

## Modifications to Sturmey-Archer Hub Gears to Produce Fixed Wheel Gears

by

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Since 1962 Sturmey Archer gears have used a hub shell with the left hand end cap pressed in on a series of serrations in place of the left hand thread used on earlier hub shells. This change means that the left hand end cap is now capable of taking drive in either direction and forms the basis of the modifications described below. It is equally easy to modify modern steel hub shells and modern alloy hub shells although the procedure is slightly different. The mechanism may be a three speed which will convert to a two speed fixed or a five speed which will convert to a three speed fixed. In both cases the highest gear is direct drive with reductions of  $\frac{3}{4}$  or  $\frac{15}{19}$  &  $\frac{2}{3}$ .

Assuming one starts with a complete hub it must first be dismantled. Having removed the mechanism one needs good access to the left hand end cap. In the case of a steel hub shell this end cap can be driven out using a steel drift (the end cap is hardened). It is not so easy to remove the end cap of an alloy shell but one only has to remove some of the soft alloy between the ratchet teeth and this can be done working down the length of the hub barrel.

The modification to the mechanism consists of removing all four pawls and discarding the left hand pawls and all four springs. The right hand pawls are now fitted on the left hand end of the mechanism but upside down i.e. concave face outwards. It will be found that these reversed pawls will span approximately 2 pitches on the ratchet ring. The ratchet ring will need modifying at two places to accommodate the reversed pawls. A hard steel ratchet ring can be worked on with small grinding wheels and/or dental burrs. An alloy shell can be modified using a rotary file followed up by some hand filing. The pawls also need some modification which mainly consists of grinding off the raised "diamond" which is normally used to disengage the right hand freewheel. I have always used the pawls "wrong" way round i.e. taking the forward drive on the previous trailing end of the pawl. This seems to fit in better as it is essential not to reduce the length of the pawls thus ensuring that the drive is taken equally by two equal length pawls.

The control system depends on the gear, for a two speed fixed a standard three speed control lever is used. For a three speed fixed the control mechanism will depend on which version of the five speed one started with. In my case the gear mechanism has the two sliding sun wheels spring loaded to the left and pulled to the right by the cable. I use an old four speed control system modified as follows. The lever although marked as a three speed actually has four positions, the first three are exactly as for a three speed but the fourth has slightly less than the 10mm extra movement of a standard four speed lever. This arises from a previous use of this lever in conjunction with an ASC. hub. The control system was set up using a jig so that the movements of the internal parts can be seen as the trigger lever is operated. Some short lengths of tube placed over the control rod within the axle have been used to adjust the position of the internal parts to that required for each gear. The slack cable position allows the sliding clutch to engage the projections on the right hand end of the cage. The next position is correct when the sliding clutch is fully engaged with the projections inside the extension to the right hand end of the annulus and the left hand sun wheel is still fully locked to the spindle. The final low gear position must ensure that the sliding sun wheels are fully moved to the right to lock the right hand sun wheel to the axle. (N.B. it is essential to use a right hand sun wheel with square dogs as the ramped off dogs used in some gears would not work in both directions. If a four speed control system is used the spring within the axle will take care of any potential movement of the clutch beyond its normal right hand limit. The adjustment is correct when the cable is just tight in the lowest gear. Do NOT attempt to adjust the gear by reference to the left hand end of the control rod and the left hand end of the spindle.

It had been hoped to arrange the lever so that the surplus low gear position would coincide with the neutral between middle and low gears but so far this has not been achieved. This low gear position appears to be a driving position but the sliding sun wheels are not fully locked and the gear is very

liable to slip. When changing into the lowest gear it is necessary for the pedals and/or the wheel to be slowly revolving to bring the sun wheels into line with the fixed parts that lock them.

Note that these conversions result in an appreciable amount of backlash between drive and overrun in all cases except the top direct drive gear of a three speed fixed. Some riders have found this backlash very disturbing but it has not worried me. I have used a two speed fixed in both steel and alloy hub shells and a three speed fixed in the alloy hub shell.

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