

Repetitive Strain Injury (RSI) Training

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About Repetitive Strain Injuries

Repetitive Strain Injuries (RSI) or Cumulative Trauma Disorders (CTD) are terms used to describe a range of injuries associated with long hours of repetitive movement. RSIs or CTDs occur when overuse or misuse of the body is chronic, zapping the same body part or parts with repeating micro-injuries--an accumulation of wear and tear that can be painful and disabling. The condition can appear suddenly or slowly. The ease of keystroking, which lends itself to long periods of rapid and repetitive movement, and the poor posture of many desk-sitters make computer users prime targets of RSIs or CTDs.

Common Problems

RSIs or CTDs can cause a variety of symptoms, and early symptoms can be hard to notice, so many computer users may not realize that problems are underway. The following is a list of possible symptoms affecting the arms or hands:

- Burning pain during non-computer time, particularly in the middle of the night
- Localized pain or dull achiness, with or without movement
- Localized tenderness when touched
- Radiating pain that seems to travel up and down the arm or shoulder area
- Numbness and tingling
- Loss of muscle coordination or control
- Stiffness

With RSIs or CTDs, it is common for several injuries to occur at once, causing multiple symptoms that may be tricky to pinpoint; weakness in one body part affects related body parts. Tingling in the hand, for example, could be related to a problem in the forearm. Or, pain at the elbow may be linked to the neck. Many specialists believe that psychological stress is a major contributor to computer-related RSIs or CTDs, since a common response to psychological stress is tensing muscles and tendons.

Muscles

Keystroking cannot occur without muscle power from the upper back, arms, and shoulders. But overdoing it can strain and fatigue muscle fibers, often causing inflammation and soreness. Injured muscles are also prone to spasm--uncomfortable but not always painful. It is not forceful movements that normally injure the arm and shoulder muscles of computer users, but chronic tensing combined with repetitive movement.

Many computer users maintain postures that involve constant tensing of their neck, arm, and shoulder muscles, eventually impairing their efficiency. Stress can lead to further tensing. Meanwhile, repetitive movements are demanding the muscles to perform: the stage is set for overworked muscles. Since blood nourishes and cleanses muscle tissue, poor circulation caused by static postures also contributes to muscle strain.

Joints

Strong fibers called ligaments attach bone to bone, forming joints. Some joints are encased in a fluid-filled lubricating capsule that allows for a range of movement. Many computer users chronically overextend the ar_ins, making them particularly vulnerable to joint problems at the shoulder and elbow. Once damaged, joints can become unstable and susceptible to recurring injury.

Some joints rely on bursae for cushioning. Bursae are fluid-filled sacs that help pad unprotected joints and unsheathed tendons from bone. Irritated tendons can irritate and inflame adjacent bursae, a condition called bursitis. Bursitis commonly occurs near the shoulder joint, causing pain and impaired movement. (There is controversy among specialists as to whether computing aggravates existing cases of bursitis, causes new ones, or both.)

Tendons

Tendons connect muscles to bones. When muscles tense, tendons usually tense too. Chronically tensing or straining muscles and tendons can lead to tendinitis, a painful irritation and inflammation of the tendons, or to tenosynovitis, an inflammation of the tendon sheath.

Tendinitis. Tendons located near joints are particularly prone to tendinitis, because they are often unsheathed or unprotected. The most common RSI or CTD, tendinitis, is marked by localized tenderness or achiness, swelling, shooting pains, and pain with arm movement. Tendon strain is also associated with sudden or severely awkward movements.

In the arms, many kinds of tendinitis are associated with computer use.

- Flexor tendinitis, which affects the tendons on the inside of the arm and hand, is caused by chronically flexing the fingers down from the wrists.
- Extensor tendinitis, which affects the tendons on the outside of the arm and hand, is caused by chronically extending the fingers up and back from the wrists.
- Tennis elbow (lateral epicondylitis), which affects the outside of the elbow is often associated with repetitive, jerky motions of the arms.
- Golfer's elbow (medial epicondylitis), which affects the inside of the elbow, can be caused by bending the wrist while rotating the forearm.
- Rotator cuff tendinitis, which affects the tendons at the shoulder joint, can be caused by working with a constantly raised elbow.

Tenosynovitis. Tendons often run through lubricating fluid-filled protective sheaths, called synovial sheaths; the lubricating fluid is called synovial fluid. Repetitive movement sometimes cause the accumulation of excess synovial fluid, a condition called tenosynovitis. Symptoms of tenosynovitis include swelling, pain with movement, redness and pain to the touch. De Quervain's disease is a tenosynovitis that affects the thumb region, associated with constantly extending the thumb to reach the space bar. Tenosynovitis of the flexor tendons contributes to a condition called carpal tunnel syndrome.

Nerves

Nerve pathways travel from the upper spine to the fingers. Problems anywhere along the route can trigger symptoms, often elsewhere. Nerve irritation in the neck, arms, or shoulders, for example, can cause symptoms in the hands and wrists. Severe problems can cause permanent, disabling damage.

The most common nerve problem for computer users is carpal tunnel syndrome (CTS). Ulnar nerve problems also can occur from computer use. The ulnar nerve, which runs down the arm to the wrist, is particularly vulnerable to irritation at the elbow. Often this irritation occurs at a particular location, the cubital tunnel, and so the condition is called cubital tunnel syndrome. Cubital tunnel syndrome is linked to constantly pushing the elbow against hard surfaces, such as armrests or desk edges, putting chronic pressure on the ulnar nerve.

Carpal Tunnel Syndrome

Sometimes called the epidemic of modern times, carpal tunnel syndrome (CTS) gets more attention than any other computer-related CTD. CTS is so notorious because it can be so debilitating--advanced cases can leave permanent nerve damage, severely limiting hand movement and coordination. Some CTS sufferers lose their ability to use a keyboard, and have to change careers. CTS was also one of the first RSIs or CTDs widely reported by computer users.

The good news is that when caught early, treatment combined with changes in computing behavior can reverse the course of CTS.

CTS occurs when the median nerve is entrapped in the carpal tunnel (see diagram on p. 7). Symptoms of CTS include pain, numbness, and tingling in the hands, particularly in the first three fingers and the thumb. The same symptoms can appear in the forearms, often at the same time as in the hands.

CTS also causes burning pain the wrist during time away from the computer, particularly in the middle of the night--even to the point of waking up some sufferers. Night burning and numbness are among the best diagnostic indicators of CTS.

Preexisting conditions, such as arthritis or scar tissue from prior hand or wrist injuries, may exacerbate CTS; they can also make exact diagnoses difficult. Pregnant women are more vulnerable to CTS due to edema, or fluid retention, which often occurs with pregnancy. Low thyroid activity, diabetes, and other illnesses can contribute to CTS, as can a pinched nerve in the neck or thoracic region.

(Thoracic Outlet Syndrome. The thoracic outlet is a triangular region located above the shoulder between the collarbone and the neck. Blood vessels and nerves serving the arm pass through this area. There is some controversy among specialists about the impact of computing on the thoracic outlet, but many believe that some computer users develop postures that chronically compress the nerves and blood vessels in the region, triggering neck tension, shooting pains, tingling, and numbness down the arm.)

Take Precautions

Preventive measures reduce the likelihood that any computer-related CTD will occur. Many arm and shoulder problems can be prevented or minimized by following a few guidelines. Depending on the job or nature of the computing work, some will be easier to adhere to than others. Try to incorporate as many preventive measures into a work routine as possible.

Work Defensively

Prevent wrist and hand problems from occurring with these methods.

- Create diversity in your work tasks to avoid long periods of time in the same movement. Take frequent rest breaks from repetitive keystroking.
- Try warm-up or break exercises and stretches.
- Pay careful attention to the positioning of the keyboard. Train yourself to use light keystroking to avoid force.
- Stay warm. Working at cold temperatures may increase the chance of developing RSIs or CTDs.

Straighten Those Wrists

Constantly flexing the extending the hands up and down by bending the wrists is believed to be a major contributor to CTS and other hand and wrist problems. Do whatever it takes to keep the hands flat and even with the wrists and forearms. This is best achieved through proper positioning of the desk and keyboard. Also avoid constantly stretching the hands side-to-side from the wrists. Keep hands straight. And watch out for pushing or resting wrists or forearms against hard desk edges; this can compress nerves and cause nerve problems.

Be Mindful of Mouse Movements

Any movement that is repeated over and over, including gripping, pushing, or clicking a mouse, can injure related body tissues. When using a mouse, try to avoid over stretching the fingers or the thumbs. And watch those pinkies. Keep the mouse in each reach from the keyboard, and be gentle; don't grab or tap the mouse forcefully. Mouse users should avoid extending or flexing their wrists. Keep wrists even with the hands and forearms. Try a trackball or other alternative.

Pay Attention to Posture

Awkward postures put uneven stress on body parts, leading to myriad problems, particularly of the neck, shoulders, and arms. Do not slouch forward or round your shoulders. Sit in a comfortable position that evenly distributes weight over your spine, while supporting your lumbar curve. Arms should extend comfortably from the elbow so that hands can use the keyboard without bending up or down at the wrist. Avoid bad resting habits, such as leaning your forearms or wrists on the desk or arm rests. Frequent leaning can compress nerves, causing nerve damage and impaired muscle functioning.

Don't Be a Creature of Habit

Most computer users develop idiosyncratic posture-related work habits--e.g., pressing the forearms into the desk edge, tilting the head towards the window, keeping one arm mostly on an arm rest, drooping the chin into the chest. Any time the body does the same thing over and over, day after day, it stresses and strains the involved body parts, potentially leading to--or exacerbating-- RSIs or CTDs. It is much safer to move around and change positions frequently, keeping the body lively and active.

(The preceding text is an extended quote from the following:

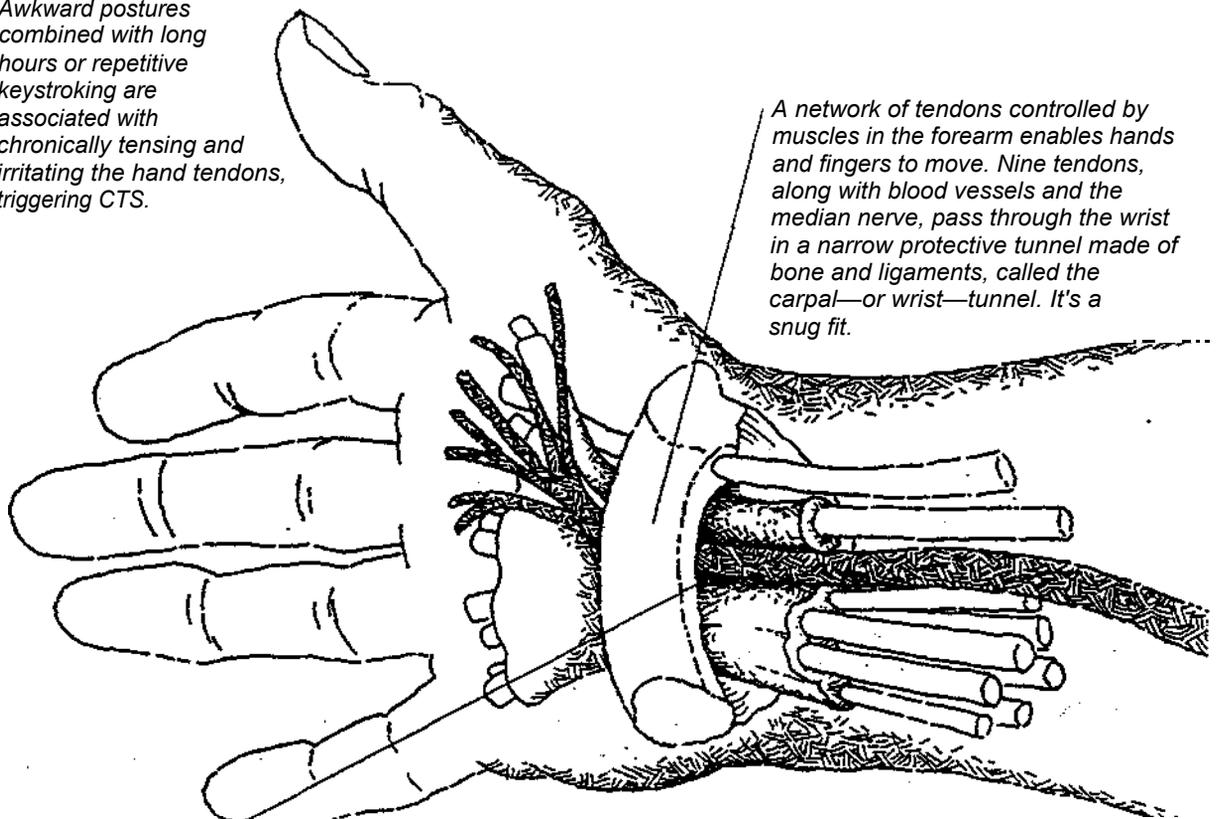
Sellers, Don. *Zap! How your computer can hurt you--and what you can do about it*. Peachpit Press, Inc., Berkeley, CA. 1994. [pp.67-74].)

The Physiology of Carpal Tunnel Syndrome

Physiology of Carpal Tunnel Syndrome

Awkward postures combined with long hours or repetitive keystroking are associated with chronically tensing and irritating the hand tendons, triggering CTS.

A network of tendons controlled by muscles in the forearm enables hands and fingers to move. Nine tendons, along with blood vessels and the median nerve, pass through the wrist in a narrow protective tunnel made of bone and ligaments, called the carpal—or wrist—tunnel. It's a snug fit.



Median nerve

CTS occurs when the tendons that pass through the carpal tunnel become inflamed and swollen, compressing the median nerve. The carpal tunnel just doesn't have the room to accommodate swollen tendons. The tissue of chronically irritated tendons can toughen, thicken, and develop permanent scar tissue, further exacerbating hand movement.

Source: Don Sellars, *Zap! How Your Computer Can Hurt You* (Berkeley: Peachpit Press, 1994), p. 69.

Ergonomic Keyboards and Keyboarding Accessories

Adjustable Keyboards for Apple

Vendors:

MacMall
www.macmall.com/
CompUSA
www.compusa.com/

Retail Cost:**System Requirements:**

Macintosh computers

Description:

Apple Computer Company Store in Cupertino recommends that buyers contact these companies when desiring to purchase ergonomic keyboards for a Macintosh computer.

Bat Keyboards (Win/Mac)

Vendor:

Infogrip, Inc.
1141 East Main Street
Ventura, CA 93001
(800) 397-0921
www.infogrip.com

Retail Cost: \$199.00 to
\$ 350.00.00

System Requirements:

Keyboards for Windows machines and for Macintosh machines are available.

Description:

There are two keyboards: one for the left hand and one for the right hand. Each keyboard has three keys for the thumb and a single key for each of the four fingers. Characters are entered by using special finger combinations to simultaneously depress a set of keys (e.g., thumb on middle thumb key and the index and middle fingers on their respective keys).

Recommended Uses:

The Bat keyboards provide an efficient means of single hand keyboard entry. Minimal hand motion is required to enter characters.

Microsoft Natural Keyboard (Win)

Publisher:

Microsoft Corporation
One Microsoft Way, Redmond, WA 98052-6399
(800) 426-9400 (Microsoft Customer Service)

<http://www.microsoft.com/products/>

Retail Cost: \$ 99.00 (often discounted)**System Requirements:**

Windows-based computer

Description:

Its split-key, sloped keyboard promotes a natural wrist posture. A built-in palm rest provides a comfortable resting place for hands while not typing. The keys have a soft, tactile action and standard Qwerty key layout facilitates the user's adapting to the split keyboard.

Recommended Uses:

Recommended for anyone wishing to modify standard typing positions
Published research on this keyboard:
<http://www.microsoft.com/products/hardware/natkeybd/intro.htm>

Notes:

Microtype Space-Saver Keyboard

Vendor:

Datalux Corporation
155 Aviation Drive
Winchester, VA 2260
(800)328-2589

Retail Cost: \$105.00**System Requirements:**

Windows-based computer

Description:

This is a compact 100-key unit with relocated key clusters, and row shrinkage.

Recommended Uses:

Because of the smaller size of this keyboard, range of arm motion is reduced. The keyboard is very light and can easily be moved to different positions (e.g., on the lap).

MiniErgo Keyboard

Vendor:

Marquardt Switches, Inc.
270 Route 20 East
Cazenovia, NY 13035
(315) 655-8050
(315) 655-8042 Fax

Retail Cost: \$ 175.00**System Requirements:**

Windows-based computer

Description:

This keyboard is designed to keep the hands and wrists in a straighter, more natural position. The alpha keyboard is positioned in a gently sloping V-configuration. A single set of arrow keys and an Insert and Delete key are positioned in the V-section between each side of the QWERTY keyboard

The number keypad is embedded in the right half of the alpha keyboard; tapping the **NumLock** key activates this function. If a separate numeric keypad is desired, it can be purchased for \$125.00, and it plugs directly into the keyboard. The separate numeric pad can be positioned to the right or to the left of the keyboard, facilitating use for left-handers.

Recommended Uses:

This is a functional alternative to the standard keyboard. Its ergonomic design may reduce hand and wrist stress which generate RSIs. Additionally, the fact that the numeric keypad can be placed on the left side of the keyboard enhances numeric entry for left-handers.

Basic Use:

1. Use the thumb to operate the special keys in the center V-section.
2. Hold down the special **Function** key (bottom left key) to convert the arrow keys in the center V-section to **PageUp**, **PageDn**, **Home**, and **End** functions.
3. If there is no separate number keypad attached, tap the **NumLock** key to activate the numeric keypad embedded in the keyboard.

PC Mini Keyboard

Vendor:**Retail Cost: \$750.00**

TASH, Inc.
91 Station Street, Unit 1
Ajax, ON, Canada MS 3H2
(416) 475-2212

System Requirements:

Windows-based computer

Description:

This is a miniature direct plug-in alternative keyboard for PCs that can be activated by one finger, one hand or a mouth stick. This keyboard does not use the standard QWERTY configuration; instead letters are arranged so that those which occur most frequently are easiest to reach. A keyguard is available for \$55.00.

Recommended Uses:

This is an alternative for persons needing to reduce range of motion. Very little pressure is required to generate a character.

Typex Comfort Type Palm Support

Vendor:**Retail Cost: \$ 198.00**

Typex
32121 Fall River Road
Trabuco Canyon, CA 92679
(916) 877-2772
(714) 858-9060

Description:

Two palm supports glide smoothly over the keyboard. The palm/hand supports are mounted on an articulating bar, and a free range of supported motion is experienced.

Recommended Uses:

The supports are designed to maintain proper hand positioning over the keyboard, and arm and shoulder tension is reduced.

ErgoRest

Vendor:

Keyboard Alternatives
537 College Avenue
Santa Rosa, CA 95404

800-953-9262

Retail Cost: \$ 169.00 per set**Description:**

This type of moveable forearm rests reduce muscle tension in neck and shoulders. The padded, contoured arm rests and pivoting arms support forearms and provide smooth, supported 360 degree movement.

Recommended Uses:

Useful for someone needing additional arm support.

Roll and Slide Wrist/Forearm Support

Vendor:

Ability Center of Greater Toledo
5605 Monroe Street
Sylvania, OH 43560
(419) 885-5733

Retail Cost: \$ 125.00**Description:**

Foam-padded rollers glide on bearings along stainless-steel shafts. An alternate height level is possible when the device is turned over. The device is placed in front of the keyboard.

Recommended Uses:

Designed to provide a feel of a "seamless" glide as forearms or wrists move vertically or horizontally.

Wrist Reminder

Vendor:

Visible Catalog
Wallace Computer Services, Inc.
1750 Wallace Avenue
St. Charles, IL 60174
(800) 323-0628

Retail Cost: \$ 19.95**Description:**

A plastic palm support is secured on wrist with Velcro strap. The hand has complete freedom of motion, yet "floats" on the palm support as user types.

Recommended Uses:

This is useful for persons wishing to minimize stress on wrists.

Height Adjustable Wrist Rest

Publisher:

Visible Catalog
Wallace Computer Services, Inc.
1750 Wallace Avenue
St. Charles, IL 60174
(800) 323-0628

Retail Cost: \$24.95**Description:**

Padded wrist rest supports wrists as user types. The height adjusts by turning knobs located on each end of the 22" long support; the height range is 3/4 inch to 1 3/4 inches from work surface to top of pad. Position at base of keyboard.

Recommended Uses:

Suggested for persons requiring or wanting wrist support while typing.

Wrist Saver Bundle

Vendor:

Retail Cost: \$ 25.00

Mac Warehouse
P.O. Box 3013 Oak Street
Lake Wood, NJ 08701-3013
(800) 255-6227

Description:

Two nylon-covered neoprene rubber pad supports: one designed to be placed at base of keyboard; the other a mouse pad attached to a wrist saver support (8" by 9.5").

Recommended Uses:

For anyone desiring or needing wrist support while typing or using mouse.

CoStar Stingray Track Ball Mouse (Win/Mac)

Vendor:

Retail Cost: \$ 69.00

Mac Warehouse
P.O. Box 3013 Oak Street
Lakewood, NJ 08701-3013
(800) 255-6227

System Requirements:

Available in Mac or WINDOWS versions.

Description:

This unusually shaped mouse has "wings" mounted on either side of the raised center portion in which the track ball is mounted. The "wings" serve as large buttons and support the hand comfortably.

Recommended Uses:

This is useful for persons wishing to use a track ball-type mouse. Using a track ball mouse required less arm and wrist movement.

Felix the Mouse

Vendor:

Keyboard Alternatives
537 College Avenue
Santa Rosa, CA 95404
800-953-9262

Retail Cost: \$ 115.00

Description:

This mouse has a rounded glide point which is permanently held within a small glide surface rectangle. Directional movement of the glide point within this area moves the mouse pointer around the screen. Very little arm motion is required to move the mouse pointer around the computer screen. Mouse clicks are made from the central gliding point.

Recommended Uses:

This device may be useful for persons needing to reduce arm motion.

Logitech Trackman (WIN)

Vendor:

PC Select
2300 Valley View Lane
Irving, TX 75062-5058
(800) 547-5444

Retail Cost: \$ 79.00

Description:

A track ball which is designed for thumb operation of the tracking ball and finger operation of three buttons. Right and left-handed models are available.

Recommended Uses:

Recommended for persons wishing to take advantage of track ball mouse operation.

Kensington Expert Mouse (win)

Vendor:

PC Select
2300 Valley View Lane
Irving, TX 75062-5058
(800) 547-5444

Retail Cost: \$99.00**Description:**

This track ball mouse is known for its very large tracking ball which allows the cursor to be moved with very little hand or finger movement.

Recommended Uses:

This mouse is recommended for persons wanting to use a very large tracking ball.

Kensington Turbo Mouse (Mac)

Publisher:

Mac Warehouse
P.O. Box 3013 Oak Street
Lakewood, NJ 08701-3013
(800) 255-6227

Retail Cost: \$99.00**Description:**

This track ball mouse is known for its very large tracking ball which allows the cursor to be moved with very little hand or finger movement.

Recommended Uses:

This mouse is recommended for persons wanting to use a very large tracking ball.

