

FOURWHEELING ACADEMY

By Harry Lewellyn

TOWING BASICS

INTRODUCTION

Let there be no doubt: Towing and tugging one vehicle with another can be dangerous. In your well-meaning attempt to help, you may do serious harm. And that should come as no surprise when you consider the size, weight, horsepower and rock-throwing tires of the vehicles we take off-road. It is easier than you think to break parts and injure people when towing and tugging.

What I also believe contributes to the mayhem and chaos of towing and tugging is our state of mind. No one likes to get stuck, but it happens to the best of us. It's embarrassing, it delays our progress and could be life- and equipment-threatening in certain situations. As Hurricane Floyd clearly demonstrated, raging waters spare nothing, but that's still no excuse to work unsafely. My intention is to help you safely improve your results on both ends of the towline. Safety will be laced throughout this article. Do not take it lightly!

I'll first fill you in on where and how to hook up. Then I'll address towing. In the follow-up article (January-February 2000), TUGGING BASICS, I'll zero in on the most dangerous process of all — an all out, serious, getem unstuck yank!

ATTACH POINTS

This really happened. I'm working sweep on a ranger-led tour. Ranger passes stuck car and radios me to assist the stranded 2WD. The 4X just ahead is eager to help and offers his new yanker and labor. I hook up my end and he does the other. For this mild, flat sandy pull, I take out the slack, begin to tug, and hear a slight "plink" from behind. Upon inspection, I discovered the helper had attached to the car's license plate bracket!

Some folks have no sense of material strength. You are most likely more aware than that, but how much? Another example drives home my point!

Man and CJ stuck in mud. Unstuck friend attaches to one side of front axle and yanks with great vigor. Displaced front axle now relocated nearer to front bumper. Man and CJ still stuck in mud!

ATTACH RULES

Here are the Coyote's rules of attachment. If your candidate connection is designed to move, or is attached with



Diagonal teeter-totter disables my old Cherokee.

Photo by Harry Lewellyn

rubber, ***do not use it!*** This eliminates shocks, sway bars, tie-rods, pitman arms, axles, radiators, springs, shackles, A-arms, drive shafts, tail pipes, motor mounts and too many other items to mention. Even modern shock-absorbing bumpers can be worthless. They are designed for push, not pull.

I've got to agree the front axle seems like a pretty substantial piece of hardware, but it moves *and* has rubber at the shackles. With this no-move, no-rubber thing, I'm trying to steer you to only use the frame or things directly attached to the frame. The forces involved in a full-on, all-out yank are massive.

Things that are attached to the frame may be questionable, too. Some dressemup foo-foo stuff is not designed for serious service even though it has been decorated with the appropriate hardware. I've seen hooks atop a 1/4-inch steel "pretty piece" (brush guard) mangled and bent beyond recognition when used for a hefty tug. This has to do with the added distance and angle from the actual frame. The leverage kinda multiplies the force and twists 'em right outa whack! If you anticipate a serious, hard pull, connect directly and only to the frame.

FRAME ATTACHMENT

Tow hooks directly attached to the frame are best. However, some ask whether to bolt or weld them on. I prefer to bolt

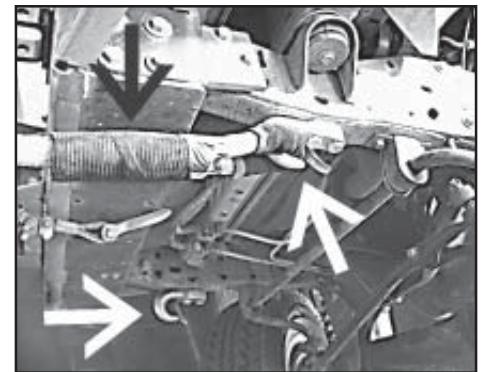


Figure 1 *Hooks bolted to frame with hose-protected Towline taped in place.*

Photo by Lewellyn

them on. I'm fearful welding will destroy the frame's heat-treating or be weak right at the weld. The average person doing the welding has never been educated about the "heat-affected" zone. That is a region, in

the process of welding, between cold and hot metal, that crystallizes and becomes very brittle — weak. It's unavoidable



Figure 2 Front D-hole near sway-bar
Photo by Lewellyn

without special attention to the immediate cooling process during welding. Figure 1 (page 6) shows two tow hook bolted to my Explorer frame.

Also, do you have a conventional frame or is it integrated with the body? Integrated frames are typically made from thinner material and thereby weaker. I've seen a Cherokee factory front hook bend and distort the frame. This is due to the integrated (thinner) frame and the fact that the factory hook adds about a one-inch extension to the attach bolts. This adds a "lever" to the pull-force and can bend the frame.

The intersection of the frame and a crosspiece may be another good attach-point. However, this assumes you're right at the corner and the crosspiece is made from approximately the same thickness of steel as the frame. Be aware there are front crosspieces that are little more than dust shields and are very weak. I've seen some made of pressed cardboard!

DOT HOLES

The U.S. Department of Transporta-



Figure 3 Rear horizontal D-hole near spare tire.
Photo by Lewellyn

tion (DOT) ensures there be four frame attach points on every vehicle sold in the USA. The DOT requires a car-carrier hole be located near each tire. I call them dinosaur- or D-holes because car carriers are called dinosaurs. These are elongated holes. They are designed to receive special attachment hardware or a chain slip hook. They are typically in a vertical surface (Figure 2), but may be in a horizontal frame member (Figure 3).

