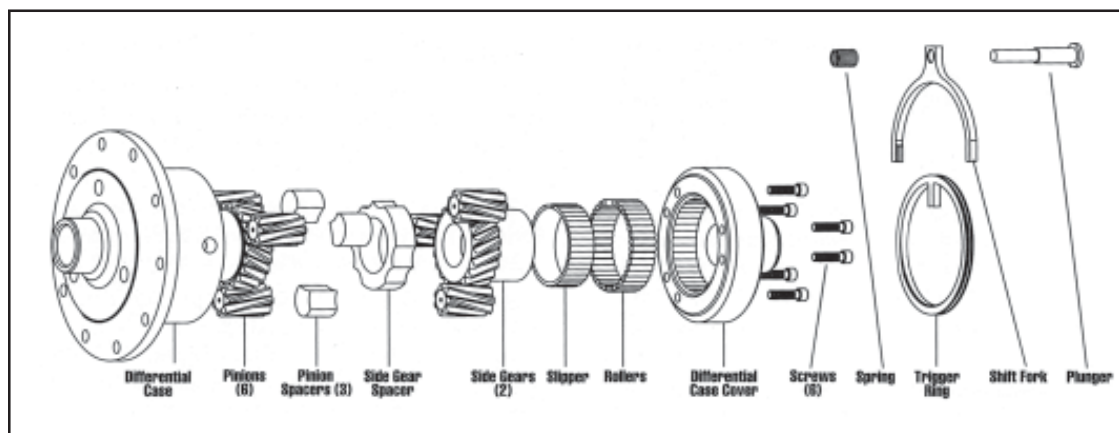


## FOURWHEELING ACADEMY

# NEW TRACTECH LOCKER



**Figure 1** An inside look at ElecTrac. Note the pinion gears vs. conventional spider gears.

By Harry Lewellyn

It's beyond obvious: Off highway traction is important. And your differentials are the key, neglecting tires, and driver skill and knowledge. Regarding traction, stock open diffs suffer immeasurably, conventional limited slips help very little and lockers are the ultimate. The new Detroit ElecTrac® by Tractech Inc. is of the latter variety, plus!

Tractech started as the Thornton Tandem Company in the 1930s. It first built tandem drive axles with belts, then with gears, all for big rigs. To increase traction it developed the No-Spin. The No-Spin is a Detroit Locker® without a case. No-Spin fits into a factory case whether it's a Caterpillar Tractor or a 14-bolt GM truck. Tractech still uses the term No-Spin for units without a case and Detroit Locker® for units with a case. The bulletproof Detroit Locker® is preferred by most hard-core folks. This long history puts Tractech at the top of the differential experience list. Here's what ElecTrac is, how it works, the pros and cons, and what's available.

## ELECTRAC

The ElecTrac is both a powerful limited slip and true, 100%, choice locker. See the Bonus Issue 2002-2003 newsletter or *SHIFTING into 4WD* for my definition of a "choice" locker. The limited slip is a version of Tractech's own Detroit Truetrac®, and this one deserves special mention.

## HOW TRUETRAC WORKS

The big plus for Truetrac is that it does not use clutches, as do conventional limited slips. Oversimplified, it uses a very sophisticated variation of the "rack and pinion" (gear) principle. This is the same technology that keeps rack and pinion steering from feeding tire jar back to the steering wheel. The Hummer thinks this principle is so great that it has three Torsens (torque sensing): One at each end and a lockable one in the transfer case. In essence, the pinion can move the rack, but the rack can't turn the pinion. Exactly why this happens is beyond the scope of this article. In the case of Truetrac, the

"rack" is a normal cylindrical gear and not a flat rack (gear) like used for steering.

## HOW THE LOCKER WORKS

The locker (option) is activated by an electric motor, not just a simple solenoid. The disadvantage of most solenoid designs is that when activated, they continue to use power until turned off.

ElecTrac's motor moves a shift fork to activate or deactivate the locker, then quits spinning, awaiting another command from the driver.

Figure 1 is a blowup of the entire mechanism. At first glance, you can see the difference between an ElecTrac and a conventional diff. Conventional diffs do not have what I call worm gears. Tractech calls them pinions.

See ET/p3

## In this Issue

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# Backcountry Adventures, So Cal



By Harry Lewellyn

Several of you reported there is an impressive new backcountry book to check out. That is great tip!

Bigger and fatter than I ever believed would be appealing for 4X use, Peter Massey and Jeanne Wilson have put together the best backcountry guidebook I have ever seen! *BACKCOUNTRY ADVENTURES, SOUTHERN CALIFORNIA*, (part of a series) is so complete it has no equal. At about 8½" x 11" and 635 pages, how can it be anything but complete!

"Before You Go," as the authors call the first section (they do not use chapter numbers), talks about using the book, why and how to use 4WD, equipment to carry and ends with a distance chart for southern California. What's of special interest to me is they not only classify how hard a trail is or isn't

(Difficulty Rating), but also give it *Scenic* and *Remoteness Ratings*, all defined in "Before You Go."

