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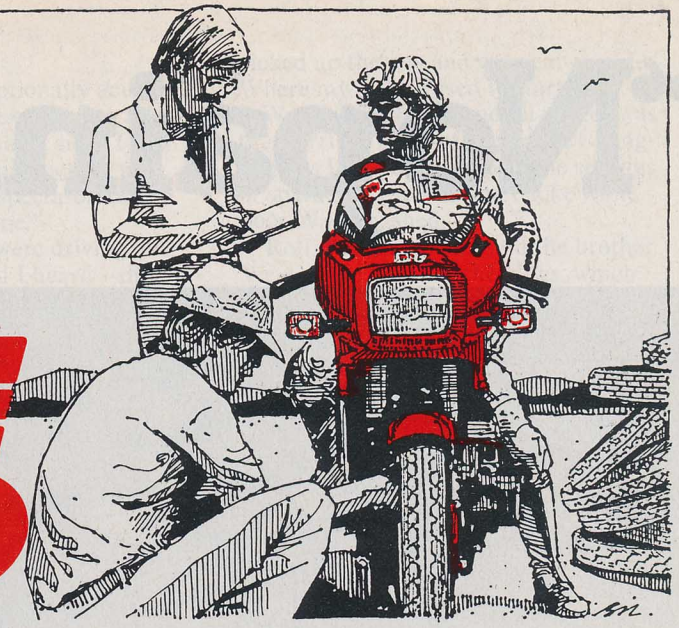

CYCLE WORLD

OCTOBER 1983 VOL. 22 NO. 10

SPECIAL FEATURE

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The best tires in the world compared.

Photographed by Jeffrey Zwart

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DOING IT THE HARD WAY

"Don't back off the gas," they told me. "The wobble will go away."

By John Ulrich

First it was a bar-end wallow, the tips of the flat bars slowly arcing to and fro. Just like the last pass, I thought, my thumb edging toward the bright brass shift button. Only this time I'm not backing off the throttle, turning a crummy 138 mph, low-10 pass. This time I'm keeping the gas on, the wobble's going to go away, and I'm running 150 mph plus, in the eights.

The Sportster slammed into third gear, two gaping cylinders gulping raw gas and nitrous oxide and straining the great wide racing slick, accelerating toward 150 mph and bouncing over a bump in the track. My butt slipped off the back of the cut-down seat, my feet, precariously balanced on forward-mounted pegs, threatened to follow. All that kept me on the bike against the pull of power and the blast of wind was my grip on the handlebars, bars which leaped from graceful movement to wild dancing. The bars disappeared, becoming a blur of motion and I wondered how my hands and arms could move so quickly and still grasp. Split seconds became years, and I knew I was in trouble.

* * *

Ray Worth is a friendly bear of a man, 6-foot-2 and 210 lb., 46 years old and used to doing things the hard way and winning despite the odds. Last year he built and ran a shaft-drive Yamaha Seca in NMRA 750 Pro Stock. With Joe Yeager riding, the Seca won and set new records almost every time it went to the track, dominating the season and easily winning the championship. Yeager, 33, has ridden for Worth for seven years. Typically, instead of asking one of the local drag racers to ride, Worth found Yeager motocrossing, and, together, the pair learned to win on asphalt.

Yeager is 5-foot-9 and 175 lb., compact, a fireplug, soft-spoken and quiet at trackside, unnervingly-calm and deadly quick on the dragstrip, a professional whom Worth describes as being smooth, not hard on equipment, a rider who doesn't make mistakes and doesn't break equipment. "It makes a big difference," says Worth. "Having a rider who doesn't hurt the motorcycle helps a lot."

Worth is a motorcycle dealer in Kansas City, Missouri. He owns two side-by-side shops. He bought a struggling Harley-Davidson franchise in 1978 and turned it into a thriving success, one of the brand's largest dealers, adding a combined Suzuki/Yamaha shop in a separate, across-the-parking-lot building in 1980.

Three years ago, Worth started thinking seriously about building a Harley-Davidson dragster to help promote his dealership. But Harleys weren't competitive in any of drag racing's Pro classes, having been left far behind by the more powerful Japanese Fours. Worth lobbied for rule changes to allow Harley-Davidsons to run with nitrous oxide injection in the Pro Stock class. When IDBA accepted the proposal for the 1983 season, Worth was already feverishly at work on a Sportster, but it's still the only Harley in the class. (The Vance & Hines CB1100F Honda holds both ends of the Pro Stock record at 8.40 sec. and 156.79 mph.)

