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SAFETY AND SAFETY EQUIPMENT

Climbing and working on towers is potentially dangerous. Safety and safety equipment are the keys to the safe and reliable installation, maintenance and enjoyment of your tower and antenna system.

OSHA

OSHA is the Occupation Safety and Health Agency of the Federal Government that sets minimum safety standards for workers. Each state has an agency that is responsible for enforcing the OSHA regulations in that state. In addition, your state agency may have stricter regulations than OSHA; OSHA regulations are just the minimum requirements. Washington State laws exceed OSHA regulations in many cases; as a result they have an excellent safety record.

The key word here is **occupation**. If you are getting paid or paying someone to do tower work, you or they must comply with the federal and state regulations. If you are simply working on your own system, or someone else's without pay, then you don't fall under the OSHA/state laws. But you should still observe them! You should use only OSHA/state approved safety equipment and follow the

regulations applicable to your activity. By doing this, you'll be giving yourself a large and acceptable safety margin while working.

Safety belts and fall arrest equipment

The most important pieces of safety equipment are the Fall Arrest Harness (FAH) and the accompanying lanyards. The FAH is the part that you wear and that the lanyards attach to. The FAH has leg loops and suspenders to help spread the fall forces over more of your body and has the ability to catch you in a natural position with your arms and legs hanging below you where you're able to breath normally.

There are 2 or more lanyards. One is the positioning lanyard. That is, it holds you in working position and at-

taches to the D-rings at your waist. They can be adjust-

able or fixed and are made from different materials such as nylon rope, steel chain or special synthetic materials. An adjustable positioning lanyard will adjust to almost any situation whereas a fixed-length one is typically either too long or too short. The rope version is the least expensive version.

By the way leather safety equipment was outlawed some years ago by OSHA so please don't use any leather safety equipment. This includes the old fashioned safety belt that was used for years but offers no fall arrest capability. If you

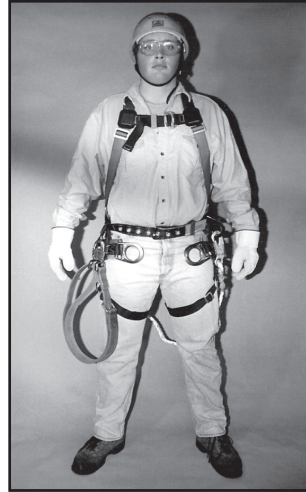


Photo 1: The well-dressed climber. Note the positioning lanyard on the left waist D-ring and the end of the fall arrest lanyard on the right D-ring.

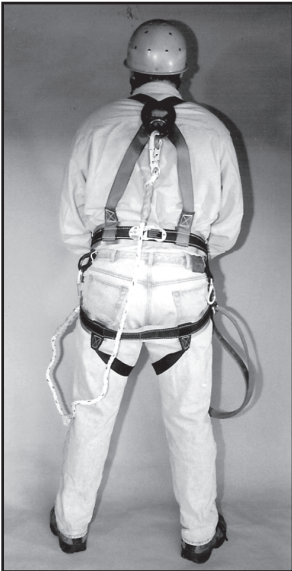


Photo 2: Rear view of climber. The fall arrest lanyard is connected to the D-ring between the shoulder blades.

drop down off while wearing a safety belt, your body weight can cause it to rise up your waist to your ribcage where it will immobilize your diaphragm and you'll suffocate. On the other hand you can use your safety belt for positioning when it's used over and in conjunction with your FAH. Just don't depend on it to catch you in case of a fall.

The other lanyard is the fall arrest lanyard and attaches to a D-ring between your shoulder blades. The other end attaches to the tower above your work position and catches you in case of a fall. The simplest is a 6' rope lanyard which is inexpensive but doesn't offer any shock absorption. There are also shock absorbing varieties which typically have bar-tacked stitches that pull apart under force.

Don't cut corners on buying or using safety equipment; you bet your life on it every time you use it!

Climbing the tower

OSHA rules and good common sense say you should be attached to the tower 100% of the time. You can do this several ways. One is to attach the fall arrest lanyard above you and climb up to it. Use your positioning lanyard to hold you while you detach it and move it up again. Repeat as necessary. An alternative is to use 2 fall arrest lanyards. This way you can leapfrog them up the tower.

