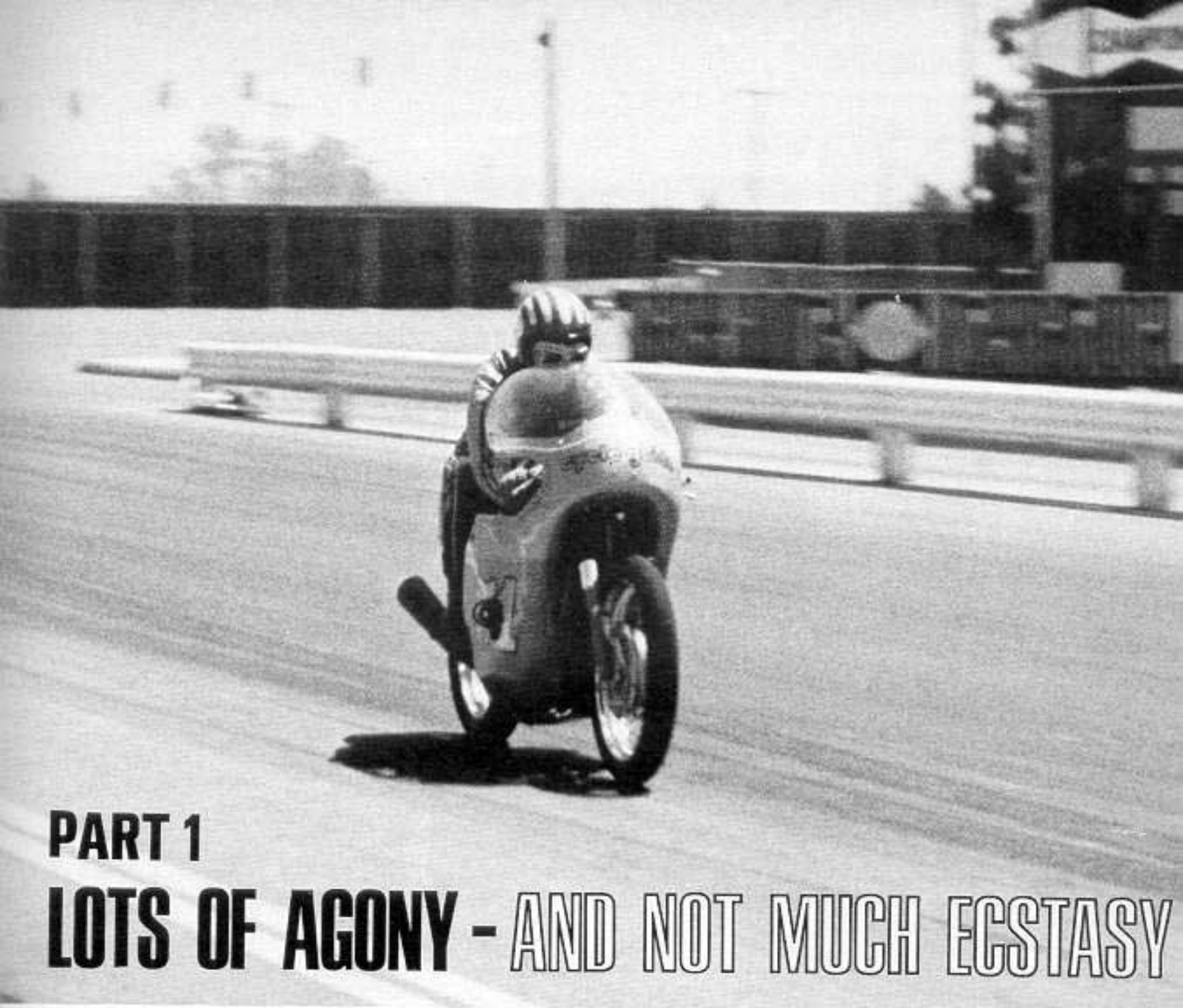


PART 1
LOTS OF AGONY - AND NOT MUCH ECSTASY

What started out to be an interesting project has turned into a year long effort filled with agony, frustration and bitter disappointment, but we learned a lot and the ending is a happy one.

