

# MINI BIKE GUIDE

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## Three Wheeler

## Speedway's Race Machine

FEATURES:

## Racing Definitions

## How To Buy a Used Mini-Bike

## The Racing Scene— What's Next?



# SPEEDWAY BLACK SHADOW

## More hustle per muscle

As racing becomes more and more an important part of the mini-bike/mini-cycle scene, manufacturers are gradually producing specially prepared, competition models. In the strict sense of the word, these are "stock" models in the same way that super-muscle cars on the dragstrip are "stock". However, the driver with respect for his life, the law and his pocketbook would no more run these "stock" race cars on the street than he would pedal a bicycle away from the Christmas tree starting lights.

Just like these ear-splitting muscle cars, the "stock" competition mini-bike is a breed apart. It cannot be considered in the same way that a plodding trail machine is considered. Nor can they be compared to fun machines—their purpose is much too serious.

Ignoring the race machines prepared by individuals (just about every mini-bike made has been modified by somebody with racing on his mind), Arctic Cat were probably the first to produce an out-and-out stock racing mini-bike. They don't talk about it much. Little publicity. No advertising. You see, they are a little nervous about the power generated by the Chrysler (formerly West Bend) 820 two-stroke that they use for an engine. Although Arctic Cat produces their muscle bike to satisfy the race-oriented mini-biker, they don't appear to be convinced of the wisdom in the move.

Earlier this year, Rupp brought out their Black Widow. It earned healthy respect from MBG test riders when they were putting together the report on this machine (April, 1971). Apart from some chassis tune-up work and a Del'Orto carb, there was nothing really radical about this machine—it just went together very nicely and happened to perform very well.

After giving this Rupp machine a workout, we should have realized that it wouldn't be long before Speedway Products would get into the act. Not that Speedway is a "follower" but the type of challenge that a racing mini-bike presents is right up their engineering alley. You remember, they were the first people to introduce telehydraulic

front suspension for mini-bikes (in fact, they may still be the only American manufacturer to do so). And their machines have undergone a constant upward revision in small, but important, details.

So we can see John Morrow, the boss at Speedway, sitting down with his engineers and wondering what the heck they could come up with, this time, to set the world on its ear. Finally, they decided to do something that has intrigued MBG for a long time. They tore the gear box off a high-winding motorcycle engine and substituted a torque converter. The engine and transmission were mounted in their top-of-the-line frame and the thing was dubbed the Black Shadow.

Ever since we were introduced to torque converters by Salsbury Corp., we have wondered why somebody didn't do this. In the mini-bike field, at least, torque converters have usually been mated with industrial type engines. These engines are slow-turning, high-torque, stump-pullers and the torque converters made them much more practical for mini-bikes. In our wonderings-to-ourselves, we had assumed that the relatively low engagement speeds (around 1,800 rpm) possible with such high torque engines was a factor. With a motorcycle two-stroke engine there would be a need to engage the transmission at around, say, 3000 rpm and maybe there was some design factor that made this difficult. On the other hand, snowmobiles have been using torque converters on high-winding engines for many years, without any apparent difficulty. There really didn't seem to be any obvious roadblock in scaling down the principle to suit the smaller motorcycle engines.

But why bother? some of you are going to ask. After all, most gearboxes on motorcycle engines are perfectly okay. We would agree except that matching a motorcycle engine with a torque converter gives mini-bikers yet another option in an ever-widening range of choices. Not everybody is capable of making snappy gear changes, at precisely the right moment, when climb-





ing a hill or worrying about trail conditions. A transmission that automatically senses the right gear ratio for whatever conditions come up, would enable the rider to concentrate on riding. And for some of us, one thing at a time is enough.

Up until now, if we wanted a torque converter we had to pay the weight penalty imposed by a four-stroke industrial engine. This is not too important for most applications but for racing it can mean the difference between a trophy or being back in the pack. Most motorcycle engines in the small displacement range are lightweights even with the gear box. When you remove all those gears and shafts, you are left with a real featherweight. Some people might feel that the ability to control the gear ratio in racing is more important than removing the need to make the changes manually. However, in practice most mini-bikers use only one or two gears when racing, anyway.

