

# Sport-Touring Suspension Showdown: Hyperpro vs. Öhlins Using Race Tech's ShockClock Pro



**Front Shock Contenders: Hyperpro, Öhlins and stock (Showa).**  
by Moshe K. Levy

**F**EW ISSUES stir debate within the motorcycle community like suspension. Is the stock suspension adequate or a throw-away item? Which aftermarket type is best? Can one tune suspension oneself, or is a specialist required? I pondered all of these questions and dozens more in considering my own daily commuter, a 2004 BMW R1150RT with over 54,000 hard miles on its clock. The RT's original shocks felt tired, but beyond subjective opinions, there was very little objective data as to which suspension upgrade choices are truly best. Conventional wisdom holds that the RT's stock shocks are worn out after 25,000 miles, and that an upgrade to a premium aftermarket suspension would result in nothing less than a remarkable improvement in ride and handling. From there, all bets are off as one wades through the myriad of brand choices, and model choices within those brands. This being MCN, we set out to discover if conventional wisdom was correct, and to prove it as objectively as possible.

## The Contenders

Öhlins of Sweden boasts an excellent reputation within the sport-touring genre. Within the BMW community particularly, it is the most popular suspension upgrade per the dealers we interviewed. Hyperpro of the Netherlands has also enjoyed many rave reviews of its products in sport-touring enthusiast publications and online forums. Fans of the respective brands often clash with each other as to which is best and why, but nobody has conducted a back-to-back comparison of the two using the same bike and the same rider—until now.

The first step in a premium aftermarket suspension purchase begins with the buyer submitting some basic information about his/her size, weight, motorcycle, riding style and other variables to the suspension vendor, who then uses this information to set up the shocks as closely as possible to a baseline "optimal." For this test, I gave both Hyperpro and Öhlins my rider weight of 165 lbs. plus 35 lbs. of luggage on average, no passenger typically, with street-based sport-touring as my riding style. My RT test mule has a given 120mm (4.72") of front wheel travel and 135mm (5.31") of rear wheel travel. (Penske was also contacted, but as they did not make a shock for this application, they declined to participate.)

From there, we ultimately decided on comparable midline models from both suspension manufacturers. Top-of-the-line shocks with more adjustments and fancier features are available from both Hyperpro and Öhlins, but these are overkill for my typical commuting applications, and incidentally, are priced at well over \$2200 per set.

**Analysis on Table 1:** Here we see that both sets of shocks are quite similar in many respects. The Öhlins body diameter is a whopping 10mm wider than the Hyperpro, but this did not present any installation issues whatsoever on the RT. Significantly, the Hyperpro utilizes a progressive spring, whereas the stock and Öhlins shocks use a linear spring design. Also, note that the Hyperpro's mechanical preload adjustment is performed only from above the spring, while the Öhlins is adjustable from both above and below the spring. More on these two issues later on.

For reference, as of press time a stock replacement Showa front shock's MSRP from BMW is \$317, and this item is not rebuildable. Both Hyperpro and Öhlins front shocks are completely rebuildable.

**Analysis on Table 2:** Here, we see a major difference between rear shock designs. Like all the front shocks tested, the stock and Hyperpro 460-3D-HPA rear shocks are both emulsion type, while the Öhlins BM125-46DRS utilizes an internal reservoir design. An emulsion design has no internal floating piston to separate the nitrogen from the shock fluid. Because the shock's fluid changes viscosity during operation, it may aerate and pass by the piston and valve shims under especially hard use. This aeration results in generally higher levels of shock fade and less efficient

**Table 1: Technical Data: Front Hyperpro vs. Öhlins shocks for BMW R1150RT Tester**

Model	Hyperpro 360-3D	Öhlins BM124-46ER
MSRP	\$569	\$756
Type	Emulsion	Emulsion
Rebound adj.	50 clicks on bottom end of shock	40 clicks on bottom end of shock
Preload adj.	Mechanical, above spring	Mechanical, above and below spring
Spring	Prog. 47/66 N/mm	58 N/mm
Body diameter	40mm OD	50 mm OD
Shaft diameter	16mm	16mm
Shaft coating	Carbon DLC	Chrome
Measured length	333mm	331mm
Measured stroke	78mm	78mm
Rebound Preset	20 clicks	18 clicks