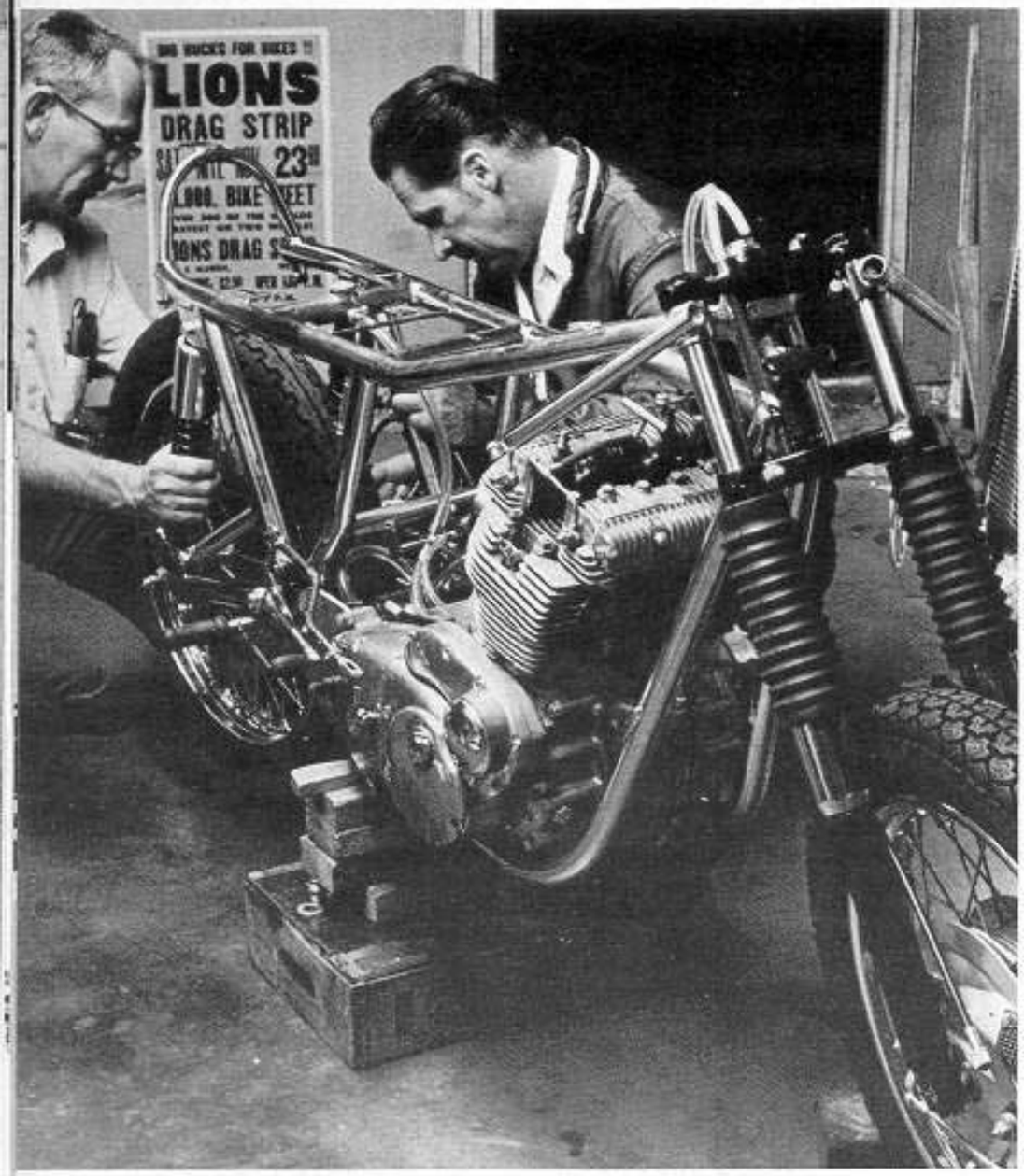
by Bob Braverman

This whole thing started about two years ago when I rode Tom Cates' bike at Bonneville. They took a stock BSA Rocket 3, hung a set of Amal GP carburetors on it and we went racing. With a Track Master flat track frame, plus a Yamaha fairing, the bike ran 140 mph consistently all week long. After removing the Grand Prix carburetors and substituting the stock units, to our surprise, we found the speed had only dropped like one or two miles per hour. All this proved was that the GP carburetors weren't set up properly since it's a fact these items, when properly tuned, will deliver four or five miles per hour more at the top end.

Anyway, Tom and Jim Pearson left Wendover to go to the Sedalia miler (which Jim Rice won, by the way, on the same bike that weekend) and I went home. The ensuing months were spent building our streamliner, but always in the back of my mind I kept thinking about how fast that BSA had gone with virtually no modifications whatsoever. Once the streamliner project was drawing to a close, I decided to try and put together a machine based on the Rocket 3 power plant I had ridden the year before. My first impulse was to use the standard frame since it handles well, but then I began to think about all that excess poundage that I'd be forced to haul around, since I was planning to build a road racer and not just something for straight-away racing.

We were down at Steen's one day picking up a bike for road test when I happened to eyeball a Rickman frame with a 650 Triumph in it. It looked like an awful lot of room for that 40-incher, so I casually tape measured the engine cavity in the frame and discovered to my delight there was far more room in the Rickman frame than there was in the standard BSA 3. This was nice for two reasons. Number one, I could put the engine virtually any place I wanted, (to get the proper weight distribution) and secondly, there was more than enough room for a battery box and any other accessories I might need to supplement the engine.

After getting the frame home we blocked it up and slid the engine into position. My original suppositions were quite correct. There was plenty of room and I could put the engine virtually anywhere I wanted to. At this point I was faced with the decision of what to use for forks since I really didn't want to use the original BSA items. I tried to get a set of the road



Jack Byers came over and gave me a hand on installing the rear wheel and had a few words of advice on the Rickman frame.

racing Ceriani forks, but unfortunately the factory or the dockmen, or somebody, was on strike in Italy and nothing was moving off the pier. I was told that it would just be a matter of a week or two until the parts would arrive. This isn't quite the way it worked out. What finally happened was the forks were finally available two days before I was ready to leave for Bonneville, and I was afraid to start dismantleing the motorcycle for fear there would be something I would need and couldn't get at the last minute. So the decision to stick with the BSA forks was made, but then again, I'm getting ahead of the story.

The main reason I didn't like using the standard BSA forks was that at high speed there is this stability problem. A good portion of this stems from the very mediocre axle locking arrangement. For a road bike, this is fine, but for a real high speed machine, it isn't the hot set up. Anyway, I figured as long as the Ceriani units are coming in, why not fit up the BSA items just to test the chassis and get the bike up on wheels. The only frame alterations that had to be made were to remove the bottom cross members and cap the holes since oil was carried in the frame on the Rickman frame.

I originally didn't plan on using the standard oil cooler because I figured there would be more than enough surface area on the frame to help cool the oil. Therefore, I felt I could eliminate the extra lines plus the oil cooler itself. The people at BSA warned me against this. They told me the engine runs very hot and every bit of cooling I can introduce is worth the effort, and they were right. I was to find out later just how true those words were.

By doing a lot of wheedling, cajoling and politicking, I was able to borrow a set of Daytona camshafts, a factory fairing and seat (actually they gave me the seat since it had been crashed anyway) and a lot of other

This is the remains of the Rocket III after dismantling it for the needed parts.

Buddy Bates (Torque Engineering) built this intricate header system for the Triple. Then . . .

information that I needed to complete the project. While all the mechanical nonsense was going on, I brought the fiberglass items over to Bob Von Sol's paint shop. He did a really knocked out job. Put a lot of labor into cleaning up the rough fiberglass pieces. The end result was something that looked so good, I even had reservations about racing it, but those reservations didn't last for long.

Jim Pearson from BSA helped me put the engine together (I should say I helped him since he did most of the work). The big fly in the ointment

. . . he built this long, long megaphone as per the factory exhaust system specs.

The end of the megaphone had to be cut and tucked in because it stuck out in the breeze. This method of holding it to the frame didn't work and the mount had to be redone.

Bob Van Sol had to do a lot of patch work to save the crashed factory seat. He used a lot of time and elbow grease to . . .