A good torque converter, properly maintained, is at least as reliable as a gear box and has the added advantage of simplicity. If anything goes wrong, it is right out there in the open—allowing impending trouble to be detected before it strikes. .

Okay, so there is justification for the theory of matching a torque converter with a motorcycle engine. But how does it work out in the particular case of the Speedway Black Shadow? In a word—great!

The power unit for the test bike was the Sachs 80 S. This very fine engine comes in two versions—with and without an oil pump. The one in the Black Shadow is without, being lubricated via an oil/gas mix. From this you will gather that it is a two-stroke. This gutsy little unit produces a rated five horses (we feel seven is probably closer to the truth) in its stock condition with a muffler, not a straight-through expansion chamber.

We do not know what the engine weighs, as it sits in the Speedway frame, but without the kickstarter, gearbox and clutch it has got to be as light as a mini-bike engine can get. The kickstart-

er is replaced by the familiar rope starter which may, or may not, be to the taste of mini-bikers.

What we are left with, from the original five-speed configuration, is just the part that matters—the engine proper. Somehow it looks a little naked. Like some bits dropped off. But the deep-finned head and cylinder obviously owes its heritage to the motorcycle field. And that long, chromed, expansion-chamber-shaped muffler would never be seen on an industrial engine.

Carburetion on this Sachs engine is through the efficient slide-throttle Bing feeder, with an 18mm bore.

Mounting of the engine is simplicity itself. The stock industrial engine mounting plate has an addition plate mounted to it so that the engine will clear all obstructions. This lifts the engine (inclined at a rakish angle) up about two inches, yet there is still plenty of room for the head to clear the frame. A trimmed-down, muscular, engine, with proportions to fit the machine like this, is a joy to see.

The transmission is also of modest proportions while fulfilling its function very well. This torque converter is Speedway's own design and it is the relatively simple speed sensing type. That is to say, it does not have the torque sensing device found on nearly all torque converters made by companies in the transmission business. We feel that the torque sensing device is important as gear changes can be made without slowing the engine. Torque converters that are speed sensitive only, require the engine to start slowing down before the gear ratio changes.

Theoretically, the lack of torque sensing in the transmission is a disadvantage but, in practice, the rider never notices it on the Speedway Black Shadow.

Speedway introduced a new gas tank on its '71 models to improve the looks of their machines. No doubt it is an improvement (almost anything would have been) but it is still not wildly exciting. We think the Black Shadow is a great machine—despite the tank.

Another improvement, a real one, this time, are the handlebars. The angle of the grips more closely approximates the natural position of the hands and there is a brace bar across the top. We never did have any quarrel with the mounting method—two U-bolts pulling down onto a pillow block. Essentially, the handlebars are shaped for maximum comfort under average riding conditions. Therefore, the racing mini-biker will probably want to exchange them for something a little more suited for competition.



In our original tests of the Speedway machines, we did hand flips over the telehydraulic front forks—the first on the scene and still alone among American-made machines we have tested. We still groove on them. Still, it seems to us that the intervening months could have seen more development. The forks still do not have a drain plug at the bottom to facilitate the exchange of different viscosity oils to vary the stiffness of the suspension.

Filling of the forks (you have to tip the machine upside down to empty them) is via two plastic plugs in the upper crown plate. Although Speedway say they have had little trouble with these plugs, ours leaked oil all over the place. When we tried to tighten them with our pliers, the threads deformed and slipped. We could not stop the leak. One of our riders, who had been beating the daylights out of the machine with abandon, stood by with disappointment on his face. "Why the heck do they have to spoil a good machine like this with toothpaste caps for oil plugs?" he said. And we didn't have a satisfactory answer. Speedway has not experienced

trouble with these plugs but we were riding this machine as it would be ridden in competition, hard, and that's when small things like this go wrong. Anyway, we are assured that this will be corrected.

