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THIS IS ME

How great is it that some of us know from an early age what will truly inspire us and become our lifelong careers?

Our cover story in this issue features Ed Prince, who, at just 12 years old, became passionate about woodworking after discovering a magazine (ah, those were the days!). By the time he turned 15, he boldly declared, "I'm going to be a cabinet maker." While woodworking ran in his family and certainly influenced him, there are countless families where children choose not to follow in their parents' footsteps.

There's something admirable about knowing so early in life what you genuinely enjoy doing; this becomes a defining part of your work journey. I recall one of our sons' friends, who at around 15, announced he wanted to be a pilot. I thought, "Good on ya, mate!" After finishing school, he quickly enrolled in an aviation school, took on a sizable loan, and before long, he was flying for Jetstar as a co-pilot. Nearly 15 years later, he is still living out that dream. He definitely knew what he wanted!

When I was younger – quite a long time ago, mind you – I distinctly remember adults frequently asking me, "What do you want to be when you grow up?" I can't recall what my answers were, as I had no idea what I wanted to do. Perhaps I'll figure that out someday, haha.

My own career journey seems to have steered me toward various forms of entertainment, and that's ultimately where I ended up, even though it wasn't a path I intentionally set for myself from the beginning.

I wonder, do adults still ask children these days, "What do you want to be when you grow up?" I don't recall anyone asking our children that. It must have been a feature of those post-war years; perhaps adults felt grateful that kids now had the opportunity for a full and enriching life after the war.

Returning to Ed Prince, how lucky are we that he chose this vocation for us to enjoy and share in his amazing creations? His woodworking skills will take your breath away, and here he is doing the job that he has always wanted for himself. He is living the dream, I reckon.

What's a hyphen between friends?

A couple of months ago, we celebrated a small victory here at *The Shed*. We had been trying for years to secure the internet domain name theshed.nz, but we could never quite make it happen – even though we already owned the master domain, theshed.co.nz, which gave us priority usage rights.

Then one sunny day, it just fell into our laps! Now you can drop the hyphen from (the-shed.nz) if you'd like when searching for us online. It's only a small thing, but it made us do a little jig of joy – yippee!

What do you mean, small things …?

Greg Vincent
ediitor@theshed.nz

Contents

4 Beyond the grain

Edward Prince is a furniture maker who is pushing timber's boundaries through innovative projects like bodging chairs, carving bowls, crafting bows, and designing bass guitars

Off the grid

Repairing and restoring old tools

Sheddie profile

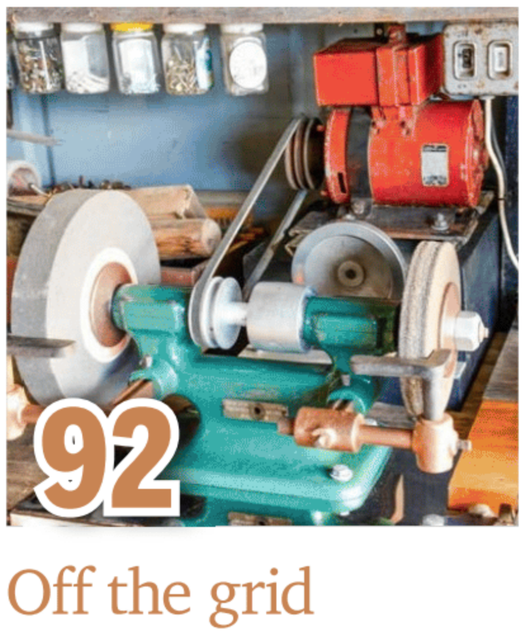
Rod Benjes: race car builder

The birth of a Fire Service museum

The time is right for a museum

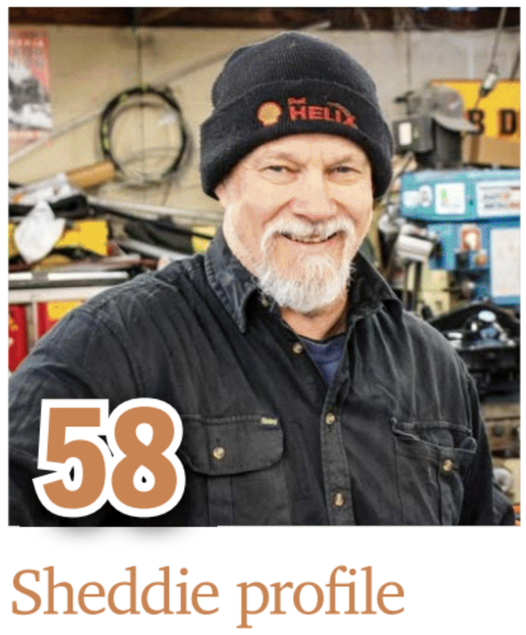
Project: Reusing old tyres

Garden and other projects using worn-out tyres



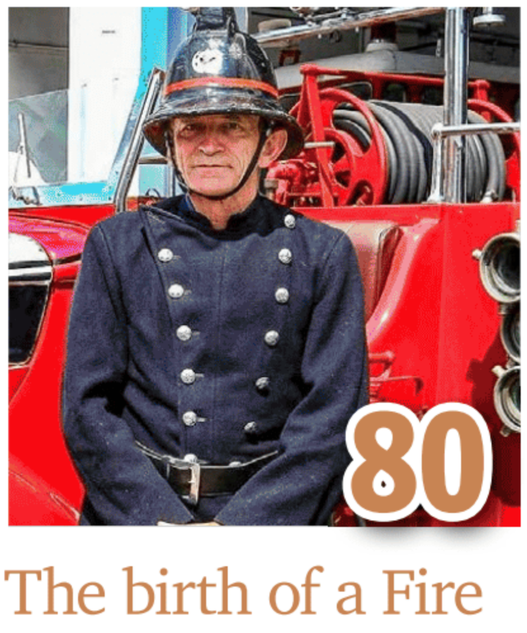
From the archives

Project: build a wooden ply canoe



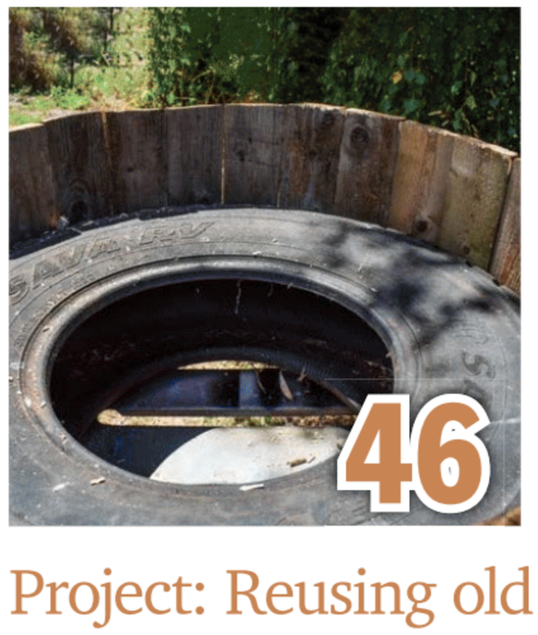
Arduino basics 102

Discover methods for sharing data



Cryptic crossword

Get that grey matter working



The Shed shrink

The joy of collecting

100 A knight and his shining armour – Part 2

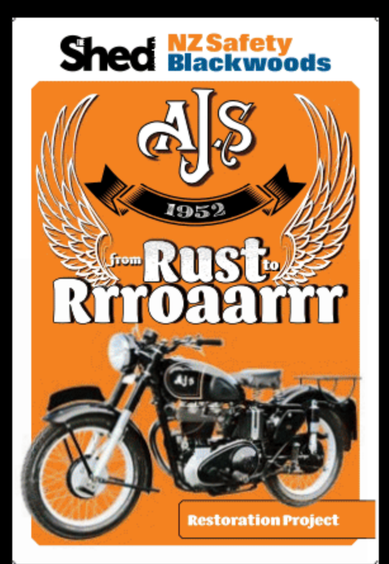
Leon shares insights into making armour

112 Better than Weta

No ordinary shed. This one is overflowing with memorabilia, toys, games, and puppets

70 Project: A coffee and a book

Building a coffee table and a bookcase



32 Restoring a 1952 AJS – Part 6

Electricals, suspension, controls, petrol, and oil

EVERY ISSUE

1 Editorial
18 News
20 Letters to the Editor
44 Subscribe to *The Shed*
51 New products for your workshop
70 Industry insider
128 Back o' *The Shed* – Jude discovers that sometimes the answer to a misbehaving tool is not as complicated as it may first appear

44 Subscribe to *The Shed*

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Furniture maker

This shield was made by Edward's son Oliver, while Edward carved the letters

BEYOND THE GRAIN

By Jason Burgess | Photographs: Jason Burgess

At age 15, Edward Prince declared to his dad, "I'm going to be a cabinet maker." Nowadays, Edward the furniture maker is pushing timber's boundaries through innovative projects like bodging chairs, carving bowls, crafting bows, and designing bass guitars

When it comes to pushing the boundaries of timber and its uses, furniture maker Edward Prince often goes where few have hewn before.

From bodging chairs and carving bowls, to moulding bows and designing bass guitars, Edward embraces fresh ideas and projects that stretch his knowledge base and skill sets. In his professional life, he has studied and taught the art and crafts of woodworking at secondary and tertiary levels, worked at everything from antique restoration to super yacht interiors, designed systems to streamline production processes at large-scale furniture factories, and created one-off furniture commissions for residential and commercial fit-outs. Recently, he decided to go it alone, pursuing his passion for woodgrain, building bespoke furniture and multifunctional objects, all from his home workshop.

Deep in the woods

A forest of lithe, towering ricker kauri; adolescent rimu; and tall ferns shade the glade around Edward's workshop. Leaf mulch, bark chips, and torn timber strips camouflage the paths. Twisted logs rest against a small retaining wall awaiting a fresh designation and a cluster of rustic timber chairs encircles a brazier on the lawn above. From the tree tops, invisible tui chime and call, while through a set of dusty French doors, an apparition of Edward can be seen and heard, cutting, carving and creating.

Edward remembers when he first set eyes on this place. It reminded him of an image on a postcard that he had saved in England. He recalls, "It was a picture of a small church in a hollow, surrounded by trees. It struck me as a place of peace and tranquillity. I thought how nice it would be to live in such a sanctuary. This place is what I had in my mind."

After purchasing the property, he found out that the area is called 'Eddie's Bush'. He laughs at the thought and says, "Rational people wouldn't clutch at such emotional things." For Edward, though, exploring arbitrary thoughts and a little whimsy is as important to his design processes as practical skills are to bringing his projects to life.

Natural habitat

If there was ever any doubt about how much influence an environment can have on a man, then look no further than Edward.

His home town was Otley, home of the great 18th-century furniture designer and cabinetmaker Thomas Chippendale, who is celebrated there with a statue in front of the old law courts. Yet despite

growing up in the Yorkshire Dales and learning the traditions of the old craftsmen, it is the natural world of his adopted country that crops up in his work today. Think New Zealand–themed electric bass guitars, wētā-inspired dining chairs, and details inspired by the environment beyond his windows. He says, "The thing that has changed for me here [in New Zealand] is being open to new creative possibilities. I tend not to be stuck in a style or tradition. Consciously, I am looking at how to reflect the world around me. I also do a lot of subconscious doodling. In my book, there is no reason why you can't draw on a Chippendale sideboard or the shape of a silver fern, a wētā's antennae, or a kiwi beak. History, culture, landscape, and coastal formations as reference points – they all influence my designs and details."

The roots

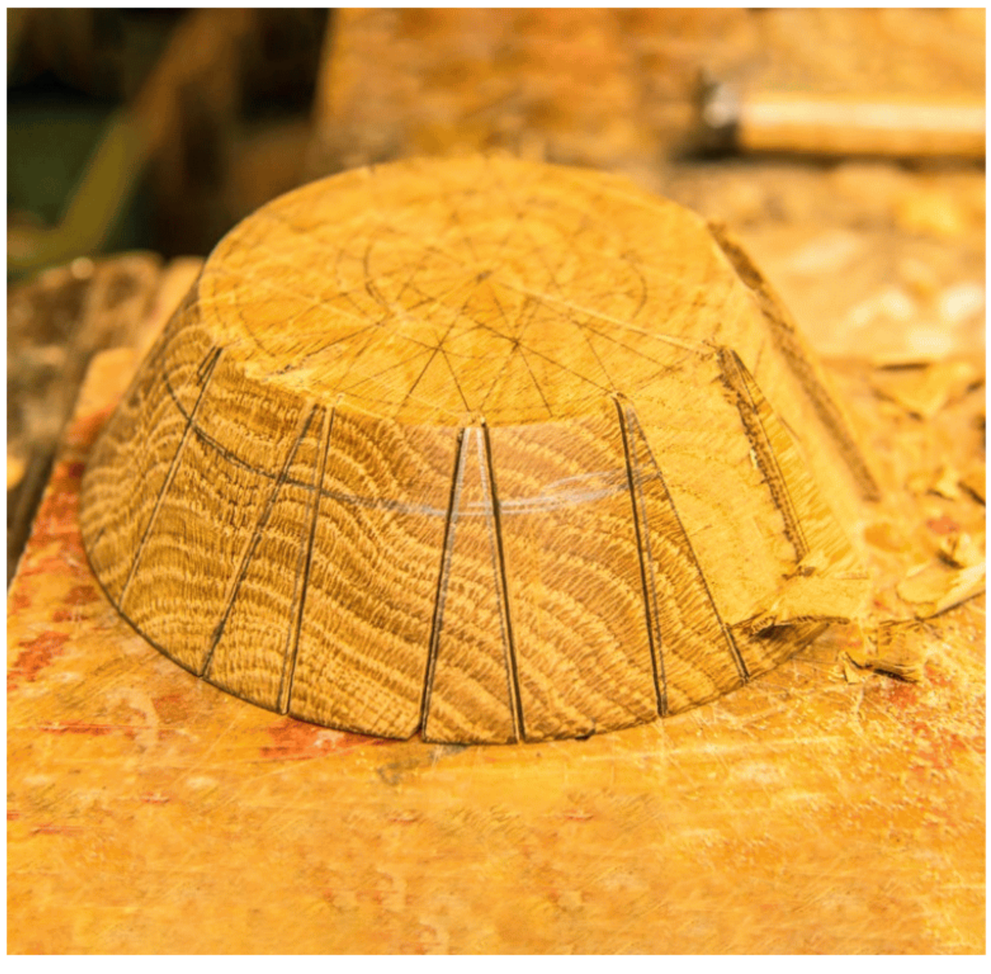
As a child, he says his father constantly pushed him to make stuff.

He remembers, "Dad was a quantity surveyor but a practical man, a passionate gardener and did loads of home improvement stuff. My grandfather was a cabinet maker too; he definitely had an influence. We lived in a tiny village, had a massive barn, and I had my own bench. When my granddad retired, we inherited a lot of his woodworking tools. I still have some of his planes. The first thing I remember making was a plant pot – a hollowed-out log, drilled with a blunt drill bit, which won a prize at primary school. We had a teacher there who made musical instruments. He would get us all to make stuff. I thought I could do that; that drive to create has been there for as long as I can remember."

When Edward's mum bought him a subscription to *Practical Woodworking* magazine at the age of 12, he was hooked. "There was an article in the first copy I got about John Makepeace, the godfather of the modern British Arts and Crafts movement, who established the Parnham House School for Craftsmen in Wood. I remember seeing a picture of a cherry four-poster bed he made, sculpted and organic. Amazing craftsmanship. I was drawn to the modern designer-craftsman movement, and then the old-school of William Morris, Ernest Gimson, the Barnsleys."

Growing taller

At high school, his father encouraged his interest and enrolled him in a woodworking night class. "Then, one day, Dad came into my room and asked what I was going to do for a job. At the time, I was having enormous pleasure covertly whittling down my homework desk with a pen knife he had given me. I thought, *I really enjoy this. I'm going to be a cabinet maker.* So that was it – official: from the age of 15, I knew what I wanted to do with my life." ▶



Bowl base scored for chiselling grooves for laminated sides

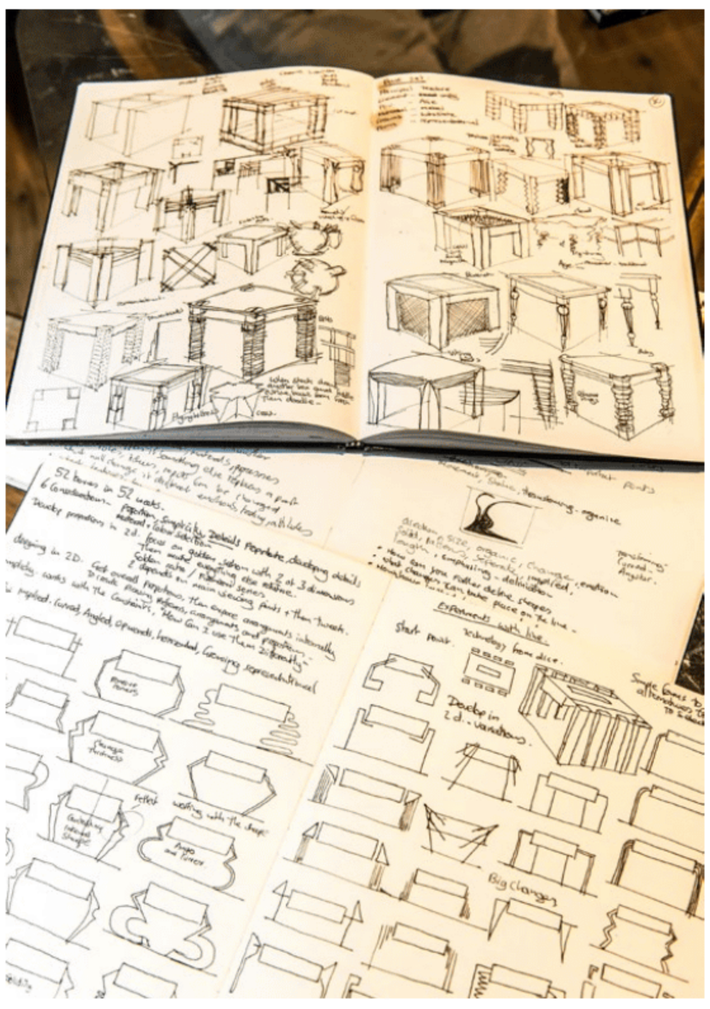
Chiselling grooves in bowl sides

Filing bowl base

Fitting bowl flanged sides

The bowl base with grooves and laminations

Fitting the laminations to the chiselled grooves in the bowl base



Sketches, notes, and dice box for his Creative Leaps ideas generation toolkit

Hat rack lamination project – forest coat-hook designs

Within a year, Edward had left school for a course in 3D design at the Jakob Kramer College of Art in Leeds, while also working part-time with an antiques restorer. From there, he set off to Rycotewood College in Oxford to learn the secrets of fine craftsmanship. He says, “At Rycotewood there were incredibly skilled people doing everything from perfect Chippendale reproductions with all the hand veneering, using all the traditional skills, right through to me doing the design thing, exploring shape, form and function, and where ideas come from. It was challenging. I really got into the discipline of designing furniture and three-dimensional objects.” Next, he was off to the University of West Midlands in Birmingham for a three-year degree in environmental design.

Branching out

The exploration of ideas is fundamental to Edward’s ongoing practice.

When inspiration strikes, he grabs a sketch pad before lifting any tools, exploring as many angles as possible,

Finished bowl

rather than settling on the initial thought. “Never fall in love with your first idea,” he says, “Keep an open mind. Even a dull idea could easily turn into something brilliant. Creativity is about making connections. I look at nature, architecture, other artists and materials, and make connections. Those connections may inform other connections, and so on.”

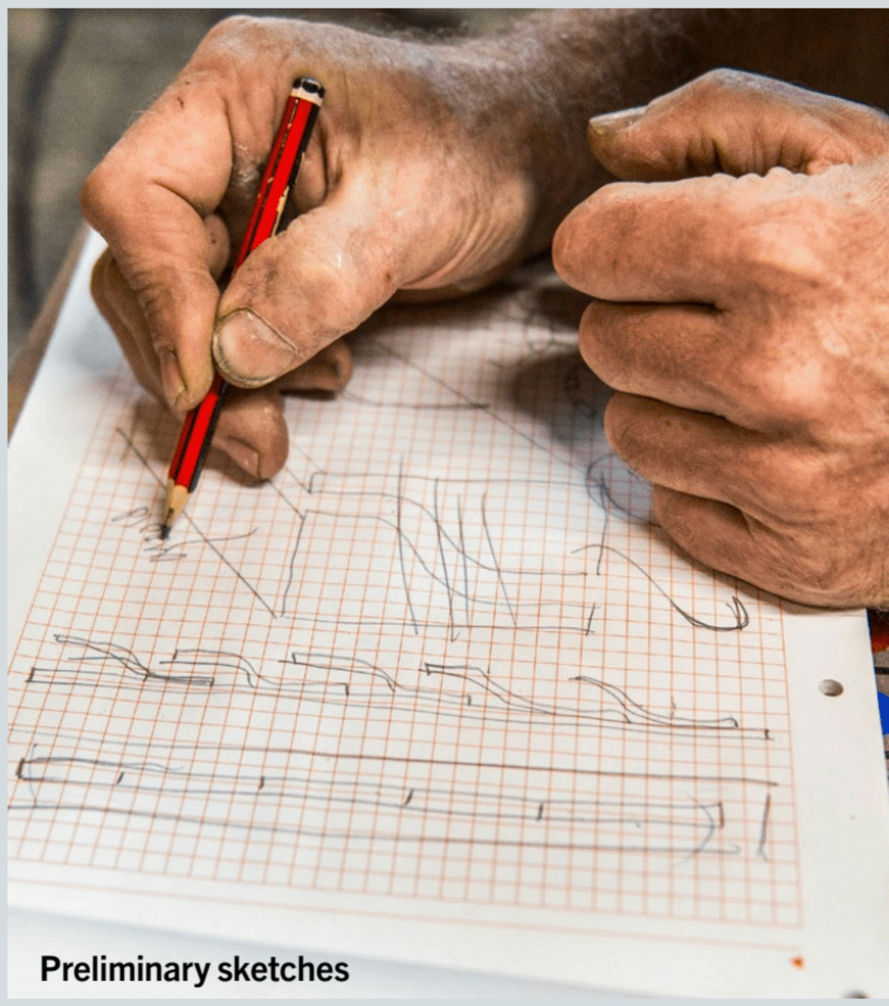
His design system also factors in efficiencies, both in terms of build times, techniques, resources and how best to “honour” his materials, always working to minimise and repurpose offcuts.

If an aspect of a design is not sparking, he turns to a set of self-designed prompt dice that he made to help himself think and act expansively as concepts proceed from page to production. Edward sees his dice – provisionally titled ‘Creative Leaps’ – as a practical toolkit suitable for any kind of crafts-person, business, or team looking for fresh approaches to idea generation and advancing innovation, not to mention workflows and problem-solving. He is hoping to bring them to market soon. ▶

Three projects, one mould

While Edward is busy riffing on idea generation and lateral thinking, he picks up a pencil and starts laying out a plan for three projects made from a single mould. Drawing on his teaching experience, he maps out an instructional step-by-step outline.

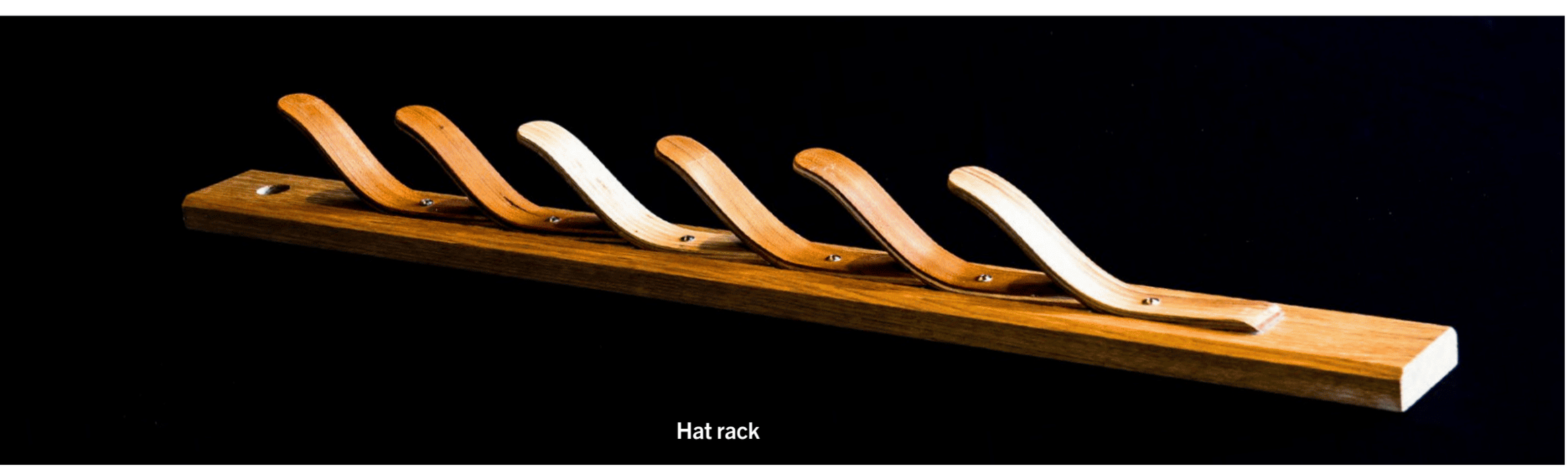
He says, “I love helping people; seeing them grow as they realise their potential and move out of a limited world view.” By developing a series of how-tos like this, he hopes he can encourage and inspire woodcraft newbies as well as challenge the thinking of more experienced craftspeople – himself included.



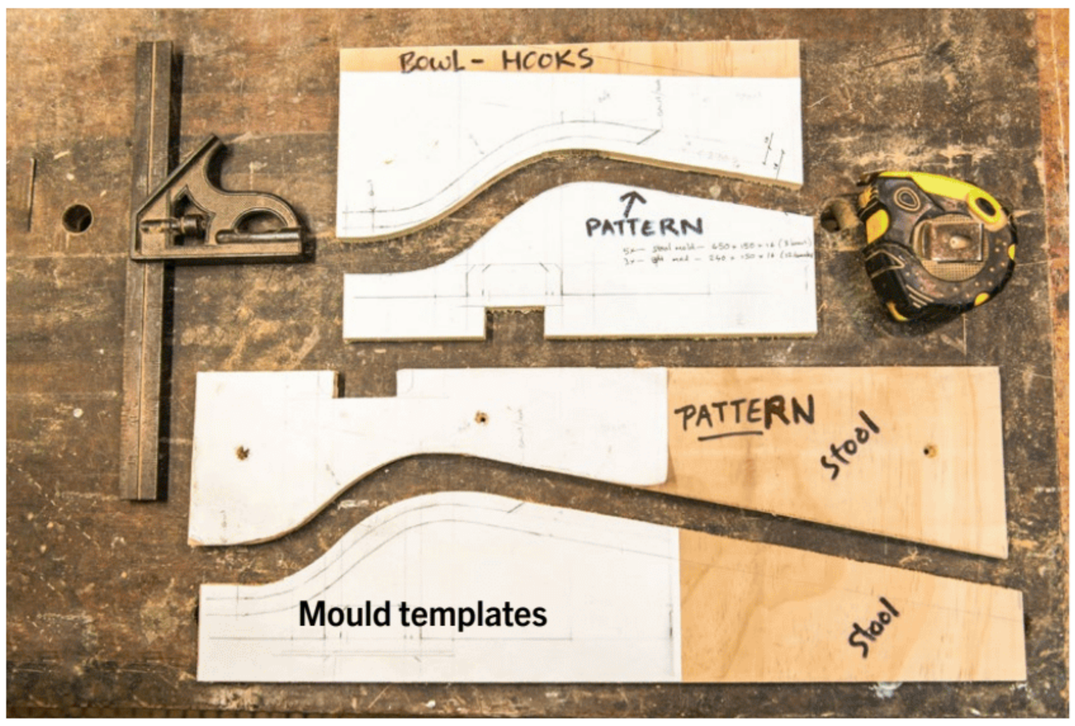
Preliminary sketches

For this project, he uses off-cuts as his base materials, epoxy resin to create laminated features, and a mould built from MDF.

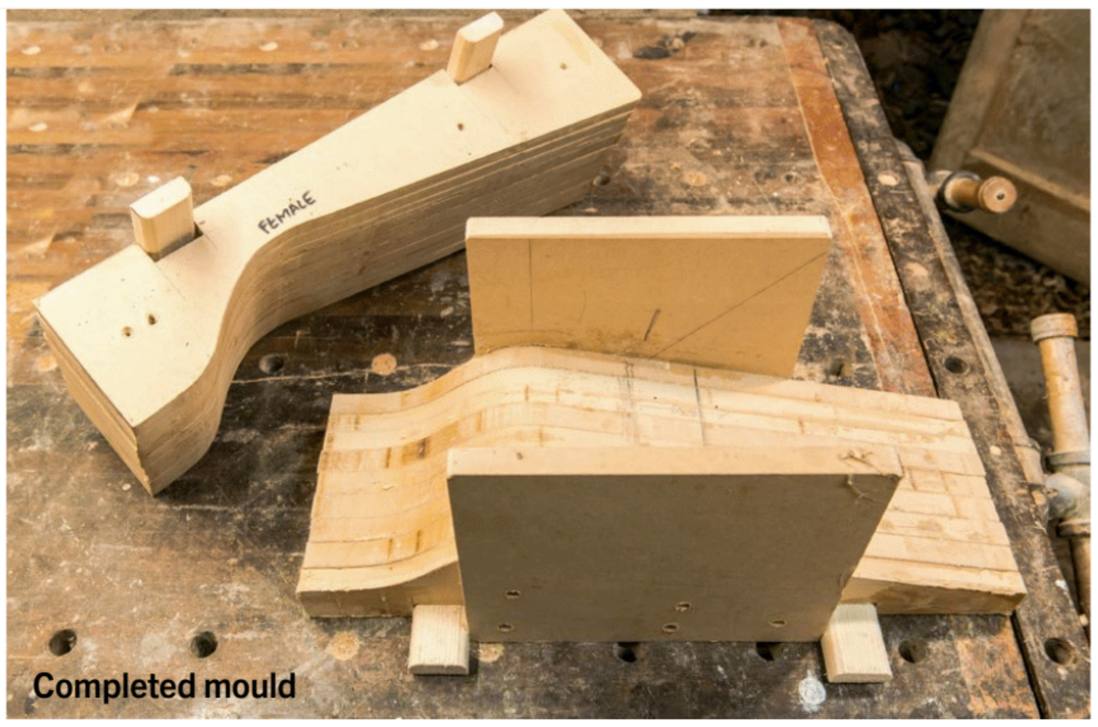
A couple of days later, the laminated timber strips are finished and cut to length to form the key features of a bowl, side table, and hat/coat racks as envisaged in his original sketch.



Hat rack

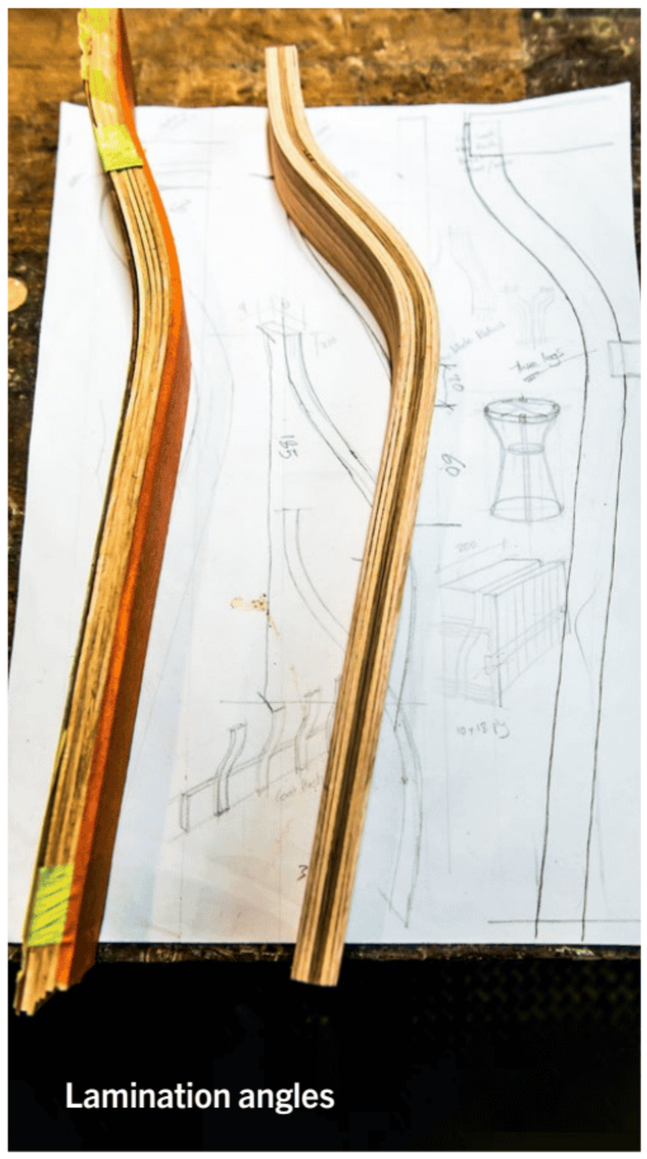


Mould templates



Completed mould

The mould clamped to hold the glued laminations within


Lamination angles

Placing the side table legs

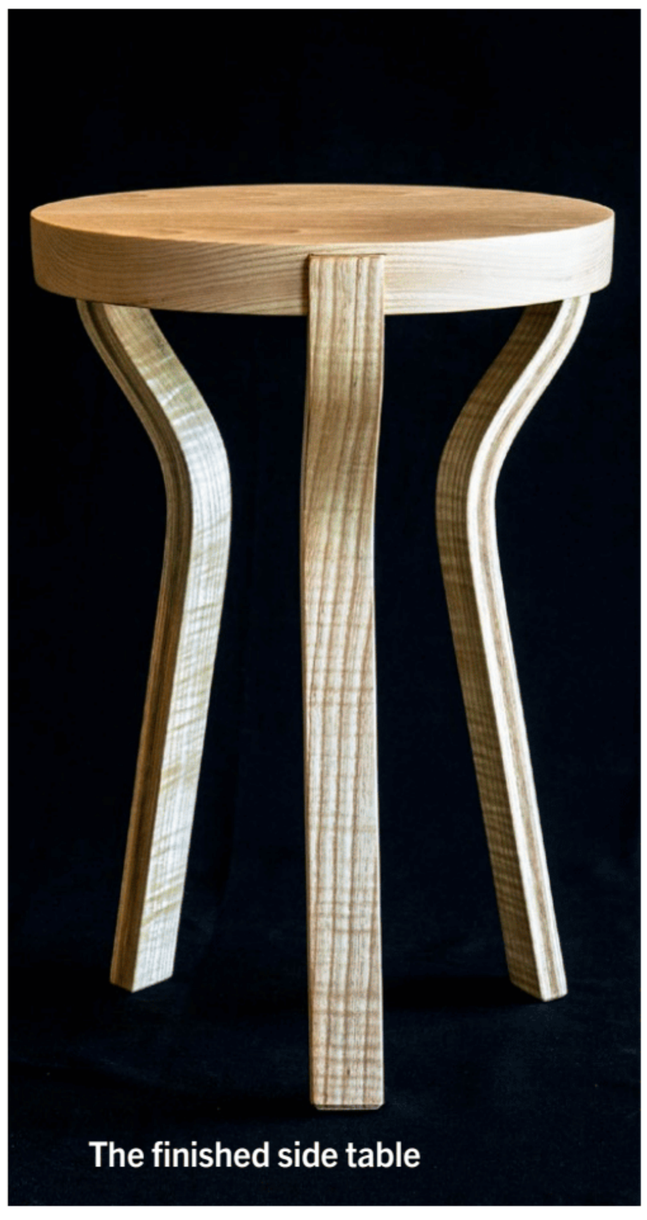

The finished side table

Table top shapes and bowl ready for lathe work

On the lathe

Out on a limb

While he could fill a small library with his sketchbooks full of project designs, plans, and conceptual thinking, Edward is most energised when he is on the tools, working the grain and turning ideas into something useful. Throughout his career, Edward has applied himself to other disciplines – from metal crafts to upholstery – but the thing he loves about wood is, "It is a living material. A tree takes years to grow, and every piece is different; working it is a multisensory thing."

He acknowledges that, "Operating solo in a small workshop can be demanding, but it is fun. I like to make furniture that makes a real statement. I like pushing the uses for wood – its grain, pattern, and colour – but, first and foremost, what I make must work, be a pleasure to live with, and hopefully rewarding for generations to come." ■

Making an archery bow

An archery club sign caught Edward's eye one day while on a drive with his son Oliver. He thought archery would be a fun activity for them both to do together.

While archery newcomers can find plenty of cheap imported bows, Edward, on the other hand, took a deep dive into the world of bow making. He smiles, saying, "There are loads of types, it is just fascinating."

He started simply, making traditional English longbows, using files, spoke shaves, and planes. He soon learned how timber choice directly influences the performance of a bow. "You need absolute straight grain," he says, "with a finely tuned taper from the tip to the centre."

He next turned to the flat bows of the First Nations tribes. "Easy to make," he says. "One thickness. Just a case of getting the edge taper right, shaped and nicely sculptured so it's nice to hold. Fun to make, quite light, but with a 25- to 35-pound draw, not terribly powerful. Perfect for kids."

Achieving a consistent bend was all trial and error: "Quite a lot of bows ended up in the scrap pile. If you don't take enough wood off in certain places where the bow bends, it will put too much force on the outside and snap. Which is why traditional longbows used yew heartwood on the belly side compresses and the sapwood on the outside stretches."

Arrows

As for the arrows, some were made as traditional as possible with feathers held on with twine, nock cut-in for the string, and bound.

Edward says, "It is all about the spine deflection, so every arrow is exactly the same weight and flex, and they all shoot accurately." The target point tips are all bought, but he created special jigs to do all the decorative paint work. "There is a lot of work in them," he says. "Most are cedar or ash; ash is stronger."

Despite having flipped many of his bows to other archers, Edward reckons his bow-making days are over. Hardly surprising when one gets into the nuts and bolts of making a fibreglass laminate American flat bow; definitely his toughest bow challenge. "Making the jig and the box to cook them in is a steep learning curve. Thermostat, incandescent bulbs, and working heats up to 150°C on the inside." Formed with a mould, using a hand-built air-pressure cushion for the pressing, required the import of a special hose to complete the job.

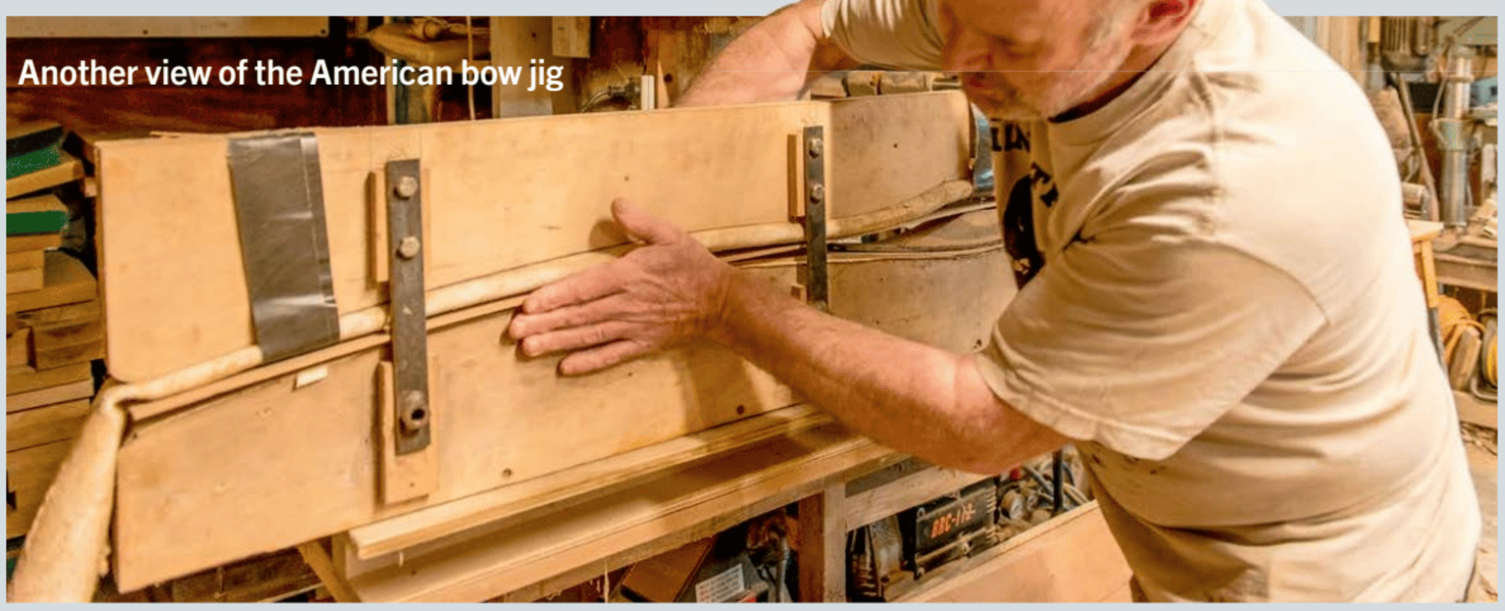
Messy-stuff epoxy

When it came to shaping the stave in the jig, Edward admits, "It is messy. Bow making with a special flexible epoxy and carbon fibre is expensive; it is toxic, inside and outside. The riser is made from exotic and decorative timbers, everything is wrapped in glue, you get covered in it, and it can turn into a horrible mess if you're not careful. It goes into the heating box for 24 hours to cure. Once you have the basic shape, then it is followed by an ocean of final shaping, making the arrow plate, limb tips, cleaning up, sanding, and polishing."

