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By Robert Felix
The tree care industry’s future is today! The author suggests action steps for those who want to stay ahead of changing times.

INDUSTRY INPUT
Candid comments from our readers.

WASHINGTON IN REVIEW
By Brian Barnard
OSHA’s push for a general industry ergonomics rule means that every employer will be required to have an ergonomics program.

MANAGEMENT EXCHANGE
By Susan Haupt
Part one of a four-part series: Finding out what your car costs per mile can help your business succeed.

On The Cover:
Spectacular fall colors frame a quaint scene in northern New England.

Lowering Devices
By Donald F. Blair
This article explores the spectrum of devices that arborists use to raise and lower loads on a work line. It ties together information from previous articles to help the arborist understand the complete rigging system.

Greener and Cleaner
By Peter Gerstenberger and Brian Barnard
Chain saw manufacturers rise to the challenge of producing saws that will meet very strict environmentally standards. Find out what it means to the end user.

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Test Your Knowledge
By Chris Carlson
Challenging questions related to our features on lowering devices.

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From The Field
By Peter Torres
Raking leaves doesn’t have to be drudgery, according to this writer!
The tree care industry is on the move. These are the most dynamic times that we have ever witnessed. As I talk to arborists all over the country, I can't help but recognize the aggressive approach that people have toward the future. Computers, the information highway, are merely tools to be used to get where we are headed as protectors of the environment.

Nobody can wait until tomorrow to deal with tomorrow. Things are moving too fast. The future is today and yesterday was the time to start planning for it. Even though 1994 has hardly begun to wind down, you need to begin planning for 1995, now!

A growing emphasis area in our industry is the projection of our image as suppliers of plant health care, PHC. We have always provided PHC. Isn't that what tree care is all about? Perpetuating a tree's health has always been our goal. We used to call it just pruning, spraying and fertilizing. Today plant health care is considerably more sophisticated.

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Providing a monitoring service to property owners and managers is part of the process and is well received. Those who have neither the expertise nor time to devote to their landscape but do recognize the value of maintaining healthy plants are quick to buy into this concept. It's all part of the plant health care philosophy. Find it now when it's a small problem and deal with it before it gets out of hand. Better yet, recommend services that prevent it from being any kind of a problem beforehand.

Aren't the insurance companies saying the same thing about human health care? Preventive medicine is the same as PHC. The only difference is the subjects. Does that raise the possibility of the government legislating universal PHC?

Seriously, Plant Health Care is a much more environmentally sound and currently more accepted description of what you do. It is more marketable in today's world and lends professionalism to your image. PHC is the tree care highway of the future and you need to be on it.

Use this fall to attend meetings, network with your peers and suppliers. Attend trade shows. Find out what's new that you can use to improve your operations. Put together an action plan this fall so that you can implement it in 1995. Be in the forefront of the future of the tree care industry. You may believe that you are already there but you can always be better.
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See us at TCI Expo
Three rope friction devices adapted to tree care use from mountaineering, left to right: the Brake Tube, a brake bar rappel rack and a Figure 8.

By Donald F. Blair

(This article is one of a series on rigging-related topics. The first was about arborist ropes, followed by arborist blocks, slings and now lowering devices.)

In 1980, after years of research, trial and error, Ed Hobbs invented and patented a technical rigging aid that he named the Lowering Device. His pioneering efforts and innovations to improve arboriculture have never been given their just due. His invention of the Lowering Device changed arboriculture forever and began a technique of removal.

In my opinion, the invention of the Hobbs Lowering Device created the demand for worldwide instruction of arborist skills. Twenty-five years ago, if someone had told me that other arborists and I would be invited to travel the world to share our skills with other professionals, I would have thought the notion improbable. But thanks to the combination of trade magazines, the International Society of Arboriculture Jamboree and chapter structure and the pioneering efforts of Ed Hobbs to show us the way of change, such a scenario has become commonplace. The more we share our knowledge and standardize our practices, the more we grow as a profession.

Reduced to their lowest common denominator, the intended purpose of lowering devices is to control the descent of limbs that are being lowered to the ground with rope. Every lowering device puts friction on a rope in one way or another to accomplish its basic function. Lowering devices differ in the amount of friction they create, the maximum size of rope and ultimate load that the device is rated for, as well as the “user friendliness” of the device. Such devices differ further in whether the amount of friction on the device can be varied while loaded, the mounting stability of the device and its ability to resist “impact loading,” and heat dissipation properties. (Some devices can get so hot that they can damage or totally destroy a rope under moderate to severe use.)

In order to sort all the “lowering device” types into some sort of manageable order, I’ve divided them into two categories - mountaineering and arborist.

Mountaineering

Mountaineering devices are cross-over implements, perhaps designed as a descender for rappelling but also capable of performing some service in load management and lowering. Early rock climbers would rappel by wrapping their climbing rope over their backs and through their legs. Severe rope burns were common. In an effort to develop a system that accepted heat and friction better than flesh and blood, rock climbers began to feed the rope through a series of linked carabiners to create a friction brake. Excessive strain on the weak gate side of the carabiner
resulted in still more flesh and blood problems. The quest for a strong, reliable descending device first led to the Figure 8 and then to the Brake Bar Rappel Rack.

The Figure 8 was the first successful friction device used in rappelling. The earliest ones were shaped very much like a Figure 8, hence the name. During rappelling the rope could ride up the top ring, creating a girth hitch. A “girth-hitch stranded” rock climber’s curses may be heard for 20 miles in gale force winds. Russ Sanderson, the extremely talented and inventive arborist and rescue expert, was the first to develop a Figure 8 with “ears” on the top ring to prevent girth-hitching.

Figure 8s come in two sizes - standard and large, also called rescue-sized. The larger one will pass doubled ropes to 5/8-inch and single ropes to 3/4-inch in diameter. The larger ones are usually equipped with ears. A larger Figure 8 will dissipate heat better than a small one. Figure 8 descenders come in aluminum alloy and drop-forged steel. Steel Figure 8s are heavier and more expensive than alloy models, but they have their advantages. Compared to aluminum, they enjoy superior strength, abrasion resistance and everyday durability. I recommend them for tree rigging.

The brake bar rappel rack is considered by many experts to be one of the strongest and most versatile descent devices available. John Cole developed the first rack in 1966. Shaped like an inverted “U,” one leg is typically longer than the other and formed into an eye for securing to sling or saddle.

A series of cross bars slide in the rack, creating the appearance of a railroad track and ties. The rope is threaded over and under the “ties” in series to create the desired amount of drag and friction on the rope. Racks are designed for use with single or doubled rope rigs.

In 1974, well-known caver and inventor Kyle Isenhart developed the gigantic Super Rack, which in turn led to the evolution of his RSI Rescue Rack. Identical in function to a standard rack, the rescue rack has been enlarged in order to accommodate doubled lines to 3/4-inch or a single 1-1/4-inch rope. With a published tensile strength of 10,000 pounds, Kyle says his rack will enable one person to manage a load of up to 1000 pounds.

The advantages of the rescue rack include mid-rope installation and the ability to vary the friction while in use. The rope may easily be tied-off while on a rack and under load.

In addition to personal rappelling, racks may also be used as a lowering device. The cross bars are available in aluminum and steel and can be replaced as needed.

Aluminum bars provide more friction than steel, but wear out more rapidly. Steel bars last longer but may require more bars to provide the same amount of friction. They have become extremely popular in rock climbing and rescue because of their versatility. I find them
As for disadvantages, racks are heavier, bulkier, slower to mount on a rope and more expensive than the average Figure 8, but they seem to earn their keep anyway. As a lowering device, their biggest problem is the difficulty in trying to pull enough slack out of the lowering line to reduce impact loading to a minimum.

The brake tube looks like a cross between a plumber’s nightmare and an overgrown carabiner. The Rock Exotica Alpine Brake Tube was developed as a rescue lowering device that could pass knotted ropes, which it does. Weighing 2 pounds, 11 ounces, the brake tube is superior, in my opinion, as a lowering device for loads under 500 pounds. The brake tube’s welded aluminum and stainless steel construction provides good heat dissipation. The oversized carabiner-type safety gate on the side prevents loss of the rope if the device twists or shifts while under load.

You must be properly trained by a competent person in rigging these devices. Over time, rope can and will begin to wear away at the surface of aluminum Figure 8s, BBRRs and brake tubes. They must be inspected before each use for grooving and sharp edges. Discard Figure 8s when the commonly used hard coating is worn through or at the first sight of grooving on a non-coated Figure 8.

Never throw these lowering devices - or any tool for that matter - out of a tree. Sharp edges can easily be raised on the rope-running surfaces, although a long drop to a hard surface could possibly create hairline fractures that are impossible to detect during routine visual inspection.

Arborist lowering devices

Arborists have been wrapping the lowering line around tree trunks from the very first time a line handler was jerked out of his boots and catapulted into the next yard. Basic, simple, effective, the practice can also leave friction burns on the tree and rough bark can cause premature rope wear or even catastrophic failure.

In the start of the quest for a “lowering device,” Euc Men would modify their trucks by replacing the standard bumpers with 4-to-6-inch round pipe. This pipe bumper made (still does) a perfect snubbing post for anchoring a speed line or taking wraps on a removal. Its limitation, of course, was access.

Among tree companies with connections to the maritime industry, I’ve heard of and seen modified bitts, bollards and cleats truck mounted to increase rigging options.

The story of the tree-mounted lowering device begins with Ed Hobbs, whose passion for falconry led him to serious rock climbing at the age of 8. With more than a half century of climbing experience behind him covering mountaineering, logging sports, extreme tree removal and SWAT techniques, Hobbs has seen a few things in his time.

Like many others with an expensive hobby and a talent for climbing, he was drawn to tree care as a way to make money to support his love for falcons. In the 1970s he recalls coming onto a job just as one of his employees was being dragged around a big euc by the weight of a log that was shy a wrap. Some time after that, they were taking down a tree with some horizontal limbs at waist height. Hobbs left a stub, took his wraps on that and the lightbulb came on! So began years of trial and error.

Although his earliest prototypes began
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with a fixed spool, Hobbs knew what he needed, thanks to his extensive experience with capstans and winches. The nature of the jobs that he was routinely undertaking, such as enormous eucalyptus trees with fishhook overhangs in backyards, rendered them inaccessible to conventional cranes. So he "set his face" to invent a "backyard" crane, or at least the most useful and portable parts of a crane or capstan winch.

In the research phase, Hobbs discovered that steel spools could get so hot that they could cause severe heat damage, so he opted to use an aluminum alloy spool. In addition to making the unit light enough to be practical, aluminum has something like four times the heat dissipation properties of steel.

Hobbs created a sensation at the Northern California Tree Trimmers Jamboree in 1979 (Rengstorff Park, Mountain View) when he gave the first public demonstration of the first commercially feasible, ratcheting lowering device in arboricultural history. I was there. I was mesmerized. At subsequent demonstrations, in order to add drama to the lifting ability of his lowering device, Hobbs would lift the front end of a truck into the air about three feet.

Although Ed Hobbs had rejected the idea of a non-ratcheting lowering device as being too limited for his needs, Ken Johnson, of Los Altos, California, thought that the idea still warranted development. In 1990, he began to expand the concept of a fixed drum lowering device beyond that of a chunk of pipe welded to a plate. By 1993, Johnson's research and development had evolved into his unique family of tree- and truck-mounted rope brakes.

