

NOVA BENEFITS



THE
NATURAL SOLUTION

Natural Viewing Angle

Stop and notice where you are holding this handout. Most likely, you are holding it down at a comfortable reading angle, the angle you use for reading a book. Nova gives you that same downward angle – the natural way to look at a computer.

Reduced Glare

Nova desks place the monitor under the desktop, beneath a tempered glass viewport that reduces glare when viewing at a comfortable distance from the eyes.

Enhanced Eye Contact

By removing the monitor from the desktop, Nova desks make it easier to converse and make eye contact with others.

Reduced Space Requirements

Nova desks offer the most efficient way to use valuable space. With computer-free workspaces, other job tasks not related to the computer can be performed, while computer access is just a look away.

Improved Privacy

The recessed monitor provides security for sensitive material and improves document confidentiality.

Wire Management

Nova hides unsightly computer cables. This also keeps the cables from accidental disconnection.

Lower Costs

Nova eliminates the need for a separate computer workstation or dedicated work area. This saves office space there by reducing cost.

Diverse Product Offering

The patented recessed-computer concept is available in various product lines with variety of styles, sizes and configurations. Nova also offers a Retrofit Kit for existing furniture and panel systems. As well as a complete line of quality casegoods.

Customer-oriented Company

Nova Solutions is a market-driven company that provides innovative solutions. These solutions are supported by innovative product development, world-class customer service and the timely delivery of quality products.

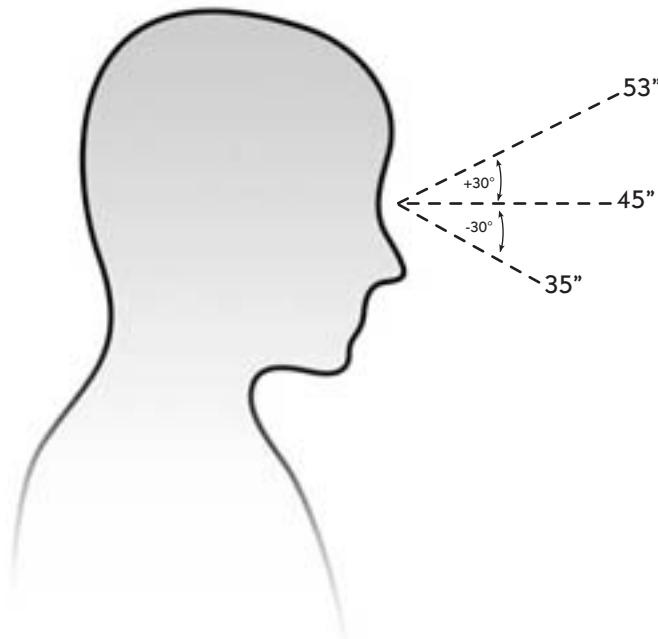


THE
NATURAL SOLUTION**Did you ever wonder...**

- Why you read a newspaper looking down and look straight ahead at your computer monitor?
- Why have we worked looking down until the last few decades when we started staring straight ahead?

Nova is “The Natural Solution”

- The downward gaze is our visual system’s natural way of viewing near work. It is the same angle you use when reading a book.
- Eyestrain, neck aches, back aches and dry eyes are problems experienced by computer users. The design of Nova can help reduce these problems. This in turn helps companies financially by saving in workman’s compensation, health insurance costs, absenteeism and the cost of training new employees.
- Two of the causes of eyestrain are:
 - **Accommodation** – Your eyes work harder to accommodate, or change focus, as the object they are looking at gets closer. Scientific studies have found your eyes improve their ability to accommodate simply by looking downward.
 - **Convergence** – Your eyes work to turn inward as the object you are looking at comes closer. The distance at which your eyes turn inward or converge is called the resting point of vergence. The closer the object you view from your resting point of vergence, the harder your eyes work. Your resting point of vergence comes closer as you look downward.
 - 30° upward gaze eyes converge at an average distance of 53” away.
 - Looking horizontal (straight-ahead like a conventional monitor) the average viewing distance is 45” away.
 - 30° downward gaze eyes converge at an average distance of 35” away.



