
MCN
MOTORCYCLE CONSUMER NEWS
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NEW LOOK SAME GREAT READS
GET DIRTY
GO ANYWHERE
2016 HONDA AFRICA TWIN
PLUS
2017 YAMAHA FZ-10
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TOTAL CONTROL
BRAKE FLUID
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VOLUME 48 // NUMBER 01 // JANUARY, 2017

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Please recycle, or better yet, share MCN.

Change

> Please complete our reader survey by January 31, 2017 for a chance to win a $1,000 Aerostich gift certificate: ***MCNews.com/survey***

MANY OF OUR readers trace MCN back to its origins and have already adapted to several significant transitions. On the prior pages, there is a new logo and our table of contents relocated to the inside cover. What follows is a brief history of MCN's evolution through the years.

In August 1969, Road Rider magazine launched, helmed by editor Roger Hull. It was the first American magazine catering to the touring rider. Road Rider evolved into a full color glossy magazine with advertising by the time Bob Carpenter took over as editor in January 1984.

In January 1991 Road Rider went through its first major transformation, abruptly dropping advertising and color printing and becoming a black and white news magazine, as it would remain for 17 years. The subtitle, "Motorcycle Consumer News," replaced "Your Guide to Touring America," indicating a focus change from touring to news journalism that would lead MCN through its next quarter century. This drastic reimaging was unwelcomed by many of the touring readership and subscriptions dropped off at a rapid pace. Nevertheless, Bob was committed to the new format and approved a project larger than any the magazine had previously undertaken.

IN AUGUST 1992, Road Rider published Fred Rau's expose on motor lubricants, "Snake Oil." Positive industry response to the seven-page feature put Road Rider on the map as the unbiased news outlet for motorcycle enthusiasts. Shortly thereafter, as editor of Road Rider magazine, Fred Rau completed the next great metamorphosis. In January 1993, Road Rider magazine officially became Motorcycle Consumer News.

After a stint as the managing editor, Lee Parks became the next editor of Motorcycle Consumer News in June 1995, further increasing the focus of the magazine on technical research and how to ride better. As a racer, Lee included more content on improving riding performance as well as technical contributions about how motorcycles work, penned by technical editor Dave Searle.

Dave Searle became the editor of Motorcycle Consumer News in May 2000. For many (myself included), Dave was the only editor we have ever known, as he served as MCN's editor-in-chief for 15 years. In addition to a steadfast commitment to accuracy and thoroughness in researching and documenting all manner of technical knowledge, Dave also oversaw the March 2008 transition of Motorcycle Consumer News back into full color. Upon Dave Searle's retirement, our publisher immediately started looking for the team that would take MCN into the future.

WE'VE ALREADY MADE many improvements to the magazine, including upgraded paper stock. Behind the scenes, we've been planning MCN's first major redesign and new logo since the early 90s. To assuage those who fear change, this issue also includes words by Fred Rau, Lee Parks, Dave Searle and myself—every editor of MCN. We've also brought back the world-touring expertise of Dr. Gregory Frazier, off-road excellence of Gary LaPlante, technical know-how of Tracy Martin and the reader favorite medical column, renamed Health Matters. We'll have more surprise scribes returning to MCN in the near future.

It's worth noting that every editor had contributed to MCN before becoming the editor as well as after leaving the editor position. I imagine very few magazines can say that. It is a prime example of how committed every single contributor is to our loyal readership.

This is still your magazine. Fill out our survey and let us know what you want to read. Our goal is to include more content than ever before. We're aiming to entice lost subscribers from the past 48 years and appeal to an entire generation of new riders who have never heard of us. Now is the the perfect time to come along for the ride. **MCN**

READER LETTERS

ONE ELEMENT IS not addressed in David Hough's *Mastering The Ride: More Proficient Motorcycling*—YouTube. Riders using public roads to record extreme videos, posted online for accolades and public recognition. Older riders even seem attracted by these reckless videos. As a younger, safety-conscious rider, I plan on riding until I can't. My goal is to give back by teaching—I see the need for it. Thank you for the inspiration.

—Chad M. Bohna

My books, including Mastering the Ride, *predate YouTube. The danger of driving a motorcycle is the same today as it ever was. The problem is that fatal motorcycle crashes attract the attention of agencies that feel "something must be done." Hooligans are a very visible problem, but there are a shocking number of fatalities on local roads, anchored by famous watering holes, which attract primarily cruiser enthusiasts. A cruiser rider who is DUI is a lot more dangerous than the hooligan doing a wheelie. Statistically, more motorcyclists equals more fatalities, regardless of training, licensing, law enforcement, etc., but current "safety" programs continue to attract more people to riding.*

—David L. Hough

TRIKING

I have been a motorcyclist for 60 years. I sold my last two-wheeler, but became interested in three-wheelers many years ago. My first was a Steib sidecar outfit. Since then, I've had several sidecar rigs, trikes, Spyders, a Slingshot and four Miatas. I'm currently driving a 2016 Spyder and a 2016 Miata. I fully agree with your response to the reader letter on selection of trikes (MCN 11/16).

—Pierce Felch

I DISAGREE THAT we should limit the number of riders. I decided it would be "cool" to have a motorcycle endorsement and took an MSF course without goals or aspirations. I loved the experience and within two weeks bought a used bike. If the net had not been cast wide, I doubt I would have picked up this sport that I love. Instead, let's make EVERYONE ride motorcycles. We are better drivers because we are also riders and look out for riders even when we are not on our bikes. A population experienced on two wheels would be more aware, observant, understanding, and compassionate toward motorcyclists.

—Pete Elton

I DECRY THE suggestion that preventing new riders is the only legitimate way of keeping the fatality rate from rising. David is on firmer ground when he applauds states that have decoupled rider training from programs pushed by the motorcycle industry. The experience of centuries has taught us that the first goal of capitalism is to promote its own interest. The decision of state legislators to push back against that culture is a service to all of us.

Understanding the culture each motorcyclist identifies with is of greater importance in addressing fatality rates. I attend annual motorcycle safety forums sponsored by the DOT. In one memorable session, representatives of ABATE "taught" us how to drink and ride. ABATE has also consistently fought against meaningful helmet laws.

I also attended the annual BMW-MOA rally. Classes emphasized ways to keep both ride and rider in top condition. Leaving the rally, it was rare to see a rider without helmet and safety gear, even in July heat. Aspiring riders watch those of us who ride. What they learn will have a more lasting effect than a few hours spent in safety courses. We should all remember that, rather than trying to keep others from entering the sport.

—Cleveland Eugene Bryant

I'VE ENJOYED THE relative merits of different approaches to motorcycle training, but we are not addressing the biggest problems. First, we are riding with dangerously distracted and selfish car drivers. Second, there are still way to many who drink and ride. To reduce the danger of motorcycling in a statistically significant way, we need to train drivers better, and never drink and ride.

—Tim Groves

THE TOTAL LACK of discussion with new riders about how much risk they are assuming is astounding. The majority of RiderCoaches I have worked with think discussing risk is negative and will scare students. Unless each RiderCoach takes the initiative to research the statistics, they have no idea what the data is. One student thanked me for sharing the statistics as he decided to leave.

Additionally, many RiderCoaches are reluctant to counsel out students that are not meeting objectives and even 'fudge" results on the Skills Evaluation

POLICE ASK ABOUT OUR LIGHTS

LOCAL LAWS ON accessory lighting vary considerably and it's the rider's responsibility to understand and comply with the law. We have sold both our P3 Rear Lights and Photon Blaster Front Lights to customers from every state and have never been asked for a refund or been informed of a citation as a result of our lights violating local laws. The unique programmability, using only the brake lever, provides flexibility to adapt to local regulations by changing the brake light to a steady bright light or turning off the conspicuity flicker. Anecdotally, we have heard stories of police officers asking riders about our lights, out of personal interest.

—Bill@skenedesign.com

to ensure they pass. If they are unable to meet the minimum requirements of the MSF evaluation, how are they going to survive on the road?

We need to get serious about sharing the risks of this great sport with new riders, in addition to a higher standard of performance in training and licensing,

—name withheld

THE OLD ADAGE, "use it or lose it" definitely applies—not everyone ages at the same rate. Just because you're passing some particular birthday doesn't mean it's over. The choice of bike and where and how you ride are fluid factors, but the biggest factor is riding as much as you can, with a positive attitude.

If you're uncomfortable, make the bike conform to your needs or get a different bike. Seats, suspension, bars and pegs can all be modified. Find people to ride with that are at your level or better. Keep reading and thinking about your next bike. Most of all, keep it fun!

At some point we all have to stop riding, but obsessing about it just ensures it will happen that much sooner.

—Marc Parnes

A HEADLIGHT MODULATOR user for 15 years and 400,000 miles, I was constantly stopped by law enforcement, stating, 'flashing headlights are illegal." About a third of the time I explained modulating by presenting the federal statute and was dismissed with a thank you. Another third ended with, "It's not legal in my town." The remaining third ended with a summons.

Subsequently, I sent letters to the court explaining modulating headlights with documentation. Occasionally, I had to plead guilty or appear, but was never found guilty on appearance. I finally lost patience for the harassment and stopped using it, but was it beneficial? ABSOLUTELY!

—Jay Hubelbank

OUR SPORT IS very hard to get started in. There is no beginner mode in traffic. The focus should be on finding ways to increase training opportunities rather than discourage all but the most hard-core riders. Safety courses are too easy and riders get on the road too quickly. We need to create more ways for riders to train and practice in safer environments, so more people might try it and increase their awareness.

—Aline Bernstein

IMPRESSED BY THE Mychanic Sidekick Stool (MCN 11/16), I tried in vain to buy one. I ended up with a near-identical stool from eBay.

—Frank Drecchio

Mychanic apologized for any issues, they have updated their website for online ordering: mychanic.us/products/sidekick-stool, *855-743-7702.*

THE KANC

Regarding the condition of the Kancamagus Highway. Last fall the NHDOT used chip seal on a six mile section of this fantastic road. Our bicycle club invited the NHDOT committee members to ride on the chip seal surface. We argued that chip seal on heavily used bicycle and motorcycle routes is not safe or pleasant. The NHDOT report agreed that the Kanc should not be chip sealed and they recently resurfaced it with proper pavement. In addition, they resurfaced the section of Kanc that Fred Rau found so rough that he feared for his safety. It was scheduled for resurfacing in 2018, but has been completed early. The Kanc is now pristine.

—Tod C. Powers

WILL YOU PUBLISH the Performance Index and Used Bike Value Guide again soon?

—George Kosovic

These two features are on temporary hiatus as their creation is extremely time consuming. We're seeking solutions to assemble them more efficiently, possibly online. In the meantime please consult the following: kbb.com/motorcycles, nadaguides.com/motorcycles.

—David Hilgendorf

SKIDBIKE APPEARS no more complex than a sidecar, available at a fraction of the price. If they charged $6,000, they'd have a chance to sell to bike clubs, police motor squads, etc. As appealing as this item is for training, the price is a turnoff.

—Troy Nicks

I suggested, and Skidbike is considering, offering only the wings, minus the fore and aft suspension modules. You'd lose the ability to adjust traction, but the price would be more reasonable and the unsprung weight would be vastly improved.

We reported the MSRP as tested, the market will respond accordingly. This is not a device for the average training facility or consumer. Whether you take a wait-and-see or pay-to-play approach, Skidbike is still a fun and educational experience.

—David Hilgendorf

SEND LETTERS TO THE EDITOR
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DOWNTIME
Q&A

Maintenance and Labor Costs

Q: A CLOSE LOOK at standard maintenance in CycleStats indicates it costs $890 (parts and labor) on a $6,500 motorcycle. Two and a half hours sounds like a long time to adjust the valves, then .5 hour to install an air cleaner and 1.2 hours to change the sparkplugs? How much of the bike has to be disassembled? What makes routine services take so long? If accounting for removal of body work, tank, etc. to get to the engine, then with everything out of the way, wouldn't installing a new air cleaner take one minute and changing sparkplugs about five?

A: BEFORE BECOMING A *technician, I thought shop charges were absurd, but didn't understand the operating cost of business and things that come up while working on a vehicle.*

Consider the cost of liability insurance for a repair shop. Just about anything touched on a two-wheeled vehicle has the potential to fail and cause an accident, resulting in serious damage, injuries, lost wages and, of course, lawsuits. Back in 2002, California legislation changed and our liability insurance went from $25,000 a year to $54,000 a year for a moderate shop of 20 employees. The insurance company required 25 percent of that sum up front to provide coverage. Without that insurance, the city would close us down. We had to get a loan to pay for it.

Advance 15 years, with more lawsuits and new restrictive legislation breathing down the small business owner's neck. Shops may be paying double or triple that for insurance. Also consider the cost of maintaining a shop that has regulatory bodies such as CARB, EPA, DOT, NHTSA, OHSA and the local fire department doing its own periodic inspections. This requires the shop to train employees and upgrade the building to maintain compliance. I don't miss it.

Most shops have overhead that requires a rate of $100+ per hour to cover expenses. In fact, many dealership service areas operate at a loss, unless they push accessories. That's one reason Harley-Davidson shops are usually profitable. Plus, factory H-D has a strong influence in the customer experience and training of support staff that run the service areas. BMW does a great job at this as well. Ask any H-D or BMW owner how much it costs for periodic services.

TO ANSWER YOUR *your question about how long it takes to perform services. Yes, it only takes a few minutes to install an air filter after everything is removed; however, there are other consumables used: time spent on inspections, paperwork filled out, data researched, etc. There is also the likelihood that some parts were not included as an individual allowance and allocated into the stated service times. It's also likely to take longer than expected. The bike probably has grime all over it, which needs to be cleaned to avoid contaminating internal parts that the technician is about to expose. These things cause the job to average out to the times given, more or less.*

As an example, an inline-four sportbike is usually pretty simple to work on, but to perform valve clearance adjustment, several things need to be done first. The tank comes up, air box off, air injection system and lines off, all areas above and around the valve cover cleaned off, valve cover off, set the crank/cam position for each cylinder and measure it in a tight awkward place. It is dark, difficult to get to, see and feel.

If the lash is out, the cams have to be removed, shims replaced, then cam timing requires setting again. Those cams were installed at the factory with the engine out of the frame. You can't see the marks because the frame blocks line of sight once the engine is installed. You end up with a mirror and a flashlight looking at timing marks backward and trying to do an accurate pin count. Then double check, then triple check. These things take more time.

MANUFACTURERS GIVE *dealers hourly values for each machine's specific part removal and replacement (R&R). It is intended to be used for warranty work, and assumes a capable technician performing the job several times, which improves efficiency. The numbers are very lean. It is customary for service centers to multiply the labor hours by 1.5 for a more reasonable estimate in a shop doing one-off work. Then, they multiply that figure by the labor rate. I feel the 1.5 is reasonable, but some shops are probably spiking the hourly rate.*

Several manufacturers have started supplying times for complete periodic interval services. Unfortunately, these numbers are not available to the public. At some point, I'd expect the Department of Transportation to require that these numbers be published. I feel this would maintain fairness for the consumer, keep things transparent and hold dealerships accountable. I'm not saying all dealerships are gouging, but a few bad apples ruin it for everyone else.

—Kevin O'Shaughnessy

GOT PROBLEMS? MCN DOWNTIME
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or email questions with jpg images to:
editor@mcnews.com Subject: Downtime

2016 ARTICLE INDEX

MCN

Pipeline

> By **Russell Evans**

Yamaha's R6 is even more race-ready, with advancements in throttle, brakes and suspension.

YAMAHA R6 GETS UPGRADES

Yamaha's description of the R6's front face as "sinister" is an indication of how serious the company is about race and track performance. Naturally, the prime concern is performance, not styling, and while the profile has been streamlined, the 2017 model has plenty to offer in that department.

A ride-by-wire Yamaha Chip Controlled Throttle (YCC-T), selectable D-Mode engine response, a multi-mode traction control system and an accessory quick shifter are new rider aids that are likely to sell a few R6's.

The 600 also features the same KYB 43mm inverted front fork as the company's R1, tuned to suit the unique characteristics of the R6. A new KYB rear shock provides a wide range of adjustment and larger 320mm front disc brakes, matched to radial-mount four-piston calipers and a Nissin radial- mount master cylinder, all right off the R1, for exceptional braking power. ABS is also new for 2017.

ZERO UPS ITS RANGE

Zero's 2017 model line features as much as 19 percent more torque, up to 11 percent more power and is the first production electric motorcycle to exceed 200 miles on a charge.

The Zero S and Zero SR ZF13.0 models equipped with the optional Power Tank accessory now exceed 100 miles on the highway and 200 in the city—the longest range of any production electric motorcycle.

Honda's CRF250L Rally, inspired by the manufacturer's Dakar racing success, is lightweight and versatile.

HONDA ROLLS OUT 250 ADVENTURE

The CRF250L Rally will be marketed for weekend adventure, long-distance touring or the daily commute. Featuring styling that evokes images of adventure and travel, the bike is part street, part dirt. Long-travel suspension and high ground clearance enhance its long-distance off-road ability, and a larger floating front disc—plus ABS that can be switched off for the rear brake—delivers stopping power.

The CRF250L's rally-type "floating" screen, fairing and radiator shrouds provide wind protection, with the rest of the machine designed with minimal motocross styling. The asymmetric headlights are LED, as are the turn signals. A large fuel tank allows extensive range, and the new digital dash includes a fuel gauge and tachometer. The engine boasts solid bottom-end torque coupled with substantial top-end power, thanks to updates from the original CRF250L, including revised PGM-FI and throttle body, a new airbox and a lightweight exhaust.

Honda also unveiled the standard CBR1000RR, which boasts most of the same updates as the recently revealed CBR1000RR SP., with a more budget-friendly street price.

» BMW 1000 Platform

BMW Motorrad's 2017 trio of 4-cylinder 1000cc machines have been adapted to EU4 emissions standard requirements, while combining excellent riding dynamics and athletic character with safety and everyday practicality.

The S 1000 RR has added ABS Pro to its optional equipment item "Riding Modes Pro," and made DTC (traction control) standard. The sportbike, which comes standard as a single-seat model with passenger seat cover, also has an optional passenger package available at no charge as an alternative. Other revisions are largely cosmetic, including established color concepts in a new design, plus a gray/black variation.

The S 1000 R has increased power-to-weight ratio by bumping up horsepower from 160 to 165, and lightening up by nearly 5 pounds. The upright sportbike has also added a new frame, titanium rear silencer, vibration-free handlebars, ABS Pro to "Riding Modes Pro," and HP Shift Assistant Pro for clutchless shifting. Its instruments cluster has been upgraded for better readability and the fairing has been downsized.