Although the Hobbs Lowering Device and the Rope Brake have significant differences, they share several advantages over taking wraps on the trunk.

First, the friction co-efficient is constant from tree to tree. No longer does the line handler have to be taught that three wraps on a eucalyptus equals two wraps on a red oak which equals one wrap on a shagbark hickory, which sheds rope.

Second, the smooth surface of the device will not abrade rope like rough bark does. In order to fully realize the cost benefits of double-braided lowering lines, you must use a block and lowering device to isolate the rope from the source of heat friction and abrasion.

Third, a lowering device saves a significant amount of time between set-ups compared to the hassle of wrestling long lengths of heavy bull rope around and around a large diameter tree trunk growing right up against a fence.

And fourth, properly cared for and maintained on and off the job, a quality lowering device should provide years of trouble-free service.

Keep in mind the differences between the price and cost of a product or service. Price is the amount you write the check for. Cost is what the real expense or value of the product or service ends up being.

A lowering device really helps to illustrate that point. I can remember people complaining about the high price of the Hobbs Lowering Device when Hobbs was building them in his garage and selling them for $300. Most of them are still in use. Because of increased base of knowledge about the use of lowering devices and improvements in the products, the Hobbs Lowering Device now sells for more than $1000. Still, in my opinion, it is far less expensive now than it was in 1990.

I'm not trying to sell you a lowering device here as much as I'm taking the opportunity to throw in a quick lesson about business perspective. Let's say you
Another winner from Carlton. The 2500-4 is a 25 horsepower four wheeled self propelled unit designed to deliver maximum cutting power in hard to reach areas. Model 2500-4's hydraulic steering and four wheeled stance combine to offer unmatched stability and maneuverability. This compact machine has a width of 35 inches, allowing it to fit easily through standard backyard gates. Model 2500-4 incorporates many of the features found in larger Carlton Models including a direct drive hydraulic pump, replaceable cylinder rod ends, hardened bushings and shafts, counter balance valves on the lift, swing and hydraulic drive circuits. Like all Carlton Models, the 2500 series is built to last.

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invest $2000 in a high-quality lowering device, arborist block and a double-braided lowering line. There are several benefits to be realized. First, if you make an informed purchase, you can create a matched rigging system of compatible components that will last for years.

Second, you should be able to depreciate the investment on your taxes.

Third, in the long run, the investment will pay for itself in time management and increased rope life.

And fourth, in the short run, I know people who have paid off their equipment loans in a few jobs.

Here's another perspective. If you plan a 10-year service life for a high-quality lowering device, you can begin to break down the amount of work that you have to justify per year in order to warrant the purchase. If you can't earn a profit of $200 per year doing removals that can be applied to your equipment, you probably don't need a lowering device (or a chain saw). This is just a lightbulb.

Use whatever time period and whatever piece of equipment you're interested in to do a cost benefit analysis. Every once in a while, I'd think I needed a crane or an air compressor or a Lear jet. I'd figure the service life of the product, the amount of need for it on a regular basis and the amount of income or cost savings that the investment could return to the company. I continued to rent larger cranes than I could afford to own and operate, I fly coach, but I did buy an air compressor.

The A-B-C's of lowering devices

In order to enjoy success and safety with a lowering device, you must understand the Systems Approach to Rigging and the relationship that each component has to the others.

The A-B-C Rule used in selecting the components of a climbing system applies equally well to rigging.

A = Anchor. Consider the tree to be the anchor. Before subjecting the tree to the stresses of removal, perform a hazard assessment. In the course of that assessment you have to consider two really important points: Is the anchoring root system sound enough to support climber, equipment and impact loading without uprooting; and is the scaffold limb structure strong enough to support climber, equipment and impact loading?
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OSHA 1910.269. Effective January 31, 1995, you must certify that all employees who come closer than 10 feet to energized wires have received electrical hazard training.

OSHA 1910.331. Effective in August, 1991, all employees who may come within 10 feet must be trained in electrical hazard awareness, and that training must be documented.

ANSI Z133.1-1994 outlines the required training subjects. Remember, an ANSI violation is an OSHA violation.

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Training is like rowing upstream; not to advance is to fall behind.
One reason the Hobbs Lowering Device has become popular is that the ratcheting capstan can be used to take all of the slack out of a rope and to actually raise limbs. Remember that in a dead vertical rig (0 degrees) the strain on the tension leg is equal to that on the load leg, effectively doubling the strain on the block, sling and tree.

Now consider the potential loads that can be created as the slack is cranked out of the lowering line, before it is cut free. I have heard slings creak and bark crack as the lowering device takes up the line. In a hazardous tree, it would be theoretically possible for an attentive crew to actually break the top of the tree out by overzealous winching.

Another situation I have observed is failure to move the arborist block down to a more substantial limb structure. In an an oak, the climber will get his rigging high up in the top. As he works his way down the tree, the limbs get larger and heavier. It’s easy to take your blocks, slings and anchor for granted, but it can be a fatal mistake. As you move down the tree, reset your rigging into progressively larger limbs to keep the relationship between the block, sling and anchor point in proper balance with size of the wood being taken.

The belt in an Occupational Protective Equipment system is, of course, the climbing saddle. The belt in a lowering device system might be considered to be the winch strap or sling that secures the lowering device to the tree, as well as any slings used in setting the blocks and other rigging. Make sure that all “belts,” i.e., slings, webbing, straps, have safe working loads in excess of and compatible with the lowering line, lowering device and load. Inspect all belts before, observe them during and inspect them after each rigging operation. A climber was killed when the sling holding the block broke under load, catapulting the block into the climber’s head.

In a rigging system, the lowering line may be considered the link that connects all components in addition to whatever carabiners, shackles and screw links that may be employed to attach this and that together.

Select your ropes with care, making sure that they are equal to the task. Remember to increase the size of your lowering lines as the weight of the wood increases. Inspect them before, observe them during and inspect them after each use.

Hardware used as connecting links must be strong enough for the task. Make sure that locking mechanisms work freely and that there are no nicks, cuts or burrs in the running surfaces that could damage slings or rope.

Note: Much of the equipment we use comes from the manufacturer with standard industrial safety factors of 5:1 (read 20% or 1/5 of tensile strength). Unlike air conditioning units or lengths of structural steel, the actual weight of large sections of tree is usually an educated guess.

My survival philosophy has always been to reach for a larger rope. Never forget that “tensile strength” means when it breaks. The safe working load is what I’m after. No one is ever disappointed or inconvenienced when a system doesn’t fail. Think about it.

Safe operating procedures

Although references to ratchet operation and maintenance do not apply to a Rope Brake, all tree-mounted lowering devices share the same safety concerns.

1. All lowering devices have been de-
signed for the exclusive use of professional arborists skilled in contemporary tree industry rigging practices. You must be fully informed as to the ratings, limits and safe operating procedures of all components used in conjunction with the lowering device.

2. Check the tension of the installation belt after each of the first few drops. Slack may develop as the device “seats” itself to the tree. Get the belt as tight as possible. Again, it helps to have two people on the ground setting up any devices. A properly tensioned belt should sing to you when you whack it with the winch bar.

3. Inspect and replace worn parts, e.g., winch strap, springs, etc., as needed.

4. Lubricate moving parts such as the strap winch and ratchet pawls.

5. Be conservative. Practice with light pieces where critical factors are not involved. Don’t buy 1-inch double-braided ropes from some ad in a tree magazine and try to rope a tree down in two pieces. The main purpose of any lowering device is to enable you to “hurry up so that you can take your time.”

6. Train your operators to stand clear. With any lowering device, the operator can stand safely in view of the work, but out from under the hazard zone. They don’t have to nor should they work directly on top of the device. The exception to this warning, of course, would be those times when the capstan is put into use.

7. On ratcheting devices, make sure the operator wraps the rope on the spool in the correct direction. Lowering devices ratchet in the take-up direction and lock up when the load is let down. Accept no substitutes.

8. Use a block instead of a natural crotch whenever possible. This will further extend the life of your ropes by reducing heat friction. It will also prevent burn damage to tree crotches.

9. Keep the spool smooth and free of nicks, cuts and burrs that can cause rope damage.

10. Keep the ratchet mechanism clear of dirt, chips and debris. Use an air hose periodically to blow saw dust and grit clear of the ratcheting mechanism. Working conditions will dictate the frequency of inspection and maintenance.

11. Before each use, make sure that the winch strap is clean, free of burns, cuts, broken stitches abrasions, kinks, knots, foreign matter or excessive wear. Make sure that the “delta” ring fitting at the end

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of the strap is not bent or deformed.
12. The load line approach to the spool must be vertical and perpendicular. A "leading" block should be used to guide the rope onto the spool when the natural angle of approach to the spool is not perpendicular or if the strain against the built-in rope guides appears to be excessive, providing, of course, the device is so equipped.
13. A capstan lowering device must not be subjected to the sort of side pull that would be created in winching a vehicle stuck in the mud or pulling a stump. A side pull could cause the device to shift on the trunk. Use a leading block whenever necessary to bring the load line to the spool at the correct angle. All lowering devices are only designed to remain seated securely on the trunk when subject to vertical loading.
14. On lowering devices not equipped with built-in pads, the heavy rubber mud flap from a truck makes a good pad to protect the bark of a tree that is not being removed.
15. When using lowering devices equipped with steel spools, be careful when lowering heavy pieces. A bullrope, under load, dragged over a fixed steel spool can give the spool an "Indian rope burn." Friction-generated heat in the spool can severely weaken the rope or cause heat fusion failure. Of the steel spool lowering devices, as far as I know, only the one developed by K & R Products has solved this problem with a unique, patented heat sink.
16. After rigging with the lowering devices is completed, remove the unit from the tree before beginning to "chunk" down pieces in a free fall. The only damage I've seen lowering devices sustain has been from getting creamed by the big rounds slamming into the mounted device.
17. Refer specific questions about a particular device to the manufacturer or dealer where you purchased it.
18. Realize that any rope, block, sling or lowering device is subject to failure if misused, mismatched or overloaded.

Comparing Ed's to Ken's
Since the Hobbs Lowering Device and the Rope Brake represent the two distinctive styles of tree-mounted lowering device, e.g., ratcheting capstan and fixed drum, it seems appropriate to offer a more detailed explanation of how they work and their differences and benefits.
Patented in 1993, Ken Johnson's Rope Brake, in my opinion, represents the absolute state-of-the-art of non-ratcheting, tree mounted lowering devices. At 54 pounds, it weighs in at about the same as the Hobbs Lowering Device. Because the drum doesn't rotate, you can wrap the rope on the spool in either direction. If you were to take a wrap in the wrong direction on the Hobbs Lowering Device, you'd be hard put to understand the value of a lowering device. Johnson arrived at...
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The forged hook is designed to draw the material being cut closer to the pivot. This maximizes leverage and minimizes the effort required to make a cut. The hook's curvature is shallow enough to easily slip between dense, tangled branches and support wires. Yet it is deep enough to hold the branch securely as the cut is being made. The sap groove is deep and wide for improved self-cleaning.

The square-shouldered, right-threaded pivot bolt that enables quick blade change is positioned so that the hook and blade open wide with a minimum of handle movement — in other words, with less effort. And the same coating that makes cutting so easy also self-lubricates the pivot action.

