

Five Huge Features + Hydro Steering + Trail Rigs + Hammers Coverage

# CRAWL

Hardcore Offroad

**KING** of the **2014**  
**HAMMERS**

»»» CRAWL to the Podium

»»» Nothing Runs Like A Desert Deere

»»» Snow & Ice, Racing in the White Stuff

\$5.99 US / \$6.99 CAN ISSUE 45

Display until 05/27/2014



ISSUE **45**

March/April 2014

# CRAWL

## JUST A FEW WEEKS BEFORE THE 2014 KING OF THE HAMMERS,

Matt Messer took the CRAWLmerica out to the desert for some testing and tuning. Not ten minutes into the workout the motor took a dump and we were shifting from "Everything is cool" to "Holy crap! We've got some work to do".

The motor ate a piston. One of the only things we didn't deal with on our budget motor build, we never pulled the heads and didn't pull the rotating assembly since this wasn't going to be much more horsepower than stock. Given the same circumstances, I think I would do things a little differently. It wasn't the engine suppliers fault since the motor was used. However, they stepped up and replaced it after learning what happened. Derek Trent has bought a lot of motors from them over the years and this may be the only one to have been a problem. I can't fault them and I'm truly appreciative of their efforts to make us whole again. The motor simply had less than 90 minutes run time and only 45 minutes at speed. I'm beyond disappointed that what seemed like a strong motor turned out to be a problem but we learn and move on. We'll build the new one at Jeff's shop and start over.

In the meanwhile, none of this deterred Jeff Grass at MJ Motorsports. He had been working on an LS2 408 stroker for Trent Fab owner, Derek Trent. He went into high gear and got the motor done to replace our LQ9 6.0. The team at Trail-Gear, led by race shop manager, John Gabriel, got the motor in the car and on the dyno. With a safe tune and 320 horsepower to the rear wheels, Matt Messer felt he had a car that could be competitive. If he only knew.

Back on the lakebed with a running rig, Messer met with the King team and they watched the car on the lakebed and made some adjustments to the Internal Bypass shocks. Matt felt comfortable picking up another 10-15 miles per hour in top speed. It was now time to tick off the list of small issues on the tech checklist and then get ready to go racing.

Words by John Herrick, photos by Tim Wages and John Herrick

# merica

The car passes the first test





Equally at home in the rocks as the desert, the race tires would be shorter 37" Falkens.



The clearance underhood was tight so a custom steering reservoir was built from PSC components.



The Branik links are huge yet the geometry is so well planned they slide right up and allow max articulation.

As mentioned in the first piece of this two part article, the car was built with the new Legends class rules in mind. Those rules were modified again after we went to press with Issue 43 and a few things were changed.

#### 6.4.11 LEGENDS CLASS

6.4.11.1 Engine must be front mounted.

6.4.11.2 Two seats must be side by side.

6.4.11.3 Shocks; only a single shock per corner is allowed. Any coil carrier apparatus are considered shocks.

6.4.11.4 Axles must be solid type. No TTB or IFS of any kind allowed.

6.4.11.5 Tires must be DOT NON STICKY compound no larger than 37" diameter as factory labeled.

6.4.11.6 All safety and tech rules apply.

Gone was the 6.2 liter max engine size. Since our new motor was nearly 6.7 liters in size, this was a good thing. Conventional wisdom suggests the style of suspension and max 37" tire size trumps the need for an enormous motor with a large displacement. All we know is that the motor sang sweet music all day and worked really well. The final rule changes gave us the option to run

this engine, otherwise we would have spent more time coming up with something else.

The new engine was mounted in front of Matt Messer and co-driver, Nick Poudrier. Having him back in the car was also a big part of the story. He suffered major injuries in 2012 in an accident that saw him life-flighted off the lakebed. It made me happy to have him as part of the crew that would christen this new car in its first race.

We had to solve an issue with tires as well. While the car was originally shod with BFG KRTb tires in a 39" size, we needed 37" tires to meet the class requirements. We were getting frustrated when Falken said, simply, "we'd love to help." We ran their new 37" Falken Wild Peak MT and between the high level of racer support and the great tires, we were impressed. There were zero problems in a 120 mile race environment.