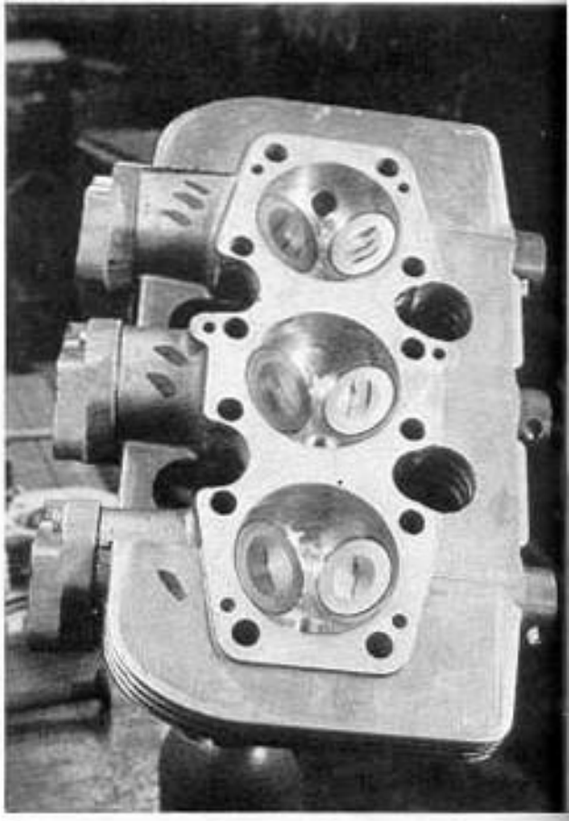
. . . prepare and paint all the fiberglass parts. The color scheme he came up with was out of sight. When the paint had dried, Walt did the striping.

was the camshafts. I couldn't get them until just before Bonneville time. As a result of this, the engine had to go together on a crash program. C. R. Axtel, the four stroke tuning wizard of southern California, had done a complete head job and it came back just about the time the camshafts arrived so the whole engine was now able to be assembled. I had three separate carburetion systems for it. The first set was the tried and true GPs. The second was some Lake units and the third was a trio of 30mm Mikunis, not unlike those found on the 250 Yamaha road racers. The interesting thing was the bike started easier, had better throttle response and seemed to run cleaner with the Lakes on it than with either of the other two carburetion arrangements.

Originally the plan was to utilize one of the Grant Industries' CDI ignition systems. This package was used in conjunction with the Victor Products replacement unit for the standard three-point distributor set-up. At best, the three-point ignition is mediocre. That's about the nicest thing I can say about it. The Victor Products unit is a single point job with a three lob cam. It's a plug together affair that is strictly a bolt on arrangement, and it works. It takes but a fraction of the time to set the ignition timing as compared to the factory Lucas parts.

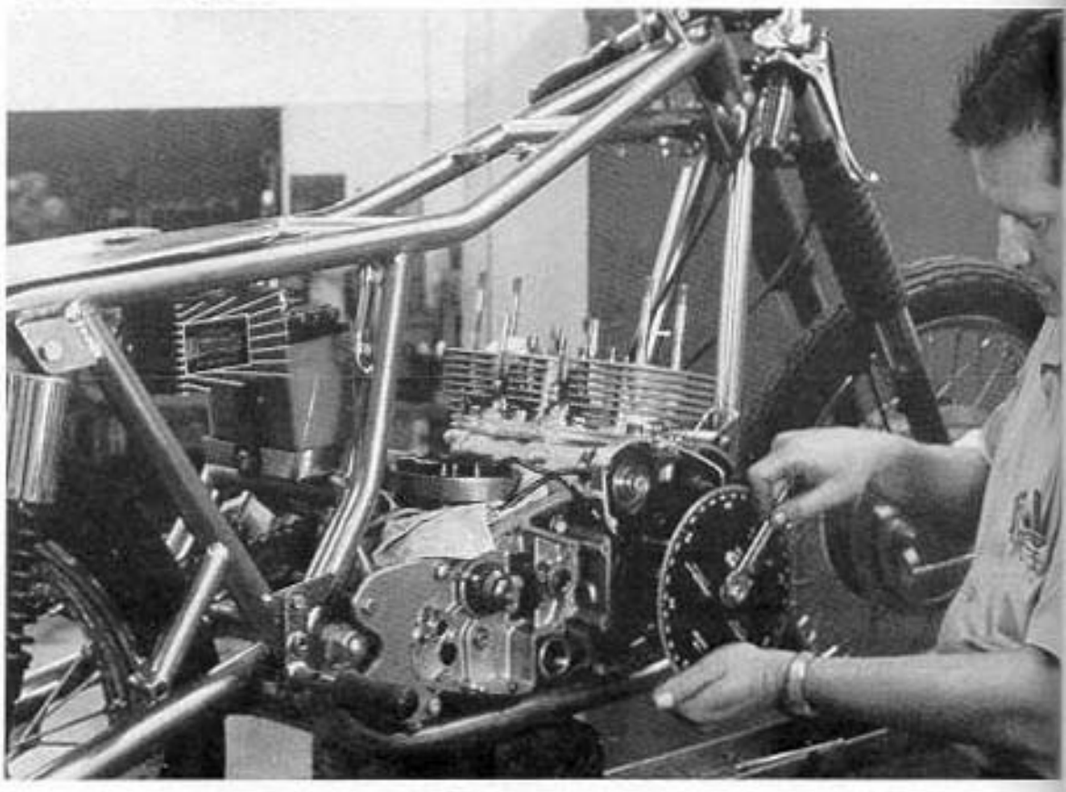
So here it was, just a few days before leaving for Bonneville and we were scrambling around like crazy trying to finish the bike up by the time we were to leave. It wouldn't have been any problem had we been able to get the much needed camshafts. Unfortunately we had to wait for almost four months before they arrived. As a result of this, our plans were considerably set back and it took some last minute crash programing to get the bike finished up in time to leave. The only opportunity we had to run the motorcycle was a couple of days

When all the porting was finished, this is what we saw when peering down the exhaust port. The head flows much better than it did when stock.



With the oversized valves lapped in, this is what the head looked like before assembling the engine.

Jim Pearson was a big help in giving me a hand in assembling the engine, since time was rapidly running out.



before leaving for Bonneville.