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If you try these loppers, we think you'll agree that they're perfect, or close to it. So we're making you this money-back offer. Buy a pair. Prune with them for two weeks. Use 'em and abuse 'em. If you agree they're the best, buy more. If you don't, return them to us along with a note telling us what you think would make them better. We'll refund your purchase price. Fair enough?

For further information, contact your Corona dealer or call us at 1-800-234-2547.
the same conclusion that Hobbs did when he discovered that extreme tree removal could get the spool so hot that serious damage could occur to his ropes. Hobbs went with cast aluminum, Johnson went with a radiator. Yes, folks, Ken's Rope Brakes can be filled with coolant to keep the surface of the drum cool enough to prevent heat friction damage.

Hobbs' device is designed to work the rope from the sides of the spool. Because the drum doesn't rotate, Johnson put some guide hooks on the end of the drum that permit the rope to lead off the nose when necessary. I'll be honest, I'm a die-hard Hobbs disciple. I've used his lowering device under every conceivable rigging condition all over the world and I've never encountered a situation that required rigging off the nose. It's all in what you are trained for and used to.

Built of steel with almost no moving parts, the rope brake costs less than the Hobbs Lowering Device. If you can be reasonably sure that you'll never need to take the stretch out of a rope or elevate a limb, the rope brake is probably all you'll ever need. On the other hand, if you encounter a large backyard oak whose limbs rest on an expensive roof, the Hobbs Lowering Device will give you an edge.

Both have something in common - their mounting frames. Hobbs first built his with a flat frame. A flat frame on a round tree trunk translates into some tailored alterations with a chain saw, which can be a problem if all you want to do is remove a few heavy limbs. Johnson's original frame has a patented security bar that seats the device on the tree, helping to prevent its shifting or slippage up the trunk. Johnson approached the design challenge from the position that an angled frame could be built to provide three-point contact on a curved surface. His frames worked so well that Hobbs acquired the patent rights to use them on his standard and deluxe models. The deluxe model has built-in rubber pads for preservation work. Hinged "dogs" can be set into position to provide greater stability in total removals. The standard frame has full-time spikes that dog into the wood on all removals - the Euc Man's friend.

Rope Brakes or Hobbs Lowering Device. Figure 8 or Alpine Brake Tube. They all have their benefits and applications. You don't have to use any sort of lowering device in your rigging. With the exception of blocks, my father did just fine without them. Please keep in mind, though, that my dad took his first tree down in 1911 and took his toughest trees down with handsaws. I could work without rigging, but I see no reason to go backwards.

Ed Hobbs showed us the light. With lowering device technology, a few good ropes and a few tricks like the speedline, tree removal can be safer, more efficient, predictable, manageable and now and then fun - things it never was before. Don't kid yourself: big wood generally means small bucks and sore backs, but now we have the technology to go broke slower and with quite a bit more style and dash than ever before. Big blocks and small lines to you all. May God bless all who labor for the trees.

Donald F. Blair is the founder of Sierra Moreno Mercantile and has recently been placed in charge of a Search and Rescue detachment of the Maryland Defense Force. This article is excerpted with permission of the publisher from Blair's forthcoming book, Arborist Equipment.
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Kudos for Blair
The article on "Arborist Blocks" by Don Blair was great - very informative, yet interesting even for those of us whose involvement with tree care generally does not include climbing and rigging.

Don writes with a highly readable, entertaining style, yet he packs the facts into every paragraph. Most of his shop-talk is easily translatable by context ("chunking-down," etc.), but I would be interested in learning his exact definition of "slam-dunk rigging!" I presume he is referring to the practice of jump-cutting large pieces and depending upon the rigging to stop them cold after a short free-fall?

Perhaps the most important lesson in Don's article was the "Words of Advice" section at the end. Although the technical information presented up to that point will be very useful (and might save lives), arborists should not become so enamored with the techniques of tree removal that they lose sight of the real objective: helping trees and people exist together in mutual health. When the Tree Doctor makes a house call, euthanasia should be his last resort!

Guy Sternberg, certified arborist
Petersburg, Illinois

A call for help
I am looking for information on a problem that has developed for me in the last two years.
I have been climbing for 20 years and have had my own small tree business for the last five years. I began to notice that my left leg would feel a little numb, and then would at times feel "asleep." In the past three months, I have had pain in the inside of the leg going down to the heel. I have stopped climbing, as it became evident that sitting in a saddle was the cause. Even though I have not been in a saddle for a month, I still have pain in my leg and am unable to sit down without developing more pain. I have no pain in my back, but was given all the back tests as a precaution. They were all negative. A test for nerve damage several months ago showed I had some minor nerve damage.

My questions are: Has anybody ever heard of this problem? Can anything be done about it?

Any information would be greatly appreciated.
Scott Zapolski
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Greener and Cleaner

Chain Saw Manufacturers Produce More Environmentally Sensible Saws

By Peter Gerstenberger and Brian Barnard

With the passage of the Clean Air Act in 1990, the Environmental Protection Agency (EPA) began focusing attention on the amount of air pollution produced by chain saws and related small equipment. While the chain saw manufacturing industry’s interest in environmental issues began well before that, recent EPA proposals for stricter small engines emissions standards only add impetus.

Under a rule proposed by EPA in May, small engine manufacturers will be required to make equipment that emits significantly smaller amounts of certain air pollutants.

The EPA is patterning its proposed standard after one in effect in California. The California Air Resources Board, CARB, has focused on non-road small engine emissions for several years. Small engines are defined as 25 horsepower or less.

The California Clean Air Act - the strictest in the nation - dates back to 1988. The 1990 amendments to the Federal Clean Air Act directed the EPA to examine and establish limits for a variety of emissions-producing devices, including the small two-cycle engines used in chain saws, trimmers, edgers and blowers.

The federal legislation requires the EPA
to establish National Ambient Air Quality Standards for six of the most widespread and dangerous air pollutants - sulfur dioxide, carbon monoxide, nitrogen oxides, ozone, lead and particulate matter.

Two-phase approach
In 1990, the California Air Resources Board set standards for lawn and garden equipment. Phase 1, which takes effect this coming January, calls for a reduction of about 45% in emissions. Phase 2 calls for an overall reduction of 55%.

As of January 1, it is likely that chain saws used by arborists in California will be different from chain saws used by arborists in other parts of the country.

Maximum allowable emission levels to be implemented in August 1996 by EPA under the Clean Air Act are essentially the same as those being implemented in California next year.

The standards for Phase 1 focus on exhaust emissions, such as carbon monoxide, hydrocarbons and nitrogen oxides. Phase 2 includes evaporation emissions such as benzene.

Manufacturers may have to add new features to the equipment, resulting in higher tool costs. In addition, both dealers and customers must learn about maintaining and servicing the newly designed products.

Phase 2 requirements will be even more stringent. California figures that its Phase 2 standards will be implemented in 1999, and the EPA is aiming at an effective date for its Phase 2 at about the same time, or a year or so later.

As currently proposed, Phase 2 requirements do not seem technically feasible, according to industry sources.

The EPA is using a procedure called Regulatory Negotiation, or REG-NEG, to develop a program acceptable to industry sources.

Through the EPA’s Phase 2 REG-NEG process, which began in 1993, the concerned parties have developed a definition of “small non-road engines” that will be the targets of government standards. The definition covers all hand-held power products used in the tree care industry.

REG-NEG discussions and task force meetings are scheduled to continue until April 1995. Then the EPA and the Office of Management and Budget (OMB) will begin a yearlong internal review process, with the proposed federal rule published in April 1996 and finalized in April 1997. An effective date for Phase 2 of the EPA regulations has not been determined, but most observers expect that it is five or six years away.

Manufacturers’ concerns
Manufacturers are concerned that CARB certification requirements will lead to fewer chain saw models, limit the ability for the user to adjust carburetor settings and increase the cost of a chain saw.

The effect of small engine emissions on the environment is not clear, but it is probably negligible. EPA’s own studies indicate that small engines produce relatively small amounts of harmful emissions. In fact, a study conducted by EPA in 1991 showed that all two- and four-cycle lawn and garden equipment combined contributed only 5% of the total emissions of Volatile Organic Compounds, or VOCs, in the U.S.

Further, recent testimony by the Por-
Chain saw mounted on a dynamometer for exhaust emission testing. Photo courtesy of Husqvarna Forest & Garden.

Catalytic converter, in a European saw, isn't an option in the U.S. Photo courtesy of Husqvarna Forest & Garden.

durable Power Equipment Manufacturers Association, PPEMA, throws the validity of regulating this engine class into question.

Most experts agree that the nation’s estimated 89 million saws, trimmers and other products in this category account for less than 5% of overall air pollution in the United States.

If one looks at only the two-stroke engines used in hand-held equipment for lawn and garden applications, that percentage is even less. An analysis conducted for PPEMA by Heiden Associates showed that all of the nation’s portable lawn and garden tools contribute only 0.8% of total U.S. emissions of VOCs, 0.6% of carbon monoxide emissions and a level of nitrogen oxide emissions so low that it registers as 0%. The emissions from large two-stroke chain saws also registered zero in the study.

In general, two-stroke engines - the type used in chain saws, trimmers, blowers, etc. - produce more unburned hydrocarbons than four-stroke models. But a significant amount of the hydrocarbon emissions can be traced to the handling of the fuel, not the running engine. EPA estimates that Americans spill 17 million gallons of gas a year while refueling their engines. Newly designed fuel tanks and nozzles may help to correct this situation.

In two-cycle engines, particulate emissions also are relatively high because of the incomplete burning of the lubricating oil that is mixed with the fuel. However, two-stroke engines emit negligible amounts of nitrogen oxides, due to the internal exhaust gas recirculation (known as EGR) that occurs during exhaust scavenging.

The carbon monoxide exhausts of two-stroke models also are lower than the emissions from four-stroke engines.

The EPA feels that its ambitious reductions in emissions will be achieved by using tighter tolerances, leaner fuel mixtures and perhaps special oxygenated fuels.

Small engine specialists warn against this approach, as it can generate higher engine RPMs, less power, shorter engine life, and ultimately lower reliability.

Reformulated fuels or oxygenated fuel additives show some promise. Reformulated fuels may mix gasoline and ethanol. Oxygenated fuels, perhaps containing ether or alcohol, can help complete the combustion process in the cylinder, thus reducing carbon monoxide emissions.

The down side of this suggestion is that these oxygenated fuels would cause an increase in nitrogen oxide emissions. Also, use of certain alcohol blends can cause premature wear on engine parts as well as hot start problems. More research is needed in these areas.

Another proposed technologic solution being considered for these small engines is fuel injection, but today’s state-of-the-art fuel injection systems are expensive. Also, any fuel-injection system for outdoor power equipment would require electronic controls that could withstand the vibration stresses produced by small engines.

The EPA feels that few models will be discontinued as a result of the new standards. The agency says that the average retail cost increase to the consumer resulting from the proposed 1996 requirement will be $4.04 per piece of equipment. The agency also estimates a decrease of 13%
in fuel consumption. Because of higher quality design and production, EPA estimates that maintenance costs will come down and useful life will be extended, though there are no estimates on degree.

Manufacturers are spending a lot of money on all of this research, development and implementation. Contrary to the rosy picture painted by EPA, PPEMA’s researchers found that makers of lawn and garden equipment will spend more than $44 million to comply with Phase 1 of the California air-quality requirements. Complying with the federal Environmental Protection Agency’s Phase 1 regulations will increase the manufacturer’s cost of each reconfigured tool by $56 to $138, depending on volume, according to a PPEMA study. While manufacturers may absorb a portion of this expense, at least some of these added costs will show up on the price tags of new equipment.

