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Motorcyclists

> There are no CycleStats in this issue. We hope the number nerds can forgive us. We promise there are other geeky data inside.

THERE ARE MANY types of motorcycle, catering to various styles of riding. Some riders jump on anything and everything, others choose a few preferred styles and yet others favor a single form of riding. What can we learn from switching it up?

DIRT: This is where many riders earn their chops—you don't even have to have a license. There are few moving obstacles; the challenge lies in conquering the terrain. Yet, the knowledge we gain about control, suspension, traction and braking on dirt frequently helps define how successful we will be on pavement.

COMMUTER: Riding in heavy traffic or bad weather is physically and mentally tiring, however, it hones awareness of one's surroundings and improves reaction times. We can learn the patterns and anticipate trouble faster by riding every day.

TOURING: Cross-country rides require researching the best routes and adapting when something goes wrong. Knowledge gained by reading service manuals and online forums to fully comprehend one's vehicle and route, plus regularly practicing routine maintenance, makes for a better rider.

ADVENTURE: Combining the best of dirt and touring by seeking knowledge of the machine and applying forethought and technical skills to take large bikes long distances without readily available support services. The reward is visiting places and having life experiences that most only dream of.

CRUISER: Frequently an active tourer or commuter, but sometimes a weekend warrior or social motorcyclist. Often attends events, such as bike nights, festivals or rallies, so they can participate in a community of motorcyclists. Often charitable and typically proud of family, brotherhood and beliefs, they embrace others with a shared love for the freedom of riding. Their propensity to spend more on the lifestyle than the machine has long been fuel for the entire industry.

RACER: They often don't ride on the road, because it is "too dangerous." On the track, everyone is heading in the same direction, playing by the same rules and supremely aware of their surroundings. Track riding hones visual acuity and reflexes, by practicing the same skills and techniques at higher speeds with intense repetition in a controlled environment that allows ample room for error.

STUNTER: Riders and nonriders alike watch expert daredevils in awe, seeing either incredible risk or amazing talent and control, with a fine line in between. Learning the limits of balance, power and traction gives riders an innate ability to command their bike when things go sideways.

SCOOTER: Low cost of ownership combined with twist-and-go operation, great fuel economy and faster arrival than public transit, make scooters and e-bikes a good entry point into motorcycling.

TRIKES: What do you get when you mix a car and motorcycle, retaining few of the best features of either? After riding five very diverse three-wheelers, we discovered that they each serve a very distinct purpose. There aren't many trikes on the road, so they also become an instant conversation starter wherever they are parked. Read our trike comparison on page 16 for more thoughts.

WE LEARN VARIOUS skills and techniques, but we earn freedom and independence and create lifelong friends and memories by riding this road less traveled. Whatever your chosen mount, learn from it, then enjoy, share and promote it. If you've grown bored or complacent, perhaps it's time to expand your horizons by trying something new or teaching someone else. Without motorcyclists, there would be no motorcycles. MCN

LETTERS

LOWSIDES (MCN 5/17): A letter incorrectly attributed to Jerry Bloch was actually sent by Jon Baker.

1936 Indian Chief front suspension is girder fork with leaf spring (not telescopic), with rigid rear (not plunger).

THE SIZE OF DSLR cameras is a significant hindrance for motorcyclists (MCN 2/17) and I can't give up three quarters of my tankbag for one. I've used point and shoot cameras (P&S) to take decent photos without consuming space, but I have not been able to satisfactorily address shutter lag. What are good cameras for use on a motorcycle, where size and convenience are major factors?

—Christian Aasland

Shooting motorcycles professionally does require good and often sizable equipment. A mirrorless camera body will be relatively small, but good lenses can easily double the size of the camera. The most important camera is the one you have with you.

There are many quality "travel" cameras available, smaller than a DSLR and more feature-rich than a standard P&S. Have a look at the Sony DSC-RX100, Fuji X series or Panasonic LX and ZS series—compact, with many features. I'll throw the GoPro Hero 5 Black into the mix for adventurers. It has drawbacks (battery life, no zoom), but it's minute, rugged, waterproof, mountable and offers one-press "QuickCapture."

—David Hilgendorf

I HAVE ALWAYS "talked up" MCN, because of the honest and thorough evaluations of bikes, accessories and products. The valuable consumer information is well worth the higher subscription cost; please don't lose sight of that.

—Charles McKinivan II

We now have two motorcyclists dedicated to improving MCN. Crafting a magazine takes time. We've made great progress reorganizing our content to create a sustainable foundation on which to rebuild MCN.

We strive to put great value into 48 pages of pure content every month, but our readers must determine if MCN is worth a few dollars a month for the entertainment and knowledge we've been providing for 48 years.

—David Hilgendorf

PROFICIENT RIDER

At 50-years old old, I decided to start riding, using the rationale, "I've lived a good life and if something happens I will not regret it." Trying to figure out my BMW R 1200 C by myself, I clipped the sidewalk leaving my driveway and dumped the bike. Things were not looking good.

A fellow BMW rider explained he had a similar start to riding. He recommended David Hough's, Proficient Motorcycling. I read it continually for the next few months. David's careful explanations and understanding of riding and riders' attitudes and the how and what to watch for has surely saved my life. I became more aware of my surroundings, started riding only as fast as I could see ahead and have always worn bright-colored protective clothing.

I've shared Proficient Motorcycling with every new rider I met, explaining how important it was and asking them to read, sign and date it—there are now 10 signatures. Thanks to David Hough for potentially saving 11 more motorcyclists' lives.

—Keith Jefferson

I'D LOVE SOME ramp loading techniques (MCN 4/17). I've put off purchasing a ramp to load bikes for fear of trying to get it up into the high bed of a pickup. A narrow ramp doesn't offer space for foot placement.

—Richard Wojciechowski

My suggestions for loading a pickup solo are to place a wheel chock at the front of the bed to capture the bike and hold it upright, then use a second loading ramp to walk up alongside the bike, which you can do under power. Optionally, use a small folding two-step ladder (like you might use in a kitchen) to step up safely, which takes up less space than a second ramp and is more stable than a toolbox or other makeshift step. Whenever possible, back up to an incline to make the ramp as horizontal as possible, and don't put a lift kit on your pickup, lower is better.

—David Hilgendorf

I AM WONDERING why you did a full "Model Evaluation" of the H-D CVO Pro Street Breakout? You admit in the article that this is a "limited edition, with limited capabilities and, presumably, limited interest."

—John Gamel

We test bikes that are available from the OEMs. As such, there will be oddballs like the CVO from time to time. While certainly not for the masses, it would be of interest to anyone who's thinking about dropping $26,000 on one and it is still a motorcycle. Our Harley rep complained that we "rode it too hard," due to the scraped-up parts, but we call it having fun.

—David Hilgendorf

A BIT MORE information on the Kettenkrad (MCN 4/17), built by NSU, which started out as Mechanische Werkstätte zur Herstellung von Strickmaschinen, making sewing machines. The airplane usually

associated with the Kettenkrad is the ME262 (Ed. correction, not 232).

After WW2 they got into two-wheelers; the Quickly moped, Prima scooter, Max and SuperMax motorcycles. Then they got into cars. One of their high-performance cars was the NSU TTS—a fire breather, to say the least. The motor and transmission of the NSU TTS were selected by Friedel Munch for the Munch Mammut (mammoth) motorcycle, documented in, "Beyond My Wildest Dreams," by David Manthey.

NSU was one of the German car companies that merged to form Audi. They were also the first company to successfully implement a Wankel (rotary) engine as the powerplant for a car.

—Dan Spannraft

AFTER READING SEVERAL online comments about Intercomp's serious lack of customer support for defective gauges, I decided to move on. They may make a fine gauge but failing to support their clients is a deal-breaker for me.

—Jim Bigger

Customer service is important, however, MCN doesn't have time to test the service department for every product our contributors recommend. If a manufacturer sells 100,000 units, has 1,000 customer service calls and 10 aren't resolved, guess which 10 are reviewed online?

I personally don't factor responses on internet forums as a legitimate indicator of a company's overall functionality. You could try calling Intercomp with a mock problem and see firsthand how they handle it, or buy from a local retailer that is willing to stand behind the products they sell.

—David Hilgendorf

SEND LETTERS TO THE EDITOR

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I'M INTERESTED IN the KTM 1290 Super Duke (MCN 4/17), but the performance numbers made me stop in my tracks. My 17-year-old bike is down more than 50 hp on the new Duke and weighs 30 pounds more, yet is quicker 0-60 and in the quarter-mile?

—Kelvin Martin

Several readers have questioned perceived discrepancies in MCN's historical data versus recent bike test results (SDGT and Z650). There are many reasons for variation: MCN historically used ex-racers, who are considerably lighter, and thus faster, to test the bikes. MCN also used to test in the high desert with a radar gun, but we currently test near sea level with GPS.

Our 20hz GPS is similarly accurate to radar, but other geographic and environmental variances affect outcomes, including tire pressure, wheelbase, surface conditions and weight bias. We strive to continuously improve our methodology.

The average buyer isn't racing quarter-miles on their stock Super Duke GT, but the bike is plenty fast enough, even if my numbers aren't as quick as is expected of the bike.

—David Hilgendorf

IN "WEATHER OR Not, to Ride" (MCN 4/17) it might be better to research wind and find out what the experts think. I have read that going faster in the wind helps to combat the drifting or being pushed around.

—Tim Truax

Having recently ridden in ridiculously strong winds and rain, I determined that I should not have been riding. I took surface streets to avoid "going faster" and taking additional risks on the stormy, heavily trafficked freeway. Yes, crazies like myself will still go out and brave the elements on two wheels, but sometimes it's better to stay indoors.

While crossing tall bridges or otherwise riding in heavy crosswinds, it can require leaning hard into the wind just to maintain a straight heading. When persistent wind lapses for even a split second, it can be every bit as unnerving as sudden gusts.

In the Plains states, they shut down the freeways when the winds are too strong, it can blow vehicles right off the road. The same could be said for riding in a thunderstorm or a hurricane. We've all had scary weather stories and should be able to relate in some way. (see Strategy, page 12)

—David Hilgendorf

DOWNTIME

Hard-to-Start Honda

GOT PROBLEMS? MCN DOWNTIME
2030 Main St., Suite 1400, Irvine, CA 92614
or email questions with JPEG images to:
editor@mcnews.com Subject: Downtime

I OWN A 1986 Honda Shadow VT1100C, 100,000 miles ridden all over the U.S., it still runs great, mostly. I have been able to repair every problem with the help of a factory manual, except this one. The bike has become hard to start, but lately has quit running when hot, leaving me stranded. It seems to have no spark when it quits, but runs again after cooling. Troubleshooting using the manual is difficult because wire diagrams are different colors, also have a complete low mileage, running parts bike.

—Skip Ehlers

IF IT ISN'T sparking I'd use a spark plug gap tester inside the plug cap with an 8mm gap. This will tell you if you have a spark problem when running. Make sure the other side of the gap tester is touching the cylinder or frame when turning over. It needs the ground to complete the circuit. During compression, the coil needs to produce much higher voltage to spark than it does when checking the plug at ambient temperatures and pressure. The 8mm gap simulates this difference.

Next, get a volt meter and peak voltage adapter. ES makes a DVA (peak voltage adapter) you can purchase from K&L Supply for about $35. You can use a $30 digital meter from Craftsman. Check AC voltage on the pulser coil with the peak voltage adaptor. It should show 0.25 or more volts when turning over. If not, replace the pulser coil. Next, I'd check primary power to the coils on a DC setting with the peak voltage meter. It should show 100 to 300 volts when cranking. If both readings are good, then replace your coil. If you don't get the right power at the primary coil, check the ground from the ignition box to the frame ground, with the meter on Ohms. If it shows resistance or O/L, clean off the ground or replace the wire if necessary. If the ground is good and the pulser is good, but the box isn't producing 100-300 volts, check 12-volt power to the box. If it has power, replace the ignition box. If not, then fix the power supply.

Finally, the issues you are having with hard starting sound like mechanical problems, especially with that mileage. First thing that comes to mind is tight valves and carburetors. Here are some other things to try:

- Clean the carburetors
- Run a cleaner through the tank
- Follow the instructions on a bottle of Yamaha Combustion Chamber Cleaner to clean the intake valves
- Check cylinder compression and leak down.
- Check valve clearances.

I hope this gets your bike many more miles. If not, let us know the results and we'll continue working on it. Take care!

—Kevin O'Shaughnessy

I HAVE OWNED my 1997 BMW R1100 RT for nine years. I think there is something wrong with the fuel injection in terms of a cold start. I have to keep my hand on the throttle to keep it running until warmed up. It will not settle into an idle without keeping the rpms elevated. Why does it not warm up without help?

—Steve Ainslie

HARD STARTING WHEN cold indicates a lean running condition. There are a few things I would try. Some you could do.

1) Spray the intake boots on each side of the throttle bodies with an alcohol based contact cleaner. If you have an air leak you will hear the idle rise or it will cause lean misfiring or popping. Try tightening the clamps to see if it seals. If not, replace the boots.

2) Run Yamaha Combustion Chamber Cleaner through the intake. Access the throttle body by removing the air box or intake boot. Then start the vehicle and run until warm. Spray the cleaner into the throttle body for several seconds on each cylinder. It will want to die and you may need to modulate the throttle. As soon as both intake tracts are coated, turn off the vehicle and let it sit for 30 minutes. Repeat three times. The cleaner may wash past the rings so I'd change the oil after this.

3) Check leak-down and compression on the engine. Decent quality tools run in the $500 range so you may want to take it to a shop for this. Plus, a trained tech can gauge the difference between the two measurements to guess the problem's source. Compression will tell you if the cylinder is performing well and leak-down will tell you if the valves and piston are sealing. If either is out of specification, take it to a shop for further inspections.

4) Check and set valve clearances. I believe yours is a screw and locknut, easy to service.

5) Run a strong injection cleaner through the tank. I've had really good results from BG44K. You can order it online for about $20. This stuff is industrial strength. I use it in my cars and trucks once every 50,000 miles and on bikes every 10K-20K. Over long term use, these chemicals can weaken the rubbers and plastics of the fuel pumps and injectors, so don't use them all the time. Use the amount recommended on the can with a full tank of fuel. Put the rest into other vehicles.

Let us know your results and we'll go from there.

—Kevin O'Shaughnessy

I HAVE A 2014 Honda Grom with Racetech Gold Valves and springs installed in the fork. I have also installed

tapered steering head bearings. Fork action is great,the front end works nicely. My issue is when I ride the bike around at low speeds. (up to 15 mph or so) there is a lot of clattering noise from the forks. These forks have compression valve in one leg and rebound in the other. A email to Racetech, I was told the noise was a check valve in the Gold Valve. I took the forks apart a couple times (to get preload/sag correct),nothing changed,everything went together nicely. Steering bearing adjustment is correct. It sounds to me like the springs are contacting the sides of the fork tubes, making a rattle/scratching sound. Road noise covers it up at higher speed, there is no looseness, or bind in fork action at any speed. One idea I had was to install a nylon zip tie onto springs,to keep springs from slapping sideways when compressing...But I wouldn't want the possibility of wear debris getting into the fork internals. This noise may seem picky, but at the price of the Gold Valves (and the time-consumed, these are the worst forks to disassemble I've ever seen), it would be great to have them function better.

—Tom

THE GROM FRONT suspension has a unique upside-down design similar to old Marzocchi dirt forks. The Marzocchi's fork also used a rebound valve on one side and compression valve on the other. They work just fine when dampened correctly; although, some configurations were made as "bargain" designs and the components were poor quality. From what I can tell the forks on the Grom use high quality parts and should not have inherent problems. The issues that come to mind are a bad piston ring and, as you suggested, springs.

If the piston ring falls off during assembly or is the wrong size, the piston can drag along the tube and make noise. This may be more noticeable under braking loads where the lateral forces cause the piston to side-load. You can check this by pulling the valve and inspecting the piston and bore with a flashlight. The piston ring should leave polishing marks over time on the tube but won't score it. Score marks are an indication of metal to metal wear and can occur pretty quickly. Finally, check to see if the piston ring has a larger diameter than the piston. You can do this by gently squeezing a caliper over the ring until it fully seats against the valve. The measurement should be at least 0.1 mm over the piston outer diameter if it is a hard plastic like Turcite®. It should probably be 0.2 over if it is a softer piston band material you can dig your fingernail into.

If it is a spring issue, the noise will be made regardless of side loading. This is due to a long narrow helix that wants to push to the side instead of compressing. Try compressing the forks aggressively with the engine off. If it makes a loud noise, it is most likely related to the spring. Spring noise can vary from high pitched resonance to a consistent chattering.

The high pitched resonance can come from shot peening. Under a microscope this looks like a bunch of moon craters on the spring's surface. They literally shotgun blast these things with high velocity carbon hardened pellets. Why? It increases the average life of a spring from say 30,000 strokes to several million before breaking. The down side is a rough surface that causes noise when rubbed. It will quite down as the high spots on the shot peening and the inside of the inner tube break in.

Because that fork design is upside down, there should be some type of spring guide. When compressed, the inner tube covers the spring and keeps it from deflecting. When extended, the spring isn't covered and can deflect without a guide. On the next stroke, each coil side loads against leading edge of the tube and makes noise. Could this be the clattering you mention? Check to see if there is some type of spring guide. If there is one, give Race Tech a call about location and assembly to verify. Good luck. Let me know how it goes.

—Kevin O'Shaughnessy

THE RESPONSE TO Michael Derrickson regarding handle bar oscillation (MCN 4/17) brings up many valid points. The weight of both the operator and components at the end of the handlebar play a part in the attempt to dampen the energy created by harmonics. Lightening or loosening your grip on the handlebar partially removes the human dampening effect. In cases where the hands are completely removed from the hand grips that portion of dampening is eliminated. Instead, the operator has relinquished control of the vehicle and energy from harmonics have a greater influence.

The weight of installed components like controls, master cylinder, mirrors, bar-end weights and additional accessories influence harmonics. Also, harmonics are altered with changes to the vehicle, such as tire and suspension wear or replacement. It may be a single item or a combination of many.

Consider the unintended consequences of aftermarket footrests now causing a buzzing sensation in your feet where there was none before, a result of weight difference. The application of weight, human or mechanical, is not necessarily a cure-all for oscillation; it is used to attenuate harmonic energy or move it to a less noticeable moment depending on engine rpm and ground speed.

—Mark Newhouse

Kevin O'Shaughnessy is curriculum developer at Motorcycle Mechanics Institute, formerly R&D at Race Tech.

Pipeline

> Edited by **Russell Evans**

Honda NM4

» **HONDA'S NM4** has a look all its own, and even the company is fast to admit the styling isn't for everybody. But it is original and Honda recently chose the low-slung, 670cc conversation piece to be its first announced street bike for the 2018 model year, rolling into showrooms this month.

NM4 was the first design by project lead Keita Mikura (see Rebel, pg. 24), debuting in concept form at the 2014 Osaka Motorcycle Show and subsequently released as a limited edition 2015 model (MCN 6/15). Honda says it has been an attention-getter and conversation-starter, its provocative, futuristic design setting it apart as something completely different—to the point that a modified version was featured in the recent live action Hollywood remake of "Ghost in the Shell."

Though Japan-centric in conception, the NM4's "Akira" anime styling has developed somewhat of a cult following internationally, thanks in part to the fact that the outlandish looks are matched by decent performance.

"From time to time, Honda has pushed the envelope with unconventionally styled models like the Pacific Coast, Rune, Ruckus and DN-0—the NM4 is very much in this tradition." While it's not for everyone, that's really the point; the model has proven to be a hit with a dedicated segment of consumers from a surprisingly varied array of demographics, including tech-savvy millennials, veteran tourers and women. "Those that buy NM4s tend to put a lot of miles on them."

The NM4 maintains a low center of gravity, enabled in part by the forward-rotated mounting of the liquid-cooled parallel-twin. Resembling a recumbent bike, the low seat enables an easy reach to the ground and the passenger seat flips up as a backrest.

