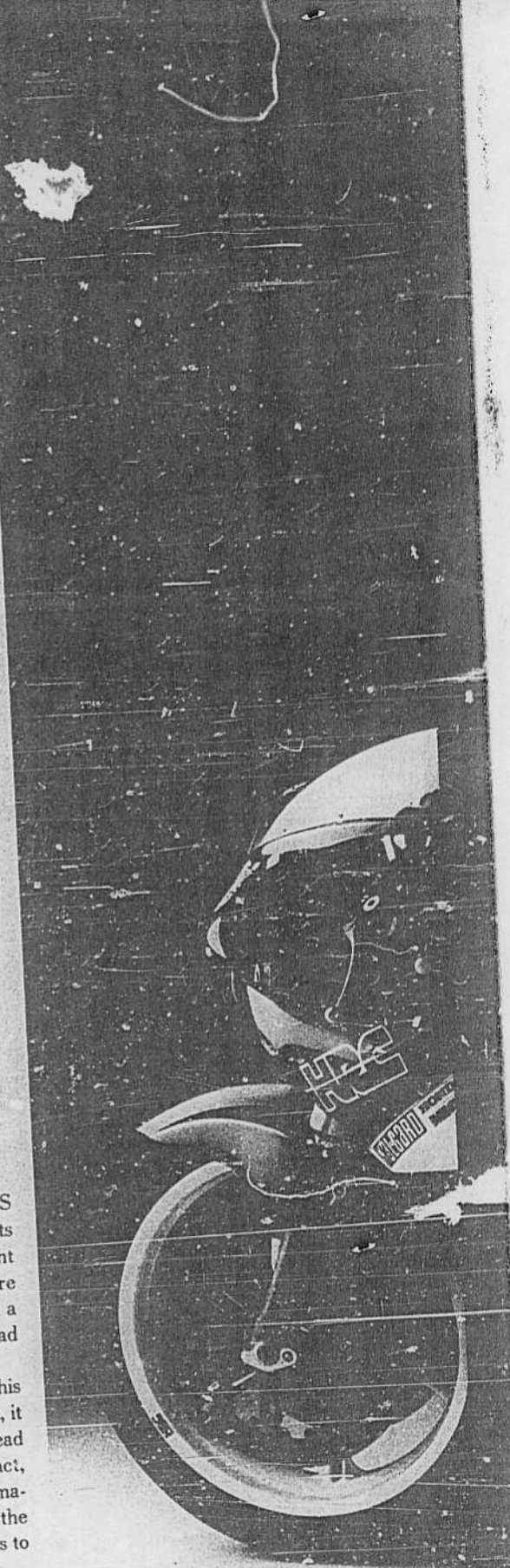
Bird of Prey

Without a doubt, Kevin Erion and his trick little Hawk were the fastest combination in Pro-Twins Modified racing. The only question was—why?

By Kevin Cameron



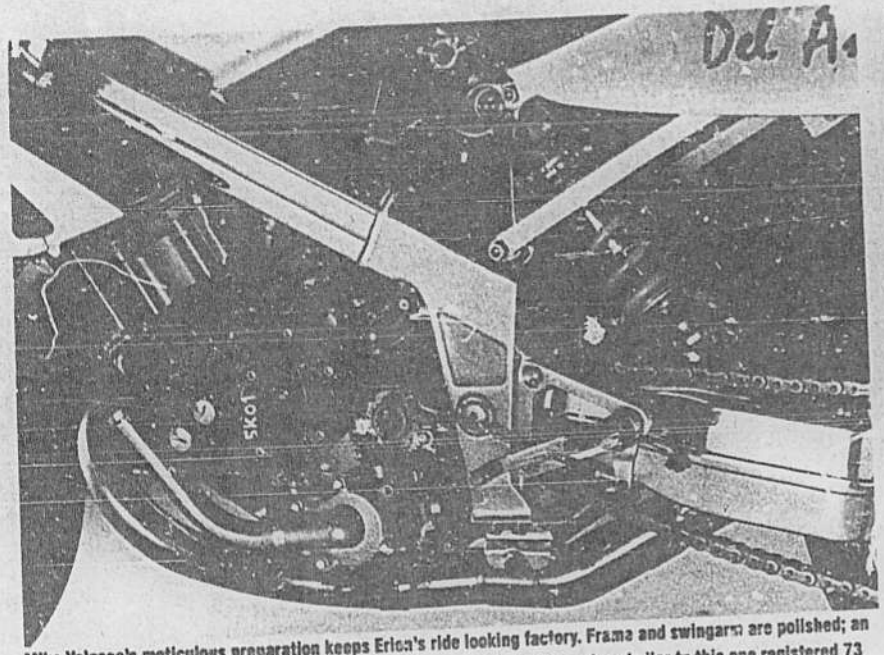
SOMETIMES A MANUFACTURER TRIES hard to make a simple, ordinary street bike, but enthusiasts won't leave it alone. More than 25 years ago, Honda brought its first Hawk (the 250cc CB72) to these shores. More quickly than Superman could shuck his Clark Kent suit in a phone booth, American racers peeled off street parts and had CB72s on the track, turning 14,000 rpm.

