TOWER MAINTENANCE:

keep your tower *UP*

Regular maintenance means lasting success

Those of us fortunate enough to have towers with moderate to complex antenna systems sometimes take them for granted. Even though we've invested substantial amounts of time and money in planning and erecting our systems, once they're up we tend to head for the ham shack and forget that they're there. Only the rotator control and the S-meter remind us that there's something out there, after all.

That's why I've designated a specific time of year — well before winter sets in — for a thorough annual inspection of every inch of metal in my system.

Good planning keeps the number of trips up the tower to a minimum, and the work pleasurable.

Choose a comfortable time of year; windy, hot or cold days will only discourage you from staying on the tower any length of time. I usually do my inspection in the fall, when temperatures are moderate and it's a joy to be up there. There's a built-in benefit for your system, too, in choosing fall as the time for your annual inspection. After a summer of heat and ultraviolet stress — and battering by the winds of thunderstorms and perhaps even hurricanes, the stiffening temperatures of winter can bring tape and cables to their natural end. Those who live in areas where seasonal changes are less severe may opt for a different time.

inspect the antenna

Gather the appropriate tools (pliers, wrenches, tape, sealant, etc.) and an approved (not home-made) safety belt. Climb up once, check and correct any deficiencies on the way *down*, and celebrate your good planning.

Most of your time will be spent right at the top, where you'll first make a visual inspection of the antennas. Although most of the hardware will be beyond your reach, a look at the general condition will reveal a great deal. Loose or missing hardware is a sure sign of trouble. Sometimes scratches and the general pattern of weathering will indicate any elements turned from original position. After your visual inspection is complete, *shake* the whole assembly; you'll hear or see anything that's come loose.

The first part of the beams to deteriorate is often the support cable for the boom. Check that thoroughly, because without it the wind tolerance of your beam may be far less than you think. All broken or missing parts should be replaced, even if that calls for a major antenna party. Electrical connections should also be checked thoroughly, since an increase in the resistance at the feedpoint can mean needless loss of power. I routinely spray all connections with clear acrylic sealer. Available in the spray paint section of most hardware stores, this product will prevent corrosion on the connections. A saturating coat sprayed over all connections once every two or three years is easy to apply and seals all cracks, yet allows disassembly when necessary.

don't forget the feedline

While at the top of the tower, remember to check the attachment of the feedline to the antenna and mast. This provides strain relief for the antenna connection. Tight taping is normally used here, but even the stresses of normal turning can loosen these support points. Although most of us use electrical tape for this, fiberglass reinforced strapping tape will serve

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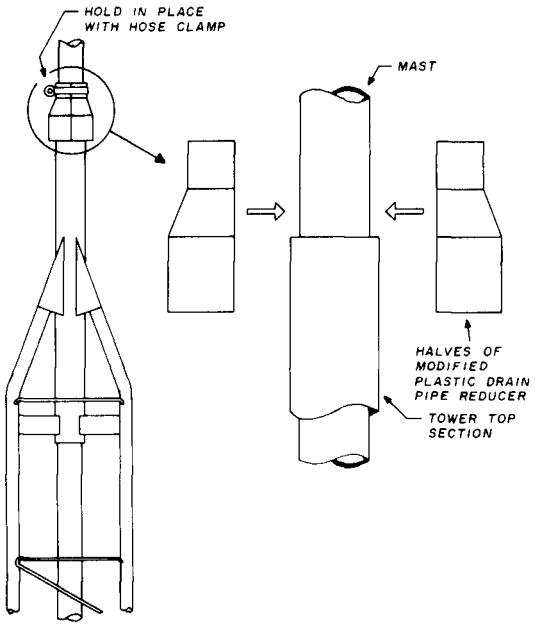

fig. 1. Illustration of split drain pipe reducer as drip-cap for tower top.

well at high-stress points such as this. If loose, retaping is in order; pay particular attention to the loop of feedline necessary to allow rotation of the antenna. Multiple feedlines can be taped together to support each other, but a larger loop should be allowed to accommodate the additional stiffness. (If you put the antenna at the center of its rotation *before* climbing the tower, it will be easier to visualize where this rotation loop must be located, and any necessary repair will thus be easier to spot and simpler to do.)

grease fittings: good idea

A step down the tower's top section will allow inspection of the mast bearing. Check and replenish the lubrication of this bearing if necessary. Most of us use a top section that has no true bearing, utilizing a top pipe section to guide the mast instead; these sections are particularly difficult to lubricate, since the pipe length may be as long as 30 inches. The mast in most installations like this fits loosely, with approximately 0.1 inch (2.5 mm) diametrical clearance. Using a hand grease gun to inject grease through the various holes already in the tower pipe makes this chore easier, and a homemade rubber washer will serve as a seal when pressed over the hole with the grease gun while lubricating.

