

## Model Aircraft Scale Wheels

The range of realistic wheels available commercially is improving and generally speaking one can buy a pair which look good enough for the sport/scale model. However even a semi-scale model can be lifted out of the rut (no pun intended!) by a good accurate scale pair of wheels e.g: a puppeteer in WW1 colour scheme could really look the part in a pair of 5" fully spoked wheels. Of course, if one had an arm and a leg spare these wheels could be purchased, but how much more satisfying to make them yourself?

In the following articles I hope to show that without too much effort one can -improve- commercially available wheels or build from scratch scale wheels which would pass in light scale, stand off or even international class.

### Commercial wheels/Tyres

Assuming one can find the correct diameter and width, the problems are very often the high gloss levels of the moulded plastic tyre, matt lacquer may be OK in the short term, but not very durable. The best effect is obtained by scuffing the surface - these popular wheels are typically small hub -doughnuts- as seen on light aircraft and between the wars machines such as the Tiger Moth. The offending black gloss can easily be reduced to a satisfying matt dark grey by the following method.

Mount the wheel via a suitable bolt or studding (well clamped with star washers and nuts) in a drill chuck. Fitting the drill in a drill stand or press - stick 120 grade wet or dry abrasive paper on 1/4 inch ply strip using double sided sellotape (1.5 - 2 inches wide) and with the wheel spinning fairly slowly, and keeping the paper continuously on the move, abrade the surface off the tyre. Some commercial tyres have a moulded tread (more often just raised ribs) and this also should be carefully removed - this "slicks- appearance is well suited to say, a Tiger Moth or similar. Take it very steady, it's very easy to overheat locally and -drag- the surface; that's why one should select slow speed, or better still, use a variable speed control. Sometimes, particularly with the harder tyre, it slips on the hub - a drop of cyano should lock it. Always take the abrasive to the rotating wheel - if you hand hold the drill/wheel to the abrasive it's even easier to overheat due to uneven/excessive pressure. This matt roughened finish will now allow paint to adhere more readily, thus enabling tyre sizes/maker's name etc to be applied to sidewalls.

Other worthwhile improvements are wheel disks - some commercial wheels (e.g. Crescent Products) provide alternative disks suitable mainly for WW2 aircraft, but not everybody builds Spits or Mustangs(!) so some imagination is required. Discs can be -bodged- from table tennis balls, lids or bases from plastic containers such as 35mm film cans. I've even pinched two doll's tea set saucers from my daughter in my time! Keep a lookout in your local drapers/woolshop, they have an interesting rack (just like Proop's Packs!) and one can find cover buttons by Scovill Dritz ~ No 350 pack For example consists of a pair of metal shallow domes 1.5 inches in diameter, ideal for trapping between tyre and hub and hiding the axle collet - the pack also contains a pair of nylon pressings which could also be used - the list is virtually endless - just keep your eyes open and your imagination running!

Your model shop is not the only supplier of suitable wheels. The local DIY or wood shop often stock white plastic moulded spoked wheels upto 6 inches diameter (also obtainable mail order from Hobbies @ 63p each). These are ideal as a basis for 1/4 scale WW1 fabric covered wheels. The first task is to cut off and throw away the fitted tyre (solid and very heavy). You are left with a light 12 spoked wheel which is extremely strong (it is after all suitable for shopping trolleys). The recessed rim accepts 3/4 inch rubber tubing cyanosed and rolled on, or car heater hose, or best of all a rolled tyre on a sponge base as per "Scale news" - RCM&E November 1986. The main improvement needed is to increase the hub width, as moulded it is only 1 inch wide - far too narrow a profile for realism. It can however be widened easily by bushing out to 1.5 - 1.75 inches wide with thick wall plastic tubing (old ball-pens?), faced both sides with ludo or tiddleywink disks and bushed with 6 or 8 swg brass tubing for the axle. Expanding the hub width this way is an ideal opportunity to match the wheel profile - perhaps flat one side and coned the other as per the SE5, or coned both sides like the Spad.