Thumbelina Mouse

Vendor:

PC Select
2300 Valley View Lane
Irving, TX 75062-5058
(800) 547-5444

Retail Cost: \$69.00**Description:**

This very small, hand held or stationary mouse with a pea-sized trackball designed to be operated by the thumb. The mouse will even operate upside down.

Recommended Uses:

This may be useful for persons wanting to use very little arm movement when operating a mouse.

Exponent Foot Rest

Vendor:

Fry's Electronics
<http://www.micronics.com/distvar/frys.html>

Retail Cost: \$ 19.99**Description:**

This adjustable footrest provides foot and leg support for proper posture during repetitive motion tasks. The basic footrest has a fluid rocking motion which allows for easy angle adjustment. Two bumpy massage rounds can be inserted into the footplate if self-foot massage is desired.

Recommended Uses:

Useful for anyone desiring to create the possibility of multiple work postures in order to reduce sustained postural positions.

Selecting Wrist and Forearm Support

Stationary Wrist and Forearm Support

If properly selected and positioned, a wrist rest or wrist-forearm support can help to:

- maintain neutral wrist alignment;
- reduce desk edge pressure on the wrist and palm; and
- unload the muscles and joints of the shoulders and neck.

Anatomy of a Stationary Wrist-Forearm Support

Most supports consist of a foam pad that sits in front of the user's keyboard. The foam may be soft or firm, and some models have a built in contour. The idea is to comfortably distribute weight pressures while keeping the wrists in a neutral alignment. These pads are often made entirely of foam. More durable models have a foam pad over a wooden, plastic, metal, or fiberglass form.

Many pads are covered. Cover materials function to make the pad surface comfortable, reduce friction, or keep the pad clean. Usually foam, vinyl or nylon covers are easy to clean, but can "warm up" because these materials reflect heat from your body. Fabric is often harder to clean, but can be cooler.

Many also have a platform that attaches to the pad and extends underneath the keyboard. This allows the keyboard and support to be moved together. Models with stiff platforms also offer more position choices (e.g., placement under the forearms rather than the wrist). The platform stiffness is usually a function of the material thickness (metal, Plexiglas, plastic or masonite). These often have non-skid pads mounted to the under surface to keep the support from sliding around.

Fitting a Stationary Arm/Wrist Support

Not all wrist supports feel the same! Generally, to keep the wrists in a neutral position, the support height should be slightly lower than the home row keys. This assumes that the user is seated comfortably: feet flat on the floor or footrest, uniform weight pressures along the thigh and buttocks, appropriate thigh-torso angle, desk height approximately level with the elbows, and computer keyboard tilted at a comfortable angle.

Modern computer keyboards (1991) usually require a support height of around one inch. Many individuals will rest the heels of their palms on the support, while others will position the support under their wrist. Individuals with neck and shoulder discomfort may find more relief if they position the support under their forearms, an

inch or two from the keyboard. Generally, wider supports offer better pressure distribution.

This handout courtesy of

back designs, inc, 1045 Ashby Avenue, Berkeley, CA 94710 (510) 849-1923

Assistive Software

Dragon NaturallySpeaking Preferred 4.0 (Win 95/98/NT)

Publisher:

Dragon Systems
320 Nevada Street
Newton, MA 02160
(800) 825-5897
<http://www.dragonsys.com>

Retail Cost: \$199.00 approx.

System Requirements:

Minimum: 200-MHz Intel® Pentium® processor with MMX™, or equivalent, IBM() compatible PC, Windows® 95, Windows 98, or Windows NT® 4.0 (with Service Pack 3 or greater). **Memory Requirements:** Minimum: 48 MB RAM for Windows 95 and 98 (64 MB is recommended), 64 MB RAM for Windows NT 4.0. **Hard Drive Requirements:** 200 MB free hard-disk space, CD-ROM drive for installation. **Audio:** Creative Labs® Sound Blaster® 16 or equivalent sound board supporting 16-bit recording.

Description:

Dragon NaturallySpeaking is a speaker dependent, continuous speech recognition system. The active vocabulary size is 160,000 words with a 250,000-word dictionary that allows for accurate word prediction and spelling. Text can be dictated at around one hundred words per minute. The system accommodates multiple voice profiles per computer.

Features include: Select-and-Say™ editing and convenient Dictation Playback and Text-to-Speech to speed editing and proofreading and the ability to launch applications and drop-down menu commands by voice. Users can now navigate the Internet by speaking URLs and into fields in Web pages when using Internet Explorer 4.0 & 5.0.

Recommended Uses:

This program is recommended for persons with repetitive strain injury or moderate to severe physical disabilities that impair keyboard usage. Users must be able to produce consistent speech output.

Basic Use:

Each user must individually train Dragon NaturallySpeaking. Training is accomplished through use of the General Training program. Creating a voice profile and completing the training process takes about 45 minutes unless you have a faster than 300 MHz processor which may reduce training time to just a few minutes. NaturallySpeaking works within its own dedicated word processing environment as well as within many popular applications. When using NaturallySpeaking, the following steps are taken:

1. Load NaturallySpeaking from the Programs menu.
2. Activate the microphone by pressing the numeric keypad + key.

3. Begin speaking clearly and distinctly in short phrases with brief pauses between each phrase.
4. If a phrase or word selected by NaturallySpeaking is incorrect say "**Correct**" and the **word or phrase** to be corrected.
5. If the correct phrase or word appears in the suggestion list, say "**Choose**" and then the number of the desired phrase or word in the selection box.
6. If the desired phrase or word does not appear in the selection box, say "**Spell That**" and begin spelling the word using the letters of the alphabet. Generally, the correct phrase or word will be identified after the first one or two letters have been spoken. When the desired phrase or word appears, say "**Choose**" and the number of the phrase or word.

Intermediate Use:

Users can insert punctuation marks by saying the name of the mark, (i.e. "**period,**" "**comma,**" "**question mark**"). A variety of options exist for selecting text. Saying "**Select**" then **word, line, paragraph** or **document** selects a portion of text that can then be edited or formatted in a number of ways. (See attached Quick Reference Guide).

Reading Text

Listening to text that has been dictated provides a useful method for identifying recognition errors. NaturallySpeaking provides two methods for listening to dictated text:

To play back digitally recorded speech of your voice dictating text, select the text to be read (i.e. say "select previous paragraph") then say "play that back." Please note that this option only works for text that has not been previously saved and then reloaded.

To play back computer-generated speech of any text in the NaturallySpeaking composition window, select the text to be read (i.e. say "select previous paragraph") then say "read that." This option works for any text file.

Mouse Grid

NaturallySpeaking provides a **Mouse Grid** navigation system similar to that used in previous and current versions of Dragon Dictate to move the mouse pointer. Saying "**MouseGrid**" displays a 3x3 grid with nine numbered squares which cover the entire screen. Saying the number of a square "refocuses" the grid to the selected square. Repeating the selection process moves the mouse pointer to the desired object by a process of approximation. Saying "**click**" selects the object.

Saying "**MouseGrid Window**" opens the Mouse Grid in the current window. Additional fine-tuning of the mouse pointer can be accomplished by using a limited set of mouse

movement commands. Say "mouse (up, down, left or right)" followed by a number between 1 and 10, will move the mouse a few pixels in the selected direction. For example, saying "mouse up 9" will move the mouse pointer up about one-eighth of an inch.

Advanced Use:

Using Internet Explorer by Voice

If you install the NaturalWeb™ Internet Explorer compatibility module you can control Internet Explorer and follow links by voice. Start Dragon NaturallySpeaking before you start Internet Explorer. If Internet Explorer is already running, close it. Start Dragon NaturallySpeaking, then restart Internet Explorer. A NaturalWeb splash screen appears when Internet Explorer starts. When it disappears you can use voice commands to control Internet Explorer, including following links and dictating into editable areas on Web pages, such as boxes on forms.

Following links or clicking buttons by voice

To follow a link or click a button by voice, just say the link or button text or part of the text. You can also say "Click" followed by all or part of the text. You can only follow links that you see on your screen. To follow a link that is low on a page, scroll down until you can see it and then say the link.

A red arrow shows the link or button that is being followed.

If multiple links or buttons match

If more than one link or button matches what you said, an arrow with a question mark appears next to the first one.

1. To click the selected link or button, say "Click That," "That One," or "Click That One."
2. To go to the next match say "Next," "Next Control," or "Next Match."
3. To go to the previous match, say "Previous," "Previous Control" or "Previous Match."

If a link or button does not have text

If you want to follow a link or click a button that does not have text, first say the word or words that best describe the picture. Often, a graphic hotspot has an internal identifier (ALT or NAME) associated with it, and if you say either of these, Dragon NaturallySpeaking will follow the link. If this fails, try the following:

1. Say "Image" to go to the first picture.
2. Say "Next" or "Next Match" until you get to the link you want to follow.
3. Say "Click That" to click the picture.

Notes:

- You cannot follow links on image maps (pictures with multiple links), or on active elements such as Java applets by voice.
- If an image link has an ALT identifier, the Browser may show you the ALT text when you hold the mouse over the image for a short time. You can then say the text you see to follow the link.
- The arrow indicator does not appear in secure documents.

Vocabulary Builder

In order to improve recognition accuracy, NaturallySpeaking provides a Vocabulary Builder option that extracts, analyzes and stores specialized vocabulary drawn from documents you've submitted for review.

To use this option, select **Vocabulary Builder** from the **Tools** menu and follow the onscreen directions.

Notes:

Network:

It is not recommended to run Dragon Naturally Speaking from a server. Even moving voice files from one computer to another requires a special sequence of steps. A networkable version has been announced and will be released some time in the year 2000.

Installation:

For NT installations, always login as Administrator for that computer. Insert the CD into the drive and wait for the install program to start. If your PC does not have autorun enabled, you will have to run setup either from the run command or by browsing in the Explorer. Follow the onscreen directions to install the program.

Most problems with Dragon NaturallySpeaking stem from a poor signal to noise ratio. This may be caused by any of the following: incompatible sound card, a bad microphone, microphone not matched to sound card which may need a booster pack installed, poor voice quality such as not loud enough or inconsistent speech production. High quality microphones are recommended to compensate for these problems.

NaturallySpeaking Commands:

Dictating text quick reference

These are the essentials of dictating text:

Start dictating:

Say whatever you want to say, speaking normally in phrases

Start a new paragraph (press Enter twice):

Say "New Paragraph"

Start a new line (press Enter once):

Say "New Line"

Enter punctuation marks, such as (!):

Say the punctuation mark, such as "exclamation point"

Dictate symbols or special characters such as @:

Say the standard name of the symbol such as "at sign"

To dictate numbers

In most cases you can dictate numbers, including Zip codes, as you normally say them. For more detail on how to dictate numbers, see Dragon NaturallySpeaking User's Guide.

Examples:

<u>To enter</u>	<u>Say</u>
4	"four" or "numeral four"
23	"twenty-three"
179	"one hundred seventy nine"
5423	"five thousand four hundred twenty three"
5,423	"five comma four twenty three"
142,015	"one hundred forty two thousand and fifteen"
0.03	"zero point oh three"
2 3/4	"two and three fourths"
11/32	"eleven over thirty two"
965-5200	"nine six five fifty two hundred"
617-965-5200	"six one seven nine six five five two hundred"
\$45	"forty five dollars"
\$99.50	"ninety-nine dollars and fifty cents"
8:00	"eight o'clock"
8:30 p.m.	"eight thirty pm"
May 15, 2003	"May fifteen comma two thousand three"

MCMLIX "Roman one thousand Roman one hundred Roman one thousand Roman fifty Roman nine"

Punctuation and symbols

You can enter the following punctuation marks and symbols in the text you dictate. If the same punctuation mark appears more than once, Dragon NaturallySpeaking treats the character differently depending on what you say. For example, an apostrophe immediately follows the preceding text, while an open single quote is preceded by a space.

To enter Say

	ampersand
	and sign
	apostrophe
	begin single quote
	open single quote
	close single quote
	end single quote
's	apostrophe ess
	asterisk
	at sign
	backquote
	backslash
A	caret
	colon
	numeric colon
	comma
	numeric comma
	dash
	dollar sign
	dot
	point
	period
	ellipsis
	equal sign
	exclamation point
	exclamation mark
	forward slash
	slash
	hyphen
	numeric hyphen
	left brace
	open brace
	close brace
	right brace
	left bracket

	open bracket
	close bracket
	right bracket
	left paren
	left parenthesis
	open paren
	open parenthesis
	right paren
	right parenthesis
	close paren
	close parenthesis
	left angle bracket
	open angle bracket
	less than
	close angle bracket
	right angle bracket
	greater than
	minus-sign
	number sign
	pound sign
	begin quote
	begin quotes
	open quote
	open quotes
/,	close quote
	close quotes
	end quote
	end quotes
	percent sign
	plus sign
	question mark
	semicolon
	space bar
(tab)	tab key
	tilde
	underscore
	vertical bar
:-(frowny face
: -)	smiley face
;-)	winky face

To add new lines and paragraphs

While you are dictating, use the following commands:

To	<u>Say</u>
Start a new line (press the Enter key once)	"New Line"
Start a new paragraph (press the Enter key twice)	"New Paragraph"

Notes:

- Saying "New Paragraph" is equivalent to pressing the Enter key twice (since this is what many people do when typing a document). Saying "New Line" is equivalent to pressing the Enter key once.
- New Paragraph capitalizes the next word you dictate.
- New Line does not capitalize the next word.

Dictation commands

When you are dictating, you can say the following dictation commands without pausing.

	To
"New Line"	Press the Enter key once
"New Paragraph"	Press the Enter key twice, capitalize next word
"Cap <word>"	Type <word> with an initial capital
"Caps On"	Start typing words with initial capitals
"Caps Off"	Stop typing words with initial capitals
"All Caps <word>"	Type <word> in all uppercase
"All Caps On"	Start typing words in all uppercase
"All Caps Off"	Stop typing words in all uppercase
"No Caps <word>"	Type <word> in all lowercase
"No Caps On"	Start typing words in all lowercase
"No Caps Off"	Stop typing words in all lowercase
"No Space <word>"	Do not put a space before <word>
"No Space On"	Stop putting spaces between words
"No Space Off"	Start putting spaces between words

Notes:

- To enter the word "cap" (as in "baseball cap"), pause after saying "cap."
- The capitalization and spacing modes are automatically canceled if you move around your document.

Move to the beginning and end of documents and lines

You can use these commands to move to the top or bottom of a document and the beginning or end of a line.

<u>Say</u>	<u>Then say</u>
"Go to"	"Top"
"Move to"	"Top of Document"
	"Beginning of Document"
	"Start of Document"
	"Bottom"
	"Bottom of Document"

"End of Document"
"Beginning of Line"
"Start of Line"
"End of Line"

Examples:

"Go to Top"

"Move to End of Line"

Note:

- These commands deselect any text that is selected.

Move around by lines and paragraphs

You can use these commands to move around by lines and paragraphs.

<u>Say</u>	<u>Then say</u>	<u>Then say</u>
"Move"	"Up"	"a Line"
	"Back"	"1 Line"
	"Down"	"2-20 Lines"
	"Forward"	"a Paragraph"
		"1 Paragraph"
		"2-20 Paragraphs"

Examples:

"Move Up a Line"

"Move Down 8 Lines"

Note:

- These commands deselect any text that is selected.

Move around by words and characters

You can use these commands to move around by words and characters.

	<u>Then say</u>	<u>Then say</u>
"Move"	"Right"	"a Word"
	"Forward"	"1 Word"
	"Left"	"2-20 Words"
	"Back"	"a Character"
		"1 Character"
		"2-20 Characters"

Examples:

"Move Right 3 Words"

"Move Left 4 Characters"

Note:

- These commands deselect any text that is selected.

Move the cursor

You can use these commands to move the cursor up, down, left, and right. To use these commands press the corresponding arrow keys.

<u>Say</u>	<u>Then say</u>	<u>Then say</u>
"Move"	"Up"	1-20
	"Down"	
	"Left"	
	"Right"	

Examples:

"Move Right 3"

"Move Up 5"

Revising text: quick reference

You can revise text by voice in any of the following ways:

Delete text:

Say "Scratch That"

Select text:

Say "Select <text>" where <text> is the word or phrase you want to change or "Select <text> through <text>."

Change text once you have selected it:

Say the words you want to replace the selection with.

Back up and resume dictating:

Say "Resume With <word>" where <word> is the word you want to back up to. Then, dictate the revised text.

Important:

- When you use these commands to revise text, Dragon NaturallySpeaking does not learn from its mistakes. If you want Dragon NaturallySpeaking to learn, so errors are less likely to recur, you should correct recognition errors.

To play back dictation in a document

1. Move the cursor to or select the words you want to play back.
2. Say "Play That Back" to play selected text, or say one of the following commands:

"Play Back Line"

"Play Back Paragraph"

"Play Back Document"

"Play Back Screen"

"Play Back Window"

"Play Back to Here"

"Play Back from Here"

You can also start playback by clicking the Play That Back button on the toolbar.

3. To stop playback, click the Stop Playback button on the toolbar, press the ESC key, or click in the document window.

Since speech input cannot be received during playback, you cannot stop playback by voice.

Notes:

- If dictation is not available, playback skips to the next section that has dictation available. Recorded speech is not available for text that was typed or pasted into a document or revised without using the Correction dialog box; for example, by selecting and saying.
- The Play Back Window, Play Back to Here, and Play Back from Here commands only play back dictation for text that is in view. For example, the Play Back from Here command plays back dictation from the cursor to the bottom of the window.
- You can simultaneously stop playback and open the Correction dialog box by pressing the minus key (-) on the numeric keypad. The last phrase played appears in the dialog box for you to correct.
- If the recorded speech for a document exceeds the space available, the earliest dictation is removed.
- You can use your right mouse button to click in a document, and then select commands to start and stop dictation playback.

Internet Explorer commands

"Go To Address"

Move the cursor to the Address box. You can then dictate a Web address.

"Go There" "Click Go" or "Go"

Go to a web address you just entered in the Address box.

"Go To Favorite <name>"

Load the <name> page, where <name> is the name you use for the page in your Favorites REVISE.

"Refresh" or "Reload"

Refresh the current page from the Web.

"Click <any part of a link or button name>"

Follow the link or click the button.

"Click" is optional. "Click That" "That One" or "Click That One"

Click the link or other object, such as an edit box, pointed to by the arrow.

"Next" "Next Match" or "Next Control"

When multiple links or other objects match a command, select the next matching link or object on the page.

"Previous" "Previous Match" or "Previous Control"

When multiple links or other objects match a command, select the previous matching link or object on the page.

"Stop Loading"

Interrupt the loading of a Web page.

"Go Back"

Load the previous page (if available) in the browser's history list.

"Go Forward"

Load the next page (if available) in the browser's history list.

"Go Home"

Load your Home page.

"Type Text" "Edit Box" "Click Edit Box" "Text Field" or "Click Text Field"

Go to the first location on the page where you can enter text.

"Check Box" or "Click Check Box"

Go to the first check box on the page.

"Image" or "Click Image"

Go to the first image on the page.

"Radio Button" or "Click Radio Button"

Go to the first radio button on the page.

"Page Down" or "Scroll Down"

Scroll the page down by a screen.

"Page Up" or "Scroll Up"

Scroll the page up by a screen.

"Line Down"

Scroll the page down by a few lines of text.

"Line Up"

Scroll the page up by a few lines of text.

"Go To Top"

Scroll to the top of the current page.

"Go To Bottom"

Scrolls to the bottom of the current page.

"Start Scrolling Down"

Start automatic downward scrolling of the current page.

"Start Scrolling Up"

Start automatic upward scrolling of the current page.

"Stop Scrolling"

Stops automatic scrolling.

"Speed Up"

Increase the rate of automatic scrolling.

"Slow Down"

Decrease the rate of automatic scrolling.

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Miscellaneous Information

Section One	Resources from the World Wide Web
Section Two	Postural Tips
Section Three	Ergonomic Telephone Devices

Resources from the World Wide Web

www.infogrip.com or www.onehandkeyboard.com

1141 East Main Street • Ventura, CA 93001 • (805) 652-0770 • (800) 397-0921 • Fax (805) 652-0880

Thank you for your interest in the **BAT™** Personal Keyboard. We think this keyboard is the best flexible personal typing solution. You will too, after reviewing these materials!

WHAT ARE THE BEST USES FOR THE KEYBOARD?

The BAT Personal Keyboard has applicability in any computing environment, especially those using the keyboard with a mouse or other input device. The keyboard is the perfect solution for computer aided drafting, desk top publishing, graphics design and other uses such as accounting, telemarketing, or customer service. It is excellent in applications requiring only one hand. The current trend in ergonomic keyboards (splitting and separating the QWERTY keyboard) makes the BAT keyboard even more compelling for single-handed use.

It is light weight and compact, takes little desk space and can easily be transported. Take the BAT keyboard with you as your personal keyboard. Use it with your laptop as a remote keyboard.

It is convenient and flexible. Use the BAT keyboard in any comfortable typing position, including the arm of your chair or your lap. Use it alone, in pairs, and with other input devices, such as a traditional keyboard, a mouse or a design tablet.

Our exclusive ChordEasy® software enhances the power of the keyboard by adding unique features: **WordChords** and **Macros**. WordChords allow you to enter a pre-defined short form (abbreviation) of frequently used words and phrases. The keyboard types the long form for you. Macros allow you to type frequently used phrases or commands up to 250 characters with just two chords. Imagine the time savings these features provide if you had to type difficult terminology over and over!

MORE ABOUT THE BAT KEYBOARD

The BAT Personal Keyboard was developed over ten years of research by an internationally renowned human factors expert. Both the chord set and the physical design of keyboard are the result of that research.

Each BAT keyboard is capable of entering all characters and functions of a traditional keyboard (plus many more) with only seven keys! Data is entered by "chording": pressing a key or combination of keys simultaneously. Chords are easy to learn in about an hour. Moderate proficiency is gained in less than 10 hours, much less than with traditional keyboards. Most people achieve 30-50 wpm. Actual learning performance varies with individuals.

CAD USERS GAIN PRODUCTIVITY WITH THE BAT™ PERSONAL KEYBOARD

One Handed Programmable Keyboard Frees The Other For A Digitizer Or Mouse

The BAT Personal Keyboard, developed by Infogrip, Inc., has gained a large following of devoted fans in the world of Computer Aided Drafting. This revolutionary ergonomic keyboard allows full keyboard entry with one hand while the other is using a pointing device; greatly reducing hand and finger movement as well as permitting the user to keep their eyes focused on the monitor.

The BAT Keyboard compresses all the functions of a traditional keyboard into a seven-key unit the size of a hand. With one key for each finger and three color-coded keys for the thumb, users press key combinations, "chords" to type on, the BAT.

Bundled with the BAT Keyboard is ChordEasy® 'software. ChordEasy is a customizable macro software that turns the BAT into a programmable keyboard. Long key commands or repetitive tasks can be entered in just one stroke. Enhancing productivity by at least 20%.

CAD users typically have very little desk top space, forcing them to crowd multiple items into a small area. The BAT Keyboard's innovative compact design (only one-third the size of a standard keyboard) frees up valuable work space. Additionally, the BAT eliminates both the need to look away from the screen and the travel needed when moving from a mouse or digitizer to a traditional keyboard, thus enhancing, the users productivity. While also reducing hand and arm movement providing a more healthy ergonomic work environment.

