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COFFEE
TABLE



STUDY
BED



ARTIST
EASEL



WOOD
LAMP

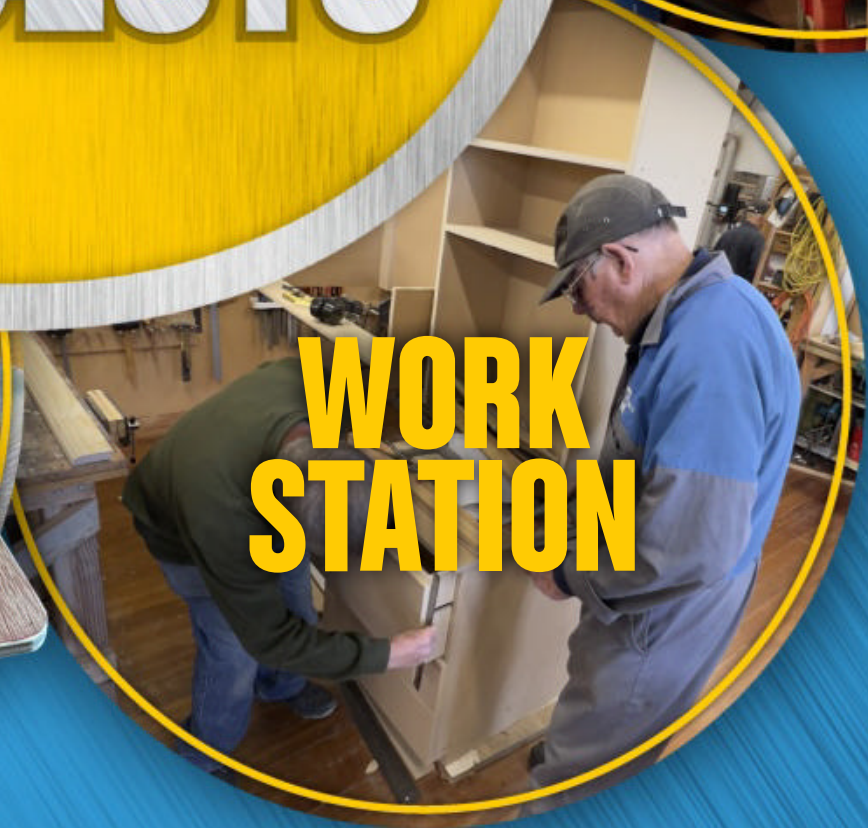


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POST Magstore, PO Box 46194

Herne Bay, Auckland, 1147

OFFICE 09 200 4847

EDITOR

Greg Vincent, editor@theshedmag.co.nz

SUBEDITORS

Karen Alexander, Chris Hall

TECHNICAL EDITOR

Jude Woodside

PROOFREADERS

Sarah Beresford, Odelia Schaare, Jo Knight

DESIGN

Mark Gibson, Deven Solanki, Stephen Philp

ADVERTISING SALES

Dean Payne

dean.payn@parkside.co.nz, 022 657 9539

ADVERTISING COORDINATOR

Kealy Mathews

CONTRIBUTORS

Murray Grimwood, Jude Woodside, Enrico Miglino, Jason Burgess, Mark Seek, Tony Cullen, Gerald Shacklock, Bob Hulme, Mal McKee, Nigel Young, Andrew Broxholme, Ritchie Wilson, Vicki Price and Ian Roberts.

parkside
media.

EMAIL contact@parkside.co.nz

PUBLISHER

Greg Vincent, greg.vincent@parkside.co.nz

BUSINESS DIRECTOR

Michael White, michael.white@parkside.co.nz

GENERAL MANAGER

Simon Holloway, simon.holloway@parkside.co.nz

WORKFLOW MANAGER

Emily Khov

PRINTING

Inkwise, 03 307 7930

DISTRIBUTION

Are Direct, 09 979 3018

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OPPORTUNITY

I'm sure it's no surprise to readers that I just adore this time of year. The opportunity to spend solid time with family and friends is something to be cherished, as is lots of time to do what you most enjoy doing when you have a good block of time available.

If you are a business owner, you too will enjoy this time of year when the office is closed, the phone and the emails stop, and all is sweet — hopefully.

We thought that in this summer edition of the magazine, we would make sure sheddies would use their time constructively, so we have created a bunch of projects for you to have a crack at. We reckon none of these “Six Summer Projects” is too challenging, so we are hoping we can drag some Kiwis away from Netflix and out into the shed these summer holidays.

This is also a golden opportunity to get some young would-be sheddies involved in the projects — family, neighbours, boys, girls, anyone you can share with, really. The more of us in our sheds creating and making, the happier we will all be.

We would really like to see photos of any of these summer projects that our readers complete. Send them to me, and we'll post them for all to see.

I must also give a big shout-out and a huge thank you to the members of the New Brighton and Halswell Menzsheds for their help and skills with the making of these projects — Ray Hall, Lindsay Papps, Pete Leversedge, Keith Preen, David Little, Jeff McElroy, Grant Taylor, Roger Owens, Alan Ball, and of course, Nigel Young for coordinating the whole series of projects.

All these projects, once made, were donated to worthy groups and families in Christchurch, and that is yet another reason for getting stuck into these projects; even if you don't need them, there are plenty of folk around who would be very grateful for them. Case closed — more than enough reasons to have a crack at them; you have no excuse now.

Have a great summer holiday in your shed. 📁

Greg Vincent

editor@the-shed.nz

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ON THE COVER

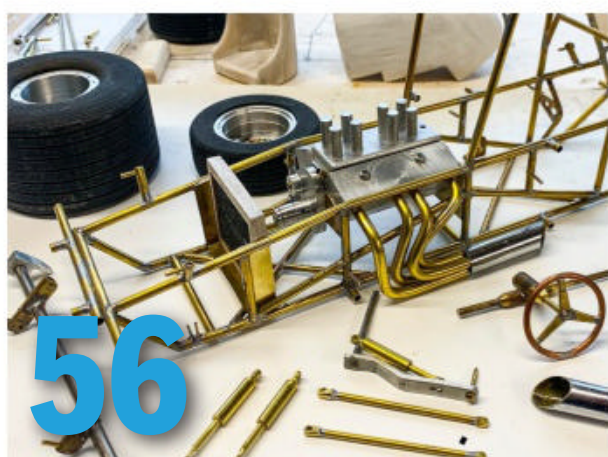
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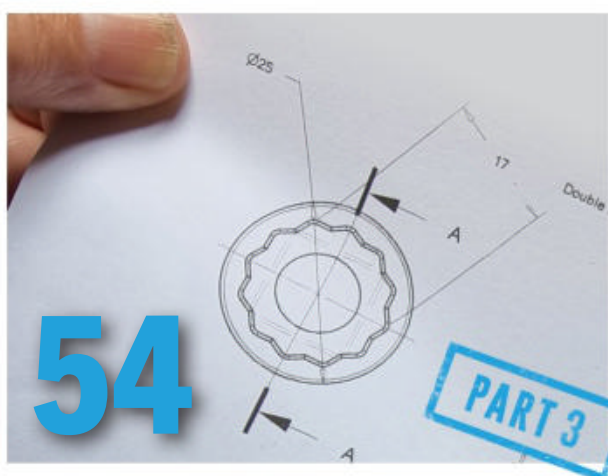
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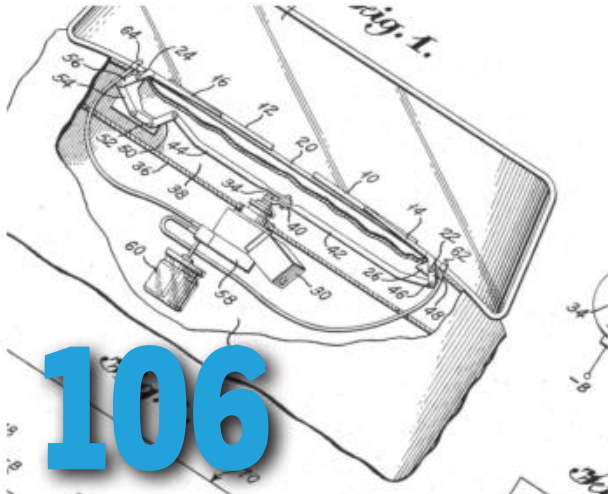
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Auckland Blade Show

CHRISTMAS IN THE SHED

A bunch of ideas to inspire the creative impulse

*By Nigel Young
Photographs: Nigel Young*

Six Summer Sheddie Projects” is about combining the fun of the summer sun and the annual wind-down with family and friends with the spirit of DIY that drove many of us to a self-sufficiency based around our garage workshops and sheds, and more recently extended into MenzSheds.

Our Kiwi No. 8 wire mentality gave us pioneers such as Sir William Hamilton of

HamiltonJet, Peter Witehira of Power Beat with his never-go-flat battery, and, in my own case, a great-grandmother who could make a chair, and then carve it with exquisite precision and beauty, with just a rudimentary range of tools — none of them powered.

Over to you

Now it's your turn. We've come up with six projects of varying levels of skill, and invite you to have a go at them, or — better yet — put your 'I can do that' hat on and improve on them, or send your own idea through to us, along with the story behind it; tell us why you did it your way, and what you had hoped to achieve. You could end up being featured in a future issue.

Our six projects started around the Covid restrictions — this article began back in June when we were all still wearing masks — and focuses on being more efficient in how we use space during a time of living, learning, and working from homes that seemed to shrink around us while seemingly having to cater for more activities and significant

lifestyle changes.

They were not easy times, and, while the restrictions have largely gone, they have left their mark in terms of social and communal adaptations and accommodations. Life post-Covid is different, and adapt we must. Priorities have changed, space is at a premium, money has to go further, and materials are far more expensive; all the ingredients for some great No. 8 wire opportunities are in place. Time to put your hat on. ►

ARTIST EASEL

My great grandmother's hand-cut and carved wooden chair, made with very rudimentary tools and a lot of attention to detail. It goes back the latter half of the 19th century



**COFFEE
TABLE**

**STUDY
BED**

**WOOD
LAMP**

**TABLET
HOLDER**

**WORK
STATION**

THE TABLET HOLDER

Ray Hall with the remains of his wife's yellow cutting board, which he used to create a frictionless bearing — the two surfaces slid against each other very smoothly. Classic No. 8 wire thinking



Dimensions

The stand had to accommodate a 12.7-inch Apple iPad.

The baseboard was 400 x 280mm

The tablet stand was 280 x 230mm

Depth and weight to be kept to a minimum, the depth coming in under 50mm

Materials

Ply

UHMWPE

Rimu

Brass hinges

Dowel

Galvanised wire for the stand

Cutting board — my wife hasn't noticed she is missing a yellow cutting board

Cost

I already had the ply and UHMWPE.

The No. 8 wire cost about 50 cents from a scrap-metal bin

Total cost: less than \$15

This was built by a sheddie who had retired from the world of IT, and who had the analytical tools to sit down and write himself a brief. The tablet holder needed to be able to rotate as well as be raised up and down, so he started

with these questions and observations:

Why would one want a tablet holder that needed to be able to rotate as well as be raised up and down?

The specified dimensions were large compared to the size of an iPad, particularly if the stand was to be used on one's lap. Was this necessary?

The stand had to be able to be turned. It must be made to hold an iPad horizontally and in a raised position.

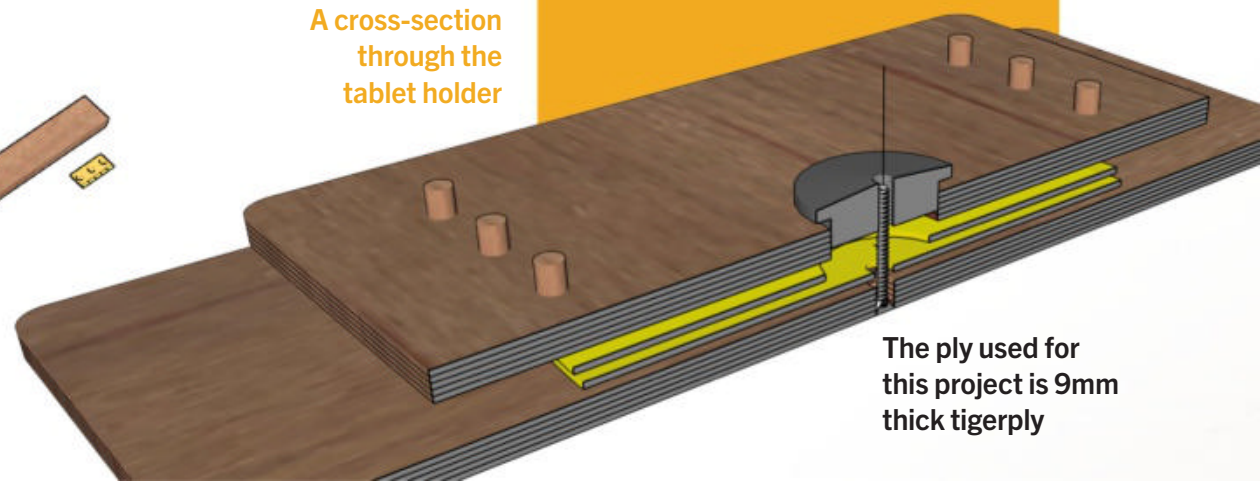
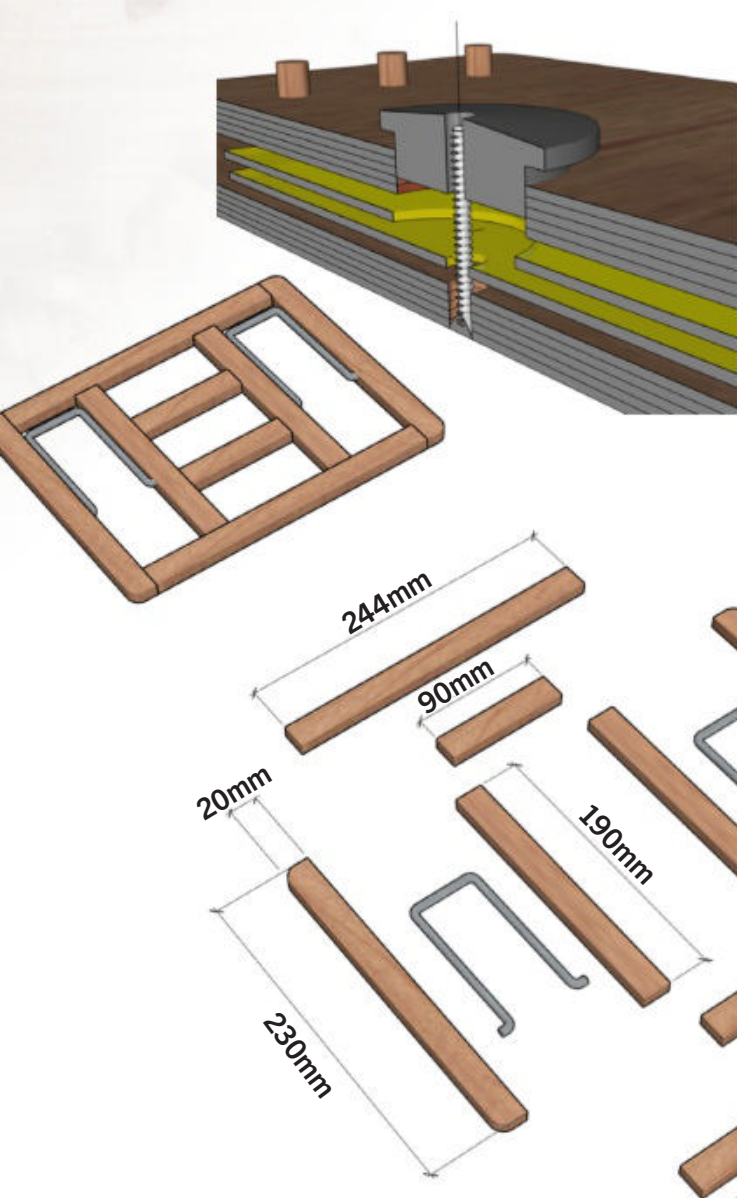
It would need supporting legs and an upper stand.

Ultimately, it also had to be fun to make.

An exploded view of the tablet holder — it was too thin to nail or screw, so Ray glued it using Gorilla glue before clamping it. It is important to keep it all flat, as it is very easy for some of the pieces to start to rise up due to the pressure of the clamps, and then dry in that distorted fashion

A cross-section through the tablet holder

The ply used for this project is 9mm thick tigerply



Designed for drawing

Part of the initial brief was that it needed to be able to be used for drawing with a stylus while either sitting on the user's lap, or on a bench or desk. The main issue regarding drawing on a lap was weight — it also needed to be comfortable to use. This was resolved by making the holder itself out of thin strips of rimu, along with a return on the base for the tablet to sit on.

The base was an offcut of 9mm Tigerply, as was the turntable. For the turntable to operate smoothly, a possible solution was to use a Lazy Susan bearing. Low-friction versions could, however, result in unwanted rotation if the stand was tilted due to the weight of the iPad and upper stand. Various Lazy Susan bearings were looked at but cost, height, and fitting considerations ruled them out. The solution arrived at was to sandwich a thin layer of plastic chopping mat between the two plywood bases and hold it all together with a large stud turned on the lathe from UHMWPE (Ultra-high-molecular-weight polyethylene — a flash plastic to the rest of us). The stud was screwed to the baseboard and consequently could be removed if no longer required.

By forming the holder in pieces as opposed to a solid one — presumably in this case some more 9mm Tigerply — Ray kept the weight down while maintaining the stability of the stand. The wire was bent by another sheddie with a background in this field

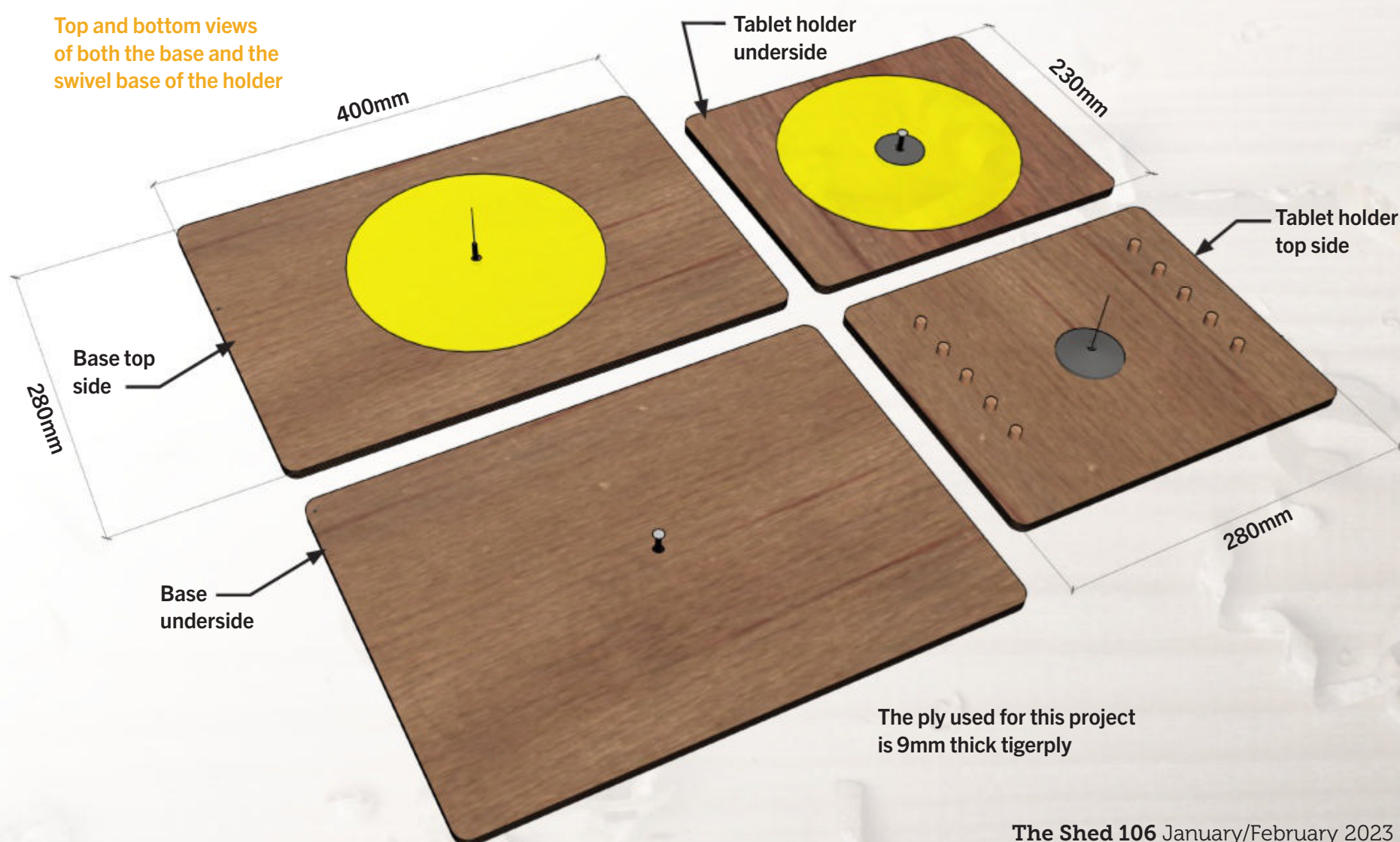
At last, some No. 8 wire!

The holder was supported by 4mm/8-gauge wire — yes, proper No. 8 wire in line with true Kiwi tradition — bent by another sheddie who had a background in this field. This rested against five pairs of dowels. Other possible uses for the tablet holder ranged in size from holding a mobile phone through to holding a book, recipes, sheet music, etc. A design with two supporting

legs left the centre area of the stand framed and able to support the smallest item, such as a mobile phone.

The tablet holder was ultimately donated to a school for special needs children to use, with one teacher writing: "Thank you for the iPad holder. We love it, and use it everyday to support communication." ►

Top and bottom views of both the base and the swivel base of the holder



THE PAINTER'S EASEL

The only thing not shown here is the rope across the bottom to prevent the two parts from collapsing. We used 3m at a cost of \$3.15

I had been thinking about this one as a potential article for *The Shed* in its own right, after seeing the size of them in an arts store — all very nice, but where do you keep them as they can take up quite a lot of space. So, the main criterion for this was to be able to use it and then fold it away with minimal storage requirements. The sheddie who built this elected to have one side fold inside the other, which kept the profile down to 30mm — the thickness of the timber he had prepared. An advantage of this approach is that, rather than use hinges, with

all the work that goes with trying to get them right and true, he simply had to use a nut and bolt on either side, and that works perfectly well.

Dimensions

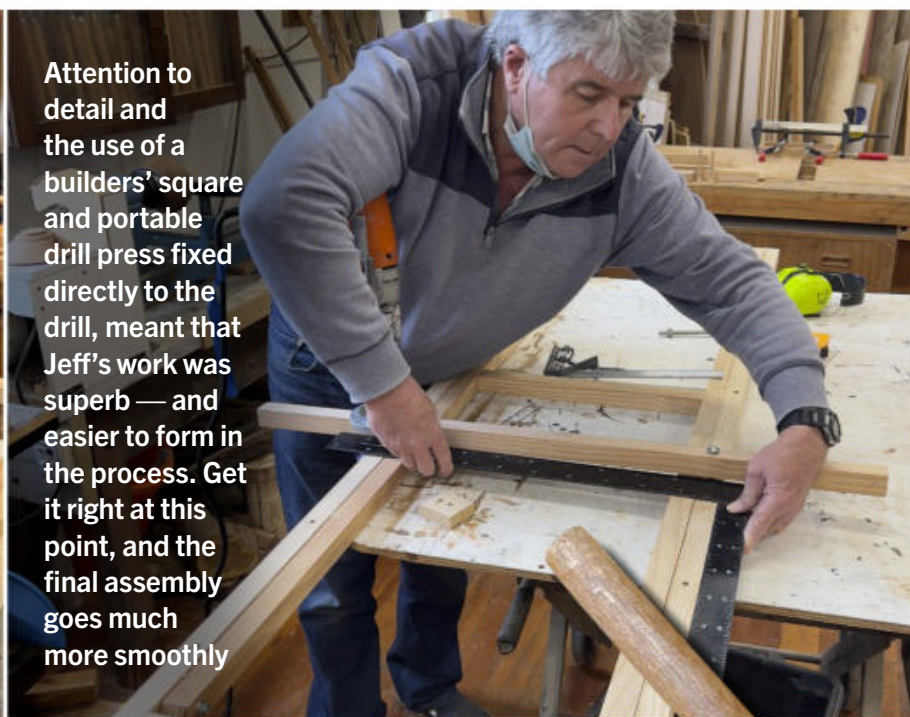
The easel stands 1800mm high and has a footprint of 500 x 900mm when in use. The back frame, which supports the front while folding back into it afterwards, is 440mm and 1740mm high — providing sufficient clearance for the side rails to tuck back in. The tops of these have been curved to ensure this is the case.

The two pins that Jeff made for the art rest are clearly shown in this picture — Jeff has drilled holes at 300mm c/c's to accommodate different height art mediums

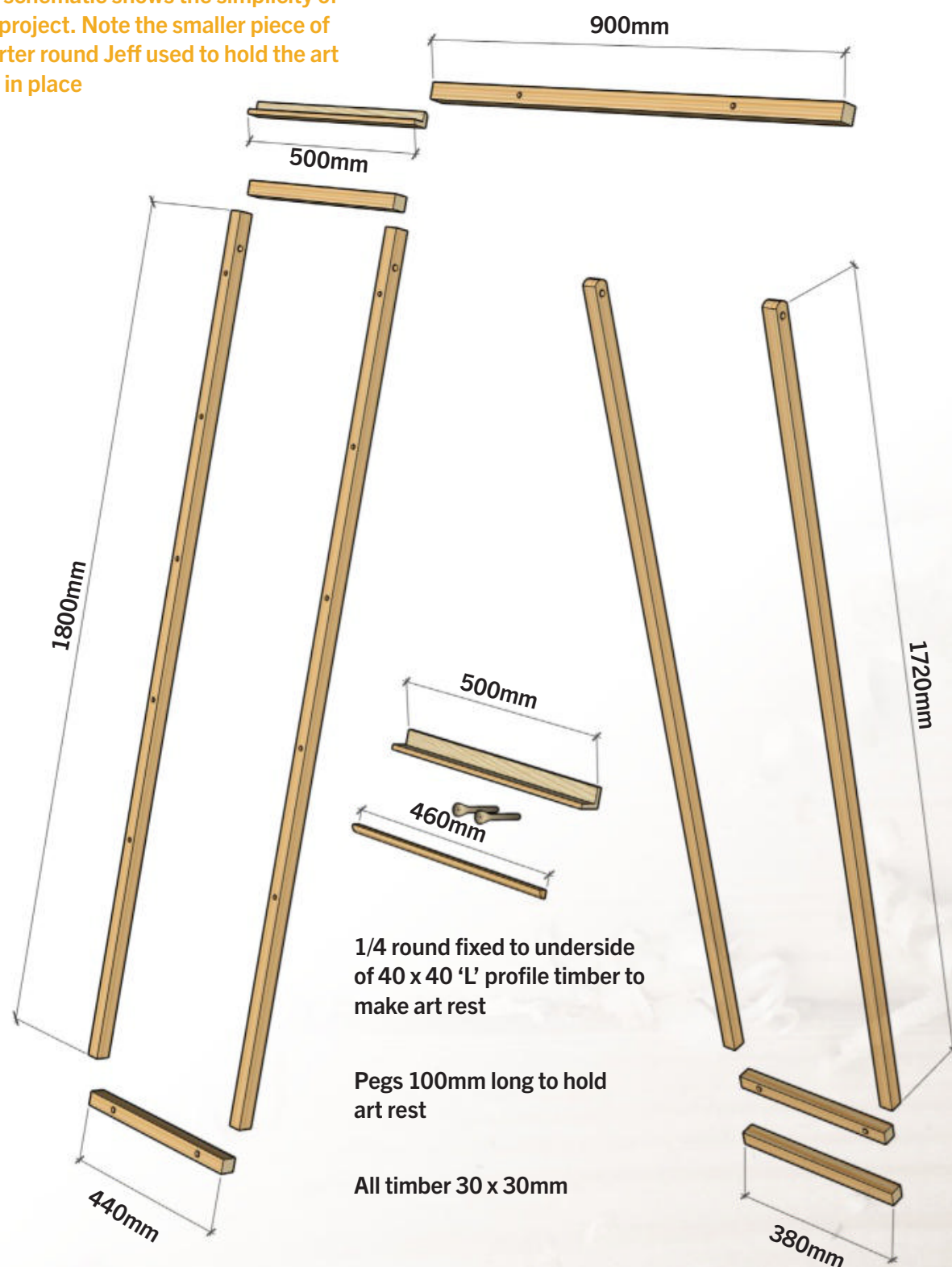
Jeff applying the second of two coats of Cabot's Danish Oil



Attention to detail and the use of a builders' square and portable drill press fixed directly to the drill, meant that Jeff's work was superb — and easier to form in the process. Get it right at this point, and the final assembly goes much more smoothly



The schematic shows the simplicity of the project. Note the smaller piece of quarter round Jeff used to hold the art rest in place



There are two cross bars on the front, used to support the canvas or medium selected by the artist. The top one is 900mm long and fixed with 8mm coach screws and wing-nuts, and is the same dimensions as the rest of the frame. The lower one is cut as an 'L', and sits on two turned wooden pegs. This is held in place by a piece of quarter round, cut just short

of the pegs, so as to fit between them. Holes drilled at 300mm intervals on either side allow for both rails to be moved up or down the easel frame. A third rail fits between the side rails on the back to keep the frame square and avoid any twisting. Finally, there is the finish. In this case, two coats of Cabot's Danish Oil was used to give it a satin finish. ►

One of two pins that Jeff formed to support the art rest that the canvas or other medium would sit on



Two sides of an old water bed frame that we found in the timber racks. Jeff would ultimately get 10m of 30 x 30mm out of these

Materials

A frame from an old waterbed proved to be perfect for this project — it used 10 metres of timber

Three metres of hemp rope was attached at the bottom to stop it from spreading out too far

Hardware — four sets of nuts and bolts

Cost

Hemp rope: \$1.05 a metre = \$3.15

Nuts and bolts: mainly on hand but about \$5

THE LAMP

This was my project as I like ease-poise lamps and saw this as opportunity to make one. The main lessons I learned was that the diameter of the base was too narrow and the first wire hole from the bottom should have been on the other side. Oh, and let's not forget fitting the wire before the ends are in place

This was my project, and I started by going through the timber rack at our MenzShed, looking for different colours and sizes, as the plan was to laminate them together and then have the base and lamp holder turned on a lathe.

I started by cutting a range of pieces into squares, then establishing the centre of each by drawing a line across the diagonals. The intention was to drill through each of them, and then pass a 6mm dowel through them all while also glueing them all together. Before drilling them, however, I used a compass to draw the best circle I could out of each of them. Next I used a bandsaw to cut out each circle as closely as I could — not one of my strengths but

I got them pretty close.

Once this was done, they were all glued together with the 6mm dowel at the centre. These were clamped and left to set. This technique was used for both the base and the lampshade.

Turning assistance

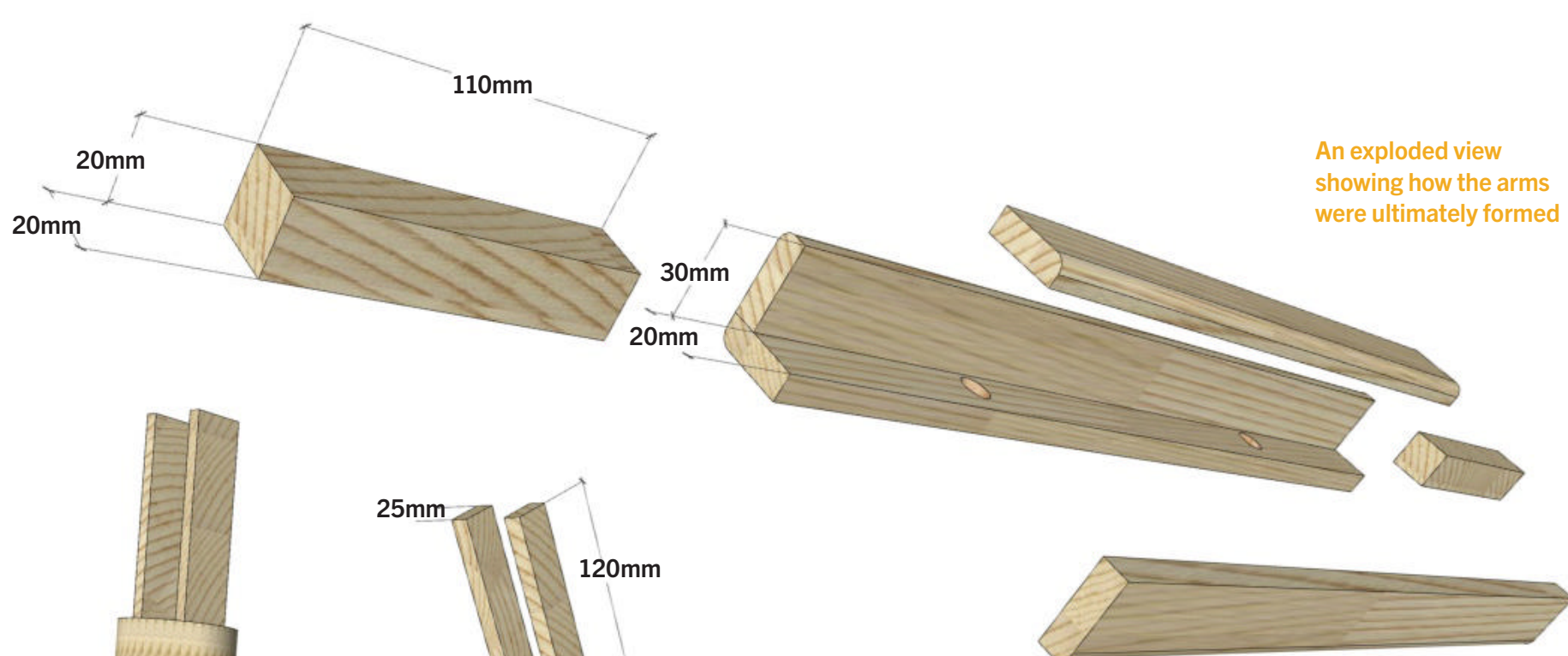
I have much to learn when it comes to turning wood, so another sheddie turned them out for me — and also wired it afterwards, as he is a registered electrician. Once this was done, the next step was to mount a centre peg to be the mount for the lamp arms. This was routed down into the top of the base and lampshade, and a peg formed from the timber that was used for the arms was glued in place.

“Before drilling them, however, I used a compass to draw the best circle I could out of each of them”

The beginnings of the arms formed from four pieces of timber glued together as indicated. It wasn't easy to keep them square, but next time I would use some square section steel and form the frame around it. The next step was to square it up using a thicknesser before rounding off the edges with a table router

I'm using clamps to fill in some gaps that appeared after the arm had been formed

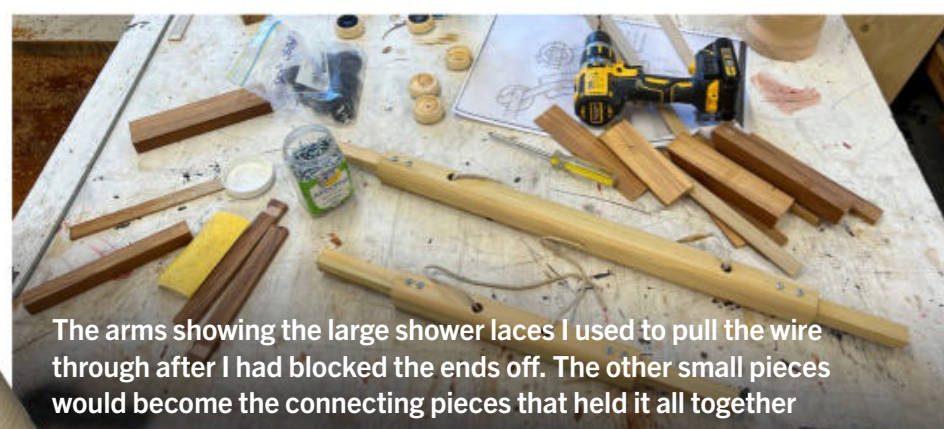
Allan Ball turning out the base. Note he's wearing a full-face shield — essential protection against a piece of wood flying off — particularly since he's wearing glasses. If these shattered, a serious injury could occur



An exploded view showing how the arms were ultimately formed



Slots to be minimum of 15-20mm



The arms showing the large shower laces I used to pull the wire through after I had blocked the ends off. The other small pieces would become the connecting pieces that held it all together

Dimensions

The lamp stands 1200mm high:

The base is 450mm high and has a diameter of 150mm. This could have been broader, to increase the lamp's stability. If I did it again, I would take it out to 200mm

The larger arm is 850mm long

The shorter one is 500mm

The lamp head is 350mm and has a diameter of 120mm. This could have been 50mm deeper in order to accommodate more of the bulb

Materials

Apart from the timber, I had to buy a lamp holder — which was duly fitted by a registered electrician — an in-line switch, three sets of 6mm bolts, each with two large washers and a wing-nut, and a packet of sticky feet to go on the base. I initially put three on, but there was still a tiny bit of wobble, so I put on three more, and that was sorted. I installed an LED bulb so that there wouldn't be a problem with heat within a wooden surround.

Cost

Lamp holder: \$25

In-line switch: around \$15, depending on where you buy it

9W LED bulb: \$5

The sticky feet: \$1.60

The nuts and bolts: mainly on hand but about \$2.50 ▶

The pieces that made up the base glued together with a length of 6mm dowel going down through the middle. On the left is an alternative method I tried for forming the arms, but it wasn't nearly as good



Multi-skilled Allan wiring the switch for the lamp. Allan is a retired electrician



The turned base still on the lathe just before sanding

“Looking back, I would use 8mm bolts as 6mm ones are a bit difficult to keep as tight as required”

A combination of glue and sawdust was used to fill in the gaps. This peg was 20 x 20 x 200mm long, with 20mm going down into the stand and lampshade. The arms had the same peg glued down into the hole I had created for the wire, and was both glued and screwed in place.

So, to look at, the peg in the base/lampshade and the ones in both ends of the arms were the same. Using contrasting pieces of timber, I made three pairs of extensions to fix to the pegs at one end, while being free to turn at the other. These were 20 x 10 x 180mm, with the exposed ends curved for a nicer finish.

The arms were to be squared with rounded corners, and hollow for the cable, and were made up of thin strips glued together and then put through a thicknesser in order to be squared up. A bench router was used to round off the edges, which meant I now had a hollow arm to accommodate the wire.

Good rule

The trick to getting a wire down a tube is to pull some string through, and then attach it to the intended wire. The rule is to do this before you block off the ends. I forgot the rule. In the end, it wasn't too hard — I found what seemed to be a long and strong bootlace and, with the help of gravity, standing on one leg and whistling — and some long-nosed pliers — I managed to pull it through the holes I had previously put in the side. Twice. Because there were two arms. The things we learn!

In the end it all came together, with 6mm bolts, large washers, and wing-nuts used to tighten the arm movements. Looking back, I would use 8mm bolts as 6mm ones are a bit difficult to keep as tight as required.

The lamp was finished with Danish Oil, with the base and lampshade getting four coats because of all the exposed end grain. This wouldn't have



The lamp at home sitting on the coffee table project

been the case if I had applied a sealer coat first. Again — the things we learn! ►



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THE WORKSTATION

The wall-standing workstation — not for the faint hearted. Note that the 12mm MDF back board only goes down as far as the desk top. The two backboards provide excellent bracing for each unit, so be sure to fix them well

This project was the most complex project, and isn't necessarily for the faint-hearted. It took two guys four months to complete, partly because it changed over that time. It was originally going to be wall mounted with a fold-up desk. However, the weight of the MDF meant that actually mounting it on a wall was going to be a challenge, and coming up with a fixing method that was both sturdy and easy to change should the need to do so arise, proved to be ambitious.

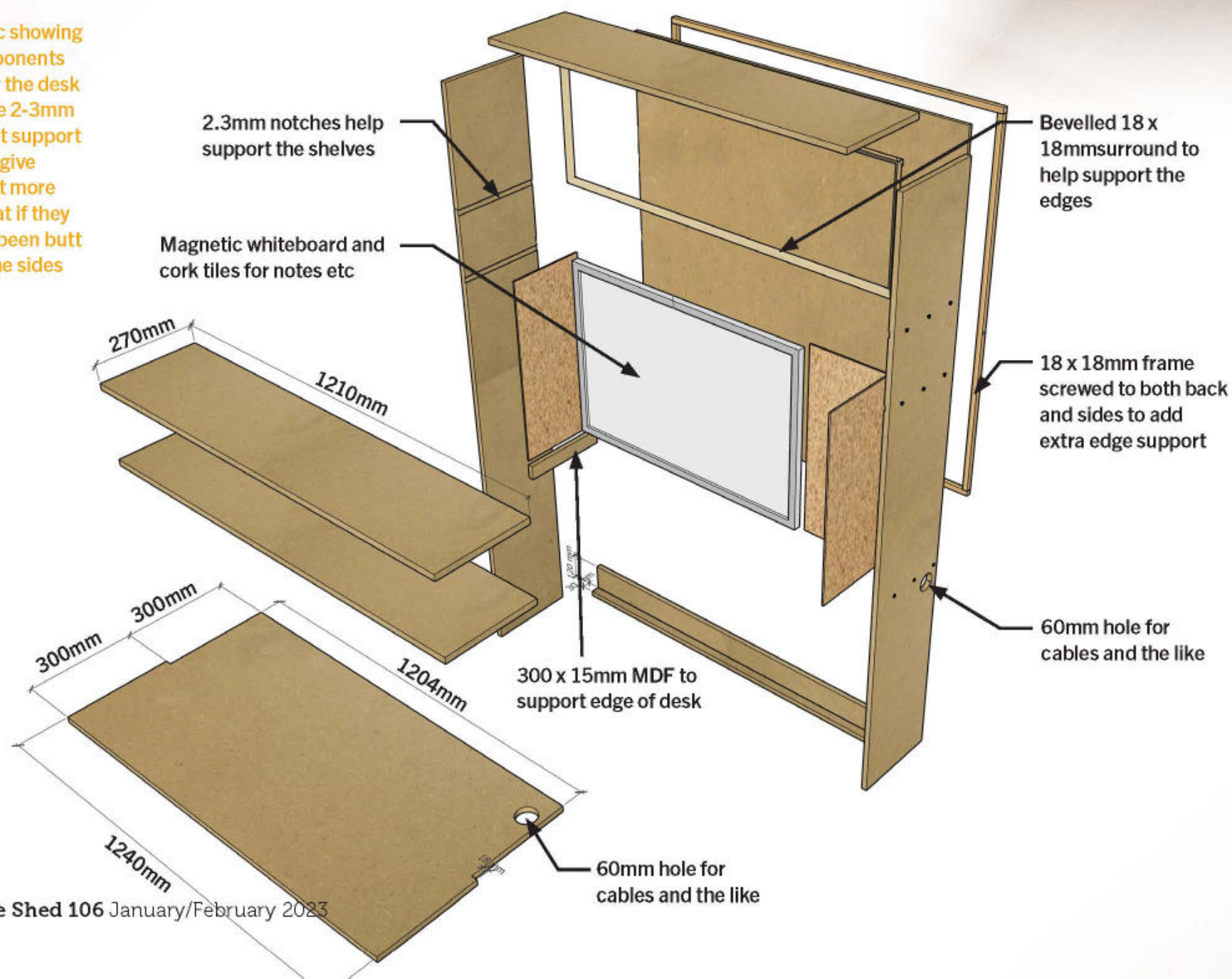
The first month or so of this one was spent going through this exercise, resulting in the decision that it would stand on the floor and be fixed to the wall with brackets, while the

desktop would be fixed. Nevertheless, the overall goal of trying to incorporate all the requirements of a small home business — printer/scanner, drawers, shelves, laptop, second monitor, lamp, whiteboard, and pinboard — was definitely achieved.

A modular approach

The intention was to build a workstation and a separate printer/scanner station that could be fixed to the side, allowing a further workstation, if required, to be fixed to the other side, and ensuring the printer/scanner was in the middle — or not. It could be used however the intended user chose — the real strength of a modular system.

A schematic showing all the components required for the desk module. The 2-3mm notches that support the shelves give the unit a lot more strength than if they had simply been butt jointed to the sides





Retired pattern maker Lindsay Papps and race car mechanic and driver Pete Leversedge demonstrating the attention to detail that went into this project. Note the packing on the floor — this MenzShed has an interesting post-earthquake floor and the units need to be level in order to ensure accuracy

Materials

18mm and 12mm MDF

18 x 18mm timber bead

Drawer handles

Whiteboard

Screw caps

Cost

This was the most expensive of the projects, at just over \$200, with most of the cost being for the MDF, and the remainder for the Danish Oil and fittings. ►

“The intention was to build a workstation and a separate printer/scanner station that could be fixed to the side”

The printer / scanner module showing the drawers being formed. Note the piece of 18mm MDF being glued to the front of the drawer to keep the overall look and feel of the unit. It was this level of attention to detail from Lindsay and Pete that was truly impressive throughout his project



The carcass of the desk unit standing on its own. Note the 18 x 18mm timber trim fixed prior to the 12mm MDF back being fitted

Six summer projects

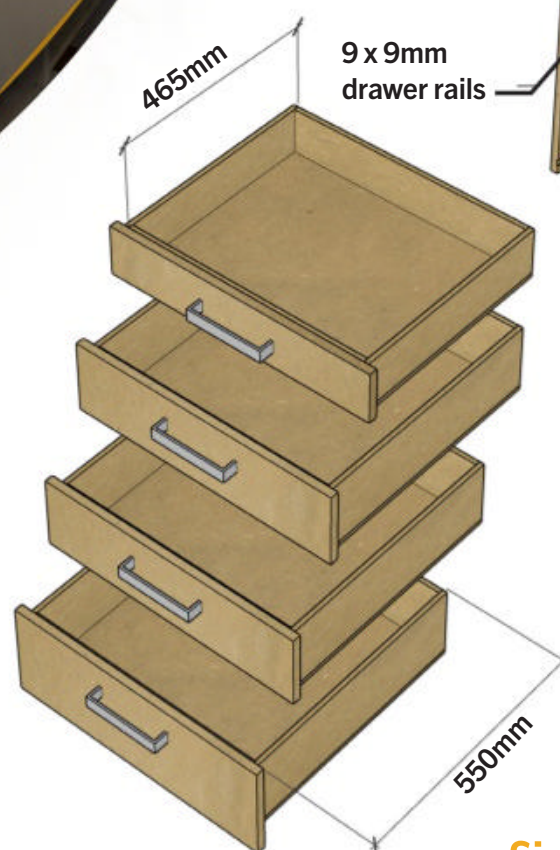
Left: The main desk carcass being sanded and prepared for its final finish — one coat of sealer and two coats of Danish Oil

Below and right: This schematic shows the materials of the different components in relation to each other, for the printer / scanner module. The 9 x 9mm drawer rails could be upgraded to drawer sliders, but this increases the cost and the complexity, as the drawers would also need to be modified to accommodate them. Note also the 18 x 18mm strip around the back that supports the 12mm MDF backboard. They are fixed into a notched stiffener across the bottom to reinforce their role

18 x 18mm strip screw fixed to both sides and back to support the structure

600mm

1982mm



Drawers made from 9mm sides with a 6mm base over the whole drawer to secure it. 18mm front added to match the rest of the workstation

Allow for the top drawer to be shorter so as to not interfere with cables and the like from the 60mm hole above

Sizes

They were both 2000mm high, with the workstation 1240mm wide and the printer/scanner station 600mm wide. The desk height was set at 720mm, with a depth of 600mm. The sides were 300mm, ensuring both stability and a decent shelf depth, with a lever arch file used to check heights. A handheld router was used to make a 2-3mm-deep groove in the sides for the shelf ends, which were also glued and screwed to ensure durability. A 20 x 20mm bead was screwed all the way around prior to the 12mm MDF back being fitted.