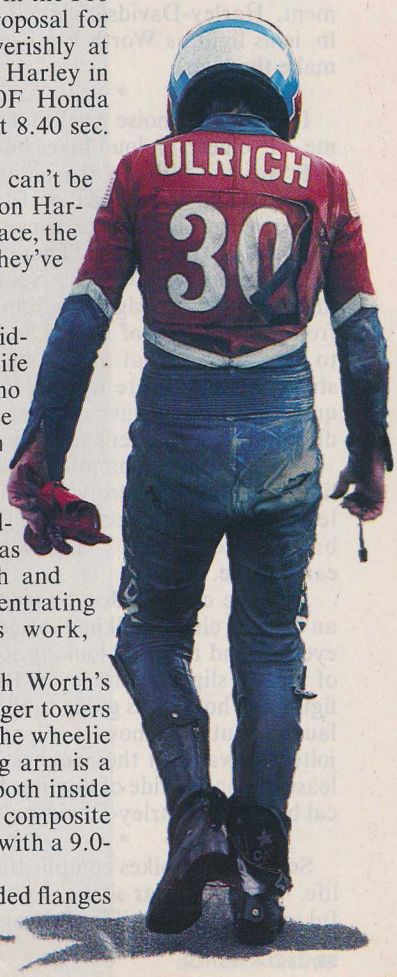
"Everybody else is of the opinion that it can't be done," explains Worth. "They've given up on Harleys. But IDBA gave us what we need to race, the advantage we need. It's up to me now. They've given us enough."

* * *

Worth's Sportster left the Harley-Davidson factory in 1969 as a 900, starting its life in the capable hands of one Dale Yeager (no relation to Joe), the 38-year-old service manager and chief mechanic at Worth Harley-Davidson. Worth met Dale Yeager when he bought the Harley shop, and kept him on. Dale Yeager and his engine building skills became as important to Worth as Joe Yeager's riding abilities. Both Worth and Dale Yeager work on the bike, Worth concentrating on chassis and making custom parts work, Yeager building engines.

The Sportster's seat is about even with Worth's kneecap when he's standing. Even Joe Yeager towers over the bike. It's long; wheelbase 68 in., the wheelie bar another 60 in. behind that. The swing arm is a massive broad piece with arms reaching both inside and outside the frame rails. The aluminum composite rear wheel is 7.0 in. wide, 15 in. diameter, with a 9.0-15 in. Goodyear car slick.

A length of square steel tubing with welded flanges replaces the frame backbone, bolting in >



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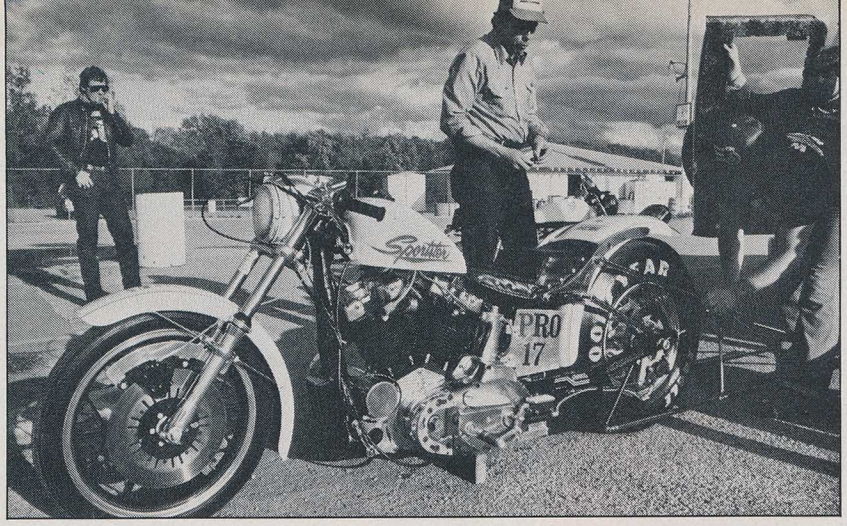
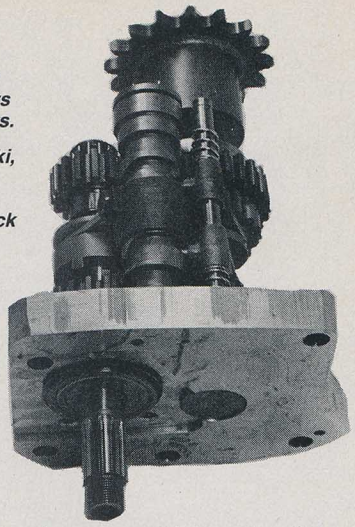


Ray Worth towers above his creation as Joe Yeager bolts on the wheelie bars.



