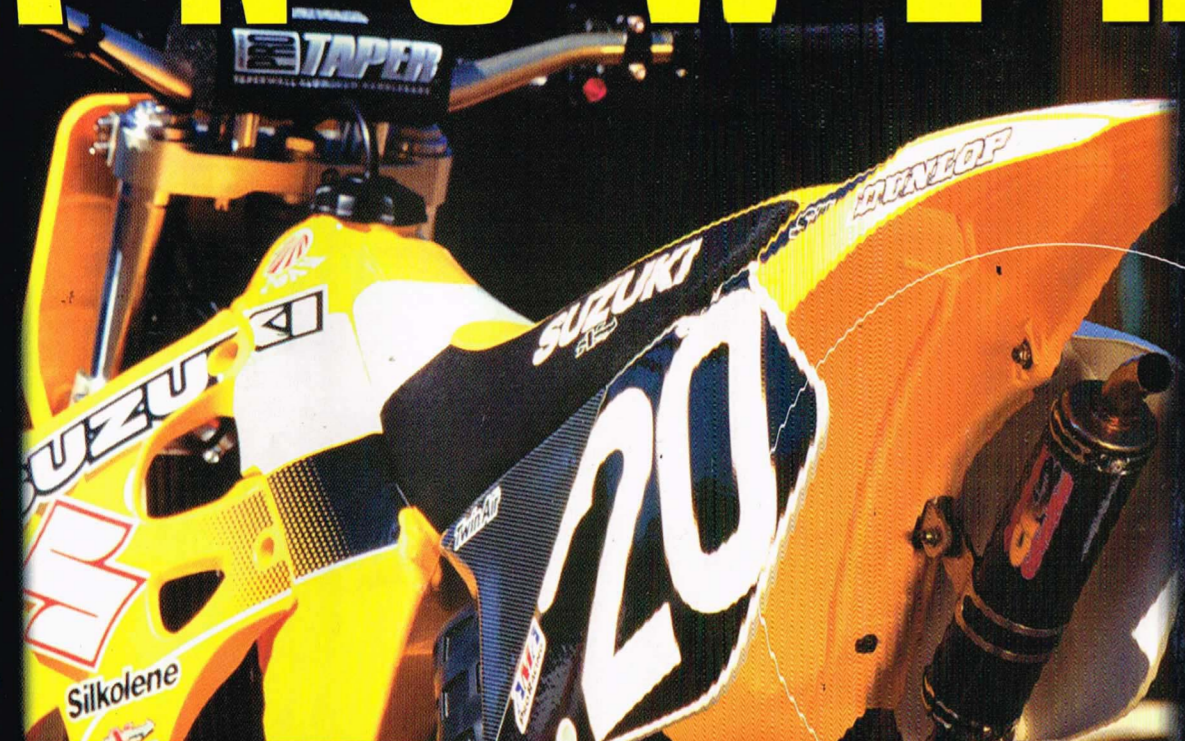
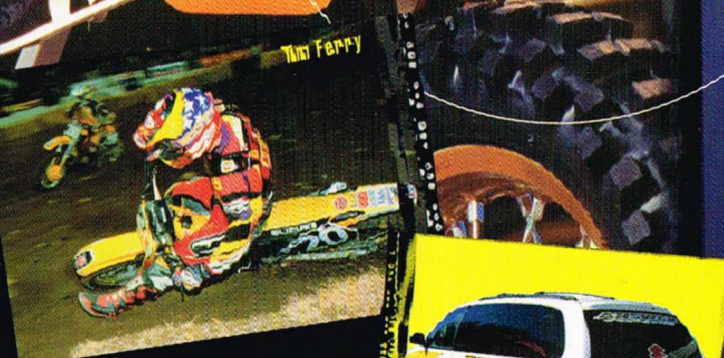


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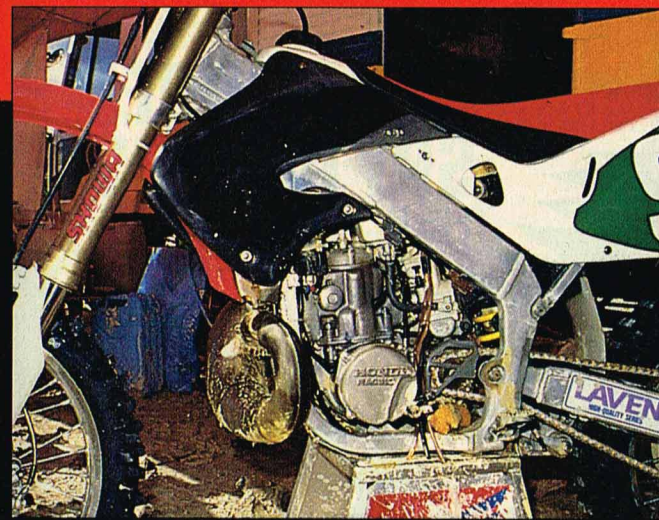