What you use and how you use it is up to you. As long as you've got the right safety equipment and follow the basic rules you won't have any problems.

Safety climb systems

Most commercial towers have a safety climb system that is typically a 3/8" steel cable that runs from the top to the bottom of the tower and the climber uses a special trolley that attaches to the

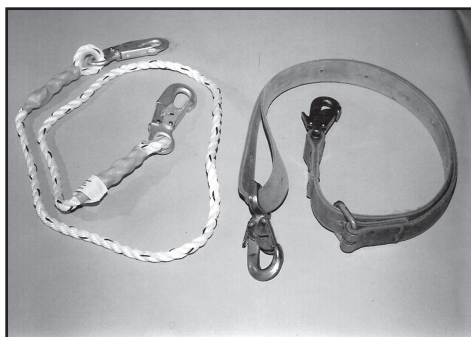


Photo 3: A rope positioning lanyard on the left and an adjustable version on the right. They both use double locking snap-hooks on the ends.

cable from the FAH. The trolley will slide up freely but will clamp the safety cable if weight is put on it, thus preventing you from sliding down the cable and tower. They are rare on amateur towers but are worth considering.

Mountain climbing harnesses

Some amateurs feel that mountain climbing harnesses offer a less-expensive option for a safety belt.

The first problem with using a mountain climbing harness is that most of them require you to tie the harness directly to a rope or to a carabiner. I wouldn't trust most hams to tie a bowline to attach themselves to anything. You could use a carabiner as an attachment point but it is another piece of hardware that could fail or open up at an inconvenient time. Be sure to use a locking carabiner if you use this technique.

Second, there are no D-rings to attach any sort of lanyard to; the only thing you have is that one carabiner that connects the loops in the front. The nylon loop that is on the front of the climbing harness is only designed to position the leg loops and is intended to be used only with a climbing rope or carabiner, not the metal snaps of your lanyard that you frequently snap on and off.

Climbing belts are designed to be used only with climbing ropes and hardware, not with tower tools or equipment. They also don't have any provisions for convenient attachment of tool or bolt bags.

The final problem is that a mountain climbing harness may be designed for a force of only 1,000 pounds while OSHA fall arrest gear must be designed for 5,000 pounds of strength. Although the main advantage of a mountain climbing harness is low cost, it does have its limitations for tower work and I cannot recommend it. Use only the tools designed specifically for the job and you can't go wrong.

Safety equipment suppliers

Chances are you've got a safety store in your area. They have some safety equipment and accessories that you can use but your best bet is to search the internet for what you need since tower climbing equipment is not very common. One vendor is Champion Radio Products (www.championradio.com) that is owned by the author and specializes in tower related products.

Vendors such as Klein, Petzl, DBI-Sala and others all provide OSHA approved safety equipment. They tend to sell the more expensive products but they're preferred by professionals who wear and work in them all day.

These companies will have many other goodies including canvas buckets, tool pouches and other hardware. Plan on spending \$150 and up for a new belt and lanyard. Just look at it as inexpensive life insurance.

Boots

Boots should be leather with a steel or fiberglass shank. Diagonal bracing on ROHN 25G is only $\frac{5}{16}$ " rod—spending all day standing on that small step will take a toll on your feet. The stiff shank will support your weight and protect your feet; tennis shoes will not.

While I sometimes wear tennis shoes for small tower jobs, leather boots are mandatory on towers like Rohn BX that have sharp X-cross braces. Your feet are always on a slant and the tower is a real meat grinder on your feet.



Photo 4: Our climber on the tower. His positioning lanyard is attached to the tower and the fall arrest lanyard is hooked to the tower above him.

Hard hats

The hard hat is your choice. Just make sure they are OSHA approved and that you and your crew wear them. As you'll be looking up and down a lot while wearing your hard hat, a chin strap is essential to keep it from falling off. Look for the ANSI or OSHA label on the hard hat; that should be the minimum safety compliance for your helmet.

Safety goggles

Approved safety goggles should be worn to prevent eye injury. Look for ANSI or OSHA approval.