***The Relationship
Between Convergence
and Viewing Angle***

Looking downward means your eye muscles converge with less stress!

- Most work surfaces are not deep enough to place a conventional monitor at a distance beyond the horizontal resting point of vergence (45”). If we lower the monitor downward 30°, a 35” viewing distance reduces eyestrain to the same extent that 45” would with a conventional monitor.
- Lowering the monitor and tilting it back reduces eyestrain and postural discomfort. This is due to the vertical horopter.

THE
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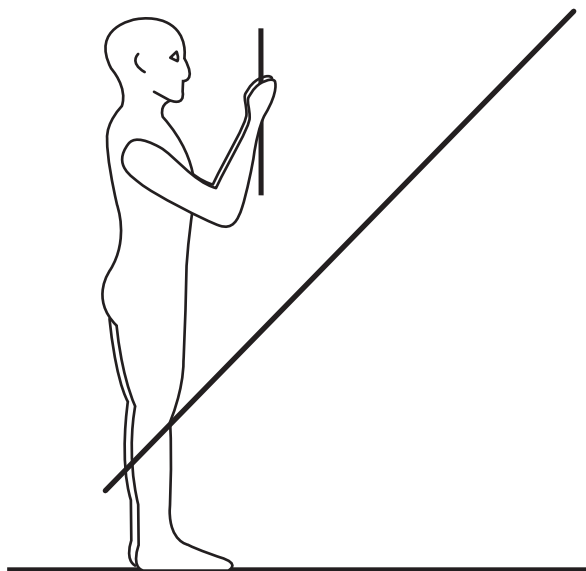
What is a horopter?

- It is the grouping of points in space, which appear as single images in our peripheral vision. Vertically, the horopter is a straight line that starts somewhere between the viewer's waist and feet, and projects outward (like the figure in the illustration below). If we look at the center of a vertical wire in front of us, both ends of the wire will appear as double images – until we tip the top away from us and the bottom towards us.

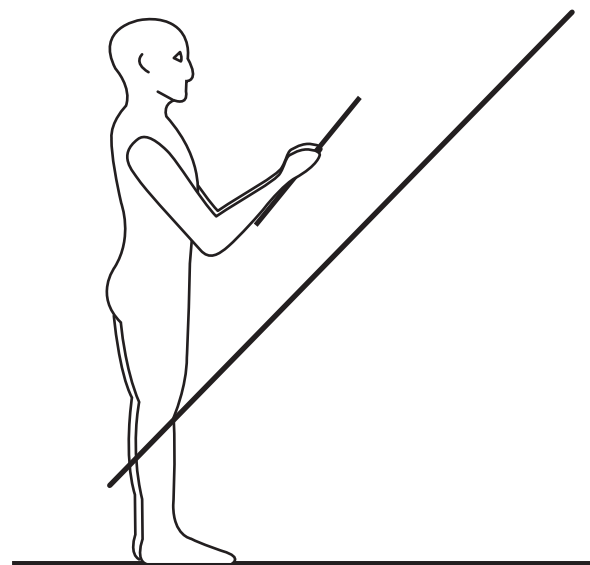
The vertical horopter means that we should tip back and lower our monitors. A vertical monitor on a work surface can increase eyestrain, neck and back discomfort.

- Tears evaporate at a faster rate when we gaze straight ahead at a monitor than they do when we look downward in a natural reading position. That is because less of the surface of the eyeball is exposed. Looking downward also increases the amount of tears our eyes produce. Lower monitor positions reduce the risk of dry eye syndrome.
- Viewing a monitor or any other close object at eye level is stressful and unnatural. Vision specialists confirm that a downward gaze improves the ability to focus and converge.
- Try this for yourself: Hold a business card at arm's length in front of your eyes. Slowly bring it toward you until the letters just begin to blur. Without moving your head, gradually lower the business card in an arc, keeping it the same distance from your eyes. You should notice the letters come into focus.