After implementation of Phase 1, end-users will be required to replace worn-out equipment with tools that comply with standards. The EPA estimates that annual equipment turnover is 19%, but the annual turnover of chain saws in tree care is closer to 75%, according to a recent letter to EPA from the National Arborist Association. Therefore, the burden on the end user industry will likely be far greater than EPA estimates.

The industry responds

Power equipment manufacturers have not stood idle. Since 1992, the members of PPEMA have been working with EPA to help define the regulations and manufacturers have been developing products that would meet the anticipated standards. Right now, most of the leading manufacturers, including at least three North American companies, produce one or more engine families that meet or exceed 1995 CARB requirements.

To illustrate the way in which manufacturers are responding to the EPA challenge, consider the following efforts of one European power equipment manufacturer.

In 1990, this manufacturer established an engine research company to focus on reducing emissions while maintaining performance. It consists of an engine design group, a microprocessor and ignition group, a fuel systems group and an engine test group, and its work has resulted in several products of significance.

The company currently sells a medium-size saw - the first production saw with a catalytic converter - that is used in Scandinavia for commercial thinning. In commercial use, the converters last about one year.

The catalytic converter, or catalyst as it is called in Europe, reduces nitrogen oxide emissions by 70% and unburnt hydrocarbons by 60%.

Currently, the catalytic converter fails to meet U.S. Forest Service fire prevention regulations, found in the San Dimas Standard, that govern muffler and exhaust temperatures. According to San Dimas, the skin temperature on the muffler cannot exceed 228 degrees C and the exhaust cannot exceed 246 degrees C. Needing high heat to operate, the high-efficiency converter produces temperatures that are more than twice the allowable maximum.

The converter also adds two-thirds of a pound to a 10-pound saw, changing balance characteristics in the process. This additional weight is perceived as a problem by some professional users. Thus, for the time being, the catalytic converter is an option only available in Europe.

This same manufacturer markets a special gasoline in Europe. The highly refined fuel is almost free from cracked and short chain hydrocarbons, the kind that contribute most heavily to hydrocarbon emissions. It is quite popular among professional users.

A number of manufacturers are following similar courses of action. Some have conducted in-house emissions testing and research for over five years, and many have experimented with catalytic converters, alternative fuels and various fuel delivery systems.

Power equipment users will be directly affected by EPA’s proposed requirements. The final rule is expected to include a section that prohibits tampering with or disabling any emission-lowering device or setting. Furthermore, it is hoped that a proposed warranty program on certain components will provide the operator with incentive to get emission-related system failures repaired. Failures of the emission control devices do not necessarily affect the engine’s performance.

While arborists may see fewer models with higher price tags on display in the local saw shop, it seems unlikely that any brand names that arborists rely on will disappear in the aftermath of EPA/CARB Phase 1 implementation.
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Ergonomics Rule Expected

By Brian Barnard

The Occupational Safety and Health Administration’s (OSHA) push for a general industry ergonomics rule may become reality this fall. When the rule is final, every employer will be required to implement an ergonomics program that addresses repetitive motion and general musculoskeletal disorders. Example disorders include carpal-tunnel syndrome and back strain.

The agency is using a draft ergonomic proposal as a stepping stone for the final standard. The draft proposal on ergonomics would require employers to:

1) develop a plan to receive and respond to employee reports on ergonomic problems;
2) conduct reviews to determine if musculoskeletal disorders have occurred in their workplace in the last two years;
3) evaluate various ergonomic risk factors on the job;
4) fix ergonomic problems; and
5) train employees in ergonomic hazard awareness.

The draft outlines job activities that would require employers to evaluate worksites to determine the extent of ergonomic hazards. Although not specifically named, activities listed in the draft would include basic tree care operations such as lifting large pieces of wood, operating a chain saw and climbing. Job activities noted include:

1) “Fixed or awkward work postures for more than a total of two hours (for example, overhead work, twisted or bent back, bent wrist, kneeling, stooping, or squatting).”
2) “Use of vibrating or impact tools or equipment for more than a total of two hours.”
3) “Manual handling of objects weighing more than 25 pounds (11.34 kilograms) more than once in each workshift.”

If the draft is adopted in this form, tree company employers will be required to list hazards that may require correction.

The National Arborist Association submitted written comments to OSHA in the past on ergonomics, encouraging the agency to consider the natural environment the arborist works in. Because a tree company owner cannot alter the natural environment to conform to his employee’s body, NAA stressed education as the best method of avoiding ergonomic hazards in the workplace.

In a related issue, the National Institute of Occupational Safety and Health (NIOSH) released a report stating that it cannot endorse the use of back support belts. The report says that the effectiveness of back support belts in reducing the risk of back injury remains unproven.

Field workers would not be the only tree care employees subject to the ergonomics rule. Much of the ergonomic debate has focused on office workers. The U.S. Department of Labor reports that typing or key entry accounted for 12% of the 90,000 repetitive motion cases in 1992.

Probable work controls that employers could take to reduce office ergonomic hazards include making work stations comfortable, having typists perform hand stretching exercises and training office workers in proper lifting techniques.

It is unclear what administrative burden will be placed on tree company employers as a result of OSHA’s ergonomic rule. But given OSHA’s recent aggressive track record on workplace hazard prevention, expect to see the ergonomic rule soon. Start your ergonomics training program now to reduce ergonomic injuries and reduce the likelihood of forced work control changes after the rule is final.

OSHA Increases Minimum Fines

Fines have increased for willfull violations of Occupational Safety and Health Administration rules, Secretary of Labor Robert B. Reich has announced. The new policy increases the minimum fine for a willful violation from $5000 to $25,000.

In a prepared statement, Reich said: “The increase in proposed minimum penalties for the more serious willful violations will make it more difficult for those few bad actors to regard penalties as ‘simply a cost of doing business.’”

Willful violations are those that could result in death or serious physical harm to workers. The new policy divides these violations into three categories of high, medium, and low gravity. Maximum fines will be $70,000, $55,000, and $40,000 depending on the category determined by the agency.

This policy change is in line with the Clinton Administration’s strategy to improve workplace safety in the most hazardous work sites. Other enforcement tactics include criminal sanctions against employers who willfully violate OSHA safety rules, and acting on those violations promptly.

Brian Barnard is Government Affairs specialist for the National Arborist Association.

See Vermeer Manufacturing Co. at TCI EXPO ’94 in Philadelphia
The 29-cent Auto Allowance

Understanding What Your Car Costs Per Mile Can Help You Be Successful

By Susan B. Haupt

Running your own business is both exciting and scary. You are your own boss. You like caring for trees. Nobody tells you what to do. You are the one who decides how the company will operate. When your hard work brings success, you are the one who will enjoy all the personal and financial benefits.

However, the key to achieving success in business won't happen just because you know what you are doing as an arborist. You also have to know how you are doing as a business. You are the one who has to assure the financial stability of the company and be sure you can pay your expenses.

To do this, you need to know about and understand all the different costs connected to operating your company. You especially need to identify which expenses are related to production and which ones are overhead. You use this information to figure out how much you have to charge so that you can pay your expenses, earn a good salary, make a profit and still be competitive. Where do you begin?

Perhaps the best and easiest place to start is with your own auto or pick-up truck. Have you ever figured out how much your vehicle costs you to own and operate? This is important to know, even if you don't have your own company.

The Internal Revenue Service allows you to deduct 29 cents per mile for the business use of your automobile. The IRS also allows you the option of accepting the 29-cent figure, or keeping track of the cost of owning and operating your auto. How do you determine which method will benefit you the most?

Start by referring to the national average operating costs for automobiles, shown on the schedule at right. If you haven't previously been keeping track of these expenses, use this schedule as a basis for categorizing them.

Keeping track of and analyzing your expenses is an excellent habit to acquire. Also, learning about the cost of owning and operating your auto will show you how relatively easy it is to determine other costs.

You can use what you have learned from doing this auto analysis in many ways. This or similar methods can be used to determine your total costs for trucks, chippers and other equipment, payroll costs, overhead, etc.

For your automobile, start by noting the beginning mileage on the odometer. Save all sales slips and invoices you get for gas, maintenance and repairs. Make note of your odometer reading on each of these for future reference.

Find your annual cost for insurance, licenses and taxes, and divide equally over 12 months. How much did you pay for your car and how many years will you drive it? Divide (depreciate) its total cost by the number of months you will use it. If you lease your vehicle, use the monthly payments.

Some expenses such as tolls and parking are not included in the IRS 29-cent mileage allowance. Include these and any other auto costs on a separate line item, Miscellaneous Expense.

Set up a method for keeping track of all of this information. Write notes in your checkbook. Enter the checkbook figures on a spreadsheet. Total it each month. As you add one month to another you will begin to see the development of the information you need. After the first three months, you should have a good start on understanding your owning and operating costs.

Continue to keep track of this information and build on it for an entire year. You could construct a spreadsheet starting from the beginning of the year if you have sufficient information, invoices, odometer readings, etc., from previous months.

Once you have entered all your figures and done the calculations, you can compare the results to the national averages on the schedule. Depending on where you live, some categories of expense will be higher, some lower.

The most important thing from all of

This Schedule uses the IRS 29-cent mileage allowance together with the national averages in five categories with percentages of total cost for owning and operating an auto. From these figures, the cost per 100 miles has been determined, then expanded to an assumed 24,000 mile per year and, finally, total costs for a 5-year period.

AUTOMOBILE COSTS BASED ON 29cents PER MILE and NATIONAL AVERAGES

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<th>CATEGORY</th>
<th>%</th>
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<th>24,000 miles</th>
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<td>TOTALS</td>
<td>100.0%</td>
<td>$29.00</td>
<td>$6,960</td>
<td>$34,800</td>
</tr>
</tbody>
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TREES CARE INDUSTRY - SEPTEMBER 1994
This record-keeping is for you to determine your cost per mile. Divide your total cost for the year by the total mileage the vehicle was driven for that year. If your personal vehicle is used in business, you will now know whether to use the IRS 29-cent allowance, or your own calculated mileage cost per hour.

Now that you have set up a system, continue to use it for your auto. Apply this system to other vehicles. If you are billing for a vehicle at an hourly or daily rate, then you would calculate your costs on an hourly or daily basis.

When you have completed gathering and analyzing all the information on your auto, you will have done a Cost Analysis. If this is the first one you have done, you should be very pleased with yourself. You’re on your way to a better understanding of how to manage a company.

Susan B. Haupt is senior vice president of the Haupt Tree Company, Sheffield, Massachusetts, as well as a management consultant. She is vice president of the National Arborist Association.
There are two ways to work smarter...

TIP

Work harder or work smarter? Some people think that's an easy question to answer. But there are hard ways to work smarter and there are easy ways. You could take accounting, management, government and other related courses, and in, say, five years, you'd be ready to take your tree care business right to the top.

Or, become a National Arborist Association member and tap into a source that has all that information ready for tree care companies. A source that doesn't have to reinvent the wheel every time a question comes up. A source that offers you all the experience of its staff and other members, to help you work smarter.

