Inside Yamaha's New '76 Four-Strokes

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NEW MODELS '76 PREVIEW!

A SNEAK LOOK AT HONDA, YAMAHA, KAWASAKI

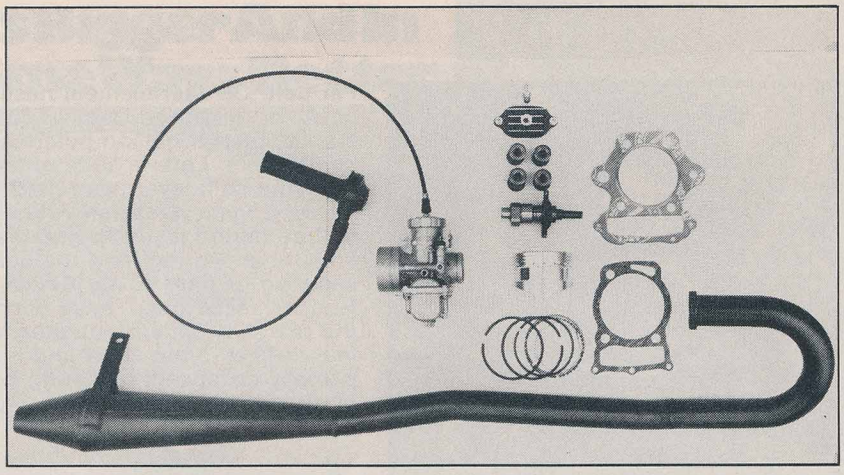
Road Test: DUCATI 860 V-TWIN

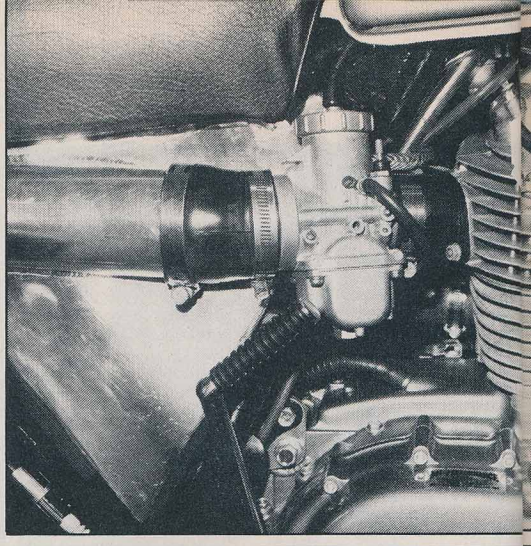
175 MX Preview: YAMAHA, CAN-AM HUSQVARNA

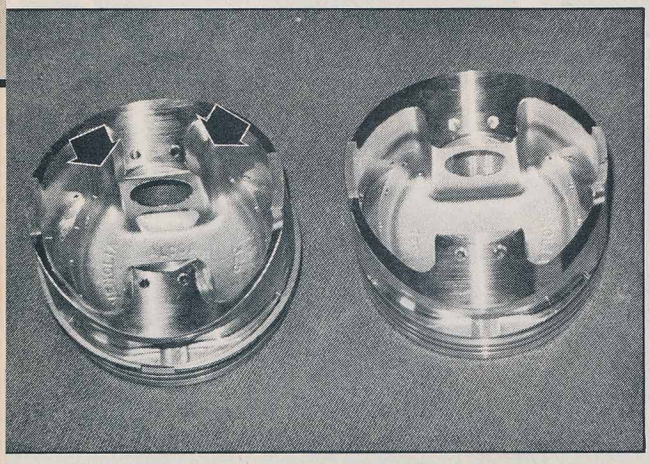
Technical: HONDA XL 402! FIBERGLASS FIX-IT