Your eyes improve their ability to accommodate or focus simply by looking downward!

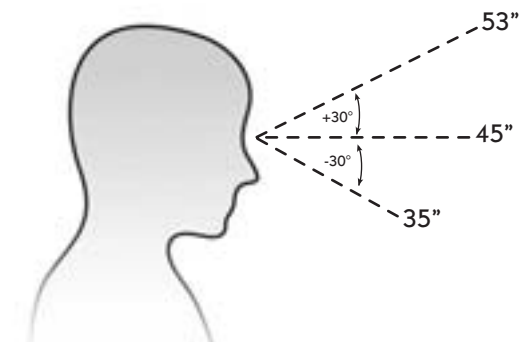


Double Images



No Double Images

SUMMARY



The Relationship Between Convergence and Viewing Angle

Try This Demonstration:

With your head erect, hold your finger at belt level. Quickly bring it towards you, follow it with your eyes until you see two fingers. Your eyes have reached a point where they can no longer converge on your finger. Now, without moving your head, try the same test at eye level and again notice the distance at which you can no longer converge. Now, bring your finger in from an upward gaze angle. As you can see and feel, your eye muscles converge much more easily with the downward gaze. Nova's lower monitor position takes advantage of your visual system's natural abilities.

We are often asked many questions regarding the science behind our product. We have developed this handout to address the most frequently asked questions. In turn, we hope all of your questions will be answered with scientific explanations of why the downward gaze is fast becoming the new standard for more and more computer users.

Would I have more neck and back strain by looking down? I think I would lean forward.

Do you have neck and back strain when reading a book or magazine? Most of us feel relaxed and comfortable. The same is true when you look down at a computer monitor. Nova users generally experience more neck and back comfort than they did when working at eye-level monitors.

The ability to move is important for comfort. Movement reduces static loads and increases blood circulation. Nova's monitor placement allows a wide range of voluntary neck postures with a minimum of postural and visual discomfort. The lower monitor position allows you to hold your head erect and direct your eyes downward. When that posture becomes tiring, you can flex your neck in a variety of non-stressful postures. These temporary changes of neck posture can relieve neck strain with little or no visual discomfort. A properly adjusted monitor will allow you to use a variety of healthy, productive postures. If you do find yourself leaning forward, one of two things is likely: Either the monitor is adjusted wrong or the letters on the screen are too small.

What is Accommodation?

Accommodation is the process by which the eyes adapt to maintain clear focus as visual targets get closer. When we look at close objects, a small muscle in each eye called the ciliary muscle changes the shape of the lens capsule. With proper accommodation, the lens bends the incoming light rays so that they strike the retina at a single point, allowing a sharp image to be interpreted by the brain. If the point at which the rays converge is too far in front of or behind the retina, the result is blur. The brain reacts to this blur and signals the ciliary muscle to alter the shape of the lens capsule, bringing the object into sharper focus. The closer the object is to the eyes, the harder it is for the eyes to focus.

The first step in reducing the demands on accommodation is to simply do less of it. Since a closer screen requires more accommodation, moving the screen back will reduce the load on accommodation. In addition, lowering the monitor will improve the ability to focus even more. Try this demonstration: Hold a business card at arm's length in front of your eyes. Slowly bring it towards you at eye level until the letters start to blur. Without moving your head, gradually lower the card in an arc, keeping it at the same distance from your eyes. You should notice the letters come into focus. Your eyes have improved their ability to accommodate or focus simply by looking downward.

What is Convergence?

The stress of convergence plays a major role in creating eyestrain. When we view close objects, our eyes converge, or turn inward towards the nose. The image of the object is projected to the same relative place on each retina. Without accurate convergence, we would see double images. The closer the object, the greater the strain on the muscles that converge the eyes.