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ON THE COVER: Brian Deegan roasts his boss' YZ through a Daniel Boone MX Park berm. Then he got to ride all of his teammates' Chaparral supercross bikes, and so did we. Next, we rode Honda's most expensive works bike, the EXP-2, but we got short people to ride the 80s (oh, to be young). It was a good month, anyway. Photos by Ron & Tim.



HONDA EXP-2

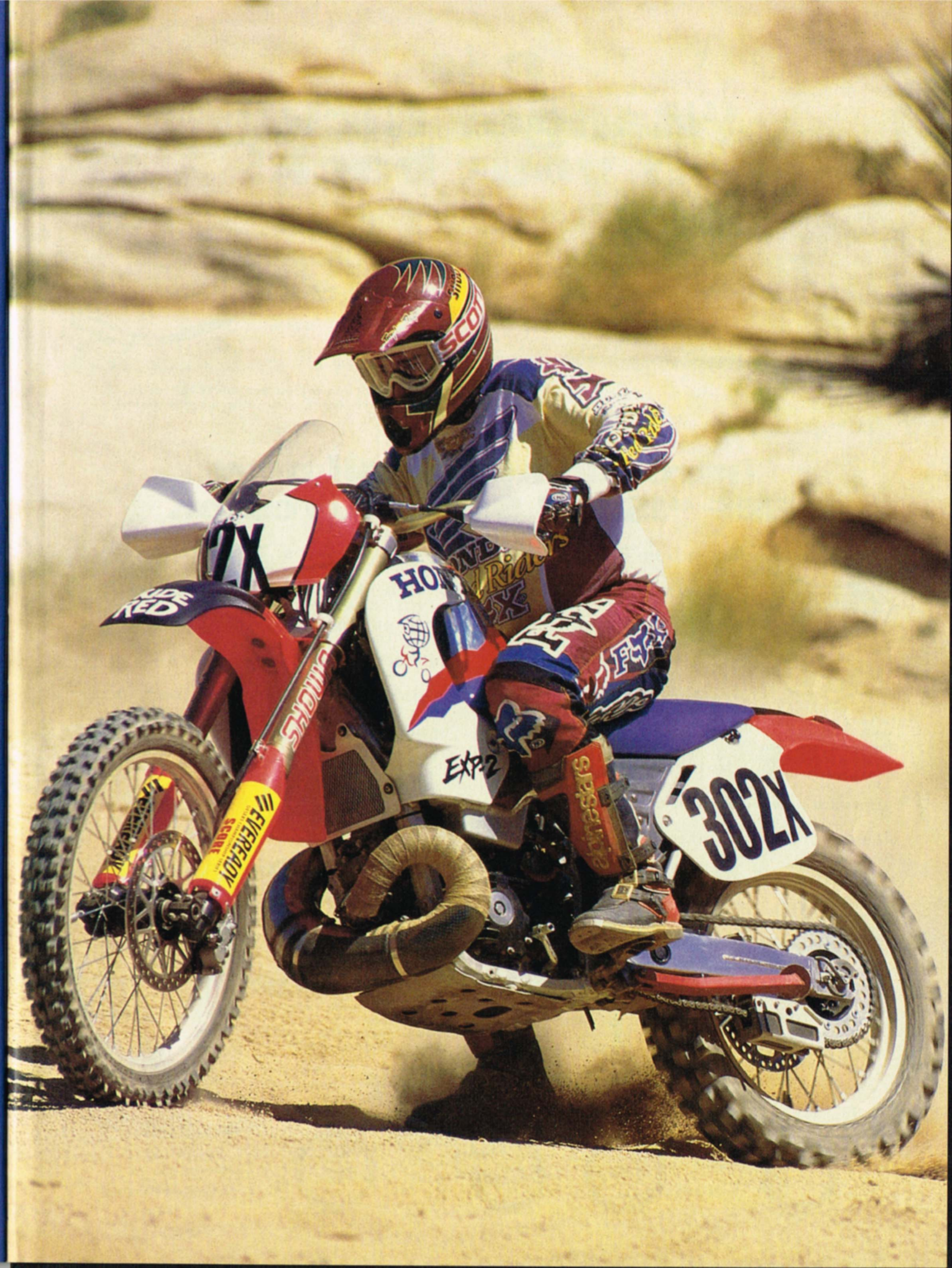
Putting ON pollution equipment for better performance