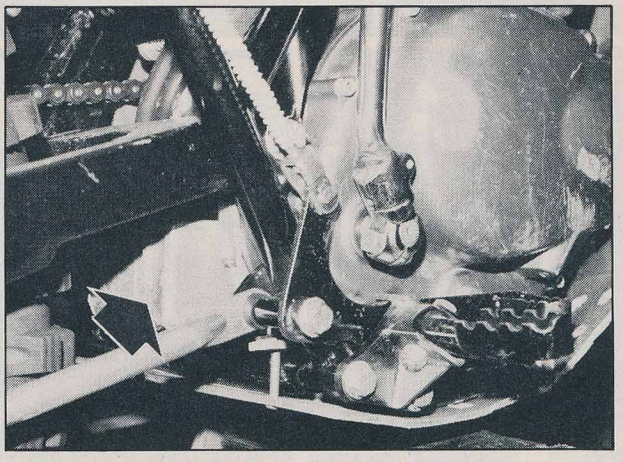
How To Ride: EKINS LAYS IT DOWN

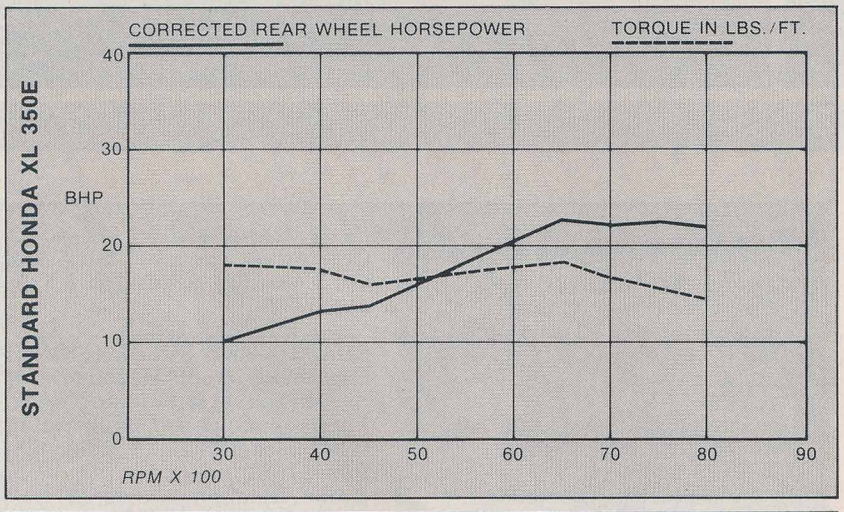
Bike Vans: FORD'S NEW LONG-SNOUT

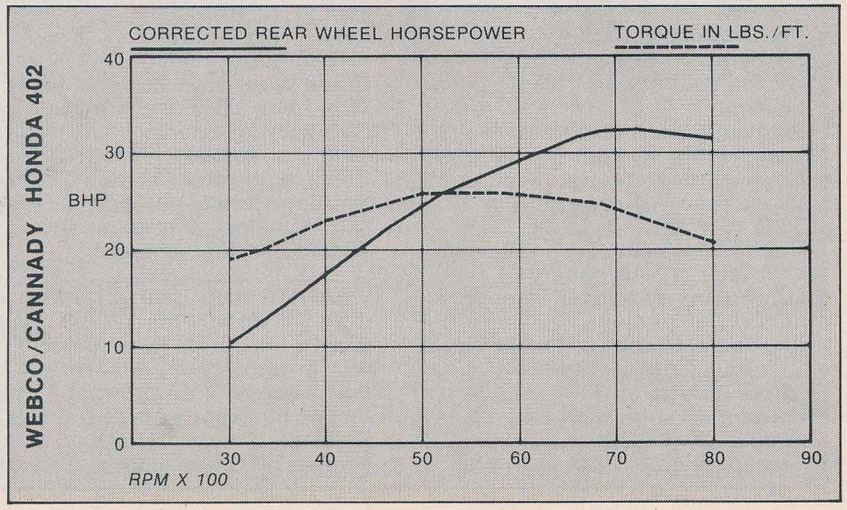












Top left: *Webco "Cannady Replica" Honda XL402 kit contains a Venolia piston and rings, Web-Cam No. 40AB camshaft, S&W valve springs and Webco aluminum valve spring retainers. A Mikuni 36mm carburetor with two extra main jets and needle jet recommendations for tuning the engine for your area; a special hose from the Mikuni carburetor to the standard XL350 air cleaner and clamps. An aluminum Magura quarter-turn throttle pulls the carburetor up via a special Teflon-lined throttle cable. New cylinder head and cylinder base gaskets are included and a trick thru-the-frame "Gene Cannady" upswept exhaust pipe installs on the standard XL350 easily. An exhaust tappet cover with a ball-check breather vents excess crankcase pressure to the atmosphere.*