Lining up in the Legends group, Matt and Nick took off in the 46th position behind all of the EMC Modified class cars and quite a few of their Legends class competitors. When the dust settled, they claimed the 2nd position in their class, 3rd overall and a podium finish for the new car on its first outing.

So now, here's the second half of the story and the rest of the components that went into building this capable racecar.

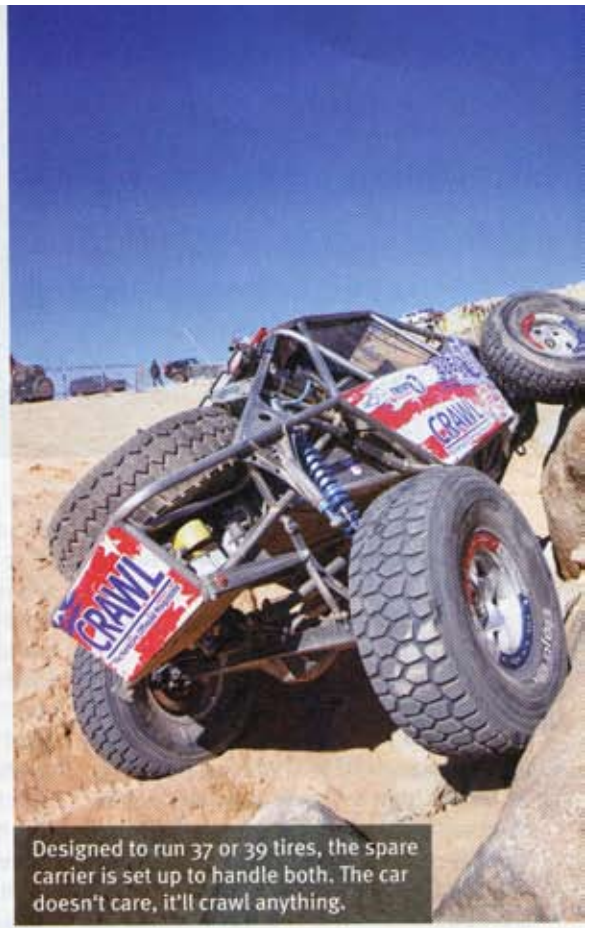
We've covered the powertrain and the ATO built Reid Racing SH400 transmission, which ran all day without a hiccup. It spent a lot of time in second gear, where it pulled like a tractor and gave Matt all the power he had on tap. If you need a transmission, call Jim at ATO Performance. What's really nice about this trans is it fits the big 408 stroker and, when the new LKQ provided LQ9 gets built, my trail engine will have the same trans behind it.

The "go to" transfer case is the Atlas from Advance Adapters and what can you say? They simply work. This one is 3:1 ratio set up specifically for Trent Fab and these cars. They make a few changes that make maintenance and geometry better.

Steering with the Trail-Gear fabricated knuckles can be as much as 50 degrees. To make the most of that, we used a PSC pump and pulley, a PSC reservoir and Trail-Gear double-ended ram. The car sits low and the hood height doesn't allow a lot of space to keep the reservoir above the pump. Aaron at the Trent shop looked at the PSC res-



The office is pretty straightforward. Circuit breakers for everything. AutoMeter keeps everyone informed and the shifters are at the ready. The carbon fiber dash and aluminum panels are top notch work. The Rugged Radios intercom is to the right along with GPS and VHF.



Designed to run 37 or 39 tires, the spare carrier is set up to handle both. The car doesn't care, it'll crawl anything.

ervoir and cut off the bottom and the top and then fabricated an aluminum reservoir that was short and fat, instead of tall and skinny. The AN fittings still fit, the PSC cap still screwed on and everything tucked under the hood. We choose PSC components because they work but also because Tom Allen and his guys know racing and understand what we want to achieve. A quick email or phone call and answers are shared and we're on to other things.

