Changing Out the Rear Hub and Sprocket on a 2012 Morgan Three Wheeler
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Intro

The early Three Wheelers had the rear sprocket in a stepped arrangement relative to the front sprocket with the belt overhanging the sprocket on the outside face. While this is probably less of a problem than it appears at first glance, as the sprocket wears it develops something of a tapered shoulder where the tyre side edge of the belt runs and a taper on the edge of the outside face which of course has no retaining flange. This uneven wear can only get worse with time and miles. This wear can be rapid on the original aluminium sprockets. Having said that, it is probably a surprise to many just how worn the sprocket can appear yet still work perfectly well so long as the alignment is kept well-adjusted and the tension is correct. In July of 2015 and having passed 18000 miles in my late 2012 M3W – about 17000 on the one sprocket – I bit the bullet and decided to fit one of the newly available steel sprockets complete with both side flanges and the wheel hub from the later models that moves the wheel away from the belt slightly to give better belt to tyre clearance. Just to slow the job down I took a series of photos to show how I did it which hopefully will be of some assistance to others. This assistance may take the form of encouragement for some and discouragement for others…and also of course covers the removal/refitting of the rear wheel which has caused a fair few skint knuckles and frayed tempers either from doing the job or paying the bill for having it done.

Just remember; this is how I did it, there will certainly be other ways of doing it and some of them may well be an improvement on my way.

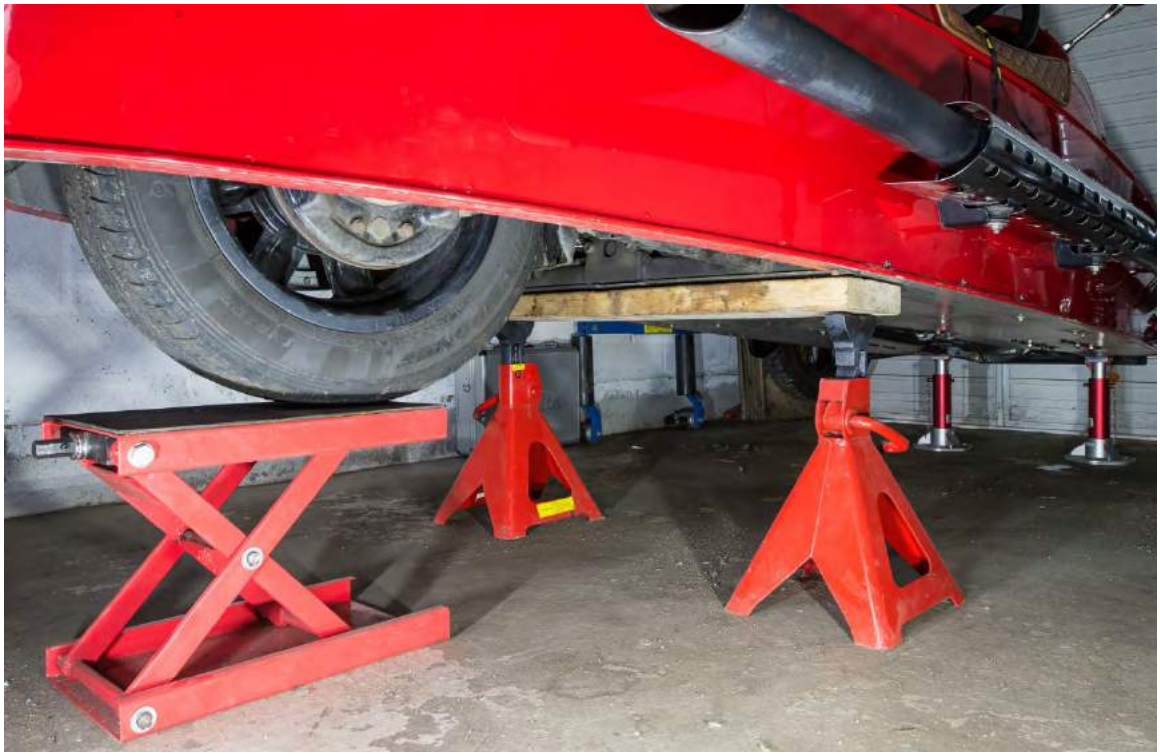
Old Style Sprocket Arrangement

Belt overhanging the edge of the sprocket.

The boot liner was removed before taking the photo, and it also shows the trailer mudguard fitted over the wheel and a Spax adjustable shock absorber.

The aluminium sprocket after about 17000 miles.

The Method



Get the car jacked up high and fairly level on axle stands, or blocks, or trestles or even a four post lift if you have such a thing.
I have the front stands under the main fore-aft chassis tubes behind the engine and the rear ones on a length of wood that spreads the load nicely and gives a good jacking point in the middle too. The motorcycle scissor lift is set up to just take the weight of the back wheel ready for when it is released.