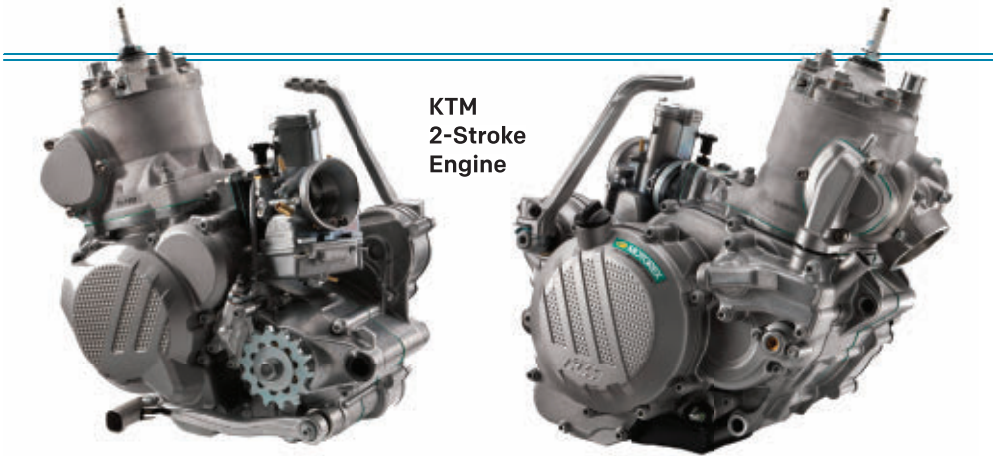
There are four small storage compartments integrated into the chiseled bodywork. The Dual Clutch Transmission has standard and sport automatic modes and can also be manually shifted via handlebar-mounted buttons. The customizable LED dash display features color-coding for the transmission modes as well as fuel-mileage tracking and other data. The NM4 comes in Matte Black Metallic, with a MSRP of $11,299.

» **THREE FEDERAL BILLS** have been introduced to halt the spread of E15 fuel, which contains as much as 15 percent ethanol by volume.

H.R. 1314, introduced by U.S. Rep. Robert Goodlatte (R-Va.), calls for the elimination of the Renewable Fuel Standard, which is the section of the Clean Air Act that provides minimum volumes for renewable fuels each year.

Goodlatte's second bill, H.R. 1315, would cap ethanol blending at current levels and ban the sale of blends higher than 10 percent ethanol (E10).

H.R. 199, introduced by U.S. Rep. Michael Burgess (R-Texas), also aims to cap ethanol fuel blends at the current maximum of 10 percent.



KTM
2-Stroke
Engine

KTM HAS REDESIGNED its 250cc and 300cc two-stroke engines and will offer the 250 EXC TPI as part of its 2018 line in Europe. It is likely that a very limited number of the 250 version of the street-legal two-stroke will find its way to the U.S. by the fall.

Euro site *enduro21.com* reported the new engines are fitted with a new cylinder with a twin-valve controlled power valve, a new counter balance shaft and plenty of other first-rate, newly designed peripherals.

The crankshaft's 72mm stroke remains the same, but has been rebalanced and set up with a counter balance shaft, with reportedly 50 percent less vibration in bars and pegs. The objective is smooth, constant power in the tightest most difficult enduro sections.

Lubrication is expected to be handled with equal accuracy, resulting in an engine freed from the ailments that have long branded two-strokes as "dirty."

The new motor has been in development for several years, and KTM field tested a couple of prototypes at the Roof of Africa hard Enduro race in Lesotho, in December. KTM product marketing manager Joachim Sauer revealed in an interview with Enduro Illustrated from last July that the two-strokes return better fuel efficiency than the current race-winning 350 EXC-F four-stroke. He also insisted that they run clean under all circumstances, performing ideally even in very cold starts, and produce a broad powerband that would make it difficult for someone to tell the difference between the two and the four-stroke model.

A street-legal two-stroke in the U.S. is big news, thought the new bikes are likely to be quite expensive, with a price tag comparable to class-leading four-strokes.

DUTCH MANUFACTURER Pinlock has introduced the Overlay, a removable external insert that can change from clear to dark tint in a matter of seconds.

Although the technology to create visors that can auto-adapt to lighting conditions is not new, manufacturers seem to prefer a whole line of products, each with varying tint levels.

The Overlay innovates by going from clear to dark smoke in a matter of seconds, using a photochromatic film with UV protection sandwiched between two polycarbonate layers and anti-scratch coating. It is placed on the outside surface of the helmet visor, and it requires Pinlock's tear-off pins to secure in place. The pins are included in the standard

package, along with the special Pin tool for installation in helmets that are not factory-equipped with Pinlock pins.

The Pinlock Overlay is available for $106 for several models of AGV, Bell, BMW, HJC, LS2, Nexx, Schuberth, Shark, Shoei and Scorpion helmets.

LATEST RECALLS

Make: Yamaha
Model: 2015-2017 FJ-09, FZ-09, XSR900
Component: Steering
NHTSA #: 17V221000

Make: KTM
Model: 1290 Super Duke GT
Component: Fuel system
NHTSA #: 17V194000

Make: Zox
Model: Nano
Component: Helmets
NHTSA #: 17E016000

Make: Polaris
Model: 2017 Slingshot
Component: Steering, Suspension
NHTSA #: 17V158000

Make: Tegol
Model: Outlaw V-5
Component: Helmets
NHTSA #: 17E015000

Make: Zero
Model: 2017 S, DS, FXS
Component: Brakes, Hydraulics
NHTSA #: 117V145000

Make: Yamaha
Model: 2015-16 YZF-R3
Component: Fuel system
NHTSA #: 17V112000

Make: Yamaha
Model: 2015-16 YZF-R3
Component: Electrical
NHTSA #: 17V112000

Make: Triumph
Model: Multiple
Component: Alarm Kits
NHTSA #: 17E008000

Make: BMW
Model: 2016-2017 S1000RR 2017 S1000R
Component: Suspension
NHTSA #: 16V948000

Make: Honda
Model: 2006-2009 Gold Wing
Component: Air Bags
NHTSA #: 17V031000

Make: Indian
Model: 2014-2017 Touring models
Component: Fuel system
NHTSA #: 16V877000

Make: KTM
Model: 2013-2016 1190 Adventure 2015-2016 Super Adventure
Component: Hydraulic, brakes
NHTSA #: 16V854000

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

Strategy

» ADVENTURE *BY GREGORY W. FRAZIER*

Don't Skimp on Your Back Support Belt

From pavement to a few hours of off-pavement adventure, it can be 10 miles or 10 hours. Most adventure bikes have a small, pod-like windscreen clearly favoring form over function. Some deflect wind upward and directly on to the pilot's chest or helmet, which is not a problem when standing on the pegs, or tracking around potholes or rocks under 40 mph. However, the miles or hours spent at 50-80 mph to arrive at the hole-and-rock adventure are often bent over, tucked low enough to allow wind to flow up, around and sometimes over the top of the helmet. This bent over riding position can leave the adventurer with sore back, wrists and knees—even after just a short day of off-pavement riding.

In the 1960s, my motorcycle mentors taught me to wear a leather kidney belt to keep the 1947 Indian Chief from rattling my kidneys to a point where I required a stop every 30 miles to pass water or an air and water mix. After I graduated to smoother running motorcycles, I quit wearing the leather girdle.

As I graduated to dirt tracks, off-pavement trails and fire roads, I went back to the old thick leather strap and buckle kidney belt.

Then came the transition to dual-purpose motorcycles, and I attributed the lower back pain, sore wrists and knee pain to what I thought was early old age. For a trip to Alaska, I switched to a taller windscreen. After two or three days of sitting upright instead of bent over, fighting the wind, I realized it was the ergonomics of my previous crouch that caused the pain, not advanced payment for hard living in earlier years.

Back-A-Line and Gold Belt make back support belts that can keep your back muscles from screaming at the end of the day.

I experimented with numerous back support options ranging from a support girdle sold at a pharmacy to a weight lifter leather belt. Some kept me upright but at great monetary expense and often stomach pressure. Eventually, I moved to motorcycle-specific riding belts.

Two of my current favorites are radically different. One is an elastic riding belt with five plastic stays in the back. This GOLD BELT Kidney Belt is my choice when space and money are limited. It wraps up small, is lightweight, and fits under all my jackets. I have worn it under a riding jersey for photo ops to lessen a protrusion referred to as my all-you-can-eat-chicken-fried-steak investment.

My second choice is the non-elastic BACK-A-LINE Lumbar Support Belt. It has a shaped pad in the back instead of stays and a solid belt-like system to wrap around and lock it in place. It is bulkier than the GOLD BELT model, so sometimes does not fit well under my formfitting riding jackets.

On laundry day, I toss them into a washing machine with soap and cold water, and let them hang dry in my motel room or tent.

I like to affix a bright object to a proper outside end of the belts, making it easier to start putting them on without trying to determine which end goes outside right or left.

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

GREGORY W. FRAZIER

LEGAL *BY HARRY DEITZLER*

Animal Encounters

A friend was seriously injured when he struck a deer that darted in front of his motorcycle. Although his health insurance paid most of the medical bills, he will receive no compensation for the rest of the scars, suffering and lost wages. An attorney told him that because it was a deer instead of a cow, there is nothing further that he can do. Is it true that you will be better off hitting a cow instead of a deer?

— Charlie J.

You are better off to hit a cow than a deer, except for the practical aspect that the cow is probably bigger and would most likely cause a lot more damage.

Insurance purchased to cover yourself and your liability to others is called "first party" insurance. You have a contract under which you paid for specific benefits. There are only two parties to that contract, you and your insurance company.

Regardless of which animal you strike with your motorcycle, health insurance should pick up a substantial portion of the medical bills. In addition, if you have medical payments coverage, which is offered by insurance companies in many states, it may help with your medical insurance deductibles and copayments. If you have collision or comprehensive coverage (depending on the language of your motorcycle insurance policy), repairs or replacement of the bike should be covered.

The difference arises with regard to third party insurance or fault. Typically when we refer to "third party" in an insurance context, we are not referencing the other driver who caused the crash as the third party. We are referencing the fact that you are a third party beneficiary to the insurance contract between that other person and his insurance company. The third party is the person or beneficiary beyond the original two parties to the insurance contract who may ultimately benefit from the insurance policy.

Getting back to deer versus cow. Animals are not going to have insurance coverage unless they are part of a herd managed and owned by a commercial farmer. Livestock is owned by someone responsible for the animal's actions and who probably has insurance to cover mistakes such as their animals wandering onto the highway.

If livestock unavoidably causes a rider to crash, the owner who negligently allowed the animal on the highway bears some portion of fault and that owner's insurance may therefore pay the claim. Different laws apply in different states. Depending on where the incident occurs, a farmer may be liable for some, all or none of the damages suffered by the motorcyclist.

Harry Deitzler is a partner at Hill, Peterson, Carper, Bee and Deitzler, PLLC. Submit questions at *motorcyclejustice.com*

DIRT *BY GARY LAPLANTE*

A Checklist, for the Trail and for Life

This riding checklist has helped me successfully operate a wide variety of motorcycles relatively safely at an expert level for over 40 years. The checklist isn't unique. I've heard similar ones so it must be common sense to most serious riders who will go through this checklist while riding at speed with just a brief glance at the terrain. The funny thing is I think this simple checklist helps me navigate through life, too.

First, carefully read the terrain. The terrain refers to the surface you're riding on; dirt, pavement, sand, mud, hard pack, etc. Is it hard or soft? Is there any traction on it? You must be able to see subtle differences in constantly changing terrain and not let anything surprise you. In life it is also critical that you see what you're getting yourself into or conditions could get more difficult.

Second, select the best line to take. What is a line? A line is only the width of your tires at times and could even be airborne if you have the ability to jump over bad terrain. After carefully reading the terrain in front of you, you must select the best line to take through it. In life you must also make good choices or you might travel down a path (line) that leads in a direction you do not want to go, much like riding a downhill rain rut that only gets deeper the further you go.

Third, apply the proper efforts to execute the task at hand. To execute means to apply the skills and techniques you have learned and practiced to accomplish the task of cornering, braking, sliding, jumping, etc. Sometimes you must utilize many different techniques to ride tough terrain and you must have the ability to take the best lines needed to get through it cleanly. Most good things in life also require a lot of effort and commitment or you won't be able to do them well.

When you think about it, every time you have made a mistake while riding it has been one or all three of these checklist items you failed to do. When you make a mistake, try to understand why before continuing or you could make the same mistake again. In both riding and in life I have occasionally misread the terrain, picked some bad lines through it, and poorly executed a few moves, but I am a much wiser person and a much safer rider because I always follow this short checklist.

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

» STREET *BY WALT FULTON*

This Force is Rarely With Us

As motorcyclists. we should always be well informed about weather. In some parts of the country, the weather can change quickly. It isn't unusual to start a summer ride in Colorado and as you start over one of the high passes find yourself in a snowstorm. No one enjoys being delayed by a thunderstorm, lightning, sleet, hail or snow but ultimately it comes back to our own comfort level and experience.

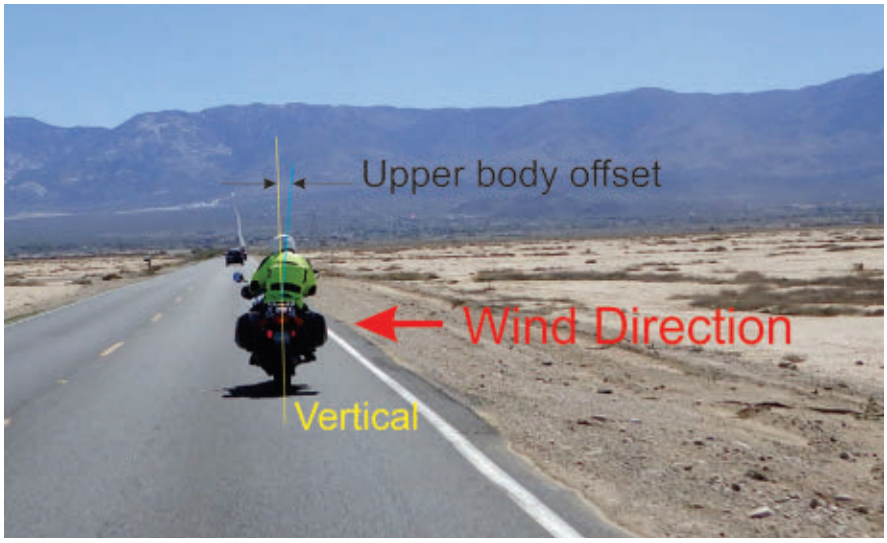
For many riders, wind is the big challenge. It is invisible, but always felt. Wind is a result of a gradient between high pressure and low pressure areas. High pressure flows to low pressure in an effort to restore equilibrium and the greater the differential, the higher the wind speed.

A Wind Advisory is issued by the National Oceanic and Atmospheric Administration (NOAA) when "sustained winds 25 to 39 mph or gusts to 57 mph" are forecast; a High Wind Warning is issued when "winds greater than or equal to 40 mph lasting for one hour or longer, or winds greater than or equal to 58 mph for any duration."

As motorcyclists, we're always blowing in the wind, but when wind begins to blow us around and cause issues like not being able to stay in our lane, things can get exciting, even uncomfortable. Wind can be so strong, some riders keep the bike in the garage for days at a time. Riding all day with wind pushing against us is physically demanding and makes control difficult.

Fortunately, winds approaching 30 mph are manageable for most riders by using good technique and practicing until it's refined—even when it's blowing 90 degrees to the direction of travel. A gentle and constant press on the handlebar into the wind will keep you on your intended path of travel.

At higher wind speeds, more handlebar press is needed and the bike must lean even more to counteract the wind's force. Riding for hours in a steady wind is a tiring task, so you may want to try shifting your weight into the wind by sliding to one side of the seat, this should reduce the pressure needed on the handlebar. Another technique you may find useful is to "tuck in" to reduce the wind's effect on the lever arm (your upper body above the seat). This will allow you to keep the bike more upright.



To learn how to ride in the wind, start when winds are light, practicing leaning slightly into the wind. As you get more comfortable, practice this technique in stronger winds.

As wind speeds increase and wind gusts become a dominant force, your tasks become even more difficult and complex. Not only must you

As winds get stronger, you must not only control your own path of travel but must watch for debris and hazards such as uprooted trees, downed signs, power lines or branches. Some can become projectiles that sail through the air like missiles. Large paneled vehicles (trucks, trailers or motorhomes) and other vehicles may have difficulty staying in their own lane.

The major issue for all road users as wind gusts increase in intensity is directional control. One moment you're riding straight and the next moment you've been pushed across two lanes of traffic. This is when keeping your upper body relaxed is essential—easy to say and challenging to do.

With tensed muscles, there is a constant battle of right arm versus left arm and neither wants to relinquish control. Making the motorcycle change direction with this battle going on may not be impossible, but it is slow, inaccurate and often quite segmented. Heavier bikes are usually more planted than light bikes, but anything with a fairing is usually more prone to be moved around compared to a similar bike with no fairing. Finding your comfort level is a matter of starting out in wind that is well below the definition of a Wind Advisory.

As you get more comfortable, start to ride in higher speed winds. Your job is to identify your own personal threshold and not exceed it.

Walt Fulton is a retired roadracer, product specialist at Kawasaki and proprietor of Streetmasters Motorcycle Workshops.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REVIEWS

INNOVATION

» Hondo Garage
PERFECT SQUEEZE PHONE MOUNT

Like many great products, Hondo Garage's Perfect Squeeze started with an unhappy consumer. Wiley Davis, owner of the Hondo Garage, was frustrated with the lack of phone mounting options available robust enough to securely hold a phone during serious off-road riding. It just so happened that his company designed and manufactured camera rigs used in the film industry. Using that know-how, he set out to create a phone mount with the only guiding principal being "What would the last phone mount you'd ever buy look like".

The result is the Perfect Squeeze ($79). Measuring 1-5/8 x 3-1/4 x 1-3/8 inches (excluding mounting hardware), the diminutive size is belied by the weighty feel of its machined billet aluminum construction. The mount has four 3/4-inch rubberized grip posts that narrow slightly from top to bottom for optimal gripping. Two of the posts are mounted stationary while the other two are mounted to a sliding base with an ultra-thin rubberized pad to protect the back of your phone.

The Perfect Squeeze offers a host of mounting options, the slickest being the tested low-profile bar clamp ($25) whose jaws slide into the machined slot on the mount's back. The reversible jaws allow for the low-profile mount to be used on any tubular part on your bike between 1/2 to 1-1/2 inch in diameter. I experimented with both handlebars and mirror stalks, both resulting in rock-solid mounting. The only minor gripe is that the low-profile jaws are separate as is the screw to tighten them, which means you have to hold the whole lot together until the mount is slid on. Hondo Garage also sells a bar-tab mount ($17) for securing the Perfect Squeeze directly onto the handlebar clamp, as well as the familiar RAM mount ($8). There is also an adapter to mount the Perfect Squeeze in portrait orientation ($18).

From construction to performance, the Perfect Squeeze impressed. The level of precision craftsmanship at this price point is notable. The Perfect Squeeze is manufactured in the USA and can be purchased directly from Hondo Garage.

●●●●● ***—Jeremy C. Willard***

Hondo Garage,
hondogarage.com

» Olympia NEW HORIZON RAIN GEAR

Olympia's New Horizon rain gear updates the already high performing original Horizon set with some key improvements. The exterior shell is 100 percent Aquares laminated ripstop nylon with copious 3M Scotchlite reflective piping, which runs across the back and from the shoulders to the forearms. The tethered YKK main zipper lives underneath a wide rain channel which closes via velcro tabs, ensuring a dry seal from the waist to the top of the microfiber-lined collar. An overhanging flap on the upper rear conceals subtle mesh vent panels for air to exhaust out of the jacket, preventing it from billowing at speed.