Now American Honda is importing another Hawk—this time a 650 V-twin. Billed as a general-purpose motorcycle, it carries no racy plastic streamlining, has no double overhead cams and no frills. But sit on it. Light, isn't it? And compact, too—like a 250. General-purpose motorcycle? For the majority, perhaps. But to a few of the riders who run in the AMA's ProTwins class, the Hawk GT 650 chivies and begs to be taken to the track.

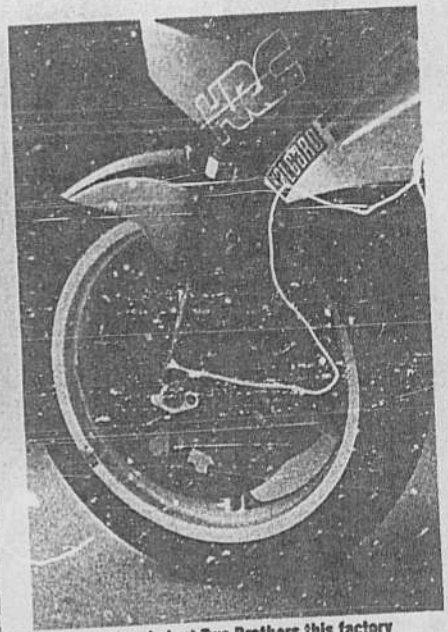
Among those who answered its plea was Kevin Erion, who had won the ProTwins Modified road-racing championship in 1988 on a well-prepared Ducati. Kevin and his brother Craig

On the right, left to right: Mike Velasco, Kevin Erion, and Craig Erion.

PHOTO BY KIRK WILLIS



Mike Velasco's meticulous preparation keeps Erion's ride looking factory. Frame and swingarm are polished; an Ohlins shock recently replaced a Fox used during the season. A 700cc engine similar to this one registered 73 horsepower, but who knows what truly lurks behind the HRC covers? The Hawkman knows . . .



Honda graciously lent Two Brothers this factory Showa front end from a Joey Dunlop TT1 V-four. Two 323mm discs offer superb stopping power.

operate a construction company on the West Coast, but have another existence outside commerce as Two Brothers Racing. At the beginning of 1989, unsure of whether to continue racing or not, Kevin took one of the new Hawks—minimally prepared—to Daytona. He was impressed by its handiness and speed.

In general, there is no such thing as racing a little bit. Mike Velasco, for many years a mechanic with the currently dormant Honda racing team, had been hired by Craig Erion to build gas stations. But as the Hawk project asserted itself, Velasco inevitably became involved. By its own weight of personality, this constellation of persons was gravitating into a black hole of racing activity. More development was planned for the next National, which was at Road Atlanta.

Velasco and Erion got to work preparing more-serious Hawks. Every day, Velasco would arrive at work to build gas stations, bringing another pocketful of titanium nuts and bolts—a legacy of his years with Honda.

"Hey, that stuff is yours, man, we don't want to clean out your assets for our project," Kevin Erion once told him.

