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COMPASS

MAGAZINE

SPRING 2016



Off-Road Advocacy in Southwest Utah

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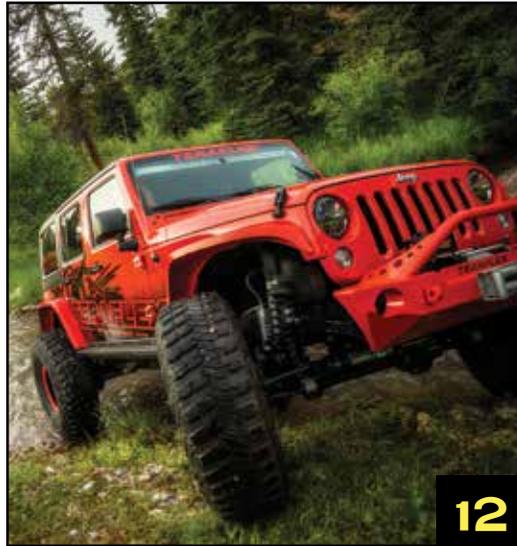
Top Photo: Monument Valley
Navajo Tribal Park, Utah.



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PRESIDENT'S MESSAGE

By Matt Westrich

Utah's Trails are America's Trails, Let's Keep Public Lands Public!

I would like to thank our good friends in Southern Utah, the Desert RATS, for putting on the Winter 4x4 Jamboree! Every year it gets better down there! It is great to get out of the weather up here in Northern Utah and spend time wheeling with our good friends in Southern Utah. All of us working together raised over 20k for public lands! Outstanding! Thank you Desert RATS for your Donation to U4WDA! If you haven't made it to this event, you are missing out, I hope you can make it next year! As well as great sponsors to support the cause! Thanks to all!

With EJS right around the corner, I hope everyone is ready! Remember to have fun and be safe. Have your first aid kits set up, tools prepped, rig checked over, meds packed, batteries charged, and away we go! We hope to see you there! We can always use help at the U4 booth!

Last but not least, the biggest land use issue in Northern Utah is that Snowbird has been trying to expand into American Fork Canyon. We are working very closely with other groups here in Utah to stop this expansion! We have been attending

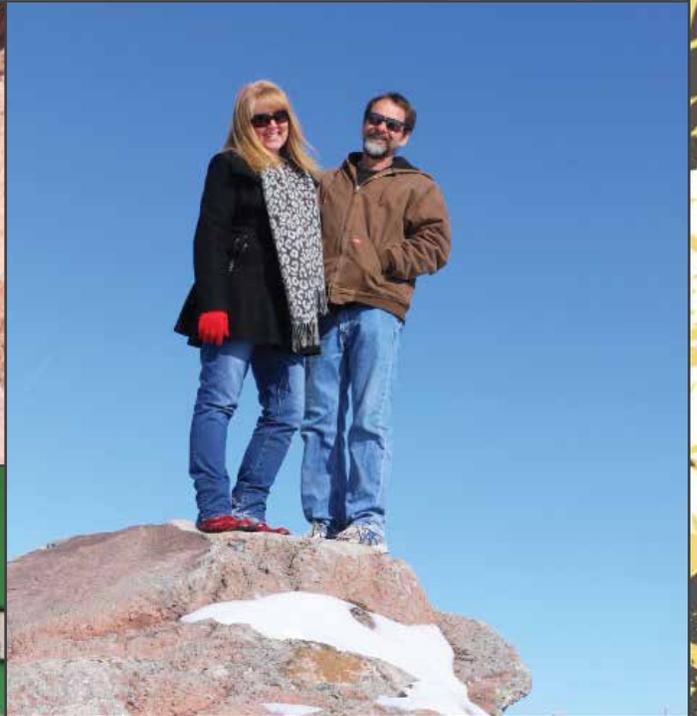
meetings in Utah County. Snowbird wants to have a lift all the way down to Tibble Fork Lake. This would cause many to lose land in the canyon, trails, camping sites, and would be a loss for all OHV users, 4x4, ATV, horseback, and snowmobiles. All these will lose out on what American Fork Canyon has to offer! We can't stand for this and we need to fight this as hard as we can! We need your support! Watch the U4 facebook page and Protect and Preserve American Fork Canyon.

After 11 years of serving as club president, Jeff Stevens is excited to turn over the reins to our new president, Melissa Fischer. Steve has been president of the Moab Friends For Wheelin' since Jeff and

other like-minded locals formed the club. Congratulations Melissa! You're going to do a wonderful job! Moab Friends For Wheelin' met with the BLM and had the chance to change one of the rules for Coyote Canyon! Now when you get a permit to run the canyon, you will no longer have to provide a list of license plate numbers of the participants prior to running the trail. The person who applies for the permit will be responsible for ensuring that only 7 rigs per day run the trail. MFFW has agreed to help perform "spot checks" to ensure that the rules are being followed. Great Change! Something new that MFFW, the Red Rock 4-Wheelers, and others in the area have been working on is to make a trail from Moab to Montrose, CO! More things to come! ■

Don't forget we have the
Old School Rock Crawl Coming up and a **new**
event this fall! Check out TheTrailHero.com and
we'll see you there!

OLD SCHOOL ROCK CRAWL





Straight Up and Full Throttle!

When it comes to rock crawling, it would be hard to find anyone more passionate about the sport than Craig Stumph. While rock crawling has its origins in military jeeps as far back as the 1940s, the sport itself didn't develop fully until the late 1990s.

Craig has been involved in rock crawling since the very beginning, when he and his wife, Lisa, started URock, a traveling rock crawling event, catering to those 4-wheel drive enthusiasts that embrace the adrenaline rush of moves that would make Spiderman cringe.

We got a chance to catch up with Craig just before the 2016 Old School Rock Crawl and talk about the sport that he helped shape.

So tell us about Urock?

Lisa and I started UROC as a traveling event for rock crawling back in 2000. We stayed mainly in the western states – Farmington, New Mexico, Vernal, St. George, and Cedar City, here in Utah. By 2003, it had grown substantially, and we felt it was time to sell. At the time, Lisa and I had a young family. I went back to racing.

How did the Old School Rock Crawl originate?

In 2006, a group of sports enthusiasts got together with Millard County and created a rock course. The group built some of the rock formations and the event site entered into existence in a rudimentary form. The county called me when the initial group broke-up and asked if I wanted to take on another project. I agreed and the county and I started re-working the venue. The county put out the money for the renovations and I just helped with the design. The sponsors and entry fees help fund the event and the county owns the park that Lisa and I rent each year for the event. The event is working because of all the awesome people in the rock

sports community. Lisa and I find it rewarding to watch everybody having fun at the event. Now that the family is raised, it's something that we can focus on together.

It's been 10 years since Old School Rock Crawl held its first event, how have the last 10 years been?

The first year, we had maybe 200 people, and this year, we're expecting over 2,000.

Is your family involved in the sport and the event?

Absolutely! Lisa does the registration and the scoring. Our sons, Dallas and Michael, are also involved in putting on the event, plus we're all into rock crawling as a sport.