Joe Kovalski of Accurate Design in Ventura, California uses the BAT Keyboard for CAD applications and finds it indispensable.

"I keep one hand on the mouse and one hand on the BAT (Keyboard), I've memorized the keystrokes for the commands I use a lot, and it's a lot faster than looking for those letters on a traditional keyboard."

David Satchell a plant engineer with a computer manufacturing company in Austin, Texas quickly took to the BAT and loves it.

"I thought it would be difficult to learn, but I found it to be easier than learning to use a regular keyboard. All your fingers stay in the same place." Satchell said he had "always been uncomfortable at a regular keyboard," and finds that using the BAT Keyboard in conjunction with a mouse helps him work faster in Auto-CAD.

The BAT Keyboard is available for both PC compatible and Macintosh computers as well as having an option of left- or right-hand. (The left-hand model is the most popular.) The PC compatible is a "plug and play" keyboard, no driver is required. The Macintosh model plugs into the ADB port and comes with a software driver.

Other features include:

- Flexibility. Can be used alone, in pairs, with a traditional keyboard and/or with a mouse, digitizer or other pointing device.

- Ergonomic design. Reduces strain and fatigue commonly associated with prolonged use of traditional keyboards and keyboard/input device travel.
 - Both PC and Macintosh models can be daisy-chained with another BAT Keyboard and/or a traditional keyboard. All can be used simultaneously.
 - Portability. Just 16 ounces and the size of a hand. The PC model comes with a lithium battery allowing the user to download macros to the BAT giving them the power of customized macros where ever they go.
-

HIGH-TECH ART

Artist Creates With The Help Of An Alternative Keyboard

Not all works of art begin with the stroke of a brush. While walking through such places as the Art Institute of Chicago, the Whitney Museum or the Guggenheim, you may find one artist who paints to a different beat.

Ron Gorchoy, based in New York City, first sketches his paintings on his computer with the help of the **BAT™ Personal Keyboard** by Infogrip, Inc. before the paint ever touches the canvas. The BAT, a one-handed, seven key unit, allows your eyes to stay focused on the screen rather than on your hands.

Gorchoy had used the alternative keyboard for three of his past exhibitions. "My hand never gets tired with the BAT because I use it just like I would play a piano ...I'm not constrained," said Gorchoy.

The BAT, which is ergonomically designed, can be placed in any location which adds comfort and mobility whereas a traditional keyboard is placed in front of the user. Although Gorchoy's computer screen is about 20 inches wide, the BAT can be used to interpret paintings of vast scales, even 20 feet.

With the help of the BAT, artists like Gorchoy and graphic designers are going beyond the ability of the brush and bringing the basics right to their keyboard.

THE BAT™ PERSONAL KEYBOARD AND PERSONS WITH DISABILITIES

The BAT Personal Keyboard is a fully functioning keyboard for one hand. It's innovative, compact design is ideal for individuals with physical or visual impairments. The keyboard's small size allows user's to easily port the BAT from home to work or school as well as place the keyboard in the most comfortable position to meet their needs. To enhance speed and efficiency ChordEasy® software, a word expansion and macro program, is included with the

13/A1 taming IL 111m, a **L,UbLVIMGCLUIC** Kcy twat u.

An input system called "chording" is used to type on the BAT. Similar to Braille combinations of keys are pressed simultaneously. The BAT has seven keys, four for the fingers and three for the thumb. The center thumb key is used in combination with the four finger keys to type "space" and "a" through "z". The two outer thumb keys are used for special keys like "Alt", "Shift" and cursor movement. "Sticky" or "latching" keys are used to enter multiple key sequences, i.e. Alt F to open a file.

The BAT is a keyboard, it is not a mouse. However, all cursor movements can be achieved and with Windows '95 and System 7 for Macintosh users can turn the keypad into a mouse. If a pointing device is desired, most users mount a portable Glidepoint touchpad (available from Infogrip) just above the thumb keys or place a trackball or mouse on the low side of the BAT, thereby minimizing hand movement.

Users can do anything on the BAT keyboard that they would with an extended keyboard and more. Included with the BAT is ChordEasy software. ChordEasy enhances users productivity, by giving them a customized short hand or Quickkeys type feature. Abbreviation expansions and macros turn long words, phrases or key sequences of up to 250 characters into two strokes. ChordEasy also allows the users to lock the BAT in Macro Mode, requiring only one stroke to be entered, transforming it into a fully customizable keyboard.

TYPES OF USERS

Physical Disabilities

- Amputation of a hand or arm
- Congenital absence or malformation of a hand or arm
- Physical injury or nerve damage to a hand or arm
- Limited range of motion from a physical injury
- Congenital condition
- Head injury resulting in hemiplegia (paralysis on one side only)
- Cerebral Palsy
- Muscular Sclerosis
- Muscular Dystrophy
- Stroke

Visually imp • ed

Total blindness

PHYSICAL DISABILITIES

The BAT is an excellent keyboard for people who have good use of only one hand or limited range of motion. Users need to have fairly good control of finger movements on the functional hand; however, the BAT keyboard is forgiving and key action can easily be adjusted to meet an individuals needs.

There is conclusive evidence that the lateral movements required to type on an extended keyboard causes Repetitive Stress Injuries in two handed users. Typing one handed on an extended keyboard is not only slow, it can increase the physical stress put on the hand, wrist

and arm. One handed keyboard layouts only minimally cut down the distance needed to travel; the user still has to access 101 individual keys. The key distance the one hand user has to travel on an extended keyboard is double or triple what a two hand user has to cover.

The BAT is a third of the size of an extended keyboard. There is no key distance to travel on the BAT because all of the keys are under the fingers. The physical design is superior for one handed users; the keys are a light tension spring, the keyboard is naturally sloped and has a built in hand rest to encourage proper hand placement and is so small and light weight that it can be placed in the most comfortable and healthy position for the user. Additionally, ChordEasy can be used to customize the BAT, turning long key commands, phrases or words into two stroke entries again minimizing hand movement and increasing speed.

VISUAL IMPAIRMENTS

Individuals with visual impairments often have difficulty learning and using an extended keyboard. Locating the keys is frustrating and time consuming especially with a mouse or other input device added to the equation. Physical stress on the back, neck and eyes can also result from individuals with severe visual impairments hunching over the keyboard and back again to the monitor to visually confirm where their fingers are and what they are doing.

All the keys are right under the users hand with the BAT. Location is not an issue. The user can quickly and easily locate the home row. This eliminates any need to look at the keyboard and allows the user to stay focused on the monitor as well as easily use a mouse with the free hand.

TOTAL BLINDNES

Like those with visual impairment many blind individuals encounter problems with correctly locating their fingers on an extended keyboard. Locating the home row can be frustrating and time consuming. Incorrect positioning can result in errors.

Since the BAT keyboard only has seven keys, finger location is not a problem. The user can easily feel the home row. This saves time usually spent to properly position the hands on an extended keyboard and decreases the number of errors from incorrect location. ChordEasy's extensive macro and word expansion capabilities are also a great tool. These functions can help cut down on errors and increase efficiency by turning frequently used command sequences, phrases or long words into two stroke entries. In addition to the easy location and time saving aspects, the BAT keyboard frees the other hand to access Braille text or a keypad to navigate a screen reader.

HIGHLIGHTS

- Ability to access the entire extended keyboard with only one hand
- Very little hand and arm movement required to type
- Ergonomically designed to position the hand in the most comfortable position
- Easy to use -

IBM Compatible - Just plug and play, easily connected through the keyboard port, no driver required

Macintosh Compatible - connects through the ADB port and requires a small software driver (98k) be installed

- Daisy chainable - Both IBM and Macintosh compatible versions allow for an extended keyboard to be plugged directly into the BAT and used simultaneously allowing other users to access the computer
- Compact and light weight - The small size allows for easy placement in any position; i.e. desk top, lap, or mounted on a wheel chair
- Easy to learn - The learning curve has been shown to be shorter than that of the QWERTY (extended) keyboard. The chord design was based on research which considered a frequency of use character index, the biomechanical action required to chord, and the cognitive process required to remember the chord combination.
- Learning time - Within only a couple of hours of training users are familiar with the idea or feeling of what it is like to chord and have the letters, numbers and basic punctuation memorized. After only 20 to 30 hours users are up to speed, typing anywhere from 30 to 50 words per minute.
- Customizable - Extensive macro and word expansion capability with ChordEasy software allows keyboard customization for individuals special needs.

The Ergonomics of Typing and The BAT Personal Keyboard

Many people ask about the ergonomics of typing and if the BAT Personal Keyboard reduces Carpal Tunnel Syndrome. We can not make any conclusive statements. But, we have assembled some general information that may be of interest to our customers.

This article discusses some of the ergonomic considerations of keyboard design as they relate to long term use. It describes cumulative trauma disorders (CTD's), repetitive strain injuries (RSI's) and factors contributing to Carpal Tunnel Syndrome. Many factors contribute to CTD's and the experts do not agree fully on the causes. This subject is controversial and hotly debated. We will attempt to stick to commonly accepted principles in the subject area.

Cumulative trauma disorders (CTD's) can be described as additive tissue damage accumulating over time. These are referred to as repetitive strain injuries, overuse syndrome, regional musculoskeletal disorders, or other names. Symptoms may surface over time in varying degrees, from mild discomfort to acute pain. CTD's occur in situations where people perform repetitive manual tasks and are subjected to shock, vibration, and strain. Examples may include the use of hand tools, loading and unloading factory machinery, picking and

r-1 Qr.; rt rr evnorati new aryl rrtntc ror•onthr nrts.r.atiri ry nmrtrilltg.r Vox thrvarri c and tr.; or. w/c+xxr,ll 1c

piu.Y.Y45 tyyyna, 14114.1 1111Jw3114".441L1y r.4 (41.1115 /V/ nAry 4.4.1%113 GLIM/ 1111✓✓, 1t 4., "V III 1A...13 on keyboards.

Cumulative traumas, as they relate to typing on keyboards, originate from shocks and strains. It is important to note that each of these is very small. CTD's are the accumulation of these shocks over many hours of typing per day, 5 days per week, 50 weeks per year, and so on. Shock is the vibration or impact that the finger feels as it pushes a key. Examples include the shock the finger feels when it first contacts the key, the shock produced by a tactile feed-back "click" in the key, and the shock the finger feels when a key bottoms on its stroke. The shock varies with how hard an individual types. "Heavy handed" typists create more shock than individuals with a light touch, as the key impact and key bottoming is greater.

Strains result from finger exertion and the reaching and stretching of the fingers. The force of exertion is determined by the spring rate of the keys. Keys that have stiffer springs are harder to push, and therefore create greater finger exertion. The reach and stretch of the fingers to the various key positions are called "trajectories". It is believed that trajectories may contribute to the strain of the tendons of the hand and the Median nerve.

The carpal tunnel is a canal in the wrist that contains the median nerve and the hand tendons. Carpal Tunnel Syndrome is the symptom of pain, numbness, and/or tingling felt in the wrist, fingers, and arm caused by excessive repetitive motion of the tendons within the carpal tunnel, causing irritation, then swelling, then pressure on the median nerve. To alleviate this condition, considerable emphasis has been placed by experts on the correct posture of the forearm, wrist and hand when typing. This includes work station and keyboard design.

Constrained posture is believed to contribute to RSI. Work station design plays a key role in reducing the risk by correcting posture. This includes properly equipping and adjusting chairs, desk heights, lighting and glare, and accessories such as document holders and wrist rests for the individual user. The workstation, when properly adjusted, should produce a posture where the arms and hands extend naturally from the torso and are not rotated (pronation) or turned (ulnar deviation) beyond certain limits. The traditional keyboard design does not fit well within these guidelines. It requires the hands to be placed flat (pronation) and close together. Placing the hands close together causes the typist to turn the hands outward (ulnar deviation). A better solution is a keyboard that allows the hands to be separated at a comfortable width and with the hands at a more natural angle with the thumbs elevated.

Summarizing, there are widely argued opinions about the contributing factors of these disorders, but the most widely accepted related to keyboard use include:

1. Pronation - the inward rotation of the forearm and hand from a vertical/thumbs up orientation.

2. Ulnar Deviation - the turning of the hand out of horizontal alignment with the forearm (i.e. the bending of the wrist toward the pinkie).

3. Wrist Support - proper wrist support is important for two reasons: a) to remove the weight of the arm from the shoulders; and b) to provide proper height of the wrist to the key-tops for proper hand posture.

4. Positioning - the hands should be comfortably apart to relieve wrist extension and elbows should be bent at 90°.

5. Frequency of Use - Disorders are cumulative. The Less one uses each finger, the better.
6. Key effort Light key pressures cause less strain, impact shock and fatigue over time, but can contribute to key "bottoming".
7. Tactile click - the tactile click preferred by most typists is considered a poor choice in that the click produces small shock waves up the fingers to the tendons in the hand.
8. Trajectories - the directed reach the fi perform to type the upper, lower, left, and right keys for each finger.
9. Resting Periods - rest periods and task variety can reduce the risks of CTD's. Warm- up and periodic exercises of the neck, shoulders, wrists and hands are also recommended.
10. Constrained Posture - can be corrected by an adjusted workstation. ANSI Standard HES-100 (1988) provides comprehensive list of recommendations.

The BAT Personal Keyboard addresses most of the issues raised above. Pronation is improved by the 15° inclined typing surface. Ulnar deviation is eliminated by rotating the BAT to a proper angle for typing. The built-in wrist pad comfortably supports the arm to relax the shoulders and to provide proper finger posture when typing. Hand positioning is accomplished by moving the BAT in or out from the center of your body.

The BAT keyboard uses specially designed springs and non-tactile keys in the keyboard. This produces a low impact, light touch for long term use. The BAT keyboard only has seven keys and uses a typing technique called chording, combinations of keys are pressed simultaneously. This method minimizes finger and hand movement, reducing hand, wrist and arm strain.

Resting periods and workstation are the responsibility of the individual and are not addressable by keyboard design. Infogrip recommends regular typing breaks, a properly equipped and adjusted workstation and stretching exercises before, during, and after typing. (Suggested exercises are readily available at your local ergonomic office furniture supplier.) Switching to the BAT Keyboard may extend comfortable working sessions and reduce the risk of cumulative trauma disorders.

ANSWERS TO COMMONLY ASKED QUESTIONS

Q: HOW DO YOU TYPE ON IT?

A! The RAT Personal Ke^yboard is *mmf ort able*, and easy to use. Your hand rests naturall^y on

the built-in wrist pad, with the fingers over the four "home" keys and the thumb over the three thumb keys. You type using a technique called chording: pressing combinations of keys simultaneously. All of the keys of an extended keyboard can be typed on the BAT keyboard, with only one hand.

Q: HOW LONG DOES IT TAKE TO LEARN?

A: Learning varies with individuals. Most people learn the alphabet and numbers in about an hour, but usually not more than two hours. The tutorial, in the manual we provide, walks you through the alphabet at your own pace. Once you become familiar with the chords (chords are the finger combinations used to type), you can refer to the convenient Reference Guide which has all the commonly used chords on a single two-sided sheet. Then, just start typing!

Q: HOW CAN IT BE THAT FAST?

A: The BAT Personal Keyboard is easy to learn. In touch typing, we are taught to start with our fingers on the home keys.. After some hours of practice, we are introduced to keys in positions other than the home keys. Many more hours of practice are required to memorize the proper finger positions for each letter. In short, you must learn two levels of subconscious decision making when typing: which finger to push and where to put the finger before you push it. This complexity is avoided with the BAT keyboard. Since your fingers are always on the home keys, it is a simple matter of learning which fingers to push to correctly type the alphabet.

Q: HOW FAST WILL I BE ABLE TO TYPE?

A: Typing speed varies with individuals. We know touch typists who type over 100 words per minute and some that never achieve more than 35 wpm. Our customers report typing speeds of between 30 to 50 wpm with one hand. Two important points: first, the BAT is not designed to be a high speed keyboard, its value is derived from other features. Second, having been available for a short time, no one yet has spent the thousands of hours that touch typists have invested with the traditional "QWERTY" keyboard. Therefore, although reported typing speeds are satisfactory, especially with one hand, we have not seen the limits to chord typing speeds.

Q: WILL I HAVE TO GIVE UP MY TOUCH TYPING SKILLS?

A: No. It has been shown that the chord method of typing is a different skill than touch typing. Fast touch typists are no better off than hunt and peck typists when learning to type with the BAT[™] Personal Keyboard. If you are an accomplished touch typist, you don't have to give up your QWERTY keyboard. Just plug it in to the BAT and use it, too. Some customers do high speed typing with their QWERTY, then use the BAT for document editing and for the versatile macros and WordChords.

Q: WHICH MACINTOSH COMPUTERS ARE COMPATIBLE WITH THE BAT?

A: The Macintosh model is compatible with Macintosh computers. The BAT uses a keyboard driver to function and plugs into the ADB port of your Macintosh.

Q: WHICH PERSONAL COMPUTERS ARE COMPATIBLE WITH THE BAT?

A: The PC model is compatible with **IBM** PC AT, PS/2 or higher and 100% compatible computers. The model requires no software to operate. Simply plug it into the keyboard port of your computer and begin enjoying the advantages of a free hand! Our exclusive ChordEasy® software, bundled with the keyboard, allows you to create and use powerful macros and WordChords. Once the macros are set and downloaded to the BAT, you exit the software. ChordEasy is not a Terminate and Stay Resident (TSR) software that takes valuable memory, interferes with other installed TSR's or other accessory devices. It won't interfere with network settings, and can be used in windows.

Q: WILL THE BAT Personal keyboard HELP CARPAL TUNNEL SYNDROME?

A: Many factors can contribute to cumulative trauma disorders, such as carpal tunnel syndrome, like proper adjustment and use of equipment and keyboards. Several specific factors have been attributed to keyboards, such as forearm posture and "key-push" effort. Many of these factors were considered when designing the BAT Personal Keyboard. No medical research has been conducted to know the specific answer to this question.

Q: WHAT IF THERE IS A PROBLEM OR THE BAT keyboard DOESN'T WORK FOR MY APPLICATION?

A: Infogrip provides full technical support to assist you in any phase of installation and use. We offer macro and WordChord programming tips. Registered owners get upgrade offers as they become available. We are so confident that the BAT keyboard will exceed your expectations that we offer an unconditional 30 day **money back** guarantee. The keyboard is covered by a one year warranty.

Infogrip Price List

<u>BNI'O Personal Keyboard</u>		<u>List Price</u>
Mac Version, Left.	M100IL	\$199.00
Mac Version, Right	M1001R	\$199.00
Mac Version, Dual	M2001	\$349.00
PC Version, Left	PC1002L	\$199.00
PC Version, Right	PC1002R	\$199.00
PC Version, Dual	PC2002	\$349.00

Accessories

Braille Reference Guide	BRILLE	\$9.95
Carry Case	BAG	\$16.95
Dust Cover	COVER	\$13.95
Dust Cover (Dual)	COVERD	\$21.95
Low Vision Reference Guide	LV	\$10.95
Manual on Cassette (PC)	MANCAS	\$7.95
Portable GlidePoint (PC)	GLIDEPC	\$75.95
Portable GlidePoint (Mac)	GLIDEM	\$65.95
Promotional Video	VIDEO	\$4.95
Protective Skin	SKIN	\$23.95
Protective Skin (Dual)	SKIND	\$35.95
Software Tutorial (PC)	DOSTUT	\$12.95
Wireless Kit w/ Touch Pad	WIREL	\$633.95

Shipping & Handling

<ul style="list-style-type: none"> • U.S. Single Unit SH \$16.00 • U.S. Dual Unit SH \$17.00 • Canada SH \$40.00 • Other Countries SH Call 	<ul style="list-style-type: none"> • All Infogrip products come with a 30-day money back guarantee • Prices effective November 1996 • Prices subject to change without notice
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[Floating Arms
Keyboard](#)

[Floating Arms
Mousetray](#)

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[Keyboard
specifications](#)

[Mousetray
specifications](#)

[Commonly Asked
Questions](#)

[How to Order](#)

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Workplace D
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Presenting
a revolutionary
t/vwt

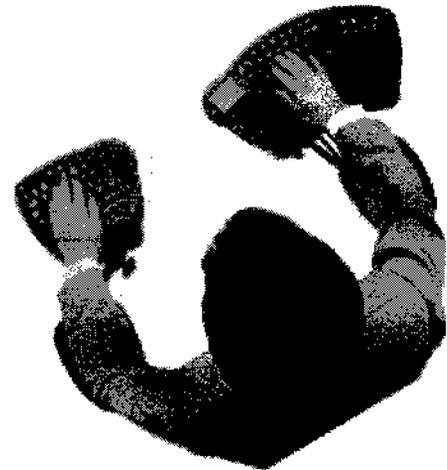
keyboard.

The chair-mounted Floating Arms Keyboard is the only ergonomic split keyboard to address the whole body. Using the Floating Arms split Keyboard with an ergonomic chair creates an ergonomic "workstation" that supports your arms, wrists, back, and neck. This ergonomic "workstation" has increased productivity and reduced physical fatigue for many computer users.



[Check out our review from Cnet.](#)

[Our review from MT MONTHLY.](#)



"I am utterly amazed that I am physically able to work with little to no pain when I couldn't make it through an hour of using a standard keyboard! Before I received the chair, I was terrified that I'd have to quite my job and give up my career as a paralegal because the pain was intolerable and effected absolutely everything I did"

*Michele Clark
Miller, O'Brien & Bloom*

"The most comfortable keyboard and chair you ever set hands and heinie on"

PC Computing Magazine

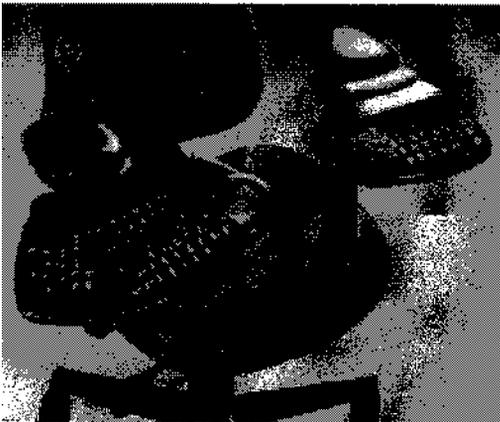
Presenting
a revolutionary
New
ergonomic
keyboard...



What ts it?

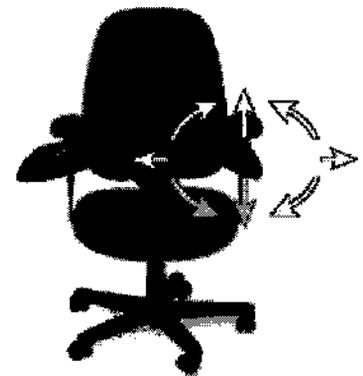
...designed to work with your chair to position the body in a neutral position thereby reducing stress on the hands, wrists, neck and back.

The chair-mounted Floating Arms Keyboard feels like a natural extension of your fingertips. Using the Floating Arms Keyboard with an ergonomic chair creates an interconnected system that supports your arms, wrists and back.