The S 1000 XR adventure-type also increased horsepower from 160 to 165, enhanced comfort with vibration-free handlebars and increased maximum payload by more than 22 pounds.

» TRIUMPH BONNEVILLE BOBBER

Fitted with a 1200cc, Bonneville HT (high torque) engine, the Bobber is tuned for more torque and power lower down the rev range. The charismatic 270-degree firing interval is designed to deliver smooth, linear power from the six-speed gearbox. Power comes through twin classically styled throttle bodies that are ride-by-wire controlled and a liquid cooling system features a unique radiator and larger fan. Topping off the engineering innovation is the 'clean line' Bonneville technology packaging system, which includes the straight line hidden 'cat box' pipe run and the sensitive incorporation of rider focused technology such as the ECU, ABS modulator and immobilizer.

Stripping back the T120 achieves minimalist styling principle goals, a muscular stance and purposeful engineering. Such features as an authentic battery box with stainless steel strap, bar end mirrors, rear mudguard loop, carb-styled twin throttle bodies, broad adjustable levers, traditional rubber gaiters, and classic rear 'drum brake' inspired hub add to the nostalgia.

LATEST RECALLS

Make: BMW North America
Model: 2013-2016 BMW G650GS
2013-2015 BMW G650GS Sertao
Component: ECU
NHTSA #: 16V689000

Make: BMW North America
Model: 2014-2015 R nineT
Component: Turn Signals
NHTSA #: 16V689000

Make: Honda Motor Co.
Model: 2014-2015 Grom 125
2014-2015 NSS300 & NSS300A
Component: Fuel Pump
NHTSA #: 16V661000

Make: Piaggio Group Americas
Model: 2016 Tuono V4 1100
2014-2015 Aprilia Tuono V4 1000
2015 Aprilia Caponord 1200 ABS
2016 Aprilia Caponord Rally
Component: Brakes
NHTSA #: 16V691000

Make: Ducati North America
Model: 2016-2017 XDiavel
Component: Sidestand
NHTSA #: 16V729000

Make: Ducati North America
Model: 2016-2017 XDiavel
Component: Final Drive Pulley
NHTSA #: 16V679000

Make: Polaris Industries, Inc.
Model: 2015-2017 Slingshot
Component: Fuel System
NHTSA #: 16V754000

Make: Polaris Industries, Inc.
Model: 2015-2017 Slingshot
Component: Swingarm
NHTSA #: 16V755000

Make: Polaris Industries, Inc.
Model: 2016-2017 Slingshot
Component: Brakes
NHTSA #: 16V752000

Make: Zero Motorcycles Inc.
Model: 2015 SR, S, DS, and FX
Component: ABS
NHTSA #: 16V610000

For more information, contact the NHTSA Safety Hotline: 888.327.4236 or *safercar.gov*

MCNEWS.com for more recalls

WORLD > By **Russell Evans**

BMW G 310 R

Designed specifically for the world market, the BMW G 310 R can run on the most diverse fuel qualities, meets all emission standards and local requirements—and takes the typical BMW premium aspiration to the segment under 500cc.

A single-cylinder engine keeps fuel economy at a high level and propels this dynamic, yet pragmatic lightweight with sufficient comfort, both in town and out in the country, thanks to an upright seating position. The company characterizes the zippy commuter, "as happy to wind its way nimbly and flexibly through the narrow streets of a city as it is traveling supremely and powerfully along country roads." With a relaxed seating position, it adds the welcome capability of being able to offer a relatively comfortable full-tank's ride. A short wheelbase and upside-down fork help deliver precise handling and easy cornering.

FB MONDIAL HIPSTER

After winning 10 small-bore Grand Prix World Championships from 1949 to 1957, the Fratelli Boselli race team all but disappeared. Five decades since its heyday and 15 years since a new motorcycle bore its logo, the Italian company returns to mass production as FB Mondial with the HPS 125 Hipster.

The new scrambler is powered by a liquid-cooled single-cylinder unit outsourced from Piaggio Group. The fuel-injected single with double overhead cams—the first motorcycle engine developed by the company in more than half a century—produces 15 hp, the upper power limit of the European A1 license, via a six speed gearbox.

The front end has 41-mm inverted forks, a four-piston radial caliper and a pair of shock absorbers spring the rear. The Hipster, which tips the scales at 287 pounds wet (3.7 gallons of fuel) is scheduled to hit the showrooms in the second quarter of 2017.

HERTRAMPF PANIGALE 959 R

When Denis Hertrampf created a modified Ducati race bike to sell at auction and benefit a charity called "We Help Children," he decided to let the kids lend a hand in decorating.

Students from Hertrampf's daughter's third grade class and his son's kindergarten class made the handprints that adorn the striking Ducati racer.

The special edition race bike adds 15 additional horsepower to a stock mill already approaching 160 hp. It also received a racing suspension upgrade, then was raced in the German "Tuner Grand Prix."

It was sold at auction during a 24-hour charity marathon, a telecast of Germany's biggest private television channel.

XTR BANDU

Bike builder Pepo Rosell unveiled his latest creation, the Bandu, for which a 1994 Ducati Monster served as donor bike. The Ducati 900 SS tuned engine has ported heads, increased compression ratio, EVR anti-hooping clutch and a lightened flywheel. The beast also features such high-end components as adjustable Showa forks from a Ducati 900, Brembo PR19 radial brake pump, Aviacompositi dash, Brembo floating rotors, Roadracing front mudguard, Frentubo brake lines, PT 13 radial clutch pump, Mash front light, high-sider mirrors, LIPO battery, DNA airpods, Tamburini race oil radiator, SuperMario two-in-one exhaust, Valtermoto CNC-machined footrest, Ohlins rear shock and NG rear brake disc.

The stark naked bike look was achieved with XTR clip ons, light bracket, megaphone by SPARK, LED turn signals, license plate holder and Metralla solo seat. The modified frame, swingarm and fuel tank were painted by Artenruta Painting. MCN

Strategy

» **LEGAL** *BY HARRY DEITZLER*

Slam Dunks

Do most lawyers just take slam dunks? I had an accident and couldn't find anyone to represent me. In 2008, I had my front tire replaced. All seemed fine until Nov. 11, 2011. My bike went into a "death wobble," became uncontrollable, and I went down in the grassy road divider. My son examined the bike's remains and found some material that was forced out of the front tire bead, giving the appearance that the tire came apart from within, the sidewall was also wavy. My son also found a stamp in the sidewall that read "For FMVSS11S PURPOSES ONLY"

Why couldn't I find anyone that would take my case?

— Paul Klein

I UNDERSTAND YOUR frustration. Usually "slam dunk" cases are settled before an attorney gets involved. An attorney is only consulted when payment of the claim is disputed.

Because attorneys pay the costs of the case up front, they will always assess the economic viability of the case. In a product liability case, those costs include compensating experts, funding product tests and paying deposition cost, in addition to the usual expenses of medical records and testimony. If the jury value of the case does not clearly offset the amount of the attorney's money placed at risk, the attorney will decline the case. In a product defect case, it is typical for those out-of-pocket expenses to quickly exceed six figures.

The notation on the tire is not significant unless it can be placed in context as to whether it is referencing specifically that tire, as opposed to simply limiting the context of the other numbers and notations on the tire. I would need additional information about the manufacturer and specific model number of the tire before forming an opinion. Typically, tire failure issues unrelated to puncture are caused by heat and delamination. In the absence of external evidence of delamination, if there was an internal failure, the defect should have been obvious when the tire was removed from the rim.

After reviewing the photos provided, I was unable to evaluate whether or not you would have a potential claim arising from a defect in the tire. There is damage to the rim where the material is forced out of the bead, so it may be hard to establish that the suspected tire damage preceded the wobble and crash. Whether the claim is against the dealer who installed the tire or against the manufacturer of the tire, your attorney would still have to prove to the jury that your crash resulted from the tire problem and not something else coming loose on the bike.

— Harry Deitzler

Note: This information is not to be considered professional legal advice.

Harry Deitzler is a partner in law firm Hill, Peterson, Carper, Bee and Deitzler, PLLC. Submit inquiries at *motorcyclejustice.com*

» **STREET** *BY DAVID L.HOUGH*

Impatient Drivers

You're on the way home from a motorcycle rally, making time on the freeway. You favor riding a few MPH faster than traffic, because you believe that to be safer.

Coming up behind a slow moving "triple" truck that's hogging the passing lane, you move to the right lane to pass. You're cautious and watching carefully for any clues the driver might change lanes. Just as you accelerate to pass, a "road shark" comes up swiftly in the left lane, swerves over in front of you without signaling, and speeds past the truck. You manage to roll off to avoid getting sideswiped, but you are startled by the aggressive driving.

If you were annoyed by the slow-moving truck in the left lane, you might have predicted that other drivers would also be. Constantly maintain your awareness of the entire situation, including other vehicles approaching from the rear in your lane or adjacent lanes.

If you had observed that the car was gaining rapidly on you and the truck, you could have predicted the driver might rapidly change lanes, and been prepared to give him more room. Alternatively, you could have accelerated sooner to get past the truck without holding up anyone else.

David L. Hough authored *Proficient Motorcycling* and *Street Strategies*. He has contributed to MCN for 20 years.

DAVID HOUGH

ADVENTURE *BY DR. GREGORY W. FRAZIER*

Keep Gear On The Down Low

There is only so much one can pack onto a motorcycle before it becomes top-heavy.

The invention of the motorcycle also launched a never-ending search for the best way to take necessities along for the ride. This is especially true for us long-distance and adventure types. Tank panniers have been around for years and have come in many forms, from leather horse saddlebags thrown over a gas tank to motorcycle-specific bags.

Modern panniers provide easy access to cargo and, often, protection from wind and rain—an added benefit to their large capacity. The drawback is a tendency to fill them up, each item adding weight up high on the motorcycle when distributing the weight lower on the bike would give better stability and handling. One trick is to use gas tank panniers as additional side bags, behind the rider's feet, resting on top of the rear passenger foot pegs and in front of rear-mounted bags. I began by filling tank panniers with lightweight items, such as my rain suit. Then, I added a tire pressure gauge and a multi-tool—items I might want to get at quickly. Then, it was water bottles and a flashlight. When I discovered I could carry a gallon of gas in each tank pannier, about 12 pounds worth, it hit me: "I'm adding serious weight where I don't want it—up high."

TIPS: Avoid filling fuel containers to the brim and be sure the container nozzle faces upward and the cap is tightly secured. Once you've burned a couple of gallons, pull over and get the auxiliary fuel out of the pannier and into the motorcycle.

If you carry tools, line the bottom of the pannier with something soft, like spare gloves or an oil rag. If you don't, it is likely the "tink tink" you hear later will be your tools or tire irons hitting the ground after they have worn their way through the pannier material.

Dr. Gregory W. Frazier authored four books on global motorcycle adventure, logging five circumnavigations and over 1 million miles.

DIRT *BY GARY LAPLANTE*

Off-Road Riding Helps on Street

Riding off road is excellent for developing skills that transfer to riding on pavement, including feel, speed management, body positioning, recognizing changes in road conditions and terrain, and braking and turning ability.

Learning to ride off-road is the best option for beginners, but it's also a great way to improve street riding skills. Here are some reasons riders learn more and faster when they ride off-road:

Dirt bikes are confidence inspiring, small, light, easy to control, responsive and provide immediate feedback. Better riders practice on bikes that don't create physical limitations. Experienced dirt riders can ride any motorcycle well.

"Feel" is the fine, delicate feedback received through contact points (hands, butt and feet) and the deliberate coordination of controls. Feel for braking, lean angles, engagement of the clutch, throttle position and traction loss is easier to develop on a dirt bike. It is best to develop control where speeds are slow. Dirt experience builds the confidence that makes riders faster.

Excellent braking and turning skills are essential to riding well. Braking on the threshold of lock-up develops the feel and judgment needed for any situation. Off-road riders discover how far a motorcycle can lean in high and low traction situations, including sliding while braking or accelerating.

Terrain reading is high priority when riding a motorcycle. Off-road riding offers many hazards, which force attention to details and changing techniques or lines.

Riding requires excellent judgment, good timing and the ability to respond correctly. Good judgment is hard to teach, but can be relatively safely developed with the lower speeds, lighter bikes and reduced traction in dirt.

Don't let anything surprise you.

Gary LaPlante is the author of How to Ride Off-Road Motorcycles and owner of MotoVentures.com Dirt First training.

GREGORY FRAZIER, GARY LAPLANTE

» Sidi DEEP RAIN BOOTS

With new leather / Gore-Tex boots now routinely commanding more than $500 per pair, Sidi has combined the characteristics of its top-shelf touring and adventure boots (and deleted some of their more expensive materials) to create the new Deep Rain models, bridging the gap between the features serious riders expect and a more affordable price point.

Let's start with what's not here: Leather and Gore-Tex. Instead, Sidi has substituted synthetic leather called "Technomicro" for the exterior shell's base material, while the interior uses a breathable "Trockenfuss" liner. Besides these material swaps, the Deep Rain boots boast a host of notable features suitable for both on-road riding and moderate off-roading as well.

The exterior's styling smartly balances the promise of rugged durability with contemporary aesthetics, starting with the stylized faux-suede upper, which blends nicely with the surrounding Technomicro material. A huge Velcro closure tab lives on the shin area, beneath which a full-height gator ensures that feet stay dry even while wading in deep puddles. Two replaceable, micro adjustable nylon/aluminum cam lock buckles with memory retention straps provide a snug, secure fit.

On the road, the Deep Rains exceeded all expectations. I first immersed them in water for a full six-hour bathtub test, and not a drop leaked inside, nor was there any leakage whatsoever over months of testing. Comfort under all tested conditions was superb, including extended rides through the hottest summer ever on record. Indeed, much of the credit for this goes to the synthetic materials themselves. Despite their robust appearance, these boots are very light, weighing in at only 4.7 pounds total for my size 10 pair. This translated into less fatigue while riding, walking, and hiking. Likewise, the Technomicro material simply doesn't scuff unless the boots take a big hit. At this point in my testing cycle, leather boots typically show multiple wear marks from abrasion against the motorcycle and flying road debris. By contrast, the Deep Rains still look like they came out of the box yesterday. Such admirable performance in real-world conditions should alleviate any initial skepticism riders may have about the synthetic materials used in these boots. While perhaps the luxury and breathability of Technomicro and Trockenfuss are a few scintillas below the gold standard of genuine leather and Gore Tex, the MSRP for the Deep Rain boots is only $295.00—a frankly irresistible value proposition.

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—Moshe Levy

Motonation, 619-401-4100, *motonation.com*

» ALPINESTARS ELOISE AIR JACKET

For a woman, form and function usually need to go hand-in-hand. For me, I like something in the middle. I wanted a jacket that could stand up to weather, impacts, and be comfortable. Alpinestars' Eloise Air Jacket has an attractive and comfortable look, plus CE-certified shoulder and elbow protection. I am usually between a small and medium. After checking the size charts multiple times, I played it safe and went with the larger size. As soon as it was on, though, I knew it was way too small.

I took another look at the size chart, measured everything I needed to measure multiple times, and it looked like a large or extra large would be a better fit. I decided to go with the large, as I didn't want a jacket that hung off my form, and I was right on—it was a perfect fit. The torso was as long as I wanted; the arm length fit me great, and when zipped, wasn't cramped in the slightest. I really liked the fit and how light it was, even with all the padding. It was time to test it out on the bike. Because the weather was in the high 80s, I wanted to see if I would be cool enough. I was not disappointed. Thanks to the mesh inserts, I was cool throughout the ride. MSRP is $179.95.

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—Megan Stewart

Alpinestars, 800-409-0903, *alpinestars.com*

SIDI, ALPINESTARS

» Motoport RACING GLOVES

Motoport's Racing Gloves eschew traditional leather in favor of fiber/dynatec/lycra stretch paneling with Dupont Kevlar swatches safety-stitched over the fingers and palm areas. A vented TPU knuckle protector over dense EVA closed cell foam provides additional fortification on the dorsal side, while a velcro-actuated wrist cincher and gauntlet strap help keep the gloves secured while in use. The overall appearance is Spartan, though the rough Kevlar swatches, which resemble a pumice stone in texture, add a distinctive accent to the styling.

On the road, the Racing Gloves have some unique attributes owing to the exotic material blends. There is literally zero break-in time required, since the materials are thin and the fingers arrive pre-curved. These gloves are extremely lightweight, and despite the uniform black coloring, do not seem to absorb heat like traditional leather gloves do when left in the sun. They also breathe fairly well for all-purpose gloves, but are not as free-flowing at speed as dedicated perforated summer gloves such as the Klim Induction models we recently tested (MCN, August 2016). Ultimately, Motoport's Chinese-made Racing Gloves are good general purpose riding gear, but with an MSRP of $169.00, some of the expected bells and whistles are conspicuously absent.

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—Moshe Levy

Motoport , 800-777-6499, *motoport.com*

MOSHE K. LEVY; MARK BARNES

» BMW MOTORRAD CITY 2 RIDING PANTS

Current below-the-belt riding gear includes a broad spectrum of nuanced options, from lightly fortified jeans to fully armored leather or ballistic textile pants. BMW's City 2 trousers slot nicely in the middle of this range. Constructed of a sturdy cotton/Cordura blend, they feel more substantial than jeans, but not as stiff and bulky as most synthetic gear. This fabric is slightly water-repellent and allows no real airflow. Fully mesh-lined, and assembled with numerous panels and articulated knees, they're comfortable both on and off the bike, and their understated styling draws no attention at destinations.

BMW's CE-rated visco-elastic NP armor graces the City 2's hips and knees. The latter get large, distinctive left and right moldings for extended coverage of the joints' outboard sides. This ventilated armor is soft enough to conform to body contours, but stiffens upon impact to deliver protection. Each piece fits securely in a pocket in the lining, and the knee pads can be located at several heights over a three-inch range to accommodate different leg dimensions. Deep, zippered front and thigh compartments provide ample storage; there are no rear hip pockets. The lower leg sections feature long, zippered gussets with Velcro tabs for easy boot entry, and there's yet another zipper along the raised rear waistband for attaching BMW Motorrad jackets. A conventional zippered fly and sturdy waistband hook are augmented by a somewhat cheesy—and easily replaceable—nylon belt that's at least highly adjustable.

Aside from that belt, attention to detail is worthy of the premium marque, from the tastefully subtle brand cues to the extensive use of reinforced seams and the solid (non-mesh) lining panels inside the leg bottoms that smooth boot ingress and may minimize wicking of splashed water. The City 2 pants come in two colors. We chose the dark-gray-with-a-slightly-greenish-cast version, called "anthracite," but a blue denim-look model is also available. Sizing is true, though you'll probably find the larger option a better fit if you tend to straddle two sizes.