For all his effort, though, Edward did become "a reasonable archer", finishing sixth in the National Traditional Longbow Competition. "But," he laughs, "the people who shoot traditionally and with longbows are few and far between. Most people shoot compound bows, which are a lot easier to be accurate with. There are some very good traditional archers." By contrast, his son became the New Zealand national under 14 longbow champion. Edward smiles. "He was the only one in the competition," he says. ■

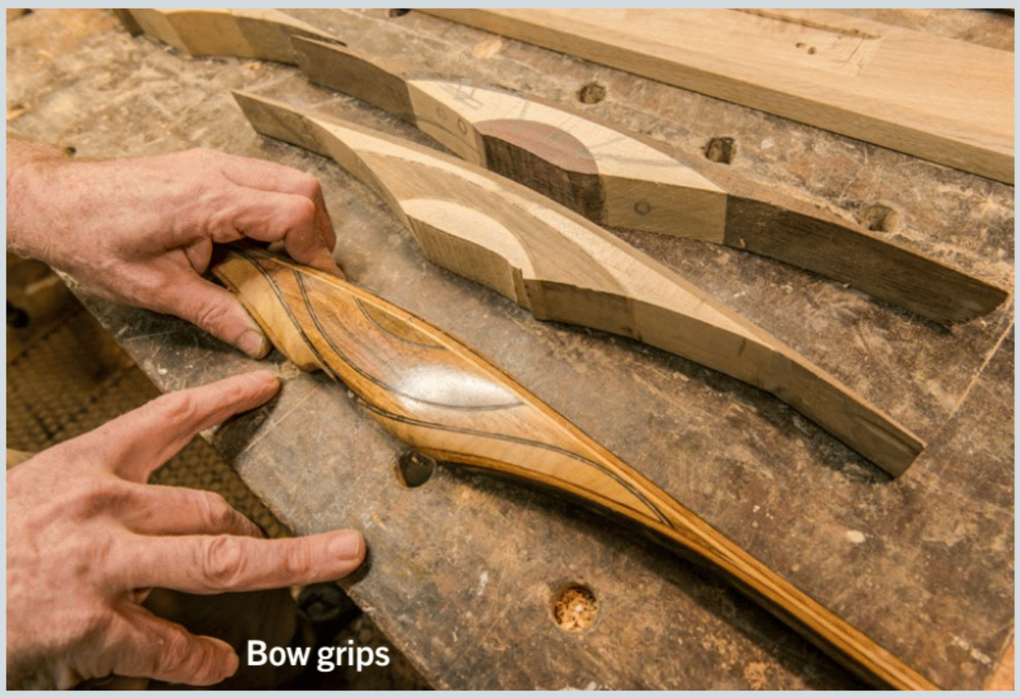
American flat bow jig with air cushion

A board full of broken arrows

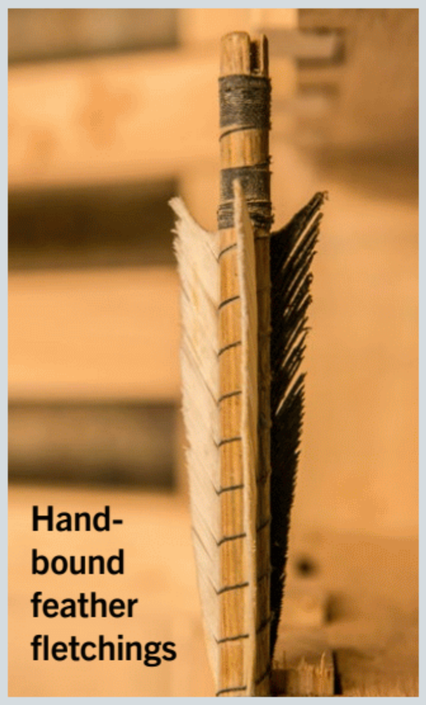


Another view of the American bow jig

A quiver of handmade arrows



Bow grips



Hand-bound feather fletchings

Unused bow grips

Laying out bow templates

Making a bass guitar

The first bass guitar Edward made was from a kit that he bought and built for his son.

When his son showed no interest in learning, Edward thought, "I'm not going to waste that, so I started learning to play bass. It came with a really nasty piece of wood for the body, so I changed that for a piece of rimu. I didn't realise how heavy that would be. From then I got drawn into making bass guitars."

After completing the kitset guitar, he found it had a neck dive and was "not nice to play". He thought the best way to get around that issue was to make them headless.

Before embarking on another guitar, Edward carved some prototype shapes to get a feel for them: "I did a ton of research on ergonomics. I also wanted to include an element of New Zealand in the design. We live in this amazing country with this unique inspiration all around us. I didn't want another generic Fender P-Bass copy." ▶

Bass case

Bass guitar prototypes

Distinctly Kiwi

As his basses evolved, he began referencing the shapes of the North and South Islands in the body designs.

The fret markers were inspired by the koru symbol, which evolved from the sea into the mountains and the moon – the sea to land to sky – drawing on forest patterns for various details and all made from native timbers. Two guitars feature swamp kauri faces, with the wood "sourced from a pile of offcuts in a timber yard in Northland," says Edward. "Their backs are made from quarter-sawn kauri, which features its medullary rays. I rescued that years ago from the wharf sheds that were being demolished for the America's Cup bases."

The neck is made from tapered laminations of pōhutukawa and tāwari, with a burr pūriri fretboard sourced from some driftwood and trees a neighbour had cut.

Making jazz basses

He then built a couple of jazz basses with pickups for different tones.

Each guitar provided huge learnings: "Pickups, wood, and strings all affect the sound. Accuracy is vital; it must be absolutely perfect, otherwise it won't sound or play nicely. Everything must be straight and level: the neck, the alignment, and the frets. I achieved it. I have inlaid carbon-fibre strips to stop the neck from bending, and, as a result, it stays flat and in tune. I jammed for a while with Tama Lundon, who played with Herbs. I met him through his wife, who was an archer. Tama agreed, 'They have a lovely action, play sweet as.'" ■

Making wētā chairs

A wētā display at the Auckland Museum spawned a series of prototype wētā chairs.

At the time, Edward was already on a research quest to find what it takes to make the world's most comfortable chair. He concedes, "Anyone can design a chair, but designing a comfortable chair is a whole different ball game, particularly one that is unique."

At college, he was captivated by the traditions of the High Wycombe chair bodgers. "In Yorkshire, we had a famous cabinet maker, Robert 'Mousey' Thompson, who carved a mouse on all his furniture, which arose because his assistant made a comment about '[being as] … poor as church mice'.

"He used adzes to carve a ripple finish on all his furniture. Then I saw the bodgers making a Windsor seat exactly the same way; those seats are very comfortable." So, Edward began pursuing the art of sculpted chair seats: "I like the process of sculpting and carving. I made my first chair at college inspired by Edward Barnsley's country chairs. I have played with that idea a lot over the years."

The wētā inspires

Wētā antennae provided the inspiration for the back-leg shapes on his chairs, and it has taken him a few years to get the design right.

"Number one," he says, "was ugly and uncomfortable. The height of the antennae, [the] backs on the first few, were a health and safety hazard and lacked good lumber support. I have made about 10 prototypes to get it right. The antennae are now taller and more elegant. I have refined the shape of the seat and legs to flow and be pointier like wētā bodies. The chairs evolved slowly but are now stronger, really comfortable to sit in, and easier to make."

To achieve the antenna backs, he built various jigs and templates for shaping all the parts. He says, "Each piece of laminate was put through a thicknesser with a taper of 8mm, laminated over a former to get the shape, and tapered on the bandsaw, then shaped with a drawknife and spokeshave. A lot of work."

TRIBUTE TO TREVOR SCOTT

New Brighton Menzshed hosted a regional meeting to honour and give thanks to Trevor, who was instrumental in introducing the Menzshed concept to New Zealand

New Brighton Menzshed hosted a regional hub meeting for Trevor Scott on 14 August, with the intention of honouring his contribution to the Menzshed movement in Aotearoa New Zealand.

Seventy-three sheddies from around the Canterbury–Westland region attended, including David Broadhead – chairman of Menzshed New Zealand Inc. – who came down from Auckland for the event. Christchurch City councillor Celeste Donovan also attended.

Trevor was presented with an honorary life membership certificate by the New Brighton shed, along with a letter from the Hon. Matt Doocey, Associate Minister for Health and Minister for Mental Health. Doocey wrote: "I would like to acknowledge Trevor's commitment to Menzshed over the many years and the positive contribution he's made to the local community."

A joiner by trade

Trevor's career began in the woodworking classes at Shirley Boys' High School in Christchurch, where his teacher recognised his abilities and arranged for him to gain an apprenticeship at RL Sparrow, "a joiner shop that made almost anything from doors to spiral staircases. I gained an apprenticeship there and at evening classes gained my Advanced Trade Certificate in Joinery", Trevor says.

He spent time in Australia fitting out shops, high-rise apartments, and the like, but a desire to teach saw him return to Christchurch to attend Teachers Training College. Woodworking expanded to include technology, graphics and design, and computer studies. Thirty years of night classes for adults allowed him to pass on both practical and confidence skills, along with a commitment to pass on his own skills, experience, and high standards of craftsmanship.

Creating our first Menzshed

It was while teaching at the Oxford Area School that Trevor came across the Men's Sheds in Australia, which resulted in the first Menzshed in the Canterbury–Westland region using the school's workshop on a Saturday.

"I approached 10 men of influence and skills in the area and convinced them it was a goer and what we could achieve," Trevor says. "We started with making outdoor seating for places in Oxford and other projects. The council could see value and gave us land in the centre of town for the shed. We were hugely fortunate to have a large shed donated to us. We worked hard, the shed numbers grew, I remained passionate, and the rest is history."

At the time, sheds were also starting in Dunedin and Hamilton – but each was unaware of the other.

Succeeding as an organisation

Trevor comments, "I always remember

Seventy-three sheddies being inspired by Trevor at the New Brighton Menzshed hub meeting

Trevor receiving his New Brighton Menzshed Lifetime Membership certificate from David Broadhead, chairman of Menzshed New Zealand Inc.

Trevor doing what he does best – teaching and imparting wisdom

two statements that a number of men have said to me over the years. 'If it was not for the shed, I would not be here' and 'It has given me a purpose in life'.

"With these two statements firmly in my mind, I know we have succeeded as an organisation within communities. My dream would be to see a shed in each community throughout the country … I really do see a great future for towns, retirement villages, and many communities to set up a shed, learn from each other, pass on skills, and improve men's health and well-being for decades to come."

Trevor has been diagnosed with terminal cancer. As Hon. Matt Doocey acknowledges in his letter, "I am sincerely sorry to hear of Trevor Scott's cancer diagnosis; my thoughts are with him, and his family and friends during this difficult time."

It's not often you get to agree with a politician. Still, on this occasion, we can, as we salute Trevor and his commitment to the skills, the camaraderie, and the health and well-being of members and potential members of the Menzsheds of Aotearoa New Zealand.

Hon Matt Doocey

Minister for Mental Health
Associate Minister of Health

11 August 2025

Nigel Young
Regional Representative, Canterbury & Westland
Menzshed New Zealand
regrep4@menzshed.nz

Dear Nigel

MenzShed Men's Mental Health & Honouring Trevor Scott

Thank you for your email of 28 July inviting me to attend the MenzShed meeting to honour Trevor Scott on 14 August. I appreciate you taking the time to write.

I am sincerely sorry to hear of Trevor Scott's cancer diagnosis; my thoughts are with him, and his family and friends during this difficult time. I would like to acknowledge Trevor's commitment to MenzShed over the many years and the positive contribution he's made to the local community.

As you know the Government is committed to improving mental health and addiction outcomes in New Zealand. I strongly value the work that MenzShed does to support men's mental health; you are doing vital work and helping to improve mental health outcomes.

I am unfortunately unable to attend the meeting on 14 August due to the parliamentary sitting that day.

Thank you again for writing.

Yours sincerely

Hon Matt Doocey
Minister for Mental Health

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand | +64 4 817 6812 | matt.doocey@parliament.govt.nz

An error and an apology

The Greville Wills cover story by Jason Burgess in *The Shed*, Aug–Sep, Issue No. 122, contained an error in a caption on page 15.

It incorrectly stated that Greville handles the accounts for the Hamilton Model Engineers club. He does not.

He has, however, attended the national convention in Hamilton and on that occasion ran both his locos there.

We apologise for any inconvenience or embarrassment that the caption may have caused.

THE SHED ONLINE

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

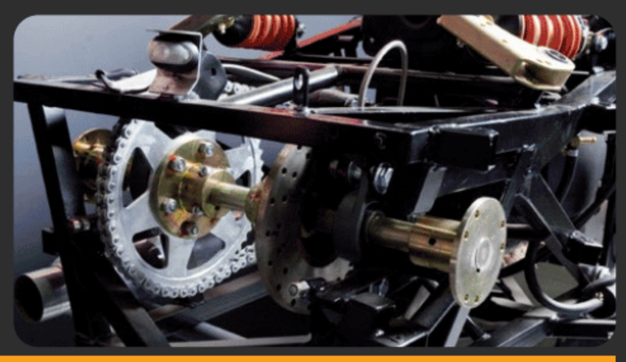
Every week, we upload new content onto The Shed *website to add to the hundreds of articles and videos already on the site for readers to discover, learn from, and enjoy. Some uploads of the past few months include:*

Mac-n-sea

A landlocked boat builder has a thriving business making craft from macrocarpa
https://theshed.nz/mac-n-sea/

It's good to be square

All woodworkers need several squares, but not all squares are created equal
https://theshed.nz/its-good-to-be-square/



Race cars made in New Zealand

From racing to making, Craig Greenwood has met the challenge
https://theshed.nz/race-cars-made-in-nz/

Build an almost-ready-to-fly Warhawk

Enjoying the hobby of model aircraft
https://theshed.nz/build-an-almost-ready-to-fly-warhawk/

editor@the-shed.nz

LETTER OF THE MONTH

LED compliance advice

Hi Greg,

Please pass on to Peter Barton, AJS build articles, [that] LEDs headlights can be used, but must meet compliance **https://vehicleinspection.nzta.govt.nz/virms/entry-certification/i-and-c/lighting/headlamps**

Click the link to Table 4-1-1, there is a table showing the required standards the light must meet.

Where you'll run into problems is that some inspectors will see LED and fail it, while others will know this table and look at your light to see if it meets the standard.

There are lots of 7-inch round headlight options out there that meet the standards. As you said in your article, you won't be putting an LED bulb in the original housing.

Good luck, I'm going to be going through it soon myself.

Cheers

Rich Martin

Peter Barton replies:

Thank you for the information, and it is encouraging to find out that there are pathways through this aspect of my future compliance. I'm hoping that I can use elements of the 6V system that the bike originally had (generator and regulator), and a 6V certified sealed LED beam unit would be hard to find? Perhaps I will have to settle for incandescent bulbs: I haven't checked the availability of those (6V) yet, but I suppose someone stocks them.

Can anybody recommend a source?

Thanks again,

Peter

More vintage Harleys out there

Hi,

I was reading your article about Bill and his Harley collection (*The Shed* Issue No. 121) and would like to correct this as it says that there are only two 1915 [Harleys] in New Zealand.

This is not the case, as my mate also has an F model 1915, so that makes three, and I have the only one that I know of, the single-speed 1915 model E, so that makes four, plus a couple of other years as well.

Steve

A simpler alternative to a black oxide finish

Hi,

An interesting article (How to Achieve a Black Oxide Finish, *The Shed* Issue No. 122), but it seems a long-winded way to achieve the objective of rustproofing small items.

I, too, had the same issue for lathe tooling I made. I use a commercial off-the-shelf item from the local sports shop to achieve the same coating. This is 'gun blue liquid' used for touching up steel firearm components.

You still need the item to be shiny and clean for best results. However, the gun blue liquid is supplied ready to use, and a small artist brush does the coating. Brush it on, leave for a few minutes and wash off with water. If not dark enough, repeat. When done. I find a spray penetrating oil product the best to use for an oil layer. It is a thin layer, so no issues with changing dimensions. If it wears in use, just clean and shine the affected area and reapply.

In my view, this is a better way, as it is quicker to use with no chemicals to procure and process into a usable product. The article process may be more durable in use, but I have items done some time back and they are still good to go.

Regards,

William Keith Beaurepaire

Storage tips for your workshop

Dear Editor,
You asked for items of interest for *The Shed*. Well, here is one, and it concerns all of us.

Having a workshop where I do all sorts of metal- and woodwork, I would be totally lost if I could not put my hand immediately on a tool or component for a job in hand. Spending long lost minutes searching for an item helps nothing, especially my temper.

It is the issue of storage. We need to store all our 'toys' in such a manner that they are:

- easily accessible
- suitably organised
- appropriately arranged
- easily found
- not overly expensive.

I just love companies that supply a case with the tool that you buy. This was not always the case, and so often the tool that you bought was in a cardboard box, which over time absorbed moisture, causing rusting, and it finally fell apart. With tools that have no container provided, I have resorted to building customised boxes out of MDF to hold them, sufficiently large to also contain their associated tools and accessories. If I need it elsewhere, I just pick up the box which has everything I need in it and go.

The boxes are sprayed internally with oil or WD20 to ward off the dreaded rust monster. They are labelled suitably to discern which brown box in the shelf holds what.

I keep an eye out for cheap plastic boxes in which I hold a variety of tools, tooling and components. Preferably, they nest to help keep them in their place. Sistema boxes are a good example of these, but they can be dear when you need 20 or so. I also use a lot of plastic bottles to hold screws and other standard parts. The bottles from the Plastic Shop are semi-square and have white lids, which are ideal to write on with a felt tip.

They then sit nicely in drawers, organised generically. I do not use glass bottles! You find out why the first time one drops on the floor. For very small parts and small drills, I use discarded pill bottles. Once again, they have nice white tops to write on. The small metal mint containers are a good size as well, but they need a bit of white paint on them before writing the contents.

A good source of boxes are those which hold take-away food, suitably clean, of course. However, as they are a bit flimsy, they do have a limited life. I use them chiefly in projects to hold groups of parts until I need them. Good for smaller and flat parts.

I also make good use of the compartmentalised flat fishing boxes. They are especially good for holding similar items which one needs to select from, such as flat washers, screws, or the various bits to go into my Dremel. I use a big fishing box to hold all my taps and dies, and their holders, a compartment for each size.

I have a good selection of files, and they are able to get blunt, rattling up against each other. My solution is to wrap each in a piece of tinfoil. Not only does this prevent them from getting dulled, but the aluminium also acts as a sacrificial anode, which helps prevent them from rusting.

Getting larger, I use crates for my building tools and painting stuff. Nice and easy to lift and go with everything inside. Once again, they need to lock together so they can stack in the corner. I also use these for holding metal offcuts.

Long pieces of metal, threaded rod and the like, can pose a problem. Pieces of offcut drainage pipe are really useful here, a few different lengths corresponding to the lengths to be stored. Sometimes, for really long items, overhead storage is the only option.

If I had thought properly, when I had my house built, I would have had the garage walls lined with plywood instead of GiB. It would have made life a lot easier for attaching shelves and cabinets.

Last but not least, I worry about the trip hazard that exists with power cords lying on the floor. My solution is to put a double adaptor on the overhead plug for the garage door opener, then drop an extension plug down. This hangs at shoulder height, making it easy to plug in smaller tools such as a Dremel or the like.

I hope that one or more of the above helps your readers.

Regards,
Chris Pattison

Odd Jobs

Hang out on your own DIY swing chair!

Elevate your outdoor entertainment area with your very own DIY swing chair. This is a satisfying weekend DIY project that you and your family and friends can enjoy for years to come.

Swing chair to do list

- ✔ **Prep and prime with the right Resene primer for your materials**
- ✔ **Build out the base, framing and construct the chair**
- ✔ **Paint with Resene Lustacryl in your chosen colour**
- ✔ **Suspend your chair and hang out!**

Watch now!

View how to make your own swing chair, plus cut lists and step-by-step instructions at masterstrokebyresene.com

Visit your local Resene ColorShop for all your decorating needs and the widest range of NZ made paints, wood stains and colours.

MasterStroke by Resene

BUILDING A WOODEN SEA KAYAK

A school project is launched

By Luke Spargo | Photographs: Luke Spargo

Cutting the ply

“This project was for the NCEA Level 2 design technology course”

Luke measures up

The wooden sea kayak I built is 5.2m long and is made from 4mm thick marine plywood. The design is constructed of four pairs of wooden panels, so eight panels in total, using the stitch-and-glue construction method (wire ‘stitches’ together the plywood panels and the joints are glued). My final choice of materials included Meranti ply, epoxy, fibreglass tape, brushes and gloves, etc.

I downloaded the plans for free from Guillemot Kayaks at http://guillemot-kayaks.com, and the website also provided quite a bit of help for a first-timer, which was useful.

It was very generous of the kayak’s designer, Nick Schade, to make the plans available for free, as I didn’t really want to spend any more money on top of everything else I had to pay for. This project was for the NCEA Level 2 design technology course in Year 12 at Hutt International Boys’ School when I was 16. Through building this kayak, I won the Parapine ITM technology award for the student with the best practical ability, which was a bonus.

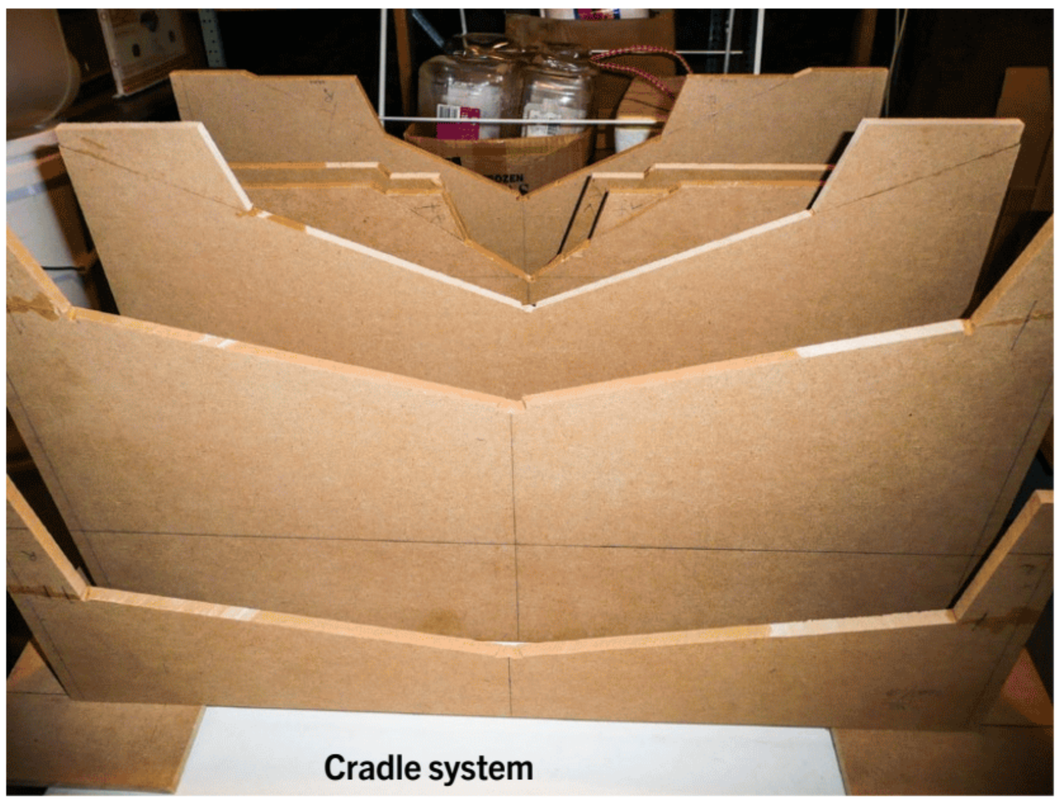
Measurements

The first stage of the build was to set out the offsets from the plans onto the plywood.

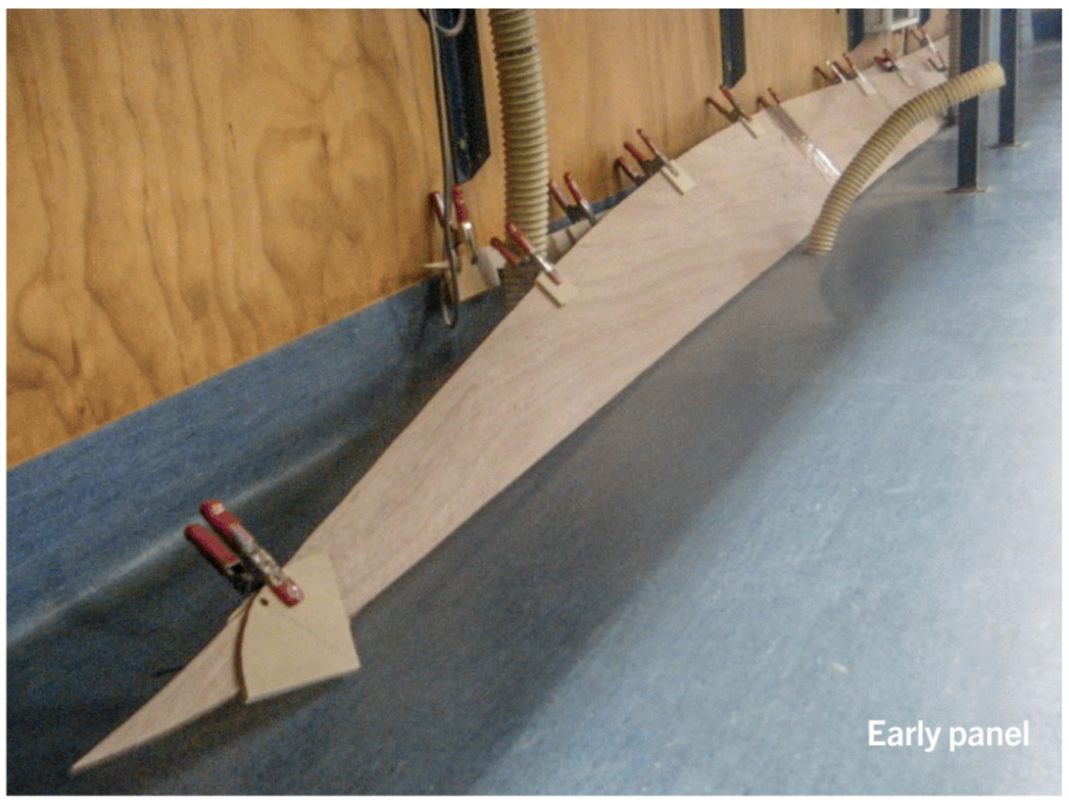
I took a few quick measurements of the sheets and found that they were not perfectly square, so I had to rule a baseline along the bottom of each sheet to take measurements from.

From this baseline, I measured out all the offset points on the plywood. To do this, I cut a piece of MDF to use as a large square. This process is very time-consuming, and once I had finished, I double-checked every measurement again to make sure they were precise. One measurement incorrect at this stage would mean the panels would not fit together correctly.

It was a good thing I double-checked, too, because I did find a measurement that was wrong and a couple of others that were not as accurate as they should have been. Once all the points were plotted, I had to use a flexible wooden batten to draw a fair curve between the points. I found it was impossible to hold the batten and draw the line with just two arms, so I recruited Mum and Dad to

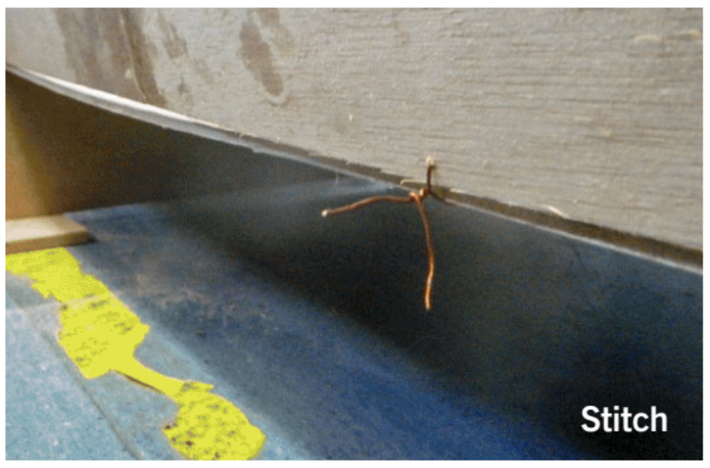


Cradle system



Early panel

Hull shapes up



Stitch

Stitch sample

Glue sample

give me a hand.

After talking to some relatives who knew a lot more about kayak building than me, I realised that I needed a cradle system to hold the kayak while it was glued and forms went inside to push it into the right shape.

Cut

With the plans for the kayak, there were offsets for the forms to shape it.

I cut out 10 squares of MDF (600x600mm) and drew the form offsets on them. I cut through the horizontal centre line, then cut the form out. I was careful not to damage the offcuts because I used them for a cradle, nailing little feet to each to make them stand up.

Using space at school, I laid two sheets of plywood end-to-end on one side of the workshop and the other two sheets end-to-end on the other side of the workshop. With the outlines of the panels matched up, I epoxied the joints, then rolled out a length of fibreglass tape along the joint and applied another coat of epoxy.

The next morning, I found a few bubbles in the tape, apparently caused by aggressive brushing. It was easily sanded out, but something to think about next time. I also had to glue the other side of the join the next day.

I now had two sheets of plywood that were 5.2m in total and 1.2m wide. I bolted these huge sheets together to cut them both at once and get identical panels; very important, otherwise the kayak would tend to pull to one side in the water.

I used a metal-cutting blade on the jigsaw that didn't splinter the edge of the wood too much, and turned the cutting

speed right up to make a cleaner cut. I worked my way along, trying to keep the blade about 2mm from the line on the wood.

I finished cutting the 40m total down the eight lengths of the ply, then found an old block plane at home to plane the edges back to the line. Throughout this process, I made sure that I was not creating any flat spots on the curve of the panel and that the curve was fair. You can easily see any imperfections in the curve by looking along it. I gave each pair of panels a quick sand and learnt that marine ply splinters really badly if you run the sandpaper the wrong way. Each pair of panels took a couple of hours to finish.

Stitch

I stitched the finished pair of top deck panels and the pair of bottom hull panels along the deck line and keel line.

Using a 1.5mm drill bit, I made a hole through the two panels, about 5mm from the edge, then threaded a piece of copper wire approximately 100mm long through each hole and twisted the ends together. I did this every 150mm along the length of the panels, which secured them together tightly.

Next, I got a mate to help lift the pair of bottom hull panels onto the cradle. The pair of bottom panels opened like a book to form part of the hull. With help, I put the side hull panels on top and put a stitch in both ends before opening them; they seemed to fit OK.

Starting at the bow, I put a stitch every 600mm between the side hull panels and bottom panels. Once I found the stern matched up, I filled in the gaps with a stitch every 150mm and a couple of extra stitches at the front where most of the tension was.

A lot of people thought it was a bit odd that I was drilling a heap of holes in my boat. Once I had finished, it was starting to look like a kayak, which was encouraging. I had a closer look at how the hull was sitting in the cradle and found that the angle of the keel line on the front half of the kayak was not quite enough, and on the back half, the angle was too great, which seemed a bit weird. I spent a bit of time trying to get it to sit right, but it just didn't want to.

Home garage cradles for hull and deck

Forms are in place to shape

"A lot of people thought it was a bit odd that I was drilling a heap of holes in my boat"

Cradle

I moved the kayak from school to home. The garage received the biggest tidy-up ever, and I set up the cradle and kayak here. I laid out two long strips of MDF end to end, which came to 4.8m, then laid out another two exactly parallel about half a metre away. Once I was certain they were parallel, I drew around the corners onto the ground so that I would know if they moved at any stage.

I placed the cradle forms roughly along the parallel strips and laid the stitched hull in them, and moved them around a bit. They didn't fit; a continuing problem. I checked the plans again and found I should have flipped the bottom hull pieces around the other way before stitching them onto the side hull. What an idiot.

So I had to clip all the copper wires I had tied and rotate the bottom hull panels and stitch them back on. Funnily enough, the stitched hull fitted almost perfectly into the forms without any force. Good thing I noticed it before I had started glueing.

Forms

I fixed the two end forms in position where they fitted the shape of the hull.

I made sure they were fixed square

to the kayak by measuring from each end. There were no exact positions for the forms on the plans, but it was fairly obvious where each one fitted. By means of a set of nails and string lines, and with Dad's help, I made sure the forms were lined up horizontally and vertically. I then tacked the hull down to the forms to stop it lifting up and moving out of shape while it was glued. Before I started glueing the hull, I stitched the deck together roughly, and it seemed to fit together pretty well, so I stitched it every 150mm. I then matched the deck and the hull together dry; once the hull was glued, it couldn't be bent to fit the deck.

Glue

To glue the hull, I mixed up a plastic container half full of epoxy and added filler powder until the mixing stick stood up in it.

This is a good consistency and stops the epoxy from running out of the joint. I made a squeegee from an ice cream container because the one I bought didn't have a big enough radius for the angles I was glueing.

Before I filleted the seams, I went along with a chisel and pushed all the pieces of copper wire on the inside hard against the wood so they would not stick up through the glue. When using epoxy, I always wore disposable gloves and a pair of overalls because I found that it is impossible to stop epoxy from getting on your hands and everything else. Epoxy is a sensitiser, and a reaction builds up; it can get really nasty if it comes in contact with your skin too often.

Between the two panels, I put a great dollop of the thickened epoxy, then ran the squeegee along the join, which pushed the epoxy right into the joint and produced a smooth curve between the two panels.

I mixed up only a small amount of epoxy at a time to use it fairly quickly; otherwise, it becomes really difficult to apply. A lot of the time, I left the mixed epoxy in the pot for about 30 minutes, taking my time to apply it, and it never seemed to harden quickly, probably because of the low temperatures. I also found that it was very useful having somebody else mix up epoxy while I applied it, since mixing it is time-consuming.

I let the epoxy cure for 24 hours, then pulled the tacks out, flipped the hull over, and clipped the wires. I used a file to file the wires flush with the surface of the wood. I then flipped it back over and put fibreglass tape along the inside seams. I should have put the fibreglass tape on a couple of hours after filleting the seams, but I didn't have time, so I had to quickly sand the surface of the epoxy to make a rough surface for the next layer to adhere to.

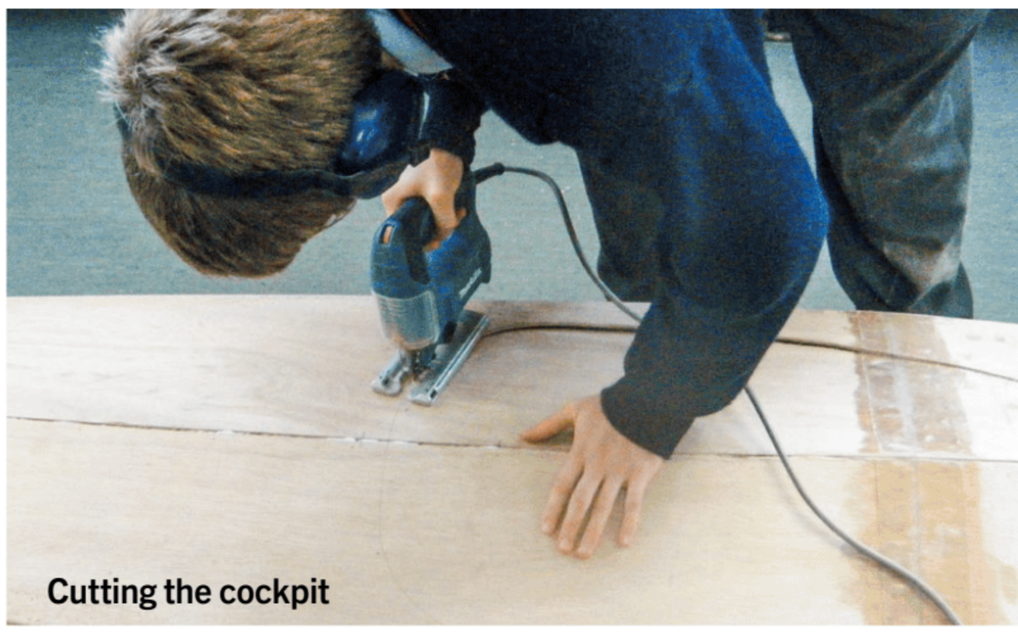
I don't really enjoy hand-sanding epoxy, so I made a really quick job of it. To fibreglass the seams, I applied a really thin coat of epoxy onto the surface, laid down the fibreglass tape, pushed it into position, then went back along and put a second, thicker coating on, completely saturating the cloth to fill the weave. I left this for another 24 hours, and the hull was fairly solid. I could now pick it up by myself without it bending in the middle.

Epoxy problem

I stitched down the centre deck line, then tacked the panels down to the forms to maintain the shape.

Once they sat nicely, I started stitching the sides on again, but there was a big bulge where the cockpit would go. The bulge should be there, but it created a lot of tension in the panels, and it took force to get it to sit correctly. I used a lot

Deck positioned



Cutting the cockpit

The bulkhead in

of tacks to pin the panels to the forms, but in some places, it lifted the forms off the ground. A gap opened up behind the cockpit. I stitched every inch, and it still would not close up fully.

After a lot of forcing, the deck was more or less the right shape. I glued it the same way as the hull, doing fillets along the seams and fibreglassing them, too. I also coated the whole inside with epoxy to waterproof it. After 24 hours, I pulled the nails out, flipped the hull over, clipped the wires and filed them down.

A couple of days later, I went to measure up the two halves to make a couple of bulkheads. I sat the deck on the hull and found they didn't fit together. In the worst places, the deck was up to 25mm too narrow on either side. Now that both halves were epoxied, there was a pretty slim chance of making them fit each other.

I did a bit of reading and found the cause of my problem: the epoxy had not fully cured because of low overnight temperatures, and when I had taken it out of the forms, it had warped slightly. Epoxy does not like temperatures lower than 16°C, and I had done most of my epoxying in about 10°C. Epoxy will cure at lower temperatures but takes a lot longer. Another case of Luke not reading the instructions.

To make the deck match the hull, I tied small, vertical cut-out rectangular pieces of wood to the deck, sat the hull onto the deck inside the pieces of wood and pulled the hull into shape, tightening it up and glueing it together (I waited for a sunny day). The epoxy went quite thick quite quickly, then started heating up and eventually got too hot to hold. Just shows how much the temperature affects the rate of reaction between the epoxy resin and hardener.

I waited four days before I removed all the supporting material to be sure I would not have any more problems from the epoxy. I filled in the gaps with more short pieces of epoxy and fibreglass and let them dry. Phew, the kayak was successfully glued together.

I used the finishing sander with a coarse paper to sand back the rough fibreglassing job along the sheer seam. ▶

Forcing the shape with rectangles

Fibreglassing the hull

Awaiting paint

I went along all the outside seams and rounded them over so that the fibreglass would bond to them. Fibreglass doesn't like sharp edges.

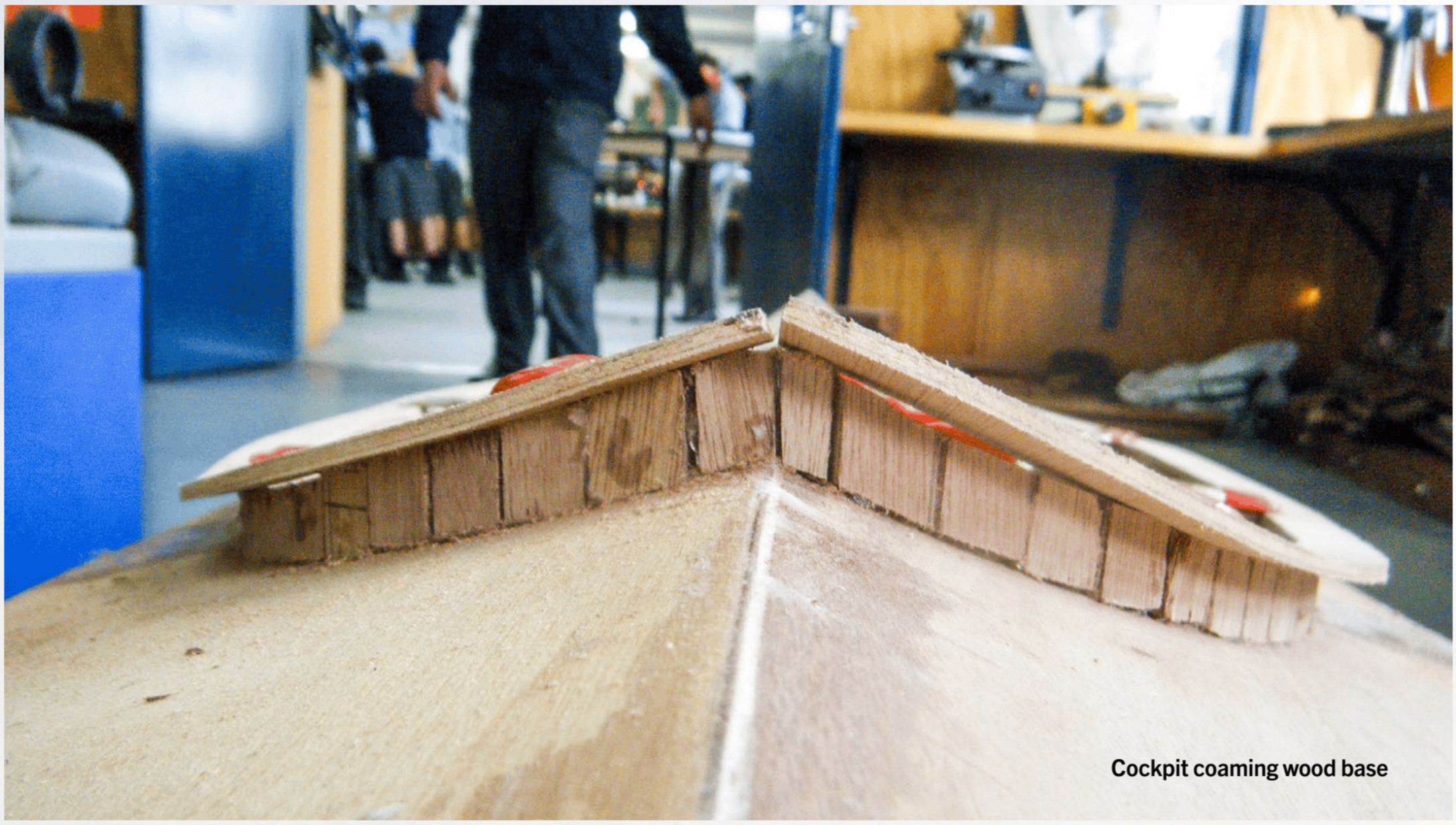
Coaming

The next project was to make the cockpit and the 'coaming' (lip) around the edge, which the spray skirt will fit to.