The jacket also features a full-coverage neck gaiter with a rubberized rain hood in an integrated pocket behind the collar, and a huge

"EZ Pack" pouch sewn in to the mesh-lined interior, which allows the entire jacket to fold up into itself. Storage is plentiful, with two external pockets by the waist and one internal pocket on the left breast.

The pants feature the same Aquares nylon exterior shell material. The leg openings are cavernous, with plenty of room to slide even ADV boots through. The lower legs have four velcro strips for quick width adjustment, and swaths of Nomex heat shields on the inner shin areas to protect the nylon from hot exhaust burns. Like the New Horizon jacket, the pants also fold into themselves via an integrated pouch, freeing up valuable onboard storage space.

During my three-season test regimen, I had the opportunity to ride through some storms of biblical proportion. The Olympia gear kept me as dry as the Sahara, without exception. The Olympia New Horizon suit was superlative in every respect, and deserves to be on any serious rain rider's short list. New Horizon jacket,$89.99; Horizon pants, $79.99.

●●●●◖ ***—Moshe K. Levy***

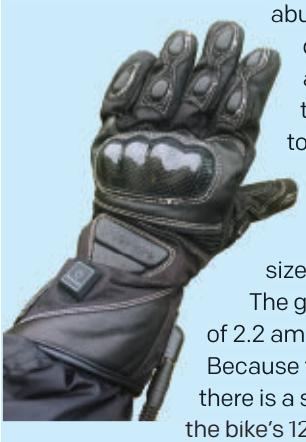
Olympia Motosports,
olympiamotosports.com/en-US

» VentureHeat

JACKET LINER, CARBON GLOVES

VentureHeat's Deluxe Motorcycle Heated Jacket Liner is thin, light and wind and water resistant. Its micro-alloy fiber heating elements run unnoticeably throughout the back, crest, arms, and neck. Inside, a USB receiver wirelessly connects to an optional remote controller that attaches to the motorcycle's handlebars.

VentureHeat's Motorcycle Heated Carbon Gloves envelop a rider's hands in high-quality leather, fleece innards, 3M Thinsulate, and a waterproof Dintex membrane. Wide Velcro straps latch each glove and the abundant gauntlet length keeps cold air out. They feature carbon-armored knuckles, padding for the palms, and smartphone touch-sensitive finger tips.



For both the liner and gloves, riders should carefully consult the sizing charts as sizes may run larger than expected. The gloves and liner draw a maximum of 2.2 amps and 7 amps, respectively. Because the gloves connect to the liner, there is a single electrical entry point into the bike's 12-volt power system. (Power harness and fuse included.)

A square button operates the three-level heating options for the liner and each glove. The buttons glow a fairly easy-to-read color (red, orange, and green) to cue the rider of the temperature setting. However, seeing the button's colors is difficult in direct sunlight. Because of their location on the forearm (for the gloves) and waistline or remotely on the handle bar (for the liner), finding, seeing, and feeling the button is a breeze.

As a safety feature, the liner automatically switches from a high setting to medium after five minutes of use.

I tested this equipment down to 30 degrees and found 160-mile journeys to be as comfortable as a spring day. A rider can expect to feel full heat within approximately one minute of powering the liner. Because of the additional insulation, the gloves can take about two to three minutes to feel full effect.

My first pair of gloves concentrated all the heat on the thumbs. VentureHeat immediately sent a new pair and included a free shipping label to return the damaged pair for evaluation—a prompt and professional response. The replacement gloves operated as intended. Liner, $299.99. Gloves, $199.99.

—Matt DeWald

Liner ●●●●◐
Gloves ●●●◐

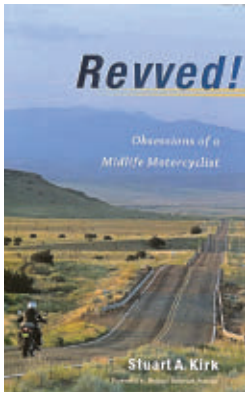
VentureHeat, *ventureheat.com*

» Stuart A. Kirk

'REVVED!: OBSESSIONS OF A MIDLIFE MOTORCYCLIST'

It was the subtitle that got my attention: "Obsessions of a Midlife Motorcyclist." After all, I'm a motorcyclist in midlife with obsessional tendencies. But Mr. Kirk and I share more than I had guessed. We're both mental health professionals (he's a retired psychiatric social worker and widely published academician) who have not only ridden lots of bikes in lots of places, but have tried to capture in words something essential about those experiences. Revved! articulates the world of motorcycling in ways that will resonate with seasoned enthusiasts, as well as educate perplexed outsiders.

Concise and evocative, the style of this 2016 paperback betrays nothing of its author's career. The language is that of a riding buddy you've known for many years, not a clinician or professor. The events, sensations and emotions described are warmly familiar, too, from the startling consequences of a momentary lapse in concentration, through the intimidation of being a neophyte among accomplished riders, to the search for companions and a solid sense of belonging. These and other existential staples found in every serious motorcyclist's history are depicted in gracefully straightforward prose, with occasional dry wit and a relentless affinity for adventure, mastery and camaraderie. While the essays are always about motorcycling, they are also about living.



Kirk's tale begins with his return to riding at 45 after a 20-year hiatus, and follows his evolution over the next 25 years and half-million miles, covering eras in New England, Southern California and New Mexico, trips to racetracks, rallies and the northern wilderness, life as a Rock Store regular, the visceral thrills of becoming one with an immensely capable machine, and the paradoxical solitude and closeness of riding in a trusted group. The book is organized chronologically, but some chapters are stand-alone elaborations of particular details, like a motorcyclist's relationship with speed, the double yellow line and lane splitting, so it's not a purely sequential read.

Revved! is smartly entertaining, but even more than that, it's inspiring. I grew determined to ride longer and harder as I absorbed the excitement and commitment vividly portrayed in Kirk's accounts. A 56-year-old like me might read about a 70-year-old's ongoing love affair with riding and feel reassured there's still plenty of time. Instead, I felt an urgency to make up for all the time I've already wasted.

●●●●◐

—Mark Barnes

$16.95, Corkscrew Publishing, *corkscrewpublishing.com*

MODEL
COMPARISON

Polaris Slingshot SL

3-WHEELIN'

FIVE DIVERSE OPTIONS FOR A DIFFERENT KIND OF RIDE.

> Text by **David Hilgendorf** and **Russell Evans**
> Images by **Gina Cioli**

Every year, more motorcyclists wonder if it's time to retire, downsize their bike, or possibly move to three wheels. Many riders are curious if they'd even enjoy three wheels, before digging deeper into which model may be right for their needs. There are several, very diverse three-wheeled choices available and frequently form precedes function in the decision-making process.

Motorized trikes have been around for over 130 years. In fact, the world's very first "automobile" propelled by an internal combustion engine was the 1885 Benz Patent-Motorwagen—a 954cc single-cylinder four-stroke trike that made up to two horsepower and topped out at 10 mph. Morgan Motor Company made three-wheeled cars for the first half of the 20th century.

Other three-wheelers currently on the market include the Piaggio MP3, Campagna T-Rex, Vanderhall Venice, Corbin Sparrow (now Myers Motors NmG). There are also a few not yet available in the U.S., including Yamaha's Tricity and Honda's leaning concept Neowing. Additionally, there are several specialist companies like Champion-Lehman that convert various donor motorcycles to three wheels.

We opted to test as many different styles of trike as possible, preferring bikes manufactured with three wheels, rather than conversions. There is value in a full manufacturer warranty and a strong dealer network for service and parts. We ended up with the Can-Am Spyder F3 Limited, Polaris Slingshot SL, Harley-Davidson Freewheeler and Ural Gear Up 2WD. We added Tilting Motor Works

because it's a minimally invasive conversion that is radically different from other trikes—it leans.

Often registered and licensed the same as motorcycles, various states differ in trike treatment, so verify your local laws before making the commitment. In California, benefits include access to HOV lanes and a motorcycle license is not required, however, a helmet is. There may be economic advantages to three-wheeled vehicles, including tax and insurance savings. Less stringent safety regulations also reduce the cost of manufacturing in comparison to automobiles.

Predominant styles of three-wheeler are: two aligned wheels either front or rear with a third centered wheel at the opposite end, or a motorcycle with an asymmetrically offset wheel, typically attached to a sidecar. Every bike tested steered at the front, regardless of wheel configuration, had a front-mounted engine transmitting power to the rear and a reverse gear.

Reasons for considering a trike include an improved sense of safety, as traction loss isn't as likely to put a rider on the ground. They are larger, thus inherently more visible than motorcycles and passenger movement doesn't affect handling as dramatically. They are also beneficial for riders with medical issues including ankle, knee, hip or back problems and those who lack the physical size, strength, or dexterity to handle a motorcycle.

There is additional capacity for gear, pets or other mass. Three-wheelers are uncommonly cool and all manner of people will gawk, talk and photograph them—what's been coined the Ural Delay Factor (UDF).

Due to the diversity in performance, ergonomics and various unique handling characteristics, we have chosen not to include CycleStats on these bikes. Instead, we will discuss each style's merits and why we'd choose one layout over another.

Can-Am Spyder F3 Limited

CAN-AM SPYDER

BRP introduced the original 106 hp, 998cc BRP-Rotax V-twin powered Spyder in 2007. For 2017 all models receive a new Rotax 1330 ACE in-line, three-cylinder, liquid-cooled powerplant with EFI and electronic throttle control, outputting a claimed 115 hp and 96 lb.-ft. of torque. The engine generates ample power and cruised easily at freeway speeds. This is the best combination of safety, stability and rideability in a trike. Great comfort, handling, power and low-speed maneuverability. The small windscreen and upright riding position blow wind in the face. It feels like a motorcycle, without the lean.

Upshifting the semi-automatic six-speed gearbox was smoothly accomplished with the left thumb trigger. It downshifts automatically when decelerating or can optionally be paddle shifted. We averaged 32 mpg, providing an estimated range of 220 miles on 6.9-gallons of fuel.

At freeway speeds, the Spyder steered smoothly, with little effort. At lower speeds, the reality of using handlebars to impose a flat turn on a half-ton vehicle becomes evident, despite the power-assisted steering. To turn left, steer left, lean left and then push real hard with your right hand—funky. On the other hand, the Spyder was very stable, with no threat of tipping over, which can't be said of some of the other trikes. Dexterity lies somewhere between car and motorcycle–it turns sharper than a car, but is nearly 9 feet long and 5 feet wide. Rough surfaces were barely felt, thanks to the electronically activated Sachs rear suspension. We did notice some vibration, a good kidney belt might assist back comfort on tour.

Spyder's come equipped with modern safety features to save us from ourselves, including traction and stability control and linked ABS—all three brakes are controlled by one foot pedal. Stability control cuts the throttle when a wheel lifts off the ground, and has infinitely smoother engagement than the original Spyder, in fact actuation was rare and unobtrusive, a major improvement.

Traction control was not aggressive and felt like it only limited throttle input from a stop, we were able to overpower traction with side force when cornering and by using the brake for hard launches. The added weight over the rear tire on the baggers causes traction loss to understeer, so learn the limits before heading into

the canyons, lest it drift off the road.

The F3 Limited we tested includes an iPhone (not Android) compatible USB control port, a cigarette-lighter 12V socket in the glovebox, plus a six-speaker AM/FM and satellite-radio-ready stereo. The reverse gear, cruise control, electrically actuated parking brake and heated grips as standard equipment elevate the Can-Am touring models to luxury status among trikes, the RT Limited even comes with integrated Bluetooth Garmin Zumo Navigation.

With 36.5 gallons of total storage, including moderately sized side-opening saddlebags, a spacious trunk that swallows a pair of helmets and the front trunk (frunk) that holds a single helmet, the Spyder can be packed for a long haul. The pilot seat is ergonomic and tandem passengers get an ample, form-fitting, slightly elevated seat, floorboards and independent audio controls.

The F3 and F3-S are hooligan versions of the Spyder priced from $16,999-$22,249, the F3-T and F3 Limited are baggers, with pricing at $24,099 and $29,849 and the RT, RT-S and RT Limited are full on touring rigs, priced from $23,449 to $31,049. Some models accept a tow package and the F3, F3-S, F3-T and RT are available with manual transmission.

TESTERS LOG

The first generation Spyder didn't impress me much seven years ago; it felt underpowered and the traction control was overzealous. What a difference time makes.

The new 1330cc Rotax is capable of breaking traction and sending the whole bike stably adrift. The new F3 geometry is incredibly sporty and simply looks much better to me.

I asked for the Daytona (sport) model, but BRP convinced me that MCN readers would prefer the Limited edition with top and side bags. I love storage as much as the next person, but after riding it hard and explaining how the bike pushed forward when drifting instead of swinging around, I was told I should ride the Daytona next, as it has less weight on the rear.

Motorcyclists, especially sport-tourers, this is your three-wheeled mount.

—David Hilgendorf

The Spyder was a very enjoyable ride. This is the best option for those looking for a more comfortable ride, car-like stability and handlebars.

It still feels a lot like a motorcycle, with great ergonomics and lots of storage space. This is a great option for touring—comfortable and easy to ride. It steers well enough thanks to the power assist. I quickly got the hang of it, but it's still more work than turning a motorcycle.

—Russell Evans

HARLEY-DAVIDSON FREEWHEELER

Harley-Davidson's first trike, the Servi-Car, was a three-wheeled utility motorcycle manufactured from 1932 to 1975, for use primarily as a work vehicle and an attempt to gain traction in the automotive market. In 1991 Lehman Trikes converted their first Harley, after six successful years crafting Goldwing trikes. In 2008 Lehman partnered with Harley-Davidson for components, paint and conversion manufacturing of the H-D Tri-Glide Ultra, which continued until John Lehman's passing and resultant sale of the company to Champion Sidecars in 2012. Harley subsequently moved production to their York, Pennsylvania plant where current trikes based on Lehman's design are built entirely by the Motor Company.

We tested Harley's latest iteration, which trades in the comfy passenger seat and touring bags of the Ultra platform for the leaner and meaner stance of a Fat Boy. The base Freewheeler rings up at $26,339, but our test unit arrived with ($1,600) premium paint, sparkly orange with immaculate details, straight out of the CVO playbook. Note there is an $856 freight fee from the factory, security can be added for $395, but ABS is sadly not offered, although the instrument cluster clearly has a light for it. This is one of the first bikes to come with the new Milwaukee Eight 107ci engine, laying down a claimed 110 lb.-ft. of torque, so there's no real want for a pricier CVO option, but for those in need there's always a Screamin' Eagle kit. It also comes with a reverse gear and cruise control.

Riding the Freewheeler is remarkably similar to riding a motorcycle, in that there's nothing up front that distracts from the view or the breeze, in fact the whole front end is nearly identical to the two-wheeled version. Of course the trike doesn't lean, so the only time it feels different is when

Harley-Davidson Freewheeler

turning. There is a steering damper on the front fork to reduce wobbles and overall the bike felt planted, though it takes great effort to steer. The odd thing about standard trikes is all the weight is in the back, which means there is very little traction on the front, where 70 percent of braking force happens and 100 percent of the steering. That is a good reason why "reverse trikes" have become popular.

To ride a standard trike safely, braking needs to be practiced and planned, do not underestimate the propensity for skidding in an emergency situation. Also consider the speed at which it can safely make turns without skipping out the front tire. When velocity is dialed back and corners and stops are taken slowly, this trike can be a lot of fun—stoplight to stoplight.

The Freewheeler attracted nearly as much attention as the other trikes, but I dropped by the local Harley shop and the mechanics ate it up. They were looking at all the components, trying to determine which features came from where and overall walked away very impressed. If H-D is your crowd and you're not into touring, this could be the right trike, else the Tri Glide Ultra is worth a look, but it starts with an $8,000 premium over the Freewheeler.

TESTERS LOG

This is your traditional Harley trike, with two car tires in back and a motorcycle front end, which best replicates the sensation of riding a motorcycle from the driver's seat—until you turn. Steering is very heavy and there is less weight on the front end, requiring careful consideration about limits of front wheel traction, particularly under acceleration.

What's untraditional is the powerful Milwaukee Eight motor, and the sporty hotrod look. This isn't a touring rig, but a genuine ripper, guaranteed to attract attention from everyone, including the most jaded Harley aficionados. Harley fans need look no further than this trike or the Tri Glide Ultra.

—David Hilgendorf

The Freeride was fun for zipping around town, and attracted a lot of attention and conversation with its cool packaging and premium metallic orange paint job. It is not a vehicle I would jump on for longer runs, however.

Though the new Milwaukee Eight engine felt stout enough to take me to the moon and back, at highway speeds I felt every bump in the road. The suspension still needs work.

Steering at speed is also a chore, taxing on upper body strength. At the same time, I kept sliding laterally across the seat on every turn. The combination was a little unsettling.

The 15-gallon trunk was useful and provided ample storage space, with a 50-pound weight limit.

—Russell Evans

Polaris Slingshot SL

POLARIS SLINGSHOT

Polaris refers to its Slingshot as a "reverse trike." The company could have named the Y-frame cyclecar just about anything. It was most often called a Batmobile. The Slingshot attracts attention—pointing, waving and thumbs-up abounded. It entices conversation from everyone, even motorcyclists. Ladies also loved the Slingshot. Those seeking to maintain a low profile should look elsewhere, this is not a conveyance; it is a statement.

Like any supercar, the Slingshot is entirely impractical. It is crazy-fast, stylish, corners like it's on rails and sits low enough that occupants can almost drag their fingers across the pavement. It is the adult version of a go-kart.

We tested the SL version, which has the same GM Ecotec LE5, 2,384cc (2.4-liter), double-overhead-cam inline-four engine as other Slingshots and cars including the Chevy Malibu, Pontiac Solstice and Saturn Sky. It churns out a reported 173 hp, and 166 lb.-ft. of torque, effortlessly slinging this 1,749-pound carriage around.

There is very little weight over the hind end, which makes it extremely easy to break rear-wheel traction when accelerating, cornering or both. For drivers who enjoy and understand how to manage oversteer (drifters), the Slingshot is pure hooligan fun. The unskilled should take it easy on the accelerator, this vehicle doesn't have any crash protection, short of a three-point seatbelt and a helmet, should you choose or be required to wear one (recommended).

The five-speed synchromesh manual transmission is manipulated via a foot clutch and automotive stick shifter on the center console and includes a reverse gear with backup camera video display on the dash console. The screen isn't very bright, is perfectly centered and not angled, which makes it difficult to view from the driving position. Final drive is a carbon fiber-reinforced belt, which hums and whines furiously during acceleration and deceleration—one of the few annoyances encountered while driving the Slingshot.

The rack and pinion steering is power-assisted and speed sensitive, maintaining a crisp and precise feel on slow, tight turns and high-speed sweepers. The Slingshot also includes ABS, electronic stability and traction control, all fighting against the immense torque. Additionally, the 18-inch alloy front wheels and 20-inch rear fitted with 225mm Kenda tires provide remarkable grip. On twisty mountain roads there was full confidence the Slingshot would track exactly where pointed, grabbing hard in the corners at nearly any speed.

With a steering wheel, stick shift, bucket seats with seat belts, radio, glove box and cupholders; it drove exactly like a sports car. Seats are adjustable, the steering wheel tilts, the auto-volume-leveling Rockford Fosgate sound system has programmable radio station presets and Bluetooth. When connected to a phone, the radio automatically mutes when there is an incoming call. In the spacious glove box, there is a 12V cigarette-lighter socket and USB port. The 22-gallon storage capacity includes lockable compartments behind each seat—each can hold a full-face helmet, plus a light jacket or other soft goods.

The Slingshot registers either as a motorcycle or an autocycle; it is not straddled and does not have four wheels, airbags, doors or a roof. A motorcycle license is required in some states, but only an automobile license in others. Helmet laws vary as well, though Polaris advises customers to wear one. Priced from $21.999 to $28,499, it's costly given the limited functionality, but it's fun and unique, especially if you want to ride with someone that refuses to mount anything resembling a motorcycle.