Although marketed as summer pants, the absence of ventilation makes these warmer than mesh gear on hot days. But this means they're viable in spring and fall for much of the continent, when mesh would be too chilly. They're also versatile style-wise, and don't look out of place or feel clumsy at restaurants or other settings where dedicated riding gear can be cumbersome. Sure, Kevlar-backed jeans have the same advantage, and occasionally even include a little knee armor. But the City 2 pants, with their thoughtful pockets, ergonomic design and more elaborate protection, deliver much greater functionality, without catching eyes (except those of other riders who recognize high-grade kit).

We love these pants. As you'd guess, BMW gear is pricey, but the features, build quality, protection and comfort of the City 2s justify their MSRP of $269.99—we saw them for considerably less on eBay.

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—Mark Barnes

BMW Motorrad, 800-831-1117, *bmwmotorcycles.com*

MODEL EVALUATION **2016 HONDA AFRICA TWIN**

SWISS ARMY Bike

As good in the dirt as it is **on the street.**

> By **David Hilgendorf**

Rewind three decades to 1986, when Honda Racing Corporation (HRC) unleashed the NXR-750 "Desert Queen," which won the Paris-Dakar rally four consecutive years—exactly as intended. Honda immediately began work on a production bike capable of crossing the same rugged expanses. First available in 1988 as a 647cc water-cooled V-twin, branded the XRV650 "Africa Twin." The industrial-strength bike featured long-travel suspension, dual 130mm headlights, a rally-style frame mounted fairing, 24-liter fuel tank, aluminum bash-plate, steel-tube rack and stainless steel exhaust. In 1990, Honda followed up with the 742cc XRV750T, sold in Europe until 2003.

In 2002, Honda introduced CRF, replacing the XR off-road motorcycles. While most are not street legal, the CRF-L series bikes are dual-sports, starting with the CRF230L in 2008. In 2012, a redesigned CRF250L launched, sporting the same liquid-cooled 250cc single-cylinder engine as the CBR250R.

Honda has re-entered the adventure market with a modern interpretation of its original Dakar winner. The 2016 CRF1000L "Africa Twin" is the first of this lineage available stateside.

ENGINE

Putting the biggest change front and center, the Africa Twin features a new liquid-cooled, four-stroke, SOHC, eight-valve 998cc engine, the first large-displacement parallel-twin in this family. Designed to be lower maintenance and more compact than the previous V-twins, it allows for positioning farther forward. This keeps the weight low in the double-cradle frame and narrows the cockpit, allowing the rider to shift forward on the seat. A 270-degree crankshaft puts plenty of power down low, where it's most needed off-road, and the biaxial balance shafts reduce vibration to an unobtrusive hum.

TRANSMISSION

The Africa Twin is available with a standard six-speed or with automatic Dual Clutch Transmission (DCT), which we tested. The latter uses the same crankcase as the manual and is exactly the same width. Modes include manual shift, D for Dirt, S for Sport and G for gravel—a

GINA CIOLI

bit confusing. The DCT defaults to neutral on power-up. Press the toggle on the right handlebar once for Dirt. For Sport, the button must be pressed again, then held to cycle through Sport modes 1, 2 or 3, each offering different shift points in the rev range. Push a different button for manual transmission, which uses a nifty forefinger and thumb toggle on the left grip for shifting (there's also an optional foot shifter). Another mode, gravel, reduces clutch slip under power, and works regardless of selected ride mode. It defaults to off when the motorcycle is powered off.

All settings are changeable on the fly and gear selection can be overridden temporarily with the paddle shifters. Likewise, when forgetting to shift in manual mode, the computer ensures every launch starts in first gear. The DCT never stalls and includes incline detection, intended to delay upshifts riding uphill for more grunt and increasing downshifts downhill to improve engine braking.

In practice, the bike still upshifted while climbing and engine braking felt negligible on descents. DCT also partially disengages the clutch during low-speed maneuvers to reduce the impact of poor throttle control. When launching from stops, it pays to treat the throttle like a clutch, engaging it very slowly until the bike starts forward motion, otherwise, be prepared for some lurching, as it spins up quickly. Cruise control is the only glaring omission for road touring.

SUSPENSION

Both ends feature fully adjustable Showa suspension, providing 9 inches of travel up front and 8.6 inches in the rear. The forks' 45mm stanchions are stiff and stable, even under duress. Riding through a dry riverbed, the bike maintained composure while weaving through the garden of medium-sized rocks. Thankfully, both ends can be dialed harder or softer, making the bike a comfortable steed on any surface. We would love to see this bike with electronically adjustable suspension for quicker or even automatic changes.

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BRAKES & WHEELS

Stock tires are Dunlop Trailmax. Our test bike came with Continental Twinduro tires—much more capable off-road. The aggressive tread pattern digs dirt like a bulldozer, but has a tendency to wander on surface irregularities and slide easily on the street.

Fortunately, the three-level TCS can be disengaged, as it was overly aggressive on the highest setting and cuts heavily into throttle response when the knobbies break loose—perhaps it's tuned for street tires. ABS can be disabled at the rear wheel for dirt riding and engages optimally on pavement.

ERGONOMICS & HANDLING

We took the Africa Twin to the track, where it was more than capable of kicking out the rear knobby on aggressive corner exits. The chassis and suspension setup is so stable, leaning it over is second nature and grinding the pegs is great fun. The riding posture puts the bars at easy reach, both seated and standing. The seat can be dropped nearly an inch from stock by simply repositioning it in its mounts—an even lower seat is optional. The ability to sit more in the bike than on it makes for excellent handling on any terrain.

INSTRUMENTS & CONTROLS

Standard controls are located where expected and controls for the DCT exist on both clusters. On the left, there are additional set and select switches for the gauges. There are three sections to choose from, clock or air temperature displayed on top, various fuel consumption data in the middle, and trip meters on the bottom. Each toggles to show various data, though we'd be happy to see even more options. For instance, range remaining isn't displayed until the low fuel light engages, but it seems sensible to have that option available via the menu at all times. There are two additional square button knockouts on the left side of the dash. The white text display on a black background becomes difficult to read in direct sunlight. We would have liked to see the excellent adjustable screen from the VFR1200X make it onto the Africa Twin.

ATTENTION TO DETAIL

The Africa Twin nails the functional simplicity expected in an adventure bike, and it looks good playing the part. Everything serves a purpose and welcome standards include a small skid plate, rear rack and brush guards. Available options from Honda include heated grips, a centerstand, topbox, taller screen and key-matched panniers. Oddly, crash bars are not on Honda's list, but the aftermarket has that, and any other serious heavy-duty protection, covered. Again, cruise control is the only thing inexplicably absent on this ride-by-ride system designed for touring.

VALUE

Available in either silver or a Dakar Rally-inspired red, white and black stripe, the Africa Twin is priced at $12,999—$13,699 with DCT. Decking this motorcycle out with every available factory accessory comes to a grand total of $15,499 (manual) or $16,499 (DCT). Compare that with the smaller BMW F 800 GS Adventure's base price of $13,895 or Triumph Tiger 800 XC at $12,500. The larger 1200cc bikes, start at $15,000 and many surpass $20,000, fully loaded. For a literbike capable of riding just about anywhere, the Africa Twin is a bargain indeed. MCN

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TESTERS LOG

The world is infatuated with adventure touring, but most OEMs are making bikes that are far more touring than adventure. America is finally getting access to Honda's ultimate Dakar-inspired rally bike. The price tag may be even more important than the functionality of this motorcycle, which is highly adept at both road and dirt. While Hondas are often among the priciest offerings, in this case they are soundly thumping the competition. Cheaper than most 800cc ADVs and fully loaded it's less than a base 1200cc. Plus, it's lower, lighter, more nimble and fully capable of around-the-world duty. Go travel.

—David Hilgendorf

Honda has taken another step or two toward delivering the perfect motorcycle. The Africa Twin is an exceptional streetbike, even with knobby tires. Off road, it performed pretty well in California's Mojave Desert, where I ride my KTM 450. It's not good in the whoops, and you have to keep things moving right along in deep sand washes, but it climbed any hill and was nimble on single track, smooth on washboard, and a dream on most any semblance of a roadway. Then, I rode it home on the Interstate. When I parked it in my garage, where I had seen a dual-sport before, I beheld a powerful, street-legal dirt bike.

—Russell Evans

2016 HONDA AFRICA TWIN

CycleStats™

QUICK HITS

MSRP: $12,999 ($13,699 as tested)
Category: Dirt/Touring
Displacement: 998cc
Engine Type: Liquid-cooled, four-stroke parallel-twin
Warranty: 1 year, unlimited mi.
GVWR: 926 lbs.
Wet Weight: 535 lbs.
Carry Capacity: 391 lbs.
Seat Height: 33.25/34 in.
Colors: Silver, Red/White/Black

SPECIFICATIONS

Valvetrain: 8-valve, SOHC, shim adj.
Bore & Stroke: 92.0 x 75.1mm
Comp. Ratio: 10.0:1
Transmission: 6-speed; DCT, or wet multiplate assist-and-slipper
Final Drive: Chain
Fueling: PGM-FI, 4-mode, TCS
Tank Capacity: 4.9 gallon
Fuel Grade: 91 octane
Exhaust: 2-into-1
Ground Clearance: 9 in.
Wheelbase: 62 in.
Rake & Trail: 27.0°/ 4.4 in.
Tires: Dunlop D610 Trailmax (tube), 90/90-R21 front, 150/70-R18 rear
Brakes: ABS, 4-piston, Nissin dual-disc 310mm front, 256mm rear. DCT adds lever-lock parking brake.
Suspension: Full adjust Showa, 9.0-in. travel, 45mm front, single shock 8.6-in. travel rear

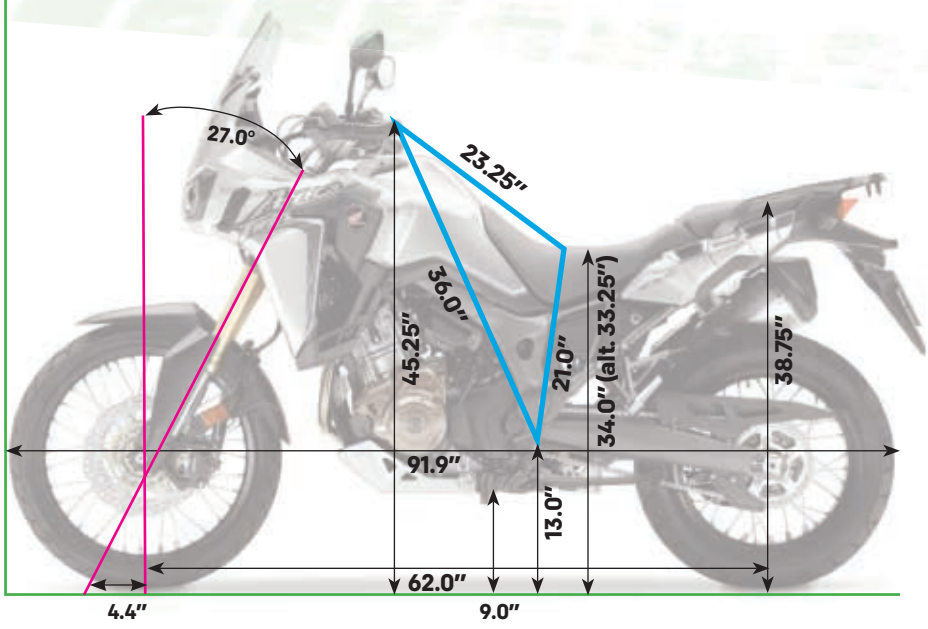
ELECTRICS

Battery: 12v, 11.2Ah
Ignition: Electronic
Alternator Output: 490W
Headlight: LED
Instruments (digital): Speedo, Odo, Trip, Tach, Clock, Temp, Fuel, MPG
Indicators: Engine, Oil, Neutral, Signal, High-Beam, Gear, Mode, TC, ABS

MAINTENANCE

($100/hr.)	Miles	Labor	Parts	Total
Routine	8,000	$580	$150	$730
Valves	16,000	$400	$100	$500

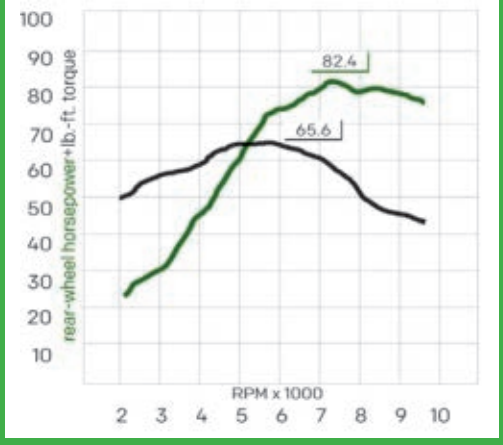
GEOMETRY



PERFORMANCE

Fuel Economy (MPG)
High: 43; Low: 38; Average: 40
Estimated Range: 200 mi.
60-0 mph: 143.28 feet
0-60 mph: 4.01 seconds
1/4 mile: 12.9 sec. @ 103.93
Power to Weight: 1:6.49
Speed @ 65 mph: 64 mph
RPM @ 65 mph: 3,800
RPM @ limit: 9,000

HORSEPOWER & TORQUE



SMILES

1. Real dual-sport adventure
2. DCT shifts flawlessly
3. Competitive pricing

FROWNS

1. Range only listed in reserve
2. No cruise control
3. Non-adjustable screen

EVALUATION

Engine:	●●●●○
Transmission/Clutch:	●●●●○
Brakes:	●●●○○
Suspension:	●●●●○
Handling:	●●●●○
Riding Impression:	●●●●●
Ergonomics:	●●●●●
Instruments/Controls:	●●●●○
Attention to Detail:	●●●●○
Value:	●●●●●
Overall:	●●●●○

WHEELS UP AND TAKE Flight

The FZ-10 has boundless thrust,
precise steering and stops on a dime.
Just be sure to hold on tight.

> By **Russell Evans**

I think I have become that guy—you know, the one who weaves through traffic, splits to the front at every light, then busts out from the pack on green, front wheel in the air. The guy having more fun than everyone else on the road.

It happens when you're in love. Well, it's probably not love; maybe infatuation. I am happily hitched to my V-twin cruiser—comfortable and full-figured.

Yet, I have been spending time with this FZ-10. Slim, firm, exciting. She makes me feel young again. She's always ready for a twist of the throttle and bombing down the back roads. Now I'm dieting and exercising, trying to fit into Alpinestars and fantasizing about Dainese.

We went away for a weekend, just the two of us, to an all-day cornering class at the track. I would pick a line, lean her over and rail the tightest turns, even grind her pegs a little. She was amazing, bringing out my inner racer, making me feel like someone special.

I know it's a fling, a dalliance. But this bike captured my heart. Endless power, perhaps too much. Quiet, smooth shifting. Precise cornering. And fairly comfortable to ride. This bike has brought back a huge rush of fun to riding. It's fast—so fast—quick and nimble. It even makes a one-hour commute in snarling traffic bearable, even joyful.

ENGINE

This is the upright, naked version of Yamaha's YZF-R1. The 998cc inline four-cylinder engine shares the same crossplane crankshaft technology as the R1, but is tuned slightly more street-friendly than the superbike. Make no mistake: this beast cranks out way more raw power than anyone would ever need, this side of the track. Harnessing that power is the Yamaha Chip Controlled Throttle, which offers three ride modes, in dashboard order: A, Standard and B. Oddly, Standard (in the middle) is the slow-throttle 'wet' mode, A is 'nor-

GINA CIOLI

mal' throttle and B is for 'be ready.' In full-power B mode, the FZ will punish those who lack precise throttle control. The ride-by-wire throttle system provides easy selection of the preferred engine response at the flick of a handlebar switch and includes cruise control for improved highway comfort.

An advanced and capable traction control system provides smooth transfer of thrust from the raging powerplant to the road and also keeps the rear tire tracking, rather than spinning. There are three offerings for throttle opening, ignition timing and fuel injection. Level 3 offers aggressive traction and "wheelie control," which results in an annoying front wheel pogo when pressed hard. Level 1 gives minimal engagement. It can also be disabled.

TRANSMISSION

It is hard to imagine smoother shifting, thanks to the shift assist and slipper clutch. Yamaha credits the six-speed transmission's "stacked" triangular layout of crankshaft, input and output shafts for centralizing mass and making the engine shorter front-to-back. Function prevails over form—all of the juts and recesses indicate this bike was designed from the inside out. Yamaha's engineers put everything precisely where it needs to be to make it work better.

SUSPENSION

The KYB suspension is fully adjustable, front and back. The inverted front fork has 4.7 inches of travel, with adjustment for firm or soft setting done via hex wrench atop the steering head. The linkage-type monoshock on the rear has four settings and adjustment is easily accessed on the left side near the top of the shock. We found the settings from the factory to be just about right for most applications, with excellent handling on the track and decent comfort during daily commutes. A softer ride was desired only on one of L.A.'s many bumpy concrete freeways. We felt a little guilty even entertaining the thought, as this bike is so much more enjoyable on asphalt—the curvier, the better. Still, a softer ride is an easy adjustment away.

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BRAKES AND WHEELS

The FZ10's advanced Antilock Braking System stopped on a dime during a Streetmasters school braking session. At 25 mph, the bike halted smoothly within 10 feet, enticing grins from instructors who had been watching baggers and cruisers taking up to three times as much distance to stop. On a tight turning, one-mile track, braking was critical, especially downhill into a hairpin turn. The FZ was precise and never broke traction.

The FZ10's front 5-spoke aluminum wheel is nearly obscured by the twin 320mm brake rotors. Yamaha says the Bridgestone Battlax Hypersport S20 tires were engineered specifically for the FZ-10, for chassis-matched handling and stability. Agreed.

ERGONOMICS AND HANDLING

The riding position is surprisingly good, even for our six-foot and six-foot-three testers, and geometrically logical. No extreme reach to the footpegs, bars just below shoulder level and right out in front. Posture is upright and the bike feels nimble, partly due to the 55.1-inch wheelbase, 24-degree rake and 4.0-inch trail. The FZ-10 uses the same aluminum Deltabox frame as the R1 and response is light, smooth and stable, leaned over or straight up. The FZ10 was built for cornering, at the speed of thought.