All that remains now is to cover the wheel with nylon cyanoed to the rim and hub disks stretching taut - then doped and painted to suit, not forgetting the valve access flap or hole - these covers were stitched on the full size and if these stitches were chosen carefully they could be sewing machine applied before fitting to the wheel.

#### Wire Spoked Wheels (typical WW1).

Earlier it was described how covered spoked wheels were made from plastic shopping trolley wheels. Occasionally however the 'special' model calls for a pair of wire wheels in all their naked glory.

There have been numerous 'how to' articles in the model press in past years, but most show laboriously built up rims from tinplate and soldered beads. My 5" diameter wheels have rims made from the tinplate handles of selected paint cans, the cross section of which can be virtually perfect as a recessed rim with rolled edges. Two handles per wheel will be needed and these are carefully sawn square and curved so they match to a complete circle. They are joined with 18 swg piano wire threaded through the rolled edges. After tinning the wire loops, the rim parts and wire are soldered. The butt joined rim ends, after cleaning, are virtually invisible.

A strip of masking tape 3/8" wide is run round the inside of the rim recess to mark off the exact circumference. The tape is removed, laid on the bench and marked out for 40 spokes. Replace the tape and drill (no. 60 drill) the spoke holes which can be gently dished inwards to give a greater spoke end solder area for better anchorage.

The hub is a metal sewing machine spool that has 10 holes around the disc circumference. The spool is sawn in half through its 'axle' and extended in width with an appropriate diameter tube, all held in place by an internal brass 8 swg tube as an axle bush - see Figure 1. After soldering together, the hub and rim are mounted on a jig, locating the hub in the position that will give the required profile, i.e. coned one side or both sides.

Using 20 swg piano wire, hooked at the hub end, thread it into the rim, allowing say 1/8" excess and solder thoroughly. Fit the spokes in the correct sequence as per figure 2, then turn the wheel over and fit the remaining 20 spokes. Grind or file off the spoke ends inside the rim recess and thoroughly clean off all flux residues. If required, the complete wheel can now be spray painted aluminium.

I have found ordinary soft solder to be quite adequate despite the 'experts' recommending silver solder or brazing. Admittedly the wheels will be stranger but mine have survived crashes on to runways that have bent the undercarriage without distortion or popping a spoke!

Tyre's are black 1/2" diameter pressure tubing, cyanoed to a very tight fit on the rim. To avoid the risk of rolling the tyre off the wheel when ground looping (who doesn't?), a bead of cyano round the rim will secure.

#### CO2 or Peanut Scale Spoked Wheels.

These can be made down to 1 1/2" diameter or smaller by using press studs (dress poppers). The male half is used as a hub disc and two are joined with alloy tubing by cyano for the hub. The rim is a 1/4" slice of hard black plastic tubing, drilled for spokes. Using one piece of nylon fishing line, the hub is 'laced up' to the rim as tightly as possible. This is repeated for the other side, the lot being laced together.

The tyre is an appropriately sized black round section rubber seal (perhaps even a Hoover belt cut down to size or a 15amp rubber flex with the wire stripped out) cyanoed in place (how did we manage before cyanoacrylates?).

#### Inflatable Airwheels.

Classic designs of blow up airwheels like M.S. (Newcastle) and Keil Kraft are to be treasured (Pete Russell bought the last of M.S. stock when they ceased manufacturing many years ago and he won't sell!).

I have extended the life of very old, now porous, airwheels by fitting an 'inner tube' of doughnut soft sponge. When however the tyres finally give up the ghost and split beyond repair, replace them with a beach ball

Inflatable children's balls can be found in assorted tub-fuls in toyshops, even newsagents. Select a pair with an inflated diameter slightly larger than the desired wheel diameter (say 1" in 6"). Wash off the pretty patterns with cellulose thinners and wire wool - the base dull dark grey looks just right!

Position the moulded-in valve near where the hub will be and with a 3/4" diameter sharpened tube or a no. 12 cork borer (if you can find one), punch both walls. Take care, because if these holes are not exactly opposite each other, the wheel will revolve in a drunken lurch! Some of mine do but are not very noticeable in use.

