

AUSTIN SEVEN CROWN-WHEEL & PINION

Specification for the new Crown Wheel & Pinion set is as follows:

Type:	5.67:1 type as fitted to unblown Ulsters. Nippys had a 5.625:1 ratio which was also used in some vans.
Pinion:	1" diameter short pinion shaft to fit 1930-32 'long-nose' banjo and 1932-39 D-type back axles.
Crown wheel:	Standard later pattern to fit 'symmetrical' differential carrier (post June 1928).
Part Number:	BP120k (A7 Components part no.)
Gear type	Spiral bevel gears, Klingelberg palloid form (see below).
Material:	655M13 (EN36B case-hardening steel)
Improvements	Original gears on unblown Ulster CWPs had 9 teeth on the pinion and 51 on the crown-wheel, giving a ratio of 5.667:1. The new sets have 6 teeth on the pinion and 34 on the crown-wheel which gives the same ratio; however, the teeth on the new sets are thicker and therefore stronger. The Nippy CWPs had 8 teeth on the pinion and 45 on the crown-wheel, a ratio of 5.625:1. The new sets' ratio is differs from this by <0.75%, which means that at 60 mph the speedometer will read fast by 0.45 mph. The new gears use a parallel tooth form all the way along which makes them stronger, and they transmit more load under deflection. This type is not so critical to set up and is also more tolerant to flexing or wear of the mounting (pinion support is notoriously weak on A7 back axles).
Process (crown wheel):	Machined from solid; form bevels & cut gear, carburised & hardened (20-30 thou), grind bore & inside face, lap teeth.
Process (pinion):	Machined from solid; stress relieve, cut thread, form Woodruff key seat, form bevels & cut gear, carburised & hardened (20-30 thou), straightening, grind complete, lap teeth.
Tolerances:	Linear ± 0.1 mm, angular $\pm 0.25^\circ$, shaft $+0.00 -0.25$ mm, .

NB. The crown wheel and pinion are high-quality, precision-engineered components. We strongly recommend that they should be fitted by a skilled, experienced Austin Seven specialist. A7 Components can not accept any liability for incorrect or inappropriate fitting or use. The parts may still have traces of lapping compound so should be thoroughly cleaned before fitting.

Klingelberg - Palloid parallel depth tooth form is a system of generating the spiral teeth using precision ground taper hobs in pairs - right hand hob for the left hand spiral and left hand hob for the right hand spiral, the hobs having a concave curvature to the flanks to generate a central bedding along the gear tooth flanks. The palloid system has now been recognised as a method of gear generation which has very real advantages over other current methods. Two points in particular are: firstly, extremely smooth running under load and secondly, a permissible displacement of axis and thrust location far in excess of any other type without the production of the fatal "heel & toe" contact which is the cause of so much spiral bevel gear failure. Of critical importance is the initial fitting of the gears and the checking of the bedding pattern of the pair before running - the gears at the first stage should be set "back to back", that is to say with the extreme back face of the wheel & pinion level. From this situation gear teeth will be "blued" to confirm the bedding pattern is correct and adjusts made accordingly if not. The desired bedding pattern will be a central bearing away from the toe or heel as per the information sheet below.

Correct Positions of the Areas of Contact of Palloid Spiral Bevel Gears.

For smooth running of the bevel gears it is advantageous if the areas of contact are located in a slightly transversal direction. If there is a main direction of rotation, the areas of contact of the driving wheel should be located more towards the tips of the teeth, the cores of the areas of contact being above the working tooth trace. On the driven wheel the areas of contact should be located more towards the roots of the teeth, i.e. the cores of the areas of contact should be below the working tooth trace.

For automobile rear-axle drives, the pulling side of the teeth of the pinion should, therefore, have the areas of contact more towards their tips and the pushing side of the teeth of the crown wheel more towards their roots. Since during braking with the engine (e.g. when driving down a slope) the crown wheel will be the driving one, the pushing side of the teeth of the crown wheel should have the areas of contact more towards their tips and the pushing side of the teeth of the pinion should have the areas of contact more towards their roots, as illustrated below.

If there is no preferred direction of rotation then the areas of contact should be located symmetrically to the working tooth trace.