INSTRUMENTS AND CONTROLS

Traction control and throttle mode are thumb switches on the left and right sides of the handlebars, respectively—visible and easy to reach. Cruise control is also on the left-hand cluster. The very legible LCD shows every piece of data a rider could desire, including gear selection and fuel level. The fuel gauge is perhaps the worst digital gauge ever created. It has only three bars: full, half- and quarter-tank. It wouldn't be so bad that the fuel gauge drops directly to half, except that fuel economy (and range) is rather lousy. As such, when it suddenly drops, there's barely 60 miles left until empty. We laugh at the infamous Yamaha 'Eco' light, which engages primarily when the throttle is off—a cruel joke.

ATTENTION TO DETAIL

My first assessment of the FZ-10 was, "It's ugly." A monstrous engine from which all other components sprouted. It is minimal, but not streamlined. Only after piloting this amazing machine can one appreciate what is offered here. We instantly forgot what it looks like when perched on top. It's all about the ride. After a few hundred miles on various surfaces and in various conditions, I say, "What a beauty." There is a small seat pad wart, meant to keep one mounted under hard acceleration, and possibly serving the secondary purpose in keeping a passenger from sliding forward from the postage stamp-sized pillion pad. The all-black model is not nearly as striking as the gun metal gray/highlighter yellow version.

VALUE

Priced at $12,999, the Yamaha FZ-10 sports the same engine and frame as the R1, which costs $3,700 more. It's also competitively priced against the $13,495 BMW S 1000 R and $14,799 Aprilia Tuono. The Kawasaki Z1000 can be had for $11,999, sans traction control. The FZ-10 keeps pace with nearly anything it encounters. When the hard riding is done, click down throttle and traction control, soften the suspension, and ride home in relative comfort. This streetfighter delivers serious bang for the buck. MCN

GINA CIOLI

TESTERS LOG

I liked the FZ-10 more than I thought I would. I guess I'm a sucker for boundless power, razor-sharp cornering and pinpoint braking. What were nearly as impressive were the ergonomics. What a kick, when you get track-type performance without having to keep your belly on the tank. I rode the bike daily for about a week and never got saddle-sore or even uncomfortable. That being said, if your primary use is freeway commuting, look elsewhere. This bike was built to turn, and you will not enjoy the ride on a long, straight slab of concrete. All that awesome power sucks the gas, so mileage is that of a midsize car.

—Russell Evans

The FZ-10 is exceptionally fast, leans well and stops quickly. It was ridiculously easy to loft the front wheel in any gear at any speed, even when rolling on to pass at 60 mph. This is not a bike for neophytes. Power wheelies are fun, but none of the included electronics effectively limits them—rather pointless. Combine the propensity to launch with unflinching throttle response and the narrow margin for error becomes more than I care to think about. With so much immediate power available on a 'streetbike,' I would prefer a more refined tech package to rein it back in when unneeded.

—David Hilgendorf

2017 YAMAHA FZ-10

CycleStats™

QUICK HITS

MSRP: $12,999
Category: Performance-standard
Displacement: 998cc
Engine Type: 4-stroke, liquid-cooled, inline-four, crossplane crankshaft
Warranty: 1 year (limited)
GVWR: 838 lbs.
Wet Weight: 468.5 lbs.
Carry Capacity: 369.5 lbs.
Seat Height: 32.5 in.
Colors: Armor Gray, Matte Raven Black

SPECIFICATIONS

Valvetrain: 16 valve, DOHC
Bore & Stroke: 79.0 x 50.9mm
Comp. Ratio: 12.0:1
Transmission: 6-speed; wet multi-plate assist-and-slipper clutch
Final Drive: Chain
Fueling: EFI, 3-mode YCC-T, TCS
Tank Capacity: 4.5 gallon
Fuel Grade: 91 octane
Exhaust: 4-into-1
Ground Clearance: 4.75 in.
Wheelbase: 55.1 in.
Rake & Trail: 24.0°/ 4.0 in.
Tires: Bridgestone Hypersport S20 120/70ZR17 front, 190/55ZR17 rear
Brakes: ABS, hydraulic disc, 4-piston, dual-320mm front, 220mm rear
Suspension: Full adjust, 4.7-in. travel, 43mm KYB USD front, KYB single shock w/piggyback reservoir rear

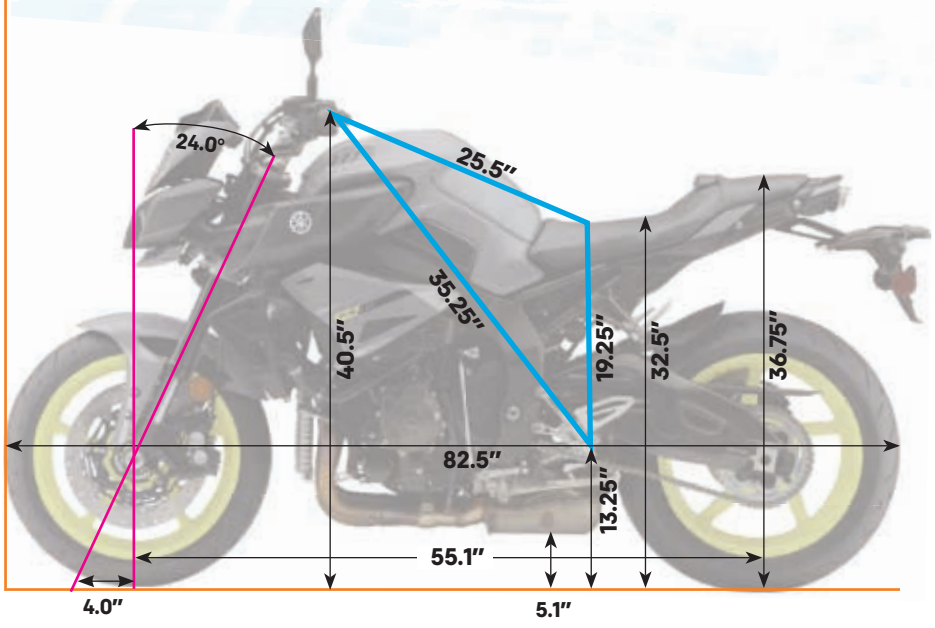
ELECTRICS

Battery: 12v, 10Ah (12V DC outlet)
Ignition: TCI-Transistor Controlled
Alternator Output: 430W
Headlight: LED
Instruments (digital): Speedo, Odo, Trip, Tach, Clock, Fuel, MPG
Indicators: Engine, Oil, Neutral, Signal, High-Beam, Gear, Mode, TC, ABS, Cruise Control

MAINTENANCE

($100/hr.)	Miles	Labor	Parts	Total
Routine	5,000	$660	$204	$864
Valves	14,000	$360	$100	$460

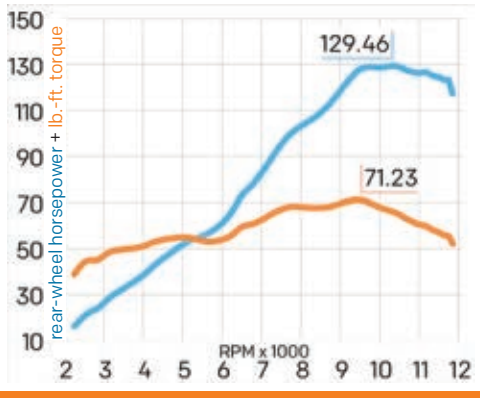
GEOMETRY



PERFORMANCE

Fuel Economy (MPG):
High: 29; **Low:** 24; **Average:** 27
Estimated Range: 120 mi.
60-0mph: 128.56 feet
0-60mph: 3.0 seconds
1/4 mile: 10.5 sec.; 135.44 mph
Power to Weight: 1:3.62
Speed at 65mph: 64 mph
RPM at 65mph: 4,800
RPM at limit: 11,800

HORSEPOWER & TORQUE



SMILES
1. Ridiculous thrust
2. Flawless shifting
3. Performance per dollar

FROWNS
1. Fuel gauge and economy
2. Unrefined tech package
3. Overly-sensitive throttle

EVALUATION

Engine:	●●●●●
Transmission/Clutch:	●●●●●
Brakes:	●●●●●
Suspension:	●●●●○
Handling:	●●●●○
Riding Impression:	●●●●○
Ergonomics:	●●●●○
Instruments/Controls:	●●●○○
Attention to Detail:	●●●●○
Value:	●●●●○
Overall:	●●●●○

BMW R nineT SCRAMBLER

BMW's R nineT Scrambler is an interesting departure from the high-end demographic, as the German manufacturer targets younger, less affluent and first-time buyers.

Targeting a younger market segment looking for a wild, less-civilized ride, on and off road.

> By **Moshe K. Levy**

BMW scramblers trace their lineage all the way back to the R 68 model the company displayed at the 1951 International Bicycle and Motorcycle Fair IFMA in Frankfurt, Germany. That classic's high-mounted 2-into-1 exhaust was a factory option that mimicked the lines of racer Georg "Schorsch" Meier's machine. By contrast, the new Scrambler is based on the existing R nineT production model, but with several notable changes that differentiate it from its more expensive sibling.

The modified bridge-type tubular steel main frame features a separate rear-seat subframe, which can be quickly detached via 8 screws for a "chopped" minimalist solo-seat look. The wiring harness is divided between vehicle functions and engine functions to further streamline modifications. Significantly, the Scrambler's wheelbase has been lengthened to 60.1 inches from the R nineT's 58.2 inches; rake has been bumped from 25.5 degrees to 28.5 degrees; trail has been extended by almost half an inch to 4.4 inches total; and overall weight, compared to the R nineT, was shaved by 4.5 pounds.

The ergonomics of the Scrambler are also more upright, in keeping with its mission, with higher handlebars for a shorter reach forward, enduro-style footrests, and an elevated seat height of 32.3 inches versus 30.9 inches for the R nineT. In the more obvious nods to cost-cutting, the Scrambler swaps the R nineT's upside-down 46mm telescoping front suspension for standard 43mm telescoping forks (replete with gaiters, for that period-correct look) and makes due with non-radially mounted brakes. The R nineT's cross-spoked wheels are supplanted with black cast aluminum hoops, and the front wheel size expands from the R nineT's 17 inches to 19 for the Scrambler. The R nineT's comprehensive multi-function display instrument cluster is replaced with a simple speedometer, and the Scramber's 4.5-gallon gas tank is made of steel instead of the R nineT's aluminum. These changes result in an MSRP of $13,000 for the Scrambler, versus $15,095 for the R nineT.

The heart of both motorcycles is the same 1170cc air/oil-cooled DOHC "camhead" flat-twin, which pumps out 110 horsepower at 7,750 rpm and 86 lb.-ft. of torque at 6,000 rpm. The twist is transmitted via hydraulically actuated dry clutch and through a 6-speed transmission with a final drive ratio of 2.9:1. Both models utilize BMW's Paralever single-sided cast aluminum swingarm and shaft drive, suspended by a single rear shock that is adjustable for rebound damping and preload. Two-channel ABS with available ASC is included, and can be disabled for off-road use.

The optional Metzeler Karoo 3 tires on our test bike have a mildly aggressive off-road pattern and howl relentlessly on the tarmac starting at 40 mph. The Scrambler itself is quite versatile, and was equally adept on the shallow gravel trails we traversed as it was dodging potholes in Metropolis. The front suspension on our early production tester was rather harsh over surface imperfections—even though total front suspension travel is up 0.2 inches to 4.9 inches on the Scrambler.

The Scrambler is only the first of BMW's efforts to leverage the R nineT's configurable architecture in an all-out assault to target every conceivable niche in the sport—especially those that appeal to younger, less affluent buyers. BMW has announced two more variations: The stripped down R nineT "Pure" and the café-inspired R nineT "Racer." Details and a thorough road test in a future issue. MCN

KEVIN WING

TWO WHEEL TUESDAYS

New York restaurant Spiegel opens its doors and its arms to a weekly celebration of motorcycles and their owners.

> By **Moshe K. Levy**

Like any faithful moto-zealot, I have made many pilgrimages to the veritable Meccas of our favorite passion, from the Rock Store on Mulholland Highway near Malibu, in California, to the Ace Café in London. These celebrated destinations, steeped in the history of the sport and all of the many changes it has endured over the decades, have captured the imagination of every serious motorcyclist.

However, as with most legends, the reality of many of these eateries often falls short of the expectations in the wayfarer's mind. Beneath the glossy veneer of nostalgia, there is something rather contrived about an atmosphere almost wholly based on the past. I've always fantasized about being part of such a place at its inception, during its actual glory period, instead of always harkening backward—and I think, at long last, I've finally found one.

Recently, I discovered Spiegel restaurant on the Lower East Side of Manhattan. Spiegel is the brainchild of Shmuel Avital, who made his bones as a restaurateur in Israel's capital city of Jerusalem. He came to America in 2001 to pursue his dream of combining his zeal for motorcycling, fine food and movies into one endeavor. The restaurant, named after Sam Spiegel (famed producer of *Lawrence of Arabia*), is the culmination of his efforts. Every Tuesday evening, a motley horde of motorcyclists from near and far descends on Metropolis and heads straight to Spiegel to experience the zesty food, atmosphere and camaraderie. Every genre is well represented—from bikers to off-roaders to world travelers to urban commuters to track racers, and everything in between—and the sundry collection of motorcycles parked in front of the restaurant inspires hours of uncontrollable gawking and drooling.

At age 16, Avital rode 50cc scooters to commute around his native Israel, and then graduated to pure desert riding on 250cc enduros. Upon arriving in the United States, his fervor for riding blossomed, and he soon found himself touring the country on his 1996 Harley-Davidson Sportster 1200S, which he replaced with a 2001 KTM Adventure model when the off-road bug bit him hard again. He rode the Katoom all across the U.S. and deep into Latin America (Mexico, Guatemala, Nicaragua, Costa Rica, Honduras, Panama and El Salvador) on monthslong trips. His restaurant is adorned with several beautiful photographs commemorating those escapades. That same faded orange, battle-scarred KTM still serves him today, always parked outside Spiegel and displaying the flags of the countries he's ridden through as a welcoming gesture to other motorcyclists.

Relying on these years of experience as a grizzled adventurer, Avital uses the restaurant as a stage to host events important to the motorcycling community. Charity fundraisers, moto-centric art displays, audio-visual presentations from prominent travelers, and many more are all part of an event-packed calendar at Spiegel. He's even planning an ambitious multiweek adventure tour of the Middle East, so customers can ride together.

The ambiance inside Spiegel is definitely moto-centric, but without excessive nostalgia. Actually, the artwork is an ever-revolving showcase for local artists to display their best pieces, and during my visit the walls were decorated with Grace Roselli's visually stunning "Naked Bike Project" collection. Various

JOEL CALDWELL

Motorcyclists come from all along the East Coast to Spiegel restaurant in downtown Manhattan for Two Wheel Tuesdays to breathe, talk and eat motorcycling.

Restaurant owner Shmuel Avital is a longtime motorcyclist who likes sharing good riding and good food. First arrivals at a recent Two Wheel Tuesday at Spiegel hang out and talk about one of their favorite subjects.

JOEL CALDWELL

gas tanks from vintage Ducatis and Yamahas punctuate period-correct posters of famous racers and their trophies. The horseshoe-shaped bar dominates the floor plan, though everything behind the bar (taps, espresso machine, etc.) are all set purposely low, so as to allow patrons to all see and talk to each other without impediment.

Perhaps only second to the sense of fellowship, riders come to Spiegel for the food. Rather than the ubiquitous greasy spoon fare, Avital has perfected his family's old-world Moroccan-Sephardic recipes that taste every bit as authentic as in the fabled cafes of Tel Aviv. There is nothing bland or boring here. The spicy flavors and exotic textures of Sephardic food delight the senses when prepared correctly, and here Avital has succeeded mightily in bringing the best of contemporary Israeli dining to the masses of hungry motorcyclists in New York City: kebab, schnitzel, shakshuka, Moroccan baked feta, couscous, bureka—it's all here, and true to its roots! Sure, you can also order burgers and other American fare from the menu, but it would be a shame to miss out on Spiegel's forte, which can instantly transport one's taste buds to the Holy Land.

Ultimately, the overall experience of a Two Wheel Tuesday at Spiegel can be best summarized as "sensory overload." The vibe is very relaxed, with no cliquishness despite the incredibly diverse backgrounds, ages, and genres of the riders in attendance. You will find whatever machine tickles your fancy, from clapped out rat bikes to hand-built customs. There will be plenty of friendly faces to strike up conversations with, all while devouring the most sumptuous food this side of the Mediterranean. Avital is a blur, racing around greeting customers, managing the staff, and admiring the hardware parked outside. His demeanor—honest, dedicated and incredibly passionate—is built into the DNA of the place. He is one of us, and that is what has motorcyclists so excited to attend every Tuesday evening. Indeed, Spiegel has ensconced itself as my favorite moto-destination in my 20 years of riding. MCN

Register AN UNTITLED Bike

Is the process a walk in the park or bureaucratic maze? That depends on the state vehicle agency.

JEREMY C. WILLARD

> By **Jeremy C. Willard**

When I was 13 years old, my parents were looking to purchase a new home. In the shed of a particular house of interest, the current owner had a 1977 Honda Z50. Of course, while my parents negotiated for the house, I was busy negotiating with them to buy the little Honda.

We both won, and in the following years, I racked up Iron Butt-worthy miles on my trusty little Honda. As I got older, life and bigger bikes came, but I never had the heart to discard my 50, even though my tough love ultimately claimed its compression, leaving it unable to run. Nevertheless, when I moved out, the bike came with me and followed me from place to place, always with the promise of "some day."

Fast forward to me now: a 40-something, married, father of 8- and 10-year old boys. My youngest son happened to notice and ask about the dusty Honda in the corner of the basement. For some reason, unlike the countless times others had asked, the fire was rekindled to end nearly 25 years of procrastination. Since the internet came along in the interim, finding the parts and manuals to get my old friend back to running order was a piece of cake. Score one for procrastinating. I wish I could say it was as easy to establish ownership and get the bike properly titled and registered.

Like many others, my state of Pennsylvania requires a title proving ownership for it to be registered. When I contacted the DMV, I was dismayed at the hoops I would need to jump through to prove the bike was mine. I first had to run the VIN through the state's system of record to establish that it had not been previously titled in Pennsylvania. This had to be done using official forms submitted via U.S. Postal Service. To ratchet up the difficulty level, Pennsylvania also purges records older than 10 years. Even if my bike was registered and titled all those moons ago, they surely wouldn't have it on record. Likewise, for any old bike purchased with a misplaced title that may have been sitting in a garage for years, you are out of luck when it comes to getting a replacement title from the DMV.

It went from bad to worse, however, when I was then told that before the state could even consider issuing a new title, I would need to file a petition with the State's Common Pleas Court to prove I was the owner. I will spare you the mind-numbing details, but I can sum it up by saying the process looked to be very time-consuming, was exceedingly expensive, and did not guarantee I would get a title for the bike. They had me over a barrel. I was just about to plunk down my money to play the state's game when a chance conversation with a fellow motorcyclist presented legal alternative to get what I needed.