Designed by an orthopedic surgeon and an occupational therapist, this keyboard features two independent sections...left and right hand with a trackpad. This standard QWERTY keyboard is Windows 95 compatible, programmable and has built-in palmar rests.

Make no mistake, the Floating Arms Keyboard is a full featured tool providing users everything they need to "do the job" including 2 independent keyboard sections, fully adjustable in all three planes of motion...Standard keyboard configuration so there is no relearning of the key arrangement or function...an Integrated TRACKPAD that requires no pressure, just lightly touch to move and point, tap to click, drag and highlight...the keyboard is fully programmable and compatible with IBM and Mac PCs.



[NOTE! Click here to view a list of compatible ergonomic chairs.](#)

°use%

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NOME



#5 10 GADGETS Floating Arms keyboard

By Erik Johnson
Project leader, CNET Labs

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It takes a lot to make a keyboard cool, but the designers of the Floating Arms keyboard did the trick. Their sci-fi design splits the board in two, allowing you to attach each piece to an arm of your office chair. Not only can you sit upright while you type, but you can also bark commands like, "Warp speed, Mr. Sulu!" with convincing authority.



True, Floating Arms' ingenious design is what initially caught our eye, but we soon discovered that it pleased our bodies, as well. It's surprisingly easy to type on a split keyboard, and it's definitely more comfortable than slumping over your desk all day. The integrated trackpad on the edge of the right-hand keyboard is the hardest thing to get used to. But, hey, everyone falls off their bike once or twice before they can ride with no hands.

Attaching the keyboard to an office chair was a cinch, though adjusting it to a comfortable position took quite a bit of trial and error. Once we got it right, though, it really was like being on Star Trek.

As if its comfy feel and futuristic style weren't exciting enough, this keyboard also has some extra gizmos. You can program any of the keys and remap them to alternate layouts. The included software also lets you record macros, create sticky keys (particularly helpful for anyone who has difficulty pressing two or more keys at once), and set a repeat delay (which helps if you accidentally press a key more than once).

The Floating Arms keyboard is a must-have contraption for anyone who wants to look cool, feel good--and spend a bit of extra cash.
(12/17/97)

CoMMO n Asked ues i ns

Q: WHAT KINDS OF COMPUTERS DOES THIS KEYBOARD WORK ON?

A: **IBM** compatible Pcs - AT/PS2 - Macintosh - Sun Microsystems

Q: DO I HAVE TO INSTALL SOFTWARE TO GET THE KEYBOARD AND TRACKPAD TO WORK?

A: No. It is truly a standard keyboard in this way. Just plug it in and start typing. The trackpad should operate with your standard mouse driver.

Q. IS IT A STANDARD KEYBOARD?

A: Yes, the key layout and spacing is conventional. The keyboard is programmable and you need to install an application in Windows 3.1 or Windows 95 to use this feature. Using the application one of the features is "remapping" which allows you to remap the keys into the DVORAK layout, or any other layout that is comfortable and productive.

Q: CAN I MAKE THE LEFT SPACE BAR THE BACKSPACE OR SOME OTHER FUNCTION?

A: Yes, the keyboard is fully programmable and allows for remapping of keys. You can also record macros for frequently used keystroke sequences, including phrases, sentences, or keystroke combinations.

Q. WHERE IS THE MOUSE?

A: The keyboard has a built-in finger pointing device known as a TRACKPAD. This device allows the user to move their finger on the pad and lightly touch the pad for a click or double click. There are also buttons that can be used for clicking. The trackpad has been called the safest pointing device available because of the lack of pressure and force needed to activate the pointer.

Q: HOW DO I GET IN AND OUT OF THE CHAIR?

A: Turn the keyboards vertical or simply push them out of the way horizontally. Remember, the keyboards rotate in all three plans of motion.

Q: HOW DO I GET UP TO MY DESK?

A: The keyboards drop down to the side for long periods of desk work. Some users use their keyboard drawer as a writing surface. For short periods of desk work, the keyboards may be pushed down slightly for sliding up to the desk or rotated to the side. If this is a concern, please call, as our customers have a lot of ideas on how they get the job done.

Q: CAN I TURN OFF THE KEYBOARD WHEN I'M AWAY FROM MY DESK?

A: When you are away from your desk, or when you move up to your desk for non-keyboarding activity, you can turn off the keyboard by using the Right Control Key four times in succession. The same sequence will turn the keyboard back on when you are ready to type again.

Q: IS THERE A CORD?

A: Yes, The keyboard comes with a 10 foot cord and cord clamps for cable management. It works best to clamp one on the underside of the chair on the side where the cord exits and one on the underside of the desk.

Q. HOW DOES THE KEYBOARD MOVE IN THREE PLANES?

A: There are knobs under the arm rest and keyboard that allow for motion up, down, right, left and rotation. They also allow for in and out adjustment for forearm length. The knobs go on the outside of the armrest.

Q: ARE THERE ANY SPECIAL FEATURES ON THE FLOATING ARMS KEYBOARD FOR DISABLED USERS?

A: Yes, besides the adjustability, there are programmability features of the keyboard which allow for:

- *Sticky Keys* designed for people who find it difficult to press two or more keys simultaneously.
- *Repeat Rate* - designed for people who unintentionally press a key more than once.
- *Delay Before Repeat* - designed for people who have difficulty releasing a key after it is pressed, causing unintended repetition of a character.
- *Validation Time* - defines the length of time any key must be held down to be recognized as a key press.

These features are helpful when using the keyboard with individuals who have various physical disabilities.

Q: WHAT IF I WANT TO MOVE THE KEYBOARD DURING THE DAY?

A: Once the knobs are sufficiently tightened, the keyboards may be adjusted by pulling them in any direction.

Q. WHAT DOES THE FLOATING ARMS KEYBOARD COST?

A: This is not a standard desktop 101 keyboard, and it was not designed to sit on the desktop. It is a high quality, mechanical switch keyboard designed for touch typists that do high volume keying. The cost of a keyboard/chair combination or a quality ergonomic workstation is an accommodation cost that can easily be justified to an employer or insurance company, if they are made aware of the costs of one RSI case. Consider:

- A. Lost time
- B. Medical expenses
- C. Lost productivity
- D. Cost of other more remedial so called ergonomic products such as articulating

keyboard trays, wrist rests, foot rests, and/or height adjustable surfaces

An individual RSI case could escalate well into the tens of thousands. The Floating Arms Keyboard is priced at \$499. Workplace Designs also supplies a variety of high quality, fully adjustable ergonomic keyboard and chairs systems starting at \$650.

Q: WHAT DOES THE AREA WHERE YOUR PALM RESTS FEEL LIKE?

A: They are of medium density that resists perspiration and difficulty with sliding the hand across the palmar surface. A soft palmar rest may feel comfortable in the short term, but in the long term, it may promote immobility and the person may reach by moving the hands and fingers unnecessarily. We want to promote ease of movement of the hand and arm while using the keyboard and trackpad, and our palmar rest allows this.

Q: WILL THE KEYBOARD FIT ME?

A: The keyboard system, with adjustable height and width armrests will fit most people, especially if their chair is proportionate to their body size. For example, smaller people use a smaller (task size) chair, larger people may use a larger chair.

Q: DO I GET NEW ARM RESTS TOO?

A: Yes, we designed a shorter, wider arm cap for the chair so that there would not be pressures at the wrist and at the elbow. Some people are used to leaning their entire forearm on a work surface. Our goal is to not allow pressure to occur in these areas where important nerves and tendons travel.

Q: WHAT IF I AM VERY TALL OR VERY SMALL?

A: Sometimes, with larger people, it is necessary to semi-recline the backrest to get correct positioning for the head and shoulders. This will also bring the arms back so they are in better alignment with the armrest and keyboard. With smaller people, the keyboard can be brought all the way back to the armcap to fit the forearm and hand.

Q: WHAT ABOUT SUN MICROSYSTEMS COMPUTERS?

A: Sun makes an interface box for using PC peripherals. This device has a PN of 595-3692-01 and is available from Sun Microsystems.

WARRANTY: ONE YEAR, PARTS AND LABOR

RSI info

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To contact us for more information or to order:
E-mail us at Workplace Designs or phone: 612.439.4474.

Workplace Designs

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FLOATING ARMS MOUSETRAY

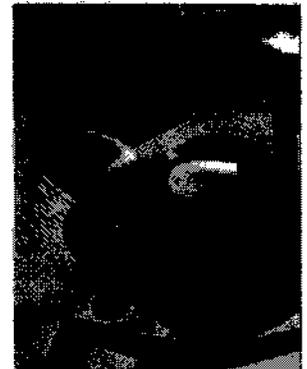


Introducing the Floating Arms Mousetray!

A fully adjustable tray, mounted to the arm of a user's ergonomic chair



Our mousetray design has brought the mouse to the user, allowing them to use the support provided by their ergonomic chair back and arm rest. The user's hand, wrist and arm are supported while mousing. Mouse users can finally get their wrist in a neutral position because of the adjustability of the mousetray. The "mouse on the desktop" doesn't dictate upper body positioning anymore because space is no longer an issue! The medical professionals at Workplace Designs, Inc. have designed this product to address the needs of anyone who uses a pointing device extensively. A pointing device can be a mouse, a trackball or a trackpad. Individuals who could benefit would include graphic artists, CAD/CAM designers, or anyone using mouse driven software extensively.



The University of California at San Francisco found that word processing applications use the mouse one third of the time and graphics software require it two thirds of the time. However, anyone who has used a computer for a long period of time knows that it's hard to position the wrist and arm for comfort while mousing.

[Take me to the keyboard page.](#)

[Take me to the chair page.](#)

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To contact us for more information or to order:
E-mail us at [Workplace Designs](#) or phone: 612.439.4474.

R1/451 Primer

Repetitive Motion Injuries are responsible for the suffering of millions of American workers. Business Week reports that lost earnings and medical costs of work-related repetitive motion injuries amount to more than \$27 billion annually.

Further, the incidence of repetitive motion injuries is increasing at an alarming rate. The National Institute of Occupational Safety and Health (NIOSH), predicts that 50% of the work force will suffer from repetitive motion injuries by the year 2000.

Surveys show that Carpal Tunnel Syndrome (CTS), racking up medical treatment, lost time and vocational rehabilitation costs of \$25,000 to \$60,000 per incidence is one of the major contributors to this national epidemic. NIOSH confirms, meanwhile that 23% of work-related repetitive motion injuries are the result of the ergonomically inadequate design of the standard computer keyboard.

The Floating Arms Keyboard, developed by the medical professionals of Workplace Designs, Inc, provides an alternative that is distinctly superior to the standard keyboard. The Floating Arms Keyboard focuses on reducing the biomechanical stresses on the hands, wrists, neck and back that are the major cause of repetitive motion injuries in the workplace.

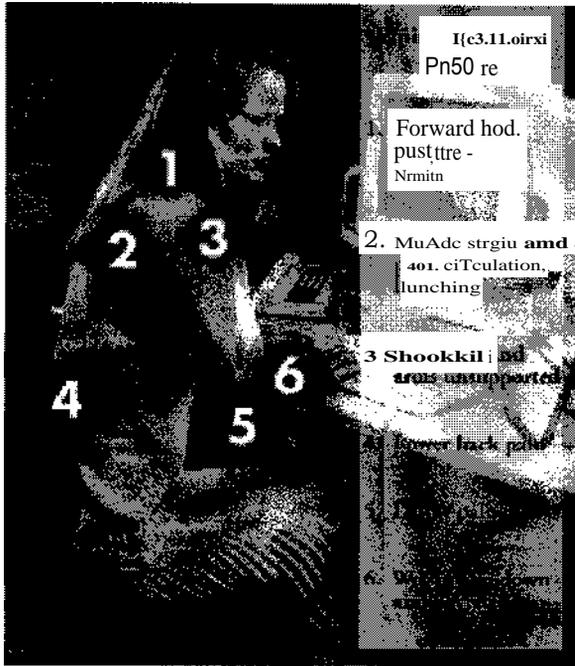
The next page has a graphic display of where the problems arise. The Floating Arms Keyboard addresses all of these problem areas.



To contact us for more information or to order:
E-mail us at Workplace Designs or phone: 612.439.4474.

*Workplace Designs
6381 Osgood Avenue
Stillwater, MN 55082
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These are the problems...



The Floating Arms Keyboard reduces the risk of Repetitive Stress Injury (RSI), by eliminating the problem areas shown above.

For an illustration of the painful stress points created by standard computer terminal positioning and their related muscle ailments, go to the next page.

To contact us for more information or to order:
E-mail us at Workplace Designs or phone: 612.439.4474.

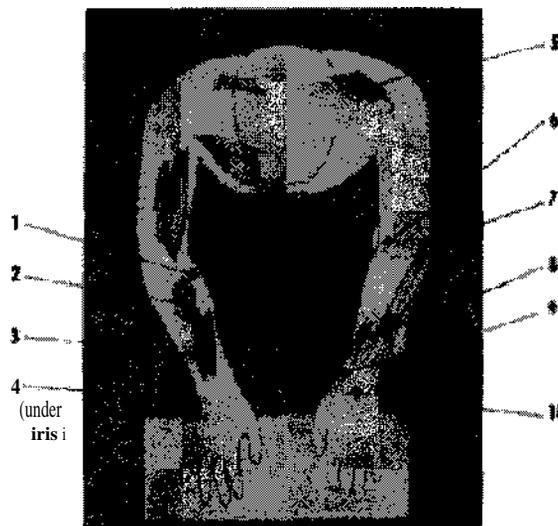
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There are painful stress points created by standard computer terminal positioning.

With the Standard Computer Keyboard:

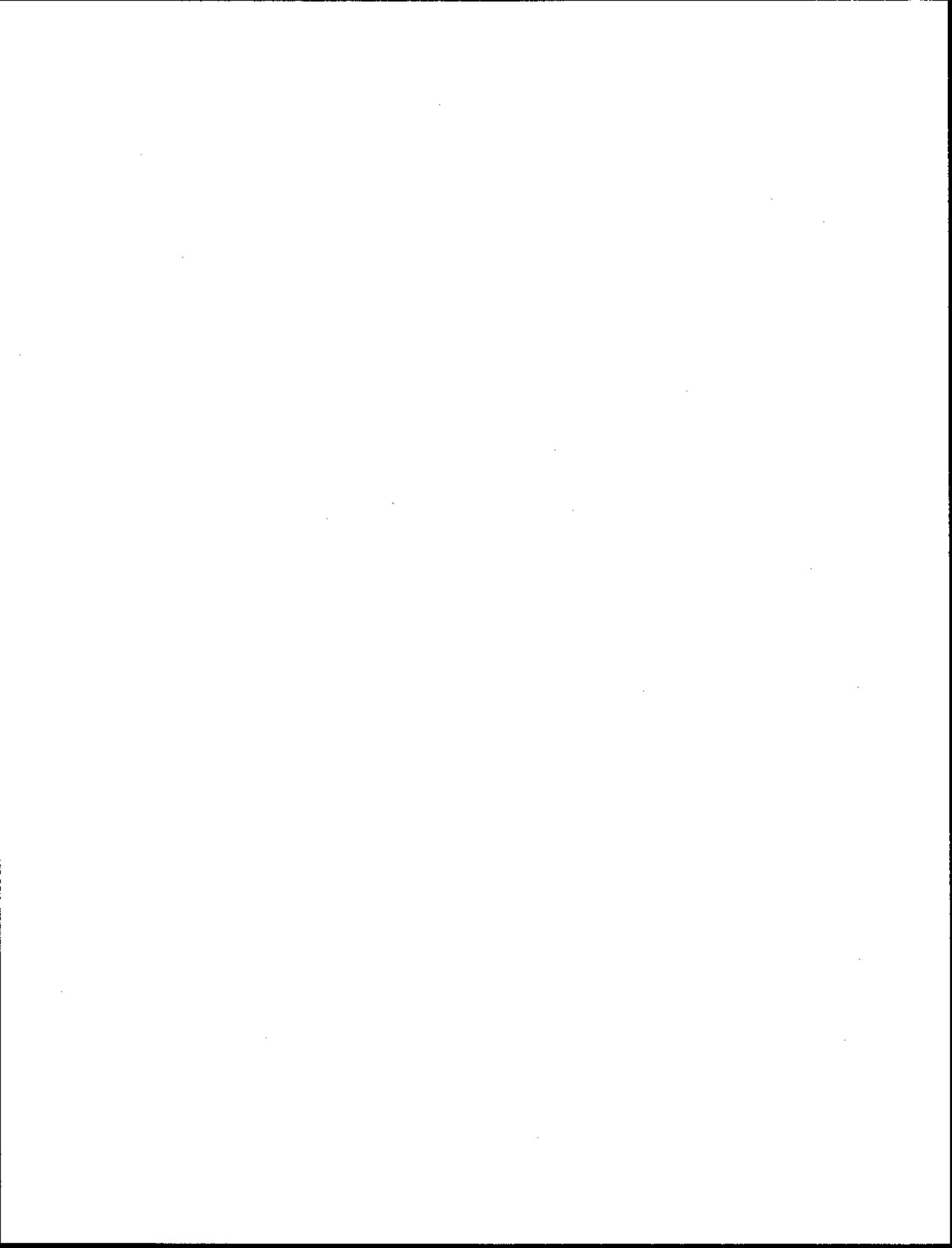
- The wrists often flex or hyperextend, increasing pressure in the carpal tunnel.
- The wrists must flare outward; tendons are irritated by frequent contact with the walls of the carpal tunnel.
- The extreme pronation (palm-down position) is awkward, painful and hard to maintain.
- Keys angle up in an unnatural way (fingers are held in more extension than necessary to strike keys).
- Reaching forward to the keyboard puts stress on the arms, shoulders and back.
- Supporting the hands and wrists stresses tendons at the elbows.
- The chair height should equal the desk height, but often does not. Feet may dangle with legs and thighs unsupported. The ideal posture and workstation design are often advocated, but rarely consistently implemented.

Here are the muscle ailments that can be encountered:



- | | |
|--------------------------------------|-----------------------------|
| 1. Cubital Tunnel Syndrome | 6. Medial Epicondylitis |
| 2. Radial Tunnel Syndrome | 7. Lateral Epicondylitis |
| 3. Extensor Tendonitis | 8. Intersection Syndrome |
| 4. Carpal Tunnel Syndrome | 9. DeQuervain's Disease |
| 5. Postural Thoracic Outlet Syndrome | 10. Digital P.I.N. Syndrome |

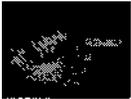
To contact us for more information or to order:
E-mail us at [Workplace Designs](http://www.WorkplaceDesigns.com) or phone: 612.439.4474.



Welcome To MIT's RSI Information Page

Repetitive Strain Injuries: Are You At Risk?

- [What is RSI?](#)
- [Who is at risk?](#)
- [Can RSI be Prevented?](#)
- [What are the Warning Signs of an RSI?](#)
- [Learning about RSI: Some Suggested Reading](#)
- [RSI Resources at MIT](#)
- [RSI Resources in the Boston Area](#)
- [Online RSI Resources](#)



What is RSI?

Repetitive Strain Injuries (RSI) are a category of injuries involving damage to muscles, tendons and nerves caused by overuse or misuse. Unlike an injury which results from a single incident, RSIs develop slowly over time. If allowed to progress, an RSI can develop into a permanent disability. RSIs most commonly affect the hands, wrists, elbows, arms, shoulders, back, or neck.



Who is at risk?

If you work at a computer, you are at risk of getting an RSI. Using a computer keyboard and/or pointing device may lead to RSI, because computer work often involves one or more of the following risk factors which predispose you to injury:

- The repetition of small, rapid movements
- Working in a static and/or awkward posture for long periods of time
- Insufficient recovery time (too few rest breaks)
- Improper workstation setup
- Poor typing technique



Can RSI be Prevented?



Yes! There are many ways to protect yourself from getting an RSI. RSIs are easier to prevent than to cure. It is extremely important that each computer operator takes the risk of an RSI seriously and informs him/herself about how to prevent an RSI.

100



What are the Warning Signs of an RSI?

Warning signs of an RSI may include one or more of the following:

- Pain or aching
- Tingling or numbness
- Loss of strength
- Clumsiness or decrease in coordination
- Tenderness
- Swelling



If you are experiencing any of these symptoms, **do not ignore them!** -- they may be warning signs of a developing RSI: contact your physician immediately!



Learning about RSI: Some Suggested Reading

- "Repetitive Strain Injuries: What You Absolutely Need To Know"***a memo from MIT Medical and the RSI Task Force***
- MIT Information Systems Publication IS-13a, "Repetitive Strain Injuries (RSI)"
- *Repetitive Strain Injury: A Computer User's Guide* by Emil Pascarelli and Deborah Quilter. John Wiley and Sons, 1994.
Members of the MIT community can borrow this book from MIT's Health Education Library, room E23-205.



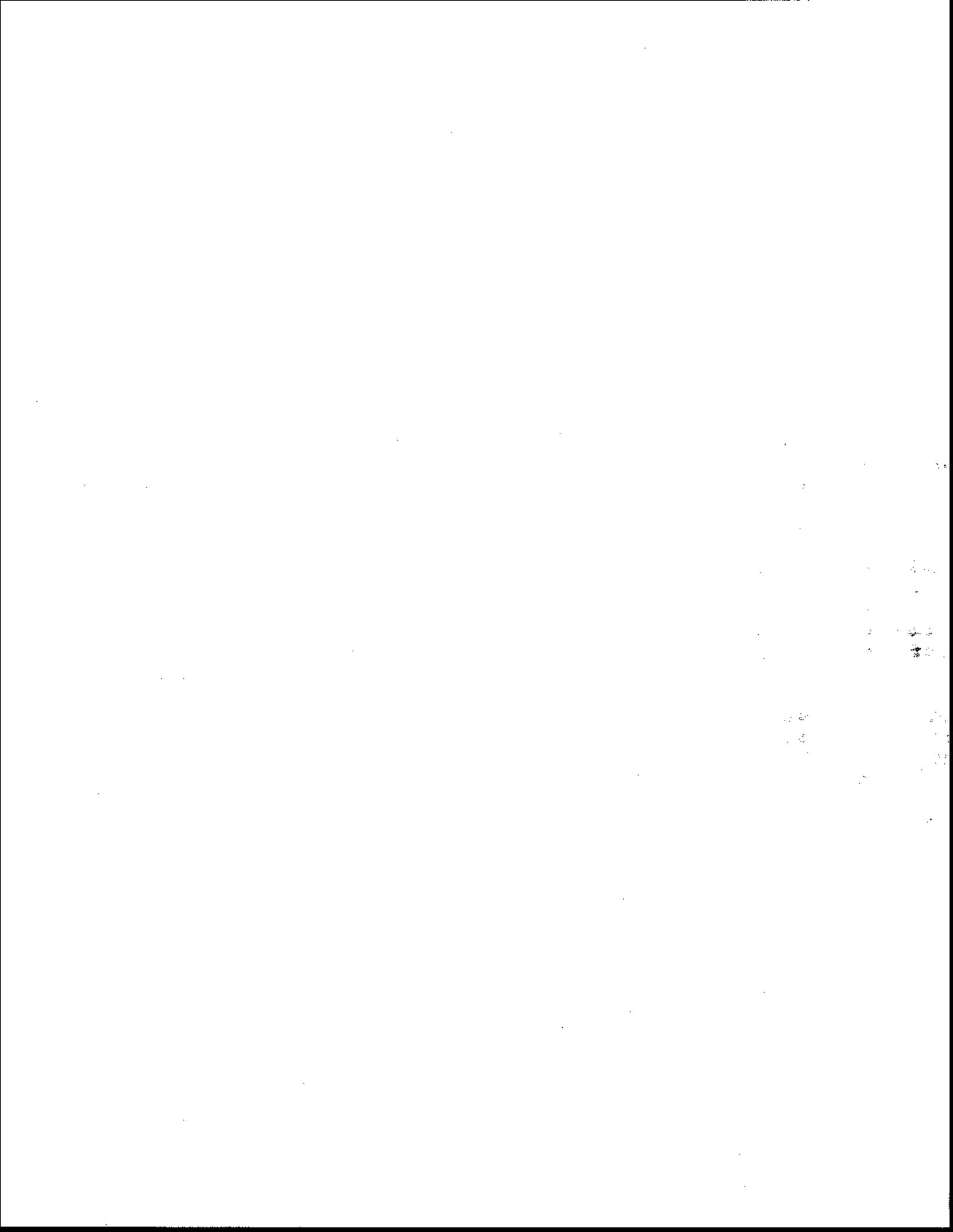
RSI Resources at MIT

- Computers and Health Resources at MIT



ATIC (Adaptive Technology for Information and Computing) Lab at MIT provides information on and assistance with alternative keyboards, voice recognition systems, software aids, and other adaptive technologies.