To get a fair curve for the cockpit, I bent a long strip of thin plastic around the nails, drew a line, cut this out, and traced it onto a piece of paper, which I taped onto the deck of the kayak in the correct position. I cut the cockpit hole with a jigsaw, being very careful to do it right. This stage seemed to draw people's interest for some reason, and everyone wanted to look inside.

To make the coaming lip, I could either cut out five plywood ovals the same shape as the hole and glue them together to build up the correct height, or I could cut out about 150 small rectangles of plywood and glue them upright to the deck. I chose the second option because the first wastes a lot of plywood. I had to shape most of the rectangles on the sander to fit the different angles of the deck, then used hot glue to stick them in place.

Using a coping saw because the jigsaw wouldn't fit, I cut them to the correct



Cockpit coaming wood base

height and belt-sanded them very gently to smooth the cut. The coaming lip stayed clamped while I glued it, using very thick epoxy with a homemade squeegee, which did a very tidy job.

Bulkheads

With the main part of the kayak constructed, the small but still very important parts that followed were the seat, foot pegs, hatches, bulkheads, and deck tie-downs.

The basic seat design I made sits on two 15x15mm pieces of ply to keep you above any bilge water. The curved backrest is attached to a planed piece of broom handle. I glued a grey bedding roll on as extra padding.

Most sea kayaks have a bulkhead in front and at the back to strengthen them and provide two waterproof compartments to keep the kayak afloat in case of capsize. Theoretically, I could have just used the measurements from two of the forms that I used when constructing the kayak, but in reality, they didn't fit because of problems and improvisation during the process.

I marked on the deck where the bulkheads were to be positioned and

used a bevel gauge and a ruler to draw out their shapes. I made a template first, then cut it out of plywood. Because I could not install the bulkheads easily without cutting the hatches out first, I decided to do this next.

Hatches

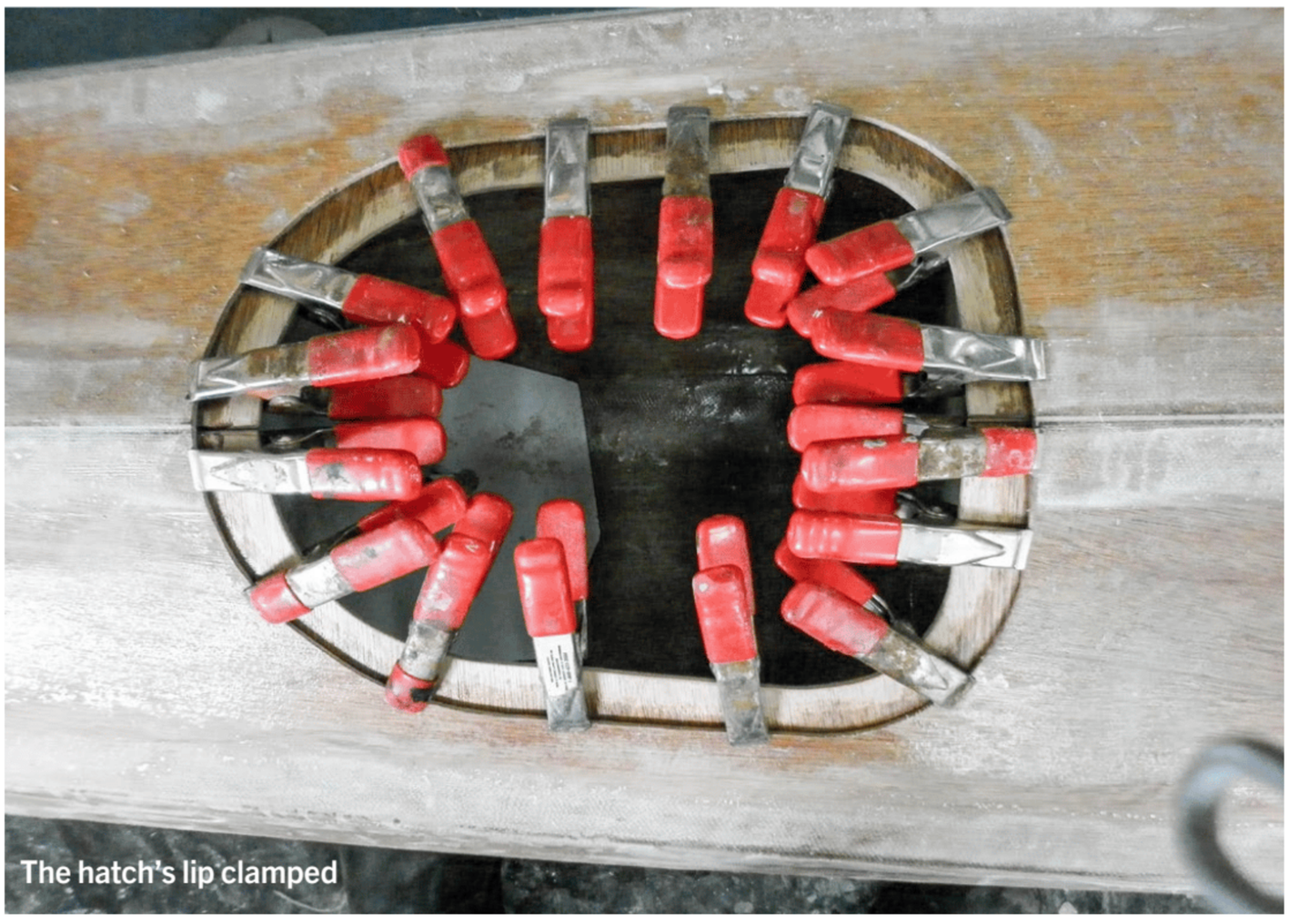
From measurements for what looked like an appropriate-sized hatch hole, I made a template, taped it on the deck and drew around it onto strips of masking tape stuck to the deck.

The tape prevents the wood and epoxy from splintering when cut. A coping saw cut across the peak of the deck, and the jigsaw cut the rest. From plywood, using the hatch template as a guide, I cut a lip for the hatch lid to sit on. I epoxied this underneath. With the hatch holes cut, I took the chance to fillet a bit further towards the forward and aft of the kayak on the inside sheer seam.

The bulkheads could now be easily positioned, and I epoxied them in place and ran a fillet of epoxy around on each side to waterproof them. I fibreglassed one side of one and found it didn't really look that great, so I decided to leave the others. Epoxying around the front bulkhead on the cockpit side was really tricky.

The 12 tie downs for the hatches I made from hardwood, coated them with epoxy to waterproof them, then painted them when I did the rest of the kayak. I used a paint roller at this point to roll a couple of coats of epoxy over the deck of the kayak for strength and waterproofing. I put fibreglass tape along the seams and sanded it smooth between layers.

Masking tape reduces splintering


The hatch's lip clamped

Fibreglass

I decided to completely fibreglass the bottom as insurance against rocks.

After cleaning the surface with a damp cloth, I laid the sheet of fibreglass over it, smoothed out any creases or bumps with my hand and used duct tape to hold the edges flat against the edge of the kayak. I mixed up small amounts of epoxy at a time and poured them along the keel line on the upside-down kayak. The best way to spread it around and work it into the fibreglass is to use a piece of plastic which you run back and forth until the epoxy has fully saturated the cloth and is spread evenly.

After a few days, once the epoxy had cured, I spent the next week sanding the rough edges of the fibreglass. Once this was done, I applied another coat and gave it a light sand, ready for painting.

After rolling on an undercoat and allowing it to dry, I applied two coats of Capricorn Yellow to the kayak and also to the parts that could potentially be exposed to sunlight, such as the inside cockpit, around the inside of the hatches, etc.

Gasket-seal tape stuck on the underside around the edge of the hatches made them watertight, and I took some cheap insurance against losing my hatch covers by attaching them with a cord to the underside of the deck in case they dropped in the sea.

The kayak floats; goes pretty quick; and, most importantly, looks good on the water. I have spent $1132 and 178 hours of my time building it – little hidden costs kept adding up. Part of this cost was building the forms and buying tools which can be used again, so if I were to build another, the cost would be nearer $900.

I had to spend a lot of time learning different construction techniques, how to use many of the materials correctly, setting up and packing away before and after each lesson, and waiting to use tools.

There were times when even I doubted whether it was going to work and felt like giving up. Most importantly, I have learnt heaps from this project and now have a functioning kayak to play with.

1955 JAGUAR D-TYPE

4.2 Litre Straight Six
5 Speed Manual

$599,990

NZ new, just 1,480km, this skillfully handcrafted recreation was built by Tempero Coach and Motor Company and first registered in 2011. Powered by a finely tuned 4.2 Litre Jaguar Straight Six DOHC engine putting out circa 300hp coupled to a 5 speed Borg-Warner gearbox and weighing in at just over 800kg this car is an absolute rocket, not for the faint hearted.

2020 BRABHAM BT62

5.4 V8 NA 700hp, competition track car, 6 speed Holinger, Pneumatic Shift. Just 4,500km, as raced by Shane Van Gisbergen in the six hour endurance race at Highlands.

2013 ASTON MARTIN VANTAGE

2nd Gen 4.7 Litre V8 coupe, only 49,500km, Speedshift II gearbox, new front pads and rotors, new battery, freshly complied and serviced with 12 month WOF.

1984 PORSCHE 911 TARGA

3.2 Litre Flat six 'Boxer' with 5 speed Rennshift manual transmission, 189,750km. A timeless classic that seamlessly blends performance, style, and character.

2016 MERCEDES-BENZ C63

4.0 Litre V8 Twin Turbo, 108,500km, NZ nav with bluetooth and an amazing Burmester Sound System, 0-100kmph 3.6 seconds, Nine Airbags, Distronic plus, Collision prevention assist plus.

1971 FORD MUSTANG

NZ New 5.0 Litre V8 Fastback Coupe, 125,850km, dual exhausts, deep-dish steering wheel, twin-gauge cluster. Recently serviced, strong-running, and full of character. Don't miss out!

1987 PORSCHE 928 S4

5.0 V8 6 Speed Manual, a captivating blend of power and sophistication, combining classic Porsche design with muscular performance, luxurious leather seating.

2014 JAGUAR F-TYPE

3.0 V6 Supercharged Coupe, 8 Speed Paddleshift, just 48,500km, beautiful example in Ammonite Grey, 340hp at your right foot! Sumptuous half leather/half suede interior with dual climate.

1973 TRIUMPH 2000

NZ New, 2.0 Litre, 83,955km, buckskin vinyl interior, loop pile carpet, NZ style wooden door cappings. You will be hard pushed to find a 52 year old Triumph in better condition than this one.

2008 MASERATI GRAN TURISMO

4.2 Litre V8, 6 Speed ZF Auto with Paddleshift, just 55,000km, 0-60 mph in just 5.2 seconds, top speed of 177 mph, premium leather upholstery, dual-zone climate control and much more.

2011 JAGUAR XJL

5.0 V8 380hp, 8 Speed Paddleshift, 74,125km, luxury full-size sedan that blends British elegance with sporty performance. LED Daytime Running Lights and bi-xenon headlights.

2007 LAMBORGHINI GALLARDO SPYDER

5.0 Litre V10, 4WD, 500hp, E-Gear, Front lift kit, custom paint in 'Gulf' blue, be quick! Electric roof, comprehensive service history, no expense spared.

2012 MASERATI GRAN TURISMO

NZ new 4.2 Litre V8, 6 Speed ZF Auto, gloss black with tan leather, electric seats, dual zone climate control, Beautifully presented in the best colour combo! 100,000km.

2012 MASERATI GRAN TURISMO

NZ new, 4.7 Litre V8 Martini Coupe, just 42,000km, looks fabulous with Martini Livery, Aftermarket exhaust system means you will hear this car coming before you see it.

1999 FERRARI 355 SPIDER

3.5 Litre V8, 380hp, Beautifully presented NZ new 355 with full service history, this two seat, mid engined V8 with a Pininfarina styled body is arguably one of the best looking Ferraris of all time.

2010 BENTLEY CONTINENTAL FLYING SPUR

6.0 W12 Twin, 4WD 550hp, Torsen-based permanent all-wheel drive system, adaptive air suspension, continuous damping control. Front massage seats.

1997 DODGE VIPER GTS COUPE

6 speed manual, 8.0L V10, super low km's - 44,500 miles, amazing condition, 2nd Gen Viper are becoming collectable – beats money in the bank! Be the coolest car on the road!

Andrew Farrow
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EYREWELL FOREST MOTOR COMPANY

WWW.EFMC.CO.NZ

RESTORING A 1952 AJS

Part 6

ELECTRICALS (BREADBOARD TESTING), SUSPENSION, CONTROLS, PETROL, AND OIL

The restoration road never runs smoothly. In this update, Peter has some surprise issues with the electrics, and the already completed nickel plating doesn't behave either – but there's also a few wins. He's is eager to get that engine running as soon as possible!

By Peter Barton | Photographs: Peter Barton

1. Substituted bits for the bike: a piece of a barbecue hotplate becomes a part of a cooling fin. 2 and 3. Stripped threads like this one at the bottom of the front forks were a problem; luckily, I had other forks I could cannibalise from. 4. Breadboarding – trouble-shooting at this rebuild stage rather than when the parts are on the bike

This is the second rebuild the old '1952' AJS 500cc has had; the first was by someone else. I have ownership papers which indicate a rebuild in the late 1960s, and it seems to have been a very broad collecting effort, pulling in different parts from different machines.

The web makes it easier to identify the bike's parts, and mine date from 1947 to at least 1956; I feel that I'm not constrained by concerns over authenticity. I can change parts if I want to – personalise the machine a little.

Readers of my first article will know that I used part of a barbecue hotplate to fix a broken cooling fin on the motor, using nickel electrodes. I have been electroplating using nickel as a replacement for decorative chromium. I can hear The Who singing Substitute.

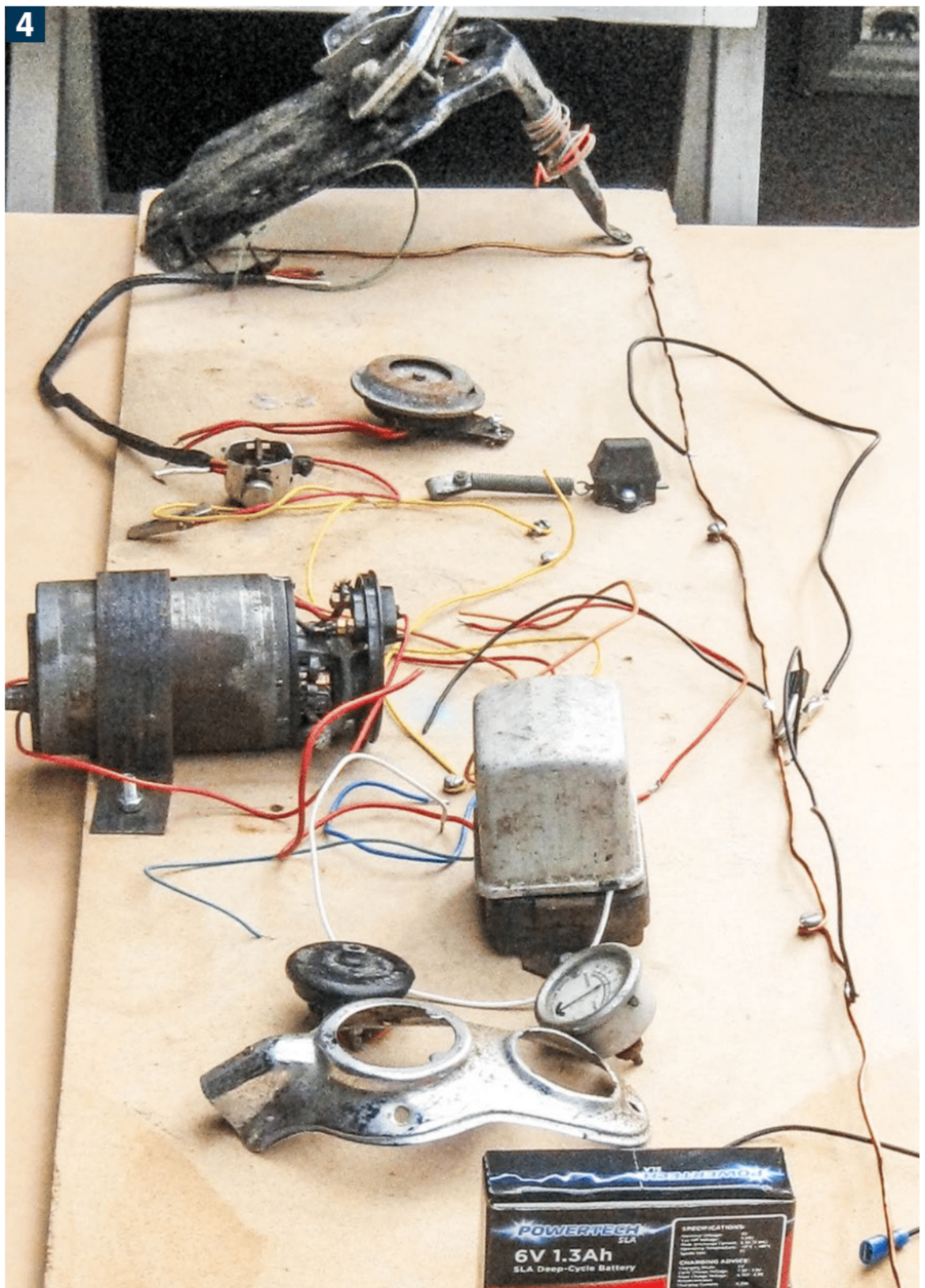
The 'Teledraulic' front forks

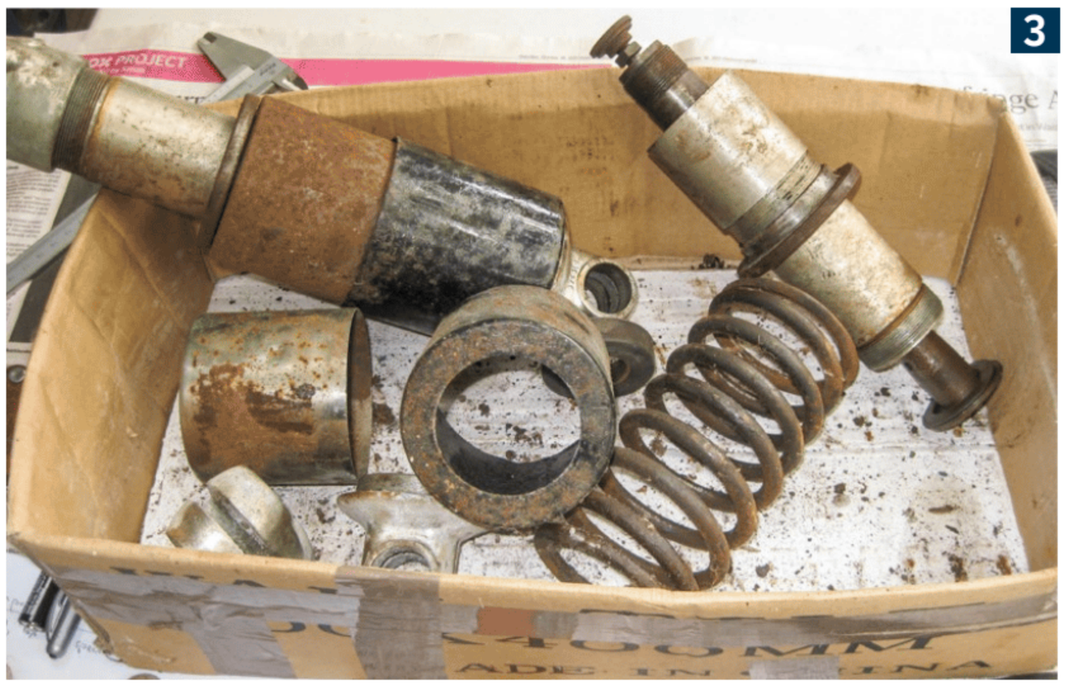
For some, not many, nuts, studs, and bolts, I have been forced to go to metric: blame stripped threads.

Where I have, thankfully, managed to keep original cycle-threaded nuts and bolts (26 threads per inch, irrespective of the imperial diameter), I have plated them with nickel, and more will get the same treatment.

A nickel finish looks more like stainless steel than a chromium plate. With the dents and rust I have to try and correct, chromium plating is simply a step – and many dollars – too far.

Later, I will describe how the electrics are going, 'breadboarding' a mixture of old bits and new





1. The rear assembly of the bike: 50 years in storage; note the unoriginal suspension. 2. A Jampot set gathered together; the damper tubes towards the right have been partially dismantled. 3. The Jampot rear suspension parts as they came out of storage. 4. Some of the front Teledraulic parts

technology; some substitutions were called for here.

One system on the bike which I am very keen to retain, mainly as original, is the suspension, front and rear. It is made up of 'Teledraulic' front forks, which were developed by the AJS parent company (AJS, Matchless, and later Norton). 'Teledraulics' are a hydraulic suspension system using pressurised hydraulic fluid to control ride height and absorb shocks, plus the famous 'Jampots' at the back.

When I bought the bike, the Jampots (so called because of their fat appearance) were not fitted; some other system, perhaps Girling, was there. The Jampots came, partly in bits, in a carton which maybe should have been labelled 'Optional Dented and Rusty Accessories'. The Jampots *have* to be used. (AJS and Matchless bike groups around the world are known as 'Jampot' clubs.) This became a bit of a challenge.

Restoring the Jampots

First of all, their outside appearance. There are three materials used in visible positions: painted steel, chromium-plated steel, and aluminium alloy. The painted steel cans (which partially cover the upper part of the springs) were dented and rusty. Where there were deeper dents, the underlying springs had scraped some small holes.

These were relatively easy problems to fix: rust converter, beating out the dents to some extent, primer, bog, sanding, and then spraying with the epoxy satin-black paint.

The alloy tubes did not have any corrosion but were severely stained; worse yet, in their past life, somebody had taken to them with what must have been pipe wrenches, for their dismantling; they are badly scored. However, unlike the front Teledraulics, no alloy had been broken off. And thankfully, the tubes still had good circular cross sections.

I did some gentle brass-wire brushing with a drill at slow speed and then used 1200-grit wet-and-dry paper for final cleaning. They look quite good from a middle distance. The score marks are still there, though. For the moment, they will have to do; once the rebuild is done, I could return to some of these cosmetic things, get the alloy filled with a metallic putty, or dismantle and then get the alloy dings filled with weld. Well, maybe that will happen.

A bigger challenge

Parts which had once been chromed, the cans covering the bottom of the main springs, presented a far more serious challenge.

They were dented; rusty; and in one part, a dent had been scraped into a small hole by the spring behind. To fix

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> “The Jampots *have* to be used”

the dents and the hole, ready for the eventual nickel-plating, I first sanded off all the rust and any chromium in the affected areas. Good sand blasting would have been more efficient and thorough, and specks of rust gave me problems later.

My neighbour has oxyacetylene (I once did as well, until BOC changed the exchange rules to hire, but I have whinged about that before) and kindly filled the dents and holes with brass, resulting in a slightly proud finish.

More sanding, first by machine, then with 400-grit and 1200-grit sandpapers.

As previously mentioned, I have decided that the best plating system for me is to cover any steel with some nickel, then always put on a thick layer of copper, then nickel again. My second article in this series went into this in some detail.

I’ve since found that just a single

5. Front Teledraulic parts: the top-right tube has to be bogged and painted; next to it (lying down), the tube with dents marked, which have to be filled with brass and then nickel-plated

6. Jampot and Teledraulic parts, which need to be plated: dents filled by brazing

7. Brass fillings sanded down; some work still to be done here

8. Copper plated onto Jampots. Sanding and polishing are still required

9. A nickel plate without copper develops a fine layer of rust for me

10 and 11. Failure to clean specks of rust leads to pox

Rust to Rrroaarrr NZ Safety Blackwoods

A tidy copper plate requires a glass of fizzy

Final layers of nickel: looks OK from the middle distance

nickel layer itself, on polished steel, looks good immediately after plating, but eventually does develop a fine rust.

I think that the nickel must be a bit porous (at least my home efforts give me that), and air and moisture can still get in and attack the underlying steel. Quite apart from being a softer metal easier for polishing (and cheaper than nickel), copper is said to 'throw' better – that is, fill microscopic pores and scratches.

Anyway, using the copper layer seems to stop the fine rust.

Bad pox

Plating showed that the dent repairs in a few cases weren't too good. "May your dents at least become dimples".

Overlooked tiny bits of rust gave the cans bad pox. Each pimple and wart had to be ground out, then fixed by local brush plating – sometimes more than once. Eventually, each can give me a good side which can be turned toward the onlooker, the bad side to the wheel.

The Teledraulics in the front had similar problems, fixed in similar ways. One additional issue was a broken alloy lug (on a stanchion), which had a hole for a mudguard stay; again, my neighbour came to the rescue with some alloy build-up which I could drill.

Cylinders, pistons, valves, oil, and oil seals

Both front and rear AMC (i.e., AJS and Matchless) suspensions had world-leading damping systems (shock absorbers) for their time, inside the outer tubes and springs.

Here I have been fortunate: the dampers themselves had not been stripped, there was still some oil, and no rust on the tubes, which were still polished where they should be.

Leather washers need to be cut, though; they are for cushioning the tops and bottoms of the main springs, and I could find only remnants of one. Looks like I'll have to find a local saddler.

The oil seals, which should stop oil escaping from the piston shaft, look to be very good; no scratches or wear are apparent on their faces. They are tightish but smooth sliding on the shiny, rust-free shafts. Washers which seal off the flange at the bottom of the cylinders

Left and right: The inner damper arrangement in the suspension needs a pin wrench for dismantling

NZ Safety Blackwoods Getting to the nuts

Left and centre: The pin wrench has done the job. Right: Some of the inner parts removed; the oil seal is visible inside the tube, top left

were easy to make, and I think they will work well.

I made some wooden clamps for holding the various tubes during dismantling and reassembly; the photographs show how these work. A bit like the stocks for rascals on the old village green.

I also made a pin spanner for undoing and retightening the different collars, and that is in the photos as well. Simply a couple of pieces of old, small-sized angle iron hinged with a small bolt, and pins (from a six-inch nail) then welded at the ends.

Breadboard checking

My breadboard is set up to let me check out the old electrical bits, which I got in a (collapsing) carton. First, the generator.

For some reason, I just cannot get more than 4V out of it now, by putting current directly into the field coil from the wee battery and then spinning with a drill (see Part 5 in the previous issue of *The Shed*, No. 122, where I describe getting 7V).

The field coil circuit is still excellent, with no shorts or breaks, and a good magnetic field. Armature coil resistances are good, and there are no shorts to the armature shaft itself. A mystery again, but I'm pushing on with other bits because the battery alone could supply

Tube with the oil seal visible: if this seal fails, oil leaves the system, and the damper will fail

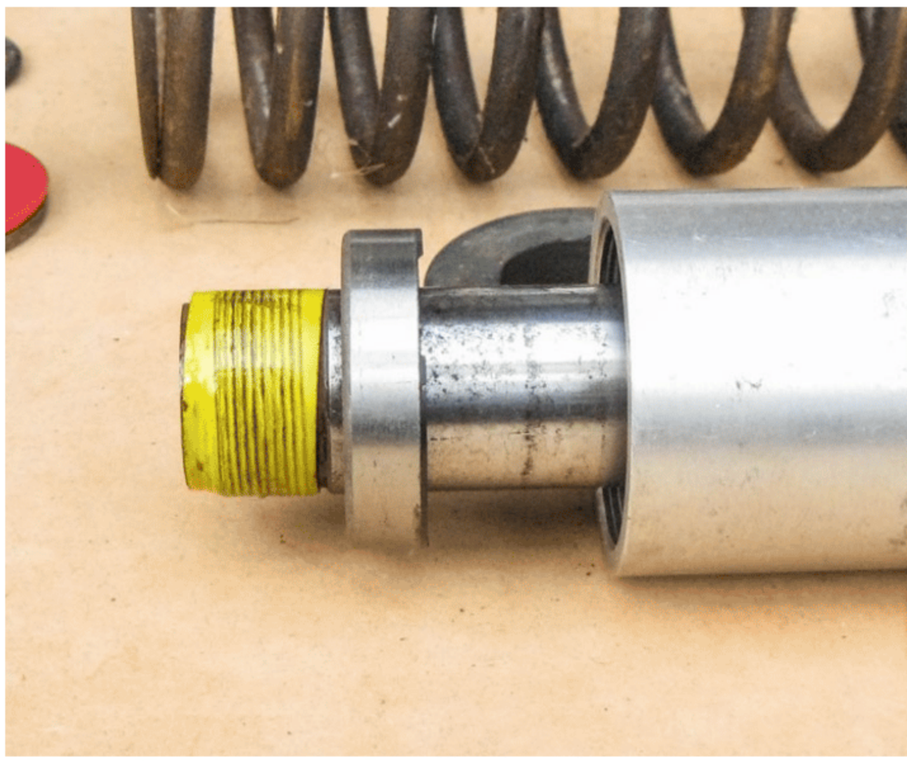
"Here I have been fortunate: the dampers themselves had not been stripped"

Jampot parts: still more dismantling to be done

s & bolts of it with NZ Safety Blackwoods

Jampot parts; plating, cleaning, and polishing to be done

Cleaned, polished, plated, and ready for reassembly



The oil seal goes in: tape over the threads protects the face of the oil seal from scratching

"For some reason, I just cannot get more than 4V out of it now"

the limited lighting, horn, and stop light for short periods (it is a deep-cycle battery) – Zen and the sheddie.

The cut-out and regulator unit (classic Lucas RB 107) did not work correctly. Supplying the D-terminal with positive current (as if the motor is turning a generator/dynamo and making plenty of electricity) and with the E-terminal at negative earth, the cut-out points closed and switched on the charging system as required.

However, the regulator points opened but did not increase the resistance – that is, did not make the field current go through a high-resistance pathway and thus decrease the field strength.

Since the regulator circuit measured as high resistance anyway, dirty points would seem to be the problem; clean them, and the regulator could allow a fat current when required to boost the magnetic field and therefore the generator output. And so it was solved. Much easier testing and fixing whilst not on the bike.

Still a mystery

The rotary switch that I described in the last article still has me baffled.

There is no hidden circuitry, just a three-position bridge which can be 'Off',

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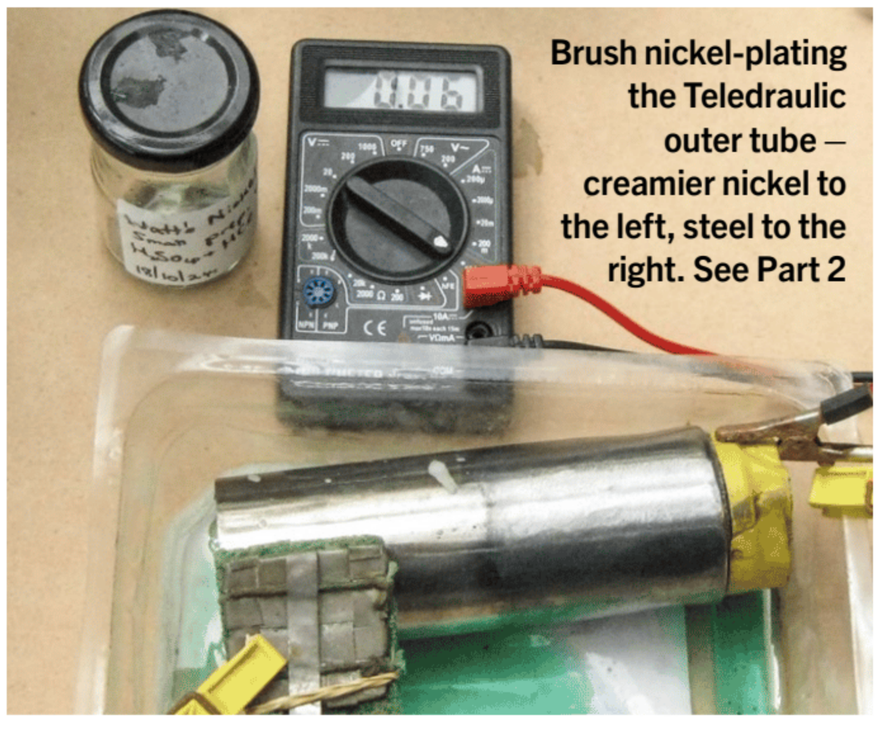
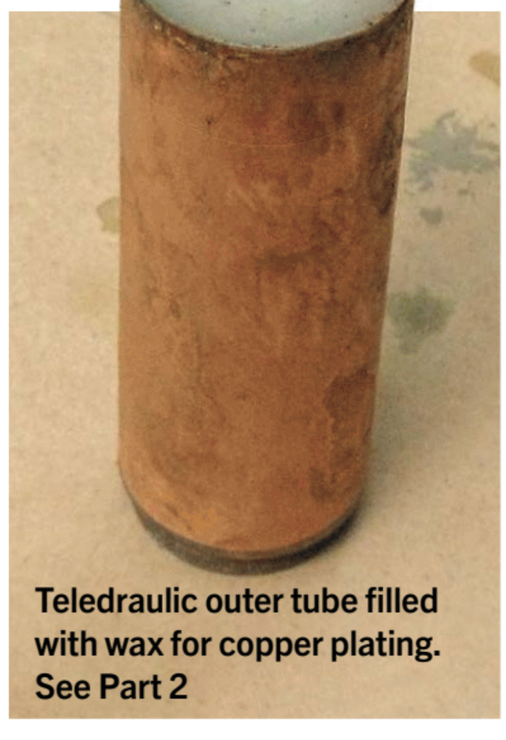
Assembly continues: wooden tools clamp tubes, rather like the village stocks

Loosely assembled. Leather washers are needed inside at the ends of the mainspring. The pivots at each end of the unit need rubber bushes for attachment to the bike



Brush nickel-plating the Teledraulic outer tube – creamier nickel to the left, steel to the right. See Part 2



Teledraulic outer tube filled with wax for copper plating. See Part 2

‘Low’, and ‘High’. It is headlight-mounted along with an Australian ammeter, which works. Perhaps a reader can help me here?

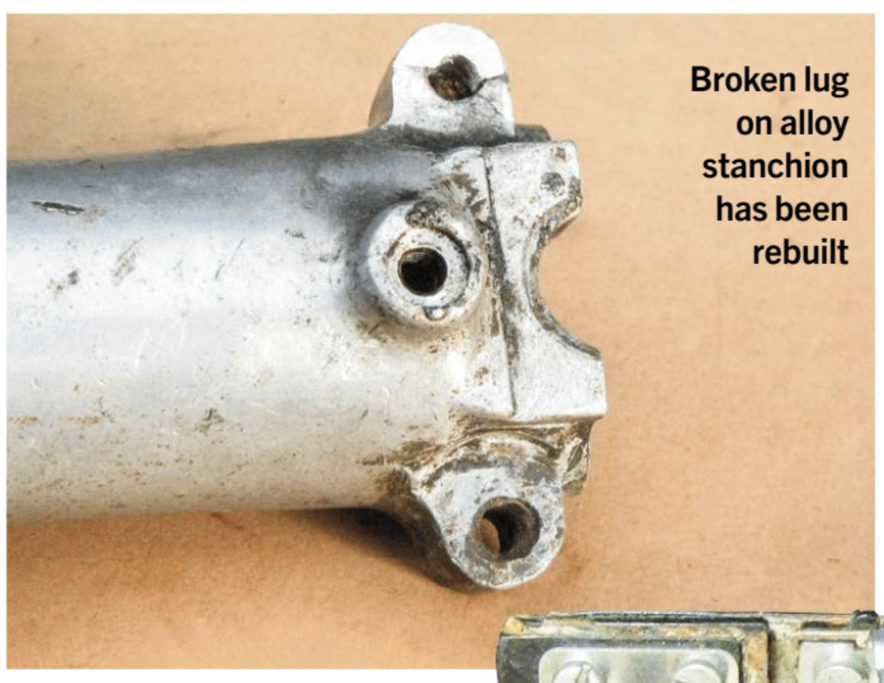
It can serve for switching pilot lights or a reading lamp in the sidecar if I ever go that far. A simple two-position toggle switch (single pole, single throw [SPST]) can switch the headlamps on and off, and, indeed, there is a hole in the headlight shell which would be for just that.

The little thumb-operated headlamp-dip and horn switch to go next to the throttle grip was easy to dismantle and clean/fix the dodgy contacts. I’ve said it before: the beauty of old gear is that it can be taken apart and repaired. I’ve yet to nickel-plate it, but it is on the breadboard (upside down so the innards are accessible).

The brake-light switch is mounted and works just fine: a slide switch which connects via a spring to the rear brake rod.

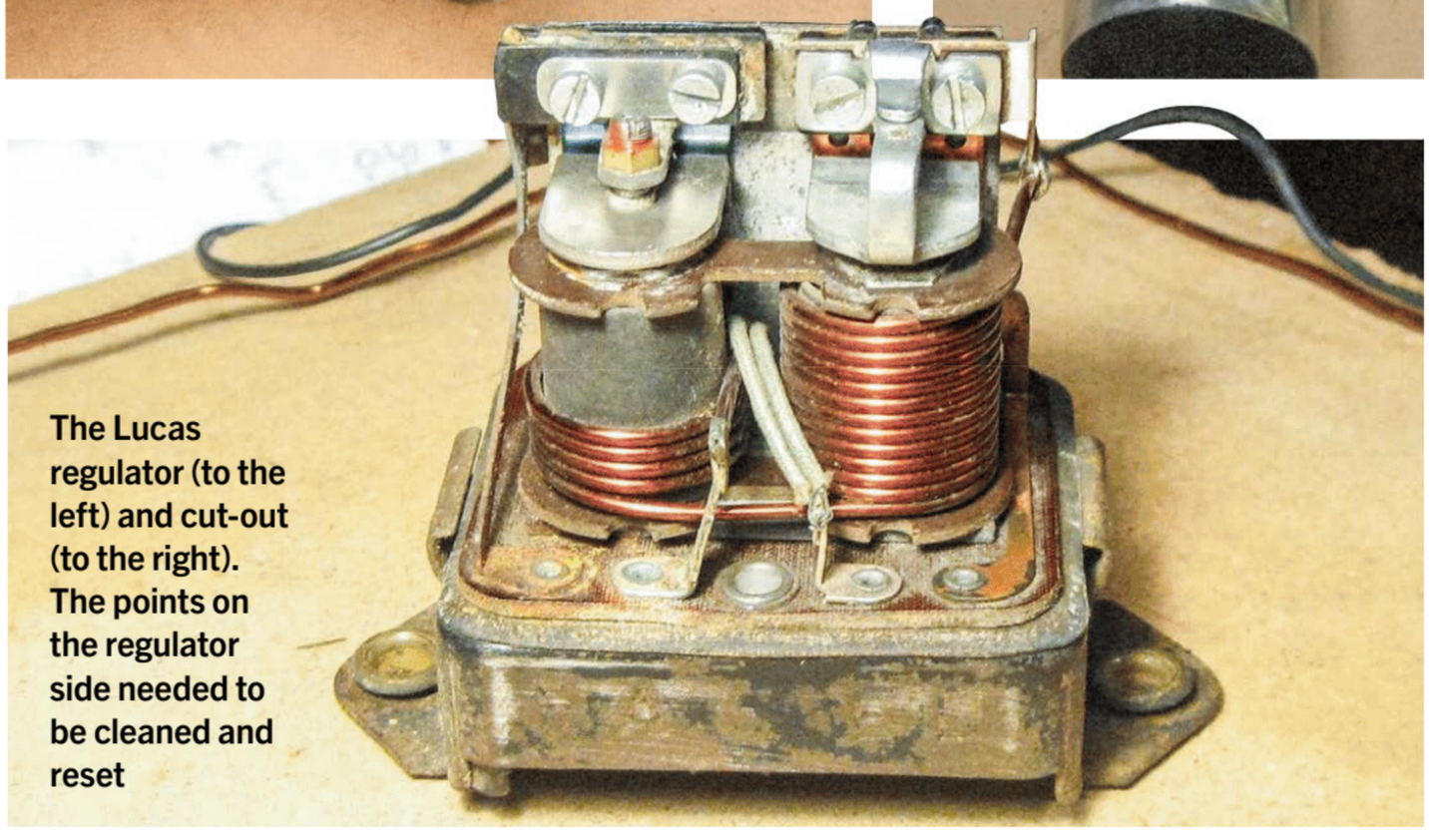
I’ve got three horns to choose from. The first, which works and is a circular one typical for this bike, is mounted on the board. The other two are intriguing: the same as each other and like little coiled trumpets. Possibly off a car?