"It's all right, don't worry about it," Velasco answered.

He got out his black book, began to phone people who could help, and more hardware and services appeared.

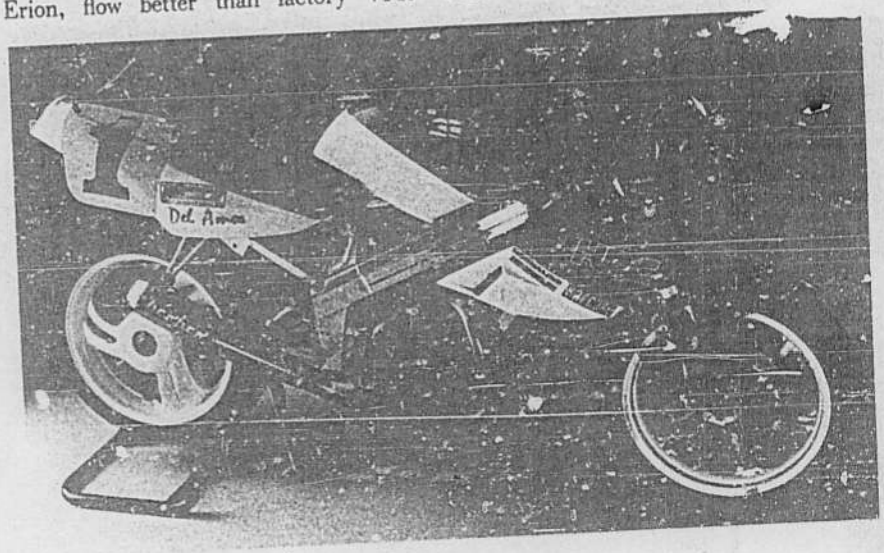
"You're calling in all your favors, Velasco. You might need them yourself one day."

"Never mind. I know what I'm doing."

Did you ever try to race just a little bit? It doesn't happen. Craig Erion decided to build gas stations some other way, switching Velasco to his natural habitat—the race shop; that way, he could get some sleep instead of trying to work three shifts—one at construction, two in the race shop.

The basic concept of the Hawk race engine was Velasco's, based upon his years of work at Honda Racing. The heads were ported by a respected Canadian, Rick Tomacic, and, according to Erion, flow better than factory VFR heads. The Hawk heads also were fitted with 1mm oversize Del West titanium valves, which weigh only 60 percent as much as steel valves. Light titanium valves continue to follow a cam contour long after steel valves would have floated. A Megacycle cam, based on what had worked in Ascots, was used. Three-millimeter-oversize Wiseco domed pistons (82mm) were installed, bringing compression ratio to about 12:1. Con rods were cut from titanium billet by Crower—"really big, and 60 to 70 grams lighter than stock," says Erion.

The downdraft intake system was topped by two 39mm racing CV carburetors taken from an RC30 race kit. Igni-



tion came from a Honda RS750 dirt-tracker, providing 36 degrees advance by about 3000 rpm. The exhaust system dimensions were copied straight from the RS750, and Kerker fabricated the two-into-one pipe in stainless, feeding an RS-style canister and muffler section.

A complete road-race front end—fork, wheel, and brakes—was lent by Honda, taken from an ex-Joey Dunlop Isle of Man TT1 bike. Honda's racing Showa forks use modern bending-washer damper technology, and are a real help over rough pavement, in addition to being tuneable. The twin 323mm disc brakes more than doubled the original stopping power, in conjunction with machined-from-solid calipers with Nissin pads. A Fox spring/damper unit controls the rear suspension. The 17-inch rims are 3.5/4.5-inch, shod with bias-ply front/radial rear Michelin 250 GP slicks.

Appearance had been important to the team in 1988 ("We should look the part," Kevin Erion had said then), and for 1989 the Hawk was painted in Honda racing colors. All easily damaged parts were backed by painted spares in the truck so the machine need never show its face with a scratch or smudge on it.