By the highly emissions-conscious staff of DIRT BIKE

The two-stroke is saved. Honda has built the bike that is going to do it. The new low-emissions two-stroke does not use lean carburetion or systems to treat the dirty exhaust. It produces less pollution because it uses Activated Radical Combustion, an entirely different combustion process that generates less pollutants. And get this: the new engine outperforms current two-strokes in some respects! We know because we rode a dirt bike with the new engine. Hey, how's

that for . . . oh, you didn't know the two-stroke needed saving?
Let's back up a bit. The California Air Resources Board may impose strict new emissions regulations as early as '97 that will apply to bikes sold for off-road use. At the moment, closed-course machines (motocross models) are not affected by the regulations. The problem is, current two-stroke engines cannot meet the new standards. Emissions police won't hunt you down and take away any two-strokes you have, but manufacturers would be prohibited from selling machines that do not comply. This isn't just a problem for

Californians. The rest of the U.S., and to some extent the world, usually follows California's lead with regard to emissions regulations.
The whole thing seemed pretty horrifying for a while. There was no answer. Well, there are four-strokes, but what good are they if you really want a two-stroke? Then the Honda EXP-2 low-emissions two-stroke came along. A flood of relief, joy and excitement poured through the *Dirt Bike* offices. The bulbous rally-tanked Honda generated more hope than a cruise ship passing near Gilligan's Island. Everybody but Rondo wondered how Honda did it. Everybody wanted to ride it.



Get "Ranger Rick" off your back!



The "ISDE" spark arrester with "TDS" not only looks like an ordinary silencer but performs like one too!

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arrester designs. This new compact design is nearly identical in size and performance to our standard silencer and it will give you a lot more maintenance free rides than other spark arrestors.

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EXP-2

TURNING BLUE SMOKE GREEN

If you had lunch with Mr. Know-It-All as often as we have, you would know that conventional two-strokes are an emissions nightmare because they don't burn much of the fuel they draw in. They send it out the exhaust. Part of the reason two-strokes are so sloppy with fuel is the odd but necessary situation of the exhaust port being open while the cylinder is being filled with a fresh charge. Misfiring is the other problem, especially under light loads. It happens because two-strokes use the incoming fresh charge to push out the burned charge. Light loads and moderate engine speeds don't get things moving well enough to prevent the fresh charge from being mixed with unburnable exhaust. That's why conventional two-strokes run and respond erratically unless they are working against a significant load. The two-stroke's wasteful ways with fuel don't just create emission problems, they make for poor fuel mileage as well.