Built for a Kawasaki, the Sportster's three-speed is supported by a thick aluminum plate.

or out quickly to allow the cylinder heads to be pulled with the engine in place.

The forks are spindly 35mm Cerianis with a skinny 2.75-18 tire on a 1.60 x 18 in. cast aluminum wheel. An air of the ridiculous is added by the small replica gas tank (made of fiberglass) and the wide, stock appearing Sportster fender (required by class rules) framing the tiny front tire. The bike looks unbalanced, its thick hindquarters and wisp of a front end mismatched. There is no steering damper, and the fake (rule-required) headlight is fiberglass with a painted-on "lens."

Worth's Sportster weighs 450 lb. Every other brand of bike running in the class has a minimum weight requirement. Harley-Davidsons don't, but 450 lb. is as light as Worth has been able to make the bike.

* * *

It wasn't the noise level that surprised me—I've been on loud bikes before.

It was the force of the individual explosions, the great heaves from every power pulse, the staggered crescendo of each roll of the throttle. There's nothing subtle about Ray Worth's Sportster, no finesse, no sharp-edged, piercing scream from rapid bursts of rpm. The Harley is to drag racing what an axe handle is to street fighting: brute force. Thundering, quivering, rolling waves of deep-throated discord breaking over the strip.

Just off idle the handlebars assume a life of their own; surely one piston was left out by mistake. Grabbing hold brings to mind a cataclysmic earthquake.

And the clutch—Joe Yeager must be an ox. The clutch pull had me casting my eyes around the pits, looking for a piece of pipe to slip over the lever. I never did figure out how I was going to slip it at the launch, but somehow it slipped, and I jolted forward on the roughest, wildest, least-in-control ride of my life. Mechanical bull, hah! Harley-Davidson!

* * *

Serious drag bikes complicate a pilot's life. Wide, flat rear slicks make wonderful traction and terrible steering. Any attempt to turn by leaning gets the bike up on the square edge of the tire, out of control. The wide, flexible sidewalls keep the tread flat on the pavement, but can distort, the tire turning egg-shaped or the motorcycle rocking and wallowing side-to-side. Or the tire tread patch may move in relationship to the wheel centerline, turning slightly to one side, diamond shaped. All those things can cause terrible problems, the rear end hopping off the ground, the bike heading sideways, the front wheel slapping violently from full left lock to full right lock and back again and again and again.

The latest thing in drag racing is the automatic override transmission, a clever device designed to shift from one gear to another without requiring the momentary engine kill (to unload gears) needed by conventional air-shift systems. An overrider has the unloaded side of gear dogs and dog engagement slots machined at an angle, about 30°, forming a set of ramps. When the power's on, the load side of the gear dogs and dog engagement slots contact, and the motorcycle accelerates.

An overrider actually engages, for a split second, two gears at once, but as the higher gear engages, it speeds up the countershaft and unloads the lower gear. When the lower gear is unloaded, the cut side of its dogs contact the cut sides of its mate's slots, and the gear backs out of engagement, the shift completed. In that way the transmission slides from first to second, second to third, and so on, each shift coming at the touch of an air-shifter button on the handlebars. All the time, the throttle is locked full on, the bike accelerating hard.

An overrider transmission is worth about 0.15 sec. and 3.0 mph in the quarter, compared to a conventional air shifter. The problem is that the throttle must be kept on until the transmission is locked into the top gear, the only gear without ramp-cut dogs and corresponding slots, or else the shift forks will bend.

* * *

The rules say Pro Stockers must have footpegs in the stock position, and, on the Sportster, that means high and well-forward. Fine with the stock seat, maybe, but hard to find after launching a cut-down dragster on its way to 150 mph in the quarter.

Check that. Hard for a guy who's taller and longer-of-leg than Joe Yeager. Yeager fits the bike fine, tucking in with knees against the tank and helmet barely showing above the upper triple clamp. I can't even tuck in after finding the pegs, because there's not enough room for my body between the seat and the handlebars. The seating position is strange for me, feet way out forward, back kinked, arms reaching for the bars. At the Harley's rate of acceleration the effect is close to riding a nuclear golf cart.