TESTERS LOG

The Slingshot is either a large go-kart or a small sports car; it's 12.5-feet long and 6.5-feet wide! Almost completely impractical, short of hooning, which it does well. There's almost no weight on an extremely torquey rear wheel—drifts, burnouts and doughnuts.

Storage is limited, the cockpit is exposed to the elements, and the seats are not very comfortable. A mishap in this vehicle would likely be a death sentence. The three-point seat belt will keep you attached, but there's hardly any protection.

With five-point harness bucket seats and a sturdier cockpit that might survive a rollover or side impact I'd probably enjoy it even more.

Though it's been out for three years, people generally have no idea what it is. If you like fast cars, you'll love this.

—David Hilgendorf

I cannot imagine having more fun in a vehicle with a steering wheel. Though technically a motorcycle, the Slingshot is practically a car, a very fast one that corners exceptionally well. It felt like a go-kart on super steroids.

The attention received in this vehicle was amazing. I kept reminding myself that the ladies were looking at the Slingshot, not me; but, they ended up talking to me, anyway. Second place isn't all that bad.

The Slingshot is so sporty, sexy, fast and cool, you never want to get out of the thing. It might be the ultimate street-legal toy.

—Russell Evans

Tilting Motor Works

TILTING MOTOR WORKS

Innovation doesn't always come from major OEMs, the Tilting Motor Works (TMW) conversion kit is a prime example. After being told it couldn't be done, Bob Mighell engineered the leaning front wheels with the goal of riding his motorcycle faster through corners with improved traction and braking capacity.

Bob believes riders want the stability of a trike combined with the handling of a motorcycle. The universal TMW conversion fits most Harleys and the Honda Goldwing and F6B, via a customized mounting kit, replacing the stock front fork and wheel with new wheels, tires, brakes and shocks (ours was a CVO Road King). It includes fenders and fairing designed by MCN's own Glynn Kerr. No frame modifications are needed.

A $3,000 TiltLock upgrade adds dual hydraulic cylinders, an electric pump, computerized speed sensor and related electronics that self-balance the bike below 3 mph. The TiltLock can also incorporate an ABS controller from the donor bike. Installation takes approximately 10 hours and must be performed at TMW (Washington) or an authorized dealer.

Handling exactly like a motorcycle means not relearning riding skills; it's an easy transition. It provides the same sensations when cornering, up to the lean-angle limit of the donor bike.

The extra wheel adds an additional contact patch and brake rotor, for more traction on loose surfaces and under hard braking, where two wheels in front is most valuable. Braking performance was satisfactory, though it will be very dependent on the donor bike's weight and whether ABS is included. Our test bike's included ABS was disabled, as it didn't have the TiltLock system.

The Progressive suspension components are a vast improvement on stock Road King forks, but an upgraded rear shock would have made the whole bike feel smoother. Each wheel is independently sprung, which improves stability. However, when one side takes a hit, it oscillates through to the other wheel, which is felt as a shimmy in the bars. This same sensation was felt to a lesser extent in the Spyder, but was not noticed in the Slingshot, leading us to believe it may be reduced substantially by additional front-end weight or tire separation (a wider track).

The biggest disadvantage is an additional 100 pounds of unsprung weight, mostly noticeable during slow-speed maneuvers, exactly where riders would want the added stability of a third wheel. When stopped vertically, the bike remains upright with virtually no input, however, if leaned, the bike is heavier and requires additional effort.

The design, machining and manufacturing is first class; you'd never know two individuals made this contraption. It looks and feels like factory parts, beautiful in its simplicity, a testament to the knowledge and skill of its creators. We liked that the components are not hidden, so it's easy to see exactly how everything works. There are at least six patents on the design. The only indications that there is some fine tuning to be done were a few paint rubs on the fender mounts (new mounts have been designed) and some random creaking metal sounds when in motion; the engagement wasn't completely silent.

The TMW fits a distinct niche in the market, provided TiltLock is part of the equation. We didn't feel the extra wheel alone adds enough stability and handling improvements to be worth a $10,000 upgrade. However, adding hydraulic stabilizers that self-balance a heavy touring bike at low speeds, is probably exactly what most trike shoppers would be interested in.

Conservatively, TMW is a $15,000 investment, with TiltLock, labor, taxes, paint, etc. Factoring a bike to attach it to into the cost, would bring the price into the realm of factory trike options. When it's time to stop riding on two wheels and you absolutely cannot imagine sacrificing the power and lean of a motorcycle, this is the best and only option.

TESTERS LOG

This trike leans as far as the motorcycle it's attached to, what's more remarkable is that it's only 43-inches wide. While the base model fits your choice of Harley or Goldwing, it doesn't prevent the bike from tipping over.

Double the traction for cornering and braking is welcomed, but the trade-off is additional unsprung weight, which can be felt in the bars. It never felt heavy in motion, but is more cumbersome at slow speeds, which defeats the purpose of three wheels.

For riders willing to invest heavily in a stable trike that leans like a bike, the TiltLock appears to be a solid piece of engineering. Get on the waiting list and be an early adopter in the future of three-wheeled motorcycles.

— David Hilgendorf

The Tilting Motor Works modification on a Harley-Davidson Road King rode very much like a motorcycle. It leans, as promised, and is the closest to riding on two wheels among these bikes.

In high-speed turns, the front wheels felt a bit chattery at times, though it never broke traction. It takes a little getting used to.

The big drawback with our test bike was that the apparatus was fairly heavy and required serious muscle to keep the 800-pound bike from falling over when walking it around or turning in tight quarters. TiltLock, a $3,000 option that will keep the bike from falling over, should resolve this issue.

—Russell Evans

URAL GEAR UP

During WWII, Soviets sought an efficient way to move troops through the rugged terrain of Russia. Engineers in Moscow reverse engineered the 1938 BMW R71 motorcycle after determining it was up to the task. Stalin approved the Soviet manufactured M-72 variant in 1941. Due to rapidly approaching German troops, the original factory was quickly moved from Moscow to remote Irbit, in the Siberian Ural mountains (IMZ-Ural). A second plant was relocated in the 1950s to Kiev on the Dnieper river (KMZ-Dnepr), now in the Ukraine.

In 1957 the Soviets sold the M-72 plans to Nanchang Aircraft in the Peoples Republic of China (PRC), which continued manufacturing the original design as the ChiangJang CJ750. Sidecar outfits manufactured by Ural, Dnepr, ChiangJang, the rare Harley-Davidson Experimental Army (XA) along with rebadged Satra Cossacks from the 1970s, are all very close cousins of the 79-year-old BMW R71. The IMZ-Ural design is the longest continuously manufactured motorcycle on the planet, with well over 3 million units produced.

The modern Ural has been upgraded substantially to improve performance and reliability and meet international emissions requirements. Featuring a perfectly square (78 x 78mm) 749cc, air-cooled, four-stroke, two OHV per cylinder, fuel injected, horizontally opposed flat-twin engine, mated to a four-speed dry-clutch gearbox with reverse, sent via shaft final drive to one or both rear wheels.

Other improvements include the 2014 addition of disc brakes on all three interchangeable wheels. Quality control and engineering techniques improved tolerances, casting and paint, which means longer lasting, easier to maintain vehicles.

Ural
Gear Up

The electronically started Ural Gear Up required a minute to warm up, even with EFI feeding the engine. Once the throttle spins up smoothly, kicking it into gear and launching is easy. With approximately 40 lb.-ft. of torque across the entire rev range, the motor happily pushes along the approximately half-ton of weight (with rider). Peak horsepower maxes around 40, which isn't enough to get into much trouble or rapidly to highway speed, but is enough to accelerate quickly from a stoplight. Ural recommends a max cruising speed of 70 mph and we took it up to 80 mph, but gaining those extra 10 mph requires some patience or a tail wind.

At 8.3 feet long and 5.3 feet wide, it won't be mistaken for a svelte motorcycle; it's bigger than some compact cars. Rider movement aids the leading link fork and three five-level, preload adjustable Sachs rear shocks immensely. Leaning into turns and standing on the pegs is highly recommended, if not required.

Brakes are a hodgepodge, with four-piston fixed Brembos squeezing a 295mm floating rotor up front and a two-piston against 245mm on the sidecar. The rear brake is a big bore single piston floating Hayes against a 256mm fixed rotor.

Braking requires forethought; stopping 1,000 pounds on knobbies with single rotors is slow and the awkwardly shifting mass requires substantial distance and skill.

Ground clearance is an ample 6.8 inches, but we discovered the hard way that the exhaust is the lowest point, relocating it above the axle would make it an even more off-road worthy vehicle.

The analog speedo is accompanied by poorly backlit indicator lights that are all but invisible in daylight. A digital display offers various data, though several functions didn't work, including fuel range and rpm.

The Gear Up comes equipped with a sidecar spotlight, power outlet and tonneau cover, a small storage compartment in the gas tank, 2.9 cubic foot waterproof trunk, 2.6-gallon jerry can, utility shovel, robust toolkit, luggage rack, spare wheel that fits all three positions and two-year, unlimited mileage parts and labor warranty, for $16,499. Trike on a budget.

It's affordable and off-road capable, garnering waves of approval from motorcyclists and bystanders. MCN

TESTERS LOG

Everything I read about the Ural made me wary. "It's underpowered and hard to control" seemed to be the consensus. The answer to both is a resounding yes, but those aren't necessarily bad things. It torques like a tractor; pack it like a mule, drop it in two-wheel drive and climb straight up and over a mountain at 5 mph in first gear—fun!

I dislodged the low-slung left muffler on rough terrain, but managed to put it back together with the included tools in the trunk.

As to the controllability, spend ample time practicing and soon you'll be flying the car and going 80 mph on the freeway—not at the same time.

This is the best value three-wheeler available. If you seek adventure on less traveled dirt roads, get yourself a 2WD Ural, and never look back.

—David Hilgendorf

I never felt comfortable on this bike. It's not unsafe—the same way riding a unicycle is not unsafe—it takes skill and practice. If you don't stay on top of things, it will put you right on your ass. Too many opposing physics pulling this way and that, in my opinion.

The first day, I rode it 45 miles (some on winding mountain road) without incident and on the final (slow) right turn near home, the sidecar lifted up and I had to put my left foot down to save it from a rollover. Enough said.

—Russell Evans

HONDA REBEL

NEW 300 AND 500 ARE NIFTY ADDITIONS TO COMMUTING CRUISER MARKET

> By **David Hilgendorf**

Both the 500 (pictured here) and the 300 Rebel have a familiar cruiser-style, feet-forward riding position and easy to reach bars. The 300 is a single, the 500 a parallel twin.

The Honda Rebel 250 was first introduced in 1985. After an incredible 31-year run, it was finally retired in 2016, only to be replaced by two motorcycles, the Rebel 300 and 500. The up-spec bikes are entirely new, sharing nothing with the former model except the name. Project leader Keita Mikura informed us that the two new bikes share 86 percent of their components, which is essentially everything outside of engine parts.

The 300 borrows its 286cc single from the CBR300R, while the 500 receives the same 471cc parallel-twin found in the CBR500R, both are liquid-cooled and three-point stressed members of the tubular frame. Honda has tuned both four-valve-per-cylinder, DOHC motors with more low-end grunt than their sportbike donors, while retaining the same high-revving top-end. An international joint effort, the heart of these machines is Japanese, but American designer Edward Birtulescu is responsible for the aesthetics.

Ergonomically, both bikes have a comfortable and familiar cruiser-style, feet-forward riding position and easy to reach bars. The 27-inch seat height should make this a fan-favorite for the inseam challenged. However, the seat was a bit too narrow in the rear and wide at the front for my 6-foot frame, which put pressure on the back of the thighs that became noticeable after only a few hours thumping around Los Angeles.

Maneuverability was stable and predictable, a testament to good underlying geometry, even though Honda went bobberish in the styling department with a fat front tire. Pillion accoutrements are absent, but conveniently available for $140 from your parts counter. Lean angle was claimed at 30 degrees, and though it was easy to touch peg on the very first roundabout, it should be more than ample for the average Rebel rider and never hindered the overall riding experience. Pegs are positioned well for riding, but could present shin bangs for shorter riders duck-walking around a parking lot, which is inevitably where many 300s will end up.

The 300 has plenty of pep, and hit 70 mph on the freeway, but it pays to wind it up, as the power comes on much stronger in the top half of its 10,500 rpm powerband. The 500 looks and feels larger with the engine filling the entire frame (the 300 leaves a visible gap). A 46-pound weight difference is noticeable and in favor of the heavier 500, which simply feels more planted, with less vibration and more usable power through its slightly shorter rev range. Another nod to modernization are disc brakes at both ends; the older 250 had a drum rear.

If ride intent is completely urban and never on the highway, we'd suggest saving $1,600 up front and more at the pump by buying the 300. Otherwise, for most riders, the 500 is the better choice for both long-term satisfaction and possible customization. ABS is available for a mere $300, though it's unfortunately only available on the black models. Also, the Matte Silver Metallic is the only color other than black to have a color-matched tank and rear fender.

Honda will have a small handful of bolt-on parts available in the U.S. at launch (over 70 in Thailand), but the bike was designed very modularly, so the aftermarket should take kindly to this platform, and many engine performance mods from the existing CBRs should bolt straight on.

For a model being marketed as "Make It Yours," there aren't many readily available options to actually do so. Yet, after half a day riding each of these bikes, we believe Honda is on the right track for another 30 years of Rebellion. MCN

KEVIN WING

Jeff Larsh of Fairfield, Ohio, stands behind his 1962 Triumph 650 Thunderbird, which was restored by John Staud, of Staud Cycles, and won the People's Choice Award at this year's Garage Brewed Moto Show in Cincinnati, Ohio.

BIKES 'N BEER

GARAGE BREWED MOTO SHOW BRINGS WINTER WARMUP TO CUSTOMS CROWD

> Text and Photos by **Tom Dawson**

Take 50 restored, repaired or hand-built motorcycles, put them on display in a rustic Cincinnati, Ohio, brewery and open the doors—and the taps—to 6,000 motorcycle enthusiasts on a Saturday and you've got a party. You've also got the Garage Brewed Moto Show, of which the Cincinnati Café Racer & Vintage Motorcycle Club is host.

The Garage Brewed show was the idea of Tim Burke, a lifelong motorcycle enthusiast who launched the Cincinnati Café Racer & Vintage Motorcycle Club in 2010. Burke had cast around for a good vintage bike club and found nothing to his liking. Seeking to build community around vintage bikes and custom builds, he welcomed kindred spirits and

watched Cincinnati Café Racers, quickly grow to about 1,200 members, though Burke says only about 200 are active members.

"The others maintain online contact to stay aware of the bike shows, races, barbecues and organized rides the club puts on throughout the year," Burke said. "It's a social club; no dues are assessed."

After a couple of years, it seemed only natural to have a bike show and to place on display the treasures belonging to club members. But where? The Rhinegeist Brewery, which occupied the building formerly inhabited by Christian Moerlein Brewing Company, was only a couple of blocks away and had gathering space. Burke says he thought the rustic old bottling plant, built in 1895, was perfect.

But Brewery officials, busy with expansion of their meeting space, were lukewarm to the idea of giving up their usual Saturday activities to a motorcycle exhibit. Then 7,000 or so thirsty motorcycle enthusiasts showed up for the 2015 premier Garage Brewed Moto Show, and that got the attention of those brewery officials, who thought it might be a good idea to keep the taps open and the beer flowing.

In 2016, the show spread into an additional 1,000 square-foot room. This year, Rhinegeist made a new 6,000-square-foot annex available for additional bikes, with room for a food vendor as well.

Burke says the Cincinnati Café Racers try to schedule the show in January each year to coincide with the V-Twin Expo, a two-day motorcycle trade show at the Duke Energy Convention Center in Cincinnati. This year, the V-Twin show was moved to the same weekend as the Cleveland Motorcycle Show at the IX Center at Cleveland Hopkins Airport.

Any fears he might have had about the three shows stifling interest were unfounded. This year's Garage Brewed show drew bikes from 10 states and attracted 15 vendors from as far away as Texas. The show is supported by vendors, advertisers, and through the sales of T-shirts. Bike owners and builders are not charged a fee to exhibit and admis-

Cincinnati Café Racer Club founder and show organizer Tim Burke (third from left), and club members (from left) Christian Neidhard, Bill DeVore, Bob Pearson and Bill Welsch welcome visitors to the Garage Brewed Moto Show in Cincinnati, Ohio, in January.

Dennis Ross of Independence, Kentucky, left, and Cincinnati's Scott Casuto look at a 1969 Triumph Trophy T1000C owned by Graham Cousens, of Sylvan Lake, Michigan.

The red brick Rhinegeist Brewery opened in 1895, extends more than three entire city blocks and was the largest of 38 breweries operating in the late 19th Century, producing more than 300,000 barrels annually, then the Christian Moerlein Brewing Company.

Andrew Frederick of Franklin, Pennsylvania, spent 17 months restoring this 1973 Honda CB350G. The Clarion University student walked away with a third place award in the Garage Custom category.

sion is free for spectators.

Overall, the crowds have 32,000 square feet in which to wander and enjoy the bikes, visit vendors, enjoy refreshments (it is a brewery, after all), and talk to the owner/builders, from restorers, customizers, and fabricators who work almost from scratch.

Charlie Tackett started Checkered Past Cycle, LLC, of Galesburg, Michigan, after his retirement as a physician assistant five years ago. Tackett's hand-built replica of a 1966 Honda RC173, is a racing bike of limited production—the firm built only about a dozen, he said. That 1966 model was the first year for the RC173, a 350cc in-line, 4-cylinder, wet-sump engine with a 6-speed transmission. Tackett built his replica on a 1976 Honda CB400F.

"And before people chastise me for not restoring it (the RC173), it was on a truck bound for the scrap yard when I bought it in 2008 for $200," Tackett said. "To say it was in rough shape is putting it mildly."

Restorer Jesse Spade, Jesse Spade Designs LLC, of Atlanta, Georgia, brought a 1971 Triumph Tiger—a real barn find. He said he went to an air conditioning shop near his Atlanta location digging through boxes in the warehouse for AC parts. That's when he found the bike.

"The owner said it had been stored there about 30 years, and he gave it to me," Spade said. "He told me to come back and get it sometime, but I took it right then. I was afraid he might change his mind about getting rid of it or he might give it to someone else.

"When I got it, I wanted to do it in my spare time, maybe sell it when I finished, but then I started buying parts and getting more into it, and it went downhill from there,"

Tim Cobb and his brother, Tyler, do motorcycle restorations and customizing, and also fabricate parts for adapting bikes and selling their creations to hobbyists who want to tailor their own bikes.

"They will have the skills but won't have the machinery to make the parts, so we make various parts available," Tim Cobb said.

Their firm, TC Bros., of Wauseon, Ohio, makes all sorts of parts for customizing bikes, then displays the parts, both at shows and on the firm's website. The website lists some 300 parts from tanks and engine parts to handlebars and fabricated parts such as weld-on steel mounting tabs.

Also shown was a bike professionally restored then sold to an enthusiast. John Staud, who operates Staud Cycle, in Fairfield, Ohio, about 25 miles north of Cincinnati, said his creation, a 1962 Triumph 650 Thunderbird, was a barn find about six years ago. He kept it in his shop, and planned to rebuild it himself, but a frequent visitor, Jeff Larsh, kept looking at it.

"I said 'Why don't you let me build a custom for you?'," Staud said. Larsh asked Staud what year the bike was manufactured. When told it was a 1962 model, Larsh said 'That's the year I was born,' so they struck a deal. He completely rebuilt the engine, crafted a custom oil tank, powder-coated custom-made wheels, and adapted the front fork from a 1971 or 1972 bike with the conical brakes.