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- Business Management Guidelines: What would you pay for accounting, cost analysis, sales compensation and human resource guidelines that are already set up for tree care companies?
- Federal Regulation Guidelines: NAA members get the rules spelled out for them exactly as they relate to tree care companies. No more wading through page after page of government gibberish!
- Safety and Technical Training Materials: There is no other source that offers such comprehensive training programs at such a reasonable cost.
- Networking with Peers: You could find out how a tree care company similar to yours turned a problem into a profit center. Maybe you can't call another tree care company in your area with a question, but why not a fellow NAA member from across the country?
- Better Group Rates on Insurance: NAA searches out the best plans, then negotiates for you and executes "power buys" to keep the cost of insurance under control.
- Better Advertising and Public Relations: An ongoing public awareness program including events such as the National Arborist Day at Arlington National Cemetery, means that the NAA logo on your advertising and stationery carries more weight with cautious homeowners and businesses. Plus, the NAA offers an excellent array of professionally developed brochures and marketing materials at a fraction of what they'd cost you to produce.

So if you are determined to make '94 a banner year for your business, you can hit the books... Or, you can hit this toll-free number and become a member today! 1-800-733-2622

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Chain Saws:

Safe Felling Techniques

By Brian Barnard and Peter Gerstenberger

Making a plan for a felling operation requires proper equipment and training to operate a chain saw safely, then following five specific steps, according to Tim Ard, authorized instructor for Soren Eriksson's Game of Logging program.

Ard travels the nation teaching chain saw use and safety to foresters, arborists, and college students. The Game of Logging is sponsored by Husqvarna Forest and Garden Company.

To use a chain saw safely, the operator must understand how the tool works. Ard says the most vital safety information for a chain saw operator to know is the three reactive forces of the chain saw, including kickback, pull-in, and push-back. "If everybody really understood these three points, chain saw accidents would really decrease," Ard says.

Most saw operators are familiar with kickback. This occurs when the chain is turning and the top quadrant of the saw bar's tip meets an object, resulting in the saw being unexpectedly kicked back towards the operator.

Saw pull-in is the simple pulling action of the saw away from the operator. This occurs when cutting with the bottom of the saw bar.

Saw push-back is the opposite of pull-in. This occurs when cutting with the top of the saw bar and the saw is pushed toward the operator.

Ard says that personal protection is another important aspect of chain saw safety, and he feels that all operators should be equipped with safety gear. This includes a hard hat, hearing protection, eye protection, gloves and chain saw leg protection. Leg protection comes in pants or chaps designed to reduce leg injury from a running chain.

Keeping protective chain saw leg wear clean is also important. Ard says any fiber, including the kevlar and polyester fibers used in many types of leg wear, can break down if it becomes dirty and oily. This reduces the protective properties of the leg wear. Read the manufacturer's instructions for cleaning.

Ard begins the first cut of an open face felling notch.

Tim Ard completes the first three steps in his five-step felling technique by sizing up the tree and surrounding area. He looks for hazards in and around the tree, estimates the tree's height and lean, and plans his escape route.
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Ard says chain saw operators often fail to understand one very important rule: Make a plan first. “Get in position before starting the operation and plan the work through,” he says.

The first step in tree felling is identifying the hazards around the tree. Hazards might include structures near the felling path, such as a house, road or another tree. Also look for hazards with the tree itself, such as dead limbs or rot.

The second step is to examine the tree’s height and determining the tree’s lean.

Step three is planning your escape route. This escape path should be 45 degrees to the rear of the felling direction.

Step four is planning the directional notch (face cut) and hinge. Ard describes this step as “very critical.” He points out that every tree is different, so the hinge size and depth of cut will vary.

While some professionals swear by a 45-degree notch, Ard subscribes to the open face felling technique that uses a notch with a 90-degree opening. The thinking is that the open face notch doesn’t close until the falling stem is horizontal, allowing the hinge to remain intact longer.

The notch consists of two separate cuts. The top cut is 70 degrees from horizontal, keeping in mind the desired hinge width. The undercut is made perpendicular to the top cut, so that it meets the top cut perfectly. The resulting notch depth should be about one-fourth to one-fifth the trunk diameter.

Ard determines the hinge size based on the tree’s diameter. The thickness of the hinge should be as much as 10% of the tree’s diameter at breast height (DBH), but may be less. The width of the hinge should be 80% of the tree’s DBH. Hinge width is important, according to Ard, because a short hinge reduces stability and control of the falling tree.

Say you plan to fell a tree 20 inches in diameter. The maximum hinge thickness should be 10% of the diameter, or 2 inches. The hinge width should be 80% of 20 inches, or 16 inches wide. This means the notch should be deep enough so the width of the hinge is 16 inches.

Step five in the felling process is the back cut or felling cut. In most cases, the back cut should be the same height as the apex of the notch, according to Ard. This is particularly true if the back cut is made low to the ground, close to the root flare. When a back cut is close to the root flare, the fibers in the stump follow the root flare out away from the hinge. If the back cut is made higher than the apex of the notch, the amount of wood fiber holding in the hinge is reduced, due to the angle of wood fibers.

Of course, Ard’s felling techniques were developed for conventional timber harvesting, and an arborist’s technique will be a bit different. For instance, it is common practice for an arborist to tie a pull line near the top of a tree to assure the direction of fall. Arborists typically don’t make as much use of felling levers or wedges. Some arborists have found that by improving their on-the-ground techniques, they can occasionally avoid the time-consuming chunk-down, tie-on, pull-over routine, and do so safely and confidently.

Regardless of their techniques, saw operators must know how to use chain saws safely. Understanding how the saw works and the need for personal protective equipment are the prerequisites to a successful operation.

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NAA Initiates Tree Care Specialist Program

The National Arborist Association Tree Care Specialist program provides members with an opportunity to certify their employees.

The National Arborist Association (NAA), a trade association of commercial tree service firms, has created a certification program that will allow NAA member firms to attest to the competence of their employees. Using current NAA training programs as well as on-the-job training, employers test employees and measure competence. The NAA scores the tests and keeps records for the employer.

The National Arborist Foundation, NAA's research and education funding organization, provided a grant to start the Tree Care Specialist program. Because of the NAF grant, registration is available at no cost for the first five employees of each NAA member firm.

In addition to improving quality of performance, this program enables employers to meet all regulations of the Occupational Safety and Health Administration, including the most recent OSHA rule requiring employers to certify that employees who are exposed to electrical hazards have been trained and are competent to work safely near such hazards.

Those who complete the program will be issued certificates, wallet cards, helmet decals and shoulder patches. This certification must be renewed annually.

The NAA's newly revised Tailgate and EHAP Safety programs form the backbone of the training in the TCS program. Together they provide the baseline training and documentation that OSHA requires all employers to maintain. Other training can come from NAA's many video or home study training programs, other training sources, or equivalent on-the-job training. These options greatly simplify training for most companies.

Regardless of the training source, each employee will be required to pass the same tests and satisfactorily meet the same field performance criteria.

The curriculum includes tree care safety; aerial rescue; equipment use; basic tree physiology, anatomy and identification; pruning practices; fertilization; diagnosis of tree problems; insect, disease and pollution problems; tree maintenance and repair practices; and crew leader training. Demonstration of competence in climbing, chain saw and chipper use are among the performance requirements.

For more information about this and other safety and training materials, contact the National Arborist Association, P.O. Box 1094, Amherst, NH 03031. Phone: 800-733-2622; FAX: 603-672-2613.
1. When comparing aluminum to steel Figure 8s, which of the following is not an advantage of drop forged steel?
   a. Abrasion resistance
   b. Strength
   c. Durability
   d. Cost

2. What is the term for the “hitch” that could leave a climber stranded when using the earliest Figure 8 friction devices because the rope would ride up on the top ring?
   a. Timber hitch
   b. Clove hitch
   c. Girth hitch
   d. Half hitch

3. What advantage(s) is (are) there to using a “brake bar” rappel rack?
   a. Rope may be easily tied off while on a rack and under a load.
   b. Ability to vary the friction and use large diameter rope.
   c. Mid-rope installation.
   d. None of the above.
   e. All of the above.

4. Lowering devices may differ from one another in many ways. List four of the most important differences that should be examined.

5. What functional advantage does a brake tube have over the standard Figure 8 and brake bar rappel rack?
   a. Will never wear out.
   b. Better heat dissipation.
   c. Can pass knotted ropes.
   d. None of the above.
   e. All of the above.

6. What precaution(s) must always be taken before using any lowering device?
   a. Mandatory drug and alcohol testing of personnel.
   b. Proper training by a competent person knowledgeable in rigging devices.
   c. Thorough inspection for grooving and sharp edges.
   d. Both B and C.
   e. All of the above.

7. From a heat dissipation standpoint, steel cools much more quickly than aluminum and has nearly four times the dissipation properties of aluminum.
   a. True
   b. False

8. When determining whether you should buy or rent a particular piece of equipment such as a lowering device, what factor is not crucial in making an economically wise decision?
   a. The amount of income or cost savings derived and returned to the company.
   b. The initial cost and service life of the product.
   c. The amount of need for it on a regular basis.
   d. The prestige your company would derive from having such a piece of equipment.

9. Taking wraps around a trunk with a rope has a number of disadvantages when compared to using other lowering devices. List three of the major disadvantages.

10. What are the three components of the “ABC Rule” used in lowering devices and... to Make Your Job Easier and More Profitable... the Green Pro Deep Root Fertilizer Needle and VITA TREE & SHRUB — The Most Complete Natural Organic & Mineral Based Root Fertilizer & Soil Conditioner.

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   $429.50 makes 2,200 gallons

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other rigging equipment?

11. Much of the equipment used in the arboriculture profession comes from the manufacturer with a standard industrial safety factor of ___:___.
   a. 2:1 (read 50%, or 1/2 of tensile strength)
   b. 4:1 (read 25% or 1/4 of tensile strength)
   c. 5:1 (read 20% or 1/5 of tensile strength)
   d. 8:1 (read 12.5% or 1/8 of tensile strength)

12. One of the most potentially dangerous mistakes made by arborists doing tree removals is failing to readjust and lower their rigging blocks, slings, etc., when working down into progressively larger limbs.
   a. True
   b. False

13. Once a lowering device is installed properly, the installation belt need not be inspected again.
   a. True
   b. False

14. Give two reasons why blocks should be used instead of natural crotches whenever possible.

15. When using a capstan lowering device safely, the load line approach to the spool must be vertical and perpendicular.
   a. True
   b. False

**ANSWER KEY**

1. D
2. C
3. E

4. 1) Amount of friction created; 2) maximum size of rope and ultimate load the device is rated for; 3) mounting stability and ability to resist impact loading; 4) heat dissipation properties; 5) user friendliness and whether the amount of friction can be varied under load.

5. C
6. D
8. D

9. 1) Can damage bark; 2) prematurely damages rope; 3) is not cost-effective when compared to using blocks, etc.; 4) can be catastrophic if rope fails due to abrasions, friction, etc.

10. A = Anchoring equipment; B = belt, examine all belts, i.e., the winch, straps, slings, webbing, saddles before equipment use; C = connecting link, examine the lowering lines, carabiners, shackles and screw links used to attach the rigging together.

11. C
12. A. True.
13. B. False.

14. 1) Extends the life of your ropes by reducing friction heat and 2) prevents burn damage to tree crotches.