New hubs can be either turned up on a lathe from hard nylon, made from two shaped discs and an internal spacer or fabricated from discs of thick sheet plastic and a spacer from a garden hose - see figure 3. These hubs are held together, air trapping the tyre with a threaded bush of 8 swg internal diameter. Alternatively they can be bolted together with a pair of 6 B.A. bolts through the spacer and discs.

Fit all together, spacer through the tyre hole, and 'fiddle" the discs and axle bush in line, then tighten up as per figure 4. Inflate- and check for leaks. Don't be tempted to inflate too hard or blow up to a much larger diameter as the tyre could distort due to minor thickness variations. In any case a hard-inflated airwheel will bounce the model to unbelievable heights! The most realistic tyres are quite soggy so at touch down they stay down!

I hope some of these ideas prompt more home made wheels to appear on the flying field. Quite apart from looking good, they can be ridiculously cheap. When I made my first pair of spoked wheels, Williams could supply 5" diameter at £35 per pair - mine cost £1.50 per pair!

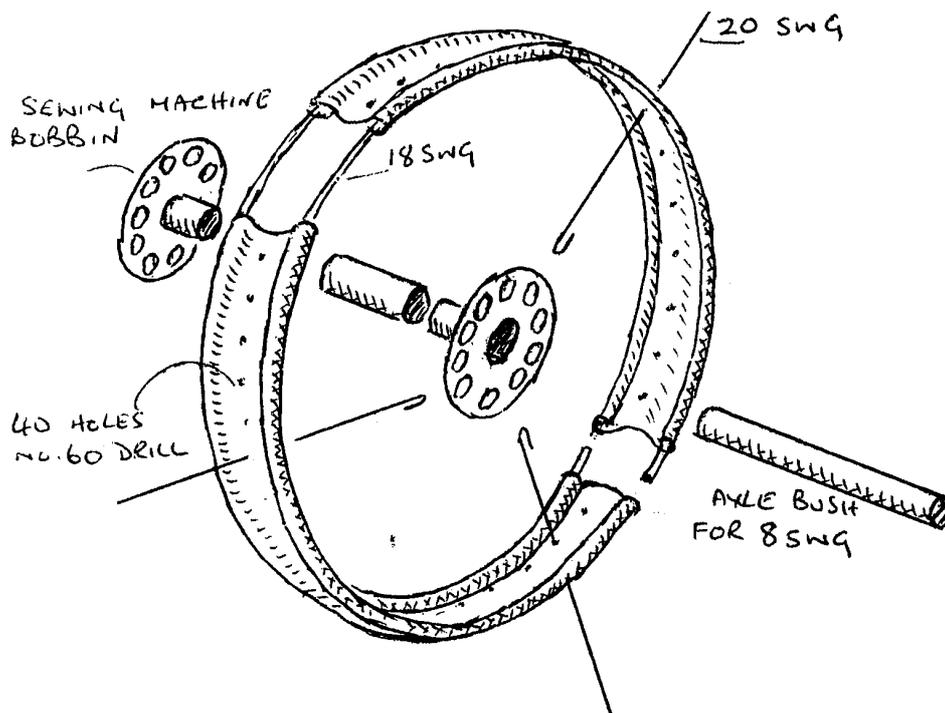


Figure 1 – Spoked wheel from paint tin handles

'LACING' SEQUENCE  
20 SPOKES EACH SIDE (20 SWG)

