MAY 1983 • $1.50

# Cycle

## Suzuki GR650D
Reviving & Remaking
The Big Vertical Twin

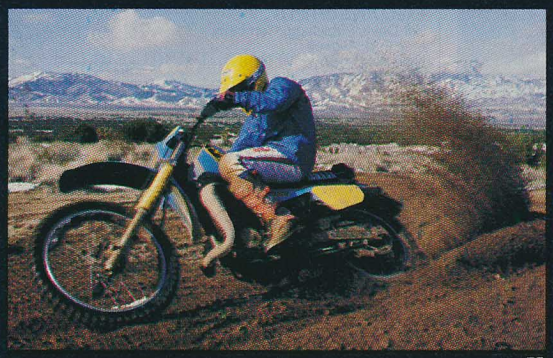
# Honda V45 Interceptor
## It's High-Tech Triumphant!


## Yamaha IT490K
Newest Monocross,
Biggest Engine Yet

## Superbike Interceptor Technical Analysis
The 750 Racer
Built To Win
At Any Cost

Cycle®

May 1983 Volume XXXIV No. 5



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*This Month's Puzzle:*
Refer to the cover photographs supplied by Dave Hawkins, observe the details and select the best bargain:
A) Honda Interceptor ($3498)
B) Honda Racer ($GULP!)
C) HawkEye Hawkins (The bill's in the mail)
D) Model T.W. ("Just buy me lunch") Wolff
F) All of the Above
For the correct answer, see the road test on page 40.



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## ROAD TESTS



## SHORTS



## FEATURES

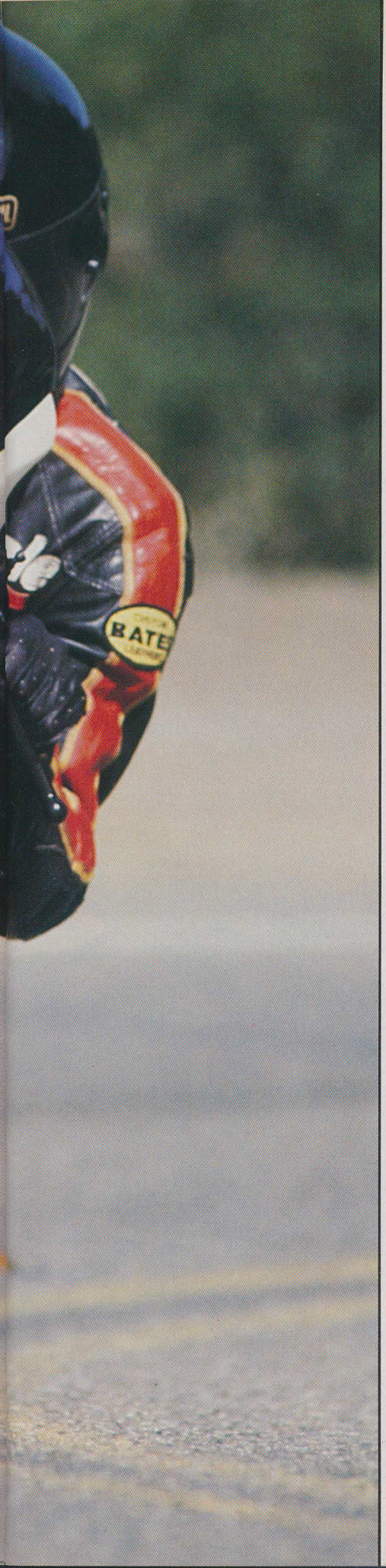


## TECHNICAL



## DEPARTMENTS


HONDA



# HONDA V45 INTERCEPTOR

*The Interceptor is the strongest 750 built and the best-handling bike we've ever tested. And even though you'd probably surrender versatility and comfort for all that, the good news is you don't have to.*

□ There's nothing like perfect teamwork. You see it most often in sports—an exquisitely timed pass completion good for 70 yards, a two-on-two fast break to a thunderous slam dunk, a doubles team that fires back tennis balls like a backboard. If you're lucky, you've been part of this kind of teamwork. Work long enough with a partner and you sometimes develop a sixth sense about each other; you make moves that coincide so perfectly you seem to be reading each other's minds.

The Honda Interceptor is this kind of partner. As a sport bike it's nearly perfect—always there, more than ready, anticipating your every move. When it's time for hard charging the VF750F excels in every area: engine performance, steering, suspension action, ground clearance, brakes and tires. But this is not to say the Interceptor is a petulant, narrow-purpose machine demanding concession after concession from the rider. Rather, the Honda's riding position is one of the best available, engine vibration is supremely well controlled, and a wide range of suspension adjustability allows for a surprisingly comfortable freeway or sporting ride.

The Interceptor can do it all. All-day rides and extended trips are a pleasure, not an endurance test. And the VF makes a wonderful profiler's platform; pull up to your favorite Sunday haunt and you'll likely draw a crowd. Then use your weekend flash-bike as an honest workaday commuter; the V45 does yeoman labor willingly, boasting all the reliability and features we've come to expect of Honda machinery. Still, the Interceptor is at heart a sport bike—and, in this application, second to none.

The VF750F handles as well as any bike we've tried to date, and its superb steering is its greatest asset. The agility that the 16-inch front wheel gives successfully masks the Interceptor's size. With a wheelbase of 58.9 inches and a curb weight of 549 pounds, the V45 is neither light nor small for a 750, but like the Suzuki XN85 Turbo, also shod with a 16-inch front wheel, the VF steers and feels like a lightweight while lacking the twitchiness and nervousness associated with small machines. Although the Honda's steering isn't quite as light or quick as the XN's, the Interceptor offers slightly more stability. Some staffers prefer the Suzuki's traits and some favor the VF's, but everyone enthusiastically endorses either bike's steering characteristics over those of any bike with a standard 18- or 19-inch front wheel.

PHOTOGRAPHY: DAVE HAWKINS, STEVE BROADDUS

## HONDA V45 INTERCEPTOR

On tight, twisty mountain roads the Honda does everything you ask of it; flick it from side to side, up hills or down, with the brakes on or off, and it responds willingly, instantly and precisely. Want to change lines halfway through a corner? Go ahead; nothing upsets the V45. The Honda inspires great rider confidence, confidence that is well founded.

We loved the Suzuki XN85's steering traits, but its limited ground clearance checked frisky riding. Moreover, we feared the problem might be common to all bikes with 16-inch wheels. The Interceptor allayed that fear; the VF750F offers more ground clearance than any other street bike commonly available, which is to say, *a lot*. We really had to work just to nick the footpegs and centerstand feet. We also scraped the exhaust pipe on the right side, but only after getting both ends sliding—certainly not recommended practice for the street.

Should you trespass the limits of prudence and traction, the tires won't let you down. Our VF750 wore new Bridgestones, plenty wide and plenty sticky. Our Honda contacts tell us that some Interceptors will come shod with Dunlops, but we can't pass judgment on these tires till we ride the 750 with them. The Bridgestones, however, are

very good; the front end pushes a bit when you really press the bike, and the rear end eases out slightly if you crank in a handful of throttle while leaned over exiting a corner. But both ends slide in a readable, predictable manner, keeping the drama to a minimum. You'd be better off performing such stunts on a track, and in any case you'll pay for such heroics with extremely rapid tire wear.

The wide tires also enhance the Interceptor's considerable stopping ability. At the front, the dual-disc brake is excellent; it offers plenty of feel and power, requiring only modest lever pressure. The single disc rear also offers plenty of power, but some staffers would prefer greater feedback through the pedal.

The left fork leg holds Honda's TRAC anti-dive valving system, offering four levels of anti-dive effect; we set ours on the number four (stiffest) position. As a whole, the V45's braking system is nearly the best setup (except for the Bimota KB2) this side of a road racer. The front binder is so powerful that under full-tilt braking you can get the rear end light and start the rear wheel hopping. Meanwhile, the TRAC system works to keep the VF's steering attitude and ground clearance relatively consistent, eliminating a few more handling variables.

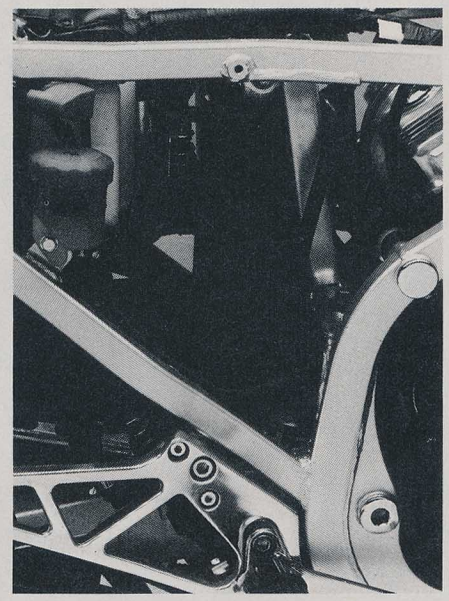
The right fork leg houses a three-way

adjustable rebound damping system; set on number two, the system offers twice as much damping force as on the number one setting, while number three is three times stiffer. The compression damping rate in the left leg is almost twice as heavy as the right side's, and an interconnecting air system provides adjustable springing. To keep all these various forces working in harmony, Honda tied the fork tubes together with a sturdy brace integrated into the front fender. This, along with 39mm fork tubes (two millimeters larger than the V45 Sabre/Magna units), ensures a rigid front end with state-of-the-art adjustability.