On 4WDs of the Land Rover variety, they are flat, vertical, egg-shaped pieces attached to the frame with a single bolt. These are definitely not suitable for serious tugging. Even if the bolt were strong enough for hard pulls, they would certainly distort and bend out of place. Avoid using these for all but the gentlest of tows.

The only problem with D-holes is that they are designed to pull mostly down —



Figure 4 Choke hook in vertical D-hole, but note potential air dam damage.

Photo by Lewellyn

vertical — not horizontal. As a result, when you use them, you have to be aware of the added stress on the slip hook and what your chains, cables, straps and ropes will touch on their journey between vehicles. Typically, you have to either protect the yanker from sharp or hot 4X metal, or the 4X itself from yanker damage. Pay particular attention to the bumper, air dam and body as pictured in Figure 4. In this case, a hard pull will lift the chain and damage the air dam.

YANK PROTECTORS

Sharp and hot things under the 4X can cut and burn yankers. Cuts and burns weaken the yanker and thereby make it more prone to break. Here's my preventative measure.

I have two pieces of lower radiator hose that are an integral part of my yanker. The yanker is threaded through both hoses (Figure 5). After the hook is in place, and before I leave the installation, I inspect for



Figure 5 Lower radiator hose "damage protectors" on towline. Photo by Lewellyn

potential yanker cut and burn points. When found, I simply slide the yank-protector hose to the hazardous spot and tape it in place (Figure 1). The potentially dangerous interference now only gnaws away at the replaceable hose, not the vulnerable yanker.

I use lower radiator hose because it is typically stronger than upper hose. The lower hose is on the suck side of the water pump and must be stronger to keep from collapsing when hot. Go for the ones that have built-in wire reinforcing.

TRAILER HITCH

I'm also reasonably comfortable with a class-III trailer hitch receiver for easy to moderate pulls. It's generally conceded that you stay completely away from using the ball itself. It's thought that if it breaks off, the projectile could be lethal. I agree.

Most yankers have eyes or loops at both ends that fit nicely into the 2-inch square hole. Simply push the eye into the



Figure 6 Insert Towline eye into class III trailer hitch and pin. Photo by Lewellyn

hole, the retainer pin through the hitch and eye, and the two have become one (Figure 6 on p.7).

For even less aggressive pulls, I use



Figure 7. Loop shackle through Towline eye and attach to trailer hitch ball hole.

Photo by Lewellyn

the reinforced trailer hitch ball hole in my rear bumper. I loop a D-shackle through the eye in the towline and attach it to the bumper hole (Figure 7).

HOOK INSERT

Another trailer hitch product I've seen is a special insert that slips into the hitch receiver with a protruding hook. The *gozinta* part is just like a ball insert. It's made of heavy stock and uses the hitch-pin to lock it in place. Just outside the receiver is a conventional tow hook. I particularly like this because you can place the hook either up or down depending on the up-down hill direction of the pull. For relatively flat pulls, I think hook-up is best since it tends to keep the towline eye in place.



Figure 8. Three-foot Coyote chain with choke hook on left and grab hook on right

Photo by Lewellyn

COYOTE CHAIN

Nine times out of 10, I'm faced with a stuck newcomer that has no accessory hooks or loops on his 4WD. For this I've fabricated a special chain. Figure 8 shows a three-foot long chain that has a grab-hook (right) at one end and a choke- or slide-hook (left) at the other end. A grab-

hook is designed to lock (grab) onto any chain link. The choke- or slide-hook has a more open end and easily slides up and down the chain. Typically, the grab-hook will not fit into a D-hole, but the choke-hook will, due to the more open nature of the throat.

(reprint corrected, see p.14) I secure the choke-hook to the frame in a D-hole (Figure 4, p.7). The chain then exits just beyond the nearest bumper. I feed the loose end through the yanker eye and lock the chain back onto itself with the grab-hook (Figures 9 & 10). Figure 9 is the CORRECT way to do it and figure 10 needs a few more words.

Figure 10 can pinch the line. Starting left, the chain goes through the towline eye, then back over and under the approach on the left and finally hooks onto the piece coming out of the eye, not the



Figure 9. CORRECT! A grab hook attached this way is best.

Photo by Lewellyn

original approach section of the chain. In essence, this is a choker of a sort. This method may be useful if you need two chokers, but not good on the towline.

I actually carry two chains in case I have a newcomer on both ends of the tow



Figure 10. WRONG! A grab hook attached this way stresses the line.

Photo by Lewellyn

operation. The chain also doubles for repairs. When I broke my radius arm on a San Felipe, Baja trip, they were used to secure the lame front axle in place until I could get to a welder. See our newsletter to purchase a Coyote Chain.

MOUSE THE HOOK

You want to ensure that the towline's

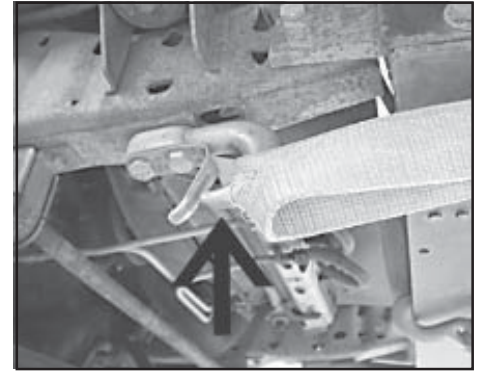


Figure 11. Improperly or unmoused yanker can lead to strap damage!