Section two, "Along the Trail," provides people, places, history, flora, fauna and geological information. It's exactly my kind of reading: Brief little bites, with interesting details, but not so much that it eats into your travel time and trail attractions.

The next three sections divide the trips into three regions: "Central Mountains," "South Coast" and "Desert." 153 trails, about 50 per region, keep you on the move from the Monterey Peninsula to the Mexican border.

A two-page overview map at the start of each trip section provides a big picture trail location reference, with a mini page number and trail name index on the left. With this, you can zero right in on nearby trails.

Each trail opens with a *Summary*, including: Starting Point; Finishing Point; Total Mileage; Unpaved Mileage; Driving Time; Elevation Range; Usually Open; Best Time to Travel; Difficulty Rating; Scenic Rating; Remoteness Rating. It then elaborates on *Special Attractions*, *History*, *Description*, *Current Road Information* (source) and *Map References*. The lengthy, detailed *Route Directions*, with GPS readings for start to finish and all critical intersections, tell me each trail was well researched and prerun. By using blue ink beneath the black, you have trail directions in the reverse direction. They also solved my map orientation dilemma for my "where

# From the Coyote

This is the first issue of the new newsletter format. Punch for binding in a 3-ring binder and look for an index at the end of each year.

More product data and past articles are available on the Web ([www.eco4wd.com](http://www.eco4wd.com)).

A s most of you know, I worked as a park volunteer in the Anza-Borrego Desert State Park for some time, and as a result, I will offer the Discovering 4WD hands-on seminar through the Anza-Borrego Desert Natural History Association (ABDNHA) on March 2, 2003. Call (760) 767-3052 to sign up. Participation entitles attendees to a \$25 discount on the Borrego Boondoggle on March 21 to 23, 2003.

I will also offer a Hot Springs Mountain skills class through Rancho Santiago College [(714) 480-7390] on June 21 and 22, 2003.



to" book by orienting the maps both vertically and horizontally, sometimes across two pages. You get the biggest map possible for each trail. Once you catch onto the color-coded info, it's a breeze to use. Pictures along the way bring it all to life before you leave home. Great book! The "Professor of Offroad" gives it an A+!

As with most products of special value, I will offer this book for sale for the next 60 days. See page 10 to order.



Managing Editor: Harry Lewellyn  
Copy Editor: Bill Kane  
Composition: Jenna Kane

ECO4WD is committed to passive appreciation of Mother Nature and ecological backcountry travel on unpaved roads.

The ECO4WD newsletter is published every other month. Subscriptions are \$14 for six issues. January through September features the Coyote's technical articles. The 40-page November-December *Bonus Issue* is the only issue that contains advertising. Contact ECO4WD for advertising rates or to receive a free *Bonus Issue*. Bulk copies are also available. For *Newsletter Reprints* on selected topics and back issue orders, see page 10. Back issues are \$3.00 each.

We encourage the submission of articles and photographs for publication and reserve the right to edit them. Submissions are only returned when accompanied by a stamped, self-addressed envelope.

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ET, from page 1

The trigger activates something that I first learned about on a 1960 Volvo. It had an "overrunning" clutch in place of a conventional Bendix spring in the starter. See Figure 2 or [www.tpub.com/basae/36.htm](http://www.tpub.com/basae/36.htm) for a close look at this concept. However, note the second reference is unidirectional vs. the Electrac being bi-directional. That means when locked, Electrac works going either forward or backward, just as it should.

An overrunning clutch is something that looks more or less like a roller bearing, only in this case, the rollers are either loose or they lock the inner and outer "races" together. Very careful inspection of Figure 2 will reveal the jamming effect of the rollers at X. It's not important to understand the concept perfectly other than to know it is very reliable. It's like having a bearing that never turns loaded. Keep it oiled and it will last forever.

## ELECTRAC CONS

I'll address the cons first, since they number one and a half. The actuator mechanism is relatively exposed. I've punched a hole in an Explorer rear plastic diff inspection plate, on the Rubicon Trail, so beware of backing up in rough rocks. It was immediately replaced.

Scott Frary, Aftermarket Sales Manager for Tractech and an avid 4-wheeler, says the unit comes with a light- to medium-duty guard, but advises he easily modified his for heavy duty protection.

The "half" con may be a little subjective. Limited slips, and particularly lockers, tend to always want to push you straight – lessen your ability to turn sharply. I've had a Truetrac in the front of a Cherokee and it would "push" a bit in tight turns. Actually, that just proves how good that design is.

Jason Bunch of Tri-County Gear tested Electrac prototypes and experienced the push. On the other hand, he also said he was amazed to have done one of Johnson Valley's infamous Hammers and never had to activate the locker feature. And, understanding he competes in the Rock Crawling Championships, that's saying something!