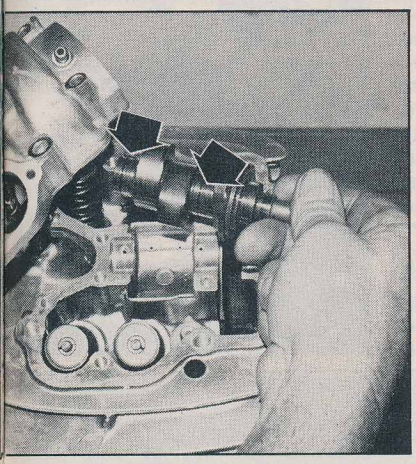
Above left: *Although 85mm Venolia piston weighs little more than the standard XL350 piston, Bell carefully removes material from noncritical areas of large piston (see arrows) to reduce weight to same as standard piston.*

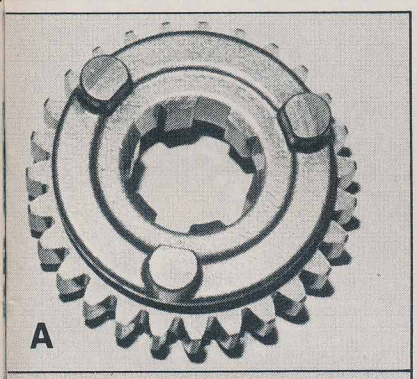
Above center: *"Bump" at rear of crankcase is heliarced on to increase oil cump capacity by approx. 10 fl. ozs.*

Above right: *Cramshaft support journals in cylinder head are aluminum so Bell has camshaft hard-chrome-plated where it rides in the cylinder head.*

At left: *Dynamometer chart for modified Honda is shown on bottom. Note smoothness of horsepower and torque curves, as well as increases over standard XL350.*

At right: *The transmission* **(a)** *gears are modified by welding on a strengthening plate* **(b)***—arrow—which keeps them from winding up like this* **(c).**





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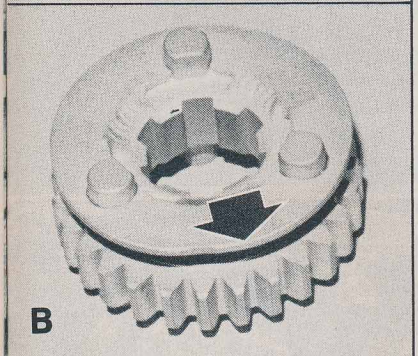

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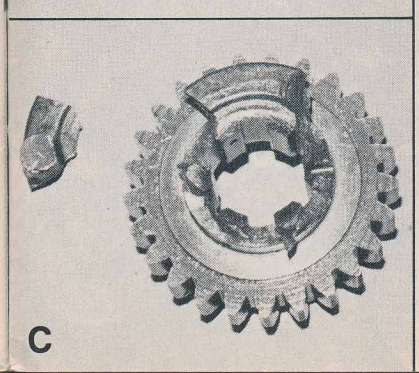

C

HONDA...

The docile, mild-mannered Honda XL350 becomes a Baja winner, and a superior cow-trailer, with modifications

TEXT & PHOTOS BY JODY NICHOLAS

A winning race machine is rarely the end result of one man's talents. Many individuals (and sometimes a computer or two) deserve a pat on the back for a successful competition motorcycle, to say nothing of the rider(s). A large part of the responsibility lies with the engine designer, but perhaps an equally big chunk rests with the people responsible for the chassis and sundry component design. Then there are the folks who integrate all the pieces and make them work for the rider, and that person, more often than not, is the rider himself.