Photo by Lewellyn

attach-eye will stay in place on the hook. If the eye falls off, it's obviously no good, but simply annoying. Partially on (or off) is worse! The hook could pierce the yanker (Figure 11), reduce the strength and tear the line apart. Some hooks come with a spring mouse (Figure 1) that holds the Towline eye in place. With an open hook or any questionable attach point, use tape, a plastic tie or something to insure the eye stays in place. The mouse term comes from sailors and riggers.

READY THE YANKER

I'm getting a little ahead of myself with this and the next tip, but this one may help you stay a little cleaner. Even if you're not yet stuck, but see a lengthy stretch of muddy or wet, tough going ahead, do this. Attach and mouse the yanker to your 4X. Drape it out of the way back through a window or coil it on the hood (Figure 12, next page) or the roof rack. I've seen some folks wrap it around the bumper, but by the time you're stuck, the yanker may be under mud! Now, if you get stuck, you can climb out the window and toss the towline out to your pull without getting too dirty.

COLD CONCERN

In freezing cold weather, you may be faced with an unexpected surprise. You work your tail off to rescue your buddy. Come go-home time, you find your rope frozen stiff and impossible to fit back into

your 4WD. I find thawing and bending it around a warm (not too hot) tailpipe will get the inflexible, stubborn assistant back in the truck for further thawing.

YANKER LENGTH

As I wrote in *Yankers Away* (September/October issue), my yanker is always the wrong length. It typically puts the tow vehicle right in a ditch, up a hill or just around a corner. I'd like to be directly ahead of or behind my stranded companion, on level ground. To change the length of a flat strap takes extra caution and some skill. With a Master-Pull® round towline (see our newsletter to order), it's a cinch. Use a bowline in the round line to shorten it. Then, even after being stressed, it's no sweat to undo. The September-October issue also showed how to tie a bowline and the secret to untying flat straps.

For added length, you can resort to looping a couple of yankers together, but again, beware of the flat yellow yankers. Even something as elementary as a loop-through-loop in flat straps (Figure 13) can become impossibly permanent. It creates kind of a square knot. And never use a shackle to connect two yankers (Figure 14). If either yanker breaks, the massive metal shackle becomes a substantial cannonball!



Figure 12. Attached Towline, draped back on hood, ready for action!

Photo by Lewellyn

YOKES

Ya *yokemup* to shorten 'em up. That's where you make the towline form a V. However, yoking up has its limitations and I only recommend it for towing, not tugging. Without fully explaining all of the reason, as the branch-legs of the yoke get shorter and shorter, the forces on the legs get greater and greater. It doesn't make sense to the nonengineer, but it has to do with the same principle as to why sailboats can sail into the wind. Beware

of very short branch legs regardless of material.

TOW LENGTH

For tows back to camp, length is of even more concern. You're concerned with length for safety and functional reasons. Too short a yanker puts the towed vehicle dangerously close to the puller's tail. Puller may react faster than pullee



Figure 13. Loop-through-loops can become permanent! *Photo by Lewellyn*

and smash into his help. I have two short tales about too long a strap.

I'm towing broken Bronco on twisting Baja dirt road. As I round a tight corner, I slow, he slows slower, introduces slack, which he drives over and wraps around the inside of his front wheel. A fraction of a second later, the strap tightens and breaks the flexible hydraulic brake (fluid) hose. Not too cool! Malfunctioning brakes on the 4X behind are bad news, particularly for the guy ahead! Yanker was too long!

I'm towing broken Commanche around a mountainous hairpin turn. He does a better job with the slack and I pay less attention. The blasting horn tells me something is wrong. Picture we're on opposite sides of the hairpin turn, pointed in opposite directions, and I'm now dragging him sideways into the cavernous "no-road" center portion. Yanker was too long!

HOW TO TOW

For long tows like back to camp or on the road (when legal), the yanker must be safely long enough to accommodate reaction time, but not too long so as to introduce tracking errors. On the highway, too long may also entice unknowing others to pass and try to pull in between the two attached vehicles. By the way, it is illegal to use a towline on California freeways and interstates (CA Vehicle Code, section 29006a). The vehicles must be connected

with a rigid tow bar. Know your state's laws before you learn the costly way.

The towee's responsibility is to keep the yanker taut at all times. Even the slightest amount of slack can get dangerously tangled in vital running gear. He does this by applying just the right amount of brake at just the right times.

The tower's responsibility is to make sure he doesn't drag the victim off the road on a tight turn as I almost did above. An extra person in each vehicle, with radiomic in hand, adds instant feedback. Otherwise, both front and back vehicles should agree on specific hand signals prior to taking off.

When taking off, the towee should gently apply his brakes to ensure a taut towline. He should slightly drag the brakes for a 100 feet or so, or until rolling friction ensures he won't surge or coast ahead. With a stick shift, this means Mr. Towee should slightly apply his brakes during each shift, too.