They don’t work, but could be taken apart. This is a distraction I must avoid until much later. A trumpet horn on the handlebars would be just dandy, though. ▶



Broken lug on alloy stanchion has been rebuilt

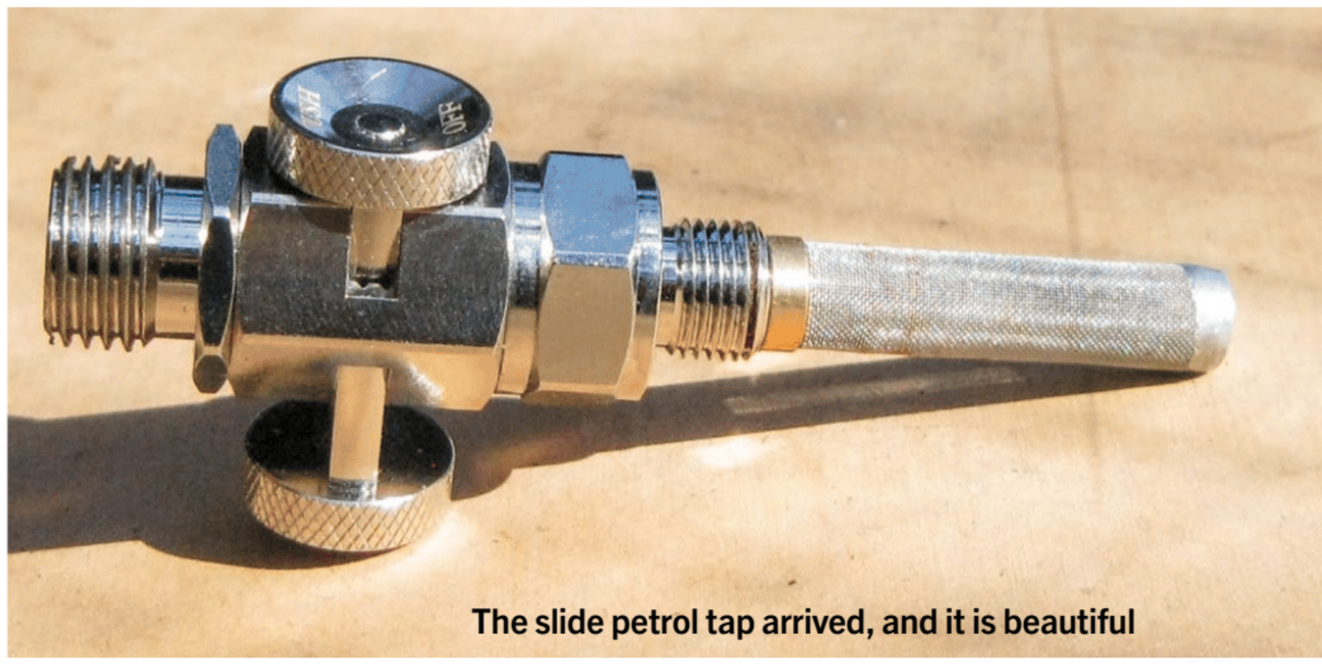
Outer tube final plate



The Lucas regulator (to the left) and cut-out (to the right). The points on the regulator side needed to be cleaned and reset

Rust to Rrroaarrr NZ Safety Blackwoods

Mystery coiled trumpet horns. I wonder what they could be from



The slide petrol tap arrived, and it is beautiful

The oil tank and filter system. The filter element is felt inside wire mesh. Fits into the top hole in the photo

The oil cap has been plated

Before the handlebars, and therefore controls, can go on, the yokes have to be assembled. Loose ball bearings – grease will hold them in place

Help from a *Shed* reader

I've also got the rear lamp, number plate holder, and the bayonet socket for the old-school twin-filament headlamp bulb mounted.

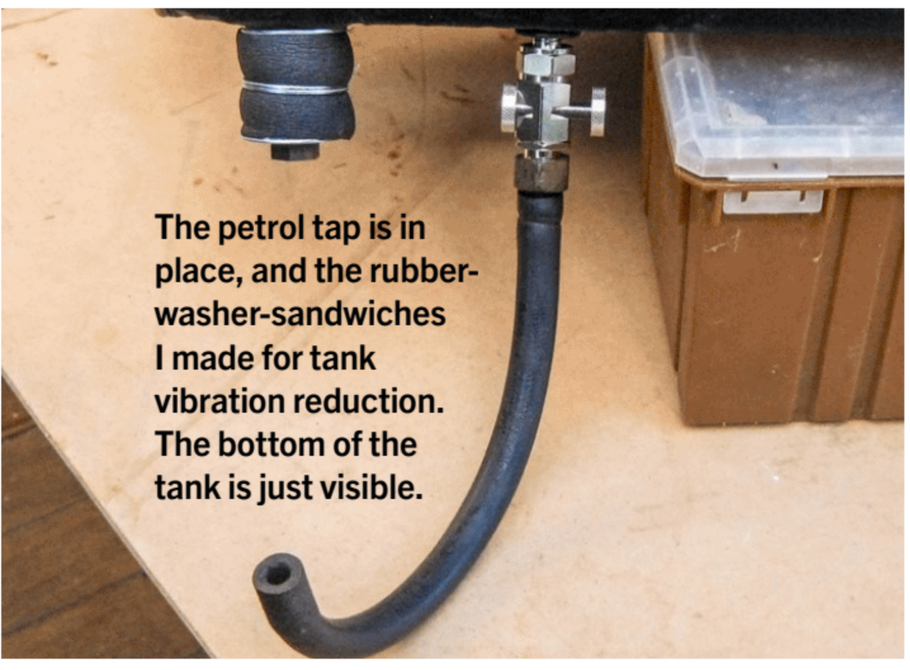
I had a very helpful message from a *Shed* reader (see the Letters page this issue) about LED headlights and rebuilds; for the moment, despite my wish to have a 6V LED system, I'll just go down an easy track. I really appreciate any advice I get.

So I think that the breadboard system is making it much easier for trouble-shooting, and I can store it upright in a corner while I get on with other things and accumulate patience.

Those other things include the fuel and oil systems, plus controls. Fuel first of all.

I don't have the old petrol taps; they must have been in a carton with other lost bits. I thought about using an old petrol tap from a defunct petrol-engine

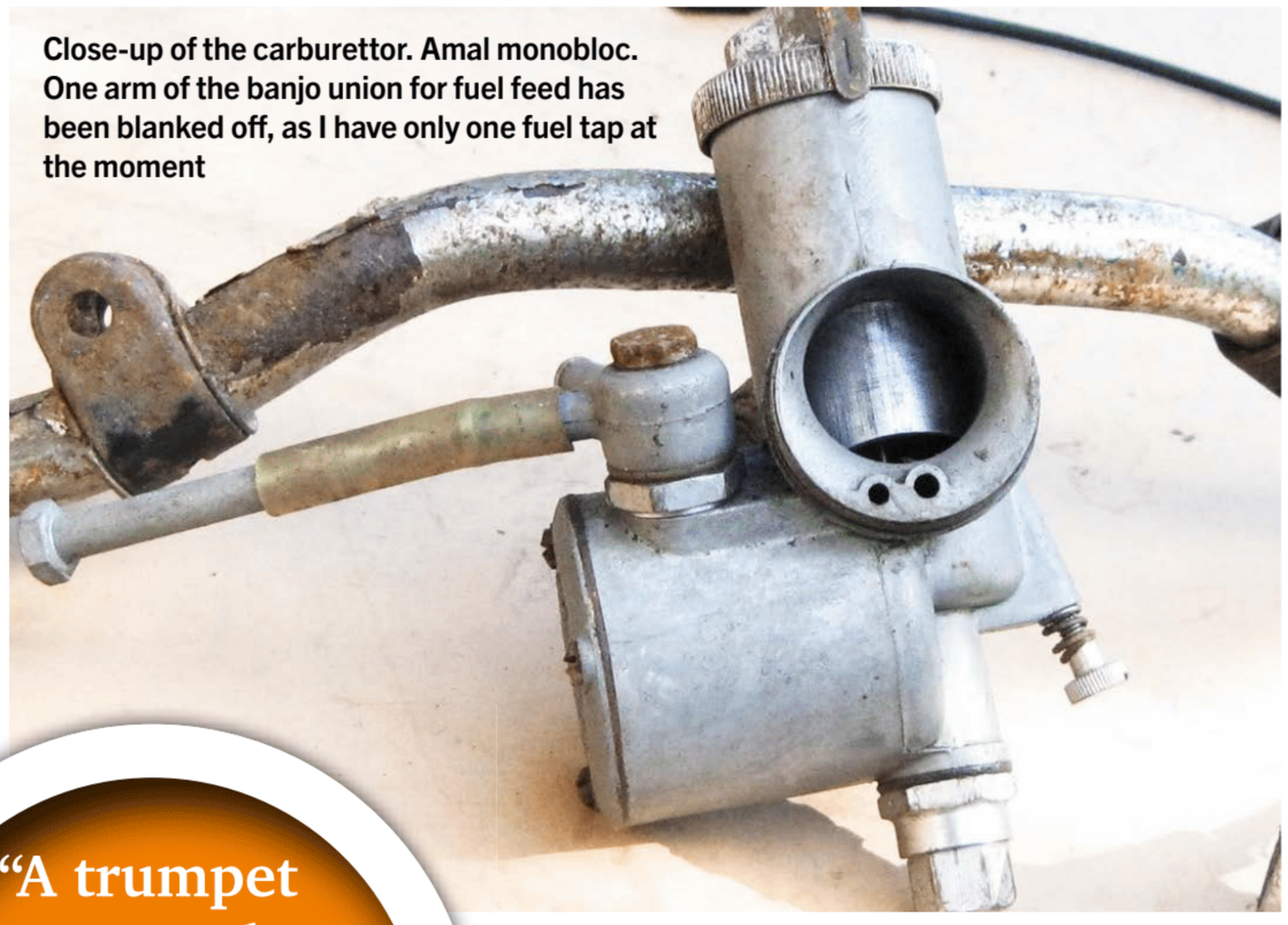
NZ Safety Blackwoods Getting to the nuts



The petrol tap is in place, and the rubber-washer-sandwiches I made for tank vibration reduction. The bottom of the tank is just visible.

Carburettor, throttle twist grip and handlebars, clamp for temporary trialling. I was told I could plate the handlebars to get them up to standard. I'm not so sure.

Yokes in place, and trying seat and tank (loosely) for checking how it will go together



Close-up of the carburettor. Amal monobloc. One arm of the banjo union for fuel feed has been blanked off, as I have only one fuel tap at the moment

mulcher, but that really was a bit miserly.

I've bought a brand-new genuine slide one from a specialist AMC provider, and it really is beautiful, nickel plate or chromium, way beyond what I can achieve. More importantly, it has a good, fine filter, because there is sure to be fine crap in that old tank despite all my cleaning efforts.

The hole in the tank for the second tap will have to be blanked off in the meantime and, likewise, one arm on the banjo union on the carburettor. Previously, I've written about the condition of the carburettor: it looks to be great apart from not having a choke slider, which isn't necessary anyway.

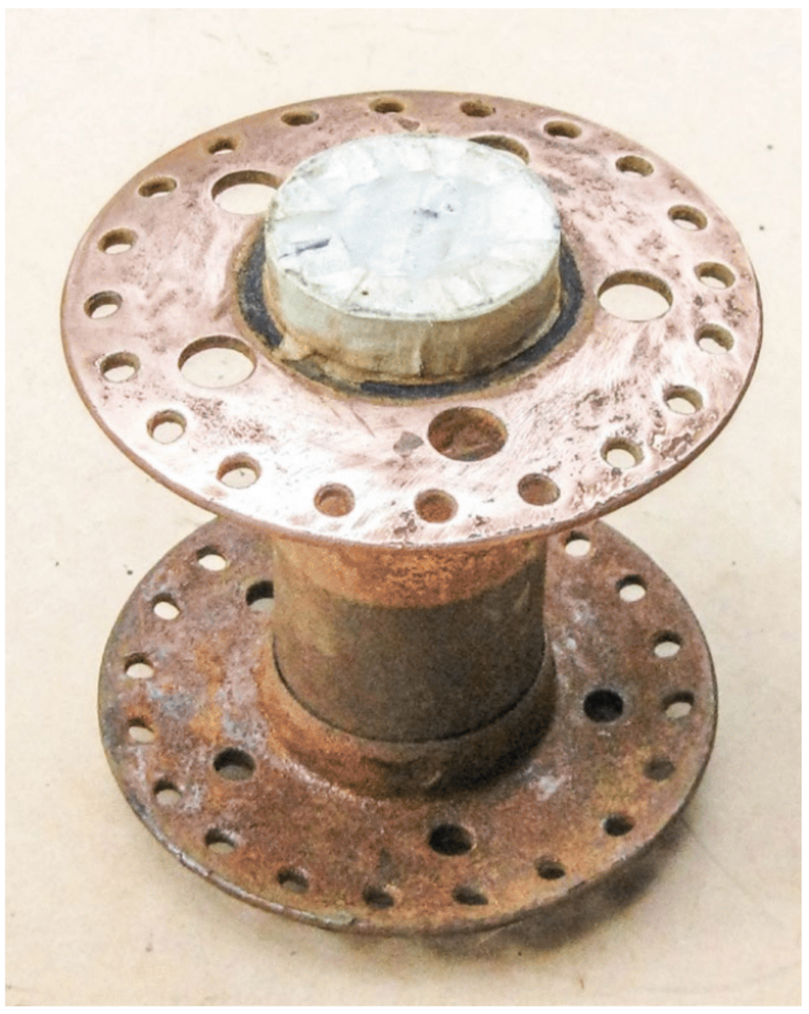
"A trumpet horn on the handlebars would be just dandy, though"

The fuel tank and oils

The fuel tank would amplify vibrations from the engine, so it has to be

Assembly. Having only two hands, I used a bungee cord to hold the bottom yoke plus its ball bearings in place while I did up the top one

s & bolts of it with NZ Safety Blackwoods



Looking ahead: part of the rear hub has been copper plated

The toolboxes have been painted

mounted on rubber washers.

The old ones, when I could find some, had decayed. I made my own from wide-diameter galvanised mudguard washers and sections of water pipe insulation, using a hot melt glue. I think they will work well. The only thing that the glue has to do is to hold the washer/rubber/washer sandwich positioned together, until in place and bolted.

Next, the oil system

The oil pump in the crankcase has to do two things: pump oil from an external oil tank under some pressure to the engine innards, and, secondly, scavenge oil from the crankcase (a dry crankcase) and send it back to its tank via a filter in the tank itself.

The filter is a felt element inside a wire mesh, and it sits under its own screwed-down cover – a system which can be dismantled, cleaned, and reused. Recently, I saw a photograph of a conversion to a modern car–type throw-away filter; the holder was mounted under the seat near the carburettor. I cannot find the photo now and can't give a reference. I think I will stay with the original system.

I have nickel-plated the oil filler cap, and at the time of writing, am partway through plating the filter top. These are both brass, and I was tempted to stay with that finish; if there was more brass in other parts of the bike (apart from the fuel cap), I probably would. I can plate brass onto steel for matching, but that would be another (steampunk) distraction.

The controls

At this stage, just the throttle twist-grip and ignition advance/retard lever are viable.

The Bowden cable for the throttle is not good enough for the bike's road use, but it will be OK for a test run of the motor, which I am starting to get impatient for. The valve-lifter cable is of no use. The engine can be stopped using this valve lifter (it attaches to a cam which lifts the exhaust valve, thereby stopping the motor; there is no ignition switch), or the carburettor could be hand-choked for the same purpose. There is no choke control, and the front brake will not be needed for some time yet. However, to mount the two items I do have, I am temporarily fitting old handlebars. I may have to buy new ones further down the track, along with the Bowdens.

Getting that motor running

There are many things which I am delaying doing for the present in a push to get the motor running, even if it's only briefly.

The handlebars are examples of things which can be easily refurbished later, along with the tank and the seat. What I do not want to leave until later are items like the suspension parts, which are a bit more challenging to remove and dig into. They have to be done once and done right.

Likewise, the wheel axles, spokes, and rims. I have done some work on the rear wheel, but haven't even looked at the front. Plating and then lacing the spokes are challenges coming up. Also, I have ideas for the future, some of which I have mentioned already, like a small leather solo seat, indicator lights, LED lights, trumpet horn, etc.

I am not really serious about a sidecar. However, I do have a spare cast-iron bath … and a galvanised steel one too. And more wheels.

Coming up in Part 7

For the next article, Peter wants to wrap up the suspension work and get stuck into the wheels: plating, hubs, rims, and lacing the spokes.

The exhaust header has to be plated and the motor started for the first time in 50 years – hopefully.

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GARDEN AND OTHER PROJECTS USING WORN-OUT TYRES

By Coen Smit | Photographs: Coen Smit

Finding innovative ways to repurpose materials that pose significant environmental challenges is both fulfilling and impactful. Coen shares several of his favourite projects that transform old tyres into functional, useful creations

Tyres! Wonderful when they are on your car, doing what they are made for. Terrible when they are past their use-by date and clogging up the world's recycling and refuse centres! Tyres degrade incredibly slowly, are a pollution nightmare if burnt, and occupy an inordinate amount of space if they cannot be recycled.

There are options for use

Even after their roadholding properties have gone, however, they can still be used in a variety of novel ways.

To name but a few of these: some are shredded and their constituents recycled; they can be used as artificial reefs or incorporated into banks and berms around houses and other structures; and it's highly likely that they could also be used by local governments, in numbers, to alter sea currents and rips, thereby reducing coastal erosion and possibly the dangers faced by swimmers at popular beaches as well, or to shore up eroding riverbanks.

My uses for them

I have used them as tree guards around our small farm.

Rubber has good insulating properties, making it a simple matter of mounting a bird-wire frame on top of the tyre with some jiffy straps and connecting it to the electric fence. Animals can graze around the tree, but will not interfere with the tiny sapling contained within.

The tyre also helps collect rain and reduces its subsequent evaporation, thereby helping to sustain the sapling, as well as protecting it from damaging winds in its early growth. After a couple

Left: An unfortunate and all too common tyre disposal method in my local area
Right: The base for the new planter pot Below: The basic parts for the project

of trees had outgrown their guards, I learned it was better to cut the tyre through from top to bottom first to facilitate its removal once the sapling has grown out of reach of the livestock. As tyres retain their integrity for many years, these tree guards can be reused for successive generations of trees. The only drawback is that they are somewhat awkward to shift around; therefore, they are probably restricted to being used in limited numbers on smaller farming properties.

Large tyre uses

I had previously acquired a couple of tractor tyres, which made great planters for a couple of large shrubs, when I came across another novel use on the internet.

The tyre forms the central structure, which is clad with short upright wooden planks cut from pallets and given a

On the second planter, I made use of a spirit level and trimmed all the planks first

The first planter under construction

The first completed planter

light scorching to 'weatherproof' them. As tyres come in a range of sizes from a small passenger car, up to truck size, it's easy to build a planter for any situation.

The build cost is negligible, as any tyre retailer will be happy to donate a worn-out tyre, and pallets are also given away freely by many businesses. Unfortunately, not everyone is as environmentally conscious as I'm sure *The Shed* readers are, so it is likely that you could also source a suitable donation or tyre from where they have been dumped in the bush. This has the added benefit of doing your bit to help our environment as well. The only remaining costs are the galvanised screws to fix the pallet planks to the tyre, and consumables.

The chainsaw carpenter

I confess that my first planter was a good example of 'chainsaw carpentry'.

The planks were hacked from the pallet with a small chainsaw and, without further ado, screwed to the tyre.

As you can see, it turned out rather rough and ready. I put minimal effort in making sure they were exactly vertical, thinking that I could adjust that as I went along. The same for the length of each plank. Because the tyre is flexible, it proved a little more difficult than I first thought.

As I had a second tyre handy and more pallets, I decided I had better build another one. This time, once I had hacked them from the pallet, I went the extra step and made sure all the planks were square and the same length on my table saw. The planks are also the same thickness, which improves the overall appearance. This time round, I used a spirit level to line up each plank as I screwed it to the tyre. I also placed the two screws holding the plank at a diagonal on the tyre, which enabled me to adjust the plank vertically in the other direction as it was screwed down.

Some stylish touches

In this project, it is also possible to enhance the appearance further by pointing, rounding the tops of the planks, or making a wave pattern as they circle the tyre. The simplicity of the build lends itself to a range of creative inspirations.

If you do decide to build your own planter, I recommend that you obtain at least two pallets made from the same dimension of timber to avoid the rougher look of my first

Both finished planters

“As you can see, it turned out rather rough and ready”

attempt. It’s a cheap and simple project that can be made as elegant as you like. To simplify and improve the accuracy of construction, I would recommend working on a flat level surface. Predrilling for the screws will prevent splitting of the planks, which, to be fair, aren’t the best quality timber, and lead the screw into the rubber.

The second old tractor tyre doing duty as a planter base

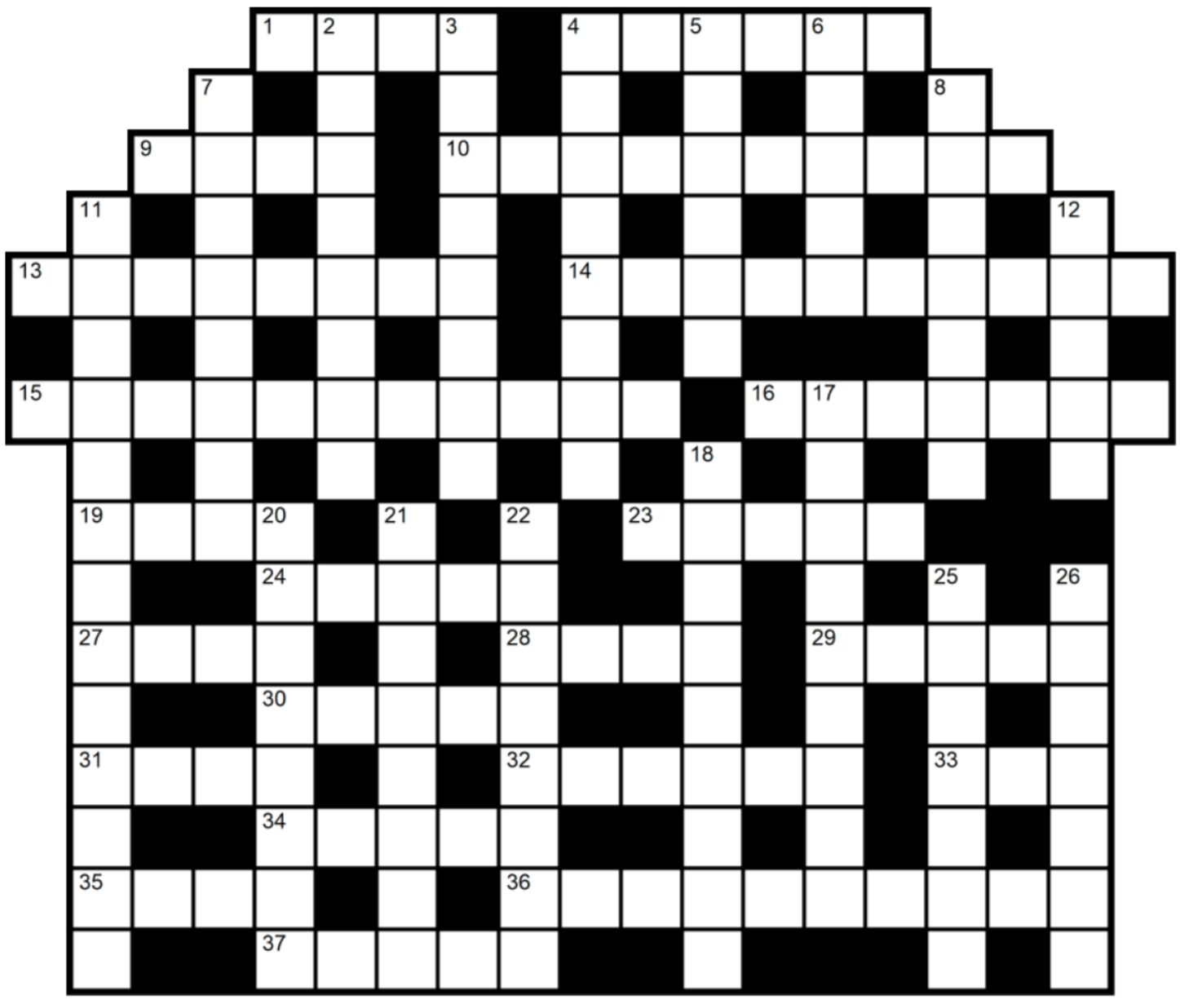
The first finished planter

THE SHED CROSSWORD NO. 1

By Māyā

(Quotes are from the song, 'There ain't half been some clever bastards' by Ian Dury and Russell Hardy)

Now that you have mastered your workshop skills, it's time to test your word skills with our cryptic crossword



Answers: See *The Shed* Issue No. 124

Across

1. Resort to medium-sized meat product (4)
4. Lover's excited for you! (6)
9. Musical about the initials of the poet on whose work it's based … (4)
10. … the same poet appears in Hitchcock's first film, *Bloodstone* (10)
13. Doctor to call is driving? (8)
14. Hint: I'd cut out from bullying (10)
15. Lathe operators court artist captured by Detective Sergeant … (11)
16. … nicked carrying large German cake (7)
19. Coward "was a charmer" who had a big trip overseas in the Netherlands (4)
23. Bright outlook for an old Nissan (5)
24. Heather is part-American (5)
27. Teletubby getting turn to bounce up and down (4)
28. Scottish inventor leads with atomic theory test (4)
29. Men in A&E going back to help with evacuation? (5)
30. Irons out a polite refusal to the boss (2,3)
31. Inform on a tree (4)
32. Dig up a dead philosopher? (6)
33. Small boat good German returned … (3)
34. … Dr Heinz's contribution to a German river (5)
35. Throw light on an erection often associated with blokes (4)
36. Egyptian God for first and last dressed in gear as a noisy amphibian (6,4)
37. A lightweight snow leopard? (5)

Down

2. Young woman returning after exercise with hesitation to the worst point (8)
3. Many a hog goes into the wood (8)
4. Bond's holding one captive for troops (8)
5. Depend on King being in sack by the first of October (4,2)
6. Playing Mr Poe for a chip (5)
7. Pet able to draw? Not at first (8)
8. Before lights out, part of CPU held up by hand tool (7)
11. Hope raincoat's bendy, as one might say (2,4,1,6)
12. A good example of a miniature railway, perhaps (5)
17. Can Kings embracing Queens become sheddies? (9)
18. Indian rider had no reservations about speed (4,5)
20. Sign Rod, an extraordinary "Italian geezer" (8)
21. Design oddly lacking on either side of the street for a genius who couldn't "be classed as witless" (8)
22. D.H., T.E., or an Otago town? (8)
25. Dogs like me! (7)
26. "A pencil squeezer" could make a vehicle move, according to some pronunciations (3,4)

It's a gas

Use industrial gas for your shed projects? Chances are that you're paying ongoing cylinder rental fees whether you're using the gas or not.

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ARDUINO 102: I2C AND MORE

Our Arduino expert outlines the advantages and disadvantages of various data sharing methods. Morse code paved the way in the past, and the underlying principles remain relevant today when selecting different communication methods for programming your Arduino

By Mark Beckett | Photographs: Mark Beckett

In the last few issues, we've covered a range of subjects, including libraries in the last issue.

During these articles, we've attached sensors or devices and either sent or received data using appropriate protocols and communication methods.

Data sharing has been around since the age of electricity. Morse code was sent using a wire, and while the original sequence worked, it was enhanced in 1851 and became the International Morse Code.

This version standardised the characters but also introduced a 'protocol' for the spacing of characters and words. It is interesting to note that speed wasn't part of the protocol, and, therefore, faster data transfer was possible between two operators.

Arduino and others have access to many of these communication methods without additional hardware. I2C (inter integrated circuit, or IIC) was developed back in the '80s by two engineers working for Phillips, but the specifications for it have been public since 1992 when it was enhanced. Our I2C LCD is a great example of using I2C.

The design of I2C limits the distance between controller and peripheral (formerly, 'master' and 'slave', respectively) to a few metres and a common ground – after all, it was intended to go between ICs on the same board or within the same bit of hardware, so it's not always the right solution.

Sparkfun has a good write-up including the history at: **https://learn.sparkfun.com/tutorials/i2c/all**.

Using I2C

There are many devices that use I2C to communicate, and our I2C LCD is just one.

I'm using a PCF8575 16-bit I2C port-expander module on my latest Ski-Lift Trip Safety System as an interface to the 16 trip inputs.

Provision for an I2C LCD has also been provided. Both use the same I2C connection (A4 and A5), and the Arduino sends and receives data to and from both using the appropriate address. (You can think of this like a street where each house has its own address.)

Being able to change the I2C address is useful, and often the hardware manufacturer will extend the pins out to solder jumpers, which pull up or pull down the address pin on the IC. However, it's not always the case, as demonstrated in the pictures on page 54. These were supplied in the same order, but as you can see, one doesn't have the address pins extended out to solder jumpers.

Most devices have a default address, so check online before worrying about changing the address.

The default address

The I2C LCD uses a PCF8574 8-bit IO expander and the default address is:

```
0x27 LiquidCrystal_I2C lcd(0x27,16,2); //
```

Morse code was sent using a wire, and while the original sequence worked, it was enhanced in 1851 and became the International Morse Code

set address to 0x27, 16 chars, 2 line display, while the PCF8575 16-bit IO expander uses: 0x20 PCF8575 PCF(0x20); // default address.

This means both can live happily on the same I2C bus and communicate without conflict.

I2C requires a data line and a clock, referred to as 'SDA and 'SCL', respectively, which correspond with A4 and A5, respectively, on the Arduino (see https://github.com/BelKed/pighixxx-uploads-archive/blob/master/pinouts/Arduino/UNO/2013/uno.pdf), which I've referenced earlier in the series.

The exact protocol of how the I2C communication works is beyond me and this series, but suffice to say, if you follow the examples supplied with the library, you'll have it working in no time.

If you have any concerns about the address, Arduino has this scanner sketch at https://playground.arduino.cc/Main/I2cScanner/, which steps through each address.

If this fails, I suggest you check that the SDA and SCL aren't swapped.

Just to prove how useful I2C is, these guys are using two Arduinos talking to each other using I2C in the mini they've been building: youtube.com/watch?v=L2Zc_XncBV4 (fast forward to 22 minutes).

I2C port expander

While I was designing the latest Ski-Lift Trip Safety System, I needed at least 12 inputs, but I also wanted an easy way of reading all the inputs at once.

You can do what is called 'port manipulation' to read the Arduino's 20 IO, but it's not recommended, and using this many would have left me short of pins for other things – that is, external communications.

https://docs.arduino.cc/retired/hacking/software/PortManipulation/

Using an I2C port expander as the interface for ski-lift trip inputs became a very elegant solution, which gave me 16 inputs and left me with all the other pins on the Arduino to do other things.

The PCF8575 is a clever device with 16 inputs or outputs that you can configure how you like. You write to it with a hex number representing which IO is input and which is output, and in my application, I wanted all 16 IO as inputs:

```
PCF.write16(0xFFFF);   // All 16 bits Input
```

You can read all IO at once with:

```
Inputs = PCF.read16();
```

I then determined the state of each input and wrote the value/state to an array for later use:

```
for (int b=0; b <= 15; b++)
{
  byte bit = bitRead(Inputs, b);
  TripState[b] = bit;          // write the state to the array
}
```

The library at https://github.com/RobTillaart/PCF8575 gives examples and the necessary library to use the PCF8575.

Rob has a vast collection of libraries at

International Morse Code

Card #	Character	Code
1	A, a	●▬
2	B, b	▬●●●
3	C, c	▬●▬●
4	D, d	▬●●
5	E, e	●
6	F, f	●●▬●
7	G, g	▬▬●
8	H, h	●●●●
9	I, i	●●
10	J, j	●▬▬▬
11	K, k	▬●▬
12	L, l	●▬●●
13	M, m	▬▬
14	N, n	▬●
15	O, o	▬▬▬
16	P, p	●▬▬●
17	Q, q	▬▬●▬
18	R, r	●▬●
19	S, s	●●●
20	T, t	▬
21	U, u	●●▬
22	V, v	●●●▬

Card #	Character	Code
23	W, w	●▬▬
24	X, x	▬●●▬
25	Y, y	▬●▬▬
26	Z, z	▬▬●●
27	0	▬▬▬▬▬
28	1	●▬▬▬▬
29	2	●●▬▬▬
30	3	●●●▬▬
31	4	●●●●▬
32	5	●●●●●
33	6	▬●●●●
34	7	▬▬●●●
35	8	▬▬▬●●
36	9	▬▬▬▬●
37	.	●▬●▬●▬
38	,	▬▬●●▬▬
39	?	●●▬▬●●
40	'	●▬▬▬▬●
41	!	▬●▬ ●▬▬
42	/	▬●●▬●
43	(	▬●▬▬●
44	)	▬●▬▬●▬

Card #	Character	Code
45	:	▬▬▬●●●
46	;	▬●▬●▬●
47	AS (Wait)	●▬ ●●●
48	BK (Break-in)	▬●●● ▬●▬
49	HH (Correction)	●●●● ●●●●
50	KA (Attention)	▬●▬ ●▬
51	SN (Understood)	●●● ▬●
52	VE (Verified)	●●●▬ ●
53	SOS	●●● ▬▬▬ ●●●

The rules of Morse Code:

1. The duration of the dash is 3 times of dot;
2. Each dot of dash is followed by the blank period which equals to the dot duration;
3. Space between letters is 3 dots duration;
4. Space between words is 7 dots duration.

* Exclamation mark (!) and semicolon (;) is not in the official ITU recommendation.

https://github.com/RobTillaart/Arduino/tree/master/libraries.

One-Wire

The name is a bit misleading, as anyone who plays with electronics knows you need two wires, the second being a return path. However, the meaning is that there is only one wire that handles the clock and data.

More importantly, many One-Wire devices can use 'parasitic power' from the data line to run, meaning you don't need to provide 3V3 or 5V to the device. The DS1820 digital thermometer can use this method, but requires a 'delay' to hold the bus high to enable the conversion to happen.

Each device has a unique 64-bit address programmed during manufacture, but will respond to the 'family' code. The key is to poll the devices and see if one is connected (see Example Code), but more importantly, check that it's the right sort of device.

Back in *The Shed*, Issue No. 120 (April/May 2025), I provided an example that used the DS18B20 One-Wire temperature sensor. These are capable of providing 12-bit resolution, which means 0.0625 deg., but the documentation says they are accurate to ±0.5°C, so I'm unsure if it changes with resolution or not. However, for most applications, 0.5 deg. is fine. analog.com/media/en/technical-documentation/data-sheets/ds18b20.pdf

Unlike a simple analogue temperature sensor, the method to use these and get a result requires a few steps, so refer to the example I provided in *The Shed* Issue No. 120:

https://drive.google.com/file/d/1SgiIm835UcYIf5K1IwEdxz7vQ2zsIXY1/view

Step 1: Identify the address (Line 657)

Step 2: Issue a Temperature Read instruction (Line 225)

Step 3: Convert the result into a valid number (Line 267 to 280)

Step 4: Display the Temperature

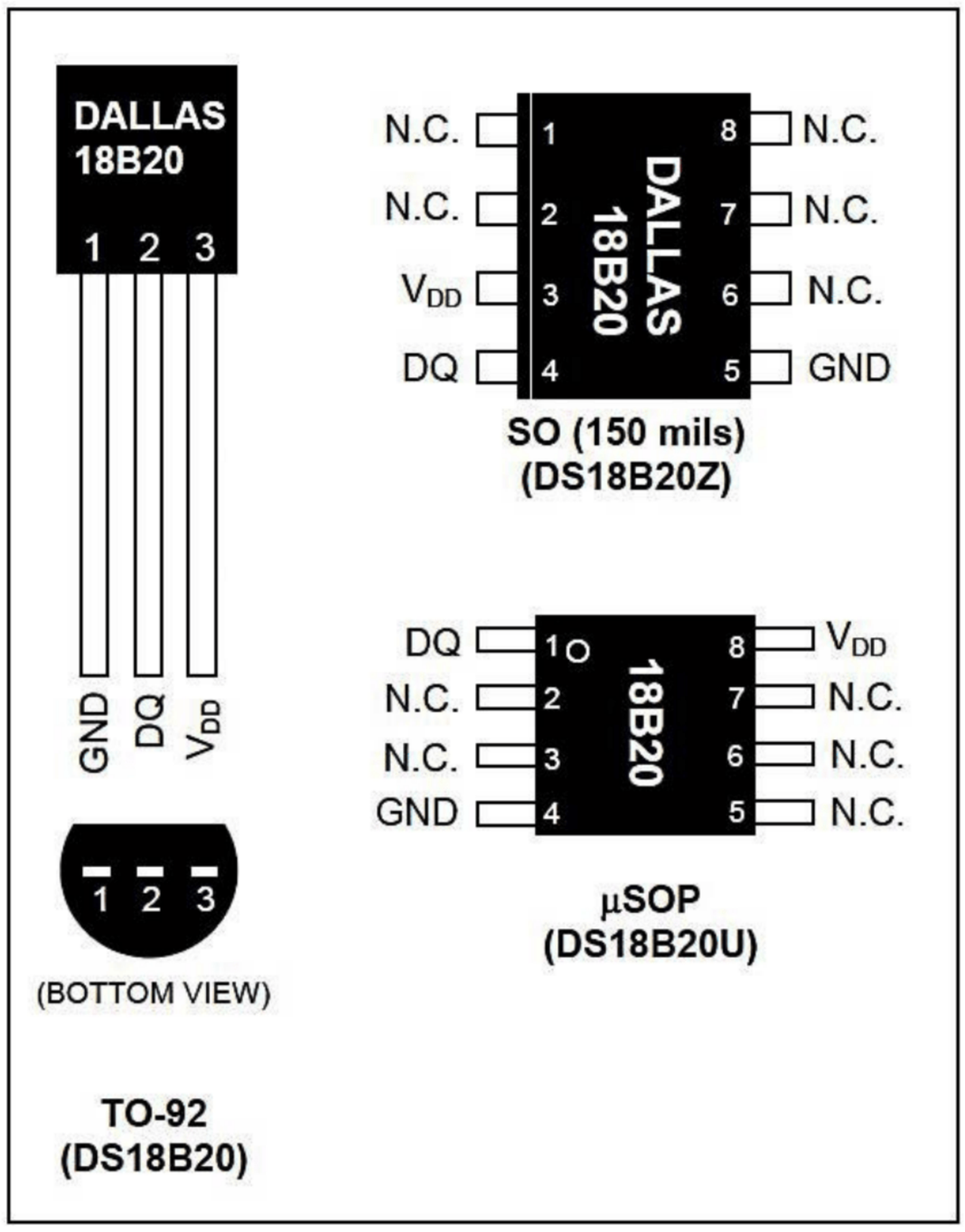
An analogue sensor may be easier to read, but these are accurate over the entire range and don't change with voltage variations.

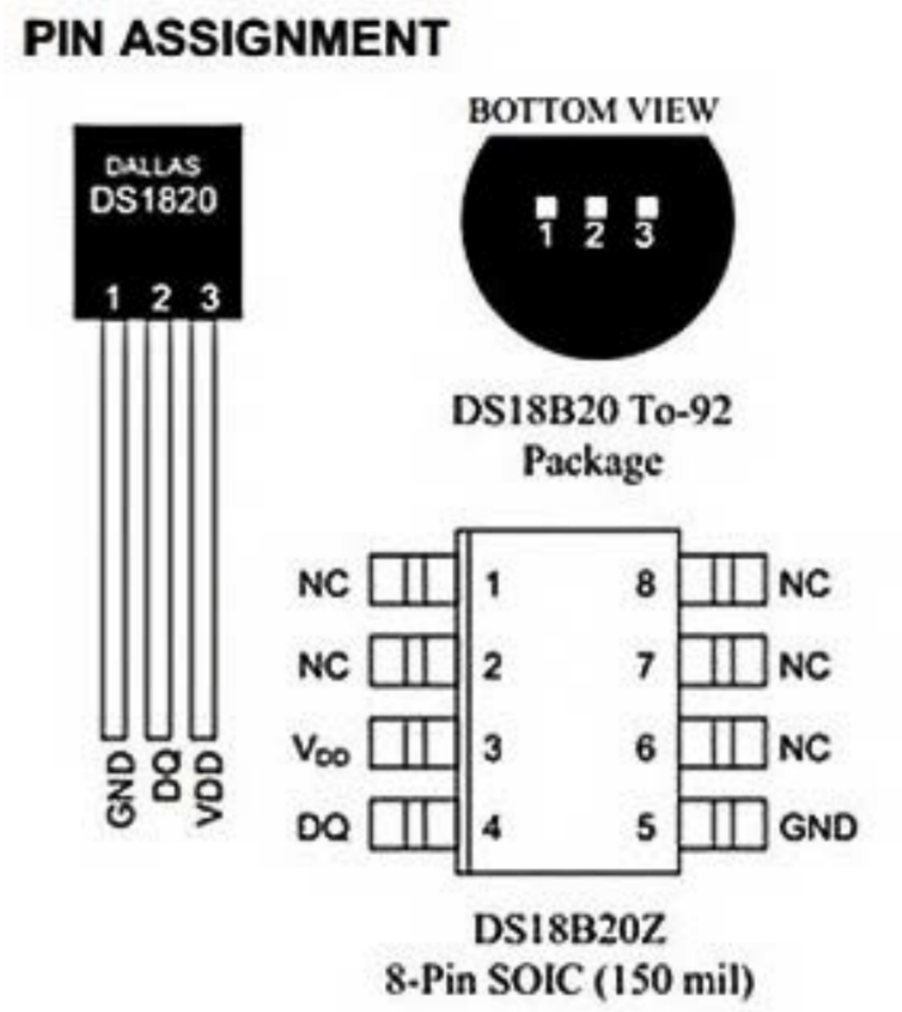
The example sketch was using a DS18B20 device, which has the family code of 0x28 and was configured for parasitic power (hence the conversion delay). DS1820 and their variations have a family code of 0x10.

Example code

```
void findDevices()
 {
  /*
     This routine is called once to find any One-Wire devices and obtain their address.
     Once the address is found, it is checked to see if it is a temperature sensor (hex 28 or 0x28)
   */

   if ( !ds.search(addr))
   {
    ds.reset_search();
    }
    if ( addr[0] != 0x28)
   {
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("No Temp Sensor");
    lcd.setCursor(0,1);
    lcd.print("Check connection");
    delay(5000);
    return;
   }
  }
```





PIN DESCRIPTION

GND - Ground
DQ - Data In/Out
V_{DD} - Power Supply Voltage
NC - No Connect

The One-Wire family includes Dual IO devices, EEPROM, real-time clocks, and battery measuring and monitoring devices. This list includes the device and the family address https://interfaceinnovations.org/onewirefamilycodes.html

Multiple sensors

You can have multiple One-Wire devices connected to the same wire, but the problem is which one has which address and what happens if you replace one?