Drawers

The drawers were made from 12mm MDF using timber rails — the sides of the drawers being routed to suit. These were faced with the same 18mm MDF used throughout. Drawer handles were on hand. A whiteboard was fitted to the back of the desk area, and plastic caps were fitted over the exposed screws used throughout the project.

The project was finished with one coat of sealer and two coats of Danish Oil.

250 x 50 18mm MDF to support edge of main desk

100 x 600mm stiffener across the bottom to bind the 18 x 18mm timber strip and support the bottom of the drawer bay

THE COFFEE TABLE

The idea behind this coffee table was for it to double as storage space for children's books and toys. We considered drawers and even a lift-off tray, but drawers can jam unless proper slides are used — and this increases the cost and skill level required. The timber for the top was too heavy to be lifted and carried around. The screws for the hinges turned out to be the only screws in the whole project, with everything else being glued and biscuit-jointed or glued and dowelled.

The timber for the top was from the timber racks, and was very dark and dirty with what appeared to be a very old stain. A few passes through the thicknesser, however, and pure gold emerged. Look at the photos of the coffee table and you'll see what I mean. It was stunning, and then, when it got the buffing oil ... The photos just don't do it justice. ►



Dave Little and Keith Preen working on the coffee table. This was during Covid as you can see by their masks



The coffee table that showed the true value of using second-hand timber with stunning grain emerging after the dark and dirty pieces of timber had emerged through the thicknesser

Small rubber 'feet' from a variety shop helps prevent damage to the underside of the lid when it is raised

A schematic of the coffee table showing the rubber 'feet' that I added to prevent the underside of the table top being scratched by the hinges. The hinges proved to be the only screws in the project - everything else was either dowelled or biscuit-jointed



60mm ply triangles cover the inevitably irregular cutting to the 9mm MDF base once it has been cut and fixed

"The screws for the hinges turned out to be the only screws in the whole project"



Keith Preen modelling the timber top after he and Dave had glued them together using biscuits. Once it was trimmed up and sanded, the grain became very evident. Two coats of Feast Watson's Fine Buffing Oil made the surface glow

Dimensions

The table stands 470mm high, while the top is 900 x 430mm. The storage space inside is 100mm deep, and the table structure is narrower than the top by 40mm all around.

Materials

Recycled rimu for everything except the base of the internal storage, which is recycled MDF. We haven't quite figured out what the top is, but it is a wonderful example of why second-hand timber should be used. What looked grubby and stained in the timber racks turned out to have an amazing grain, which, under the influence of Feast Watson's Fine Buffing Oil, just about glowed.

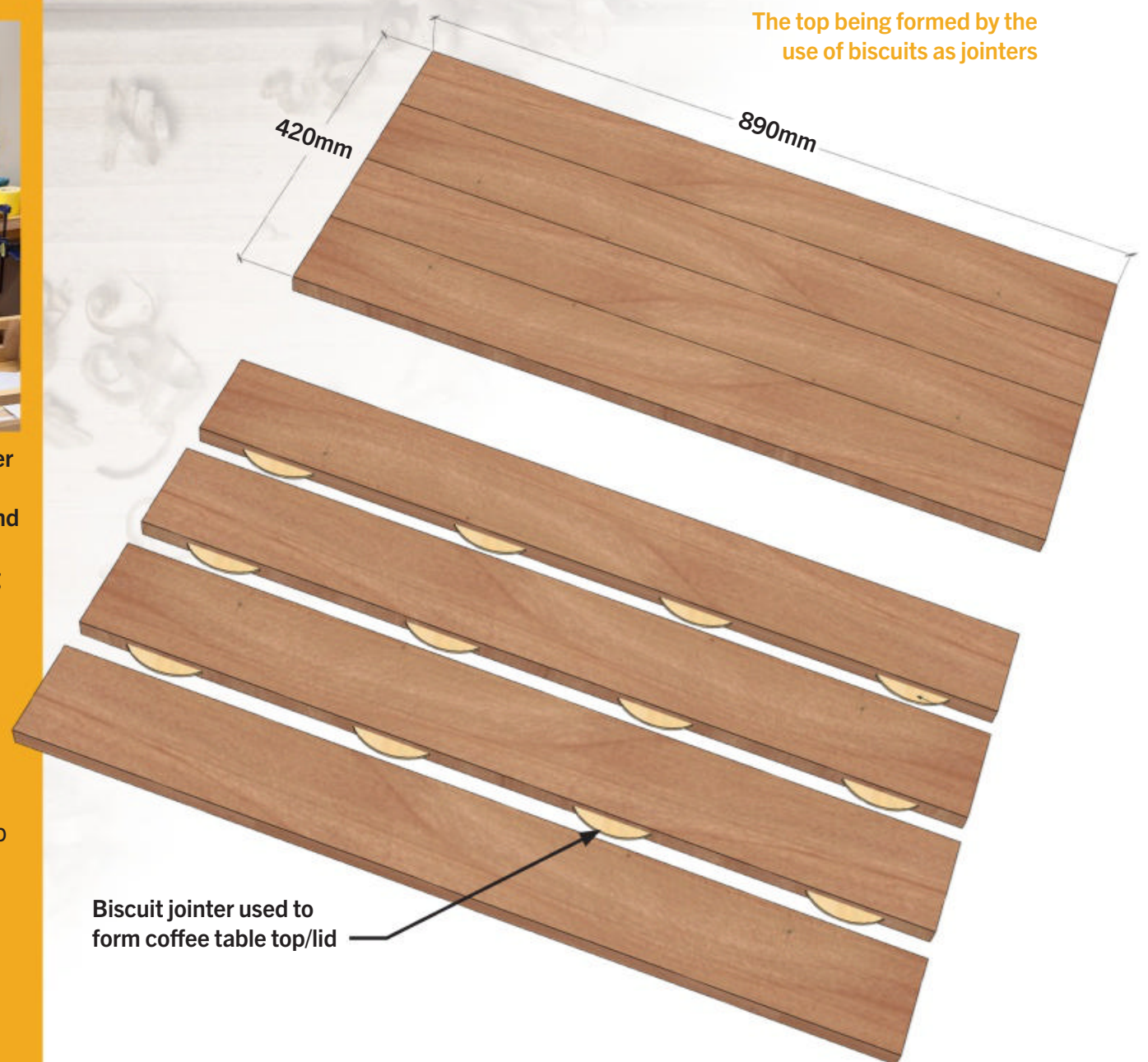
The table was sanded with 180-grit paper, and the buffing oil was applied with steel wool. The instructions on the tin proved to be perfectly adequate. The top was buffed after application, and then again some hours later. It was given two coats, and that was all that was needed. With an item that is flat and thin, such as a table top, it is important to apply the finish to both sides at the same time. This is because, unless the item is well secured and can't move, there is the possibility that applying moisture to one side and not the other will cause cupping problems, so, before you start, make sure to place the item in a position that will enable the oil to be applied, and then left to dry.

Cost

Buffing oil: \$25

A pair of hinges: on hand

Rubber feet to prevent damage against the hinge: \$1.60 (They were from the same packet as those used for the lamp)



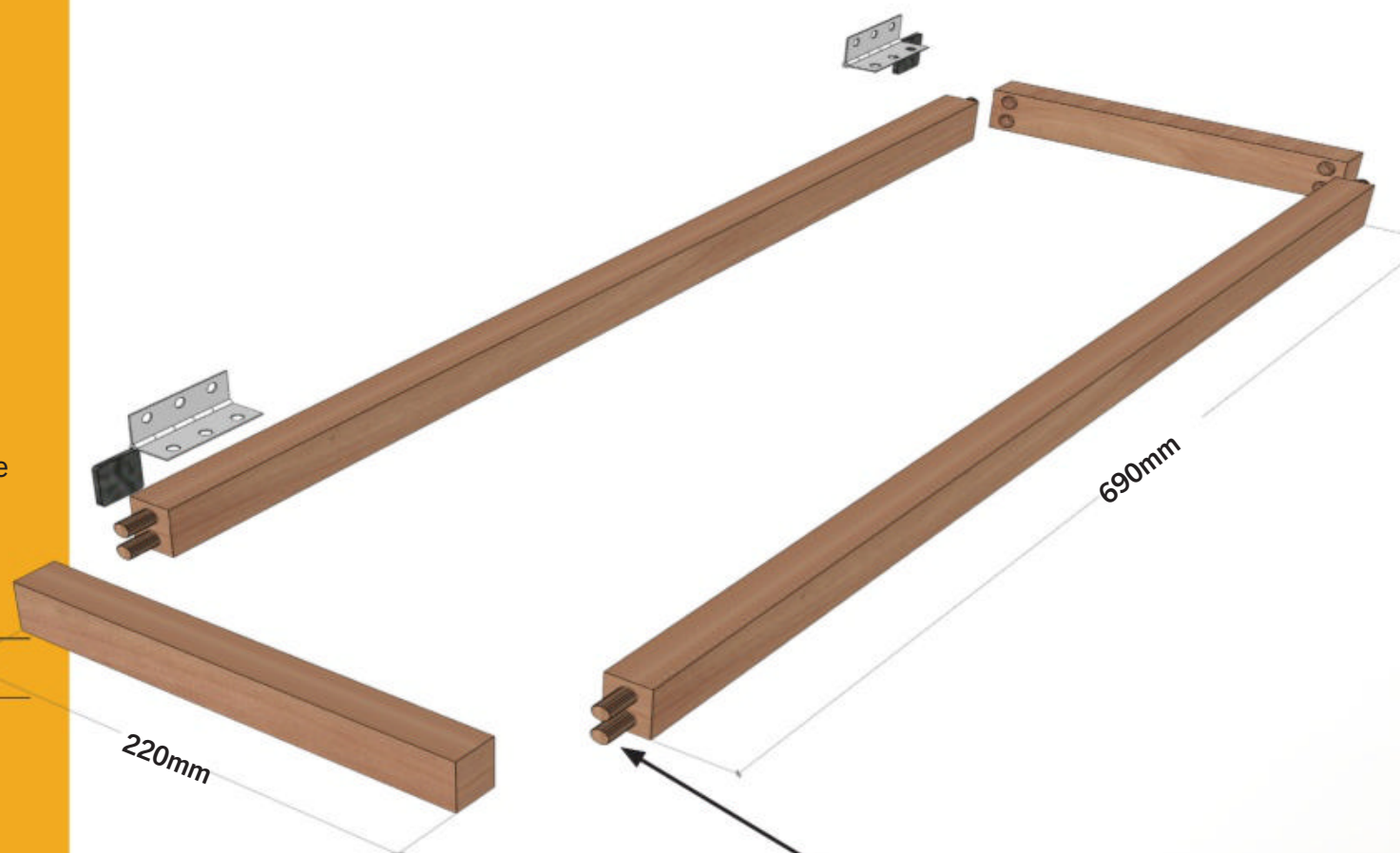
The top being formed by the use of biscuits as jointers

Native timber

The structure was built of rimu from a sheddie's garage, trimmed down to 20mm. The tabletop was planed on the underside, with all measurements taken from a drawing I had supplied. The legs were glued together into an 'L' shape, with the side pieces being attached with biscuits. This created a profile of 60 x 60mm, with a 20mm depth. The 12mm MDF base was fitted into grooves

that were routed into the sides 5mm in from the bottom edge, with thin 60mm triangles used to tidy up the corners.

The bottom shelf was formed separately from four 60 x 20mm rimu rails, 40mm apart with ends to match. This was then fitted to the legs to be 75mm from the floor. Dowels were used for all the rails and bottom shelf as indicated. The biscuits were used to join the top as well as form the 'L' shaped legs.



Dowels are used on the rails and ends, and the bottom tray



Pure gold emerging from the thicknesser, justifying the use of second hand timber

“A few passes through the thicknesser, however, and pure gold emerged”

Below: This schematic showing exploded views of the different components that went into the coffee table. The triangles were used to tidy up the corners



Keith showing me his handiwork when I went to take the photos. The quality of workmanship was excellent. The legs came from some rimu Keith had in his garage

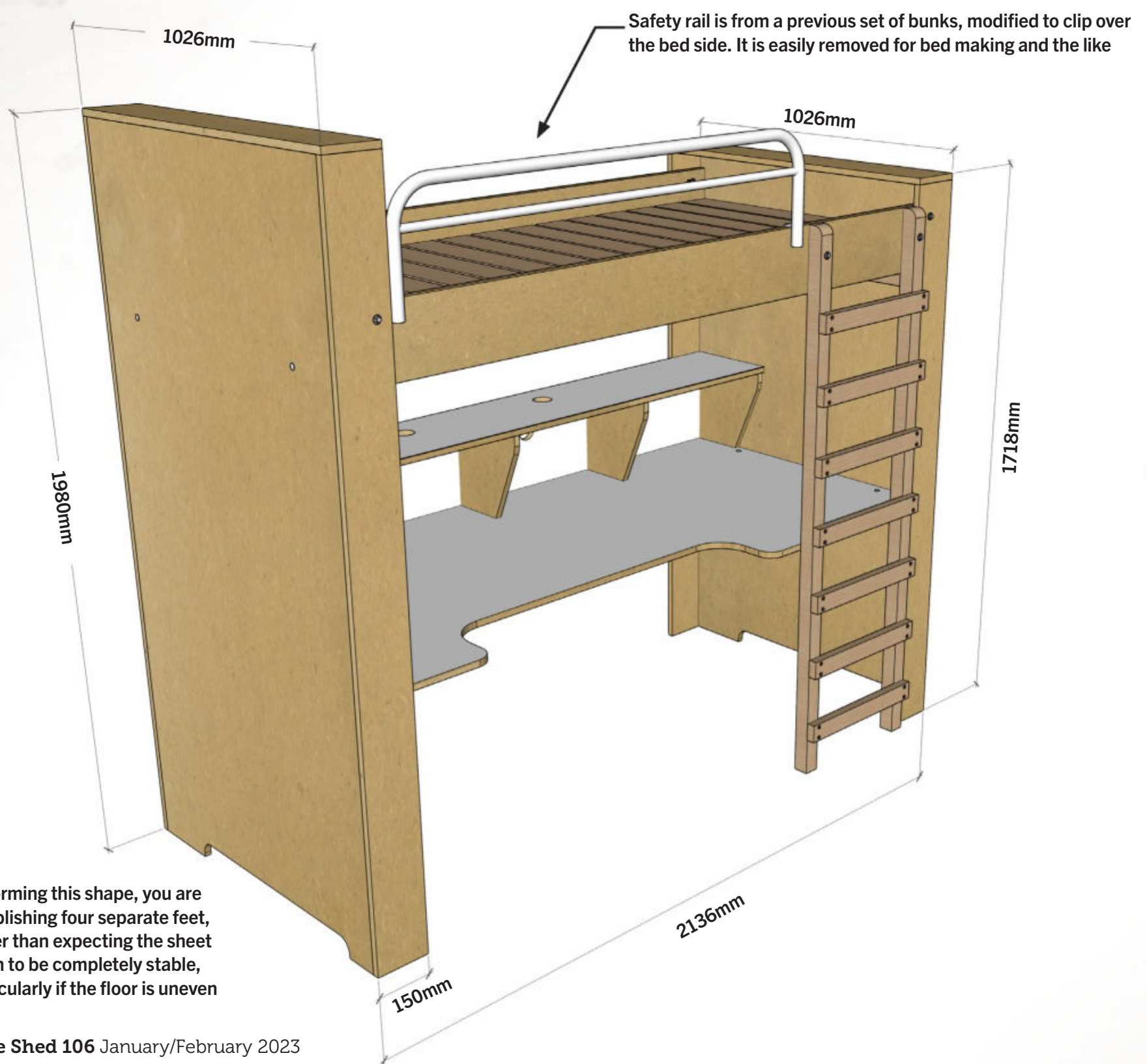
THE BUNK AND DESK

This project was a similar size to the workstation, the difference being that the employee who used that was able to walk away from it at the end of the day. With the bunk desk, however, the user was required to sleep at their station — no sneaking off for a life somewhere.

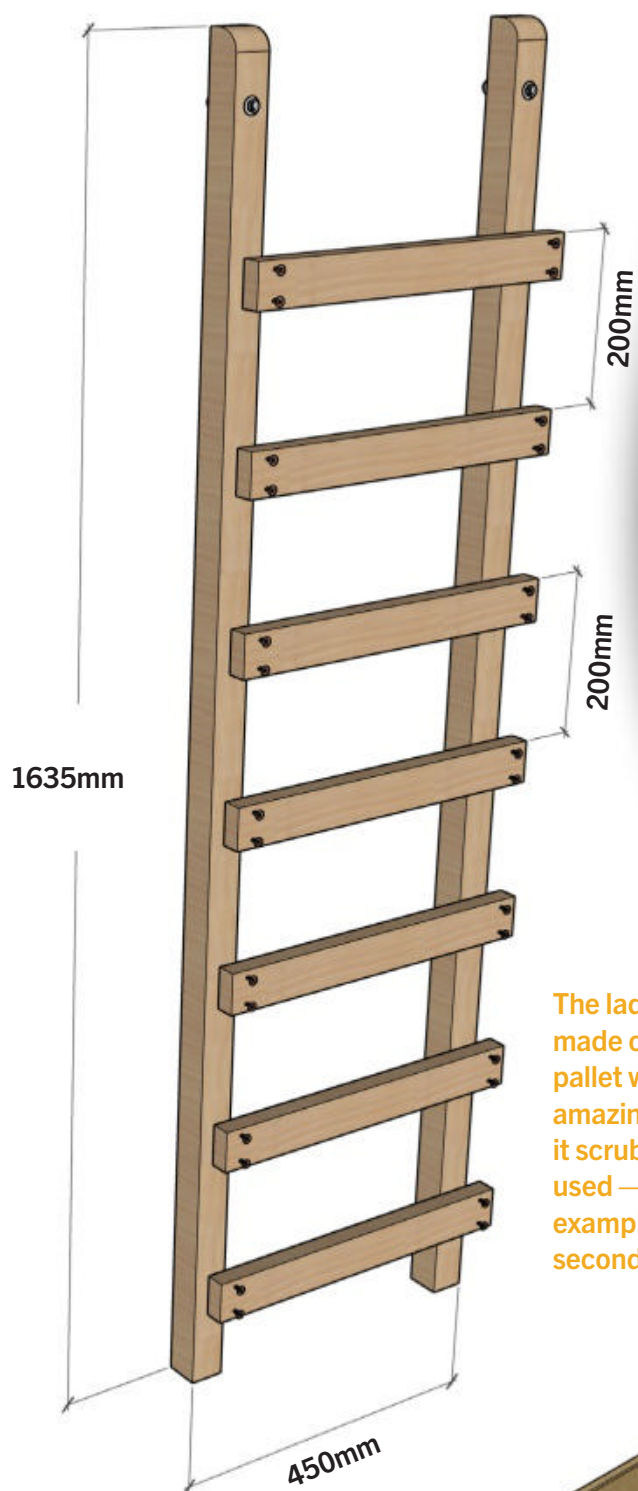
The project started with two 70 x 50mm rails for

the bed base, fixed together with 950mm-long 100 x 20mm slats on top, each 20 mm apart. The rails were 2100mm long. Making this first established the parameters of the bed — everything else would follow. Two end pieces of the 70 x 50mm rails were used at the ends, cut between the rails, making them 850mm long. ►

A schematic showing the different components of the study / bed. Note the reuse of a guard rail from a previous set of bunks — it can be removed and then replaced as needed

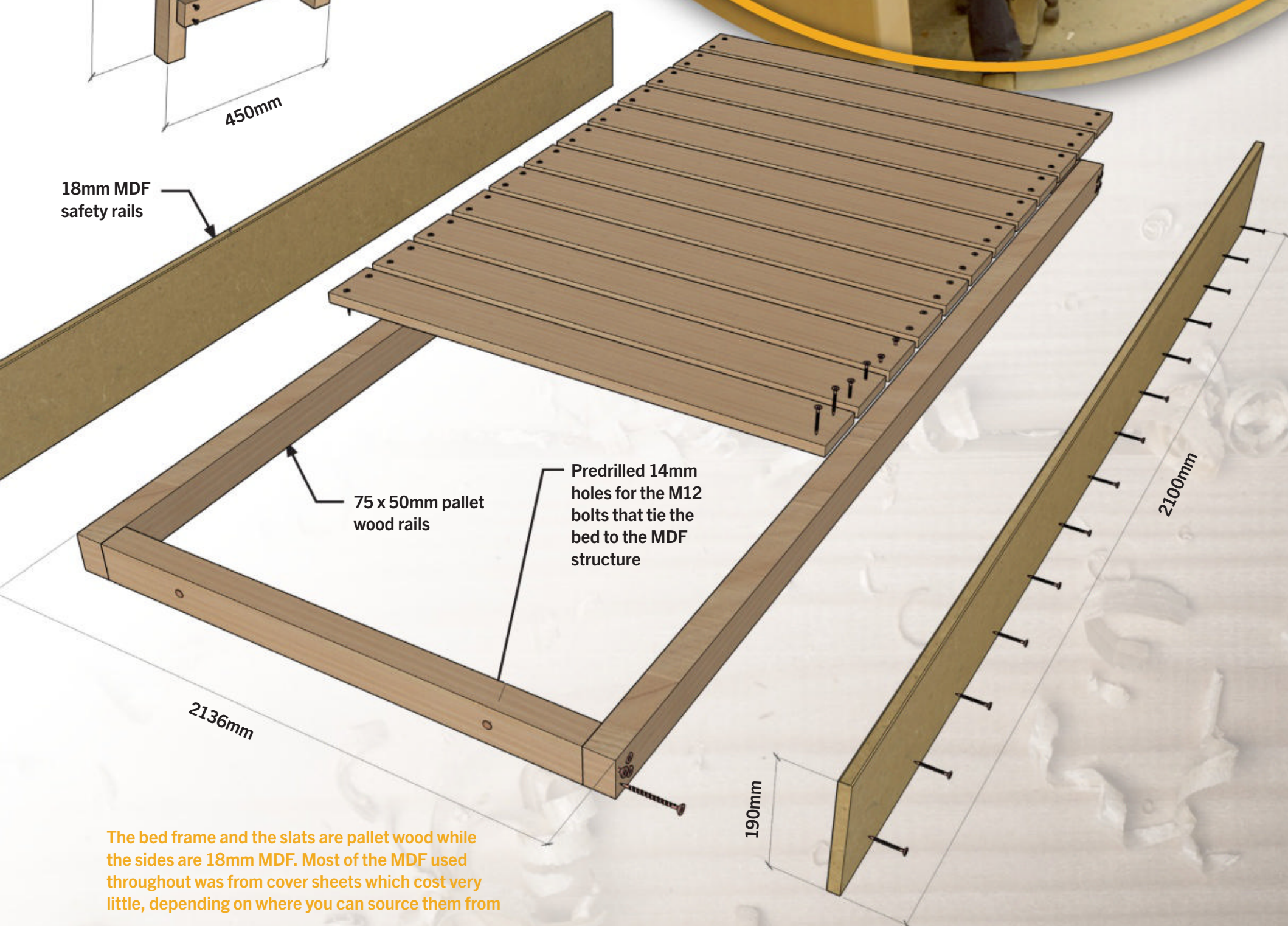


By forming this shape, you are establishing four separate feet, rather than expecting the sheet width to be completely stable, particularly if the floor is uneven



The ladder made out of pallet wood. It's amazing how well it scrubs up when used — another good example of the use of second-hand timber

Grant Taylor and Roger Owens — the two builders of the study bunk — feeling justifiably pleased with their workmanship. It was extremely well made yet used the simplest of materials — MDF cover sheets and pallet wood for the most part — and fixings, ultimately costing around \$100. It was given to a family in the area for use by one of their children. Dreamwool donated an Evolution mattress (not shown) as part of the project. Also Joinery supplied the Meltica board for the desk while Cabot's supplied the Danish Oil for the finish



The bed frame and the slats are pallet wood while the sides are 18mm MDF. Most of the MDF used throughout was from cover sheets which cost very little, depending on where you can source them from

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Below: The study bunk being installed in the bedroom of the very grateful student.



Left: Grant drilling the first of the slats — two screws at either end making the screws one of the dearest components in the project. These can't be fixed properly until the bed frame has been squared by measuring across the diagonals and corrected accordingly



“How many sheddies does it take to install a ladder?”



Grant drilling 60mmØ holes to accommodate power cords and cables and the like

Materials

18mm MDF cover sheets

A donated sheet of Melteca Melamine from Alsop Joinery

Pallet wood

An adapted safety bar from a previous bunk

A mattress, donated by Dreamwool, a local mattress manufacturer

M12 bolts through 14mmØ holes, with tee nuts being used in order to bite into the MDF and ensure no slippage or loosening off

Cost

When this project began, a quote for new timber came in at just under \$1000 — even with a discount.

Ultimately, it cost less than \$100 — and most of that was for the related hardware rather than the actual materials, as outlined above.

Keeping square is vital

It's important to keep a project like this square, with constant checking required. In this case, once the rails and the first two slats were placed, the base was measured across the diagonals to check before they were fixed permanently and further slats were fitted. If it's wrong at this point, the error will be compounded as the project progresses.

Next came the 18mm MDF, cut on a bench saw with the assistance of other sheddies. This was fitted with more of the 70 x 50mm rail, to be the support for the bed base. This was both glued and screwed for long-term durability and stability. Sides made from 18mm MDF were fixed to the bed base.

Bracing

The bed ends that gave both the height and the majority of the bracing strength to the project came next. They were identical, the only difference being a piece of MDF fixed at the front to prevent the mattress from migrating — the last thing we want is a migrating mattress! As it turned out, that was unnecessary because the depth of the mattress confined it to its space. The desk was formed with a 200mm rebate

400mm in from the headboard end and 650mm in from the tail end in order to accommodate the ladder. It was supported on three sides with more of the 70 x 50mm timber used for the bed rails. The exposed corners were also rounded, only not to the same extent. The desk was set at 700mm from the floor, while a shelf at the back was set 300mm higher. This required a support in the middle to stop it bowing. 60mmØ holes were drilled through the shelf top and back support for power and computer cables to pass through.

Ladder

The last thing to be made was a ladder, created using the same recycled materials as the rest of the bed, in this case cut to 45 x 45mm for the rails and 65 x 25mm for the rungs. These were set at 300mm centres. How many sheddies does it take to install a ladder? Check out the photos to find the answer.

Finally, it was assembled, finished with two coats of Cabot's Danish Oil, delivered, and installed — along with the Dreamwool mattress.

The bunk and desk set was ultimately given away to a local family for one of their children to use. ►

Roger and Grant clearly enjoying this project
— all the timber here is recycled pallet wood

Our six summer projects contributors



The luxury 'Evolution' mattress was kindly donated by Dreamwool, a local Christchurch mattress manufacturer. Dreamwool has been in the luxury bed business since 1934 and in the Henderson family for more than 40 years.

In 1978, Dreamwool owner Edgar Henderson began his quest for the most luxurious sleep. An ex-farmer with a bad back, Edgar remembered the old-fashioned black wool singlets worn by his shearers; how they acted as natural insulators and adjusted to changes in temperature during the day to maximise comfort and create perfect balance — never too hot or too cold! From there, the first woollen overlay was created, and thousands have enjoyed Dreamwool's quality, handcrafted merino wool mattresses ever since.

The layers in this mattress include 100 per cent natural rubber latex and 100 per cent pure merino wool from Goldwyn Station, Kurow.



The Danish Oil used to seal and finish the MDF was kindly donated by Cabot.

This deeply nourishing, penetrating oil is suitable for all interior furniture, doors, windows, and trim. The oil penetrates to provide a protective natural matt finish to bring out the best in your wood grain. Apply a second coat for even greater lustre.



The MDF and Melteca Melamine Board were donated by Alsop Joinery, Christchurch.



“These projects were built by sheddies who didn't necessarily have the requisite skills”

WHAT WE LEARNED

One point that came out of this project was that this is the realm of second-hand timber, with the bunk and desk demonstrating this very well. It isn't just about the price — second-hand timber is usually dry and has long since stopped shifting. It can hide a stunning grain and colour, as can be seen by the top of the coffee table and the layers in the lamp. I built a coffee table a while back, after being given six lengths of white pine from the garage of a recently deceased family member. They cleaned up well, and it is now in my lounge. Strips of Kwila at the joins give it a contrast, while the rimu legs came from the MenzShed timber racks.

Sheddie spirit

These projects were built by sheddies who didn't necessarily have the requisite skills, but who had the confidence and tenacity to take them on and see what sort of a job they could do: the spirit of DIY. They were all done in MenzSheds, but this article isn't about the MenzSheds;

it's about the pleasure of tackling something new, particularly if you are unfamiliar with wood, tools, practices, and ultimately finishing your project.

I was brought up in a time when a workshop with a bench, a reasonable range of tools, and both the need and the desire to make stuff for around the home was a lot more common than it is now. My dad built his table saw — a very common practice back then — and used it all the time.

My son's partner is a former airline hostess turned industrial electrician, and has been making her own furniture for some years. She didn't let ignorance get in the way of her enjoyment of working with wood, and has built up quite a collection of good-quality tools over the years.

The spirit of the Kiwi shed has no boundaries — so give these a go and let us know how you got on. It's an excuse to buy some great tools, enabling you to keep going once you've completed some of them, along with any other idea that gets you to put on your 'I can do that' hat. 🧰

THE CUTTING EDGE

Age-old skills thrive in our modern world

By Jason Burgess Photographs: Jason Burgess

An engaged audience at Auckland Blade Show

The knives were out in their hundreds at the Auckland Blade Show 2022 in late September, and, judging by the quality of artistry and handiwork on display, New Zealand's knife-making community is in the ascendance.

If lockdowns had deprived knife-makers of a place to show off, then the show highlighted how a burgeoning body of bladesmiths used enforced isolation positively; to hone, grind, and shape some superb steel.

It was not just the seasoned veterans who were turning up the heat. Some 70 per cent of the makers at the 2022 show had never exhibited before, yet already these rookies looked confident, well-researched, and versed in the tricks of the trade; some were also getting pretty inventive.

“The show had doubled previous attendance records, in one day”

An event for knife-makers

The Auckland Blade Show organiser and host, Skye Eilers, is one among this new wave of internationally collected young bladesmiths. He put aside exhibiting his own knives to promote the wider maker community.

Skye says, “I thought I would give it a go and try and create the kind of show that I would want to be at. I’ve never exhibited at a show before, nor run

anything bigger than a birthday party. It was a big learning curve!”

Skye rebranded the show, taking inspiration from similar expos in Australia and America.

“I wanted to create a professional event, a show for the public and for us. I am really happy with the turnout.”

With 43 exhibitors and around 600 curious visitors through the door on Saturday alone, the show had doubled previous attendance records, in one day.

Blown away

Event founder, Brent Sandow, is no stranger to *The Shed* readers. He set up the first Blade Show in 1999 — the year Skye was born — and handed over the reins to Skye before moving to the South Island. Brent is amazed at the depth and breadth of the knife-maker community and the quality of exhibitors at this year's show.

He says, “The standard of workmanship has blown me away. The stuff is insane. It is fantastic and it is great to see that the community has grown like this. Skye has done a great job. His generation understands social media, which has helped grow the whole thing; everyone has grown closer and YouTube has had a huge influence on makers.”



Shaun Roodt's winning art pieces



Liam Croft, Hjalmar Járn Blades displays

Auckland Blade Show winners 2022

Best Folder and Best In Show:

Justin Williams of Judge Handmade Knives

Best Historical Piece:

Liam Croft, Hjalmar Járn Blades

Best Utility and Best of the Rest:

AJ Prime, Prime Artisan Knives

Best Damascus:

Caden Bostic, Nedfly Knives

Best Details:

Liam Walle, Liam Valla Knives

Best Art Knife:

Shaun Roodt, Ronin Hand Crafted Knives

Best Chef:

Shea Stackhouse, Stackhouse Knives

Best Hunter:

Francois Mazieres (bladesmith) and partner Annieka Skinner (sheath maker), Yandiwa (Australia)

2023 show

With plans to repeat the show in September 2023, Skye says he wants to cultivate the audience and fraternity further.

“There is no competition in the knife-making community. We’re all constantly inspiring and supporting each other, and I’m humbled that this show has deepened those connections.

“It’s about creating an environment where we can all come together, elevate ourselves, and show the very best we have to offer. I was chuffed to have lots

of makers come up and say they wanted to display next year, too, so I’m looking forward to an even bigger show.

“We also aim to gradually add to what the show offers visitors and makers.

There’s so much possibility for education, entertainment, and more.

“Overall, I’m just really proud of what we’ve achieved, and inspired for next year.”

For more on some great Kiwi knife-makers, see the next issue of *The Shed*, the March/April 2023 issue 107, on sale 31 January.



Liam Walle's award-winning blades

THE SHED ONLINE

What’s happening online at the-shed.nz?

Every week we upload new content onto The Shed website to add to the hundreds of articles and videos already on the site for readers to discover, learn from, and enjoy. Some uploads of the past few months include:

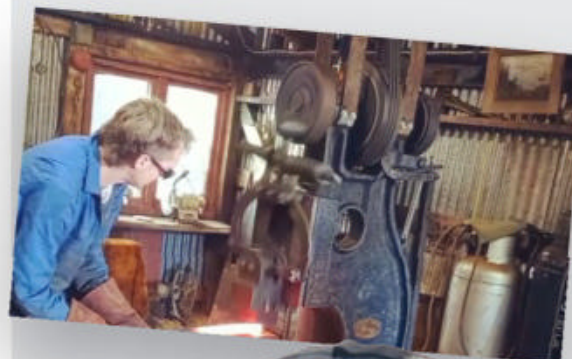
A three-part series on installing and using a milling machine in your workshop

<https://the-shed.nz/time-for-a-milling-machine/>



A video of a restored 1910 power hammer in action

<https://the-shed.nz/video-of-a-restored-1910-atlas-power-hammer/>



Buying advice for anyone wanting to get their own air compressor

<https://the-shed.nz/which-air-compressor/>



A guide to repairing a stripped thread on a mower or an engine block

<https://the-shed.nz/how-to-repair-a-thread/>



PAINTING TIPS FROM THE RESENE EXPERTS

To help you make your painting projects easier, we've asked the Resene experts to share some of their top tips:

Use a paint pot

Yes, we know it's tempting to just paint direct out of the paint container, but did you know that every time you dip your brush back into your paint you are also bringing contamination and bacteria from the surface you're painting back into the paint. The best idea is to tip the paint you plan to use into a smaller Resene paint pot and paint from there. This will keep the paint in the original can in mint condition, so if you do find you have some leftover and want to save it up for other paint jobs later, it will last in good condition much longer.

Clear the clutter

When you're repainting and end up with empty cans or have changed to a new colour scheme and no longer need or want the old paint, bring it into the Resene PaintWise service at selected Resene ColorShops. If you have lots of paint leftover, consider donating it to a local community group whose building needs a lick of fresh paint.

Freshen up

Sometimes the surface doesn't need a repaint, it just needs a good clean. It's best to clean your home's exterior paint at least once a year – we recommend Resene Paint Prep and Housewash for a quick clean. For driveways, paths and decks, simply spray or brush on and leave Resene Deep Clean and nature to do the work. Slow acting Resene Deep Clean gets right down to the roots of the problem, destroying the growth and combining with nature to let the remains be weathered off leaving a cleaner surface.

Did you know?

If you need help with your painting or wallpaper project Resene has free expert advice available – simply use the free Ask a Tech Expert service online, resene.co.nz/techexpert, visit your local Resene ColorShop or call 0800 RESENE (737 363).



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Letters to the editor



MICHAEL HOURIGAN NOT MIKE HOGAN



Hello Greg,

Thanks for such a brilliant article [For the love of it, *The Shed* issue 105]. How Jason put together such a detailed and enjoyable story with such a short visit — amazing!

Re the name, Mike Hogan, in the article: it should be Michael Hourigan. I have worked on some of Michael's exotic car restorations since the mid '80s. The detail

and finish of the cars is unbelievable!

The hours of work involved in putting these cars from completely stripped down to the finished product — truly amazing. I wonder if you could somehow apologise to him [for this error].

Thanks for sending me the copy of your great magazine.

Kind regards,

Steve Roberts

IS THERE BALANCE IN CHILDREN'S LIVES?

Dear Sir,

I'm a part-time teacher aide at our local intermediate school here in Auckland. I've been compelled to write this letter to *The Shed* as I've seen a real shift in kids' screen time, especially over the past five or so years.

When my boys were growing up, Atari was all the rage — the console that you connect to the humble television set. It was easier to get young people off them back then, as the television was central to every household. Fast forward to the present day and I'm seeing how modern devices, and particularly screen time, have slowly but gradually eroded away traditional skills. It is a real concern that children aren't having these essential technical skills passed down from one generation to the other. Parents are finding it too hard to get their children off screens, and I believe more energy needs to be put into creating

new ideas to stimulate our young.

My husband is an avid reader of *The Shed*, and he now looks through the archive editions and finds projects that the grandkids would enjoy getting involved in. He has recently finished building a bunk bed, and is now building go-karts for the farm up north. Both our grandchildren enjoy the skills he is passing down to them, and the quality time they spend together can never be replicated by any screen.

I hope, through the schools and parental influence, that more children come off screens and engage in the practical sides of their personalities.

Thank you,

Mary Lawrence

If anyone has any ideas on how to tackle excessive screen time for youngsters, please drop me a line and we will share with readers. Ed.

LETTER OF THE MONTH PRIZE

Every issue, our Letter of the Month winner will receive a copy of *Best of Shed 1 & 2*. More top projects from 15 great years of *The Shed* magazine.

Letters should be emailed to editor@theshedmag.co.nz, or posted to Editor, The Shed, PO Box 46,020, Herne Bay, Auckland 1147.



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PART 2

BUILD YOUR OWN TRAILER

DECK AND WIRING

The trailer is back from galvanizing and ready for the finishing touches

By Tony Cullen of Cullen Equipment Specialist

Photographs: Gerald Shacklock

Diagrams: Philip Heath



(1) Drilling out

“Check the coverage of the galvanizing, especially on the welds”

Rust can occur on a weld that has been sitting in the rain after galvanizing if there is an air lock not properly covered by the weld. The wiring clip barrels and tie-ons — pieces of bent rod — that were welded to the trailer frame should also be well covered with galvanizing (photo 2). To cover any gaps in the galvanizing, you can use spray-on cold galvanizing zinc spray from a can. Follow the instructions. ►

At the end of part one (*The Shed*, November–December 2022, issue 105), we sent the welded frame, the front and back gates, and the axle of our trailer for galvanizing. You could paint the trailer instead of galvanizing it, but paint won’t get deep inside the box section to stop rusting in there. You can paint the frame after galvanizing, but there’s a lot of fuss with primer and preparation.

Use a drill to clear galvanizing from the box-section vent holes you drilled for safety during galvanizing. I also cleared out the holes in the spring holders (photo 1) and in the angle-iron cross members that I pre-drilled before the trailer went for galvanizing. It pays to pre-drill as many holes as possible before the galvanizing. These include holes in the hinge straps and holes in the angle-iron supports for the side boards.

Check the coverage of the galvanizing, especially on the welds.



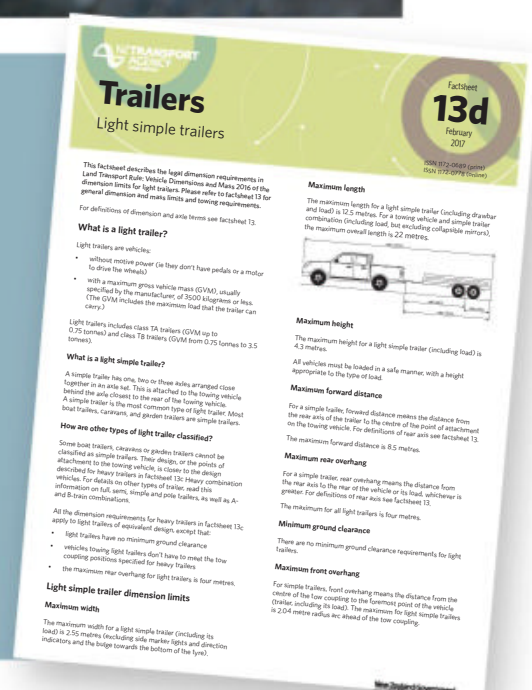
(2) Galvanized tie-ons

Safety tips

Land Transport NZ (now Waka Kotahi) produced useful information about trailers and their use. Check out the NZTA website for Factsheet 13d on light, simple trailers: <https://www.nzta.govt.nz/assets/resources/factsheets/13d/docs/13d-trailers-light-simple.pdf>

A free guide to safe loading and towing for light vehicles is available.

Caution: 90kph is now the maximum speed at which light vehicles towing trailers or other vehicles may drive on the open road. If you’re towing a trailer, remember to allow more time than usual for your trip.





(3) Wiring at front

Tailgate cutting

Use the offcuts from the deck plywood to make the front and end tailgate boards and side boards. There should be enough ply left, if you make the boards 280mm high. This height leaves a gap at the top between the boards and top rail for tying off tarpaulins and loads. The higher you go up with the boards, the more people would be inclined to load up the trailer with extra weight, so I keep it to 280mm. You will need these boards cut and ready to check the placement of the deck back and front.

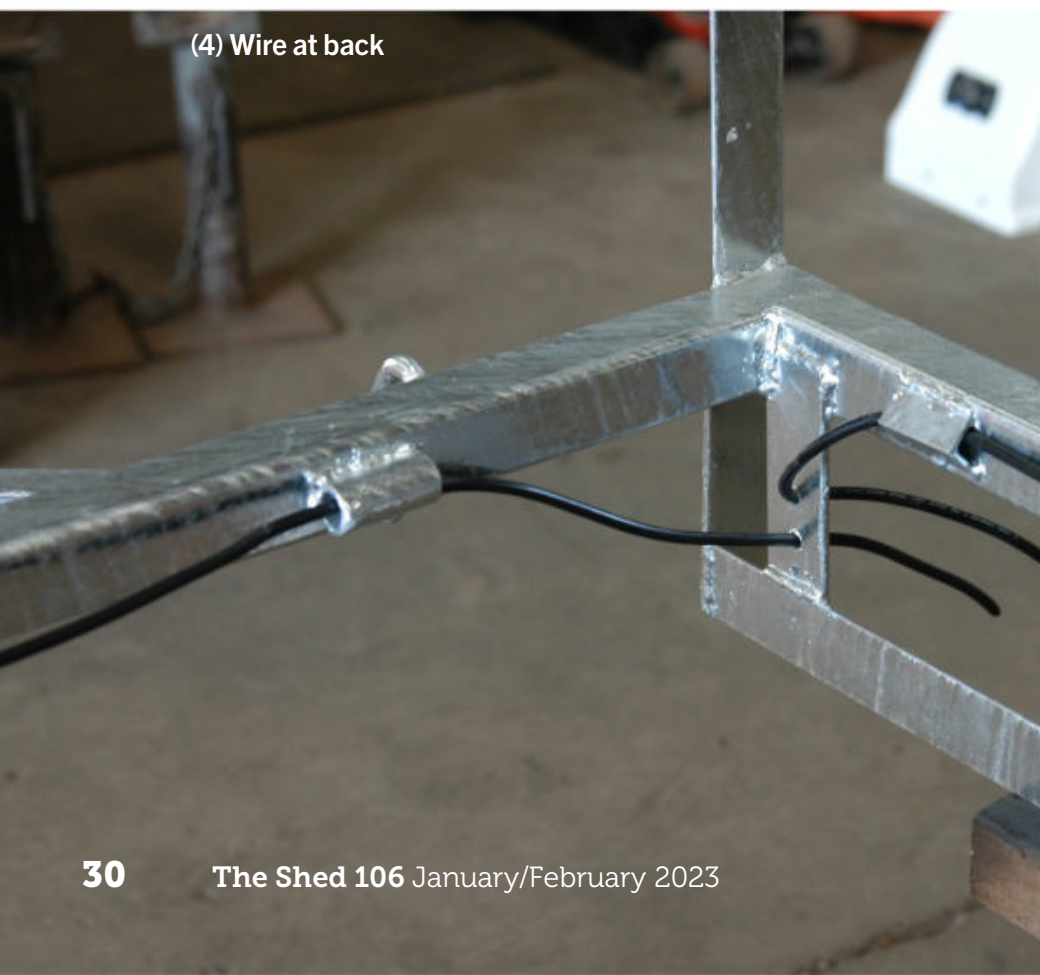
The deck

Place the frame on sawhorses or similar. While the deck is off, run the cable through the drawbar, down one side, and through the wiring barrels (photo 3). Run a second wire across the back. Join them later when you wire up the lights (photo 4). Leave a bit of extra wire lead at the front — I allow a metre at the front where the plug is going to connect to the towing car.