To ensure that slowing and stopping does not introduce slack, it is the responsibility of the front vehicle to radio or signal back he's changing pace. The back vehicle must then slow or drag the front guy to a stop. On a downhill, this means the rear 4X drags his brakes to eliminate slack. To safely take off, shift, turn, slow down and stop perfectly is much harder



Figure 14. WRONG! Never use a shackle (cannonball) to attach two yankers!

Photo by Lewellyn

than it may sound. But that's definitely less stressful and safer than *tuginum*.

TUGGING BASICS

Getting unstuck requires more preparation and serious attention to safety. TUGGING BASICS will be covered in the January/February issue of *Ecological 4Wheeling Adventures*.



FOURWHEELING ACADEMY

TUGGING BASICS

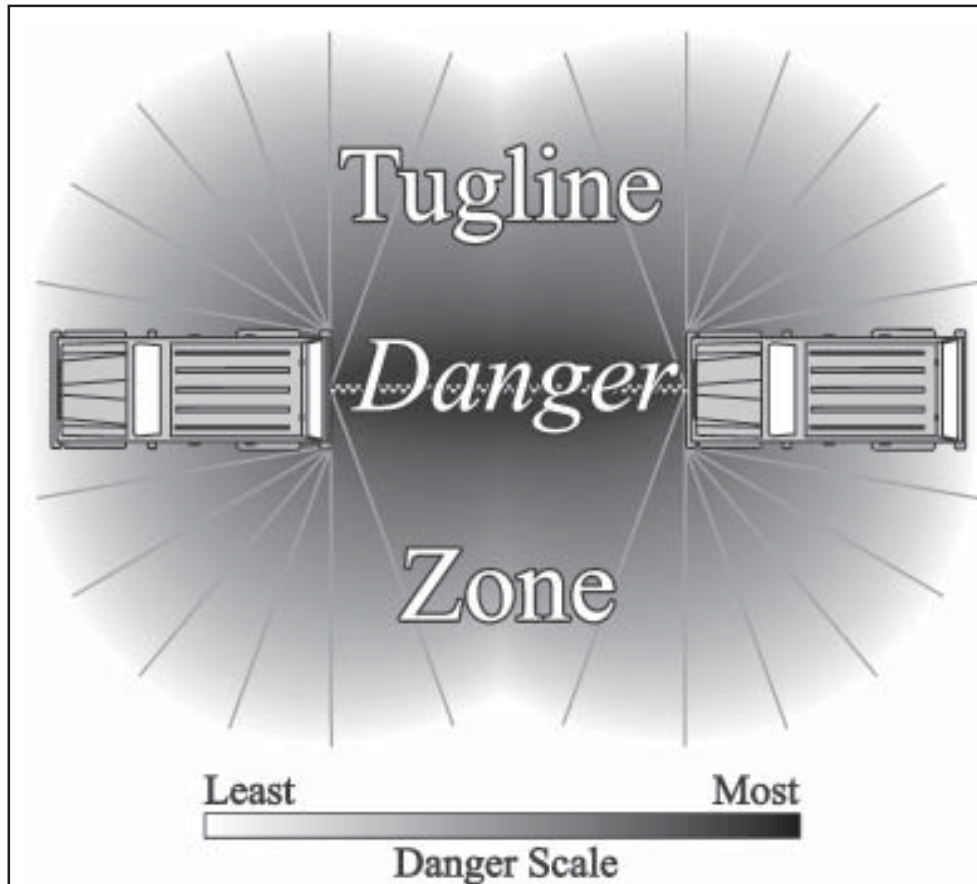


Figure 1 Relative danger in the tug zone

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INTRODUCTION

Repeating from last month: "Let there be no doubt: Towing and tugging one vehicle with another can be dangerous. In your well-meaning attempt to help, you can do serious harm. And that should come as no surprise when you consider the size, weight, horsepower and rock-throwing tires on the vehicles we take off road. It is easier than you think to break parts and injure people when towing and tugging." Define, enforce and respect a *danger zone* encompassing the work area as shown in Figure 1 and explained in "Define the Danger Zone" on page 13. Tugging can be treacherous!

TREACHEROUS TUGGING

If towing is dangerous, then tugging is treacherous. It requires a crawl, walk, and then finally the deadly "run" approach, only when absolutely necessary. To start off running, with little or no experience, is irresponsible. This article builds on two previous *FOURWHEELING ACADEMIES* and in no way should be considered a stand-alone source for tugging. I make frequent reference to *YANKERS AWAY* (September-October '99) and *TOWING BASICS* (November-December '99). So let's first chill your spine with a few horror stories, hear how others

helped me improve *TOWING BASICS*, then get on with how to tug.