I went out to Orange County raceway and put on a lot of miles trying to get the thing sorted out. What appeared to be a bad carburetion problem ultimately turned out to be ignition. What was happening was the CDI unit was putting out so much power, the high tension leads were cross firing and the engine sounded for all the world like it was carbureting poorly. Once I found out what the problem was it was easily corrected. We slipped some clear heavy wall fuel line tubing over all the high tension leads and were able to keep the H. T. leads separated enough to prevent any further problems. The bike seemed to pull pretty strong so I was quite confident we would put up a pretty good showing on the salt. This was not to be however. The machine never really did perform the way we expected. (Which is putting it very mildly.)

Everything that was possible to be done to the engine was done during speed week, but unfortunately all that work was to no avail. Nothing we did helped one iota. The bike ran as consistent as a train, but never more than 125 mph. The speed never varied. It was always between 124 and 125. We changed ignition systems, (the CDI unit burned out after two days), carburetion systems, valve clearances, (to try to get different cam timing) but nothing seemed to help. At this time, I began to feel more than ever something was wrong inside, something very wrong.

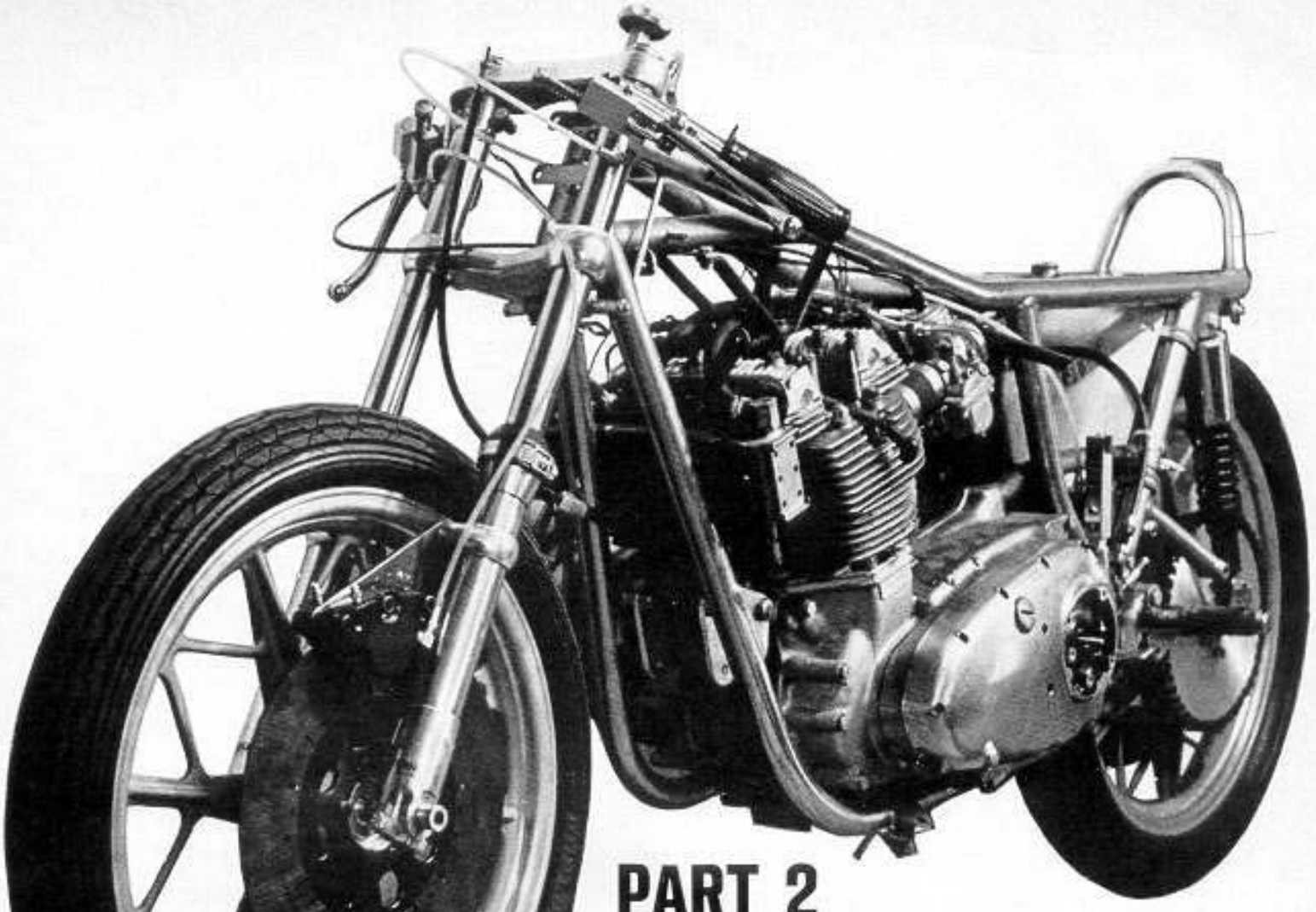
By the time we had concluded all of our testing and had tried all of the various combinations, speed week was over and it was time to go home. We were all very discouraged, but this sort of thing does happen from time to time and it's necessary to roll with the punches. Otherwise this racing business would drive you right out of your mind.

Next month I will let you in on what it was we found and how we corrected it, not to mention some very surprising facts that turned up once we were in a position to put the bike on the dyno. I think you'll be as surprised as I was at what we found. See you next month.— ***CG***

A set of high compression pistons were put in after cutting down the crown to provide valve clearance. Compression ratio is 11.2 to one.

With the bike all finished (or so I thought) we trudged off to Bonneville. Notice how flat the underside of the fairing is in the picture . . .

. . . and compare it to this one that was taken as the machine approached the traps at about 125 mph. The factory fairing appears to need more development.



PART 2

LOTS OF AGONY - AND NOT MUCH ECSTASY

After returning from Bonneville, the problem child sat for two months awaiting new magnesium cast wheels and disc brakes. We still had to take the engine apart and find out what went wrong. ***by Bob Braverman***

The first thing we did after returning from Bonneville was remove the standard BSA fork assembly and replace it with road racing Cerianis to improve overall high-speed stability. This is a relatively simple task because it is a bolt-up operation and doesn't require any particular machine work.

The wheels, engine and brakes are another matter entirely. After waiting forever—it was actually nine weeks to be exact—the mag wheels and disc brake setup was finished. After the original single disc on the front was installed, we decided to go to a twin disc setup with a safety feature built-in. If one brake failed, the other one would still work.

Since we had to ride this bike, we wanted all the protection we could get. As this is being written, the second disc and the new brake components are being installed.