**Table 2. Technical Data: Rear Hyperpro vs. Öhlins shocks for BMW R1150RT Tester**

<b>Model</b>	Hyperpro 460-3D-HPA	Öhlins BM125-46DRS
<b>MSRP</b>	\$858	\$834
<b>Type</b>	Emulsion	Internal reservoir
<b>Rebound adj.</b>	50 clicks on bottom end of shock	40 clicks on bottom end of shock
<b>Preload adj.</b>	Remote hydraulic adjuster	Remote hydraulic adjuster
<b>Spring</b>	Prog. 157/242 N/mm	Linear 01092-69/170 N/mm
<b>Body diameter</b>	50mm OD	50mm OD
<b>Shaft diameter</b>	16mm	16mm
<b>Shaft coating</b>	Carbon CNC	Chrome
<b>Measured length</b>	367mm	367mm
<b>Measured stroke</b>	56mm	56mm
<b>Rebound preset</b>	25 clicks	16 clicks
<b>Preload preset</b>	10mm	15mm

damping. By contrast, the Öhlins' internal reservoir design features a floating piston that separates the nitrogen from the shock fluid, eliminating the possibility of aerating the shock fluid, reducing potential shock fade, and increasing the damping efficiency of the shock.

Other notable differences include the Hyperpro's progressive spring versus the Öhlins' linear setup, and the Hyperpro's 50 clicks of rebound adjustment vs. the Öhlins' 40 clicks.

For reference, as of press time a stock replacement Showa rear shock's MSRP from BMW is \$703, and this item is not "officially" rebuildable (though there are a few shops that claim to be able to perform this task). Both Hyperpro and Öhlins rear shocks are completely rebuildable.

### Suspension Setup, Installation & Tuning: A Prerequisite For Performance

Readers interested in proper suspension setup should refer back to Mark Barnes' comprehensive report "Suspension Setup: Adjust, Test, Repeat" in the July 2007 MCN. Though a layman can glean enough information about sag, preload, damping, rebound and compression to get started, even an expert like Barnes correctly refers to suspension tuning as a "black art." The sheer number of variables—motorcycle type, rider weight, rider size, riding style, typical road surfaces encountered, personal preferences—renders any "one size fits all" approach far from optimal, and any objective data far from conclusive. To quote

a Race Tech ShockClock Pro to the RT to optimize tuning and measure shock performance objectively (see sidebar).

Surprisingly, many riders are unaware of the value of professional suspension tuning, content that they have purchased quality hardware that is a "bolt-on" upgrade from stock. However, the biggest surprise that arose from this test is that far more benefit was derived from the suspension tuning than from the actual hardware. Though it was a tedious task of "adjust, test and repeat," the time Klaus and I spent fine tuning the settings of each shock yielded exponentially better feel than simply replacing the tired OEM shocks with new aftermarket models. When one considers that a professional tuning typically costs less than 20% of the hardware and generates 80% of the tangible results, it becomes clear that any rider considering a suspension upgrade should absolutely include a competent professional tuning in the purchase decision.

### Suspension Installation & Initial Adjustments

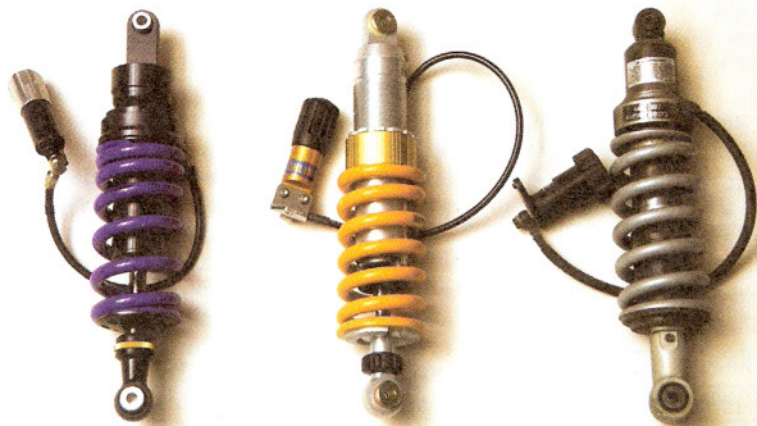
Each set of shocks was closely inspected prior to installation. Both the Hyperpro and Öhlins shocks are well made, with beautifully finished aluminum components and distinctive color combinations that identify the brands—purple for Hyperpro and gold for Öhlins. Both are substantially beefier than the RT's stock Showa shocks, and unlike the Showas, both Hyperpro and Öhlins are completely rebuildable. Likewise, both feature adjustments for compression and rebound damping, which is standard in most midline aftermarket shocks of this price range.