## ELECTRAC PROS

The pros number many and I divide them into financial, functional and reli-

ability. For this article, I'll compare the Electrac to an ARB, but don't get me wrong, for I dearly love my ARBs.

## FINANCIAL PROS

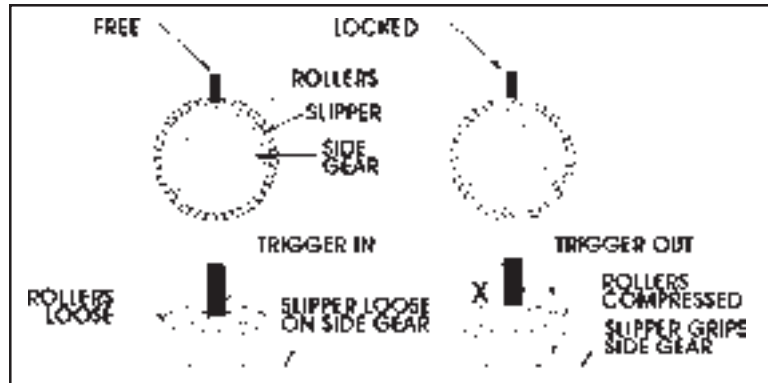
At about \$795, Electrac is pretty close to an ARB for parts only. The financial pros come with installation costs, not parts

freeze and block the line. This leaves an ARB in its last state, locked or open.

Further, the plastic lines could freeze and break with wheel travel. I have personally broken a frozen plastic compressor hose. Depending on where it breaks, this typically leaves an ARB open. Regarding the Electrac, functioning or broken,

per above, open or locked is still your choice.

I know lots of ARB owners and, like me, they love 'em, but ... Over time, most eventually have a problem of one sort or another. This adds to cost of ownership. In contrast, the Electrac is designed for the lifetime of the vehicle. Tractech is so confident Electrac will last "forever," it is not rebuildable, short of axle bearings.



**Figure 2** *Electrac activates the locker based on a reliable design. Triggered, the rollers cause the slipper to grip the side gear.*

cost. It's easier to plumb power and control wires (only) vs. air hoses, with power and control wires.

The Electrac control panel is located where you choose, the control wires go to the actuator, the power wire goes to either a fuse block or the battery, and you're done. For an ARB, you have to consider where to locate the air pump, then wire and plumb that in addition to the control panel and connecting to the diff. If you don't set it up yourself, the air pump adds to installation costs.

ARB cost of ownership is another consideration. See reliability below.

## FUNCTIONAL PROS

Functionally, when an ARB fails to activate, you're stuck with an open diff and associated limitations. When an Electrac fails to activate, it stays in the last selected mode (limited slip or locked). If you knock off or remove the activator, it goes into locked, but Tractech still gives you a choice. Electrac comes with an override (safety) plunger. You simply remove the electric actuator, shove the safety plunger and spring into the actuator hole, and you're now open. I'd choose open at the end of the trail for the paved trip home.

## RELIABILITY PROS

Since I live in southern California, I have never experienced these extreme cold weather considerations, but will pass them along on the good faith that they can happen. Moisture in the air lines may

## WHAT'S AVAILABLE

To summarize, if you own a Jeep product, you're first in line. Ford and Hummer products are soon to follow, with final intentions to support all that the market will bear.

This is gear-head talk, so bear with it. The Dana 44 is currently available, with the Dana 60 not far behind (~Feb. 2003). The AMC 20, Dana 50 and Ford 8.8 inch are scheduled for May 2003 and the Dana 30 and 35 will follow in July 2003.

## SUMMARY

As you know, I usually want to have personally dissected and tested something before I recommend it. In this case, I know from where the design comes, so I have faith in that and the experience of others. I am also curious to hear your feedback as you try Electrac. I'm even more excited to try one for myself.

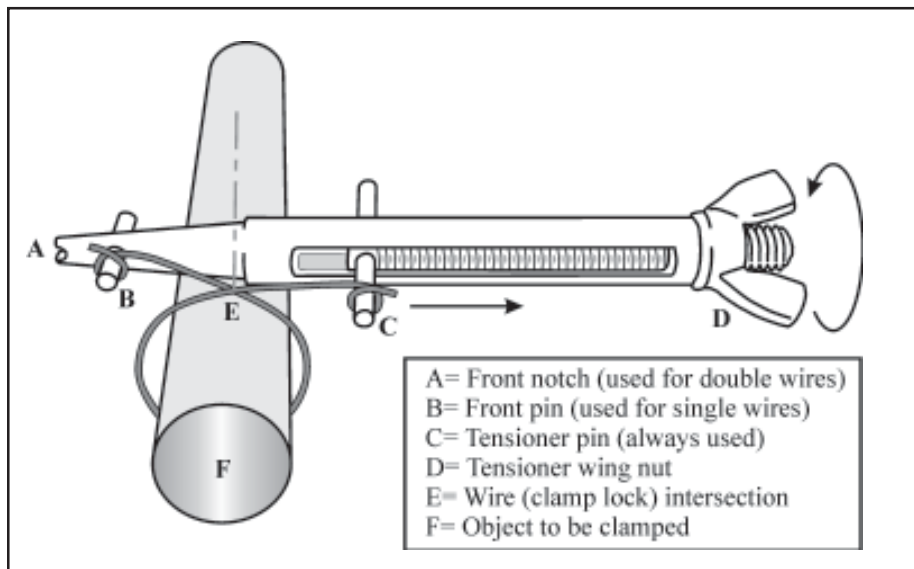
Go to [www.tractech.com/WhatsNew.htm](http://www.tractech.com/WhatsNew.htm) to see what the guys that make it have to say about the Detroit Electrac®. Also, as an aside to the last two articles on differentials (Sept.-Oct. and the Bonus Issue), go to [www.tractech.com/Products.htm](http://www.tractech.com/Products.htm) (second paragraph) to see what the diff pros say about open diffs and how they work.