- Courses on Ergonomics: *Preventing Repetitive Strain Injuries*:
Computers provide enormous benefits but also create the challenge of sedentary and repetitive work. This seminar clearly defines repetitive strain injuries (RSI) and provides information on how to prevent their onset. You get to test your office ergonomics IQ, find out about suspected risk factors, learn how to adjust furniture and equipment, and practice prevention strategies for common physical problems
Instructor: Martha Loss
Fee: \$50.00, including course materials
For more information or to register for the next available seminar, call IS Training Services at



x3-7685.

- **RSI Task Force**

The RSI Task Force was formed in 1994 to address the issue of repetitive strain injuries at MIT. The focus is primarily on prevention and reducing the number of injuries at the Institute. Members of the task force include representatives from the various MIT offices providing services to those with an RSI. ([Computer And Health Resources at MIT](#)) If you have a concern you would like the task force to address, you can write to stop-rsi@mit.edu

- **RSI Alert**

RSI Alert is an informal group of MIT employees and students dedicated to: (1) creating an awareness of RSI, (2) educating to prevent RSI, and (3) facilitating treatment and accommodations for those who have an **RSI**. All MIT employees and students are welcome. To receive email messages announcing RSI Alert meetings and other RSI events and information, subscribe to our listser^y mailing list by sending an email message to listserv@mitvma.mit.edu with the first line of the body of the message reading: *subscribe RSIALERT First-name Last-name*. (please note: this list is for MIT [and affiliated labs] people only.) For more information, send email to: maryz@mit.edu



RSI Resources in the Boston Area

- **CNOT (Coalition on New Office Technology)**

Boston, MA

Telephone: (617) 247-6827

A non-profit organization that promotes office worker health and safety. Offers resources and referrals, hotline, support groups for injured workers, and prevention education.

- **RSI Action**

A group of injured and at-risk computer users sharing resources, educating for RSI prevention, and advocating for changes in the workplace and to the laws. RSI Action is a project of the Coalition on New Office Technology (CNOT), a nonprofit organization. Call 617-247-6827 for more information.



Online RSI Resources

- Listser^y Mailing/Discussion Lists

- **Sorehand** is a San Francisco-based listser^y mailing list for people with RSIs.

Sorehand is the most popular RSI list, with international subscribers and a lot of advice (perhaps more than some might like!).

Subscribe by sending mail with any subject to: listserv@itsrvl.ucsf.edu with the message body reading: *subscribe sorehand Your Name*

- **RSI-East** is an east coast based listser^y mailing list for people with RSI.

RSI-East is more of a regional resource than Sorehand, offering referrals and references for the east coast.

Subscribe by sending mail with any subject to: listserv@sjvm.stjohns.edu

with the message body reading: *subscribe rsi-east Your Name*

- o **Voice-Users** is a mailing list for discussing all aspects of using voice recognition input systems (DragonDictate, Kurzweil Voice, IBM Voicetype, IN3, etc.).

Subscribe by sending mail to: *voice-users-request@cuckoo.hpl.hp.com*

with the subject line *subscribe*

To receive a digest of the voice-users discussions instead of individual messages, send mail

to: : *voice-users-d-request@ cuckoo. hpl. hp. com*

with the subject line *subscribe*

- Links to Other Web Sites

- o [Janet Cahn's Home Page](#)

(Janet's web page includes good advice about RSIs)

- o [Typing Injury FAQ by Dan Wallach](#)

- o [Nebraska RSI Page](#)

- o [Amara's RSI Page](#)

- o [CTD \(Cumulative Trauma Disorder\) News](#)

- o [DragonDictate FAQ](#)

- o [RSI Doctors List, also known as "Find-a-Doc"](#)

- o [US OSHA \(Office of Safety and Health Administration\)](#)

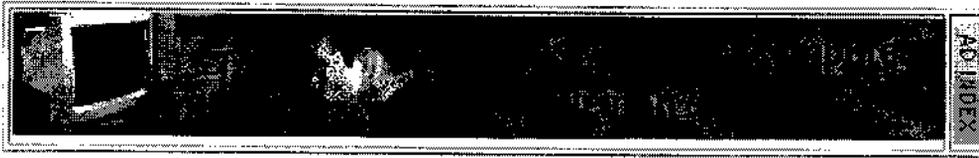
- o [ErgoWeb](#)

This web site was partially created by voice input with DragonDictate for Windows. Any comments, corrections, or suggestions are welcome and can be addressed to:

[Mary J. Ziegler](#)

Last modified: 10/22/97





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Dumbstruck

Can speech recognition programs lead to vocal injury?



by Deborah Quilter

People who use computers and live with repetitive strain injury often search for ways to reduce their keyboard time. Speech recognition software could be one way to give your hands and arms a break. But in addition to certain accuracy problems (see this issue's [Cover Story](#) and my previous column at www.currents.net/magazine/national/1603/ergo1603.1.html), there are indications that some heavy users of speech recognition programs could be putting themselves at risk for another injury.

There aren't many studies on the effects of long-term use of speech recognition software. But I spoke to several speech professionals who treat patients with vocal problems that may be due to overuse of such software. This admittedly anecdotal evidence should serve as a cautionary tale.

Double Trouble

Anyone who's considering replacing typing with speech recognition should listen to Paul Taylor first. "I've been so terrified of voice-activated programs that I'm not going to try any of the new ones," he says.

Taylor, a medical reporter for the Canadian Globe and Mail, developed repetitive strain injury in 1993 and began using discrete speech software in 1995 to give his hands a rest. To be understood by such programs, you must say each word separately, unlike the continuous flow that is common in regular conversation. "I used it four hours a day," says Taylor. "By the end of a week I had a sore throat. I would suck throat lozenges and drink water, but that just covered up the symptoms. I gradually lost more use of my voice until I couldn't speak for more than half an hour a day."

Taylor went from one speech pathologist to another seeking help. Finally, he found Lois Singer, a speech-language pathologist and director of the Voice Laboratory and Treatment Centre of Ontario in Toronto, who helped him regain his voice.

Profile of an Injury

Singer says the larynx--like any other muscle in the body--is subject to overuse syndrome, which begins with muscle fatigue. "You're using the same muscles in the same way for a long period, and the fatigue leads to injury," Singer explains.

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"eventually, the vocal cords can't come together because they're too weak, so people wind up using every muscle in their neck trying to force the cords to close. But they can't stay closed." Such prolonged, intensive use can eventually result in a loss of strength. The weaker the voice becomes, the harder people push to make it work, thus aggravating the injury.

Vocal overuse is relatively common among people who use their voice professionally, such as teachers, litigators, telemarketers, and aerobics instructors. But because speech recognition programs increase known risk factors for injury, such as excessive talking, a whole new class of workers may suffer.

The unnaturally slow monotone that some speech recognition users fall into may compound the danger. But although so-called natural or continuous speech programs are said to be safer than the older, discrete speech programs, Singer says the continuous speech programs are not a significant improvement. "I'm getting as many patients from [using] continuous speech [products] as I got from discrete speech," she says.

Serious injury can develop quickly. One of Singer's patients used a speech recognition program for four weeks, gradually increasing to four consecutive hours of use. "The following day, her voice became so weak that she couldn't sustain a conversation for more than a few minutes," said Singer. This problem persisted for almost three months, even though the patient stopped using the software right after losing her voice.

Scarce Studies

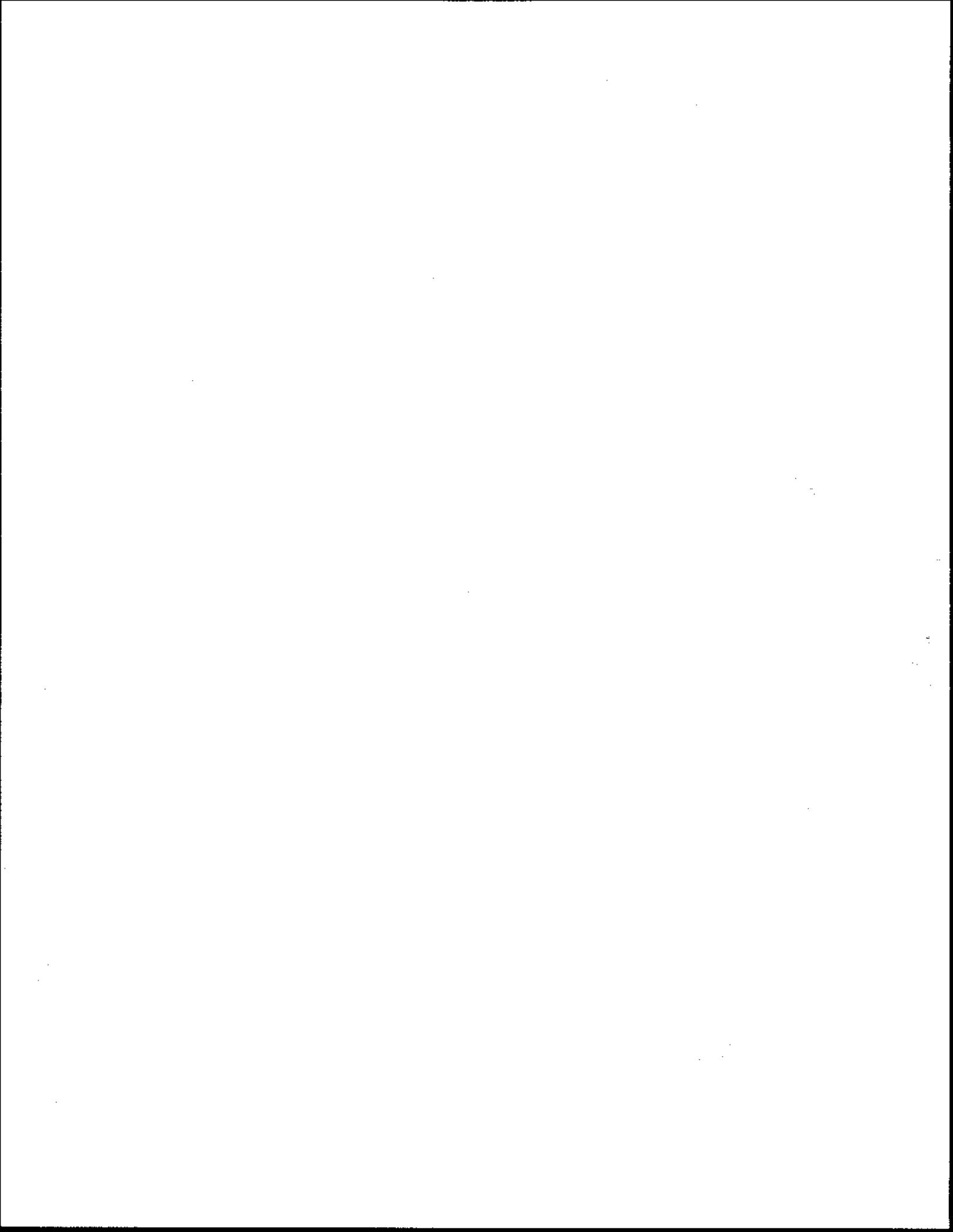
In a study, Singer examined four severely injured speech recognition users in depth. The four patients had begun using the software after developing repetitive strain injury. Within a year, all either had suffered loss of vocal control or speech endurance or had lost their voices. All four were incapable of modulating their vocal volume, and their voices would cut out after five minutes of talking. Vocal rehabilitation was slow, but months later, two of the patients decided to return to a speech recognition program. Their subsequent swift vocal deterioration convinced both patients to stop using the software for good.

Although the evidence from this small study is strong, Singer says more studies are necessary to identify conclusively the relationship between time spent using speech recognition programs and the occurrence of vocal problems. Studies are also needed to identify risk factors that make people more susceptible to injury.

Rebecca Shafir, chief of speech pathology at Lahey-Hitchcock Medical Center in Burlington, Mass., has also seen patients who suffered vocal problems after using speech recognition programs. Half of her patients were teachers, so the injury may have been partially due to other vocal demands. Shafir points out that it's difficult to study voice problems associated with computer programs because people may use the same speech behaviors in other aspects of their lives. "How could we [create a] control for this unless we put them in a vacuum and only let them talk to their computers?" Shafir asks.

Think Before You Speak

One small study and anecdotal evidence does not an epidemic make. But it makes



sense to think twice before you make a heavy commitment to speech recognition programs. If you choose to use the technology, be aware of the possible consequences and take early symptoms such as a sore throat or hoarseness seriously.

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Deborah Quilter is coauthor (with Emil Pascarelli, M.D.) of "Repetitive Strain Injury: A Computer User's Guide" from John Wiley and Sons and "The Repetitive Strain Injury Recovery Book" from Walker Publishing Company. You can write her at P.O. Box 1502, Ansonia Station, New York, NY 10023 or care of Computer Currents. Or visit her Web site at www.rsihelp.com.

Signs of Vocal Injury

Phase I

- Dry throat/tickle
- Coughing bouts
- Aching throat
- Pitch lowers slowly
- Hoarseness becomes chronic
- Recovery possible with rest

Phase II

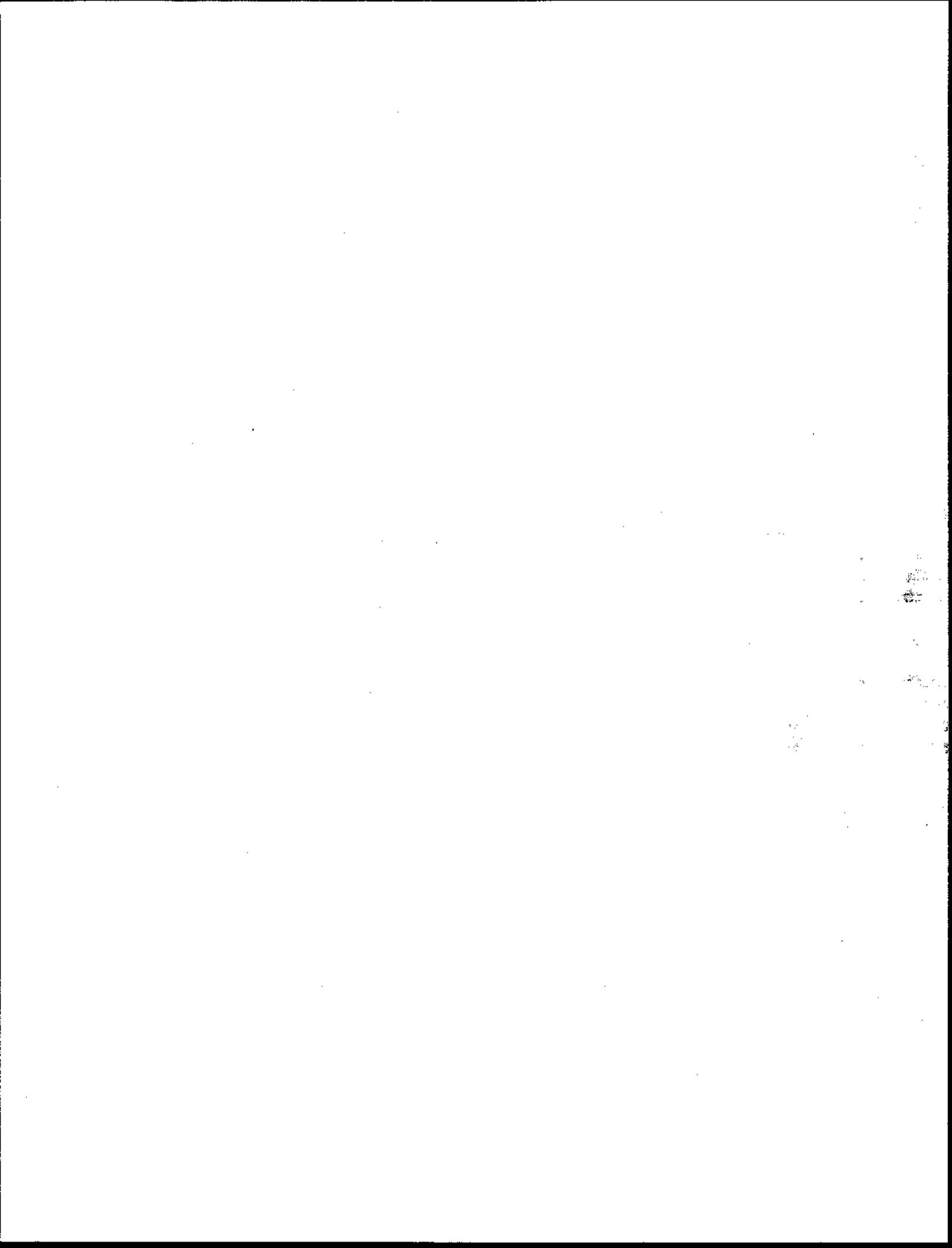
- Neck muscles ache
- Sore throat
- Voice always hoarse and breathy
- Normal pitch lowered
- Cannot increase volume
- Voice cuts out at progressively shorter intervals
- Vocal cord bowing
- Extreme fatigue in speaking
- Talking becomes difficult
- Recovery from overuse takes longer

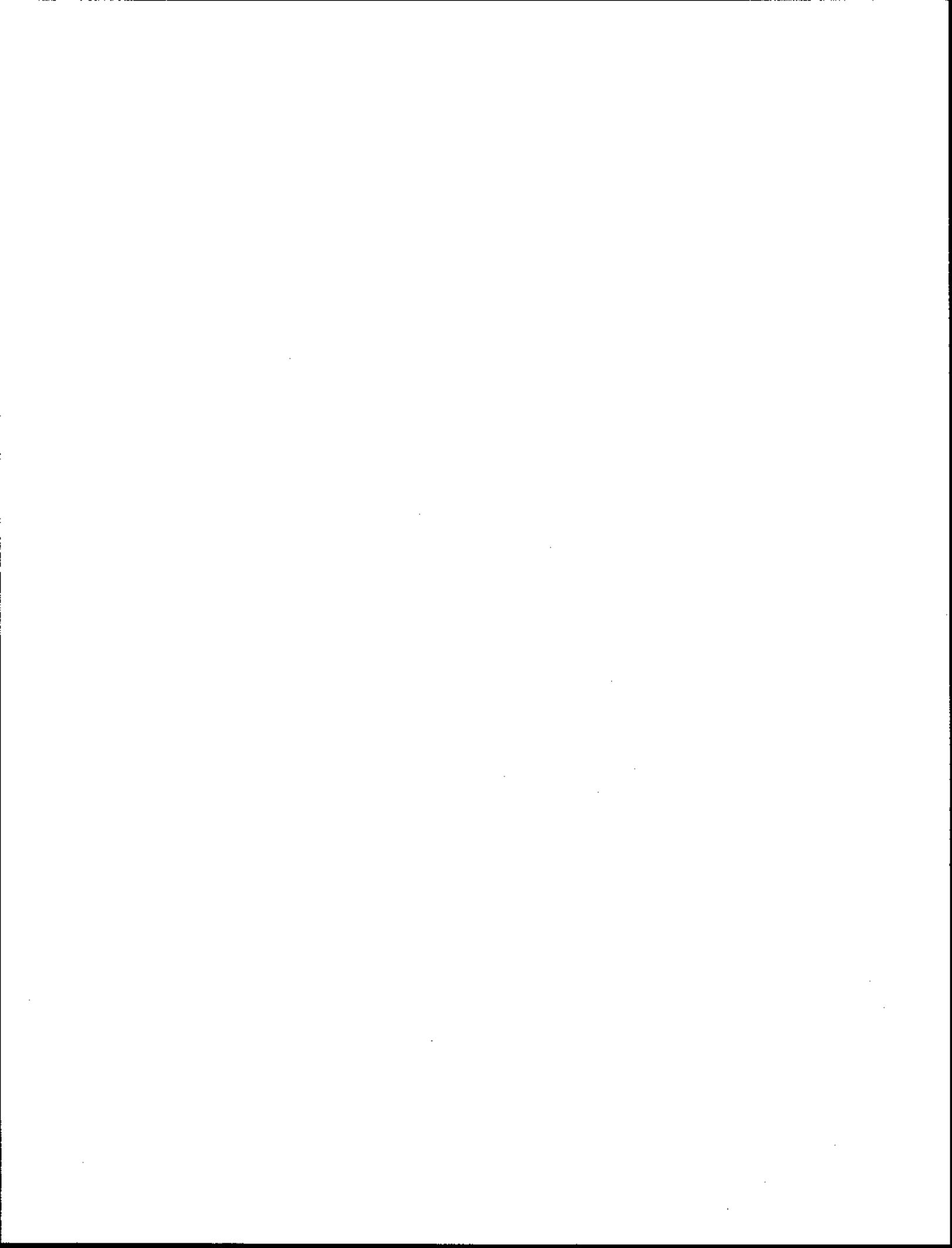
Phase III

- Symptoms same as phase II but all become chronic
- Spontaneous vocal recovery impossible

Adapted from "Potential Problems Associated with Use of Speech Recognition Products" by Dona Kambeyanda, M.S., Lois Singer, D.S.P.A., and Stan Cronk, Ph.D., Assistive Technology, Volume 9, Number 2, 1997.

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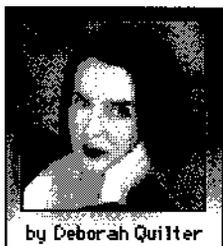
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Speech Recognition and Other Unnatural Acts

Straight talk about NaturallySpeaking



by Deborah Quilter

Computer users with repetitive strain injuries are often told to type less, but short of changing jobs, this feat isn't always easy to accomplish. Speech-recognition programs, which transcribe dictation into text files, promise to free computer users from the keyboard. I tested Dragon Systems' speech-recognition program NaturallySpeaking, hoping it could make good on that promise.