Plumbing all of this requires fittings and lines for the steering and cooler, the transmission and cooler, engine coolant and radiator, fuel delivery and return as well as venting the axles, t-case, motor and transmission. To solve all of this, in a word: Summit. Summit Racing was a huge part of this project, not only because they helped with sponsorship, but because they're about 1/2 mile down the road from the Trent shop. I can't even begin to count how many trips I made there to get what we needed. Always friendly, always helpful, always in stock. Being open until 9PM every night of the week makes building a race car a lot easier.

Plumbing our fuel delivery was fairly easy using Aeromotive components we got at Summit. We ran a 100 micron pre-filter,

with an integrated fuel shutoff, down to an A1000 pump, then a 10 micron post-filter that fed fuel to the Aeromotive fuel rails before being returned to the tank. The car is setup to run a dual redundant system, all accessible under the driver's seat from outside the car.

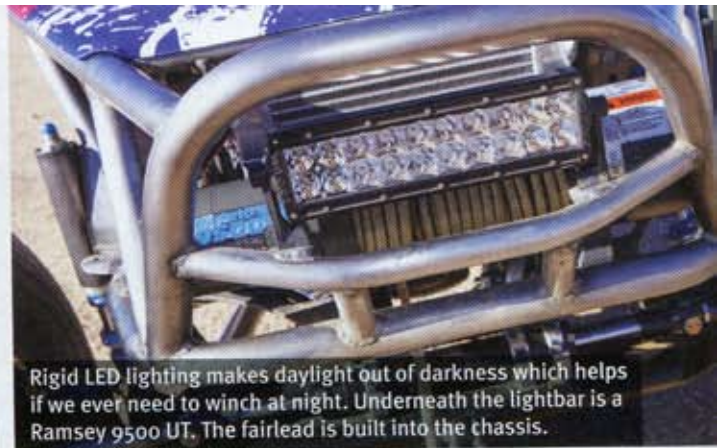
The fuel comes from an ATL Racing Fuel Cells tank of approximately 32 gallons capacity. They custom designed the cell to fit the Top Shelf chassis and have made it available for Trent cars ongoing. It's an aluminum "shoebox" design with a full bladder and foam. It maximizes the use of space below the spare tire and allows a variety of filler options. We ran our fuel vent up and around the B-pillar hoop and, using some AN fittings, were able to make nice 90 degree turns that kept the vent hose out of sight and fully functional with being obtrusive. The cell is held in place by a custom steel plate made on the Trent Fab plasma table. It's securely positioned and yet can be removed in a hurry if needed. The outbound fuel delivery starts at the main flange, enters the 100 micron filter/shutoff and then drops below the driver to meet the fuel pump. All of the fuel related items are on the left side of the car, all of the exhaust is on the right.

The CBR radiator fits in behind the seats between the B-pillars while the trans cooler is up front in the nose with its own fan. Right below the trans cooler and back is the Derale steering cooler. Matt was impressed with the cooling capacity as it's both large and efficient. Engine temps were never a concern. The coolant runs from the engine down the inside of the chassis and then out to the radiator before being returned down the other leg of the chassis. This not only uses otherwise wasted space but it increases coolant capacity and allows a larger radiator to be used. A pair of 16" Spal fans keep the coolant cool, a smaller one in front does the same for the trans fluid.

The links that hold the axles to the chassis are some of the nicest I've seen and Branik Motorsports built them. All made from 7075 aluminum, the lowers are 2.50" in diameter, the uppers being 2.00". They are designed to take abuse. Matt knows how to eke the last bit of performance out of a car and lesser links would possibly have failed. Stan Haynes and his Branik crew build great stuff and we had one less thing to worry about once they were under the car.



Trail-Gear's knuckles, Cs and steering arms allow up to 50 degrees of steering angle. Wilwood brakes are peeking from behind.



Rigid LED lighting makes daylight out of darkness which helps if we ever need to winch at night. Underneath the lightbar is a Ramsey 9500 UT. The fairlead is built into the chassis.

The Trail-Gear 1.25" heims held everything together and are simply beefy and tough. They have a lot of builder parts and should be on your list of companies to consider for more than just Toyota stuff.