To simplify lubrication of the entire length of the pipe, I installed automotive grease fittings in a few places along the tower pipe. If you do this, take care to choose fittings that are flat on their bottoms, and install them so they don't protrude into the inside of the tower pipe, because this would cause a wear point on the mast. One alternative is to leave the fittings in only during the lubrication process and then cover the holes with tape. I admit that while installation of the fittings is a cinch on a new tower still on the ground, it could be quite a challenge on an existing tower.

Water and dirt must be kept out of the bearing area. If they're not, your antenna may freeze in place during the winter. You can easily install a drip cap to prevent this, using readily available hardware.

My mast pipe, like most, is a standard pipe size. For the typical installation, 1.5 inch (38.1 mm) pipe which is 1.9 inch (48.3 mm) OD fits through a 2 inch (50.8 mm) ID tower tube, which is in turn about 2.25 inches (57.2 mm) OD. Since the mast pipe is a standard pipe size, a 1.5 inch (38.1 mm) to 2 inch (50.8 mm) reducer for plastic drainpipe makes an excellent drip cap (see **fig. 1**). Just cut it in half with a hacksaw, file out the internal chamfered stop, and fit the two halves snugly over the mast pipe. Use an automotive hose clamp to hold it in place over the top of the tower pipe; water and dirt will be excluded, and the mast will rotate freely for a longer length of time than it might without protection (see **fig. 1**). For other standard mast pipe sizes, different size reducers are required; there should be no problem as long as the water pipe used for the mast and the plastic drain pipe follow the same size conventions.

on the way down

On your way down, check all cables for proper support, replacing tape as necessary. Look for any rust; it's a sure sign that galvanizing in that spot on the tower has been scraped off. Remove the rust with a light sanding and seal with acrylic sealer or aluminum paint.

Check bolts and nuts for tightness, both at the tower section joints and on any other hardware. Guy wire attachment points are particularly important. Treat all bolts to prevent their nuts from rotating off should loosening occur; this can be done by striking a center punch against the bolt thread protruding beyond the nut. By slightly upsetting the thread, you'll prevent the nut from vibrating off, but don't be so aggressive that you destroy both the thread and your chances of disassembly later on.

on the ground

Back on ground level, check the cable entry into the house to make sure it is still properly sealed. Check the connections to the tower ground system, too, both for tightness and for any signs of corrosion that would cause poor contact. If the grounding wires have become kinked for any reason, straighten them as needed for optimum protection against lightning.

Now take a walk around the yard. Are all guy wires and turnbuckles secure, all nuts and bolts tight? Here in particular, upsetting the threads of the bolts as described above is appropriate, since they generally can't

be tightened completely and still allow equalizer plate motion. Note the condition and tension of the guy wires: any signs of rust or wear in the wire calls for immediate replacement. In checking tension, remember that it will change from season to season with rising and falling temperatures, which is why I check mine in the fall when temperatures are moderate. This factor is important enough for tower manufacturers to recommend different guy wire tension for different temperatures at the time of installation. Lacking the equipment needed to measure tension, a rule of thumb is to tighten the turnbuckles as much as you can with your bare hands. This will normally leave some sag in the wires, especially if insulators are installed, but don't worry. The last bit of sag requires a great deal of tension to remove and puts undue stress on the wires and the tower. Remember that the wires are pulling not only *out* but also *down*, and all that force has to be supported by the tower.

Finally, if you haven't installed safety loops and checked them, install one now at each guy anchor. A safety loop may be as simple as a short loop of guy wire threaded through the guy wire ends and the anchor rod loop, with the ends held together with normal wire clamps. The loop serves to catch the guy wires and save the tower if a turnbuckle should break. The loop may also be threaded through the turnbuckles in figure-eight fashion to keep the turnbuckles from loosening.

ham radio