Looking downward also makes it easier to converge as you can discover for yourself by trying the demonstration that is on the left.

What is the Vertical Horopter?

An important, but little known characteristic of the visual system is the vertical horopter. The horopter influences postural and visual comfort at VDTs. The word horopter, loosely translated, means the horizon of vision. The horopter is the locus, or grouping, of points in our field of view that appear to us as single images in our peripheral vision. Points that are anywhere else in space appear as double images.

Horizontally, the horopter is curved, with the sides coming closer to the observer. The vertical horopter, however, starts somewhere between the viewer's waist and feet. It projects outward, intersecting the point of fixation and continuing in a straight line. If an observer looks at the center of a vertical wire at a close distance, both ends of the wire will be seen as double in one's peripheral vision until the wire is tilted backward, with its top farther away from the observer. The existence of the vertical horopter means a monitor should be tipped back so that the top of the monitor is farther from the eyes than the bottom.

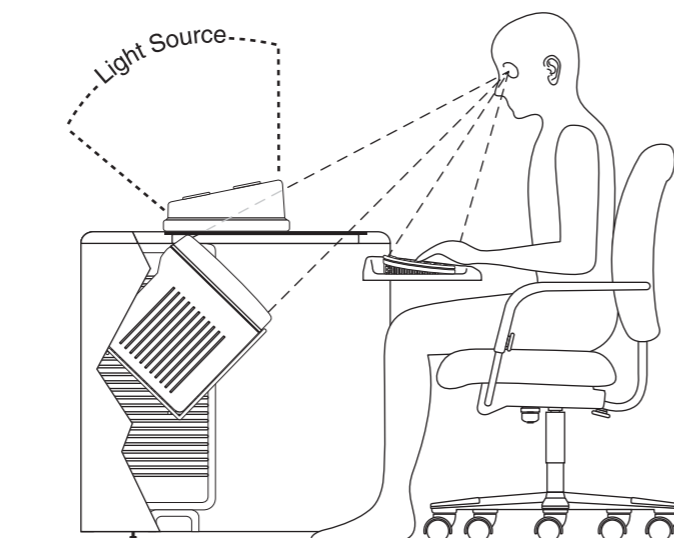
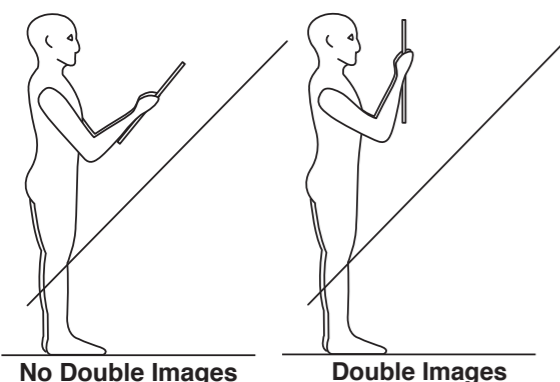
To understand the vertical horopter for yourself you can try doing the demonstration that is on the left.

How does Nova address glare on the glass?

Nova desks come with a tinted tempered glass viewport. A visor is supplied for unusual lighting situations. The standard tinted glass viewport enhances screen contrast by absorbing 59 percent of the light that passes through it.

As an option, Nova offers a viewport with an anti-reflective coating (CDAR™). This CDAR™ coating can reduce glare up to 99.7 percent. In many instances, the anti-reflective viewport can reduce reflections to an acceptable level.

Lighting design also plays an important role in reducing glare in the workplace. Ceiling suspended, indirect lighting provides the best solution for glare problems in any computerized office, along with not placing bright lights directly above or behind the user. If you cannot install indirect lighting, other measures will help to reduce glare. Fluorescent light fixtures with small cube parabolic or paracube lenses, properly located, can reduce the light directed on the monitor. Likewise, light redirection can be accomplished with baffles in recessed down lighting. Addressing the lighting layout in the early stages of design can prevent and solve many potential glare issues.