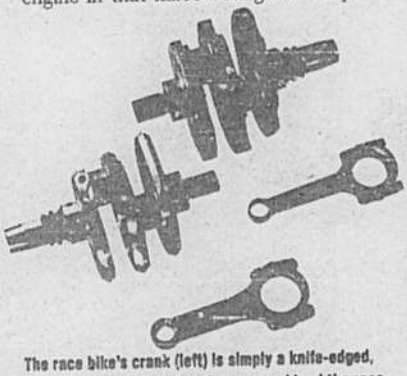
Two Brothers Racing brought three engines to Atlanta, but all broke in practice—Kevin's, the spare, and the one from Craig's bike. After running-in an engine, Kevin would gas it up, tantalizingly equal his best Ducati lap times from a year ago, and the engine would blow on the next lap.

Now racing irrationally asserted itself over all else. With the championship slipping out of reach after two races that had netted zero points, these people suddenly wanted very much to win it.

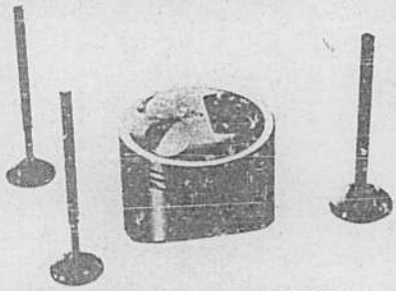
The curious thing about the Atlanta failures was that, although there were substantial differences in the tune of the three engines, all had failed in the same way—by the rear cylinder's exhaust valve contacting the piston, hard. Valves touch for several possible reasons. First, the valves could be floating—rising off the cam contour. This was unlikely because it was the exhaust valve, and only on the rear cylinder. At the moment of closest piston approach, the exhaust is on its deceleration ramp, slowing for the seat—an unlikely place for float. Second, the inertia forces of stopping the pistons at TDC could be stretching the rods or deflecting the crank enough to make contact—but then, why was it always the rear-cylinder exhaust valve that touched? Finally, something could be dynamically altering the phase between crank and cam, allowing the cam to lag behind the crank, keeping the exhaust valve open longer as the piston came to meet it.

They studied the cam drives and the tensioner shoes used to prevent vibration of the camchain, and decided the rear tensioner needed help. This was the pivotal improvement; after this work, the valve train became stable—all the way to 12,000 rpm. Apparently, the camchain had been rapidly cycling from tension to slack sides of the drive, flexing the tensioner enough to put the rear cylinder's exhaust valve in the way of something big.

At this point, Velasco's basic preparation was vindicated, and the bike began to work well. Peak torque appeared down at 7000 rpm, and decreased slowly up to 11,500 rpm. Although there are alternate, closer gearbox ratios made for the Japanese-market 400 Hawk, Erion says they are irrelevant in view of this wide torque band. Close ratios are useful on engines whose torque and power peaks are close to each other, for they keep the engine in that narrow range. If torque is the same everywhere, close ratios don't help. This engine's torque curve closely matches that of a 750 twin dirt-tracker—either a Harley or a Honda. A small-bore intake system provides peak flow at low rpm, which diminishes slowly with rising revs. The pipe, with its long megaphone, saves the engine from positive return waves that would chop off the powerband early. Such torque characteristics are ideal for an inexperienced racer, for it gives good acceleration as long as the engine is in more or less the right gear. There is no "sweet spot" on which the rider must keep the tach needle hovering by ceaseless and precise shifting. Despite the wide power, there is no advantage on top: The Hawk pulled everything in its class at Elkhart Lake, Wisconsin, where there is room to see who has the power.



The race bike's crank (left) is simply a knife-edged, slightly lightened stocker. Crower machined the race rods (bottom) from titanium.



Wiseco pistons help bump compression to about 12:1. Titanium valves are 1mm bigger than stock's.

PHOTO BY JOHN FLORY

Race Hawk poised for liftoff at Mid-Ohio last year.

How does the bike work? "I can't think of an easier bike for a beginner to get on and race," says Kevin Erion. This is partly because of its spacious, dirt-tracker torque curve, and partly, I suspect, because of its chassis stiffness. These traits make it easier to recover from a mistake in midcorner than with less-rigid designs.