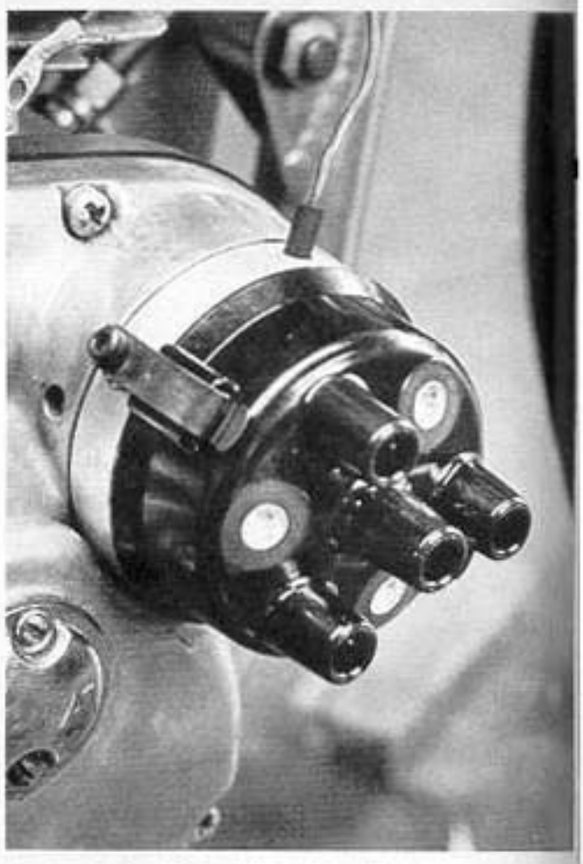
The Kimball-Tabloc wheel and brake setup are impressive and distinctive. How they will operate is still unknown. But if appearance and quality are criteria, they should be instant winners.

Completing this portion of the work, we and a friend of ours took the engine apart and degreed the cams to determine if possibly this was the problem. We strongly suspected that the intake cam had been improperly timed. While at Bonneville running flat out at 125 miles an hour, we looked underneath the fuel tank for a clue to what was wrong. The top speed was at least 25 mph under our expectations. Surprisingly, we saw vapor being blown back out of the carburetors. We first thought that somehow, the valves had tangled or the intake valves had struck the pistons and bent them, allowing the mixture to blow back through the inlet tract.

A later compression test proved the valves were in good operating condition. After that, we were very careful not to overrev the engine since we had been warned repeatedly that the factory Daytona cams would not allow the engine to be turned over 8,000.

Later, however, while in England, and talking to a friend, we discovered

Mike Libby helped me out with degreeing in the cams before taking the top end apart.



A reworked standard ignition cap and rotor is included in the distributor kit. All the new BSA factory bikes use this unit.

The complex stock three-cylinder ignition system (right) was replaced with the slick Victor Products single point set-up.

this was not true. Instead of 8,000, we should have been able to turn nine grand with no problem. But, despite our efforts, the engine wouldn't turn 8,000.

Once the engine was disassembled, a degree wheel was installed and we finally discovered the problem. Both the inlet and exhaust cam were out of time by 10 degrees. The intake was closing 10 degrees too late, allowing a good portion of the inhaled mixture to escape through the not-yet closed valve as the piston started upward on the compression stroke. Additionally, the exhaust cam was opening 10 degrees too early.

The sad part of this was that we could blame no one but ourselves. The figures we were given (Jim Pearson and I) were the figures we used to time the engine when it was first assembled. We had even checked them at least three times to be absolutely sure there would be no problems.

We're still upset about that.

The cams have now been retimed and are back in the engine. We have every reason to believe the engine should work quite well. We also switched to the standard three cylinder BSA carburetion system after learning we were using too large a diameter carburetor. We ordered new GP carburetors, but they have not yet arrived. To expedite the project, we reinstalled the standard carbs which should be adequate for the time being. While we wouldn't select Amal carburetors, they work so well on both the Triumph and BSA triples that we're going to have to eat some crow.

After removing the head we discovered the valves had been touching the edge of the pistons because of the valve timing being incorrect. Mike took the valve gear apart and checked everything out. Everything looked great.

C. R. Axtel (right) and Nick Deligiainis checked out the cam timing when we first started taking the engine apart. The bump sticks were way off.

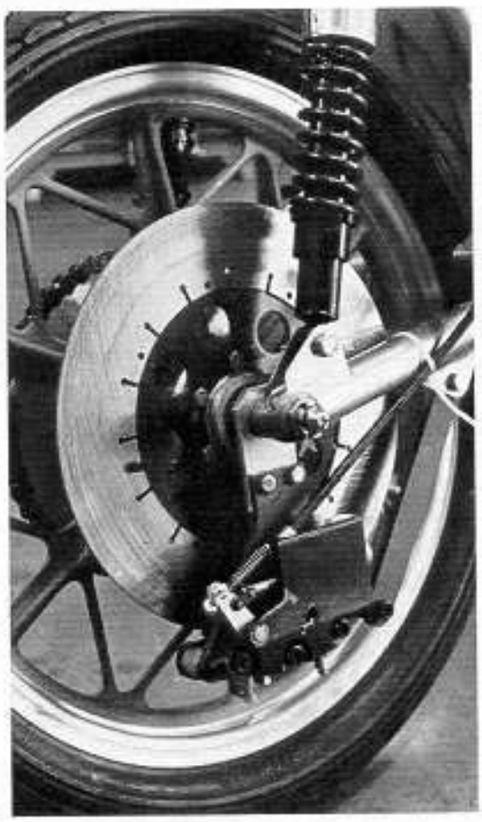
We don't think anyone else has criticized the Amal carburetors more than we have.

We spent several days reassembling the engine and cleaning the chassis before installing the remaining front brake parts and firing up the engine. We had to know just what effect our retiming the cams made.

One thing we strongly recommend to anybody considering modifying a triple is using a Victor Products single point ignition system to replace the stock Lucas plate. The single point system operates far superiorly, installs with more ease and will stay tuned at least twice as long.

The whole thing is a bolt together operation and shouldn't take more than a couple of hours, even if you have 10 thumbs. So far, everyone who has tried one of these little beauties has improved the performance immeasurably. It does present a problem, if you're running a fairing, but this is a small price to pay for the improved performance you get.