* * *

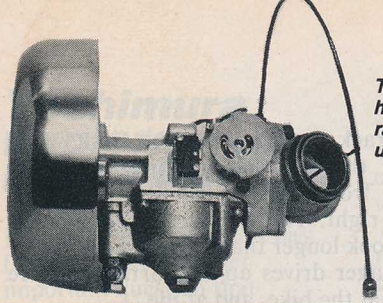
Nitrous oxide is amazing stuff. Its chemical composition is simple enough, one atom of nitrogen and two of oxygen. Dentists call it by names like Twilight Sleep and use it to knock out queasy patients; abusers inhale it and become high.

But the real attraction of nitrous oxide lies in its being two-thirds oxygen.

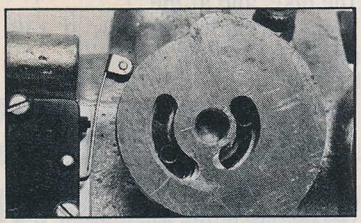
The more gasoline an engine burns, the more power it makes, but the amount of gasoline an engine can burn is limited by the amount of oxygen available in each cylinder, which in turn is limited by intake tract flow, carburetion, etc.

The picture changes with the injection of liquid nitrous oxide into the intake manifold. Suddenly, there's too much oxygen, a problem easily solved by pumping straight, liquid gasoline into the intake ports at 16 psi, bypassing the carburetor. The trick is to get the proper proportions of nitrous oxide and straight gasoline, delivered through lines at the right time, quantity controlled by replaceable jets (just like carburetor main jets) and nozzles, timing controlled by electric solenoids activated by a microswitch fitted to the throttle or carburetor. (The system on Worth's bike adds nitrous oxide and gasoline at three-quarter throttle).

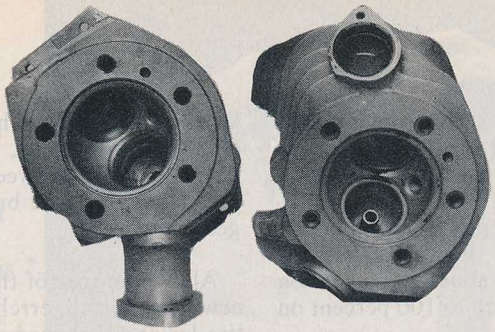
Nitrous oxide injection also discourages detonation: as the liquid nitrous oxide hits the cylinder head it instantly be-



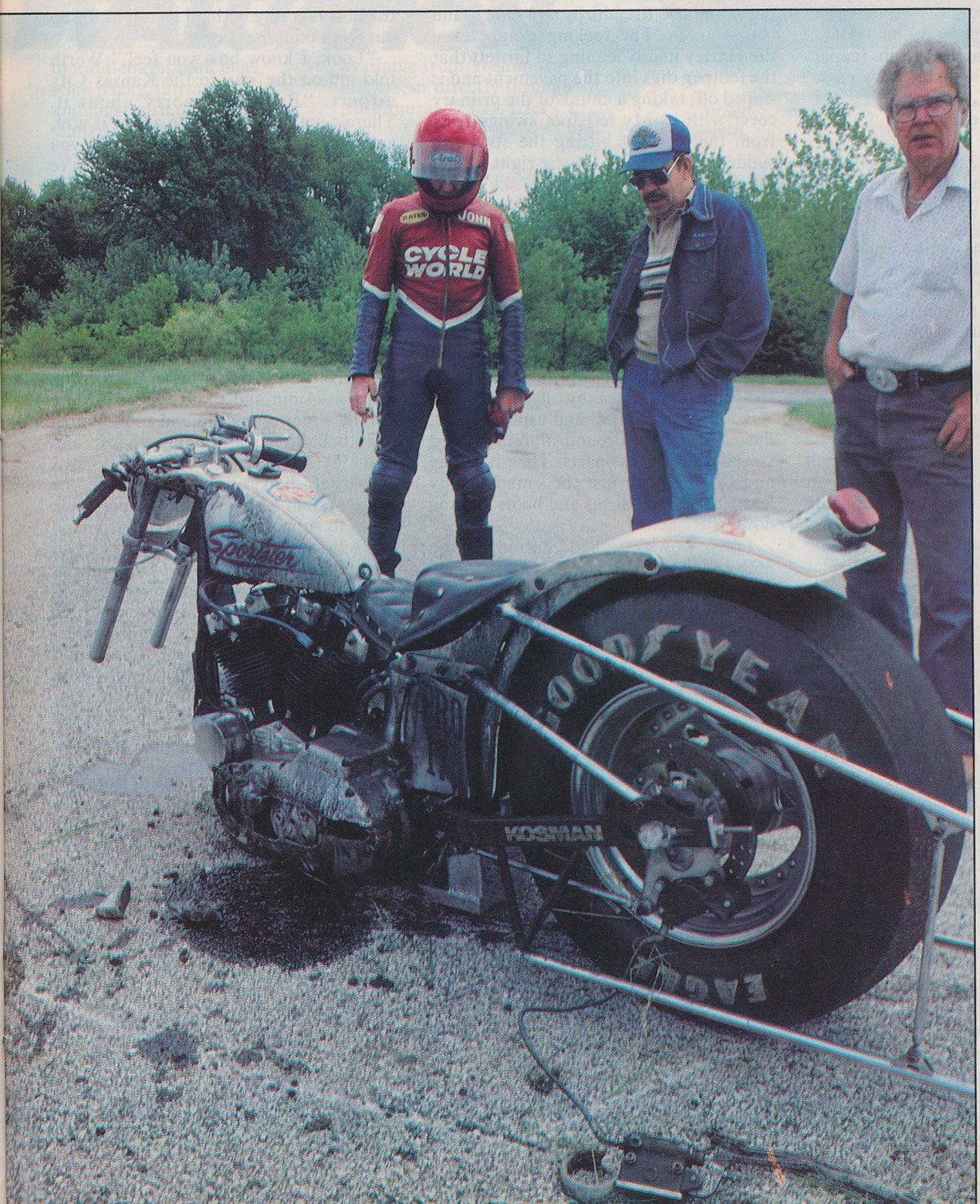
The S&S carburetor has feed lines for raw gasoline added upstream.