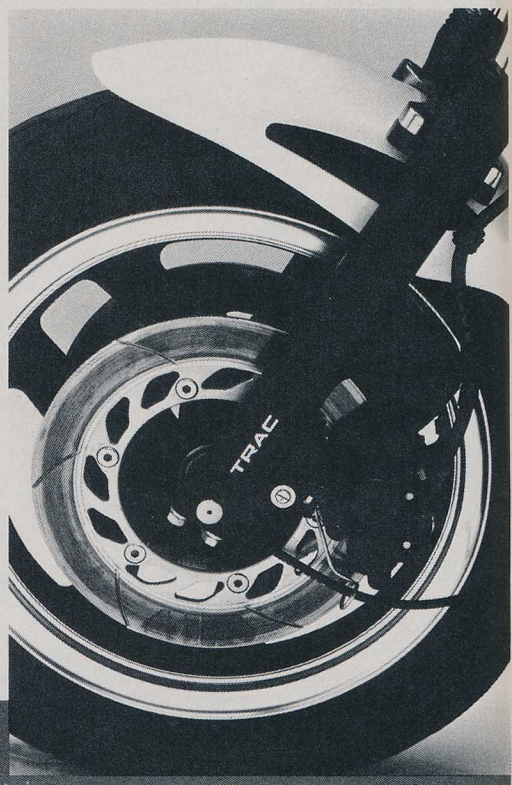
The Interceptor's Pro-Link suspension is similar but not identical to the Sabre's rear end. Like the Sabre, the VF750F uses air-assisted shock springing. The Interceptor's shock, however, offers four rebound damping settings instead of three. The new cast aluminum swing arm and Pro-Link linkage produce a more pronounced rising rate effect which improves freeway comfort without hurting sport performance.

For freeway cruising we set the fork and shock on the lightest damping position, let all the air out of the front end, and kept 10 psi in the shock. This combination yields a supple ride, especially good in light of the Interceptor's go-for-it intent and abilities. The VF effectively damps out a variety of road irregularities, from expansion joint seams to big holes and bumps—not the case with the shaft-drive Sabre. For hard riding we bumped the fork up to 10 psi with the damper on the number two or three position, and we liked the rear end set to number four with 35 pounds of air. Here the fork action is excellent, and the rear end is just a cut below.

We wanted a bit more damping over the initial portion of the shock's rebound stroke, and a stiffer setting corresponding to a number five spot would be more useful than the existing number one setting. This bit of criticism

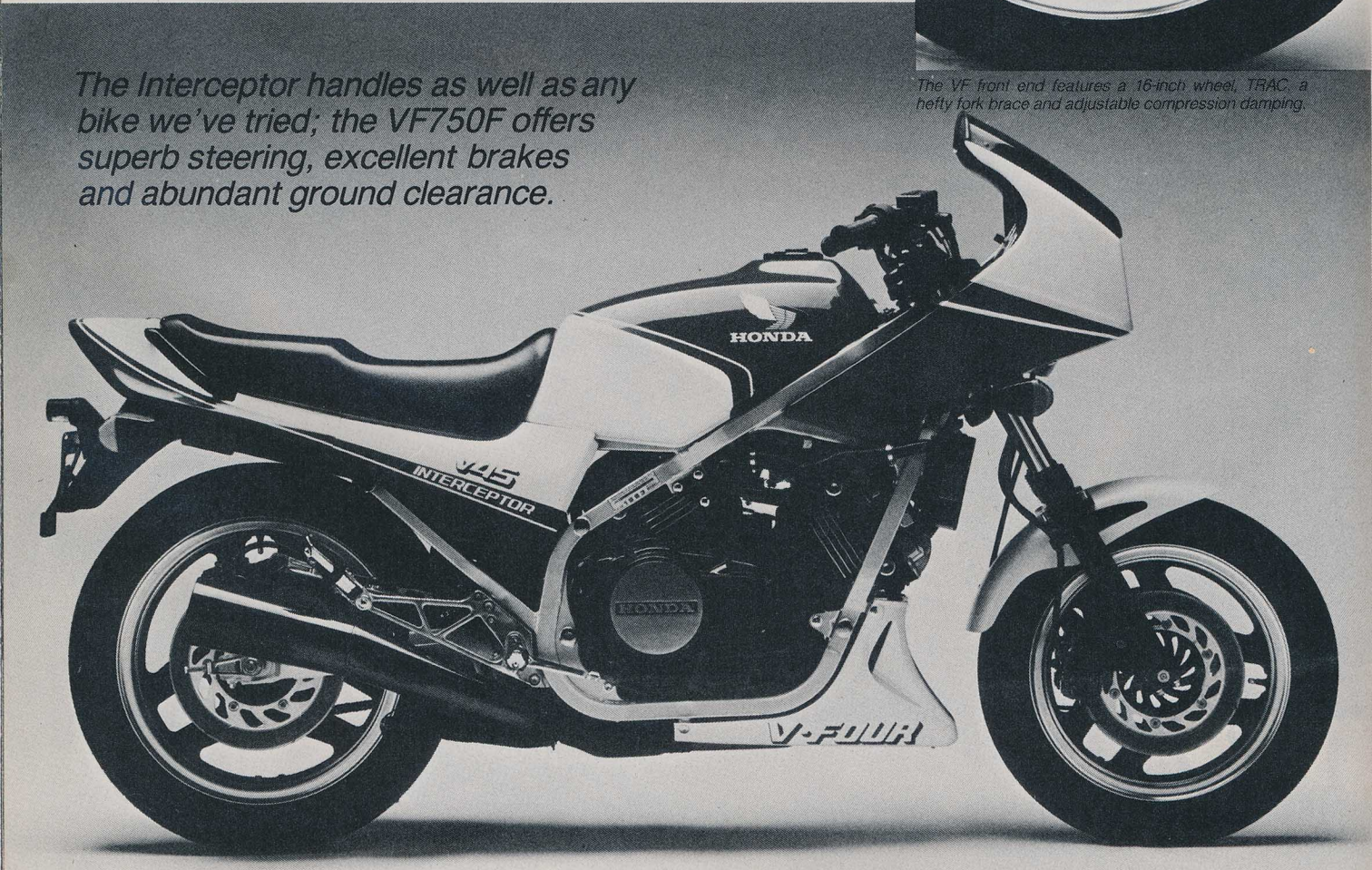


*The single air-adjustable shock mounts vertically in the frame. Rebound damping is four-way adjustable.*




*The VF front end features a 16-inch wheel, TRAC, a hefty fork brace and adjustable compression damping.*

*The Interceptor handles as well as any bike we've tried; the VF750F offers superb steering, excellent brakes and abundant ground clearance.*

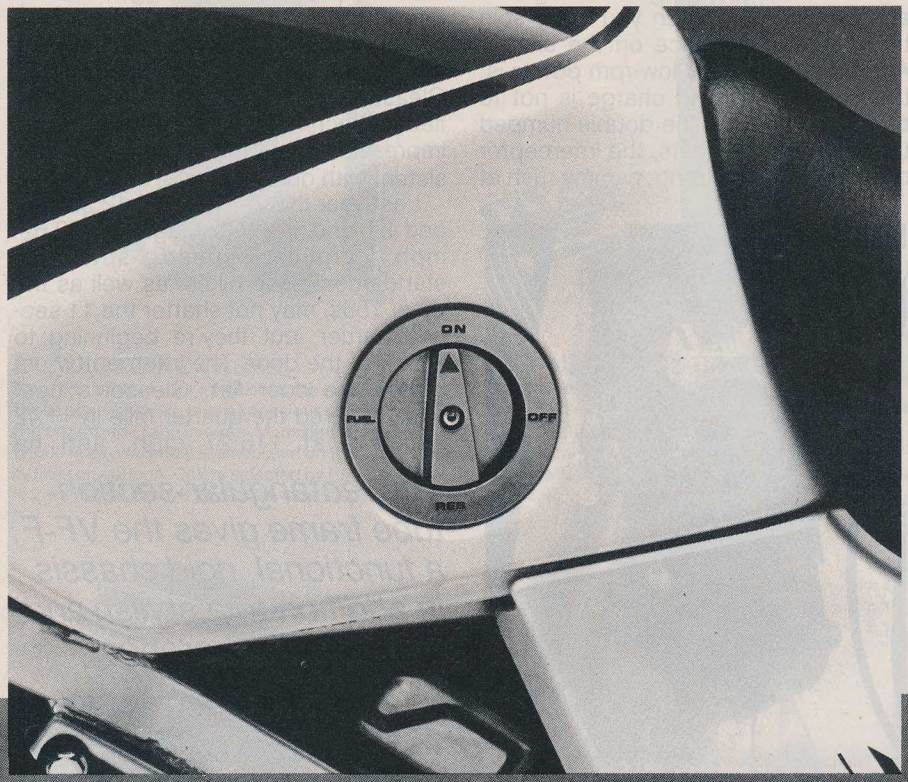


borders on nit-picking, though; as is, the F-model's rear suspension stands far above the norm.