Any new obstacles for the course on the horizon?

Yes, we're building a new one, but it won't be ready for this year.

How does the scoring for this event work?

The lowest score wins. We joke that golfers must have started this sport, since scoring is a lot like golf! Although that is where the similarity ends! If you hit a cone, you gain 10 points, and if you back up, you gain 1 point.

So, Craig, what's your dream ride?

That's easy. A red dot buggy. Actually, I want Kevin Carroll's buggy!

Anything else you care to share about the upcoming event?

I would invite everyone to Delta this Memorial weekend on the 27 and 28th of May. It's a great event, lots of fun, and family-friendly. ■

You Don't Know Jack!

Jacks Ride

By Jack Johnston



My first IH Scout was a 1967 model 800 with the slant 4 that used Dick Cepek farm implement tires, the first off-road tire on the market.

My second IH Scout was a 1973 Scout II with the 345 V8, and 727 Dodge automatic transmission and 3:73 gears. After rolling it and buying it back from the bank for \$600 I raced it in the Mojave 24 hour race. I had moved from 26th place in the race to 12th place when my navigator fell asleep and we were time barred (disqualified) when we got lost. This Scout II was sold for \$250 dollars.

My last IH Scout II was a 1973 \$350 scout that had a blown rear end and front U-joint, but it was cherry on the outside. I swapped out the entire 3rd member (rear end) with my old Scout and put in new front u-joints and was ready to go. The following is a list of upgrades that I did myself:

- Front disc brakes from a junkyard
- A 3" Rancho lift in front with caster and camber reset by Currie Ent.
- Transgo shift kit in the transmission (the gear you put it in stays in)
- 3" rear lift (2" re-arched main spring and 1" trussed spring shackle)

- Spring hanger skid plates at all four corners (I don't like spring over in obstacle courses)
- Double shocks at all four corners
- An old skid plate hanger that went under the engine/transmission to protect against motor mount breakage (saved me twice)
- 34 gallon skid plated gas tank
- Upholstered interior to protect from heat and noise (air conditioning still worked)
- Mallory electronic ignition
- Torsen-Gleason in rear and limited slip in front that was going to be replaced by a True Trac
- Removable hard top and soft top
- Bush bar in front that had four cow bells hanging from it (my scouts were all called Clara bell to warn people in crowded camps)
- 4 inch channel iron bumper in rear
- Class III hitch
- Bush bar in front set up with a tow bar (used three times) and dune flag connection with light
- Cibie head lamps
- Two spot lights in front and large backup light
- Crossover pipe between the dual exhausts
- Shoulder harness in front
- Access plate on rear deck to the fuel gauge
- The usual CB and whip antenna

That's all I can think of at this time. I know the set up works because of the trophies from High Desert Roundup and Pismo Sand Nationals in California.

That was the ride and this is the history. Started four wheeling in 1966 at the age of 36. A ride in a Scout 80 with my family of 5 and Bob Hughes family of 4, yes 4 adults 3 children and 2 babies, at Death Valley caused me to buy a Scout 800 in 1967. Liked exploring, rock hounding, and obstacle course racing. Got active in Land Use in 1968 when they started closing Trail Canyon to Aguerberry Point in Death Valley. I have some good stories about the Manson Family in Death Valley. I was Conservation Coordinator for CA4WDC and held many positions in The Rough Wheelers Four Wheel Drive Club out of Redondo Beach. Participated in Pismo Sand Nationals, High Desert Roundup, Johnson Valley and Randsburgh runs. I have been to Pony Express Trail, 5 Mile Pass, Coral Pink Sand Dunes, Moab, Honey Moon Trail, etc. in the 20 years I have been in Utah. Joined Utah 4 Wheel Drive Association in 2003, was a member of USA-ALL, and now belong to BRC, UNITEDFWDA, and others. I am 85 now and recently had to cancel a trip to Hurricane because of my back. I still have fun when I can. ■



Josh McBride's Winter Jamboree

By Marc Bryson

We've all seen the "meme" of late. The silver XJ with an IFS looking Dana 30 front axle sitting in the sand. Something isn't exactly right about that picture and if it is, we needed to find out to relay info to you via this article. Josh McBride started seeing those on social media before he'd even gotten his Jeep off the mountain at the Winter 4x4 Jamboree in Jan. 2015. I chatted with Josh the other night and got the lowdown on his 15 minutes of fame, his observations of the incident, and most importantly what can be learned from a situation like this.

Josh works at Fat Bob's garage in Layton as a sales guy. He's not any kind of stranger to our sport and assists customers in making their rigs safe and reliable. With a little help from the shop and some access to some decent parts, Josh built up a very clean and trailworthy example of an XJ Cherokee. His wife appreciated the work put into the vehicle but had never been out on a trail before. He convinced his wife to go down to wheel St. George with him and have a good time. I can identify with this a little as my wife is not an off-roader. If you get a chance to get your spouse out with you, you want to help them have a good time and possibly get them in the driver's seat so they'll really buy into our chosen form of outdoor recreation.

They got signed up for a trail, headed out to run it and were playing in the sand with their group as they were headed to the "Plan B" trail about 10 am. He got paired up with someone in a bit of sand drag race started through the dunes. Carrying a fair amount of speed up a dune while following the group, Josh couldn't heed warnings coming over the CB saying "don't follow me, don't follow me" as he crested a dune that had a steeper drop off than expected. You know those, we all know those. He and his wife went airborne for approx. 25'

down a 20' drop. That's going to leave a mark on any rig. After the sudden stop and as soon as the air bag propellant was out of the cabin, they started doing a self-assessment. As he and his wife started doing inventory of themselves, they were fortunately not hurt seriously. Just some bumps and bruises and a little shock.

Once the dust had settled and they realized all the important stuff was OK (people), it was time to assess the rig and figure out how to get it off the mountain. Very convenient that only the rig suffered any real harm. His casting on the Dana 30 gave way and axle tube and casting separated themselves. It appeared to Josh that his Rusty's bumper kept the front of the Jeep intact. Recovery can always be a bit tricky and this was something most of us have not seen before. In fact, put yourself in the shoes of a recoverer and let us know how you would handle things. Conveniently, a clever friend of all of ours steps onto the scene at this time. We all know Dennis from Teraflex video fame. Dennis isn't just the dashing star you see on Teraflex instructional videos and YouTube. He's actually a pretty savvy wheeler and an all-around good guy as you'd expect. After trying to rig the axle together with a hi-lift for a few minutes, the idea of dragging the Jeep out with a skid was proposed. By placing a skid under the front of the vehicle, it could be pulled through the sand fairly easily. The hood could act as a 'sled' through the sand supporting the front of the now dysfunctional XJ.

Not one wants to hack up a decent Jeep that had just survived an unfortunate accident, Dennis was able to procure a hood from a local body shop off a wayward Honda. While Dennis was acquiring a hood, Josh and friends got to work totally disassembling the front suspension and assessing any damage while doing so. Conveniently, a severed axle will fit in a Cherokee's cargo

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area along with two tires, shocks, coil springs, trackbar and RockCrawler control arms quite tidily. After securing the Honda hood under the Cherokee, they were able to drag the Jeep to the waiting trailer.