One scenario might be an inside and outside thermometer. How do you allocate device X to inside and device Y to outside? I ran into this once and never really came up with a foolproof solution.

You could disconnect one, use the returned value, heat one (the inside would be easier), but whatever you do, you need a configuration or calibration routine so the sketch knows what address belongs to which device. The alternative might be to use two data lines.

Whatever solution you use, just remember that, at some time, one of the sensors/devices may need replacing, and therefore, a fixed address won't work.

By the way, I didn't see anything to solve this in the official documentation, but they kept saying you can have multiple devices on the same bus/data line.

NeoPixel

This uses a single wire (plus the return) to send and receive data to NeoPixels (WS2812, WS2811 RGB LEDs).

The pixels are connected in a 'daisy chain', which is a wiring strategy where multiple devices are connected together in sequence, forming a linear chain-like arrangement. Each pixel needs 24 bits of data to control the internal red, green and blue LEDs.

The Arduino sends out a string of 24 bits that represent the level (0–255) of each of the three colours (hence 3 x 8 bits = 24 bits) for each pixel in the string. That is, for an 8 LED pixel string, the Arduino will output 192 bits.

The internal controller in the pixel takes the first 24 bits that appear on the Din pin and passes on the rest to the Dout pin. Think of it like passing a plate of biscuits; each person is meant to take just one and pass the rest on.

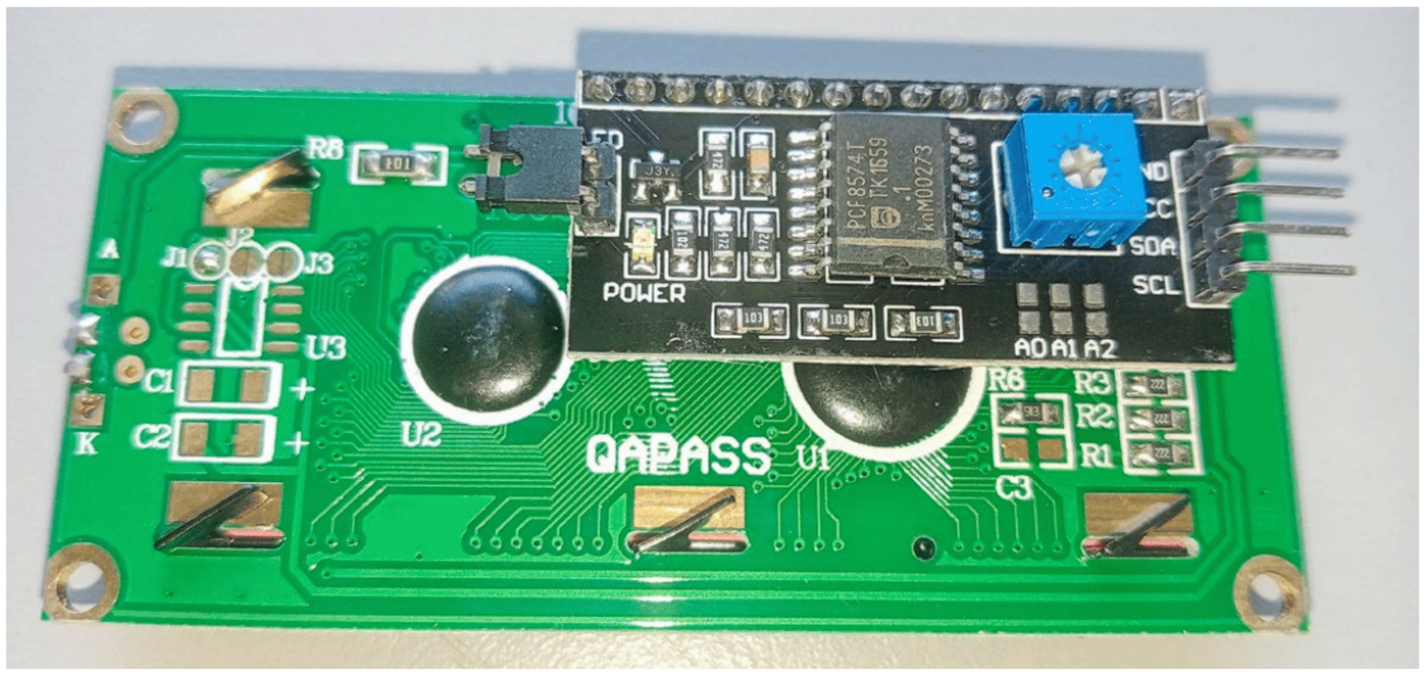
With this concept, there are no addresses, and it is scalable from one to hundreds of pixels, but the RAM on the Arduino means that 622 pixels is the absolute limit.

DS18B20 – waterproof version

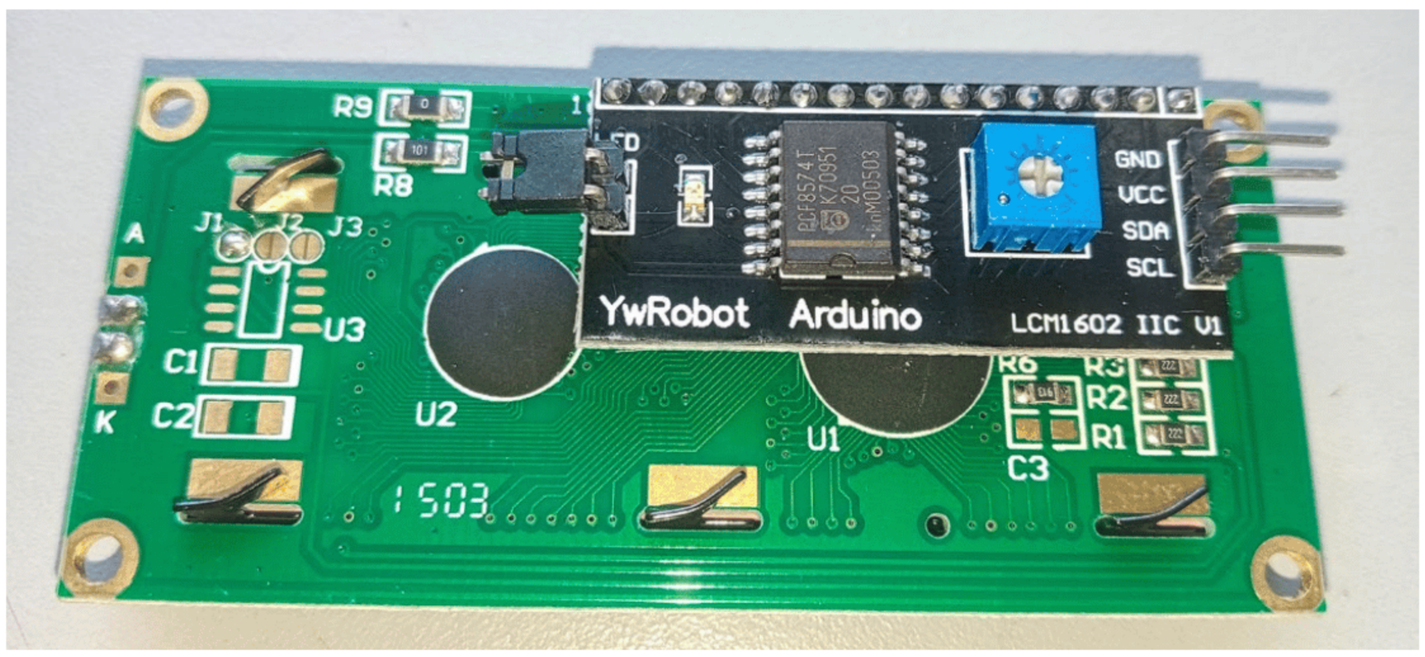
Obviously, powering the pixels needs careful consideration (each pixel can consume 60mA), and for larger strings, Adafruit recommends powering at the middle or from both ends.

A search on the internet shows many daisy chain devices and systems, but most are simply wired in parallel rather than having the data pass through the device.

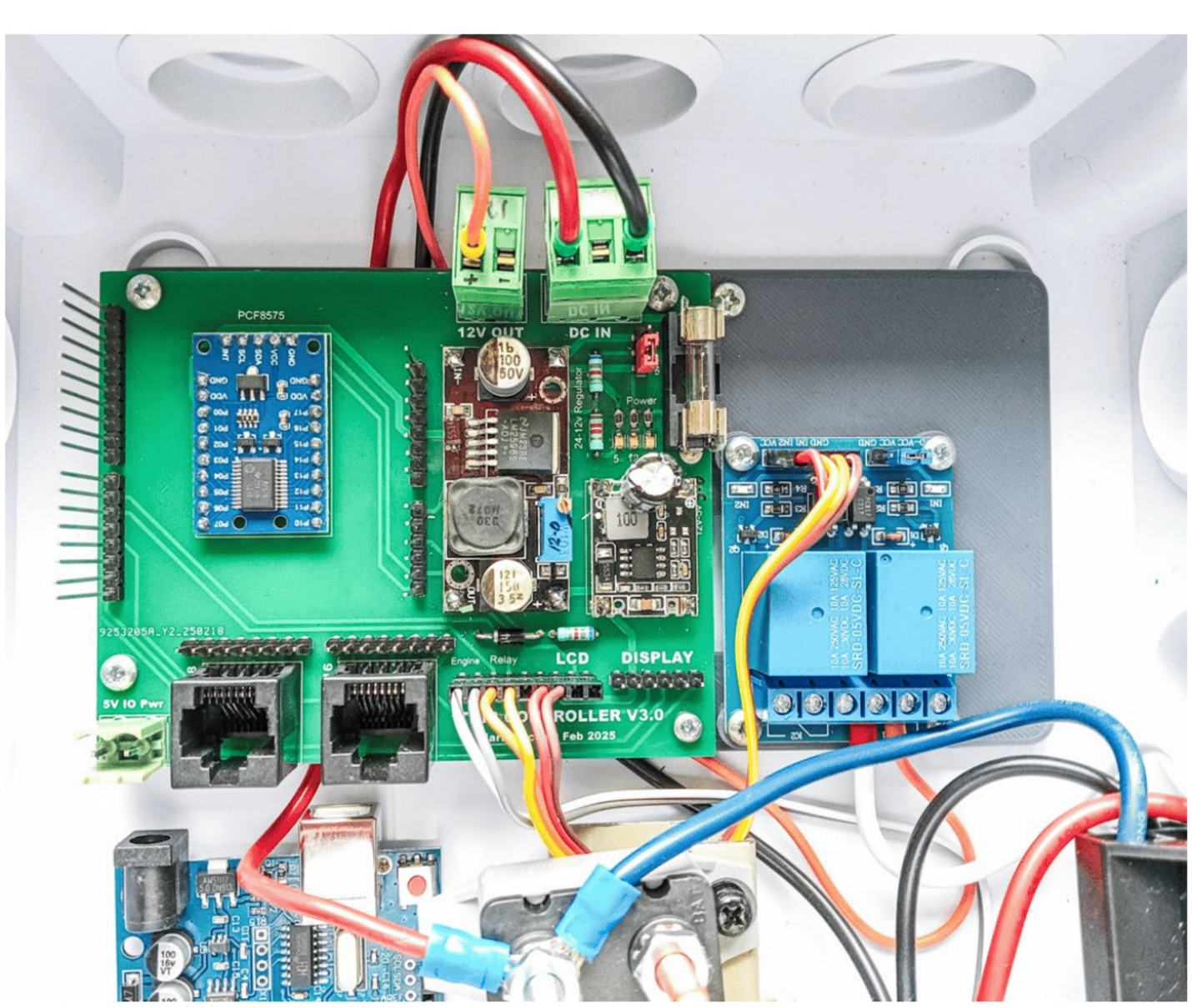
Daisy chaining isn't new; if you



With address pins extended



Without address pins

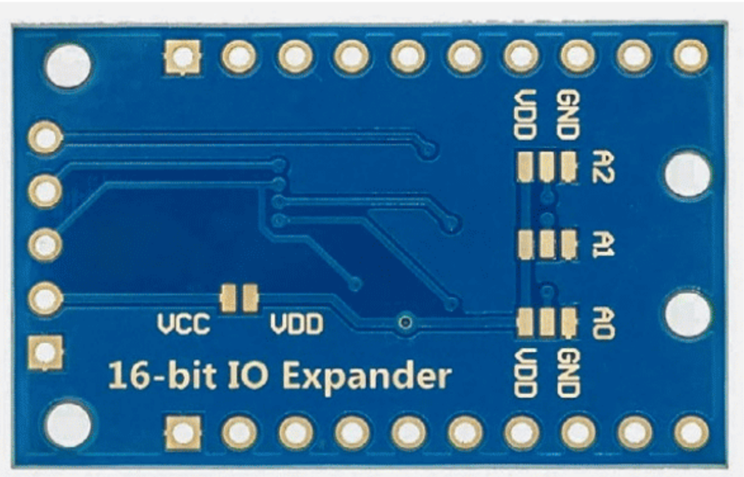


PCF8575 underneath Uno

use our Morse code example, the information was received at one station and passed on to the next station. Undersea fibre-optic cable repeaters are another example, and this article is worth a read for the engineering if nothing else: https://hackaday.com/2023/08/08/under-the-sea-optical-repeaters-for-submarine-cables/.

This shows where the cables are: submarinecablemap.com/, and I was surprised by the number around New Zealand.

Hopefully, this has brought some clarity to talking to some of the devices that can connect with an Arduino.



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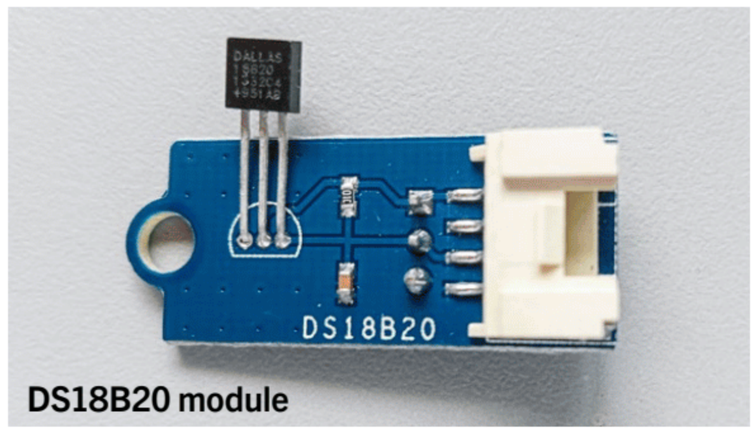

DS18B20 module

Useful links

https://learn.sparkfun.com/tutorials/i2c/all

https://github.com/BelKed/pighixxx-uploads-archive/blob/master/pinouts/Arduino/UNO/2013/uno.pdf

https://playground.arduino.cc/Main/I2cScanner/

https://www.youtube.com/watch?v=L2Zc_XncBV4

https://docs.arduino.cc/retired/hacking/software/PortManipulation/

https://github.com/RobTillaart/PCF8575

https://github.com/RobTillaart/Arduino/tree/master/libraries

analog.com/media/en/technical-documentation/data-sheets/ds18b20.pdf

https://interfaceinnovations.org/onewirefamilycodes.html

https://hackaday.com/2023/08/08/under-the-sea-optical-repeaters-for-submarine-cables/

https://www.submarinecablemap.com/

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TRIUMPH

FOR THE RIDE

Rod Benjes
RACE CAR BUILDER

A highly successful career in building and racing drag cars began with reading hot rod magazines in the 1960s. This passion for speed and cars has led this self-taught sheddie to become one of our most accomplished and sought-after drag car builders

By Kevin Cudby | Photographs: Kevin Cudby and Rod Benjes

"HE'LL BE WORKING ON HIS 1967 MUSTANG, WHICH PUMPS OUT AROUND 3500 HORSEPOWER"

Ask around the drag racing community for help with your race car, and chances are, you'll be referred to Rod Benjes.

The inside of Rod's purpose-built hot rodding shed is lined with fading drag racing posters aged from just a few weeks old to way, way back. This is a guy who loves building and racing drag cars. When he's not doing it for himself, he's helping other people do it. If you're lucky, he'll be working on his 1967 Mustang, which pumps out around 3500 horsepower and is currently New Zealand's quickest Top Doorslammer.

I first met Rod when I needed help with a motorcycle-engined junior dragster bought second-hand for my granddaughter to drive. Our driver loved the car's performance and driveability, but details such as the chain tensioner looked a bit dodgy. Almost everyone we talked to suggested Rod Benjes. We were delighted with his simple, economic solutions and with his ability to make us feel as if we were the most important people in the world.

How it all began

I asked Rod how he got started.

As a teenager, he said, "I had an LJ Torana, and I used to hang out with a friend whose father was into hot rodding."

Reading his friend's dad's hot rodding magazines stirred an interest in cars. A trip to the now-defunct Thunder Park drag strip in Hastings sealed the deal. The Torana needed upgrading. "Stephen's dad had a rebuilt 202 with a hot cylinder head, better cam, that sort of thing. I bought that off him."

Replacing the original 173 six-cylinder with a warmed-up 202-cubic-inch (3.3-litre) Holden engine would be an easy swap. Rod added a triple carburettor set-up for more go. "Three

Rod in his happy place, surrounded by racing souvenirs and high-horsepower race cars

two-barrel Dell'Ortos was a bit much for a 202, and it really sucked the gas." But the set-up looked really cool, like some of the cars Rod had seen in magazines.

Regular exposure to drag racing

Rod and his mates regularly drove to Hastings to watch Thunder Park's Christmas and New Year meetings. Regular exposure to high-powered drag racing inspired further modifications. He was doing shift work for a computer company, commuting by train three or four days on, then three or four days off. "I had big blocks of time to do whatever I wanted to do … It's not like you can go out and hang with your mates when they are all at work … working on my car was what I enjoyed doing."

Most of his expertise came from reading books and practising what he'd read about, although he did do a course on gas welding at polytech.

"I was travelling on the train to work, and I'd read books about building engines, welding, and automotive engineering," said Rod. After reading about something, Rod would get out in the shed to try it out. "I've got to go hands-on and figure it out for myself."

Rod starts racing

It wasn't long before Rod started on the Torana's next upgrade.

He bought a 350-cubic-inch (5.7-litre) Chevrolet V8 short block and a set of high-performance cylinder heads, replaced the internal parts with

Rod's FED regularly raced at Masterton

high-performance components, and set about shoehorning the V8 into the Torana.

"I had to mount the engine and transmission, make up a sump and exhaust, redo the wiring, and that sort of stuff. I did everything myself. That was cool." The trickiest job was building the new free-flow exhaust manifolds. Rod used pre-formed pipe U-bends, cut and fitted by trial and error.

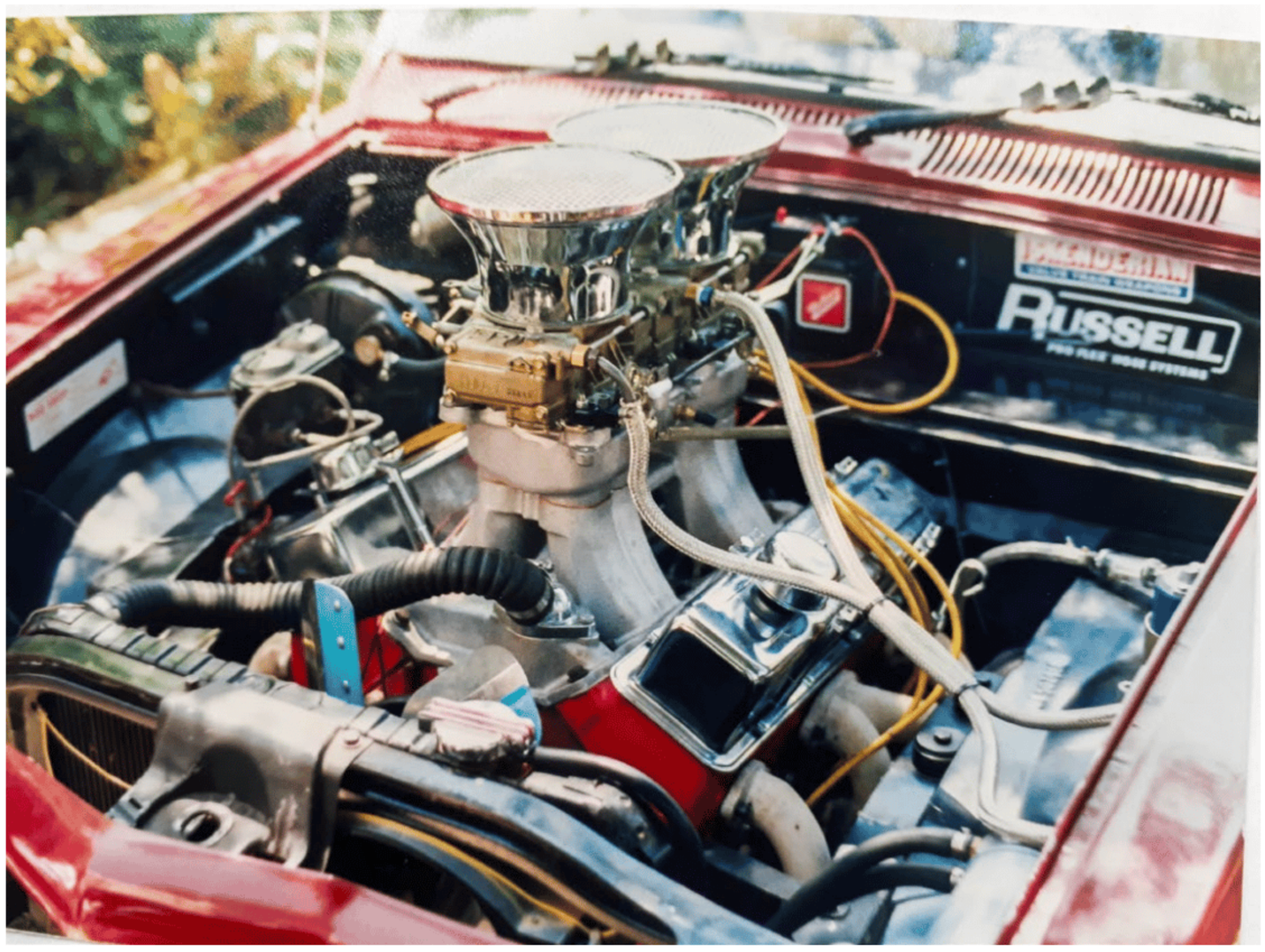
With the Torana now making respectable power, Rod started racing at Thunder Park. "I was about 22/23 at that time. There were a lot of trips up to Hastings." Many of his mates had V8s, but none as fast as his. Most were happy to watch the racing. Rod's best quarter-mile time with the Torana was about 12.6 seconds – very quick for a street car in the 1980s.

He was runner-up in his class at the 1986 nationals, racing against a high-budget car that was towed to the drag strip on a trailer. "I was pretty chuffed. Later on, I found that I didn't have full throttle. When you put the gas down, the car still had a bit of go. The transmission was one I just bought used … It was pretty naffed." Rod bought a book and read it. Then he rebuilt the Torana's automatic transmission. To do the job properly, he made a couple of special tools.

Tempted by a T-bucket

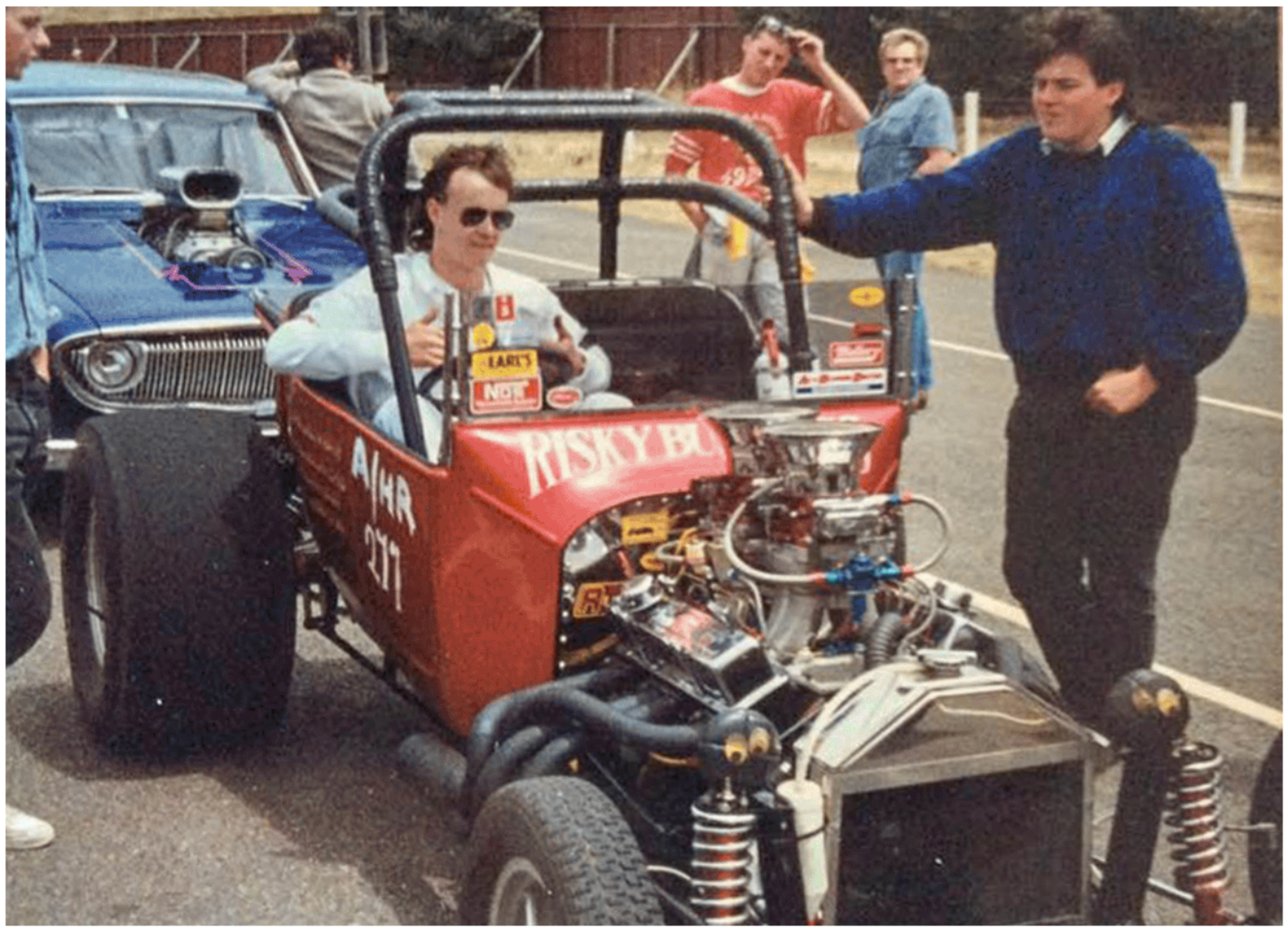
The Torana was a fun car. But when one

Rod's V8-powered LJ Torana



The Torana had almost enough room for the V8, two four-barrel carbs, and free-flow exhausts

Rod's LJ Torana (left lane) at Thunder Park, near Hastings



Rod (driving) and John Dillon with Rod's T-bucket hot rod

Cockpit area for Rod's 1967 Mustang Top Doorslammer

Engine bay and front suspension for the 1967 Mustang Top Doorslammer

of Rod's mates put his Model T Ford hot rod up for sale, the temptation was too hard to resist.

"I thought, a T-bucket! Yeah! I put my motor in it and sold the Torana," he said. "It was a cool bucket, but it wasn't how I wanted it."

In keeping with the Model T Ford's styling, the car had a vertical steering column. Rod wasn't keen on trying to control the car at 120-plus miles per hour with a horizontal steering wheel, so he rebuilt the steering system with a sloping column. The original single-hoop roll bar was replaced with a fully braced roll cage. As an old-school T-bucket with just enough bodywork to support the seats and dashboard, the car's chassis and mechanicals were fully visible.

Rod tidied up the chassis to make it look good. He added nitrous oxide injection and new large-diameter exhaust pipes, further boosting the V8's power output.

Rod and his mates regularly helped each other with car projects, and he was often called upon to make special parts. Exhausts, engine mounts, roll cages, chassis work – he was making pretty much anything that needed to be custom-built.

"Not for any money, just doing it as projects with friends," he said. The common theme was problem-solving. A part that worked on one car wouldn't necessarily work for another. Rod enjoyed the challenge of trying to understand the purpose of each component and figuring out how to make something that would achieve that purpose.

Rod's shed

The shed evolved alongside the projects. Starting with a collection of hand tools, a gas welder, and a stick-type arc welder, Rod acquired new equipment as he went along. His first 'high-tech' welder was a gasless MIG, which used special flux-cored wire that released inert gas right at the weld.

"TIG welders were quite expensive back then." The only true MIG welders available were big industrial ones. Later, he bought a TIG welder and hasn't looked back.

"I haven't gas welded for years now, I don't even have gas here. No need for it." Rod made his own engine hoist, engine

Rod's shed fits two drag racing cars and all the gear he needs to make them go

stand, and other workshop equipment. He used his homemade engine hoist for about 25 years before replacing it with a more compact store-bought item five or six years ago.

The Wild Bunch

In the late 1980s, Rod met Vince Borowicz, who was building a Holden Caprice to race in a category called 'Wild Bunch'.

"It was a brand new crash-test body," said Rod.

The big four-door stretched Commodore was powered by a supercharged fuel-injected Chevrolet V8. Rod joined Vince's race team and helped build up the race car. They travelled around New Zealand, racing at Auckland, Christchurch, Nelson, and Hastings.

"I got to see more of the drag racing landscape," said Rod, "It was right in the heyday of Wild Bunch … all these guys putting superchargers on these crazy cars, it was amazing and being part of it was cool … Vince is a mechanic by trade … I got to learn a lot off Vince."

About the time Vince finished racing in Wild Bunch, Rod got talking to fellow crew member Ian Lane.

"There was renewed interest in New Zealand in front-engined dragsters [FEDs]. A couple of people [imported cars] and they suddenly became quite popular."

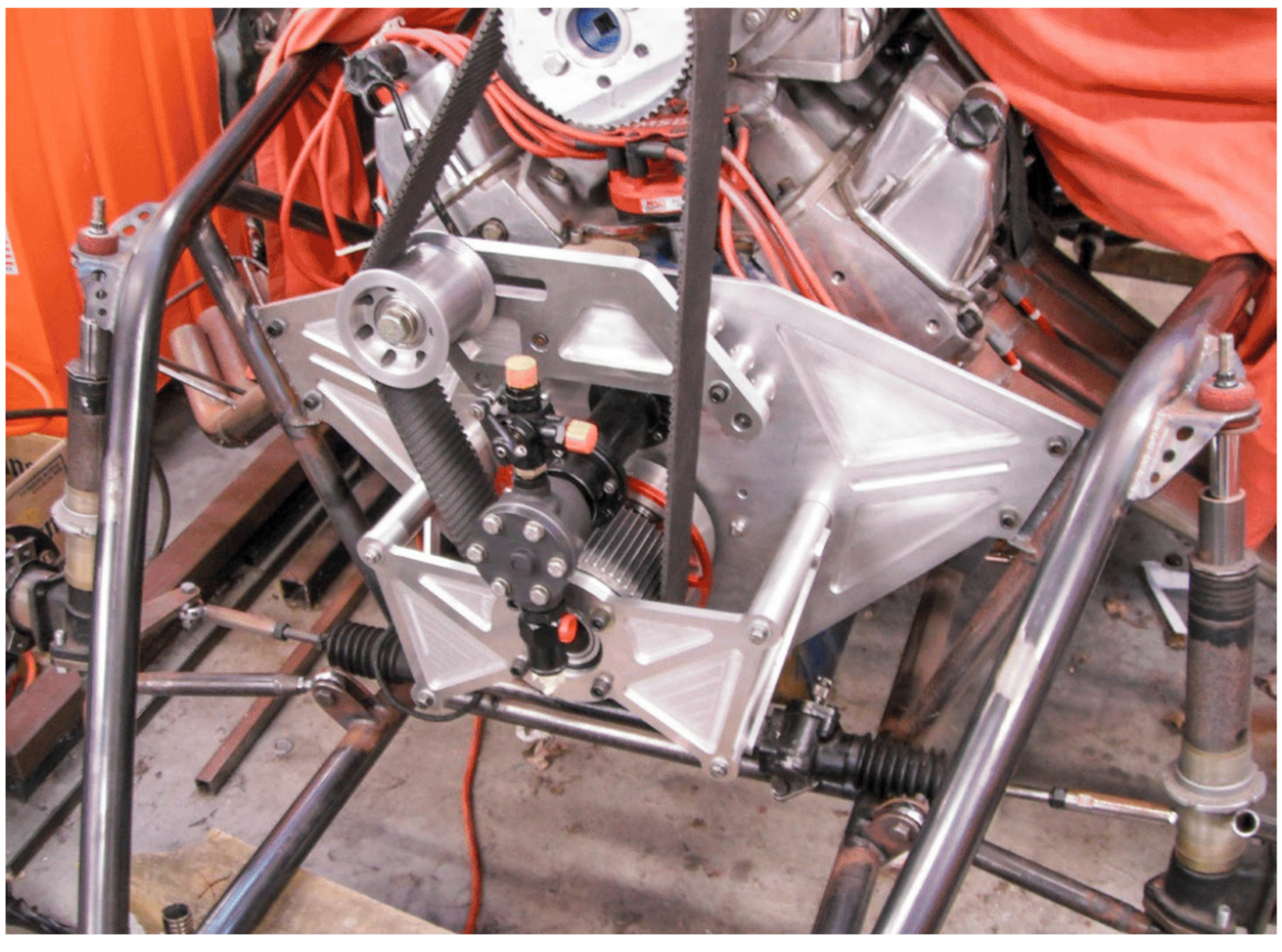
Developed in the early days of drag

Rod uses his mill to make engine and chassis parts that look like bought ones

“THIS WAS THE FIRST TIME ROD HAD SET OUT TO BUILD A CAR FROM THE GROUND UP”

Rod has built up a sizeable collection of gear

Chromoly chassis for 1992 Chevrolet Beretta Top Doorslammer



Rod built this custom engine mounting and supercharger drive system for a 1971 Mustang drag car

racing, the FED provides a unique driving experience. The driver sits between a pair of massive tyres, and the view forward is mostly blocked by the supercharger and air scoop.

The car itself is as basic as they come: just an engine, transmission, two skinny front wheels, plus those enormous rear wheels and tyres. FEDs have brakes on their rear wheels but not the front. Braking parachutes are essential. Rod and Ian agreed FEDs looked awesome.

“We decided to team up, and so we built a chassis at my place.” This was the first time Rod had set out to build a car from the ground up. All his previous projects had involved modifications or components such as roll cages, exhausts, and so on. The car was built with second-hand parts and borrowed equipment. “We didn’t have much budget. Built a basic jig in the garage and built a chassis using a borrowed TIG welder.”

Time to get serious

The car debuted at Meremere Dragway, and Rod and Ian were very happy with its performance.

They raced it for a couple of seasons before deciding they wanted something “a bit more serious”.

The existing car’s chassis had been built of mild steel. To reduce weight, they decided to build the new chassis of

1992 Beretta Top Doorslammer at Meremere Dragway. Note the 'Thank You' message to Rod and John's wives

high-strength chromium molybdenum ('chromoly') alloy steel. This meant they could use tubes with thinner walls (but similar outside diameter), reducing weight without sacrificing strength or stiffness.

With no experience using chromoly steel, they commissioned Graham Berry Race Cars to build the new chassis. When the project was nearly finished, Rod and Ian dissolved their partnership, and Rod took over the new car. Powered by a 468-cubic-inch (7.67-litre) Chevrolet V8, the FED debuted in 2001. Rod raced it regularly until 2008. "I got that to a best of 6.67 seconds, 202.88 miles an hour [327kph] … after plenty of seasons trying."

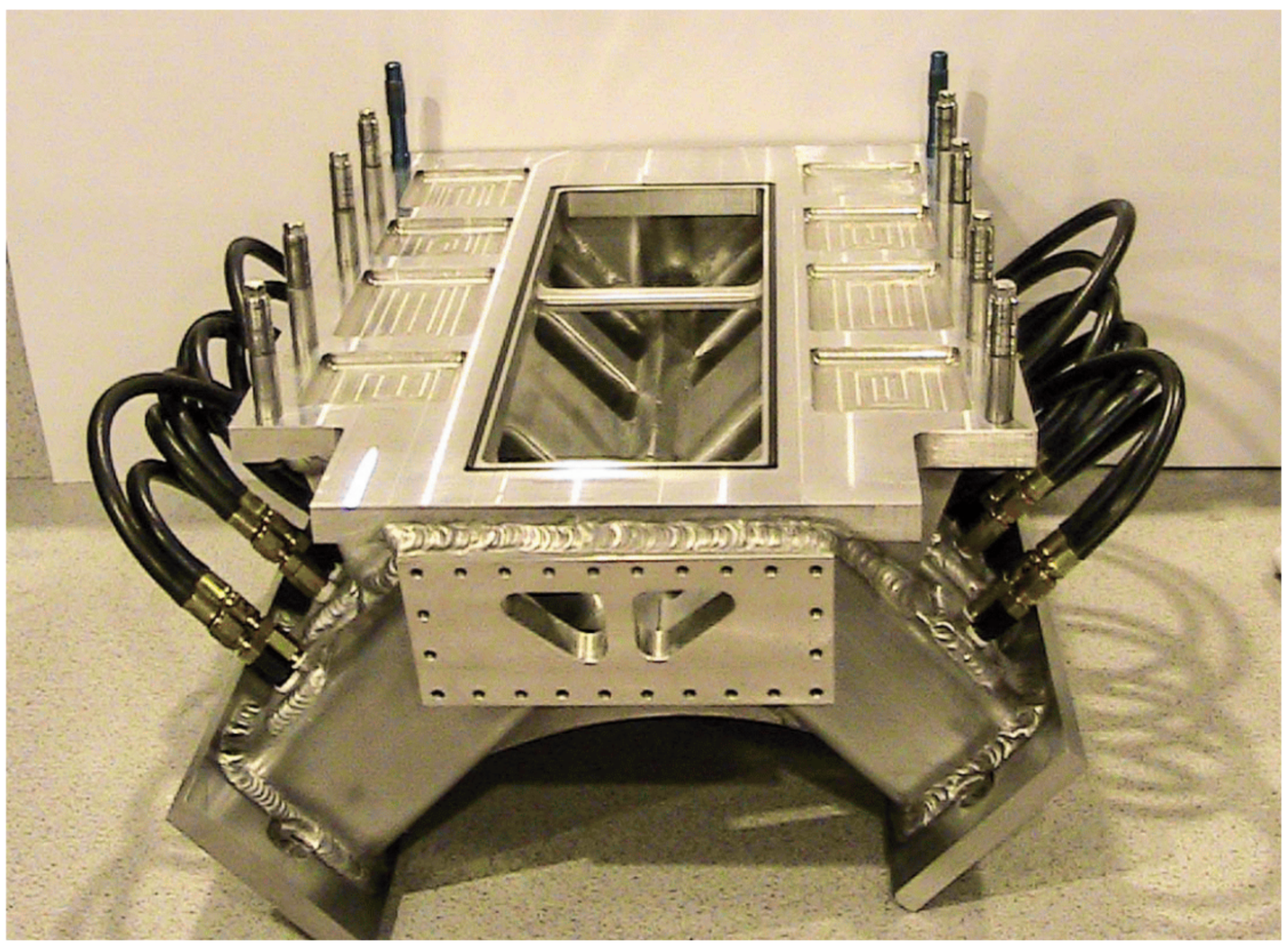
Meanwhile, Rod and his family had moved to a new property with room for the now-vital shed. With a real shed, an expanding collection of gear, and a series of successful race cars under his belt, his confidence was growing.

What's next?

Commuting by train to Wellington, Rod bumped into John Dillon, an old friend from way back.

John was in the process of rebuilding a 1992 Chevrolet Beretta drag car he had bought as a project. They got talking about what they both wanted to do next in drag racing and decided to team up. Rod started working on the Beretta at John's

Drag cars outside Rod's shed: 1992 Beretta (left) and 1971 Mustang (right)



Rod built this intake manifold for the 1992 Beretta

Rod driving the 1992 Beretta Top Doorslammer

Rod built this rear axle from scratch for the Beretta

place. They fitted Rod's supercharger to John's engine, and used the transmission and some other parts from Rod's dragster (which he sold as a project car).

Once the Beretta was built up with suspension, wheels, and body, they were "sort of looking at it," said Rod, "talking about it, and going, 'What have we done?'"

They wanted to run in the Top Doorslammer (T/D) class. The International Hot Rod Association New Zealand (IHRA [NZ]) rulebook describes T/D as the "best in mechanically super-charged, nitrous oxide or turbo-charged cars whilst still maintaining the resemblance to a full-bodied street car complete with operational doors".

The class rules allow any automotive internal-combustion engine (but only one). Top Doorslammers are allowed to use petrol or methanol fuel (everybody uses methanol). New cars inspected after 1 January 2011, have to be made of chromoly steel.

Starting afresh

John gave the mild steel chassis to a relative, and it was built into another car. They set up a jig in Rod's shed and started fresh. It was Rod's first chromoly project.

Chromoly steel has to be TIG welded. By this time, Rod had bought his own TIG welder, but that wasn't the only special equipment they needed.

"You need a mandrel bender," said Rod. "Working on a budget, I couldn't afford to go out and just buy a bender, so I found some internet plans, I bought a couple of forms that we needed for different sizes, and I went and had some 16mm steel plates cut in the right shapes and built my bender. I used that for probably 15 years before I bought a factory-made one."

As the Beretta was approaching completion, "John had been talking to somebody," Rod explains, "and they said, 'Oh, could you do something for me?' He's like, 'Yeah, sure we can.'"

Chromoly chassis for rotary-powered Mazda RX-2 drag car

Rod working on the interior of the 1937 Ford coupe

They incorporated DB Racecars Limited in 2012. They had come up with the name ‘DB Racecars’ in their late teens. John remains a shareholder in the company; however, these days, Rod usually works alone.