It turns out not all states require a title for all vehicles. One such state is Vermont, which only requires titles for vehicles 15 years old and newer. The rest can simply be registered if one can prove to be the lawful owner of said vehicle. Even better, the state does not title any motorcycle under 300ccs, no matter what year it was manufactured. Thinking this was too good to be true, or possibly something that was not on the level, I reached out to the state of Vermont to inquire about registering my motorcycle in their state. The conversation went something like this:

Me: "I do not live in your state, nor do I have any sort of residence in Vermont. Can I still register my motorcycle?"

Vermont: "Sure, no problem, just

The author and his beloved 1977 Honda Z50, restored so his sons can enjoy it as much as he did as a kid.

Registering in Vermont, even with a Pennsylvania residence, proved to be relatively easy, and all done by mail.

complete the VD-119 form."

Me: "Will I need to personally come up to submit the form or pick up the license plate, etc.?"

VT: "No, you can mail the form to us and we'd be happy to mail everything back to you."

I then called my local notary to determine how hard it would be to get a title in Pennsylvania once my little vehicle was registered in Vermont. I was pleasantly surprised to hear that because Vermont does not issue titles for vehicles older than 15 years, the registration would act as a de facto title.

Is it really that easy? Well, not exactly, but I would call it more complicated versus difficult. Let's take a closer look at the mechanics behind obtaining a Vermont registration. As mentioned, the form used for this is the "VD-119," which can be found at Vermont's website *dmv.vermont.gov*. Because my bike was not previously registered in any state, I also needed to prove ownership. This, however, was much easier than it was for Pennsylvania. To prove ownership in Vermont for vehicles that have not previously been titled/registered in the state, one must produce a bill of sale that contains the make, year, VIN, purchase price, mileage, and signature of the seller and date of sale. I had to get a bit creative with this requirement. Since my dad originally purchased the bike, I reckoned he was technically still the owner. I drafted a bill of sale, which my dad and I both signed. Though I do not believe it was required, I had the bill of sale notarized.

While this did not impact my bike, those motorcycles that are 500ccs or larger must also have the VIN verified by an authorized official. According to Vermont, for out-of-state applicants, this could be a DMV official, a state law enforcement official, or one authorized by that other state to perform VIN verifications.

You are also required to pay Vermont's 6 percent sales tax based on the purchase price or the NADA sourced value, whichever is greater. So, don't try to get cute and say you paid $5 for a bike. I used NADA's site to print the value and included that with the VD-119 form. Finally, there are fees for registration. For motorcycles, the fee for registration is $48. Package all of this together and mail it to: 120 State St., Montpelier, VT 05603.

Keep in mind that, upon approval, the registration and the license plate will be sent separately. Once you have received them, you could technically stop at that and legally ride around with your Vermont plate, registration and proof of insurance.

When transferring the newly registered bike back to your home state, do your homework on fees and taxes. In my case, Pennsylvania credits taxes that are paid by states that reciprocate, such as Vermont. Pennsylvania's sales tax is also 6 percent, so I didn't get double-dinged there. Otherwise, I filled out the normal Pennsylvania forms and, in a matter of weeks, all of my work was rewarded with a Pennsylvania title and registration.

As an aside, there is no reason this will not work for other states with similar restrictive title requirements, but I can only speak definitively from my experience in Pennsylvania. I have heard anecdotally about certain states, New Jersey being one, which might hassle the owner when transferring a title from more a flexible state such as Vermont. However, my research was unable to produce an actual documented case of a transfer being denied.

I would suggest that you contact a local notary or even your state's DMV to see if a Vermont registration would be accepted in place of a title when transferring your vehicle back to your home state.

I also want to stress that the process outlined above is intended to be an easier legal means for getting a title for a motorcycle that is rightfully owned. MCN

HOW TO READ Wiring Diagrams II

Practical experience that may save you some money.

> text and images by **Tracy Martin**

In Part 1 of How to Read a Wiring Diagram, we covered the basics of how circuits are depicted using over-simplified, but progressively more complex wiring diagrams. The central concept used in reading and understanding any wiring diagram is to identify the three essential parts of all 12-volt circuits: 1) a power source, 2) load device, and 3) a ground return. The examples in Part 1 provide a clear illustration of how the three elements connect, where power and grounds are located and how the load device is controlled. The last example in Part 1 was more like an actual service manual wiring diagram and illustrated how two relays, an ignition switch and fairing panel switch, were connected to control a pair of driving lights.

Part 2 will test your knowledge using complex wiring diagrams. In addition to these exercises, practice requires working on the electrical system of a motorcycle. Next time you are faced with a motorcycle electrical related problem, make use of the bike's wiring diagram and try to figure out which of the three elements is missing in the problem circuit. This "self-education" will pay off in the long run by reducing the number of times your motorcycle has to go to the dealer for diagnosis of a simple electrical issue. Answers and analysis to the Part 2 questions can be found on the next page. Good luck!

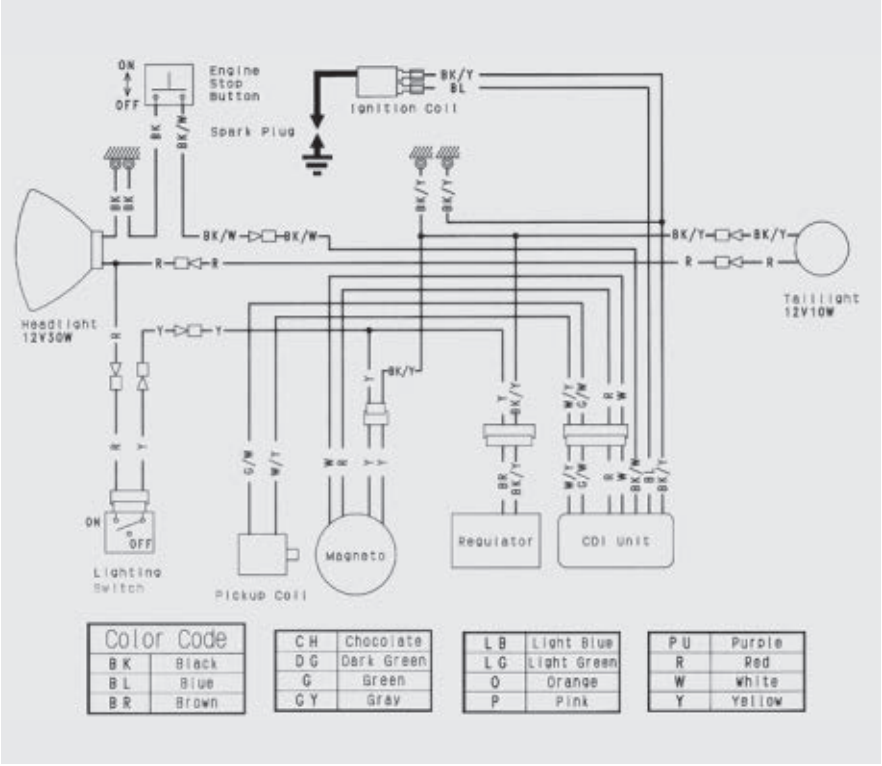


FIGURE 1

OFF-ROAD MOTORCYCLE DIAGRAM

Figure 1 is a wiring diagram typical for a small, off-road motorcycle. This bike does not have a battery, but instead uses a magneto as a power source. Wire colors are identified in the legend at the bottom of the diagram. For example, if a wire's color is marked as "O" the wire is a solid orange-colored wire. Wires marked with two letters have a solid color with a stripe—G/W would be a green wire with a white stripe. The load devices are the headlight, taillight, capacitor discharge ignition (CDI) unit and ignition coil. The four wires at the magneto are connected

to two charging coils (not visible in the diagram). One charging coil powers the CDI unit and the other is used for the lighting circuit. The regulator maintains the magneto's output at 12 volts for the lights. The CDI Unit uses an AC pickup coil to sense engine RPM and has an engine stop switch to shut off the ignition.

OFF-ROAD DIAGRAM QUESTIONS

Q1. Trace how power is routed to the taillight by identifying the wire colors and components in the circuit. How can the lighting switch be bypassed?

Q2. Which are the power and grounds (wire colors) for the CDI unit? Which input wires at the CDI Unit cause it to operate the ignition coil in time with engine RPM? Which wire causes the CDI unit to shut off the ignition coil?

ANSWERS

The following are answers and analysis to the questions about the off-road motorcycle wiring diagram. Hopefully by studying the questions, answers and referring to the wiring diagram, the logic of solving some of these examples of electrical issues will become clear and help prepare you for the next time your motorcycle has an electrical problem.

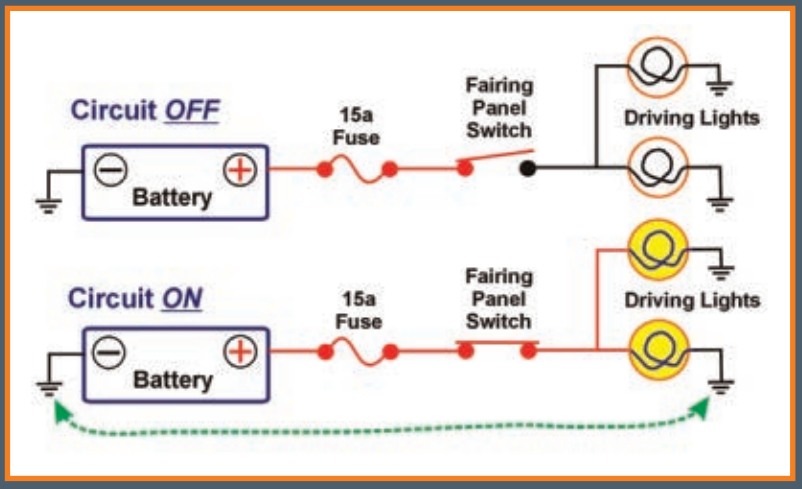
A1. Power for the lights comes from the magneto on the Yellow wire that goes to the light switch. The Yellow wire also goes to the regulator that maintains voltage at 12-volts. A red wire goes from the switch to the headlight and taillight. To bypass the switch, start the engine and touch the red and yellow wires together—the head and tail lights will go on.

A2. The Red and White wires at the CDI unit are power from the magneto. The ground is the Black with Yellow striped wire. The Green/White and White/Yellow wires from the AC pickup coil to the CDI unit trigger the CDI to pulse/fire the ignition coil on the Black wire. To stop the engine, the Black/White wire at the CDI unit is grounded by pressing the engine stop button.

Part 3 of this series, which focuses on carbureted motorcycles, will appear in the February issue of MCN. MCN

Correction

Note: In Part 1 of "How to Read Wiring Diagrams," which appeared in the December issue of MCN, there was an incorrect reference to a diagram within the text of the article, which may have been misleading. The correct diagram and text are below:



This is a simple wiring diagram showing a driving light circuit. The circuit consists of a battery, 15-amp fuse (used to protect the circuit), a switch (located on a fairing panel of the bike), and the two driving lights. Ground returns are shown by the ground symbol—a vertical line with three horizontal lines. Be advised that grounds are not drawn into wiring diagrams and it is assumed that all ground wires are connected to the battery negative terminal.

This diagram is unusual in that the presence of 12-volts is illustrated with the circuit in both "on" and "off" states. Red lines indicate the presence of 12-volts and black lines are the ground returns. In the upper part of the diagram the circuit "off" drawing shows that 12-volts is present to the end of the switch.

The lower part of the diagram shows the switch closed and 12-volts reaches the lights and they turn on. It also shows how electricity (current) travels from the battery positive terminal, through the load devices and back to the negative terminal.

Unfortunately, most wiring diagrams do not provide any of these advantages and even late model motorcycle diagrams may not isolate circuits to this extent—more likely they will be part of the overall lighting system. Color, if used at all in a wiring diagram, is used solely for the purpose of identifying individual wire colors, not to indicate power and ground sides of a circuit. In addition, wiring diagrams always default to show a load device in its "off" state.

There is one inherent problem with the design of the driving lights circuit as shown in the diagram. The driving lights require high amperage (12 amps) from the battery to operate and this high electrical load has to travel through all the wires and fairing switch to reach the lights. The wires, and especially the switch, would have to be quite large to handle the high current.

A skilled rider, builder and authority on motorcycle values, Brian Slark is also a member of the AMA Hall of Fame.

A JUDGE OF BIKES

> By **Joe Michaud**

Technical director for the Barber museum, **Brian Slark** lives fast on two wheels.

Brian Slark was born in London in 1938, into a motorcycle family.

"My dad and his brothers had bikes when they were younger, before WWII intervened," Slark said. "I always had photographs of them around the house on a big port AJS."

So, it was no big deal for Slark to own a BSA Bantam as soon as he was old enough to get a license.

"My parents were very supportive," he said. "They made sure I was careful, but I was lucky in that respect. I lived on the damned thing. Able to get out of the city, I knew every little muddy, two-track farm road in southeast England."

When Slark was 16, he moved up to a '38 250cc AJS OHV 4-stroke with telescopic forks from a BSA WD model.

"That was big-time," he said. "I would go search for BSA 250s—and shift when the valves float. I was in high cotton."

Slark even rode during two years of service in the RAF.

"We were 18-year-old single guys and there was a good motorcycle scene," he said. "I rode some trials and, after getting out, I bought a Greeves trials bike."

At 19, Slark excelled in scrambles and motocross and approached Associated Motorcycles for a job. He was interviewed, questioned, and ultimately hired by his hero, Hugh Viney, the famous AJS 7R scrambles rider who was captain of the International Six Days Trials (ISDT) team and winner of the Scottish Six Days Trials numerous times. Slark had snagged the best possible job for a young rider.

"After a few months, I became the youngest bike tester. I was 20," Slark said. "It was a dream job. I had to test eight or nine bikes a day and I got a new bike every night and on the weekends. I didn't own a street bike for years."

As Slark's off-road skills improved, he moved up to British Expert class in motocross. Soon, Viney moved him to the race shop, a small building adjacent to the main factory.

"We worked on all the scrambles,

BRIAN SLARK COLLECTION

trials and ISDT bikes," Slark said. "Whenever we made a special part for the works bikes, I made one for me. So, I always had pretty good equipment."

Slark came to America by accident. "Bud Ekins rode Matchless and he came to the factory occasionally," Slark said of Steve McQueen's motorcycle stunt double in *The Great Escape*. "We would carouse a bit, and when he came over for the ISDT, I loaned him my scrambles bike so he could get a little experience slithering around in mud. He was used to sand in the desert.

"Over a bottle of Scotch, he said, 'Why don't you come over to California and ride in the desert?'" Slark said. "Within three months, I sold my race bike and pickup, and was in California."

Slark became friends with Nick and Alice Nicholson, owners of Nicholson Motors in Long Beach. Nick Nicholson was a versatile racer who was also the U.S. distributor for Greeves.

"They were family to me," Slark said. "I spent every holiday with them, and they got me on a Greeves. I loved the desert in those pre-BLM (Bureau of Land Management) days. In England, every inch of land is used. The desert was beautiful and wide open. I could ride for hours, get up on a hill and shut the motor off. It was phenomenal."

After a year, Slark returned to England to ride the ISDT at the Isle of Man on a Greeves. He also went back to work at Associated Motorcycles, but the cold and wet British winter wore on him, so he returned to California. He got a job working for Tom Cates at BSA West in Duarte, California, until the three-cylinder Rocket Three ("a heavy and complicated machine") was released. In 1969, he left BSA to work for Norton. "I was very involved with the Commando and the Factory dirt track team," Slark said. "I stayed with Norton until '75, when the British industry collapsed."

Slark taught some friends in the entertainment business to ride, including singer Bobby Darin. "It took a while for him to master the clutch and throttle, but eventually he got proficient enough to ride around," Slark said. "The first thing he did was buy the most expensive bike of its day—a R69S BMW."

The Hollywood bike scene included McQueen, Keenan Wynn and Pernell Roberts. "Those guys could ride—and drink," Slark said with a laugh. "That was a hard-living bunch. They were fearless. McQueen could ride pretty good, but some of the other guys did it on alcohol and bravado."

From 1971 to 1984, Slark worked on Clymer motorcycle repair manuals. "I did those for quite a few years," he said. "Those are all my hands in the photos."

In 1976, Slark opened a Norton shop, but after a few years moved out of California.

"I ran into Dave Mungenast, a former ISDT rider who owned a few midwest car dealerships," Slark said. "He wanted to get into the classic bike business."

The two started a motorcycle museum in St. Louis, Missouri, that still exists. Slark did appraisals and sold bikes to Alabama dairyman George Barber.

"He wanted to build the best motorcycle museum in the world," Slark said. "I offered my services, he accepted. That was 21 years ago. I'm still there."

The newly-enlarged Barber Motorsports Museum in Birmingham, Alabama, is the largest motorcycle museum in the world, with 1,526 machines displayed in nearly 250,000 square feet.

In addition to working a short week at the Barber museum, Slark judges at the Quail Gathering in Monterey, California, and at Amelia Island Concours in Florida. He vets Barber purchases, answers technical questions and generally continues to play with motorcycles. He was inducted into the AMA Hall of Fame in 2012.

"A complete surprise, but it is nice to be recognized by your peers," he said.

"One of the most rewarding things that I've been involved with was "The Art of the Motorcycle" exhibit (in 1998) at the Guggenheim. The curators of the show were all customers of mine back in California. The Barber museum was the major contributor to the show. We installed all the motorcycles, since the museum staff was more used to hanging fine art. We were very involved."

BRIAN SLARK COLLECTION

Slark competed with the best riders in the world on the Isle of Man in the International Six Days Trials.

The shows in New York, Chicago, and Bilbao, Spain, demonstrated the widespread appeal of motorcycles.

"In New York, you'd see a tattooed biker in cut-off sleeves standing next to a prim and proper, high society woman with her little purse, looking at an orange XR-750 Harley as art," Slark said.

Slark says the survival and future of motorcycles lies in passing such passion along to the next generation.

"We have to get our kids into motorcycles," he said. "The enthusiasts are aging. We owe it to our sport, with all of our passion, to get kids involved. I just got my 14-year-old grandson a basket case Honda. His dad is helping him restore it. We need to get kids interested in mechanical things instead of pushing buttons on a handheld game if we want this wonderful sport that has been around for a hundred years to continue.

"The café racers, rat bikes, butchered-up 350 Hondas are maybe not our taste, but when we were their age, we butchered up good Norton chassis and added Triumph motors. These kids will mature, get more income, and get into newer bikes. They're the kids we need to embrace. We need to approach them and encourage them. If we do not, what we have may fade away." MCN

THE NEXT 100 YEARS

Is the future a world of self-driving motorcycles?