In the next installment, you will find out just how good these new mag wheels and disc brakes work and what the engine changes did to our performance. ***CG***



The new Tabloc magnesium wheels and double disc front brake set-up looks mighty impressive. One disc has been removed for clarity.

On the rear we installed a conventional disc set-up except for the Tabloc double acting caliper with a built-in master cylinder.

E GUIDE'S 70 HP SUPER PROJECT

- ROAD TESTS:
125 SUZUKI. 350 HONDA

PART 3—CONCLUSION

LOTS OF AGONY - AND NOT MUCH ECSTASY

As our story draws to a conclusion, we're delighted to report our project is a complete success. It was a lot of grief but worth it. **by Bob Braverman**

At the conclusion of the last installment, we had completed redoing the engine and installing the mag wheels and disc brakes. After bringing the bike back home, we were fortunate enough to have a four day weekend to get it back together again. With magazine schedules being what they are, it was another week before we could wangle the time to take the motorcycle back to Axtel's dyno and see if the work, anxiety and frustration would pay off.

It had been six months since we returned from Bonneville and we still weren't sure we knew what was wrong. During the reassembly, we had decided to try the original 27mm Amal concentric carburetors instead of any of the trick set-ups. We expected the power output to be less

The original mechanical dual cable hook-up proved to be troublesome and ineffective.

Once a heavier cable was used (it was necessary to use ⅛" cable), the single rear disc unit worked great.

Standard road racing Ceriani forks replaced the stock BSA items. No more wiggles at the top end.

than it would be with Lake's, GP's or Mikuni's, but we were wrong. The stock carbs gave better performance than any others we tried. The reason may be the smaller size. The other carburetors were 3mm to 5mm larger, and the air velocity through the larger venturis may have dropped enough to impair the efficiency, even at high RPM's.

With the stock set-up, the engine pulled strongly from 4,000 RPM on up. At 7750, it developed slightly over 70 hp at the rear wheel. The power peak is supposed to be between 8,000 and 8,200, but we couldn't get a reading above 7750 because of a high speed miss that appeared. After checking, we found the spring inside the distributor which adheres to the moveable point was weak. These were the original points, but there was not enough time on the engine to have caused much wear. With the ignition problem, there was no advantage in any further dyno running. We were satisfied with the readings, for the time being anyway.

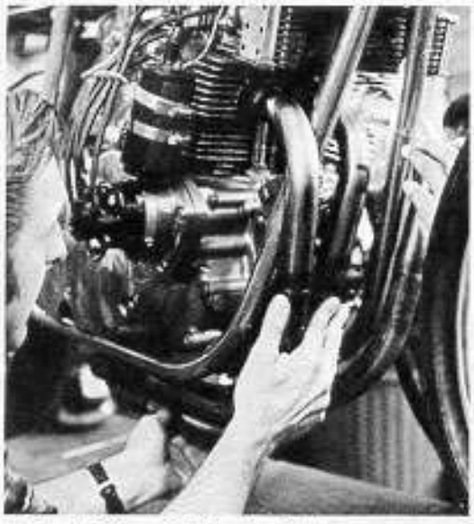
We bought a replacement set of ignition contacts and discovered the new unit had considerably stiffer springs. Apparently the factory had encountered the floating point problem and changed their manufacturing specifications. After installing the new points, we took the bike to Kimball Industries to complete the front brake installation.

We had decided that twin discs were necessary, and assumed the addition of the second disc and master cylinder-caliper unit would be a simple bolt-on operation. The object was to provide an added margin of safety. If one master cylinder or caliper unit failed, the second would provide partial braking power. The problem was the mechanical linkage between the second master cylinder and the hand brake lever. It required two cables hooked up to the single lever. We used parts from a Yamaha roadracer, which has twin front brake cables. This linkage was not precise enough to allow proper adjustment of the critical twin master cylinder-caliper units.

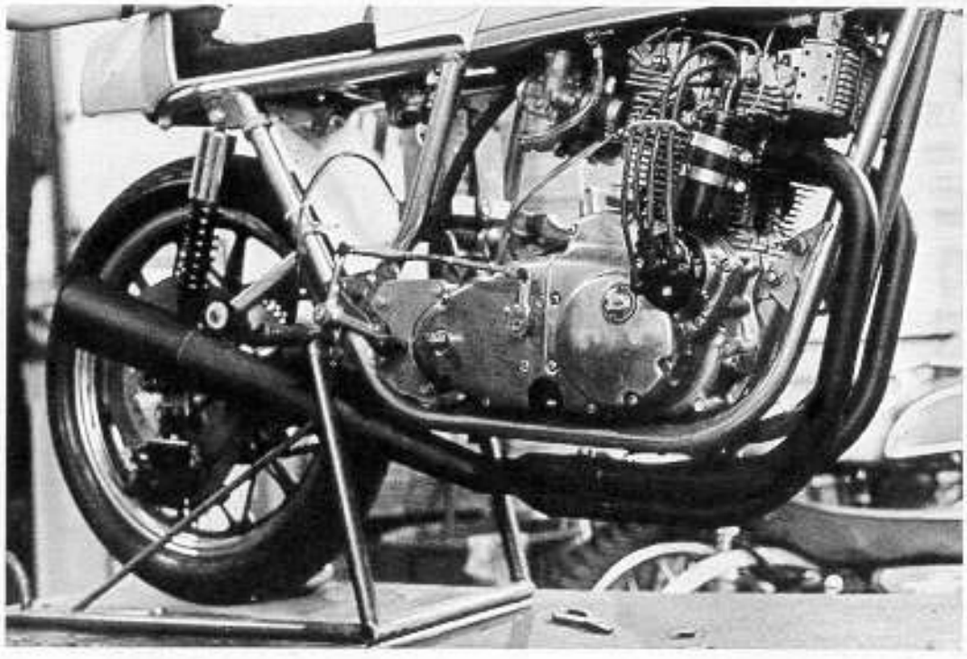
The magazine deadline could not be put off, so we had two alternatives. We could settle for a single disc brake on the front wheel, or we could try removing one master cylinder from the twin disc assembly. The single remaining master cylinder could provide hydraulic pressure for both sets of calipers through a connecting hydraulic line. This would require only a single cable from the master cylinder to the hand brake lever, and provide self-equalizing hydraulic pressure between the two caliper units. We chose the latter option for the obvious advantage of twin disc braking.