A cam added to the throttle shaft of the carburetor activates the nitrous system microswitch at ¾-throttle.



On the left, Worth's secret weapon: a cylinder head modified by Byron Hines. On the right, a stock 74 head.



"You went through the traps at 139 mph, turned a 10.20," he says.

Not bad for a man without a bike.

comes a gas, the transition from liquid to gas using energy and cooling the cylinder head; nitrogen itself is thought to damp detonation.

The result is horsepower, lots of horsepower, percentage increases ranging from a maximum of about 50 percent on full racing engines, up to 100 percent on stock street bikes.

The nitrous oxide is stored at 600 psi in an aluminum bottle located somewhere on the motorcycle, and the size of the bottle limits the amount of time (or number of runs), a motorcycle can spend "on the bottle."

Nitrous is expensive, sold by the pound (the bike bottle is weighed before and after being filled) for $3.00 a pound. Worth's Sportster carries a 5-lb. (capacity) bottle and uses ¾-lb. on every pass.

* * *

Worth's bike displaces 93 c.i. (1524cc), with bore and stroke of 3.5 x 4.812 in. (88.9 x 122.2mm). The forged pistons were designed and sold by C.R. Axtell, and fit in oversize Axtell cylinders.

The stroker crankshaft came from S&S, with S&S polished rods made of chrome-moly steel. The pressed-together crank is welded on the output side and carries a one-off, custom-made primary gear built to mesh with a Kawasaki KZ1000 clutch basket. The stock 1972 Sportster cases are machined to accept a 1.0-in. thick aluminum plate used to carry the ends of the transmission shafts and the clutch. An inset, 3/16-in. thick piece of steel reinforces the aluminum plate and extends around the end of the crankshaft, keeping the primary gears from pulling the crankcases apart. The overrider transmission, built by Orient Express for a Kawasaki, has three speeds and is supported on the output side by a 1-in. thick aluminum plate.

Worth says cylinder heads don't matter much on a nitrous bike, and the heads on his Sportster are close to stock. The valves measure 1.75 in. (exhaust) and 1.875 in. (intake). They're operated via pushrod by Lineweber standard #6 camshafts. The carburetor is an S&S Super with 1.875 in. bore, the ignition a Martek 1000 with 880 amplifier box, run total loss by the battery.

* * *

Worth figures he needs 155 mph to be competitive in Pro Stock. The bike has run 152 in testing, once, with a disappointing 9.30 sec. E.T. That was before Worth installed the three-speed overrider transmission, instead using a breakage-prone stock transmission that forced Yeager to leave the line in second gear. Worth thought the new transmission would both increase top speed and decrease E.T., but the best the bike's run since is 9.24 sec. at 148 mph, and now Worth thinks maybe he should have installed a four-speed, that perhaps the gearing spread between first and top is just too wide to be bridged by a single gearset.