The Sheriff and BLM were able to escort a trailer to within about a half mile of where the incident happened so the recovery crew was able to be back in the hotel parking lot by 6:30. Conveniently timed for dinner and a few beverages. Just another day on the trail for Dennis, Josh, et al. Josh feels very fortunate and grateful for the responses of our community, Washington County Search and Rescue, Washington County Sheriff and the BLM for their responses to this incident.

Josh did have some other things to convey when we were chatting. He's pretty meticulous about strapping items down in his Jeep. Some of his observations will make me reconsider my packing methods. As you may have seen, a "c" clamp got loose at impact and hit the windshield with enough force to damage it pretty impressively. Josh had that ball joint press secured with a tie down in its plastic shipping container along with a few other things in the cargo area. The plastic container failed and the clamp was able to break free with the obvious show of force. We might be all better served by checking how we stow things and learn from this incident. I'm not sure

what a ball joint press "C" weighs but I'd hate to have it hit someone in my vehicle in a similar situation. Please check your loads and packing methods. He was also surprised by the response via social media and modern communications. Within minutes after the situation occurred, he was getting queries about their welfare and best wishes for them and the vehicle. Shortly after that and as people realized all was well, good natured harassment started popping up all over the place. We all know we are part of a great and supportive community. Josh feels the love from his fellow wheelers and appreciates all the well wishes.

The last thing I asked Josh is about the Jeep. What's next? From the looks of things, the Jeep itself is in pretty decent shape. The RockCrawler arms appear totally usable, most of the suspension components were totally undamaged. As mentioned above, the Rusty's bumper seemed to brace the unibody well enough to survive this impact. Basically the biggest casualty is the Dana30 housing, windshield, and airbags. When I talked to Josh he was going to sling a Tera JK Dana 44 axle under the Jeep and keep it and its now famous heritage. Having his girls grow up in a Jeep with a past wouldn't be such a bad thing. This was Josh's wife's first car accident ever. For now, she's decided to stay home with their two girls for the next trip out. Now if he can just get his wife to go out with him again..... (good luck our brother). ■



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TeraFlex is a manufacturer of premium suspension systems, body protection, low-range gearing, high-performance axles and accessories for the Jeep Wrangler. Most people know TeraFlex for their excellent products and off-road performance, unfailing customer satisfaction, and endless stream of remarkably informative and strangely humorous YouTube videos. Today, we take a closer look at what makes this company tick.

A brief look at history reveals that TeraFlex has been professionally involved with Jeeps since 1959, beginning

with MEPCO, a Jeep/truck related military surplus store founded by Don Falkner. Don's son Mark, learned everything about Jeeps and suspension assembly using old parts in his father's store yard. This began a rich journey and legacy of Jeepers and suspension building, trial, error, and old fashioned fun that would soon change the entire market. In 1986 Mark took the reigns of the company and continued the strong Jeep focus.

1996 presented the new TJ Wrangler, opening an immediate demand for an aftermarket suspension that was non-existent. Mark Falkner met the challenge,



inventing the first TJ lift kit and started the new company TeraFlex Suspensions. Since then, TeraFlex has consistently lead the industry with a constant flow of new, unique and innovative products that continue to stun the market. TeraFlex is still the only aftermarket company to offer a solution for the 231 transfer case's low range gearing, and in 2001 TeraFlex astonished the entire off-road industry with the CRD60—an off-road specific high-pinion 60 differential that took innovation to a new level, again reinforcing their reputable position in the industry.

Big reputation, but not a big company. Surprisingly, TeraFlex has just 69 current employees at a single location in West Jordan, Utah. TeraFlex has moved from various locations in the Salt Lake Valley and in 2013, due to growth demands, they purchased a larger 27,000 sq. foot facility in West Jordan. TeraFlex has since added another 23,400 sq. feet and is currently in the process of adding 4,000 more. And will add another 50,000 in 2016, equaling a total of approximately 120,400 sq ft by the end of the year!

So how does this small company maintain its huge brand? A glance through the parking lot will answer that with one word: passion.

TeraFlex is extensively employed by local men and women driven by excitement and fervor for what they do, mixed with a combined love for the Jeep lifestyle.

Direct quote from TeraFlex: TeraFlex is all about back country trails, canyon river beds, and dry waterfall ledges. We love the same adventure that you do on the rocks, in the sand, mud, snow, and ice. This passion pushes us to manufacture the best products available for the entire Jeep® family.

Want to see for yourself? Search the hashtag “#teamteraflex” on social media to see what these guys do in their day-to-day, and you won't be disappointed. The team that plays together stays together and makes a great business.

What exactly happens at TeraFlex? Quite a lot actually. Various in-house departments include engineering, research and development, marketing, graphic design and video production, customer service and international business relations, axle production and assembly, lift kit production and assembly, quality control, warehousing and shipping. Virtually everything happens on-site. The skills and talents involved here are

innumerable, surpassing normal abilities and are utilized in every part of the development and manufacturing process.

TeraFlex is widely known for its ability to enhance an existing product's usefulness and performance for specific needs off-road while retaining the drivability requirements necessary and essential for highway use. Customer Christopher Scarpantonio said of his TeraFlex 3” lift kit with monster trackbar, “I couldn't be happier with how well it handles the trails of Rausch Creek Off-Road Park and the city streets of New York. Their customer service is second to none.” Quality and durability of parts is equally important, recognized by customer Trevor Daniels who said, “Been running a TeraFlex lift for 14 years. Never had an issue. Last set of BFG's lasted for 65,000 miles. The lift has stayed completely in spec with normal greasing. And yes I do wheel it.”

Continuing their stronghold, TeraFlex offers the most comprehensive list of performance components for the JK Wrangler of any other manufacturer to date. For complete performance with unsurpassed dependability, get the TeraFlex advantage today. ■

The Trail Hero



Doing something good in the world is important. Doing it as part of a short, highly memorable trail-riding vacation is even better. You can combine both October 5 – 8, 2016, on the trails of Sand Hollow located three short miles from Hurricane, Utah, a place that welcomes off-road enthusiasts. In addition to trail riding on more than 28 trails that are suitable for stock jeeps, buggies, and UTVs, there will also be bounty obstacles; an endurance race; a rock crawling competition; the Trail Breaker, where riders will break new ground on the hardest trail in the U.S.; and charitable raffles, including one by and for the Utah 4 Wheel Drive Association (U4WDA). The goal is to collect \$10,000, then donate it to the Utah Public Lands Alliance.

Participants will also enjoy catered food, live music, a car show, a Rock Sports gala, and a film at the end of the event to celebrate the just-completed action.

Why was Sand Hollow chosen? Located in Southern Utah, with a winning combination of warm blue water and red sandstone hills, it has access to thousands of acres of mild and wild off-road terrain. The nearby five-star resort has villas, an 18-hole golf course, and

off-road rentals and services. There is also year-round lake access and camping facilities, both wet and dry, at Utah's relatively new Sand Hollow State Park.