### Front Shock Installation & Adjustments

Installation of the Hyperpro and Öhlins front shocks went without a hitch. Sag measurements are shown in Table 3.

Unfortunately, the Hyperpro 360-3D shock has its preload adjustment only at the top of its housing. For many motorcycles, including the RT test mule, this area of the shock is not easily accessible, meaning the Hyperpro front shock must be physically removed from the bike in order to adjust preload, and then reinstalled. By contrast, the Öhlins BM124-46ER shock has a preload adjustment knob located at its bottom, which can be easily accessed and tuned with the shock installed on the motorcycle.

Luckily, the Hyperpro 360-3D front shock felt perfect as is, and did not require any adjustment to provide a fine balance of ride and handling. Meanwhile, the Öhlins BM124-46ER front shock's preload had to be increased



Rear Shock Contenders—Hyperpro, Öhlins and stock (Showa).

# Product Comparison



**Left: Front ShockClock Transducer mounted on the RT's handlebar. Middle: Rear ShockClock Transducer fully mounted with Data Recorders secured in place of the RT's passenger seat. Right: An example of a construction road used in Test 3.**

by 4.5mm to bring the dynamic sag into my preferred range of 45mm. I found the Öhlins' factory preset rebound (18 clicks) far too soft for my taste, which was corrected by stepping down to 13 clicks.

## Rear Shock Installation & Adjustments

Installation of both Hyperpro and Öhlins rear shocks was also trouble-free. Sag measurements are shown in Table 4.

Both Öhlins and Hyperpro rear shocks allow for preload adjustment via a remote knob. However, the Hyperpro 460-3D-HPA utilizes a much classier knurled aluminum knob, complete with machined notches in the adjustment housing that correspond to varying levels of preload. The Öhlins, by comparison, utilizes a cheap feeling plastic knob that clicks every so often to announce a different level of preload. Obviously, adjusting by sight on the Hyperpro was infinitely less frustrating than dealing with the unmarked Öhlins adjustment knob.

As for the final settings, the Hyperpro 460-3D-HPA rear shock's preload was increased by 4mm to 14mm total, while the factory set preload on the Öhlins rear shock was left alone since it was close to the recommended setting of 30 mm. The Hyperpro's preset rebound (25 clicks) was adjusted to 30 clicks, while the Öhlins preset rebound of 16 clicks was deemed ideal.

## ShockClock Pro Testing Methodology & Results

Each set of shocks was broken in for 50 miles prior to any measurements to give everything a chance to settle. After the break-

in period was over, the process of initial fine tuning began, followed by 750 miles of test riding. Then, each set of shocks went through one last painstaking final tune before recording the measurements on the ShockClock Pro. Any interim adjustments were recorded over the period of testing, and the RT's tire pressures were continually verified to recommended settings prior to any adjustments, to keep measurements as accurate as possible.

As a moto-commuter, I use my RT every day through a variety of conditions which were the subject of this test. Along my route, I typically encounter a sharp curve, a medium-sized pothole, and a rough construction road. So this test centers around how the suspension performed in these realistic situations, with a fourth 50-zero mph quick-stop braking scenario thrown in for good measure. The following data are the objective portion of the results, as measured by the Race Tech ShockClock Pro. All results shown for the Hyperpro and Öhlins shocks illustrate their final performances, after all tuning efforts had been exhausted.