# FOURWHEELING ACADEMY

## ClampTite™



**Figure 1** The ClampTite™ tool ready to create a very effective clamp.

Photos and text by Harry Lewellyn

At about the size of a kindergartener's pencil, it should be in everyone's toolbox. It may be just what it takes to getchaback! Figure anything you can do with a hose clamp, you can do better with the ClampTite™ tool. My tests proved that it exceeds conventional hose clamps for tightness and holding power.

### HOW IT WORKS

The concept is simple: ClampTite™ gives you a way to tighten wire wrapped around anything, then securely lock the "clamp" in place. Figure 1 details the tool ready to tighten. A basic single wire, single wrap is shown; however, the wire-to-tool attachment method at B and C has been simplified for sake of illustration.

Once the wire (E) is wrapped around the object to be clamped (F) and attached to the tool at B and C, the tensioner wing nut (D) takes over. Can you see that as you tighten (turn clockwise) D, it spreads B and C farther and farther apart? When you've reached the desired tension, you give the entire tool a coun-

terclockwise baton-like twirl (direction varies depending on which wire crosses over which) about the centerline locking the clamp tightly in place. To make stronger clamps, the tool is designed to work equally well for multiple wraps of both single and double wires (see below). You just think you don't need a ClampTite™ until you break an air conditioning hose, flexible brake line or power steering hose as I did.

### WAR STORY



This was six years prior to ClampTite™ being issued a U. S. patent in 1992. My two-year-old Cherokee's power steering hose gave up way out in the boonies. Now powered by arm strong, I struggled to get back to our high Sierra fishing camp. Since the power steering pump relief valve opens at 1,540 PSI, I knew my creativity would be challenged. This valve cuts in, and is the noise you hear, when you make a full locked turn or a wheel is jammed against an obstacle.

Over the next few days, I tried various conventional clamps. One pass-erby traded his "super" clamps for my lesser-quality ones. Every conventional clamp, including his, broke under this very high-pressure strain. And despite my having the perfect barbed brass splice, nothing held!

Knowing I could most likely concentrate and increase the unit force on the hose with wire, I proceeded to wrap and wrap. I discovered the wire held, but like a reverse Chinese finger trap, the pressure enlarged the hose's inside diameter and would slowly creep off the barbed splice. There is more on that below.

The final cure came by laying several (axial) wires over the splice and hose, then wrapping all tightly. Once wrapped, this allowed me to bend the axial wires back and lock the ends together thus preventing axial spread (see Figure 2). Maybe ClampTite™ would have held without the axial wires?

And of course by now, I was out of power steering fluid, so I used motor oil. That worked fine until I got home and replaced it and the hose. The pump and steering box continued to serve flawlessly for another 80K miles.

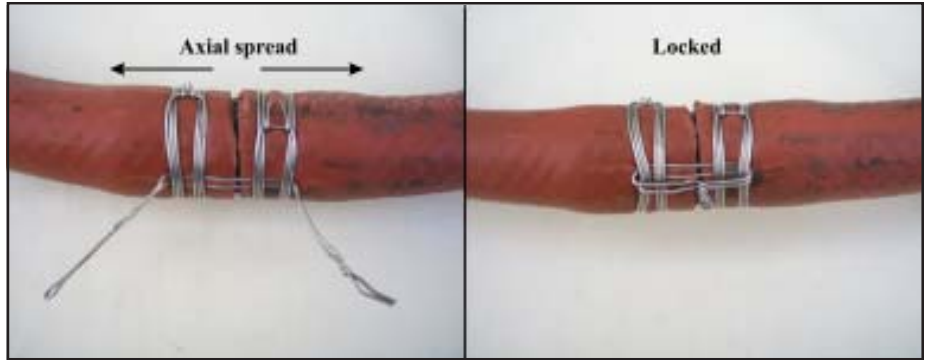
### TEST OBJECTIVE

Considering the above, I designed a test that would stress a clamp's axial holding force. For all practical (automotive) purposes, the power steering, air conditioning and flexible brake hoses are the only applications that would take full advantage of this. However, I felt this type of test would severely tax ClampTite™ and other clamps. Also, the materials and methods are all automotive, but again, the objective was to investigate the holding strength of various clamps, not exactly simulate automotive conditions, parts and failure modes.