Drill through the cross members in the deck. I measure to get the screw holes even at 300mm distance across front and back cross members. Now, put on the cut

1200mm x 1800mm ply sheet (photo 5). I used farm-grade ply — it is a bit rough on one side, so I put the knotty side down. The plywood thickness we chose was 17mm 7-ply farm grade. The deck should be a minimum of 10mm-thick 5-ply for strength.

Clamp the deck onto the frame before drilling it from the bottom (photo 6). Drill up through the cross member holes already drilled (photo 7). Use one or two holding screws on top, then drill the rest of the holes in the angle-iron cross members and box-section frames at the front and back.



(4) Wire at back



(5) Fit deck



(6) Clamp deck



(7) Drill up

Good tip

I put a spot of weld on the hinge base of the front tailgate so I don't get the front and back mixed up. They are probably not exactly identical gates. Check with the gates placed on to make sure you will cut the ply deck short enough (photo 8). Remember the frame was built 10mm wider than the sheet of ply, in case the ply was out of square. With the ply in the frame, mark it underneath at the ends where you will trim it shorter to allow the gates to close.

Now take the deck off, or use an air hose, and clear the swarf from the cross members

before you screw the ply down (photo 9). Otherwise, the swarf, or iron fillings drilled out from the steel will raise the deck and let the water in under the wood, where it will stay and cause rust. Trim the deck ends to size. Plane the deck sides smooth.

Replace the deck and screw it on (photo 10). I use self-drilling screws, and pre-drilling the holes makes them go in more easily. They are just anchor points for the deck. I use three screws on each of the cross members. You don't need a lot because the side boards hold the deck down. Make sure the screw heads finish just below the surface of the deck. ►



(8) Check gates



(9) Clear swarf



(10) Screw on deck

Two balls for tow-balls

We all think that 'standard' means an agreed norm. Yeah, right. Not in the world of Kiwi trailers. Not one but two sizes of trailer tow-balls are standard in New Zealand. They are the imperial measure 1 7/8-inch diameter and the metric measure 50mm diameter. That's because, over 34 years of discussion and use, the market has been unable to agree on a single standard.

In 1971, the then Ministry of Transport decided at a conference to adopt the world metric standard size for a tow-ball — 50mm in diameter. This was never mandatory, although government departments such as the New Zealand Railways, Post Office, and Ministry of Works used it with new couplings. Over the years, the ordinary user continued, or drifted back to, putting the 1 7/8-inch tow-ball on the family car. One backyard theory is that government staff borrowed official trailers for the weekend, then found that the official 50mm coupling rattled around uneasily on the smaller imperial measure tow-ball on the home car. They soon decided the new trailers and couplings were unsafe and awkward to use with the existing equipment, so it was back to the old.

In 1989, a government white paper again recommended that the standard tow-ball size should be the metric 50mm in diameter. Committees met, and in 1993 produced a code of practice that, again, was not mandatory. Home users who added tow-balls to their cars went their own way. The 1 7/8-inch tow-ball was still built onto cars and survives to this day, alongside its metric cousin. In a quiet acknowledgment of the status quo, with no suggestion of finger-wagging, the NZ Transport Agency guide to loading and towing safety states simply: "There are two sizes of tow-ball in use: 1) the older 1 7/8-inch ball; and 2) the newer 50mm diameter tow-ball."

One trailer component maker has devised a trailer coupling that can be turned two ways, one for metric, one for imperial measure. Naturally, there are complaints that the trailer coupling doesn't fit, or is loose. Could it be that some trailer users don't read the instructions?





(11) Toggles in

Tailgates back and front

Put on the tailgate and lock it in place with the toggles (photo 11). The nuts that come with the toggles in the components are locking nuts, but you could use ordinary nuts with a spring washer.

Clamp the tailgate board in place so you can locate it correctly. I found the tailgate board was not sitting down flush, so had to plane the bottom to correct this (photo 12).

There is already a 12mm-wide gap between the side of the tailgate and the side rail but the tailgate board butts up to the side board, so it will cover this. Check with a piece of scrap offcut first (photo 13). Drill through the hinge straps at 200mm intervals into the tailgate board (photo 14). You could pre-drill these holes as I have done. Clean the filings and shavings away after drilling.

I would normally rivet the tailgates on with 4mm-head rivets at 250mm spacing as it looks neater. The rivets used depend on how thick the timber is; for the 17mm 7-ply deck we needed rivets 30mm long in total. Unfortunately, the supplier did not have

these rivets available, so I switched to using 6mm-head coach bolts with spring washers. I put two coach bolts in each hinge strap. Be sure to have the round head of the bolts against the timber and the nuts outside against the metal. If you put a bolt in the other way, the nut will dig into the timber.

Side boards

There was a 1760mm measurement inside the trailer from tailgate to tailgate, so I cut side boards at 1760mm x 280mm high, leaving a gap for tie-offs to the rail. Clamp the side board inside the angle-iron side-board uprights. Drill through the uprights or through pre-drilled holes into the side board (photo 15). Install coach bolts with the round heads on the timber. I put two coach bolts in each upright. Plane the edges of the timber on the corner angle for a



(12) Tailgate sitting flush

“I would normally rivet the tailgates on with 4mm-head rivets at 250mm spacing as it looks neater”



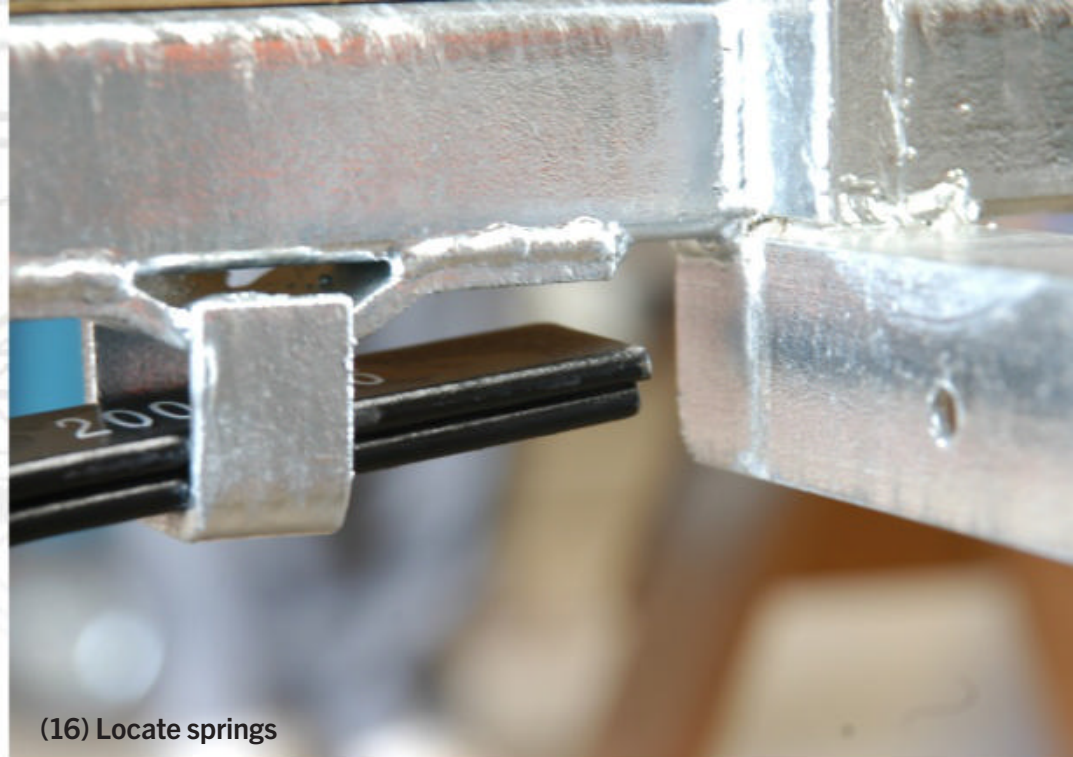
(13) Gap check



(14) Drill tailgate hinges



(15) Drill side uprights



(16) Locate springs



(17) Cut out mount with grinder

smooth fit and neat finish.

I would have riveted the side boards as well as the tailgates. Rivets are quicker to insert and look tidier, but bolts can be better than rivets because rivets could shake loose. Even so, check the bolts from time to time in the life of the trailer because they can work loose.

Springs and axle

The supplied springs in trailer components are not always galvanized. Some makers don't do it because springs can go brittle at the high temperatures used in galvanizing. It's not crucial that springs are galvanized for an application like a domestic trailer, but they should be galvanized for a boat trailer going into salt water.

Locate the springs in the slippers and in the spring slots and bolt either side (photo 16). Ensure there is room at the mudguard bracket when the spring compresses under a load and slides back in the slipper. I found I had to make

room by cutting the angle iron back.

To make room for the spring to move back through the slipper, you could butt weld the mudguard support only up to the frame, and not under the frame. However, I put the mudguard support under the frame for extra strength. Now, having to cut the angle iron to give the spring room to move, I cut out some of the welding with a grinder (photo 17). I then had to make a repair to the galvanizing with a cold galvanizing zinc spray.

Axles

Now clean rust from the axle stubs. The axle has been hung by one end when being dipped in the galvanizing tank so the thread at that end should not be clogged, but the trailer sits around after galvanizing and the untreated part rusts. Clean the thread with a file, wire brush, and emery tape sandpaper (photo 19). Clear the galvanizing from the thread on the other end of the axle.

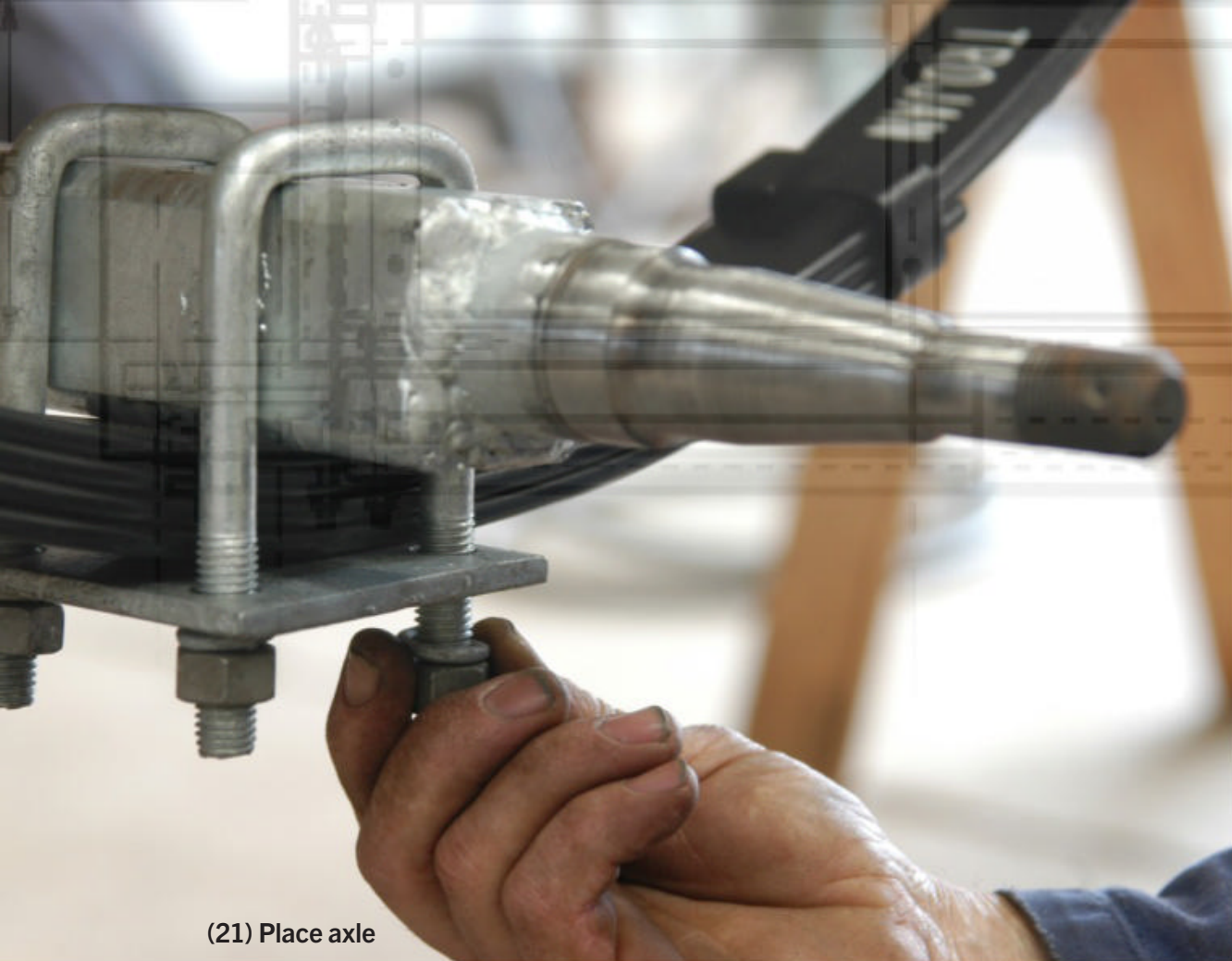
“Bolts can be better than rivets because rivets could shake loose”

Make the hole for the split pin clear (photo 20).

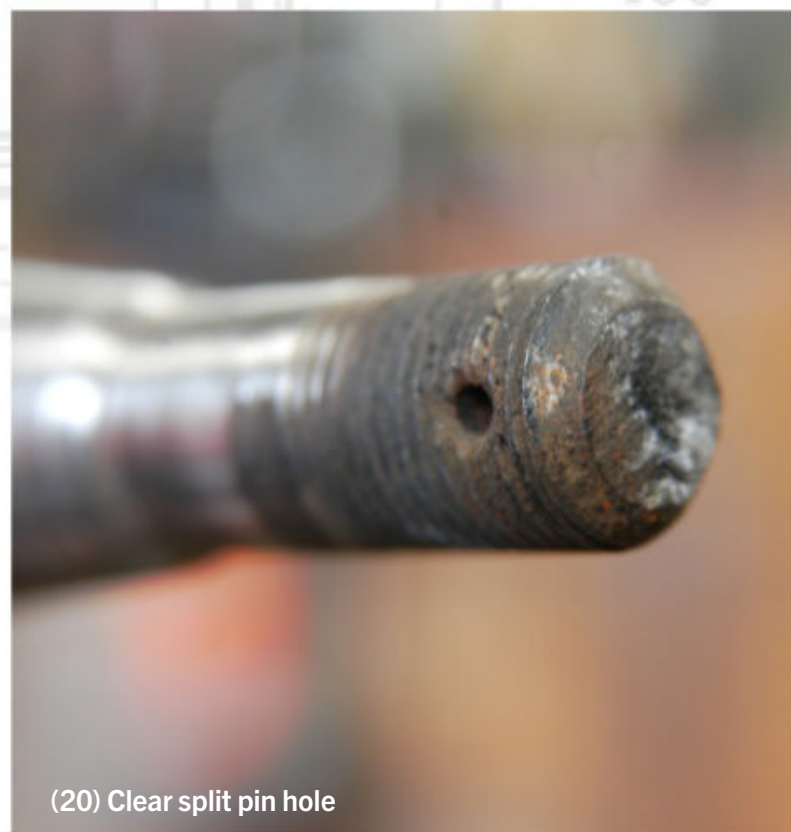
Place the axle on the spring locators and bolt the axle in place with the supplied U-bolts and plates (photo 21). Now, assemble the axle hubs according to the instructions that come with the



(19) Use emery sandpaper



(21) Place axle



(20) Clear split pin hole

components. Check that the nuts and bearings go on before assembly of the whole thing (photo 22). Check that the stainless steel ring goes on and that the seals are in. The hub goes on filled with grease. Make sure you get plenty of grease in the bearings and inside the hub. Complete the assembly of the hub and bearings as per instructions (photo 23).

Wheels and mudguards

Put the wheel on to get the adjustment right. For the Warrant of Fitness, the bearings must hold the wheel firmly. They can't be loose or you get wheel wobble, but they can't be too tight because that ruins the bearings. Test whether there is play in the bearings by trying to wobble the tyre by holding the top and the bottom (photo 24). Put the split pin in when the play is out of the bearings. Then hammer the bearing cap on. Tighten the nuts on the hub loosely at first. The tyres for this size trailer

should be 175/70 R13.

When working with the mudguards, I mark them 'right front' and 'left front'. This is because, after you measure the mudguard mountings, they are welded to fit where you have measured them. I found on this job that the mudguard mountings were not exactly the same. Bolt on the mudguards (photo 25). Make sure the nuts are tight.

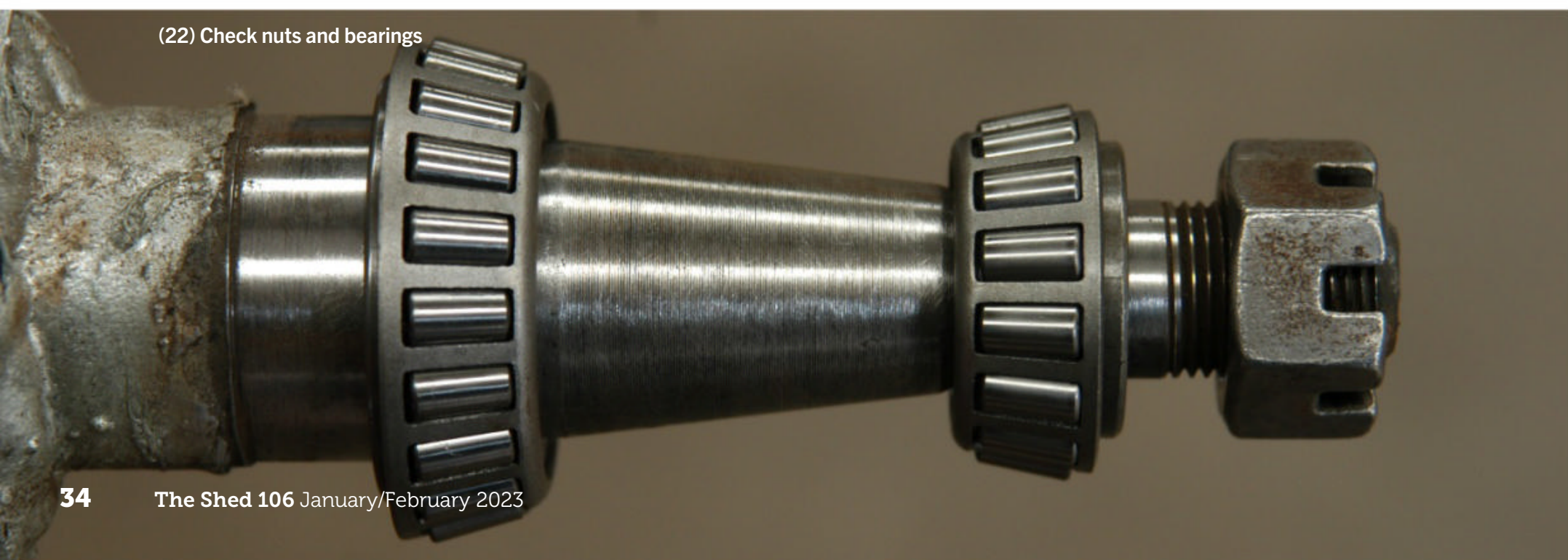
Wiring

The trailer lamps that come with the trailer components kit should have a stop lamp, indicator, and clear lens to the side for a white light onto the number plate. I rivet each lamp backing to the metal strap under the trailer frame at the back, but they can be bolted on or screwed on.

I have used one of the standard plugs for the towing vehicle, a seven-pin connector. The Standards New Zealand code of practice for light trailers



24. Check play in bearings



(22) Check nuts and bearings



25. Bolt on mudguards



23. Complete assembly

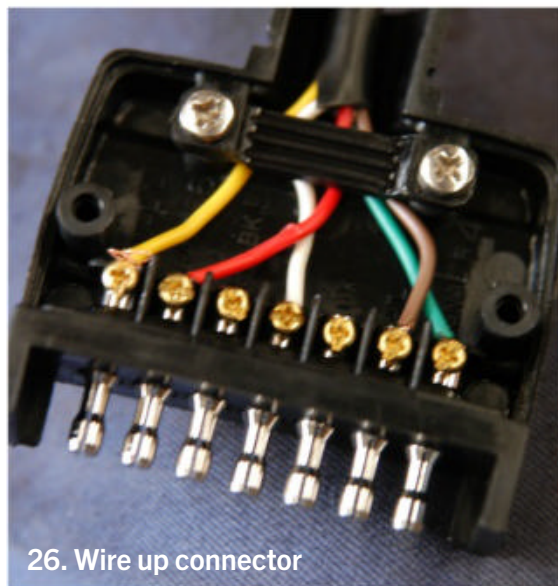
“Bolts can be better than rivets because rivets could shake loose”

describes the colours and circuits for the seven-pin connectors as: left-hand turn, yellow; reversing signal, black; earth return, white; right-hand turn, green; service brakes, blue; stop lamps, red; rear lamps, clearance, side marker lamps, brown. For the wiring, I use a standard five-core electrical cable so I leave out the connections for the auxiliary/braking and reversing light wires (photo 26).

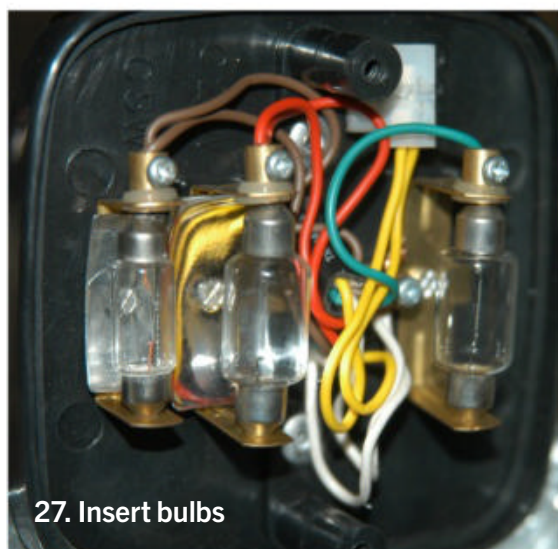
Feeding wires

I have fed the cable from the towing connection at the front of the drawbar, through the drawbar, and down the right-hand side of the trailer — left and right are the positions when looking at trailer lights from the back towards the front. Now, you need to join wires from the cable across the back, coming from the left-hand light, with the wires from the cable from the front, to the right-hand light.

To the left-hand light, join the wires



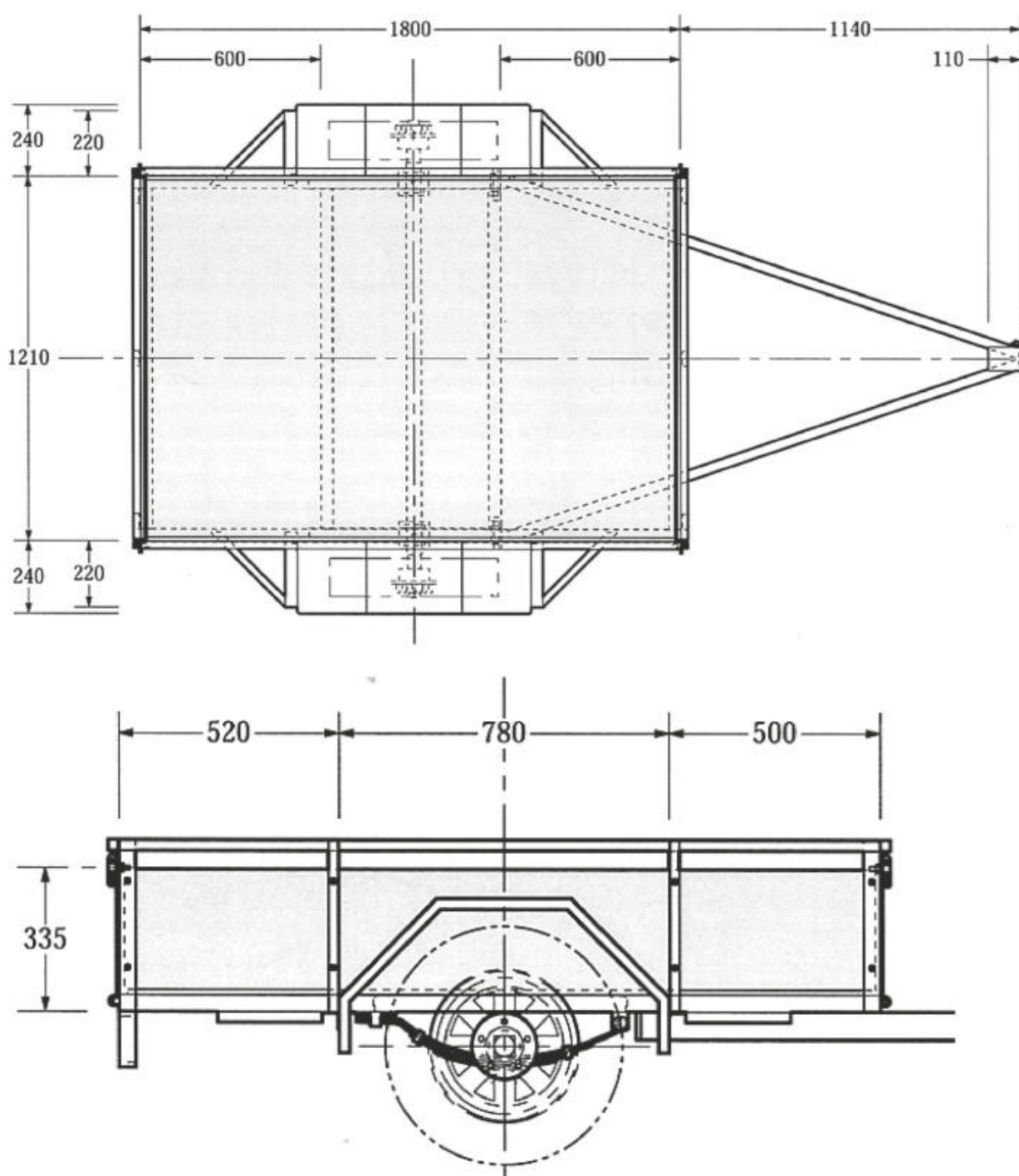
26. Wire up connector



27. Insert bulbs

from the cable to the correct terminals. Leave out the green wire (right-hand indicator). To the right-hand light, join all the wires from the front cable except the yellow wire (left-hand indicator). Join the yellow wire from the front cable to the yellow wire in the back cable. Join the red and brown wires from the left-hand light coming through the back cable to the terminals in the right-hand light, and join the white and yellow wires from the left-hand light to the cable from the drawbar. Put in the bulbs (photo 27). Make sure you don't trap wires with the metal separator inside the lens. Place the covering lenses over the lamps.

Drill holes for the number plate in the frame next to the back light. The uncoloured lens at the side of the lamp should allow the light to shine clearly on the number plate. To hold the connector plug for the car at the front of the trailer, drill into the drawbar and rivet or screw on the plug holder. ►



Checking the springs



Passing the test

The new trailer built from **The Shed** plan and instructions passed its first Warrant of Fitness test with flying colours. A WOF examination includes lights, safety chain, coupling, springs, tyres, wheels, wheel bearings, trailer frame, and a check that the number plate is correct according to registration.

Problems with the lights cause the greatest percentage of warrant failures in trailers, according to Marcus Kavermann, Kingsland station manager of Vehicle Testing New Zealand Ltd.

“We are looking for consistency in the correct operation of the lights, which must be in position, [and] not broken, insecure, cracked, or damaged, for example, or with holes in them. There must be a reflector in the light. New lights from reputable trailer components suppliers have no trouble. Some people use reflector tape, which will have sufficient reflection for only about three months.”

Light has to be visible from the side through 80 degrees. The light on **The Shed** trailer was possibly marginal because of the metal strap at the side, but the trailer passed as the light was new, the car indicator and stop lights were clearly visible, and the design of the trailer and light at the back were generally acceptable. Protection for the light from damage was a consideration in the design of this trailer.

Marcus Kavermann explains that the chain and bolt set-up is another important part of a trailer WOF. The chain must be able to hold the trailer if the coupling comes adrift, and for that reason is safety rated at twice the weight rating of the trailer. There used to be debate about whether a trailer would fail if the chain was welded on, because it could be difficult to tell if there was good weld penetration. The Standards New Zealand code of practice for light trailers (NZS 5467:1993) now states that welding of the chain is not acceptable.

The design of **The Shed** trailer also received a tick because the coupling plate is welded on and the coupling itself is bolted to this with high-tensile steel bolts.

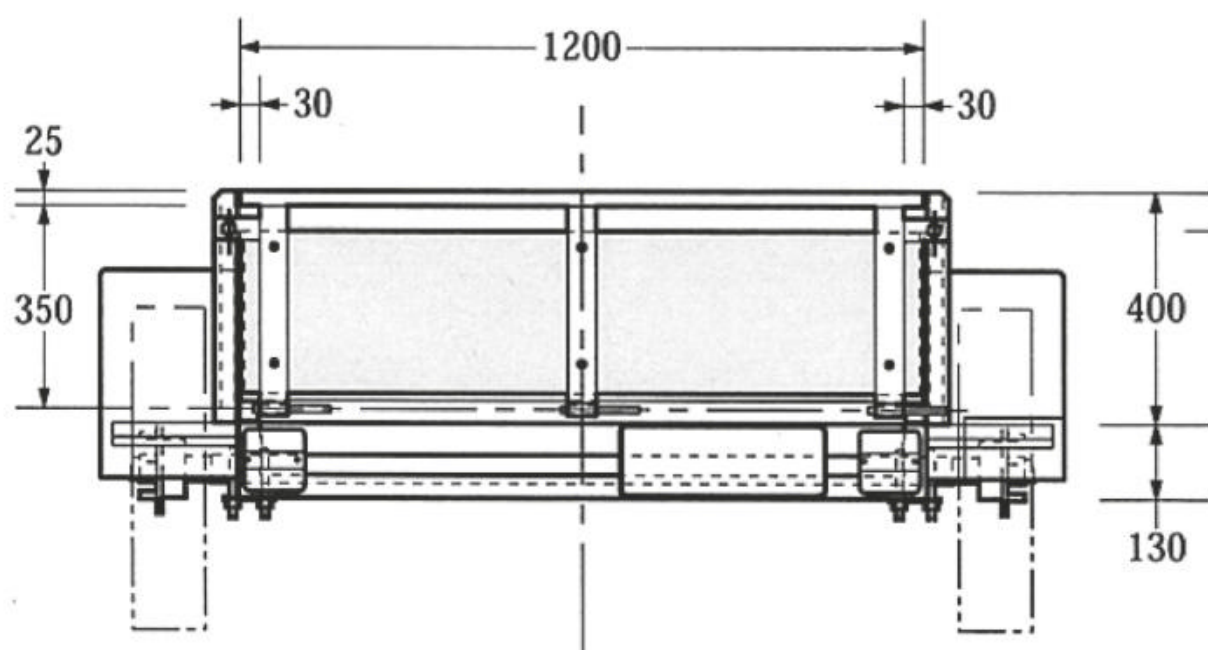
“Couplings can wear out and this arrangement makes for easy replacement, as opposed to the coupling being welded on permanently,” says Mr Kavermann.

Coupling

The coupling is bolted on with high-tensile zinc-coated bolts to the welded coupling plate. Into the hole previously drilled into the drawbar screw the high-tensile bolt that comes with the chain. A supplied chain should have a weight rating that is twice that of the rating for the weight of the trailer or the springs — e.g. this trailer, with 1000kg weight

rating for the springs, has a safety chain with a rating of 2000kg.

The registration cost, including GST, for a new trailer less than 3500kg weight rating is \$98.55 for 12 months, and that includes a new number plate. Once the plate has been issued, it's \$35 per year. The Warrant of Fitness test costs \$72 at all VTNZ branches. (See the “Passing the test” panel.) 📄





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After

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MURRAY'S RELICS

At Murray Brown's place, one shed is never enough

*By Jason Burgess
Photographs: Jason Burgess*



Murray amongst his handtool collection holding a double-sided hacksaw

It has been said that the first law of intelligent tinkering is to save all the parts. That is exactly what Cambridge sheddie, Murray Brown, has been doing since he was a nipper. Murray is a mechanical engineer, wood turner, and self-confessed hoarder. When I arrive to check out his growing fleet of home-built tractor models made from upcycled sewing machines, I somehow lose an hour just nosing around the first two sheds of his eight-shed property. Since retiring, Murray says he is happy just tinkering in his sheds, restoring his full-size tractors and making his tractor facsimiles — a pursuit he picked up about five years

ago. He does not remember where he first saw the idea but he does remember thinking, “I could make one of those.”

How does that work?

Murray says that growing up, he was always pulling things apart to see how they worked.

“If it was new, I’d take the back off to see what was inside it. If it was knackered, I’d dismantle it and save all the nuts and bolts.”

The difference between Murray and many other sheddies his age is that he still has that collection of fastenings. In the 1970s he built a 144-drawer storage unit, from recycled rimu, to house

“I somehow lose an hour just nosing around the first two sheds of his eight-shed property”

his “millions of nuts and bolts”. It is a resource he still actively utilises but it is just the tip of an impressive stockpile of vintage hardware, tools, and manual agricultural machines. ►



A Farmall tractor “... because it’s red”. Murray’s second tractor with working steering, aluminium window extrusions for the engine with chrome dome nuts and his ‘trade mark’ serving spoon seat and fry pan mud guards



“Murray’s range is broad and not without a few oddities, such as double-sided hacksaws”

An eclectic collection

Murray’s display sheds are as full and as ordered as any small-town museum, with an intriguing store of everything from antique pushbikes to domestic appliances and industrial parts — most in perfect working order.

Aspects of his collection have been with him since the late ’50s, when as a youngster, he made small-tool purchases on the rare family trips from farm to town. As far as hand tools and farming implements go, Murray’s range is broad and not without a few oddities,

such as double-sided hacksaws, a Terrex ‘invalid’s spade’, hand-wound grinders, sickle-bar mower blade sharpeners, an arsenal of egg beater drills, and a swag of brace and bits in every variation imaginable — including antique wimble braces.

On one wall is an extensive — and knee-weakening — catalogue of old-school mechanical castration devices. From the rafters hang various long-handle dehorning loppers, which Murray remembers regularly using on the farm with his dad.



A J H Rudd & Co Pty Ltd hand-held castration device!



I remember those

Among the hobnails and wooden shoe-shapers in the cobbler's corner are Murray's bunion stretcher tools. In the dairy area are a hand-operated centrifuge for doing butter fat tests, plus assorted milk separators and vintage butter churns. In addition to the early telephones, cell phones, and typewriters in the domestic shed are a cluster of egg-grading scales, ships in bottles, and a Bakelite string-pull razor blade sharpener.

Murray says, "I just love the fact that they don't make this stuff any more. When someone comes in here they start to reminisce ... they often say 'My grandfather had one of these'."

A handmade sign in one corner reads: "A relic — something that has survived from a past time and serves as a reminder."



A collection of American-made egg grading scales

Family heirlooms

Murray has kept a few family heirlooms, including a 1910 gramophone that his grandparents owned, which still gets played; a couple of candle-powered gig lamps — heirlooms — that have been around as long as he remembers; and a replica he made of his grandfather's borer-ridden rocking chair. As a kid, his father's Meccano set was the only toy he was allowed to play with, and that is now also on display.

"The last time I applied for a permit for another shed, they said I had exceeded my allocation for land coverage!"

He is not sure what happened to the stash of *Hobbies* magazines that inspired him as a youth but he is proud of his complete collection of *The Shed*; every issue well-thumbed but filed in order.

"I love getting ideas and seeing what other sheddies are up to."

Murray's collecting has slowed up a bit recently because he admits to running out of shed space.

"The last time I applied for a permit for another shed, they said I had exceeded my allocation for land coverage!" ►



A set of carriage lamps have been in the Brown family for longer than Murray can remember



Christine's old high-school bike is one among many in the bike shed



The road grader that Murray called 'The Boat' because his grandson preferred boats to tractors



Building a sewing machine tractor

The upside of making tractor models from old sewing machines is that the machines can be found for around \$25 a unit — more if they are a vintage brand other than Singer. The downside is they can be cumbersome and heavy to lift and turn when remodelling.

Murray says he works on one section a day. He begins by taking the machine apart. All shafts, columns, and/or blocks are cut off. He then reverses the base plate to form the tractor floor and bolts it back in place.

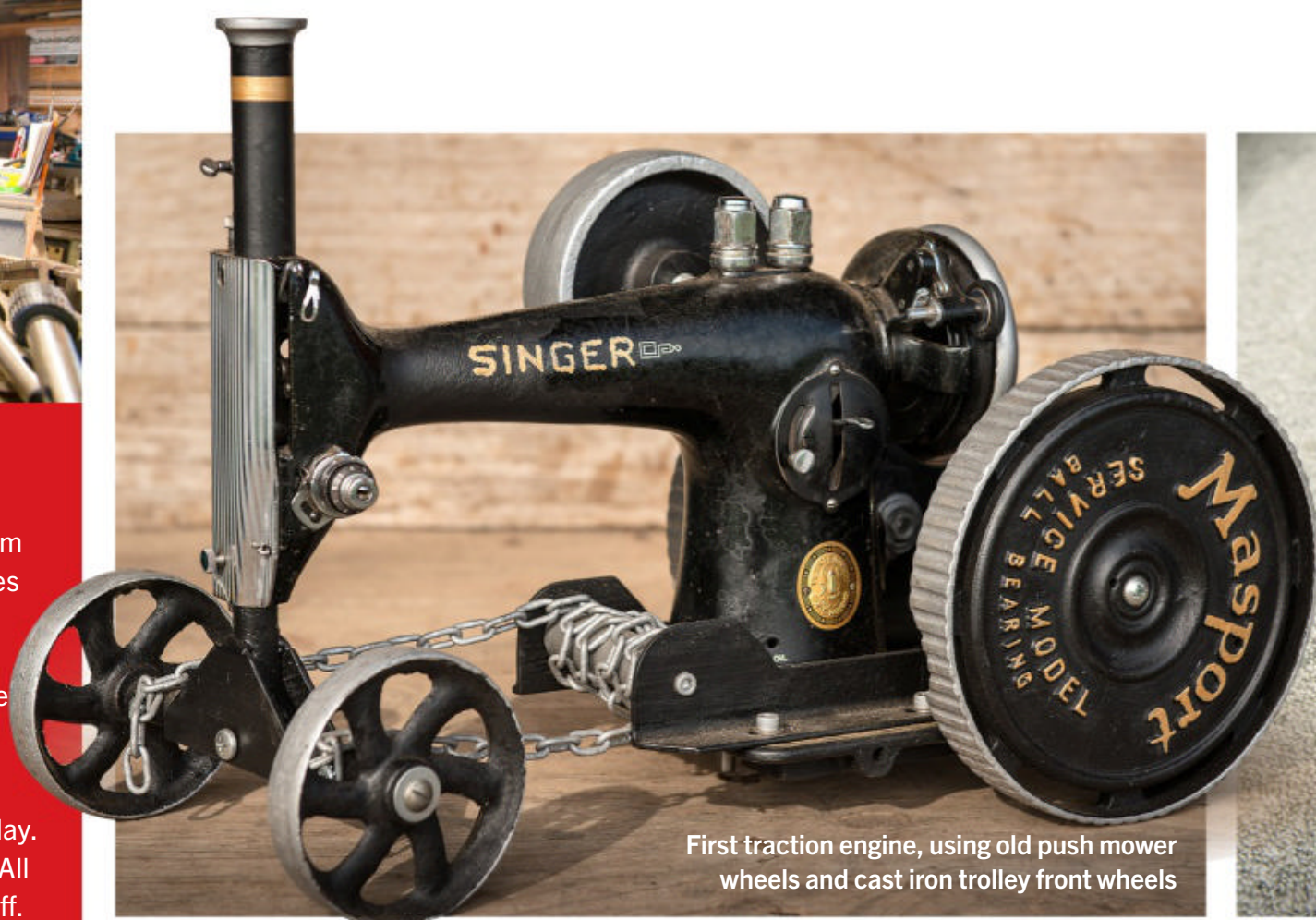
He cautions, “I’ve had to use an impact driver on every single screw I have taken from a base plate” — luckily, the driver he bought in the mid 1960s still does the job.

Murray’s ethos is: build to last. He plans and engineers each piece to avoid waste. Most holes are tapped as opposed to the use of nuts on the bolts or machine screws.

“Some of these tractors have up to 50 tapped holes,” he says.

He also drills and taps his axles, and, just like the real thing, his tractors all have pivoting front axles. He designs the front assembly first, before mounting the back wheels.

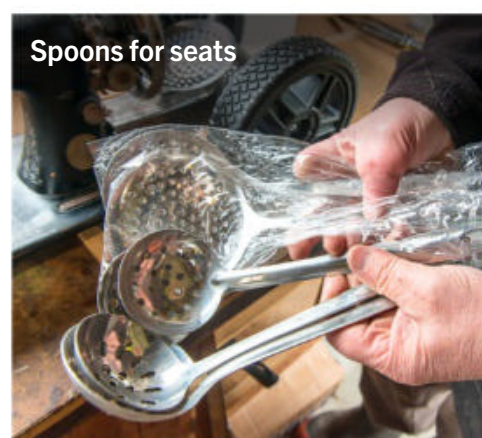
“It takes a while to work the steering out — the right centre and height.”



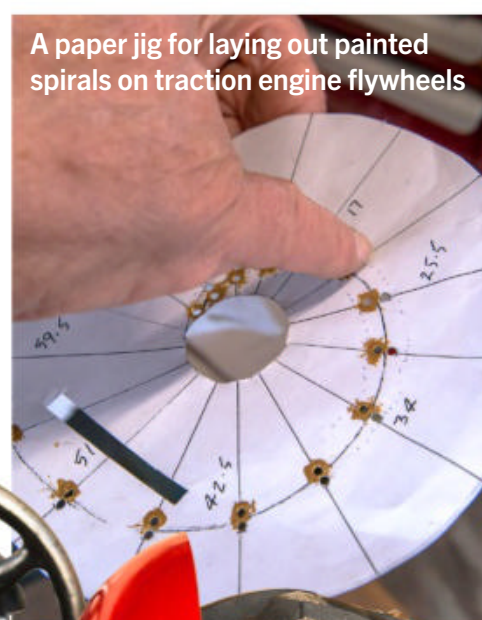
First traction engine, using old push mower wheels and cast iron trolley front wheels



Drilling out frying pans to shape for guards



Spoons for seats



A paper jig for laying out painted spirals on traction engine flywheels

Sections of Dad’s Meccano set, stored in old cigarette tins



Rear end details



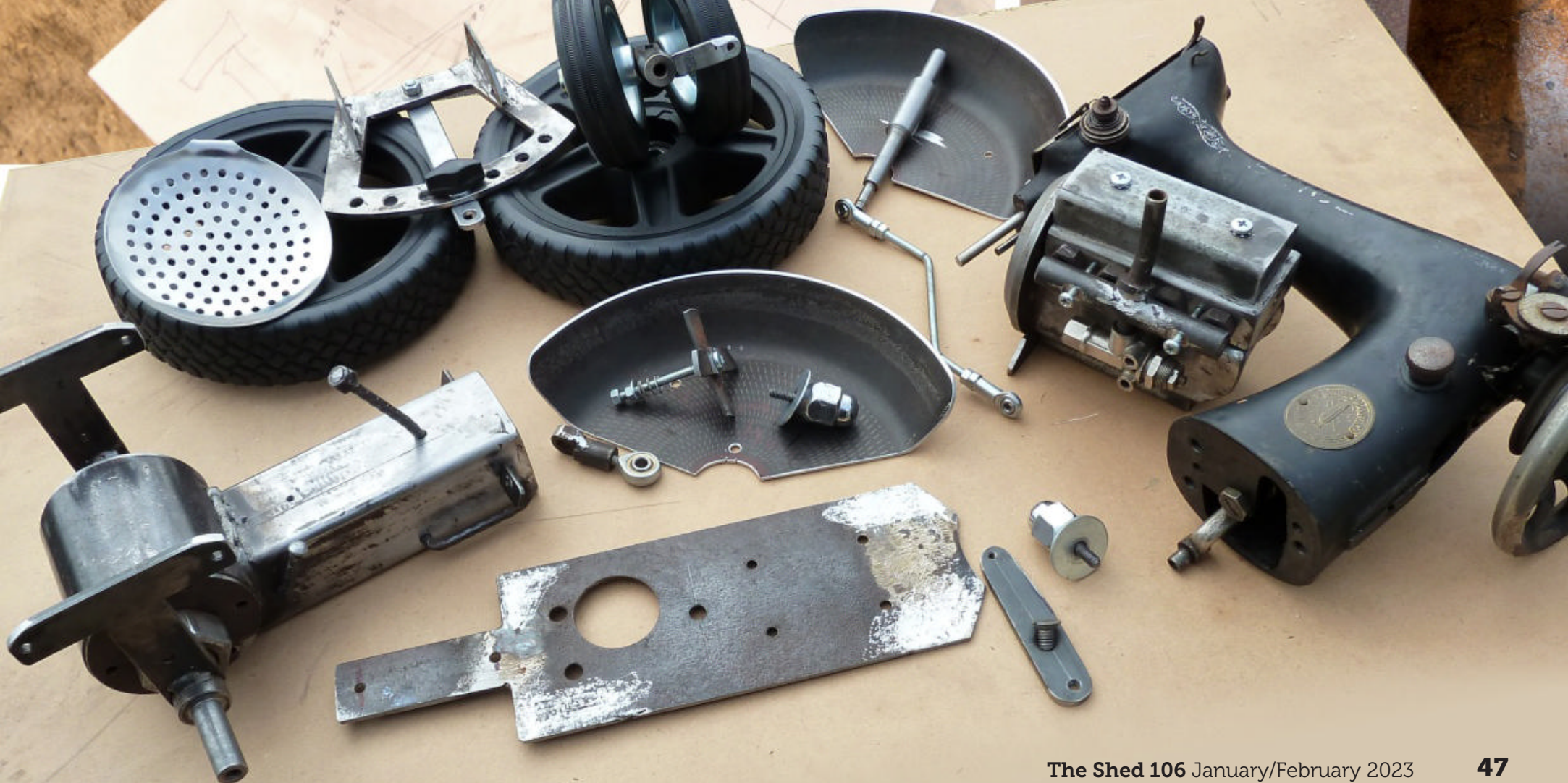
An 1800s hand cranked 'New Home' sewing machine; aluminium extrusion bits for the engine with four old porcelain fence insulators to simulate the cylinders



The largest and most detailed traction engine made with brass industrial safety valves and a 3/4-inch water pipe for the smoke stack. "When the fly wheel is turned, the rods reciprocate via a couple of meccano eccentrics"



Plans, parts, and a ready-to-weld back end made from box section, a spoon seat and freewheeling plastic wheels on a drilled and tapped axle





An early Murray-made power drill, still going strong

In the workshop

Whether it is working with wood or steel, Murray has been making almost as long as he has been walking.