### Test 1: Sharp Curve

The first test involved a sharp curve on a residential road, marked with a recommended speed limit of 25 mph. The curve was negotiated at 50 mph, with every effort made to follow the same apex line through the curve on each run.

**Baseline:** Stock Showa shocks: The front stock shock had an average travel of 13mm (11% of available travel) and peak travel of 27mm through the curve, while the rear shock had an average travel of 11mm (8% of available travel) and peak travel of 28mm.

**Hyperpro:** The Hyperpro 360-3D front shock managed an average travel of 11mm (9% of available travel) and peak travel of 22mm on this run, while the rear Hyperpro 460-3D-HPA was recorded at 9mm average travel (7% of available) and a peak of 22mm.

**Öhlins:** The Öhlins BM124-46ER front achieved an average travel of 11mm (9% of available travel) and peak travel of 23mm on this run, while the rear Öhlins BM125-46DRS recorded an average travel of 8mm (6% of available) and a peak of only 16mm.

**Table 3: Front Suspension Sag Measurements Out Of The Box, 0 Miles Use**

Model	Hyperpro 360-3D	Ohlins BM124-46ER
Static Sag	38mm (25-35mm)	45mm (15-30mm)
Dynamic Sag	53mm (40-60mm)	55mm (35-50mm)

**Table 4: Rear Suspension Sag Measurements Out Of The Box, 0 Miles Use**

Model	Hyperpro 460-3D-HPA	Ohlins BM125-46DRS
Static Sag	31mm (10-20mm)	9mm (10-20mm)
Dynamic Sag	51mm	33mm (15-30mm)

## Data From The ShockClock Pro Recorder

**Analysis:** By studying the data, one can easily discern how the jagged peaks and valleys of suspension travel shown on the OEM chart, which represent the excessive “pogo” effect typical of worn suspension, are clearly smoothed out with the fresh aftermarket shocks. The result, not surprisingly, is a more planted feel as the motorcycle negotiates the curve with the Hyperpros and Öhlins. The Hyperpros had a distinctively sportier, more immediately responsive feel than the Öhlins during aggressive cornering maneuvers.

### Test 2: Pothole

The second test involved a medium-sized pothole, also on a residential road, marked with a recommended speed limit of 25 mph. I rode over the pothole at 25 mph, with every effort made to hit the same spot of the pothole with each run.

**Baseline:** Stock Showa shocks: The front stock shock had an average travel of 11mm (9% of available travel) and peak travel of 61mm, while the rear shock had an average travel of 16mm (12% of available travel) and peak travel of 90mm.

**Hyperpro:** The Hyperpro 360-3D front shock had an average travel of 16mm (13% of available travel) and peak travel of 55mm on this run, while the rear Hyperpro 460-3D-HPA was recorded at 22mm average travel (16% of available) and a peak of 70mm.

**Öhlins:** The Öhlins BM124-46ER front shock achieved a rather busy average travel of 28mm (24% of available travel) and peak travel of 78mm on this run, while the rear Öhlins BM125-46DRS shock was recorded at 14mm average travel (10% of available) and a peak of 97mm.