I've been using NaturallySpeaking for nearly three weeks, and it makes me think of a dog that can walk on two legs: It doesn't do it well, but it's amazing it can do it all. While Naturally-Speaking is indeed remarkable, it's no replacement for your keyboard.

WHAT YOU NEED

NaturallySpeaking is essentially a dictation program that functions like a rudimentary word processor. Instead of typing words, punctuation, and formatting commands, you dictate these elements and the program transcribes them. You can then print, save in plain text or rich text format, or copy the document into a traditional word processor or email message.

The system requirements are fairly modest. NaturallySpeaking needs at least a 133MHz processor, 32MB of RAM, and Windows 95 or NT 4.0. It's also important to have a compatible 16-bit sound card. Required hard disk space starts at 60MB but varies according to the edition and features you use. The program comes with a headset microphone that you plug into your sound card.

My test system, a newly reconditioned, 200MHz Gateway running Windows 95, came with 32MB of RAM, a 3GB hard drive, and an Ensoniq Wavetable sound card. I started off with the basic Personal edition, but when I experienced general protection faults, I switched to the Preferred edition at the advice of a Dragon technician. (Dragon admitted to errors in the Personal edition.) Switching to the Preferred version solved the problem.

In addition to the \$159 Personal and \$229 Preferred editions, there's also a \$695 Deluxe version of NaturallySpeaking. All three have the same vocabulary size (230,000 words), but you can have up to 55,000 active words in the Deluxe edition.

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The other two are limited to **JO,UUU** active words. Dragon says the Preferred and Deluxe editions can play back your recorded speech and translate any written text to speech.

GETTING STARTED

Installing and training the program is easy, if time consuming. After installing the software, you read a few paragraphs so the program can adjust to your voice. Then you fine-tune the program's ability to understand your voice by reading about 18 minutes' worth of text. Dragon offers selections from "3001: The Final Odyssey," "Dave Barry in Cyberspace," and "Dogbert's Top Secret Management Handbook."

The program's interface is similar to a word processor's, with menus for File, Edit, View, Format, Tools, and Help options. When you dictate, your words first appear in a tiny window that shows the program analyzing your text. Then the analyzed transcription appears in a larger window. Separate windows pop up when you correct words and train the program to recognize words it has misunderstood.

To improve the program's transcription accuracy, you can run the vocabulary builder. NaturallySpeaking analyzes a general-purpose document you've written, such as a memo or email, and adjusts to your style of composing text. I used one of my columns to acclimate NaturallySpeaking to my style.

MISS TAKES HAP IN

Alas, NaturallySpeaking was a poor student. Here is an example of how the program interpreted some dictated text. My intended words are in parentheses:

"The program would frequently insert words that I had not uttered, and it had a strange tech (tic) of inserting the word "and" when I had not said it, which I later discovered was how it interpreted my breathing. And know (though) it claims to be continuous speech, you sure deal (do) an awful lot of backing up and repeating yourself in a most unnatural and stressful fashion."

NaturallySpeaking often ran afoul of words that sound the same but are spelled differently. It's obvious that the program has a way to go before it can recognize words in context.

While such errors might be amusing at first, I quickly tired of having to repeat myself--sometimes five and six times--to make corrections, meanwhile losing my train of thought. When I hemmed and hawed, my mistakes were dutifully printed. I then had to dictate and correct the errors. And though Dragon says you can use the alphabet to spell words, when I tried to change the word "in" to "and," I first got "kende." Then I got "ae" for "a." Then I got "ane" twice, at which point I used the keyboard. It was far easier to type the correct text than to spell it out.

SAY WHAT?!

Dragon claims that NaturallySpeaking can transcribe your words as fast as you can speak, up to 160 words a minute. That was not my experience. In general, I found that printed text lagged as the program figured out which words to choose. When I read a

266-word sample, the program finished transcribing the speech a minute and a half after I stopped, and it didn't include my final line of dictation. (The program failed to record significant chunks of text in other samples, too.)

In the same sample, it took me 58 minutes to correct the approximately 80 errors, and I cheated. When the program failed to correctly interpret my voice commands after the third try, I used my hands.

When NaturallySpeaking makes errors, you can use the correction box to record your pronunciation of the right and wrong words so the program can differentiate between them in the future. I trained the program to recognize the incorrect words in my 266-word sample and then redictated the text. The program repeated a few of the original errors, which made me wonder how effective the "training" system is. It also made about 20 new errors and failed to record 58 words at all.

When I told a Dragon technician about my error rate, he asked what I had dictated. "A simple children's story," I replied. "That's a bad example," he said. He explained that the program analyzes the likelihood of words appearing together in context. If you're not dictating something highly predictable, such as boilerplate contracts or medical reports, NaturallySpeaking is more likely to make mistakes.

To troubleshoot the high error rate, I read a brief, straightforward passage from Dragon's Web site. I got three errors in a 23-word sample the first try and four the next time, including one error I had "corrected." I also sent Dragon's technicians an audio file I recorded using NaturallySpeaking. Their analysis of the file indicated that my sound card's quality was "normal," which meant it was doing its job correctly. Incidentally, this sound card test is available for free as a troubleshooting method to anyone who buys the program.

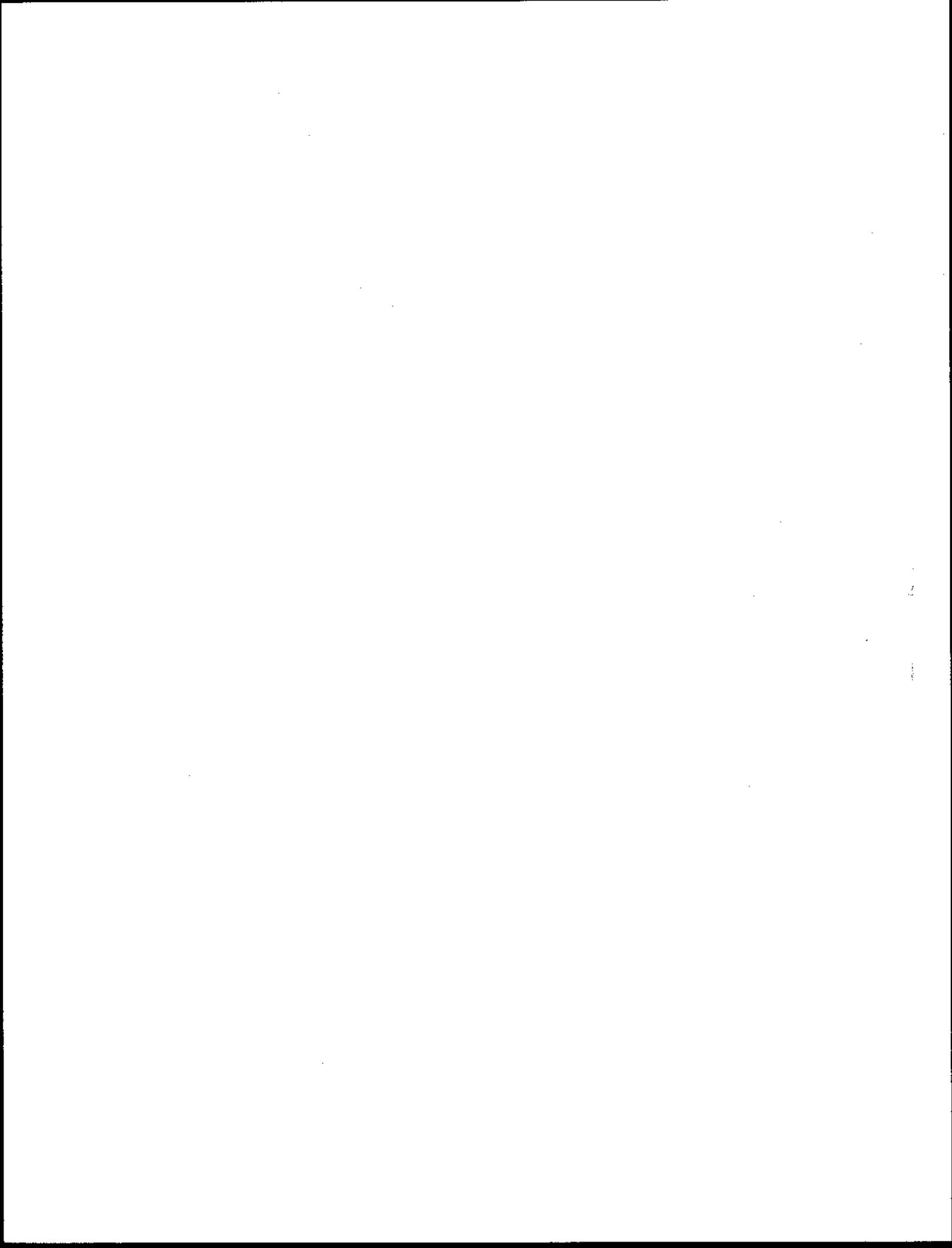
A Dragon technician said my error rate was unusual and suspected my PC was at fault. However, he agreed that my hardware and software were up to spec and couldn't pinpoint anything like ambient noise or poor diction as the cause of the errors.

DON'T TOSS THAT KEYBOARD

Voice recognition programs are often suggested as a solution for people with repetitive strain injury, but NaturallySpeaking is not entirely hands free. In addition to using your keyboard when voice commands don't work, there are some actions that require your hands, such as turning on the microphone, typing the first few letters of what you're looking for in Help, and holding down the Control key so the program realizes the word you're dictating is a command, such as "click file" or "select."

A heavy user of the program could also be at risk for another injury, serious vocal strain. There's nothing natural about talking for hours on end, as some jobs would demand, or being tethered to a computer by a headset microphone. The likelihood of a vocal injury could be heightened if you find yourself talking in a halting cadence, as I did when the program couldn't keep up with me or when it made mistakes.

NaturallySpeaking may be more appropriate for doctors, lawyers, and other people who dictate predictable strings of text. If you try this software, make sure your PC



meets the system requirements, or your results may be worse than mine. If you want to run other software in the background, you'll need extra memory. Otherwise Windows might slow down, which in turn will slow NaturallySpeaking. Small details like microphone placement and ambient noise can also lower performance, although those factors were not a problem in my case.

I hope the program's performance is better in a wider variety of situations. It could be a great boon to switch between computing by hand and voice and thus reduce your overall bodily strain.

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Deborah Quilter is coauthor (with Emil Pascarelli, M.D.) of "Repetitive Strain Injury: A Computer User's Guide" from John Wiley & Sons. You can write her at P.O. Box 1502, Ansonia Station, New York, NY 10023 or visit her Web site at www.interportnetl-webdebl.

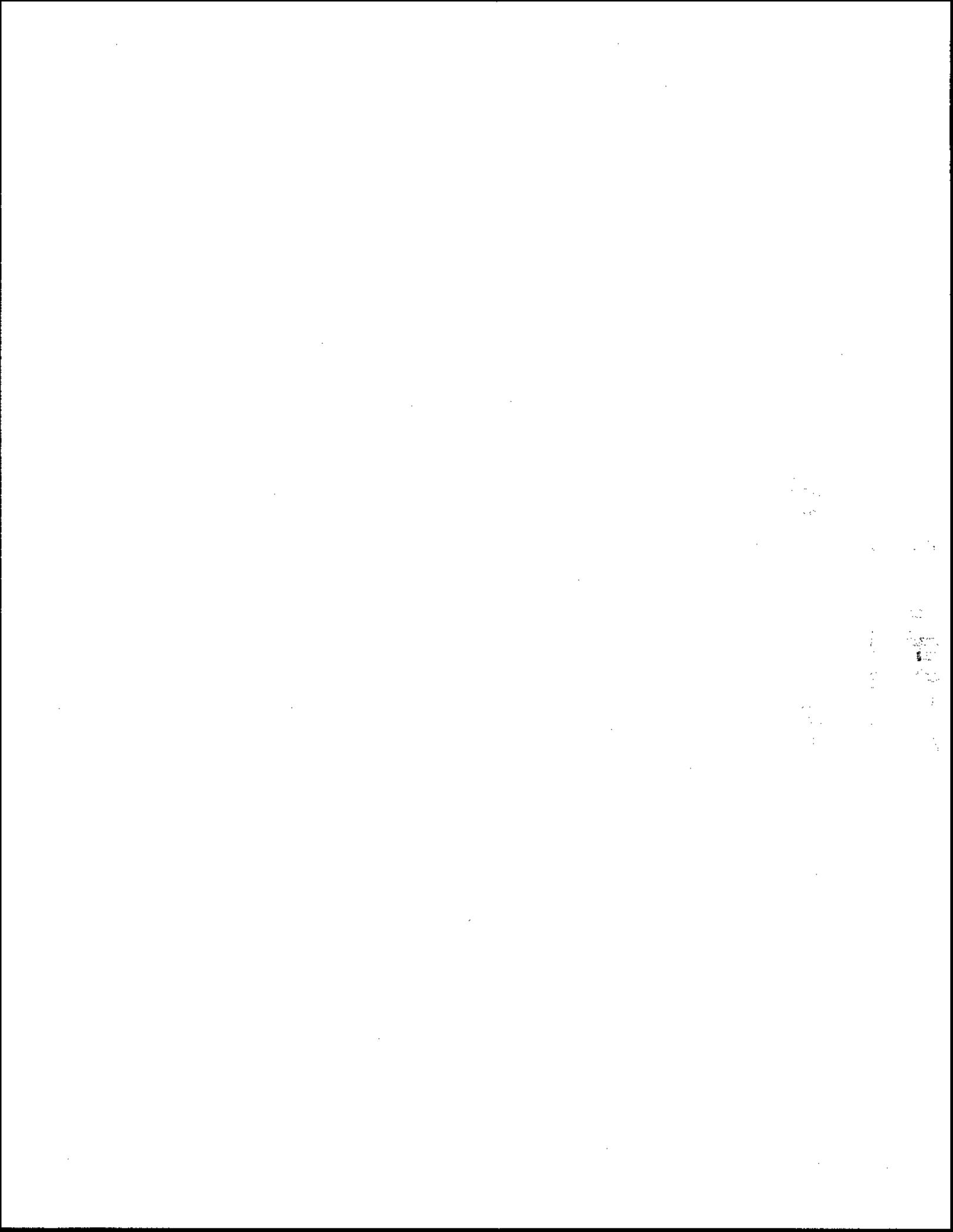
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The Repetitive Strain Injury Recovery Book

If you or someone you know suffers from RSI, *The Repetitive Strain Injury Recovery Book* is an important step toward knowledge and, ultimately, relief. Deborah Quilter, who herself has RSI, has assembled resources and advice from leading RSI experts. Her comprehensive and groundbreaking guide to recovery includes:

- the best treatment and therapy options, both conventional and complementary
- techniques to minimize the risk of further injury and help restore comfort and mobility
- tips on dealing with the emotional effects of RSI, such as job anxiety and depression
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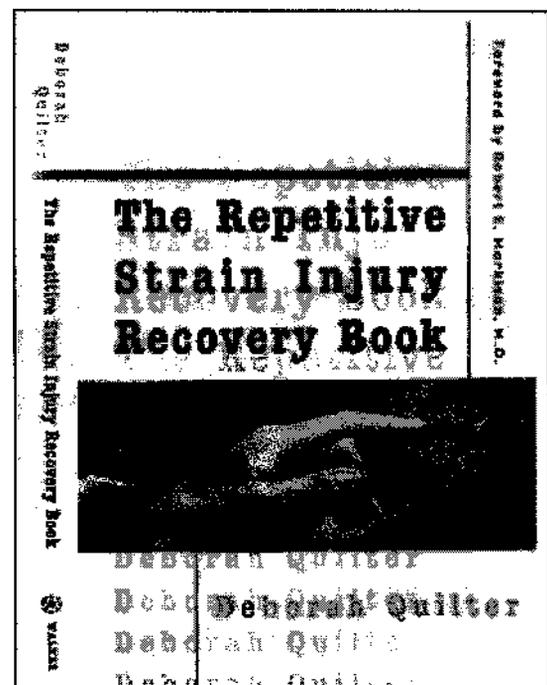
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-- Lewis G. Maharam, M.D., FACSM
President, Greater New York Regional Chapter
American College of Sports Medicine

Deborah Quilter lectures, conducts RSI consultations, and writes a monthly ergonomics column for *Computer Currents*. Her articles have appeared in national magazines, including *Good Housekeeping* and *Fitness*. She is the co-author of *Repetitive Strain Injury: A Computer User's Guide* (with Emil Pascarelli, M.D.) and lives in New York City.



Robert E. Markison, M.D., author of the foreword, is a celebrated hand surgeon, Associate Clinical Professor of Surgery at the University of California-San Francisco, and Cofounder of UCSF's Health Program for Performing Artists.

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The Rossiter Systems™

The Rossiter System uses non-invasive techniques that bring immediate relief. There are 72 techniques that are in wide use in workplaces across America. This self-administered mini *Workout* is only a tiny part of the full Rossiter System. To receive a more comprehensive *Workout*, check Rossiter Express® on our homepage. This one technique, however, will give you temporary relief and hopefully will give you a bit of understanding of why you are in pain and what to do about it.

What Will A Full Rossiter Express Workout Do For You?

In most cases, you'll be able to reverse the connective tissue deterioration completely, restoring your full range of motion, eliminating pain and returning strength. In severe cases involving chronic pain and extensive damage, you'll most probably be able to stop the progression in its tracks, return some of the lost mobility and strength immediately—and in time regain the full use of your hands.

In cases where shots or surgery have been administered, the damage cannot be reversed completely, but can mitigated to a greater or lesser extent.

How Does The Rossiter System Work?

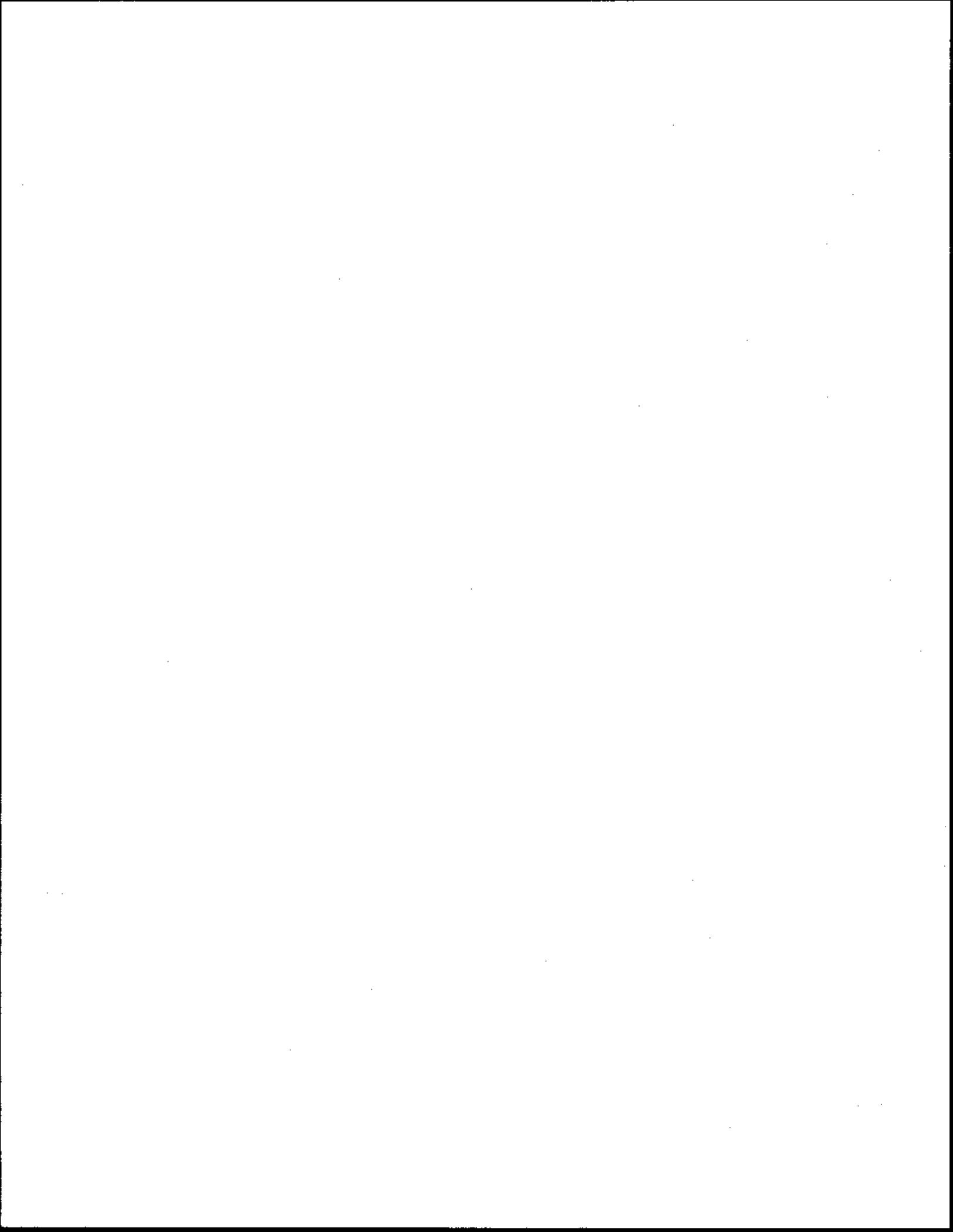
Remember the connective tissue mentioned earlier? It's there that the Rossiter system does its work. There are three processes at work whenever a Rossiter technique is applied.

First is the application of weight. When weight is applied, the area naturally heats under the pressure. This warmth facilitates the next part, the stretch.

The stretch is done actively by reaching and hunting for the pain yourself. This unique style of stretching under pressure returns the tissue to its former size, shape and elasticity. You will feel this immediately after the stretch. If you do not stretch the area while you are applying weight you will not get any results. If you 'sort of stretch you will 'sort of get results.

The third aspect is the movement. Each technique involves very specific movements which take place while the stretching and the application of weight are maintained.