Murray laughs as he says, “Dad used to say, ‘Murray never had a bedroom; he had a workshop with a bed in it’. We lived in a large homestead with big bedrooms. A neighbour gave us an old dining table, so I put a vice on it and

that became my workbench.”

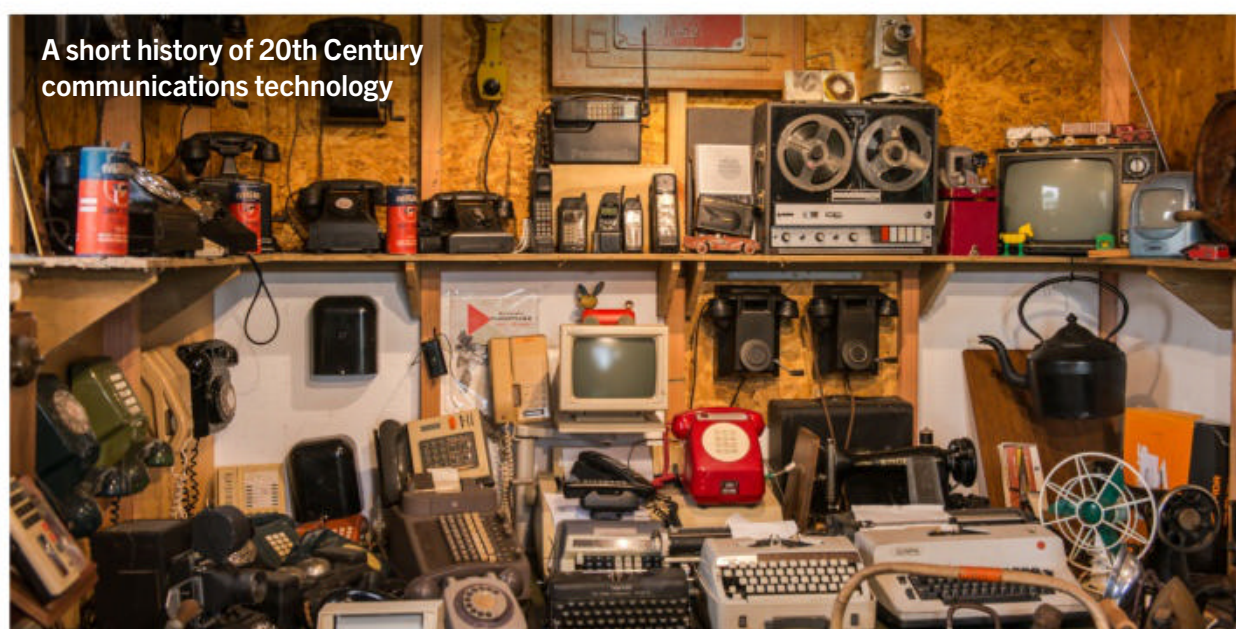
These days, Murray’s well-ordered workshop is equipped to tackle most jobs, large or small. Over the years, he has turned his hand to everything from wooden foot stools and a full-size penny farthing made from the steel rim of an old gig tyre to sculpturing a flock of ibises from totara and creating a herd of metre-high dinosaurs from plywood.



Just some of Murray’s forest of folding rulers



A Murray-made electric duck-plucker. “I bought the fingers from a bloke in Hamilton, on six-inch PVC pipe, and an old motor I had lying around



A short history of 20th Century communications technology



Cobblers’ corner



A Murray special, built from aluminium and furniture tube framing and finished with Christine's home-sewn skirting



The plywood and fibreglass hovercraft frame in progress.

Hovercrafts

In the '70s and '80s Murray knocked up and captained a series of hovercrafts, building their trailers as well. He bought his first machine in 1977; a Gooch J4, it was the first hovercraft of its kind to cross the English Channel. After putting the Gooch through its paces, he started on his first home-built craft, which was a plywood and fibreglass construction based on plans from the US. It had a rotary Wankel motor for lift and a Hirth two-stroke for thrust. Murray's third machine was all his own design and was built from aluminium and furniture tubing. His wife, Christine, sewed the skirts for it on an ancient industrial sewing machine. A buyer snapped it up before Murray got it into the water.

The hovercrafts are long gone but he

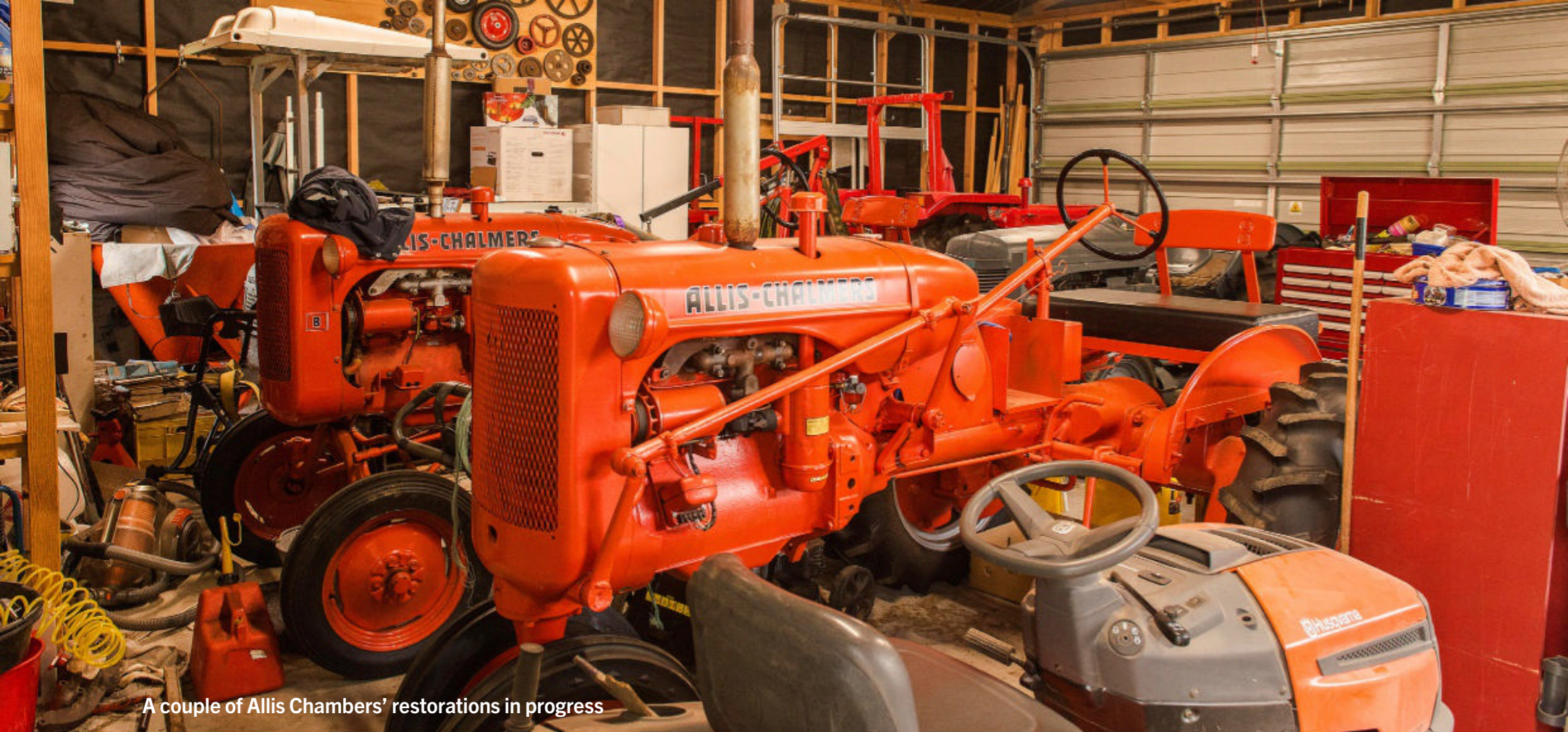
still employs many of the machines that he self-built in the '70s to manage such tasks, including his 200mm double-ended pedestal grinder, a 10-speed wood lathe with his own 'motor slide' system, and a 150mm x 1220mm belt sander.

Murray says he often uses a sliding bevel that he made in the third form and a homemade poker machine that he assembled in the late '60s from an old valve radio transformer — a six-volt Lucas headlight bulb (for a resistor) and an electric heater element for a burner wire, housed in a metal WWII electronics case, with three heat settings. A recent Murray invention — cobbled together from six-inch PVC pipe and a motor he had "lying around", and awaiting a proper trial — is an electric duck-plucker. ►

"A buyer snapped it up before Murray got it into the water"



Plywood framed hovercraft with rotary Wankel motor and Hirth two-stroke for thrust



A couple of Allis Chambers' restorations in progress

“My father bought this brand new in 1953. He drove it up from New Plymouth when we moved to Cambridge in '54. It took him two days”

There be tractors

Also lying around under covers between Murray's sheds are a couple of full-size tractor projects awaiting some TLC. In the tractor shed itself — alongside Murray's shelves of tractor models — is a burgeoning collection of fully restored vintage tractors, including two Allis-Chalmers, a B and a C, and a Ferguson TEA, the 'Grey Fergy', which once belonged to his dad.

He says, “My father bought this brand new in 1953. He drove it up from New Plymouth when we moved to Cambridge in '54. It took him two days. He had the farm trailer on the back with the chook house and the dog kennel, with the chooks and dogs on board. I still use this one.”

As to his model tractors, Murray says he built his first one from scratch, working from a few drawings. It took him a couple of months to nut out how to minimise waste and use as many of the existing sewing machine parts as possible. He enjoyed the process so much he went on to make another one.

“There is some design and vision involved; I draw them all up roughly first. I love doing the engineering — a bit of

lathe work and welding; that gives me satisfaction.”

Murray is now onto his 15th model, including a traction or engine or two. He still owns most of them but he did give one to his former boss.

“He gives me usable scraps of aluminium that would otherwise end up in their bin.”

As Murray's tractor fleets — lifesize and otherwise — continue to grow, he has no plans to sell anything just yet. As far as his sewing machine creations go, it is the search for parts, which takes him and Christine all over the country, and the challenge of designing well-crafted assemblage that keeps him building — plus, of course, the fact they buy him more time in his happy place, out among his tools and collections, in one or other of his sheds.

Sourcing wheels

For wheels, Murray prefers push-mower and Triang scooter wheels but they are becoming harder to find. He still has a collection of push mowers for special tractors but often resorts to rubber castors. At a push, he uses plastic wheels. ▶



Murray's rimu drawers — an exhaustive resource of collected fasteners and hardware



Murray and one of his Massey Ferguson replicas



An old grocer's delivery bicycle



A Murray-made Penny Farthing built from 1.5-inch galv waterpipe, flat bar forks, an original gig 'tyre' front wheel with 1/2-inch round bar spokes, and wooden wheelbarrow back wheel

A singer sewing machine, with an electric sewing machine motor as the engine. This one has working steering, 3-point lift and a PTO (power take off)





A vintage string operated, razor blade sharpener -circa 1940s



“Murray handles all the grinding and cutting outside his workshop, using an old blacksmith’s leg vice”

“Cast-iron wheels are available but they are expensive compared to plastic; I try to disguise the plastic as much as possible.”

Old frying pans or \$10 ‘Briscoe specials’ are halved for mudguards. Flywheels are cut from old pipe and gas

cylinders. Seats are made with \$2 Shop spoons. Aluminium scraps are shaped to form the back end/diff area, and dog chains are repurposed as chain steering. He makes his own footplates and brackets for the mudguards, and has a ready store of three-inch pipe, welding plate, and threaded rod on hand to bring them all together.

Murray handles all the grinding and cutting outside his workshop, using an old blacksmith’s leg vice, “because there are too many inflammable items in the shed”.

At his plywood sand-blasting box, he cleans up push-mower wheels, removes the Teflon coating from the frying pans, and roughs up plastic wheels to give them a more realistic look before they are painted. Push-mower wheels are sand-blasted then coated with a rust converter. Murray prefers to leave the actual sewing machines unpainted, as often they have a suitably aged patina of their own. 🏠

Any work that may cause sparks happens outside the workshop



Murray’s first tractor made with “a Monarch sewing machine, aluminium extrusion to simulate a “V” engine complete with spark plugs. Everything on it was made from found bits



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ALIBRE

101

PART 3

There's still a place for conventional drawings and paper in the digital world

By Bob Hulme Photographs: Bob Hulme

Welcome to Part Three in our series about using 3D design software and the Alibre Atom 3D software in particular.

In the previous articles we have created a 17mm A/F ½-inch drive deep socket and then changed it slightly to create a socket that's the same, but with double hex instead of single. This time we are going to make a 2D conventional drawing of the socket. This is very easy. By accessing the file of the part you have created, most of the work is already done.

Hard copy drawings are still useful when you need to convey what you want to have made, particularly when CNC machinery will not be used. The details of a part you have created can be sent by email as a 2D drawing directly from Alibre, just as a 3D digital file of the part can be.

Of course, if you are like me, it's nice to have a physical drawing for discussing with others as well as for scribbling notes on. Often you will see changes or improvements that could be made to the part and, by noting them on your drawing sheet, they are ready to deal with when you open up the Alibre program again. Let's get started.

Making choices

Open the file which has the double hex socket. Then in the 'Design Explorer' panel, right click on the name of the part (in this case I have called it '17mm

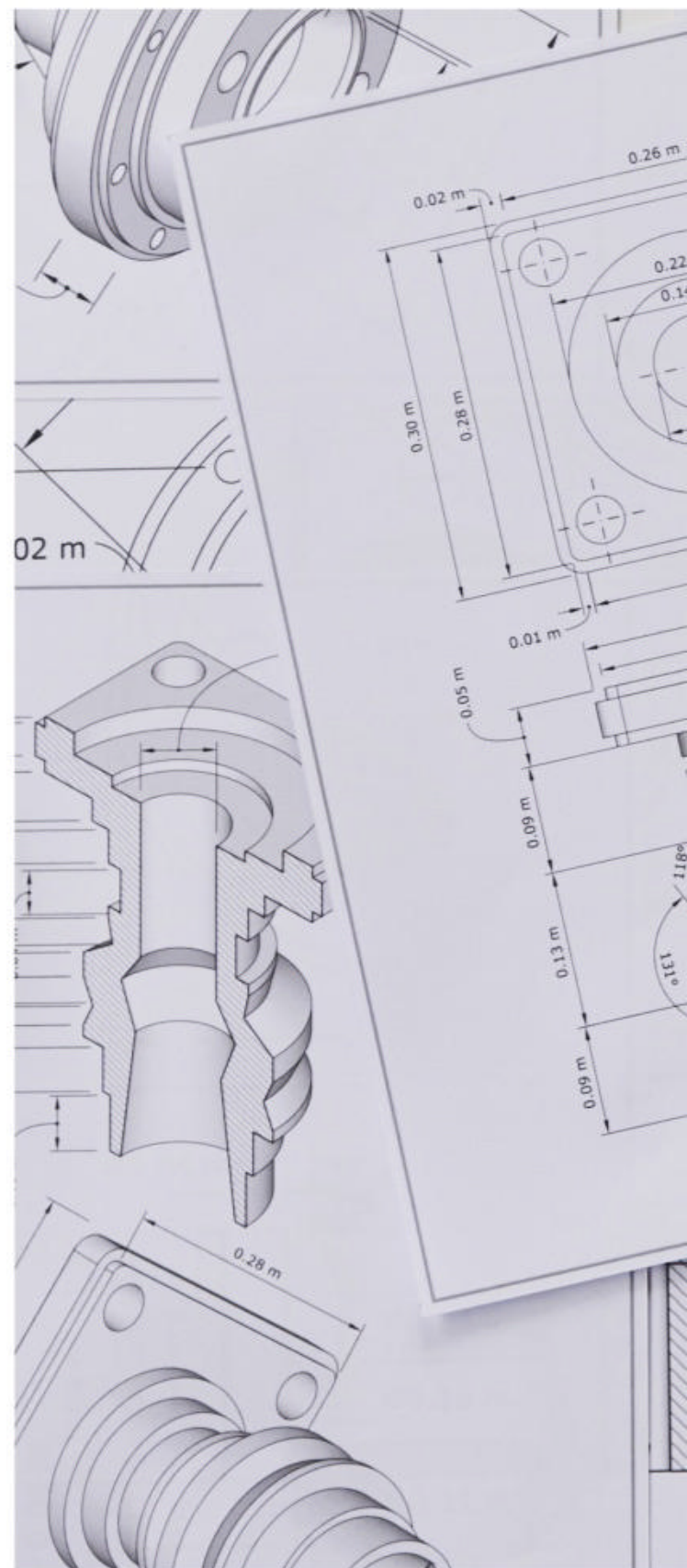
double hex socket').

From the options shown, select 'make drawing of this design'. A panel will appear (**fig 1**) asking for some decisions to be made about things like paper size. You can select a template if you want to have a formal title block, but it is easier to select a blank page and put text on the drawing to suit your own purposes. So, tick the blank sheet button and pick A4 Landscape as the paper size. Of course, you can pick other sizes if you like. I picked A4 because that's the biggest my home printer does.

When you click OK, another box appears with more options. (**fig 2**)

This is the 'Standard Views Creation' box. There will be a front view of the part suggested and you will be able to change to another face of the part to use as the front view if you desire. I have decided to use the end view looking into the double hex hole as the front view as I want to make a side view that I will section through the centre to show the details of the inside holes.

"The details of a part you have created can be sent by email as a 2D drawing directly from Alibre."

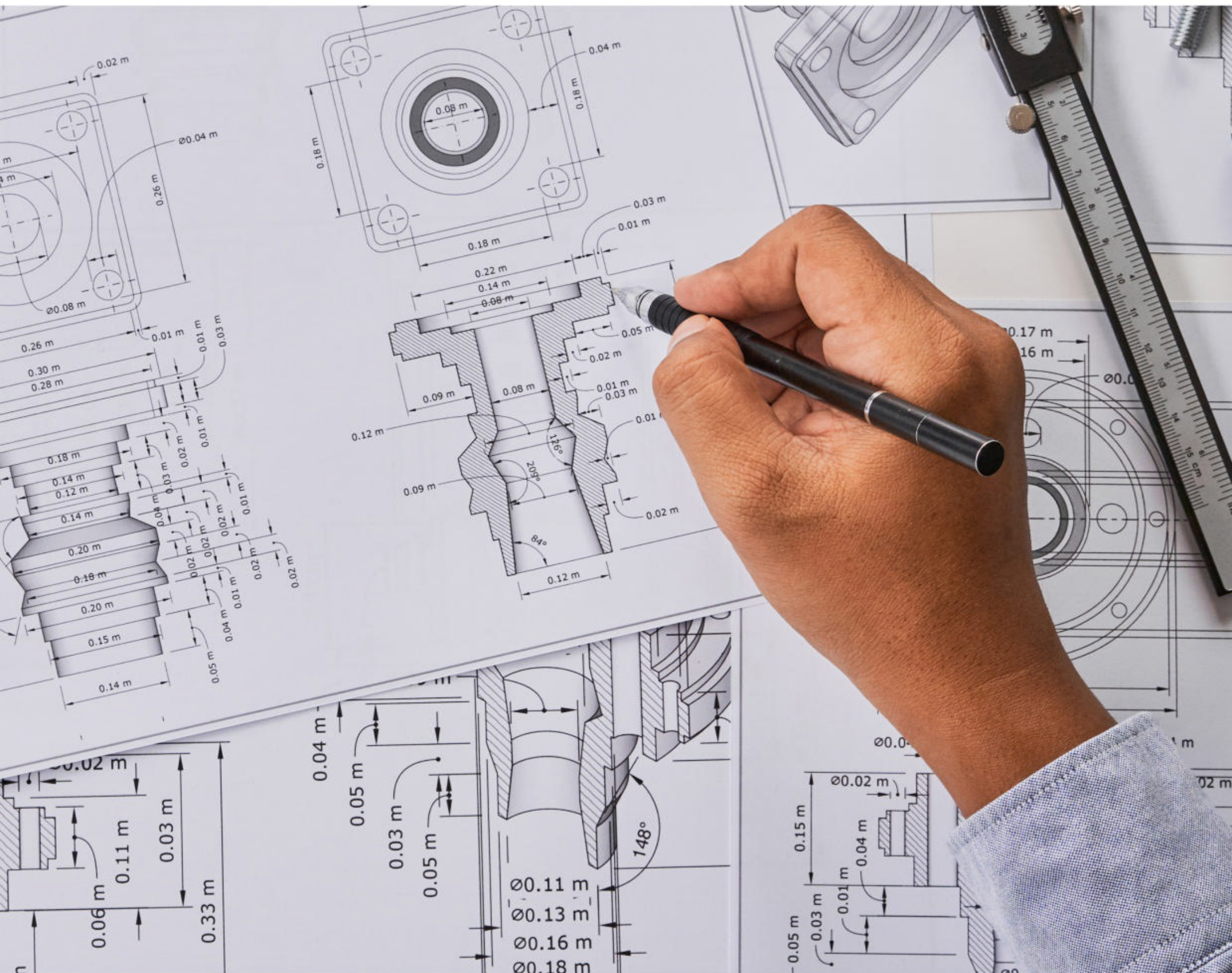


View options

There are also options for how many views you would like on the drawing sheet and which ones they are. In this case, I don't think that there is any point showing more than the front view and a side view together with an isometric view.

One of the advantages of using a 3D design program is that it is simple and easy to drop an isometric view into a drawing sheet. It definitely gives more insight into what the part looks like and aids understanding for anyone reading the drawing. You would need a very good reason not to include one on every drawing you do. It's just so easy.

In the 'Standard Views Creation' box (**fig 2**) the set of 10 squares show which views can be selected to appear on the



drawing. These are like buttons and if they look like they are depressed, then they are selected. It is just a matter of clicking on them to change them from unselected to selected, or vice versa. Select the front view and side view immediately to the right. The isometric view can be either of the two lower views as they can both be moved around the drawing sheet and placed wherever we want. Next, select the view type. Standard is what we want for our drawing. When you have made the choices above, click OK. (Don't worry about other choices offered.)

The drawing sheet will appear with boxes on it indicating where the views sit. Left click anywhere on the drawing and the shapes will appear. (fig 3) ►

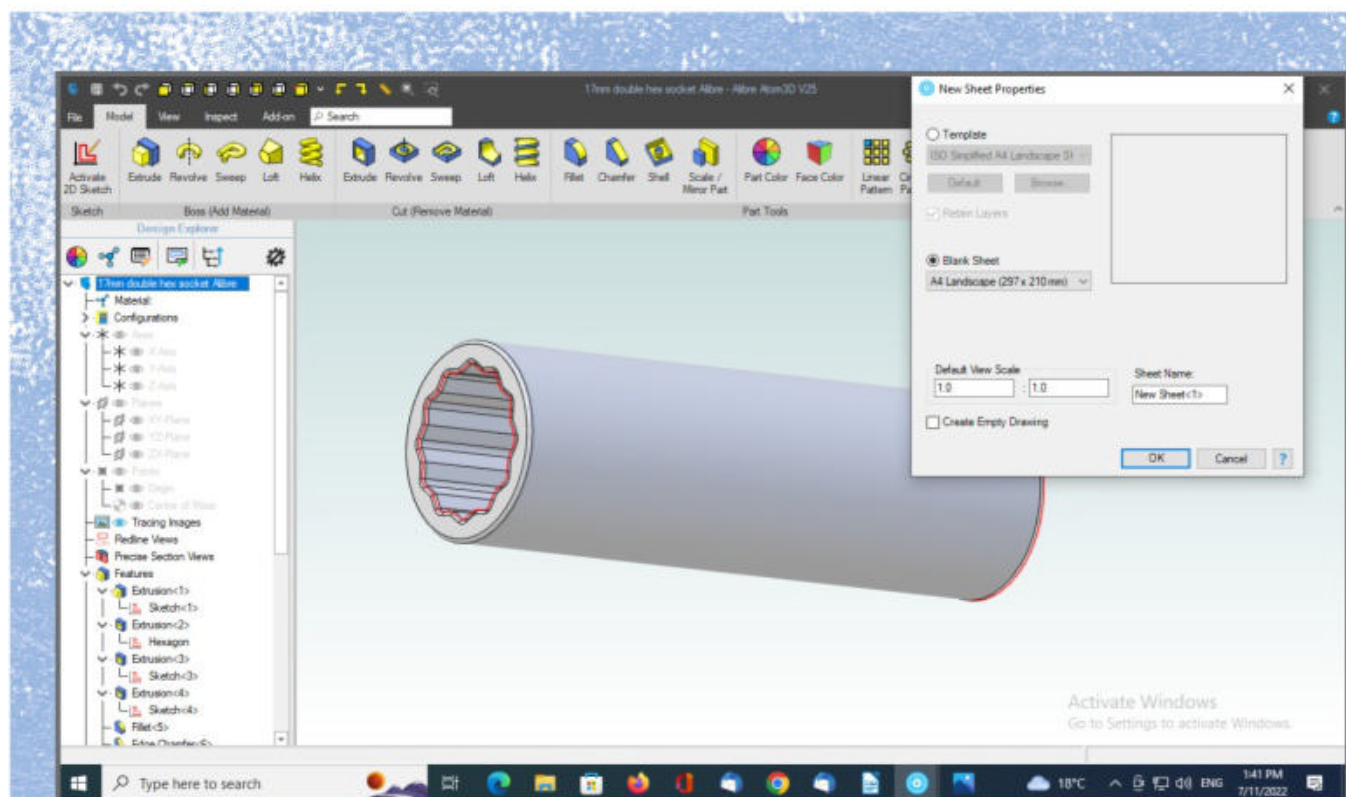


Fig.1. Paper size and template choices

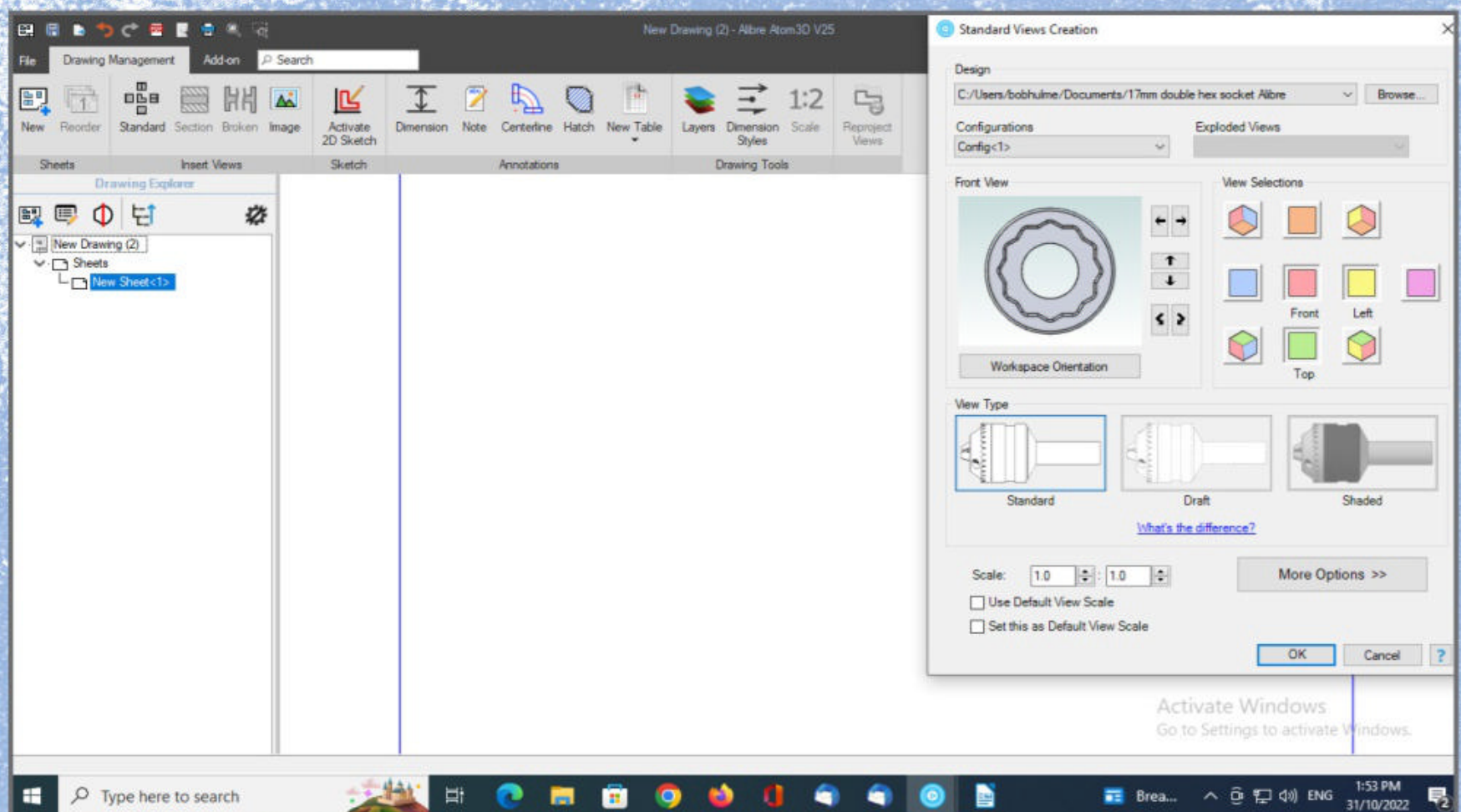


Fig.2. Chosing the views to be shown on the drawing

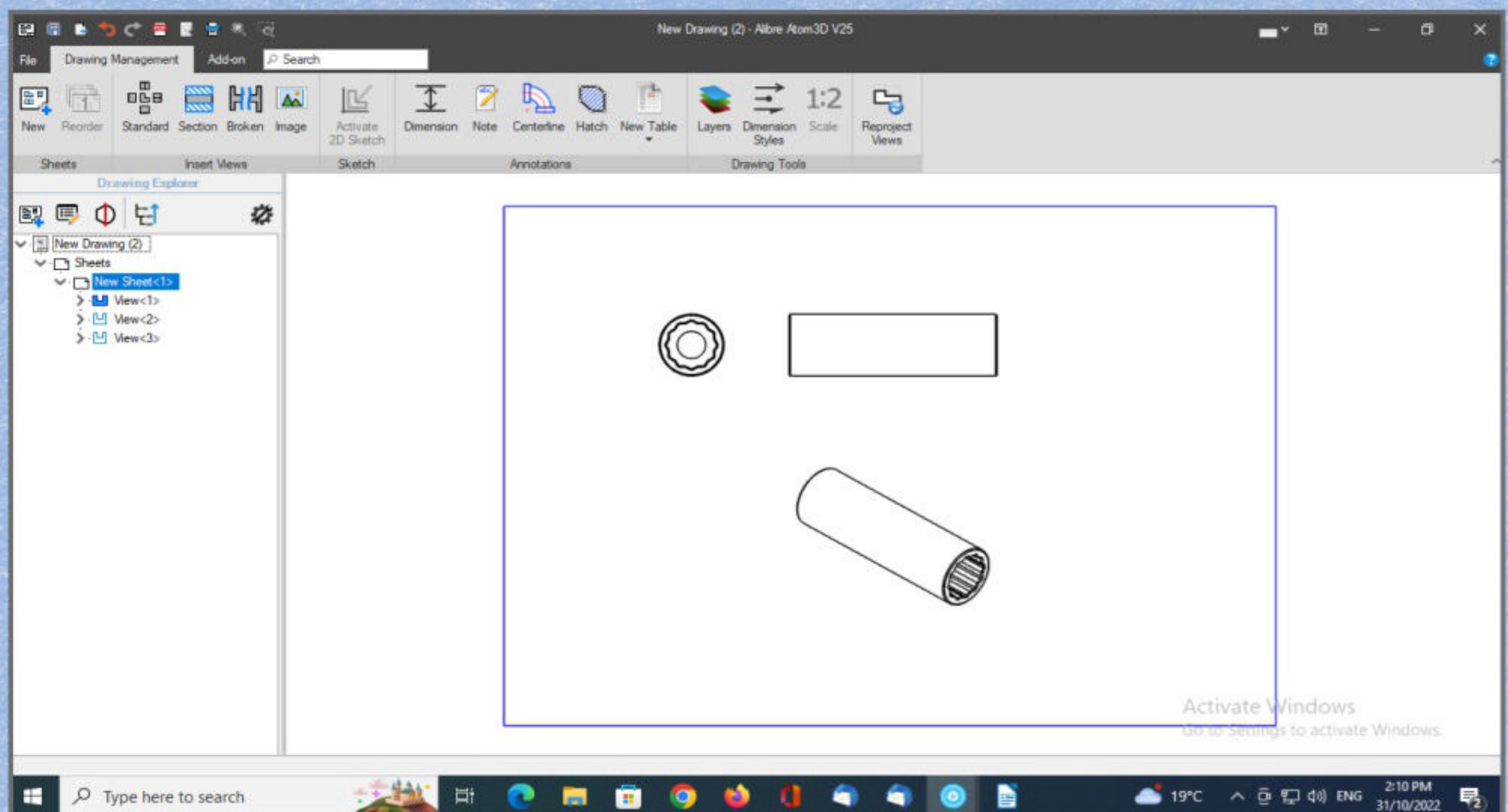


Fig.3. The selected views as they first appear

Organising the drawing sheet

When hovering the cursor over one of the views, a red box will appear around that view. That indicates that it can be selected.

Click on the red box around the front view. A toolbar will appear next to that view with some options. (fig 4)

Put the cursor over 'Manage View' and consider the options shown. I like to see centrelines on a drawing, so I ticked the +box for centres and, in this instance, I think that showing hidden

lines helps clarity, so I ticked that box.

Next, put the cursor over 'Change Scale'. The images look a bit small on the page so this is the opportunity to make them bigger, although not so big that there is no room for dimensions. Try changing the scale up to 2.0. The front view looks OK, but the side view runs off the page. Go down to 1.5 and it will look better. Notice how the side view changed in unison with the front view. That is because the side view is always projected from and in line with the front view.

Placing the view

Now let's see if we can place the front view on the page better, bearing in mind where we might put dimension lines and notes.

Click onto a blank area of the page. Hover the cursor over the front view again and click the red box. A symbol with arrows going up/down and across will show at one corner. This indicates that you can drag the image to place it where you would like it to be. When the cursor changes to a hand symbol on the red box, you can click and drag the

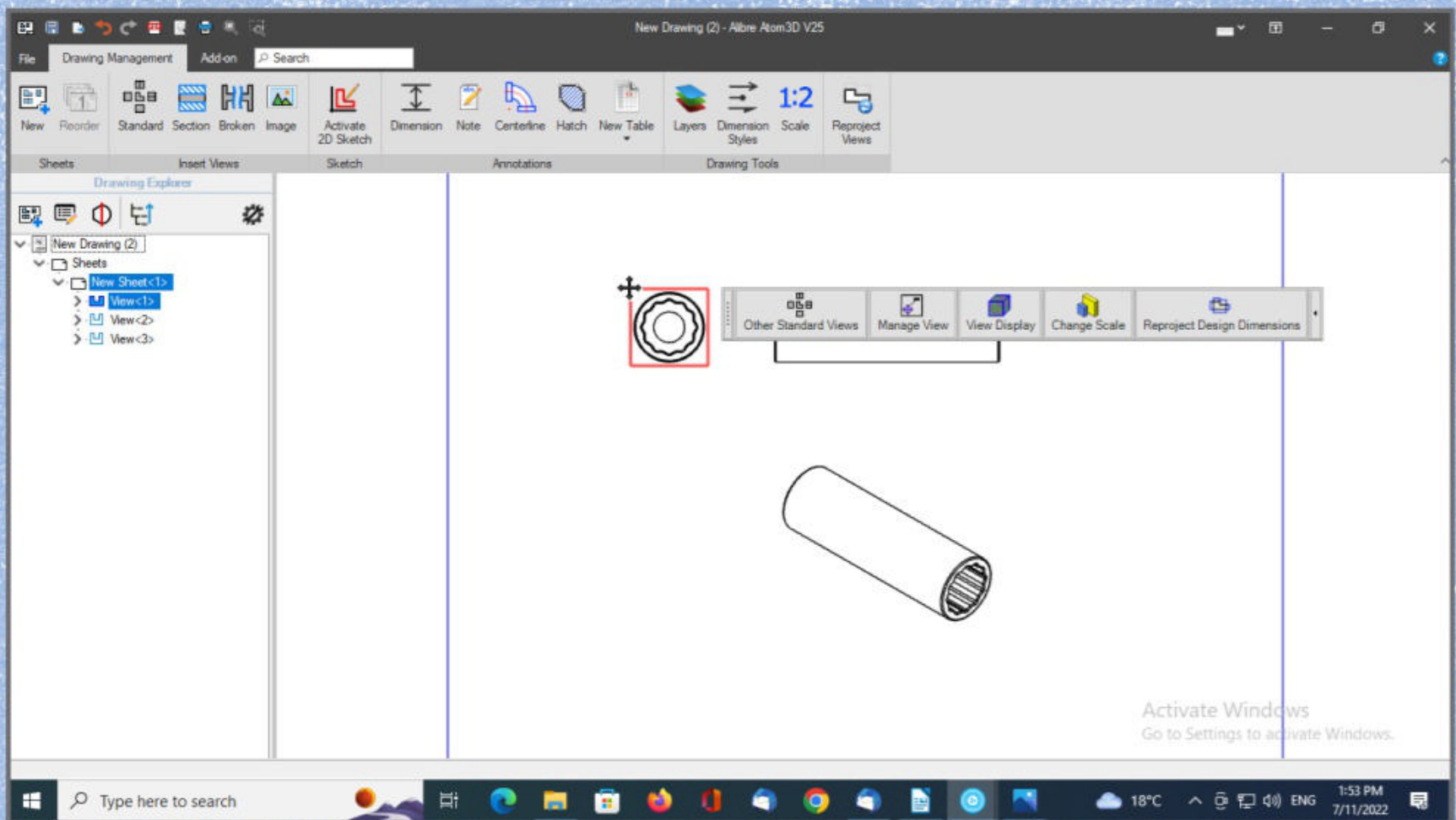


Fig.4. Tools for enhancing the front view

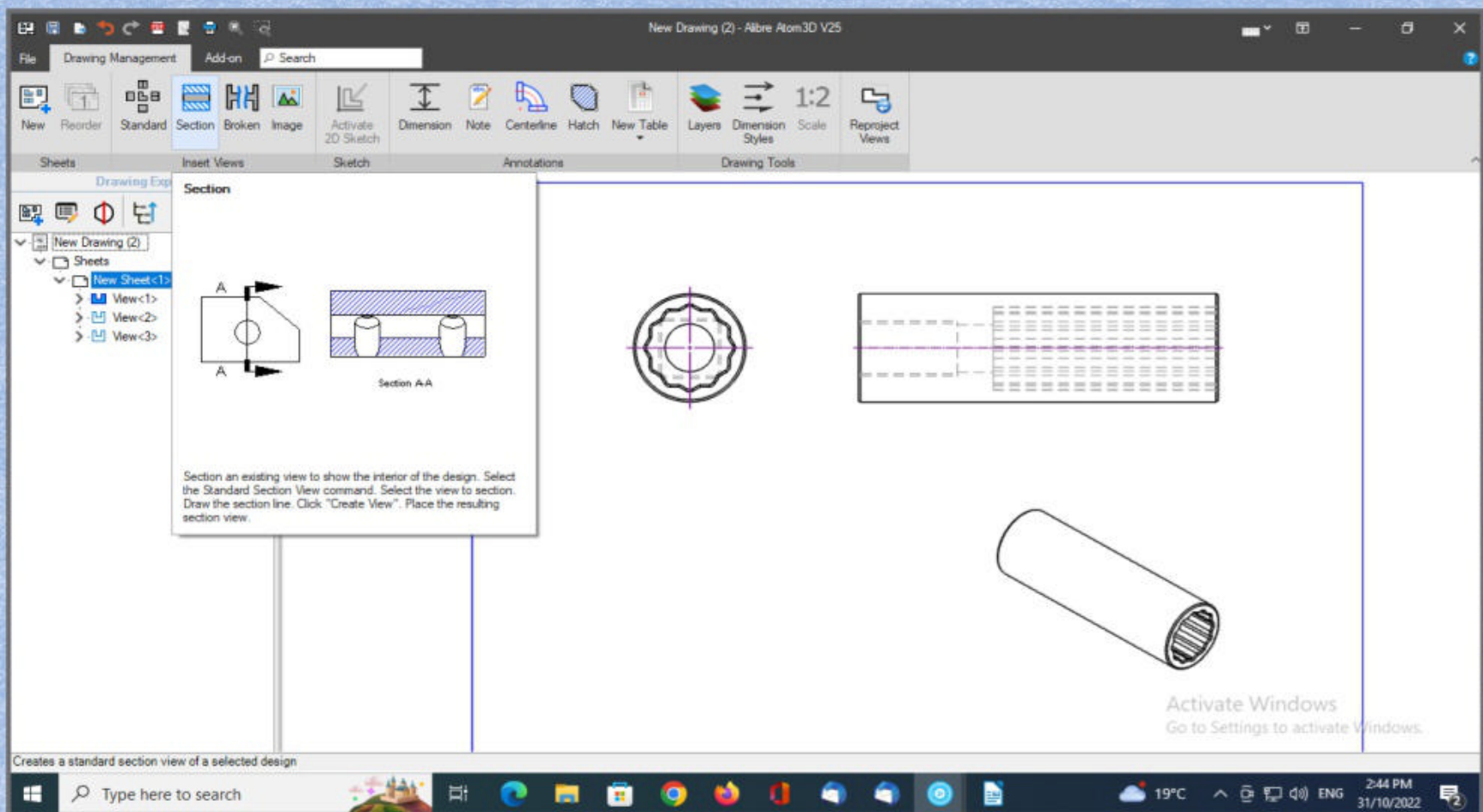


Fig.5. The selection tool

front view image around the page.

Now move the cursor above the side view. Click and make the same choices that we did for the front view (ie, centre lines and hidden detail dotted lines to be shown). Now try to change the scale. It won't let you, right? That's because the front view really is the boss. Now try to move the side view around on the page. You will be allowed to move it towards or away from the front view, but that is all. That's because it is a projected view from the front view and so is always in line with it. That front view definitely is the boss!

The isometric view has more freedom and can be moved around to wherever you want it to be because it is not a projected view and is only there as an illustration and has no ties to other views.

Sectioning

In order to show what is inside the socket — the side view — in this case needs to be a section view. This will make it look like we have sliced the socket in half exactly through the middle along its entire length. Not only

will it show the innards, but it will allow us to add dimension lines for those inner shapes. We could leave it as a solid view, but dimensioning dotted hidden detail lines is really bad practice. It's just too vague to dimension to a dotted line and has been the cause of misunderstandings and costly errors.

Before starting on the sectioning, make sure that none of the views are highlighted by clicking with the cursor in blank space on the page. Then click on the 'Section' tool in the toolbar. (fig 5) Select the front view and click on

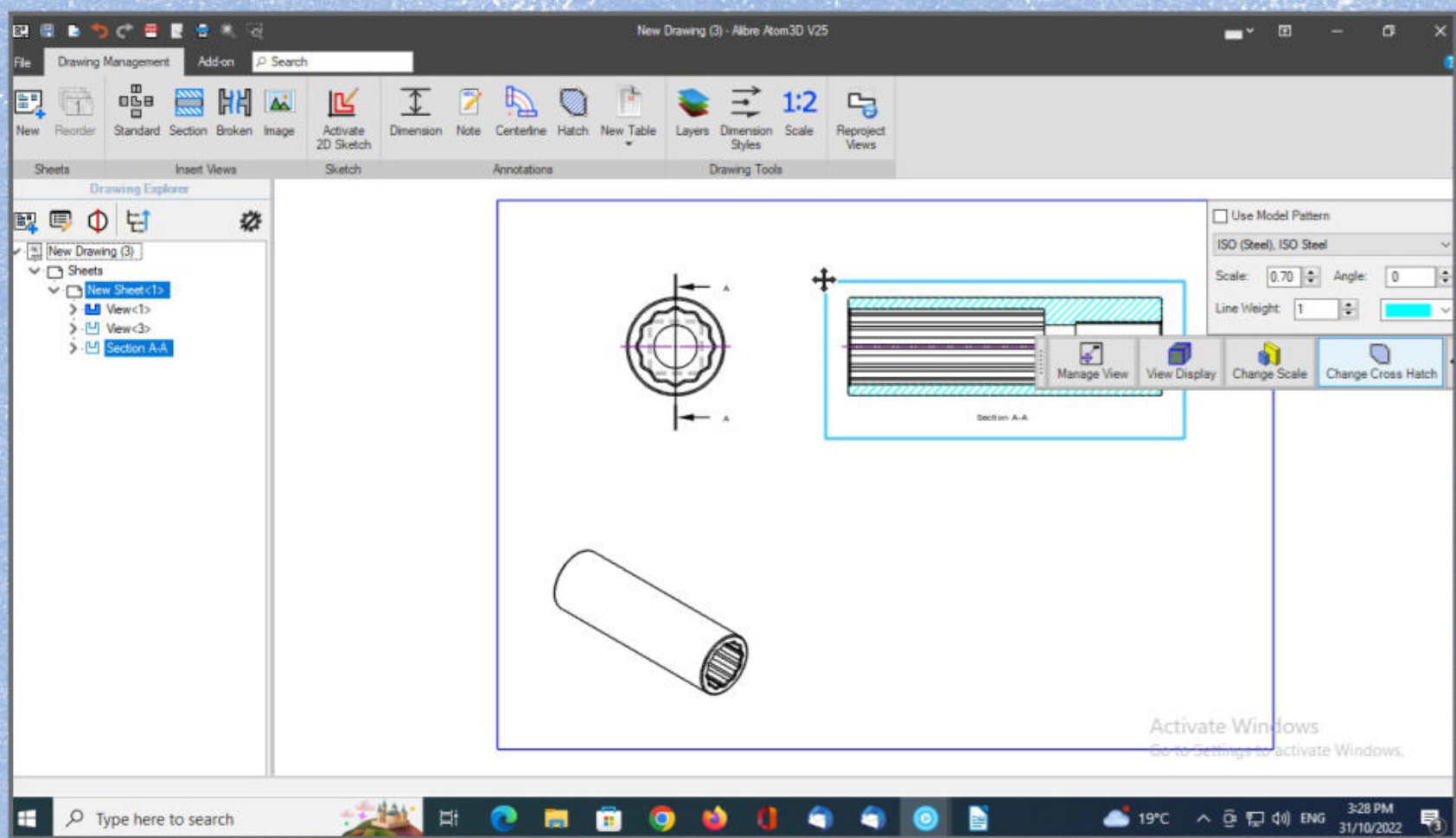


Fig.6. Tools for enhancing the sectional view

each end of the vertical centreline. Next click 'Create View', at the left-hand end of the tool bar.