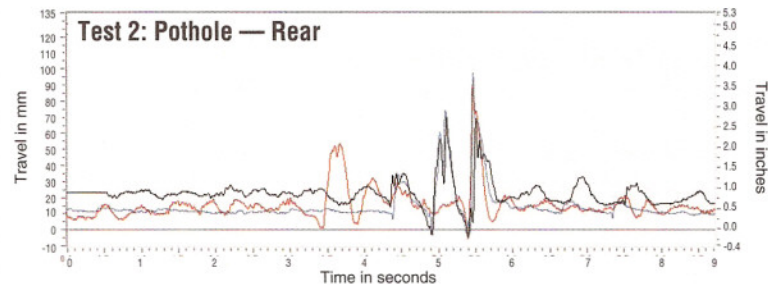
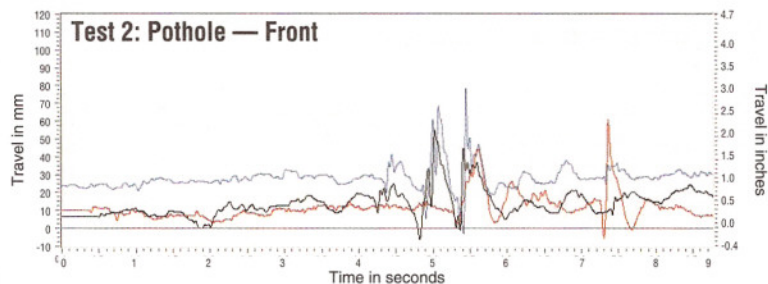
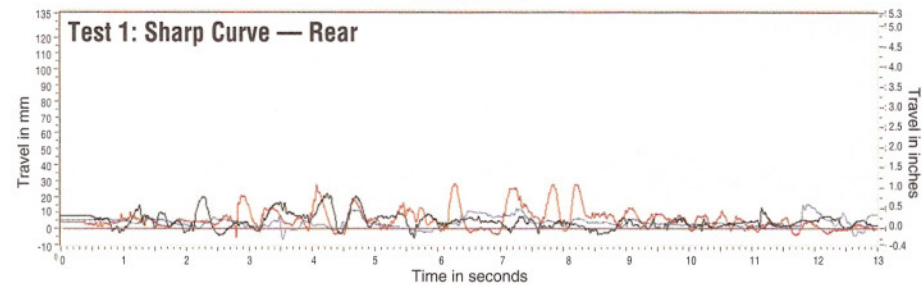
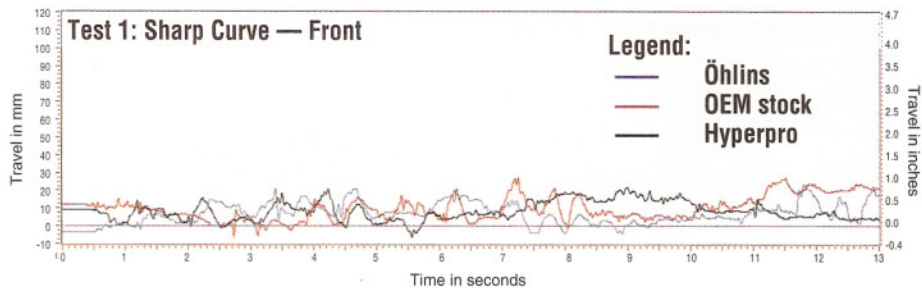
**Analysis:** Comparing the ShockClock Pro’s charts of this pothole test gives away very little in terms of the rider’s feel. The stock suspension “crashed” over the pothole, while the aftermarket shocks soaked it up with aplomb. Overall, the Öhlins shocks were slightly more compliant than the Hyperpros in absorbing sudden large bumps. The Öhlins’ higher average travel overall translated into a feeling of insulation between the rider and the road imperfections, though we must remember here that the Hyperpros use progressive springs (which do not compress at the same rate as the Öhlins’ linear springs to deliver the same rate of absorption).

### Test 3: Construction Road

The third test involved a typical New Jersey residential “construction workzone” road, marked with a recommended speed limit of 25 mph. I rode over the unrepaired sections of the road at 25 mph, and made every effort to duplicate the line of travel with each run.

**Baseline:** Stock Showa shocks: The front stock shock had an average travel of 19mm (16% of available travel) and peak travel of 69mm, while the rear shock had an average travel of 14mm (11% of available travel) and peak travel of 81mm.

**Hyperpro:** The Hyperpro 360-3D front shock managed an average travel of 27mm (23% of available travel) and peak travel of 71mm on this run, while the rear Hyperpro 460-3D-HPA recorded an average travel of 17mm (16% of available) and a peak of 70mm.



**Öhlins:** The Öhlins BM124-46ER front shock achieved an average travel of 30mm (25% of available travel) and peak travel of 73mm on this run, while the rear Öhlins BM125-46DRS shock recorded 16mm of average travel (12% of available) and a peak of 71mm.