Aside from this, we have nothing else but praise for the construction of the machine. The frame is single backbone, double loop engine cradle design, similar to last year's. However, the backbone member has been changed from tubing to pressed sheet steel. This is shaped at the steering head to provide gusseting support to the steering column and the down tubes of the engine cradle loop. Although it is unconventional, this method seems to be strong and there doesn't seem to be any obvious drawbacks.

A seat loop is welded to the backbone member and turns around, behind the seat, to provide a handy lifting device. The back of the engine loop is welded to the seat loop. Gussets provide triangular strength at this point—and a place to mount the top of the chromed shock absorbers. The engine mount plate triangulates the bottom of the engine loop.

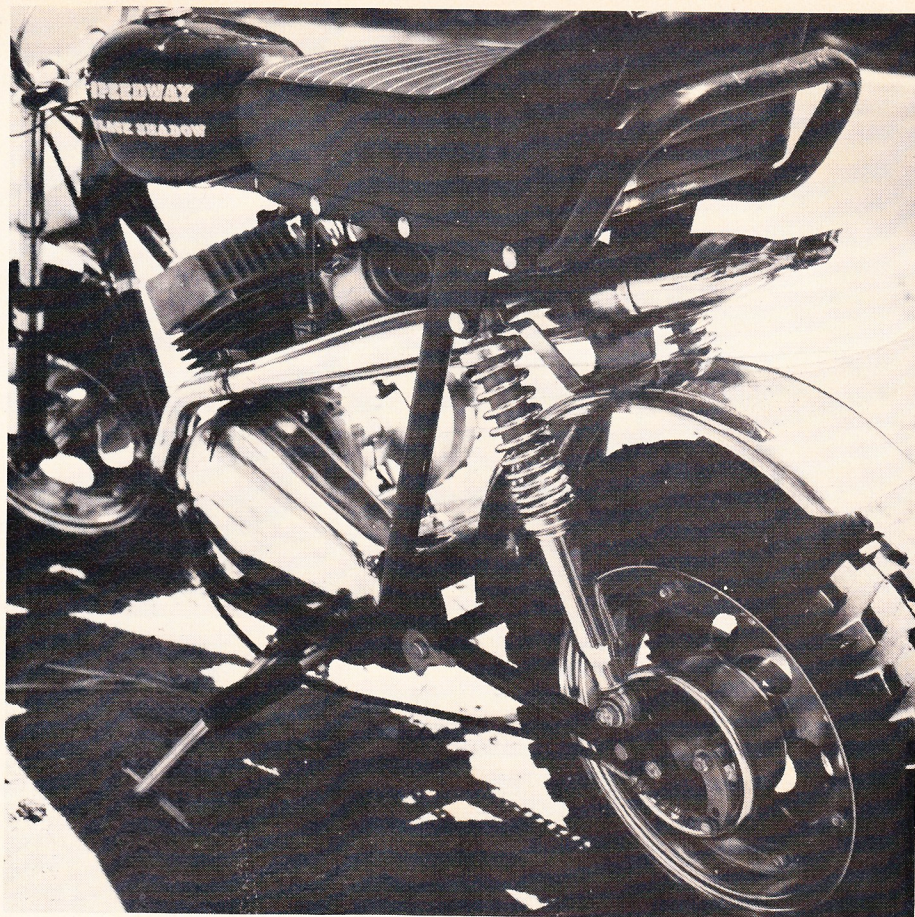
inclining the engine forward. The jackshaft is mounted under the engine mount plate, with the bearings installed in the side sections of the steel stamping.

Pivot point for the swinging arm is in a bracket behind the engine cradle loop, in a line with the rear axle and the jackshaft. Chain tensioning is achieved via a cam washer arrangement on the swinging arm pivot point, not at the rear axle, as is the general practice. This arrangement works well except that more bearing surface for the pivot point could prevent later wear.