Most experienced riders, and especially the ones who've been around long enough to have ridden 350 and 500cc four-stroke singles, appreciate the power characteristics and relative ease of power output control that such an engine design delivers. Unfortunately, there was a period when this design fell out of favor with dirt-oriented riders and competitors because of a tremendous surge forward in two-stroke engine development. Two-strokes could be (and were) made lighter in weight, with more horsepower, than their four-stroke brothers and that's exactly what happened. The world's largest producer of the single-cylinder four-stroke, England, went through some hard times economically and the development of racing four-stroke singles virtually stopped when BSA pulled out of grand prix motocross racing after Jeff Smith won the world 500cc motocross title for them in 1964 and 1965. And the two-strokes kept getting more and more refined, more and more flexible and more and more *faster!*

But Honda, one of the world's leaders in four-stroke motorcycle technology, picked up the ball that England was forced to drop in the mid-1960s and began rolling it before the introduction of the XL250 in early 1972. Although the XL was intended to be a street/trail machine it wasn't long before certain inveterate off-roaders began pruning the excess weight from the bikes and increasing the power by the use of special high-compression pistons, less restrictive exhaust systems, modified camshafts and larger carburetors. And the frame builders here in America jumped onto the bandwagon too and began building some really lightweight, strong, good-handling frames. And now Webco, Inc., one of the nation's leading suppliers of custom components for "trick" motorcycles is offering goodies for the XL-series Honda which can hardly be overlooked by the serious off-road XL rider. The Webco kit is aimed at the XL350 rider who wants to "wake up" his machine but who is unable to get *all* the pieces together to turn his bike into a full-blown "Baja winner." But back to the development of a race-winning motorcycle.

Followers of Baja off-road racing for motorcycles are familiar with the name Bill Bell. "Ding Dong," as his friends are wont to call him, prepared the Honda SL350 twin that Larry Berquist and Gary Preston rode to win the first Baja 1000 back in 1969. In addition, he's got many miles in Baja under his belt racked up on pleasure rides as well as a huge number of "cow trailing" sessions in the desert areas of Southern California.

Bell is currently in charge of the Hi-Performance Division at Long Beach Honda, one of Southern California's largest Honda agencies. In the Long Beach Honda shop, and in collaboration with Bob Hughes at Webco, Inc., some very outstanding modifications to the XL350 Honda have materialized, and Bell is currently at work doing special conversions for the public and developing the racing machines he sponsors even further.

The subject of this article is the Honda XL402 which was ridden in this year's S.C.O.R.E. 500 by Los Angeles policeman Gene Cannady which was sponsored by Webco, and prepared by the Webco personnel and by Cannady, as well as its *sister* bike, a very similar conversion prepared by Bill Bell and ridden by off-road aces Al Baker and Gunnar Lindstrom.

Bell went through the preparation of Baker's engine with us very closely and the hours spent with him were well worth it. It's an easy job to modify the XL350 for competition work even without a complete machine shop if the proper tools are used, the working area is reasonably clean, and care is used in assembling the engine. *continued on page 72*

DUCATI 860

continued from previous page

essary. Before a trip to Baja California, a 35-tooth rear sprocket was substituted for the 40-tooth original and this raised (lowered numerically) the rear ratio to 4.243:1, a much more "comfortable" ratio for highway cruising. Although the fuel consumption figure of 41 mpg was only slightly improved upon, the engine was much more "relaxed" and there was still more than adequate power throughout the speed range, even when packing double.

Braking qualities are very good. The Brembo front brake caliper closely resembles the British Lockheed double-acting unit and works just as well. The front brake disc is a cast-iron alloy and tends to rust easily, but the stopping power is there in spades. A single-leading-shoe drum brake on the rear provides good stopping power until it gets hot, but few touring riders are likely to get it hot enough to notice appreciable fade. Overall braking is *very good,* although not *excellent* like the triple-disc-equipped Super Sport.

Another interesting feature is the "idiotproof" method of rear chain adjustment using an eccentric swinging arm pivot. Two clamp screws (one on either side of the machine) must be loosened and the pivot turned with the special tool supplied in the toolkit. It's therefore impossible to get the rear wheel (and the chain) out of alignment while adjusting chain tension. Robert H. (Bob) Liebeck, PhD, an aeronautical engineer at Douglas who designed the wings and airfoils used by Dan Gurney on his USAC Eagles (and who often joins for us for a wobble in the dirt) pointed out that moving the swinging arm pivot point up and down would vary the "squat" characteristics of the rear-end. However, the difference obtainable would be so slight that probably 99.875 percent of us would never be able to tell the difference. Talk about splitting hairs!