15. A. True.

This test was compiled by Chris Carlson, a professor and director of Horticulture Technology at Kent State University, Salem, Ohio, campus.
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September 21
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Contact: Sue Stott, 301-948-0810

October 21-23
New Jersey Shade Tree Federation Annual
Meeting and Expo
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McAfee, N.J.
Contact: Bill Porter, 908-246-3210

October 3-6
Society of Municipal Arborists
Annual Conference and Trade Show
Stouffer Madison Hotel
Seattle, Wash.
Contact: Jerry Clark, 206-684-7649

October 5-7
ISA/Pacific Northwest Chapter
Annual Training Conference
Victoria Conference Center
Victoria, B.C.
Contact: Lynnette Claire, 206-365-3901

October 6-7
Minnesota Society of Arboriculture
Fall Conference and Business Meeting
Collegeville, Minn.
Contact: Mark Schnobirch, 612-587-2975

November 17-19
TCI Expo ’94
Pennsylvania Convention Center
Contact: 800-733-2622

January 25-28
Think Trees/Pollen Conference
Albuquerque, N.M.
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A new application system for Ciba Turf & Ornamental Products’ Alamo®, a systemic fungicide that fights oak wilt and Dutch elm disease, has been registered with the Environmental Protection Agency (EPA). The micro-injection system makes the product easier to use and less expensive to apply. The micro-injector unit provides a “closed” delivery system. Each unit comes ready to use and is made of transparent plastic that allows applicators to see when the bluish-colored fungicide has been taken up by the tree. Ciba Turf & Ornamental Products, Ciba-Geigy Corp., P.O. Box 18300, Greensboro, NC 27419. Phone: 910-547-1160.

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The Tree Fertilizer Company

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Please circle 38 on the Reader Service Card
The Yoga Of Tree Work

By Peter Torres

True, the rigors of taking trees apart and the challenges of rigging allow a climber to lose himself or herself, the mind absorbed in the work. And the quest of aesthetics in a large pruning job can become all-encompassing for a while. Even pruning a small ornamental can dominate one’s thoughts when every snip counts. And dragging brush and moving wood around is indeed a valid form of karma yoga, a way to fulfill one’s dharma.

There are a lot of ways to get outside oneself in the tree business, but raking up the yard at the end of the day is often the best part for me. It’s a time for meditation. The engines are shut down, there’s nothing overhead to fall and crack my hat, no shouted commands and no decisions to make. Tranquility. Our way of high-technology tree work has been going on for less than half a century. We take it for granted and it leaves us little time for perspective. Our way of life leaves us little time for contemplation. Our fleeting technology - and I say fleeting because it will be history a half century from now - enables us to administer human aesthetics and other requirements to trees - the biggest and one of the oldest forms of life on the planet.

Without any boasting or ado, trees take water and minerals out of the soil and air out of the sky. Then, with a very clever use of sunlight - radiation from outerspace - they stand there quietly and create. When I’m raking up at the end of a job, sometimes I understand that it is sunlight made incarnate that I’ve been cutting on all day. And the plants make flowers and fruit, and we eat this solidified sunlight and are ourselves made of it.

The bigger ones make wood we can use to build with and burn for fuel: stored sun in the woodbin. Every breath we take is a prayer of thanks to plants for making oxygen; it’s in my blood and my brain and I use these things to think.

The earth is a stage for embodiment, and the trees do it darn well for such primitive forms of life. When I’m raking up, doing that mindless chore of making someone’s lawn look like nothing happened here today, I let my thoughts wander and I become amazed at each leaf and every woodchip I see, every blade of grass, made real by a millenia of practice, resting on top of this big chunk of rock we call a planet, spinning around a burning ball of nuclear fire somewhere in the Great Void.

I have come to realize that the miracle of my mind is no better or worse than the miracle of the plants I work on. Take the time when you’re sweeping up the mess at the end of the day - magic grows and spreads only when you pay to it the attention it deserves.

There’s nothing finer.

Peter Torres is associated with Pruett, Inc., of Lake Oswego, Oregon.

Do you have a story for From The Field? TCI will pay $100 for published articles. Submissions become the property of TCI and are subject to editing for grammar, style and length. Entries must include the name of a company and a contact person or they will not be considered for publication. Articles and photos must be received by the first day of the month for the following month’s issue.
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7 Lines Designed For the Demands of the Professional Arborist

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Samson has a complete line of ropes specifically designed for the professional arborist. Ropes that can take all the punishment dished out in this abrasive environment and retain that critical margin of security and control.

SAMSON CLIMBING LINES

Samson has developed the most complete line of climbing ropes in the industry. Lines designed to make this critical part of the job a little easier and more secure. Braided or 3-strand twisted, Samson climbing ropes excel at the worksite. True Blue is our premium all polyester 12-strand braided climbing rope in the distinctive blue color. E-Z See Orange, with its easily identified color pattern and Braided Tree-Master share their 16-strand braided construction of polyester over polypropylene strands with a control core of preshrunk nylon.

Arbor-Plex combines polyester and polyolefin fibers in a 12-strand construction. Tree Master is our 4 stage 3-strand all Dacron twisted climbing line. All are designed for maximum wear life, flexibility, abrasion resistance and knot control.

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Arbor-Plex is a high strength, yet lightweight 12-strand bull rope combining polyester and polyolefin fibers for excellent wear and snag resistance. Pro-Master 3-strand combo bull rope is Samson's easy to handle, lightweight, high strength polyester over polyolefin fiber bull rope. For price and performance there isn't a better bull rope available.

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Precision-crafted of forged steel, tipped with tungsten carbide. Pro Series teeth have shanks that are thicker, wider and stronger than regular teeth, which means less bending and less replacing. Once they're installed, they never need adjusting. And they're found exclusively on Vermeer stump cutters.

COMPACT, YET STABLE
The 672 provides the stability you need, yet it's narrower than a full-size pickup for easy transporting and access to work areas.

HEAVY-DUTY BOOM PIVOT
Built tough and durable, with a greater spread between the bearings for drastically reduced bearing failure and more support.

CUTTING CONVENIENCE
A full 60” (152 cm) tongue extension gives you five extra feet (1.5 m) of cutting length, without repositioning the machine. Cutting depth 24” (61 cm), width 78” (198 cm), height 31” (79 cm).

EASY MAINTENANCE
Vermeer's reliable mechanical drive means routine maintenance can be performed without the need for a costly service technician.

THE NEW 672 STUMP CRUSHER
More Productivity
And Backed By An Exceptional Warranty

Here it is. The machine that gives you more stump-cutting performance per dollar. A reliable, maintenance-friendly mechanical drive delivers more power from the 67 HP (50 kw) Deutz turbo diesel or 65 HP (48 kw) gas engine directly to the cutting wheel. And at the wheel, exclusive Pro Series teeth cut...
LET'S GET DOWN TO BUSINESS AT

The National Arborist Association
& The International Society
of Arboriculture

present the

5th ANNUAL TREE CARE INDUSTRY TRADE SHOW & SEMINARS
November 17-19, 1994
Philadelphia, PA — Pennsylvania Convention Center
For three days, everything you need for the business of the Tree Care business will be gathered under one roof. TCI EXPO '94 is the one trade show that brings together the tools, services and knowledge to make your tree care business run more smoothly, more profitably, and more safely.

Why Attend?
• Informative and timely educational seminars, lectures and demonstrations are offered for both management and field personnel.
• Over 130 manufacturers, distributors and service providers will be on hand to show you the newest tree care tools, equipment and supplies available.
• Your fellow arborists from around the country will be available for highly productive networking.
• Get the answers you need at our new NAA Information Central Booth.

TCI Expo—the only Trade Show of its Kind
TCI EXPO '94 is unique. It's the one place you can study the latest in climbing techniques or the latest in tree-care equipment; learn about electrical hazards—or put some spark in your selling technique; pick up a new source for supplies—or pick up Pesticide Applicator Recertification Credits and ISA Continuing Education Units for certified arborists. TCI Expo '94 is one trade show where you can really get down to business.

FREE, FREE, FREE Demonstrations
Don't miss out on the free educational opportunities at TCI EXPO '94. This year, we'll have a tree inside the Convention Center for live presentations on rigging, aerial rescue, climbing and work techniques with Bob Phillips. Plus, we've lined up Baltimore Gas & Electric for a demonstration on Electrical Hazards and Trees. Look for schedules posted in conspicuous locations throughout the Convention Center.
Twin Track Seminar Program
To provide your field personnel and managers with the latest tree care technology AND management information available, we have structured an expanded seminar program. All speakers are professionals and/or well-known experts from the tree care industry, presenting a variety of topics that address both management and field operations. We encourage you to take advantage of our cost-saving MULTIPLE EMPLOYEE DISCOUNTS by bringing your key employees. Please refer to the TCI EXPO '94 Schedule of Events for more details.

Group Discounts
Empowerment is an important business practice in the 90’s. Empower your employee by registering him or her for TCI EXPO ‘94. You’ll earn a $6.00 discount per person per session. If we receive your registration before October 11, 1994, we’ll take an additional $3.00 off each session you attend, a $9.00 savings! See page 7 for details.

Save Money—Buy Gold
Gain access to everything TCI EXPO '94 has to offer by purchasing a TCI GOLD CARD, the money-saving way to attend the full seminar schedule. Every seminar, every lecture is open to you when you hold the GOLD. You must register before October 11, 1994, to purchase the GOLD CARD. No additional discounts are available with this package, but if you are bringing employees who are not purchasing GOLD CARDS, they are entitled to the same group discounts as general attendees.

Recertification Credits
Several programs will provide ISA certified arborists with recertification credits (CEU’s), and some seminars will give pesticide applicator recertification credits for arborists in selected states. Two of these seminars are FREE.

Arbor Bucks
Every day at TCI EXPO ‘94, at noon in the Trade Show, there will be a drawing for $500.00 in ARBOR BUCKS. ARBOR BUCKS can be used the same as cash to make purchases from participating vendors at the show. There is no cost to enter the drawing, and the chances of winning are fantastic! ARBOR BUCKS—another way you can profit from attending TCI EXPO ‘94!

Listen to This...
“TCI Expo has such an excellent speaker program, it’s difficult to decide who to hear. I don’t want to miss anyone!”

PAMELA PICKHARDT
AMERICAN TREE
TROY, MI

“The exhibitors were extremely knowledgeable and eager to answer my questions.”

HARRY BANKER
TREES, INC.
WEST ORANGE, NJ

“The chance to meet other arborists and business people from across the country was just as valuable to me as the seminars.”

BOB THURLOW
B & T TREE CARE, INC.
CLARKSTON, MI

Perhaps the most important event in Philadelphia since the signing of the Constitution: NAA Information Central is coming to TCI EXPO ‘94! Information Central is a MUST-SEE stop on your trade show agenda. What’s new in the industry? What’s new in Washington? What’s new with the NAA? We’re stocking up on answers and solutions to your toughest questions and problems. Our Staff representatives and some of our Guest Speakers look forward to seeing you there.

Special: Bring in your latest financial statement during show hours for a free, confidential financial analysis!
7:30 AM: REGISTRATION

7:30 AM-10:15 AM: COFFEE - Registration Area

8:30 AM: Seminar 1 - PLANT HEALTH CARE NOW AND IN THE FUTURE Mr. Jim Ingram

In the last few years, new ideas have revolutionized ornamental pest control and related areas. Working with the F.A. Bartlett Tree Experts, Jim has helped apply the concept of IPM for ornamental trees and shrubs, sensibly and profitably. This presentation can help you apply some of the winning principles of Bartlett's PHC program in your work.