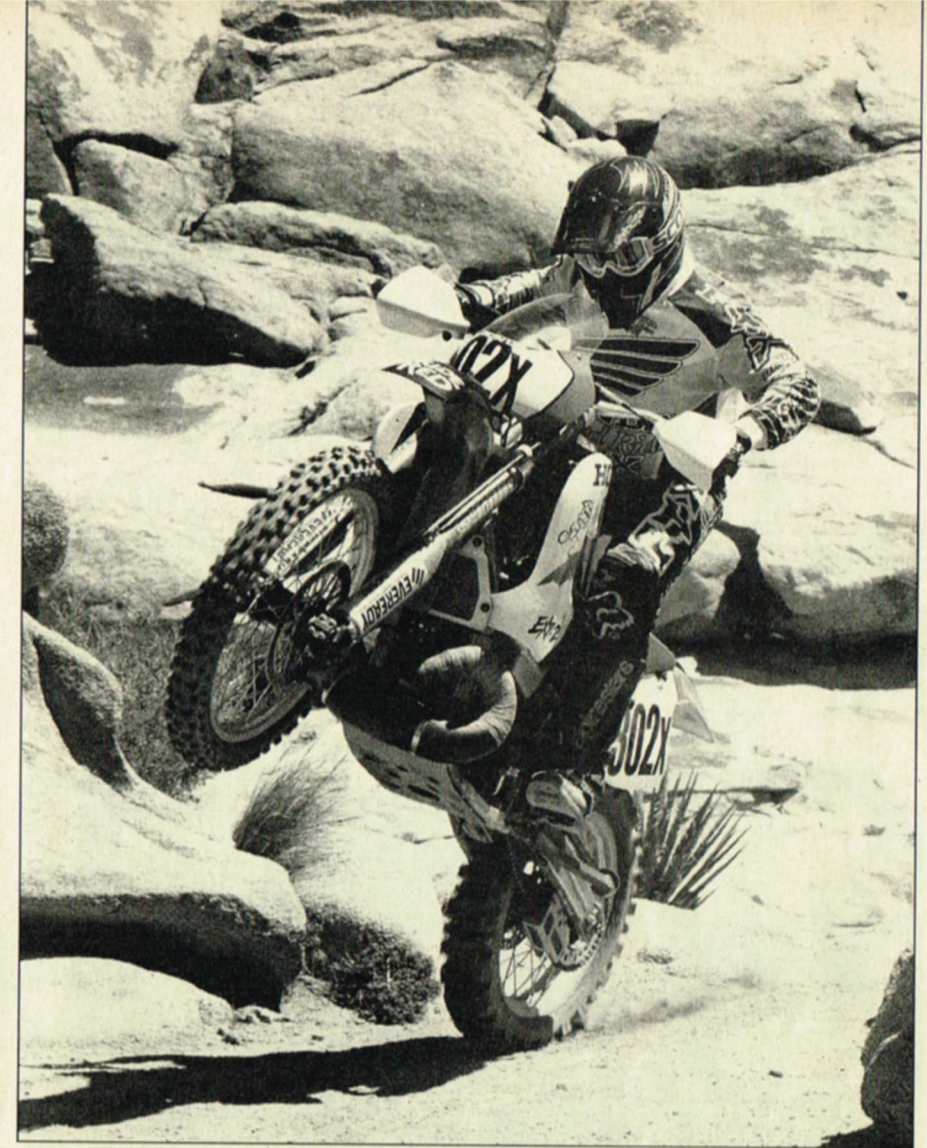
Despite Honda's strong attachment to the four-stroke engine, the two-stroke's benefits are so great that the company decided it was well worth it to make it work. Honda found that existing low-emissions two-stroke technology was pretty lame. Conventional two-strokes don't like super-lean mixtures. Catalytic converters are generally bulky, heavy and expensive and don't truly solve the emissions problems. They don't do a thing about the poor response or poor fuel economy, either. Other experimental low-emissions two-stroke engine designs employ unrealistically costly, complex gasoline injection and (brace yourself, two-stroke fans) even valves!

Honda wanted a solution that took care of the emissions, response and fuel consumption problems that *didn't* spoil the two-stroke's cost, weight, simplicity and power advantages. After considerable testing, Activated Radical Combustion produced the desired results.

BRING YOUR DIRT BIKE TO CHEMISTRY CLASS

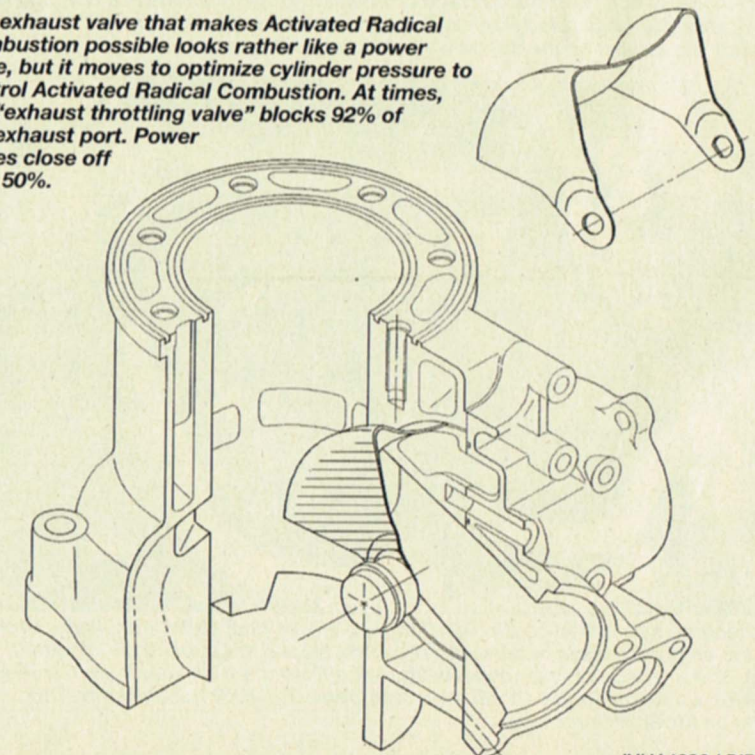
Activated Radical Combustion sounds like something an advertising agency would dream up, but the name describes the Honda combustion process in accurate, scientific terms. The process itself is really not new. Managing it and making it truly work in a high-performance dirt bike engine is.