We worked most of the night to complete the modifications. Then we took the bike home to install the fairing mounts and fiberglass fairing.

The following day, we went out to Orange County Raceway to see how the bike performed under actual racing conditions. The first thing we encountered was a carburetor flooding



Bob Bailey fabricated the new exhaust system with specs obtained from the factory units. The new pipes made a big difference.



Here's what the completed exhaust system looked like after working all night to finish it up.

Dyno testing our jewel at Axtel's repeatedly produced astounding readings of over 70 H.P. at 7750 RPM.

In order to use the distributor, it was necessary to cut a hole in the fairing to provide clearance.

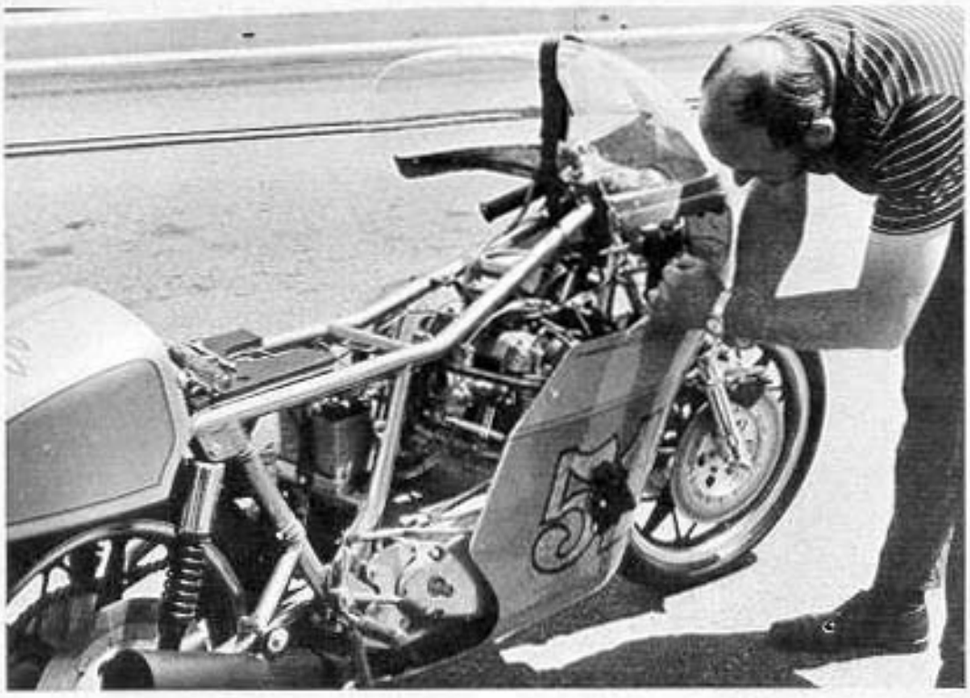
problem which had not shown up on the dyno. This is unusual, because dyno running is normally harder on a bike than a track is. We found the float level was too high, apparently a borderline case. We never did cure the problem completely, but we improved things enough to run fast enough to check out the engine and brakes.

For a relatively mild engine, the performance was impressive. With short course gearing, the BSA Triple would accelerate quickly to 145 mph in top gear, where the tach redlined at 8,000 RPM. It took several laps for the brake pucks to seat in. We used them progressively harder until in a few laps we could get on them hard enough to scrub off approximately 100 mph, in order to make a tight left hand turn at the end of the straightaway, which is slightly over a half-mile long. Looking through the fairing opening for the forks, we could see the tubes bend slightly backward from the braking force. This vindicated our judgement that twin front discs were necessary. The bike weighs 350 pounds and is capable of 155-165 mph with the proper gearing. With that kind of performance, you can't compromise on brakes.

When the brakes had bedded satisfactorily, we could get on them hard enough at 100 mph to make the front tire smoke. We didn't have the hair to try this at top speed, but we were satisfied it could be done. In a few hours on the track, the discs turned blue from the heat generated by the hard braking, but they never warped. We were surprised, because they're only ⅛" steel. Maybe on a very hot day, some warpage would occur, but it didn't on our test. It was never necessary to use more than two fingers to apply all the pressure required for the front brake, which allows the right hand to retain better throttle control.

Tabloc and Kimball Industries teamed up to produce the disc brake unit. They offer a 3/16" steel disc for racers who think they need it. The ⅛" disc should be more than adequate for any street bike application. You should use nothing less than ⅛" steel cable for connecting the master cylinders to either the rear brake pedal or front brake lever. We found smaller sizes were not satisfactory. We ended up using the front brake cable from the Harley Sportster. The cable and housing are beefy enough to work perfectly.

There has been a lot of argument about the relative merits of magnesium wheels versus the conventional spoked units. We could not detect any difference in operating efficiency between them. The magnesium wheels have the advantages of being abso-



It took some additional jet work to get the engine sorted out the first time we went out to Orange County raceway.

Linden Grainey from Kimball Industries came out to give me a hand and keep check on the new disc brake setup.

lutely true, strong as a house and maintenance-free. The weight of the mag, and spoke wheels are the same. The cost is about the same for either type too, so our recommendation would depend on the project. If we're building a machine and have to buy wheels, we'd use the magnesium variety. If we had a bike with standard wheels that were satisfactory, we'd stick with those.

We've heard some wild stories about how mag wheels do weird things which require tricky chassis adjustments and suspension modifications. The truth is if anything is going to move around, it's likely to be the tire rather than the wheel. Action photos show that roadracing tires have little deformation at high speed. They're designed that way. So, it would seem that chances of wheel deformation are slight enough to be ignored.

Magnesium wheels cost about $100 apiece, which is close to the price for spoked assemblies. The manufacturer claims the mags can be run tubeless. We haven't tried it, but if it works it would save a couple pounds per wheel.

The Rickman chassis proved extremely stable at all speeds. It was also forgiving in emergencies. On one occasion we missed a turn during our test, and slid out onto the dirt border. The speed wasn't too great, maybe 65-75 mph, but the dirt was pretty lumpy. As the bike drifted off the asphalt, it bounced around a bit so we raised up off the seat to get some motocross practice. In spite of the bike being leaned over when it entered the dirt, it was able to be steered back onto the pavement with no more effort

After repeated hard running, the discs turned blue (all three), but they didn't warp and the brakes worked fine.

than it takes to read this. Maybe it was luck, and we won't intentionally repeat it to find out, but the Rickman frame and Ceriani forks did what was expected of them. We're sold on this combination because it works. We may find it necessary to reinforce the swing arm. We noted a very slight flexing at high speed. If it proves to be the case, it's a simple matter to correct.