* * *

Above the roar of the engine comes a new noise, errch, errch, errch, the front tire leaving S-shaped skid marks before the timing lights. The bike rocks left and right, the tire noise gaining tempo and volume, the horizon tilting crazily this way and that. I can't do a thing about it, out of control, along for the ride, wondering where it's gonna end and waiting, waiting, waiting as the bike snakes and rocks and the tire chirps and chirps and chirps again. The rocking exaggerates, the Harley finally leaning so far left that the footpeg digs into the pavement and is ripped off, taking a chunk of the primary cover with it. My left foot swings back from the force of hitting the strip and suddenly I'm rolling off the right side of the motorcycle, the deep blue sky catching my eye before I hit the wheelie bars and bounce forward, the awful, grinding, shussing noise of metal on pavement and leather on pavement engulfing me. The engine is silent. Parts of my body feel heat as leather wears thin. I'm sliding at an impossible rate, on my back, looking at the sky amid the din of crashing.

A dark shape fills my faceshield and the Sportster races by, leaving in its wake a barrage of oil and asphalt chips, dust and debris, ground aluminum and steel and fiberglass parts. Then it's gone and I'm left with just the sounds of my leather suit and gloves and boots slewing down the track.

I pivot slowly as I slide, turning gentle 360s on my back, and try to raise an elbow or wrist when the heat is too intense, spreading the load in the hopes of minimizing damage.

* * *

The slide stops and silence, a blanket, descends. My faceshield is coated with oil and grit. In the distance I hear a pit bike start, rev madly through the gears, and head toward me, its engine screaming.

I lie on the track, moving an arm, an ankle, a knee, toes, a leg, feeling for damage. I find it in my left collarbone, twice broken last year, in the form of a new wobble, a joint where there's not supposed to be one.

The pit bike's rabid drone is near, and Worth skids to a halt, shouting, "Are you all right? Are you all right?"

"Sorry about your bike, Ray." It's all I can say.

"Never mind the bike," he says, frantic. "We can fix the bike. What about you?"

* * *

We find the bike another 300 ft. down the track, in the grass, the front wheel gone, the fork locks snapped on both sides from the violent shaking. They were right. The wobble *did* go away. It just took longer than I expected.

Yeager drives up in Worth's van. He looks at the bike, and at me.

"You went through the traps at 139 mph, turned a 10.20," he says.

Not bad for a man without a bike.

* * *

Why the bike got such a wobble, I'll never know. It seemed to start when the bike hit a bump, and there was no way to push on the bars to damp the motion, not when you're bounced out of the seat and the bike is trying with all its might to run out from underneath you.

"Look, I know how you feel," Worth told me on the way to the Kansas City airport. "But don't worry about it. There's nothing we can do about it now, and we can fix the bike. Every time you put a motorcycle on a racetrack you're taking the chance that something might happen. It's part of racing."

With that, Worth is off into his plans, plans to get the Pro Stock record with his Sportster. It's not quick and fast enough now, he knows, but he's not worried.

He's got another complete engine in the works, 108 c.i. (1770cc) with bigger cylinders and 3-⅝ in. Wiseco pistons, a longer, 5.0-in. stroke from an S&S crank using a 74 pin and rods. To make room for the wider crank pin and rods, Worth had to build an aluminum spacer and place it between the vertically-split crankshaft halves. The cases have the same system of plates and super-thick doors to support a Kawasaki clutch and transmission. But the crowning glory of Worth's as-yet-unfinished new engine is a set of aluminum 74 heads painstakingly modified in spare time over three full years by Byron Hines. Before agreeing to take on the project, Hines told Worth—the two are good friends—that he must have blank heads without seats or guides or machining. Worth managed to get the heads, walked off the factory's assembly line by a friend in the racing department, and Hines went to work.

The results don't have much to do with Harley-Davidson parts as previously known, and, on the flow bench, the new ports and valves flow enough air to rival, in theory, a four-cylinder Kawasaki Pro Stock cylinder head.

Worth plans on finishing the engine before the end of the year, on being competitive, on taking the record, on doing it the hard way.

"I want to do it because it's different," Worth tells me, "because everybody else has given up, because people really go nuts over it. The Harley guys really love it because it's a Harley, and I want to do it just to do it." ◙