Summing up, it should be pointed out that the Ducati is still a very singular type of motorcycle. All ball and roller bearings, expensive bevel gears and an extremely smooth powerplant, due in part to the fact that a 90-degree V-twin is easy to balance (the primary mechanical balance) and the firing impulses are such that they tend to relax rather than excite the rider . . . something akin to riding a cantering horse. The Ducati 860GT is an Italian answer to the GT concept as augmented (stifled?) by U.S. government safety and noise legislation, but is a thoroughly enjoyable touring mount with true racing heritage. •

CANNADY HONDA XL402

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If the Honda engine to be modified is going to be used for racing or "heavy-duty" cow-trailing Bell recommends the addition of a rectangular container heliarced to the rear of the transmission area to increase the marginal oil capacity of the engine/transmission which is a mere two U.S. quarts and hardly sufficient for racing purposes in the often 100-plus-degree heat found in Baja. An additional 10 fl. oz. is gained by doing this, and when oil is the engine's *lifeblood,* every little drop helps!

Strength of the XL350 seems to be adequate for the standard engine being used for its intended purpose, but when both the piston displacement and severity of usage are increased the transmission just can't take the added horsepower and its associated loading. Third and fourth gears are the ones most likely to give out and Bell modifies them by welding a steel plate next to the shifter fork groove and then making certain the gears are properly spaced in the transmission so that the "dogs" on the gears engage properly with the mating gears. Even with this modification the transmissions occasionally fail unless the rider is extremely careful about using the clutch when shifting.

For racing use Bell uses the clutch plates from a Honda Elsinore or a set of Barnett plates. Then the crankcases are put back together and the Webco kit is installed.

Moving up the engine we find the piston next on the replacement list. In order to gain engine displacement a larger piston manufactured by Venolia is used. The aluminum forging is shaped on top to give a compression ratio of 10.5:1 by the manufacturer and is run this way for shorter races. For the long-distance events in Baja the dome is slightly lowered with a file to reduce the compression ratio in an effort to keep engine heat to a minimum. Although the piston in the racing machines is 85mm in diameter (the same as a BSA Gold Star), the 71mm stroke, along with this bore size, gives the XL a piston displacement of 402.9cc (24.57 cubic inches), well under the 500cc class upper limit.

Slight reshaping of the combustion chamber is performed to make its outer edge compatible with the 6mm larger piston, but the area of the head where combustion takes place (i.e., everywhere *but* the edge) is left unaltered. The intake port, all too often "hogged out" by amateur speed tuners, it not altered in size or shape by Bell. He merely smooths the rough edges of the port walls and leaves the size unaltered which is most compatible with good midrange torque. However, a 36mm Mikuni carburetor is employed and works very well.

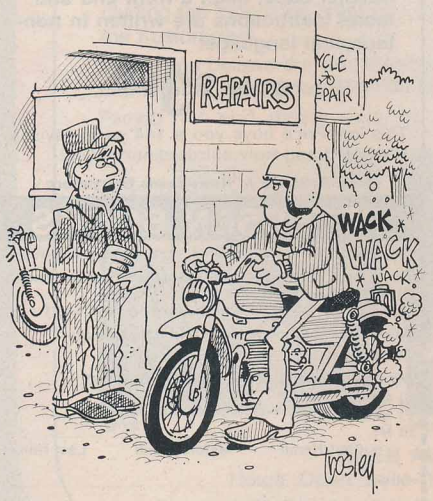
Farther upstairs we find a Web-

Cam No. 40AB camshaft. This grind works extremely well in producing a fat torque curve and good top-end horsepower without having to spin the engine unnecessarily fast. A glance at the dynamometer curve from Webco's ultra-sophisticated Schenck dyno shows the torque remaining *above* 22 lbs./ft. from just under 4000 rpm all the way up to a little below 8000 rpm with maximum power being generated at 7000 rpm. The horsepower curve shows a steadier climb to a maximum of 32.23 bhp than a standard XL350 does with its maximum of 22.73 at 6500 rpm. If there was ever a perfect power curve for Baja/desert racing, this one has got to be close to it!