9:57 AM: TRADE SHOW OPENS

11:30 AM-3:30 PM: DEMONSTRATIONS - Demonstration Area

12:00 NOON: ARBOR BUCKS DRAWING

4:00 PM: Seminar 2 - CREATING CREW LEADERS Mr. Jim Perrone

Your best field person doesn't necessarily have the knowledge and experience to become a crew leader. Perrone is a professional management consultant who specializes in employee development. He can show you how to play an active role in developing your personnel to their full potential.

Seminar 3 - TREE AND RESOURCE PROTECTION AND MANAGEMENT Dr. Thomas Perry

When construction upsets a forest ecosystem, the problem often extends beyond the obvious physical damage to the plants. This noted researcher and speaker will help you understand the plant and how it is interrelated to the ecosystem—the soil, water, and associated plants and organisms. He will show how changing the resources can affect tree health and survival.

5:00 PM: TRADE SHOW CLOSES

6:00 PM-8:00 PM: RECEPTION FOR ATTENDEES AT THE DOUBLE TREE HOTEL - Complimentary Beer, Wine & Soda

FRIDAY, NOVEMBER 18, 1994

7:30 AM: REGISTRATION

7:30 AM-8:30 AM: COFFEE - Registration Area

8:00 AM: Seminar 4 - DIAGNOSING SITE RELATED PROBLEMS IN THE LANDSCAPE Mr. Scott Guiser

In this FREE Seminar, Extension Specialist Mr. Scott Guiser will help arborists better diagnose non-living site related problems in the landscape. His talk will focus on how these site related problems can be confused with pests or disease problems.

9:00 AM: Seminar 5 - ROOTS & MYCORRHIZAE Dr. Donald Marx

Where tree health and vigor are concerned, what is happening below ground has enormous influence over the changes we see above ground. Arborists who are best able to monitor, evaluate and influence root growth and development have the greatest chance of keeping trees healthy and clients happy.

Seminar 6 - DOT COMPLIANCE TRAINING—Part I Mr. Greg Baumann

If you own or manage a fleet, you probably find Department of Transportation requirements burdensome and confusing. In this two-part session leading to D.O.T. Certification, this speaker will unravel the complexities of compliance for the small and medium size company.

9:15 AM: TRADE SHOW OPENS

10:00-10:15 AM: COFFEE BREAK - Outside Meeting Rooms

10:15 AM: Seminar 7 - FLEET SAFETY FROM THE GROUND UP Mr. William Boguski, ITT Hartford

Considering what commercial arborists do for a living, you would think that our property/casualty insurance claims would be dominated by incidents unique to us. Actually, vehicular accidents dominate the loss statistics. If you are a company owner or manager, then you are a fleet manager. Come to this seminar for practical advice on controlling insurance costs.

Seminar 8 - DOT COMPLIANCE TRAINING—PART II

11:30 AM-3:30 PM: DEMONSTRATIONS - Demonstration Area

12:00 NOON: ARBOR BUCKS DRAWING

4:00 PM: Seminar 9 - BECOMING A BETTER SALES PERSON Mr. Hal Becker

Mr. Becker appears on the Expo program a second year in a row due to overwhelming demand. At the age of 22, he was the Xerox Corporation's top salesperson in a sales force of 11,000. His inspiring presentation mixes serious selling techniques with plain old fun.

Seminar 10 - TRAINING TREES THROUGH PRUNING Dr. Kim Coder

This session takes a fresh look at how to prune both young and old trees. Dr. Coder's knowledge and ability to communicate have placed him in high demand for arborist meetings across the country.

5:00 PM: TRADE SHOW CLOSES

SATURDAY, NOVEMBER 19, 1994

7:30 AM: REGISTRATION

7:30-8:30 AM: COFFEE - Registration Area

8:00 AM: Seminar 11 - EVERYTHING YOU NEED ON A SPRAY RIG Mr. Paul Wolfe

This FREE Session tells you everything you need to know to make your spray vehicles comply with all the regulations, and function at peak efficiency. Mr. Wolfe is the owner/operator of a successful pest management/fertilization business in Maryland.

9:00 AM: Seminar 12 - TEAMWORK AND LOSS PREVENTION Mr. Keith Sheriff

Mr. Sheriff is safety director for Wright Tree Service, a large midwestern line clearance and residential/commercial firm. His company leads the industry with exemplary and innovative employee development and safety programs. He can show you how to turn your programs into winners, too.

Seminar 13 - BECOMING A CONSULTANT Mr. Steve Day

Your years of experience with arboriculture are worth a great deal in the marketplace. Mr. Day shows the owner or manager how to take your professional skills to the next level—the paid consultant.

9:15 AM: TRADE SHOW OPENS

10:30 AM-2:30 PM DEMONSTRATIONS - Demonstration Area

12:00 NOON: ARBOR BUCKS DRAWING

3:00 PM TRADE SHOW CLOSES

ISA CONTINUING EDUCATION UNIT

PESTICIDE APPLICATOR RECERTIFICATION CREDITS & ISA CONTINUING EDUCATION UNIT
Who's Who of Manufacturers and Suppliers

Bring comfortable shoes and a notebook. We've got miles of aisles with over 130 companies displaying the newest technologies, equipment and services specifically aimed at the Tree Care Business! Find all the information you need to make informed buying decisions that will increase the productivity, performance, and profitability of your tree care business. TCI EXPO '94 is your opportunity to find chemical manufacturers and formulators, equipment manufacturers and distributors, professional services, and arborist industry suppliers — all in one place!

Admission to the tree care industry's largest trade show is FREE, but you must have an official TCI EXPO '94 badge to enter. To avoid long lines at the registration area, mail your registration form before October 11 and take advantage of all the discounts.

Some of This Year's Exhibitors:

- ACRT, Inc.
- Aerial Lift, Inc.
- Agape Design
- Albiez Insurance Agency, Inc.
- Altec Industries, Inc.
- American Arborist Supplies
- American Group-Samson Division
- American Intertool
- American Safety Utility Corporation
- AmeriQuip
- Arbor Care
- Arbor Care Equipment
- Arbor Computer Systems
- Arborchem Products Company
- Arborbased, Incorporated
- ArborTech
- Asplundh Tree Expert Company
- Baertschi Of America, Inc.
- Bandit Industries, Inc.
- Bashlin Industries, Inc.
- Big John Tree Transplanter
- Bishop Company
- Bradco
- Bryant Orthopedic™ Inc.
- Buckingham Mfg. Company
- CV Foster Equip/Carlton Company
- Canns-Bilco Distributors
- Ciba Turf & Ornamental Products
- CNA Insurance Companies
- Corona Clipper
- Corporate Capital Leasing
- Cray Bearcat Company
- Creative Sales, Inc.
- The Davey Tree Expert Company
- Delaware Valley Bobcat
- Detroit Diesel Corporation
- Deutz Corporation
- The Doggett Corporation
- E-Z Implement, Inc.
- East Hill Manufacturing Corporation
- EL SoftWare, Inc.
- Engine Distributors, Inc.
- Environmental Info & Design
- Fanno Saw Works
- FMC Agricultural Machinery Division
- FMC Corp.-AGC Specialty
- Fox Manufacturing, Inc.
- GFX Corporation
- GMC Truck
- Gravely International
- Green Garde Div/HD Hudson Mfg.
- The Green Oil Company, Inc.
- Green Pro Services
- Greenlee Fairmont
- Grow Gun Corp./ISOLITE
- Growtech, Inc.
- Growth Products Ltd.
- Hodges Manufacturing Co., Inc.
- Holan Mfg./Toombs Truck/Equip.
- Husqvarna Forest & Garden
- ImpleMax
- Independent Protection Company
- Intnl Soc. of Arboriculture
- ITT Hartford/A&A
- J.C. Ehrlich Chemical Co., Inc.
- J.J. Mauget Company
- J.P. Carlton Co., Div. DAF, Inc.
- Jameson Corporation
- Kan-Du Stumpers
- Karl Kuehmerling, Inc.-Ohio
- Keystone Stihl, Inc.
- Lanphear Supply
- Leonardi Teeth
- Monterey Lawn & Garden Products
- Morbark E-Z Beaver Company
- Nation Wide Ladder & Equip. Company
- New England Ropes
- Niemeyer Corp./Oregon Saw Chain
- Niemeyer Corporation
- Norman Prince Associates
- Northeastern Associates
- O'Connor Truck Sales
- Omni Leasing, Inc.
- Opdyke, Inc.
- Oral Ivy, Inc.
- The Peavey Manufacturing Company
- Penn-Del Chapter, ISA
- Plant Food Company, Inc.
- Poulan Pro
- Practical Solutions, Inc.
- Ram Outdoor Power Equipment
- Rayco Manufacturing, Inc.
- RICK/MAX
- Roots/RGB
- Rope Step Inc.
- Safety Test & Equipment Company
- Schoodorf Truck Body & Equip.
- The Sharp Tool Co., Inc.
- Sherrill Arborist Supply
- Shindaiwa, Inc.
- Sierra Moreno Mercantile Company
- Simonds Industries, Inc.
- Source Technology Biologicals
- Southco Industries Inc.
- Steiner Turf Equipment Inc.
- Takagi Tools Inc.
- TCI EXPO '95-Indianapolis, IN
- TECO, Inc.
- Tilton Equipment Company
- Time Manufacturing Company
- The Toro Company
- Traffic Devices, Inc.
- Tree Management Systems, Inc.
- Vermeer Manufacturing Company
- Waldon, Inc.
- Wall Rope Company
- Weaver Leather, Inc.
- Webster Corporation
- Wellington Commercial Cordage
- Wis-Con Total Power Corporation
- Wood/Chuck Chipper Corporation
- Workforce Products, Inc.
- Yale Cordage
Free Admission
Admission to the trade show is free, but all attendees must be registered and receive a TCI EXPO '94 badge in order to gain entrance into the exhibit hall. If you do not pre-register, you must sign in at the Registration Desk upon your arrival. Avoid the long lines: PRE-REGISTER!

Seminar Discounts
The basic price per seminar for TCI EXPO '94 is $32.00 per session. You can lower your seminar costs significantly in several ways. Register early (before October 11, 1994) to earn a $3.00 discount off each session. Bring an additional member of your firm to earn another $6.00 off for you and your associate or associates. This is a total of up to $9.00 off the base seminar price for registering early and bringing one or more associates.

You might also elect to purchase a GOLD CARD. The card allows unlimited access to all seminars for one reduced price. Additional employees who are not getting GOLD CARDS are entitled to the same discounts as general attendees.

Registering
Begin by photocopying the blank registration form on the facing page. Use these copies to register additional employees from your firm. Next, fill out the top of the registration form and circle the number of each seminar you wish to attend. Be careful not to register for two seminars scheduled during the same time. Count the number of seminar hours indicated next to the seminar titles. Record this number in the space provided and begin your calculations. Once you have determined your final seminar cost, mail the completed form with your check or credit card information to the TCI EXPO '94 office at P.O. Box 1094, Amherst, NH 03031-1094. Call us toll-free at 1-800-733-2622 if you have any questions.