Referring to Figure 3, I used PVC fittings and clear hose so I could see what was going on inside. The left end of the hose (A) was “plugged” as shown. A similar plug was fitted on the right (B) with a tire valve stem. With this, and my compressor and pressure regulator, I could slowly increase hose pressure. The test was quite an eye-opener!

## TEST FIXTURE

The PVC-to-plastic- hose fit was slightly loose as desired. This ensured the clamp would have to work pretty hard to prevent axial slippage.



**Figure 2** This technique prevents axial spread in high pressure hose splices.



**Figure 3** The test setup, at full pressure, on the ClampTite clamp.

You're not going to do this in a real application, but to further ensure slippage, end A's PVC outside diameter (OD) and the plastic hose's internal diameter (ID) were greased. End B's PVC was barbed with a file to prevent slippage. A conventional clamp was used at this end so I could easily remove and fill the test hose with colored water and make other adjustments. For reference, several barbed fittings are shown in Figure 4. Barbed fittings are the only thing to carry. The extreme left and right splices are worthwhile spares for your parts box. Since I do not carry spare radiator and heater hoses for all 4X that go on my trips, a variety of these little gadgets has bailed me out a couple of times.

The test setup was held vertically in place with my “clamp bench.” This kept the valve stem and core out of the water.



**Figure 4** Barbed hose fittings - the only way to go!

## SAFETY CONSIDERATION

So why water and not just air? The answer has primarily to do with safety. Compressed air stores energy and makes for potentially destructive explosions depending on volume and pressure. Fluids (water) do not compress and therefore store no energy. The less air in the system, the less explosive force (destruction) there would be when a clamp failed. Further, I could color the water and investigate for the reverse Chinese finger trap effect, if that was in fact happening.



## TEST METHOD

Various clamps were used at end A and the pressure increased until the plug started to slip out of the plastic hose. All “worm” clamps were tightened to the point where I felt they were ready to break. The strap usually fails at the worm or the worm pops out at the worm holder. I could see distortion that warned failure was near. You can't go any tighter than that. That seemed fair.

## TEST RESULTS

All conventional clamps failed to hold the hose axially. The plug would start to slip out at around 30 to 35 PSI. My nerves gave out before the double wire, double wrap



**Figure 5** Clamp indentation is a sign of holding force.

### CLAMPTITE, from page 5

ClampTite™ clamp showed any signs of slipping. As pictured in Figure 3, this clamp held until the gauge maxed out at 60 PSI (shown).

## SURPRISE RESULTS

Notice the water level beneath the bench table on the right. Knowing fluids do not compress, and since I started with the hose completely full of water, what explains the air on this side?

The plastic hose changed far more than I would have ever guessed. It went from oval to perfectly round and it stretched in diameter. These changes made for a larger internal volume and hence, the water level change.

## TEST OBSERVATIONS

Compare the depth of each clamp's indentation (X vs. Y in Figure 5). The conventional clamp has a larger surface area over which to spread the tightening force and does not deform the hose as much as ClampTite's wires. The wires concentrate the force over less surface area and I suspect clamp tighter. I had no way to measure this. I can only guess that ClampTite™ forced the grease away for the hose-PVC-interface and allowed the plug to hold. The conventional clamp must have left enough grease in this area to permit slippage.

Also notice how the hose at X has increased in diameter enough to allow water to separate (slip in between) the

hose and PVC. This is the reverse Chinese finger trap action that I suspected. In essence, this action is enlarging the ID and trying to force the plug out of the hose from the inside. That's a slick way to escape the finger trap, but lousy thing to have happen when you're trying to fix a high-pressure hose.

As an aside, the ClampTite™ manufacturer reports that one 6,300-PSI test caused hose failure before the ClampTite™ clamp gave out. I'm impressed!