> By **Glynn Kerr**

A multi-function heads-up display in eyewear could be all the gear a rider requires.

After reading the brief for the college motorcycle design project I set last year, my students' first question was to ask the target launch date. As someone who has spent a lifetime being asked, "How quickly can you get this done?", it was something I hadn't really considered. When I picked an arbitrary date of 2020, there was a communal slumping of shoulders, and complaints of having their creativity shackled by the hard reality of, well, reality.

For those of us who earn our living designing real products for real consumers, utopian dreaming is a luxury that rarely comes into play. While college projects may well be the only occasion in which budding designers can throw off the mantle of cost and production restrictions and really dream, it's also the duty of a tutor to ensure they know how to handle the real world stuff by the time they graduate.

In reality, thinking ahead more than five-to-10 years is off the charts, as far as new technology is concerned. The automotive world is already talking of an autonomous future within that same time-span. So attempting to look ahead a full century would appear ambitious, if not downright foolhardy. But that is exactly what BMW has been doing in a series of studies to celebrate its centenary—by giving us a glimpse of what its products may be like in another hundred years.

BMW's motorcycle concept, the last in that company's series of 'VISION NEXT 100' studies, projects the group's products forward a hundred years. The motorcycle study, which is a 180-degree turn from the retro-custom R5 Hommage unveiled at the Villa d'Este earlier this year, tries to turn our understanding of what a powered two-wheeler should be on its head.

First, there is no mechanical steering. Thanks to its "Flexi-frame", the whole bike bends from front to rear, with variable effort required depending on the speed. This is intended to give stability at higher speeds, while making the steering lighter for urban use or parking (as with most car power steering systems). There is no suspension either, damping being "provided by the tires, whose variable tread actively adjusts to suit ground conditions and ensure the best possible grip in any situation."

BMW

But the best part is that the bike is self-leveling, automatically adapts to the skills of the rider for the lean angles it will allow you to attempt, and, through interactive sensors that read the road conditions, is incapable of crashing. For this reason, says BMW, you won't need a helmet—although you will need the accompanying goggles, which project a multifunctional heads-up display. Apparently, you won't need protective riding gear either, although the matching suit the company is also proposing can heat, cool or massage you, and vibrate to warn of impending danger.

The styling is predictably Tron-like, although the design team deliberately maintained a link to company heritage by including overtones, most notably the frame triangle, from the 1923 R32—the first motorcycle BMW built under its own name. Even the familiar air-head boxer engine is reflected in the cooling fins, which expand outward when the bike is moving to improve cooling and provide additional rider protection. Cooling, in this case, is for the batteries and an unspecified electric motor—this bike is zero emissions, naturally.

A lot has been made of the "roadster" riding position, but the low bars make it more of a cafe racer, from where I stand. Either way, the minimal bodywork is designed to protect the rider "from wind and weather as effectively as a full fairing," although no explanation is given as to how that works. A bank of Dyson hand-dryers blasting the weather away from your body, perhaps. It would need to be pretty substantial to eliminate the need for protective riding gear.

Although BMW has announced it will produce fully-autonomous cars by 2021, it's a relief to learn there is no such plan for two-wheelers. While the design study boasts many automated safety devices, someone has at least understood that self-driving is not high on the desirable features list for most motorcyclists. Continued rider involvement, along with controls and instruments that are there only when needed, acknowledges that the riding experience remains a tactile, all-encompassing activity.

BMW

One up side of setting the vision a full century hence is that the company felt free to propose ideas without the need to explain how any of them would work, under the assumption it will be figured out by then. On social media, the strongest reaction has been to the suggestion that helmets would be obsolete. Accidents aside, anyone who has ever made contact with a flying bug while wearing an open-faced lid will take some convincing on this one. And even if those Dyson Air-blades can push insects away along with the weather, accidents will always happen. If my computer can crash occasionally, so can my computerized motorcycle.

Self-leveling is nothing new. The 2-wheel Wolseley Girocar was demonstrated in London in 1914, although thanks to some serious flaws (it could turn right but not left, for example) it remained a one-off. However, as I reported in 2012, San Francisco-based LIT Motors has developed a gyroscopically self-leveling two-wheeler that actually works. Production is imminent, and all pre-order slots are already sold out.

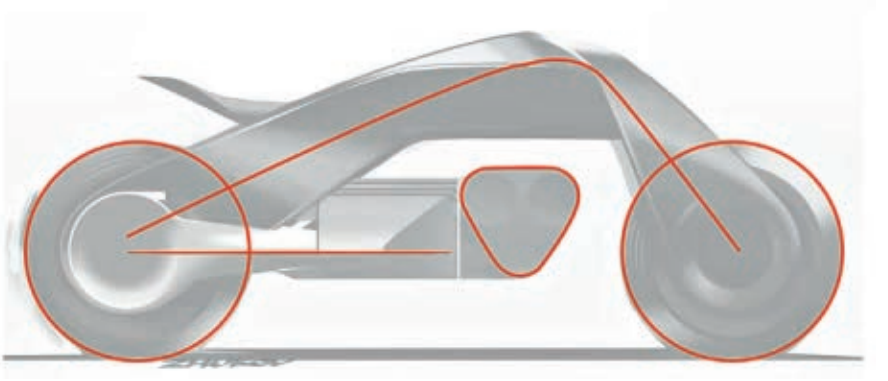
Will our vehicles look like the 'VISION NEXT 100' studies a hundred years from now? That seems highly unlikely. Early visions of the 21st Century had us dressed in silver space suits, and hovering above the ground in atomic-powered projectiles. And how far have we actually come, nearly two decades in? The Prius, and a Volkswagen diesel that can cheat emissions tests.

Whether the target is 25, 50 or 100 years from now is entirely academic. Whatever comes out will be an exaggeration of today's latest trends (I do hope we won't still be painting everything black in 2116), and in retrospect, will demonstrate designers' limitations rather than their imagination. But this is unlikely to faze BMW. Unless medical care improves at the same rate, few of us will be around to tell them they were wrong.

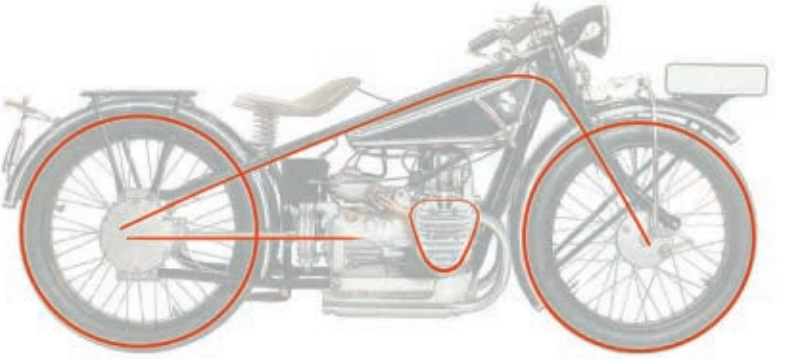
What the exercise might achieve though is that, given the freedom to think ahead unhindered by realistic restraints, some ideas can be generated that wouldn't otherwise have been proposed. And a few of those might pique the imagination enough to get the green light for further development. It's the whole basis of brainstorming. As Adrian van Hooydonk, Senior Vice President of Design for the BMW Group says, "You have to try to imagine the future in order to give yourself a chance of creating it."

In that respect, BMW may not only be predicting the future, but acting as the catalyst that makes it happen.

All the same, I don't plan to give up my helmet anytime soon. MCN



BMW's design follows the frame triangle from the 1923 R32—the company's first.



RUN SMOOTH

Sync Your Cylinders

Varying air pressure in the cylinders can cause rough idle and hesitation upon acceleration. Here's how to adjust it.

text and photos by **Kevin O'Shaughnessy**

PHOTO 1

PHOTO 2

PHOTO 3

Over time, our engines become dirty and components wear. This causes rough idling and possibly hesitation when accelerating. On some vehicles, this requires thorough cleaning of the intake. On others, it means a cleaning and synchronization is needed. As a consumer, I want to know why some engines need a synchronization and some don't. Let's reveal the magic.

Single-cylinder engines, Harley-Davidson V-twins, most current autos and personal watercraft use a single throttle assembly to control air volume. Since the same throttle plate is used on all cylinders, all receive the same pressure. On a multi-cylinder engine with individual throttle assemblies, wear causes differences in volume between cylinders. This affects the power output of each cylinder—one will push and another will drag. This is where rough idle and hesitation are seen. A general cleaning may help, but the air velocities between cylinders need to be aligned as well.

How does a technician fix this problem? Back when EPA was nice to the auto and motorcycle industry, we were allowed to play with mercury. Yes, mercury, the base element that children once played with in school and hat makers used to create malleable felt hats, thus, the mad hatter syndrome. Mercury was an excellent heavy liquid medium as used in a set of vacuum tubes to show differences in pressure. Hook up an individual tube to each cylinder and voila! You could see the pressure difference between cylinders. They were very accurate and inexpensive at $60-75.

If you blipped the throttle too hard while using this device, the vacuum would suck mercury through the combustion chamber. The engine then did an awesome job of shooting mercury BBs all over your shop floor. This also produced a nice cloud of highly toxic mercury gas. For some reason, the EPA thought this might be hazardous and banned mercury from such use.

The next solutions were vacuum gauges, anemometers, digital gauges, steel balls and bars in tubes.

PHOTO 1: Digital gauges are pretty cool and very accurate. However, the cost of gauges rockets into the $400-$600 range, past most DIY budgets. There are some mechanical gauges under $100 that do a decent job, such as the CarbTune Pro. All sync gauges are fragile, if accidentally dropped on the floor, they can be damaged beyond repair. I've seen a couple of techs dash their $500 digital gauge to the ground and ruin it.

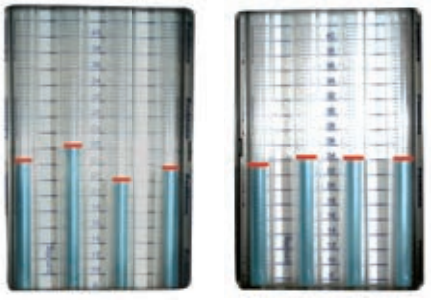
PHOTO 2: The details of a synchronization are different on every model, but the basics are the same. Remove the air box, tank and anything else in the way of the intake. This is where the technician will spend most of his time. On a GSX-R, it's pretty simple, and it even has a stand to hold the tank in place. Synchronization can be done in 20 to 30 minutes.

On a KTM 1190, a technician will

PHOTO 4

PHOTO 5A

PHOTO 5B



PHOTOS 6A & 6B

PHOTO 7

PHOTO 8

spend a good hour or so removing a layered puzzle of fairing pieces, then the tank, air box and several dozen fasteners. On EFI vehicles where the tank is removed, a specialized (and expensive) fuel pump tool is needed to provide fuel pressure to the system to run. In a few cases, the fuel pump line and electrical connectors are long enough to sit beside the vehicle for sync.

PHOTO 3: The sync gauge is hooked up to a vacuum port on each intake. These may be covered with a plug or another vacuum line.

PHOTO 4: Many vehicles have a vacuum line connected to the intake air pressure sensor. This is a major sensor for injection timing and must stay connected. If the sensor requires removal to install the sync gauge, then a "T" junction is required to allow the sensor and gauge to work on the same circuit.

PHOTOS 5A & 5B: Start the vehicle and adjust the idle to specification, typically around 1,100-1,500 rpm. This should be maintained at ± 100 rpm throughout the process. With every adjustment, the idle will change.

PHOTOS 6A, & 6B: Check the gauge and adjust the throttle until the gauge is as level as possible. It may be difficult to get them exact since the readings are bouncing up with intake valves opening and closing. Aim for the average.

PHOTO 7: Adjustments are made in two variations: throttle plates and air bleeds. Throttle plate adjustments control air volume by opening and closing the plate. As the plates open, velocity increases and the pressure drops (more vacuum). Most are screw and linkage-type, but there are also cable-type adjusters. They still adjust the plates, open or closed.

PHOTO 8: Air bleed adjusters are similar to a fuel screw adjuster on a carburetor, but only allow air to bypass. By adjusting the air screw out, the velocity increases and the pressure drops (more vacuum). Sometimes, I notice the adjuster isn't making a difference. At that point, it's time to remove the screw assembly, change the O-ring and clean out the port and parts. The O-ring is usually not available for purchase from the OEM, but is the same O-ring used on most carburetor fuel screws. You'll have to do some searching, or you can always buy a new $1,100 intake assembly.

ON ALL INTAKES it's important to make sure the venturi and plates are clean and free of deposits. Be careful about using cleaners on plates with a strip toward the opening. This strip has a substantial effect on low-speed airflow and can be accidentally wiped off with some cleaners. Check the service manual for cleaning suggestions if you see a rubber or painted strip at the leading edge of the plate.

Some EFI units require the OEM digital tool to disable functions such as electronic idle speed. If not disabled, the computer will promptly counter-adjust all of the technician's adjustments.

Equal pressure may not always be the best performance option. Some performance vehicles have specific pressures that vary slightly from one cylinder to the next. It's interesting to see idle and acceleration improve when adjusted so.

For some vehicles, a shop may only charge $100, because it is a quick and easy procedure. If the sync requires special tools, equipment, and hours of time to get to the components it may be closer to $300. In this case, ask if it would make sense to perform other maintenance services while the bike is apart.

While a DIY'er could do this procedure at home on most models, I'm starting to see more specialized procedures and use of digital diagnostic tools. If you do decide to try this, make sure to consult the service manual for special instructions. Gauge your ability to perform the synchronization before investing in special tools.

Hopefully this assists in understanding what to expect on your next sync. It's not actual magic, but it does take a bit of skill and practice.

Next month:
Valve Clearance Servicing. MCN

Survive The Ride: AVOID & EVADE

Half of all motorcycle crashes in the United States in have been collisions with cars. In about half of those, the driver was at fault, and often claimed, 'I didn't see the motorcycle.'

> text and photos by **David L. Hough**

A few years ago, during a presentation on situational awareness, my main point was that motorcyclists need to understand what is happening around them at all times, so they are able to get out of the way. At the time, I felt that being aware of the traffic situation was one of the most important skills for keeping the rubber side down.

A participant, "Mr. High Beam" asked, "Would it be helpful to ride with my headlight on high beam all the time?" I'd just spent 80 minutes discussing how to stay out of the way, and he was still hoping to force others out of his way. I concluded that Mr. High Beam wanted to flip a switch and magically ward off danger. So, I designed a "Motorcycle Magic Talisman." Simply wear it around the neck to ward off evil, including left-turning cars, edge traps, deer, even loose gravel in blind corners.

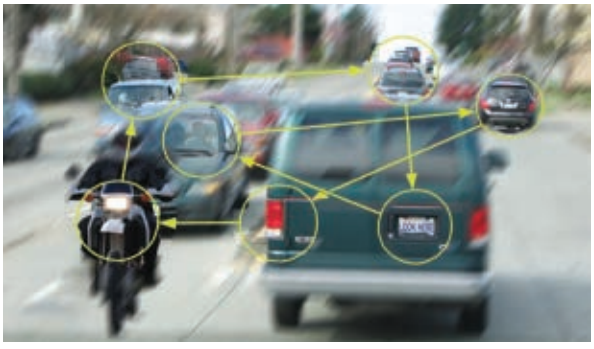
On the list of positive steps to avoid crashes, I suggest removing "making other drivers stay out of your way."

WHEN THE FAMOUS "Hurt Report" was published in 1981, motorcyclists and training developers eagerly pored over the statistics and recommendations. Motorcyclists had long known that automobile drivers crash into motorcycles, claiming not to have seen us. The Hurt Report put numbers to our suspicions, and offered advice: "the need for motorcycle riders to develop a traffic strategy so they can SEE AND BE SEEN in traffic."

Motorcyclists, manufacturers, and the Department of Transportation quickly took the business of seeing and being seen to heart. The government required illuminated headlights and taillights on street motorcycles. Headlight modulators were created. Manufacturers of riding gear added reflective panels and designed jackets and suits in yellow-green "Hi-Viz." Attracting attention became known as "conspicuity." It's hard to believe a driver would NOT see a motorcyclist wearing a hi-viz on a motorcycle equipped with flashing lights.

I remember believing that drivers couldn't help but see us, and after cutting us off, were simply trying to find excuses. But later, I learned that drivers pull into the paths of oncoming fire engines and railroad locomotives, oblivious to their blazing lights and blaring horns. It turns out the human brain doesn't "see" things quite like the Hurt Report assumed. There's been a lot of brain research in the decades after the "Hurt Report," indicating why conspicuity isn't reliable.

"SEEING" IS A complex process. We examine relatively fuzzy with our peripheral vision and when it picks up something of interest, central vision is triggered to focus on it. The center of vision, the fovea, is the only part of the eye that sees in sharp detail, and it sees only about one degree. Hold your arm out with your thumb erect. The thumb-



When your peripheral vision notices objects of interest, foveal vision can be commanded to take quick focused looks. The sequence of focused glances can be very complex as a motorist attempts to take in the various details and remember them.

nail will be about the size of your foveal vision. Foveal vision takes in more of the scene by making rapid glances, and remembering each one. Reading this, you are focusing on the details of one or two words on the page, and scanning the line of text in a sequence of quick glances.

Seeing is not a matter of our eyes transmitting images like a camera. The brain takes multiple impressions and combines them with other sensory intake. A memory search is done for comparison, and the eyes are tasked for additional glances. All of this is done instantly, evaluating what is being seen. It's so automatic that we don't realize how complex it is.

Here's an experiment: Place a finger on the middle of this column of text and focus your vision on your fingernail. See if you can still read any words on either side. Now, move your finger to the edge of the column, focus on it, and see if you can read a whole line. It should be obvious that only in your foveal vision can you see much detail. The farther out from central vision, the less detail is observed. In fact, color even fades off at the edges of peripheral vision.

WHAT DOES THIS have to do with motorcycles? A motorcycle might appear as a colorless blur in a driver's peripheral vision. In order to "see" a motorcycle, a driver must focus foveal vision on the bike to determine what it is. If a blurred motorcycle in a driver's peripheral vision doesn't trigger central vision, it remains a blur of no particular consequence.

To make judgments about speed and distance, drivers must take several successive focused glances. A driver may momentarily focus on the license plate of the van ahead, then glance over at the driver of an oncoming car, over to a car ahead of the van, back to the van's left brake light, then over to the bike's headlight, and so forth. The sequence of focused glances (a "saccade") will be very complex as the driver attempts to take in the various details and remember them.