DB Racecars

The first chassis built by DB Racecars was a TIG-welded mild steel chassis for a steel-bodied 1971 Mustang drag car. Due to a love affair with another race car, the owner shelved this project for a few years. Recently, his son started racing it, typically clocking about 8.8 seconds elapsed time (ET), at about 140 miles per hour (225kph).

Another early project was a chromoly RX-2 drag car. The owner’s original concept involved building the car as a Mazda RX-2 body shell with a roll cage and some bracing.

The car would be powered by a small rotary engine, so it needed to be as light as possible. After talking over the project with the owner, Rod and John proposed a full chassis built of chromoly tubing.

With any project, Rod starts by talking with the owner to find out what they want to achieve – how fast they want to go, which drag racing class they want to race in, whether they want to upgrade the car later, and so on.

Once he has a clear picture of the car’s purpose, he sets up his chassis jig and fits the body, which is the main constraint. He’ll position the engine, axles, and wheels to get some basic measurements and find any other important limitations. “Depending on what style of car it is, there’s some optimal engine placement,” he said.

Some drag racing class rules have dimension or weight restrictions.

Strict safety requirements

From there, he gets out his pencil and paper and starts drawing.

“I’ll be taking measurements off the body,” he said. He’ll figure out how to work within the constraints and how the chassis needs to come together. To protect the driver if things go wrong, the tubing around the cockpit area has to comply with drag racing rules, and the engineering specifications of the California-based SFI Foundation Inc. Faster cars are required to have more elaborate framing. Once the chassis is fully welded, it must be inspected by a drag racing technical inspector before it’s painted.

The rules of drag racing impose very strict safety requirements, but they are very permissive about engine, body, and chassis decisions.

“There are all sorts of things you can do in there, and that’s cool,” said Rod. “I like the freedom.”

In addition to structural needs, a race car has to be practical to drive and maintain. A team’s pit area consists of a patch of land, usually covered in grass. You have to keep your car running using only the tools, equipment, and spares you take along with you. A racer himself, Rod understands what’s needed.

The current project

When I visited Rod’s shed in June 2025, he was working on a 1937 Ford coupe that had been built as a drag car many years ago.

Owner Paul Cathro wanted to achieve sub-seven-second quarter-mile passes. The project has given Rod a unique ▶

Welding

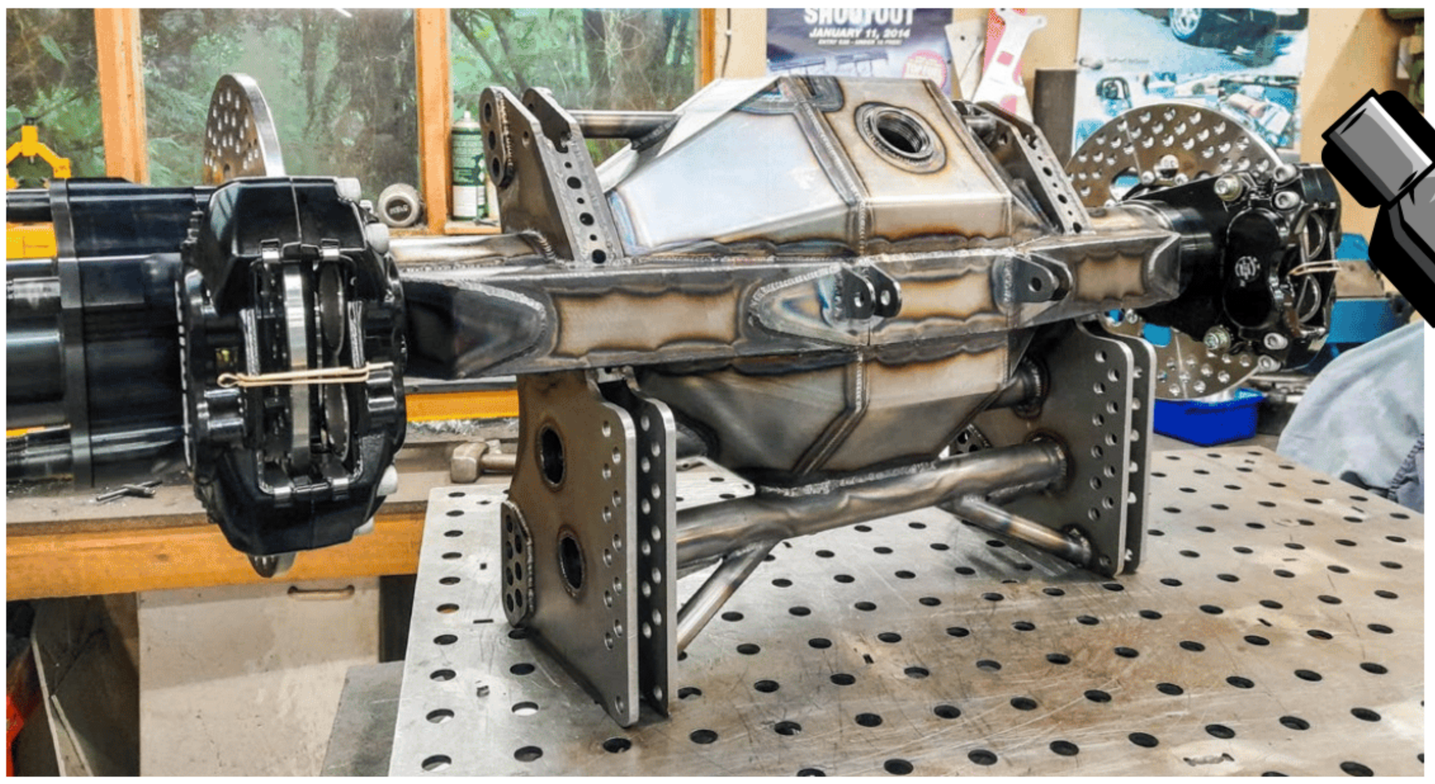
Gas: An oxygen and acetylene flame heats the parts to be welded, forming a pool of molten metal. The operator uses a hand-held filler rod to add metal as needed.

Stick (arc) welding: An electric arc welding process. The arc is formed between a consumable electrode (stick) and the job, melting the workpiece metal. The electrode melts to provide filler metal. A flux coating on the electrode gives off a shielding gas and forms a layer of slag. The gas and the slag protect the weld from oxidation or atmospheric contamination. The stick electrode clips into the handpiece.

MIG (metal inert gas): An electric arc is formed between a consumable wire electrode and the job, melting the workpiece and the wire. The wire is continuously fed through the handpiece. Shielding gas (carbon dioxide) is also fed through the handpiece, protecting the weld from oxidation or atmospheric contamination.

Gasless MIG: Uses flux-cored wire that releases inert gas right at the weld, eliminating the need for a separate supply of shielding gas. The wire is continuously fed through the handpiece.

TIG (tungsten inert gas): Uses a non-consumable tungsten electrode to create the electric arc. Filler metal (if needed) is hand-fed, similar to gas welding. Inert shielding gas (argon) is fed through the handpiece.



Rod added suspension brackets and bracing to an off-the-shelf rear axle housing for Paul Cathro's 1937 Ford coupe

Rod's own 1967 Mustang Top Doorslammer

opportunity to flex every race car design muscle in his highly experienced brain. To achieve Paul's goal, the '37 needed an upgrade to the T/D class.

Top Doorslammers cross the finish line travelling well over 200 miles per hour (330kph), so they tend to be long and low. The coupe body came with a nicely executed top chop; fibreglass doors; and a one-piece fibreglass front panel incorporating the bonnet, grille, and wings. It was high and boxy. Rod recommended lowering the front while keeping the back up high to clear the tyres. This meant slicing a 75mm horizontal wedge out of the front panel to maintain some ground clearance. With a relatively short body and cramped engine compartment, it was a big ask fitting everything in.

In addition to building the chassis, Rod stripped and reassembled the engine and transmission and completed all other mechanical assembly. The car needed many custom-built components. For example, he built an adaptor plate to properly align the supercharger with the engine. There's a bespoke cage around the supercharger drive belt to protect nearby components from damage if the belt snaps. The rear axle housing started life as an off-the-shelf race car part, but it needed custom-built bracing and suspension brackets to make it work in the '37. Paul Cathro is rapt: "It's a credit to him," said Paul.

Not as simple as it sounds

Listening to Rod talk about designing and building high-horsepower race cars, it's tempting to think it's a simple step-by-step process. Nothing could be further from the truth. Rod makes it sound easy because he has so much experience solving difficult problems. He points out that he might not always find the quickest or most efficient way to solve the problem, but he does come up with great solutions, which is why so many racers keep asking him to work on their cars.

Part of the thrill is getting out of the shed and studying each car's performance on the drag strip. "I'll watch the car … how it launches … how it drives. And I'll give them advice on how to set up the rear suspension to get the car to do what it's supposed to do."

Fastest ever time

Rod loves driving his drag car as much as he likes helping other people build and tune theirs.

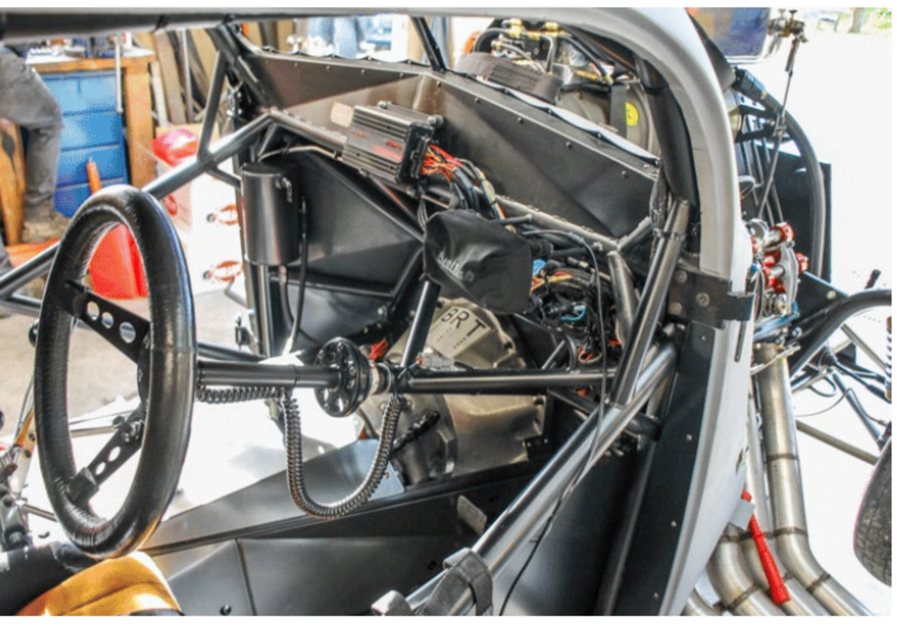
He recently debuted a new Top Doorslammer, which he and his old friend John Dillon built from the ground up. Christened 'Wyld Stallyn', the car has a 1967 Mustang body and a supercharged, methanol-burning 526-cubic-inch (8.62-litre) V8.

At Meremere's Napa Auto Parts Dragway in February 2025, with John crewing, Rod drove the fastest quarter-mile ever recorded by a supercharged 'Door car' in New Zealand: 5.927 seconds, 245 miles per hour (394kph).

Rod and John had been chasing a sub-six-second pass for years.

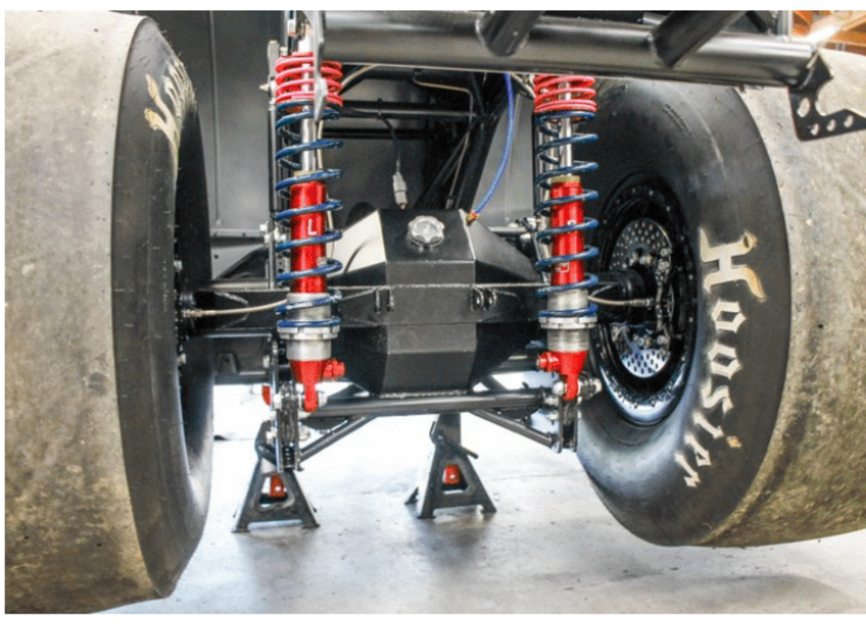
"We've built the car. But there's a big difference between building something to try and achieve a goal to actually achieving it. That's something I'm very proud of."

1937 Ford coupe in Rod's shed



Inside the '37 Ford coupe, showing the fire suppression system and some of the wiring

TIG welding is essential for working with chromoly steel



The 1937 Ford coupe rear suspension is packed with custom-built parts

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What really sets EziSwap apart is its Kiwi ownership. As the only New Zealand owned gas supplier operating nationwide, every decision is made with the local market in mind. Supporting EziSwap means supporting a business that's reinvesting in New Zealand and putting the needs of its customers first.

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A COFFEE AND A BOOK

After finishing his TV cabinet, Nigel decides to continue adding to his living room furniture. This time, it's a coffee table and a bookcase made using parts from the cabinet plans and leftover timber

By Nigel Young | Photographs: Nigel Young

The TV cabinet I built, as I detailed in *The Shed* Issue No. 121, works well and has received some very positive comments.

I'm pleased with the proportions and the finish, and I managed to get my measurements correct. I notice my mistake every now and then – it won't happen with this coffee table project or either of the bookcase builds – presumably, they'll have their own mistakes.

The coffee table is literally a cut-down version of the TV cabinet – the middle section and end sections are the same. The only significant difference is that there isn't a back to it – the leading edge goes right around, which means there are four Kwila highlights in the corners rather than the two that are in the TV cabinet.

A tale of three bookcases

The bookcases started with a comment from my wife about a year ago: "Why don't you just use the whole garage for your workshop?" I never saw that coming.

The result was a three-article series on how to set up your workshop (*The Shed* issues 117, 118 and 119), which first required a lot of sorting through stuff that hadn't been seen for a long time – hands up if you don't know what I'm talking about!

In amongst it all were several boxes of books – I knew they were there and had wanted to get at them for a while, so now was the time. But they required a bookcase. This was prior to the decision to write these articles and make the TV cabinet, coffee table and two matching bookcases.

At the time, all I had was several full-size lengths of 16mm Melamine that were of varying widths and quality, so that was where I started. When I studied to be an architectural draughtsman back in the 1980s, one of the first things we were taught was to start with what you know, a piece of advice that has held me in good standing ever since.

Maximising what I had on the shelf

It was a case of careful measuring in order to maximise the use of the Melamine.

The bookcase was intended to be against the wall in the lounge next to the sliding front door, which meant it had to be 1000mm wide. The two sides would be 2000mm tall and the depth 185mm. Now that isn't particularly deep, but it was the best I could achieve at the time, and it was sufficient to accommodate most books.

I cut the Melamine into six 185mm strips, and then cut them all down to 2000mm lengths. Separating two out for the sides, I cut the other four down into 1000mm lengths for the shelves, including the top.

I had to remember that this one was the full 1000mm wide, while the rest would need to be trimmed by a further 22mm – 32mm to achieve the actual width between the sides, but then adding 5mm back on each side as I intended to rebate them in order to seat the ends rather than just relying on glue and screws.

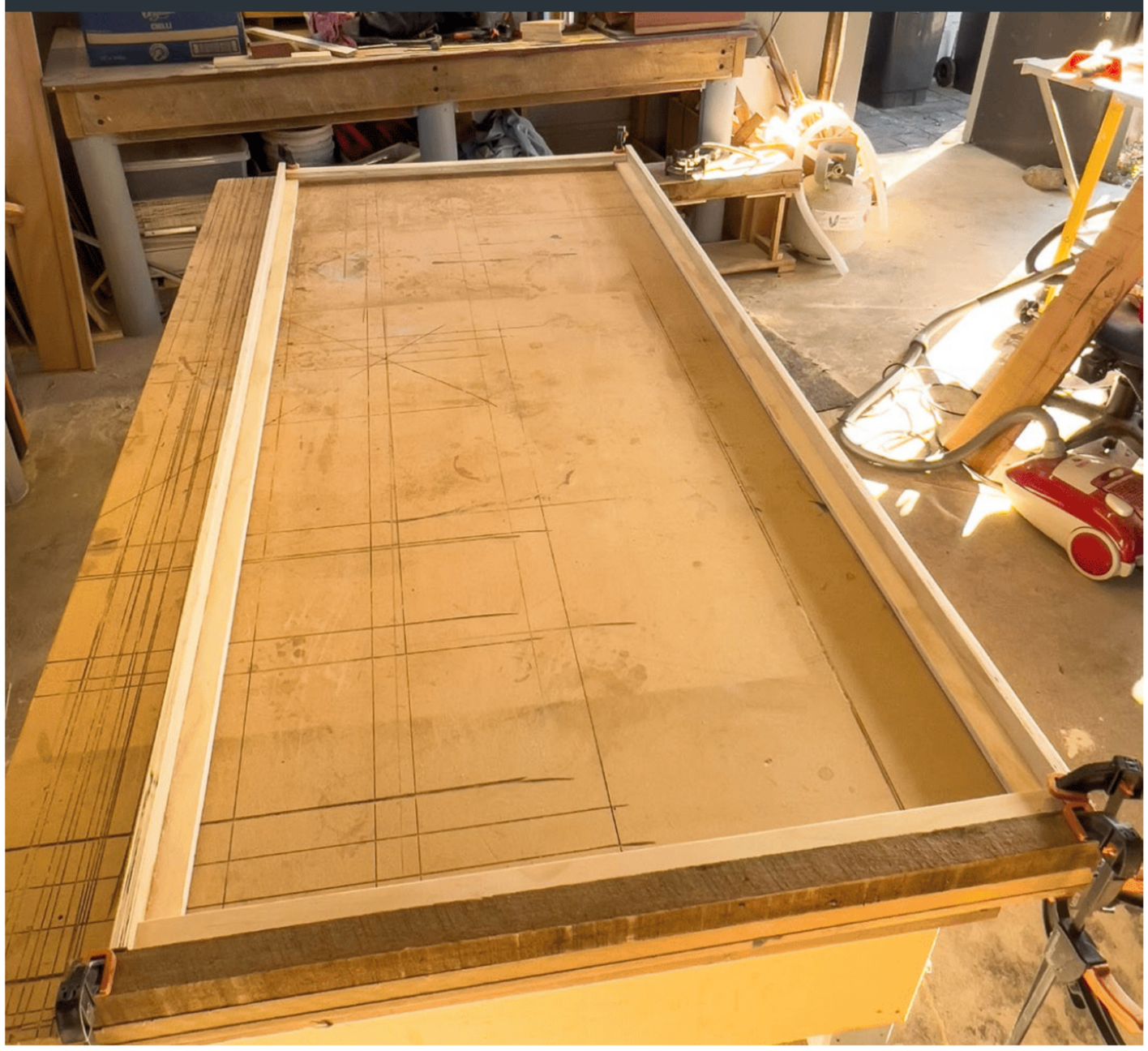
Melamine is not a good surface anyway when it comes to glue, so rebating was always going to be a given. I then measured up the skirting board we had in the house and notched the bottom of the back edges to accommodate it. This gave me the

The TV cabinet that started it all, followed by the matching coffee table. The bookcase is one of two that were built as part of the project

The original Melamine bookcase that allowed me to bring the boxes of books in from the garage. It was only meant to be temporary. My son now has it and has painted it green

Cutting the Melamine strips that I had available. The Stanley skin saw has a 60-tooth Diablo blade, which gives a superb cut. The straight edge is designed to have the saw sitting on it

Two of the L-shaped sides of a bookcase being fitted with the two 40mm deep 1000mm long spacers – top and bottom. I know that my workbench is square, so I clamped everything to it to be as accurate as I could. It always pays in the long run if you get this sort of thing sorted early on in the project



underside height of the bottom shelf so that it would span over the skirting board and be hard up against the wall. As for the corner with the other wall, there is a skirting board thick gap between the shelves and that wall. The same will apply to the new ones.

Adjustable shelves

I established the heights for the shelves as 300mm centres – this bookcase was temporary, and I wasn't going to make it adjustable – that would have to wait for the future ones.

I laid the two sides lengthwise against each other, making sure to have the notches for the skirting board mirrored – an easy thing to forget when you're in the thick of it all. Using the top edge of the notches to establish the underside of the bottom shelf, I drew a line across them both, and then a second one 16mm above the first. I did this at 300mm centres until all six of the internal shelves had been marked out. The top

Keeping things square – cutting out the notches for the 60mm high skirting board at the back. Remember to keep these mirrored when you rebate the side for the shelves

Setting out the first of the four front and back frames for the new 18mm ply shelves. The L-shaped corners are held apart by 40mm deep pieces top and bottom. These would take the top of the bookcase and the bottom shelf when assembled. The piece of rimu at the front is to help me keep everything square right from the beginning. If you get this wrong, it becomes harder to fix further down the track

Showing the way the 40mm deep strips are placed in relation to the L side corners. The four 264mm pieces that establish the depth of the bookcase are butted into here also

shelf would go across the tops of the two sides, forming a butt joint. They weren't going to be pretty, but they would do the job. I set my router to cut a 5mm groove across both lengths, ensuring there would be no discrepancy between the two sides. I clamped them and cut them both in one pass against a straightedge I had put in place, and then adjusted it for the subsequent passes until I had a rebate 16mm wide and 5mm deep.

I checked the width with an offcut, and then reestablished it all again, 300mm along where the next shelf would be. Finally, I was all set – the cutting and rebating were now complete, and the next task was to assemble it all.

Assembly

The most important point from here is to make sure the whole thing is square. Establish the position of your sides and then clamp them. Once you're satisfied that you have that right, glue and screw your bottom shelf and your second-from-

Checking squareness as I fix the bottom shelf to the shelf carcass. It was both glued and screwed in place

1. I marked the two faces before glueing them

2. But they didn't hold – the surface was too shiny and smooth

3. I scuffed them with some 40-grit sandpaper and tried again

4 and 5. Now glued and screwed, they were fine

Marking out screw positions – the 40mm strips beneath are only 18mm wide, so your holes need to be 9mm in from the edge

the-top shelf in place.

This is the first and the last of the rebated shelves. The underside of the bottom one should be flush with the top of the notch you've made for the skirting board, while the second from the top will be completing the square. Check and recheck this as you go – get it wrong at this point and it becomes harder to correct the more shelves you have in place. The best way to check for square is to measure across the diagonals – top left to bottom right, and bottom left to top right. If they are within 1mm, you're good to go.

Glue and screw the remaining inner shelves in place, and use a countersink bit to recess the tops of the screws. Then, finally, fix the top one – it should be sitting on the top of the two sides, giving you a squared-off butt joint. Allow for an hour or so for the glue to do its job, then you're all set to take it inside.

Once you've installed it, get two small L-shaped brackets and fix the top shelf to the wall. For those who lived through the Christchurch earthquakes, you'll appreciate the wisdom of this. We were woken at 4:35 am with the first one in September 2010 by a large bookcase we had in our bedroom falling over and blocking the whole room. Lesson learned.

Not just a book container

I was under no illusion that the Melamine bookcase was very temporary.

There were two main influences

behind the ideas for this latest project: an existing dining table I had previously built, and the one who had said, “Why don’t you just use the whole garage for your workshop?” and the subsequent re-access to the boxes of books previously mentioned.

I had been planning on building the new bookcases in the same aesthetic as the table, but as just a ‘book container’ for want of a better description. My wife, however, had other ideas – she wanted the sides to be open, and the shelves to be deeper to accommodate pictures in frames, knick-knacks and the like. So, how was I going to do that using 18mm ply?

The answer was to cut eight 50mm wide full-length strips, then to glue them together to form a long L-shape. These would be the four corners of the bookcase – everything now went inside them.

The 40mm wide spine added down the back to assist with support for the shelves – books can be very heavy, and these shelves are spanning 1000mm. Once the middle shelf was fixed in place, this would be fixed to it, so there would be no ‘wandering’

Maximum bond

Once the Ls were laid out – there were eight in all as I made two at the same time – the top and bottom were held apart by 40mm wide strips of ply, each 1000mm long.

These were glued and screwed to ensure maximum strength, with the two glueing surfaces sanded rough and gouged in order to give the glue maximum bond. That sorted the width of the bookcases, and meant that the front and back had been formed; now all that was left was the depth.

This was intended to have 300mm deep

Lessons from earthquakes – two L-shaped brackets that I had on hand, used to fit the top of the Melamine bookcase back to the wall

1–5. I had a strip of 15mm wide aluminium on hand, so I cut two pieces at 160mm long each – one for each of the new plywood bookcases. I drilled them at either end, and then clamped them to my bench where I bent them into a right angle. Two long screws to go into the wall and two short ones to go into the top of the bookcase

Checking for height – I got it as close to the ceiling as I could. The pieces of ply clamped to the sides were just to make it easier to move and avoid any twisting until it was all properly assembled

by 1000mm long shelves, making the overall dimension of the final bookcase 1036x336 – allowing for the 18mm width of the ply from the Ls'. That meant that the 40mm pieces of ply that formed the depth of the bookcases were 264mm – 300mm minus the 36mm from the 1000mm long strips that gave us the width.

These were glued and screwed in the same way that the 1000mm long pieces had been. I only had sufficient plywood to complete one of the bookcases, but the structure for both was made at the same time.

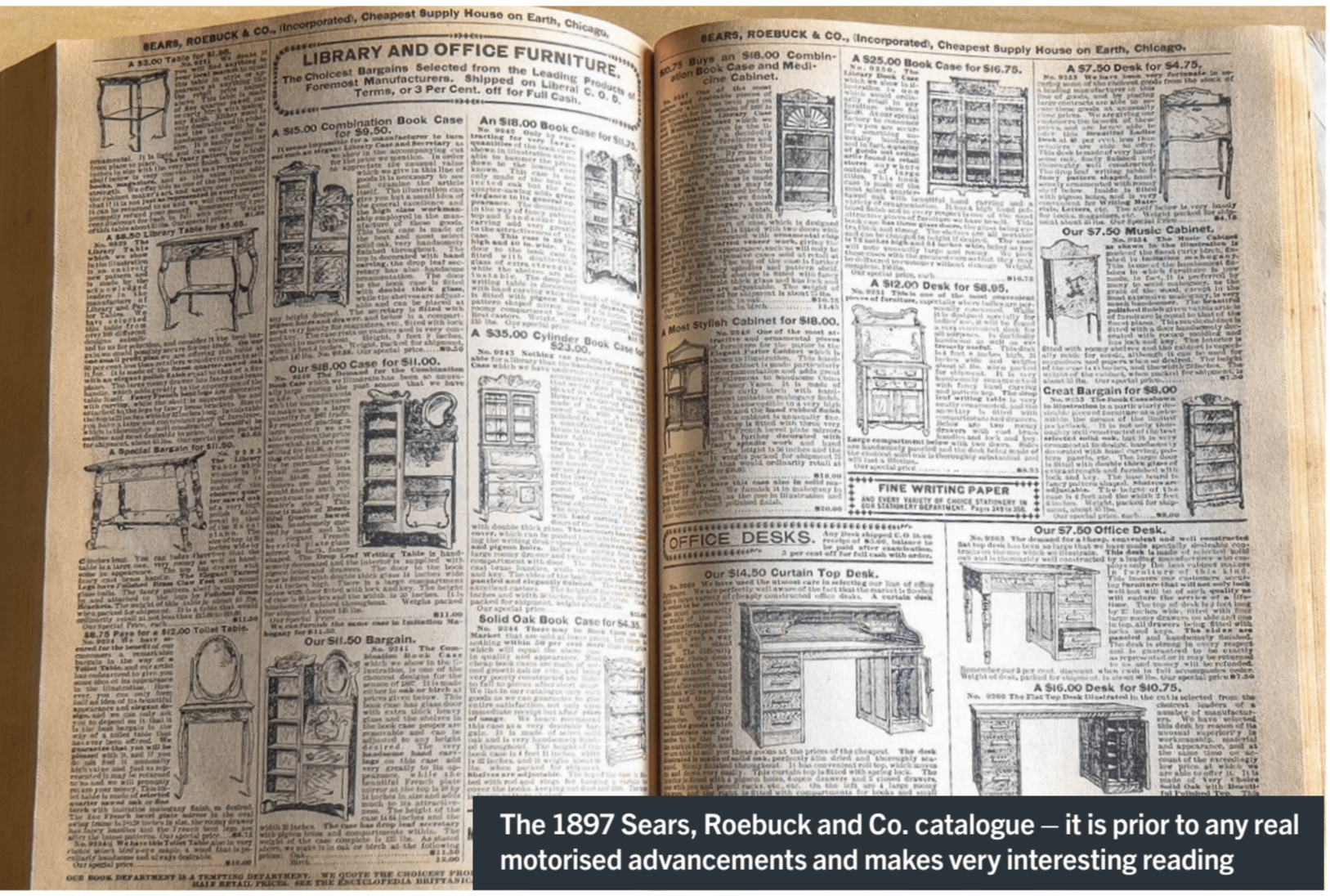
Checking it in situ

Once the core carcass had been made, it became a case of screwing on the top and the bottom to tie it all together.

We took it inside and stood it up to check. It was a wee bit touch and go, but it worked – I had the top as close to the ceiling as I could get it, which is what I had intended. Once we were happy with that, it was simply a case of taking it back out to the garage and adding the middle shelf. This was set at the 1200mm mark, and was the only shelf to be fixed; all the others could be moved up and down as required.

The idea of having the middle shelf fixed is just good practice, as it helps stabilise the whole thing – keep in mind that there weren't any sides to contribute to the overall stability of the bookcases.

The last thing I did was screw a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The 1897 Sears, Roebuck and Co. catalogue – it is prior to any real motorised advancements and makes very interesting reading

The table that was the inspiration for the TV stand and coffee table. It needs resurfacing, so I'll match it with the others

40mm wide full-length spine down the centre of the back of the bookcases. This allowed me to reduce any sagging by putting a shelf support at the back edge of the shelves, halfway across. I had been concerned about sagging, it was, after all, a 1000mm span, and books can be heavy. The second bookcase had to have its spine offset by 150mm in order to clear a power point.

Finishing touches

With construction finished, it came inside where both the carcass and the individual shelves got two coats of Danish Oil, as did the matching coffee table.

Holes were drilled for the shelf supports – the bottom two shelves were to be 400mm centre to centre to allow for some quite tall books we have – the tallest being a book I had bought a couple of years ago on crossbows – I had used it as a resource for *The Shed* articles I wrote at the time. That left 375mm centre to centre up to the fixed shelf at the 1200mm mark. Above that, we put four shelves at 270mm each, for our collection of DVDs.

The final step was to make an aluminium bracket to tie the bookcases back to the wall. I had a length of flat aluminium on hand, so I cut it to 160mm long, rounded off the corners, drilled two holes in either end and bent it by 90° in the middle. I sorted four screws to do the work – the ones into the wall had to be longer because they had to pass through the 9mm of gib before finding the stud behind. The ones in the top had to be shorter because I didn't want them going through the 18mm ply and out the other side.

A uniform aesthetic

And that was it.

The shelf supports were pushed into their 5mm holes, the shelves placed onto them, and then it was just a matter of putting the books, CDs and DVDs in place.

I had initially bought three sheets of 18mm 1200x2400mm ply from Mitre 10, at around $90 each. Ultimately, I would need four, bringing that to a total of $360. The black steel legs for both the TV cabinet and coffee table were from Bunnings, at about $10 each, so that was a further $80.

I had an almost used tin of Danish oil on hand, and had to buy another three, probably taking the final amount to around 1.7 litres used overall – around $160. Allow another $40 for screws and fixings, and the whole project – a TV cabinet, a shorter but matching coffee table, and two matching bookcases – cost around $630.

The sharp-eyed amongst you may have noticed a copy of an old Sears, Roebuck and Co. catalogue sitting on the coffee table. It's dated 1897 and makes for fascinating reading. I have included a picture from that showing bookcases of the time, and their prices.

Conclusion

The whole project was very satisfying – the aesthetic being started with a dining table I had made some years before, which was also made with 18mm ply, had thickened edges, Kwila flashes in the corners and black steel legs.

My next job is to resurface it and try to match it with the rest as closely as I can. They all look good together, and the satisfaction level is very high, given that they are very public and used on a daily basis.

My hope is that some Shed readers will give one or all of these projects a go. Please let us know if you do.

Auckland Fire Brigade Museum

THE BIRTH OF A MUSEUM

By Chris Hegan | Photographs: Chris Hegan

The Auckland fire service has changed dramatically over the years in so many ways. With its rich and long history, the time is right for a museum to commemorate these heroic Kiwis and their tools of the trade

Colin Prince is the right man in the right place.

He spent his years in the Auckland Fire Brigade not fighting fires but supporting the crews with the kit to do their jobs. Now he's part of a team of mostly retired firefighters collecting and curating a very large collection of firefighting equipment and memorabilia of mostly Auckland origin for the Auckland Fire Brigade's Museum and Historical Society.

What he doesn't know about firefighting and rescue equipment isn't worth knowing. In a packed 40-foot container on the grounds of the Albany Fire Station and salted away in various storerooms and fire stations, the group has more than enough to deck out a museum with rotating exhibits.

The society currently relies on the grace and favour of Fire and Emergency New Zealand to accommodate the collection, but to put it before the public, the society needs its own building.

Some unique tools

I meet Colin in his 'office' – a desk and computer in the front of the container – cataloguing a strange gadget which he informs me is a hydraulic cutter for vehicle pedals. "People in crashes often get their feet jammed under a pedal. The only way to get them out is to cut the top off the pedal," he says.

Colin, the society's secretary, takes me to meet the two Walkers, John and Gary – no relation – who are sorting out one of the working appliances, a 1984 International, when the organisation was still known as the 'New Zealand Fire Service'. This is a dedicated rescue

Colin with pedal cutter

A Prince and two Walkers

vehicle of a modular design with specialised pods moved around by a Palfinger crane on the back. The one they show me is a trench collapse pod, equipped with gear for that specific eventuality.

"We once got a horse out of a trench with that crane," says John Walker. It did have one small pod for firefighting.

"That was for the embarrassment factor," explains John. "People would get pretty exercised about what they saw as a fire engine driving past a fire without stopping. They had a stand-pipe to plug into a hydrant and a single hose, so at least they could make a show until a real fire engine showed up."

"We never say no"

Back at the container, Colin starts pulling out items of interest from a collection that includes objects and documents going well back into the 19th century. Much of what they have comes from private collections of former firefighters. He shows me the latest arrivals, a typical case.

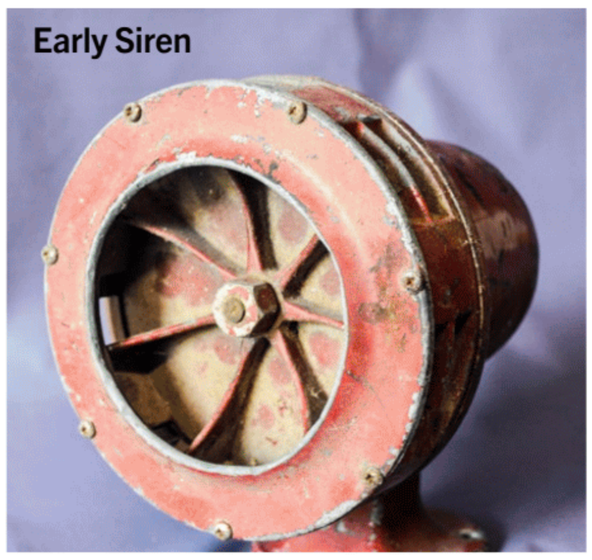
"A guy we had in Auckland for many years, who had also moved around a bit, died last year. His daughter called me up and asked if I wanted some of his memorabilia. We never say no. This is the first lot here," he says, pointing to some large cardboard boxes. He starts fishing bits out.

"This is the kind of stuff that firemen tended to accumulate." At first glance, it doesn't look like much. Brass and aluminium couplings, plastic hats, and I am wondering why on earth anyone would want it. But then Colin starts pulling out prizes.

The horse lifter

For the avoidance of embarrassment

What you get when you never say no



Hand axe

Small box, big noise

Oxygen rebreather

"An old mechanical siren off a truck. We have a 1940 Ford V8 truck in Glen Eden. That siren would come off something like that. An executive officer's breathing apparatus. They're small and quick to put on, so the officer in charge can duck in and out to check on something.

"Some of this is duplication. But here's a wooden-handled firefighter's axe. They're as rare as hen's teeth. They used to have to scrub the handles with sandsoap to make them white. Everyone had an axe."

Ship fires

The next item to turn up is a 'life call', which went with the breathing apparatus.

"If you go down and there's no movement for a certain time, it goes off. Or you can set it off manually. It makes an ear-piercing noise," Colin explains.

He points out a small tank and backpack, a long-duration breathing set. "They use pure oxygen, which is recycled through a chemical scrubber and reused. That would give you an hour. They were used on ship fires."

Why ships?

"Because you can't get out as quickly, and you're often in tighter spaces," he says. "You've got tunnels. Ships are much bigger than houses. This was originally a mine set. A lot of the early innovations came from the mines, where you can have poisonous gas and be further in."

An earlier time is recalled with an original bellows-pumped air supply.

"They came with a rope as long as the air tube. Here are the instructions on top," Colin says. ▶

Contents of the rural pod

Bellows breathing apparatus

Breather instructions

Suction change over shield

Identifying alarm location

Beautiful, dangerous brass

All dressed up and no fire in sight

"'One pull: more air required. Two pulls: slack off lifeline. Three pulls: help me out immediately'. And for the man on the bellows, 'Three pulls – come out immediately'."

"We have a complete one in storage at Pitt Street headquarters. It came from the Wellington Maritime Museum, which had it because they were commonly used on firefighting tugs for ship fires, where they were still in use until 20 or 30 years ago. They were suitable for the purpose. It takes a while to get into a kit with tanks. With this thing, you could just plant it on your head and go," says Colin.

Not just firefighting equipment

There is more than just firefighting equipment. Colin hauls out a huge ledger book. An ornamental flyleaf commemorates its presentation in 1911 to the Old Boys & Honorary Members of the Fire Brigades and Salvage Corps Association. It contains decades of newspaper clippings going well back into the 19th century.

On seeing the book, I had first assumed it would be a record of fire callouts. John explains that those were called 'occurrence books'.

"It was actually an occurrence book that prompted us to start the society, seeing old occurrence books being thrown into a skip at the [Auckland] City Station. Murray Binning, a senior commander, saw it happening and called about a dozen of us together and said we needed to do something about hanging on to the history."

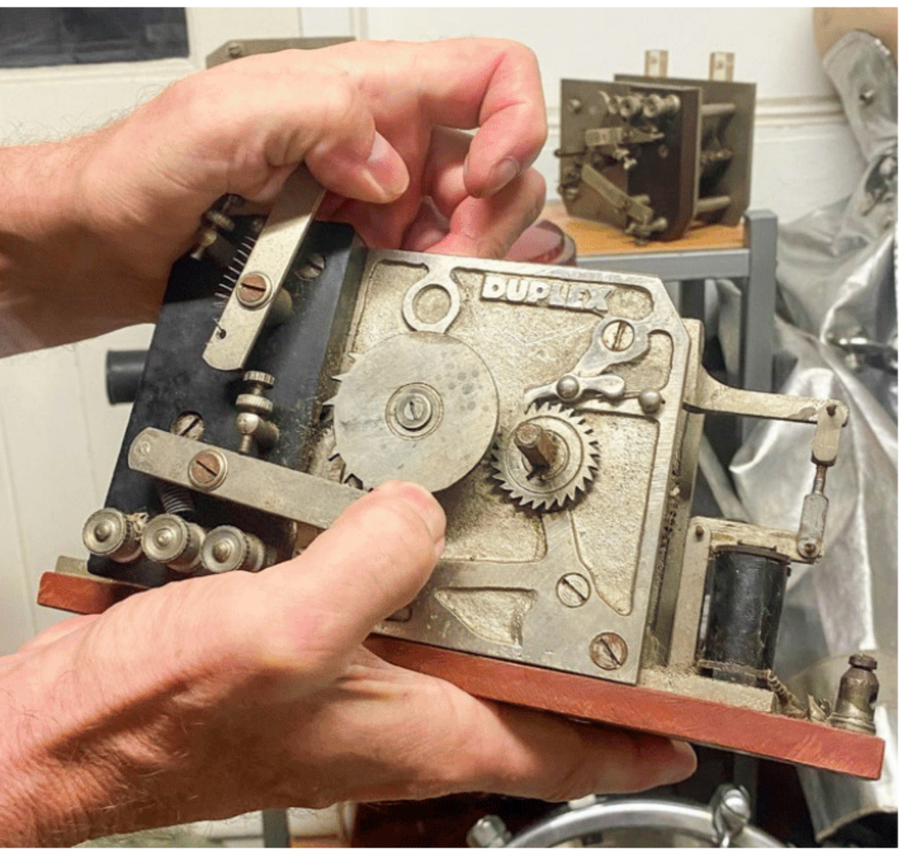
Of course, there are trophies, firefighters being competitive by nature. There is a shield for 'Suction Change Over'. Suction change over? John explains: "Every truck carried four lengths of suction hose. They have a small tank onboard that runs out pretty quickly, so you have to find a water supply. If there's no hydrant, you look for a pond or a swimming pool you can pump from. Setting it all up is time-consuming and needs to be done fast, so some lot obviously turned it into a competition."