PRP Seats took care of seating, harnesses and window nets. We got some cool looking carbon fiber vinyl covered seats for a look that matches our real carbon fiber dash. They look great together and once the belts were installed, along with the window nets, it was hard to keep Matt and Nick out of the car. They were comfortable, safe and able to focus on the prize. What I like about PRP is how comfortable they are, the fact that they're made in the US and, after having had four sets of their seats, I've never been disappointed. The fact that they were on the lakebed to provide racer support speaks volumes about their customer commitment.

Without communications, there would be no reason to even have a co-driver. That's where Rugged Radios steps in and made our system work. I provided an iCom VHF radio that I already had. It puts out 50 watts of power and reaches places that old CB radio technology can't even think of touching. The Rugged guys took that, along with the Rugged 686 intercom system and put together a way for Matt and Nick to talk. The cool thing about this intercom is that it's all digital and weatherproof with a membrane touch pad with memory, so when you kill the power to the car, you don't lose your settings. Add an iPod and some headsets and you can go trail running. Swap for helmets and firesuits and the Rugged equipment is equally at home doing triple-digit speeds and taking podium spots.

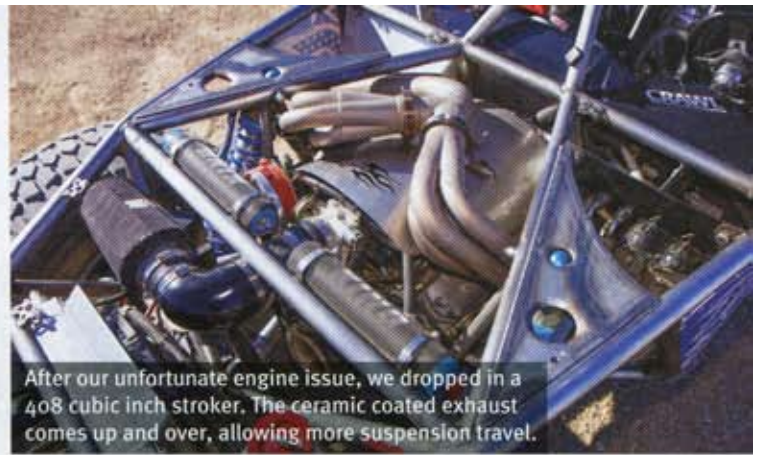
Information exchange between driver and co-dog is critical and usually the driver doesn't do anything but drive. The right

seat has a lot of responsibility and several resources to manage. Following the course is critical, obviously, so the Lowrance GPS is a mandatory item. With a busy cockpit, I opted to re-use my existing Elite 5M Baja. It's a smaller screen but it allows the co-driver to see other things instead of having an obtrusively large GPS in the way. AutoMeter gauges cover the dash and one of the really unique pieces is the speedometer. It's a GPS unit in a speedo so you get constant position and an analog style instrument showing you speed over ground. You can use it in any application since it doesn't need to have a vehicle speed sensor or any attachment to a t-case output. This makes packaging easier and in our case, added a speedo the driver could easily see. The balance of the AutoMeter instruments included water temp, trans temp, oil pressure, trans pressure so we could see any oil starvation before the transmission was harmed, along with a large tachometer. All of these gauges,





Rugged radios help us set up our iCom VHF and matched it to a Rugged 686 intercom and cabling. Sure beats yelling at 115 miles per hour.



After our unfortunate engine issue, we dropped in a 408 cubic inch stroker. The ceramic coated exhaust comes up and over, allowing more suspension travel.

where applicable, come with warning lights for either minimum or maximum operating parameters allowing the co-driver to quickly assess the car's health at a glance. If a light comes on, he pays more attention. If it doesn't, things are good to go.

Another area that is all co-driver is vehicle recovery. The Ramsey winch out front is another choice made because it makes us faster. With Ramsey's semi-auto clutch, the driver can hit the "in" switch from the cab after the recovery has been setup, negating the need for the co-driver to come back and flip the handle to engage the gearbox. It's a slick setup and looking back at last year's EMC race, I can recall a 225 foot run; 75 out with the rope, 75 back to engage the winch, 75 out again to finish the recovery. That kind of time can be the difference between winning and losing. It certainly makes it more fun not having to run as much. Ramsey is paying a lot of attention to what we're do-

ing and they are listening.