The results of such stories go on display in the chill of winter each January in a 121-year-old building, and it would be difficult to come up with a more appropriate venue. The attraction of such a show is the ability to see different restoration projects, talk with the craftsmen who fabricated the bikes, and enjoy warm companionship with like enthusiasts while their own bikes are put away snugly in storage. And in a brewery yet—what could be better? MCN

A small tent, a few necessities and your bike can make you feel at home almost anywhere.

CAMPING ON 2 WHEELS

THE REWARDS ARE MANY, BUT SUCCESS REQUIRES PLANNING

> Text and photos by **Jeff Buchanan**

Any fool can be uncomfortable. That quote comes from a friend who spent time in the Australian military. It pertains to using one's head to achieve a modicum of comfort regardless of any particular situation, so it applies quite appropriately to motorcycle camping.

I came into motorcycle camping somewhat late. It was a baptism by fire. I was the embedded journalist for the American team competing in the GS Trophy competition. Each of the 93 participants was issued a tent and sleeping bag. Over 12 days, we rode and camped our way through South Africa, Swaziland and Mozambique. The experience introduced me to a whole new world. Since then, I've taken many motorcycle trips, all enhanced by the freedom of being self-contained. This article is less a guide for those who already enjoy motorcycle camping, and more an encouragement for those who haven't tried it.

I had always planned trips around hotel stays. The uncertainty of vacancies and the costs (even for a low-end room) was just an accepted consequence. Camping has opened a spontaneity that has not only enriched my motorcycle

travels, but has made overnight travel much more affordable. There is a great reassurance that comes from being outfitted for overnighters, knowing that regardless of where you are, you have shelter. Also, the relief from the stress of trying to find a hotel is liberating. I've spent more nights than I care to remember racing from No Vacancy sign to No Vacancy sign, desperately trying to find a room.

Even my lady—whose previous definition of camping was a hotel without room service—has become a convert to motorcycle camping after a night at a coastal campsite in Big Sur granted her a stunning view of the Pacific Ocean at dawn. Sipping coffee in the morning chill, she commented that there wasn't a hotel in the area at any price with a comparable view.

THE BASICS: Let's assume you're starting with a dependable, mechanically sound motorcycle with a good percentage of tread remaining on the tires. Side bags are certainly a plus, but not essential, as there are a number of quality, versatile and waterproof rear bags and aftermarket soft bags that can be strapped onto virtually any bike.

It may take some creativity to figure out the packing, but that's half the fun. Naturally, if you're traveling two-up, carrying capacity is going to be at an even stiffer premium, for which planning will be rewarded. For the sake of this piece, I'll concentrate on single-rider outings.

Given the limited amount of space on a motorcycle, think small on everything. This is especially true where clothes are concerned. We tend to pack more than we need. Be brutal in choosing what you think you may need. Most drug stores have miniature toothpaste, shampoo and soap offerings, which help you make the most of limited space.

SLEEPING: Most lightweight sleeping bags have an EN-tested sticker and rating. The EN (European norm) rates bags relative to temperature and are categorized as Summer (down to 32 degrees), 3-Season (10 to 32 degrees) and Winter (Below 10 degrees). This rating assumes the user is wearing thermal underwear and utilizing a ground mat.

Sleeping bags have down or synthetic fill, or a combination of the two. My bag is a three-season mummy-style with a down-synthetic blend. It compresses to the size of a football. In summer, it's often left unzipped. In winter, I wear my BMW long johns and have had an issue only once, when an unexpected snap in Nevada dropped the overnight temperature below 10 degrees. Be realistic in determining the possible range of temperatures you will be encountering, as nothing is quite as uncomfortable as being caught out in the cold.

A ground mat is worth its weight in gold—except that given its lightweight, it wouldn't net much. My inflatable mat rolls down to the size of a milk carton. No need for a pump; these are easily filled with lung power. In addition to providing cushion, mats are highly effective insulators between you and the cold ground.

SHELTER: I use a MSR two-man freestanding mesh tent with rain cover. The tent, cover, poles and stakes roll up to about the size of a large loaf of bread. A warm weather tent with rain cover breathes well, though I recently discovered the down side of that when a severe windstorm cropped up in Moab, Utah.

The wind drove sand up under the rain cover and dusted everything inside—one negative episode out of dozens of trips. It's a good habit to always zip the netting closed to keep insects out. You'd be surprised at the odd creatures that find their way into a tent.

Being self-contained on two wheels opens up options not available to traditional, four-wheel camping. Of course, there's no laundromat, either.

LOADING: The relative light weight of the tent, bag and ground pad allows you to stack them up behind you without concerns of being top-heavy, thus freeing the side bags for heavier items. Just be sure your tie-downs are reliable.

Take the time to figure out the most efficient pattern and remember what goes where. The road is not the place to be experimenting. It's a good idea to check your load and tie-downs frequently, as things tend to loosen up under way. In addition to hefty 1-inch-wide nylon straps with metal crimp clamps, I bring several lengths of quarter-inch nylon line to secure items to each other or to the bike. Also, be ready to waterproof in case of rain while riding.

Even a conservative load of gear will add to the weight of the bike, so maintaining proper tire pressure and adjusting preload is essential. Added weight can drastically alter the handling of a motorcycle, on or off pavement, so be aware and ride accordingly.

Always start your travels with a fully

Waking up to a million-dollar view costs hundreds of dollars less per night when camping on two wheels.

charged cellphone and keep it on airplane mode to save the battery. Phones burn up power as they automatically search for signals once under way. Many campgrounds have AC, or you can usually bum a charge in an outlet in the campground office or at a café.

CAMPSITES: I have tried primitive (no amenities) and plush (KOAs and the like, with fire pits, showers, bathrooms and pools), private property (with owner's permission) and open plains. Perhaps the best advice is don't let the day get away from you, forcing you into scrambling around in the dark. I start looking for possible places to put in with plenty of sunlight remaining.

Also, if there is a choice, don't always grab the first place you find. Give yourself options. I can't tell you how many times I have settled for a campsite, only to discover a superior one the next morning, just a little farther up the road. When that happens, file a mental note under: Next Time.

FOOD: Due the limited space I have yet to pack a stove and cooking utensils, choosing instead to pack sandwich fixings or various cold dishes in plastic containers. I'm on the prowl now for a compact, lightweight cooking setup. A real temptation of road trips is the convenience of fast food. It may take some discipline, but it's just as easy to go to a market and get something healthy.

WARMTH: Campfires are kind of a tradition, providing warmth, charm and cooking possibilities, but you'll need fuel. Occasionally, I've been lucky enough to find wood, but most sites will have been picked clean or it's been made illegal to collect.

Most campground offices will provide firewood for a price or you can often find a small bale at a market. When camping near civilization, I'll typically get the site set up and then head into town to buy a roasted chicken, potato salad a beer and firewood. Any fool can be uncomfortable.

MORNING COFFEE: I've often said that so long as I can have a good cup of coffee in the morning, almost anything else is tolerable. My taste for good coffee was born in 1987 when I went to Belgium to wrench for Scott Johnson, who was competing in the Belgian Motocross Championship. Our sponsor's wife used to make us the most incredible coffee in the morning, thick enough on which to float a nail, served in a bowl.

Returning to the States, I set about finding a unit to replicate that euro coffee. I settled on a Bialetti brewer (Holiday Gift Guide, MCN 12/16). This is the iconic Italian coffee maker that has not changed since its original design in 1933. To bring the Bialetti to a boil, I use a small Coleman burner that screws onto a compact "pancake" propane canister (available at REI, good for about two-dozen brews).

When packing for a trip, my "coffee kit" is always one of the first things I put in. It comprises the Bialetti, a porcelain cup, propane canister, burner, matches, spoon, sealable container with coffee grounds and creamers (the non-refrigerated type found in bowls at cafes). For lighting, I use standard wood matches and put them in a sealable sandwich bag to keep them dry. There are few things as enjoyable as waking up in nature to a good cup of coffee.

OTHER ESSENTIALS: After years of simply bunching up my riding jacket I now have an inflatable pillow. Tools include a miniature channel lock pliers (good for roadside repairs and pulling up tent pegs) and a small hammer for tent stakes. I also carry a small flashlight (with new batteries), Swiss Army Knife, 12 feet of ¼-inch nylon cord (can be used as a clothesline or tie-down), a

towel for washing and a large, absorbent rag for wiping moisture off the bike in the morning.

Most important are sunscreen and water, plenty of water. In fact, I carry two half-liter bottles and as many small bottles as I can. You cannot have too much water. Snacks include protein bars, apples and bananas, though they go bad quickly.

NATURE CALLS: One potentially unseemly aspect of camping that I'll take the opportunity of addressing is that of relieving oneself. I'm talking about urinating. There is nothing quite as disquieting as to wake in the middle of the night, especially a cold night, needing to pee.

In anticipation of this, I always make sure to grab a Gatorade during the day's ride to hydrate, then keep the empty bottle. The wide neck opening makes it a suitable receptacle for a nighttime bathroom break, eliminating the hassle of getting dressed to go out into the elements. This may sound inconsequential—until you need to go.

BREAKING CAMP: After getting packed up, I always pull forward 10 feet and stop, then look back to make sure nothing has been left behind. In the film business, we used to call this a "dummy check." You'd be surprised at the items people accidentally leave behind, sitting on the ground or hanging from a tree. Take those precious few seconds for peace of mind.

Stores specializing in the outdoors are filled with all kinds of inventive items created for hiking, with their light weight, size and efficiency playing well to the motorcycle camper. Start small, with a simple overnight destination to test the waters, and see how it goes. I am certain you will go again, and immediately start thinking of how to do things next time to be more comfortable.

EPILOGUE: Earlier this year, I was in the South of France and visited the Belgian sponsor and his wife who had turned me on to that precious gourmet coffee in 1987. They'd retired to a small village. I was so looking forward to savoring one of her exquisite coffees. How dismaying when she said she doesn't go to all that trouble anymore and simply brewed up some weak grocery brand bland grounds in a Mr. Coffee.

Any fool can be uncomfortable. MCN

When camping, you'll have to put up with random critters. Be sure to zip your tent closed each night.

JEFF BUCHANAN'S MOTORCYCLE CAMPING CHECKLIST

- ✓ Cellphone and charger
- ✓ Hat (wide-brimmed)
- ✓ Sunscreen
- ✓ Road maps (in addition to GPS)
- ✓ Tie-downs, 1-inch wide-by-6-feet-long (2)
- ✓ Bungee cords (2)
- ✓ ¼-inch nylon (12 feet)
- ✓ Sleeping bag (rated for expected temperatures)
- ✓ Tent (smaller the better)
- ✓ Inflatable ground pad
- ✓ Flashlight
- ✓ My trusty Bialetti coffee maker
- ✓ Ground coffee in plastic Tupperware container
- ✓ Single burner stove and "pancake" propane canister
- ✓ Matches (in sealable sandwich bag)
- ✓ Knife, fork, spoon (1 each, per person)
- ✓ Creamer, sugar packets, (lock in bike, not tent; animals smell this)
- ✓ Inflatable pillow
- ✓ Bathing suit
- ✓ Shower sandals (if room)
- ✓ Pee bottle (improvised)
- ✓ Towels (large for post-shower; small to wipe dew from bike)
- ✓ Soap, shampoo/conditioner (travel size)
- ✓ Toothbrush, toothpaste
- ✓ Plastic bags, small grocery type (2)
- ✓ Plastic bags, large heavy duty (2)
- ✓ ½-liter bottles, water (2)
- ✓ Additional small bottles, water
- ✓ Swiss Army Knife
- ✓ Pliers (mini-Channel Locks most versatile)
- ✓ Toilet paper (1 roll)
- ✓ Paper towels (half roll)
- ✓ Duct tape (partial roll)
- ✓ Small hammer
- ✓ Clear and dark helmet shield
- ✓ Sealable sandwich bags (4)
- ✓ Writing tablet, pen

Horsepower and torque measurements will be much different on this V-twin cruiser than on a sport bike with a V-twin, by design.

GETTING UP TO SPEED ON HORSEPOWER & TORQUE PART 1

STANDARD MEASUREMENT STARTED WITH THE STEAM ENGINE

> By **Tracy Martin**

Almost all motorcycles that are reviewed in magazines have horsepower and torque numbers listed. Showcasing engine power begins with powersports manufacturers, which use horsepower and torque numbers to sell technology, performance and image. Other than sales and bragging rights, there are other reasons to measure horsepower and torque.

There are many aftermarket engine performance parts available for most brands and models of motorcycles, marketed to increase engine power or part-throttle performance or fuel mileage. Changing exhaust systems, camshafts, ignition systems and even air cleaners is only part of improving performance. To take full advantage of these modifications, the motorcycle's electronic fuel injection (EFI) or carburetion must be matched to the components installed. This is called fuel mapping. Fuel mapping simply changes the amount of fuel delivered to the engine at various throttle openings and engine rpm using software on EFI systems (or jet kits for carburetors). Once aftermarket components are installed, modifications to the fuel delivery system are made and evaluated using a dynamometer to verify the enhanced performance. This is a practical reason for measuring torque and horsepower.

In this article, we'll take a look at what defines horsepower and torque, types of dynamometers used to mea-

SHUTTERSTOCK

sure power, and some inexpensive, D.I.Y. dyno-testing methods.

HORSEPOWER HISTORY

Determining horsepower often comes down to who you ask and how it was measured. To understand the practical use of engine power measurements, horsepower needs to be put into historical perspective.

"Show me the money!" The dollars and cents of measuring an engine's power is easy to understand. For example, if an engine made by company "A" makes 100 horsepower and company "B" makes an engine that produces 108 horsepower, and both engines sell for the same price, which is more desirable? This logic applies not only to engines but anything that can be bolted on to them, such as exhaust systems touted by their manufacturers to increase power output. If two similar systems claim different power increases, one will have an advantage in the marketplace. Honda, Harley-Davidson, Suzuki, Kawasaki, Yamaha, Ducati, Triumph, KTM and other manufacturers are all trying to sell motorcycles, and if horsepower is a factor that potential customers value, more can only be better. Because horsepower is important, a way to measure it had to be devised. Enter the dynamometer, a machine that has been around to measure horsepower since the invention of the steam engine in the early 18th century.

In 1712, Thomas Newcomen designed the first commercially successful steam engine. One generation later, in 1764, James Watt, a Scottish inventor and mechanical engineer, came up with a vastly improved version that used 75 percent less coal than the Newcomen engines. Watt's business plan was to collect royalties from his customers based on the savings in coal that a similar sized, competitor's steam engine consumed. This payment plan worked for customers that had existing steam engines and could track their use of coal, but mine operators that still used horses needed a different way to calculate what they would pay for this cutting-edge technology.

TRACY MARTIN

A dynomometer measures both horsepower and torque. The data are recorded in 500 rpm increments, or sometimes at 250 rpm increments, and the horsepower line is calculated.

Watt's plan to entice mine owners to purchase his steam engines relied on comparing horses (a familiar form of power and effort at the time) to the output of his engine. He first had to answer the question of how much work a single horse could perform over a period of time. Watt reasoned that if a horse could hoist a bucket of coal weighing 366 pounds up a mine shaft at the rate of one foot per second, in one minute the horse could raise the bucket 60 feet. With this information Watt calculated that, theoretically, a horse could raise 21,960 pounds one foot in one minute (366 x 60 = 21,960 foot-pounds per minute—lb./ft./min). Watt experimented further and in 1782 calculated that a brewery horse (a large breed) was able to produce 32,400 foot-pounds of work per minute. He rounded that number up to 33,000 lb.-ft. per minute and that became the standard still used today. Few horses of even the largest breeds can pull that much weight for any length of time and there was speculation that Watt had exaggerated the number to his advantage for the purpose of over-valuing his steam engine's capabilities.

TORQUE

Horsepower doesn't exist without torque because it is merely a calculation using torque and engine rpm. Torque is the "twisting" energy that an engine produces. In pure engineering terms, torque is also called moment, or moment of force, and is defined as energy required to rotate an object (an engine's flywheel for example) about its axis. Home technicians that work on their motorcycles or automobiles are familiar with measuring torque as it pertains to tightening a nut or bolt. A torque wrench is used to measure how much twisting force is applied to a fastener. When tightening a bolt, a torque wrench doesn't read the final torque value until the bolt stops turning. This type of torque is called static torque because there is no acceleration involved when a fastener is tight. Dynamic torque is different than static torque and involves acceleration.

An engine can produce both static and dynamic torque. For example, if a motorcycle is being ridden at a steady throttle opening on a flat road, the type of torque produced by the engine is static because there is no acceleration of the engine. When the throttle is opened, and the bike accelerates, the torque produced is dynamic. Static or dynamic, torque is measured in foot-pounds (lb.-ft.) or sometimes pound-feet, and these terms are often used interchangeably. In the United States foot-pounds is used to describe the twisting force

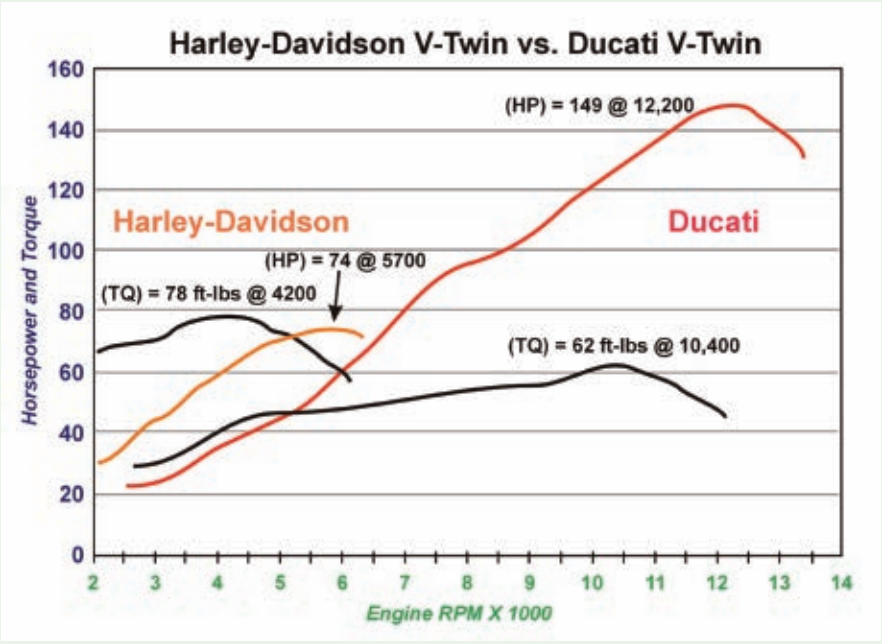
ANALYSIS

Horsepower vs. Torque: Which Wins the Race?

One activity in which many motorcyclists participate is bench racing using horsepower and torque numbers. Many times the statement "Torque causes acceleration, not horsepower," is made, most often by cruiser owners whose motorcycles are low in horsepower, when compared to a sport bike, but generally have higher torque numbers. This thinking, while it may make some kind of intuitive sense, is incorrect. Because horsepower is a calculation of torque multiplied by engine rpm, horsepower and torque will always be linked—they will never be independent of each other.

Before we discuss how torque and horsepower are related, we need to define work. Power is the application of work within a finite time. One horsepower equals 550 ft-lb of work performed in one second. For an engine, torque is always listed at specific rpms because no work or power is produced unless the engine is turning. Once an engine is turning, the force (torque) exerted against a load (accelerating the mass of the rider and motorcycle) and engine speed can be used to measure how much work (horsepower) is being accomplished.

The horsepower/torque graph in the image on this page compares horsepower and torque for two very different motorcycles. The Harley makes 78 ft-lbs of torque at 4,200 rpm and the Ducati makes 62 ft-lbs at 10,400 rpm. With 37 more ft-lbs of torque right off idle, both torque and horsepower on the Harley are greater than the Ducati up to its rpm redline of 6,500. The Ducati makes more horsepower only when it reaches 7,000 rpm and it never has greater torque than the Harley at any point in the chart. For this example, let's assume that both bikes and riders weigh the same. If you bet on a drag race between the two bikes and you think that more torque will win the race you're going to lose. While it's common sense that a 150-horsepower sport bike will be faster than a 74-horsepower cruiser, the cruiser makes way more torque. So why is the sport bike faster?