HORROR STORIES

Tightly stretched things of any sort can be deadly ... if they break or come loose! How about a few wakeup horror stories of unknown origin? There's the one about the strap with a metal hook that broke loose from its attach point. The hook came through the pickup's back window and killed the driver with a blow to the back of his head. Same story, but this time through the windshield, with a trailer ball, in the face! Different strap, spectator too close, strap cuts off legs. Another version except this time it's the onlooker's

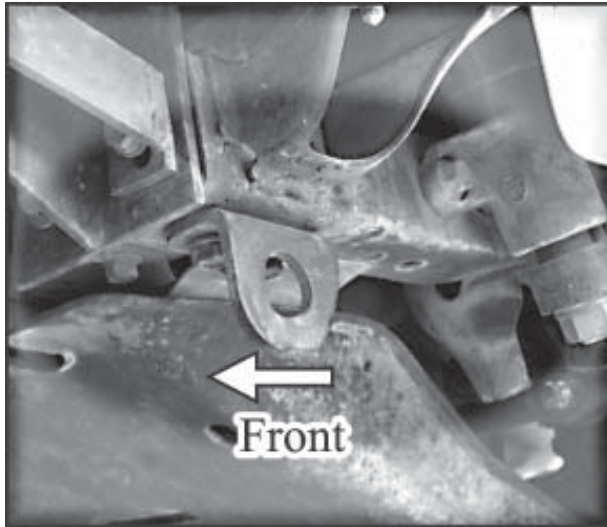


Figure 2 Toyota "D-hole" front attach plate
Photo by Harry Lewellyn

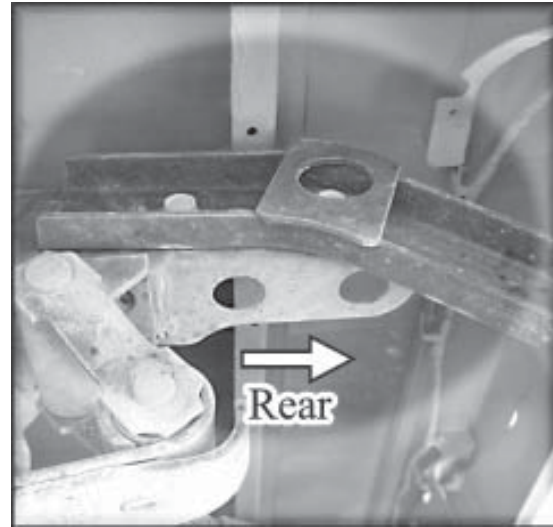


Figure 3 Toyota "D-hole" rear attach plate
Photo by Harry Lewellyn

head! Think of everything you use between two vehicles for towing or tugging as howitzer-size slingshots!

metals are crystalline structures and I should have more accurately said recrystallizes. He goes on to clarify that Department of Transportation

holes are only required on vehicles that will be carried on car carriers. He owns "Big Mama," the 4X Chevy Van that towed me up from Urique Canyon in the Copper Canyon complex (see Bury my Ford in Cerocahui, January '98). Actually, it's wife Cindy's regular transportation. Since it's a 2WD to 4WD conversion, it lacks D-holes in the front. That may be due to the 4WD mod or that it was never designed to be hauled on a car carrier. Finally, he points out that a slip hook, when attached

to a D-hole, puts the full stress on the hook. More on this later. Myrna Wosk (La Jolla, CA) noticed her Toyota had another kind of "D-hole" attach plate. See Figures 2 and 3 for two variations that I would be skeptical to use for an all-out tug. I have no idea how many different "D-holes" there are in the world and would welcome your enlightenments. These will be used to continually update Web material.

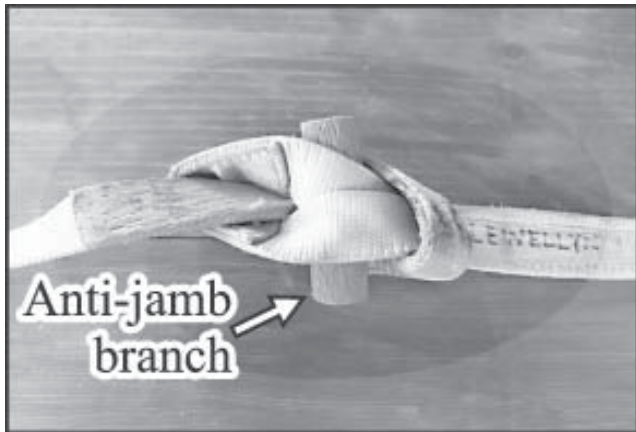


Figure 4 Anti-jamb separator (untaped)
Photo by Harry Lewellyn

Here's a true tale of what happened to my lumberjack uncle with just a ridged cable. His log-towing cable breaks, snaps forward and wraps and crushes him to the open seat of his Caterpillar. Several months in the hospital straightened out a couple of broken ribs, arm and damaged internal organs. Taut things of any sort can be deadly if they break or come loose! Don't take tugging loosely!

FEEDBACK

Fellow engineer Ken Obenski, P.E. (San Diego, CA) had several comments. I may have misled you when I said, regarding welding tow hooks to the frame, "... crystallizes and becomes very brittle — weak." He correctly points out all

points out that a slip hook, when attached

"Loop-through-loops" drew comments from Frank Harris (Ramona, CA) and Jay Center (Mission Viejo, CA). Both suggested what I'll call an "anti-jamb" separator to join two flat strap loops. See Figure 4 and understand the last step would be to tape the anti-jamb in place (not shown). It would certainly simplify untying (have tested it) and I believe (never tested it) round material like a dowel or branch will stress the straps less than, say, a sharp-cornered 2x4 or other rectangular material. My only reservation