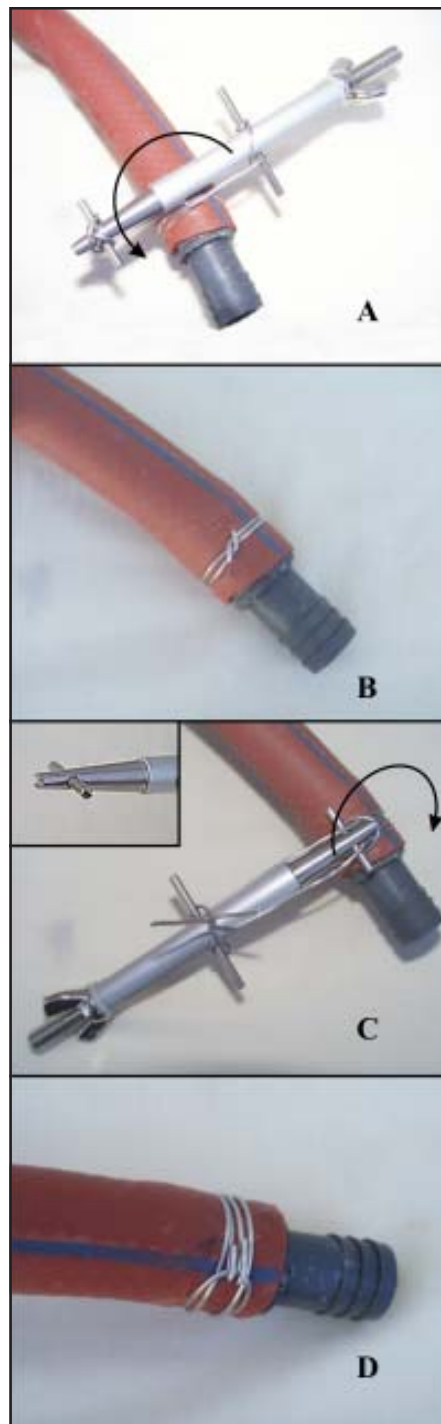
## USE DETAILS

As already mentioned, ClampTite™ can make a single or double wire clamp. Figure 6 A shows a single wire, wrapped two times, and twisted to lock. Figure 6 B shows the clipped lock. A double wire, two-wrap clamp is illustrated in C, prior to flip and lock. Note the locking action in this case is a "rear over front" flip of the tool. The inset is a closer look at the notch. B and D show it doesn't take much to securely lock either one or two wire, multiple wrap clamps.

The manufacturer's one-page instructions show how to make single or double wire, single or multiple wrap clamps, and lock them. I won't go into that.

## FALLOUT

In the process of making so many connections, I decided to leave one barbed splice on my getchaback box spare heater hose. There is about a



**Figure 6** Various ClampTite methods.

100% chance that will be required when used in the field, so why not start with it attached? Consider the same for your spare hoses.

## DOWNSIDE

The drawbacks are few. Understanding you have to either flip or twist



the tool to lock the wire, some engine compartment applications may be space limited. However, I suspect swapping a flip lock for a twist lock, or vice-versa, may overcome this potential limitation.



The other one has to do with clamp longevity. The wire can be tightened to the point of cutting into the hose. This can be overcome two ways. Obviously, don't over tighten the clamp and, replace it when you get back to civilization. Given enough time, even a moderately over tightened clamp could eventually cut into the hose and fail.

## APPLICATIONS

Let your imagination run wild. All kinds of hose fixes are obvious. ClampTite™ can also be used to repair a broken broom or shovel handle, innumerable camping items and many things around the house. I can also picture using it as a temporary gluing clamp.

Ever tried to splice a 2-0 cable in



Figure 7 A ClampTite wire splice.

the field without a giant crimp tool or soldering iron? Here's a ClampTite™ application that should make short work of a broken starter cable. Shove the strands together and clamp it in several spots. This acts like a giant wire crimp splice as shown in Figure 7. It ain't pretty, but functions perfectly. And rather than spend half a roll of tape insulating it, temporarily slide a piece of hose over the wire before splicing, then tape at both ends.

Haig, of Haig's Automotive (see page 33 of the Bonus newsletter) offers another idea. Between flattened soda cans, and copious imagination and wire you can probably fix mufflers and exhaust system problems of all sorts. It's almost like having an on-board welder.

Regarding wire for the ClampTite™, there is no magic. Any wire will do, even clothes hangers, but consider stainless steel for permanent applications. I suspect however, if the wire is too much larger than the front notch, it may spread or break it. Large wire would stress the very tips of the notch.

## CONCLUSION

ClampTite™ works as advertised and I suspect with time, I'll discover more applications. It comes in three varieties: plated, stainless steel and large. I will offer the stainless steel unit for sale for the next 60 days. Here's where you can spend some of that Christmas money you've been wondering what to do with. See page 10 to order.



# Four-Wheeler's Bible

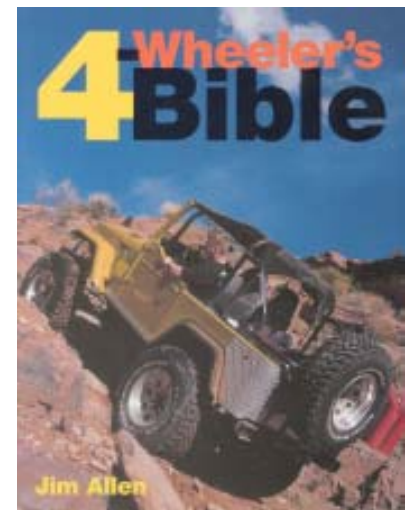
By Harry Lewellyn

Slick usually turns me off. It typically reeks of marketing and lacks facts. Jim Allen's new *Four-Wheeler's Bible* is a remarkable exception.