Brakes on the Black Shadow are internal expansion in the rear and disc on the front. We are not quite sure of the reasons behind this combination but it seems to work out very well—and makes the machine look very racing-professional. Cable adjustments can be made by locking nuts at the brake end and by thumb-turned adjusters at the levers. The levers, both handle-bar mounted, are sturdy looking pressed steel units, six-inches long and well knobbed at the ends. The other controls on the handlebars also earned respect. The instant return dead-man, quarter-turn, accelerator operated smoothly and had no hang-ups, while the push button ignition kill switch was close and handy to the thumb.

The wheels on which the brakes are mounted are Speedway's own stamped steel, highly chromed, split rimmed, beauties. Of course, they run on sealed ball bearings. Mounted on the wheels of the Black Shadow are coarsed-knobbed "Moto Cross" tires which carry forward the competition theme of the machine. However, they do little for stability. Although heavily-knobbed tires are considered best for dirt use on the big machines, this tread pattern doesn't seem to work as well on the smaller-diameter tires found on mini-bikes. We would prefer more modestly treaded tires.

Little touches of quality abound—the chromed, high-mounted, steel fenders and nice-shaped clutch guard; the front fork treatment, with the chromed upper legs telescoping into the lower legs; a snap-fastened, deep cushioned, seat (ideal for carrying a few tools); No. 40 roller chain; shut-off valve on the fuel line at the gas tank; a mud-guard mounted on the front of the engine loop; and, most unusual, the thumb-operated choke lever mounted on the right-hand side of the handlebars. This last feature is more important than it might seem at first—it gets around the problem of fumbling around the engine, once it's hot, to get the choke off. All the cables are



over-sized, making for longer life, and all are teflon lined, making for smooth operation.

Altogether a functional-looking competition machine. Now, how does it all hang together?

The Speedway Black Shadow was one of several machines taken along for a long-weekend's camping at Butterfield Country in California. This is a large chunk of privately-owned land (some 2,000 acres, we are told) dedicated to camping—but tents are not allowed. The camping is today's with-it style—recreational vehicles only. This is great but doesn't have much to do with camping, as we used to know it. For instance, we went along in a friend's motor home—complete with shower, two air conditioners, color TV—everything including the kitchen sink. At our age, we appreciate these things.

However, our riders didn't get to use these comforts very much. They were too busy beating the life out of our test machines. This they succeeded in doing to all but two machines—one of which was the Speedway Black Shadow. A tribute to its strength.

The Black Shadow is what it is supposed to be—a hairy competition machine. It is not suitable for a whole range of applications. It is no learner's machine; it is a fun machine only for

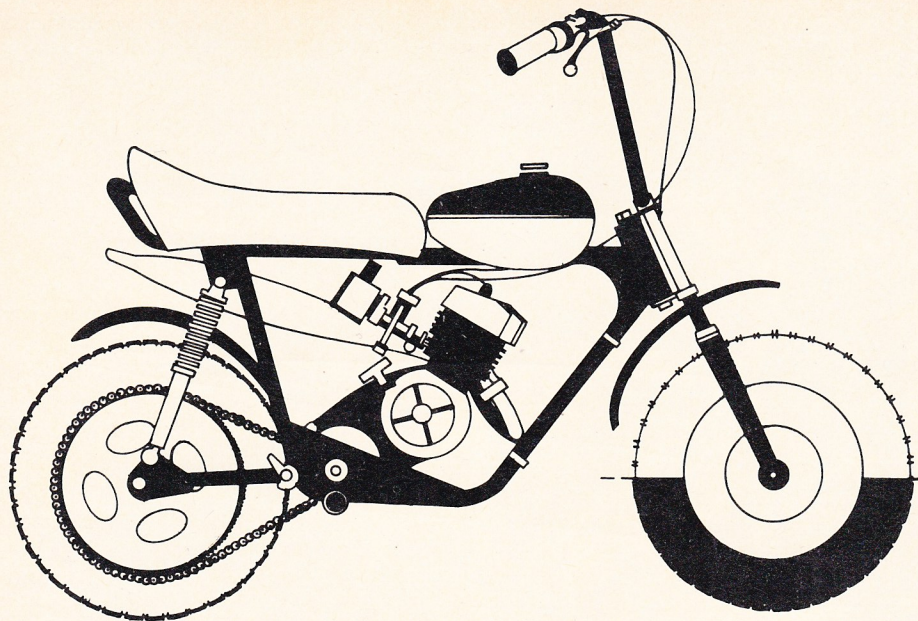
the people who have sufficient experience not to be scared of scads of power: it is not a trail bike since slow speed maneuvers are not its major strength (although it *can* be ridden slowly, it is not easy).