Some restored equipment

Next stop, the Pitt Street headquarters of Fire and Emergency New Zealand, where the society has a display case that gives a foretaste of how the museum will look, showing a collection of immaculately maintained or restored equipment.

Most striking is the brass helmet, made by the ingeniously named Brass Helmet Company and in use from 1940 to 1955. Firemen liked them for their dash, but that was all. They were heavy, uncomfortable, and dangerous, being highly conductive of both heat and electricity.

Downstairs, we find two storerooms packed to the gunwales with more museum feedstock, including a fully dressed mannequin in gear from the '80s and the complete bellows-driven breathing kit from Wellington, in perfect condition. And some curious bits of machinery



A mechanised telegraph key

The society's Karrier

that look like the insides of clocks.

These, Colin points out, were from the old roadside fire alarms. He shows me the rotating plate notched at irregular intervals. Essentially a simplified telegraph key, the notches cause a sequence of two sets of pulses to be transmitted to the local fire station.

Those two numbers matched an entry on a roller blind identifying the alarm's location. For instance, on the Tamaki B-circuit, a '5' and a '1' meant the corner of Riddell and Grantham Roads. Low tech but highly effective (and possibly more reliable than six different people calling on their mobiles at the same time).

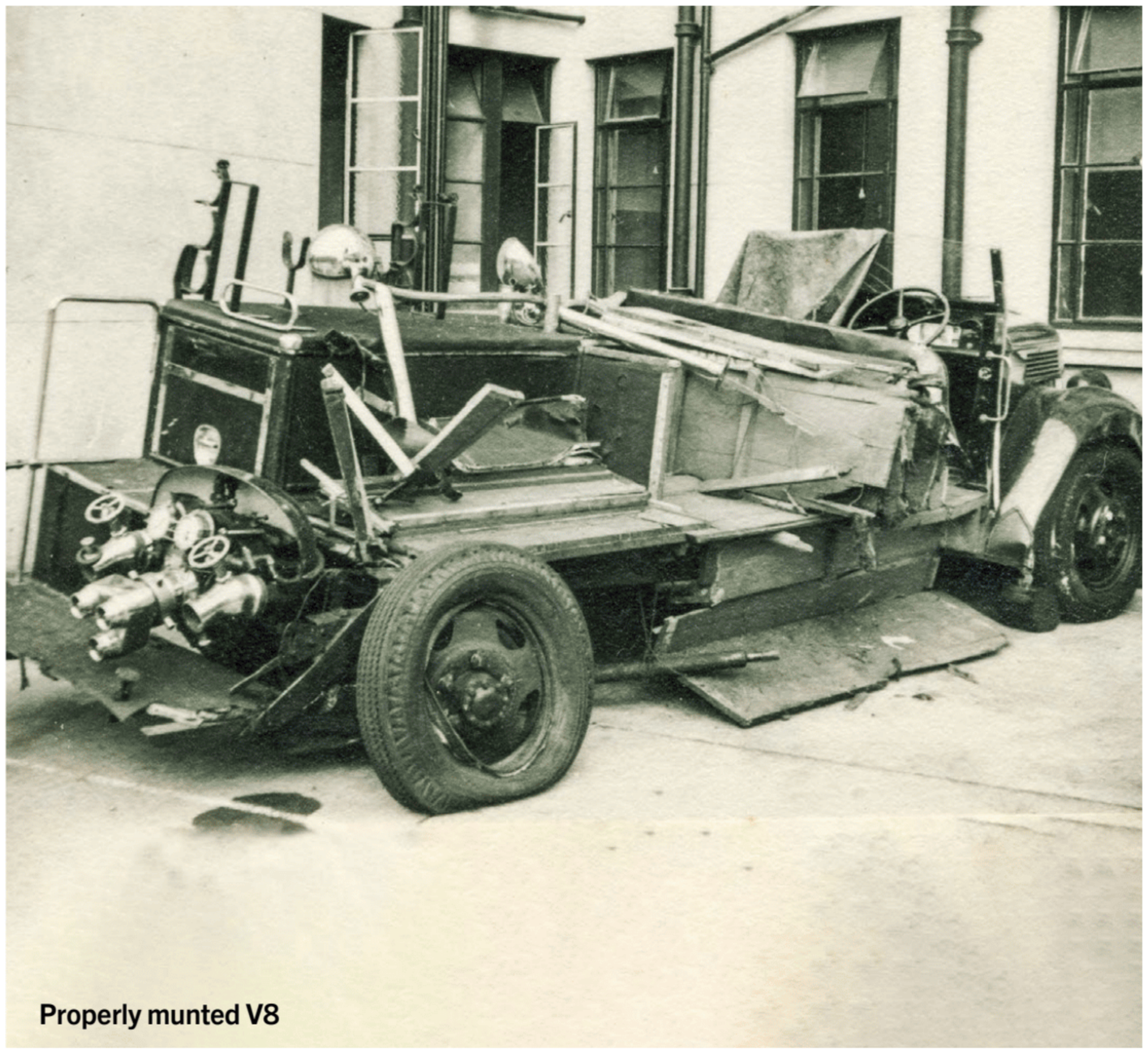
Fire engines

Finally, I head out to the Glen Eden Fire Station where the group stores its remaining two vehicles, a 1940 Ford V8 and a 1963 Karrier.

Parked next to the station's current MAN engine, the Ford is tiny by comparison, but Graeme assures me it was at one point Auckland City Station's lead engine.

"That's how big fire engines were back then," he explains. "Fire trucks had no roofs in those days. Firemen used to hang on the back or sit on the top. Going to a call on a fine summer's night was like being in a sports car. Coming home soaked to the skin on a cold winter's night was no fun at all. The uniforms were woollen and they got heavy, very heavy.

"This one has been totally rebuilt from the ground up after a crash. It's a famous story – it went through the front of a barber shop and the driver asked for



Properly munted V8

Proudly and sturdily built in New Zealand

Slow and flimsy (but weatherproof)

Hand-pumped jaws of life

a short back and sides, or so they say.

"Crashes in these things were not that uncommon because all the weight being in the back meant that if you spun the wheel on a slightly damp road, they had a tendency to keep going straight ahead. In fact, we can't get this one registered because it has been so heavily doctored and repaired that we can't find the chassis number. When we need to use it on the road, we're allowed to use a dealer plate.

"American Ford V8s dominated the fire service from the mid '30s to the early '50s. Every fire station had one. The Colonial Motor Company held the Ford agency, and they brought them in as a cab and chassis, and all the coachwork was done by Colonial in Wellington.

"They were very reliable, but something went wrong. Allegedly, they brought a guy called Tom Varley out from the UK after the terrible Ballantyne's fire in Christchurch. He was made the Dominion Chief Officer. He was a hell of a good guy, but he was a Pom and wanted Pom fire engines. We got fully-built Dennises and Bedfords after that."

Not the most sturdy of vehicles

We look over the Karrier. Apart from the considerable advantage of being fully enclosed, the striking difference between the American Ford and the English Karrier is how flimsy the Karrier is.

"It's just as well no one ever crashed one of these like the Ford there," says Graeme. "Aluminium panels screwed onto a light wooden frame; I hate to think what would have happened. ▶

Rushing to unexpected consequences

There is one aspect of the heritage of firefighting that no one celebrates: cancer. Smoke and ash contain high concentrations of carbon, a deadly carcinogen.

"See that equipment room over there," indicates Graeme. "Back in the day, that would stink of smoke. We'd breathe it in and shrug it off. No problem for a seasoned firefighter. Now we know different."

Then there are the asbestos exposures, chemical fires, and

ICI blaze

IT'S ALL FUN AND GAMES UNTIL SOMEBODY LOSES AN EYE

spillages. There was the day in 1973 when storm-damaged drums of organophosphate caused lower Parnell to be evacuated and put hundreds of people, including 41 firemen, in hospital.

Colin was serving at the time of the huge ICI (Imperial Chemical Industries) fire at Riverview in December 1984. A worker swept chlorine waste into a spill of oil and started a fire, which quickly engulfed the entire building.

"I was working here at Pitt Street at the time," Colin remembers. "I had just started two weeks of leave, but on early Saturday morning, I was called and told to come back to work. As soon as I walked into the store, all I could smell was weedkiller. We took all their uniforms and gave them new ones. Halfway through the Saturday, our technical liaison officer said, "Let's set up a big portable dam in the yard and we'll take all the stuff up and let it soak."

No gloves, no health and safety; we picked everything up and dumped it in. The problems started a few days later. I was diagnosed with paraquat and 245-T poisoning. Some of the guys are still suffering 40 years later. We get little lumps that come up and last for months. Doctors say they don't know what it is, but we know.

"They know what happens to that chemical when it burns, and to this chemical when it burns, but what happens when it's two, or three, or five? And guys were wading around up to their thighs in the stuff, watered down. They had rashes, mood swings, all sorts of things. It changed the way the fire service operates in this country at a fire.

"Guys are still getting cancers. A mate of mine has just had throat cancer, and that goes back to not only that fire but all the other ones. The over-trousers were fireproof but not waterproof. Those helmets had no flash hoods. They said, if your ears start burning, it's time to get out. It's different now. With a major fire, they send out a command unit either from here or Ōtara. They will decide whether the tactics are going to be offensive or defensive. They have hazmats [hazardous materials], decontamination, and replacement uniforms."

Practices have changed dramatically, spurred by the official inquiries into the 'Parnell Pong' and the ICI fire.

"Firefighters from those days, especially the ones that went to a lot of calls," says Graeme, "rarely make old bones."

Fortunately, this is recognised by the ACC, which accepts cancer in firefighters as a work-related injury.

ICI – the aftermath

A taste of the future – the Pitt Street display

Colin on the job with Ford V8

And they were slow, like most British vehicles of the time. I remember chugging up the Piha hill many a time."

Both engines are still fully equipped. I notice there is no rescue equipment – no crane, no jaws of life.

"We just did fires," explains Graeme. "The way we got into rescues was because we had stuff to break into buildings, or to break through gates and things like that. We were getting into situations where, as cars got lighter, they were folding up around people. The ambulance people wouldn't know what to do, and they'd ask, 'Maybe the firemen have something?' We had angle grinders and chainsaws with big abrasive discs on them. Impact saws with a compressed air tank, basically a big chisel hammering away. It was all we had. No wonder people died inside vehicles. Country brigades would go and get Bill's truck from down the road and hook onto each end of the car and pull it apart. Not great, with a person in the middle of it.

"There was a huge breakthrough when the jaws of life came along. The first ones were more than a metre tall. It took two firemen to lift one, with its hydraulic motor roaring. And they were expensive. Auckland City Station had one. The nearest other one was at Pukekohe, where the local Indian association heard about them and then fundraised to buy one for their station. Eventually, the smaller, hand-pumped ones came along. Lots of country brigades got those. They were very effective."

It's mostly a volunteer service

Although most city dwellers assume the fire service is a professional organisation, in fact it is almost overwhelmingly a volunteer service, with the 12,000 volunteers vastly outnumbering the 1800 paid staff.

Graeme explains how the volunteer service has grown: "It's always the same story. One brigade published their history and titled it The Day the Pub Burned Down, which was true in their case, but it is always something similar. In a small community, the pub, the general store, the school, or somewhere catches fire. Everyone rushes to help, they call the nearest fire service, they can hear it coming for miles, but by the time it gets there, it's too late. So they hold a meeting and ask, 'How much does a fire engine cost?' Someone rings Wormald and asks, then faints. But then they hear about a second-hand one coming on the market, and they start fundraising. Then they build a tin shed for it, and the story starts. It's always the same story, with variations."

When will Auckland get its museum?

The answer may well be soon. People enjoy fire engines, fire-fighting kit, and illustrated tales of disasters and heroism, so for any institution looking to increase its drawing power, a fire and rescue museum is a winner. Buildings on this scale are costly, but Colin points out that well-heeled stakeholders are not in short supply. Plans for the museum are well advanced, and a location, currently the subject of confidential discussions, has also been identified.

"We'll have an activity centre for kids, all hands-on; somebody from FRNZ [i.e., Fire and Emergency New Zealand] doing fire safety for the adults," Colin says. "We'll have a workshop so people can see the things we work on, an area with three or four vehicles which we can change around every three months, and another space with three aerial appliances that will stay put.

"We'll have a lot of fundraising to do, but there are plenty of interested parties. Insurance companies, obviously. In fact, most professional fire services can trace their origins to the days when the companies sold insurance protection to subscribers and issued plates to buildings. No plate, no service. The society includes among its oldest exhibits a plate from the Phoenix Insurance Company.

"Councils, Worksafe have an interest in promoting fire safety. FRNZ have a lot of trouble getting fire safety onto the school curriculum, but schools have no problem going visiting, so we would include a FRNZ fire safety briefing and then they'd go on to look at the museum."

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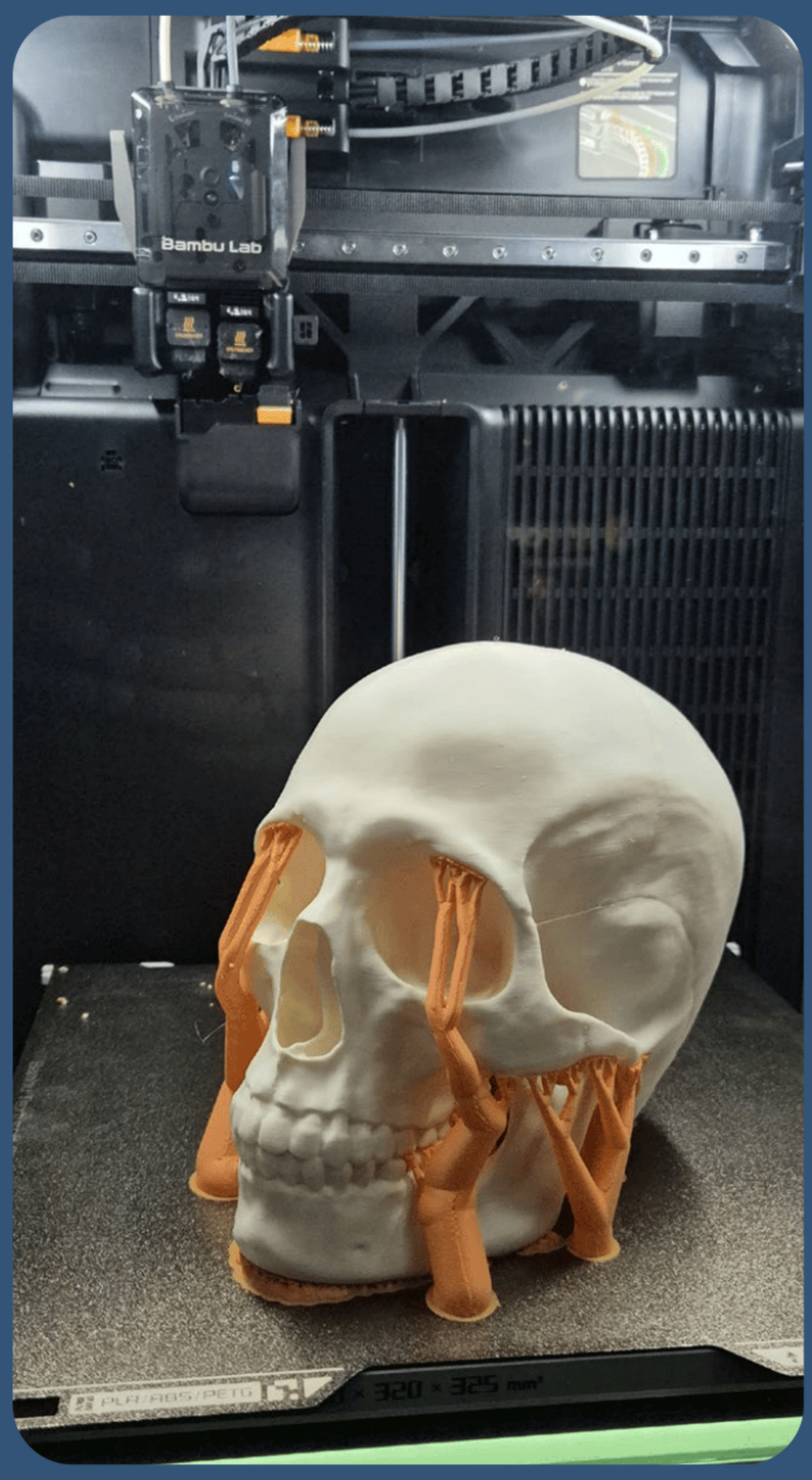

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Paul and the wee shop dog, Zac!

THE JOY OF COLLECTING

By Mark Seek | markseek@rocketmail.com | http://www.youtube.com/@shedshrink

Our *Shed* shrink mingles with a group of seasoned collectors, all excited and mesmerised by the eclectic items they find in a new local store

Many of us sheddies can confess (unashamedly, of course) that we are collectors of things that most people don't see any value in or are unable to fix and repair, and that's where we come in.

On weekends, we can be found at recycle stores, thrift shops, auction houses, swap meets, and locations only known by those enthusiastic. But is this all about to change? Is there a new breed of collector waiting to pounce on our little slice of paradise? There is, and I can prove it.

Recently, I popped my head around the door of The Flipside in Sydenham, Christchurch, and I was reliably informed this little piece of the city has recently attracted some small boutique businesses: cafés, breweries, gastro pubs, vintage fashion stores, and the like.

So, it was no wonder that I noted there were hipsters, gamers, skaters, punks, and a handful of us more mature collectors all in a state of excitement and mesmerised by the eclectic items in Paul and Jo's Flipside store.

Attracting a crowd

I first met Paul at one of the regular vintage markets here in Christchurch.

At the time, I was accompanying my wife. My task was to walk several paces behind her and carry her purchases back to the truck without dropping them or on-selling them in the car park – yes, I have been known to do this.

So, with no intention of letting the moths out of my wallet but merely assisting my wife and people-watching, I couldn't help but notice a crowd gathering around this chap (Paul) playing what appeared to be a cigar-box guitar.

It sounded very cool, but what was more impressive was this chap's ability to multitask (not every bloke can do this), which meant he could also tell his audience the most colourful stories, in a distinctive Aussie twang, while plucking away at this rather extraordinary instrument.

Fifteen minutes later, after the appreciating crowd dispersed (some with a few less dollars in their pockets), Paul and I struck up a conversation about a small portable 1960s turntable (perfect for the picnics in the Healey) he was parting with.

The next level called

After a deal was made, we exchanged

Rock gods coffee mugs!

The Flipside!

contact details, and I proudly tucked that little turntable under my arm and went to find my wife.

Over the coming months, we kept in touch, and when he announced that he was considering taking his hobby to the next level by opening a store, I was intrigued, so here I was in Sydenham, interested to find out how things were going.

Paul and his wife Jo have created a place where folks can visit on Saturdays or Sundays. Still, its attraction is that it doesn’t conform to your stereotypical weekend shopping excursion; forget the soulless big box stores and mega retail outlets.

Paul refers to a vision very much like ‘American Pickers’ but with a big pitch towards music, art, clothes, collectables, guitars, and anything oddball. Paul explains that Flipside is a serious hobby business that has been a burning passion of his for many years. It’s a culmination of over 40 years of selling and trading in Sydney.

He gives me his back story of managing shops for Angel Music for seven years, and then owning and managing a partnership shop in Southwestern Sydney called ‘Ace Music’. His time spent developing extensive knowledge of the music scene over the ditch and rubbing shoulders with many of the pioneers of the ‘Australian sound’ is one that Paul remembers fondly.

Musical heroes

While reminiscing, he’s thumbing through hardcover books with black-and-white images of his musical heroes.

He begins to tell me the story of a younger version of himself, hitchhiking into the Sydney CBD to purchase the latest imported vinyl from his favourite record store. Many of us have a music store from our youth.

From my many conversations with people, rising living costs often stifle our hobbies and passions. But I encourage you to look for places like Flipside, where you can have a conversation with other thrifters, and maybe, after a few visits, it may inspire you to start your own collection.

Well, I enjoy my Saturday morning chat with this friendly Aussie bloke, before I head off into the carpark, he tells me: “Mark, we love it when people find objects they treasure which they did not expect to find. There’s real serendipity in that, and many of us are also at that time of life when we are downsizing our collections. Finding new custodians for this memorabilia is important because vintage objects and nostalgia deserve to continue and to be valued.”

The Flipside, 8a Wordsworth Street, Sydenham, Christchurch.

Six boats for one ferry cost

WHY RESTORE OLD TOOLS?

By Murray Grimwood | Photographs: Murray Grimwood and Russell Witt

With Murray's mantra always 'repair and restore rather than replace', this issue, he decides which tools will get the 'Grimwood Restored' plaque. But first, he has some big news to share …

There are three reasons to restore old tools. The first two are the pleasure of the rebuild process and the resultant eye-candy. The third is that they will likely serve a future need.

That last reason is not as widely grasped as the first two, but having restored a few lately, my mind is somewhat full of such matters and I feel a need to unload. As well, I have a very Kiwi (and satisfying personally) effort to report on.

Last things first

Some issues ago, I wrote about doing up my Paper Tiger catamaran; an exercise which has had some amazing repercussions. The last time I'd been to a national championship, I'd gotten 36th out of 45, and went to this year's one expecting to be there or thereabouts again.

Coming down to the finish line of the first race, there were only 10 sails ahead – holy heck; all those little improvements have added up!

Above: Trailer frame and roof-rack; they stayed in Wellington for three months

Left: Pulling the old sleeve out of the mast the old-fashioned way

Old and new – same weight, but three sleeves of carbon are far stiffer

Above: Good old Kiwi DIY – two racks of hulls already in the container. Just masts, beams, rudders, centreboards, sails, and beach trolleys to go …

I slipped as the regatta progressed; 12th overall became 13th and ultimately 16th, although I did add a first-ever top-10 score: ninth, in the strongest conditions of the series.

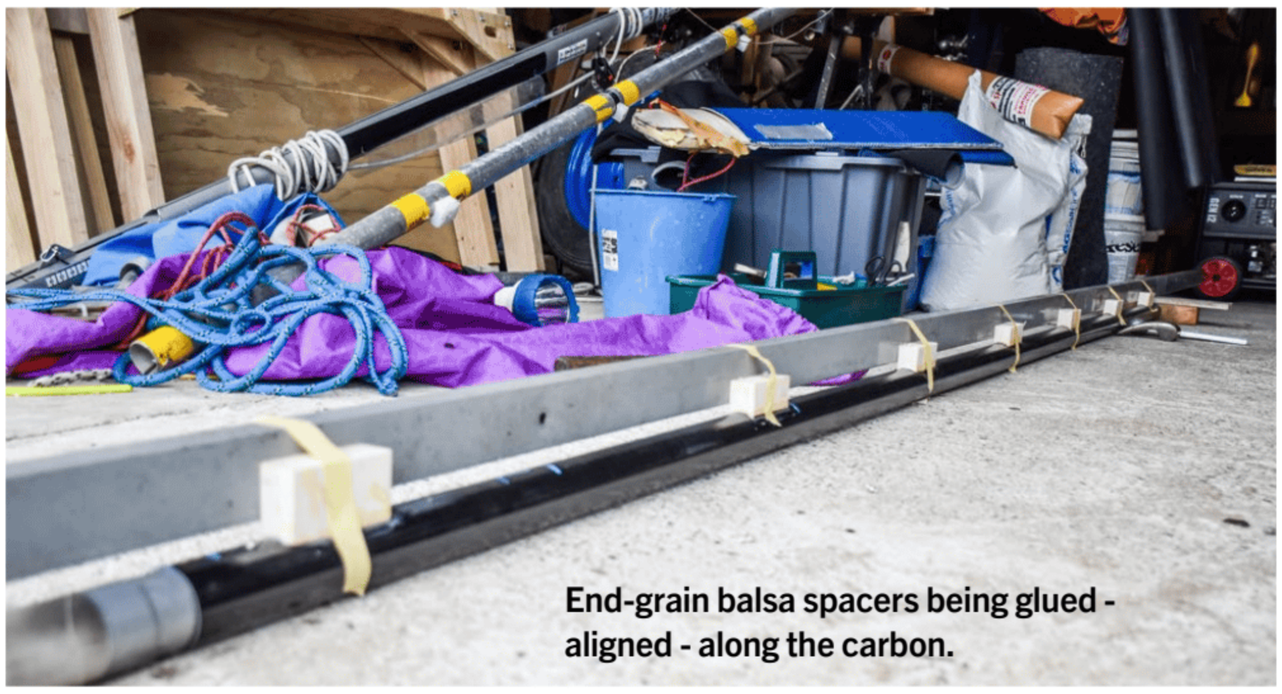
But wait, there's more

Home and in a mellow mood, I got an email: the class association had decided to go ahead with a planned international challenge – the 34th of such, spanning 50 years – and my 16th meant I was eligible (indeed, via abstentions, I ended up No. 9 in the front-10, Kiwi team).

My better half said "go for it", and we decided to make it a prolonged joint holiday – regrets are usually about chances not seized, rather than ones seized that perhaps didn't come up to expectations.

Logistics – here come the sheddies

The South Island contingent had to get its six boats to a Wellington



End-grain balsa spacers being glued - aligned - along the carbon.

My friend and I built two carbon centreboards. It took many steps and many coffees

Routing centreboard halves so they fit together accurately

container-loading rendezvous.

All of us are sheddie-types – it goes with the territory – and we soon hatched a plan. I built a rack for my trailer, capable of carrying four boats to Picton – mine and three picked up from Christchurch.

There, we would meet a vehicle from Motueka carrying two others on its roof-rack. If we slipped the masts from my trailer to his roof, we could save the ferry cost of the overhang.

That part all went to plan – but the container ship bypassed Wellington, and for a period, the whole enterprise hung in the balance. Luckily, Mainfreight managed to get the container to Tauranga, thence to the venue (Lake Cootharaba, near Noosa, Queensland) in the nick of time.

Boat prep

I spent the time between notification and loading, optimising the boat.

That old hang-glider tube mast-stiffener had gotten me this far, but carbon is lighter and stiffer – albeit more expensive. It was a bit of a bun-fight getting the old one out, and the first carbon tubes sent got crushed by a forklift, but eventually a trio of sleeves got slipped into each other, and into the mast. They measure 3m, 1.8m, and 1m.

Some at the front of the fleet have taper-laid, resin-infused, autoclave-gelled carbon mast reinforcements worth more than my whole boat, but this is enough for me.

A friend and I built a lightweight pair of centreboards (mine were bullet-proof but heavy). It took a lot of mornings and a lot of coffee, but in the end, I took off the borrowed pair I'd moulded them from. Yet another cast-off sail got sticky-patched and sewn (these plastic sails don't last; I seem to specialise in wringing life out of discarded ones) and a pair of hand-me-down rudders saved me a kilo off the back of the boat.

Old wins the day

I won't detail the event.*

At 70, I was the oldest Kiwi; at 40, my boat was the oldest in either fleet and the second-most-DIY effort (the best used two carbon ice-hockey sticks to connect the tillers).

Suffice it to say, I attained my goal of being in the top 20, and there were many times when I thought, *I wouldn't be anywhere else.* For a common purpose, a disparate group of DIY Kiwis had joined forces to pull off a fairly complex exercise and ended up like family; I'll treasure the memory – not just the sailing but the nights around the campfire.

Being in the shed is great, but producing something in your shed and then campaigning it at something like this takes it to the whole next level. At the time of writing, my trailer is still in Wellington awaiting the return trip, and my target is to be sailing in the rematch (in New Zealand) in two years' time. ▶

1

2

3

1. A team that became like family – our happy band at its nightly ritual

2. My backstays didn't measure, but in a team in which every member is a sheddie … Here, Mark and Stu fabricate new stays; we could darned-near have built a boat with what we took 'in case'

3. Team Kiwi, out there doing it – none of us would have missed it for the world

4. *Hijinx* and I first teamed up in '06 to win masters gold. Here, we're working upwind in the light, Kiwi (albeit orange) proudly flying. I'm keeping below the sail airflow, watching for wind-shifts and other boats

"ALL OF US ARE SHEDDIE-TYPES – IT GOES WITH THE TERRITORY"

4

**If you want to learn more about the Paper Tiger International Championship, keep an eye on* Boating New Zealand *magazine.*

Trying out the oil mix (two parts turps, two parts linseed, one part varnish)

Eye-candy – it came up a treat

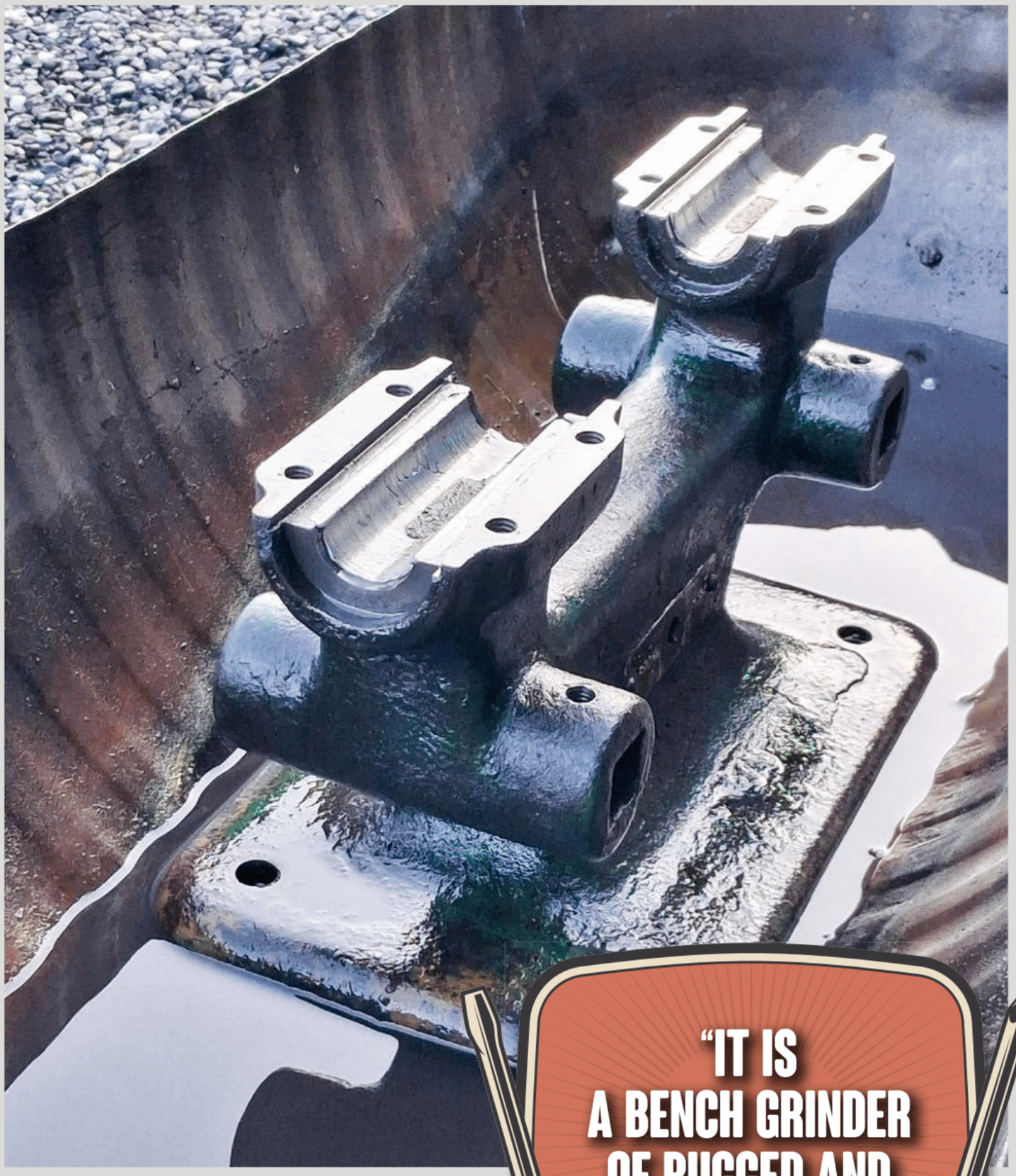
Back to the tools

Back home, attention turned to a collection of recently acquired tools, the first being a saw-bench which had set me back the princely sum of $40.

As mentioned in a previous article, I already have a Dyco tilt-table saw, but I don't really like tilt-tables, nor something so heavy that it is hard to move. The new machine seemed to have proprietary tilt-arbour internals, set cleverly in a homebuilt timber-and-steel-tube table.

Minor structural slop needed a bit of bolt-tightening; the wood oiled up a treat; and a lick of paint, some greasing, and a new belt saw the working part as good as new.

The builder had obviously been comfortable in both metal and wood; besides which, some of the design details – like the use of pipe T-fittings – bring a smile every time I look at them. It'll see me out. I love it.



Babbitt bearings to die for

But wait, there's more to this one, too

The Dyco found a new home, and I thought that would be the end of the saga – but no.

A friend – a fellow sheddie – arrived en passant in his motorhome; I told him the tale, and asked if he might have known of the (deceased) prior owner, presumably the builder and whose skills I now hold in some regard.

"I was at his funeral," was the reply. So a photo is on the way to the prior-owner's widow, by way of letting her know that the saw-bench is in good hands and being loved. Talk about full circle!

They don't make them like they used to

If the next tool were a car, it would be a Rolls-Royce Phantom 1 (produced from 1925 to 1929 and built to last).

It is a bench grinder of rugged and substantial build. It has babbitt bearings to die for and was cheaply bought from the same auction. Readers may remember that I already have a bench grinder – but in the car context, versus a Phantom 1, I'd rate it a slightly battered, high-mileage 1993 Corolla. Both will outlive me, but only one is sheddie eye-candy!

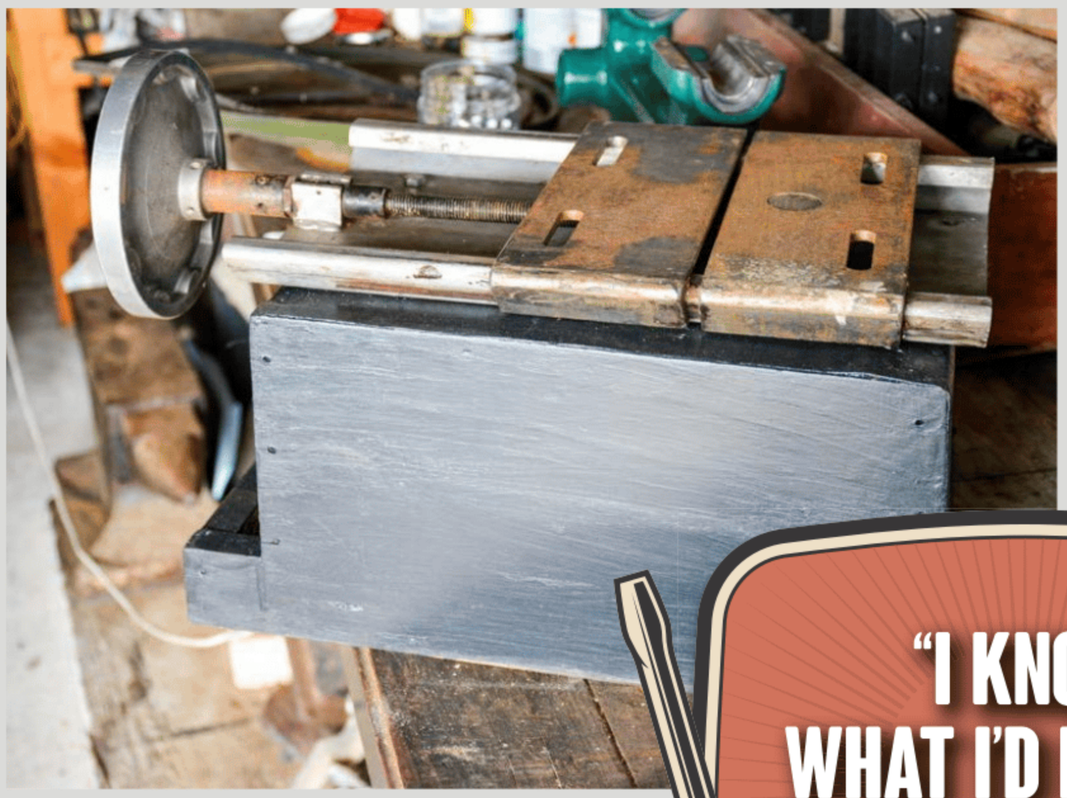
Serious net-searching failed to identify a manufacturer; all I have to go on is the attached plaque, which reads: "John Chambers and Son Ltd, Merchant Engineers, Dunedin". The company imported but did not fabricate; I guess there is an outside chance I could trace who it sourced its products from, but I probably won't get around to it.

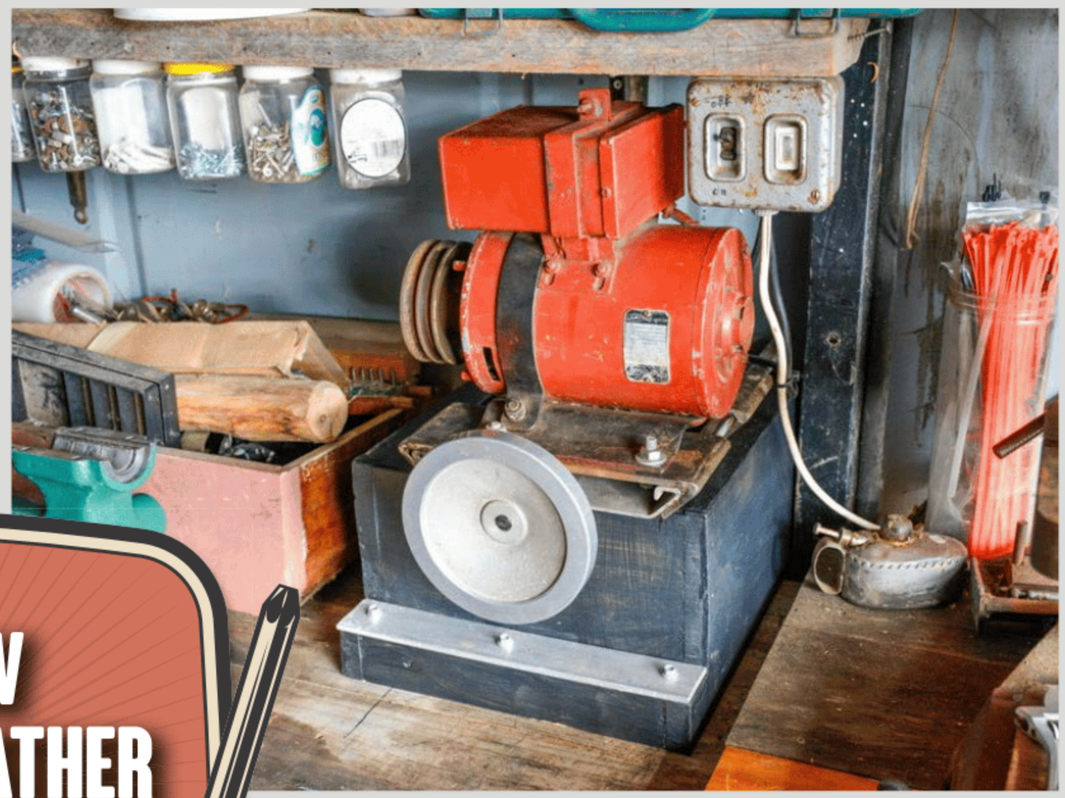
Mr Babbitt

The babbitt bearings – named after the fellow who first concocted their metallurgy – have some crazing down-rotate from the oil pads, suggesting that detritus collects on them then gets smeared in the first part-turn.

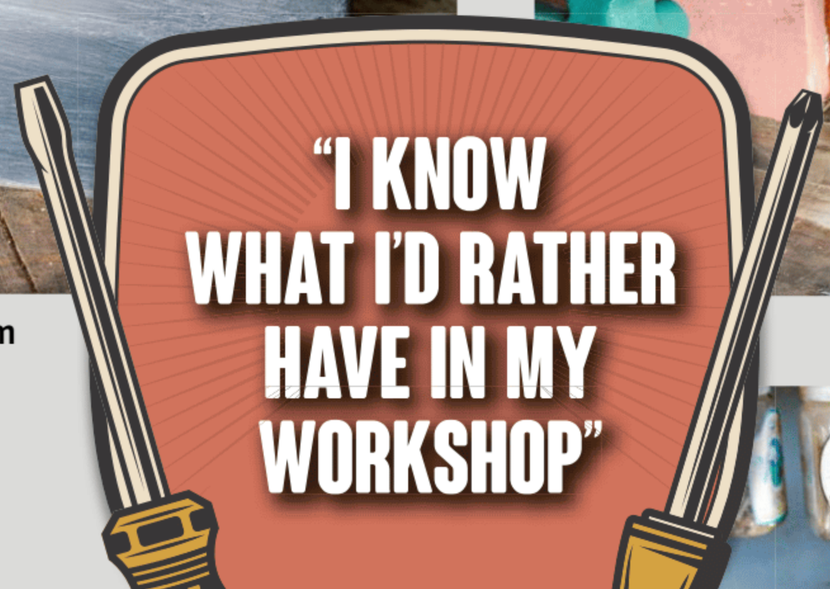
The jury seems to be out on what to lubricate such bearings with, although everyone agrees that something is better than nothing.