Two Brothers Racing has strengths other than just riding and preparation, however: They understand public relations. Once their unusual machine began to win races and everyone's eyes were upon it, a tide of rumor naturally rose around the team. Are the Erions collec-

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tive masters of the psych, or did the other riders in the class psych themselves out? You can decide for yourself.

"It's a black operation run straight out of Honda R&D. Cost is no object. There's no way to beat those guys," grumbled some riders.

"They've already spent a quarter-mil on that thing and the season isn't even half over yet. They've got cases of titanium rods up in their truck, I've seen 'em," groused others.

Still other riders were bothered by the apparently seamless excellence that suddenly confronted them in ProTwins Modified. After another Erion win, one competitor whipped out a magnet and tried to stick it to the parts that would be steel on a stock Hawk, shouting, "Everything on that bike is made out of something it shouldn't be!" Believing that the rule book prohibited many of the Erions' modifications, several Mod riders were now permanently upset.

The Erions met it all with bland good nature, denying any official tie with Honda, denying even that they had spent much of anyone's money on their bike. Just a fun little project we cooked up out of odds and ends. It's agreeable to be the center of attention in your chosen sport, and pleasant to be considered a mystery. They played it to the hilt. The bike looked and performed like a factory racer. It bristled with parts not found in catalogs. An ex-Honda factory mechanic (in a Team Honda shirt, yet!) was working on the project. Other riders felt that ProTwins Modified—traditionally a bastion of low-bucks racing—was not the place for a factory team, or even for a reasonable facsimile.

At their first National win—at Loudon—a track groupie named Erion "The Hawkman." Brian Fuchida (of Honda racing parts service) drew a cartoon, showing a black-gloved fist with a hawk perched upon it, and this became the basis of Mick Ofield's amusing series of Hawkman cartoons that have appeared in magazines—advertisements for Hawk racing parts offered for sale by Velasco. The subject of those cartoons? The hopeless struggle of "ducks" versus hawks.

The Erions arrived for the Mid-Ohio National towing their rig behind a giant (but borrowed) Bluebird motorhome. As we've noted, these fellows like to do things in fine style. It's part of the fun. For this race, they had built a special engine; instead of the modest 3mm overbore of their 700, this unit had an 88mm bore for 802cc displacement. Tension now reached the yield point. Ad hoc committees of ProTwins Mod riders consulted among themselves about what action to take, rule books in hand. First came a prerace visual protest of the Two Brothers' streamlining height, and they cheerfully agreed to cut the offending inch off the bottom of their half-fairing. After Kevin had won the final (cracking a crankshaft in the process), a formal protest was filed,

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based upon the widespread belief that titanium parts were used in the engine. (The AMA rule book says, page 20, paragraph 3, section (a), subsection 1a, "The engine must be of the same basic design and materials as on the original model. The maker's original crankcase, cylinder(s), and head(s) must be used.") Kevin Erion signed a declaration that there were indeed titanium parts in his engine, remarking affably that he had never attempted to conceal their use in the first place. His interpretation of subsection 1a was that crankcases, cylinders and heads had to have the same basic design and materials, but that valves and con rods did not. Nevertheless, the protest was upheld. The Erions were unruffled.

Next, the case went to an AMA appeals board, and was reversed on the basis of imprecise rule-book wording. Erion's Mid-Ohio win was reinstated. Tempers flared, but none of them was an Erion temper. Throughout all these proceedings, the Erions spoke calmly, in complete sentences, and in a maddeningly even, non-argumentative tone. Then they put steel parts in their engine and won the next race as well. Turning the other cheek is not always done out of saintliness of spirit, but in knowledge that nothing is more frustrating than an opponent so confident that he refuses to fight.

The season outcome? Perseverance through technical and political difficulties had its reward, and Kevin Erion won himself another ProTwins Modified championship. Because of widespread rider dissatisfaction, the AMA overhauled the Modified class rules for 1990, making it in effect now a 750 GP class with a 360-pound weight limit, with no materials specifications at all—precise or otherwise. What was called ProTwins GP in 1989 will become GP1 in 1990, and the restructured Modified class will be called GP2. Both will run together, instead of as two separate races.