All three things have to take place for this to work for you. The weight must be maintained

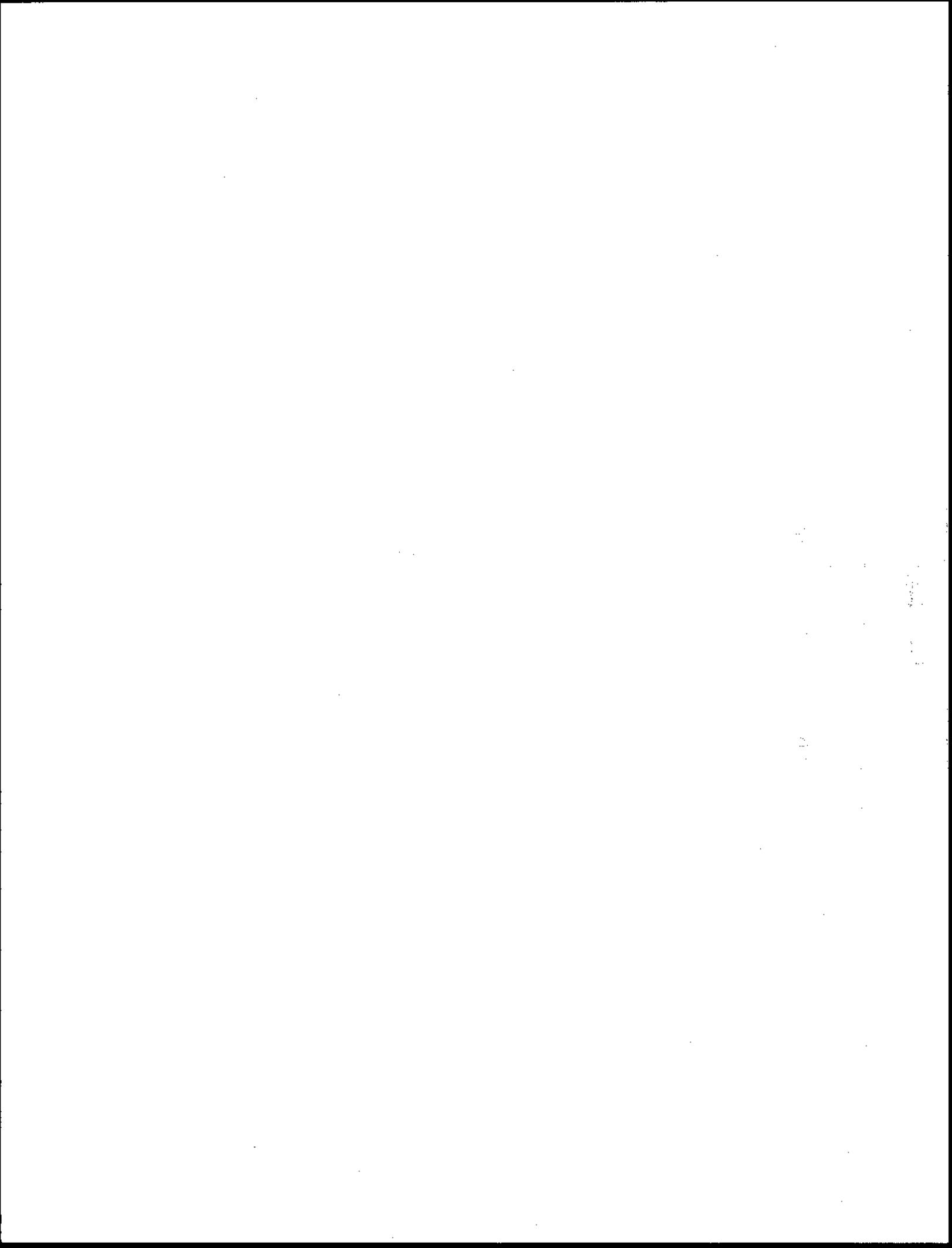


at a consistent level during the technique. The stretch must be done in earnest, looking for pain. And the movement must be carefully executed, while maintaining the stretch and the weight.

To get results that are powerful and lasting you must stretch your heart out and bring many tears to your eyes. In a very short time you will see your results.

Continue ...

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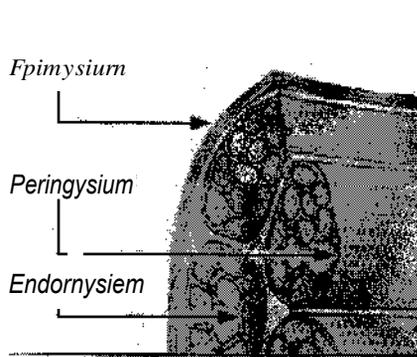
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What Is Connective Tissue And Why Is It Important?

Rossiter & Associates were the first to understand that damage to the connective tissue system is the basis for all repetitive motion injuries.

Connective tissue is really quite simple to understand. It is what it does. It connects body parts together. In fact it connects every part of the body to all the other parts. It



*This graph illustrates
the level at which The Rossiter System
acts on the body's connective tissues.*

connects bones to bones, muscles to bones, and muscles to muscles. It is variously called cartilage, ligaments, and tendons.

Our connective tissues give us our very shape. They are like a continuous sheath, interrupted by muscle fibers, then muscle fibrils then the muscles themselves. The connective tissue surrounds all our muscles and bones, holding us together.

With the right amount of stress to our bodies, we function normally. Excessive strain damages our connective tissues on a microscopic level. Along the entire pathway of stress or trauma, our connective tissues tighten up and pain results as well as loss of movement.

This permanent tension has a of number names; repetitive motion disorders, repetitive strain injuries, carpal tunnel syndrome, restrictive sympathetic dystrophy, cumulative trauma disorders. Each may have a particular symptom related to one area in the connective tissue system, but they all have the same underlying cause. No matter what you may wish to call them, they are caused by a tightening of the connective tissues

What Is This Pain Trying To Tell Me?

RMI pain happens when your nerves are compressed. Your body doesn't like that. The shortening of your connective tissues has caused a disruption in the nerve paths and your nerves are telling your brain that you're in pain. We need pain to tell us when we're in trouble. By the time you feel pain your tissues are already damaged.

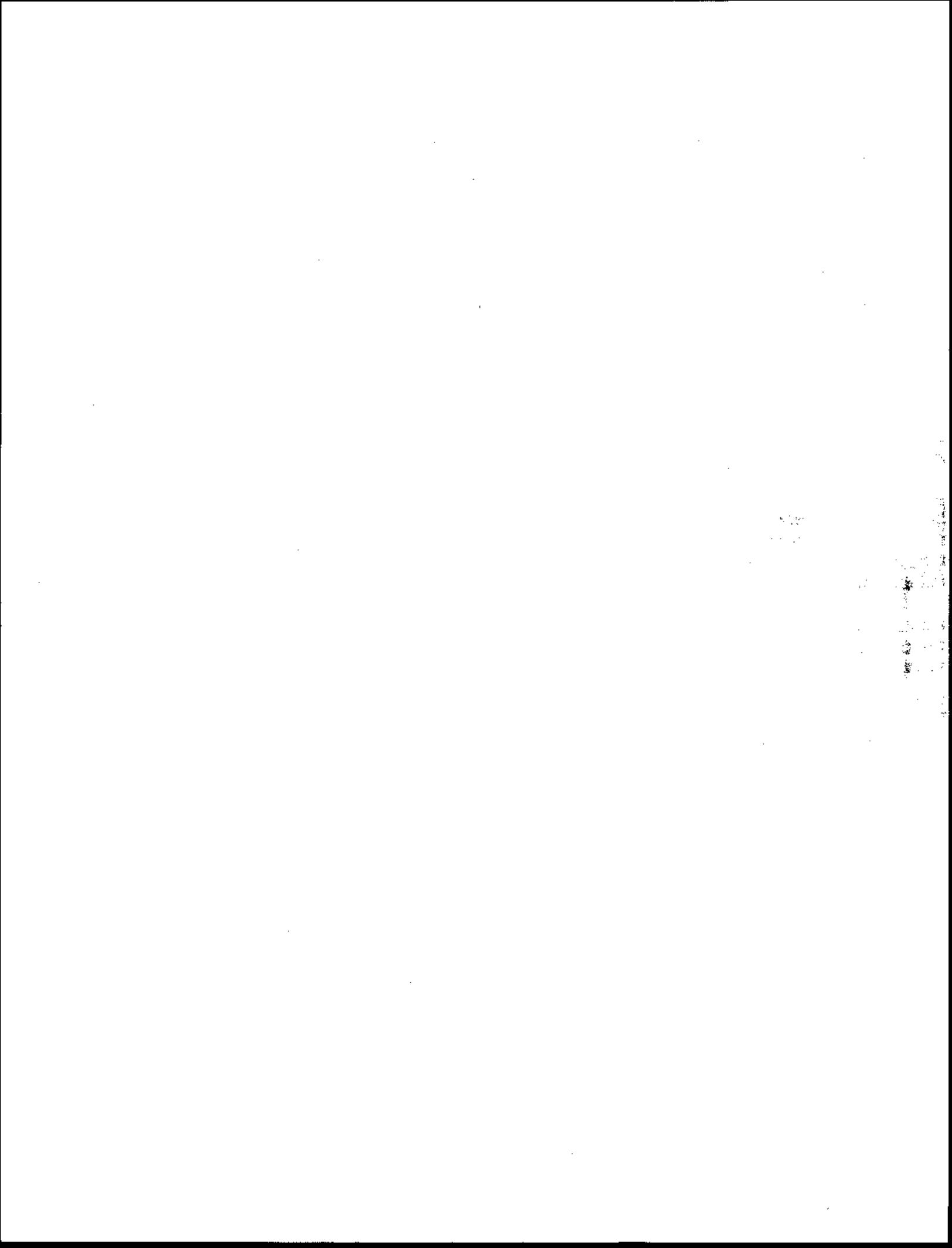
When we mask the pain with drugs and keep on working, we can't feel the additional damage that is occurring. And when the drugs wear off—of course—there's more pain because of the damage which occurred while our pain was masked.

Beyond constriction or tightness, pain is also caused by your tissues not receiving enough 'food'. Normally, the blood delivers nourishment with ease into all areas of the body. Traumatized tissue doesn't receive food as well as normal tissue because of the constriction. So those areas are extra 'hungry', and are crying out. The body's cells cannot store food. Cells require a never-ending supply of nourishment.

How Did It Get So Bad?

In the beginning, the tension only occurs during the day, when you're doing the repetitive work. Next, it lingers after work into the night, where it robs you of your sleep, pushing the tolerance level of your body beyond its capacity.

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Okay, Let's Do It... Let's Get Rid Of Your Carpal Tunnel Pain Right Now!

There are three parts to this technique as mentioned above. Run through them individually until you are sure that you understand them.

Rest your forearm on the edge of a table as shown with your palm up. If you can find a small pad or even a blanket to place under your arm this will make the process much more comfortable.

Start with your arm in the palm up position. You will apply the technique—fifteen seconds of eight/stretch/movement—three times on each arm. First palm up, and then palm down.

You need only work on the upper one third of the forearm area. Start 1/4 inch away from your elbow for best results.

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Applying Weight

We will refer to your 'working' arm and your 'receiving' arm for the purpose of this explanation. The working arm applies weight. The receiving arm works with the weight and does the stretching and the movement.

Apply the weight with your working arm by placing it on the forearm of your 'receiving' arm, about 1/4" away from the elbow. The part of your 'working arm' that touches your 'receiving arm' should be the back of your forearm close to your elbow. In other words if your right arm is the 'receiving arm', then your left arm should be palm up, and your left forearm should be pressing down on your 'receiving arm'. The weight should be on the fleshy part of your 'receiving' arm—never on the bone and never on a joint.



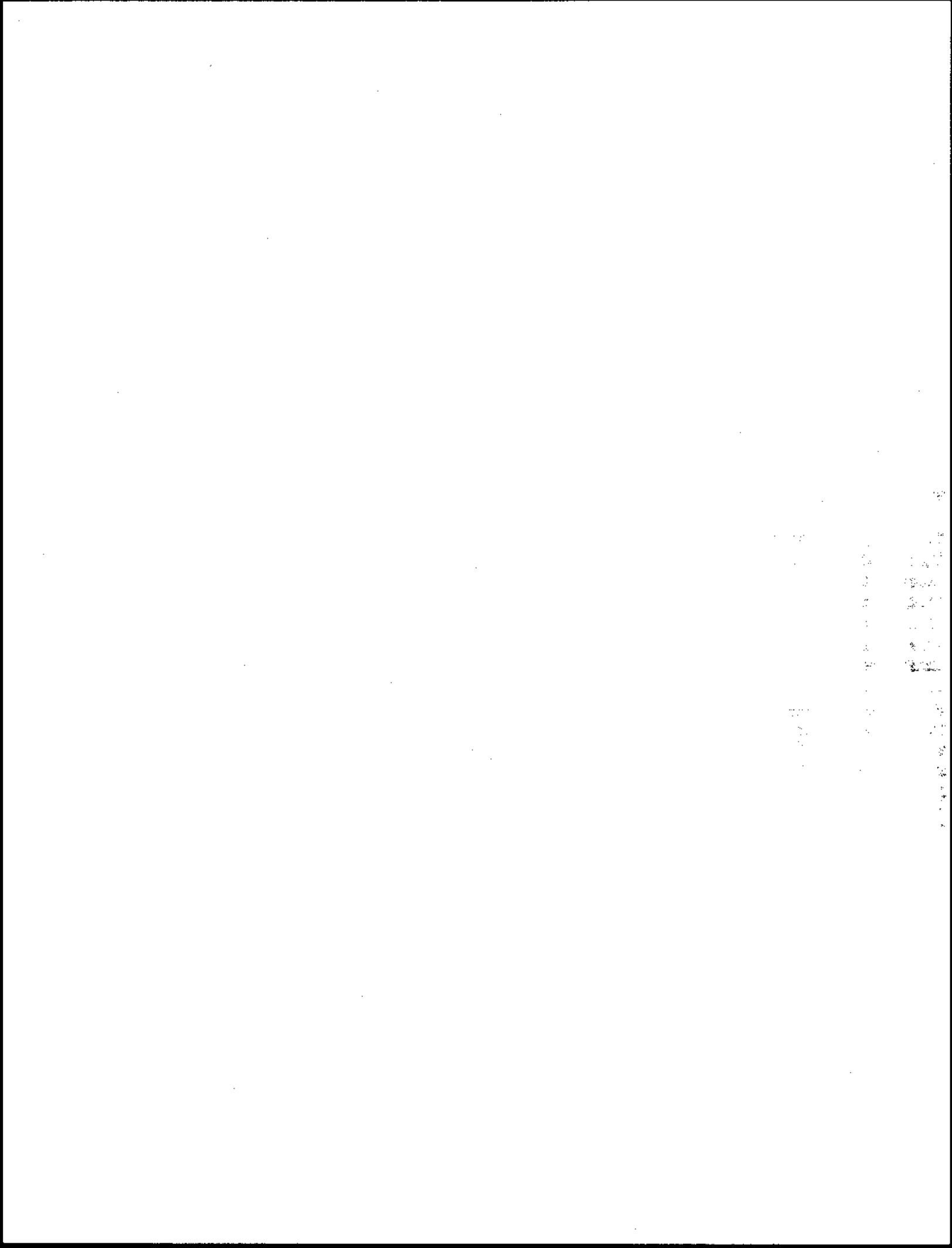
When you apply the weight, lean your body, together with your 'working arm', onto your 'receiving' arm until it starts to become uncomfortable. Make sure that your back is straight while you apply the weight.

Special Note: Apply as much weight as you can comfortable work with. To get rid of the pain you have to go after it and then go through it. There are no short cuts. Many thousands of people have learned to use these techniques to eliminate their pain. Once you learn, you'll be able to find and eliminate your carpal tunnel pain too. Don't be afraid to work with your pain.

Finding the exact area to be worked on:

Once you have applied the weight, you will find the optimal area by slowly rocking your working arm back and forth until you find the worst pain. Once you find it, stay on the spot, add as much weight as you can work with.

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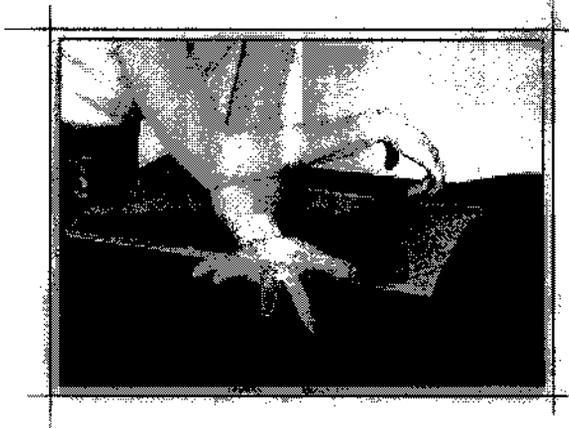
The Stretch

Now, stretch your fingers and thumb out as far as you can. It helps to imagine that you are reaching for a \$100 bill that's just beyond your reach. You will notice—if you are stretching correctly—that your palm appears white. Maintain the stretch throughout the movement.



Movement: The Wave

Now, do a five finger wave as follows: start with your pinkie. While maintaining the weight and the stretch, slowly curl your pinkie towards your palm. Bring it as close to your palm as it will go. At the same time keep the rest of your fingers from moving as much as possible. Don't worry if your other fingers come forward a little bit—that's normal. Once



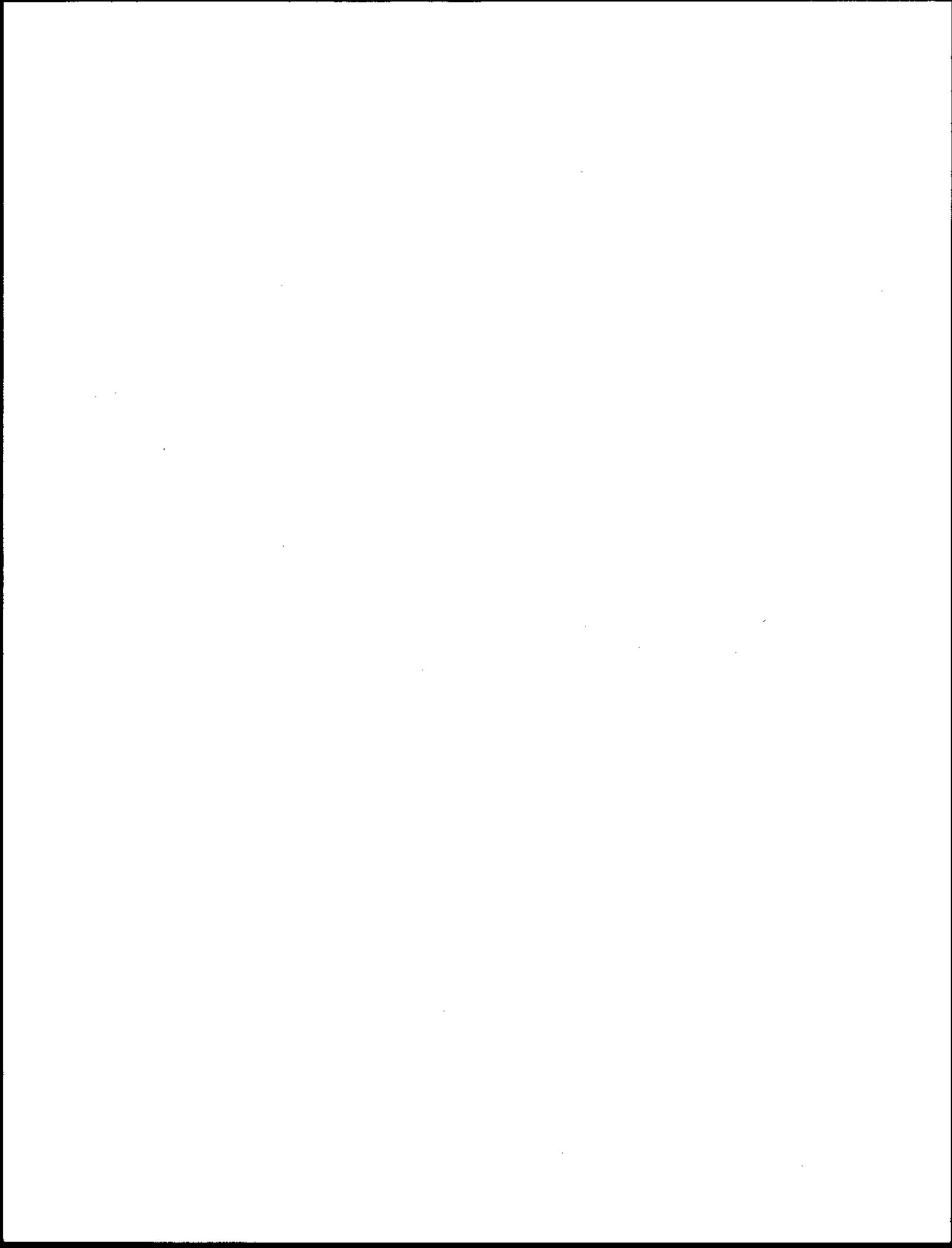
your pinkie has stretched towards your palm as far as it will go, return it slowly to its original position, while maintaining the weight and the stretch. Now move on to the next finger and try to get it to touch your palm. Move slowly through all five fingers, and then rest—relax the weight and stop stretching. If you feel a residual pain or tingling when you stop, then do a 'tiny torque', before moving a 1/4" up the forearm for the next part of the *Work-out*.

This first section should take about fifteen seconds. Do not let up on the weight or the stretch until your fifteen seconds are up. You

will feel your connective tissues pulling or rippling under your 'working arm' as your fingers reach into your palm. It will hurt. Don't worry. That means that the technique is working.

(Notice the areas where your pain is especially intense. After you have completed the *Workout*, it's a good idea to return to those very spots for another fifteen seconds. This will accelerate your pain relief).

You will apply the weight for fifteen seconds, three times, one quarter inch apart. Start closest to the elbow without being on the joint itself and move down from there. The



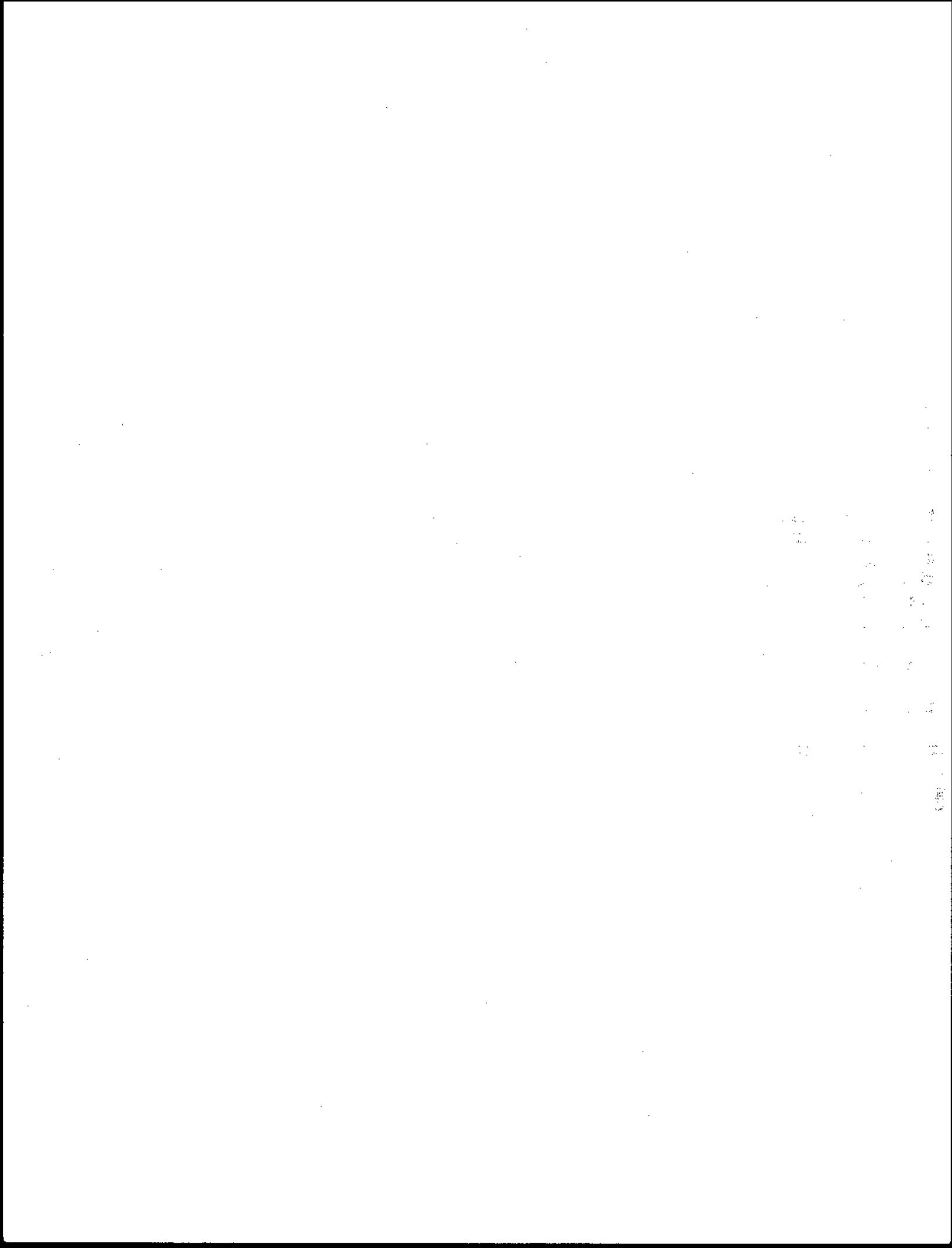
working arm should rest briefly between applications. (ten to fifteen seconds at most)

Tiny Torque

With the fingers of your working hand, gently pinch a generous portion of the fleshy tissue in the area where you still feel residual tingling or pain. Twist a half turn or so—gently, and wait until the tingling is absorbed, then let go.