Trail difficulty is between 1 and 10, with 1 being trails that are appropriate for stock 4 wheel drive vehicles and 10 being the rating for extreme trails. You can find something for everyone:

- Mild trails (1 – 3): These are casual, fun, off-road drives that don't need a lot of experience in order for you to enjoy them. They generally won't do body damage and you don't need lockers. Vehicles with Small Lift or off-road packages should do fine. Wheels should be between 29 inches and 31 inches.
- Moderate trails (4 – 6): This is where drivers are tested by more difficult terrain and spotter's can show their navigation skills. Vehicles should have tires between 33 inches and 35 inches, with limited slip or one locker in their differentials; it is best if both front and rear are locked. You need a hard-top vehicle and/or a roll cage with a winch if possible.
- Difficult trails (7 – 8): The terrain is more demanding, and correctly built roll cages are mandatory at this

point. Tires usually range between 37 inches and 40 inches, but a highly skilled driver can finish some of the easier trails with 35-inch tires. Expect the possibility of body damage, and outfit your vehicle with body protection. You will need beadlock wheels, hydraulic assist steering, safety gear, recovery equipment, and a winch.

- Buggy trails (9 – 10): These are the most difficult trails available, and they will test both you and your equipment to the limit. Only highly skilled drivers should attempt this kind of challenging terrain. You are likely to roll over and break your vehicles, so it is important to have safety gear such as helmets. You should also seriously consider using a five-point harness. Mandatory equipment includes beadlocks, heavy duty axles, hydro assist to full hydro, lockers, tires that are 37 inches or more, and a winch with recovery gear.

Early registration is important because the trails offered through Trail Hero have population limits, and you won't be able to get access once they are full. The months between now and October will go fast. Don't delay your registration. ■



U4 Land Use

BY Marc Bryson

Welcome to another issue of the Compass magazine. Hopefully you've noticed some of the changes in the U4 lately. We've been working hard to improve our communication to members, reach out to areas that are underrepresented and become a better organization overall. As I'm sure you've noticed, Utah has had some pretty interesting developments in the Land Use area over the past few months. Hopefully you're engaged and involved. We have a lot of stand up members that are involved but we could certainly use more representation when and where appropriate. We do need engaged people from all around the state. We also need a way to effectively communicate issues over our large geographical area. We are working on that but if you've got effective ideas, we're all ears.

Not just U4 could use more participation but are you a member of any of the following organizations? United

4 Wheel Drive, Blue Ribbon Coalition, Tread Lightly or ??????. What organizations espouse our values in taking care of the land? Are we missing the mark on some of our core philosophies? Stealing numbers from a Crawl editorial by Kurt Schneider, "According to one of the most recent Forest Service studies on recreational OHV use, there are 57 million OHV enthusiasts in the United States." I'd be embarrassed to know how many of those 57 million throw down \$50-75 a year to belong to a group that tries to have a voice in governments around the nation. The bulk of the public land is in the west. OHV organizations should have large numbers and they don't. I'm stealing the thunder of his editorial but he's got a great point. To me, Blue Ribbon contains the bulk of what I'd like in a national organization. They have resources we just can't have. We have a few solid contacts in Blue Ribbon and our own president sits on

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the board. They are pretty handy and available if we need some help from them.

Utah has some pretty serious issues that our members and other members of local communities have really made some local and state governments pause in their steps. The American Fork Canyon fight is FAR from over but things still seem to be progressing for the likely closure of at the very least Mineral Basin and Mary Ellen Gulch. YOU can make a difference. If you check out the progress of a grass roots Facebook group call "Protect and Preserve American Fork Canyon" you can follow the momentum of someone with some passion. Mark Allen started that group in opposition to trail closures in the area. He and his followers have made a LOT of noise for area governments and a large corporation trying to expand a foot hold at the tops of the canyon.

My point is this: I think YOU can make a huge difference in access and issues in your area. I think WE can help you by generating a volunteer base and helping with exposure. Everyone I talk to on the trails is all about land use and keeping trails open. It's going to take some work from all of us to do so. The Bishop "grand bargain" sounds like a good thing. We need some bodies to get into the nuts and bolts of that and figure out what that means to our type of use. I'm not convinced we won't lose something valuable within this proposal and we should all take some personal responsibility and figure out if our valued tract of land is affected and how by this bill. This will affect Summit, Uintah, Duchesne, Grand, Emery, Carbon and San Juan counties in the very least. I'd venture a guess that some of your favorite areas will or could be affected by inaction on your part.

I'm writing this just after King of the Hammers '16. That was the 10th running of a BRUTAL race. Look at it's fast ascension to relevance on an international scale. The event started as a challenge (for some adult beverages) by some friends and now it's bringing over 50,000 people to nowhere, CA for 10 days, has created a new desert racing class and advanced suspension and tire technology pretty significantly. Joining, volunteering and supporting a land use organization is within all of our budgets. It would give a great voice from our community.

Hopefully outlining the success stories of King of the Hammers and Protect and Preserve American Fork Canyon will inspire you to make a success story in your area. I invite you to meet us at LHM Jeep SouthTowne on the last Thursday of every month or at the very least to let me take your ideas to the Board Meeting (marbryson@yahoo.com). I'm all ears and want to help

YOU can make a **difference.** If you check out the progress of a grass roots **Facebook** group call "Protect and **Preserve** American Fork Canyon" you can follow the momentum of someone with some **passion.**

make this organization represent you, the weekend wheeler, shop owner/worker or even the web wheelers. Everywhere I go around this state I meet great people. If you're reading this, you are likely one of those. We need your talents and resources to maintain the lands that the off-road industry (I see the SEMA pics, off-road is an industry) utilizes. ■

See you on the trails,
Marc Bryson

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OFF-ROAD ADVOCACY IN SOUTHWEST UTAH

By Bud Sanders

In March of 2014 The Desert Roads and Trails Society (Desert RATS) was formed by a group of diverse but like-minded individuals interested in promoting and protecting use of our public lands by all members of the public. Desert RATS is a Utah non-profit all-volunteer organization. All funds raised above operating costs are donated to advocate groups promoting open access and multipurpose use.

Simultaneously, in the Spring of 2014 a 501c3 all-volunteer corporation known as the Utah Public Lands Alliance (UPLA) was organized. UPLA's purpose is to preserve public lands for public use, principally through public education and representation. They work as an

alliance between many varied users of public lands to maintain access and multipurpose use.

The current pressing local land use concern is a proposed land swap which would allow part of the popular Sand Mountain off highway vehicle (OHV) area in Hurricane to be developed. It's a long running, complicated and contentious issue pitting land users against some local government and development interests.

The cooperative relationship between Desert RATS, UPLA, and the local BLM is key to the mission of keeping off-road access to our public lands in southern Utah and the Arizona Strip. Trail closures often seem arbitrary and capricious, but by working

cooperatively they have made great progress.