Try This Demonstration:

Try this demonstration: Notice how you are holding this brochure. Most likely, it is tipped back at the top and at a low gaze angle. Gradually rotate the top forward until the top is closer to your eyes than the bottom. You will notice it becomes increasingly harder to read the brochure as you rotate it forward. The difference you notice in your ability to read the brochure is caused by the vertical horopter.

Will I be too far from the monitor?

Vision specialists agree that the closer the viewing distance, the greater the strain on the visual system. The greater the viewing distance, the less stress on the muscles that converge the eyes. The eyes have a resting point of vergence (RPV) at which the eyes converge with little or no stress. If the viewing object is close to or beyond that resting point, eyestrain is reduced. The RPV comes closer with a downward gaze angle. At a horizontal gaze angle, it averages 45 inches. However, when you look downward 30 degrees, the RPV comes in to about 35 inches. With a conventional workstation, it is difficult to get the monitor far enough away (average distance of 45") due to the depth of most work surfaces. If we cannot move the monitor farther away, lowering it can have the same effect in reducing eyestrain.

How do people with bifocals use a Nova desk?

Bifocal users usually view the monitor out of their upper segment of their glasses. They can do this because the monitor is farther away. With a close eye-level monitor, they often suffer constant neck discomfort from bending their necks back to see their monitor. Bifocal users experience less neck and back strain due to Nova's downward gaze.

What size monitors fit in the desk?

Nova accommodates most monitor sizes. See the artwork to the right for the specifics on monitor sizes.

Will my knees hit the monitor support?

Nova provides adequate depth between your knees and the recessed monitor carriage. With the keyboard tray pulled out, there is even more room. Most people should fit comfortably seated at a Nova desk.

How easy is the monitor support to adjust?

The monitor support adjusts with four tracking blocks, locking tabs and security screws. The monitor support adjusts three ways: height, angle and forward and backward. It is easier to adjust for proper angle first. The top front of the screen should be set slightly farther from your eyes than the bottom of the screen. Once the angle has been set, adjust the height by raising or lowering both upper and lower tracking block assemblies at the same time. The top front of the monitor should be as close to the underside of the glass as possible without noticeably raising it. Then push the carriage back so that the top of the monitor is at the back of the viewport. See the artwork to the right as an example.

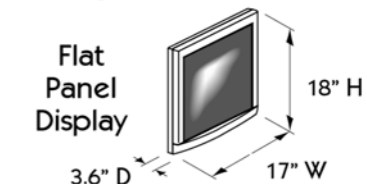
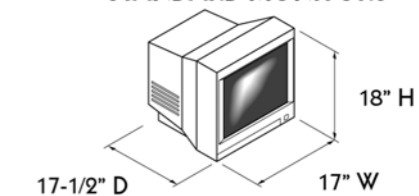
How did the conventional monitor placement develop?

By accident! When computers first became part of the work environment, it saved space to put the monitor on top of the CPU on a desk. This put it at about eye level. Over the years, scientific research has shown that the downward gaze angle allowed by Nova improves our ability to focus and converge on the monitor.

Ergonomic standards such as those from the International Standards Organization (ISO 9241 - part 5) have been revised to incorporate the benefits of a downward gaze angle at computer workstations.