Also, make sure you:
- Photocopy the completed registration form for your records—this will serve as a record of the seminars you chose;
- Mail all registration forms together by October 11, 1994 to earn the early registration discount and avoid long lines;
- Complete the checklist on the back page.

Hotels
This year's host hotel is the Doubletree Hotel, located at Broad and Locust Streets within walking distance of the convention center. Rooms have been reserved at the Doubletree, but space is limited. We strongly encourage you to make your reservations before October 15th to guarantee the preferred rate of $85.00 per night (single or double occupancy). Please make your reservations early by calling the Doubletree Philadelphia directly at 215-893-1600, extension 3030, or the Doubletree General Reservations number at 800-222-8733. When making your reservations, please request a room in the "National Arborist Association TCI EXPO '94" room block.

We have also arranged for a special rate at an alternate hotel, just a few miles south of the convention center. The Holiday Inn Philadelphia Stadium is located at 10th and Packer Streets and is offering a rate of $69.00 per night (single or double occupancy). To make a reservation, please call 800-424-0291 and be sure to mention the "National Arborist Association TCI EXPO '94." To ensure the preferred rate, please make your reservations prior to October 15th.

Shuttle Service
For your convenience, there will be a complimentary shuttle service from both the Doubletree Hotel and the Holiday Inn Stadium to the convention center throughout TCI EXPO. This shuttle service will also be in operation during Thursday night's Grand Opening Reception at the Doubletree.

Airline Information
The official carrier for TCI EXPO '94 is USAir. The airline is offering attendees 15% off the unrestricted coach fare, or 5% off the lowest applicable fares, including first class. This special offer applies only to the attendees of this event, and only to travel on domestic segments of all USAir flights. The same discounts are available for attendees traveling from Canada for the show. These fares are valid for travel from November 11 to November 22, 1994. To obtain the best fares or schedule information, you may call Brock Travel at 800-488-2027, or USAir directly at 800-334-8644. USAir reservationists are on call 7 days a week from 8:00 a.m. to 9:00 p.m. EST. When making your reservations, please be sure to reference the EXPO '94 Gold File #1926 0017. Seats may be limited, so call today.

Driving to TCI EXPO '94
From Northern and Western Suburbs: Take I-76 East to Exit 38/Rt. 676 East. Follow signs for Central Philadelphia. Take 676 East and exit at Broad St./Rt. 611 (2nd exit). You will be on Vine St. Follow Vine St. 4½ blocks, look for parking.

From Pennsylvania Turnpike: Follow PA Tpke. to Exit 25A/I-476. Take I-476 South to Exit 6/Rt. 76 Philadelphia. Stay on I-76 East for approximately 12 miles. Exit at #38/Rt. 676 East. Take 676 East and exit at Broad St./Rt. 611 (2nd exit). You will be on Vine St. Follow Vine St. 4½ blocks, look for parking.

From I-95 South: Take I-95 South to Exit 17 Central Philadelphia/Rt. 676. Stay in the left lane of this exit. Follow signs for 676 West to the first exit (Broad St.). This exit brings you up to 15th and Vine St. At the 2nd traffic light (Vine St. East) make a left turn. Follow Vine St. 3½ blocks, look for parking.

From Philadelphia Airport (I-95 North), Baltimore, Washington, Delaware: Take I-95 North to Exit 17 Central Philadelphia/Rt. 676. Stay in the left lane of this exit. Follow signs for 676 West to the first exit (Broad St.). This exit brings you up to 15th and Vine St. At the 2nd traffic light (Vine St. East) make a left turn. Follow Vine St. 3½ blocks, look for parking.

From the New Jersey Turnpike (New York): Take the NJ Tpke. to Exit 4 (Philadelphia/Camden Exit). Get onto 73 North and follow it to 38 West. Take 38 West following the signs directing you to the Benjamin Franklin Bridge (the Bridge is 30 West), crossing into Philadelphia. Follow the signs for local traffic (this is Vine St. West). Go approximately 6 blocks, make a left onto 12th St. Go to the 1st traffic light (Vine St. East) and make a left turn, look for parking.

For simple, fast and easy Ground Transportation around Philadelphia and its suburbs, be sure to stop by the Southeastern Pennsylvania Transit Authority (SEPTA) Booth in the lobby of the Convention Center.
Basic Costs
Multiply your total seminar hours by $32 and enter the amount on the Basic Cost line.

Discounts
If you are registering before October 11, 1994, deduct $3 for each Early Bird seminar hour you registered to attend. Enter the amount of your Bird discount on the Early Bird line.

If more than one person from your organization is registering for Multiple Attendee seminars, deduct $6 for each seminar hour you registered to attend. Attendee Enter the discount on the Multiple Attendee line.

Total your discounts by adding the Early Bird and Multiple Attendee Total amounts together. Enter this figure on the Total Discount line.

Total Cost
Subtract your Total Discount from your Basic Cost line. This Total figure is what you pay for your registration.

CALCULATE YOUR COST

The Gold Card
If you will be attending more than 5 seminars, or would like unrestricted access to all seminars, then THE GOLD CARD WILL SAVE YOU MONEY! To purchase a Gold Card registration, you must register before October 11. Check "Yes" in the box below and enter $160 on the TOTAL COST line. You are done!

I wish to buy a GOLD CARD Registration:
☐ YES ☐ NO

Standard Registration
Standard Registration is for you if: 1) you will be attending 5 or fewer seminars; 2) you will be attending 6 or fewer seminars and registering an associate from your firm; or 3) you will be attending 7 or fewer seminars, registering an associate and registering before October 11.

The Gold Card
If you will be attending more than 5 seminars, or would like unrestricted access to all seminars, then THE GOLD CARD WILL SAVE YOU MONEY! To purchase a Gold Card registration, you must register before October 11. Check "Yes" in the box below and enter $160 on the TOTAL COST line. You are done!

I wish to buy a GOLD CARD Registration:
☐ YES ☐ NO

Basic Costs
Multiply your total seminar hours by $32 and enter the amount on the Basic Cost line.

Discounts
If you are registering before October 11, 1994, deduct $3 for each Early Bird seminar hour you registered to attend. Enter the amount of your discount on the Early Bird line.

If more than one person from your organization is registering for Multiple Attendee seminars, deduct $6 for each seminar hour you registered to attend. Enter the discount on the Multiple Attendee line.

Total your discounts by adding the Early Bird and Multiple Attendee Total amounts together. Enter this figure on the Total Discount line.

Total Cost
Subtract your Total Discount from your Basic Cost line. This figure is what you pay for your registration.

Check enclosed for $ Please charge my Visa/MasterCard
Credit Card # Expiration Date
Signature

Mail the original form and/or copies for additional attendees, with your check or credit card information to:
TCI EXPO '94, PO Box 1094, Amherst, NH 03031-1094
If you have any questions, please call TCI at 1-800-733-2622.

NO REFUNDS AFTER NOVEMBER 1, 1994.
Philadelphia—
Immerse Yourself In History,
Culture, Fine Dining and Fun

In Center City Philadelphia, surrounding the brand new Pennsylvania Convention Center, you'll find everything a city could offer. Fine restaurants are everywhere. Whether you want to choose from the four-star restaurants or find the most authentic Philly Cheesesteak, whether you want to sit down in an inn frequented by our founding fathers or an authentic Chinatown eatery, Philly's got great Phood. Bring your appetite and take a walk! You'll find a phabulous Philadelphia meal on every block.

And for things to do, Philadelphia can't be beat. Within a few-mile radius of the Convention Center are Philly's Phinest: the Philadelphia Art Museum, the Philadelphia Zoo, the Liberty Bell, Independence Hall (collectively, "America's most historic square mile,"') Penn's Landing with its submarine and turn-of-the-century warship, several theatres, the Academy of Music—home of the world-renowned Philadelphia Symphony, clubs featuring all kinds of entertainment, excellent shopping, the Franklin Institute, the Museum of Natural History, and more. Plus, Philadelphia is the home of the Phillies, the Eagles, the 76'ers and the Flyers.

Venture into the suburbs for even more: Valley Forge and Washington's Crossing are popular sites for history buffs, and there are such diverse offerings as the Camden Aquarium and Atlantic City, all nearby.

Also, the Philadelphia Restaurant and Information Booth will be on hand to help you choose between the city's hundreds of excellent eateries and attractions.

Grand Opening Celebration '94

Come help us celebrate the opening day of TCI EXPO '94. Socialize with exhibitors and fellow arborists at the Doubletree Hotel on Thursday, November 17, from 6:00 to 8:00 p.m. As our guest, enjoy complimentary beer, wine, soft drinks and a variety of snacks. There will be a cash bar available for other beverages. For your convenience, complimentary shuttle service will be provided between the Doubletree and the Holiday Inn Stadium hotel throughout the celebration.

Coffee Breaks

Complimentary coffee service will be provided every morning starting at 7:30 a.m. in our registration area. Coffee will also be served between seminars on Friday morning. There will be concession stands in the Exhibit Area during Trade Show hours for refreshments and snacks.

Get Down to Business in Philadelphia!

See you at

TCI EXPO '94

Write or call for more information:

TCI EXPO '94
P.O. Box 1094, Amherst, NH 03031-1094
800-733-2622  FAX: 603-672-2613
VERMEER
STUMP CUTTERS
FOR EVERY NEED

Powerful, labor-saving Vermeer stump cutters let you do it all with just one operator. They're tough, reliable, easy to operate, and backed by an exclusive dealer network for local service, parts and support.

Model 222
- 20 HP (15 kW)
- Cutting depth 13" (33 cm)
- Cutting width 38" (97 cm)
- Cutting height 25" (64 cm)

Model 630B
- 33 HP (25 kW)
- Cutting depth 12" (30 cm)
- Cutting width 55" (140 cm)
- Cutting height 20" (51 cm)

Model 665B
- 65/67 HP (48/50 kW)
- Cutting depth 24" (61 cm)
- Cutting width 72" (183 cm)
- Cutting height 27" (69 cm)

Vermeer Manufacturing Company
P.O. Box 200
Pella, Iowa 50219 U.S.A.
Phone: (515) 628-3141
Fax: (515) 628-7734
Toll-Free: (800) 829-0051 (U.S.A. only)
BRUSH CHIPPERS FOR EVERY NEED
Complete Line of Brush Chippers

Vermeer sets the standard for safe and reliable brush chippers with longer feed tables. And all models also include a patented auto-feed system to reduce engine stress and enhance productivity.

Model 620
20 HP (15 kw) engine, 60" (152 cm) feed table, variable-speed hydraulic feed drive with full reverse.

Model 1250
100 HP (75 kw) Ford, 80 HP (60 kw) Perkins or 103 HP (77 kw) Perkins turbo engine, 72" (183 cm) feed table, curb-side feed keeps operators away from traffic.

Model 935
Air- or water-cooled 35 HP (26 kw) Wisconsin engine, or 50 HP (37 kw) Perkins diesel engines, 68" (173 cm) feed table, handles material up to 9" (23 cm) in diameter.

Model 1600A
Drum style, with 100 HP (75 kw) Ford or 80 HP (60 kw) Perkins diesel engine, 26" (66 cm) flywheel with blower.

Exclusive Dealer Network
Vermeer is the only tree equipment manufacturer that backs you with a specialized dealer network for local after-sale service, parts and support.

For a copy of our full-line tree equipment brochure or for the name of your local Vermeer dealer, call us toll-free at 1-800-829-0051 (U.S.A. only).