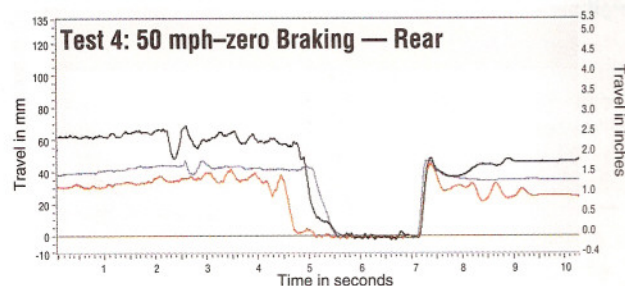
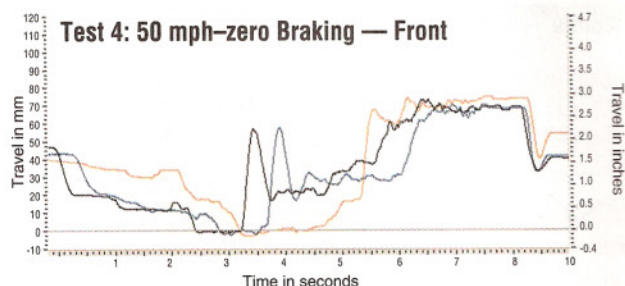
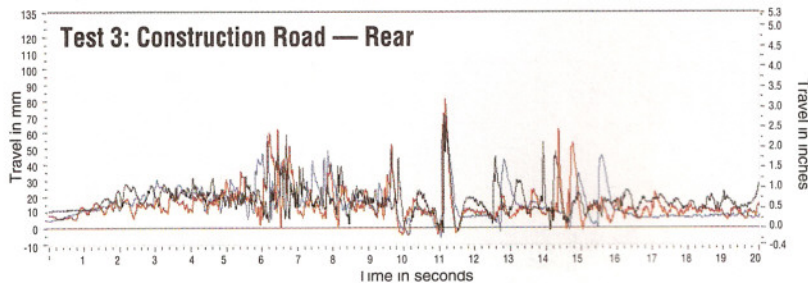
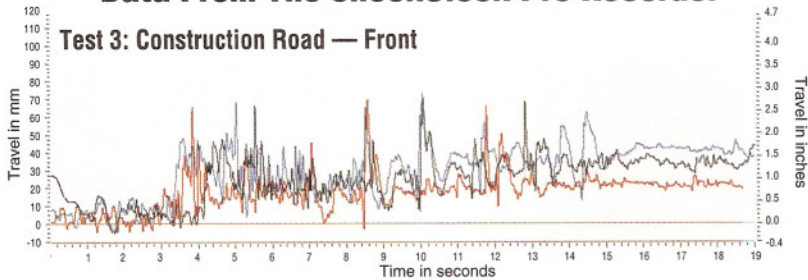
**Analysis:** Hyperpro and Öhlins both generated similar numbers on the front shocks and nearly identical charts for the rear shocks, but once more, the ShockClock Pro’s data cannot address feel. The construction workzone road brutalized the suspension, and the stock shocks were overwhelmed throughout the process, jarring the rider. The OEM front Showa only managed 19mm average travel, a testament to its accelerated state of wear. In this test, the Öhlins shocks again revealed themselves to be faintly more compliant over rough surfaces compared to the slightly stiffer, tighter feeling Hyperpros.

### Test 4: 50 mph—zero Quick Stop Braking

The last test involved a 50—zero mph quick stop, made at about 80% effort of a full-scale emergency panic stop. It’s worth noting here that the 2004 BMW RT mule has a fully linked power-

# Product Comparison

## Data From The ShockClock Pro Recorder



assisted braking system, as well as the Telelever front suspension geometry. Both of these factors play serious havoc with the ability to compare these braking test results to other, more conventional motorcycles.

**Baseline:** Stock Showa shocks: The front stock shock had an average travel of 47mm (39% of available travel) and peak travel of 73mm, while the rear shock had an average travel of 28mm (21% of available travel) and peak travel of 45mm.

**Hyperpro:** The Hyperpro 360-3D front shock managed an average travel of 41mm (34% of available travel) and peak travel of 73mm on this run, while the rear Hyperpro 460-3D-HPA was recorded at 53mm average travel (39% of available) and a peak of 69mm.