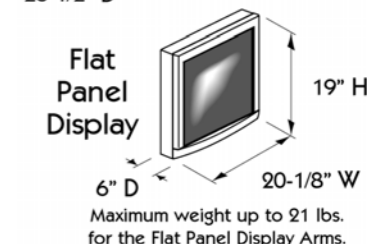
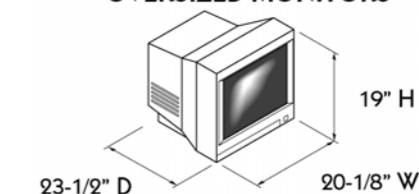
Monitor Dimensions

STANDARD MONITORS

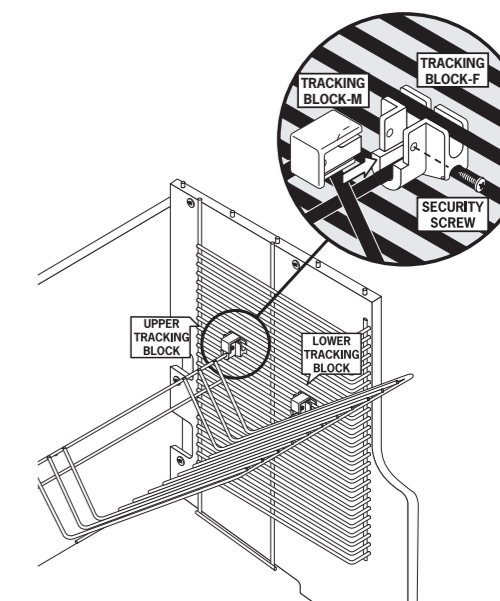


Maximum weight up to 9 lbs. for the Flat Panel Display Arms.

OVERSIZED MONITORS



Maximum weight up to 21 lbs. for the Flat Panel Display Arms.



Adjusting Monitor Supports

What if I have existing furniture and I want to use Nova technology?

Nova offers a Retrofit Kit that can be installed in most freestanding casegoods and systems furniture workstations. The Retrofit Kit consists of the monitor support, keyboard tray, tempered glass and visor. Instructions and a template assist a local millwork person or furniture installer in preparing the work surface and installing the Retrofit Kit. After the hole is complete, the monitor support, keyboard tray and tempered glass are installed. Once the installation is complete, you can begin to receive the benefits of the downward gaze angle - The Natural Solution™.

What scientific studies support the technology of Nova?

The following studies and standards are available through Nova Solutions, Inc. upon request:

- A Challenge to Eye-Level, Perpendicular-to-Gaze, Monitor Placement. Proceedings of the 13th Triennial Congress of the International Ergonomics Association June 29-July 4, 1997. Tampere, Finland. Volume 5, p. 35-37. (1997).
- Design of the Computer Workstation. Karl H. E. Kroemer. Handbook of Human-Computer Interaction, p. 1395 - 1414. (1997).
- Fitting the Task to the Human. K. H. E. Kroemer and E. Grandjean. A Textbook of Occupational Ergonomics, p. 63 - 66. (1997).
- Heart Rate Variability in Eye-Level and Low Monitor Conditions. Proceedings of the Seventh International Conference on Human-Computer Interaction (HCI International '97). Vol. 1, p. 571 - 574. Elsevier: Amsterdam. (1997).
- Lower your VDT Monitor. Workplace Ergonomics, p. 32-35. (1995).
- Posture, Comfort and Monitor Placement. Ergonomics in Design, p. 7-9. (1995).
- Some New Visual Considerations at Computer Workstations. Proceedings from World Workplace '95 - Volume I.
- The Vertical Horopter and the Angle of View. In A. Grieco, G. Molteni, B. Piccoli and E. Occhipinti (eds.). Work With Display Units '94. Amsterdam: Elsevier. (1995).
- The Vertical Horopter and Viewing Distance at Computer Workstations. Proceedings of the 6th International Conference on Human Computer Interaction (HCI International '95). Amsterdam: Elsevier. (1995).
- VDT-Work with Different Gaze Inclinations. A. Grieco, G. Molteni, B. Piccoli and E. Occhipinti (eds.). Work With Display Units '94. Elsevier Science B.V. (1995).
- Viewing Distance at Computer Workstations. Workplace Ergonomics, p. 10-12, Sept.-Oct. (1996).

SUMMARY

The Retrofit Kit