The sectioned view appears. But, what's this? There is a completely new

view that has drawn over the page.

Oops! Not to worry, this sort of thing can happen and I have left this error in here to demonstrate that things can happen and that it's easy to fix.

The view I want

In my mind, when I imagined how this drawing would look and where the views would be, I wanted a side view that would be sectioned. However, I included a normal side view in the set-up. So we need to get rid of that normal side view to make room for the sectional view.

First, click on the section view and move it off to the side of the page (well, right off the page really) so it is out of the way of the side view. Then click on the side view and press the 'Delete' key. Move the section view back onto the page and place it where it looks best. Notice that you can only move it left to right as it is a projected view from the

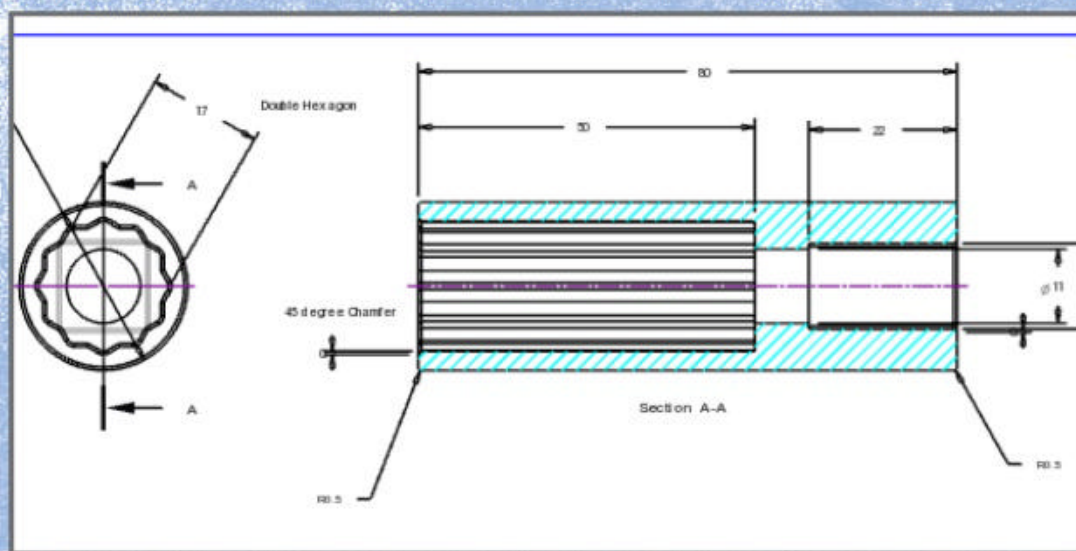


Fig.7A. Dimension is what matters most

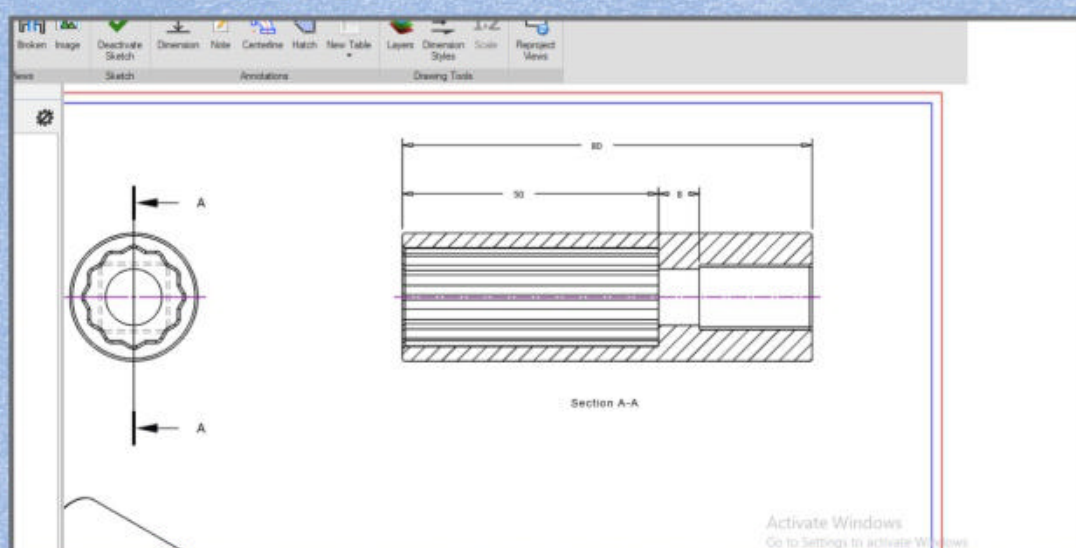


Fig.7B. Not best practise

“Oops! Not to worry, this sort of thing can happen and I have left this error in here to demonstrate that things can happen and that it's easy to fix”

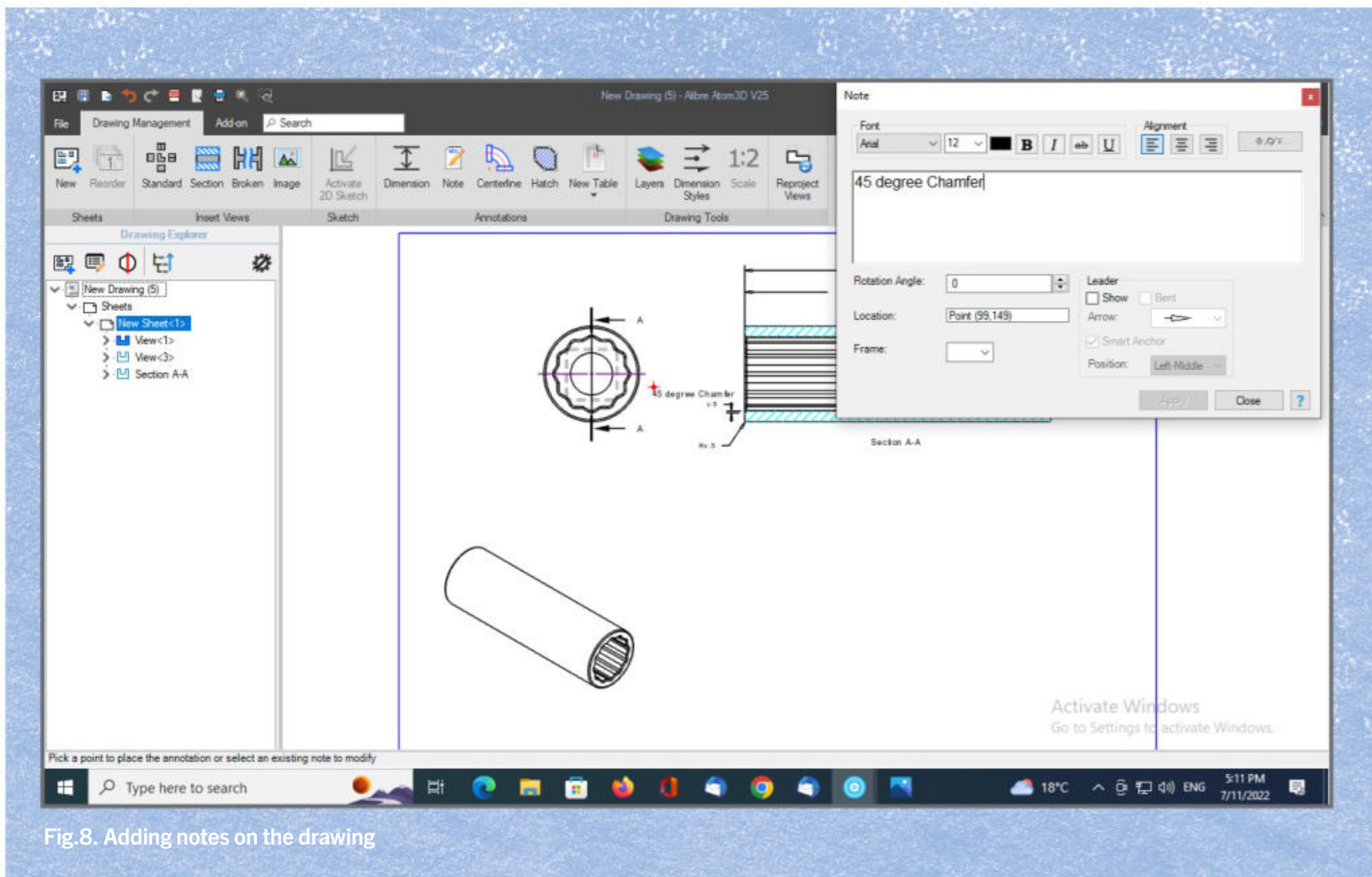


Fig.8. Adding notes on the drawing

front view which is still the boss.

It is possible to make changes to the sectional view using the small toolbar that appears when you select that view. I selected centrelines to show as it is good practice to show them in all projected views. I selected cross hatch lines that were closer together and a light blue colour to help clarify the image. (fig 6) When changing the cross hatch lines, make sure that the 'Use Model Pattern' is not ticked.

Adding dimensions

This is pretty simple, but some thought is important to get the best result. Overall dimensions are always a good starting point. Anyone looking at a drawing will want to know how big the part is in broad terms, so overall dimensions are a must. Next is to show dimensions in a way that indicates what is important. For instance, the depth of the double hex hole is important and so is the depth of the 1/2-inch square hole, but it doesn't matter what the length of the round hole between them is. It just joins up the other two. So the depths of the hex and square holes will be dimensioned as shown (fig 7A) rather than stacking dimensions as shown. (fig 7B)

To add dimensions, simply click on the 'Dimension' icon in the toolbar and

then click on the lines of what you want to dimension. For the overall length, click on the lines at each end in the sectional view and draw the cursor away from the image. The dimension

lines will be generated. Move the cursor to around midway horizontally and that is where the actual size will be shown. There's no need to enter a size as the 3D file already knows this. ►

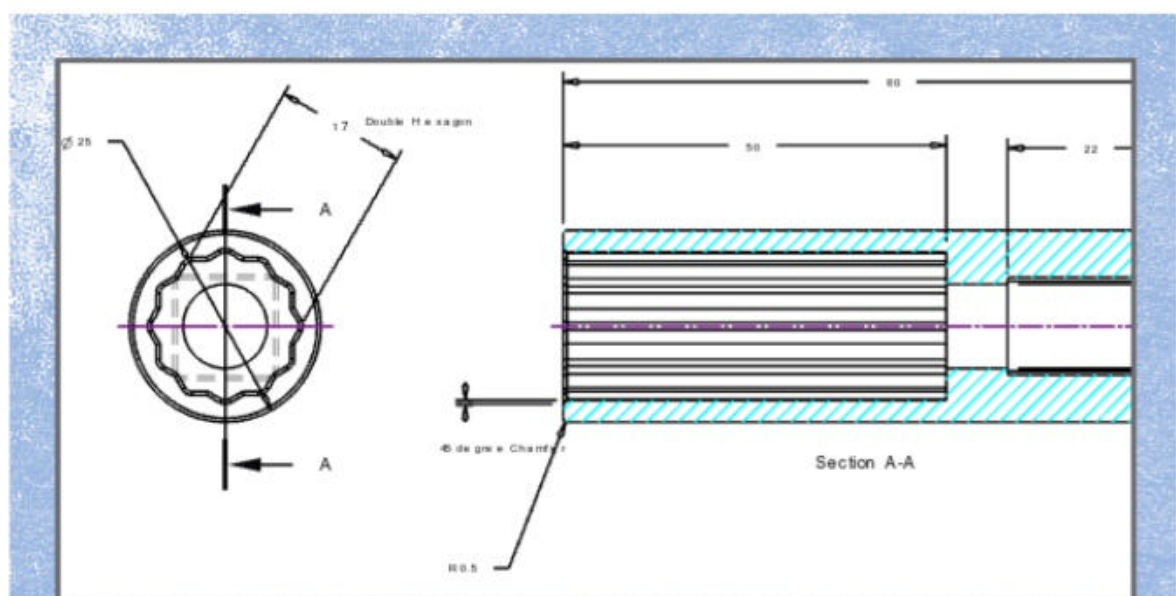


Fig.9A. Not ideal placing of the chamfer note

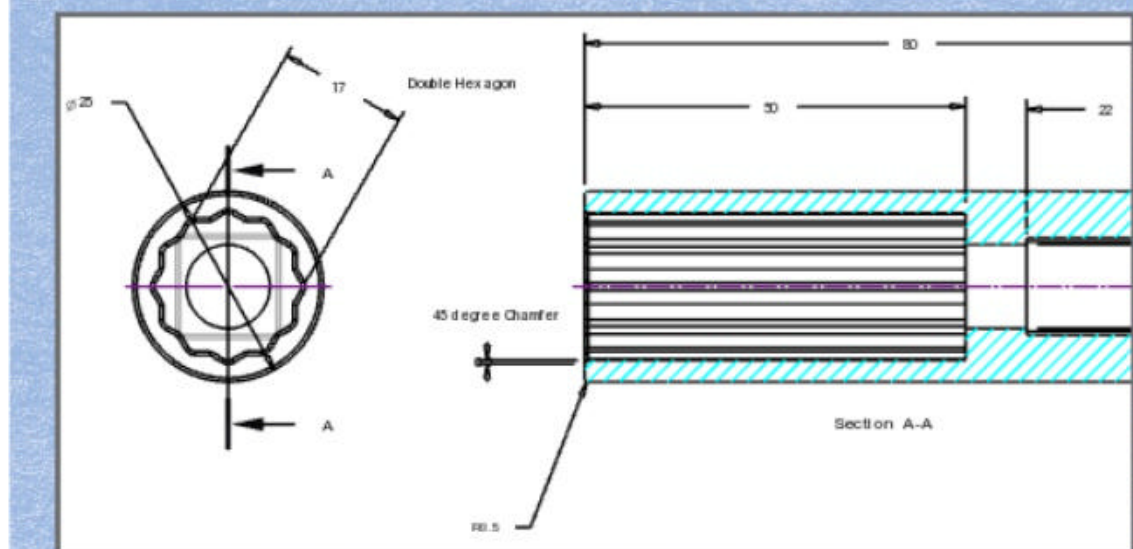
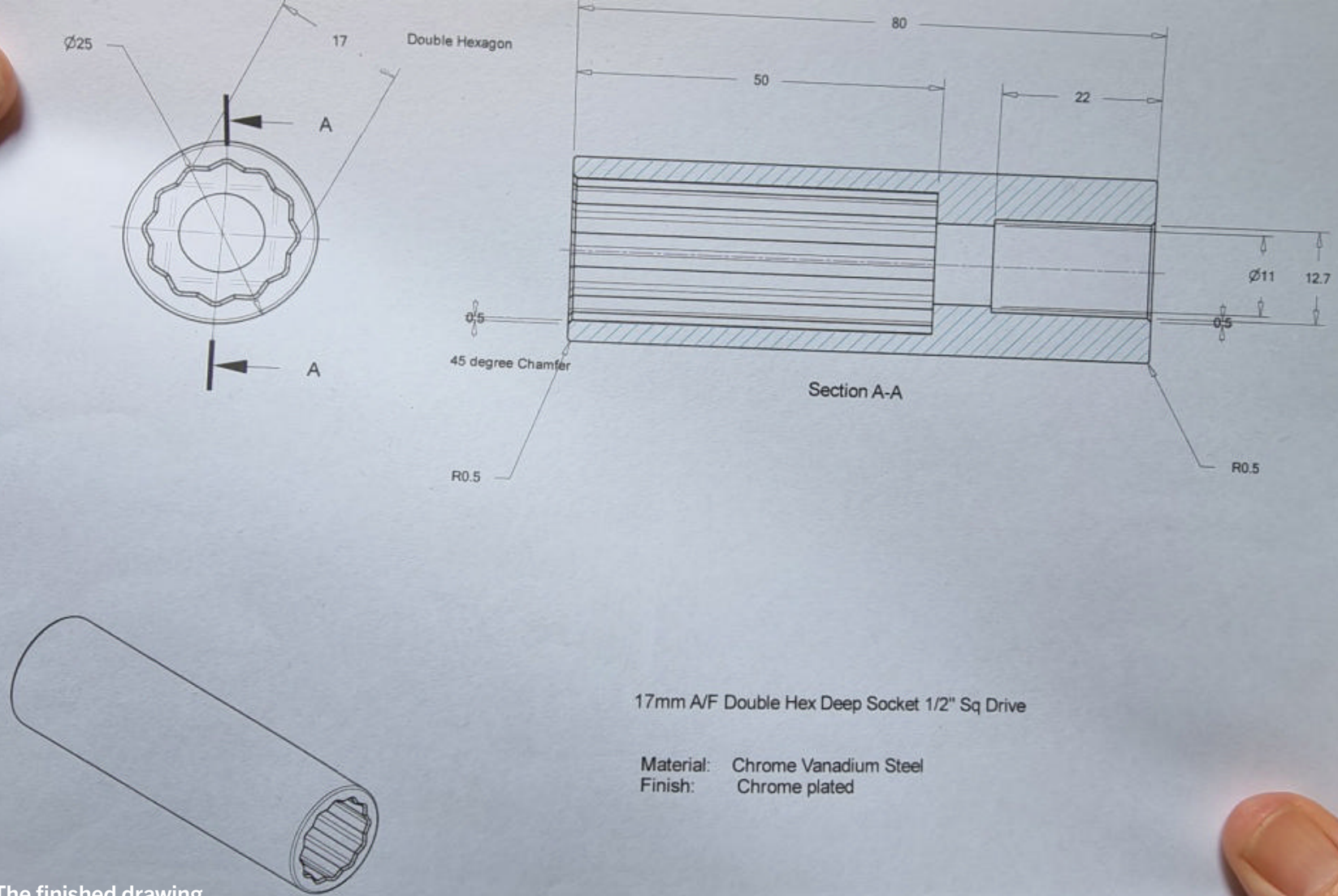


Fig.9B. Better



The finished drawing

To dimension a radius, simply click on the radius line and a dimension line in the form of an arrow will be generated. Move the cursor away from the part image so it is well clear and click to position the end of it.

Note that when a dimension is for a diameter, the dimension shows with the symbol for diameter. Clever little program, isn't it?

Making notes

Notes on a drawing are always needed to get the message across about the part depicted. I've added some on this drawing to avoid misunderstandings. Next to the 17mm dimension for the hexagon hole, I have put the note 'Double Hexagon'. This clarifies what the dimension refers to. By the 0.5mm dimension for the chamfer, I have put the note '45 degree Chamfer'. Because the detail on the drawing is so small, it could easily be assumed that the chamfer was a radius.

To add a note to the drawing, simply

"Notes on a drawing are always needed to get the message across about the part depicted"

click the 'Notes' button in the toolbar, which is right next to the 'Dimension' button. Then when you move the cursor over the drawing area, a red dot will show. When you have it in the position where you want to put the note, click to fix that spot. A box will appear where you can select the font style and size. (fig 8) Type the note and click 'Apply'.

When I first applied the note about the 45-degree chamfer, I wasn't happy with where I had placed it, as it was too close to the radius dimension and could be confusing. (fig 9A) No problem. Move the cursor over the note and, when it turns red, click and drag the note to a new location. Job done. (fig 9B) If you want to make changes to a note, right click it when it turns red and the option to edit will appear.

Sometimes it is good to have an arrow pointing to whatever the note is referring to. This can be done when you first make the note.

The 'Note' options box shown in fig 8 also has a section titled 'Leader'. Tick the 'Show' box. Wherever you position the red dot next will determine the arrow end of that leader line. Draw the line out with the cursor to where you want the note to be and click again to fix that end. Now you can select the font type and size before typing the note and clicking the 'Apply' button.

The notes function can also be used for giving the drawing a name and

specifying things such as material and finish. Putting a date on a drawing is always a good idea too.

What have we learnt from part three?

There is still a place for paper in the digital world and programs are developed to recognise this. In fact, they make it easier to produce a drawing. If you have to make changes to the design of the part, the drawing file will update automatically.

A variety of views can be selected to get the message across so that everyone understands the part intimately. Even sectioned views are catered for. Some of you probably think the writer should be sectioned, but that's something else entirely. 📄

Coming up in Part Four published in the next issue of *The Shed*, the March/April 2023 issue #107

- We delve into the clever stuff that Alibre Atom 3D does with patterns and mirrors.

element 14
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SOMETHING DIFFERENT IN HIS SHED

A passion for flying planes has led to a major project
— building an aluminium Vans RV-14A aircraft

By Andrew Broxholme
Photographs: Andrew Broxholme





“My project is a two-seat computer designed Vans RV-14A mostly aluminium aircraft, powered by a 210hp Lycoming engine”

still get a kick out of seeing the expressions on people’s faces when I tell them I’m building a plane in my shed. What, a real plane? is a common response, or, are you a pilot? (Yes, I am, but more about that later.) I think many people’s first thought when they hear the term homebuilt or, more correctly, amateur-built aircraft is that it’s made of balsa wood, spit, and number 8 wire.

However, my project is a two-seat computer designed Vans RV-14A mostly aluminium aircraft, powered by a 210hp Lycoming engine. It comes as a kit made by Vans Aircraft in the USA, and it has all the necessary parts and hardware except the engine, propeller, and instruments. Vans is one of the leading, if not the leading, manufacturer of kitset aircraft with over 11,000 of their kitset aircraft already having flown, with thousands more under construction. In 2022 they celebrated their 50th year in business.

Why build a plane?

The next common question is why? It’s not for the faint hearted and will take fairly deep pockets and lots of time, so let’s consider why anyone would decide to build an aircraft over buying one made by Cessna, Piper, or a major manufacturer of general aviation (GA) aircraft. The answer, in two parts, is simple — I can trade my time to end up with an aircraft that will have a higher performance than I could ever afford to buy, and under the rules governing amateur-built aircraft, I will be able to do the majority of the regular maintenance to keep it airworthy and safe.

My dad was in the English Air Force (RAF) for 22 years as an engineer, then a further 14 years in the RNZAF after we emigrated to New Zealand in 1969 (I was seven). We lived in Bulls, and he was stationed at Ohakea the entire time. I was a regular visitor and when I was older looked a lot like dad, so I could just walk through the gate whenever I wanted to and pretty much had the run of the place — not something that would be possible now. ►



The parts are exceptional, everything fits perfectly without the need for an assembly jig, the wooden formers are just holding it upright for better access while rivetting

“Flying is an expensive hobby, plenty of hobbies are”

Hooked

My lifelong passion for aviation started in 1984 at age 21 when my sister gave me a \$25 voucher for my birthday and I bought a trial flight at the Palmerston North Aeroclub. I absolutely loved it but it would become one of the most expensive ongoing experiences in my life. I hadn't been out of university long, had just started working at Palmerston North Hospital, and decided to get my pilot's licence. Not long into my training, before I had even flown solo, I bought a plane — a Victa Airtourer, registered ZK-DYK. This isn't (as I would discover) a cheaper way to do it, exactly the opposite in fact, but I didn't know that, and more importantly as Donald Rumsfeld would say, “Didn't know that I didn't know.”



My first plane, a 130hp Victa Airtourer

I achieved my private pilot's licence in 1987. Flying was never going to be a career though and after three years at the hospital I realised medical technology wasn't either. I left the hospital to train as a secondary school teacher, moving to Auckland to attend a year-long training college course, which meant the aircraft had to be sold, and was exported to Australia. I tracked it down recently and it's still there but not currently airworthy.

Didn't know what I was doing

Buying an aeroplane to get a pilot's licence wasn't a mistake as such, but it was stressful and expensive, mostly because I was naive, trusted people more than I should, and simply did not know what I was doing. However, it did teach me a great deal and firmly fits into the ‘what doesn't kill you makes you stronger’ category.

Flying is an expensive hobby, plenty of hobbies are, but what makes flying different is that constant practice is required — to stay legally current you only need to perform three take offs and landings every three months, and have a comprehensive flight test every two years (called a biannual flight review). Any skill lapses if not practised, and flying is no exception — if you don't fly much, don't practise, you get rusty. It

isn't as enjoyable, your landings can be a lot more hit and miss, and you can lose confidence in your own abilities. This makes you more hesitant to take friends and family flying.

After the plane was sold the only option was hiring a plane on an hourly basis from the nearest aeroclub. Sometimes I could afford it, sometimes I couldn't; the net effect being that my flying was patchy with occasional long gaps. By 2002, though, I had still built up about 160 hours of experience.

20-year gap

I moved to the UK in 1996 and went into IT as a self-employed consultant. As in NZ, the flying was sporadic but I didn't think that my flight in early 2002 would be my last for almost 20 years. I intended to fly again but it didn't happen; either I couldn't afford it or to justify it, and as the years went on I started to wonder if flying was even something I wanted to do again. Eventually I stopped thinking about it, and even stopped looking up when planes flew overhead, until I saw a video on YouTube in January 2021.

So let's back up a bit ... just prior to going to England in 1996, I met Jim

Couldn't resist posing the tailplane and fin, as it does give you an idea of the size of the aircraft



McPhee, who at the time was an Air New Zealand training captain and in the final stages of finishing a Vans RV-4. I had never considered building a plane, didn't know the first thing about it, and thought most of them were little wooden aircraft built from plans in your garage.

Nice looking plane

Jim's RV-4 was an eye opener — two seats, all metal, fully aerobatic, very fast, and very nice to look at. To

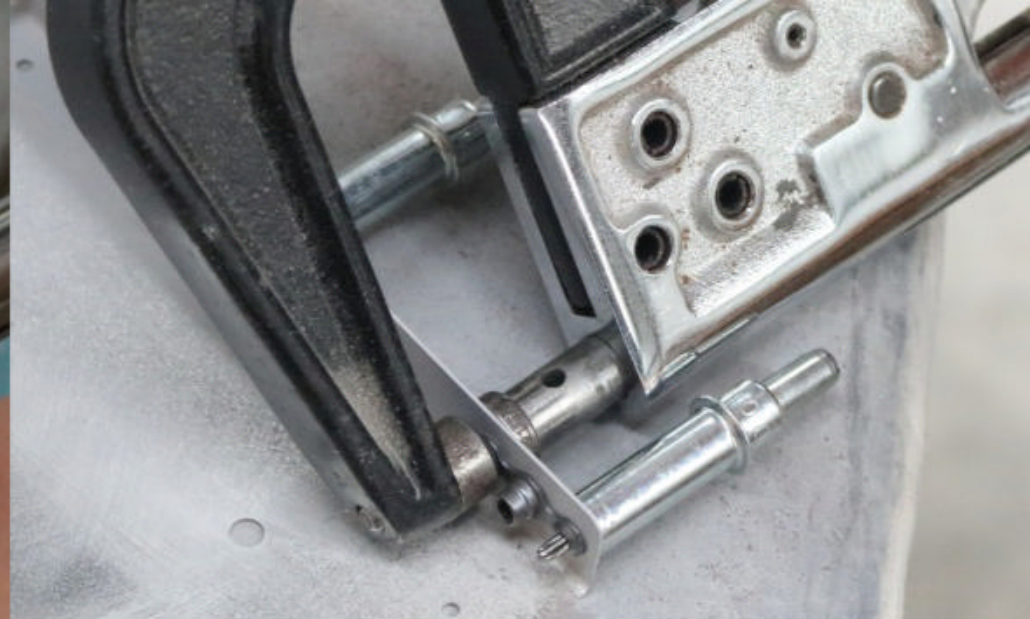
cut a long story short, I bought the empennage or tail kit for the Vans RV-7, a slightly bigger design, with side-by-side seating. However, it wasn't to be, as by the time it arrived, I had decided to move to the UK so I sold the kit to Jim without even opening it.

But the seed had been sown, and I would check out the Vans website from time to time and see the aircraft evolve. The video in 2021, by the EAA (US Experimental Aircraft Association), ►

“I had never considered building a plane, didn't know the first thing about it”



Good-looking aeroplane



Hand squeezing a rivet. It's a flush rivet — pull back on the rivet to keep the rivet seated in the dimple/cavity, and squeeze the handles. The shop head flattens and pulls the two parts tightly together. This rivet holds in a nut plate for a removable panel

“You don’t need a huge amount of space, and at a squeeze you can build it in a single garage”

during homebuilders week was all about the RV-14 and it stopped me in my tracks.

After a little more research, I jumped in feet first and ordered the empennage or tail section. The idea was to dip my toes in the water, knowing I could sell the kit without losing much, but fairly confident that building an aircraft was a challenge worth taking on.

Tools and skills

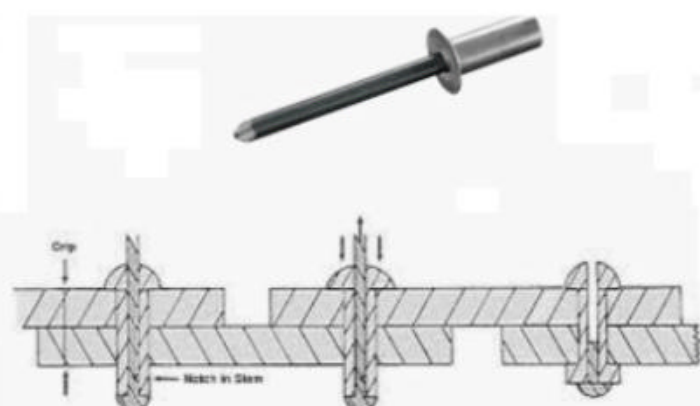
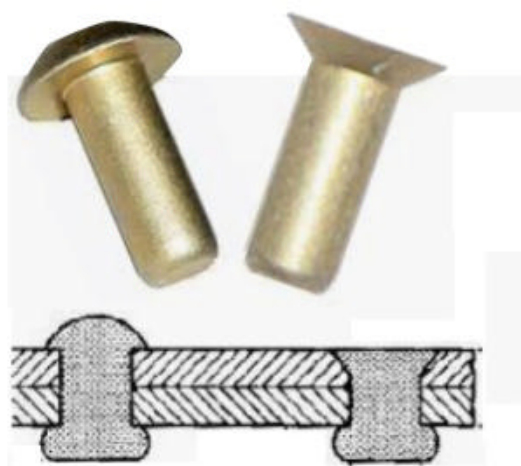
All Vans RV kits, including the RV-14, are divided into subsections. You start with the empennage or tail, then the wings, followed by the fuselage, and these make up the basic airframe. To turn it into an aeroplane you need a finish kit (canopy, undercarriage, engine mount, etc), engine, and propeller. This spreads out the financial investment, but also means less initial space is needed to store parts and start building. The empennage, while not simple, is intended to build confidence and introduces you to virtually all the techniques you will need to complete the aircraft.

You don’t need a huge amount of space, and at a squeeze you can build it in a single garage. You will need more space later on, unless you have somewhere to store big items like the wings once completed. The final assembly is always after it is moved to the airport from where it will take its first flight. Some are built at airports but it does add significant cost and is only realistic if you already have space out there. If you’re a first-time builder, it’s a better idea to work at home, or as close to it as possible. If

you have to travel any sort of distance to work, it will not progress as fast. I can walk to my shed in about a minute and work for 10 or 15 minutes if that’s all the time I have that day, and I’m currently averaging four to five hours per week. Follow this link to the EAA builders log (<https://eaabuilderslog.org/?blproject&proj=717zEgN73>) where I track and record my sessions and ongoing costs with lots more photos.

Some specialist tools

What about tools? There are different approaches, and for an RV-14 you will need some specialist tools like a rivet gun and its accessories, sheet metalworking tools, and special-sized drills specific to aircraft construction. If you’re a first-time builder and have deep pockets you can buy an entire toolkit, but these start at US\$2500, add on the



Standard and countersunk or flush solid rivets, and a pull or blind rivet (aka pop rivets). The solid rivets are squeezed to set them. Blind rivets are used when you cannot get to the other side of what you are riveting

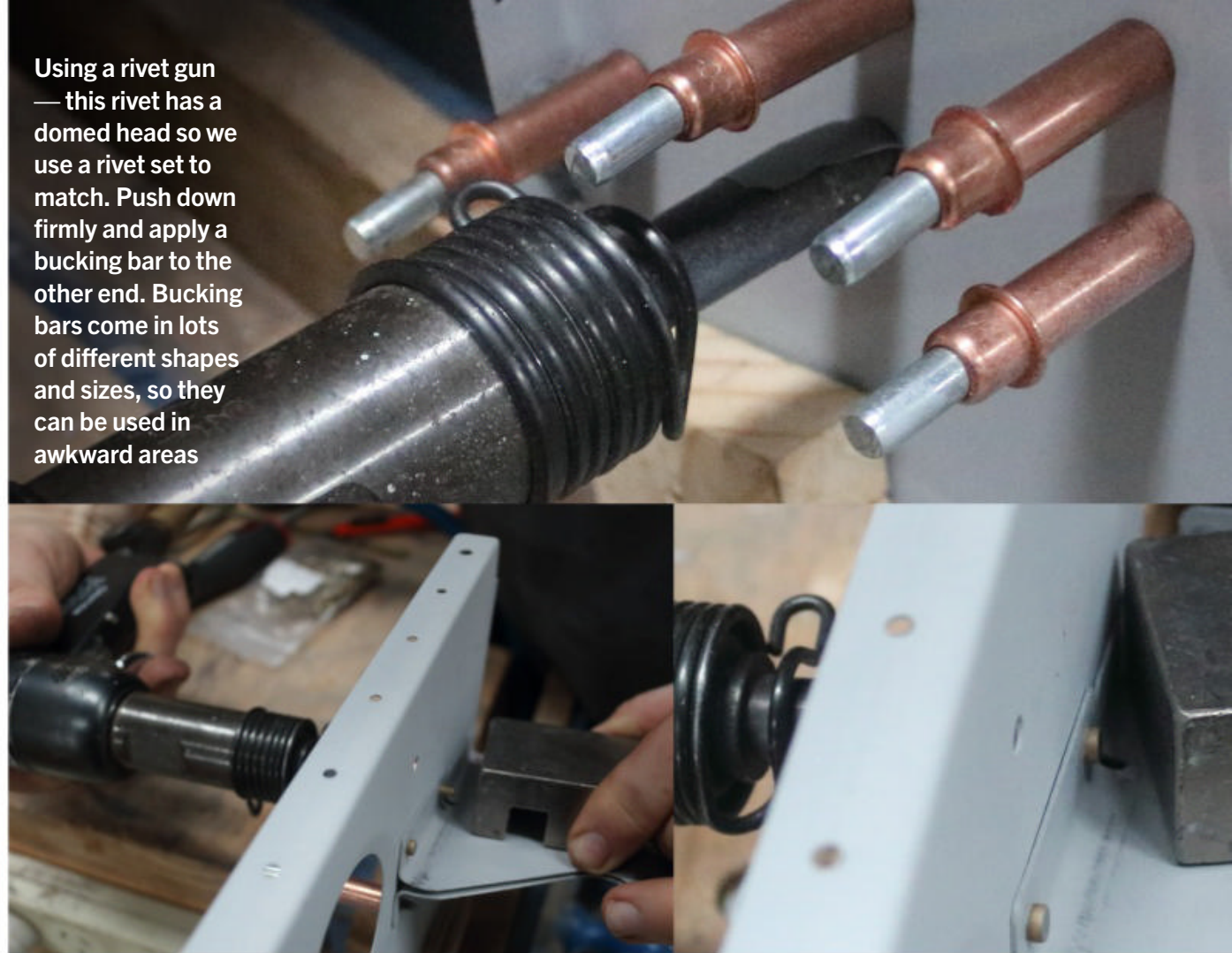
cost of shipping these bulky and heavy kits, plus import tax, and you're looking at a minimum of NZ\$6000. True, the tools are an investment, and can be sold on completion, or if circumstances change, but it's still a lot of money to outlay if the project fits into the 'I'll try this and see how it goes' category.

I was lucky and I spotted a number of items on Trade Me — a former builder was having a clear out, and I picked up the core items for about \$600 from the South Island. I've since spent another \$1000 filling in gaps, and I still need a few more items, but nothing urgent. There are also some nice-to-have tools which can save time. Another option is to borrow tools from someone close by who has finished their project — this is less of an option when you live out of the big population centres.

You need support

The most important thing you need, unless you are single, is a supportive partner. Building a plane is a major financial, time, and mental energy investment, and there will be times

Using a rivet gun — this rivet has a domed head so we use a rivet set to match. Push down firmly and apply a bucking bar to the other end. Bucking bars come in lots of different shapes and sizes, so they can be used in awkward areas



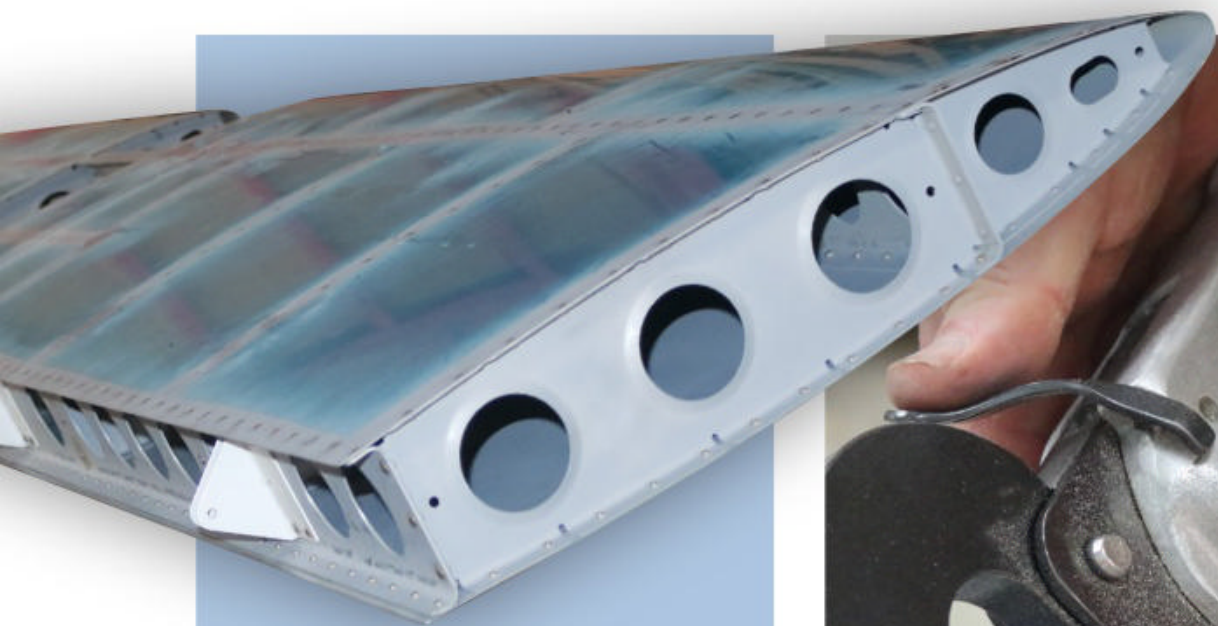
when you need actual practical help. It's important your partner understands and supports what you're doing.

My wife Amanda is wonderful — I had already ordered the tail kit before even telling her, and she didn't really grasp what it involved until she saw a nearly completed RV-14 up close. I planned a trip to Whitianga to see the aircraft and meet the builder, but we went for

a couple of days on the understanding that a couple of hours were set aside to see the project, and for her to see it too. I was more than a bit surprised at her positive reaction — as a non-pilot we are yet to see how she will handle going flying. In principle though, she likes the idea of an hour or so flight down to Palmerston North to see her friend vs a five-hour drive. ►



First stage of the tailplane is installing the small nose ribs. It's very tricky to rivet a curved surface. The spar and internal ribs ready to be added, then the forest of Clecos holding it all together — every Cleco becomes a rivet. The final part is the rear spar with elevator attachment bearings and, finally with that added, the complete tailplane

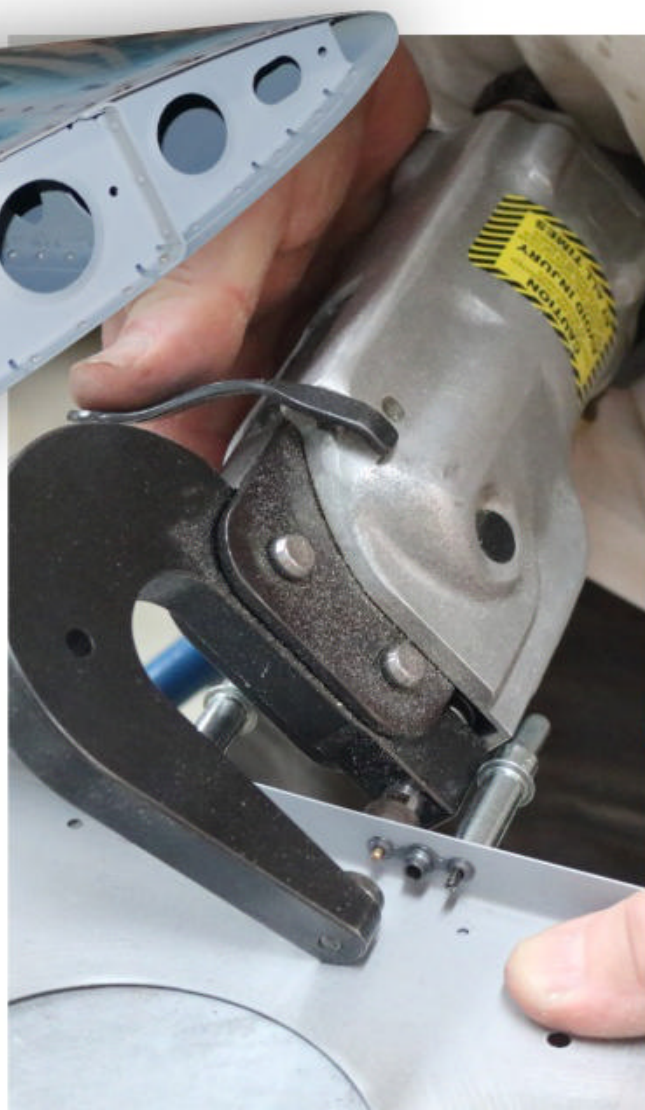


What's the damage — time and money?

So far, I've bought the basic airframe, the empennage or tail, wings, and fuselage. The investment so far is just over NZ\$55,000, including shipping, tools, and import taxes.

To get it flying I need a finish kit (canopy, engine mount, undercarriage, etc), engine, propeller, and instruments. Realistically that might be another NZ\$150,000, although it will be higher if the NZ dollar doesn't recover. I might not have intended to spend this much early on but I do have a year of building at least before any further investment is needed (phew). It is slightly scary to think that I might have to spend \$200,000 to get it flying (it's even possible it will be more), but it will be worth what I have invested in it on completion. I'm committed to building this aircraft right now, but things might change. If they do, it can be sold fairly easily and most of the investment recovered, not least because at the moment if you want an RV-14 you are facing lead times of up to 18 months for a kit, so a partly built aircraft would be an attractive option.

Timewise, I'm at around 135 hours; based on others' experience it will take around 800 hours to complete the airframe, and maybe another 400 hours to turn it into a complete aircraft. I'm managing a fairly consistent number of hours per week at the moment but an end date is impossible to know right now as work on it needs to be balanced with a full-time job in real estate (to help pay for it) and the renovation of an old house we have just relocated.



The pneumatic squeezer takes the RSI out of setting rivets — just don't get your finger trapped between those jaws when you press the trigger



What holds it all together?

Metal aircraft are typically held together with a combination of rivets and threaded fasteners (bolts and screws). Solid rivets date back hundreds of years and, while modern ships are now welded, ships built in the 19th and up until the mid-20th century were assembled from thousands of metal plates held together and to the internal framing with rivets. My RV-14 is held

together by something like 12,000 rivets, which means by the end I'll have had lots of practice installing them.

A riveted joint is designed to resist shear or sideways force. If you look at the rivet pictures, note that the two sheets of metal are held closely together. While each individual rivet in an assembly only contributes a small amount of strength, rows and rows of closely spaced rivets confer immense

“A riveted joint is designed to resist shear or sideways force”



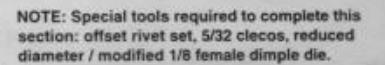
This is a good example of a riveted structure — one of the attachment points for the tail plane; the layers of metal and closely spaced rivets make it very strong but still light weight



Above: The Cleco is a temporary skin fastener that holds parts you are about to rivet firmly. The top left shows it ready to insert — let go of the handle and the central pin moves forward and the jaws pull the parts tightly together. At the bottom you can see some vintage skin fasteners I found among my father's tools. The large diameter ones are 60-plus years old, but still work — it means I don't have to buy any big spring Clecos.



In order to work out how big the second workbench needed to be, I partially assembled the cockpit floor area. The blue is a vinyl that covers the parts from scratching until you need to work on them



The first page of section 26 (above) shows what you are building; it's then broken down into detailed steps. The pair of assemblies ready for installation (this pic)

The fuselage wing attachment spars, pre-assembled by Vans, which for me is a very good thing. Those very big rivets must be installed correctly



The internal structure of the rudder laid over the outer skin; more than 500 rivets make this very strong for its weight



The rear fuselage is assembled upside down; Clecos hold the fuselage bulkheads and skin stiffeners in place before riveting



Are they safe?

A certified aircraft like a Cessna 172 has a type certificate and when it rolls off the production line, it goes through a test program and is issued a certificate of airworthiness every year, or 100 flying hours. It undergoes a comprehensive inspection — you take it apart, look for defects, and make repairs as necessary. The inspection is detailed in the technical log and the aircraft is released as safe and airworthy.

The principle is the same for amateur-built aircraft; when it's finished it's inspected by the CAA and given a permit to fly. It undergoes a 40-hour flight test program before its final airworthiness certificate is issued, and each year it is inspected and repaired as necessary. There isn't a legal requirement for supervision while being built but any sensible builder will have their work checked as they go, and you do need to document it and take photographs as you go, or you will struggle to get through the final inspection.