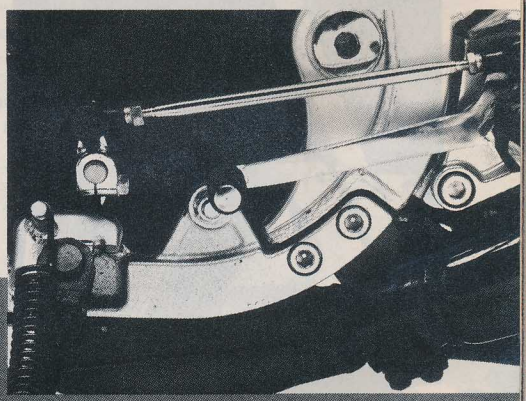
The Interceptor's frame and engine are new items designed to work together in another light too; since new Superbike racing regulations impose strict limitations on frame alterations, the Interceptor had to be ready for the track even in street trim. The frame, made of rectangular-section tube, increases chassis rigidity considerably, and the F-bike's frame dimensions are competition oriented. Its wheelbase is much shorter than the Sabre's (58.9 inches versus 61.5), and its steering head angle dropped from 29.5 degrees to a moderately steep 28.2 degrees. To accomplish these changes, Honda rotated the engine up and backward relative to the engine centerline, letting the tucked-in front wheel clear the front cylinders. This engine shift, along with the move to chain drive, dictated a redesign of the engine case.

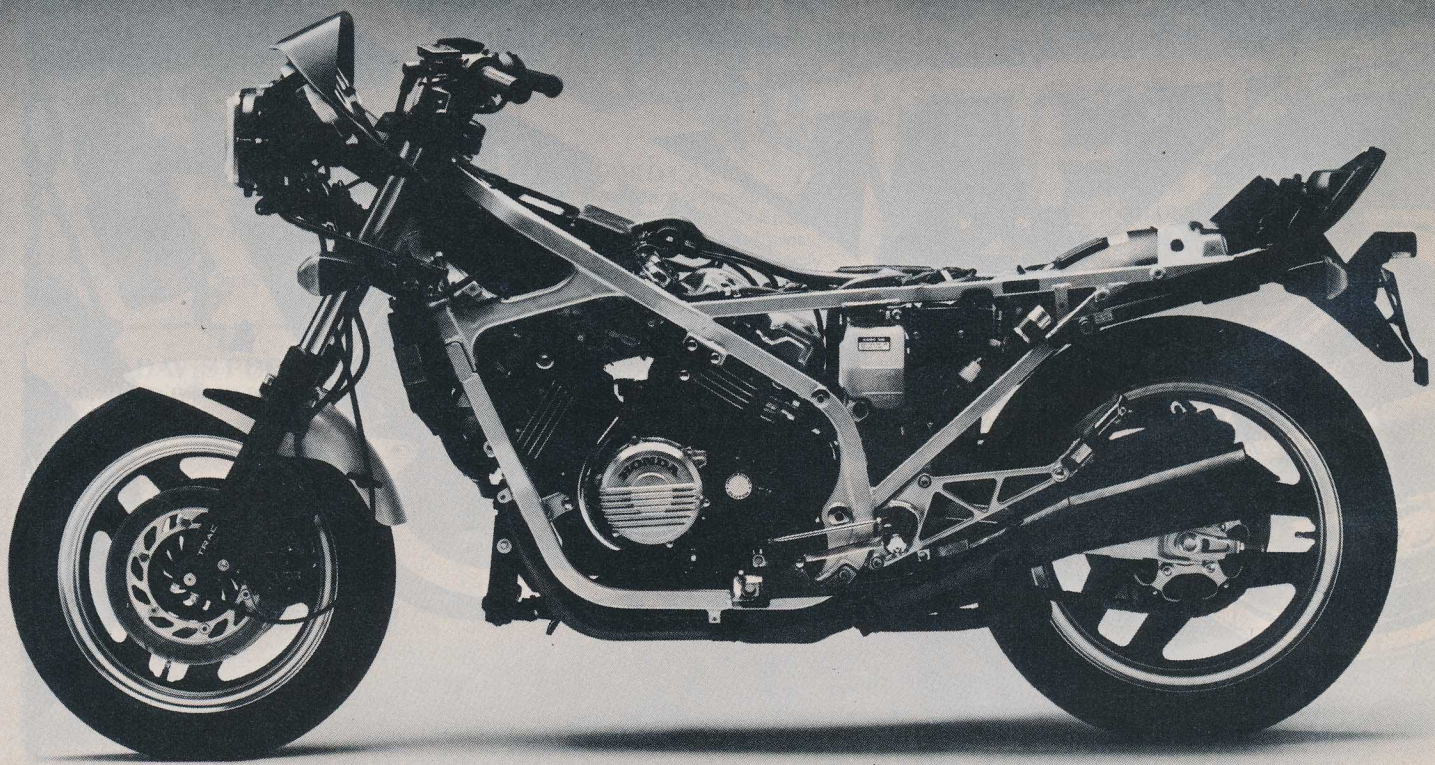
Most of the engine internals, however, remain unchanged. The crank, cams, valves and compression ratio are all identical to the Sabre's. The only performance additions are a slight change in cam timing, a larger airbox and a freer-flowing exhaust system.

From these seemingly insignificant changes comes a surprising power increase. Our Interceptor pumped out a whopping 77.36 peak horsepower, making it far and away the most powerful street 750 we've ever strapped to the dyno. Last year's Sabre 750 and GPz750 both topped out at 65 horsepower, and the one-liter Kawasaki Eddie Lawson Replica barely edges out the Honda at 79.01. Though last year's



*The 750's large fuel petcock, made to look like a racebike quick-fill, is easy to find and operate while riding.*


*The lower loop on the left side of the Interceptor's frame unbolts for easy engine removal and servicing.*



## HONDA V45 INTERCEPTOR

V45 engines were wonderful, the VF750F sets completely new standards for the three-quarter-liter class.

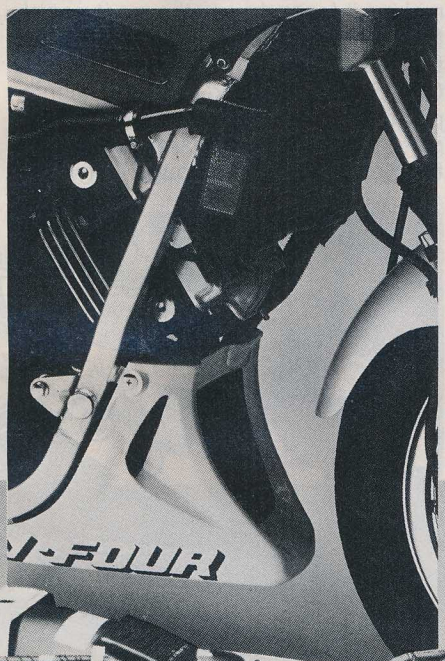
Like last year's V-fours, the Interceptor gains revs with a deceptive quickness, willingness and smoothness; it's easy to violate the 10,500-rpm redline inadvertently because the VF doesn't give the usual warnings—noise, vibration, high-rpm straining. But the Interceptor holds an edge over other 750s in more measurable terms. We conducted roll-on comparisons against the new Suzuki GS750E and the '83 Kawasaki GPz750 with dramatic results. The Honda outpulls the other two bikes in high-rpm contests and absolutely devastates the GS and GPz in low-end and mid-range duels.

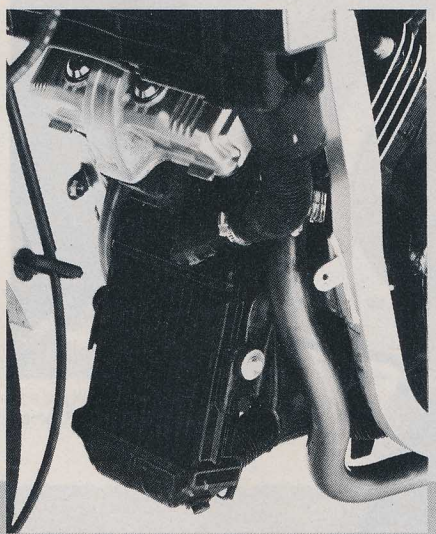
This brawny low-end grunt is what makes the VF750F so exceptional; its ferocious mid-range punch makes it feel more like a 900cc or a full-liter bike than a 750. So the Interceptor erases the traditional 750-class weak spot: big-bike size and weight but big-bike acceleration only when you really spin the engine and dance on the shifter. And as good as this low-rpm power is, the Honda's top-end charge is not to be discounted. As the double-humped torque curve suggests, the Interceptor comes on with a strong, cammy rush at about 7000 rpm. Since seven grand works out to about 90 mph in top gear, this surge is pretty darn impressive.