However, if you've got the itch for sparkling performance, and the experience to handle it, the Black Shadow will scratch that itch for you.

Firing the engine up is usually a matter of a couple of tugs on the rope even when the choke lever has to be depressed on cold mornings. Despite the engine's 9:1 compression ratio, it was easier to twirl than a two horse Teke. Once the engine was running we were struck by the amount of noise coming out of that muffler. Although Sachs warns about tampering with this muffler, on the grounds that fooling with it will make it louder, it sounded like it should be fooled with to make it quieter. So we did fool with it.

We pulled the stinger end and, sure enough, somebody had removed the muffler section before we'd received the test machine. Since we didn't have a spare Sachs muffler section with us (who has?), we wired on a Bassani silencer and were very impressed with its effectiveness.

The Bassani silencer is straight through, so shouldn't restrict exhaust



## SPEEDWAY BLACK SHADOW

Manufacturer: Speedway Products, Inc., 160 Longview Ave., Mansfield, Ohio 44905.

### ENGINE

Engine type	Sachs two-stroke single	Compression ratio	9:2
Bore	46mm	Carb	17mm Bing
Stroke	44mm	Ignition	Bosch flywheel magneto
Displacement	73cc	Lubrication	Oil mist
Horsepower @ rpm	7 hp @ 8,000	Fuel capacity	1 gallon
		Fuel requirement	25:1, reg. gas:oil

### TRANSMISSION

Transmission type	Torque converter	Final drive	No. 40 roller chain
Primary drive	V-belt	Gear ratios	Variable from 7.5:1 high
Clutch type	Centrifugal		

### CHASSIS

Frame type	Single backbone, double engine cradle loop	Tires,	
Wheelbase	40 inches	Front	18" dia. knobby
Overall length	58 inches	Rear	18" dia. knobby
Suspension,		Brake(s)	Front, disc; rear, int. exp.
Front	Telehydraulic forks	Ground clearance	7 1/2 inches
Rear	Swinging arm	Seat height	26 inches
Wheels	10" pressed steel, split rims	Handlebar height	37 inches
		Dry weight	pounds

PRICE AS TESTED \$289.00

gases. The only major difference would be to lengthen the effect of the stinger. This would make the engine stronger at high rpm with a subsequent reduction of power on the low end. Still, it was not very important whether or not power was increased or decreased, since we would not have been able to ride the machine at all, under the rules of Butterfield Country, unless the engine was muffled. And there's a lesson in that for the effect that noisy machines will have on our ability to find *anywhere* to ride.

Before we get off this subject, we should point out that at competitive events it is accepted that racing machines make a lot of noise. We don't know how long we can get away with even this limited unconcern with noise, but for the time being, racing mini-

bikers will probably want to install expansion chambers on their Black Shadows. For a short time, and when well away from other camp sites, we tried the Black Shadow without the muffler. There was a noticeable increase in low end performance.

Still, this test is being written on the basis of a muffled engine because we don't believe that the machine should be sold without a muffler. And the machine was plenty spirited enough for our tastes, even with a muffler.

The Sachs 80 (it really has 73cc) winds happily up to 8,000 rpm (compared with the maximum 3,600 rpm for industrial engines) and is still pulling strongly up there. Obviously, the torque converter could not engage at the usual 1,800 to 2,000 rpm—the engine would proba-

bly not be producing enough torque to move the machine. In actual fact, the engagement speed is around 4,000 rpm—right at the beginning of the strongest part of the power curve.