To safeguard against valve float from missed shifts, and of course to keep the valves following the cam lobe contours properly, S&W valve springs and lightweight Webco spring retainers are used. A special exhaust system with the end in a megaphone shape is used, but in reality a perforated tube the size of the exhaust header pipe runs almost all the way to the end of the diverging cone which is perforated and has a fiberglass packing around it which helps knock the edge off the exhaust's "bark." No, it's not a legal U.S. Forestry Service-approved spark arrester, but it does help quiet the exhaust note.

Just as a safety measure, Bell has the camshaft bearing surfaces (where the camshaft rides in the cylinder head's aluminum bearing supports) hard-chrome-plated to preclude the possibility of the bearing supports galling under marginal lubrication conditions.

Any competent mechanic can install the Webco kit in his XL350, and certainly any motorcycle repair facility can perform the work. Is it worth the trouble? Just read on about the S.C.O.R.E. 500 . . . and next month we'll continue the story about chassis and rider preparation. •



"Of course I fixed it . . . it used to go wack-a-ding . . . now it just goes wack."

Catalogs

WEB-CAM

Camshaft pioneer Harry Weber has just released the latest edition of the Web-Cam Motorcycle Handbook, dealing with the total concept of additional horsepower in a motorcycle engine. Written especially about camshafts, it covers many other avenues of engines as well. Basic formulas for determining the correct camshaft for street and competition applications are also included. Send $1 to **Web-Cam, Inc., Dept. MC, 1999 S. Ritchey, Santa Ana, Calif. 92705.**

DICK'S CYCLE WEST

Dick's Cycle West, Inc., has just announced the publication of their fourth-edition catalog. This new catalog showcases the largest single source of custom Cafe Racer Special Equipment in the world today. The classic Racer I accessories have now been expanded to include all the popular superbikes. To see the latest cafe equipment, send $1 to **Dick's Cycle West, Inc., 304 Agostino Road, Dept. MC, San Gabriel, Calif. 91776.**

SI INC

SI Inc has produced a catalog that features the Strader Engineering line of Super Silent Fluidic Exhaust Systems. Strader builds pipes for most two-strokes, all of which have built-in U.S. Forestry-approved spark arresters/mufflers. Also available are two-into-one, four-into-one, and four-into-two systems for the big superbikes. Write to **SI Inc, 8819 Shirley Avenue, Dept. MC, Northridge, California 91324.**

SHELL RACING SPECIALTIES

Shell Racing Specialties has released their '75-'76 racing parts and accessories catalog that caters specifically to the 650/750 Yamaha. Featured are such items as piston kits, racing sleeves and rods, camshafts, Mikuni carbs, "TT" header pipes, rear disc brake kits, plus much more. If racing is your bag, then Shell is for you. Write to **Shell Racing Specialties, 3365 Century Blvd., Dept. MC, Lynwood, Calif. 90262.**

PACIFICO

Pacifico has made available their new '75 product catalog, showing their wide selection of "PAC" polyethylene gas tanks, the Pacifico Face Fender, System 2000 Fairings, and Pacifico's New Cafe Racer Fairing System. Also included are Super 2 Fenders, stock replacement fenders and mud flaps, plus much more. For more info write to **Pacifico Incorporated, P.O. Box 348, Dept. MC, Gresham, Ore. 97030.**

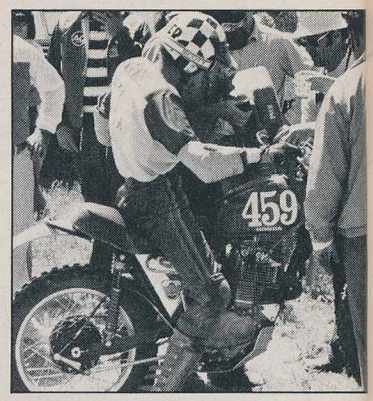
Preparation of the class-winning Honda XL402 was a joint venture and so was the riding responsibility. Although not a "team" in the strict sense of the word, the XL402s of Gene Cannady/Tom Garner and Al Baker/Gunnar Lindstrom started the race at the same time and ran very close to each other until the second check.