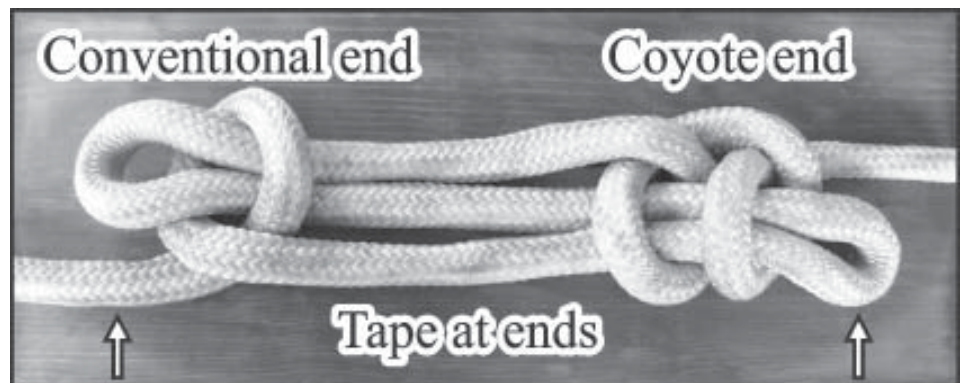


Figure 5 Conventional and Coyote sheepshanks for shortening rope
Photo by Harry Lewellyn



Figure 6 A class III towing insert
Photo by Harry Lewellyn

with this, as they both pointed out, is you've added a "cannonball" to the circuit.

Frank adds that a sheepshank is a nautical way to shorten a rope. Note I've shown the conventional knot (left end) and the Coyote version (right end) in Figure 5. My past experience with a trucker's knot (a half sheepshank of a sort) has shown the double loop (half hitch) approach withstands more stress. And with a little tape at the ends (not shown), you'll ensure either approach stays tied with and without stress.

Blaine Johnson (Dana Point, CA) suspects the class III trailer receiver pin through yanker loop may bend the pin (last issue, Figure 7). I've broken pinned yellow yankers and the pin remained straight, but have never tested round towlines. They would definitely centralize the force on the pin and could bend it. His comment brought to mind another towing and tugging class III insert. See Figure 6.

TOWING AND TUGGING DEFINED

My crawl, then walk and finally run approach definitely applies to tugging. Don't be a jerk and go for the gold on the first tug. The balance of this article assumes you have the two vehicles properly attached to each other, both vehicles' paths are clear and the stuck vehicle is safe to move. Above all, make sure the brakes and steering work on both vehicles, and both drivers have calmed down from whatever caused the problem.

Towing is simply the process of taking the slack out of the yanker, applying power and hoping your *compadre* follows

closely behind. With a disabled 4WD, this would almost certainly be the case. But, if the other turkey is stuck, he may be more stubborn.

CRAWL

Still within my definition of towing (pulling with no slack in the towline) is to apply horsepower until the tires spin. Depending on the traction, you may produce considerable force, but don't depend on it. Don't be surprised if the tires spin earlier and easier than you ever imagined! With proper attachment and the equipment in top condition, "crawling" danger is minimal. We've only begun to crawl.

WALK

When you put slack in the yanker and try to snatch 'em out, you've entered the realm of tugging. Tugging begins with the process of introducing slack in the towline and driving off like a trip to the market, neglecting your partner is attached. Even with proper attachment and shiny new equipment, danger now enters the scene. You've just begun to walk.

CAUTIOUSLY! RUN!

Once you introduce 10 or more feet of slack (arbitrary Coyote number) in the line and drive off like your worst nightmare is on your tail, you've entered the realm of running. This is very dangerous regardless of equipment, conditions or experience!

A running tug, yank, snatch, jerk or whatever you choose to call it is dangerous! Tugging is unforgiving! It demands attention to safety and detail! It produces unimaginable force on every element in the circuit! One neglected element blows the fuse! It makes about as much sense to ignore any tug detail as it does to moor the Queen Mary on a shoestring!

PRELIMINARIES

As covered in TOWING BASICS: Inspect your equipment, attach only and directly to the frame, slide yank protectors into place, mouse the hooks and attach-chains, don't use yokes and take these additional precautions. Don't take shortcuts, but first, two simple basics!

TWO BASICS

Here are two simple basics that will most likely be neglected until you really need them. Try very hard to get unstuck going straight and downhill. Turning offers rolling (more stuck) resistance. Next

time you're struggling along in the soft stuff, throw in a little turn. Don't be surprised if you slow down or get stuck. Straight is easier than curved, but don't drive off a cliff trying to stay straight!

Being the creatures we are, if we get stuck headed uphill, we'll most assuredly try to get unstuck in the same direction – uphill! Put Mother Nature to work for you, not against you. Real numbers: It is about 40% easier to get unstuck going down a measly 10° grade than it is to try up the same slope! I've seen situations where it's hard to tell which way is up on a 10° grade, but remember, Mr. Trapped could come coasting down into Mr. Jerk!

PARACHUTE THE TOW/TUG LINE

Install what I call a parachute. This is a blanket, sleeping bag or other large "cloth" that will act as an airbrake if the yanker breaks. I've seen people use jackets, sweaters and floor mats, but I question these little things. You drape the 'chute at the middle of the extended yanker (Figure 7).

I have no data to validate this tradition, but for now, I see no reason to change it. The thought is that if the yanker breaks, the blanket and yanker will lock together and drag the lethal monster to a speedy, harmless halt. Some of the times when I've broken yankers, they have jumped out from under the blanket, or broke beyond it, and still sped along their merry way. But until I perform definitive tests, I practice and recommend you use a parachute.