One trip to the drag strip distilled all these measurements and reactions into crystal clarity. Because our staff tester, High-Side Homchick, was still on the mend, we called on John Gleason once again. As before, Gleason's times are not logged into the official *Cycle* records. Though Gleason is a bit quicker than Homchick, the two are close enough in ability that Gleason's drag-strip time should reflect Homchick's and give an accurate impression of performance, fairly consistent with our past tests.

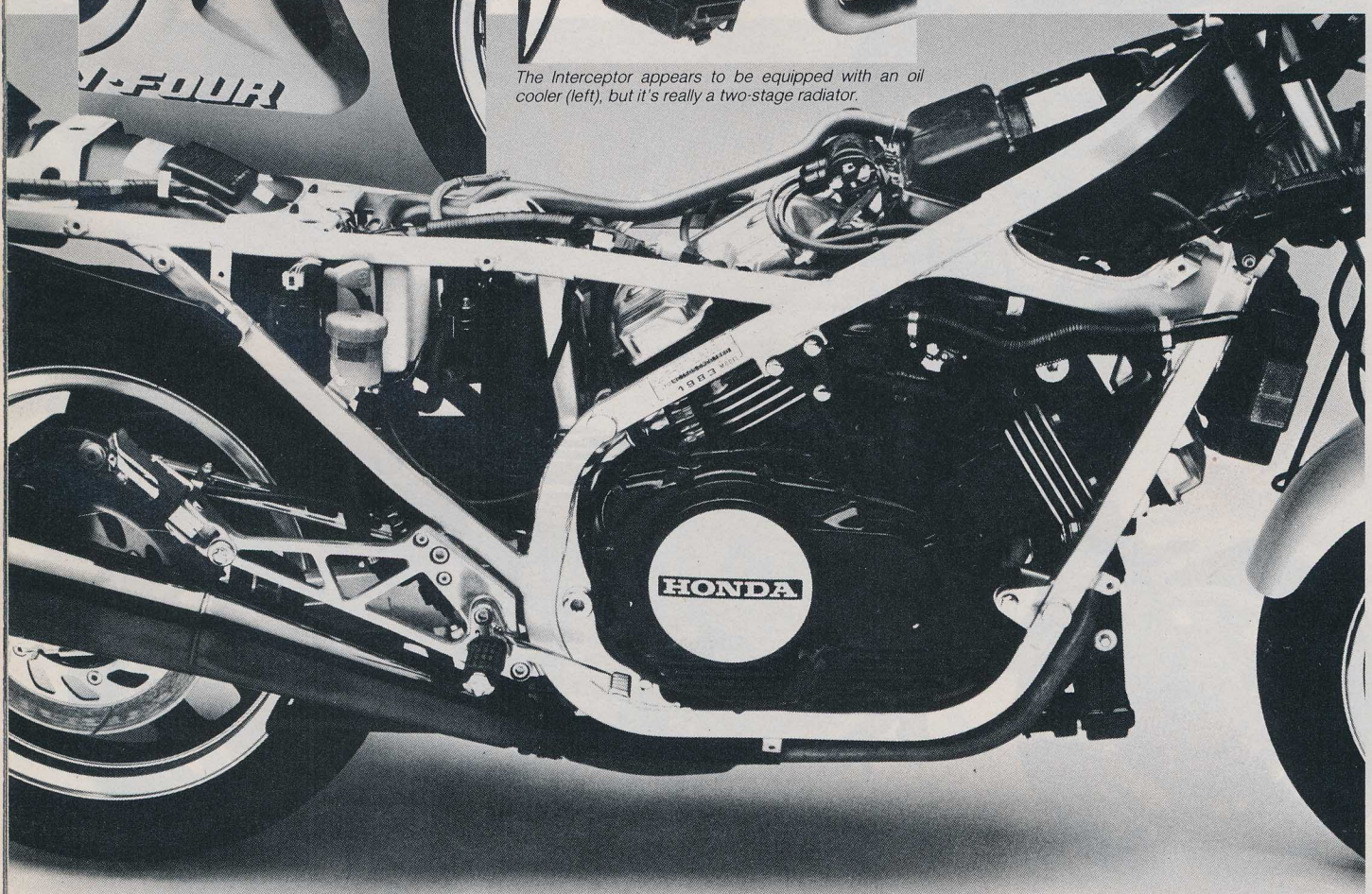
Last year the V45 Sabre's 12.23-second ET and the V45 Magna's 109.62-mph terminal speed set new standards. These bikes, as well as the other 750s, may not shatter the 11-second barrier, but they're beginning to knock at the door. The Interceptor just kicked the door flat. Gleason's best pass covered the quarter mile in 11.42 seconds at 116.27 mph, and he

*The rectangular-section-tube frame gives the VF-F a functional, rigid chassis in addition to a stylish and futuristic appearance.*



*The Interceptor appears to be equipped with an oil cooler (left), but it's really a two-stage radiator.*



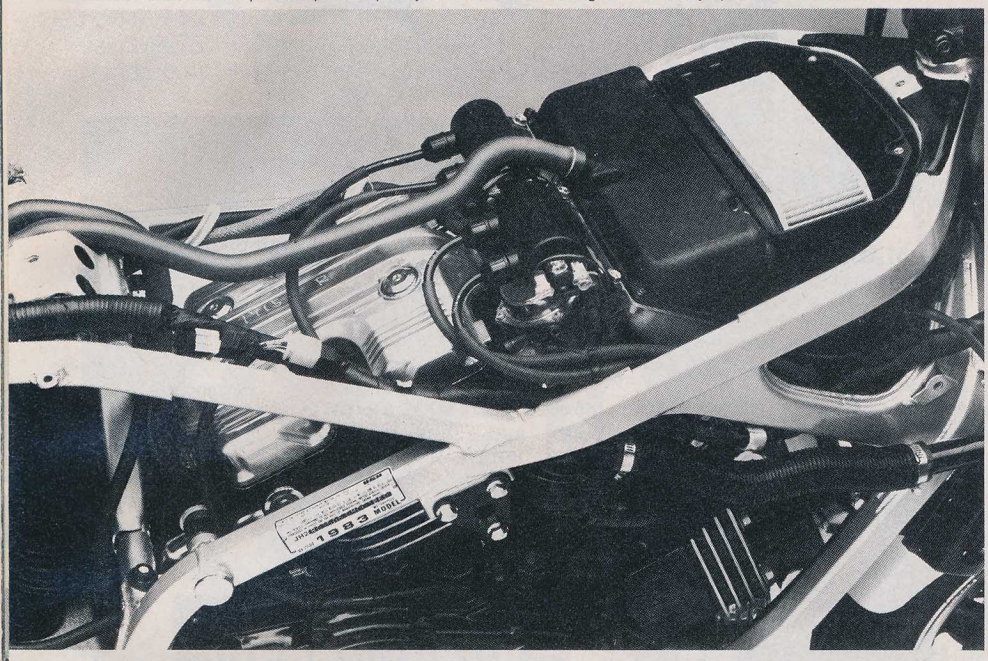
backed that up with another run of 11.47 seconds at 116.42. Eleven forty-two! Even discounting the Gleason Effect, the Interceptor is clearly the strongest 750 ever to hit the showroom floor, and it's easily one of the top 10 quarter-milers now available.

Besides being hell-for-strong, the Interceptor engine is also easy to live with. The VF starts readily on cold mornings, and the choke lever is mounted neatly and conveniently near the left hand-grip. The Keihin carburetors meter fuel precisely at all engine speeds, giving the VF crisp and immediate throttle response. The hydraulic clutch offers a broad actuation point and requires little lever pressure. This unit differs from last year's version; it is basically the same as the Shadow 750's diaphragm-spring, anti-lockup unit, but with seven friction and six steel clutch plates. The anti-locking clutch aids rapid downshifts during hard riding, and it's more appropriate in a sport bike like the Interceptor than in the Shadow.

The deletion of the shaft final drive forced Honda to alter the primary reduction gears and substitute a five-speed gearbox for the Sabre's six-speed. The loss of sixth gear doesn't handicap the Interceptor; the F-version has more than enough extra power to span the broadened jumps between gears. At 60 mph the Interceptor turns 670 rpm more than last year's Sabre, but the higher engine speed doesn't impair the VF750F's cruising abilities. Despite losing the rubber mounts used in last year's V45s, the Interceptor is very smooth. Some roughness arises at legal riding speeds, and the bars and pegs buzz lightly from 7000 rpm up to redline. The shaking never becomes uncomfortable though, even after all day in the saddle. Our only drive-train complaint concerns the irritating, though not unmanagable, drive-line lash.