**Öhlins:** The Öhlins BM124-46ER front shock achieved an average travel of 39mm (33% of available travel) and peak travel of 70mm on this run, while the rear Öhlins BM125-46DRS shock recorded a 37mm average travel (28% of available) and a peak of 47mm.

**Analysis:** In terms of feel, the Hyperpro's progressive front

spring was the star of this test. This type of spring design allows its resistance to increase as it compresses, as opposed to the Öhlins' linear spring whose resistance is constant throughout its travel. In hard braking, the secure feeling of firm control was most apparent with the Hyperpro in place.

## Conclusions

Ask 10 different riders to define proper handling, rebound damping, compression damping, or preferred preload adjustments, and you'll surely get 10 different answers. All of these factors and virtually everything else surrounding the black art of suspension tuning is, for the most part, very subjective. Not only do preferences change from rider to rider and from motorcycle to motorcycle, but also from application to application. Thus, some baseline recommendations from the suspension manufacturers and objective data as gathered from a device like the ShockClock Pro are hardly the final word when it comes to dialing in a suspension system. What ultimately counts more than anything else is, obviously, the individual rider's opinion as

to what feels best.

That said, the most significant conclusion of this test is that tuning trumps hardware. Out of the box, for this rider and this motorcycle, neither Hyperpro nor Öhlins provided the astonishing "night and day" difference from stock that we so often read about in enthusiast publications and forums. Since aftermarket shocks are usually an expensive investment, even at this mid-line model level, one must suspect some degree of post-purchase rationalization comes into play as new owners report their opinions.

But in our experience, it was only after a very tedious process of "test, adjust and repeat" did we realize the amazing transformation in feel we all hear about. Only after the tuning could an upgrade of this cost level be considered worthwhile, at least for common commuting applications on a motorcycle with a decent stock suspension like the subject BMW RT.

So, which is better, Hyperpro or Öhlins? By now you've guessed there is no objectively "better" here, just "better for whom." During this test, it became increasingly clear that these two sets of premium aftermarket shocks share more similarities than differences in real world performance. Yet each set has its own personality and may be better suited to one rider over the other.

For my tastes, the Hyperpros were biased to the sport side of sport-touring, with quicker responses as the riding became more aggressive. The Öhlins were biased toward the touring side of sport-touring, with a more compliant and supple ride. Only you know which aspect you'd prefer in your suspension. Either way, once tuned properly, both are high quality shocks that can, indeed, add a whole new dimension to the ride and handling of your motorcycle.

**Hyperpro Sales BV—Kraijenhoffstraat 3, 4251 Le Werkendam, The Netherlands; info@hyperpro.com; www.hyperpro.com**

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# Race Tech ShockClock Suspension Analysis System

**T**HIS HYPERPRO VS. ÖHLINS showdown was the perfect opportunity for us to sample Race Tech's new ShockClock, which neatly fills the gap between primitive suspension analysis methods (such as mounting zip ties to shocks to determine if they've bottomed out) and full-scale professional suspension data acquisition devices, which can sell for upward of \$5000.

The "Basic" ShockClock System consists of three main components: the Race Tech Data Recorder, one Ultrasonic Acoustic Wave Guided Transducer, and the ShockClock suspension analysis software package. Some basic mounting brackets and all required cabling are also included.

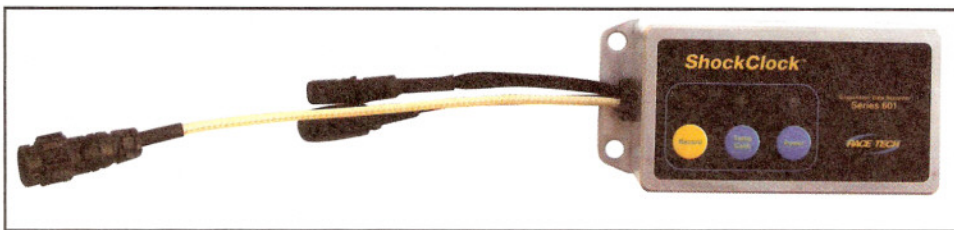
For the purposes of this test, we utilized the "Pro" ShockClock System, which consists of two complete "Basic" systems plus a remote switch that allows for simultaneous analysis of both front and rear shocks on the motorcycle.