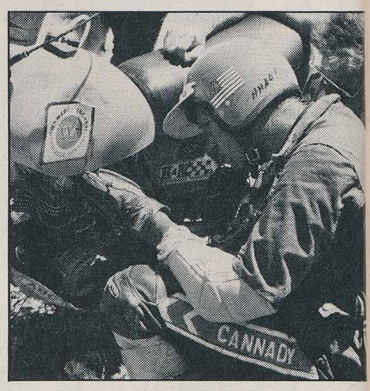
Blazing down the first stretch of asphalt the bikes, with Gene Cannady on the Webco entry and Al Baker on the Long Beach Honda entry, seemed very nearly equal in speed. They came into the first check almost together and at the second check Cannady was about a minute in front of Baker. At this point the bikes were leading the race overall as they were the third and fourth vehicles through the check and had started the race in 18th and 19th.

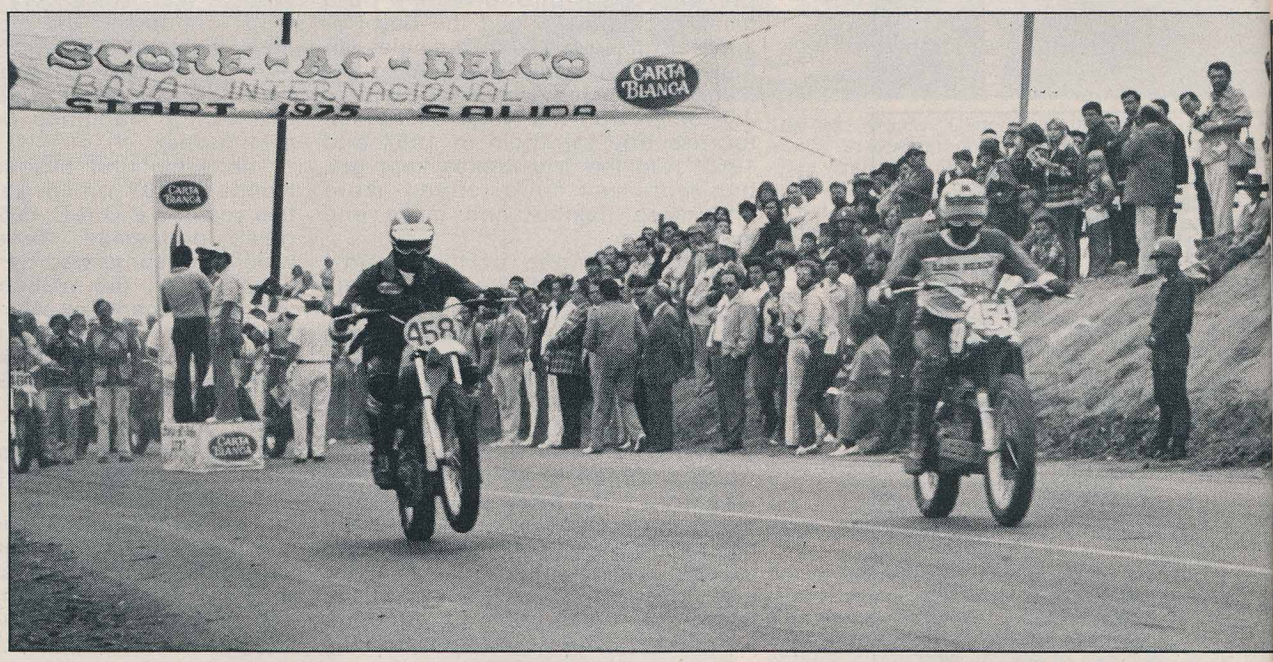
Shortly after the second check Cannady's engine began misfiring and the performance fell off markedly. After stopping twice to clean oil off the ignition points, Cannady limped into the third check several minutes after Baker. With the aid of Webco's Bob Hughes, Cannady inspected the point cam area as well as possible without dismantling the engine and elected to continue the race. It was obvious that the bike couldn't last much longer and it was touch and go whether it would make it as far as the next check at Camalu.