When a driver is scanning traffic, there are too many little details to track at once, so the brain automatically assigns priorities and focuses on the higher ones. Size matters. Let's say a driver waiting to turn left observes an oncoming truck in her peripheral vision. The truck will get visual priority because it's bigger, and she'll glance at the truck several times to make judgments about speed, direction, and distance.

A driver is likely to give higher attention priority to a bigger vehicle, ignoring a motorcycle.

If there are two vehicles in the scene, a bike might get second priority. In such a case, she might glance at the truck, then at the bike, back to the truck, and maybe back to the bike. If there are many other vehicles in the scene, she might not waste a focused glance on the bike.

EXPERIENCE CREATES a system of automatic visual priorities: threats, strong emotions, personal relevance, then everything else. Threats, the top priority, might include big trucks and locomotives—most people will assign high priority to a large vehicle speeding toward them. Given a small motorcycle next to a large truck, the driver's visual priority will be the truck. Strong emotions are a close second in terms of how other drivers see us. The stronger the interest in motorcycles, the more likely we are to register in the peripheral vision.

A driver who has some interest in motorcycling will most likely see a motorcycle.

A driver with no interest in motorcycles may not "see" a bike.

A driver's brain can easily be overloaded with input. If something is low priority, the brain's "spam filter" may disregard it. In other words, if a driver has multiple higher-priority threats, he can look right at a motorcycle and not comprehend it is there. This is called "inattentional blindness." If the driver has no motorcycling experience and no family, friends or neighbors who ride, their brain may be conditioned to ignore all motorcycles. A bike might appear as a foggy blur, regardless of how conspicuous it is. It's not that drivers' eyes don't pick up the motorcycle, but that their brain is occupied with more important tasks.

What's more, the brain "sees" what it expects. Car drivers tend to see other cars, because the driver's brain is conditioned to expect cars. A motorcyclist's brain is conditioned to see other motorcycles. A driver who is a motorcyclist will usually notice a bike, perhaps looking more closely to see what brand it is, or what gear the rider is wearing.

When people are shown scenarios common to inattentional blindness, about half don't see low-priority objects. We can predict that, at any moment in traffic, it's likely about half of the drivers won't comprehend a bike. The best tactic is to assume none of them sees us and to keep a safe distance from all of them.

That is what I had suggested to my seminar participants, including Mr. High Beam. On the other hand, if you prefer wizardry, I'd be happy to sell you a genuine Motorcycle Magic Talisman. MCN

CYCLE ANALYSIS > By **Mark Barnes, Ph.D**

Matters of Size

I RECENTLY SAMPLED polar opposites in bike world: Suzuki's diminutive TU250X, and KTM's monstrous 1290 SuperDuke GT. The experiences were so vastly different, it was almost irrelevant that they were both motorcycles. Great minds think alike, and so it was that myself and several neighbors all independently selected the TU as the bike most likely to get our significant others on two wheels. In spite of the TU's extremely user-friendly nature—light, agile handling and classic, gracefully understated style—this sweetheart of a motorcycle has yet to inspire any of our sweethearts to venture beyond the rare 30-minute neighborhood "tour." The machines reflect the unrealistic hopes of three male motorcyclists, not the actual interests of their ladies.

SADDENED BY SEEING worthy mounts left sitting unappreciated in our garages, the guys decided to take them out and stretch their legs. On a gorgeously temperate, sunny, late-summer day, we set out in search of simple pleasures. Literbikes left behind, there'd be no temptation to push limits or jockey for position. Prepared to kick back and enjoy some rural scenery, we headed to a tiny gas-station-turned-BBQ-and-bait-store in the middle of nowhere.

Traveling at a relaxed pace was more a function of the restrictions imposed by small engines and narrow tires than a reflection of mellow mindsets. Exploring the TUs' capabilities on winding country roads, throttles were pinned—you'd never know it from measured velocity. Endowed with wonderful chassis geometry, the TU250X handled better than expected, allowing for heroic cornering in the complete absence of speed. Perhaps wishing for more ponies and suspension damping, only big grins remained whenever we stopped. Getting lost, we backtracked half an hour—nobody seemed to mind.

The barbecue place closed for the day to cater an event in the city where we'd started. We laughed at the irony, hunger be damned. We scarfed down less exotic fare in the nearest town. The only unpleasantness was hustling the TUs across four lanes of thick, fast-moving traffic. Though sometimes comical, it had been an excellent day of riding and we returned home satisfied. Who'd have thought three jaded enthusiasts would have so much fun on such cheap, slow and low-tech bikes?

THE HAPPY OWNER of a 990 SuperDuke, I've been pondering the 1290 "Beast" since viewing KTM teaser videos in 2013. The R version always left me ambivalent. It's irrefutable that 152 rear-wheel horsepower (MCN 3/14) would be far more entertaining than my bike's "measly" 107. And there were glorious new electronics to envy—ABS, traction control, multi-mode ride-by-wire—none of which exist on my '07.

Yet, I couldn't justify the price of admission, knowing I've never harnessed the full power of my own Duke and the 1290 R wouldn't enable anything additional. Small, soft panniers were available, but wouldn't extend its range meaningfully beyond what was achieved on the current bike, with tank- and tail-mounted bags. Adventures held more promise in this regard, but felt precariously tall and heavy for my 30-inch inseam. I chose not to demo the 1290, fearful I'd be hooked if I did, rational reservations notwithstanding.

THE NEW GT threatened to tip my mental scales. With little increase in height or girth, it features substantive hard luggage and sexier gizmos, including WP's latest electronically adjustable suspension. I figured the GT might echo my first outing on Honda's original CBR900RR. That bike, more than any other I've ever ridden, felt like purchasable skill. I was instantly comfortable, confident and relished how its unique combination of innovations immediately made me both faster and safer.

OFFERED A SPIN, I jumped on the GT without hesitation, though that came moments later. The 1290 motor makes nearly 50 percent more power up top and out-torques the 990 by a large margin down low—and the 990 is no slouch. I'm uncertain how quickly or to what extent I might eventually recalibrate my senses and reflexes if I owned a 1290, but my experience was one of utter bewilderment and sometimes terror—not the delightful exhilaration I'd anticipated.

The route consisted of short stretches of twisty back roads where even a tiny fraction of the GT's power felt excessive and potentially overwhelming—the bike was prohibitively intimidating. I wondered what mortal could actually use such undeniable thrust, even with electronic assistance. Distracted by fearsome acceleration and the hefty financial penalty of dropping a $20,000 motorcycle— even at walking pace—I was certainly both slower and less safe on board, despite the outrageous capabilities and sophisticated safeguards. Clearly, my evolution as a rider has not kept pace with that of modern powertrain development.

Perhaps I had a "senior moment" on that test ride. I'll give the GT another chance, at some point, to substantiate my own capacity. For the time being, I've learned the wisdom in the old adage, "It's more fun to ride a slow bike fast than to ride a fast bike slow." MCN

Mark Barnes is a clinical psychologist, in private practice since 1992. He has written extensively for MCN for more than 20 years.

Rotator Cuff Shoulders a Heavy Load

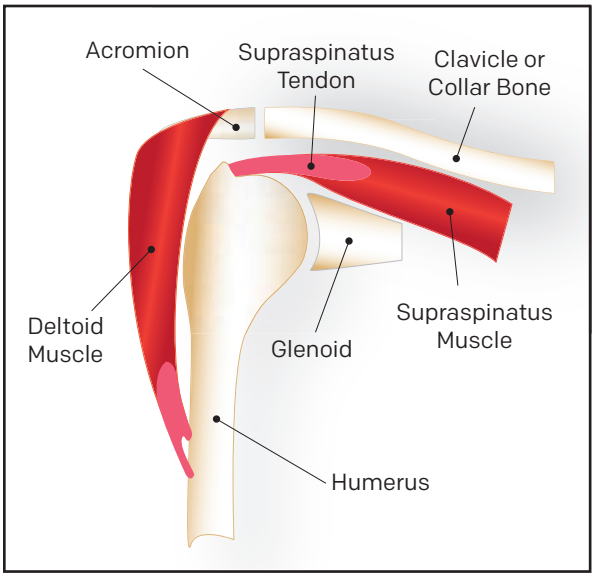
THE ANSWER TO the question "What does the rotator cuff do?" is closely related to healthy shoulder maintenance. Many riders are aware that painful conditions of the shoulder joint may be related to the rotator cuff, but the actual function of the cuff is less well understood.

The rotator cuff is a group of four small muscles that stabilize the shoulder as the larger muscles of the chest and back move the shoulder. The primary motions are internal and external rotation, and elevation. Internal direction is the motion used to propel a baseball in the throwing motion. External rotation is placing the arm behind oneself in preparation to throw. Elevation is reaching overhead. All of these movements require an intact rotator cuff working in concert with larger muscles of the chest and back, such as the pectoralis, the deltoid and the trazpezius.

The humeral head is the ball of the ball and socket joint of the shoulder (see diagram). The glenoid is the socket. The proportional size of each is similar to a basketball in a coffee saucer. Because the ball is not confined within a deep socket, like the hip, there is not a great deal of stability conferred by the boney anatomy. Stability and motion require intact ligaments and functioning muscles.

The shoulder moves by what engineers call a force couple (see diagram). The rotator cuff muscles pull the humeral head tightly into the glenoid socket stabilizing it and initiating movement, while the larger muscles power the shoulder in the primary motions described. These forces are said to be coupled because they need to occur together for shoulder motion to be strong and unrestricted.

The diagram shows the site where the rotator cuff is often torn at the supraspinatus tendon. It can also be abraded between the humeral head and the acromion, often called shoulder impingement or bursitis. In the operating room with the shoulder open, if one places a finger between the rotator cuff and the acromion, and then elevates the upper extremity, the finger will feel like it is crushed in a vice—there is not a lot of room. For these reasons, maintaining the strength of the rotator cuff via exercise is important, though, not always exercises which are commonly done.



RUSSELL EVANS

KEEPING A SHOULDER HEALTHY

By Rick Lembo A.T.C.

Athletes often neglect to stretch shoulder muscles, and ignore scapular stabilization and rotator cuff strengthening. Vanity often plays a role, as many athletes, especially males, focus only on strengthening their "mirror muscles," the pectoralis, biceps, triceps, deltoid, trapezoid and latissimus.

Devote 15 minutes to total body stretching before and five minutes after each workout. This will help prevent injury.

The easiest way to work out the rotator cuff is with rubber bands or tubing. A web search for "rubber band exercises for the rotator cuff" shows the same sets of exercises that we use to train racers, and college and professional athletes in our physical therapy facility. Every motorcycle rider's garage can easily be equipped with the common Theraband branded resistance bands, which are available in different resistances, but even bungee cords or old inner tubes will work in a pinch. Get a set of reps in while you contemplate your next bike modification or while prepping for your next tour or track outing.

Do abduction and external rotation with dumbbells and pulley weights too. For the right side: Begin with a dumbbell in front of your right hip. Elevate the shoulder while externally rotating it until the weight is at the level of your right ear parallel with your shoulders. The rotator cuff muscles are small, so multiple light reps are desired. Begin with a weight one-third to half of your curling weight. Do three sets of 20 repetitions.

While doing all rotator cuff work, as well as latissimus strengthening and rowing, retract your scapulae (shoulder blades) like you are trying to hold a pencil between them. This will strengthen scapular stabilizers.

Yoga is trending, and rightly so. It adds stretching for flexibility and endurance strength, which is what riders need. There are high demands of scapular stabilization with many poses. If you are not already taking advantage of yoga, consider adding it to your exercise regimen. MCN

Dr. Cary Tanner is a surgeon, chairman of the board at Fresno Surgical Hospital and medical director of Summit Surgery Center.

YOUR RIGHTS > By **Megan Ekstrom**

Still Fighting for Our Place at the Table

THE 114TH CONGRESS, gaveled into session in 2015, has been underachieving at best. I would literally fall over laughing if anyone said Congress is a highly respected and functioning body that has done a phenomenal job of passing comprehensive and innovative reforms that speak to the hearts of constituents. Unfortunately, the 'do nothing' sentiment about congress is, in many cases, true. Things get in the way: elections, lack of consensus, special interests and good, old-fashioned politics. That being said, the 114th Congress achieved one accomplishment in a bipartisan and collaborative manner.

In December 2015, H.R. 22, the 491-page Fixing America's Surface Transportation Act (FAST Act) was signed into law. The primary objectives are to upgrade our nation's surface transportation infrastructure, enhance roadway safety and increase federal funding. This has empowered state governments and local planners across the nation to commit to upgrading roads, bridges and highways. The law went into effect in January 2016 and continues until 2020. It is the first long-term highway bill to pass Congress in a decade. The motorcycle community considers the FAST Act a victory for several reasons, one of which is re-establishing the Motorcyclist Advisory Council (the Council).

The Council was established in the 2005 highway bill, Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). That law called for the Administrator of the Federal Highway Administration (FHA) to have a dialogue with the motorcycle community about infrastructure issues of concern to motorcyclists. The Council had 10 motorcycling community representatives with professional expertise in national motorcyclist safety advocacy. The Council would then advise the Administrator about such concerns as barrier and roadway design, construction, maintenance practices, and the architecture and implementation of intelligent transportation system technologies—all relative to motorcyclists. The Motorcycle Riders Foundation (MRF) was instrumental in getting the Council started and serving as an official Member.

THE FIRST MEETING convened at the end of 2006 and, for the first time, provided an official forum and direct dialogue between motorcyclists and DOT and FHA officials. Unfortunately, these meetings were short-lived. In 2009, SAFETEA-LU expired and along with it, the Council. The highway bill went through a series of short-term extensions, but none provided for the re-establishment of the Council. The 'direct connect' to our nation's highway safety officials was dead and there was no sign of resuscitation.

Too often—admittedly, with the best intentions—a room full of bureaucrats who've never ridden a motorcycle make decisions affecting our safety. For members of the MRF and other motorcycle rights organizations around the country, the Council was a critical forum. It is unclear why the Council was not a priority in any of the extensions that passed over the years, but when the FAST Act negotiations got underway in 2015, the possibility returned.

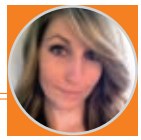
When the FAST Act re-established the Council, motorcyclists had reason to celebrate. Once again, we would have a seat at the table and the ear of our transportation and infrastructure safety officials, ensuring representation. Or, would we?

UNFORTUNATELY, THE FAST Act neglected to specify who would participate on the Council. This was different from the previous law (SAFETEA-LU), which ensured motorcyclist participation by naming organizations the Council should include. It became clear that we would have to fight for a spot on the very council that was established to give us a voice. And fight we shall!

In June of this year, congressmen Reid Ribble (R-Wis.) and Mark Pocan (D-Wis.) drafted a letter to the FHA encouraging the agency to adopt similar language found in SAFETEA-LU when determining the participants of the Council. Twenty members of Congress signed the letter. In addition, senators from South Dakota and Alaska questioned Secretary of Transportation Anthony Foxx in a congressional hearing about participation in the Council and referred him to the language in SAFETEA-LU. Efforts such as these, plus outreach from motorcyclists across the country to their Congressional representatives, have helped ensure that the FHA has a very clear understanding of the role motorcyclists want when the Council convenes its first meeting.

DEADLINES WERE established for various Fast Act provisions. However, re-establishment of the Council did not have a deadline associated with the first meeting under the law. The MRF will be making recommendations about who should participate in the re-established group and we are hopeful that nomination and announcement of participants happens in 2017. There are many issues in the pipeline affecting motorcyclists, such as autonomous vehicles regulations and debate between concrete versus guardrail versus cable barriers. It is critical that motorcyclists have a loud voice in transportation decisions made by our elected officials. MCN

Megan Ekstrom is vice-president, government affairs and public relations for the Motorcycle Riders Foundation - mrf.org



From Four Wheels to Two: A New Perspective

ROBERT JERSEY

I'M DRIVING DOWN Pacific Coast Highway in California in my 1991 Mazda Miata Special Edition. The top is down, sun shining and waves are breaking on the shore to the right. Downshifting to slow for a stoplight, before throwing the stick in neutral, a motorcycle rides up next to me. I watch the rider shift to neutral and relax ever so slightly. While we wait for green, something finally clicks.

While riding a motorcycle isn't quite like driving a manual transmission car, there are similarities. Maybe this is why shifting was never a major problem area when I first started riding. But if this skill could transfer, it made me question what other driving skills actively might.

As I watched the rider shift into first gear and get ready to accelerate, I also wondered if the reverse was true. What riding skills transfer to driving? Does each skill make you both a better rider and driver at the end of the day?

SHIFTING IS THE most obvious transferable skill when swapping a steering wheel for a set of handlebars. When I was learning to drive, it took forever to figure out the manual transmission. Years went by and I nearly gave it up. But because I didn't give up, I had an easier time transitioning to riding. I understood the fundamentals, and while the mechanics may be different between vehicles, they're similar enough that the transition was pretty smooth.

In a car, you shift with your hand and clutch with your foot, the exact opposite of a bike. But the biggest difference is that in a car, you can throw it in neutral or select any gear whenever you want.

KNOWING YOUR LINES may be a stretch for some riders and drivers, but my on-track experience behind the wheel was beneficial when it came time to practice cornering lines. The first thing taught in class is looking with your whole head, not just your eyes, when you want to corner on a bike. This is also true when going 80-plus mph around the racetrack. All instructors will tell you the same thing—make sure you look through the turn, keep your eyes focused on where you want to go.

Before I ever rode a bike, I always shifted my body in tight, high-speed corners on the track, keeping my eyes pointed farther ahead than the average driver. This knowledge transferred the first time I sat on a motorcycle. I watched others in my riding class not fully grasping the head turn, when right out of the gate, I was looking completely through each turn. If I fail to look fully through a turn, it's shaky and uncomfortable, but when implementing a full head turn, cornering feels like gliding.

THE FIRST THING I noticed after riding and then returning behind the wheel was that I drove more defensively. I found myself checking the mirrors much more frequently than I normally would and realized how much can be missed when zoning out during a morning commute. Even though it's normally stop-and-go traffic, little things became abundantly apparent in the vehicles around me. I began to notice what's happening several car lengths away, both before and behind me. Turn signals engaged too late or going entirely unused, drivers paying more attention to their phones than the road. It's quite scary what passes for driving these days.