Activated radical combustion takes place in a two-stroke whenever a partially burned charge comes in contact with a fresh charge at certain throttle openings and engine speeds. Many dirt bikers have seen examples of Activated Radical Combustion. It's what takes place in most engines that mysteriously run on, even when their ignitions are killed. What is happening is not "dieseling." It's a complex reaction caused by the highly reac-

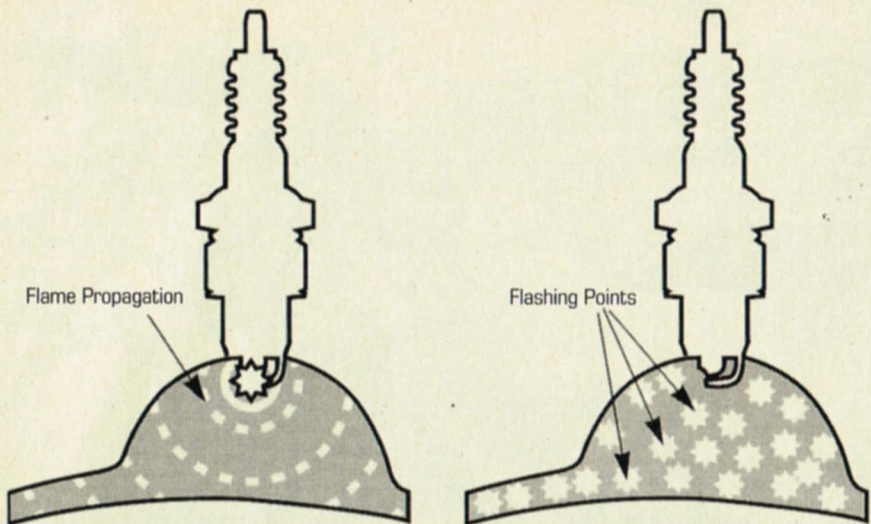


Honda feels that the EXP-2's impressive finishes in the Granada-Dakar Rally, the Baja 1000, Vegas-to-Reno and the Nevada Rally prove that Activated Radical Combustion works in real-world applications and that an engine equipped with it can handle unreal abuse. The testing regimen is lightweight by DIRT BIKE standards, but the results certainly say something.

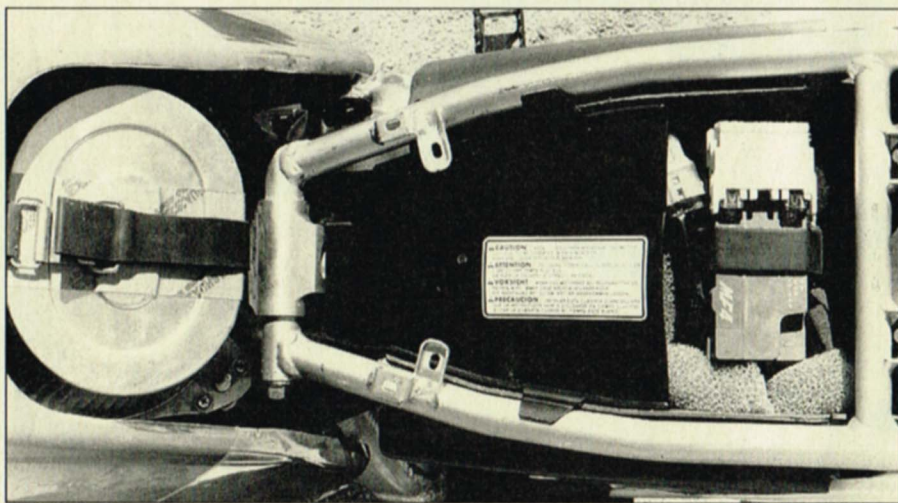
The exhaust valve that makes Activated Radical Combustion possible looks rather like a power valve, but it moves to optimize cylinder pressure to control Activated Radical Combustion. At times, the "exhaust throttling valve" blocks 92% of the exhaust port. Power valves close off only 50%.