Bottom-line, I don't like wire rope and it was the first thing I swapped out. MasterPull Superline XD is the toughest and strongest synthetic I'm aware of and that's what we use. The rope is connected to a shackle on the front axle for use as a suck-down winch until vehicle recovery is needed and then it comes off.

Recovery can come from being stuck or being broken. In the back of the car, under the spare tire, there are several things that we covered in our Tech article on Spares last issue. You'll find a unit bearing, a power steering pump and pulley, a universal driveshaft for either front or back, a second Optima Yellow Top battery, an extra Mechman alternator as well as tools, small parts and eight quarts of fluids. Turns out the driveshaft and the unit bearing were needed during Friday's Ultra4

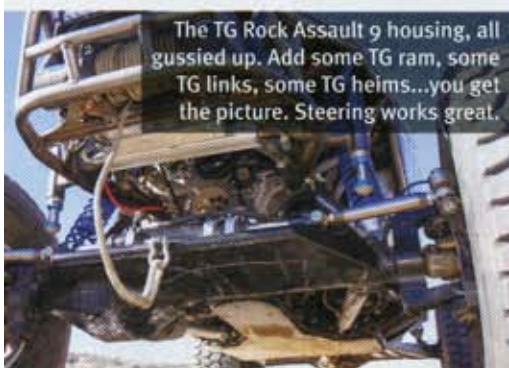
race. After having run to a podium finish on Thursday, the team prepped the car the best they could to run Friday as well. Having the spares made the difference.

Speaking of racing two days in a row, this involved a tire change. In the Legends race, as mentioned above, the tires were Falken 37" Wild Peak MTs. On Thursday night, the wheels got wrapped with a sticky version of the MT in a 38-13.50 which worked well and provided an even higher level of grip.

We're pretty excited about the finish and we're really excited about the prospects for this car in 2014. We want to try a variety of disciplines and locations around the country. Starting with KOH and a 2nd place finish might be hard to beat but we're going to give it the CRAWLmerica try. Stay tuned throughout the year as this car will be everywhere - maybe even offshore - spreading the spirit of the red, white and blue. (C)



The ATL fuel cell is a piece of art. Perfect fit and over 30 gallons capacity.



The TG Rock Assault 9 housing, all gussied up. Add some TG ram, some TG links, some TG heims...you get the picture. Steering works great.



Trail-Gear Creeper Locks. Anodized colored beadlock ring components. It just looks cool.



Under the spare are fluids, tools, spare PS pump, spare unit bearing, spare alternator, recovery gear, spare driveshaft. Murphy's Law = don't have it, will need it.



The tail end includes a Pac Racing Spring swaybar and another Trail-Gear Rock Assault 9 housing. The truss work done by Trent is nothing short of art. It makes a great axle better.



**Owner** CRAWL Magazine  
**Hometown** Reno, Nevada  
**Vehicle Type** Top Shelf  
**Builder** Trent Fabrication, Sparks, NV

# SPECS

## CRAWLmerica

### CHASSIS

Frame / Chassis Design	Top Shelf Two Seat Rock Racer
Frame / Chassis Materials	1.75" DOM
Cage / Cage Material	1.75" DOM
Overall Wheelbase	111"
Overall Length	159.5"
Belly Pan Clearance	18"
Overall Height	68"
Wheel Track Width	Front 84", rear 83"
Chassis Width	55" widest point
Overall Weight	4280 lb

### POWERTRAIN

Engine Make	GM LQ9 built by MJ Motorsports
Engine Displacement	6.0 liters
Engine TQ	400
Engine HP	450
Engine Induction	Normally aspirated
Engine Modifications	Comp Cams camshaft & valve springs, LS1 auto intake, Melling oil pump, Kevko oil pan, Cloyes True Roller timing set
Batteries	Optima Yellow Top x2
Radiator / Fans	CBR Performance w/ dual SPAL fans, rear bulkhead mounting
Air Intake	Trent Fabrication w/ K&N filter
Exhaust	Trent Fabrication custom header w/ Cerakote by Fine Line Powder Coating, Borla Sportsman
Transmission Make	Reid Racing SH400 built by ATO Performance Transmission
Transmission Adapters	Reid Racing bellhousing
Transmission Cooling System	CBR Performance w/ SPAL fan
Torque Converter	Custom by CT Converters
Transmission Shifter	Winters
Transfer Case(s)	Advance Adapters Atlas 3:1
Fuel Delivery	Aeromotive A1000 fuel pump, Aeromotive 100 and 10 micron filters, Aeromotive pressure regulator
Fuel Containment	ATL Racing Fuel Cells custom 32 gallon fuel cell