This dyno chart is unique in that it compares a Harley-Davidson V-twin engine's horsepower and torque to a Ducati 1098 V-twin sport bike engine. The torque and horsepower lines are overlaid on the same graph illustrating how horsepower is a function of rpm, or time.

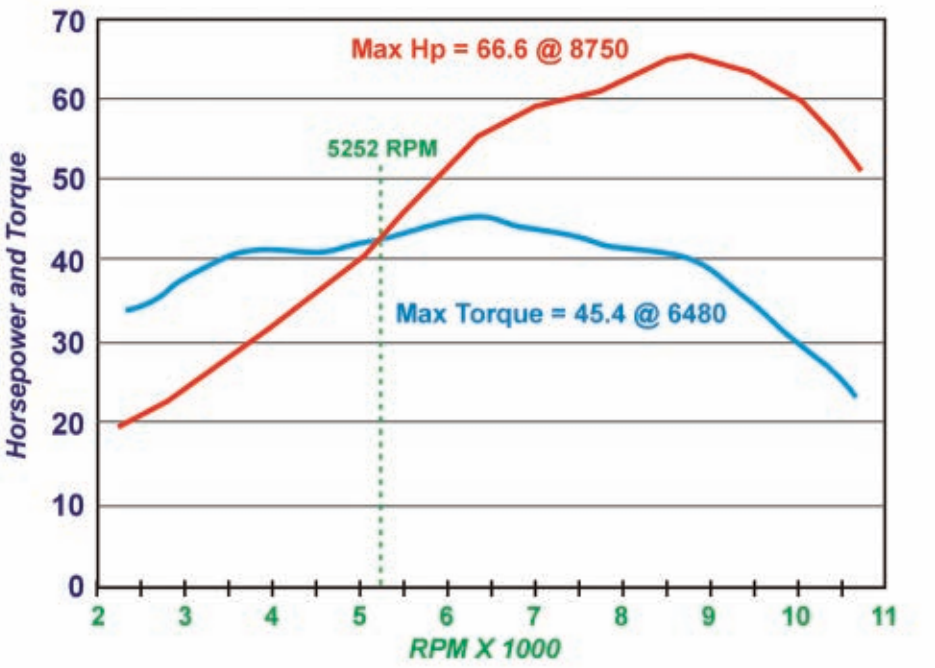
When the drag race starts, both motorcycles will leave the starting line and be neck-and-neck for a short distance. When the Harley reaches its rpm redline (around 6,000 rpm), the rider will have to shift into second gear to continue the race. At this point, the cruiser is traveling around 40 mph. At the same point in the race, the Ducati is still in first gear accelerating and won't have to shift into second gear until over 12,000 rpm. When the Ducati is shifted into second gear its speed will be around 74 miles per hour—almost twice the speed of the Harley. Even though the Harley can deliver 37 more ft-lbs of torque off idle to get the motorcycle launched from the starting line, the Ducati can go twice as fast in each gear. Each time the motorcycles are shifted into a higher gear, torque and horsepower are reduced because the gear ratio is higher and engine rpm drops off. To win a drag race, the engine that performs work at a higher rate of speed and doesn't have to be shifted as often will win.

Both of these motorcycles have V-twin engines, but that's where the similarities end. The engines are designed for very different purposes. The Ducati 1098 is a road race replica and is intended for track use and occasional street riding. The Harley-Davidson is used for street riding and doesn't need to be ridden fast to be enjoyed. The Harley engine has a longer stroke than the 1098, smaller valves, intake tract and a heavier flywheel. This engine design fills its cylinders (called volumetric efficiency) close to 100 percent at low rpm and provides lots of low-end torque that is ideal for the type of motorcycle it powers. The trade-off is that it runs out of breath (cylinder can't fill with air) at higher rpms. This is caused by the use of smaller valves and the camshaft design. Cylinder filling becomes less and less efficient as the

engine speed increases, causing the torque to drop. The up side is that the Harley is easy to ride on the street in that it doesn't require much shifting because of the large, flat torque curve between 2,000 and 5,500 rpm.

The Ducati engine has a short stroke that allows the engine to rev much higher and has large intake tracts and valves that promote cylinder filling at high rpm. The camshaft design, duration and valve overlap for the 1098 does not fill its cylinders well below 6,000 rpm, but starting at around 9,000 rpm, cylinder filling is at 100 percent all the way up to 12,000 rpm. For the Ducati to use its 149 horsepower, the gearbox has to be shifted constantly to keep the engine in the 9,000-12,000 rpm range—doable on the track, not on the street. In addition, the total weight of each motorcycle dictates engine design. The Ducati weighs around 400 pounds without the rider and doesn't take as much low-end torque to get the lightweight sport bike going when compared to the heavier Harley-Davidson that weighs in at 800 pounds.

For both bikes, the chart shows that each engine's torque drops after a certain rpm. This is because as rpm increases, the engine's cylinders don't fill with air as well as at lower rpm. Cylinder filling is directly proportional to torque production. Horsepower increases in both engines once torque decreases; horsepower is a product of rpm and torque. The decrease in torque at a given rpm is small and not enough to offset the increasing rpm, so overall horsepower increases until the drop in torque outweighs the increase in rpm. This can be seen on both engines but it takes place at different rpm—higher for the Ducati and lower for the Harley-Davidson.



All horsepower/torque graphs produced by dynamometer software should show horsepower and torque crossing at 5,252 rpm. This happens because at that rpm, torque and horsepower are equal. Below 5,252 rpm, torque will always be greater than horsepower and above 5,252 rpm, horsepower will always be greater than torque.

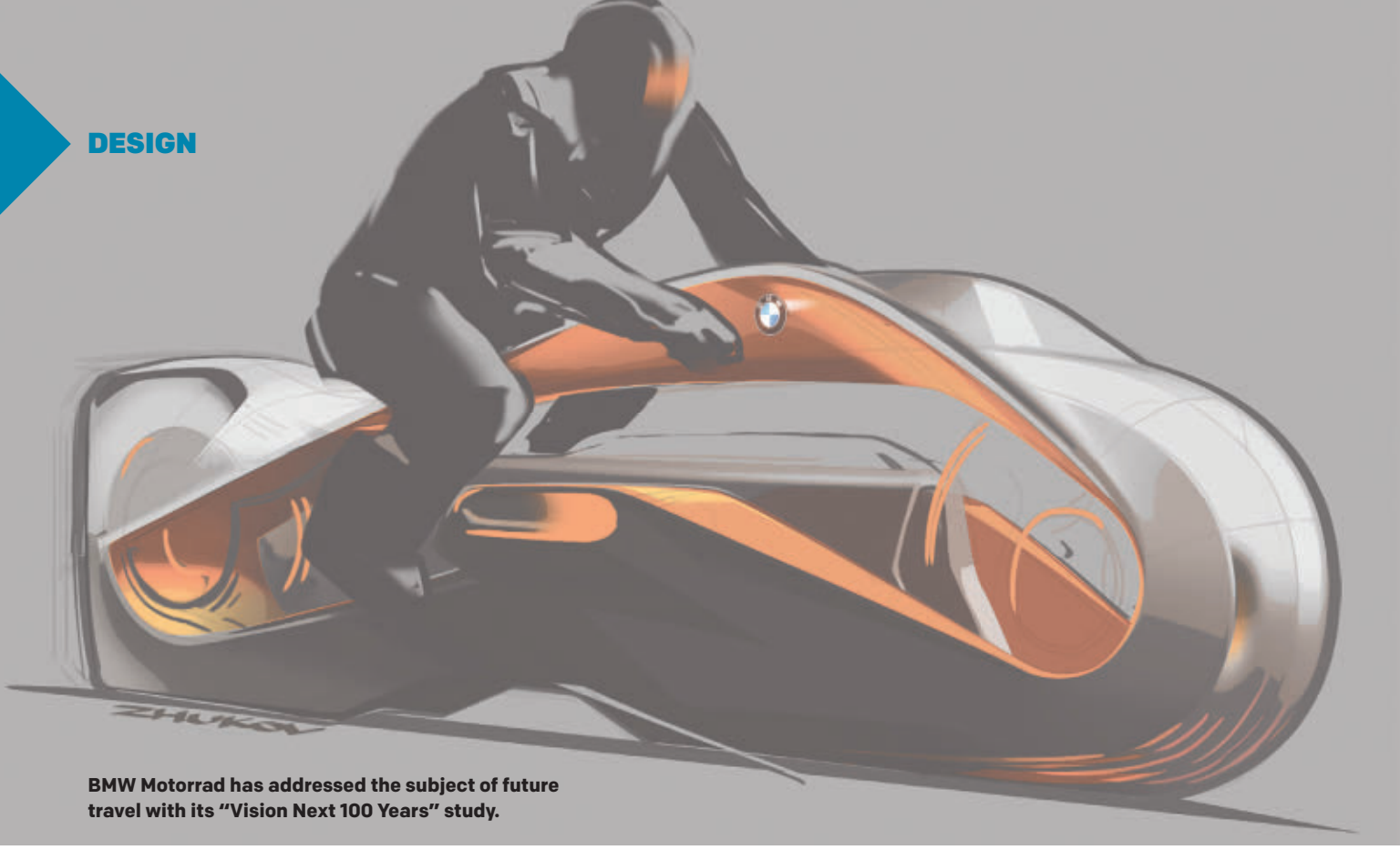
created by an engine or electric motor. Pound-foot came about in 1892 when an English physicist coined the term in an attempt to minimize the confusion between the two. Both are technically correct and in this article foot-pounds will be used, the accepted, common terminology in the United States.

CALCULATING HORSEPOWER

Engines do not make horsepower—they only produce torque at various engine speeds. Horsepower is merely a calculation using torque and engine rpm. An engine's horsepower output is a calculation of engine torque produced, multiplied by engine speed. To use foot-pounds of torque and engine rpm to calculate horsepower, several numerical conversions need to take place. The formula for horsepower is: Torque x Engine Speed, divided by 5,252 = horsepower. The number 5,252 is the result of lumping several different conversion factors together into one number. On graphs that show horsepower and torque lines, the two always cross at 5,252 rpm because at that engine speed they will always be equal.

Here is how the constant 5,252 is arrived at. One horsepower is defined as 550 foot-pounds of work per second, or 33,000 foot-pounds per minute. Engine power is equal to its torque multiplied by angular velocity. To convert angular velocity to engine rpm it needs to be multiplied by 2pi (3.14 x 2). So now we have HP = 550 ft-lb/seconds x 2pi. If this equation is rearranged it looks like this: HP = (Torque x rpm x 2pi) / 33,000/minute. This can be simplified further as 33,000 / (2 x 3.14) = 5,252—the constant in the horsepower formula.

In the dynamometer chart above, the lines for horsepower and torque are created by software that uses data points for torque measurements. Data are recorded every 500 rpm, or sometimes at 250 rpm increments and the horsepower line is calculated. For example, maximum horsepower is 66.6 at 8,750 rpm. The torque at 8,750 rpm is 40 foot-pounds. Plugging the numbers into the formula for horsepower (40 x 8,750 / 5,252 = 66.6) the result is 66.6 horsepower at 8,750 engine rpm. The horsepower line may not represent an exact calculation of torque and rpm because the software that generates the lines uses a smoothing function. MCN



BMW Motorrad has addressed the subject of future travel with its "Vision Next 100 Years" study.

Fork IN THE Road

WILL MOTORCYCLING FOLLOW THE SELF-DRIVING PATH OF THE AUTOMOBILE?

> By **Glynn Kerr**

For years, I've been laboring the point that motorcycle design and technology follows that of cars. And often with a lag of many years. The finances of the motorcycle industry are peanuts compared to the automobile world, which is why for many years the two arguably most innovative 2-wheel companies are Honda and BMW. Both have car divisions that can bankroll their less profitable motorcycle siblings, and cross-pollinate a whole bunch of technology that they could otherwise simply not afford. It's also why I was one of the few who openly applauded Audi's takeover of Ducati. And me, a 916 owner, no less. Has Ducati lost its Italian flair in the interim, as everyone feared? Nope. But their financial future is certainly more secure.

Well, despite this inspired wisdom on motorcycle hand-me-downs, things might be about to change. Road transportation is at a turning point, after which, cars are going to be very different beasts than the ones we've grown up with. Some of the latest car design studies have no windows, because nobody will need to see where they're going (although I bet the inhabitants will still want to look at the scenery occasionally). A few interiors offer swiveling seats around a central table, so the occupants can have a business meeting, or share in a friendly family environment while hurtling down the freeway. One recent BMW study featured bookshelves no less, illustrating the company's confidence in accident-free autonomous motoring. There's nothing like a few hefty tomes flying through the air to liven up the experience of a frontal collision.

The impression is that future motoring will offer anything but hands-on driving, although for me, that exhilaration is still as much a reason to get behind the wheel as the need to transport myself from A to B. Proof of that has my choice of cars over the years, which, while entertaining to drive, often had only a 50:50 chance of getting me back from B to A again. But Mercedes tuning division AMG has expressed an intention to program its future cars' semi-autonomous systems to read their drivers' preferences and abilities, and help educate them into more proficient skills by demon-

BMW MOTORRAD

strating the ideal line, and gradually allowing more exciting performance to be permitted. It's an electronic version of having your father in the passenger seat back when you first learned to drive.

Honda too has announced its 'Electric Vision', featuring similar intelligent software. Speaking at the 2017 Geneva Motor Show, Katsushi Inoue, President of Honda Motor Europe, also outlined Honda's commitment to an electric future in Europe, with a specific aim to have electrified powertrains in two thirds of European cars sold by 2025. Perhaps in that respect, motorcycles are again lagging behind.

Alternative energy sources aside, it's the autonomous aspect of cars that will have the most profound effect on the way they are used, purchased and valued. And while it may seem that it's a technology the automotive world is forcing on us against our will, a surprising percentage of car buyers have indicated they would welcome having that option. Partial automation is already with us. My wife's new wagon does all sots of things on its own that's quite alarming to a hands-on driver like her husband. But autonomous development isn't aimed at people like me. The idea that my car can go find its own parking spot after I arrive at the restaurant (Mercedes-Benz has developed a system that does precisely that), or drive me home after the fifth glass of wine makes a lot of sense. But other than that, you'll have to wrestle that steering wheel out of my hands.

The direction this is all heading is linked with a reduction in the perceived value of objects—cars in particular. People, especially younger ones, see transportation as a necessity, with ownership being less relevant than mobility. Pride is rapidly being replaced by ease of use, at which point possessions start to lose their value. This shouldn't be surprising in a world where our richest entrepreneurs don't physically build anything, own the items they sell, or the accommodation and car services they offer. This last example is particularly poignant, because the car industry has been teaming up not only with software developers like Google for their autonomous vision, but with Uber and Lyft. Think self-propelled transportation pods, just like in the old science fiction movies.

Where this leaves the likes of Ferrari remains to be seen, but I'm more concerned about the future of motorcycles in this environment. BMW's Vision 100 went some way to mirroring AMG's intelligent software, learning the rider's skill level, and allowing increasing lean angles as competence was demonstrated. But this advanced motorcycle concept was just that—non-functioning, and with no explanation of how it all worked in the real world. And is this technology really applicable to motorcycles? If I'm reluctant to let Big Brother take over my car, I sure as heck don't want him interfering with my motorcycle.

A **fully autonomous** two-wheeler **whizzing** through dense city traffic **would be a scary** and claustrophobic **experience.**

Two wheels are a whole different world from four. Cars like my wife's can brake on their own if the driver doesn't spot a hazard, which is great news if your bike is being tailgated by a distracted mum with an SUV full of kids. But a self-braking bike would be disastrous. It may indeed stop in time, but unless the rider is somehow secured, like with the BMW C1, they'll go flying over the handlebars and head-butt whatever the bike managed to miss. It also assumes the bike is perfectly upright. If not, chances are it's going down, and hitting the object on its side.

Robotics are playing an increasing role in many aspects of our lives, but it's hard to see how some of the latest technologies are going to be applicable to bikes. Anti-lock brakes and traction control have made them safer, and features like variable engine mapping or suspension settings on the fly have improved the function. Lane drift sensors may have some merit, but after that, we're about done.

There has already been a kick-back against high-tech motorcycles, visible by the increased interest in cafe racers and scramblers. Either home-made or off-the-shelf, many are built around pretty rudimentary technology. Whether or not this is a long-term trend, it indicates a re-establishment of the core values of motorcycling—freedom, connection and simplicity. All three are gradually being reduced in cars, especially the connection aspect, with a greater reliance on automated back-up for distracted driving. Unfortunately, that simultaneously encourages it. There is little application of this technology for motorcycles, and little requirement. Distracted motorcyclists don't tend to live very long.

The ultimate division from cars will be autonomy. There may be some opportunity for a C1-like device, or fully enclosed two-wheel pods, but other than offering some advantages in cramped, urban landscapes, there seems to be little point. A fully autonomous two-wheeler whizzing through dense city traffic would be a scary and claustrophobic experience.

From an industry viewpoint, I don't see many current riders accepting this technology. Motorcycling is a very tactile, hands-on experience, and we relish that connection between man and machine that even the best cars can never fully offer. If I don't plan to give up my steering wheel, you can be sure nobody is taking my handlebars away. My concern, as always, is legislation. Once the statistics start to show a huge reduction in the number of road deaths due to autonomy—and they will—we are going to have a very tough job maintaining our right to engage in the relatively dangerous act of riding a motorcycle. MCN

SPRING FEVER

UNLOCKING THE MYSTERIES OF SUSPENSION TUNING

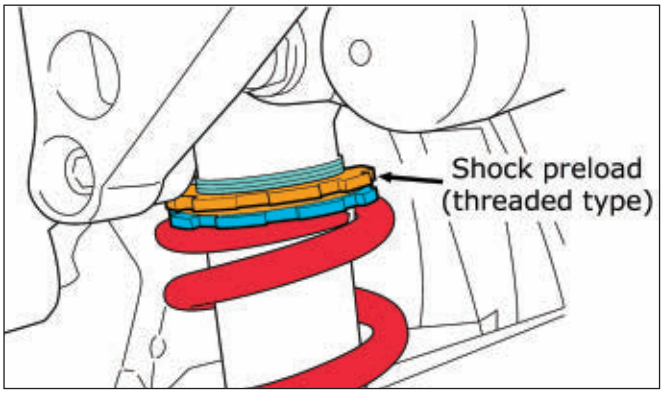
> By **Kevin O'Shaughnessy**

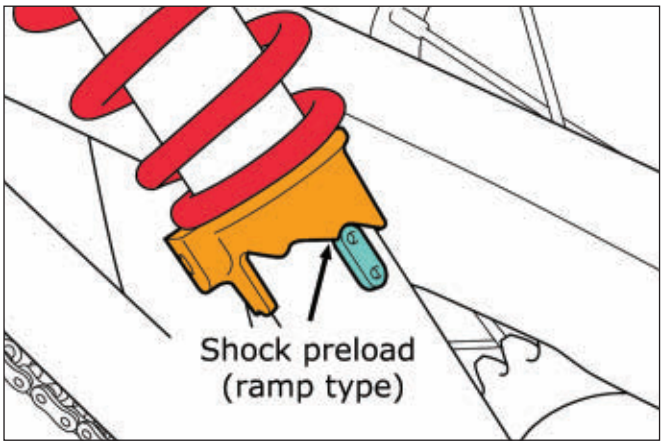
When I started working as a mechanic, I purchased an '83 Suzuki GS550ES. While I had mechanical ability, suspension seemed more akin to black magic than something I could control. In turns, the bike wallowed. When braking, it dived too much and was harsh on bumps. I had no idea what to do, so I reached out to "experts" for help. I found a wide range of cool ideas, but none of them worked. Eventually, I acquired an allergic reaction to witch-doctor solutions. Opinions are the basis for scientific method, but without the fundamentals they can be self-defeating. It's like a Neanderthal thinking fire is bad because it burns, so he snuffs it out [in the middle of the ice age].