Mudguard removed.

Brake hose P-Clip on swingarm removed and disconnected from drum, the end bagged and taped and secured up out of the way to the fuel filler pipe (arrowed in red). Green tape protecting the brake hose fitting on the drum backing plate. Belt tension adjusters backed right off (both sides) (arrowed in yellow). Split pin removed from spindle.
Not visible; P-Clip also removed from hand brake cable on underside of swingarm and two tie-wraps cut.

Before taking this photo the spindle nut has been loosened, the wheel has been pushed forward to slacken the belt, the belt pushed off the sprocket to the left and then the wheel rolled back again till the spindle comes out of the back of the swing arm. There is no need to take the nut off the spindle at this stage. The wheel is sitting on the scissor lift.

Similar to previous photo but with the adjuster swung up to be visible and in the position that you will be looking for when it all goes back together.

Lowering the wheel down on the scissor lift; watch out for over pulling on the handbrake cable. Battery drill complete with socket is your friend at this point for driving the lift!

Spindle nut, washer and adjuster removed and brake back plate and mechanism lifted out of drum. The scissor lift can be slid out from under the wheel which then gives space to tilt it and take it out from underneath the car or if not jacked up high enough then lift it out through the top.

Removing the sprocket. 8mm Allen key required; decent in-hex socket and bar or ratchet recommended; they go back in at 70lbft (95Nm) so bit of effort required to undo.

What you find when sprocket removed.

The wheel bolts with tapered seat that hold the wheel to the hub and the sensible length of ratchet and 17mm socket used for their removal. The bolts were copper greased.
They go back in at 80lbft (108Nm)

Hub still with brake drum attached and the side of the wheel it attaches on to.

Above and below; removing the drum to hub nuts and bolts. These are imperial and need a 5/8” socket and spanner. They were surprisingly tight to undo but only get torqued to 18ftlb (24Nm) – all torque figures were obtained from the factory.

Later style hub on left – anodised black – showing the change in wheel mounting flange position when compared to the old style silver hub.

Wheel adjusters. The one on the left is as it should be, the one on the right has the bent bearing bar that is very common; a good reason for not setting the alignment by measuring the projecting length of the adjuster bolts and also for ensuring that the spindle is properly tight. I probably will replace the bent one when I next change the back tyre, till then I'll live with it.

The wheel spindle components arranged as seen from the front of the car looking backwards.
Split pin (I use 4mm A2 stainless, about 50mm long)
Castellated nut; needs a 36mm spanner
Heavy washer
Adjuster
Aluminium spacer
Adjuster
Spindle; hex head needs a 24mm spanner.
For assembly I copper greased the spindle but kept the mating faces of the adjusters and the swing arm dry to maximise friction when tightened in place; my suspicion is that the clamping force available is adequate but does not have a large margin for error when it comes to dealing with the torque and grip available. I'm not the only one to have had the spindle move out of alignment in normal use never mind enthusiastic driving, likely due to inadequate tightening of the spindle.

Inside of the drum brake mechanism. On this occasion I just dusted it out and gave it a wipe with brake cleaner, maybe next time I'll take it apart and grease the pivot points.

Outside face of the brake mechanism.

New steel sprocket mounted on the wheel assembly.

Wheel assembly manoeuvred into place and sat on the scissor lift.

Brake mechanism placed back into the drum with the reaction fork pointing forward ready to engage with its boss on the swing arm.

Spindle inserted through hub.

Adjuster, heavy washer and castellated nut on end of spindle and the wheel straightened up ready for lifting on the scissor lift.

At this stage lift the wheel up making sure that nothing snags and get the swing arm ends to pass between the adjuster plates; once the spindle is level with the swing arm slots and the adjusters are correctly positioned to sandwich the swing arm ends then simply roll the wheel forward while making sure that the brake reaction fork is engaging with the boss on the inside face of the swing arm.

Simply is a good word; sometimes it involves swearing, damaged knuckles and general frustration, other times everything just slots together.

Once in place, push the wheel well forward and get the belt back on to the sprocket and tighten the spindle nut till it is gripping the swing arm a little bit but can still be moved.
Then carefully adjust the spindle position so that the belt rides in the same position on the sprocket when the wheel is spun forward and backward. Once that is achieved then evenly adjust the tensioners till the tension is right; I go for about a 45° twist in the underside belt run being manageable – others have their own views on this. Once the tension is done the spindle can be tightened; I suggest effing tight then slightly tighter to get a castellation to line up with the hole for the split pin. Do check the tension after tightening.

Brake line reconnected, P-Clip re-attached and tie wraps wrapped round swing arm. P-clip for hand brake cable also re-attached. Split pin securing the castellated nut on the spindle inserted and opened up and the brake bled. Just need to re-fit the mudguard, the boot liner and get the car down off the axle stands.

Time for a beer – you can always test drive it tomorrow.