Jim has a way with words that even keeps me interested, and I hate to read. Couple that with years of hands-on experience from working as a mechanic to being one of the chosen few to conduct Land Rover 4WD driving schools to his humility and willingness to learn from others, regardless of experience, and you have the most significant single contribution to four-wheeling that I have yet to see. His ability to gently let you know a limited slip is of less value than an all out locker is in stark contrast to my rape and pillage methods to communicate the

same fact. I see his book surfacing around many campfires to answer question as to how to drive or settle arguments regarding differing opinions. And differ we do on a couple of things, like how a differential works, but all in all, I learned enough to feel my reading time was well spent.

His 8" x 10½" full-color, 223-page, glossy, full-color book is published by MBI (Motorbooks International) Publishing Co., which has a full selection of manuals for GM, Ford and Chrysler. The *Four-Wheeler's Bible* radiates with professional publishing qualities. Copious photos and illustrations make understanding difficult concepts easy. Colorful layout keeps you interested. Jim's



smooth style slides you through nine chapters without a blink.

The *Four-Wheeler's Bible*, by Jim Allen, ISBN 0-7603-1056-4 may be purchased on the Web from [www.Motorbooks.com](http://www.Motorbooks.com) and many retailers for \$29.95. Try it, you'll love it!



# 2003 Coming Events

EVENT	DATE	REMARKS (See Bonus Issue N/L /p# for more info)
Death Valley I (H)	January 24 to 27	4WD mini-vacation from Furnace Creek Ranch /p23
Pinyon Mountain (C)	February 8 to 9	Anza-Borrego, CA camping roughie—skills trip /p23
Truckhaven (C)	February 22 to 23	Anza-Borrego, CA camping roughie—skills trip /p24
ABDNHA 4WD class	March 2	Discovering 4WD class in Borrego Springs
Baja Whales & Rock Art (H)	March 7 to 13	Great intro to Baja, Mexico—open to all vehicles! /p25
Borrego Boondoggle (H)	March 21 to 23	Three good days of CA badlands adventures /p25
Lucerne Sand Session (C)	April 5 to 6	Sand dune driving practice in CA high desert /p26
Mojave Expedition	April 12 (Sat.)	Explore mountains and valleys of the Western Mojave /p26
Bonus Trip with Roger Vargo	April 13 (Sun.)	TBA: Ridgecrest/Mojave/Jawbone area /p26
Copper Canyon (H)	April 18 to 29	A driving vacation through Mexico's backcountry /p27
Moose Anderson Days	April 26 to 27	Clean-up and fun at BLM Jawbone Station, CA (see p 34)
San Felipe Sand Blast (H)	May 16 to 19	Sand driving and local excursions /p27
Piute Passage (C)	June 7 to 8	Historic California tour /p28
Arrowhead Brunch	June 8	Easy back way into CA's San Bernardino mountains /p28
Land of Volcanoes (C/H)	June 21 to 23	Geologic California tour /p29
Hot Spring Mountain (C)	June 28 to 29	<b>Resurrected!</b> 2 skills-improving days at Los Coyotes /p29
Fat Hill Fandango (H)	July 19 to 21	Historic California/Ghost town tour /p30
Rubicon Rendezvous (C)	August 14 to 17	Camping roughie in Tahoe, CA /p30
Monache Meandering (C)	August 16 to 18	Historic California tour /p31

(C) = Camping trip

(H) = Hotel-based trip



= Schedule subject to change

## Tire Deflators



Easy to use, adjustable, automatic tire deflators. Start with as little as 6 PSI pressure difference.

Four per pack. See page 10 to order

## No-Loss Valve Caps



Never loose a valve cap again! Easy to install. Holds air in the tire with or without a core!

Four per pack. See page 10 to order

## TRAIL TIP

### SHEET METAL BRAKE

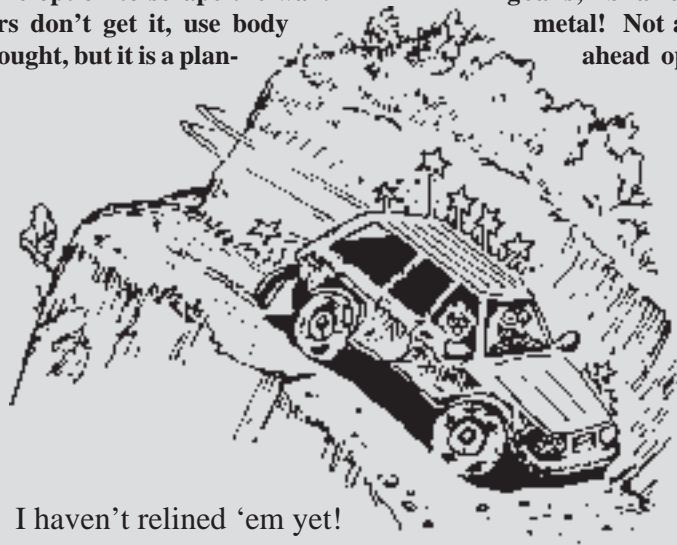
*Actually, one time on the highway, with broken brakes, I scraped the curb to a safe stop. Log this in for when all else fails. Page 125 of SHIFTING Into 4WD offers:*

I call it your *sheet metal brake*. Have I ever done it? No. Have I ever seen it done? No. Have I ever heard of it being done? No. Is it a viable alternative to death? Most assuredly, yes!