The Interceptor's racer-styled riding position orients the pilot toward active operation of the motorcycle. Since the small fairing deflects most of the wind, the rider finds himself leaning slightly forward. With the adjustable handlebars pulled all the way back, the seat/peg/bar relationship suited all our staffers well. Even though a couple of testers would prefer the bars set back just a pinch, the Interceptor's seating should please the vast majority. The

*The VF's paper-element air filter draws air from beneath the fuel tank. The 750 engine bolts rigidly in place, without rubber vibration dampers, to provide plenty of solid cross-bracing for the widely spaced frame tubes.*

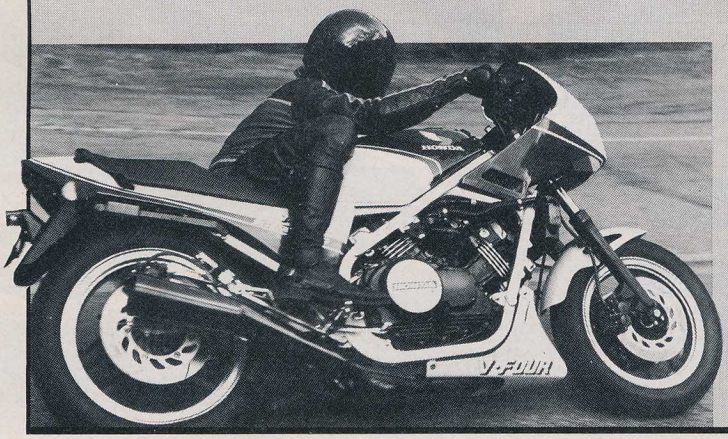



## INSIDE HONDA'S INTERCEPTOR

*By Kevin Cameron*

□ In 1982 Honda introduced the V-4 Sabre 750, a decisive break from the traditional bulky transverse fours that had ruled the performance world. The Sabre engine, though, was packaged in a mixed metaphor chassis: shaft drive yet firm sport suspension. Now in 1983 Honda has continued the work begun with the V-4. For the first time, a truly modern engine is available in a chassis designed with handling as first priority.

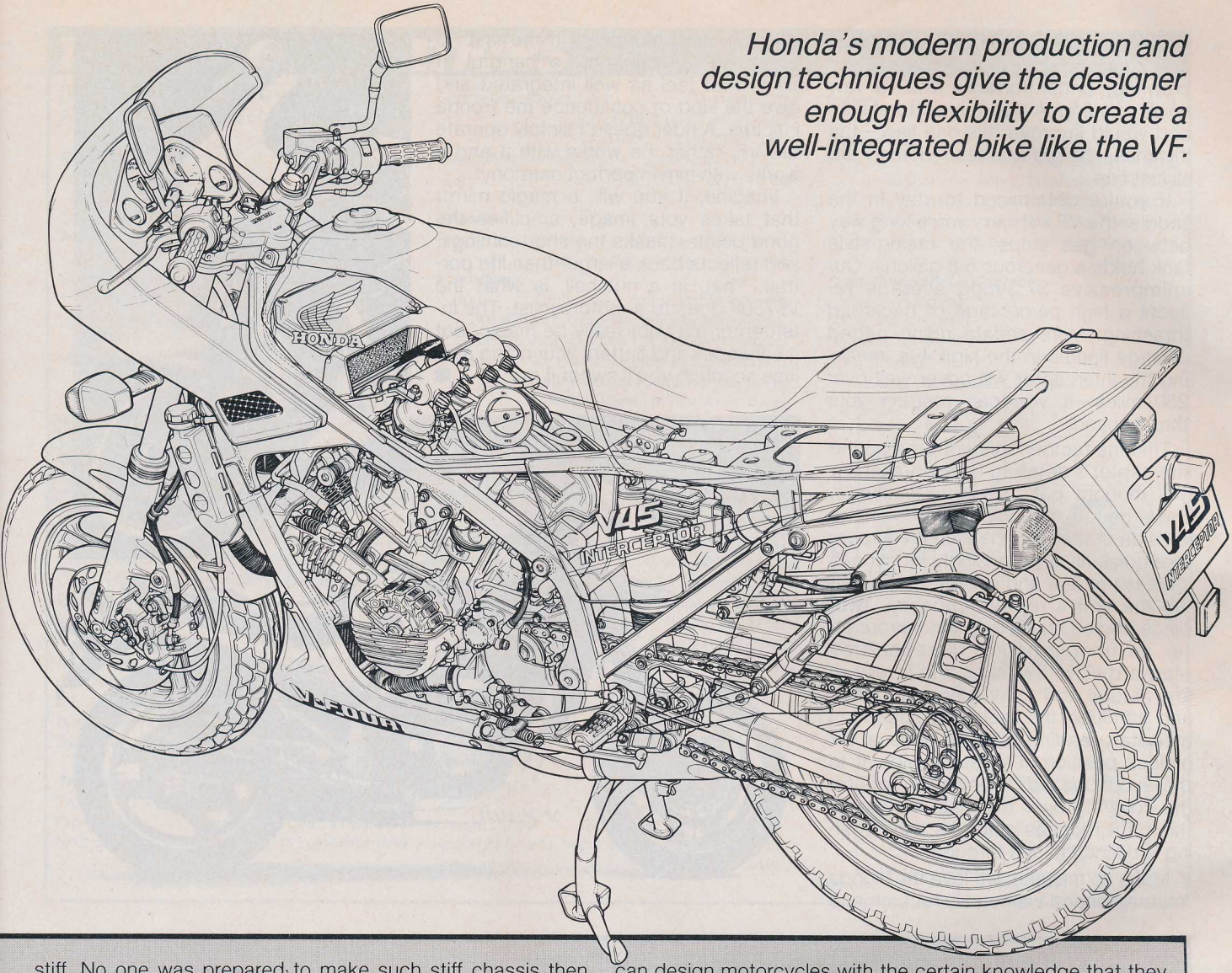
The new Interceptor 750 is in a sense an accident. Beginning this year, the Superbike class moves downward in displacement from 1025cc to 750cc. Honda, with a large commitment to racing, naturally wanted to use its Sabre engine in the new class, but the shaft-drive chassis would be a huge handicap. Therefore, they designed and produced the Interceptor from the ground up as a race bike, with a huge and stiff chassis, quick steering geometry and good suspension. Everyone who has ridden it feels Honda has succeeded in making the best street machine yet.




Why now? Why make such a machine at all? It has taken years for several important changes to take place. First, the manufacturers had to believe there were buyers for this kind of machine. Through the 1970s, quarter-mile times seemed to be foremost in buyers' minds, but that has changed now with a new appreciation of the motorcycle as a vehicle. For years, production motorcycles have been more or less compromised between quality and cost, because it has been expensive to build in certain ways. With modern production and design techniques, much of that difficulty is gone, leaving the designer freer to make important choices. The market has changed, and the means of producing motorcycles have changed as well. The market won't accept two-dollar shock absorbers, and at the same time the cost of good shocks has dropped because of better production methods. Honda, the biggest manufacturer, is naturally in the best position to benefit from such changes.

Good racing chassis have been around for a long time. Why haven't they made it to the street? There have been attempts. In the mid-1970s, a strong move arose to put steep race-bike steering geometry on street machines, but it failed because such geometry won't work unless the chassis is adequately

*Honda's modern production and design techniques give the designer enough flexibility to create a well-integrated bike like the VF.*




stiff. No one was prepared to make such stiff chassis then because that would have required expensive production changes, and *that* would mean higher prices. Designers backed away from race technology and satisfied themselves with adorning weak chassis with better components such as improved, externally adjustable shocks, wider and better tires and stiffer forks.

Engineers have been reluctant to consider racing's contributions because they aren't available in textbooks. To learn about racing you must live at the races for 10 years or so. Race chassis technology has been under suspicion as being more of an art than a science, and, besides, until recently most racing motorcycles have used two-stroke engines. While we're rejecting two-strokes for road use, let's reject everything associated with them.

With the factories' return to racing, four-stroke engines have been married to two-stroke chassis concepts, and the discovery is that, horsepower for horsepower, four-strokes can be built to be just as fast as two-strokes. What they lose in weight they more than make up for in good torque curves. Indeed, the better torque characteristics of four-strokes are now changing chassis design again, because riders are using the available power sooner in corners and making more demands on the chassis than before.

In the process of learning how to race four-strokes, factory engineers naturally tried to assign numbers to everything they do, in effect adding pages to the textbook. Handling is moving out of the realm of art and into engineering. With the reliable suspension components now available, engineers can design motorcycles with the certain knowledge that they will handle well.

Having control over yet another aspect of motorcycle design, manufacturers are now in a position to market handling. Handling, once it is understood in an engineering sense, becomes a commodity that can be sold.

By now, most experienced motorcyclists have owned at least one machine fast enough to scare the daylights out of them. Experienced riders know their limits. But what if a motorcycle appeared that could suddenly expand those limits? Would those experienced riders be interested in that? What if we could give them the power to flick their machines effortlessly over to their cases, to hold line through a series of sweeping, ripply turns, *and* to be happy and confident while doing all this, not frightened half out of their wits? Would anyone be interested in that?

Back in 1974–76, many road racers had lost heart because they found that only men like Roberts and DuHamel could control the new 750s. Those bucking monsters just plain scared a number of people out of the sport. When the Yamaha TZ750D came along with its monoshock suspension and stiffer chassis, it gave these men back their self-confidence. Their normal skills worked again! Why, this is just like riding a motorcycle! The new Honda Interceptor is the machine that will do for the street rider what that Yamaha did for the racer—give him back his confidence and put the fun back into sport riding.