The primary difference is that as the builder, I can also legally maintain the aircraft which will greatly reduce ongoing running costs. If you were to buy a homebuilt aircraft, built by someone else, you would not be able to maintain it yourself unless you were a licensed aircraft engineer.



Every rivet hole in the flush riveted skins is dimpled. Here I'm dimpling the lower fuselage skin

You get plenty of spares

You get all the hardware to build the aircraft in the kit, but they are more than generous with rivets, giving you plenty of extras, which you need because early on you tend to muck up quite a few, depending on how quick a learner you are. These need to be drilled out and replaced.

I've not so far made any mistakes that made ordering replacement parts necessary. When building the tailplane, I misread the instructions and drilled some rivet holes in the spar to the next size up — the fix was to use bigger rivets along the spar which if anything makes it stronger, but it did

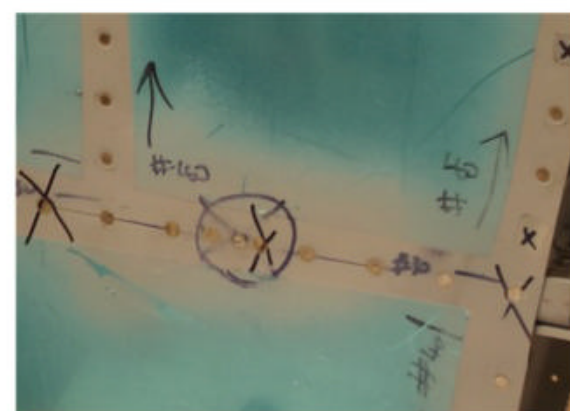
cost me hours of extra work, some blue air, and a bit of worry until I thought things through. The rivet gun also slipped when I was working on the curved leading of the tailplane, and left some dents in a very visible area. The material isn't very thick, so by shaping some wood I was able to mostly push the dents back out and a small amount of filler will finish the job.

Stay tuned

So we get to the end of Part One. Stay tuned for an update in around six months. If you happen to be in the Whakatane area and would like to drop by, give me a call on 021 087 66836. [📞](#)



I love pin boards as organisers — these are some of the different fasteners for the fuselage



Bad rivets. Above is a close-up of a section of the tailplane; the rivets marked were not very flush and were marked, removed, and replaced. In the middle you see what looks like an extra rivet — it is. I ended up with a hole in the wrong place, so after getting advice, I put in some extra rivets, and once painted it won't show. Below you can see what happens when the bucking bar slips — instead of a nice round head it is mutilated, very weak, and needs to be replaced



Smaller parts for the fuselage, each one uniquely identified

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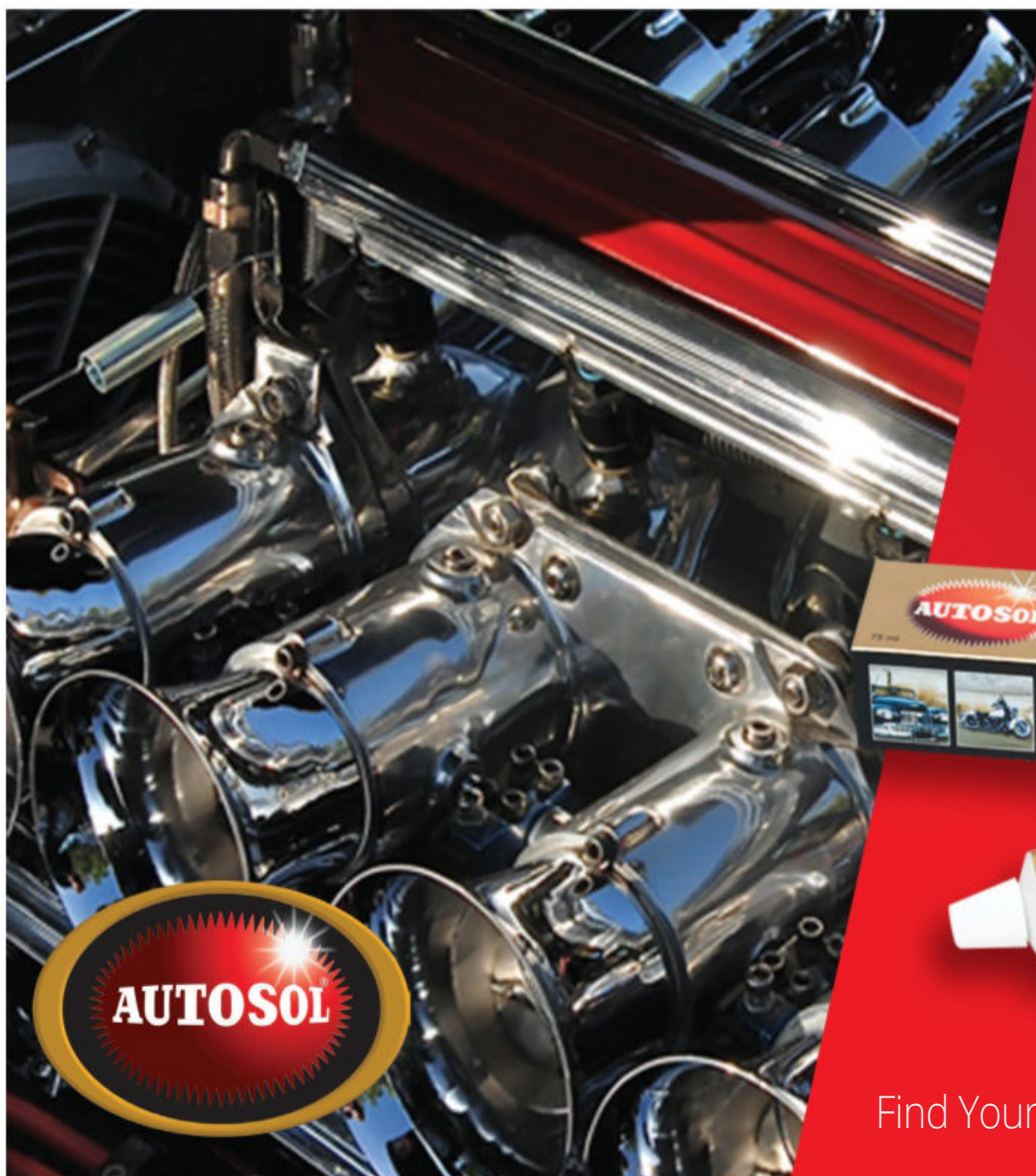
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On the home straight — now for all those time-consuming, fiddly bits

By Mal McKee

Photographs: Natalia and Mal McKee

We now have the structural guts of the house built — exterior log walls, roof, windows, doors — it's weatherproof, and we have moved in, just.

As we were coming up to the middle of winter, I think our second boy, Maximilian, didn't want to appear until the fireplace was operational. Two weeks late — we didn't plan it this way but he arrived bang on Natalia's 40th

birthday! Good for me; only the one birthday to remember.

The end is nigh

So we're onto the finishing bits, which include electrical, plumbing, cladding, bathrooms, and kitchen, plus all the fiddly bits to try to make it look good. For that first winter, we all moved from the partially finished master bedroom and en suite into the — not really

finished — kitchen/lounge/dining to have one warm room with the fireplace for the new baby — nice to have extra space as well. Meanwhile, I turned the master bedroom into a workshop again so I could completely finish it and the en suite bathroom.

This was time consuming as there were many fiddly bits to complete; more than I first thought in the en suite, while the master bedroom had two spaces

THE E



above the wardrobe, shelves, and a tunnel up top to take hot air from the kitchen/lounge/dining into the master bedroom in winter — a great idea from Natalia — as well as a complex roof structure with the valley beams.

Luckily, starting with the small ensuite roof first, I soon discovered it's a lot simpler and neater to do the walls first and then the roof; it is much easier to line up two roof boards than up to 14 tricky angles on some of the taller walls.

Maintaining standards

I told Natalia that, having made such a

good job of the main structure — if I do say so myself — I wasn't now going to finish it all rip, sh*t, and bust. I didn't plan to be looking at mis-matched joints forever. We're very pleased with the results.

The eastern white pine shiplap is so nice to work with and gives a lovely warm feel to our house — quite similar to the Lockwood and Fraemohs houses made here in New Zealand. I've gone through maybe 12,000 brad nails! Natalia sanded and varnished the 800-plus shiplap boards, at 170mm wide x 3600mm long — that's nearly

500 square metres of sanding and varnishing! I knew I had married her for something.

Being the homeowner, one is legally allowed to run all the wiring. Apart from the ceiling lights, it mostly runs under the house nicely protected between the floor joists — but, man, what a labour-intensive job that was.

Neat as

Feeding miles of wiring carefully through all the holes so as not to have any twists or damage, mostly done lying on my back in the dirt or up a ladder. Me



Pre-clad inspection = pass



En suite roof construction;
shower vent to eave



Master bedroom — knee-wall plus bracing



Master bedroom ready to clad

being me, though, it's as neat as!
Do it once, do it right.

The wiring for the ceiling lights has a neat click-clack female three-pin plug behind, time-consuming to install but neat in the long run. The downlights all come with a cord and a male plug anyway — easy.

I found fairly cheap (\$13 each) but high-spec 10W lights that have the driver inbuilt. They are wet-area rated, fully abutted — you can put the insulation

right up to them — and dimmable. I used the same for the two garages.

Electricity and cost wise, we are attempting to see if the hot-water cylinder has had its day. So, all our hot water is fully electric on demand — i.e. tap off equals not spending any money.

Hot water units

I researched the hell out of electric showers and got two fantastic units through the UK Amazon site — my brother then sent them over — max 11kW/45-amp each, along with two under-sink Zip units, 9kW/38-amp each.

The UK gave us a much wider selection and better prices. One under-sink unit feeds the kitchen sink, with a split then going under the floor and up to supply the nearby en suite basin. The other does the master bathroom basin and the bath.

Our awesome electrician, Carl, advised me all the way and custom designed/installed switching gear so

we can't overload the system and blow the main 63-amp pole fuse at the street connection. It means only one shower at a time, which is easy enough to manage, really, and the showers are great, particularly on the massage function. Our power bill doesn't seem to be anywhere near that of our neighbours, so it looks as if we're onto a winner.

Mal's a plumber, too

I also got the go-ahead and guidance to do the plumbing. For me to be the main plumber and electrician most of the time, as well as the builder, is a huge advantage. Everything is now designed and installed seamlessly, and I have only myself to blame if I drill in the wrong place!

In fact, only the two cold-water pipes running to each shower unit are in the walls; every other part of the plumbing system is fully accessible — so great for any future problems, rebuild, or modifications. Installing the three-sided

“I turned the master bedroom into a workshop again so I could completely finish it and the en suite bathroom”



Master bedroom and en suite in progress



I'm not going to wait for that to dry; brace it, OK

“The eastern white pine shiplap is so nice to work with and gives a lovely warm feel to our house”

shower into Natalia's en suite was tricky. A plumber friend up north, Dale, talked me through that step by step. He did the same with the splashback tiling for the sink. Dale now only does showers for a living — using the skills he learnt for me.

I didn't enjoy any of the tiling one bit, but it turned out OK and Natalia is happy with the result.

Someone mention tiling?

Speaking of tiling, we had two goes at the kitchen splashback tiles; 52 tiles failed to stick — within 24 hours they

started falling off. Grrrrr! We think it was the combination of a cement type of adhesive with the varnished wooden wall? As they had cost only 36 cents each, we just chucked them, cleaned up, and started again. I used Sika Showerbond this time, and they ain't coming off now; that stuff is good.

The south kitchen wall was the one to get right for me. Looks great now, but behind it is an electrician's nightmare. One cooking gas pipe and 13 different electrical points on one wall, with the electric shower and

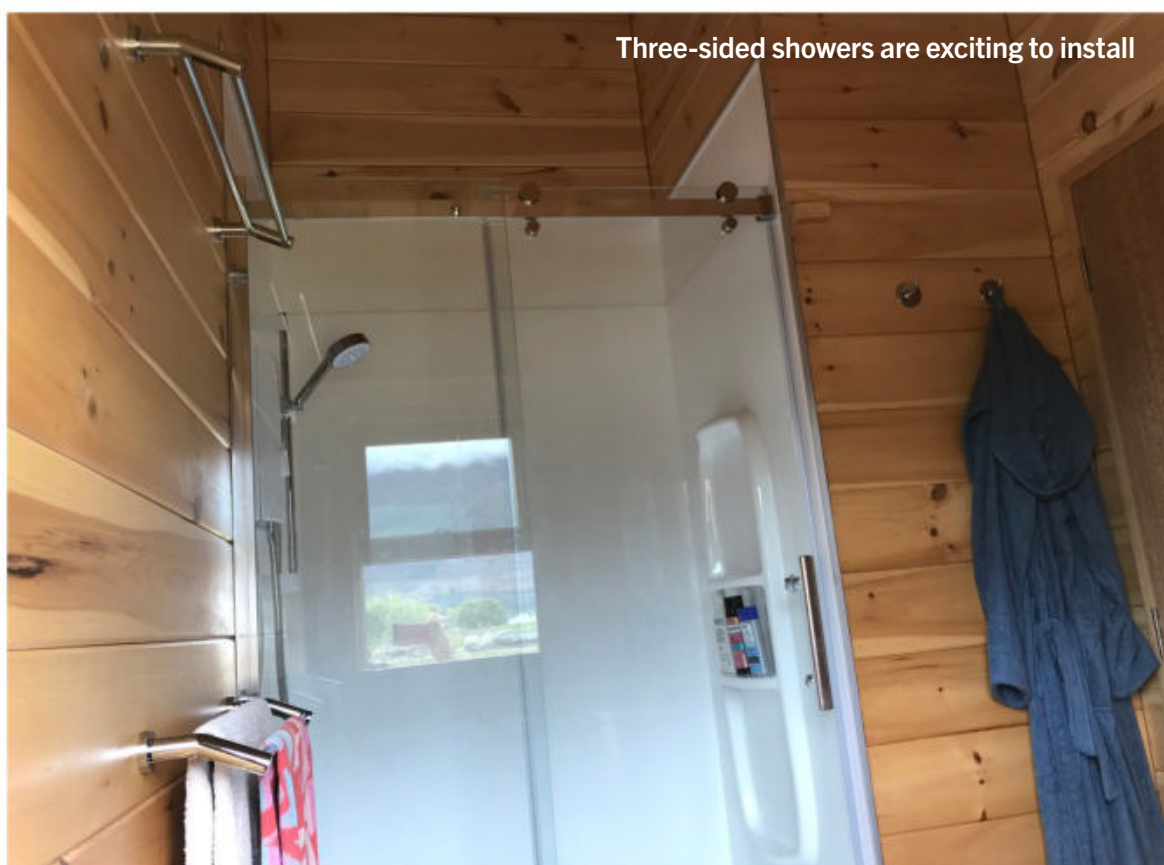
isolation switch for the en suite next door inside the same wall!

With multiple calls to Carl, along with photos, I made triply sure I had that one all tidy and legal before I cladded it. I measured, labelled, and photographed all the frame dimensions, too, so I know exactly where everything behind the cladding is. Carl got to do the easy connecting bit at the mains! We're doing an electric oven, with a double gas and double electric hob up top — best of both worlds for cooking. The range hood goes up and across into the eave outside to vent; same with the bathroom fans.

An imported kitchen

After cooking for quite a while in our makeshift kitchen in one of the kids' rooms, it was time to give Natalia her brand-new kitchen. Got the shiplap on the walls and the roof done, finished the bay window, and it was into the vinyl floor. Installing that was a yucky job — vinyl glue, although water based, is horrible to work with; well, I found it so. Glad that was a oncer.

We looked elsewhere, thinking outside the — ever increasingly expensive — New Zealand box, and managed to get our custom-designed wood/glass Ikea kitchen through Canada, including delivery, for



Three-sided showers are exciting to install



Natalia's en suite all done



Master bedroom — pleased to be done



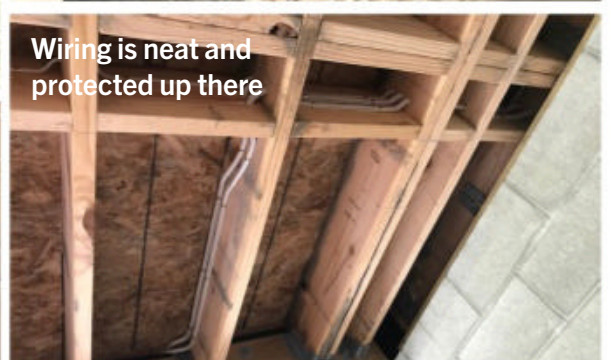
Master bedroom, all done except carpet



Nice to wake up to: master bedroom roof



Sander requiring much-needed rest

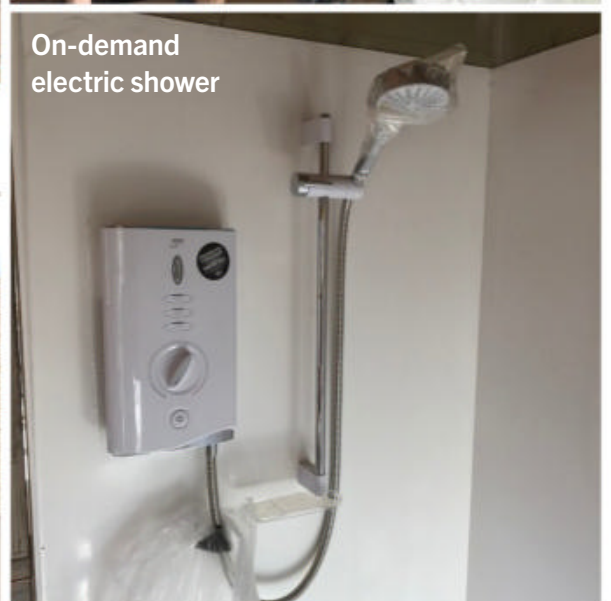


Wiring is neat and protected up there



Natalia the sander and helper

I researched the hell out of electric showers and got two fantastic units



On-demand electric shower



Main line out, tap and gully trap



On-demand electric hot water



Electrician's nightmare, now covered for ever

The UK gave us a much wider selection and better prices

\$8500. You wouldn't get any change out of about twice that in New Zealand, unfortunately. I'm a Kiwi; love country and I want to keep it working, but not while we're being driven that hard.

Anyway, installing the kitchen — now there was a giant jigsaw. No wonder Ikea is a prospering company. Cheap, but actually a high-quality product, and very, very easy to install. Just watch a YouTube video and you'll see what I mean. Thankfully, I pretty much nailed the kitchen dimensions, in a guess, when we ordered the kitchen about three years earlier, way before the house was built — phew!

Some small mods

Only had to nip 97mm off the side of the one oven unit that we purposely ordered oversize to get the ultimate fit. The kitchen is great, and you can't beat that price. Technically, one bench hangs a bit into the dining window area, but I trimmed the edge off and have cunningly distracted the viewer by building a wine rack underneath, so you don't really notice. It keeps the bench and cupboard areas as large as we can have them.

Natalia and I are both quite tall, so the bench now sits at a more comfortable 940mm height, which meant I had to make 21 higher legs and taller 150mm kick boards. It was quite a pain to line it all up and secure it but things are level and strong.

The slightly free-standing cabinet unit is firmly secured at the back through to the floor, which is the garage roof. Under the bay window, we have a matching white ceramic / granite-type double sink — geez, that stuff is hard — fitted within a poof-teenth by countersinking it flush with the bench. I tried hard to get away with 2x45-degree elbows for the waste drain but had to add 1x15-degree; fitting it all was a bit like a game of Tetris — in fact, all the plumbing was like Tetris.



Job done

Sorted

Somehow, I had accidentally purchased a stainless sink/waste-drain set-up. The supplier had no stock, and wouldn't be getting the one we needed for our thicker granite-ceramic system for months; nor could he sell us the two longer drain screws required.

I had the skills so it was off to an engineering shop. With two stainless M12 bolts and three nuts to mount it in the lathe, I machined up two custom ones for \$6 — job done. One very large sliding drawer to go under the sink, with a large custom rubbish bin on the right side, is to come soon. The cabinet unit alongside is already set up, with an electrical socket and drain underneath for a dishwasher should we want one in the future. Additional space next to the fridge has allowed me to build a large tray-rack; the cabinets there aligned perfectly to allow the largest 700mm-wide single-door fridge to fit if and when we want to upgrade. The fittings

I measured, labelled, and photographed all the frame dimensions, too, so I know exactly where everything behind the cladding is



Ikea, make a kitchen out of that, please



It's a family affair; consultation



The blank canvas awaiting the Ikea kitchen

in the kitchen are all high-quality soft-close. Natalia is very pleased with her new 'cheap', but by no means nasty, kitchen.

Happy wife, happy life — right?

I have only myself to blame if I drill in the wrong place

Some really nice aspects

Approx two-thirds of the house is set over the three-quarter underground garage, with the remainder on piles. It's really good to have the whole underside of the house accessible; all the plumbing and most of the wiring is up within the

floor joists, making it neat while also providing protection.

We will eventually plumb our 25,000-litre in-ground concrete water tank into the system, using the water off our roof as the supply. We don't need to, but I think in this day and age letting all that good rainwater go down a drain is a terrible waste — besides which, the council started unnecessarily chlorinating our otherwise pristine water here a few years ago; none of the townsfolk wanted it — progress, huh?

During the build we have managed to dodge quite a few bullets with regard to weather damage; skimming and re-covering the water-damaged floor made it ultimately better, and managing to water blast the internal

log walls brought them back to looking like new.

Sealing the logs and varnish

I had to use a special log-home caulking sealant on the chinks (cracks) in the wood and a lot of the joins. I did both the outside, which was necessary, and the inside, for looks. Energy Seal, from US company Perma-Chink is water based and comes in a wide variety of colours. I've gone through 90-plus tubes of it to get the whole outside and inside done. It was quite time consuming to apply, but future upkeep will just require filling an easy gap here and there.

To keep future maintenance as easy as possible, we've varnished the whole inside of the house. For the ceiling and



Better than the picture; wow, we like it



Window frame sealed



House and the view — not bad, thanks

I am putting more coats than suggested on the outside for these first few years, so it will really soak it into the wood

I used Sika Showerbond this time, and they ain't coming off now; that stuff is good



One of Ikea's computer images of our order/design

Inspection and weight check; thumbs up



My manager and supervisor

Skills + lathe = job done: \$6

walls, we actually used a hard-wearing Cabot's water-based floor varnish that doesn't yellow over time.

For the whole of the outside, we chose a NZ-made wood oil called CD-50X in Rustic Gold. I am putting more coats than suggested on the outside for these first few years, so it will really soak it into the wood. It should then only need a coat to the sunny sides of the house once every couple of years or so thereafter.

So close

At time of writing, there is still a bit to do; getting there but we're not finished yet. It's mainly building the decks — ideally three in total. The main one in front of the lounge is 7x3m; then there

is one for the front entrance area and another outside the master bedroom, possibly with a spa pool — we'll see how we go. Then there's the windows and a waterproof door for the three-quarter underground garage and a bit of basic landscaping.

We've had a good amount of luck, help, and guidance with our huge undertaking, so thanks to all our family, friends, contractors, and our community here for their support.

Stay tuned, in 25 years time (!) we might get it entirely finished and write another article about it for *The Shed* — ha ha. Thanks for reading, everyone, and I wish you all well with your projects, however ambitious they may be.

Nothing ventured, nothing gained. 📄





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SPINNING, SPINNING, SPINNING...

SOMETIMES A HAND-TOOL IS AN EXAMPLE OF PERFECTION, DOING EXACTLY WHAT IT WAS DESIGNED TO DO, WITH VERY LITTLE FINE-TUNING, FOR HUNDREDS OF YEARS

Words and photographs by Murray Grimwood

Off-gridders are acutely energy aware. They have to be; they realise very quickly that what they don't demand, doesn't have to be generated. It is no coincidence, then, that hand-tools are much discussed, coveted, refurbished, and, indeed, loved. One tool that ticks all those boxes hereabouts is the spinning wheel. My partner will often sit treadling one of our workhorse Ashfords (pictured above), as we have our cuppa and discussions at each end of the day; she says it's therapeutic. I just love the way spinning wheels do exactly what they have to do, perfectly, as is so often the way with tools designed when energy was scarce. One way or another, we've been spinning yarns for years — and every now and

then, she believes one!

The earliest spinning tools were simple spindles, and examples have been found from as far back as the Neolithic age. Indeed, a recent article traces fibre twisting all the way back to the Neanderthals. Wheel spinning has been around for more than 1000 years, refined and mechanised particularly since 1800, but the basics haven't changed: short staples of something fibrous, twisted together to form a continuous thread or rope.

Hand spindles

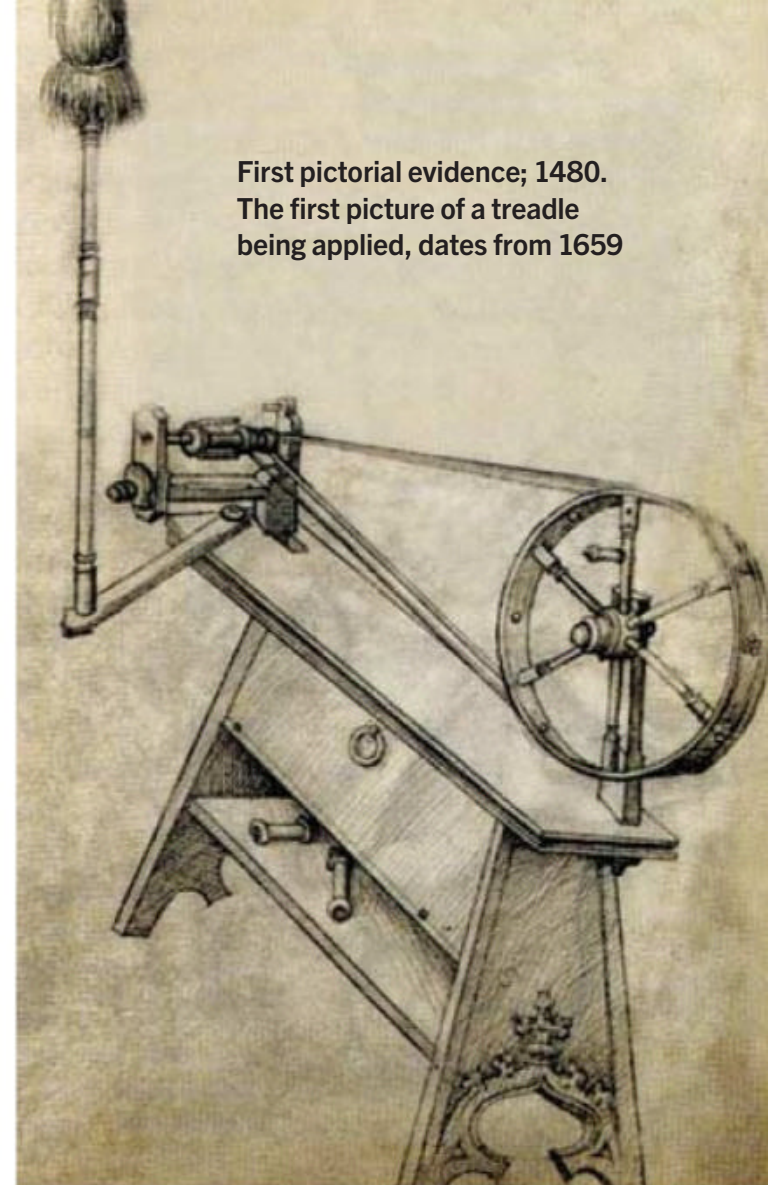
The earliest depictions of spindles can be seen on Egyptian wall paintings and Greek vases, and they are referenced in early Greek and Roman literature. Anthropologists identify three types:

A modern portable upright wheel, made by Ashford





Our spindle experiment; a scooter wheel, a stick and a hook. It erred on the heavy side.



First pictorial evidence; 1480. The first picture of a treadle being applied, dates from 1659

She plucks wild-sheep wool from bushes, spinning it as she walks

drop spindles — sometimes called free spindles — where the spinner can walk or stand; supported or stationary spindles — the spinner is seated with the spindle in a bowl or container; and thigh-spinning spindles — the spinner is seated and the spindle rolled between thigh and hand.

I first learned of drop spindles when reading Jack Lasenby's dystopian book

(and series) *Because We Were the Travellers*, set in post-apocalyptic New Zealand. The hero and an old lady, remnants of a tribe, travel in gypsy/tinker fashion. As they go, she plucks wild-sheep wool from bushes, spinning it as she walks. At night, she knits it into items to trade with static-living folk; a story as old as time.

Drop spindles

Drop spindles also — as we found when we built one out of a dead bassinet and a scooter wheel — require a lot of patience. You can only twist the length from your hand to the spindle, then you must stop and wind it on.

These spindles can still be bought new, but are the simplest of home builds: a shaft, usually tapered, with a feeding hook at the top, and a wheel — called a whorl — doing the flywheel/inertial thing. The flywheel can be top or bottom by individual preference; heavier flywheels can break the incoming fibre; lighter ones lose inertia quickly.

Wheels

Wheel-driven spindles came next; invented in more than one place, at more than one time. Indian charkhas — think Gandhi — were already used in the ninth century; great wheels

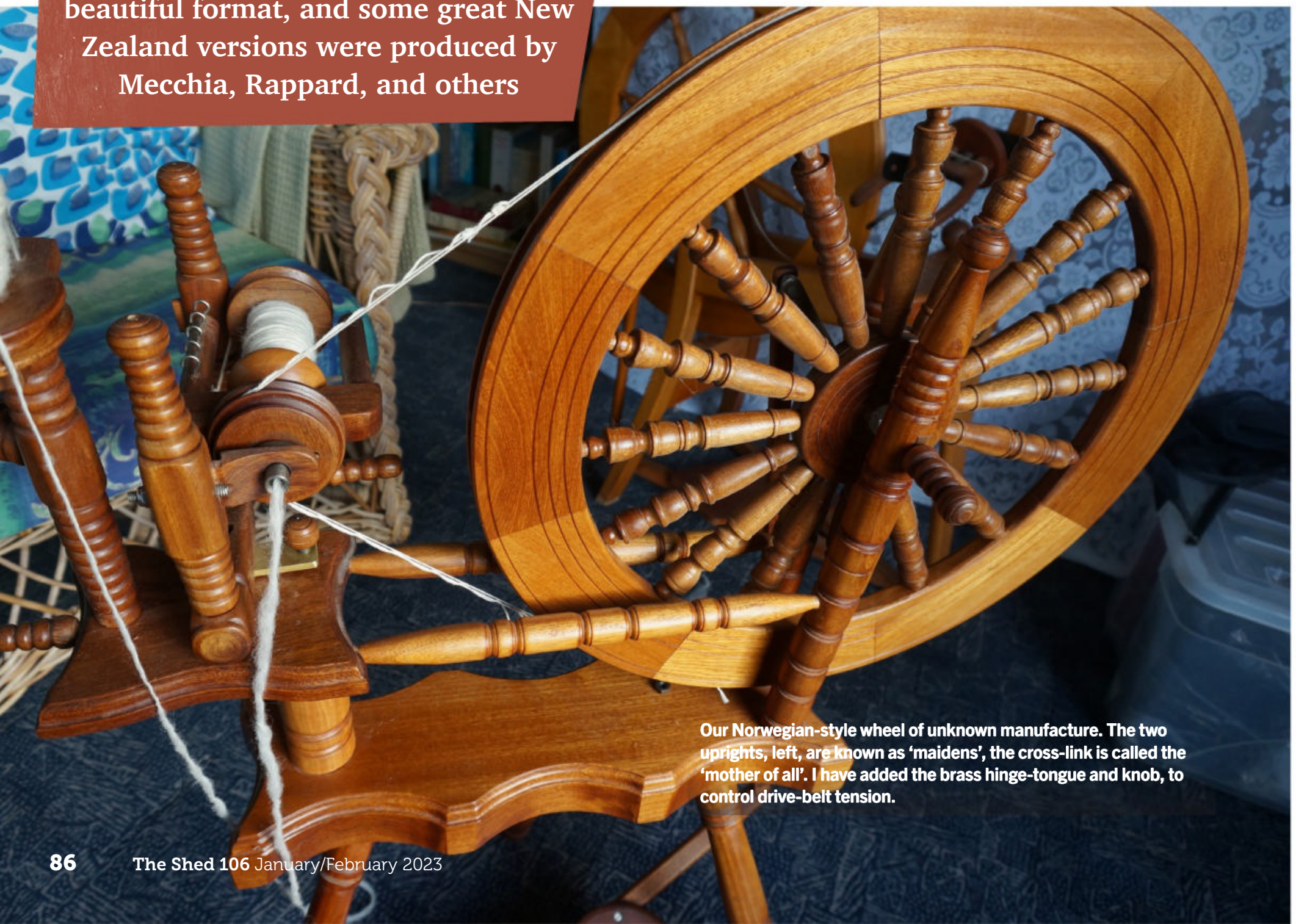


Wheels in limbo - the Rappard factory today



'If there's a more satisfying way to spend a rainy afternoon in the shed than giving new life to old wood, I've forgotten it.' Our Little Peggy on the way back.

To my mind these are the most beautiful format, and some great New Zealand versions were produced by Mecchia, Rappard, and others



Our Norwegian-style wheel of unknown manufacture. The two uprights, left, are known as 'maidens', the cross-link is called the 'mother of all'. I have added the brass hinge-tongue and knob, to control drive-belt tension.

Some even have different pulley profiles — V-shaped versus U-shaped grooves — to vary this fixed ratio under load

were invented in the Islamic world in the eleventh century and have been depicted in illustrations dating as far back as 1237. Great wheels needed to be spun by the right hand and the yarn was drawn away, twisting off the end of the spindle, with the left. When the operator could reach back no more, the wheel was reversed and the twisted length was wound onto the spindle — so, somewhat like a drop spindle on its side, with a bit more control on the spin. By 1480 — see illustration — flyers and bobbins had clearly been invented, but wheels were still hand-driven.

Logical thinking applied

Somewhere around 1533, someone had the bright idea of treadle-driving the wheel — and the rest is history.

Today, spinning wheels come in three styles: Saxony, Norwegian, and Upright — alternatively called Castle, and even Upright Castle. Saxony wheels usually have a sloping frame to facilitate the wheel and the flyer being arranged horizontally, the Ashford Traditional being typical of the breed. Norwegian-style wheels are similar to Saxony ones, but with two stacked horizontal benches — another way to get those wheel and flyer centres horizontal. To my mind, these are the most beautiful format and some great New Zealand versions were produced by Mecchia,

Rappard, and others. Upright/Castle wheels have the components stacked vertically, flyer on top. Their forte is compact portability; examples are the Ashford Traveller and the Majacraft wheel. Modern wheel variations are often of upright form, and often take advantage of plywood and other less-traditional materials.

Drive differences

There are two operations going on in spinning: the twist applied to the fibre, then the winding of it onto the bobbin. Obviously, control of the speed between the two is important — it comes down to the speed difference between the flyer and the bobbin — and can be achieved in multiple ways.

With single drive, only the flyer (Scotch tension) or the bobbin (bobbin-led) is driven. An adjustable ‘brake’ is applied to the bobbin in order to slow it down. The operator can hold back, or let the bobbin take up. With double drive, a single drive-band is wrapped once around the flyer, back around the big wheel, and then around the bobbin. (It needs to be crossed over for this to happen). The grooves in the flyer and bobbin are sized to control speed differential; some even have different pulley profiles — V-shaped versus U-shaped grooves — to vary this fixed ratio under load. Some can switch from one mode to the other; all work,



A Niddy-noddy; easily replicated.

and mostly it's a matter of personal preference — single drive perhaps being easier for beginners.

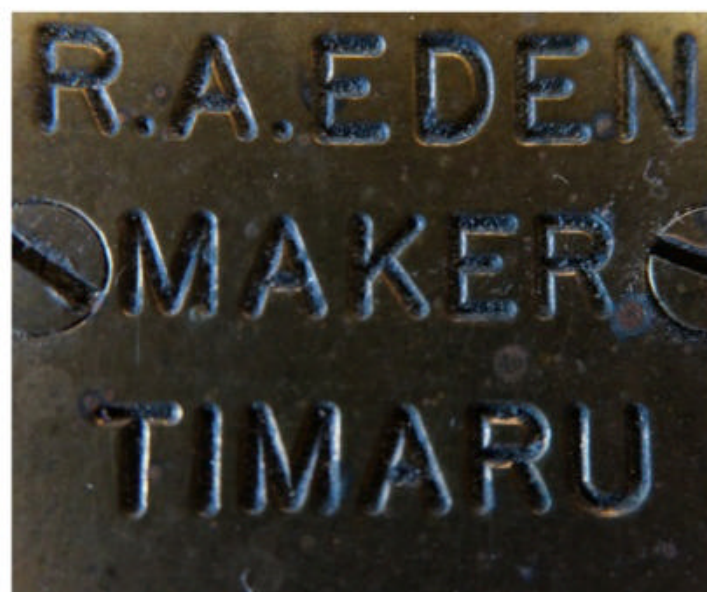
New Zealand manufacturers

There have been many makers of spinning wheels in New Zealand. The definitive history is *New Zealand Spinning Wheels and their Makers* by Mary Knox — a masterpiece five years in the making. The spinning wheels have ranged from low-volume amateur — often someone making one for his wife, then a few more — to high-volume factory.

Knox records sporadic production until 1960, with minor enthusiastic blips caused by WWI, WWII, and



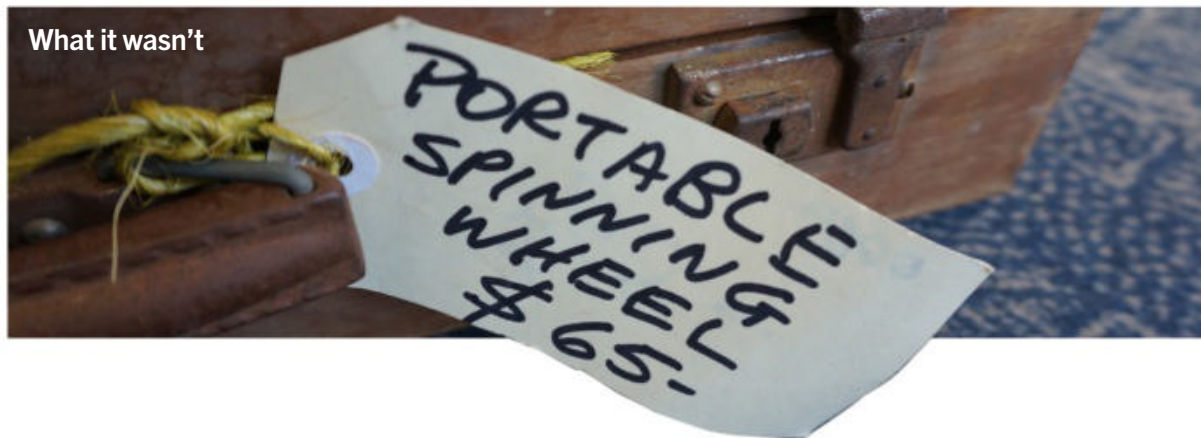
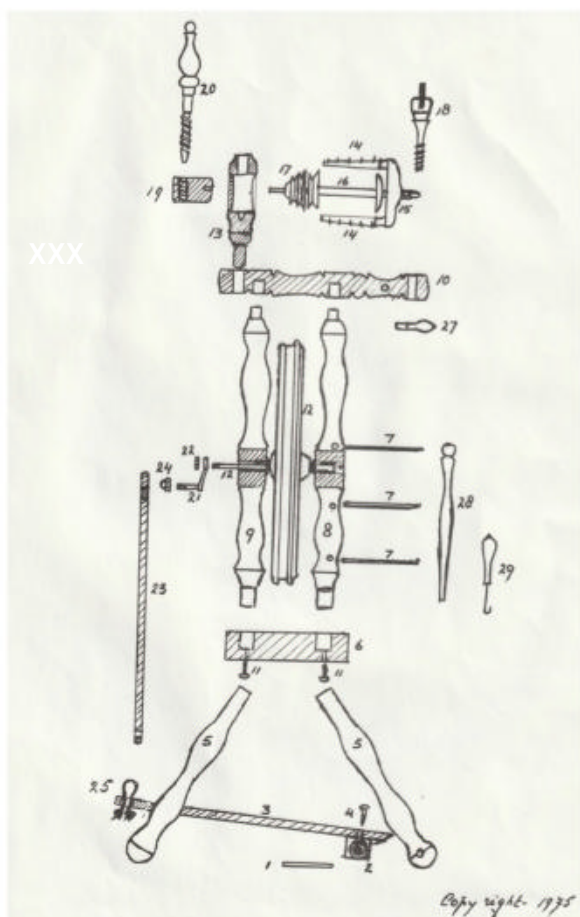
Backstories add interest; one of our Ashfords, left, and the ball-winder, right.



the Depression. During WWII, some makers took to repurposing old wheels from treadle sewing machines. From 1960 until perhaps 1985, things really got into gear, starting with horizontals and graduating to the more-portable uprights. When more portability was demanded, some makers took to repurposing lead from old batteries, to add flywheel inertia to the necessarily smaller wheels.



The Little Peggy, back in action



What it wasn't

The Rappard connection

A friend of a friend happened to buy a property with the remains of the factory where John Rappard, his wife Maria (Mies, Mitzi), and various workers turned out 20,000 wheels, mostly for export. Given that we have two Rappard products, visiting the site was an interesting experience. Some machinery had gone but much remains as it was when John died. There are part-built wheels and parts of wheels and piles of brochures; this was a busy place. John also found time to build all the buildings, and create a ride-on railway system complete with tunnel. An organised sheddie, then ...

Our own Rappards are:

A Little Peggy upright — which was languishing in the back of a second-hand shop.

An early-colonial spring rocker — he made these chairs as kits; I had no idea of his connection to the chair I had been the only bidder on — at \$10 — until our factory visit.

A Norwegian wheel we acquired and thought might have been a Rappard; Mary Knox assures me it is not. We knew the number of felloes — segments in the wheel rim — was wrong; Rappard used 12, ours has 8. However, the unique number of spokes — 16 — was correct. Also, the tensioning was badly engineered — not typical of Rappard — and Knox pointed out that, while treadle carving was a Mitzi trademark, this one wasn't in her style. Knox suspects it is the work of a gifted woodworker who didn't really understand spinning, and who more or less copied a Rappard.

The wheel that wasn't

I spotted it in an auction line-up on a dour Dunedin day. The tag stated,

“Portable spinning wheel”; the price suggested it hadn't sold at a garage sale or some such. It had a single-arm flyer with a counterweight and I thought, “Oh yeah, interesting enough to bid on” — and did. And got it! Then, when it came home ... one thing it surely wasn't, was a spinning wheel. I spent a happy hour working out what went where, with what — pennies can drop slowly hereabouts — and finally assembled a beautifully engineered ball winder.

I find this sort of construction aesthetically pleasing, and am always interested in the back-story. By the aluminium, I knew it was made this side of WWII; from the Knox book, I'd plump for early '60s. The plaque said: “RA Eden, Maker, Timaru”. I contacted Timaru Spinners and Weavers — a branch of Creative Fibre NZ — and asked the question. Nobody knew of him; nobody had any recollection. That happened with our Wunda Kettle, too — no anecdotes, no remembered encounter. It is amazing how fast these things get forgotten. We owe folk like Mary Knox for doing what Maurice Shadbolt once described as “smash and grab raids on history”.

A buyers' guide

If you are looking for a spinning wheel, there are bits and

John also found time to build all the buildings, and create a ride-on railway system complete with tunnel

The big Grace wheel; stunningly beautiful, great spinner, seldom re-sold.

I love this stuff



Ever notice there are Lazy Kates and Lazy Susans, but no Lazy Bobs or Trevs!



Restored Little Peggy flyer and bobbin detail. Note leather bearing!





I spent a happy hour working out what went where, with what

Knox suspects it is the work of a gifted woodworker who didn't really understand spinning, and who more or less copied a Rappard

pieces that, if they are present, add desirability. Firstly, you can never have enough bobbins — although new ones are available for Ashford, Majacraft, and the like.

Also useful — although easily constructed — is a niddy-noddy: a cross-frame to carry yarn. The last thing to look for — again, easy enough to build — is a Lazy Kate, otherwise describable as a small creel. Ever notice there are Lazy Kates and Lazy Susans, but no Lazy Bobs or Trevs! From a Lazy Kate, multiple-spun yarns can be fed onto a fresh spinning bobbin, being reverse-twisted together as they go.

There is no 'perfect wheel', although I suspect the big Grace wheel goes close. In an ideal world, sealed ball-race bearings impart less friction than wood, leather, or plastic bushing — but they require more-accurate alignment. Pretty can equal flimsy; solid can equal heavy, and so on.

Before buying, make sure the wheel isn't slipping on its axle — although the average sheddie would probably just find that an intriguing challenge. Sun-warped wheels are common, but

never unfixable. At current prices, finding you've made a less-than-perfect call is not the end of the world; we bought our fifth wheel — a '70s kitset Ashford clone — because we wanted the bobbins, and the wheel was cheap because it was covered in what appeared to be coagulated beeswax. We cleaned it up and donated it as a fundraiser.

Sheddie heaven

Recently, I stripped down our third wheel — that Rappard Little Peggy — and, if there's a more satisfying way to spend a rainy afternoon in the shed than giving new life to old wood, I've forgotten it. My hinge-and-adjustment-screw 'fix' of the tensioning on number four — the Norwegian-style wheel of no determined parentage — was equally satisfying. It also led to a chuckle; reading the Knox book, I came across a Mr JW Graham, of Ōkaihau, who built at least 65 wheels during WWII, and blow me down, he'd done the same thing. Great minds!

Where to from here?

For those of us with tinkering mindsets, adapting a bike wheel or building a plywood two-treadler might be an intriguing idea, but we'd just be reinventing the wheel for the fun of it. There are a lot of good and potentially good wheels still being traded in New Zealand. They tend to wear out more slowly than a lot of other things, and refurbishment is in easy-DIY territory, with many parts interchangeable. Parts for the common makes are often still available new, and supporting facilities, such as Tally Ho Woolcarders*, are still around.

I'm one of those who is a sucker for a spoked wheel — I just like looking at them — and I think the large Mecchia is to die for. The Grace wheels, meticulously engineered and crafted by Mike Keeves in Wakefield, prove that spokeless wheels can be timelessly beautiful, too. Aesthetics aside, this is a technology that deserves to be kept going in its own right. There are many worse ways to spend an evening than in bringing an old spinning wheel back from the brink.