A subsequent teardown revealed the cause of the oil leakage: The camshaft bearing surfaces had been improperly hard-chrome-plated and the plating began to flake off, causing the camshaft bearing support journals in the cylinder to gall badly. With the camshaft able to *flop* up and down, the oil seal behind the points was destroyed, and, as an added liability, the cam timing was also changing.

Baker rode the first part of the race and modestly admitted that the overall motorcycle winners, Larry Roesder and Bruce Ogilvie on their Harley-Davidson SX250, were "really smokin' down the road" and probably would have won the overall motorcycle award even if they (Baker/Lindstrom) hadn't experienced some difficulty after Lindstrom took over for the last part of the race. After Gunnar hopped aboard there were several very short time lapses caused by unknown problems, and a major one after he slid off the road and down into a ditch. But there wasn't enough of a delay to knock them out of first place in the 500cc class. And it's not inconceivable that one of these machines could be the overall

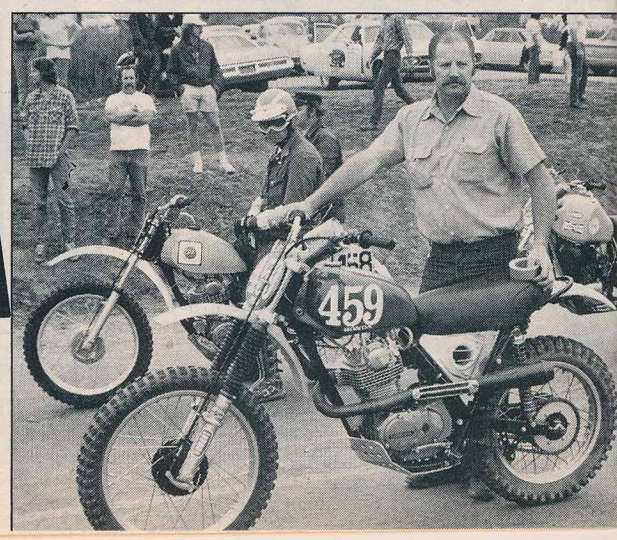






IN BAJA

Sometimes even the best laid plans go awry!



motorcycle winner at S.C.O.R.E.'s Baja 1000 which will be held in November.

Due to a lack of space and some unanswered questions regarding protests and the "legality" of the overall win by a single-seat dune buggy which was pushed the last three miles to the finish line by a truck, only the motorcycle class finishers will be given, without comment. •

S.C.O.R.E. "AC-DELCO BAJA INTERNACIONAL"

OFFICIAL RESULTS

Class 20—125cc or under:
1 Eric Jensen/Carl Cranke (Penton)
2 Joe Padilla/Mark Barber (Husqvarna)
3 Charlie Hammil/Larry Froelich (Penton)
4 Paul Eddy (Yamaha)
5 Lee Fabry/R. Devonshire (Husqvarna)

Class 21—250cc or under:
1 Larry Roessler/Bruce Ogilvie (Harley-Davidson)
2 Andy Kirker/Ron Wright (Yamaha)
3 Mike Maze/Ben Maze (Bultaco)
4 John Bilkey/R. McCallister (Bultaco)
5 Bill Halbert/Richard Finger (Husqvarna)

Class 22—251cc or over:
1 Al Baker/Gunnar Lindstrom (Honda)
2 Bill Conroy/Kevin Hasten (CZ)
3 Steve Staats/Will Staats (Yamaha)
4 J.B. Wise/Richard Harris (Husqvarna)
5 Adam Padilla/James Jasper (Husqvarna)

Top: Baker is refueled at the third check by Bill Bell, still enjoying the overall lead . . . **Above:** . . . but Cannady trundles into the third check several minutes later. Here he and Webco's Bob Hughes check out the oil leak.

Above left: At the start Cannady gets the front wheel slightly airborne while Baker motors off more gently.

Above right: An elated Bruce Oglivie finished the race on his Harley-Davidson SX250 some 13 minutes ahead of the next motorcycle (on corrected time).

Bottom: Long Beach Honda's Bill Bell waits for Al Baker to climb aboard at the start. Gene Cannady, on the Webco-sponsored "sister bike" is mounted up and ready to go.