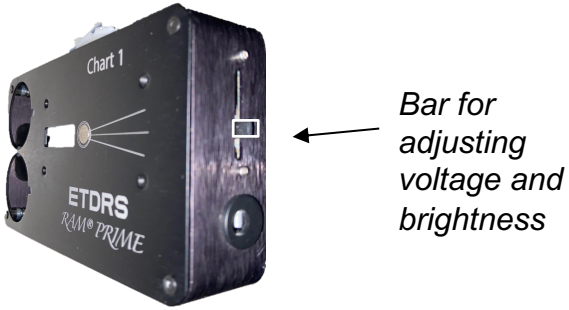
Retinal Acuity testing using any of the ETDRS charts, the RAM® pinhole, distance correction plus near correction, and super-illumination. RAM® testing eliminates other causes of vision loss to measure the ability of the macula to function. The light for RAM® testing is adjusted to bright, 9.0 volts or more.

Optional Retinal Acuity vision charts are available for the ETDRS-RAM with acuities ranging from 20/200 to 20/20. Potential vision (retinal acuity) charts are available in letter, numbers, Landolt C and tumbling E charts. These charts also allow more light transmission for super bright testing of eyes with dense cataracts.

Power.

Use **9 volt. NiMH** rechargeable battery. The brightness of the viewing window is adjustable by sliding the bar on the right end. The RED digital readout displays the voltage setting determined by the position of the bar on the right end. Sliding the bar down increases the voltage and brightens the vision chart and sliding the bar up reduces the voltage and dims the vision chart.
The voltage setting for **ETDRS** acuity testing is **5.28 volts** producing brightness of 85 cd/m^2. Bar is all the way up.
The voltage setting for **POTENTIAL** vision (retinal acuity) testing should be at least **8.5 volts** to produce brightness of 3000 cd/m^2 or more. Bar is all the way down.
Charger: Green light means charger is plugged-in. Does indicate full charge. Full charge when votes = 9 volts or more. Turns off automatically.





Letters for Chart 1 and Chart 2

CHART 1 RAM

ROW	SNELLEN	16"	8"	2"
1	20/800			N C K Z O
2	20/640			R H S D K
3	20/500			D O V H R
4	20/400			C Z R H S
5	20/320			O H N R C
6	20/250			D K S N V
1	20/200		N C K Z O	
2	20/160		R H S D K	
3	20/125		D O V H R	
4	20/100	C Z R H S	C Z R H S	
5	20/80	O H N R C	O H N R C	
6	20/63	D K S N V	D K S N V	
7	20/50	Z S O K N		
8	20/40	C K D N R		
9	20/32	S R Z K D		
10	20/25	H Z O V C		
11	20/20	N V D O K		
12	20/16	V H C N O		

CHART 2 RAM

ROW	16"	8"	2"
1			D S R K N
2			C K Z O H
3			O N R K D
4			K Z V D C
5			V S H Z O
6			H D K C R
1		D S R K N	
2		C K Z O H	
3		O N R K D	
4	K Z V D C	K Z V D C	
5	V S H Z O	V S H Z O	
6	H D K C R	H D K C R	
7	C S R H N		
8	S V Z D K		
9	N C V O Z		
10	R H S D V		
11	S N R O H		
12	O D H K R		

Packaging

- RAM PRIME XL/Interchangeable Charts
- Charts= Chart 1, Chart 2, Chart R, Revised Chart 1, Revised Chart 2
- Carrier Frames
- Pinhole-Lens Clip, 2 ea.
- Near Lens Clip 2.5/5.0 Diopters
- Low Vision Attachment
- Trial Frame Pinhole
- Magnetic Occluder
- Charger
- Lanyard Switch/Adjustable Lanyard
- Instruction Manual
- AMA Optics, Inc Lens Cloth

Options sold separately:
Potential 20/200-20/20 Chart
Super bright
Letter, Numbers. & Landolt C
Panoramic Pinhole