The Washington County Water Conservancy District has announced plans to build a reservoir in Warner Valley that would flood Fault Line and West Rim Lite trails within the Sand Mountain OHV area. Working with officials from the BLM office in St. George, officers of Desert RATS and UPLA have acquired grants to construct an alternative trail. It will be known as the Ridgeline Trail and will maintain access to the OHV area. The BLM awarded a grant of \$110,000 to be used over the next five years for trail development and education. Funds will come from the BLM's local permit fees account. An additional \$2,500 grant was obtained from OMIX-ADA/Rugged Ridge, an off-road product company, also for the construction of Ridgeline Trail.

The major fund (and fun) raising project of Desert RATS is the Winter 4X4 Jamboree. It is an annual event conducted in January. The second annual Jamboree was held on January 22nd and 23rd in 2016.

Both radical rock-crawling and easy, scenic trails are available at the Jamboree, an event headquartered at the fairgrounds at the Washington County, Utah, Regional Park. Four wheel drive is required for all trails. Drivers choose from over 25 trails. Each group is led by an experienced trail leader. Proceeds from the event are donated to land use organizations including the Utah 4 Wheel Drive Association, UPLA and the Blue Ribbon Coalition. In 2015, over 285 vehicles and more than 700 people participated. In 2016, 435 vehicles participated on Friday and 458 on Saturday. Participants come from all western states and as far as the Midwest, Minnesota and Florida. Over 1,000 people participated this year and dinner was served to 400.

In the late 1990's a small group of volunteers at the BLM field office in St. George started a group of off-road enthusiasts interested in weekly backcountry trips to points within a hundred mile radius. Their email list, now named the St. George Jeepers, has grown to over 130 members. Mostly retirees, they routinely go out every Tuesday led by volunteer trail leaders. Members enthusiastically volunteer for events such as the Winter 4X4 Jamboree and desert cleanup projects. The Jeepers pride themselves in providing opportunity for many physically challenged outdoor enthusiasts (including wheelchair bound) to get out and see this amazing countryside, an opportunity they may not otherwise have.

Desert RATS, with cooperation of the St. George Jeepers Group coordinated a desert cleanup project with the local BLM office in December of 2015. This event was the first of what is planned to be a continuing project on BLM lands. Twenty-five vehicles and 35 individuals gathered. BLM supplied the project with 500 heavy duty trash bags and a 12 cubic yard dumpster which was filled to overflowing.

Traditionally, Desert RATS and UPLA have conducted trash cleanups on Sand Mountain every National Public Lands Day in September. This effort will be ongoing and more frequent. ■

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Desert Roads and Trails Society is proud to announce that the Winter 4x4 Jamboree cleared \$20,300!!!

We are donating \$15,000 to the Utah Public Lands Alliance, \$5,000 to the Utah 4 Wheel Drive Association and \$300 to the BlueRibbon Coalition.

After paying all the bills and setting aside a little seed money for next year's event, we are thrilled to be able to donate this much to land use groups!

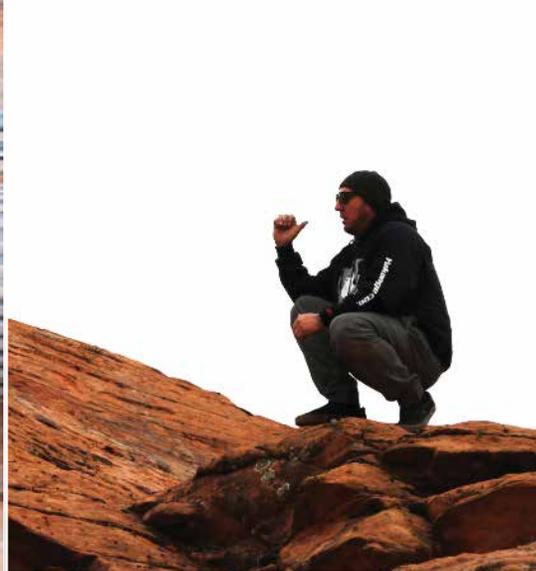
In 2015, over 285 vehicles and more than 700 people attended. In 2016, 435 vehicles participated on Friday and 458 on Saturday. Over 1,000 people participated this year, enjoying some spectacular trail conditions, weather, and community.

Comments from participants, sponsors, vendors, the BLM, Utah Department of Natural Resources, and

the volunteers have been unanimously favorable. Participants were particularly pleased with our new online registration this year. The organizers have already met to discuss ways to make the event even better into the future.

A big, big 'thank you' to the Desert Roads And Trails Society - Desert RATS board of directors, the awesome volunteers and most of all to everyone who participated in this great event. Hope to see you all back next year!

The Utah Public Lands Alliance is a local nonprofit land use group fighting a proposed land swap that would allow development of part of Sand Hollow/Sand Mountain OHV open travel area – where many of the trails for our event are located. ■



Guidelines for Leading and Spotting

By Newly Wade Tolf

Being a trail guide or trail leader is not for everyone. What characteristics and skills are essential to doing it well and safely?

- Confidence is a must. As someone in a leadership position, you have to be comfortable taking responsibility for those in a group, sharing your awareness of the environment, and insisting that safety be a high priority.
- Cultivate a good sense of humor. Having enough perspective to pull back and see the funny side of what happens might be just what you need to be able to deal more effectively with any problems that occur.
- The ability to be organized, to delegate, and to follow through all matter, as well as the ability to focus well when faced with multiple distractions.
- Outdoor skills are essential, such as reading a map and planning a route. You might want to think about getting a GPS and having the best guidebooks you

can find. You should also make an emergency supply list of indispensable items.

- Driving skills also matter. For example, you should be able to pick a line when driving that will allow you to keep traction on all four wheels. Even moving just a few inches can help you minimize hazards.
- Conflicts will sometimes arise. A trail leader will stay calm and be assertive when necessary.
- The possibility of injury is very real. As a result, a trail leader should have community first-aid/CPR certification, and should know how to use safe recovery techniques.
- If a vehicle breaks, it is important to have the mechanical skills necessary to get the vehicle off the trail and to clean up toxic spills.

Knowing what you are doing is essential; so is preparation. You will need to have respect for the challenges you are sure to face, and you should also be conscious of just how fragile back country can be.

“

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Once you are out on the trail, remember the following:

- Know the boundaries for the area you are in and stay on established paths. Not only could ruts made by your tires provide an argument for closing off an area, they can last for decades. Your vehicle might crush wildlife tunnels and excavations and might easily cause erosion as well.
- Pack out whatever you pack in, even if it is a candy wrapper or a cigarette butt.
- To get over an obstacle, pile up some stones to help you. Put them back when you are done. Spinning your tires chews up the surface crust and is another cause of erosion.
- Leave wildlife alone. This is their home, and you should interfere with them as little as possible.
- Go relatively slow. Driving slow is easier on the terrain and is less likely to do damage..

It's a good idea to educate yourself as much as possible and also to consider investing in a class where you can learn the practical skills you need for four-wheel driving and how to communicate more effectively in different situations.

Tread Lightly! is an educational program that promotes being responsible when four-wheeling. Visit the Tread Lightly! website

at www.treadlightly.org for more information.