It's about time this happened. Superbike racing *has* elevated the level of four-stroke design, but we have all heard the

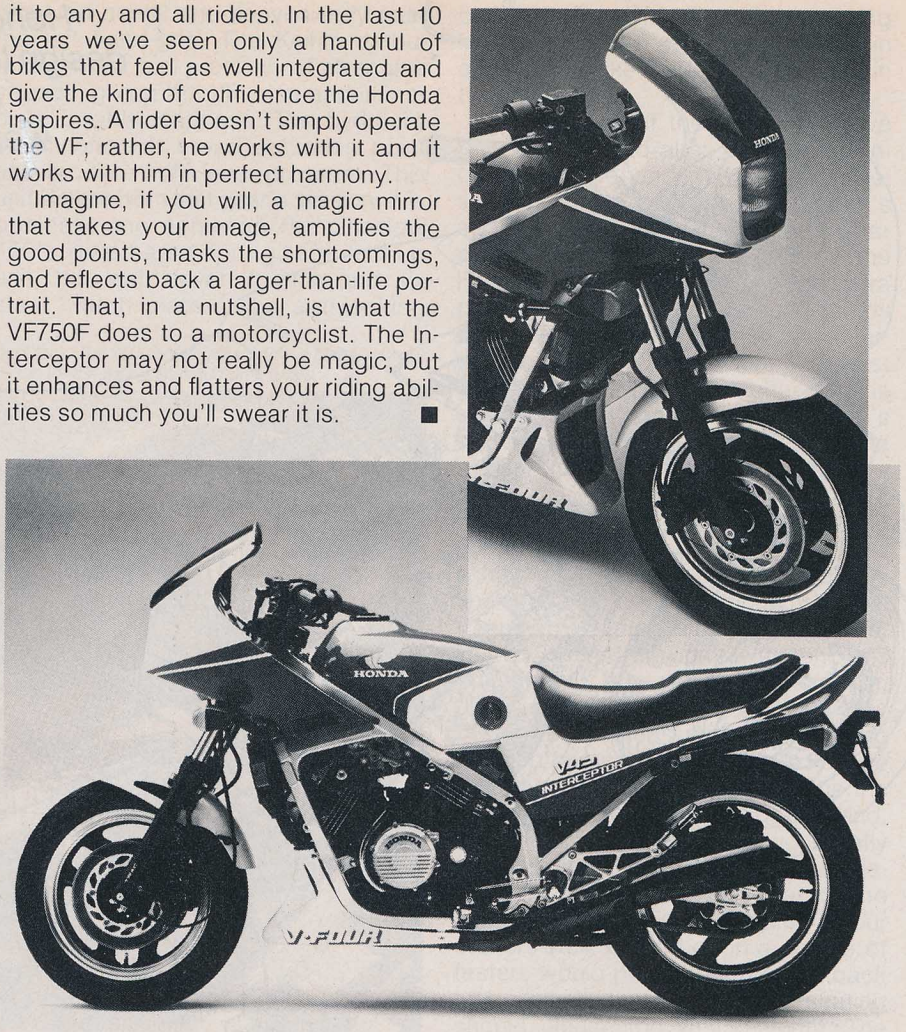
seat itself is fairly narrow and a bit crowned, uncomfortable after a few hours of riding. A little more lateral support would improve this one flaw—the thickness, height and foam density are all just fine.

If you're determined to stay in the saddle, the VF will carry you a long way between gas stops; the racing-style tank holds a generous 5.8 gallons. Our unimpressive 37.3-mpg average reflects a high percentage of backroad thrashing. More sedate riding netted mileage figures in the high 40s, meaning the Interceptor will cover well over 250 miles—if you can restrain your throttle hand.

That the factory concentrated on the Interceptor's detailing is obvious: it's a well thought out, complete package. The large fuel petcock, mounted on the left side of the tank to resemble a race-bike quick-fill, is surprisingly functional; it's easy to find and operate when you tap the tank's reserve capacity. Two-piece dogleg stems help the mirrors offer an unobstructed, vibration-free rearward view. Switches and levers allow natural and convenient operation, and although the tach and speedometer start reading from an unusual six o'clock position, it's easy to adjust to the layout. We didn't, however, care for the covering over the instruments; although it reduces glare, its light frosting is difficult to see through.

Make no mistake: we love the Honda Interceptor and we heartily recommend it to any and all riders. In the last 10 years we've seen only a handful of bikes that feel as well integrated and give the kind of confidence the Honda inspires. A rider doesn't simply operate the VF; rather, he works with it and it works with him in perfect harmony.

Imagine, if you will, a magic mirror that takes your image, amplifies the good points, masks the shortcomings, and reflects back a larger-than-life portrait. That, in a nutshell, is what the VF750F does to a motorcyclist. The Interceptor may not really be magic, but it enhances and flatters your riding abilities so much you'll swear it is. ■




## INSIDE HONDA'S INTERCEPTOR

stories of famous (names have been withheld to protect contracts!) Superbike racers taking their first spins on the plain-Jane street versions of the bikes they race. They come back with their knees knocking and ask, "Are all street bikes that bad?" This is not one isolated case—most Superbike racers have had this experience. Compared with the stability and competence of a real race bike, a street bike ridden hard can be frightening.

Why was racing suspension an art? Mainly because the components weren't very good. The steep steering geometry pushed the frame to the point of making a steering damper necessary, the suspension units worked only if adjusted hourly for temperature changes. Such chassis were really lab experiments that only worked when their white-coated creators were right there to keep all the parts functioning in harmony. Such technology is of no use on the street machine.

Mike Baldwin is a Team Honda rider with wide experience on other kinds of racing machinery. After an early Daytona test, he urged me to convert my race bikes to Interceptor suspension parts, *street parts,* saying Honda's new motorcycle is nimbler on its feet than any race bike in privateer hands today. Just advertising chatter from a company man? Not Baldwin—he's the PR man's despair because of his embarrassing frankness.

Is the Interceptor just an updated chassis for the Sabre engine? No, it boasts an entirely new engine, chain-driven and with new cases, designed from the ground up to work with the chassis concept. That's progress in thinking. *Handling* is now important enough to warrant changes in basic *engine* architecture. Essentially, the Sabre engine has rotated backward 15 degrees relative to the engine centerline to make the Interceptor engine. Why? To permit pulling the front wheel back under the front cylinders, and to allow front wheel travel to be increased. Both the Sabre and 1025 Formula One racer, model FWS, suffered from poor weight distribution because their engines were set back in the frame for front wheel clearance. On the FWS, the rider was moved forward to compensate, hanging on to offset clip-on bars. The Sabre's engine shape necessitated a very long 61.5-inch wheelbase.

Since new racing rules don't permit any metal removal from the chassis, the Interceptor's chassis stiffness and geometry had to be correct from the start. No more steering head cutting and re-angling—things must come right from the factory. Its steep 28.2-degree head angle is a degree and a half away from the 27 degree of GP racers, and a degree and a half away from the 30 of touring machines.

In the past, street bike chassis were narrow for several reasons. First, tradition dictated two closely spaced downtubes in front, passing between the exhaust pipes of an in-line four-cylinder engine. A single backbone or narrow pair of frametubes could pass through a tank tunnel. Second, frames have been something of an embarrassment to stylists. Paint them black and let them merge into the background. Make them unobtrusive. Make them small, invisible if possible.

What about section modulus? Section modulus is a measure of how the material in a structure is distributed around

# TEST SPECIFICATIONS

Make and model . . . . . Honda VF750F Interceptor
Price, suggested retail (as of 2/3/83) . . . . . $3498

### Performance

Standing start ¼ mile . . . . . 11.42 sec. @ 116.27 mph (see text)
Engine rpm @ 60 mph, top gear . . . . . 4766
Average fuel consumption rate . . . . . 37.3 mpg (15.6 km/l)
Cruising range (main/reserve) . . . . . 179/37 mi. (288/60 km)
Load capacity (GVWR less curb weight) . . 361.0 lbs. (164 kg)
Maximum speed in gears @ engine redline . . . . . (1) 52 (2) 75 (3) 95 (4) 114 (5) 132

### Engine

Type . . . . . Four-stroke, 90-degree V-four; liquid-cooled with dual chain-driven overhead camshafts; four valves per cylinder
Bore and stroke . . 70.0 x 48.6mm (2.76 x 1.91 in.)
Piston displacement . . . . . 748cc (45.6 cu. in.)
Compression ratio . . . . . 10.5:1
Carburetion . . . (4) Keihin 32mm constant-vacuum
Exhaust system . . . . . Four-into-two
Ignition . . . . . Battery-powered, inductive, magnetically triggered
Air filtration . . . . . Paper element, disposable
Oil filtration . . . . . Paper element, disposable
Oil capacity . . . . . 3.1 qts. (2.9 l)
Bhp @ rpm . . . . . 77.36 @10,000
Torque @ rpm . . . . . 45.09 @7500

### Transmission

Type . . . . . Five-speed, constant-mesh, wet-clutch
Primary drive . . . . . Straight-cut gear; 71/33; 2.15
Final drive . . . #530 chain; 17/44 sprockets; 2.59
Gear ratios (transmission) . . . . . (1) 41/15, 2.73 (2) 36/19, 1.90 (3) 33/22, 1.50 (4) 31/25, 1.24 (5) 29/27, 1.07
Gear ratios (overall) . . . . . (1) 15.22 (2) 10.55 (3) 8.35 (4) 6.91 (5) 8.35