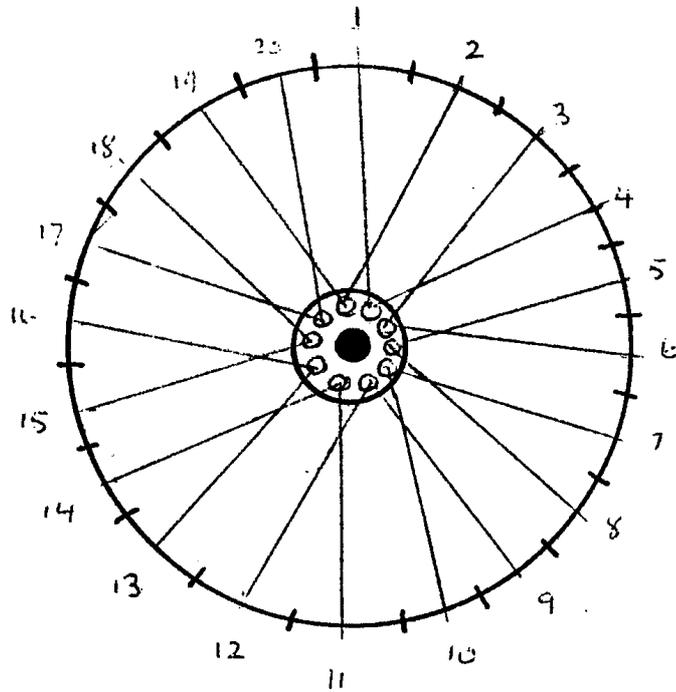


Figure 2

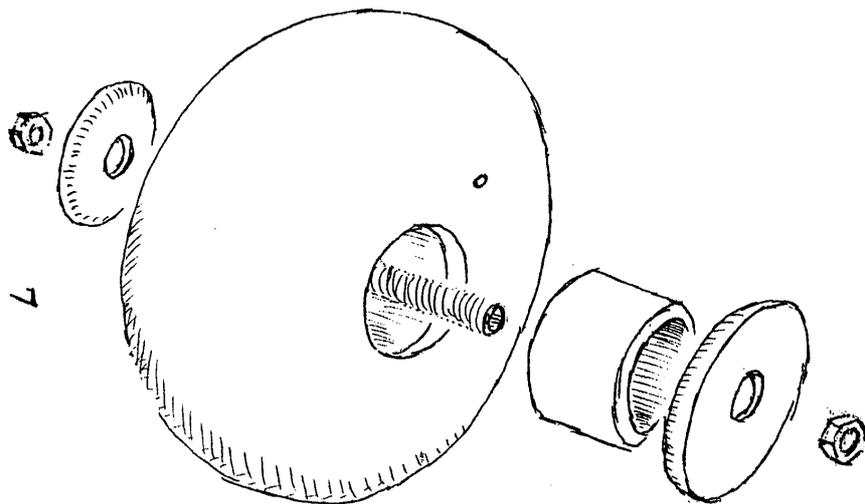


Figure 3 - 'Beach Ball' Airwheel

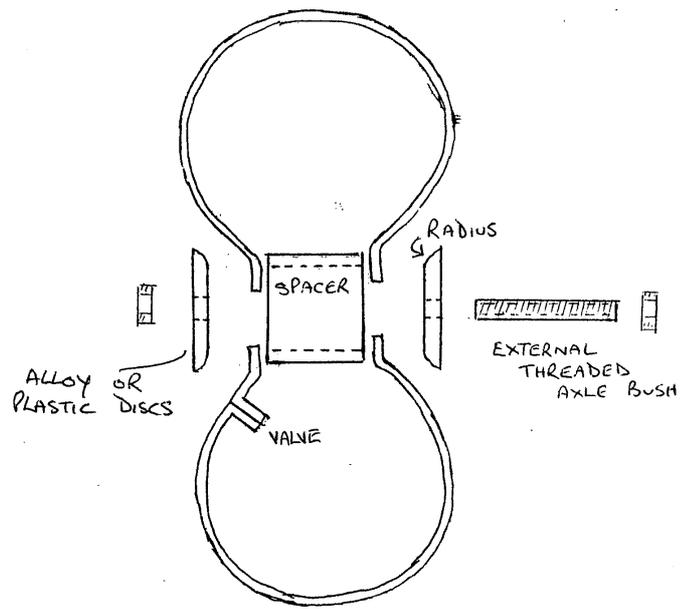


Figure 4