RAISE THE HOOD

Another recommended safety practice is to raise the hood on the vehicle that has the line attached to the front. This is most likely the 4X being towed, but who's to say the tugger isn't pulling backwards. And let there be no doubt, once force is applied, danger is present at both ends. The raised hood acts like a shield to keep a breaking line out of that driver's face. Use a parachute and raise your hood, but avoid the foolish alternative that follows.

FOOLISHNESS

I've heard you can fill one-gallon plastic containers with water, thread the handles along the yanker and presume this will slow down the splintered strap. I haven't tested it, but I don't believe it! If you're truly talking about forces in excess of 20,000 pounds, I see plastic water bottles as either lethal cannonballs or stationary, handle-less containers at

best. I believe it would be the latter. If a handle will support 20,000 force-pounds, shouldn't it be able to support 20,000 pounds of weight? Can you picture lifting two or three 4Xs from one plastic handle? I can't! Forget the plastic bottle farce!

CHAIN HOOK CAUTION

Your chain may be similar to the Coyote Chain I sell (see a newsletter). It uses transportation-quality chain and hooks, but it is not intended for an all-out yank. I suspect the hooks won't take

off to the side, visible and within earshot of both drivers. Both drivers should have their director's-side window down to ensure verbal communication.

DEFINE THE DANGER ZONE

Define the danger zone for all to avoid. This applies to participants, spectators, pets, other vehicles and anything of value. My method is an overkill but, understand clearly, yanker break-forces are potentially lethal. I won't argue whether the yanker could do damage in every square inch of the danger zone, I'll only say it's definitely safer outside vs. inside this area.

Here's how to define the danger area. Mentally disconnect the yanker from one end, hold it taut and walk around the tethered end/4X. Do the same for the opposite end. This will draw out

something like a figure eight. This is the danger zone. Only drivers and, when absolutely necessary, the director should be within this zone. See Figure 1 on page 10. Dark is most dangerous and if I could have made it red, I would have!

AVOID THE TOWLINE

Another general rule is to avoid the towline even during setup. That means don't walk on it, over it and definitely don't straddle it. The assumption is that it could go taut at any time. The testosterone gender is naturally sensitive to and acutely aware of the dangers of straddling anything that could snap up between your legs!

HOW TO TUG

So a push by hand didn't work and a tow just smoked the tires. The yanker is safely attached and parachuted, the onlookers are outside the danger zone and the director is in place. One at a time, he calls to the front, then rear drivers, "Are you ready?" When both acknowledge, "Yes," the process begins.

First, give traction another try. Take out all of the slack and try a gentle pull. It's fair to give it a couple of goes, but you don't need to bury yourself trying. If crawl doesn't work, try walk.

Put a couple of feet of slack in the yanker and drive off like no one was attached. If slight progress is gained, do it again. It's completely OK to recover Mr. Stuck a foot or two at a time. It doesn't always have to be a one-shot deal. With no success, cautiously, **very cautiously**, try run.

Run gets progressively more dangerous. In essence, your 4X and movement add momentum to a traction-only tow. More slack and speed mean more momentum. The tug energy builds with the **square** of the speed. This means **20 MPH** is **sixteen times** more powerful than **5 MPH!** High-speed yanks introduce severe death and destruction potential. The yanker is like the energy stored in a giant rubber band. You can think of it roughly like smashing directly into Mr. Stuck at whatever speed you reach. Your airbags go off at a 12 MPH impact! Thank you, Ken Obenski, for the concept and data.

YOKES AND SLINGS

I once ran across a hard-core jeeeper that had a chain tightly bolted parallel to, and from one end to the other on his bumper. I asked about its use. He was a chain and cable guy and thought he gained getting-unstuck advantage by being able to hook onto the chain at any left to right point. I tried to explain to the Chainman the yoke force he had created to no avail. What follows puts numbers on this destructive monster. The science and information is not new to those who use slings in lifting and rigging.

Figure 6 shows four typical yoke arrangements and the associated forces. I chose things you're likely to use for yokes like a yanker (A), tree saver (B) or Coyote chain (C). I assumed you have one hook at each end of the front frame rails. That measures 28 inches apart on my Explorer. I further assumed the vehicle to be a 4,000-pound load, as would easily be the case with bad mud.



Figure 7 Parachute employed on tow-/tugline Photo by Harry Lewellyn

it! The stuck Suburban story that follows bears witness to the forces involved. Next time you pass by a Suburban, inspect the size of the front tow hooks. By the time the stuck Chevy was moving on its own, the hooks were considerably straighter!

ASSIGN A DIRECTOR

You primarily need a traffic cop, a director, *un jefe*, in addition to two rational, competent drivers. This is someone who will clear the onlookers, check the connections and ensure both tuggee and tugger are alert and ready for action. He gives the go-ahead, narrates the continuing process and is prepared to immediately shut down the whole shebang if something goes awry. He should be safely

As the attach-point angle gets greater and greater, or the legs get shorter and shorter, note what happens to the strain on each leg. I particularly call your attention to the strain on the Chainman's setup (D). Understand the force monster can sneak up on you, so in industrial applications, OSHA and other safety agencies require slings be significantly derated. Further, for ease of presentation, the drawings are not exactly to scale.