What comes next for Two Brothers Racing? Kevin says he would like to try the Hawk in GP1 next year, having finished high in that class already. Or, to find a steeper hill to climb, he might like to try Superbike. On a limited budget, of course.

How good is their little Hawk engine? Good question. The Erions—cooperative fellows that they are—supplied us with a dyno chart (the Kerker dyno, a Schenck machine) showing flat torque, but a peak of only 73 horsepower. Dale Newton's ex-factory TT-F1 is representative of Ducati 750 potential, and on the Axtell dyno it generated 83-86 horsepower. Even a streetable Ducati 750 Montjuich recorded 75 horsepower in a test on a Schenck dyno by the Italian *Moto Sprint* magazine. Yet the Erion Hawk clearly pulled away from such Ducatis, race after race. Is it a weight difference?

Although stock Ducatis weigh about 360 pounds dry, a race-prepared version might weigh as little as 325, while Erion's Hawk, without gas, is 308. This is not enough weight difference to produce what we see on the track. Another of the Hawk racers active in 1989—that of Massachusetts rider Ed Abdo—produced 84-88 horsepower on the C&H Superflow

dyno. This is believable.

The horsepower of an unsupercharged engine depends mainly on two variables: combustion pressure and rpm. The practical limit to combustion pressure is imposed by our atmosphere, which can only cram a cylinder so full. The practical limit to rpm is set by stresses on pistons, rings, and con rods, of which a good measure is piston speed. Piston speed equals stroke, times two, times rpm, so stroke length gives some clue to an engine's power potential. A conservative figure for racing piston speed is 4000 feet per minute, but many engines run beyond this—detail design permitting. In the early eighties, Honda ran its 1025cc air-cooled Superbike engines to 4700 fpm, and drag-race engines regularly run briefly beyond 5500 fpm. The Hawk engine reaches 4000 fpm at 9200 rpm, and 4700 fpm up at 10,850.

A useful figure of merit in comparing engines is the brake mean effective pressure—the bmep. This is combustion pressure averaged over the power stroke. A rough relationship is this: horsepower = (displacement in cubic inches x rpm x bmep) divided by 793,000. A low-performance auto engine might achieve 125 psi bmep, a middling-level street bike engine hits 150 psi, and a sharp street engine often comes to the 155 psi level. Racing engines tend to cluster around 175 psi in early development, and can be pushed on toward 190-200 psi. With this in mind, look at the dyno chart of the Erion Hawk with consideration to bmep. At 11,000, power is 73 horsepower, so bmep must be about 124 psi. This is very weak—not plausible in a racing engine. Let's look down at the torque peak, where bmep reaches a maximum. Fifty-seven horsepower at 7000 translates to 152 psi bmep—again, a figure incompatible with reasonable expectation. What is a reasonable expectation? Start with a 4000 foot-per-minute piston speed—9200 rpm—and combine that with 175 psi bmep to get 87 horsepower. This is more like it. Jack the revs a bit to get in line with the Erions' proven ability to keep the valves under control at speed, and you have a potent recipe for pulling away from Ducatis and the other Hawk opposition.

What's true and what's not? Are the Ducati figures, and those for the other Hawk, all wildly optimistic? Did the Erions give us a tongue-in-cheek dyno sheet? The power of their engine remains demurely cloaked in the mystery that has attended this enterprise. Here again, the effective public relations skills of the Erions shine forth; a good mystery keeps our interest. Every other tuning enterprise pushes wild horsepower overstatement—perhaps it amuses the Erions to go the other way.

The next time you're at the AMA races, fall by the Two Brothers garage area and ask some leading questions; you'll be answered reassuringly, plausibly, and at length, but you'll go away not entirely sure you know much more than when you arrived. That's OK. The same thing happens when you talk to factory racing team managers: They are genial, even talkative, but you get more words than answers. That's their job, and they're good at it. Everyone in racing aspires to factory level, and very few reach it—technically, in riding skills, or in public relations. The Erions are better at it than most, and that mystifies and baffles their competitors. Are they factory, or are they just playing at it harder than the rest of us? Ask them. ■