During the next 25 years, I found resources that expanded my understanding. I spent a decade working at Race Tech and during that time found a 1984 copy of Tony Foale's book, "Motorcycle Chassis and Design." While applying these theories to racing, trackside support, chassis R&D and factory test engineering, I learned some things. 1) Suspension is not black magic. 2) Suspension is based on physics. 3) Most riders can detect a problem, create a solution and test it. 4) Some things are easier to diagnose than others. 5) How much money or time do you have to figure it out? Knowing the fundamentals helped me understand which to use and how to reduce the investment.

My preference is to set sag first, then tune suspension, because it requires the least investment and provides the largest gain. Last, I work on frame geometry. Motorcycle manufacturers spent decades refining geometry until the different brands ended up with the same settings. They know what works, so we can assume these values are reasonable and can focus on suspension. The process can be simplified by separating suspension into spring and damping forces.

Springs are used to store movement energy and release it in the opposite direction. This keeps suspension in a position to accept the next event. When a shock hits a bump, the spring compresses and stores movement energy. After the bump, force against the shock is reduced and the energy is released as the spring extends. When tuning, it's important to understand springs are sensitive to position. For example: You will see springs defined as weight/distance. To compress a 10 kg/mm spring 10 millimeters, it will take 100kg. This is calculated by multiplying 10 (kg) x 10 (mm) of force. It doesn't matter if you compress it that distance in a millisecond, or over 10 seconds. It will require the same amount of force.





KEVIN O'SHAUGHNESSY

ADJUSTMENTS

Decrease (Counterclockwise)	Adjustment Type	Increase (Clockwise)	Adjustment Increments
Reduce Harshness	Compression Damping	Minor Reduction of Wallowing	Screw-Type Damper 4-6 Clicks or 1 to 1-1/2 turns
Faster Spring Extension	Rebound	Slower Spring Extension Moderately Reduce Wallowing	Nut Type Damper 1/2 turn
Incremental Decrease in Ride Height	Preload	Incremental Increase in Ride Height	Fork Preload 2 turns
Decrease Bottoming Resisance	Spring Rate	Increase Bottoming Resisance Significant Change to Ride Height	Shock Preload 1/2 turn
Allow More Travel Use	Oil Level	Change Bottoming Resistance Significantly	Oil Level 10cc

Gas springs play two important roles for suspension: displacement and bottoming resistance. Suspension systems require sealing to provide damping and prevent contamination or spilling. For practical purposes, assume gasses are compressible and fluid is not. In order to seal a hydraulic system, a portion of nitrogen or air is trapped to allow for displacement. If we fill the suspension completely with fluid, it will act like a solid rod with no damping or spring. Having a portion of air trapped in a fork or using a charged chamber in a shock allows the suspension to compress.

The air gap in a fork is also used to tune bottoming resistance. Gasses act as a progressive spring when compressed. According to Boyle's Law, compressing a volume of gas in half doubles the pressure. Adding more oil creates a smaller air gap, causes the air to compress sooner and increases bottoming resistance. The resistance is usually felt only in the last one-third of travel.

Damping is a different creature, one that has the job of reducing unwanted movement. Compression movement can be created through bumps, g-forces or braking and is controlled by a compression damper. Extension is created by the spring and controlled by a rebound damper. Damping is created when fluid is resisted by fixed holes or spring assemblies. The resistance slows the fluid and converts the movement energy into heat. When tuning, remember damping is speed sensitive. It doesn't matter how far it travels into the stroke; what matters is how fast it gets there. Here are a couple of common examples to get your tuning mind engaged:

Example 1: You hit a square-edged crack in the road at 60 mph. The fork compresses only a half inch but moves that distance in a split second. Because of the high-speed movement, you feel a harsh jolt to your hands as damping resists the movement. High speed movement = high damping resistance. Low travel = low spring resistance.

Example 2: The speed of the vehicle may not be an indicator of the speed of the suspension movement. Suspension speed is what you should be considering when tuning. Let's say you are moving at 60 mph and begin to drag the brakes lightly into a long sweeping turn. In this case, the vehicle speed is high but the suspension movement is very slow. The suspension travels close to bottoming at the apex but takes several seconds to compress to that position. At this speed the compression damper doesn't even react. You don't feel harshness, but do take the chance of bottoming if you hit a bump. Low speed = low (or zero) resistance. High travel = high spring resistance.

So how does this help you? Let's break down example 1. The crack caused a sharp pulse intense enough to cause pain. First, you'll need to decide if it was a damping (speed) or spring (position) issue. The suspension only moved a half inch through the travel, but the bump caused high speed movement. You assume it was a speed issue and focus on damping. Was it rebound? No, the event caused the suspension to compress. Do you want more or less resistance? You want it to move with less resistance, since it was harsh. After turning the compression adjuster out several clicks, you notice a softer pulse from the event.

Let's add a dynamic to example 2. The bike is turning and nearly bottomed. Then you hit a bump. Since there is no travel left, it bottoms out and the front tire loses traction. Back to the basics: Is it a speed or position issue? It happened at the bottom of the fork and you didn't feel harshness getting there, so you assume it is a position issue. So what things can you do to affect the spring? 1) Install a stiffer spring. 2) Increase preload. 3) Add oil (reduces air gap). The stiffer spring option means buying a spring and making a change that would affect the entire travel. Instead, you increase preload and notice no change in the bottoming, though it is more difficult to turn in. You add 10cc's of oil and notice the fork has more travel left after the same event.

This knowledge won't make you a pro tuner, but may get you on the path to positive results. If you need help, find a reputable tuner and pay them set the sag on your bike and assist with tuning suggestions. A small investment will give a considerable boost to confidence and fun.

Next issue: How to set sag. MCN

KEVIN O'SHAUGHNESSY

CYCLE
ANALYSIS

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

A Good Story is Like a Good Ride

YOU ARE READING my 200th column for MCN. Through sheer happenstance, this personal landmark coincides with my review of the entire collection. I am putting together a book that will contain selections from the past two decades, sort of a "best of" album scheduled for fall release (fingers crossed). As I've read through this body of work, something has emerged that I didn't expect.

What is now called CycleAnalysis was Mental Motorcycling until earlier this year. MM covered a wide variety of topics, from the cognitive skills involved in riding, to the emotional dynamics that drive various perspectives and behaviors in the garage or saddle, to the interpersonal exchanges that constitute a crucial element of the motorcycling experience for many riders. Sometimes MM was more didactic, explaining psychological principles or neurophysiological functions. Sometimes it was more playful, illustrating common foibles by confessing my own recent bike-related blunders. And occasionally it was more angry, ranting about my latest frustrations as a consumer dealing with abysmal service from a dealer or parts vendor, and exhorting readers to expect more.

BUT WHAT STOOD out across the vast majority of MM columns was this: I recognized how much I loved telling stories. Often, these functioned as examples of whatever point I was trying to make; they were secondary to the essay's larger structure. In many other cases, though, the story was really the centerpiece, and the commentary about psychological details contained therein was added so the piece wouldn't be merely a matter of me using MCN's readership as a captive audience for my babbling.

So, I had to wonder about this motivation I'd clearly been trying to keep in check while writing for the MM spot—this impulse to tell stories about

rides, riders, wrenching and all things motorcycling. Was it all about me and my exhibitionism, my desire to grab the mic and take full advantage of an opportunity for one-sided conversation? I considered how other riders also seem perpetually anxious to tell their stories—their many, many stories. If it's really a function of craving the spotlight, then at least I'm not the only one. But I don't think it's just that.

STORYTELLING IS A substantial part of the joy of motorcycling. Recounting our adventures and misadventures extends the pleasures involved, either by allowing us to re-experience something wonderful or by confirming that something awful is securely behind us. Storytelling serves other functions, too. It can establish status, as when someone boasts of an accomplishment at a riding school or at their workbench. It can be a way to connect with another rider, to demonstrate similarities in respective histories that reveal more in common and serve as the basis for empathic engagement. It can also spark curiosity and initiative by introducing another rider to something not already in his or her experiential repertoire (conversely, cautionary tales point the listener in the opposite direction).

When our riding histories are actually written, another dimension is added. Memoirs have the potential to reach more people. A touring log, for example, may be fascinating and instructive to riders far beyond our circle of acquaintances, whether posted on an internet forum or relayed via email or other means. An account of some motorcycling ordeal we endured could become a treasured heirloom long after we're gone—a trace left to introduce us to descendants we may have never even met. Actually, it needn't be anything heroic or dramatic to reveal something important about our personality and what we loved.

STORYTELLING WAS SURELY one of the earliest features of primitive civilization. It is how a group can share in the experience of an individual, so everyone doesn't have to make all the same mistakes, so others can share the excitement, and so some will be inspired to launch their own adventures. Obviously, the value of storytelling isn't confined to the world of riding and wrenching on motorcycles. But it's worth noting what an essential component it really is.

If I had never started writing this column, I would have still loved telling and hearing (and reading!) stories about other riders and their bikes. This process would have remained a vital part of kicking tires at rider hangouts, discussing modifications under consideration, and planning routes. It would have also leaked into conversations with uninterested parties, and would have had to be dialed back in response to glazed-over eyes. However, knowing explicitly how integral storytelling is to my enjoyment of motorcycling allows me to pursue opportunities—for giving and receiving—more directly. Are you missing chances to tell your own riding stories, or hear others'? Why not dedicate a gathering to exactly that? MCN

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

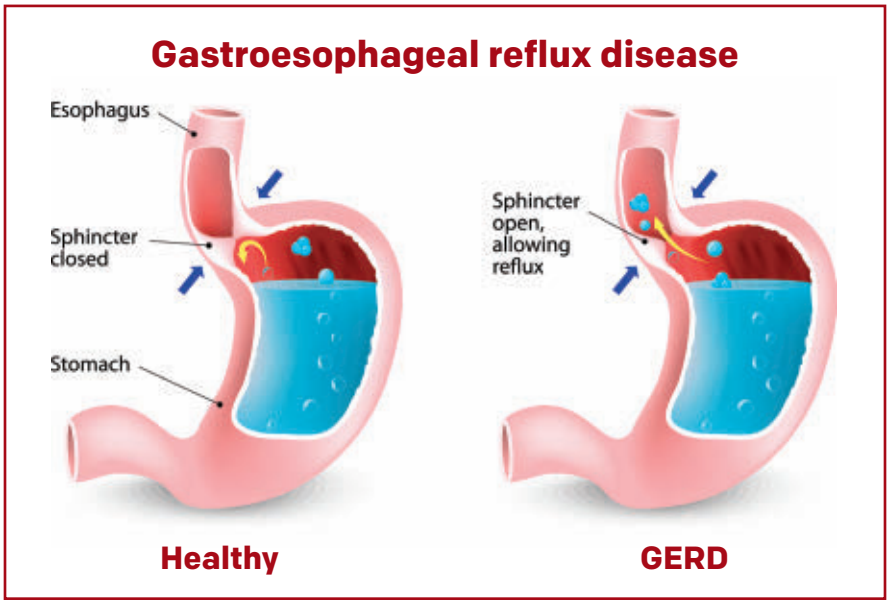
SHUTTERSTOCK

Is It Heartburn, or Something Worse?

WE ARE ALL familiar with one-way streets, which are similar to your esophagus. Heartburn is what happens when the acid from your stomach goes the wrong way, up the esophagus. Your stomach is resistant to acid and the digestive enzymes used to break down food, but the valve that protects the esophagus isn't acid proof. When acid continually goes the wrong way it's called acid reflux or gastroesophageal reflux disease (GERD).

Heartburn was named for the part of the stomach that the esophagus goes into, called the cardia, and because the pain is close to the heart, as the esophagus passes nearby. This can lead to confusion as to whether pain in that area is from the heart or from heartburn. My dad was having chest pain and his doctor said "Milt, it's probably heartburn. Make an appointment to come to the office and we'll take a look." It turned out to be the first of several heart attacks.

MODERN BLOOD TESTS make it easier to tell the difference between a heart attack and heartburn by measuring chemicals released from damaged heart muscle. When I was practicing emergency medicine, these blood tests weren't yet available. When the cause of the problem wasn't obvious, we gave patients a liquid antacid, like Maalox, Mylanta or my personal favorite, Gaviscon, mixed with a local anesthetic like viscous lidocaine. For heartburn, the above concoction typically relieves pain in 30 seconds or less. If the pain comes from the heart itself, antacids won't make any difference at all. Although many people use antacids for quick relief from heartburn, those medications don't help the problem heal, they simply address the symptoms. So, what is actually going on?



Heartburn begins when a valve called the lower esophageal sphincter (LES) begins to leak. A number of things can make this happen. If the stomach is overfilled, it can push acid through the LES and burn both the top of the valve, which is not acid proof, as well as the lower part of the esophagus, which hurts. Another cause is eating food that is spicy, greasy or acidic—you know, anything good. One surprising cause is peppermint, whether in a chocolate patty, gum or tea, which loosens the valve, making it more likely to get heartburn. Alcohol, caffeine and tobacco also relax the LES, making it more likely to leak.

Curiously, many men's stomachs enlarge with age (but that's another column), and wearing a belt that's too tight can also lead to heartburn. The abdominal cavity only has a certain volume and a tight belt leaves less room. When the stomach is digesting food, any pressure can push contents through the LES. I have found suspenders to be very helpful; they hold the pants up and don't put pressure on the stomach.

BODY POSITION CAN also lead to acid reflux. If acid passing through the LES has to fight gravity, it's less likely to happen. That's why lying down after eating increases reflux risk. Another helpful strategy for dealing with a tough case of reflux is putting 6 to 8-inch blocks under the legs of the head of the bed to incline the body. Pillows don't work, as they tend to bend the body right where the LES is. Acids in the stomach are more likely to leak through while you are prone, relaxed and sleeping.

Acid leaks cause more than pain, they irritate the valve, causing it to swell and leak more easily. When the valve leaks more, it hurts more, swells more and then leaks more—a vicious circle. My recommendation for treating acid reflux is to make a few tough diet and lifestyle changes and, if lucky, the valve might heal naturally.

Next time, I'll talk about more specific treatments for heartburn. MCN

Dr. Flash Gordon is a primary care physician, author of *Blood, Sweat & Gears,* and former director of Haight-Ashbury Free Clinic.

YOUR RIGHTS > By **Jim Halvorsen**

What the Cops Look For

THINK OF ALL the times you see someone pulled over by police. The typical image is likely to include red and/or blue lights, the unsuspecting prey snared on the right roadside. In this image, is the stopped vehicle a motorcycle? Probably not.

Everyone wants to avoid being 'that guy.' If he is the jerk who just blew by you a little too close, you may be cheering under your breath that he is now experiencing a law enforcement encounter. Again, 'that guy' was probably not a motorcyclist. Let's do the math: We typically make up less than 1 percent of the traffic volume, so the odds are in our favor. Still, how do motorcyclists avoid being 'that guy'?

As an officer assigned to routine patrol, I had myriad tasks within my territory, such as complaints to which I was assigned, or a follow-up on a crash investigation, or a burglary complaint that needed to be completed—all competing for my time. Let's assume it's a postcard day and traffic is light and steady. I could typically spot a violation every five to 10 minutes. That's roughly 50 in an eight-hour tour. Cell phone abuse alone could have me tied up all day. So, I tended to be selective. Usually a vehicle with multiple violations made it more worthy to be stopped. Someone with a headlight out, who blew a stop sign while on a cell phone might be a good candidate for a roadside "conversation."

Knowing there are many demands of an officer's time means every traffic stop must be worthwhile. Something mundane, such as a malfunctioning license plate light might regularly be overlooked. Excessively high handlebars might routinely be ignored as well. Loud exhausts are almost never enforced and a non-compliant (D.O.T.) helmet may not garner a second look.

So, if 'that guy' who is pulled over is on a motorcycle, well he (or she) is likely to be a law enforcement poster child. This is going to be someone with at least three obvious violations. Loud pipes at 2 a.m. that set off car alarms, unsafe handlebar heights, indicators of alcohol use, speeds that are well over the normal flow of traffic, and, of course, the obvious wheelie, illegal passing and lane-splitting (except in California) will all raise the ire of the police.

Usually, motorcyclists have to do a lot of things wrong to be pulled over and cited.

WHEN THE SUBJECT of quotas comes up, there is fact and fiction. Yes, police supervisors need ways to gauge a subordinate's performance, and the number of tickets written might be one factor; but that is certainly not the only one or even the most important. Most often, tickets written isn't used to gauge performance; it's violator contacts, which may include warnings, repair orders, assists to motorists and yes, citations.

Most officers write citations because we know it makes the highways safer. We all had our reasons for being tougher on certain offenses. Drunk driving was a thorn in the side for most all of us. Just one fewer death notification by arresting an intoxicated driver was worth it. I also watched for those not wearing seatbelts. Pickup truck operators were the most common. To this day I don't know why.

Another violation I sought was the use of non-DOT helmets. These so-called helmets offer about the same protection as a baseball cap. I viewed both the seat belt and a DOT helmet as safety devices. As such, they are both well documented to save lives. Motorcyclists are some of the most benevolent people I know and I'd like to keep them around.

OVER THE YEARS, I have done a lot of police training, making officers more aware of the violations pertinent to motorcycles. I would commonly ask questions such as, "Who has written a motorcyclist a summons for an improper helmet?" The room would remain mostly silent. But for a seatbelt violation, every hand would go up. I would ask why, and their answers probably won't surprise you.

"They're only going to kill themselves, so why should I care?"

"I don't want to get involved in a chase; it's a lose-lose situation."

Additionally, but not usually stated, the officers don't want to admit that they aren't as familiar with the laws for motorcycles as they should be.

This apathy quickly turned around with a short hands-on training approach that allowed officers to put their new knowledge to the test immediately after the class. We would find a stop sign on a road where motorcyclists were known to be prevalent. There, violations could be easily detected and enforced. The unsuspecting motorcyclists were told that this was a training event and no tickets would be written. After that first year of training, helmet tickets alone went up over 2,000 percent, though that is easy to do when starting with ridiculously small numbers.

So, to avoid being 'that guy,' blend in, ride safe, wear proper gear. And yes, obeying the law helps. MCN

Jim Halvorsen is a retired police officer, MSF RiderCoach, police motor instructor and architect of motorcycle checkpoints.

Getting Back On The Horse

I DON'T LIKE three-wheelers. I never have. Even when I was 3, I remember shoving my silly-looking trike into the corner of the garage and trying to throw a leg over the seat of my brother's Sting-Ray. I couldn't ride it, but I didn't care. So, I approached our Grand Prix des Trikes in this issue with an open mind, but also with a little deep-seated contempt. Full disclosure, I had never ridden one and didn't really know what to expect.

The first one I rode was a Harley-Davidson with a Tilting Motor Works conversion. Two wheels up front that actually tilt in the direction of the turn. Not bad. It still leaned left, leaned right, still sort of had that motorcycle feel, though it felt a little chattery at times on sweeping turns where the pavement was a little rough.

Then came the Can-Am Spyder. Pretty good ride, more car-like. The Can-Am also had two wheels in the front and one in the rear, but the front wheels were out much wider. Still get the open-air feel, but turning was quite different. It didn't lean. I had to lean. Now, we were getting into that whole three-wheel weirdness. On a motorcycle, you want to turn left? Lean left. This one, to turn left, you turn the handlebars left and lean left while pushing the whole bike to the left with your right hand with all your might. This took some getting used to.