My thanks to Mary Knox for her assistance, comments, and patience. Her book is out of print, but her website has it all and more: <https://nzspinningwheelsinfo.wordpress.com>

Thanks also to Richard and Amanda for letting us view the Rappard site.

*<https://www.needleandhook.co.nz/blogs/kerryns-journal/road-trip-to-the-local-wool-carders-tally-ho> 📖

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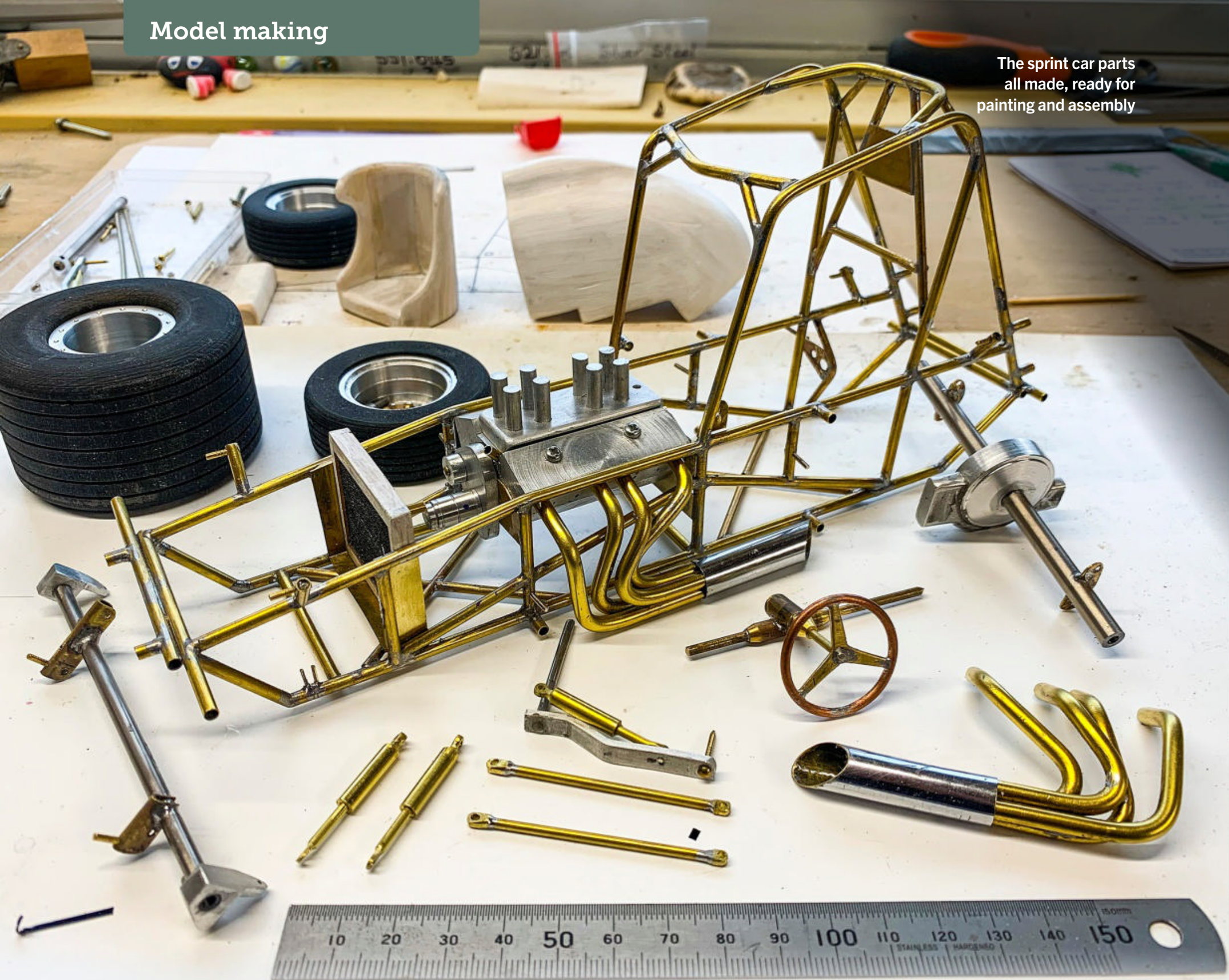


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AUTOMATA IN MINIATURE

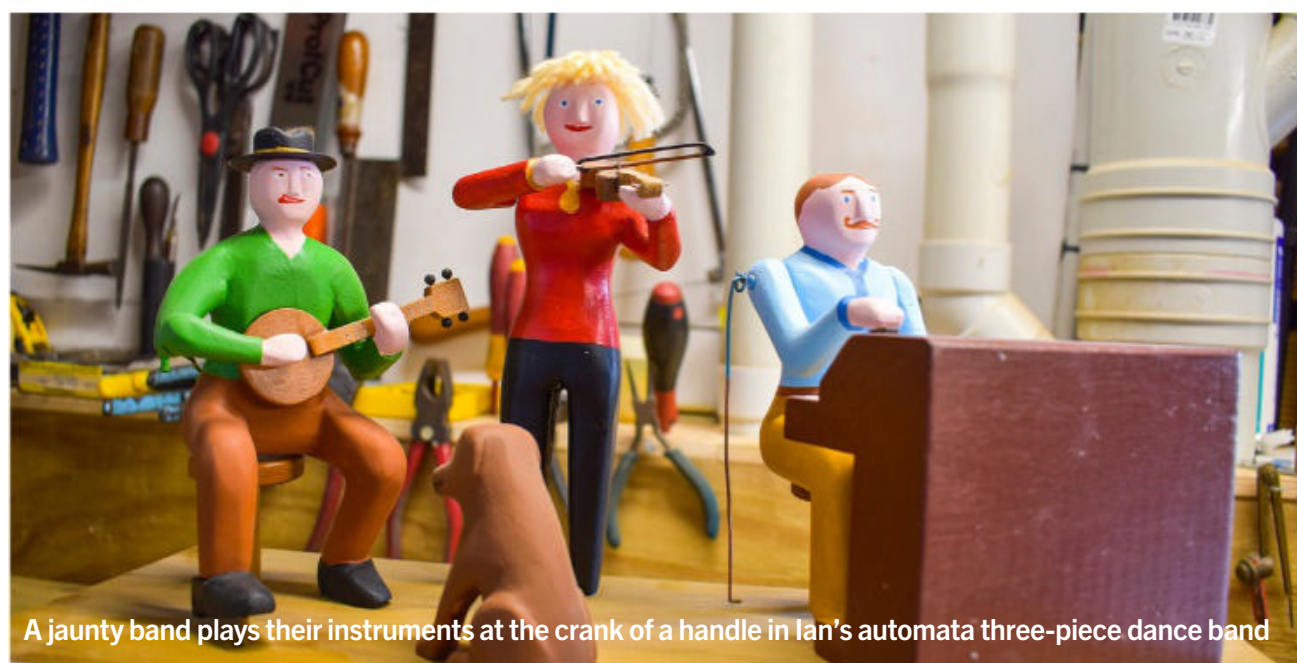
From a kaleidoscope to a miniature band worked in wood to tools carved in bone, Ian Roberts has created them all — and he's constantly seeking inspiration for new challenges

By Vicki Price
Photographs: Vicki Price and Ian Roberts

The man's arms move up and down, hammering out a tune on his piano. He is accompanied by a woman, sawing away at a fiddle, while a man in green with a fedora hat sits strumming a banjo. These wooden figures are brought to life by the turn of a handle. The whole band would fit in a shoebox. It is a delightful thing, a mesmerising, sort of alive, thing.

"It's not so much the band that appeals to me," says creator Ian Roberts. "It's the mechanical part of the thing — getting it all to go, with hands and levers and things."

Like plenty of sheddies, Ian enjoyed the lockdowns more than most. Upstairs, wife Carol would stamp on the bathroom floor when the jug had boiled for morning tea and, like clockwork,

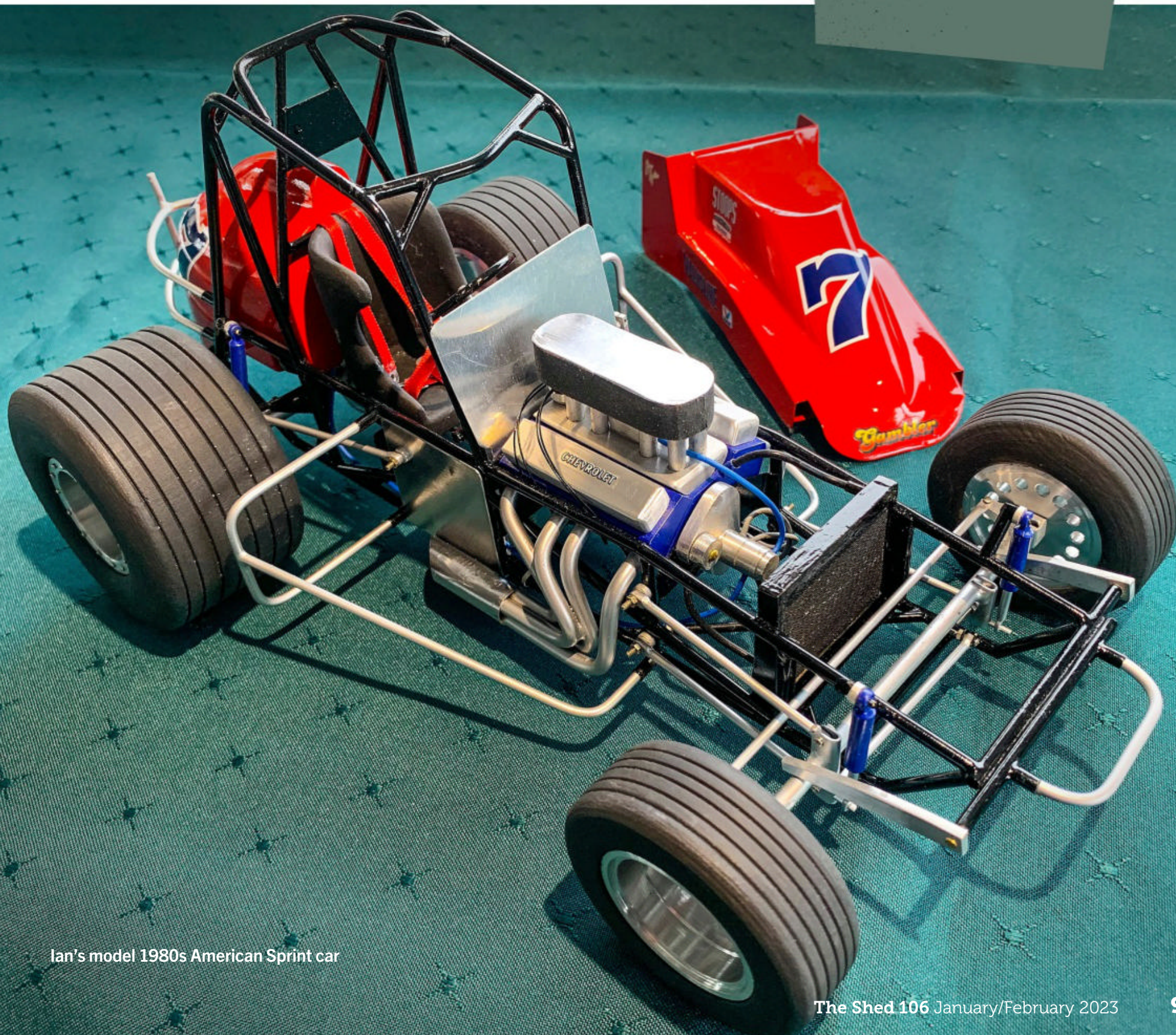


A jaunty band plays their instruments at the crank of a handle in Ian's automata three-piece dance band

Ian would emerge from his tiny shed beneath the house for a cuppa.

Ian explains he's only been retired for a few years, so is relishing all this time to devote to tinkering on tiny automata projects. After finishing 20 years of working often 12-hour days in his electrical business in Hawera, he was now free to play. But first, he and Carol took some time out. ►

"Like plenty of sheddies, Ian enjoyed the lockdowns more than most"



Ian's model 1980s American Sprint car



Ian personifies Kiwi ingenuity, figuring out how to make miniature things work. Always thinking ...

“Driftwood carving led to bone carving led to a phase of making kaleidoscopes led to race-car making, which led to automata of all descriptions”

The bus years

“It was 2000; I guess it was a middle-age crisis or something. We met these people who lived in a house bus — a real old gypsy house bus. I was quite intrigued, so we went down after tea one night and had a cup of coffee. They were selling their bus.”

When Ian and Carol came home, there was one thing firmly on Ian’s mind.

“I said to Carol, ‘We should buy that and bugger off.’”

Happy times followed as the pair meandered around the country,

A machine Ian designed and built in order to make marbles roll uphill, because, well, why shouldn’t they?



rambling down unlikely roads to see where they led, and picking up work here and there. Wherever they parked, Ian was able to indulge his interest in making things with his hands — tiny things. Driftwood carving led to bone carving led to a phase of making kaleidoscopes led to race-car making, which led to automata of all descriptions. In a bus, a hobby this size is welcome.

Wonder Man

“I’m like ‘Wonder Man’; one day I’m bone carving and then I get an idea and I go off and do that,” Ian says.

After crafting a wooden cell phone holder — named Boris — for Carol, Ian was inspired to make one for himself, with improvements. He made his one a car.



Boris the cell-phone holder was an invention for wife Carol, which naturally led to other cell-phone holders



A working crescent and pair of scissors Ian carved from wood

“Then a friend bought a Camaro, so I made a Camaro stand for him. Soon after, he sold his Camaro and bought a Mustang.”

Of course, Ian then made him a Mustang phone stand.

Ian’s next project stemmed from a desire to make marbles roll uphill. The wooden steps are lifted by means of cams and a crank handle. Ian saw the concept somewhere for something else, and worked out a version for his marbles.

“I just started; cut things out and played around with it and built it from there.”

Ian says it’s really the challenge of working something out that drives him.

“The challenge is to get something to work. Now I’ve made it, well ... you know. There are all sorts of crazy things going on.”

Things get smaller

When Ian and Carol lived in the house bus, Ian was painting rocks and selling them at markets. However, many other people started doing it so there was no money in it, he says. Then someone held a photographic competition of miniatures.

“I’m a biker, I thought I’d build some push bikes,” Ian says.

The result is two bicycles standing side by side — on a bottle lid!



These two tiny, really tiny bicycles stand on a bottle-lid



Turn this handle and birds will fly and swoop

While there was a dearth of tools in the bus, there was no shortage of creativity. It was while living in the bus on an East Coast beach — “back in the days when you could just drive up to a beach and do that” — that Ian began carving driftwood into various things. He has also discovered that basswood is easy to carve and has a smooth finish. He has made wooden teddy bears and tools, including a pair of full-sized wooden scissors.

The couple now live in a house in New Plymouth and Ian has a shed plus a small workshop beneath the house. Both are very neatly organised — one of the beauties of making miniatures is that the stash of materials doesn’t need much space. ►



Ian keeps an orderly shed, with neatly stacked and labelled storage boxes on his shelves



Contemporary bone carving

Next, Ian set to carving bone, but not in traditional designs so often associated with the craft. He enjoyed making wooden tools and saw potential in carving some out of bone.

“Then I got carried away,” he says, “and tried to see how small I could make them.”

He made a pair of bone scissors that sit in their own box and a toolbox with the tools to go in it.

Sitting neatly within two slide-out drawers and under the opening lid, there’s a handsaw — complete with wooden handle and teeth — multigrips, tin snips, a set of open-ended spanners, a hammer, a chisel, a finishing handsaw, a square, two G-clamps, a crescent, and a hacksaw. The whole set can sit in the palm of your hand.

Miniature G-clamps

Inspiration comes to Ian from many places; one resulted from a conversation with fellow bone carver and mentor, Mike Brown of Tongaporutu.

“He runs bone-carving symposiums and he gets me to go up and give him a hand. One time he said, ‘When you come next time, you’d better bring your G-clamp, ’cos I haven’t got enough.’ So, I thought, ‘I’ll fix you,’ and I made some G-clamps and took them up, but he didn’t think they’d do the job.”

Ian’s clamps were about a centimetre long.

Ian finds beef cannon bone good to use, although the curves of the bone mean the shapes that can be made from it are limited. You can’t make big flat surfaces, for example, but Ian says he prefers to work with bone rather than wood.

“I like bone. I’m not a good



The Mechanical Turk

A figure in rich Turkish dress sits behind a large box. He raises a stiff arm, removes a smoking pipe from his left hand, and moves a chess piece across the board in front of him.

His opponent, seated opposite, hears the whirr of wheels turning within the Turk like an eerie life force. Any false move made by the opponent and the figure shakes his head solemnly and assumes the next turn at the game.

Every 10 to 12 moves, the Turk is wound up again, like a clock, to continue the match in front of amazed onlookers.

This match was noted in Chambers’s Edinburgh Journal in 1835, but the famous ‘Mechanical Turk’, as it was known, had been wowing audiences since 1770. Widely toured around Europe for nearly 84 years, this marvellous invention was promoted as an automaton by its inventor but was later revealed to be somewhat of a hoax.

The illusion of it was that a small man slipped inside the trick box — previously opened to show the audience the workings and demonstrate there couldn’t possibly be room for someone inside — and not only outplayed many skilled chess players, but also answered many questions put to the ‘Turk’, in several languages.

The mystique of this so-called automaton was such that generations of people throughout Europe and America tried to deduce how it worked. Many articles and even books were produced, but it wasn’t until it was destroyed in a fire that a previous operator gave up the inside knowledge.

A room with a view, Ian's compact workshop he built under the house serves it's purpose well

woodworker, because wood pisses me off. You get nearly finished and then you take a little sliver off, or it splits, whereas bone is like soft metal and you've got control over what you're doing. I get annoyed with wood."

Eclectic creations

Ian doesn't have a lot of his creations around his home, as he gives them away.

"Well, you know, you do it and it lies around here."

However, he hopes some of his creations will become a family heirloom later. One of these is a boat hanging on the wall.

"I looked at a book and it had these neat little British fishing boats in it. I thought, 'Gee, I'd like to build one because they have laminated sides.' So, I started making this in the workshop. Then I thought, 'What's the point in me building a little boat?'"

Ian decided to leave one side off the boat, so he could put little components inside and would be able to see them. However, when it was all built, the inside was quite dark, so Ian installed tiny LED lights.

"It ended up hanging on the wall; it's not good for anything."

None of Ian's creations is money making.

"People produce things, and they



make money. I just do things because it's a challenge and it amuses me."

Whether it's creating, racing cars, or eating a new food, Ian's philosophy is to try anything once.

"If you don't like it, you don't have to do it again, but if you don't try it, you don't know. There are a few things I've tried that I won't do again" he adds.

Inspirational dad

Ian's father, Noel Roberts, was a shed tinkerer, too.

"However, when it was all built, the inside was quite dark, so Ian installed tiny LED lights"

"My father was probably better than me," reckons Ian.

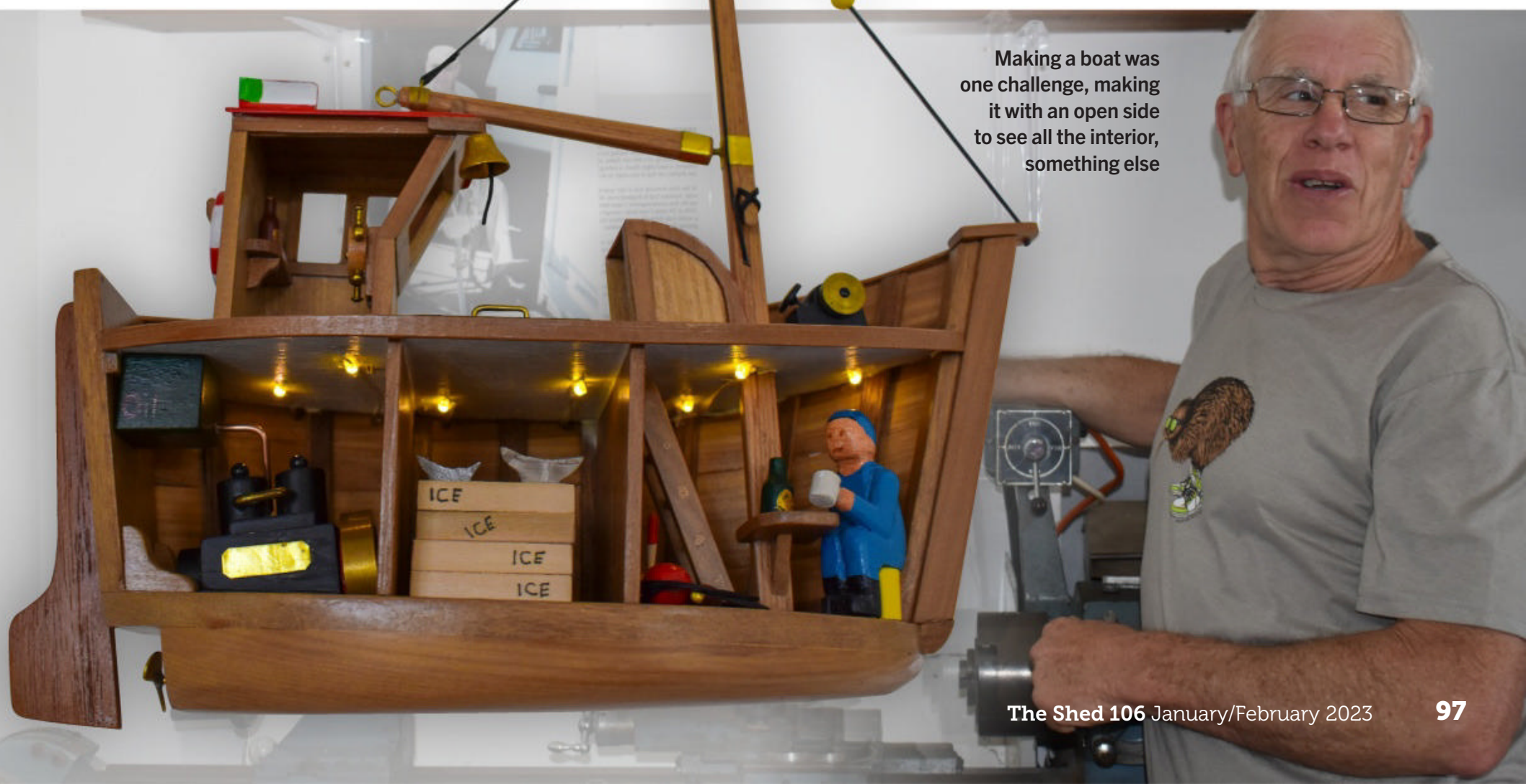
When Noel was a teenager, he was into the popular hobby of the time, fretwork. He won a couple of competitions, and for one he received a prize treadle fretsaw.

An intricate steam train model Noel made is proudly displayed in a glass case in Ian's shed. As boys, Ian and his brother were not allowed to touch the train on which his dad had worked so hard. It sat for years in its glass case in the lounge.

"Every year, he would religiously take it out of the cabinet and turn it around, so that it wouldn't fade. We were never allowed to touch it. When he died and I inherited it, the first thing I did was open it up, take it out of the cabinet, and play with it!" Ian announces.

His father rode his motorbike for 75 years, and was still creating things in his 90s. One of his last creations was a model castle with Chinese-style roof panels.

Noel had a bike shop in Hawera, and Ian would fix people's bikes when they were brought in for repair. As Ian got



Making a boat was one challenge, making it with an open side to see all the interior, something else



The workings of Ian's automata three piece dance band

older, he got into modelling — there was a good modeller's club in Hawera. Ian remembers lots of fun time spent with model aeroplanes, then boats on the lake at King Edward Park, and then slot cars.

"We always played with something," he explains.

Ian and his mates tried to fit lawnmower engines onto push-bikes, and generally had a tinkering sort of childhood.

Under-house workshop

It's time to go under the house, the place where a lot of miniature magic happens. When Ian first saw the space under the

house, he instantly saw the potential.

"It had these boards on the outside and it goes right around. I said, 'What a waste of space', so I put a floor in, fibrolite on the outside, and painted it, put a window in, and got myself a workshop."

He also bought and installed a dust extractor.

Here, cannibalised parts of photocopiers, olive oil tins, biros, brass rods, and paint get transformed into automata of many kinds.

Speedway thrills

As a grown-up sheddie, Ian became heavily involved in motor racing and has

The mysteries of automata

Throughout history and cultures, automata have exuded mysterious power, especially throughout European mediaeval Christianity. Pilgrims came from far and wide to pray to a statue of the Virgin Mary, seeking a miracle. The statue would on occasion gently nod its head to a praying worshipper. News of the sensation would bring ever more people to its presence, in the hope they, too, would be granted a miracle. It wasn't until many years later that it was discovered that it was nuns, hidden beneath the statue's clothing, who pulled ropes to make the head move, thus creating the illusion of a miracle.

Other statues of Christianity also performed 'miracles'. In one, small fish were put in a vessel behind the statue's eyes. Their movement would create droplets of water that merged and ran like tears down the statue's face.

While the Turk chess player captured the minds and imaginations of many throughout the 18th century, a later and real automaton, the celebrated 'duck of Vaucanson' was held as being superior to even the great Turk.

built a few racing cars over the years. Eventually, these became Formula Fords.

"I got into single-seaters in the end, because I got sick of lifting up the bonnet and climbing underneath cars."

Now, he sticks to making them in miniature.

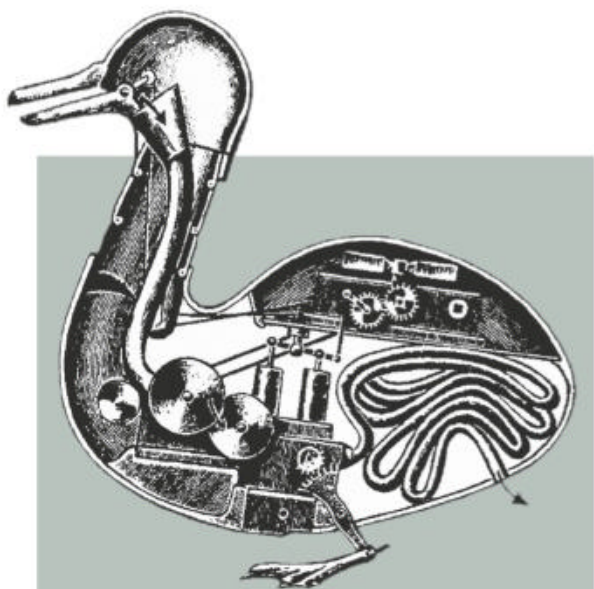
Ian shows us the speedway car sitting on the workbench. It has a tiny seatbelt, fuel tank on the side, an oil tank with oil filter, and a couple of blue fuel lines that connect to a tiny fuel pump and fuel injector.

"The little black thing is supposed to be the battery with the electronic ignition," he says.

It's the details that make these tiny works of art so impressive. This car is a replica of an historic car and has torsion bars instead of springs. Ian says you don't need a lot of suspension in these cars, because "you go sideways most of the time". Another one is a chain-driven 1908 Mercedes Grand Prix car.



Ian's new toy — a miniature lathe that he says is great for making tiny parts



If it looks like a duck ...

Created in France during the reign of Louis XV, the duck looked and acted just like a real bird, according to reports. Wikipedia's page says it quacked, muddied the water with its bill, and ate and drank with such realistic accuracy that, when grains of corn were cast in front of it, it would stretch out its neck, pick them up, and swallow them.

Then, by some 'artificial chemical process', the food was discharged from its bowels in a digested fashion. It was later discovered that fake faeces were preloaded ready for discharge and not digested at all by the mechanical duck. However, it looked impressive and has influenced inventors and artists ever since.

Other well-known automata, clocks — named 'Sing Songs' by the Chinese — were reputedly the only things that country was interested in buying from early Europe. The Chinese had invented the first mechanical clock during the Song Dynasty, in 976, in order to tell time more accurately than they could with the water and sun clocks of the day.

Tiny wheels = tinier spokes = tiniest holes

The cars have wooden spoke wheels, but Ian's next project is to build wire-spoked wheels. That would mean about 60 spokes — quite a challenge in a miniature car. While considering this, Ian thought about how motorbike wheels are slightly bigger and you only need two of them.

When photographing a friend's speedway bikes, he noticed the front wheel was slightly bigger than the back, so he'll still have to make two totally different wheels.

Albeit each wheel has just 32 spokes, each spoke is 0.4 of a millimetre thick. Ian has a lot of patience, but admits he is struggling in the eyesight department as he gets older.

Tiny holes require tiny tools. Happily, Ian's dentist friend's father was a dental technician, and Ian has acquired some of his tools. He finds small clamps especially useful.

Next time we visit Ian, he shows us the spokes he's made for the speedway bike. The rim is made from aluminium tubing, with holes drilled .45mm.

"It was hard to find a chuck small enough," he says. "When you're soldering stuff like this, you've got to be careful."

He points to a brass tube and explains that, when you solder at one end and then the other, the heat runs along and melts the solder you've already done. Clamping each end off prevents the heat from undoing his work.

Useful stuff

Much of the metal used in Ian's car creations comes from olive oil tins, a ready supply of which he gets from a restaurant in town. Once the paint layer is sanded off, the tin is suitable to be soldered.

"It's beautiful 'cos it's already tinned. It's easy to solder and easy to bend. I have a stockpile. I'm a hoarder; if I see bits of old brass or old clocks or anything, I pick them up. I've got a storage shed I've had for years, so most of the stuff is recycled."

Even an old photocopier contains useful bits. "You wouldn't believe how much stuff is in a photocopier," Ian says.

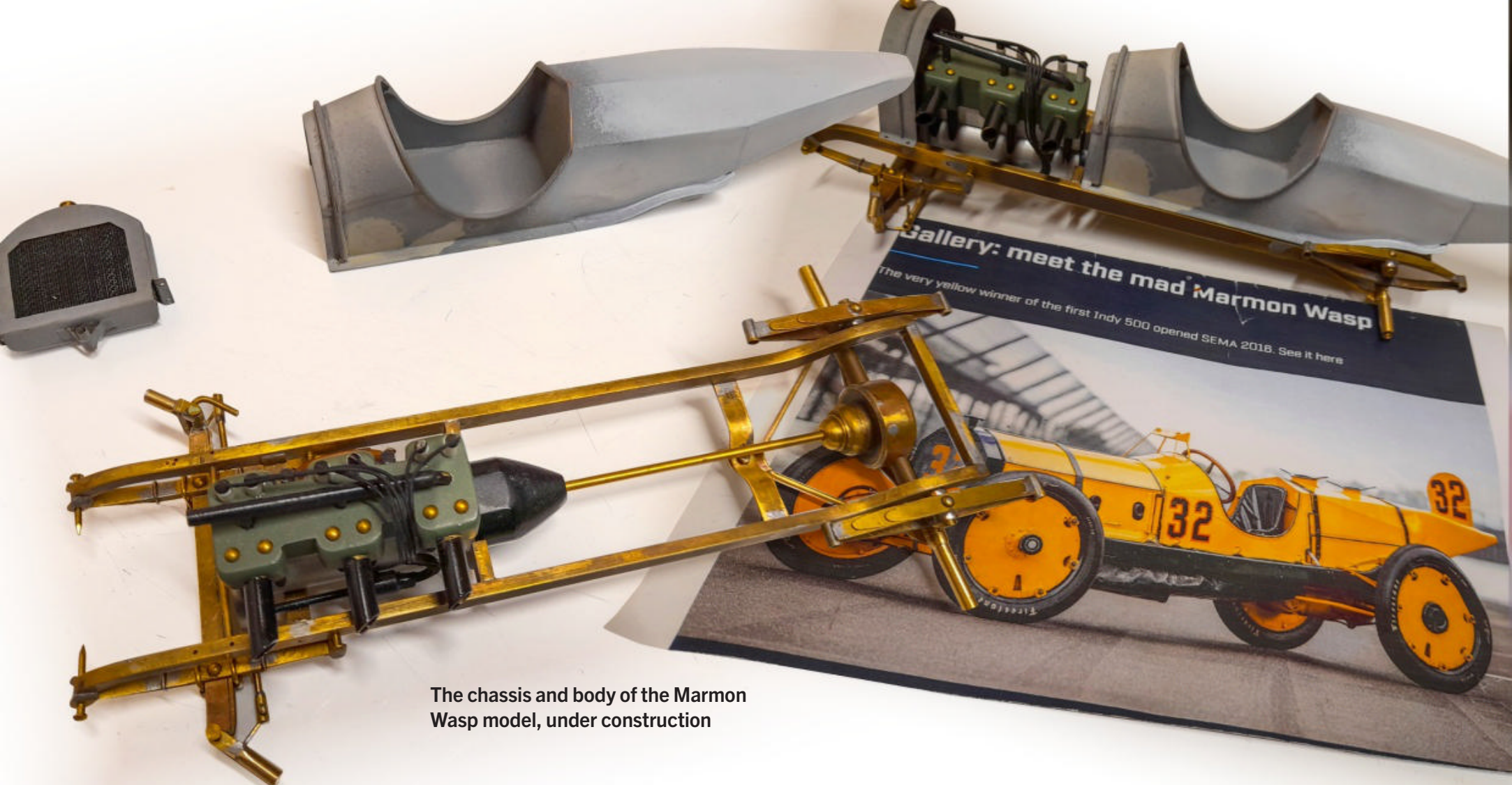
Ian points to a spark plug and explains it's the metal tube out of an old pen. ►

"I'm a hoarder; if I see bits of old brass or old clocks or anything, I pick them up"

Vintage forks and spoons to make bracelets from



Ian carved this chain from bone, having learned techniques from a carver he met in America, named Wild Bill Cody



The chassis and body of the Marmon Wasp model, under construction

Marmon wasp

The Marmon Wasp replica is Ian's latest project. The original full-sized car was the first in the world to be built with a rear-vision mirror. The bright yellow car had a pointed end and was a sensation in 1911, after winning the first Indianapolis 500 race.

It was while flipping through a magazine that Ian spotted the car, and the colour appealed to him right away — as well as the wheels, being less complex to make than the spoked bike wheels were. He found a plan and, after adjusting the scale, began building it.

Made from metal, the tiny car has a part made from one of Ian's lucky finds: a small filter he discovered in the middle of that old photocopier. Using a jeweller's saw, he cut metal out for the frame and the thing turned out just like a radiator in miniature.

"It's pretty time-consuming; you wouldn't want to make a living out of it," Ian admits.

The springs are hand cut, using tin snips. To make them all the same takes plenty of time. They are soldered together, and have tiny pivots made for them. It's fiddly work — "but that's the part that I enjoy," says Ian.



Ian at work on his sander



The finished Marmon Wasp model in all its yellow glory

The chassis of the Marmon Wasp took some fine handling to create

Keep everything

Ian keeps most of his offcuts as they may be useful. Often, they turn out to be just the right thing for a project.

“I don’t throw anything out. Everything’s got a use — credit cards or whatever.”

Ian indicates a plastic tray full of leftover bits from his creations. He uses a lot of tubes, which he’s discovered he can buy from Mitre 10. For the roll cage on the race car, he used a solid rod, as

it’s easier to bend than tubing.

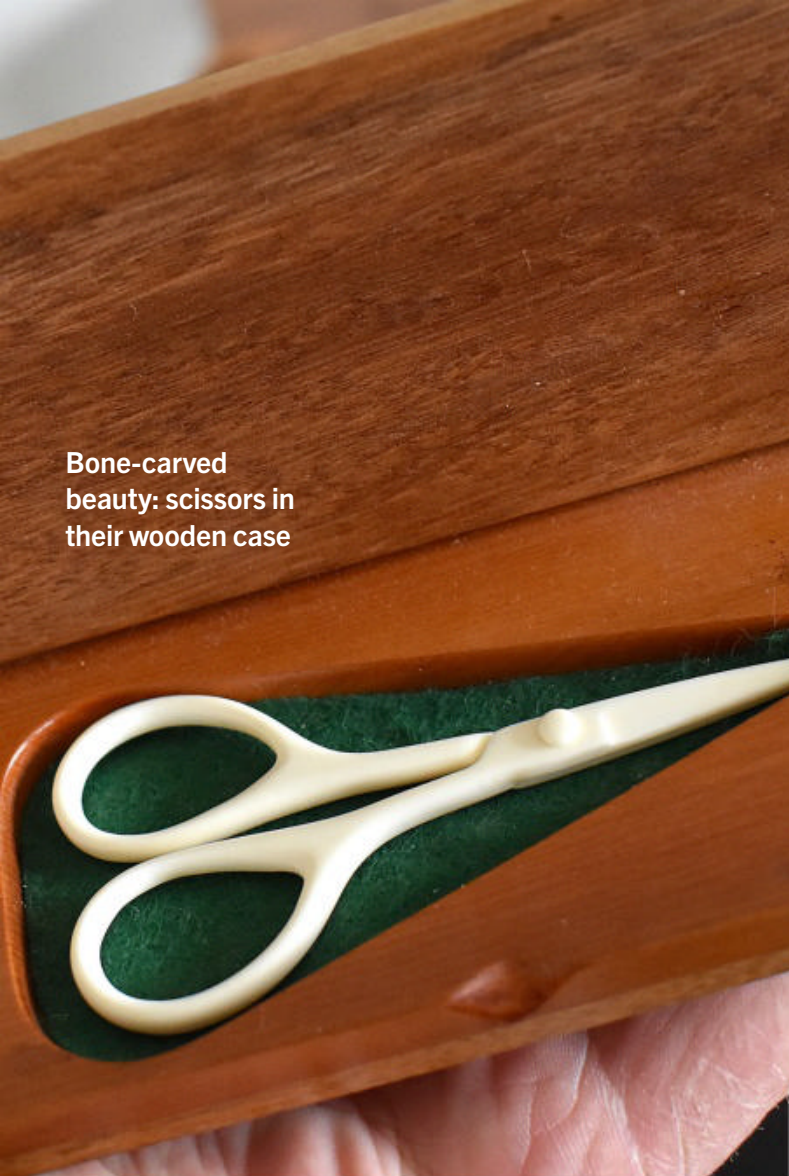
Other items in Ian’s stash also hold potential. A box of old forks is waiting to be bent — once Ian perfects the art — to make bracelets. In searching for these in op shops, Ian discovered the old silver ones are sold as antiques, with a higher

price tag. However, while on holiday somewhere out back near the Murray River in Australia, Ian found them for 20 cents each in an op shop. He left with 300 forks. This made for heavy luggage, so the haul had to be farmed out among friends for the flight home. ►

“Ian keeps most of his offcuts as they may be useful. Often they turn out to be just the right thing for a project”

The radiator was a lucky find; it is made from a piece from the inner workings of a photocopier

No car is complete without a steering wheel



Bone-carved beauty: scissors in their wooden case

Having been a racecar driver himself, Ian has enjoyed constructing cars in miniature



Wild Bill Cody

Ian enjoys the challenge of learning something new. While visiting a craft fair in America, he met a chap named Wild Bill Cody — long story, his name!

“He was a knife maker, doing bone carving on antlers. [Using] a bone saw, they cut the shape out but cut it on an angle. Normally, if you cut the shape out, you end up with a gap of the saw blade and the thing drops through, but if you cut it on a slight angle, all the way around, it’ll push through and jam, so you then sand the brown off the outside and can push it through to the outside and it sticks out like 3D. You have to keep moving the workpiece around towards the saw as you cut, to keep the same angle all the way around. It’s actually quite hard to do. I perfected that, and have never done it again.”



A very useful ingredient in Ian’s creations is tin from olive oil tins he sources from a local restaurant

New adventures

Moving on to the topic of new learning adventures, Ian has a selection of projects on the go, including flapping birds, model aeroplanes — which his grandson flies down into the garden gully behind the house — and a golfing model.

He has the beginnings of a wheel travelling along a wire, with a counterweight below, inspired by a circus performer riding a unicycle along a tightrope. There are ongoing experiments, including making spoons into fish ... and so the big ideas and miniscule creations flow on. 📁



The completed model of the Denco TQ Midget

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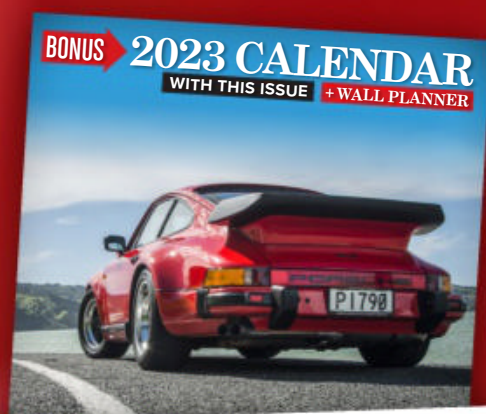
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A NEW KIND OF SAVIOUR?

EVERY TIME I SEE AN ADULT ON A BICYCLE, I NO LONGER DESPAIR FOR THE FUTURE OF THE HUMAN RACE — HG WELLS

By Mark Seek

www.seekandthrive.com

Queen wrote several songs about them; Jesse James was inspired by riding them, and began West Coast Choppers; some people wear a yellow jersey whilst riding one in front of millions of viewers; others ride one that has only one wheel; they come in a variety of shapes, sizes, and colours, and are priced accordingly. Let's talk bicycles.

Bicycles have long held a fascination for me. Bicycles have the ability not only to give us freedom but also to encourage self-reliance and responsibility. I recall at the age of 10 riding my bicycle to a favourite fishing spot. Mum would put together a substantial lunch: doorstep cheese sandwiches, a packet of crisps, an apple, and chocolate cake. Dad would throw me half a crown to buy a bottle of fizz.

"Now don't get the boxes mixed up," my mother would remind me with a cheeky look — I had another Tupperware container full of fresh maggots for bait.

Gone fishin'

Peddling out of the housing estate, fishing rod strapped to the handlebars, I tasted freedom for the very first time and I suddenly felt very grown up. My destination seemed like a long way; riding country lanes dotted with hedgerows I recall only having to cross one major road, the Bath Chippenham one. This required pedalling like mad in first then slipping into third and keeping my



head down until I reached the safety of the village sign.

Laycock is a picturesque English village with a very narrow bridge intended for small carts and livestock. I would dangle my fishing line from the bridge with a freshly baited hook and a colourful float intended for the river pike.

My trusty steed, made up from random parts, was adorned with a distinctive blue-glitter banana seat and ape hangers — very cool in 1970. It had back pedal brakes — very rare in England. I held the record for the longest skid on that bike — for a few

summers, anyway; Raleigh Twentys, eat my dust!

Saved by a bicycle

Fast forward to 2022 and I am having my morning coffee staring at my restored Raleigh Chopper perched on its side stand in the corner of the dining room.

Now, I am not a very scholarly guy, and I have the attention span of a small child, but I have enjoyed the series of TED talks on YouTube over the past months. By the process of narratives, I find myself being inspired but often



“I held the record for the longest skid on that bike — for a few summers, anyway; Raleigh Twentys, eat my dust!”

challenged. You see, education comes in many forms. One bloke’s story grabbed me by the scruff of the neck: it was titled Bicycles ‘saved’ my life. In my experience my bicycles have never saved my life; mostly they tried to kill me or at least cause injury.

I thought, ‘Perhaps this fellow has never been winded as his crown jewels met the cross bar at 40kph, or perhaps his saddle is made of some new bouncy fabric invented by the bloke who makes those horribly expensive electric cars. Nah, surely no bicycle can save you.’

Just give me a bike

Intrigued — and mostly convinced he would be a liar and a fraudster — I watched his performance keenly. Anthony Desnick turned out to be American, and used the word ‘saved’ more times than Bishop Tamaki on a Sunday.

Let me introduce this concept of bikes and the ability to bring you into the light! Anthony would suggest riding bicycles can be healthy for us and our neighbourhoods. He described how his health deteriorated due to a terminal illness and his reaction to this was,

“I went for a simple bike ride around the block.” This ride around the block obviously increased as he felt the benefits of cycling very much alive! Anthony now heads up a new initiative in the state of Minnesota. His title is Director for Development and New Projects with Nice Ride Minnesota.

Of course, most of us are aware that any form of exercise is good for us, and certainly bicycles have come a long



“Bicycles have the ability not only to give us freedom but also to encourage self-reliance and responsibility”

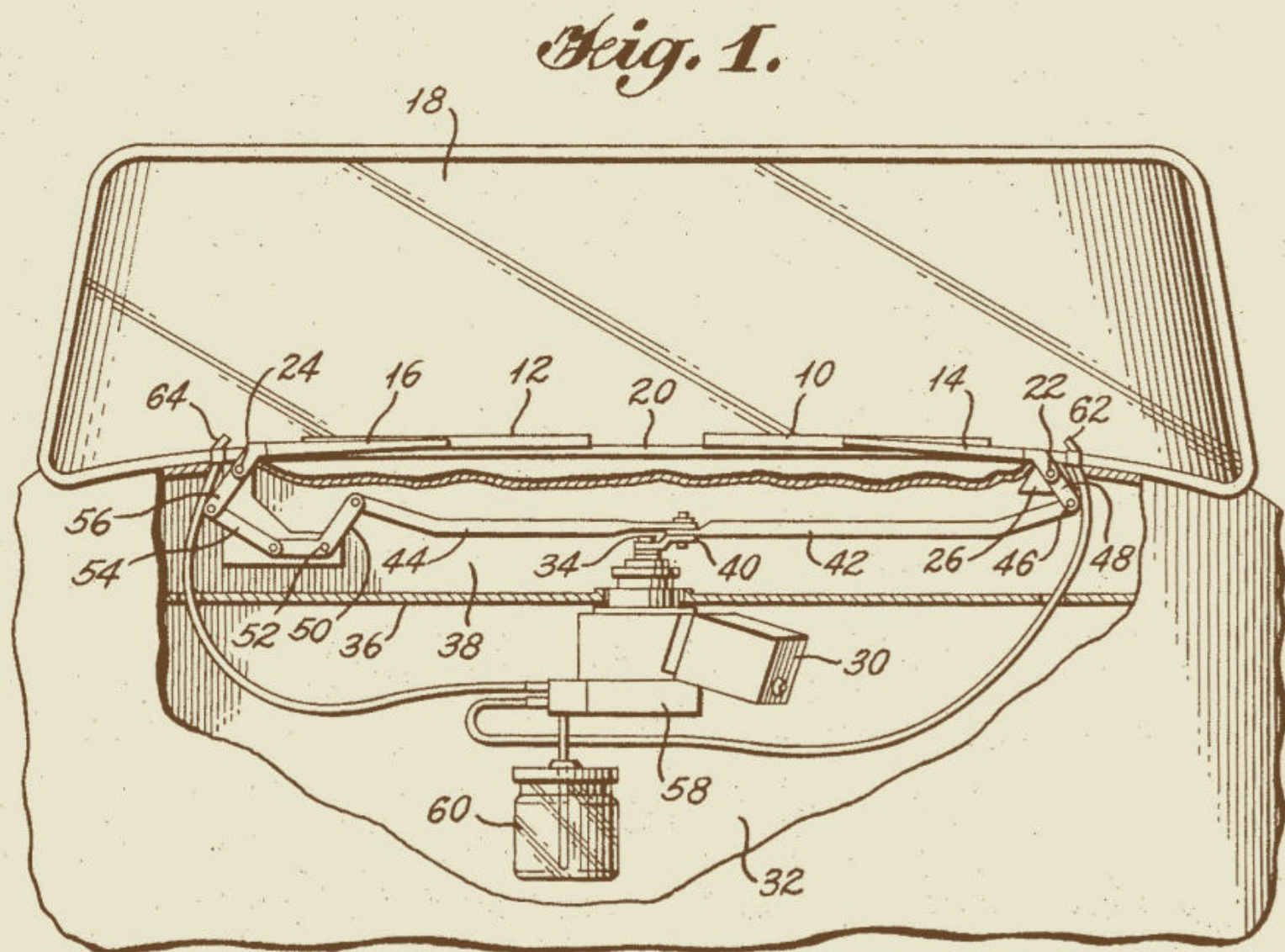
way technically, mechanically, and aesthetically, but buying one, especially an e-bike, can be a bit daunting. There are blokes who can give you all the up-to-date mumbo-jumbo as well as the lowdown on all the trails and cycle paths specifically for those who have thrown their car keys in the river and decided to live in tiny houses. However, the average person will just want something that doesn’t draw too much attention and will be happy to wear sensible shoes and ordinary clothes whilst pedalling along in complete bliss.