Sometimes the only way to get past an obstacle on the trail is to have someone's help. Spotting prevents vehicles from getting damaged, and it can also prevent unnecessary trail delay. However, it is also an art that takes time and experience to acquire. For safety, stand in the driver's direct line of sight and follow the rules:

1. See whether someone is already acting as a spotter. If so, your job is to be quiet unless the driver asks for your help.
2. If there is no spotter, then ask the driver first before you start issuing signals. Some people know their equipment so well they don't need a spotter. Other people just don't want one.
3. If you are going to be the spotter, take the time to talk to the driver and create a bond: "I'm going to spot you through this. Will you please focus on me and tune everything else out?"
4. Go over the hand signals and make sure the driver understands them:
 - A closed fist means stop.
 - To turn right or left, use your index finger or your thumb to point to the correct direction. If the driver doesn't turn far enough, use your finger or thumb to point and push in the correct direction at the same time.

- To tell a driver to move forward, extend an open hand so the palm faces you. Fold in the thumb so the driver won't think you are asking for a turn. Keep the fingers together and wave them inward over and over.
- To tell a driver to reverse, extend one or both open hands so the palm faces the driver. Push toward the driver. Sometimes you can help the driver be safer by going to the back of the vehicle and directing from there.
- To combine two signals, use one hand for the first signal and the other hand for the second signal. For example, one hand can indicate direction and the other one can indicate motion. If you want the driver to turn the wheels without moving, hold up a closed fist and use the second hand to point.
- 5. Refer to the driver side and the passenger side, not left or right.

Drivers have their own set of rules for spotting:

1. Either ask for a spot or tell everyone that you don't want a spotter. If the trail leader wants you to have a spot, however, it's best to comply.
2. Lock on to your spotter. Do not pay attention to anyone else.
3. Move if the spotter directs you, and stop if the spotter stops. Make sure the spotter understands this rule in advance. ■



Vehicle Preparation

By Craig Stitcher

If you are reading this magazine, chances are you have multiple vehicles. You probably have something to drive daily and some kind of off-highway vehicle for your adventures as a weekend warrior. If you have an OHV then you probably also have a basic understanding of how to turn wrenches as well. Many owners claim they maintain their purpose-built rigs and commuter rigs when they actually don't. They mean what they say, but they just don't know what it means to maintain a vehicle. That gap in their knowledge causes them to end up with expensive repair bills that could have been avoided.

In order to prevent this from happening to you, I am going to give you some suggestions about maintaining your vehicles so you won't have to spend more money than necessary on them. Even though maintenance and safety are different for a purpose-built vehicle than they are for a vehicle you drive every day, five simple actions will prolong the life of any vehicle.

1. Learn about your vehicle

Taking care of your car involves more than just filling up the tank regularly. Find out what the correct tire pressure is. Know how and where to check fluid levels, including the correct fluid types for your vehicle. Know where the spare tire is and how to jack up your vehicle, because the procedure is not the same for all vehicles. Know what systems you have on your vehicle and have a basic understanding of how they function on your vehicle. Know what the malfunction indicators on your

instrument cluster mean and how concerned you should be when you see them; that way, you won't panic unnecessarily if you see one light up.

2. Observe

Listen to the sounds your vehicle makes, and check on any abnormal sounds like grinding, rubbing, or squeaking. Check out any sound that seems excessive or abnormal to you. Be aware of any wet spots under your car where you park. Look at your tires when you walk up to your vehicle, and check them if they look low.

Do the same for your trail rig; the more you drive it, the more you will know whether it is functioning correctly. Check any squeaks, rattles, and creaks that don't sound normal. When you are under your rig before taking it out, you should look for drips and leaks so you won't have issues later such as being stranded on the trail.

3. Be Proactive

Know your service intervals and follow them. By doing the bare minimum of checking and changing all your fluids regularly (oil, transmission fluid, coolant, and so on) and ensuring that your tires are at the manufacturer recommended pressure, you will increase the fuel mileage and performance of your vehicle while decreasing the need for maintenance-related repairs.

Even if you don't drive your vehicle often, you still need to change the fluids on a schedule. Oil deteriorates, moisture builds up and causes problems you won't see, and rust forms quickly. If your rig sits for extended periods of time, start it up regularly and run it through all the gears. Don't store your vehicle

on tires that are aired down. Air them up instead. That way, you can also see whether you are losing air before you hit the trail. Airing down for the trail is a necessity, but keeping the weight of your vehicle on low tire pressure will cause the side wall to crack and fail.

4. Follow a schedule

Check fluid levels every day for the vehicle you drive daily, and check tire pressure a minimum of once a month. If your OHV is the vehicle you drive daily then you are covered, but if it isn't, check it out in advance. Put a wrench on the steering and suspension components, and check for leaks and broken or cracked frames, shocks and mounts at least a couple of days before you head out.

5. Find a trustworthy technician and shop

Even if you do the majority of the work on your vehicles yourself, you still need a good technician and a shop you can trust. You may end up with a job that is just too big for you to handle, or you might not have the specialized tools you need.

There are benefits to finding a shop you can trust and having the mechanics there perform regular service on your vehicles. A great shop will give you a full explanation of all necessary repairs and how urgent they are, including ones you didn't notice but that can cost you more if you ignore them. Expect a full explanation of options and cost breakdowns, including future expenses. Remember, a great technician and shop will never try to force you into making expensive, unnecessary repairs, but instead will help you to make the best possible decisions based on your vehicle's needs. ■



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Rock Crawling History

Rock crawling has its origins in World War II. When Germany invaded France on May 10, 1940, military leaders in Britain and the U.S. thought the French military would fight back hard and delay the Germans. It didn't work out that way. France was under German control by June 22, 1940, just a little more than a month later. The U.S. was worried the Germans would take the Volkswagen and come up with a military version. On June 19, 1940, when it was clear that France was going to be defeated, the Pentagon asked U.S. car manufacturers to come up with a U.S. military vehicle. They asked manufacturers to design a vehicle that included the following requirements, and to deliver it in 50 days for testing:

- A powerful engine
- A short, 80-inch wheel base
- A total weight of slightly more than 1300 lb (590 kg)
- Four-wheel drive
- High road clearance
- Off-road abilities

Three companies successfully built prototypes: Willys, Ford, and the Bantam Car Company. Pentagon designers then gave the car manufacturing companies an assignment to merge the best features of the three prototypes into one vehicle, the Jeep, and they ordered 1,500 from each of the three companies on November 1940.

In July 1941, six months before the U.S. officially started fighting in World War II, the Pentagon ended production with the Bantam Car Company after it had built about 2,700 vehicles. However, the Pentagon ordered 15,000 more Jeeps from Willys and 16,000 more Jeeps from Ford. Although the Bantam Car Company sued Willys in 1943 and the courts sided with the Bantam Car Company, it was a bitter victory. They never built cars again.

After the war, Ford went back to building cars but Willys continued building Jeeps for the military. Willys continued to produce Jeeps for the military during the Korean War (1950 to 1952), but the automobile line ended in 1953. After 1960, Willys built many vehicles for the U.S. Postal Service. The company was purchased by the American Motors Company (AMC) in 1970. Chrysler bought the Willys part of AMC in 1987, and in 1998 Daimler-Benz bought Chrysler.