Next, Harley Freewheeler, standard trike, one wheel in the front, two huge wheels in the back. This turned real quick, and I was constantly sliding off the seat in the general direction of inertia. Great engine, though, (the Milwaukee Eight is the real deal) but a lot of work to turn the thing. It even had a trunk, and it turned a lot of heads. Really a novelty. But I wouldn't want to be on one for a trip to Sturgis and back.

Then came the Ural, with a sidecar. I love "Hogan's Heroes." This is insanity on wheels. If you can ride this, you can ride anything. That sidecar has a mind—and gravity field—of its own. Unless you have plenty of ballast, it will lift up off the pavement at the darnedest times. The childhood memory of me and the rest of the dead end kids bolting a makeshift sidecar to a donor bike comes to mind. My right elbow starts hurting a little too, the one I landed on when it was my turn on that bucking bronco.

Then it was the Polaris Slingshot, still a different kind of three-wheeler. This is pretty much a car. It's a ton of fun, fast and sporty. Anyone who loved go-karts as a kid HAS to take a few laps in this baby. It turns corners and heads.

Nonetheless, I couldn't wait to get back on two wheels. The three-wheeled life is much different than the two-wheeled life.

Hey, we all have our hangups.

MY WIFE IS terrified of motorcycles.

It's a rational fear. When she was about 9, her dad brought home a motorcycle he borrowed from a friend and put her on the back to go for a ride. Not what you would call an experienced motorcyclist, he twisted the throttle, popped the clutch and launched the little CB 250 into a wheelie with her on the back, dropping the future mother of my children painfully to the ground.

From that day forward, she has considered all motorcycles to be evil.

Years later, after successfully navigating 20 years of marriage, I informed my beloved that I intended to purchase a motorcycle called a KTM. This did not go over well. Yes, she knew I had been on two wheels since I was about 4, yes, she understood I had owned a dirt bike when I was 12 and had ridden it all over the Mojave Desert. It was a tough sell. I bought the bike, she held her breath and, I suspect, sent up a little prayer every time I headed out to the desert with my orange bike in the back of my little red truck.

When I'd return, she would give me the walkaround.

"Well, any broken bones, cuts, bruises?"

It got worse for her. Frustrated with the dependability of some of my trail riding buddies, I told her I wanted to buy a street bike. Then I could ride every day.

It was a red, rocket-looking thing called a Honda VFR. She hated it. She hated it so much that she even rejoiced when I came home with an even bigger bike a few years later, a Victory Hammer. It was big, loud and black. But at least it wasn't red.

Detente.

RECENTLY, MY DAUGHTER stopped by and saw the Slingshot in the garage. She gave it the same look she gives a firefighters calendar.

"Wanna go for a ride?" I said.

"Yay-yah!"

When we got back, she was still grinning. The wife was obviously intrigued.

"Honey," I said. "I was going to ride the dirt bike tomorrow, but how'd you like to go get some brunch down by the beach?"

"That would be nice."

"I mean, in the Slingshot."

"Yeah, let's go."

Maybe there is room in the world for three-wheelers. I quickly found a helmet for her and on a sunny April Sunday morning in 2017, my lovely wife got back on the horse. Of course, there was little chance of me throwing her off the back of this one.

Cruising down Pacific Coast Highway, nearing Laguna, the impossible words finally came.

"OK, we can get one of these," she said.

"Really? They're 25 grand."

"Oh. Well, maybe we can just rent one." MCN

TOTAL CONTROL > By **Lee Parks**

Entering the Turn

IN THE FEBRUARY issue, we discussed the importance and techniques of effectively using vision on a motorcycle. Once we know how to achieve proper vision through a turn, that opens up the ability to be extremely precise in our line selection.

In our Total Control Advanced Riding Clinics, we like to say that arc equals speed. That means that the larger the arc, the faster you can go and still have traction available. A path of travel with no arc is a straight line, which is where you can ride the fastest. The tighter the arc, however, the slower you must go.

Motorcycles, as single-track vehicles, are significantly narrower than multiple track vehicles like cars. As such, we have the cool ability to vary our lane position. By precisely timing changes in our lane position, we can literally change the arc of the road and make it wider than it actually is.

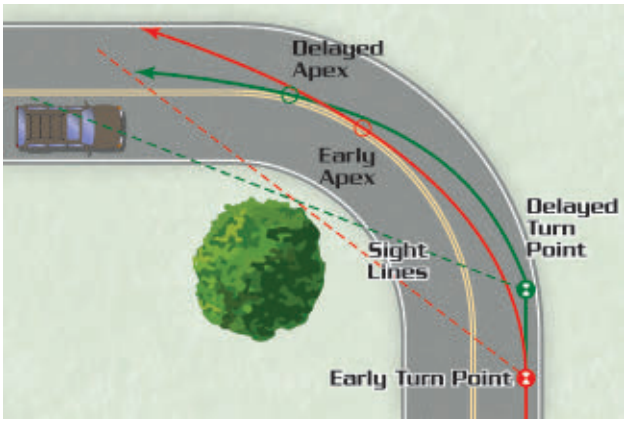
You see racers doing this all the time. If you look closely, you'll notice they take an outside-to-inside-to-outside path of travel. If you compare that line to a line that stays in the middle of the lane, you'll notice the racer line has a much larger arc. On the track, where conditions are controlled, this allows the racer to go faster through a given turn.

On the street, where conditions are not controlled, we're going to use a similar path to the racer, but we're going to do it at a slower speed. The reason for this is that we need to leave some safety margin for the things on the street that I like to call "unexpecteds." These are the things that can compromise safety.

Some examples of unexpecteds we might face on the street are oncoming cars, surface hazards, decreasing radius turns and animals.

When it comes to achieving proper line selection with that outside-inside-outside line, there are three common problems experienced by both street and track riders: Premature Initiation, Slow Steering and Fifty-Pencing.

Let's closely examine the first of these, premature initiation, which is, by far, the most common problem with line selection. Essentially, this means starting your turn too early. Even experienced riders often make this mistake. It is just natural to want to get away from the nasty edge of the road to give yourself a buffer zone for safety.



IN THE ILLUSTRATION, we see two paths of travel. The red path is the early turn point line and the green path is the delayed turn point line. Notice the tree in the middle of the turn, which makes this a blind corner.

There are two reasons we don't want to prematurely initiate our turns. The first reason is that it limits our sight line. The sight line represents what we can see as we look through a turn. Take a look at the sight line in the red path of travel.

The first drawback with an early entry into a turn is limited vision around it. In the case of a blind corner, an oncoming vehicle may not be seen when the turn is being initiated. If the vehicle's driver is not paying attention, talking on a cell phone, going too fast, texting, putting on makeup, etc., that driver's recognition of and reaction time to oncoming vehicles, such as motorcycles, may be seriously hindered. You, the rider with a limited sight line, may not become aware of this safety threat until it is too late.

By delaying entry to the turn, a clear view of the road is opened before the rider commits to a path of travel. This way, there is time—even just a split second—and room to maneuver before the turn-in, should dangerous circumstances present themselves.

THE SECOND DRAWBACK with an early entry is an early apex. An apex is the point in the turn where the rider is closest to the inside of the lane arc, which is often the center line. The earlier a rider enters the turn, the earlier that apex is reached.

Unfortunately, and contrary to what you might think, the earlier the apex, the wider the exit line will be. This is because less steering must be used initially to keep from running off the inside of the turn, which means more time must be spent in a leaned-over state. The longer the bike is leaned over, the fewer options a rider has for changing the bike's speed or direction. By delaying entry to the turn, more steering can be done initially, and the apex is also delayed, which keeps the bike from running off the outside of the road and provides more options on the exit should a problem be detected.

Next month, we'll look at two other common problems with turning: Slow Steering and Fifty-Pencing. MCN

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

Motorcycling in Movies and on TV

PLEASE JOIN ME in a look back at how motorcycling has been portrayed in the movies and television over the past 100 years, a project I will attempt in stages over the next few months, starting with pre-1960.

MABEL AT THE WHEEL (1914). An early silent film from Charlie Chaplin in which Charlie on his motorcycle competes for the affections of Mabel Normand with his rival, a race car driver. As near as I can determine, this was the first film in which a motorcycle played a significant part.

SHERLOCK, JR. (1924). A Buster Keaton silent film with Hollywood's first motorcycle chase scene. You might be surprised just how well it was done—particularly the stunts, in an age before computer-generated imagery. You can check it out on Wikipedia.

NO LIMIT (1935). The first motorcycle talking film, starring George Formby, Jr. winning the Isle Of Man TT in a musical comedy. I would imagine you could credit this film with bringing the famous Isle of Man into the American motorcycling consciousness.

THE PACE THAT THRILLS (1952). This action film about racing might have been the first film that was really about motorcycling, rather than just featuring a bike somewhere in the story. The story revolves around motorcycle racing, building and design, much like previous films about automobiles.

THE WILD ONE (1953). The film by Stanley Kramer that changed everything. Most noted for the character of Johnny Strabler (Marlon Brando), whose persona became a cultural icon of the 1950s, "The Wild One" is considered to be the original outlaw biker film, and the first to examine American outlaw motorcycle gang violence.

The film was based on Frank Rooney's short story "The Cyclists' Raid," published in Harper's Magazine in 1951, inspired by sensationalistic media coverage of an AMA Gypsy Tour motorcycle rally that got out of hand on Independence Day weekend, 1947 in Hollister, California.

Drinking and street stunting were given national attention in the July 21, 1947 issue of Life magazine, with a staged photograph of a wild drunken man on a motorcycle. In time, we would learn that virtually everything reported about the incident was false, and the story wildly exaggerated, but the die had been cast.

TEENAGE DEVIL DOLLS (1955). Quick to try to capitalize on the financial success of "The Wild One," Hollywood rushed to produce movies like "Teenage Devil Dolls," in which a normal, middle-class young girl is drawn to a life of marijuana smoking, heroin abuse and wild living with a motorcycle gang. A formula that would be repeated with varying degrees of success in hundreds of films to come.

RKO, COLUMBIA

MOTORCYCLE GANG (1957). Not ready or willing to spend time and money to producing their own biker-exploitation movie, B-movie studio American International Pictures simply took one of their drag racer movies, "Dragstrip Girl," and in two short weeks re-shot a half-dozen scenes with bikes in place of cars. It made money.

THE HOT ANGEL (1958). Another case of a studio "repurposing" a film. Originally about pilot buddies from the Korean War, where one was trying to save another from drifting into a life of crime with a gang, the gang scenes were reshot with the gang riding motorcycles. Instant biker movie!

This was only the beginning. The success of Brando's "The Wild One" character (as well as Lee Marvin's "rougher" side) would spawn a whole new genre of American cinema. Stay tuned for the coming decades, which gave us such celluloid classics as "Zombie Biker Chicks From Mars!" 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**

Links to the Future

THE CONCEPT OF using linked chain to create a strong, flexible mechanism to precisely transmit mechanical energy is far older than most would ever guess. In fact, Philon of Byzantium is credited with its earliest mention, in his repeating crossbow design of the third century B.C.—2,300 years ago! So, given humanity's almost inbred familiarity with drive chains, perhaps it's not surprising that we don't give them much thought—essentially taking for granted what clever, deceptively complex devices they are.

Incredibly versatile, a staggering variety of layouts and unique chain designs are currently used in synchronized machinery of all kinds, but to keep this short, we'll restrict our investigation to motorcycle final drive chain.

Hans Renold, a Swiss émigré to the manufacturing center of Manchester, England, invented the modern roller chain in 1880. Prior to roller chains, the contact points between chain teeth and pin bushings never varied, resulting in rapid wear. Renold's contribution, the addition of a second cylindrical bearing between the pin bushing and sprocket teeth, allowed the chain contact point to migrate, greatly reducing friction and wear. And as the key component of J. K. Starkey's then-new "safety bicycle," the chain drive's ability to adjust rotational speeds between the bicyclist's legs and the rear wheel allowed equal sized tires, a much lower center of gravity and more maneuverable handling without the direct-drive high-wheelers' lethal tendency to send the rider head-over-heels.

Those of us who remember lubing the drive chain every few hours on long trips—before O-ring sealed the lubricant inside the pin bushings—should toast Joseph Montano, who invented the concept in 1971 while working for the Whitney Chain Co. of Hartford, Connecticut. O-ring chains resisted the lubricant-shedding strains of big power and high chain speeds (~1,500 meters per minute on race bikes) as well as the external assaults of water, mud and grit, to give vastly greater chain life. Although a variety of rubber seal designs such as X, Z and XW-rings have since appeared—all designed to improve sealing and reduce link-to-link friction—the relative stiffness of a sealed chain is convincing evidence that its durability advantages do come at a small cost in friction. As a result, non-O-ring chains are still favored in racing, and are considered consumables, because of their short lifespan. Pro motocross teams, for instance, replace premium drive chains every 20 hours on their practice bikes and much more frequently on racers.

O-ring chains seal lubricant inside the pin bushings, and these seals help keep out impurities. This extends chain life, but doesn't elimintate the need for lubing and cleaning.

To clean such chains, which often have a clip-style master link to facilitate easy removal, the chain can be immersed in an ultrasonic bath filled with kerosene, diesel fuel or something similar before re-oiling. The proper lubricant will be a fairly heavy grease mixed with an evaporating solvent, to penetrate the links' close clearances and leave a strong protective film behind when it dries. To ensure the master link clip doesn't part company with the chain, it should always be installed with its closed end pointed in the direction of rotation and safety wired in place.

REGARDLESS OF THE chain type, remember that even O-ring chains are not fully sealed. The roller that contacts the sprocket teeth has no barrier to dirt entry between itself and the pin bushings, so proper cleaning and lubing is still important. For best results, spray lubricant on the inner run of the chain on both sides of the inner link plates after the chain has warmed from use.

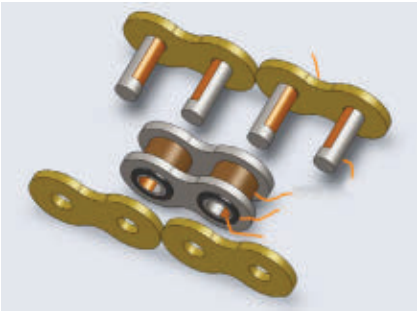
O-ring chains must be cleaned with agents that don't attack their sealing rings, so be sure to use lubes specified for O-ring chain. Again, kerosene forms the basis of many cleaners and it has the

EK CHAIN

advantage of leaving a waxy film behind when it dries. WD-40 is popular and, like kerosene, it doesn't attack sealing rings. It does contain penetrating solvents, however, so while it does a great job of cleaning dirt and grime, some say it may do too good a job by removing factory lubricants behind the O-rings. Brake cleaners are a definite no-no, as they cause seals to swell and fail.

Although chain can be the most power-efficient final drive method (~98 percent), the friction created by inadequately lubricated and/or dirty chains can reduce power transmission by up to 20 percent, making good chain maintenance critical to top performance. Enclosed drive chains have been rare on larger motorcycles, though they have been popular on commuter bikes, where reduced mess and maintenance are as valuable as efficiency. The world's best-selling single model, the Honda Super Cub, used an enclosed chain, and many new scooters now run their final drive chains in an oil bath for maximum efficiency.

WHAT IS CALLED "chain stretch" is a misnomer. The reason chains get longer is wear between their various contact surfaces. This may be due to centrifugal force at high speeds, misalignment, corrosion, vibration and metal-to-metal contact when loads exceed the strength of captive lubrication. Chain wear is also relative to engine type. Smooth-running motors are easiest on chains with big singles and narrow angle twins the most stressful. The maximum allowable elongation is no more than 2 percent, often given as a measurement between a set number of pin centers with the chain under tension. The shade-tree method is to pull on the mounted chain at its most rearward position to see how far it can be pulled away from the rear sprocket teeth. If more than one-third of the tooth can be exposed, the chain needs to be replaced. And it's a false economy to replace just a chain on worn sprockets. For longest life and peace of mind, all should be replaced as a set—chain and front and rear sprockets. To verify the quality of new sprockets, wrap the sprocket's teeth with the new chain. There should be no observable play between them. And make sure that when mounted, new sprockets are perfectly concentric with no runout to create variations in chain tension.



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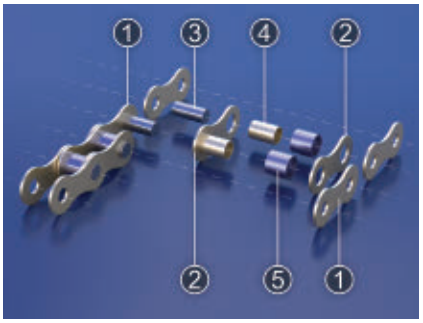
The orange in the illustration indicates typical wear areas, giving the elongation we commonly call "stretch."



An exploded view of a modern chain link shows: 1. The outer link plates; 2. Inner link plates; 3. Pins (press fit to outer plates); 4. Pin bushings (press fit to inner link plates); 5. Rollers (slip fit on pin bushings).

WHAT'S NOT WELL appreciated is that chains produce an inherent vibration of their own, as sprockets behave like multi-faceted polygons, generating lifting and dropping, acceleration/deceleration forces magnified at the chain's tightest turn. This is the reason for normal chain noise and also for the rubber cush drives in rear wheel hubs. Chain manufacturers also recommend against using drive sprockets with fewer than 15 teeth for the same reason, suggesting reduced-pitch duplex chains to carry the loads instead. Note that drive chain will have a number of links divisible by two as one inner and one outer link must be paired. To prevent accelerated wear, manufacturers suggest the sprockets should have an odd number of teeth, so the two aren't mating in the same pattern with each revolution.

Chain slack is also critical, and too loose is better than too tight, as overtightened chains can snap or break engine output shafts. To find the correct slack when you don't know the OE specifications, turn the rear wheel until the chain is tightest and then compress the rear suspension until the swingarm pivot is precisely in-line between the sprocket centers. This will be its tightest point. Then allow 2 percent of the distance between the sprockets as additional slack.

Although the chain's alignment should be perfectly true when the bike's axle adjustment marks are equal, visually inspect the rear sprocket teeth for telltale wear on one side or the other which can indicate a bent swingarm or other serious issue.

Chains are built with very high grade materials to meticulous standards and the links plates are case hardened by heat treatment, compacting the metal's outer grain structure to provide a very hard, long-wearing surface together with a softer more ductile inner core for resilience to shocks. However, an important precaution is to be sure that the battery's vent hose (if it has one) is not routed so as to allow any battery acid to spill on the chain. Acid will create hydrogen embrittlement of the case hardening, which can cause the links to suddenly crack from internal stress.

Now that you appreciate the hard work they do, don't forget to show your drive chains regular cleaning and lubrication love. MCN

Dave Searle (MCN editor '00-'15) started freelancing for Road Rider in 1988 and became the technical editor of MCN in 1996.

MCN MOTORCYCLE CONSUMER NEWS

Next Month

- BMW R nineT Racer
- Indian Chieftain
- Harley-Davidson Street Rod

Vintage

Ciao!

The world's oldest Vespa, hand-built in 1946, fetched €195,748 ($208,930) in March, tops among 21 bids over eight days on Catawiki, a premium online auction site based in The Netherlands.

One of 60 prototype scooters from Piaggio's "0 series," this one actually had chassis number 1003. However, since the first two prototypes no longer exist, this well-weathered model is the granddaddy of them all. It is powered by a 98cc two-stroke engine with forced air cooling and a three-speed gearbox.

The iconic Italian scooter brand emerged just after World War II and became a symbol of carefree, youthful exuberance.

Piaggio originally manufactured warplanes, which halted after the war due to Italy's collaboration with the Germans. As a result, Piaggio's management team redirected manufacturing efforts on the now-famous Vespa scooters.

From 1946 onward, the scooters quickly became popular in Italy. In 1953, the release of the Audrey Hepburn movie "Roman Holiday," which features the scooter in a prominent role, put Vespa on the path to cult status.

Vespa scooters, like this original model, have become increasingly valuable over time. Models in good condition from the 1940s through 1960s are often worth more than five times their original retail price, adjusted for inflation.

CATAWIKI