It was just a year and a half ago that we started this project that was supposed to take four months. Since then we've had our share of work, hassle and frustration. We won't bore you with the details, but the acceleration of our aging process has confounded the medical authorities. Now that the bike is sorted out and performing as expected, we think it was worth it, although there were times when it was doubtful. As usual with a project like this, if we didn't have the help of a lot of people who know more than we do about certain things, it wouldn't have been done. Expan-

Continued on page 84

We ran into some carburetor flooding trouble which was traced to an incorrect float level. We changed plugs a few times before the problem could be traced.

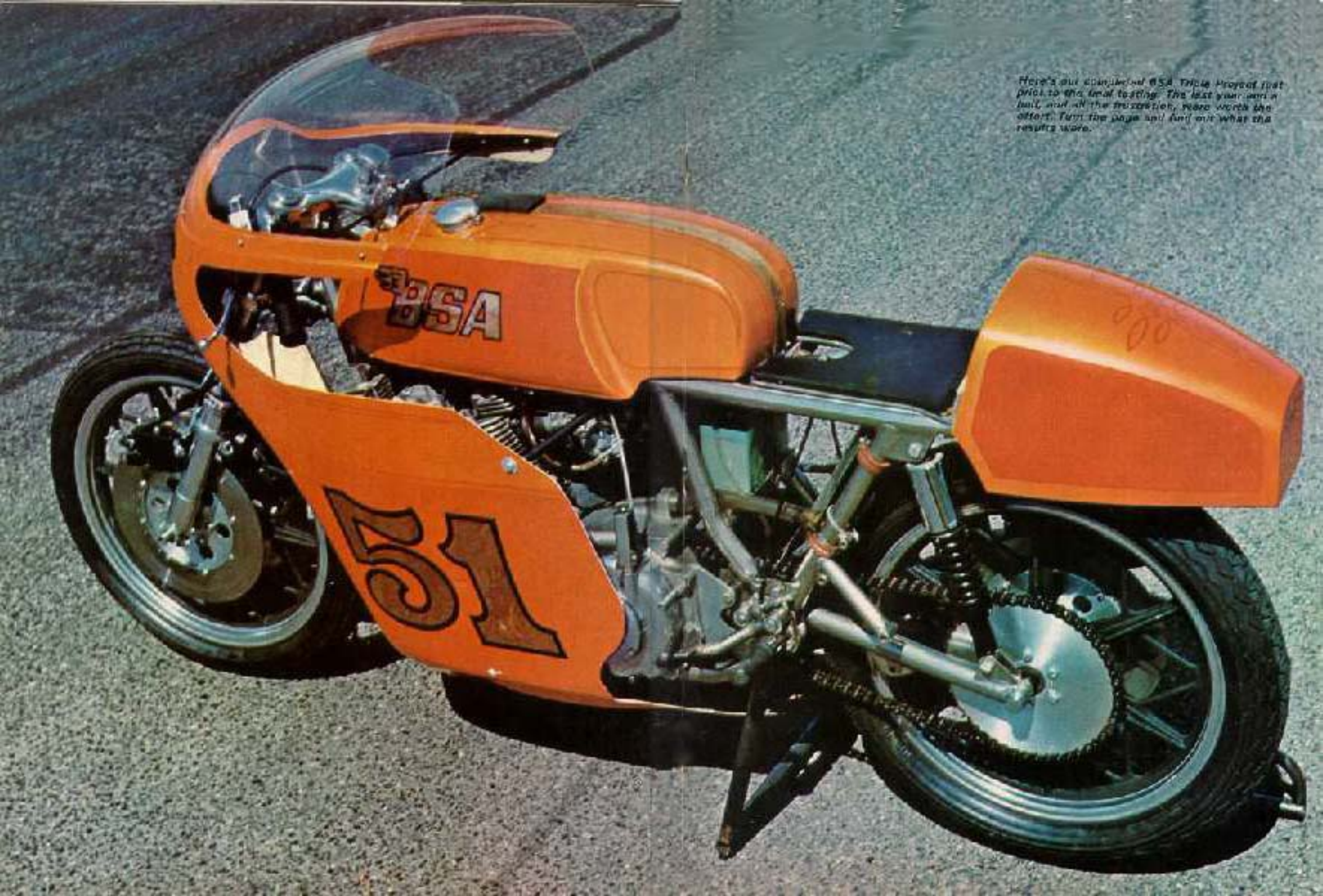
LOTS OF AGONY

Continued

sion chamber expert Bob Bailey stayed up all one night to build the exhaust system. It is so successful, Bob has decided to market the item to anyone who wants to race a three cylinder four-stroke. C.R. Axtel and Mike Libby devoted many hours of effort, and their facilities, to help us get the engine straightened out. Dave Kimball of Kimball Industries and Manny Harriman of Tabloc never gave up until we had the brakes working right. Bob Von Sol did the super trick paint job that looks as good as new after 18 months, which proves quality always tells. To all of these and various others who pitched in when needed, our sincere thanks. And please don't go away because we may need some more help.

We think the bike is beautiful, and exciting to ride. Though it's running well now, we're going to tinker with it to try to improve the performance. It shouldn't be too difficult. The engine is still fairly mild, with cams, high compression pistons, a head job, Victor Products single point ignition and Bob Bailey's exhaust system. This combination has yielded over 70 hp at the rear wheel, and close to 80 at the crankshaft. It's doubtful the engine was developing more than 40 hp at Bonneville, since the bike would only run about 125 mph there.

One thing we're convinced of is that a few well selected components will yield large dividends. It isn't necessary to go to a lot of exotic parts and major rework to get more power. The simple way is cheaper, more reliable and usually more effective. Now that this project is going pretty well, we can start to work on some others we have in mind. With the continual growth of motorcycle technology, it's doubtful we'll ever run out of projects. We hope not, anyway. ***CG***



Here's our completed BSA Triple Project just prior to the final testing. The last year and a half, and all the frustration, were worth the effort. Turn the page and find out what the results were.