Gloves

If you do a lot of tower work, your hands will take a beating. Gloves are essential and I like to keep several spare pairs for ground crew members who show up without them. Cotton gloves are fine for gardening but not for tower work; they don't provide enough friction for climbing or working with a haul rope. Leather gloves are the only kind to use; either full leather or leather-palmed are fine.

The softer the gloves the more useful they'll be. Stiff leather construction gloves are fine for the ground crew but I prefer the pigskin and other soft leathers because you can thread a nut or do just about any other delicate job with these gloves on.

The mental game

One of the most important aspects of safety is having the knowledge and awareness that will enable you to do a job safely and efficiently. You must have the mental ability to climb and work at altitude while constantly rethinking all connections, techniques and safety factors. Climbing and working on towers is 90% mental. Mental preparedness is something that must be learned. This is an occasion where there is no substitute for experience.

When it comes to tower climbing, my experience has been that only a small percentage of people will climb and work at altitude. The biggest obstacle for anyone is making the mental adjustment. Properly installed towers are inherently safe and accidents are relatively rare. The only thing stopping most people is their own mind and attitude.

Would you have any trouble standing on a 24" by 24" piece of one-inch plywood on the ground? Of course not. Could you stand on that same four square foot platform 100 feet in the air? The only difference is in your mind. I know that it's easier said than done but you must make the mental adjustment if you are going to do any tower work.

About twenty years ago I got involved in mountain climbing in Washington state. One of the most important lessons I learned, and that is directly applicable to tower climbing is that when you climb, you have four points of attachment and security—two hands and two feet. When climbing, move only one point at a time. That leaves you with three points of contact and a wide margin of safety if you

ever need it. This is in addition to having your fall-arrest lanyard connected at all times.

Another recommended technique is to always do everything the same way every time. That is, always wear your safety strap on the same belt loop and always connect it in the same way. Always look at your belt D-ring while clipping in with your safety strap. This way you'll always confirm that you're belted in. There is a story of a fellow who went to work for a local cable company and went out on his first line job. After he got up the pole, he threw his belt around and clipped in. Hearing the reassuring click of his safety belt, he leaned back, only to find that he'd clipped into his screwdriver! He didn't fall but was so shaken that it turned out to be his first and last day on the job. Don't let that happen to you. Always look!

Check your safety equipment before each use

You should also check your safety equipment everytime before you use it. Inspect it for any nicks or cuts to your belt and safety strap. Professional tower workers are required to check their safety equipment every day.

Inclement weather

Tower work is the easiest when the weather is nice and the sun is shining. Unfortunately, that doesn't always coincide with your construction schedule or repair priority.

For raising tower sections or antennas, a relatively windless day is preferred. Professional climbers usually do their trickiest lifts first thing in the morning when the chance of wind is the least. This'll work for ham work too. Don't push on in marginal conditions; you may wind up doing more harm than good. Obviously you don't ever want to climb during a lightning storm.

As far as rain goes, unless it's coming in horizontally it's more of a nuisance. For ham towers, you'll always be belted in and you won't be walking across any rain slicked surfaces, so working in the rain is possible. Just dress with polyethylene underwear and good rain gear and you'll be able to still get some work done.

Don't hesitate to call off your project, though. If you're not sure if the weather is good enough, it probably isn't.

More tips

1. Don't climb with anything in your hands; attach it to your safety belt if you must climb with it or have your ground crew send it up to you.
2. Don't put any hardware in your mouth; not only does it taste funny but also you could swallow something.
3. Remove any rings and/or neck chains; they can get hooked on things.
4. Be on the lookout for bees, wasps and their nests; there aren't too many bigger surprises when you're climbing a tower (imagine a nest big enough to engulf a portion of 25G!). If you do run into a hornet, wasp or other stinging insect, use Adolph's Meat Tenderizer on the sting. There is an enzyme in it that'll cut the pain within a minute or two. I always have a bottle with me just in case.
5. Don't climb when tired; that's when most accidents occur.
6. Don't try to lift anything by yourself; one person on a tower has very little leverage or strength. Let the ground crew use their strength; save yours for when you really need it or you'll quickly run out of arm strength.
7. If something doesn't work one way, re-rig, then try again.