

1/4-Mile Performance

Yamaha 650 Seca

Stock Motorcycle Baseline	13.39 sec. @ 98.90 mph
K&N stock replacement filter	13.33 sec. @ 98.46 mph
No filter element	13.34 sec. @ 98.36 mph

Suzuki GS 1100

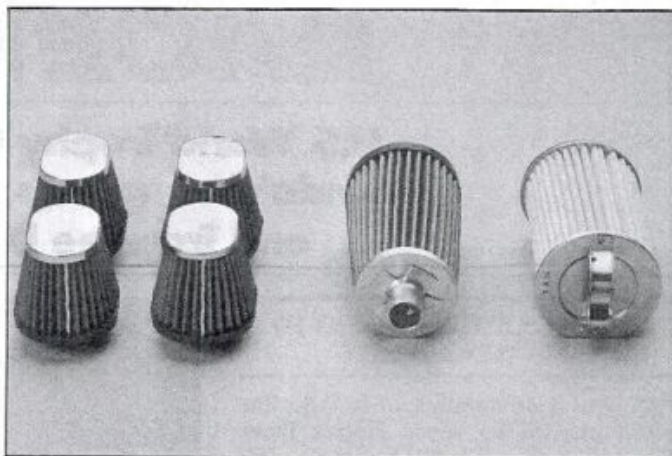
First Test Session

Stock Motorcycle Baseline	11.30 sec. @ 119.36 mph
Kerker KR pipe, stock jetting	11.13 sec. @ 122.44 mph

Suzuki GS 1100

Second Test Session

1. Stock Motorcycle Baseline	11.18 sec. @ 119.68 mph
2. Kerker KR pipe, stock jetting	11.11 sec. @ 120.48 mph
3. Kerker KR pipe, airbox lid off, 122.5 Main jets	11.13 sec. @ 120.00 mph
4. Individual K&N airfilters, Kerker KR pipe, jetting as described in text	11.42 sec. @ 119.56 mph



Air filters for the GS1100 include the individual K&N filters at the left, the stock filter on the right and the K&N replacement filter in the center.

the position they were in during the dyno runs, still considerably down from the stock position. A study of the dyno sheets showed that the jetting had been headed toward the lean edge at 3500 rpm, so the 30 pilot jets were bumped up to 35s. These two changes were adequate to make the bike rideable, and we put several hundred miles on it with this setup. However, carburetion still left something to be desired. The engine ran slightly rich on the pilot and needle, and didn't seem to run as strongly as it should on the main jet. A check of the carb synchronization showed that it was off, and correcting it offered some improvement in throttle response. (Suzuki calls for the idle synchronization of the carburetors to be set slightly off deliberately to compensate for airbox effects at higher engine speeds, but this is unnecessary if the air box is removed.)

At this point, the jetting was still far from providing the quality of carburetion that the GS had had in the stock condition, and some of the changes had been completely unexpected. Why did the pilot circuit require smaller jets, and why did the needle have to be dropped, when the airbox had been removed? If it had been restricting flow, shouldn't the low speed circuits require richening instead of leaning? We went straight to the source for answers to these questions and talked to Mikuni engineers.

They told us part of the problem was that we were using the wrong type pilot jets. There are two styles of almost identical Mikuni pilot jets, one intended for the slide throttle VM series of carburetors, the other for use in the constant velocity BS series. The orifice size is identical for both styles of jets with identical numbers, but the orifice location within the jet body is different. When the VM style pilot jet is used in a BS carburetor, a leak path exists around the ori-

fice, and the jet flows more fuel than its orifice size would indicate.

Yoji Hirose, a Mikuni engineer who had worked with motorcycle factories on new model jetting, made some general comments on motorcycle tuning. He said that the factories spend literally months coming up with airbox, carburetion, and exhaust systems, and that they generally design these to give a flat torque curve, without bumps and hollows. The intent is to give maximum power with this flat torque curve while complying with noise and pollution laws, and generally the factories are very successful in achieving this. Yoji said that if the aftermarket pipes and air filters offer performance gains, there is usually a trade off, and generally it goes beyond making more noise. The aftermarket products generally operate with stronger resonance tuning than the stock equipment, and if power is gained somewhere in the rev range, it is lost somewhere else. He said this was true even of air filters. There are characteristic lengths in the intake system that affect intake resonance tuning, and for an individual air cleaner, this length would be the distance from the carb throat to the back of the air cleaner. This distance would be more important than the actual size and surface area of the air cleaner, as even the smallest of the aftermarket air filters usually offers minimum resistance to flow. In any case, power gained at the top of the power band may well mean power lost elsewhere. There may be fuel economy effects from individual air filters as well. At high engine speeds, fuel is spit back through the carburetor. With the stock airbox this spit back fuel stays in the airbox and is sucked back into the engine. With individual air cleaners some of the spit back fuel is lost, and fuel consumption increases at the high speeds where the spit back is common.

Taking our new information, and a supply of BS style pilot jets, we set out to improve the low speed carburetion in the GS1100 with individual airfilters. After a day of experimentation, we found the best combination was 47.5 pilot jets, needles in the stock location, and 170 main jets. The bike now carbureted very cleanly, and would out-accelerate a GPz1100 from a 1200 rpm, top-gear roll on. The main jet size might be slightly off, but we won't be able to determine that for certain until we have a chance to do some high speed plug chops.

Considering the testing and experimentation, and bearing the comments of the Mikuni engineers in mind, what are our conclusions?

Intake system changes affect carburetion more than exhaust changes. The exhaust system can only affect intake conditions during the relatively brief overlap period when both intake and exhaust valves are left open, and in the amount of residual gas left in the cylinder. Current pipes from most of the major aftermarket manufacturers work well with stock carburetion, and at the most should require minor jetting changes. The aftermarket exhaust systems that work well with stock carburetion probably will not give dramatic (if any) power increases.

Stock replacement type air filters, at least in the two cases we looked at, neither changed power output or carburetion, as might be suspected. The two characteristics are, after all, related. If the stock air filter is so restrictive that it hurts peak power, the substitution of a low restriction air filter would mean the pressure drop in the carburetors would be less, and the jetting would be overly lean. There are certainly some models that have restrictive air filters (1975 model RD350s for example), and for

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