### Chassis

Type . . . . . Double-downtube, full-cradle frame; box-section aluminum swing arm
Suspension,
front . . . . . Center-axle, air-adjustable fork with 39mm tubes, three-way adjustable damping, anti-dive valving, and 6.1 in. (155mm) of travel
rear . . . . . (1) air-adjustable shock absorber, adjustable for rebound damping, producing 4.4 in. (112mm) of rear-wheel travel
Wheelbase . . . . . 58.9 in. (1495mm)
Rake/trail . . . . . 28.2°/3.8 in. (96mm)
Brake, front . . . . . Hydraulic, dual-disc with twin-piston calipers
rear . . . . . Hydraulic, single-disc with twin-piston caliper
Wheel, front . . . . . ComCast, 2.50 x 16
rear . . . . . ComCast, 3.00 x 18
Tire, front . . . . . M120/80-16 Bridgestone G511
rear . . . . . M130/80-18 Bridgestone G510
Seat height . . . . . 32.2 in. (818mm)
Ground clearance . . . . . 6.0 in. (152mm)
Fuel capacity (main/reserve) . . . . . 4.8/1.0 gals. (18.0/4.0 l)
Curb weight, full tank . . . . . 549.0 lbs. (249.0 kg)
Test weight . . . . . 709.0 lbs. (321.6 kg)

### Electrical

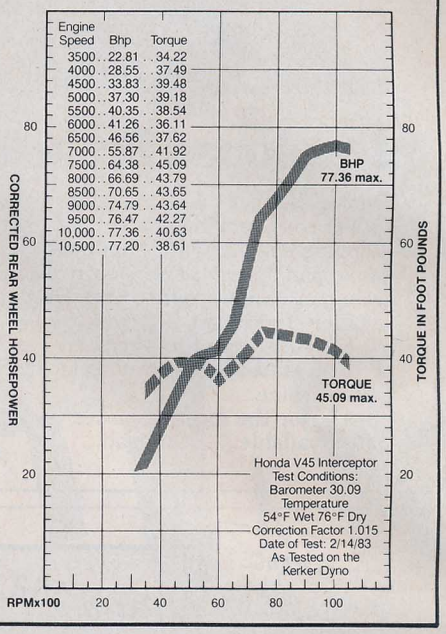
Power source . . . . . Three-phase AC generator, 300 watts
Charge control . . . . . Solid-state voltage regulator
Headlight beams, high/low . . . . . 60/55 watts
Tail/stoplights . . . . . 8/27 watts
Battery . . . . . 12V 14AH

### Instruments

Includes . . . . Speedometer, odometer, tripmeter, tachometer with 10,500-rpm redline. Fuel gauge, coolant temperature gauge; indicators for taillight out, low oil pressure, high beam, turn signals, neutral

### Customer Service Contact

American Honda Motor Co.
100 W. Alondra Blvd.
Gardena, CA 90247
(213) 321-8680




the load. Two drive shafts of identical weight, one solid, one hollow, have different section moduli. The hollow shaft distributes its material far from the centerline around which the twisting forces are acting. This gives it a high section modulus, and makes the shaft more rigid while subjecting its material to reduced stresses.

The old-style narrow motorcycle chassis have a low section modulus because their material is close to the machine's centerline and must be highly stressed to transmit loads from steering head to swing-arm pivot.

By contrast, the Interceptor's chassis is huge and wide, with a very high section modulus. Like a true racing chassis, it's just as wide as the engine, in the form of a large box, welded from rectangular steel tubing, mandrel-bent. Two widely spaced upper members curve abruptly inward to grasp the top of the tall steering head, and two other similar members curve up from beneath the engine to grasp the bottom. The four are joined not only by the head, but also by a pair of large-section sheet-metal braces a few inches back. A section of the lower left loop is removable, facilitating engine service.

The bare frame is so large that a person can step into it and almost sit down. Although the frame appears to be lacking several cross-members, the apparently missing strength is supplied by the engine itself, which, like that of the FWS, bolts rigidly in place. This is made possible by the V-4 engine design; such a smooth engine can be rigid-mounted without causing either rider discomfort or frame cracking. The engine provides cross-bracing more massive than anything made in steel tubing.

Instead of painting this new chassis black and trying to force it into the background, the styling department highlighted it in silver and made it the main theme of the design. This is the look of the future; the chassis has finally come into its own.

Attached to this frame at the rear is a cast-aluminum swing arm, produced by the lost-wax, or investment-casting, process. This gives fine control over dimensions and produces a

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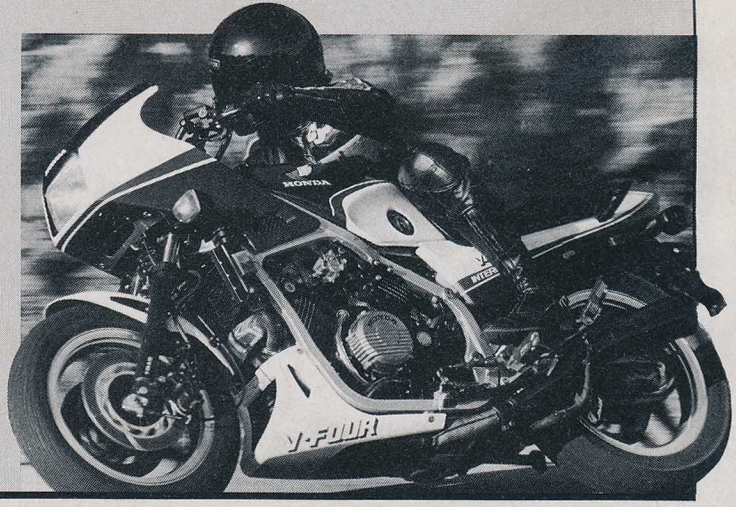

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part of the required strength with far less human labor than needed to build a welded sheet aluminum structure. The part isn't light, but it has a uniform and substantial wall thickness of five millimeters (0.195 in.) to make it rigid. Instead of pivoting on a solid bolt extending clear across the frame, this wide arm attaches on stub bolts heavily set into the sides of the chassis. The weight of a solid pin is avoided, and a roller bearing supports the arm on one side, double-row balls on the other, addressing both lateral and torsional flex.

Again because of new racing rules, this swing arm is made wide enough from the start to accommodate the largest recent racing tires. On older machines, narrow swing arms made it necessary to bend rules as well as metal in every direction to permit use of proper tires. Not on the Interceptor.

The suspension is a version of Honda's Pro-Link rising-rate single-shock concept, which is compact, has a good rising-rate curve, and loads its members largely in compression and tension only, flex-prone bending avoided. Because of its very high leverage ratio, rising-rate suspension places heavy concentrated loads on swing arms. Forces of 2000–4000 pounds are not uncommon at the lever attachments, and a welded-up arm requires complicated doublers and reinforcements. The investment casting technique can easily provide local increases of material thickness to accept these loads.

The vertically mounted shock extends downward from a point in the frame, through a hole in the swing arm, and reaches the apex of the Pro-Link assembly. The pivots in the links are phosphor bronze; any looseness here would be multiplied many times at the rear wheel. Five-thousandths of an inch clearance at each of four pivots could easily become a bothersome one-eighth-inch of up and down "clunk" at the rear wheel.

The shock is not a high-tech piece, but rather of the same family as used on the Sabre. Internal gas pressure is used not so much to apply pressure to the shock oil but to assist the steel spring and to provide the capability to adjust ride height. In a true nitrogen-charged damper, gas pressure acts only on the diameter of the piston rod; in this hybrid design, gas pressure acts on a piston almost the size of the shock body.

At the front, a roller-bearing steering head more than six inches tall reduces the loads that must be fed into the frametubes there. Roller bearings can tolerate heavy preload without deform-

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ing, and this makes the fork's attachment stiffer yet.

The fork itself, a 39mm-tube version of the Sabre's TRAC anti-dive unit, is updated now with adjustable damping and extended travel. The two fork sliders join at their tops with a heavy fork brace, uniting them into a rigid structure—necessary because the adjustable damping feature is in one fork leg, while the TRAC anti-dive is in the other. Without the brace, such asymmetric forces would distort the sliders into a parallelogram shape that would push the brake caliper pistons back into their bores, making the brakes useless.

Wheels are ComCast—Honda's response to the need for light weight, airtightness and strength in the context of a market that seems to want cast wheels. The hub and spokes are a single casting, but the rim is a separate part, made from a high-pressure extrusion, bent into round form and butt-welded into an endless ring. If the rim were cast with the hub and spokes, it would have to be at least 0.200-inch thick to guarantee strength, and would likely have to be impregnated with epoxy sealant to permit tubeless tire use. With the strong and dense wrought material of the extruded rim, free as it is from the porosity and voids normally found in castings, it is possible to use thinner sections while retaining strength, ductility and airtightness. Remember, weight at the rim has double significance; as the machine accelerates, the wheel must not only be accelerated in a straight line, but also around its own axis, requiring twice as much energy in the process.