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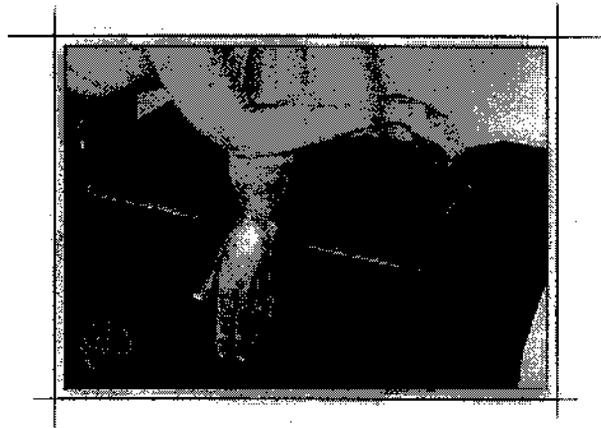


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Comparison Time

After you've done one arm, compare it with your 'working' arm. Roll your wrist around and notice the difference—if any. If you don't notice any difference then that's not where your pain is coming from. Now go ahead and repeat the workout with your palm down. Remember, you have to do both sides of your arm or there won't be the balance your body requires.

Apply the weight on the other side as shown. Do the same technique as before, but palm down. Make sure that the application of weight is maintained through the stretch and movement.



Extra Variations

Only use these after you have mastered the Mini *Work-out*.

Substitute the following movements: while applying the weight,

- i) arch your hand as far back as it can go and then as far forward as it can go.
- ii) Make a hard fist, then open your hand as wide as possible.



Place the tip of your elbow into the palm of your hand—the one that hurts. Now, with the tip of the elbow, roll around in the palm with enough weight to find the sore spots. Add weight to the sore spots while slowly stretching the hand and fingers out. Don't stretch the fingers up! Do this three or four times following the above guidelines.

Final notes

This technique, as simple or unusual as it may seem, will definitely relieve your pain if you do it correctly. After completing one round of the technique as described above, rest until

the next day and repeat the technique if you need.

Remember, absolutely everything you do should be in slow motion. No matter which technique you use the slower the better. The more it hurts the better it works! But stop after three times or you'll make yourself sore.

Final Tips

- No lotion, please.
- Make sure the hand of your working arm hangs limply while the working arm is working.
- Use good posture while leaning over the table. Keep your back straight.
- Drop your shoulders and let them relax while you do the technique.
- Don't sit at the table or you'll make your neck sore—or even give yourself a headache. Do the technique standing up.
- Don't go overboard. Let the area rest after a workout. Once you get the hang of it, you'll get excited and start to feel relief. Let your body rest or you'll be sore later.
- Roll your shoulders when you're finished to get the bugs out.

A Note of Caution

These techniques are in use in many Fortune 500 companies. The best results come when a person has not undergone surgery, has not had shots and can refrain from using any splints. Most everybody who has never had any cortisone shots or "cain" shots in the area of pain will make a full recovery.

People who have used splints but have not had shots or surgery should see a full recovery.

If a person has had shots, they can expect to see only third to one half of the results a person who has not had shots.

If a person has had surgery, they can expect to see only third to one half the results a person who has not undergone surgery.

Part of the reason they may not get the results they want is that their soft tissues are so painful from the damage inflicted by shots and/or surgery that they can't stand working on the techniques.

How hard you work at it will make a difference!!!!

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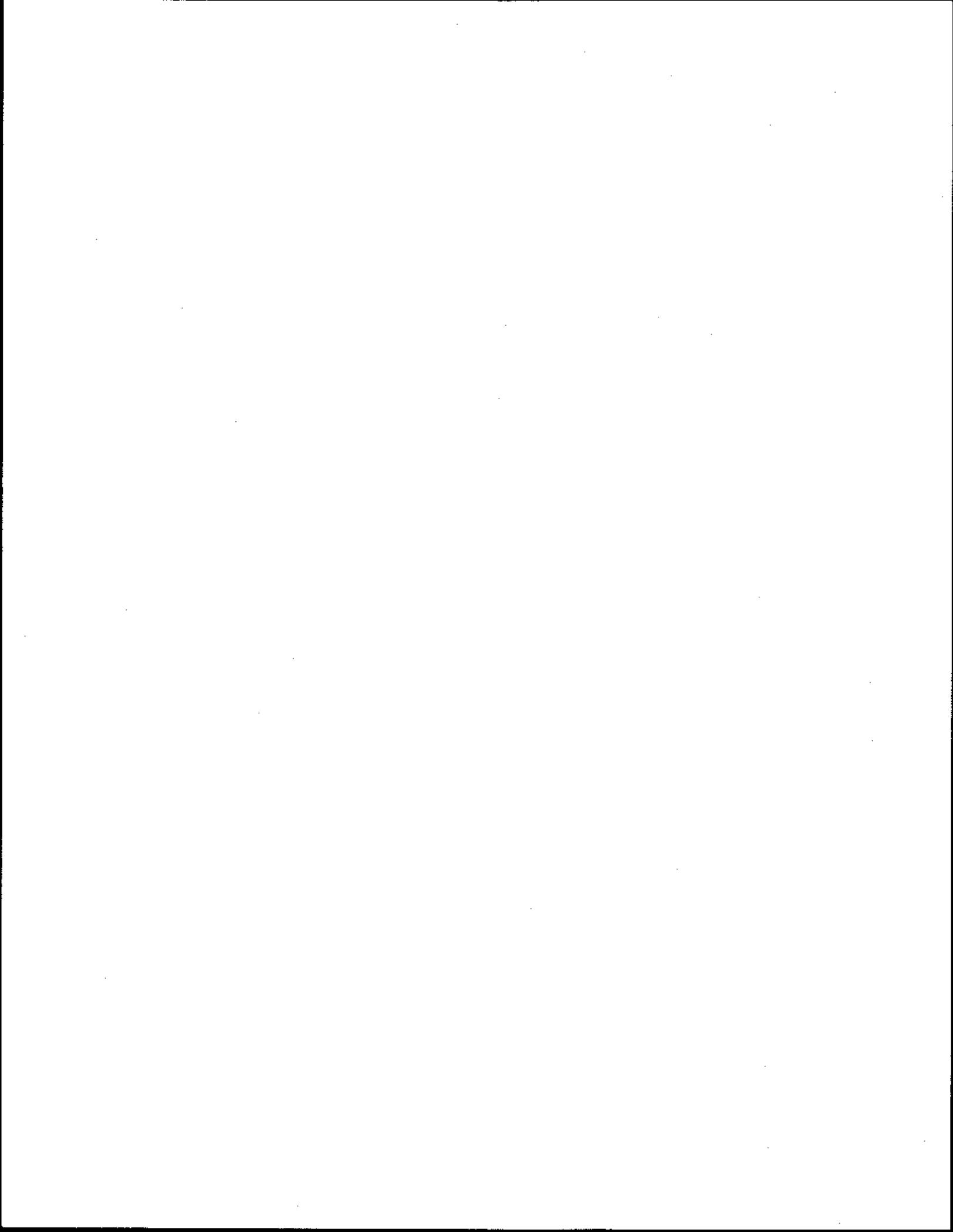
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Postural Tips

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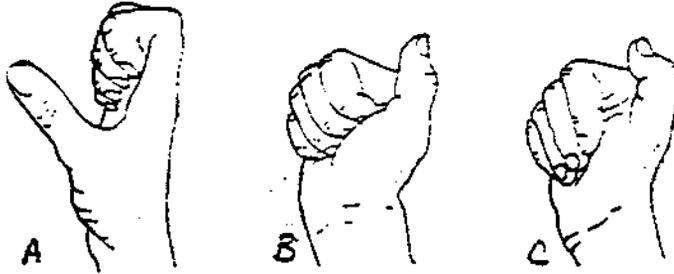
The human body is made of living tissues. Our muscles, tendons, bones and nerves need oxygen and food delivered by blood, and the tendons need lubrication. Work that requires sitting for a long time and/or particularly rapid repetitive movements needs to be broken up every 20-30 minutes with a stand and stretch moment. This will give your body a break, relax tight muscles and let your blood flow.

How to stretch - Move slowly into position and avoid rapid or jerking movements. Move to the point where you feel your muscles stretched and hold the stretch for 5 seconds. Then move a little further into the stretch and hold another 5 seconds. Relax between each exercise and let your arms swing at your sides. If your stretch hurts, you are pushing too far. Back up to the point where pain is gone. Perform each exercise 2-5 times.

1. Stand up slowly bend backwards and then rotate at the waist to right and left. (Stretches back muscles)
2. Raise both arms over head and reach for the ceiling, raising up on your toes. Then bring down both arms to right and left with your body, stretch them as far back as you can slowly, then cross them in front of you. (Stretches tight chest and shoulders)
3. Tuck in your chin, look down to the floor and then return to middle. Next bring right ear towards the right shoulder and left ear towards the left shoulder. (Stretches neck)
4. Tuck in your chin, look down and keep chin close to chest. Slowly roll chin around to the right shoulder and then to the left. (Stretches neck)
5. Tuck in your chin, relax your shoulders, then pull your shoulders back until you feel a stretch. Then raise your shoulders up toward your ears as far as you can. (Relaxes shoulders)
6. Dandle arms at side and shake out hands. Then with your arms at your sides and elbows bent to 90°, slowly rotate wrists 360° each direction. (Loosens wrists)
7. Let your arms relax by your sides. Grasp right arm above elbow with left hand and hold it firmly against your right side, turn palm of right hand forward and bend wrist backward gently with fingers extended. Repeat With opposite arm. (Stretches wrists and fingers)



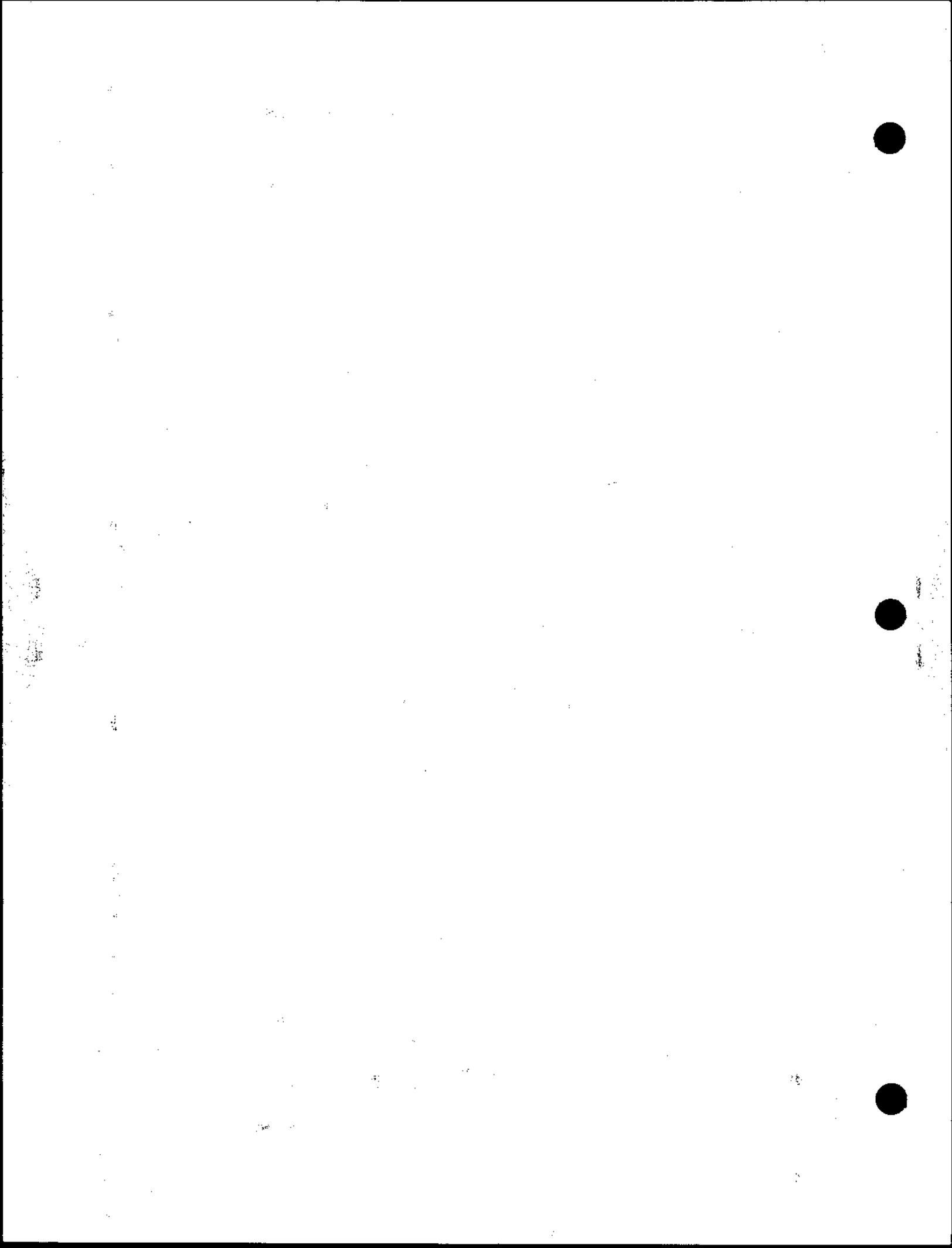
8. With your fingers straight, do each exercise separately. (Stretches fingers)
- a) "Hook" fist.
 - b) "Full" fist.
 - c) "Straight" fist.

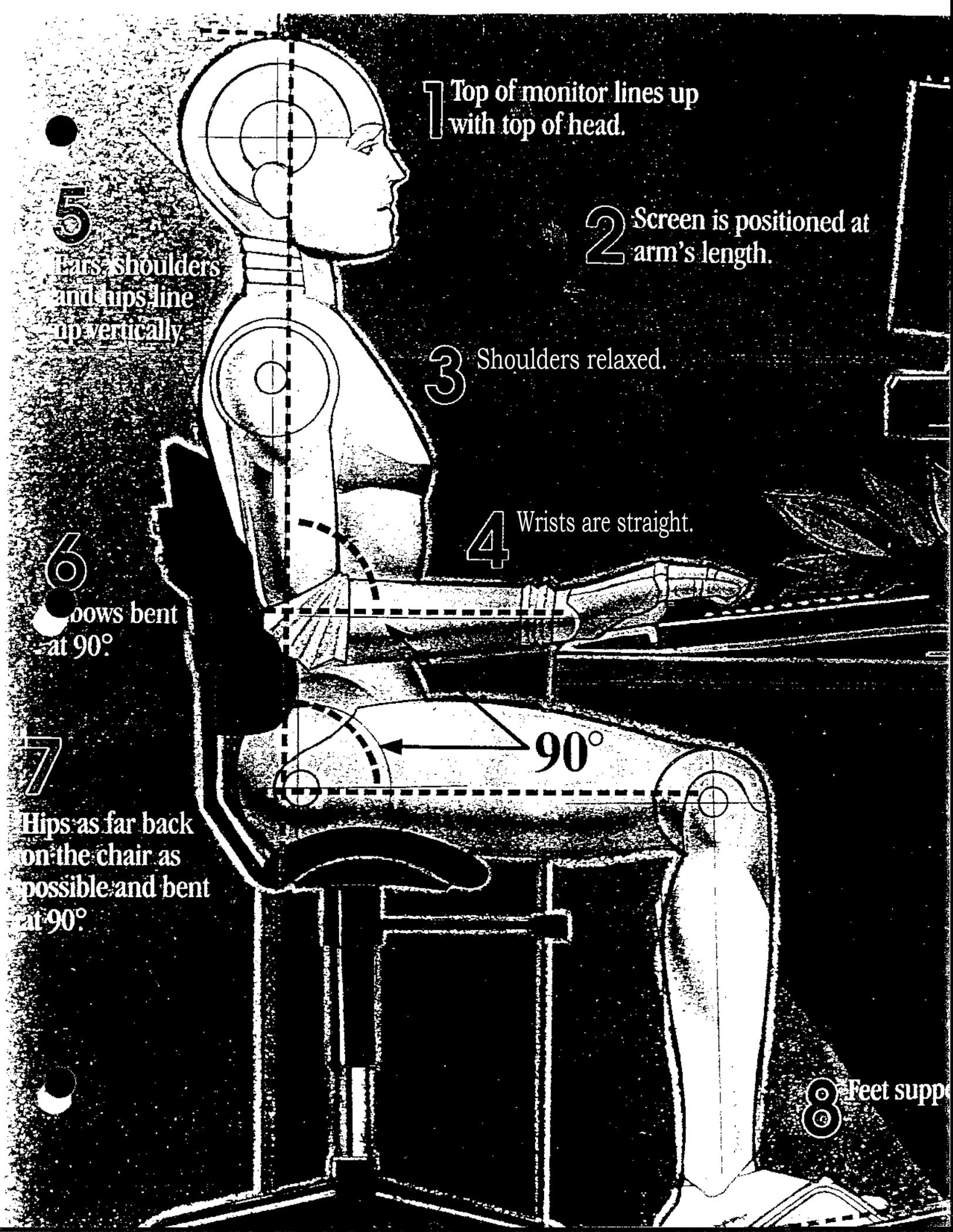


9. With palm up, touch the tip of your thumb to the base of your little finger. Then gently pull your thumb out and back until you feel the stretch. (Stretches thumb)

Sit back down again, readjust your position, work station and tasks for safety and comfort, and start work again.

If you have any problems with any exercise, hold off on that one and discuss it with your clinician or therapist.





1 Top of monitor lines up with top of head.

2 Screen is positioned at arm's length.

3 Shoulders relaxed.

4 Wrists are straight.

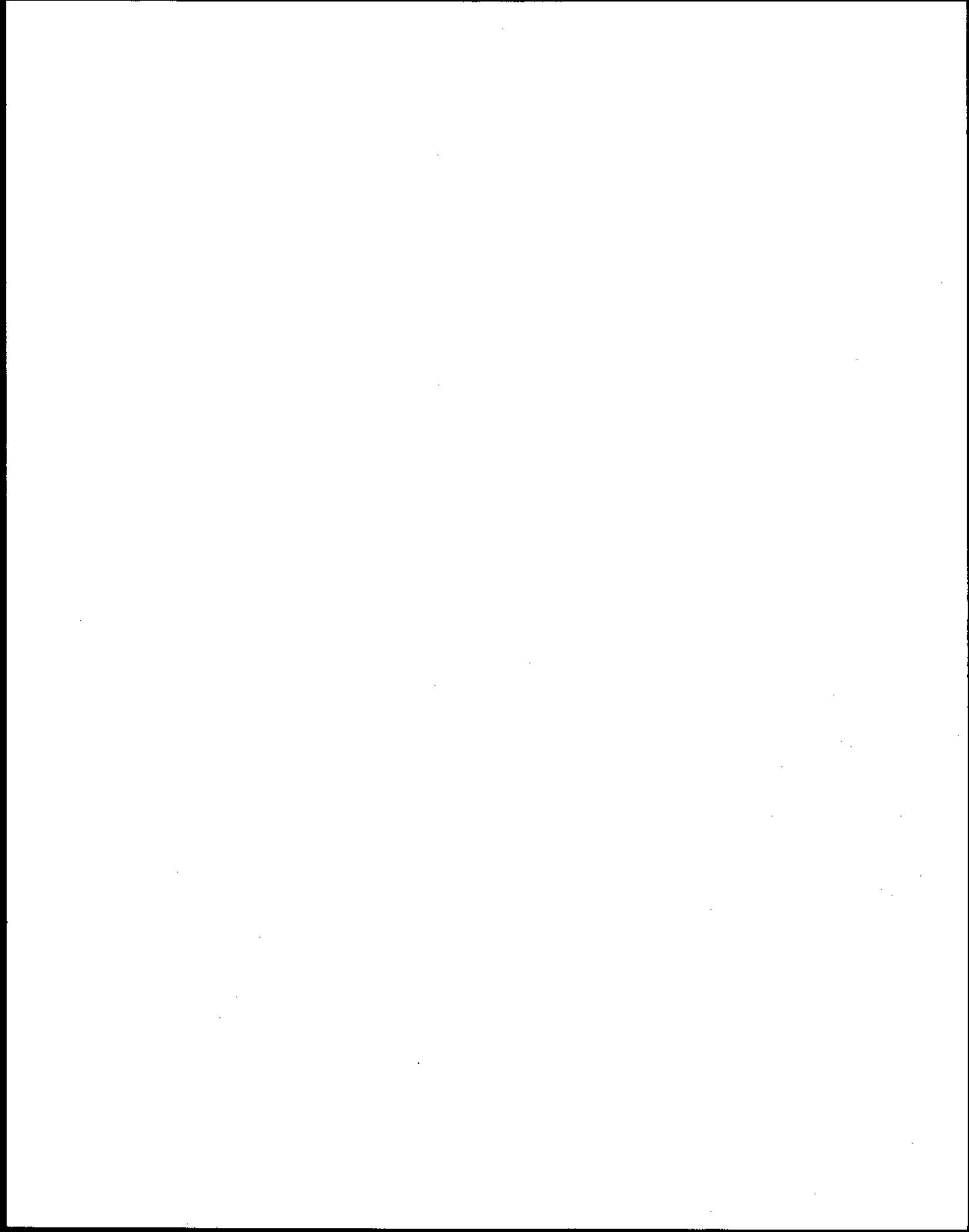
5 Ears, shoulders and hips line up vertically.

6 Elbows bent at 90°.

7 Hips as far back on the chair as possible and bent at 90°.

8 Feet supported.





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