YOKE RECOMMENDATION

Keep the legs long and the attach angle tight. Assuming you have an undamaged standard 30-foot yanker, and the attach points are at about frame width, you're OK. As you widen the attach points or shorten the legs, the forces increase as you can see in Figure 8.

Where does all of this extra force go? It goes into pulling the two frame rail attach points together toward the center of the 4X. Keep it safe by only using yokes for towing and never in serious, all-out tugs.

CHANGE SOMETHING

If two or three serious, all-out yanks don't work, I recommend you change something. Experience speaks.

A Suburban, San Felipe Sand Blast tour participant is buried in the frame in Baja mud. His massive weight had stuck him good! A full-size pickup's full-speed tug didn't work (plan A). We put two 30-foot straps in series only to break one strap (plan B). The nylon strap (only) went through the grille and seriously into the air conditioning/radiator. We paralleled two trucks and proceed to yank (plan C). Still no success! We switched to plan D. We jacked it up and put stuff under the tires. Three dirty hours later, the damaged Suburban was out.

The essence of the message is that yankers are great recovery tools, but not always the final solution. Don't kill yourself and others trying to perform the impossible!

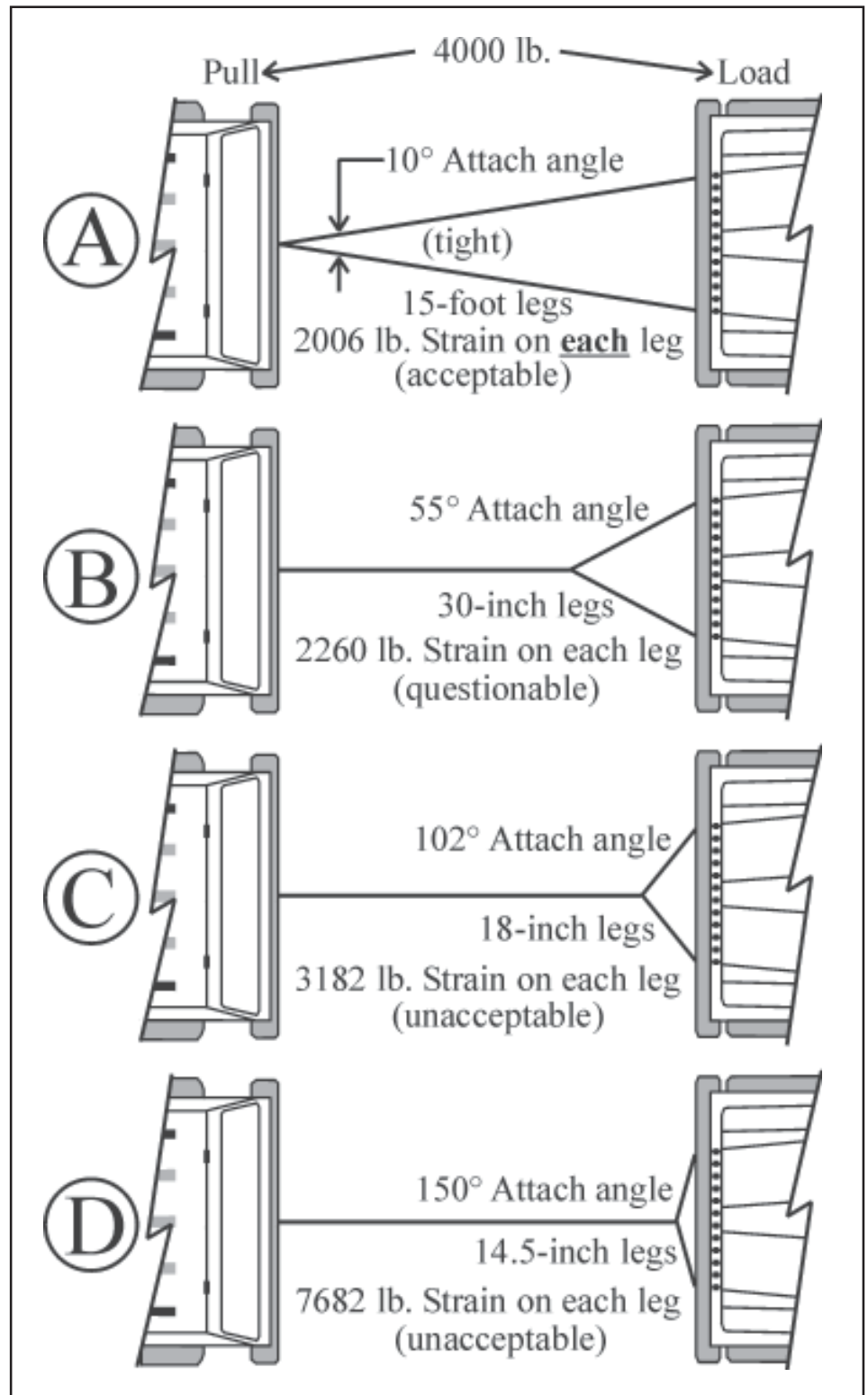


Figure 8 The yoke monster becomes inconceivably large as the attach legs get short and the angle becomes broad!
Photo by Harry Lewellyn