Regardless of how much you value your 4X, is it worth more than your life? If not, read on. If yes, have your head examined. You always have the option to scrape the wall.

If gears, brakes and prayers don't get it, use body metal! Not a pleasant thought, but it is a plan-

ahead option.

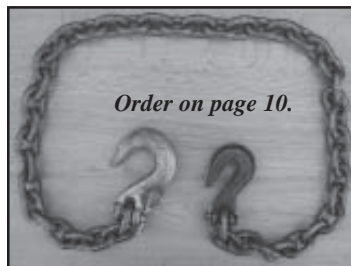


Yep! I haven't relined 'em yet!



## COYOTE CHAIN

*Your buddy is stuck.  
You are free, but you can't connect...*



Order on page 10.

### The Coyote Chain is your solution!

Attach the **slide hook** (left) directly to the 4X frame or use it as a choker to cinch up on anything, including the downed tree blocking your trail.

Loop the **grab hook** (right) back and attach to any chain link. Both clevis hooks are easily removable, leading to endless recovery and repair uses. Includes 3' of welded, transport, heavy duty 5/16" chain.

*Don't travel the backcountry without one!*

## 12V HEAVY DUTY INFLATOR TRUCKAIR



½ Fan-cooled motor runs nonstop for 8 hours

½ Runs 200° F cooler than standard compressors

½ Extra long 13 ½' power cord

½ 47 cubic feet per hour air flow

½ Rugged carry case that stores all components

½ Made in USA; 7 year warranty!

*Order on page 10.*

**TRUCK AIR CAN'T BE  
MATCHED FOR THE  
PRICE!**

## master-pull super yanker

*This unique, 7/8 inch diameter, double braid, nylon towline is 30-feet long and has spliced eyes that all but eliminate sewn-in eye failure. The round, 28,500 lbs strong line is more knot friendly and still stretches 12.3% more than conventional flat, yellow yank straps.*

*Order rope with or without a large vinyl storage bag on page 10.*



**THE COYOTE'S  
#1 YANKER  
RECOMMENDATION!**

## SAFETY SEAL



**ULTIMATE  
TUBELESS TIRE REPAIR!**



**PERMANENT REPAIR:** Road heat vulcanizes the plug through a patented repair process. It will not flow under heat or pressure. You make the repair once and it conforms to the shape of the puncture and outlasts the tire.

**SIMPLICITY:** The first 100% self-vulcanizing rubber-fibre material, *Safety Seal* uses no messy cement. With the patented insert tool, tires can be plugged in minutes, *on the car*, with little effort.

**SAFETY SEAL** is made from the same ingredients as the tire itself. It is 21 plies of high-grade synthetic fiber completely embedded in a super-sealing vulcanizeable rubber composition. Each yarn is individually coated and then twisted into a durable plug.

*Kit comes with a durable 8" x 12" x 3" plastic case, pictorial instructions and 60 plugs.*

*Order on page 10.*

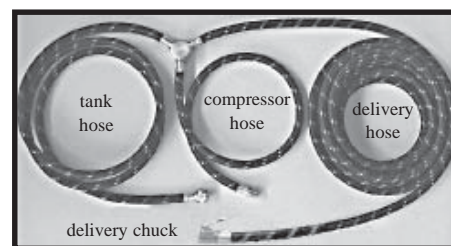
## CoyoteAIR ROBBER

**UNLIMITED AIR:** With an AR, you have air with or without a compressor.

**SIMPLE TO USE:** Connect the AR's screw-on valve stem chuck to any inflated tire. Use the custom lock chuck at the other end to air up.

**INNOVATIVE DESIGN:** Connect a compressor to the valve stem at the end of the 3-way manifold and you continuously replenish the source-tire while you fill the others.

**QUALITY CONSTRUCTION:** The AR is 22-feet long, has brass fittings, including a screw-on chuck, a valve stem and a new lock chuck. *Order on page 10.*





# NEWSLETTER REPRINTS

The ECO4WD newsletter runs the gamut! It presents places to go, driving techniques and theory, new products, the class and tour schedule, and more. Back issues (\$3.00 each) and *reprints* bring you up to speed on past matters and selected topics. Use this form to identify which reprints you want to order, then simply attach it to the order blank below. Order specific back issues by making a note on this form. *\* indicates revised format.*

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