What this means is that the rider is sitting there, tweaking the throttle and concluding that the transmission is kapute as the revs build higher. Just as he is about to give up and go home—wham—something kicks him in the back. Everybody scrambles to get out of his way as he rapidly approaches Mach I at a G force of about eight. Kinda surprising, at first.

However, next time out, you know what is going to happen. And you're prepared for that 18:1 low gear ratio. More careful. And you still get kicked in the back and zoom off with eye-bugging acceleration. That's just the way this thing goes. After riding it for a day, you can predict pretty accurately when the engine is going to come on by listening to the engine note, but you never really get over that acceleration. Top speed, according to our pace motorcycle, was around 45-50 mph (before we had to shut down).

It's a good job that the geometry and weight distribution is good. Otherwise the Black Shadow could very easily become a suicide machine. As it is, the machine is close-coupled and, therefore, fairly quick in its response. This is great for tight racing around a flat track or a moderate TT course. However, for long distance or desert racing, a little more rake on the front end would contribute to stability. Not that the thing is squirrely but with all that instant power that comes on like gangbusters with a twitch of the wrist, the rider has to watch that he doesn't over-react.

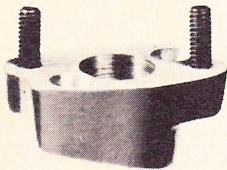
After riding the test machine for three days, we thought that we were sufficiently familiar with it to try out some boonie tests. We found that the big knobby tires, were not suitable for traversing loose gravel hills. If care was not exercised, a twitch of the throttle could cause the wheel to spin and the rear end to slide down the hill. A change of tires could cure this. Straight-up hill climbing was a cinch but coming down was either a Banzai charge or a slip-and-slide affair.

The same was true of the braking tests. The brakes seemed to work fine—too well, in fact, for the tires. On the dirt, feathering of the brakes was difficult—just moderate pressure would cause the wheels to lock up. Suspecting that the problem was the knobbies, we took the machine onto the asphalt where better traction was possible. In these condi-

Continued on page 64

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## BLACK SHADOW

Continued from Page 28

tions, feathering the brakes was much better.

We have always liked the suspension on the Speedway mini-bikes. It seems to be an excellent compromise for general conditions. However, in racing, conditions are not general. They are very particular. We are coming to see more and more machines with adjustable rear suspension. They use various mounting points that provide differing angles for the shocks. This in turn provides differing spring action. We think this idea would be most useful on a competition machine such as the Black Shadow.

This same argument extends to the front forks. On nearly every other mini-bike, the owner has no choice of spring rate unless he wants to go to the trouble of changing the springs. Speedway's hydraulic front forks give the opportunity to adjust the stiffness of the front end by using differing viscosity dampening oils. However, the lack of drainage plugs makes this less practical since the machine has to be turned upside down to get the the oil out. In addition, the handlebars must be removed before the plugs in the upper crown plate can be unscrewed.

We have lambasted these plastic plugs earlier in the report, so we won't repeat ourselves. Suffice to say, after we lost the oil through them, it was not replaced with fresh oil because of them. They were the only important design fault we found. We are not wild about the gas tank but . . . what the heck.

Seat/handlebars/foot peg relationship was excellent and the rearward weight bias when standing on the pegs was ideal for trail riding (hill-climbing). Depending on the type of racing the Black Shadow owner gets into, he will want to change the handlebars to suit. However, the stock units are among the best we have seen—certainly they are as strong as any—and mounted like the Rock of Gibraltar.

In all, the Black Shadow is an exciting machine. The mini-biker considering racing but put off by the prospect of riding against people on super-modified machines, now has a chance. In its stock form, the Black Shadow is a respectable out-of-the-box competitive machine—and it costs a very reasonable \$289. In the hands of a competent rider, it will provide stiff opposition to any machine in its price/displacement range. And for the guy who wants a hairy machine for showing off at the local hill-climb, this could be just the ticket. □

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