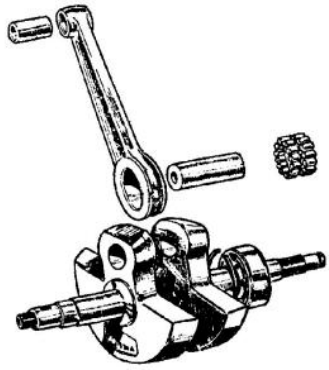
# 4 Crankshafts



Villiers crankshaft

The Villiers crankshaft is one of the half circle types (hammer head) and saw service in both sizes of engine throughout their manufacture, the only difference being the length of the conrod, 5¼″ for 197 and 5½″ for the later 250. Non sporting cranks used a crowded double row big end bearing of 26 x ¼″ by ¼″ rollers, and this was upgraded to a caged bearing of 9 off ¼″ by 5/16″ for the sports variants. The standard conrod will benefit from an increased oil supply, which is achieved by grinding notches in the big end eye faces. Four indentations on each face, 1 mm deep.

All Villiers crank pins are the same diameter, at 0.7980″ to 0.7983″ regardless of the type of big end bearing fitted, but the con rod eye size changed to give the caged bearings of the sports variants extra clearance. 1.2981″ to 1.2986″ for the uncaged bearing, and 1.2985″ to 1.2990″ for the caged type. This size was increased to 1.2991″ to 1.2996″ for the A series motors.

The Villiers crankshaft was notoriously weak and twisted quite badly at the first hint of a power increase. A measure of this flexibility can be gained from the factory maintenance and repair manual, in which it states that if reconditioning the original flywheel assembly, an oversize (1 thou) crankpin and rod must be used. Presumably to take up the slack in the elastic flywheels, a sad state of affairs which is not tolerated today in high speed two stroke motors. To counter this problem Alpha came up with a superior replacement shaft which fitted straight into the Villiers cases, this item being used quite extensively by many works teams, solving their twisting problems.

**Figure 14** Alpha crank Mk1

The Alpha crankshaft had full circle flywheels with reduced crankcase wall clearance which not only added rigidity but also increased the primary

compression ratio, which aided cylinder filling. Designed as a flywheel effect shaft the Alpha crank did not need the Villiers heavy external flywheel, but in the trials application with the flywheel and the extra weight of the additional ring, the better cylinder filling increased plonkability markedly.

**Figure 15** Alpha crank Mk2

With the Alpha shaft came a streamlined conrod (of both lengths) and a superior racing type bigend bearing, but the small end remained bushed as in the Villiers rod. The very early rods had a big end width of 0.5″, and a single diameter pin, which ran in parallel flywheels. This was later to be increased to 16 mm, the flywheels being machined away around the pin to accommodate the stepped pin, larger bearing and thrust washers. Much of the increased rigidity came from the larger crank pin of the early type and the later stepped crank pin which was needed for the larger big end bearing which now measured 25 x 32 x 16 mm. The outer diameters of the stepped crank pin are not the same size as the Villiers pin, therefore rods and cranks are non interchangeable without recourse to machining, so measure up the fit if mixing Alpha shaft rods with the Villiers webs.

For those who preferred more modern technology, Competition Classics again came to the rescue by providing an "Alpha" type crankshaft available with racing conrod which has a 22mm Small End eye to take a 22/18 mm needle race for a Japanese piston with an 18mm gudgeon pin.

Big end Details

| | web diam | inner diam | outer | width diam | roller size | units |
|---|---|---|---|---|---|---|
| Villiers Road | 0.8 | 0.8 | 1.3 | 0.5 | 26 x 1/4 x 1/4 | in |
| Villiers Sport | 0.8 | 0.8 | 1.3 | 0.5 | 9 x 1/4 x 5/16 | in |
| Alpha Replacement | 0.8 | 0.8 | 1.3 | 0.5 | 8 x 1/4 x 5/16 | in |
| Alpha type 1 | 0.925 | 0.925 | 1.3 | 0.5 | 10 x 3/16 x 3/8 | in |
| Alpha type 2 | 22 | 25 | 32 | 16 | 32 x 25 x 16 | mm |
| Alpha Crank cases | 22 | 25 | 32 | 16 | 32 x 25 x 16 | mm |

The early Alpha shaft is quite suitable in the sporting role, with the type 2 bearing being preferred for racing, a fact borne out by its use in the Greeves RAS Silverstone. As these cranks are many years old it would be a wise move to inspect them carefully, as some users have discovered cracks across the crankpin webs. The cracks, presumed to be the direct result of over enthusiastic reconditioning, can only be detected on the inner faces of