The soldiers who drove Jeeps while they were in the military didn't want to stop when they came home. Many of them bought either surplus military Jeeps or Willys Civilian Jeeps and took them off the roads. In the late 1960s, off-road racing became a popular sport.

During the 1970s, motor sports enthusiasts became more specialized and tended to belong to one of four different categories: four-wheelers, street machiners, and street rodders. By the 1980s, there was an increased interest in trail riding, and that developed into rock crawling during the 1990s. Most trail rigs were modified with parts that had been bolted on. Production sheet-metal bodies had to be cut away to make room for increasingly large tires. People developed beefy high-clearance transfer cases and axles with low gears and high-travel suspension systems. They put together custom suspensions and rollcages. Jeep flatfenders, CJ-5s and CJ-7s, and new Wranglers were transformed into something new and ambitious. Naturally enough, as people modified their vehicles, they wanted to compete with other people and see what would happen.

- Moses Ludel, who worked at Off-Road magazine, worked to start a trials competition for 4x4s, but it didn't catch on.
- Bob Hazel worked with 4-Wheel & Off-Road magazine to create a vehicle-only rock competition in 1998. It was the BFGoodrich Rock Crawling Championship in Las Cruces, New Mexico. People got together and had a great time.

In 1997, Soni Honegger created the Scorpion Mk1, which has been called "the most capable 4x4 ever." Enthusiasts fell in love with it because of its ability to perform, and it inspired people in 4x4 shops to start building rock buggies. Each one was smaller, lighter, faster, and tougher than the last.

The three main players in rock crawling today are the World Extreme Rock Crawling Championship Series, ProRock, and RRock. Other organizations have focused more on speed or one-time events.

Whatever the future holds, one thing is clear: rock crawling has become a beloved sport because it combines tough vehicles, excellent driving skills, and unbeatable adventure. ■

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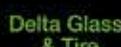
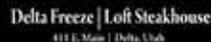
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KRAWLZONE

By Nathan Riddle

KrawlZone is an off-road adventure network that provides news and entertainment geared specifically for off-road enthusiasts. Established in late 2010, KrawlZone has covered events, all across the country and been on the trail with some of the biggest movers and shakers in the extreme motorsports industry.

Blah, blah, blah. That's technically what KrawlZone is, but at its heart we're just a small team who is passionate about getting out and sharing everything that is great about the off-road community. We're sharing it all on our website, which is our hub for news and information and giving the off-road community a voice with our nationally recognized, self-titled show, KrawlZone.

Hi, I'm Nathan Riddle (Mr. KrawlZone), the host of KrawlZone, and this is the story of our humble little show.

It was late in 2010 when my phone rang and longtime friend John Jacobs greeted me on the other side of the line. After a few pleasantries he said, "Hey Nate, you've got a camera right? Well I've got an idea for a show!" "Everyone has an idea", I quickly retorted. At that time I was working on a couple of documentaries and had heard the same line several times before when others had discovered I was a filmmaker.

But as a friend I heard him out. As he described the concept for an off-road show I became intrigued. Of course I needed to do some research to determine the viability of such a project. It didn't take long for me to know that there was a market for off-road content and I became excited at producing a series that would allow me to cut my film production teeth on.. And with that simple phone call between friends the wheels were set into motion and soon KrawlZone would be born.

Growing up in Southern Utah, where the red rocks grow, John and I were often found in one 4x4 or another, bounding around the desert's rock hewn trails, but I really didn't realize how large the wheeling community was nationally. Not until I started looking into the feasibility of a show that is. It was then I realized how vast and vibrant the off-roading and rock crawling community really is. I also realized how under-served they were as far as media coverage was concerned. I soon planned a sit down meeting with John to discuss his ideas. It was then I decided to invite my little brother Brian, who is a videographer and editor, to join in the conversation.

"I remember thinking this was a cool idea. We'll get some cool footage and play it to heavy metal music! Who wouldn't want to watch that". Brian reminisced about the genesis of KrawlZone.



At this time in 2010, web video was still new and YouTube was growing, but no one was producing content at the caliber we were planning to for our fans. And to prove it, we brought our cutting edge film equipment out on the trail to produce our first episode. With excitement we attended our first off road event in St. George Utah, and we got some epic footage. But success led to failure. Due to a hard-drive failure, after the event, we lost 99 percent of our footage.

That hurt, but as the saying goes, fail early and fail often. We learned that we needed backups and redundancy. We filled some production gaps we noticed and polished our pipeline. Even with our stumble we made some great friends and several companies showed support with what we were trying to do.

Over the next six months we produced eight episodes that took us across the country, from Jeep Beach in Florida to the Big Bear Forest Fest in California. We were wheeling with some of the biggest names in rock crawling, were becoming nationally recognized and changed the way our community expected to watch off-road entertainment.

With all the success we were seeing, we soon discovered a problem. As fate would have it, KrawlZone was started as the housing market crashed and a serious recession was setting in. Our business model was to be advertising based and, though we were growing, no one was really willing to risk sponsoring us in such a shaky economy. So without funds to continue full production, we put KrawlZone into neutral for a while and over the next couple years only produced about 4 additional episodes.

This would be a sad story if that were where it ended. But toward the end of 2014, a friend encouraged me to put KrawlZone back into gear and get moving. With some apprehension I got the old gang back together and we started idling forward. In 2015 we started getting some sponsors on board and wrapped up the season with 12 new episodes.

Now KrawlZone is heading into 2016 with a whole new plan and a fresh purpose. We love the outdoors. We are stewards of our lands and stand with the people and organizations that are fighting for our freedom to wheel. We are focused on presenting content that is informative and

entertaining, always highlighting the things that drive our sport and make our community great.

I'd like to invite you to join us in 2016 as the KrawlZone team and I have committed to 12 new episodes that will once again take us nation wide. Our website will continue to expand in content that is relevant to our fans. I also invite you to follow our build blogs and see the progress on the KZTacoma, our classic Ford Jeep restoration, and the epic new build we've named Project DarkFall.

But that's not all. KrawlZone isn't just about us. We want to hear your stories. We want to hear about your trail rides and adventures. We want to know about your builds. If you're reading this and are saying to yourself, "I've totally got this awesome video (or picture or trail report or build) and these guys have got to see it", then please share it and chances are we'll publish your story on the KrawlZone website. KrawlZone has come along way and still has a long way to go, but the adventure will be found in the journey. I hope you'll join us as we take you on the ride of a lifetime. ■



Learning to Rock Crawl

Does rock crawling seem like the adventure you've been looking for? The keys to success are advance preparation, learning from the experiences of others, and making sure you have a thorough understanding of the path you want to conquer.

To keep yourself and your vehicle safe, a few general rules apply:

- Always wheel with at least one other person. You know things are going to go wrong. When they do, having someone else there can make all the difference.
- Trust your instincts. When you are making an approach and something just doesn't feel right, stop. It's better to back off and think the problem through than to ignore what your mind is trying to tell you and then end up having to do a recovery.
- Respect your limits. Take a bypass if you don't feel comfortable with an especially difficult obstacle. There's no shame in being smart about what you attempt.
- Respect your vehicle's capabilities. If you know your vehicle can't handle something, don't ask it to.