The brakes are Honda's twin-piston type, inspired by those developed for their racers, acting on discs that also show competition thinking. It is far cheaper to stamp a disc in one piece with its carrier, and to bolt the resulting part directly to the hub, but the forming process results in a disc with internal stresses. Although normally this is fine for the street, under severe brake use, these stresses reappear as disc distortion. Distortion can cause pulsation at the brake lever and pad knock-off (disc movement pushing back the brake pads and caliper pistons). Why not, Honda engineers reasonably proposed, avoid this and produce the Interceptor's discs from flat sheet and bolt them directly to the wheel some distance from the center? By eliminating the disc carrier, a holdover from the days of wire wheels when bikes used a carrier to connect the large disc with the small hub, Honda shortened the load path from the tire, where brake forces are reacted, to the disc, where the forces are created. A shorter load

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path means a lighter structure.

The TRAC anti-dive acts as before, using the caliper's tendency to follow the disc it is gripping. The TRAC caliper pivots on the fork leg, pressing on a valve which controls the fork's compression damping. The harder you pull the brake lever, the greater the increase in compression damping and the less the machine tends to slam down to bottom its front suspension. A lighter fork spring can be used, making suspension more supple.

It's all very well to speak blithely of rotating the engine backward 15 degrees, but do you know what that implies? It means making new and expensive casting dies all over again—something extremely costly and involved were it not for the flexibility of modern production planning and equipment. It took BSA/Triumph 20 years of talking to get around to making its new three-cylinder engine because of the expense of changing production tooling. For Honda today, such a change takes less than a year.

As long as Honda was changing the engine, they made the supports for the main bearings massively strong and heavy. In a racing engine, case rigidity controls durability and power by holding the bearings truly concentric, relieving the crank of destructive bending loads, thus allowing the con-rods to move in a single plane instead of a complex orbit requiring bending and twisting which in turn twists the pistons from side to side, impairing the seal of the piston rings. Rigidity has a price in weight, but the payback is worth it. The Interceptor engine has rigidity.

As with all recent Honda water-cooled designs, an open-deck layout uses cylinder and water jackets cast in one piece with the upper case. The open-deck design places the head hold-down studs far from the cylinders, preventing distortion. Making the cylinders and jacket in one piece along with the upper case supports that structure enormously. When you see how an in-line engine with a separate cylinder vibrates at high rpm, actually wearing out its base gasket from engine bending, you appreciate the extra stiffness.

In sum, the Interceptor has a strong engine in a fine chassis, with basic parts reconfigured to deliver these advantages. What else has been done?

The 1982 Sabre had a shaft drive, allowing it to pack a high final reduction ratio of 3.4:1 into a small space. Gears, which can tolerate high contact pressure in their cool oil bath, are very compact. Simply deleting the shaft and substituting a chain would have required bulky sprockets—something like 16/55—which would make the rear

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sprocket into a real bacon-slicer. To bring the final drive ratio back to a reasonable value for chain drive, Honda chose a slower-turning primary gearset. Because this turns the transmission more slowly, the already narrow Sabre six-speed gearset would have been terribly overloaded. On top of this, claimed horsepower jumped from the 80 of the Sabre to the 86 of the Interceptor. The new gearbox uses five instead of six speeds. With fewer gears in the same space, each could be made wider, and in this way, Honda made tooth-to-tooth contact stresses reasonable while providing a usable final drive ratio. The engine's power also makes six speeds unnecessary.

As MV discovered back in 1974–75, and Honda found five years later, when a racing four-stroke is braked to the point of unloading the back wheel, engine-braking makes the rear tire skip, hop and chatter, upsetting the machine during the crucial phase of corner entry. Honda attacked the problem by providing a one-way device in the driveline—the engine can drive the rear wheel solidly under power; during braking any reverse torque passes through a slip-clutch, damping rear-wheel hop. A simple one-way clutch would make push-starting the engine impossible and leave the rider helpless if the engine died in the middle of a corner.

In the Interceptor, this one-way drive is cleverly incorporated into the main clutch, using half its plates for its function. Instead of a normal one-piece clutch inner hub, the Interceptor's splits into two sections—one solidly fixed to the transmission input shaft as per normal practice, the other half connected to the shaft through a one-way drive. This drive consists of an inner and outer race, between which a bearing cage holds an array of kidney-shaped sprags. When the outer race rotates one way, these sprags stand up and wedge themselves tightly between inner and outer races, delivering a solid drive. When the outer race turns the opposite way, the sprags lie down and transmit nothing. The sprag assembly comes from a standard automatic automobile transmission.

In the Interceptor, when the engine drives the rear wheel, the sprags lock up and torque passes from engine to rear wheel through all six of the clutch plates without slippage. When the rear tire tries to drive the engine, during overrun/braking, the one-way sprags unlock and the reverse torque now passes through only one-half the clutch plates, by way of the split inner hub. Since half the clutch has only half the torque capacity, when the rear wheel tries to hop, these three plates slip enough to damp out the jumping, al-

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lowing the rider a smooth entry into turns while braking.

On the dyno, the Interceptor engine produced a peak of 77 horsepower versus 65.05 for the Sabre, a gain of some 12 horsepower. Where does it come from? Other engine internals are the same as the Sabre, with its cams, valve sizes and compression ratio. The cams are reset to close the intakes later and open the exhausts slightly earlier, and the exhaust pipe design is reportedly freer flowing.

The new airbox contains more air. Located directly above the four intake trumpets and under the front end of the fuel tank, this box takes in cool air from above the brass radiator. Despite being larger, it doesn't need the side-mount air filters that make Sabre the wide machine it is.

The power increase is surprising, considering the few changes made to the engine, but perhaps here too it is a result of many small differences. Exhaust, intake and cam timing can add up impressively, as has been discovered when modifying standard machines with aftermarket pieces.

Along with engineering measurements of chassis stiffness and handling qualities, Honda has taken pains to provide the Interceptor with lower air drag than previous designs. A stock CB750F at an all-up weight of 700 pounds (rider and fuel included) required 70.4 horsepower to overcome rolling friction plus air drag at 125 mph. For the Interceptor, with its wide frame but narrow frontal area, the power requirement at this same speed is down to 64.5 horsepower, leaving an extra six horsepower for acceleration.

Why do testers rave about the Interceptor's handling? Not because of magic chassis numbers, although the wheelbase is fairly short, the steering head fairly steep, the chassis exceptionally stiff and the parts modern in design. The answer, according to Honda, lies in the integration of these parts—in the way they work together. With the stiff chassis, the steep head angle produces no wobbling and provides a stable attachment for all the suspension parts, allowing them to work to their maximum capacity.

What's so hot about rising-rate suspension? The magic is not in the *rising* but in the *rate* it permits the designer to use. Softer suspension isolates the machine from road disturbances that lead to wobbling, but soft suspension also invites bottoming over bumps and during braking. The first step in improving suspension was to increase wheel travel while cutting back on spring rate. This allowed bumps to be absorbed through movement rather than through simple spring stiffness—a great advance. There are limits to suspension travel, though, because ultimately you must make the machine taller to increase wheel travel. That won't work on pavement. The answer? Make the suspension soft in the part of the travel where the machine spends most of its time—the first 60 percent of wheel movement—and then increase the rate as the wheel nears full-bump.

A rear suspension of pushrods and rocker arms can provide a rising-rate if the rockers are properly angled, but it's hard for this kind of linkage to provide a flat, low rate over most of the wheel movement, then rise in rate toward the end. Honda's toggle-link design produces this kind of curve inherently, and the designer can choose the ratio of rate to rise by how far he drives the linkage toward the point at which the toggles form a straight line—the end-point of link movement. For a street machine never driven hard enough to need ultimate refinement, a moderate Pro-Link can deliver a nearly flat rate from full-droop to full-bump. For road racing, a flat curve that sweeps smoothly up toward the end may be best; for some motocross applications an even steeper rate rise may be better yet. The drawback of Pro-Link is that it must occupy some space between the rear tire and the back of the engine, making wheelbase longer than optimum in some cases.

Certain classic motorcycle designs are described as being greater than the sum of their parts—the Norton Manx, the Moto Guzzi twin-cam 350, and the Suzuki RG500 come to mind. The Interceptor is certainly another in this category, and it may be unique because it is a *street* motorcycle, not a racer. Is this kind of motorcycle a sign of the future? Let's hope so; it combines the rationality of racing design with the economy of large-scale production. Versatile manufacturing equipment of the kind Honda uses makes it just as easy to produce a motorcycle that handles well as it is to produce a machine of indifferent quality.

Will the public accept race-inspired motorcycles? Traditional marketeers have always said no, because British-style café-racer styling has historically failed in the U.S. market. In the Interceptor, we are talking about something different; this is a machine that *works* like a race bike, not just *looks* like one. The qualities of the Interceptor will make every rider instantly more capable, less at risk and more confident, and that will please everyone. The new race-inspired motorcycle handling technology can be disguised in any form style dictates. It doesn't matter how high the bars, how low the pegs, or how much chrome is showing—if it handles precisely and amplifies the riders' talents it will be a classic. The Interceptor is a large step forward. ■