Whatever way you tackle this phenomenon, remember that you are doing something that could save your life. So, give it a go; it is just like falling off a horse — but that’s a story for another day. Remember a helmet, a bottle of H₂O, and some sunscreen for the pale legs. I will see you out there sometime! Oh, in case you are interested: the pikes in the stream were elusive creatures, but the bicycle ride was always tremendous.

FTW (forever two wheels). 🚲



PATENT THAT INVENTION!



One of the drawings for Bob Kearn's 1964 US patent application for an intermittent car windscreen wiper mechanism

A few tips for those who believe they may have invented the world's next great must-have

By Ritchie Wilson

You've laboured long in the shed or had a supernova of inspiration, and have come up with a widget that is going to make your fortune. It is innovative, transformational and, best of all, highly desirable.

Now comes the difficult part. You are naturally reluctant to reveal any details to anyone, being understandably fearful that your invention will, as so often happens, be stolen. What to do?

If the widget is granted a patent by

the government, no one else can make and sell it without your permission and without paying an agreed payment per item, called a royalty. If you wish to gain intellectual protection (IP) in the form of a patent, you will probably have to consult — and pay — a patent attorney. If you want an international tool company to make your widget one of its products, you will have to have obtained a patent before it will even consider it.

An instant hit

The founder of the Australian electrical equipment manufacturer Kambrook, Frank Bannigan, developed the first power board for his own use in the rented shed in which he was working on new home appliances. The power board has several electrical sockets joined together. When put into production, his power board was an immediate hit and was the foundation of Kambrook's success, but the idea wasn't protected and other manufacturers swiftly copied it.

Bannigan says, "I've probably lost millions of dollars in royalties alone. Whenever I go into a department store and see the wide range of power boards on offer, it haunts me."



It's easy to be wise after the event, but it is obvious that Kambrook should have filed a patent application for the power board before it went to market.

So, should you seek intellectual property protection for the results of your time in the shed? The answer is: it depends. There are several things to consider.

Is it a new idea — is it 'novel'? Or is it already known somewhere — is it 'prior art'?

Does it have an obvious end user? With the power board, that was everyone.

Can you afford the cost of gaining a patent, the cost of maintaining it year after year — called a renewal fee — and are you prepared to fight copyists in court?

Weird inventions

Often the idea is the result of an obvious need: 'Necessity is the mother of invention', after all. Patent attorneys have recalled to me times they have expressed scepticism at some eventually successful idea brought to them for consideration, with the inventors assuring them that they are very familiar with potential end users who would buy it. However, even a cursory look at the New Zealand patents listed online will reveal the weirdness of many. You may well ask: "Who would ever use that?"

Which brings us to cost — someone has paid significant money to be granted a patent on an idea that may have been trivial or of use to a vanishingly small market. To take one example among very many: a better way of constructing a log

cabin. Really? Even if the idea swept the log cabin market, would it have generated royalties sufficient to cover the cost of the patent application? Would large numbers of log cabin constructors be lining up to pay a royalty to use the new method? Or would the inventor have been better to have revealed the idea to a wide audience, gaining them an enhanced reputation, and perhaps helping themselves to get a higher paying job? No outlay and a better return, perhaps.

Is this a first?

If Kambrook had applied for IP protection in the form of a patent or design registration, a search would have been conducted to ensure that the idea wasn't already the property of someone

else; that the product was novel. If subsequent to the granting of a patent, a competitor came up with evidence that very similar products were already being sold, Kambrook would have lost the protection of the patent.

In 1976, Sears in America claimed in court that the famous Workmate portable workbench wasn't a novel idea but was a modern version of a bookbinder's vice — see *The Shed*, issue 81, November–December 2018 — and hence not novel. Sears lost because the court ruled that the Workmate was more than a vice — the portable workbench aspect was fundamental — and the inventor's rights were upheld. Substantial damages were awarded.

Intermittent wipers

It was a similar, but more disturbing story with intermittent automobile windscreen wipers. In the early 1960s, the big car companies were working on intermittent windscreen wipers for use in light rain. The Ford Motor Company was testing a system that used an inlet-manifold vacuum to switch the wiper on and off, using a complex mechanism with many moving parts and multiple points of potential failure. Detroit local and university lecturer Bob Kearns independently came up with the electronic system universally used in cars today.

Kearns had only partial sight in one of his eyes — reportedly the result of an accident on his wedding night involving a champagne cork — and found driving

"I've probably lost millions of dollars in royalties alone. Whenever I go into a department store and see the wide range of power boards on offer, it haunts me"

Wiper inventor beats Ford in David vs. Goliath patent case

Inventor says carmakers stole 'blinking' wiper idea

Inventor suing Ford

Tweaks nose of auto giant

"I'm not in competition with the companies. All I'm trying to do is serve them."

— Robert Kearns, inventor

"When they offer you a settlement, they're really sending you to a park bench."

— Retired engineer and inventor Robert W. Kearns



Windscreen wipers in action in the movie 'Flash of Genius'



Bob Kearns in a happy moment

in the rain difficult. The intermittent windscreen wiper idea popped into his mind in 1962 while he was driving in the rain and, being an experienced electronic engineer, he was able to make a working prototype in short order.

Transistor switch

Kearns' idea was to use the recently invented transistor to switch current to the wiper's electric motor on and off. The transistor was switched on by the build-up of charge in a capacitor; the rate of build-up being controlled by a variable resistor — a device elegant in its simplicity and, with one moving part, unlikely to cause trouble over the vehicle's lifetime.

Kearns fitted his device to his Ford Galaxie and drove it over to Ford's Dearborn headquarters, which housed the company's engineering department. The Ford engineers swarmed over the car, were very impressed, and Kearns thought he was on the way to fame and fortune. He was granted a patent in 1967, and made plans to manufacture

and market the device to car companies.

When Ford told him it didn't, after all, want his wiper-control mechanism, he was stunned. In 1969, Ford cars were available with a new option — intermittent wipers. The wiper control mechanism contained a transistor, capacitor, and variable resistor. Ford's position seems to be that the idea was not in fact novel, but was the obvious next step in the existing technology, and so Kearns' patent was invalid.

"Bob Kearns independently came up with the electronic system universally used in cars today"

A flash of genius

Kearns would spend essentially the rest of his life fighting first Ford and then Chrysler in court, defending his patent. Most of his six children assisted him in his fight, and for the youngest it was the ever-present backdrop to their whole childhood and young adulthood.

Bob's wife left him and, after being shown Mercedes-Benz's version of the electronic intermittent wiper control in 1976, he had a breakdown. The court battles lasted decades, and Kearns and his son Dennis repeatedly had to represent themselves in court because of difficulties with their attorneys. Ford offered \$30 million, but Bob didn't want just money. What he wanted was the exclusive right to manufacture the wiper control.

In the end, Ford had to pay more than \$10 million for inadvertently infringing Kearns' patent, and Chrysler much more, but Kearns never felt he had received a fair deal.

The 2008 Hollywood movie *Flash of Genius*, directed by Marc Abraham and based on a 1993 New Yorker article by John Seabrook, tells this David and Goliath story. Kearns died in 2005 aged 77. His son, Dennis, is now a well-known lawyer.

Kiwi inventor

Back in the 1980s, Christchurch's Geoff Keller was a keen cyclist. He wanted a bicycle that, when disassembled, would fit inside a standard-sized backpack so he could take it with him on aeroplanes.

On reaching his destination, Keller would reassemble the bike and pedal off

on his travels. He studied the patents of other folding bicycles, such as the British Bickerton, and ensured that his design was sufficiently different, or novel, to be patentable, with a view to marketing the bike and the bag it was transported in. He made a variety of prototypes from aircraft grade aluminium, with 16-inch wheels, control cables that split in the middle, and a carefully engineered frame, which required only three tools to assemble and was very rigid in use.

Huge fees

The main pack was worn on the cyclist's back and detachable side-packs became saddlebags on the assembled bicycle. Even the unpainted prototypes created great interest, so Keller was encouraged to get engineering assessments and IP protection.

Today, Keller is a market manager and trader, but back in 1988 he was a Post Office engineer working in telephone exchanges earning, as he says, "regular money". Much of this money was spent securing patents for the collapsible bicycle he had designed and constructed. He has kept the many receipts for the fees he was charged through the process, and they add up to an eye-watering \$15,000 — a serious

Geoff Keller's NZ Patent 220883 for the Driftwood Hitch-cycle

"Even the unpainted prototypes created great interest"

amount of money today, let alone in 1988. More money was spent on engineering assessments.

A visit to Raleigh

Keller travelled in Australia, Asia, the Middle East, Ireland, and Britain on his patented collapsible bicycle. Towards the end of his stay in England, he went to Nottingham to show it to the Raleigh Company, which was then one of the largest bicycle manufacturers in the world. Its headquarters covered 40

Geoff Keller
— inventor
of the
Driftwood
Hitch-cycle



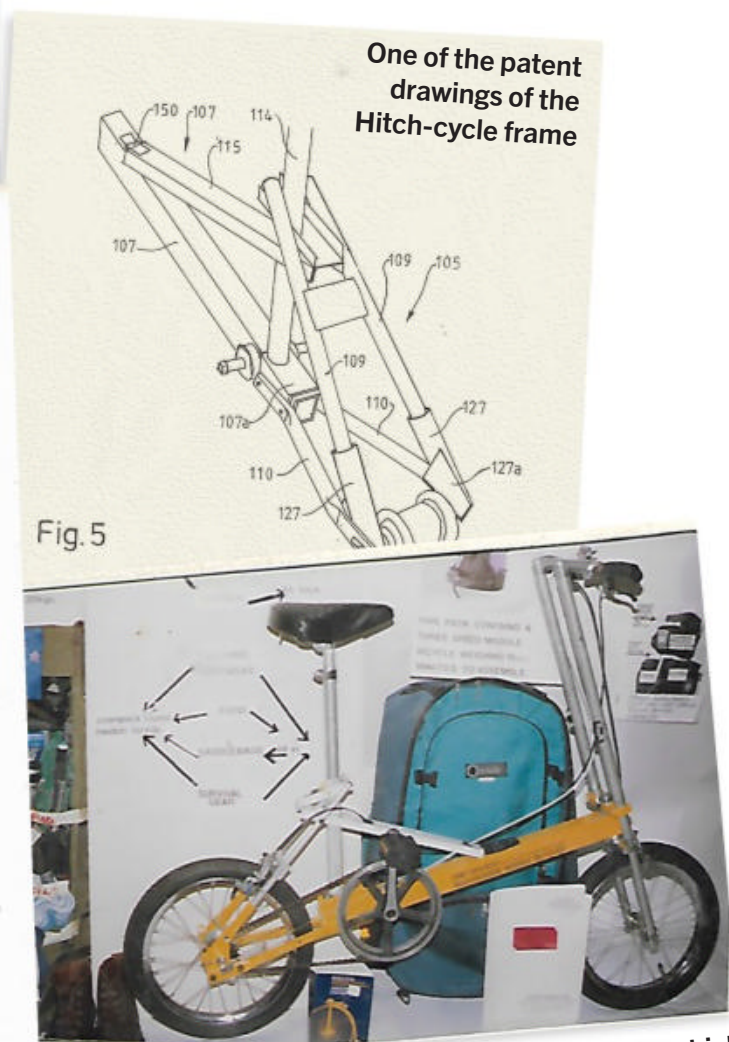
acres. He was politely received and told to leave the prototype in a special area, where it would be studied by the company engineers. This was one of the sharpest memories Keller has of his travels — leaving his lovingly constructed collapsible bicycle in a very long room lined on both sides by scores, perhaps hundreds, of prototypes awaiting evaluation.

Six weeks later, Keller was returning to New Zealand so he collected his machine from Raleigh. The technology of high-end bicycles had evolved and aluminium was no longer cutting edge.

New Zealand Patent No. 220883 has long since expired but Keller remains proud that he was granted it. He lists it on his business cards, along with the Registered Design number. He still follows developments in folding bicycles, has a large file of clippings on the subject, and has a new design for one he is experimenting with. He is still inventing — he calls it thinking — and showed me two examples of recent ideas: a solar-powered night light and an electrically heated aroma-therapy device.

The springless tramp

Professor Keith Alexander of the School of Engineering, University of Canterbury,



Geoff's cycle and the pack which the disassembled bike fits into

Split Enz circa 1978. Top row from left: Nigel Griggs, Malcolm Green, Noel Crombie.
Bottom row: Tim Finn, Neil Finn, Eddie Rayner



New Zealand’s coolest invention

In the mid 1970s, Paul Crowther played drums for iconic Kiwi band Split Enz. He also worked on the band’s gear and, amazingly, constructed its synthesiser. One of the various things fellow band member Noel Crombie did was play guitar, and he asked Crowther to make an effects module to distort its sound. Crombie wasn’t overly pleased with the result, saying it sounded “too professional”, which Crowther took as a compliment.

When Crowther left Split Enz, he started making the Crowther Audio Hot Cake Overdrive Pedal for guitars in his Auckland garage. More than 40 years later, he is still making hundreds of Hot Cakes each year. He gets the circuit boards made, and his wife assembles the components on the board. Crowther installs the potentiometers in the metal box, every one of which he autographs. I’m told that slightly cheaper rip-offs are around, but they don’t have the inventor’s signature on the case.



Professor Keith Alexander and his best known invention

has been involved in the granting of about 20 patents — he doesn’t keep track — one of which is for the very well-known Springless Trampoline.

He tells me that in the United States there is one accident a year for every 35 trampolines with springs, and possibly more in other countries. Having young children, he set out to develop a safer trampoline and came up with the springless model, which was then patented by the university. The professor thinks that patents don’t give you the protection you would like to have, but are useful in attracting interest from potential manufacturers.

A provisional patent

A business doesn’t want to invest in making something only to find that someone else has IP protection for it and is reassured if a designer can show they have been granted a patent for the product. Alexander’s suggestion is that inventors apply for a provisional patent themselves. It costs \$100 and lasts for one year. It may not provide any IP protection, but it does stop others from patenting the same idea. The idea has become ‘prior art’ for everyone except the inventor who can then spend the year searching for a manufacturer to underwrite the cost of the patent application. In Alexander’s opinion, a year is usually much too short a time to do this. Patent professionals point out that the difficulty with provisional patents is getting the wording precise enough to cover the new idea. They often

see provisional patents that don’t cover exactly what the inventor thinks they do, and are consequently useless. Advice from a patent attorney would prevent this.

Big royalties

There is no doubt that holding a patent on a popular item is an enviable position to be in. If the royalty fees are high enough, you can give up work and concentrate on your next invention. A New Zealander in exactly this position told me that he watches companies manufacturing similar products closely and has had to threaten legal action when they are rumoured to be making an item that too closely copies his patented version. If, however, the copyist is in a far-distant country, with different laws, threats may be ignored.

If your widget is the next big thing, the rewards could be outstanding enough to warrant large expenses and daunting difficulties. To give an example from the aviation industry: Sir Frank Whittle, inventor of the jet engine. If Whittle had managed to retain and defend his patent, his heirs would be, today, amongst the richest people on the planet. Whittle gave his 1936 jet engine patent to the British government during WWII and, many years later, was awarded a mere £100,000. He was recently ranked 42 in a list of the 100 greatest Britons, just behind King Henry VIII and Charles Dickens. Maybe that’s reward enough. 📁



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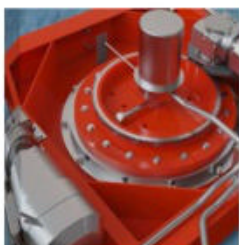
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SEAGULL RESCUE

The stalwart little Seagull outboard motor was a ubiquitous part of small-boat sailing in New Zealand during the latter part of the 20th century and Harley Lishman's got a bit of a passion for them

*By Jason Burgess
Photographs: Jason Burgess*



Pre-1958 tag line: The best Outboard Motor for the World

Welcome to the Seagull nest





“Drive it in
six or four
cylinder one
day, then
four days
later, out you
go driving a
new V8”

Engines are second nature to Harley Lishman. He grew up in a car-mad family, watching and helping his father Tye, a V8 specialist, modify and customise hot rods and muscle cars from the family’s backyard shed.

“Dad repowered cars with V8s,” says Harley. “He modified the diffs, gearboxes, the works. Drive it in six or four cylinder one day, then four days later, out you go driving a new V8.”

The ’59 Cadillac is Harley’s mum’s favourite car and, although she has never owned one, she did name her son after the industrial designer, Harley J Earl, responsible for the Caddy’s sublime chrome work, fins, and tail lights.

While Harley maintains the family tradition of ‘souping up’ and driving

the big cars of the 20th century, he has recently turned his attention to a less-celebrated end of the mechanical spectrum: vintage Seagull outboards.

Quickly hooked

Harley has been collecting Seagulls for less than a year but is already hooked. He says, “I love the retro lines; crude and simple, but reliable, and you can fully strip, rebuild, and get them going in less than a week. With cars, it can take 10 years to get to the same point.”

The walls, boxes, and shelves of Harley’s ‘man cave’ boast close to 20 Seagulls in various states of repair plus a couple of space-age beauties, a ’38 Bendix Eclipse and a ’47 Mercury, which he aims to revive in the future.



A 1960 T-bird is a recent addition to the Lishman family car collection

His restorations do not stop there; his collection of vintage motors includes a couple of reel mowers, 1930s rotary hoes, and a burgeoning stockpile of stationary engines.

Bigger is better

Harley's interest in Seagulls was piqued by his mate, Tom, who owns a couple of family heirloom engines. However, his Seagull rescue journey has not been quite as simple as uncovering some forgotten doozies in a back shed.

"The first Seagull I bought had a

buggered gearbox, so I bought two more for parts. After that, I decided I wanted one that went! I bought a two-horsepower, 40-plus model, but then I figured bigger is better so I went out and got a four and a half horsepower."

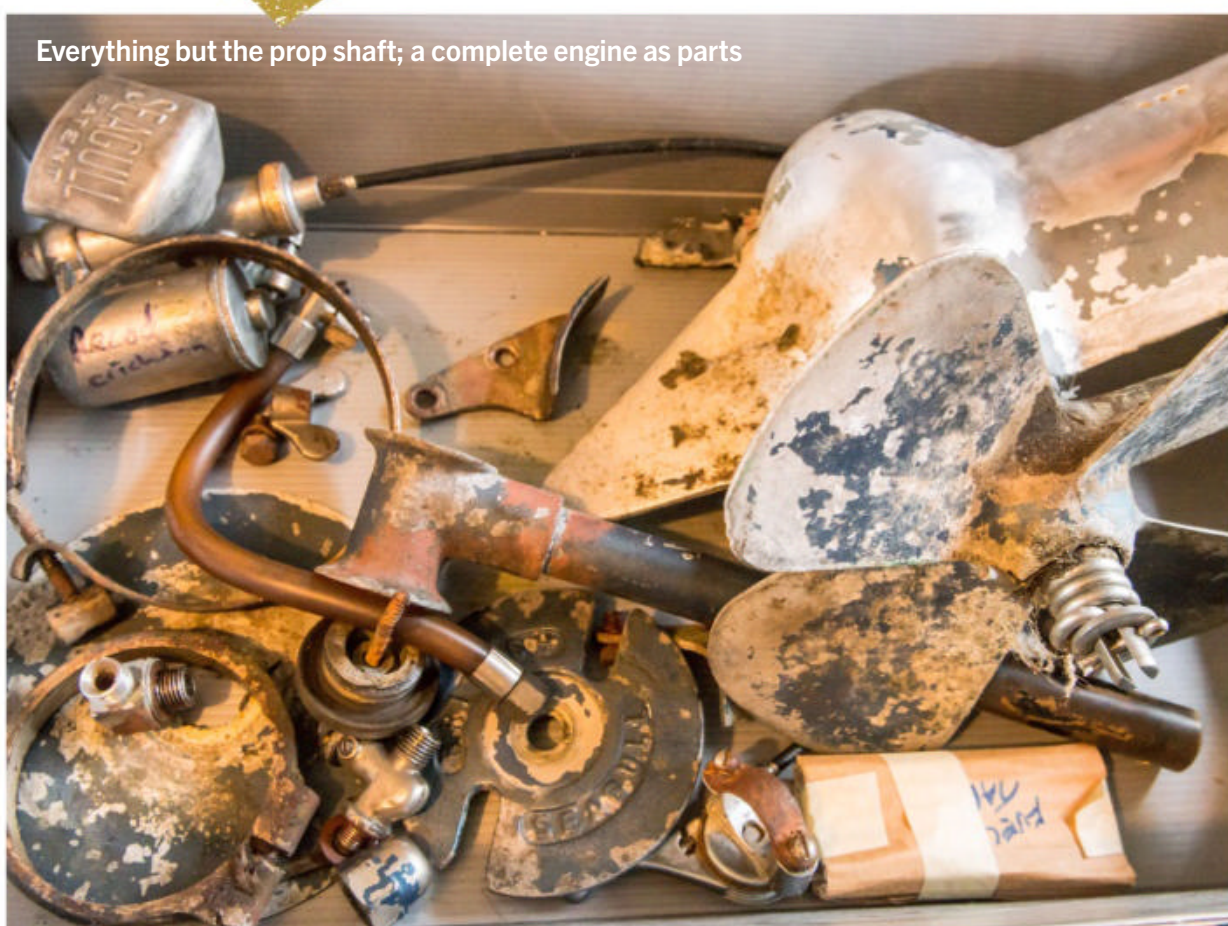
Thus, Harley's collection had begun.

On a recent roadie up north, he scored a further five outboards in one day. If they are in good nick, he cleans and tunes them up but otherwise leaves them as original as possible. The real keepers, though, get the full makeover: stripped, polished, and repainted. ►

"You can fully strip, rebuild, and get them going in less than a week"



Rotary hoes and an Archimedes Penta outboard are just some of Harley's vintage engine treasures



Everything but the prop shaft; a complete engine as parts



Harley's tips

Restoring old Seagulls: It is relatively simple, but getting them apart can be an issue, especially if they have been used in salt water or have not been properly flushed after use in salt water.

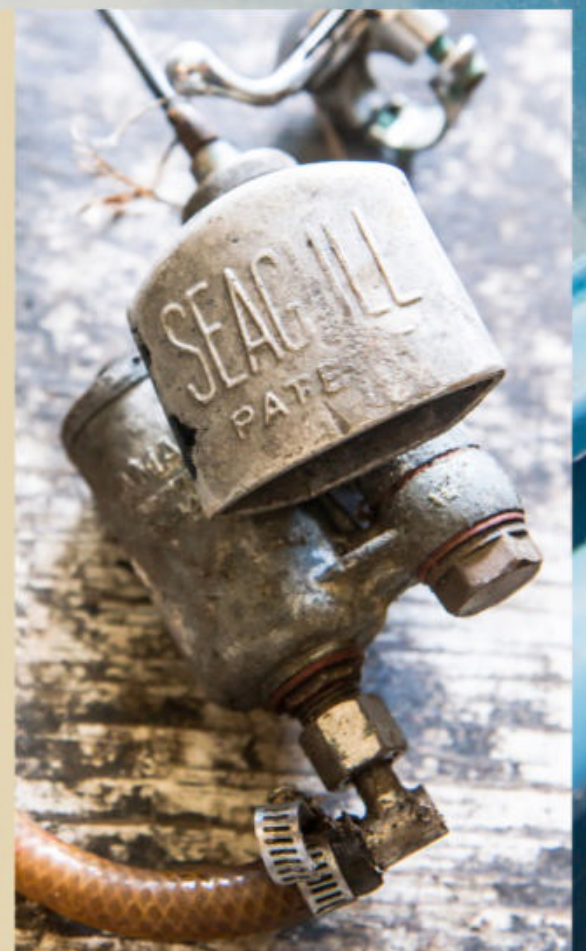
Buying an old outboard: Check that the gearbox turns over and the engine is free. Turn the flywheel over by hand and feel for resistance. If it's got a bit of fight to it, you know it's still got compression.

Outboards can easily be dated: each engine has an ID number stamped on the crankcase. Open the link below and click on 'Engine Identifier' in the sidebar options. Type in the ID number to find the model, year, and the horsepower rating.

<http://www.saving-old-seagulls.co.uk/>

Troubleshooting starting issues: Work backwards through the systems — first things first. Check for spark, then the points and coil pickups. They are very simple. There is one wire from the points to the coil, and a spark plug lead; that's the complete electrics for the whole motor. Three moving parts in the motor: piston, con rod, crank. As it is a two-stroke, there are no valves and there is no cam; there is nothing else moving. It has a gravity-fed fuel system that keeps it simple and reliable. The carburettor is the most complex component on a Seagull. Keep a photo record of all the parts during the dismantling.

A Seagull gearbox benefits from regular oil changes to stop the oil from getting too milky.



“Everything on them is brass, copper, and bronze, hiding under a layer of paint”

“Everything on them is brass, copper, and bronze, hiding under a layer of paint. I am a hot rodder; I love to shine them up rather than repainting over nice metals.”

Good buggers

For Harley, one of the unexpected bonuses of collecting Seagulls is meeting the previous owners. Virtually every Seagull he has encountered has been in the possession of a family for

decades, and each engine comes with its own story.

“I recently bought one from an old guy who had owned it for 50 years. He remembers travelling in his grandad’s Seagull-powered boat on a seven-hour river trip. Seagulls are known to rattle and vibrate, so, as a kid, sitting that long with the boat vibrating to bits, he decided he didn’t like the petrol side of boating and instead developed a lifelong love of sailing!” ►



Like new again



Silencer tubes



Sizing up propellers



Seagull ID number on crankcase



Big is better — 4hp vs 2hp



A 1957 Anzani



Some cleaning jobs will require a little more elbow grease



Rehanging the first of his regatta engines

Waikato river regatta

Speaking of river journeys, one of Harley's first Seagull projects was to restore a couple of engines for the 2022 Great Annual British Seagull Waikato River Regatta, a 142km race billed as 'The longest Seagull outboard regatta in the world'. He customised one of the engines by juggling parts from a Trade Me 'special' with a standard motor.

"The old gearboxes have a taller ratio for more speed. So, to gear it up, the bottom half is a 1950s 102 model; the top is a 1971 Silver Century 4.5/5hp. I made a cavitation plate to stop the prop aerating water and give it better suction, then fitted a two-blade prop, sharpened up — because every little bit counts when you are starting with no power." ►



Coming ashore on the Waikato, after the first days 'racing'



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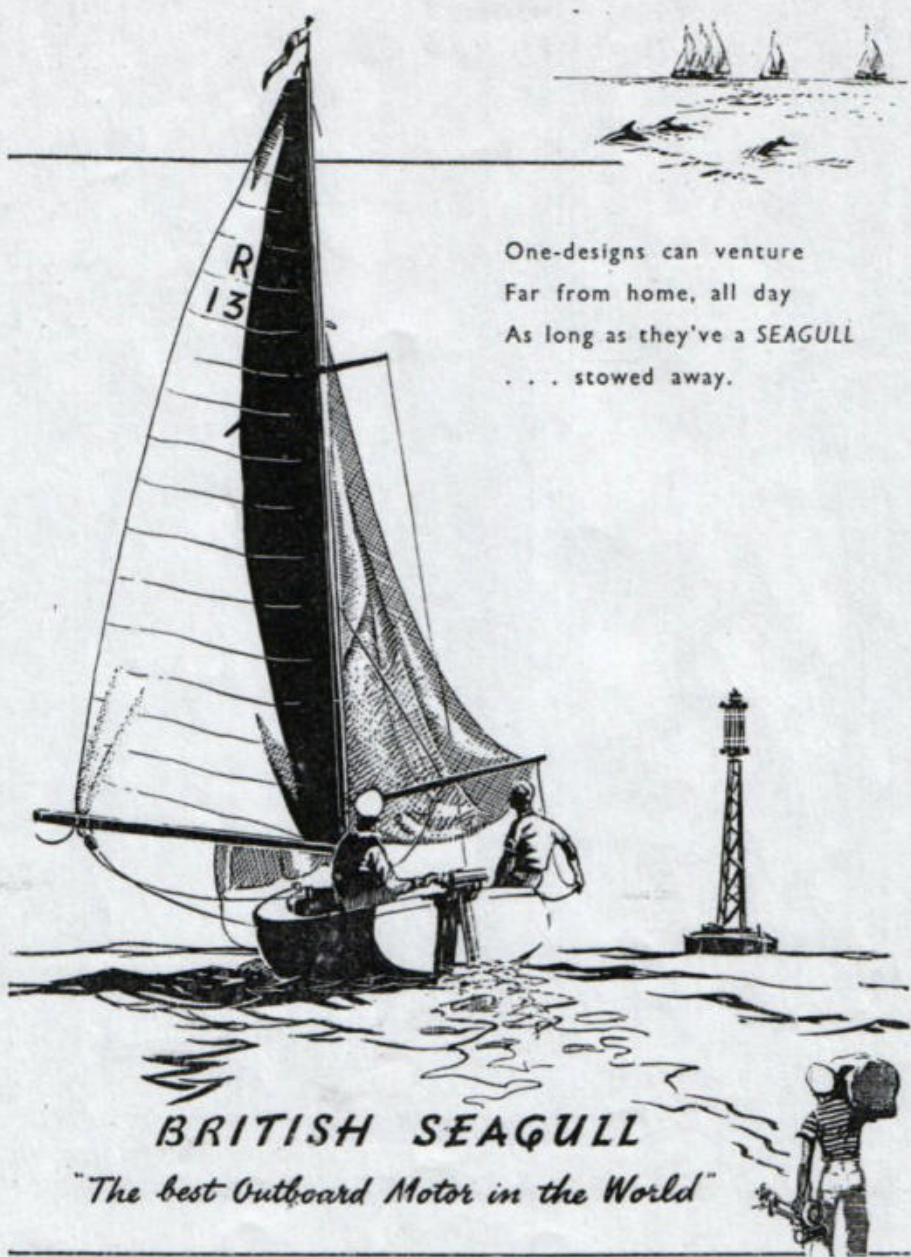
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The two-stroke, one-cylinder British Seagull outboards were once ubiquitous on our shores. In the 1970s, the company was selling more than 80,000 motors a year worldwide. The motors were marketed as a small, affordable, and bullet-proof outboard, known for their reliability not their speed. Seagulls were produced between 1931 and 1996, and were available in short and long shaft models, with the designs changing very little after World War II. Models ranged from the Standard and the High Power through to a Super High Power twin-cylinder, 10hp version capable of powering boats up to 30 feet long.

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Crown wheel safely removed from the housing

Gearbox clean — 1970s Silver Century clutchless gearbox

METHOD:

- Remove the propeller: pop split pin out and pull the drive spring off. Sometimes burrs and wear on the driveshaft may make it difficult to pull the prop off so a tapping hammer is useful. Be careful not to hit the blades of the prop.
- Drive the pin from the collar to release the bronze bush. Vice grips and a screwdriver can be useful to gently budge stubborn bushes.
- Prise the oil seal off with a screwdriver end. As this is the only seal keeping water out of the gearbox, it is always a good idea to replace it. If genuine parts aren't easily available, a 50-piece pack of washer and sealing rings — found

at stores such as a Two Dollar Shop — will normally have a gasket sized to do the job. The red fibre washers in these packs are perfect for use in the fuel line where it meets the carburettor.

Remove the bolts: first gently heat the gearbox housing around the bolts. Use vice grips to help loosen the heads before employing a screwdriver; this will help minimise burring if the bolts are still too tight. Once the bolts are extracted, use two screwdrivers in tandem and gradually pry off the gearbox cover. This will be the moment of revelation. Is the gear box full of sand, sea shells, grit, and stones? Despite the milky mess, this one is in good nick. ▶

TOOLS:

- screwdriver
- vice grips
- long nose pliers — to remove the split pin
- spanner — to make it easier to remove gearbox from bottom leg of the motor
- a punch and hammer to release the collar pin
- burner for heating around tough bolts — steel bolts into aluminium housings often get fused together

Gearbox stripped and cleaned ready for reassembly



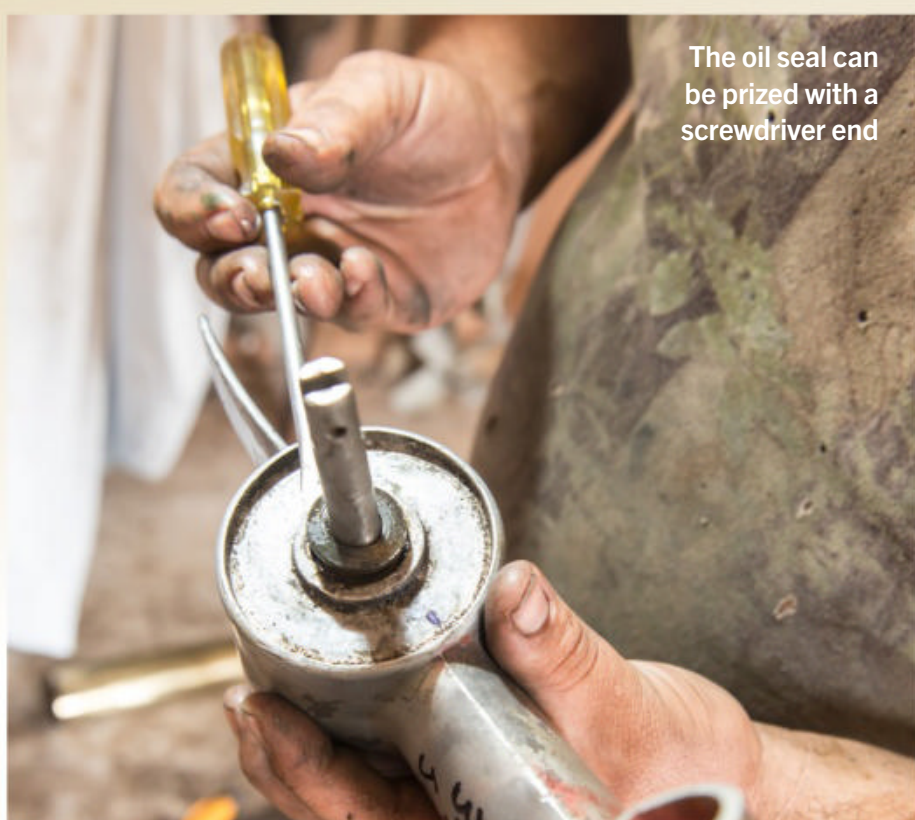
Pop split pin out and pull the drive spring off



A tapping hammer is useful



Drive the pin from the collar to release the bronze bush



The oil seal can be prized with a screwdriver end

As this is the only seal keeping water out of the gearbox, it is always a good idea to replace it



First, gently heat the gearbox housing around the bolts



Use vice grips to help loosen the heads before employing a screwdriver — this will help minimise burring if the bolts are still too tight



The moment of revelation



Once the bolts are extracted, use two screwdrivers in tandem and gradually pry off the gearbox cover



Despite the milky mess, this one is in good nick

- A little tap on the shaft may be required to help remove the crown wheel, or gear wheel, from the housing.
- Kerosene, petrol, diesel, or brake cleaner and a wire brush will take care of the cleaning. Sometimes you might need a screwdriver to clean in the cavity where the pinion gear is located, because that holds a pocket of oil and can also retain debris. Put it all back together, replacing any worn bronze bushes and the sealer gasket.
- Polish and detail the reassembled engine. Warning: once you start polishing, everything has to be polished to match. Then watch the hours fly by! ►

A little tap on the shaft may be required to help remove the crown wheel or gear wheel from the housing



Kerosene, petrol, diesel, or brake cleaner and a wire brush will take care of the cleaning



Gearbox clean — vice grips and screwdriver can be useful to gently budge stubborn bushes



“Warning:
once you start
polishing,
everything has
to be polished
to match. Then
watch the hours
fly by!”

Renewed



Winding the starter cord



Sometimes a lick of
paint to showcase a
favourite engine



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“142km in two epic days is probably the equivalent of 10 years’ normal use”



The slowest boat on the Waikato

Trophy winner

As a novice boatie, Harley’s choice of vessel — an 11-foot fibreglass runabout — was oversized for the job, earning him “The big trophy for the slowest time”.

But, he says, “I was happy with the way the engines ran; very reliable and dependable. Neither engine had been used in 20-plus years. I had only finished and started up one of them for the first

time — and for a very short time — two days before bolting it on for the first leg. I thought, ‘She’ll be right!’ They ran eight hours each on respective days. Nothing broke, although a couple of bits did rattle loose along the way, but 142km in two epic days is probably the equivalent of 10 years of normal use for them. Next year I will try a few old-school performance tricks and rod them up a bit.” 📦



The 1971 Silver Century head of one of the regatta engines

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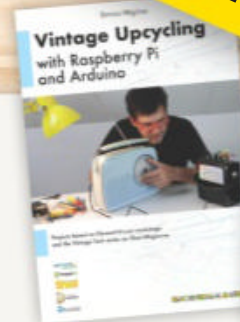
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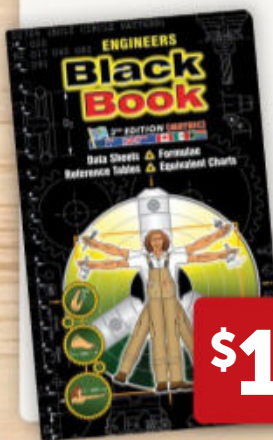
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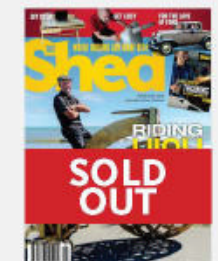
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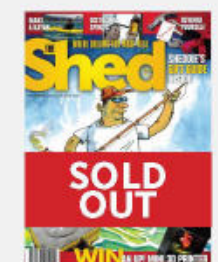
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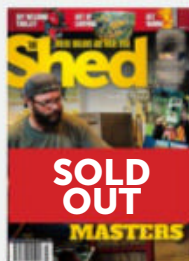
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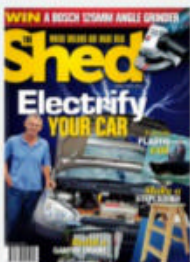
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GIVE A MAN A HAMMER

It's worth it to invest in the best

By Jude Woodside Photographs: Jude Woodside

I have a couple of young relatives who are just discovering the joys of home ownership and renovation. Consequently, my tools are in demand. I don't mind except when I go to find a tool only to realise I loaned it out weeks ago and I can't remember who to. So I thought I would give these beginners a list of tools that will serve them well long past their last renovation.

Thinking about this I remembered when I first started doing the same thing, at about the same age, and the lessons I learnt back then. The most important of which was don't buy cheap tools. It is worth remembering the aphorism, 'The bitterness of poor quality remains long after the sweetness of low price is forgotten.' Ask me how I know.

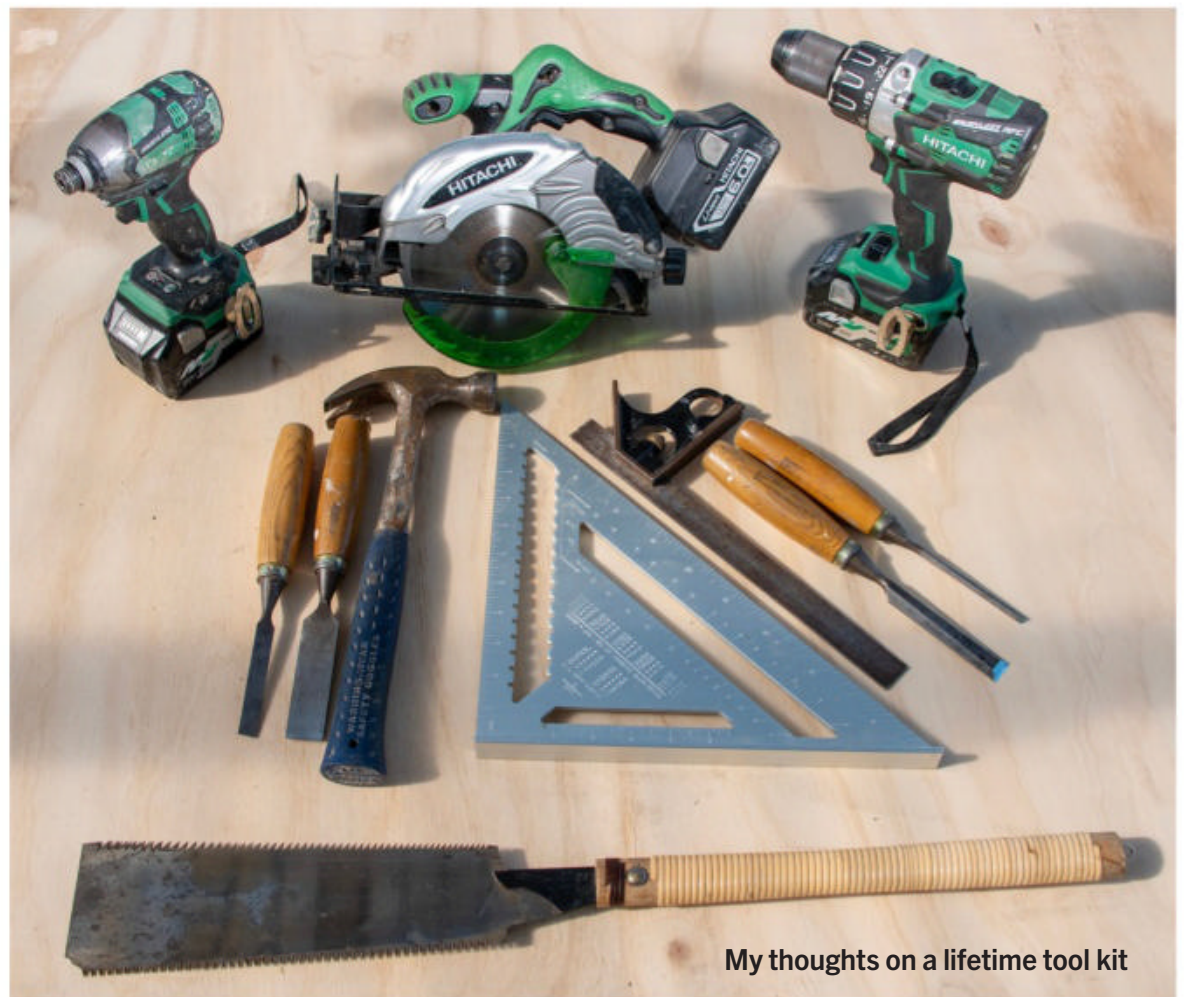
So I have compiled a list of tools that I think are essential for anyone embarking on home renovation — tools that will last a lifetime, and more than return the investment.

The lifetime tool kit

Number one would have to be a decent hammer, one with good balance, good grip, and of a decent weight. You can't really go past the 20oz Estwing. Until I took the plunge and bought one for myself I didn't appreciate what a good hammer was. I had an older one, wooden handled, and sturdy but it didn't have the balance of an Estwing. I recall the pain in my wrist after a long session of fence building using my old hammer. I bought an Estwing for one of the aforesaid relatives for his birthday recently and, being a tradesman himself, he immediately got the difference. He admitted his ball-pein hammers weren't up to the job when it came to extracting nails.

Don't ya love battery tools

Second would be a decent drill and impact driver set. Current battery technology is so good that you should



My thoughts on a lifetime tool kit

throw in a brushless battery saw into the mix. Here it doesn't pay to compromise. These tools will be with you for a lifetime and it's a good idea to get the most reliable and most functional you can. Yes, there are cheap alternatives from lesser known brands, but they are all false economies. Stick to the established brands — the American, Japanese, and German manufacturers — and pay the extra. It is worth it.

The cheaper tools have design compromises that will affect their performance and you will always regret the purchase. Bosch has a domestic range — Bosch Green — that is good value, and can often be found on special. They are good tools although not rated for trade use. It's worth selecting carefully because you will likely stay with that brand into the future since you own their battery chargers.

Good carpentry tools

Good layout tools are a necessity; a good-quality adjustable square for general carpentry work is indispensable,

and the lipped rafter squares are very useful for making accurate right-angle cuts with your battery saw.

In terms of hand tools, I would rate a good Ryoba Japanese hand saw. This two-sided saw — one side for cross cutting and one for rip sawing — works on the pull stroke and has a very narrow kerf. They are aggressive, quick, and very accurate.

A set of chisels is very handy too, a good set made from really good steel; again English, German, or even American. It is also worth investing in a set of water stones and learning how to sharpen them. At least an 800, 1000, and 3000 grit. A blunt tool is of use to no-one.

This a very basic set up likely to cost in the range of \$1000-\$1800 but they are tools that will stay with you for a lifetime — you won't regret the expense and they are a strong foundation on which to build.

Meanwhile, I have to go and buy another hammer for someone's Xmas present. 📦



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