The precision you're going to need to rock crawl successfully translates into picking your line (that is, planning the path you're going to take) and driving slow.

In fact, the crawl part of rock crawling shouldn't be more than three miles an hour. You have to go that slow because going faster than that is likely to get you stuck. It can also damage your vehicle. By going slow, you will be able to maneuver with exactness, judge upcoming obstacles more accurately, and know exactly where your tires will be at all times. Your vehicle, with its low gears and locking differentials, can transmit large amounts of torque through the axles. Going slow and easy is the key to preventing the drivetrain from binding, the engine from stalling, and (potentially) the axle from breaking. If you can tell your vehicle is struggling, back off. Try a different line before you break something expensive.

One of the most important parts of rock crawling is determining whether your vehicle can clear the rocks you encounter. That means you need to know the angles on your vehicle.

What are some of the dangers of rock crawling?

- Avoid straddling large rocks. They can high-center your vehicle and also damage its underside. You'll be safer if you assume the middle portion of your vehicle won't be able to pass over a rock safely, and approach it by lining up your tires with the rocks, instead of the undercarriage, before you start driving.

- Rocks can damage your tires. Tire sidewalls are vulnerable to being punctured when they come into contact with the rocks.
- You can tip over if you move too fast. This occurs because your vehicle will start to rock side-to-side more as the tires roll over the rocks.

Sometimes you will need to walk the line first to be sure your vehicle can handle the terrain. It might also be helpful to have a spotter who can stand close by and guides you as you maneuver over the rocks. The best drivers often do use spotters because they appreciate the benefit of having someone else around who can see the rocks, tires, and differentials from a different point of view than the driver. If you do use a spotter when the terrain gets technical, be sure to go over the communication signals ahead of time.

Here are some guidelines you can use to select and prepare your vehicle, and then to drive more effectively off the road.

Armor

Protect the sheet metal on your vehicle from the rocks. Improve your vehicle's odds with rocker guards, bumpers made from plate steel and tube, and skid plates that give you additional clearance. Think about getting front bumpers that accept a winch, and rear bumpers that carry a spare tire. Don't forget about approach and departure angles. You want your tires, front and rear, to be as close to the front and rear edges of your vehicle as possible. Also, avoid tubular "nerf bars" and bumpers. They bend too easily and will take away some of your ground clearance.

Articulation

The most stable way to drive is to keep all four wheels on the ground. Current thinking is to have balanced suspension. That means flex front and rear with coilover suspension systems, four links that are triangulated, and sway bars. Jeep Wranglers use coil springs, and that works well on the rocks, but leaf springs can work, too. If you have leaf springs, though, be careful. Sometimes the torque can cause the springs to twist and the rear axle to hop. The resulting shock loads can destroy axles, so that is definitely something you want to stop as soon as possible.

Locking Differentials (Lockers)

Lockers force both tires to turn at the same rate even when one is in the air and the other is on the ground. What you don't want is a limited slip differential from the factory. Those are not useful on the rocks. Instead, go for an automatic or selectable locker.

Which one should you choose? Automatics are easy to use because they don't need you to do anything other than drive. However, they can be quirky to handle and cause extra wear on your tires. Selectable lockers don't have those problems, but they cost more and are more complicated than an automatic locker. They are also more likely to malfunction.

Low Gearing

When you are driving slow, you want low gearing so you can keep control more effectively. The ideal crawl ratio for an automatic transmission is 75:1, and the ideal transmission for a manual is 150:1. Why the difference? Automatic transmissions can have lower crawl ratios because the ratio is multiplied by the torque converter.

Strong Axles

Torque multiplication is great, but it can break drivetrain components such as the axle shafts. You want aftermarket shafts and u-joints that are built from stronger materials than is usual, or a heavier duty axle that will also give you more stability. Think about tire size before you spend any money changing gears or adding lockers to stock axles, though. The extra width of a heavier duty axle can limit your terrain choices if your vehicle is then too wide to navigate a narrow area.

Don't forget the driveshafts. You can get aftermarket driveshafts and larger u-joints, along with the yoke. Add heavier wall tubing, too, and all the torque will be transmitted to the axles from the transfer case. Vehicles like the Ford 9-inch that have a long wheelbase and low-pinion axles are vulnerable to rocks, so if you have one, make sure you have plenty of driveline strength.

Tire Pressure

The right tire pressure for off-road terrain is low. Lower air pressures make your ride smoother and increases traction among the rocks. That way, the tire has a wider contact patch and conforms better to the ground as you travel. Don't go to lower than 10 psi unless you have beadlocks to keep the tires on the rim and a way to pump air back into the tires when you are done.

Wheelbase

Your choice of wheelbase depends on the terrain you want to drive across. A larger wheelbase means more stability but less maneuverability and a breakover angle that isn't as good. You should also think about the drivetrain length with respect to the wheelbase. Dual transfer cases and automatic transmissions in short wheelbase vehicles can make severe driveshaft angles worse.

Continued on page 30

More About Crawl Ratios

Why are crawl ratios such a big deal? They are all about the forces between your vehicle's engine as it pushes down through the tire tread and against the ground surface of the rocks. The resulting force from the rocks as they push back is what actually makes it possible for the vehicle to move. The bigger the forces are, the more easily your vehicle moves.

Crawl ratios are your vehicle's lowest gear ratio, or the ratio of wheel torque to the engine's flywheel torque. It tells you how many times the engine torque is multiplied before being applied to the surface. What is really going on? When the engine generates power, that power is directed through the transmission, the transfer case, and the differential.

Engine power is conserved, which means you can't gain more power but you can gain more torque. Power is proportional to torque times RPM: according to the equation, horsepower equals torque times RPM divided by 5252. If you reduce gears and increase output torque, angular velocity (RPM) has to decrease by the same ratio so that the power will stay constant. Increased torque means your transmission and axles don't have to lift as much. It also means, if you have a manual transmission, that your engine will stall less.

Crawl ratios are fairly easy to calculate. What you need is the torque at the wheels divided by the torque as it leaves

the engine and enters the transmission. That equals the product of three numbers:

- The transmission's first-gear ratio.
- The transfer case's low gear.
- The gear ratio in the differential (also known as the axle gear, the axle ratio, or the final drive).

To determine your 4x4's crawling capability, you just have to know, and multiply, these three numbers together. Let's look at some examples.

- Suppose you have a Wrangler Rubicon. The first-gear ratio is 4.46, the transfer case is 4:1, or 4, and the axle ratios are 4.10. Multiply them together ($4.46 \times 4 \times 4.10$) and you get a crawl ratio of 73.
- If you have an ancient 1992 Jeep Cherokee with four-speed automatic transmission and AW4, the first gear ratio is 2.80, the NP231 transfer case low-range reduction is 2.72, and the axle ratios are 3.55. Multiply them together ($2.80 \times 2.72 \times 3.55$) and you get a humbler crawl ratio of 27.

The bigger the number you get, the more low-end torque your vehicle has, and the more power your vehicle can put into going over big rocks. ■

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