### BODY / INTERIOR

Body / Body Panels	Trent Fabrication, .125" polycarbonate
Skid plate / Material	Steel and UHMW
Painter Name	Trail-Gear wrap based on CRAWL Magazine design
Hood / Grille	Trent Fabrication, aluminum
Floors / Firewalls	Trent Fabrication, aluminum
Dash / Gauges / Switches	Auto Meter Pro-Comp with GPS speedometer
Steering Column / Wheel	Trail-Gear / Grant
Pedal Assembly / Cutting Brakes	CNC brake and Summit Racing throttle

### DRIVETRAIN

Front Suspension / Type / Materials	Triangulated 4-link, Branik 2.5" 7075 aluminum lowers, Branik 2" 7075 aluminum uppers, Trail-Gear 1.25" heim joints
Front Shocks	King Racing Shocks Internal Bypass 14" coilovers, external finned reservoirs
Front Bump Stops	King Racing Shocks 2" diameter
Front Axle Housing	Trail-Gear Rock Assault 9 fabricated 9" housing
Front Differential / Locker	Yukon 3rd with Yukon spool or Grizzly locker
Front Ring & Pinion / ratio	Yukon 5.29:1
Front Axle Shafts	RCV constant velocity 300M
Front U-Joints	RCV
Front Drive Flanges / Hubs	Trail-Gear Rock Assault 9 unit bearings
Front Brakes	Trail-Gear by Wilwood
Front Steering Setup	PSC pump, PSC/Trent custom reservoir, Trail-Gear double ended ram
Front Driveshaft	Bayshore Truck Equipment
Rear Suspension / Type / Materials	Triangulated 4-link, Branik 2.5" 7075 aluminum lowers, Branik 2" 7075 aluminum
Rear Sway bar	Pac Racing Spring torsion bar with Trent Fab arms
Rear Shocks	King Racing Shocks Internal Bypass 16" coilovers, external finned reservoirs
Rear Bump Stops	King Racing Shocks 2" diameter
Rear Axle Housing	Trail-Gear Rock Assault 9 fabricated 9" housing
Rear Differential / Locker	Yukon 3rd with Yukon spool
Rear Ring & Pinion / Ratio	Yukon 5.29:1
Rear Differential Cover	Nitro Gear aluminum
Rear Axle Shafts	RCV 300M full float
Rear Drive Flanges	Trail-Gear Rock Assault 9 unit bearings
Rear Brakes	Trail-Gear by Wilwood
Rear Driveshaft	Bayshore Truck Equipment
Tire Make / Size	BF Goodrich Baja KRT/b 39 x 13.50 x 17
Tire Make / Size for Legends class	Falken Wild Peak MT 37 x 12.50 x 17
Wheel Make / Size / Bolt Pattern	Trail-Gear Creeper Locks 8.5" by 17", 6 on 5.5 BP

### BODY / INTERIOR

Seats / Harnesses	PRP / PRP
Electronics	Rugged Radios 686 digital intercom, headsets and radio interface, iCom F121 VHF radio
Lights Interior / Exterior	Rigid Industries
Winches - Front / Rear	Ramsey Patriot 9500 UT with MasterPull Superline XD
Extras	Trail-Gear Quart Carriers, Lokar locking dipsticks, Ram Mount GPS mounting, Earl's remote oil filter mount
Fluids	Engine: Valvoline 10W-40 motor oil, Transmission: Caterpillar TDTO 10 wt transmission fluid, Transfer Case: Amsoil Tractor Hydraulic Transmission oil, Axles: Sweeney 203 gear oil, 250 wt, Steering: Sweeney 715 hydraulic steering fluid, Brakes: SSBC 1130 silicone DOT 5 fluid