The Data Recorder is fairly advanced, with the ability to record up to 18 minutes worth of data at a sample rate of 240 times per second. It can hold up to 10 different recordings in its memory, so long as the total doesn't exceed the 18-minute limit. The compact aluminum chassis is easy to mount with zip ties, hook and loop tape or hardware, and the unit runs independent of bike power on three AA batteries.

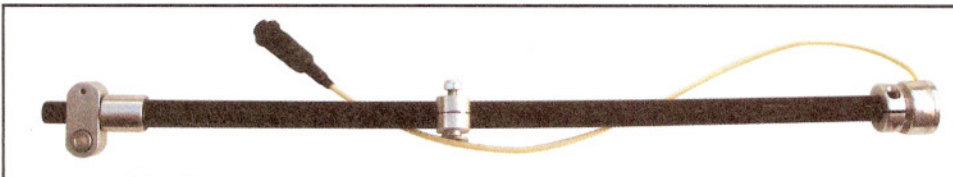
The Ultrasonic Acoustic Wave Guided Transducers we used had a whopping 15" (380mm) of travel, enough for most dirt bike applications and much more than necessary for the average street-bike. They can be shortened without much effort, but we left them stock for the testing.

The transducers are capable of measuring 1mm increments with +/-1% accuracy. Mounting them using the included brackets was not difficult, even on the fully faired BMW RT test rig. On our 61st test run, one of the transducers failed and had to be sent back to Race Tech for a free warranty replacement, which functioned perfectly for the rest of our testing.

The ShockClock software is comprehensive, with the ability to perform waveform analysis, travel and velocity histograms, and plenty of capability to



The ShockClock Data Recorder is only 1.5" high, 5.5" wide and 2.5" deep.



ShockClock Transducer can measure up to 15" (380mm) of shock travel.

compare different settings versus results as measured.

## Suspension: Where Objective And Subjective Collide

With the ShockClock installed, the tuner can study shock behavior over a given route in much greater detail than most anything short of a very expensive professional suspension data acquisition device, and adjust the various suspension settings accordingly.

The ShockClock is especially good at showing a given shock's use of its travel range, very helpful data for dirt bike riders or racing applications. Professional or semi-pro riding teams with dedicated suspension tuners would most appreciate the tool for its stated benefits.

For general street motorcycling applications, the need for objective data gathering isn't as great. Granted, few riders truly possess the years of focused experience necessary to provide a commercial suspension tuner with quality feedback after a test run. As such, some ability to quantify events is surely a notable advantage for the tuner to have.

However, before investing in one, a commercial street-based tuner needs to determine whether his customers will pay for the extra time required to install the ShockClock, go on test runs, and analyze the data versus just dialing in conventionally.

One important thing to keep in mind during this consideration is that the further tuning progresses from general baseline to fine detail, subjective personal preference becomes the more important

standard by which final suspension settings are judged—and consequently, objective data carry less weight. For example, the ShockClock can tell you when and where a shock bottomed out on a given circuit. Depending on the data, the tuner may decide which valving adjustments to make, or if changing the spring would be an option to consider.

In the relatively intense case of very high peak or average travel, the ShockClock's data of one change versus another can objectively prove one solution over another, feel notwithstanding.

On the other hand, at the other extreme of fine tuning, feel completely overrules the ShockClock's data. In those cases, the data in the ShockClock's charts do not always correlate to what feels best, which is ultimately what we're after here.

All told, like a doctor treating his patient with the aid of a monitor, the suspension tuner can use the ShockClock to provide objective data to the extent that it is useful. Ultimately, both the good doctor and the competent tuner can work with objective hard data (mixed in with a healthy dose of subjective opinion) to arrive at the best solution for that individual rider.

The "Basic" ShockClock (Model MMSC-601) retails for \$799.99, while the "Pro" ShockClock (Model MMSC-601PRO) retails for \$1599.99.

—Moshe K. Levy

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