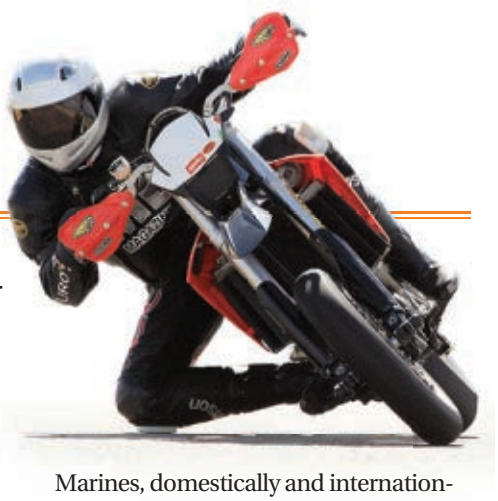
I've gotten into the habit of examining drivers around me. If I can't see them, either through tinted windows or because my car is too low, I'm watching their every movement. Are they swerving? Are they about to cut me off? Are they going to turn?

STAYING ATTENTIVE goes hand-in-hand with being a more defensive driver, but on a different level. Not only do I pay more attention to drivers around me, but also to road conditions, weather, and other motorcycles on the road. Keeping an eye out for distracted drivers, kids, or activity on the side of the road can be the difference between avoiding an accident and being the cause of one. I've also noticed that driving such a small car is similar to riding a motorcycle—other vehicles do not see you. Increasing my visibility to other drivers is always in the back of my mind.

Whether you're behind the wheel of a car or a set of handlebars, there are many ways each set of skills and awareness influences the other. MCN

Megan Stewart is a creative writer, journalist and former editor and contributor at Motor Trend and Automotive.com.

TOTAL CONTROL > By **LeeParks**



Back in the saddle, at MCN

WELCOME TO THE inaugural Total Control column. For those of you who remember me as the editor of MCN from 1995–2000, it's good to be home. When Editor Hilgendorf called and asked if I would come back to MCN as a contributing editor, it felt just like putting on a favorite old riding jacket.

That we now have four current and former Editors (with the big E) on staff brings a history and perspective unparalleled in the industry. Fred Rau is a touring and investigative journalism icon that needs no introduction. He began this no-advertising ride and continues to kick butt and take names. Dave Searle is one of the all-time best technical writers to ever grace the pages of a motorcycle magazine. His insights and passion for all things that go fast and smell of hot oil is an inspiration to motorheads everywhere. Our fearless leader DH is ready to make the tough decisions to take us into the next era of two-wheeled nirvana. I'm honored to return to my old stomping grounds and bring a decade and a half of new knowledge and experiences back to the mother ship.

I BEGAN RIDING dirt bikes when I was 12 years old and soon discovered my need for speed. By the time I was 14, I began ice racing on the frozen lakes of the Midwest in the winter and motocrossing in the summer.

When I turned 16, I immediately started street riding, and two years later began road racing during college on a 1984 Kawasaki GPz305 with belt drive. I have always believed that learning on smaller, more agile bikes enhances your learning curve, and I saw evidence of that when I began to win road races within a couple years.

In 1994, I finished second overall in the AMA Superbike Series in the 125GP class in its exhibition year. Back then, I was fast, but not knowledgeable. I took a five-year hiatus from racing when I was the editor of MCN, and used that time to work with the best in the business to understand the physical dynamics of what was really happening while riding a motorcycle.

From this experience, I developed theories on riding skills and created what became known as my Advanced Riding Clinic. It was designed to fill in the gap between the Motorcycle Safety Foundation's Experienced RiderCourse (now called BRC 2) and the many racetrack schools around the country. The success of the clinics led to the publication of my first book "Total Control," which continues to be an international best-seller in five languages. Before the book was finalized, however, I decided to do some final testing of the techniques by going back to the racetrack.

AT THE AGE of 32, I became the "old man" on a rookie endurance racing team and we set out to do a final test of the techniques to make sure they were sound. Amazingly, with some pretty green teammates right out of the novice class, we won the 2001 WERA National Endurance Championship in the lightweight class in our first try. Unlike in 1994, this time I was in relatively bad physical shape, but armed with a keen understanding of proper technique, I was able to ride even faster and much more efficiently.

The success of the book led to a huge demand for the Clinics, so I renamed them the Total Control Advanced Riding Clinics (TC ARC) and started setting up licensed providers of the TC ARC curriculum around the country. Currently the TC ARC is taught in 22 states and provinces. The success of the advanced training soon caught the eye of the military and now my company provides training to the Army, Navy, Air Force and Marines, domestically and internationally. In 2015, we entered the beginner training market and now manage the California Motorcyclist Safety Program, training 60,000 riders a year in our beginner curriculum.

ADDITIONALLY, I MANUFACTURE my own line of motorcycle gloves and other technical riding products. That keeps me pretty busy, showing them off at motorcycle shows, selling them to dealers and also continuously developing new products. I really have a passion for motorcycle products, whether I'm designing them, selling them or testing and reviewing non-competitive gear for magazines.

Taking the torch from legendary contributor David Hough, I will use this column to teach you the latest, most effective riding techniques and strategies available. As Total Control is always innovating and testing new ideas, you can be confident that you'll get to read about them here first.

I will also keep you up to date with some of the latest news and trends affecting safety and rider performance. This means when new rider aid technologies and parts come out and improve, I'll report the good and the bad, and explain what it means to you. Let me assure you that I'm not one to simply complain and pass judgment; I'm going to offer real solutions to our problems, and I'm committed to making the world a better place to live, one motorcyclist at a time.

My mantra is "better living through motorcycling," and that's what Total Control is really all about. MCN

Lee Parks (MCN editor '95-'00) is author of *Total Control Performance Street Riding* and proprietor of Total Control Training.

What I Don't Know…

HAVING MY NAME in print for four decades, combined with my lifestyle of bouncing around the world to various motorcycling events has convinced many people I am some kind of sage about anything involving bikes. In fact, that's a long, long way from the truth.

Two different and commonplace things happened today. First, I read the latest columns from Kevin Cameron and Peter Egan, and second, I received a half-dozen emails this afternoon, asking for my advice on a variety of subjects. Let me declare as emphatically as possible that I only wish I had one percent of the knowledge of the actual workings of motorcycles as writers like Cameron and Egan, or for that matter, MCN's own Dave Searle. Often, I have to re-read one of their paragraphs three or four times in a vain attempt to understand what they are trying to teach me.

I'M NO DUMMY—I have advanced training in steam turbine design and electrical generating and transmission systems. I'm pretty good at comprehending component design and regurgitating feature specifications until blood runs out of your ears, but when it comes to hands-on mechanical engineering, I am a total disaster. Once, several engineers from Fox spent an entire day teaching me how to properly set up a bike's suspension. I was highly impressed with the difference they could make in a bike's overall performance and handling, and was determined to learn how to perform the process myself. When I attempted to set up my own bike the next day, I screwed it up so badly I had to take it to a shop to have it corrected.

I can write a 10-page paper on the properties of any specific grade of oil, its additives and how they interact, but I can't be trusted to perform a simple oil change. Which is why I feel like such a phony when I try to answer technical questions that come my way. I wish I were the oracle of all motorcycling knowledge, but to start getting into the inner workings of the machine, you really need one of those guys mentioned earlier, or a local mechanic you can trust. I have several on speed dial, each of whom answers the phone with something like, "What have you broken now, Fred?" They know me all too well.

MY PUBLIC CONFESSION: I don't know nearly as much as some of you seem to think I do. Yes, I own and run a motorcycle touring company, with decades of experience leading guided tours. I also wrote the book "*Motorcycle Touring Bible*," and feel very well versed on the subject matter therein. But those are about travel and adventure, or "lifestyle." I would be happy to help figure out what to pack for a specific tour, or how to choose a jacket or pair of sunglasses, but for advice on altering cam timing, read Dave Searle's column.

In the arena of motorcycle journalists, I'm a lightweight. People place a mantle on me that is completely undeserved—I'm a lifestyle guy. I love riding and probably ride as much as almost anyone in the world. But experience doesn't equate to knowledge. Riding a million miles doesn't mean I understand how the engine works.

I AM OFTEN asked to speak at large motorcycling events, among experts from various fields of the sport. I sit in the background and listen to the technical seminars of those who really know what they're talking about, dreading the moment I will have to take the stage. Often, I pace queasily behind the building. I really can't compete in the intelligent information arena, so I try to be entertaining.

If I can make them laugh or cry, get happy or mad, maybe they'll feel they gained something from my talk. Most of the time it seems to work, but it's all a ruse. Though I smile, laugh and bounce about the stage, in my heart I'm dreading the moment someone will jump up and yell "FRAUD!" I am writing this as a pre-emptive strike, so I can jubilantly point back to this column and say, "I told you so!"

I AM NEITHER an "iron butt," nor "adventure touring" rider. I once rode 1,275 miles in a single day, out of necessity, more than 20 years ago. I will never do it again. I tried adventure touring—twice. The first time, I sprained my ankle and bruised three ribs. The second time, I destroyed a perfectly good motorcycle. I have no advice to give those riders.

I don't particularly care about the destination. The more time I have available, the better the route I can plan, and the longer I can ride. I want variety—mountains, deserts, hills, plains, deep forests and wide-open spaces—just keep me out of the cities. I don't care if it's 100 degrees or 10 below zero, the bad days make the good ones feel that much better.

I'm a fairly normal guy, who happens to love going everywhere on a bike. I am not the fount of all motorcycling knowledge, just ridiculously lucky to end up with a job that allows riding almost full-time. What little knowledge I have comes from years of testing dozens of bikes, and a myriad of riding gear. I'm happy to advise, but don't expect too much, because I'm really just like you. MCN

Fred Rau (MCN editor '91-'95) is author of *Motorcycle Touring Bible* and proprietor of Fred Rau Adventure Tours - FredRau.com

OPEN ROAD > By **Dave Searle**

Brake Fluid Tech

MOST OF US are well aware that changing motor oil frequently can significantly extend the life of our engines, but how many of us really pay attention to changing our brake fluid? Many riders go years without giving it a thought, only to find that when they really need their brakes to deliver full performance—on a long downhill mountain road or an infrequent track day excursion, when discs may reach temperatures of 800 F—they can suddenly lose all braking power as the fluid boils. The faster or heavier, the more energy that must be converted to heat in the brakes, but these two factors have different dimensions. Physics tells us that greater overall weight creates more energy in direct proportion, but velocity's effect is exponential—double the speed and you must shed quadruple the heat to stop.

Remember that hydraulic brake systems rely on the incompressibility of their fluids to transfer energy from your hand and foot controls to the brake caliper pistons, and when brake fluid "boils" it forms gas bubbles that may be compressed but can't transfer energy (also called brake "vapor lock"). Because the majority of motorcycles use glycol-based DOT 3 and DOT 4 brake fluids that—much like ethanol-blended gasoline—constantly absorb water from the atmosphere through microscopic pores in their rubber hydraulic hoses and seals, their ability to resist boiling decreases significantly over time.

TWO CRITICAL factors change with age. One is the fluid's temperature resistance, as codified by DOT regulations that specify its minimum "dry" and "wet" boiling points, which are always printed on the container. The dry boiling point indicates its performance when new, and the wet boiling point assumes a water content of 3.7 percent—a figure that represents the typical moisture content after two years in the system—when OEMs typically specify brake fluid changes. Note: water absorption does not depend on miles ridden—simply time and ambient humidity. Even if you never ride the bike, its glycol brake fluid needs to be changed at least every two years. Note in the enclosed chart that DOT 4's boiling point will drop from 446 F to 311 F over that time, but water absorption continues the longer it remains in the system, and fluid containing 8 percent water has virtually the same boiling point as plain water, just 212 F. Even previously opened but tightly recapped cans of glycol brake fluid should be discarded after 12 months for the same reason, so always buy in small quantities.

Wet boiling point defined as 3.7 percent water by volume

	Dry boiling	Wet boiling	Viscosity limit	Primary constituent
DOT 3	401 °F	284 °F	1500 mm2/s	Glycol Ether
DOT 4	446 °F	311 °F	1800 mm2/s	Glycol Ether/Borate Ester
LHM+	480 °F	480 °F	1200 mm2/s	Mineral Oil
DOT 5	500 °F	356 °F	900 mm2/s	Silicone
DOT 5.1	500 °F	356 °F	900 mm2/s	Glycol Ether/Borate Ester

The other factor is the fluid's viscosity, which increases as it absorbs more moisture. Because anti-lock braking systems are typically designed around calibrated metering valves, consistent brake fluid viscosity is critical to proper operation. DOT 4—the standard ABS brake fluid—typically adds more expensive borate esters to elevate its dry boiling point, and absorbs moisture faster as a result. Therefore, DOT 4 fluids, as well as DOT 5.1 and products marketed as "super DOT 3 or super DOT 4" for racing use (which can have dry boiling points in excess of 620 F), should be changed more frequently.

Viscosity also changes with temperature, increasing as the mercury drops. In arctic conditions, glycol brake fluid that contains significant water can form crystals to make brakes inoperable. It's for this reason that the U.S. military uses silicone brake fluid in all its vehicles, to be ready for deployment around the globe on short notice.

The best performing brake fluids are expensive "racing" types, but excellent mass-market fluids are available, offering great value.

BECAUSE WE ARE accustomed to the higher a product's specification number, the higher its performance, DOT 5 is very poorly named. Unlike the most common glycol-based based fluids (DOT 3 and DOT 4), DOT 5 fluid is not a simple upgrade because it is silicone-based. Only new, dry parts can be safely filled with silicone fluid. While you might mix or substitute DOT 4 for DOT 3, and DOT 5.1 for DOT 4 (follow the motorcycle and fluid manufacturers' recommendations), silicone and glycol fluids are completely incompatible and must never be mixed. Because glycol fluids contain dispersants that keep water

in suspension, even a brake system that has been thoroughly drained will still contain some water, which settles to the bottom of a system refilled with DOT 5, forming a corrosive gel. Restorers and collectors will often substitute DOT 5 silicone fluid for glycol types in fresh builds, to prevent brake system deterioration in little-used show vehicles—the same seals are compatible with both types. To help avoid confusion, the DOT requires that all glycol fluids must be colorless or amber when fresh and silicone fluids must be purple.

The reason that Harley-Davidson specified DOT 5 silicone fluid in its bikes for so many years (from 1990 to 2006) is that silicone is not hygroscopic like glycol, so it doesn't attract water and has a more stable viscosity index over a wider temperature range. Perhaps most importantly, silicone fluid does not attack paint like a glycol fluid—an important distinction when custom paint is a motorcycle's major selling feature. However, the main reason DOT 5 isn't used by more manufacturers is that silicone fluid is very easily aerated, even tiny air bubbles will spoil the firm lever feel that riders appreciate. Its compressibility also makes it incompatible with ABS. If your bike uses DOT 5, take special care when filling to pour it slowly down the side of the master cylinder and don't pump vigorously when bleeding the system, which can create cavitation-induced aeration.

ALTHOUGH THE DOT'S FMVSS 116 brake fluid standard doesn't specify any particular chemistry, glycol-based brake fluids are generally preferred by the OEMs for their performance and low cost, but other fluids are possible.

Early motor vehicles often relied on castor bean oil brake fluid, which offered an exceptionally good 595 F boiling point. The earliest DOT certified fluid, the now discontinued DOT 2—was alcohol-based, either butanol (crimson) or ethanol (yellow). Mineral oil brake fluid is another option that is still used. A byproduct of petroleum distillation, you'll find it in everything from perfumed baby oil to laxatives. Advantages are that because it's petroleum based, it has no affinity for atmospheric moisture, so its boiling point never changes, and it naturally resists corrosion so it can stay in the brake system indefinitely.

The visual refractometer needs only two drops of fluid, best obtained from the caliper where water content will be slightly higher. The pen-tester is inserted into the master cylinder and a series of graduated lights reveal the water content.

Both Rolls Royce and Citroën have used specifically formulated mineral oil brake fluid (called LHM for liquid hydraulique minéral). BMW now uses mineral oil in many of its hydraulic clutch systems (blue BMW branded Vitam LS). Nevertheless, you cannot simply switch to LHM, as the critical seals in the system will fail if they are not designed for mineral oil.

Mineral oil also provides excellent lubricity, so the master and slave pistons will move easily. Glycol ether by itself is a poor lubricant. Therefore, any glycol-based brake fluid will actually be a mixture of as many as 10 different chemicals. Glycol ether will make up 50 to 80 percent and a polythene or polypropylene lubricant additive might make up as much as 20 to 40 percent, which is why many glycol-based brake fluids are also referred to as "poly-glycol." Corrosion and oxidation inhibitors, and agents designed to reduce seal swelling are added as well. These also tend to degrade over time, adding further impetus to keep your brake fluid fresh.

A ROUGH WAY to identify glycol fluid past its change date is to remember that when it becomes quite dark, it needs renewal. There are more scientific ways to test for water content. Two tester types are commonly available. One is a AAA battery powered twin-probe device that tests electrical conductivity, ($20 to $75). The other is a refractometer, either visual or digital ($100 to $500). Paper brake fluid "test strips" available in auto parts stores are no longer considered reliable as they can absorb moisture on the shelf.

The benefits of fresh brake fluid include more than peace of mind. Not only will your brakes better resist fluid boiling and expensive corrosion, they will usually have a noticeably more positive feel that aids bike control. MCN

Dave Searle (MCN editor '00-'15) trained in engineering and the arts before becoming MCN's first technical editor in 1988.

MCN MOTORCYCLE CONSUMER NEWS

Next Month

» Yamaha SCR950
» BMW R nineT Scrambler

Vintage

Double-Take

Recently at auction, a 1921 Megola Tourer made news when it sold for $106,556. The Megola's unconventional design, especially its recumbent bucket seat, invites a comparison to a modern motorcycle that cuts a similar profile: Honda's NM4.

» 1921 Megola Tourer

ENGINE 640cc five-cylinder radial engine, built into the front wheel
IGNITION Started by pushing, or alternatively by rotating the wheel with the machine on its stand
TRANSMISSION No clutch, no gearbox; just a torquey engine
FINAL DRIVE Direct, to front wheel
TOP SPEED Touring model 70 mph (race version 85 mph)
FRAME Welded and riveted box-like steel fabrication
FUELING Front section contained fuel, pumped to header tank
SUSPENSION Leaf-sprung front and rear suspension (on some models)
ERGONOMICS Recumbent, bucket seat
PRICE $106,556 (at auction)

» 2016 Honda NM4

ENGINE 670cc SOHC parallel-twin
IGNITION Digital transistorized with electronic advance
TRANSMISSION No clutch, six-speed with two automatic modes and a manual mode
FINAL DRIVE Chain
TOP SPEED 100+ mph
FRAME Welded Steel tube
FUELING Electronic Fuel Injection
SUSPENSION 43mm fork, 3.9 inches travel; Pro-Link® single shock; 3.9 inches travel
ERGONOMICS Recumbent, bucket seat.
PRICE $10,999