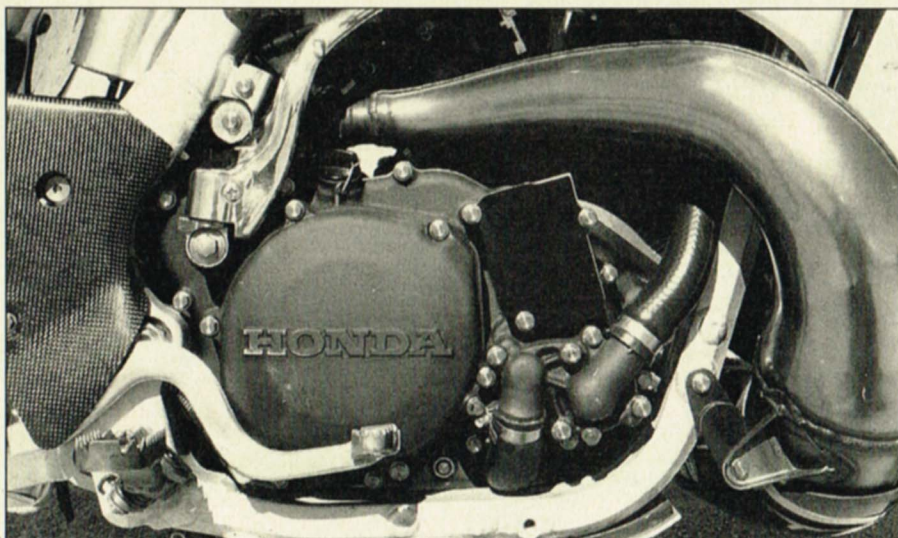
EXP-2



Activated Radical Combustion ignites the fuel-air charge at the molecular level, not from a single point as with spark ignition. Combustion is faster and more complete than in a conventional engine.



The complexity and expense of Honda's half-million-dollar EXP-2, with its computer-controlled electronic fuel injection and electrically operated exhaust valve, is enough to scare the motocross socks off the average dirt biker, but the machine is a test bed for affordable, carbureted Activated Radical Combustion bikes. The battery and the computers occupy the airbox, so the airbox was moved into the tank.



The EXP-2 engine was based on the CRM250 two-stroke dual sport, but almost everything but the engine cases is handmade. The plate blocks the unused oil-injection pump inlet. The mysterious engine steals attention from the trick aluminum frame and the numerous works parts, like the titanium footpegs. The EXP has the same fork Honda puts on McGrath's race bike.

tive intermediate molecules (active radicals) left over by a previous ignition, not the direct result of heat or pressure. Because combustion initiated by active radicals starts at the molecular level, it "lights" the charge from trillions of points, rather than at a spark plug way over on one end of the combustion chamber. Because the charge literally lights from within itself, it is burned extremely quickly and uniformly. Power is generated efficiently and far less combustion heat is transferred to engine parts.

Using little more than an exhaust valve (to limit the escape of radical-rich exhaust) coordinated with the throttle, Honda has devised a system that initiates, times and sustains this bizarre combustion process in the light-load range where it is most needed. Full-time conventional spark ignition takes care of starting and any speed range where Activated Radical Combustion isn't practical or desirable. For strong full-throttle performance, for example, the exhaust-restricting valve must be fully open, so spark ignition does the job.

Honda's roost-throwing, knobby-tired, rolling laboratory for the concept is the EXP-2 ("experimental two-stroke") dirt bike. It is frighteningly complex with its computer-controlled electronic fuel injection and the electrically operated exhaust valve, but Honda assured us that the electronics are only there to simplify testing, adjustment and data recording. Once the "answer book" of throttle position-to-exhaust valve ranges and other parameters for controlling the Activated Radical Combustion process is complete, simple, affordable versions using carburetors and mechanical exhaust valves will be practical.

RIDING INTO THE FUTURE

So, what is it like to ride? It's weird, but even the most normal rally bikes are weird. Huge tanks, 115-mph gearing and roadrace-top-end engine tuning isn't the county-fair-winning recipe for a fun, responsive dirt bike. As a result, the 402cc EXP-2 doesn't feel as crisp or strong as a CR250 in the midrange. The bottom-end power is like a two-stroke twin: lazy, smooth and even with almost no engine vibration. A half-million-dollar bike with a counterbalancer-equipped engine should be smooth. It did have an eerily clean, even pull from idle to well past 100 mph, with real muscle way on top and no end in sight to the revs. It also makes sounds like a miniature Cummins Turbo Diesel at certain midrange throttle positions. No amount of putting around could make the exhaust outlet wet or even dark black. After riding it for a while in varying conditions, you start to realize that a normal 400 two-stroke ported and geared like the EXP-2 would be a disaster. If this is what two-strokes will become, there is something to look forward to. □

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