Oil, grease, chain-bar oil – they all have their supporters. These bearings have oilers, not nipples, and I've stayed with that but with a smear of grease at the ends; we'll see how it goes. ▶





An adjustable motor mount diverted from ‘something else’ and an old cupboard – looks like it might work …



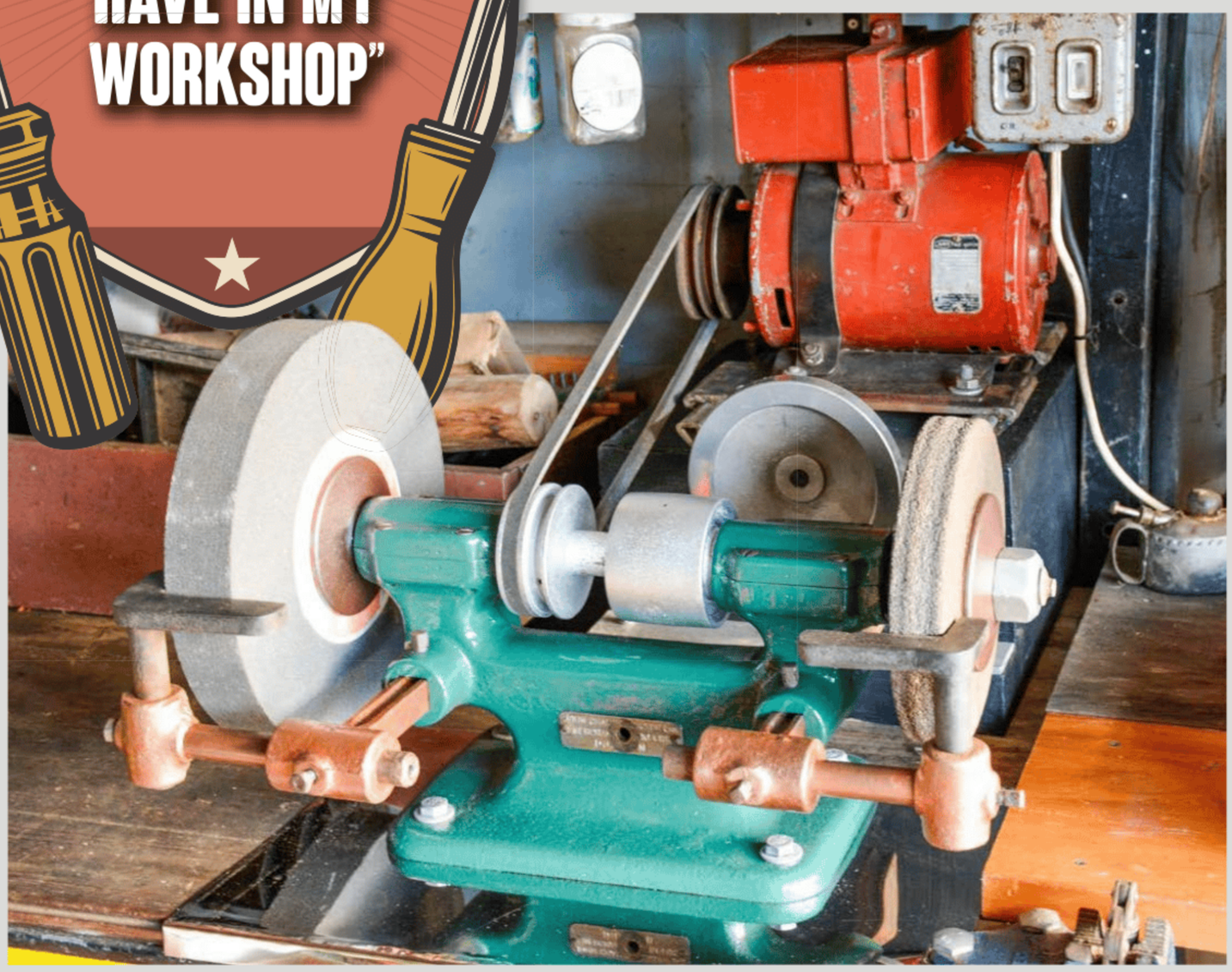
I think I can remember enough to re-pour them if wear ever gets to that point; Dad and I ran Wolseley 18 motors for a long time (me in a Wolseley, he in an MG), which had white-metal-in-the-rod bearings. We always had one or two poured and line-bored, waiting for the next ‘rattle on the overrun’ (the taper at the bottom of their bores made feeding a piston in from underneath a breeze). The grinder was A-section belt-driven (although a flat-belt pulley is still in situ, suggesting it was originally overhead-shaft driven) by a grunty-looking motor, and the whole thing came on an obviously-later chipboard mount.

Cleaning and painting gave the usual amount of pleasure, and I got a chuckle from visible repairs to both tool-posts – pre-OSH accidents, one guesses … I’ve chucked the chipboard and bolted the grinder down on a stainless-covered (because it’s wooden) bench.

Tension mechanism

I started by wondering if I could tension the belt by swivelling the motor on one mounting bolt using a lever.

Then I realised I had an adjustable motor mount which I’d bought to do something else with but which would do this job perfectly; the something else will have to wait. I’ve mounted that sliding arrangement high enough to access it. The next job will be curved guards of 6x75mm steel strap (there is a fellow on YouTube who made some out of brake drums – but cast-iron? Maybe not).



‘And if it’s eye-candy too, all the better’

Things built to do the job

The serious thing I thunk while doing all this was about which tools to bother restoring/repairing. It seems to me there was a period – say, from the beginnings of production lines until 1930; maybe later for some items like my Singer 201K and Kenwood A701a – when things were built to do the job.

There were kudos and pride in producing something which lasted and which didn’t need constant repair or replacement; no thought was given to planned obsolescence as a way to increase turnover.

The beginning of the end

But somewhere in the late ’20s, carmaker Nash wrote to fellow carmakers, warning of overproduction.

Concurrently, Freud’s nephew Bernays gave birth to advertising (which spawned twins: propaganda and spin – and when AI gets ahold of them …). Sure, we have improved both quality control and efficiency, but not ease of repair or length of life. Lack of parts or battery availability, plus cost of repair versus new cost, are the reasons most modern tools are trashed.

Given what is unfolding globally, I know what I’d rather have in my workshop: something I can fix right there. Or something so agricultural it likely won’t need fixing at all. And if it’s eye-candy too, all the better.

It went together with a minimum of fuss – always a good sign – and I can’t take my eyes off it, which is probably another.

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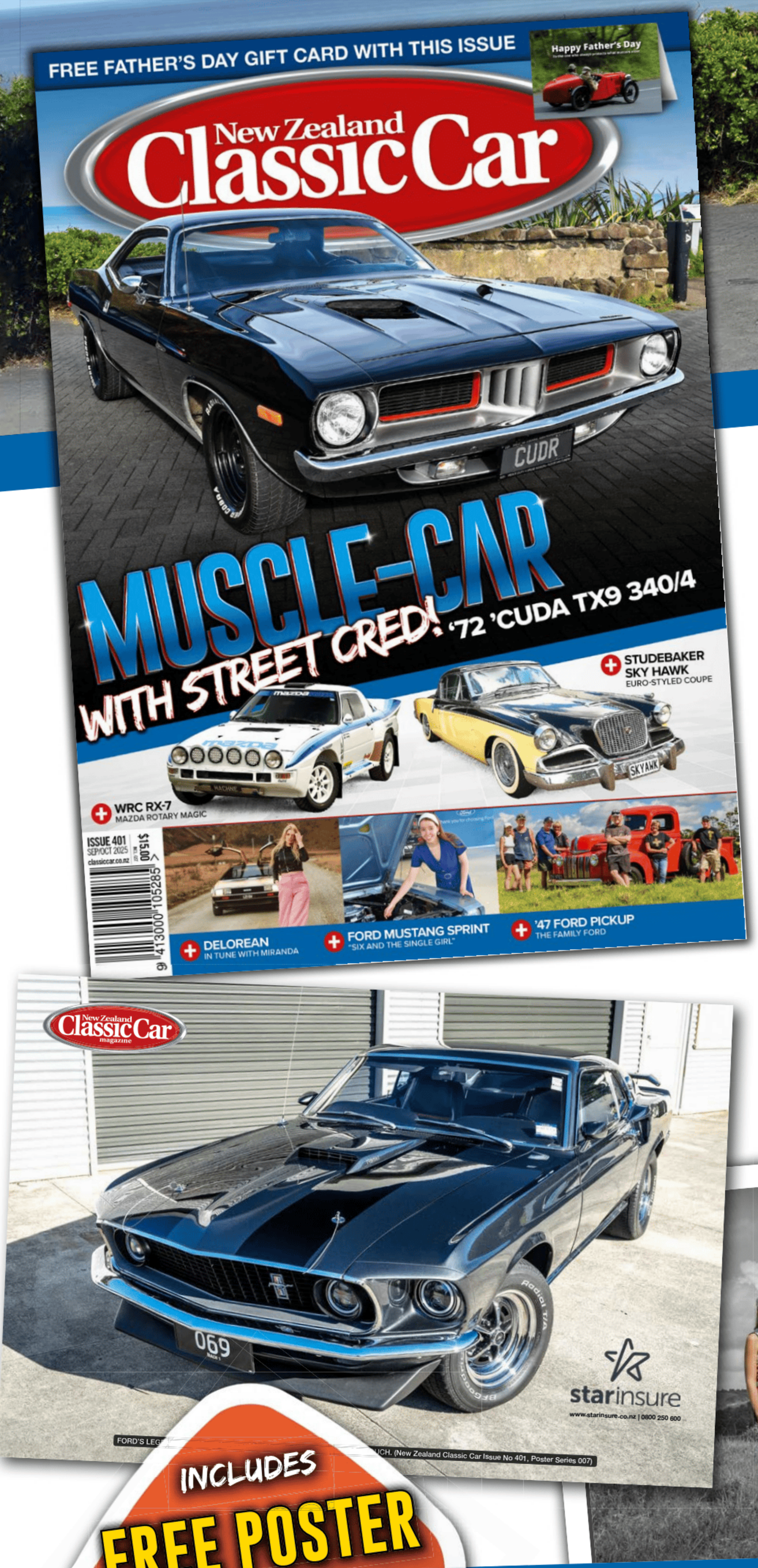

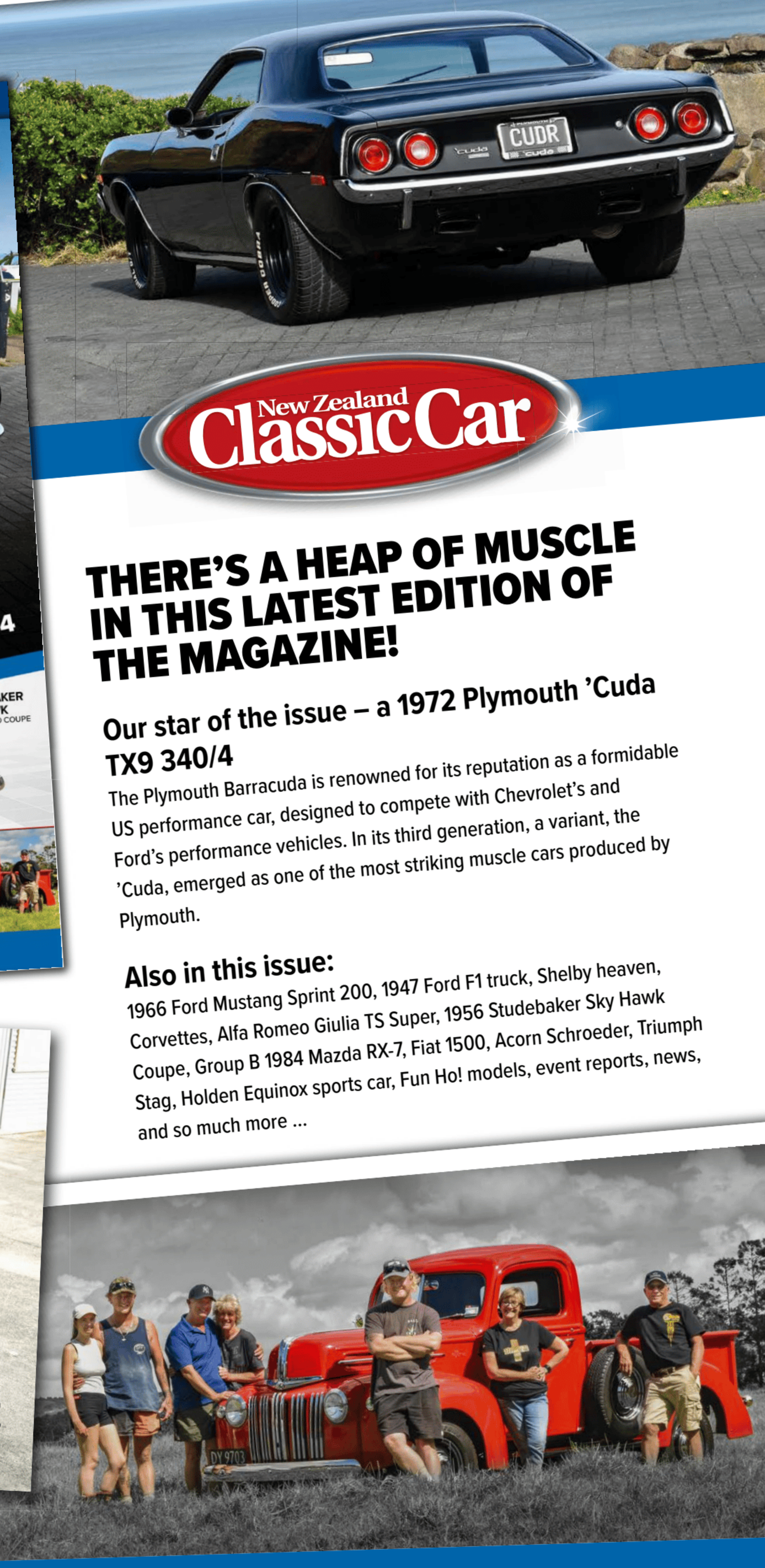

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Blacksmithing

A KNIGHT AND HIS SHINING ARMOUR

Part 2

Leon shares numerous insights into his methods for making armour, demonstrating all the tools he uses consistently in his work – a beginner's guide on how to create your own armour!

By Helen Frances | Photographs: Helen Frances

Leon's smithy with the sign he made. He also makes signs on commission – see leondeverickdesigns.com/

Armourer Leon Deverick featured in our last issue (*The Shed* No. 122) in Part 1 of this two-part series on his work making armour for medieval re-enactors and Buhurt medieval sport fighters. This issue, we focus on Leon's use of tools, many of which he makes himself, and take a look as he works on an awl and a cuisse, heating, hammering, and quenching – covered in Part 1.

Leon works in a small smithy that occupies a corner of a cavernous former woolshed he rents in Whanganui. His tools and workbenches are close at hand, which allows for efficient use of time and space.

Tree stumps help with shaping

When shaping sheet metal into armour, be it a helmet, cuisse, spaulder, or any other protective body part, he has the choice between three tree stumps that serve as movable workbenches from which tools can be hung.

One stump anchors the anvil and is wrapped around with chains to reduce the amount of noise it makes. An anvil can be secured by wedging it into a recess chiselled into the stump or by using straps or bolts.

"It's a fairly light, small, cheap anvil, so it's only about 50kg," Leon says, "which means even though it's set into a stump and has some chains around it, it still bounces a bit if I'm doing heavy work on it. Ideally, I'd have a heavier anvil that's of better quality. The quality of the anvil can make a large difference in the effectiveness of how you work, because you end up with more of the force being applied into your workpiece as opposed to going through the anvil. That's kind of nice when you're doing stuff by hand. There is less effort for you if you have a better quality anvil."

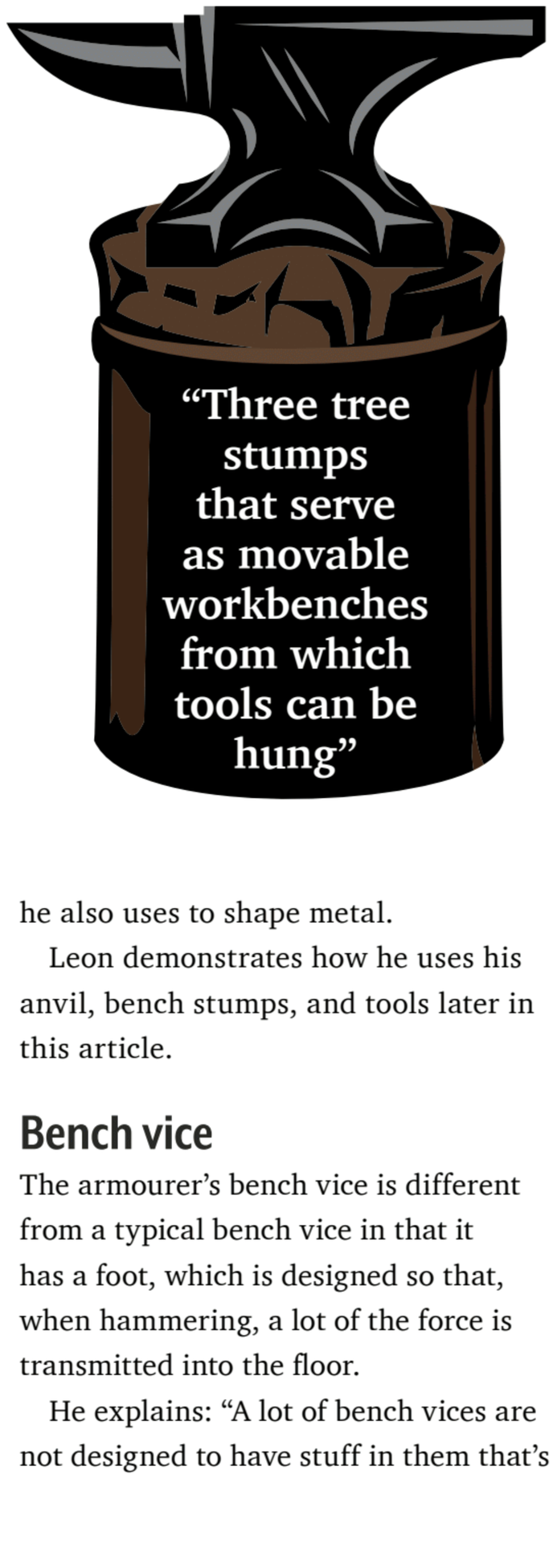
Another stump has been gouged out

Leon's anvil, with tongs and hammers close to hand. The chains help reduce the noise of hammering

with different-sized hollows, which he uses for 'dishing' to shape metal into various hollow forms. The third stump carries a leather-covered cushion which

Three tree stump benches and the forge are placed at the right distance for efficient work

A sturdy vice and ball stakes used for shaping metal



he also uses to shape metal.

Leon demonstrates how he uses his anvil, bench stumps, and tools later in this article.

Bench vice

The armourer’s bench vice is different from a typical bench vice in that it has a foot, which is designed so that, when hammering, a lot of the force is transmitted into the floor.

He explains: “A lot of bench vices are not designed to have stuff in them that’s

Holding a drift, Leon waits for a bar to heat up in the forge

being hammered, and they'll tend to snap eventually, whereas blacksmith vices are designed specifically so you can put stuff in them and be fairly rough."

Hammers – get my drift

Leon says there are several different types of hammers, but the essential hammers for a beginner blacksmith are a cross peen hammer and a rounding hammer, both with smooth faces that don't leave marks on the metal.

A cross peen hammer is useful for shaping and spreading metal, while a rounding hammer is good for general forging and moving metal. A lightweight ball peen hammer can also be helpful for detail work and riveting.

Leon is shaping a metal drift. A 'drift' is a bit like a punch with a pointed end that is used to enlarge and shape a hole in metal to a specific dimension or shape. However, unlike a punch, a drift is usually slightly tapered to ensure that it falls through the workpiece.

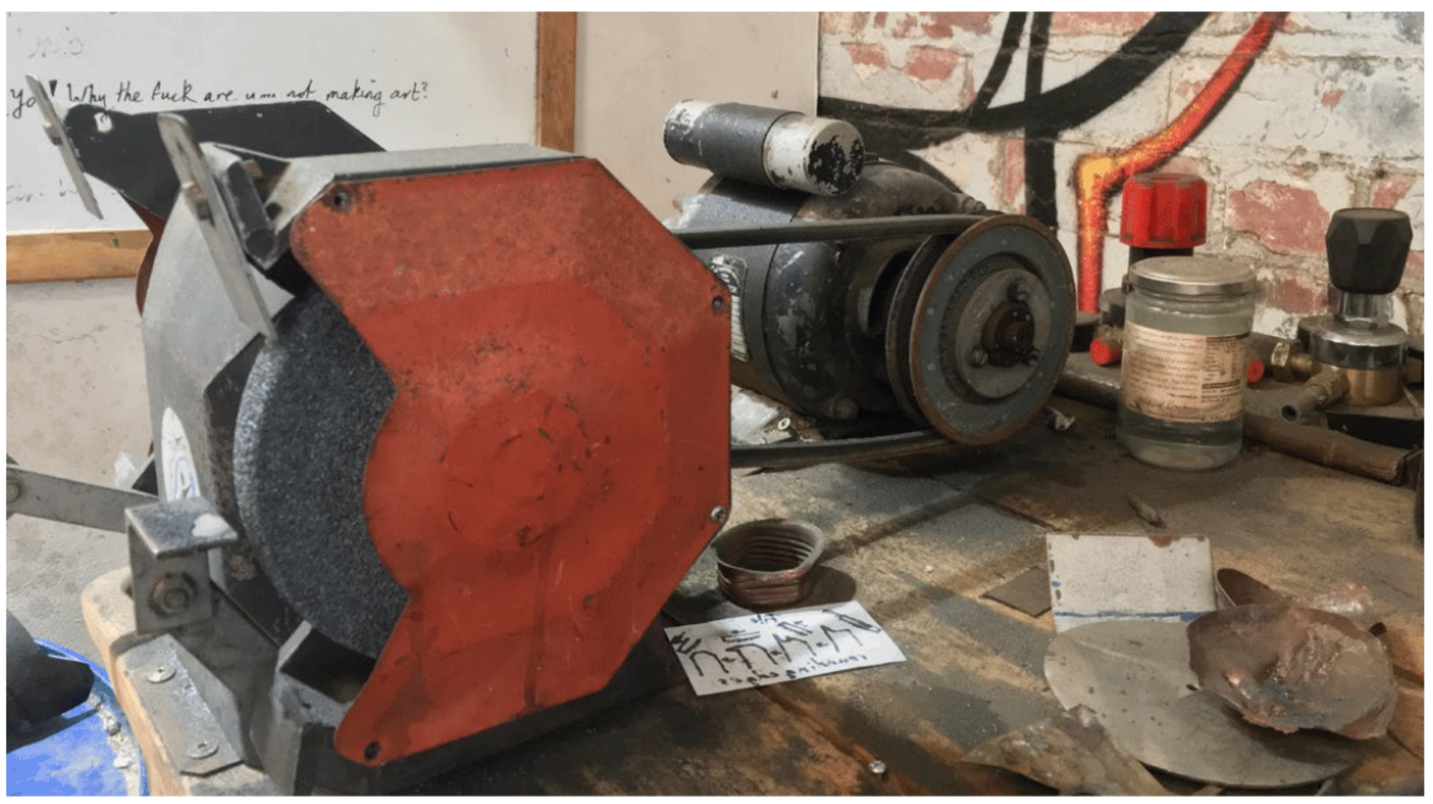
A drift can be used to make the hammer 'eye', or hole, in a hammer head where the handle is inserted, connecting the head to the handle.

The eye is shaped to hold the handle securely and may be fitted with a wedge to further tighten the connection. ▶

The essential hammers for a beginner blacksmith are a cross peen hammer and a rounding hammer

Demonstrating how the drift will be used to hammer a hole in a hot bar. A drift is used to make the hammer eye, or hole, in a hammer through which the handle is fitted

Hammering a hole in the red hot metal with a drift



Leon inherited his grandfather's bench grinder

Using the angle grinder, Leon can remove excess metal and shape tools and parts of armour to fit clients. He uses both a narrow cutting disc and a flat grinding disc

Tongs

Tongs are another essential tool, and it is a blacksmith tradition to make their own tongs.

"If you're doing it full-time," Leon says, "it's useful to make your own tongs so that you have the grips that you want. A big thing about blacksmithing is holding the metal in exactly the position you want, so that you can hammer it in the way that you want and not drop it, because you don't want hot metal flying everywhere."

Electrical tools

He uses electric drills for drilling holes for rivets in armour parts with which he affixes the leather straps that attach the armour to the 'gambeson' (padded undergarment). He uses angle grinders for cutting out sheet metal and smoothing off edges, but all the shaping he does is by hand.

The angle grinder has both a narrow cutting disc and a flat grinding disc. He says his bench grinder goes at lower rpm, which is better for sharpening or grinding.

"I'm probably going to replace this one with a polishing wheel because I end up doing a lot of polishing," he says.

Polishing can involve many hours of work. Historically, Leon says polishing a piece of armour accounted for about one-third to one-half of the time spent on the armour. Now, he says, "If you're doing it with modern hand tools, probably closer to about a sixth of the time you spend on the armour is doing the surface finish."

Stakes

Armourer blacksmiths use a range of metal 'stakes', which are essentially metal anvils with various shapes and forms designed to support and shape metal during the raising and forming processes.

The tops of the stakes are different sizes and shapes, such as flat, curved, conical, and horn shaped. Each shape is suited for a specific task, like shaping helmets, plates, or other armour pieces.

Leon uses ball stakes, or raising stakes, and fluting stakes.

Dividers and callipers

Leon uses the dividers for drawing circles and callipers for taking

Taking the steel bar from the forge with tongs

measurements of clients. He says armour is much more than cylinders, which cheap armour can tend to be. It should conform to the subtle contours of the human body.

He says, “There are a lot of curves in the body, like the swell of the forearm down to the wrist. But then your wrist isn’t the same dimension all the way around. It’s an oval shape in cross-section. So you can use callipers to take measurements of different parts of the body, which you’re not going to be able to accurately get with just a tape measure.

“Tape measures are great for measuring circumferences and straight across things like the breadth of the chest, but for some things, callipers are more accurate, like how wide or how long a skull is.”

The dividers are made of mild steel, and he has case-hardened the tips so he can use them to scribe on metal. He also uses them to measure the golden ratio that people find aesthetically pleasing when etching decoration onto Renaissance-style armour parts, such as helmets.

Shaping metal

Raising and dishing are two metalworking techniques Leon uses to shape flat, two-dimensional sheet metal into three-dimensional forms such as helmets, breastplates, spaulders, and cuisses. Dishing thins the metal, whereas raising thickens it. ▶

Files, dividers, and callipers hang on the smithy walls. A leather-covered cushion is useful for ‘dishing’ — making a hollow shape in metal

Leon has just made his first sword

Raising shapes metal by hammering and shrinking and compressing it, thickening it in certain areas, while dishing shapes it by stretching and expanding areas.

Dishing

With ‘dishing’, a related and opposite process to raising, metal is formed into a concave shape by hammering it into a depression, such as the hollows in one of Leon’s stumps.

He explains: “The blacksmith expands the sheet to fill a void. You can do this into a hollow form. Some people use metal. I tend to use, like, a carved-out wooden stump, or you can use it on a semi-soft object, such as a leather sandbag, in which case you often place it over the form, and you hit down into the form.

“You’d use a fairly round-shaped object to hit. It could be just like a shotput welded onto a stick. Or you can use, like, the rounded face of an engineer’s hammer. It just depends on the size that you want to use.”

He can hammer the metal into both regular and irregular shapes and sizes using different shaped holes, some of which are carved into the stump.

“I’ll use different holes for different purposes. It also depends on the angle that you hold the sheet as to how it will shape as you dish it.”

Raising

‘Raising’ involves gradually shaping a flat sheet by repeatedly heating and then hammering it over a stake or an anvil.

Leon says raising can be done with cold metal; however, it is much more efficient when the metal is heated.

“Often you’ll do it over a ball stake,” he says. “So, you’ll have a round-shaped object that you either have in a vice or you have it set up so you can put it in the hardy hole on your anvil. On a ball stake [for example], you raise or shape it by hammering it around in a circle from the centre outwards with multiple passes usually like an inch to two inches apart.”

A ‘raising hammer’ is like a cross-peen hammer that has a fairly fat,

The hollows in one of the tree stumps are used for dishing

Also a craftsman, Leon makes pipes and soft kit items such as shoes

rounded edge to avoid thinning or marking the metal too much.

"You don't hit directly onto the ball stake, but you hit off centre from the stake so that the metal is compressed around the stake. As you compress it, the metal will tend to thicken as opposed to thinning," Leon says.

For a demonstration, see *Hammered Metal: How to Raise a Copper Bowl – The Art League School*
youtube.com/watch?v=yawQP474RF0

The shaping and thickness of the metal play a key role in determining how strong the armour will be. The ability to precisely control the metal's thickness also determines the quality of the finished product.

Spring steel, not easily accessible in New Zealand, is lighter and stronger than mild steel and allows the blacksmith to reduce the thickness while maintaining adequate strength. Less steel is required, so it is both protective while being lighter to wear.

You can see a shaping stake and other tools at:
metmuseum.org/art/collection/search/35895

Some examples of the work of armour makers can be seen here:
denverartmuseum.org/en/age-armor-access-guide-artistry-craftsmanship

That's not awl

When Leon is making tools or parts of armour, he usually has a few pieces at once warming up in the gas-fired forge so that he's not standing around waiting for a workpiece to warm up. A piece, depending on size, takes around 20 seconds to reach the right temperature.

"You can swap between three or four of them at a time and constantly stay working," he says.

His three work stumps have to be the proper distance from the forge so that he can easily move from one part of the work to another.

"Ideally, you can just pick up your

Armoured up – jousters from many countries displayed their prowess at the World Invitational Jousting Tournament in Upper Hutt in 2009

TOOLS

SOME BACKGROUND

The tools and skills are 80 per cent derived from silver smithing, Leon says and 20 per cent from the images in medieval manuscripts of armourers' set-ups – engravings of people in workshops using tools, which give an idea of what they're doing and how they're doing it.

He says, "All of the main centres for Europe that are known for armour making were the areas that were heavily industrialised; areas that had good access to water, automated trip hammers; and places where they had good road networks. So, a lot of armour design is also based around the industrial technology and the industrial centres that they had."

Water-powered trip hammers were used in Europe during the 1100s, and some French documents record the use of trip hammers to shape wrought iron. Later, during the Renaissance, Leonardo da Vinci drew designs for trip hammers that included vertical hammers used in forges and file-cutting machines. (Source: Wikipedia.) Leon, however, uses his own muscle power, aided by the weight of metal hammers and the force of gravity.

Making an awl – heating in the forge, hammering on the anvil, and quenching in canola oil. Later, he will temper the awl to strengthen the metal and sharpen the pointed end by hand

workpiece from the forge, take half a step, and a turn and have your work area right in front of you so that you're not wasting time while it's hot and losing temperature," he says.

That said, having a nice amount of space in between the work areas is important, in case something goes wrong, to be able to step away – especially when teaching, as he says it's very common for people to drop stuff: "If you're dropping hot metal, you want space to move."

Leon makes his own stitching awls for creating 'soft kit' such as belts, straps, and medieval shoes. An 'awl' is a tool for making and enlarging holes in various materials, and for sewing heavy materials such as leather or canvas. It's a thin, tapered metal shaft with a sharp point that can be straight or slightly bent.

How to make an awl

To make the awl, Leon chooses a bar of high-carbon steel (some may use a garage door spring or recycle other suitable metal) and, holding it in hefty tongs, begins by heating it in the forge and repeatedly hammering the end that will pierce the leather to make it sharp.

As he reheats and hammers the metal to form a sharp tip, he turns the metal, drawing it out, making the metal longer and thinner, and finishes by rounding off any edges. He also shapes the end that will fit into a wooden handle.

"I'm being fairly rough with it because I don't need to have a high finish," he says, "and having a rough surface for the part that's going into the handle actually helps with the binding into the handle and not coming loose as easily. It gives a bit more surface area if you're going to put glue in, or if you're going to shrink

the handle onto the metal, depending on the handle material. There are lots of different techniques."

He finishes by quenching it in canola oil to harden the metal, which also makes it brittle, then tempers it at home in the oven to toughen the steel. Lastly, he sharpens the point by hand so that it will pierce the material he uses for the leather soft kit.

Giving the steel a handle – if he chooses to use an antler handle – "a rat-tail tang", he soaks the antler; fits the awl inside; and, as the antler dries, it shrinks and locks the shank into place.

This method can also be used with bone and antler handle knives. When affixing a wooden handle, he will use glue.

"So I'll probably heat this up and drill a hole like a pilot hole," he says. "Heat this up, put the shank into the handle, and burn it out. And then take it out. Go for the heat-treatment process with the middle part and then glue it in."

Rolling an edge on a 'cuisse' (upper thigh guard)

At the time of our interview, Leon is also making the upper limb for a cuisse, heating it in the forge, raising and shaping it around the anvil. He started with a semi-circular piece of metal that he had already cut out and formed to the correct dimensions measured around the client's thigh.

He had drawn a line around the area where he would eventually hammer the metal in to form a stop rib.

"What I've done is gradually roll the edge over," he says, "which adds depth to the piece. This means it's a lot more resistant to bending. It also acts as a bit of a stop rib – if you have a blade that

SOFT KIT

Leon demonstrates on a test piece of soft leather how he uses the awl in a rounded wooden handle to make holes in the material. Then, he passes waxed linen thread through the holes using a boar's bristle instead of a needle. The seam closes tightly and is waterproof.

LINKS

metmuseum.org/art/collection/search/35895

denverartmuseum.org/en/age-armor-access-guide-artistry-craftsmanship

youtube.com/watch?v=yawQP474RF0

leondeverickdesigns.com/

Rolling an edge on a cuisse – Leon had drawn a guideline where he’d hammer the metal in to form a stop rib (top right). Other images of the process show him shaping it around the anvil

hits the plate and skips up the plate, it’ll tend to get stuck and stop against the stop rib, as opposed to coming over the plate and going into something soft, which is a bad, bad day for people.”

Panel beating and the like

These skills can be applied to other sheet-metal work.

Leon has panel-beaten friends’ cars a fair amount using his precise hammer skills and hammers with faces that leave few and lighter marks. He has also repaired an antique bedpan and makes metal signs, like the one above his smithy.

Update

In between his usual work – arm and leg armour for a medieval re-enactor are waiting for a client fitting to check fit and comfort – Leon has made his first sword and some knife blades.

Leon’s website:
leondeverickdesigns.com/

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Paddy McIvor has transformed his shed into another world — a world of fun

BETTER THAN WETA

By Vicki Price | Photographs: Vicki Price

Paddy McIvor's is no ordinary shed. It is overflowing with memorabilia, toys, games, and puppets – just a few of the attractions at Shannon's Toy Circus. These unique collections offer visitors a chance to revisit their favourite toys, games, and media that brought joy, laughter, or even fear!

It's ironic that the owner of this shed has the surname of McIvor, given he has some similarities to the '80s TV character who regularly escaped impending doom using a paperclip, string, chewing gum, and the like.

A TV character Paddy McIvor isn't, but an ingenious MacGyver he arguably is, with a touch of Willy Wonka as well.

Don't visit this shed if you're scared of clowns, though, as Paddy's collections might raise your blood pressure! But for nearly a decade, kids and adults alike have loved visiting Paddy and his shed.

A best-kept secret

As we drive up the spooky jungle driveway, here, on the outskirts of Shannon, near Palmerston North, it feels like we are discovering a best-kept secret.

We come across a bright yellow, polka-dotted 1946 Austin 8 with a giant pink-haired troll in the passenger seat and a grinning chimpanzee at the wheel. We have already passed an Aztec ghost train, which hides various skeletons in different shapes and forms, hanging and dangling in the breeze.

On the other side of the driveway is a T-rex and a wishing well, guarded by a large skull. Creeping ivy appears to be attempting to halt a bright yellow, circus-style bike frame ridden by a bloodshot-eyed monster wearing child-sized racing overalls.

An innocent, plastic slide set tempts children into the shrubbery to play, but here they will find themselves surrounded by creepy skulls, doll parts, and oversized spider webs at every turn.

A little further on, there is a full-sized skeleton, grinning as it mows with a lawn roller – in front of which there is a pair of gumboots sticking out, suggesting the fate of an unfortunate

"IT FEELS LIKE WE ARE DISCOVERING A BEST-KEPT SECRET"

The chimpanzee at the wheel and pink-haired troll passenger look to be having fun in this 1946 Austin 8

Someone got in the way . . .

Paddy pushes kids in a trolley *Indiana Jones* style through an Aztec-themed part of the Spooky Jungle, aka the driveway

Paddy made an old trolley into a train-truck-like box that slides over hardboard across the driveway and into an *Indiana Jones*–style scene filled with spooky skeletons

Paddy keeps a sharp eye on auctions to source old McDonald's playground props and the like

who got in its way. This is followed by an open chest with numerous skeletons inside looking to escape, presided over by a giant toy pirate. A massive worm looks to be waiting to gobble up small children who risk a slide into its toothy grin.

And then, we are out of the trees and into the car park next to the shed. This is clearly not an ordinary shed!

It's a big top

Paddy McIvor's Toy Circus was once described as "better than Weta" by a visitor who worked at Peter Jackson's famous movie workshop in Miramar. The budgets would be in stark contrast, but the imaginative output is impressive in both.

Paddy began collecting toys as a four-year-old and has never stopped. When he and his mother moved to this property about nine years ago, he set about converting the existing horse barn into his museum. He admits that if he were to set out to create all that he now has, he would be so daunted it wouldn't happen. But he started with a small project that would take one week

"THIS IS CLEARLY NOT AN ORDINARY SHED!"

Kids can have tea Mad Hatter style in the garden

A *Battlestar Galactica* diorama in an old TV set is joined by other space-themed toys and some random characters

Thunderbirds are go! Along with *The Planet of the Apes* – classic television in the '60s and '70s

to complete, and continued in this way, completing 52 projects in one year.

"I spent two years mucking around in my dad's shed – that's when I did a lot of stuff. Most of my projects I did in a week. Because I had it all worked out, in a year that's 52 weeks, so I could do quite a few displays," he says.

"That's when I was working on each sort of little toy diorama. And I used two things, so then I could also make them shiftable – TVs minus the tube. One of the first ones I did was the *Star Trek* one, and straight away I thought it'd be cool to display the toys in an old retro TV. And then I thought I could do *Thunderbirds*."

Initially, Paddy didn't have the right TV, so he used a more modern TV case for the *Thunderbirds* display. He later sourced a vintage set to use. The other thing he initially used was TV cabinets: "That was the way I could create a little diorama and then be able to shift it."

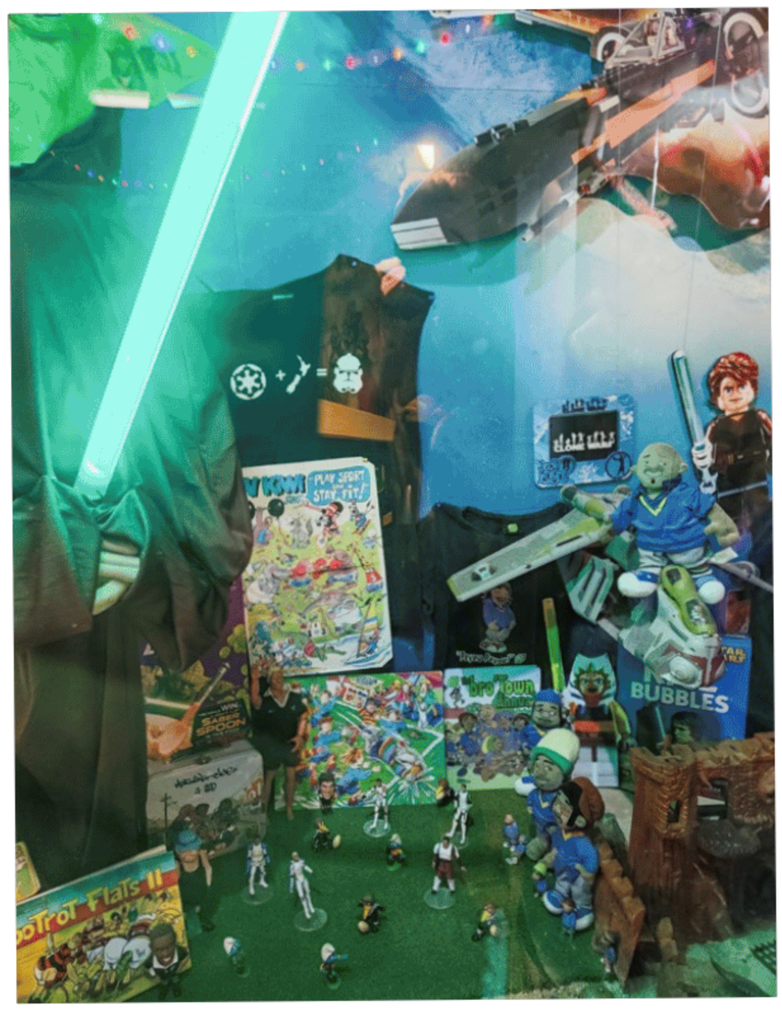
Skating school

Toy Circus recently celebrated its eighth year.

There are large McDonald's props and items from side-shows spread around the land surrounding the shed, as well as skate ramps and a horticultural shed with a floor for skating. It is here that Paddy teaches kids to skate.

Skating has been a large and important part of Paddy's life; he is a skater boy from way back. And he did pretty well at

Roll up! Roll up! Forty-plus years' worth of collecting and creating has turned Paddy's shed into a fun masterpiece for adults and children alike



Above: The big pig character from *Star Wars* is named 'Gamorrean' – or, as Paddy likes to call him, 'Peppa Pig's Uncle' or 'The Piggy Monster'

Star Wars slides seamlessly into Kiwiana – this might be the only place in the world where *Star Wars* clone troopers play a game of rugby

Paddy was a world champion amateur skater in 1999 and passes on his knowledge to kids who want to learn. Crazy clown bikes are also popular with the kids

it too, becoming the Amateur World Roller Blading Half Pipe Champion in 1999. In this, he follows in his family's foot skills – his mother was also a champion skater.

Back to the dioramas. He was inspired by someone he saw online who made a *Star Wars* diorama and a *Wizard of Oz* diorama. As a child, Paddy was enthralled with these creations of little worlds that reflected the shows he'd watched on TV.

Paddy grew up as a 'Bay Kid' in Waipukarau and has fond memories of miniature worlds that he visited as a child.

"As a real young kid, it was Lilliput. I loved Lilliput as a young kiddy," he explains. "And then later on, Fantasy Cave in Dannevirke, and so that's initially where I got the idea of the wiper motors, because I was fascinated by how they created some of their movement, and the old chaps in there, they put me onto wiper motors."

Paddy also visited the local model shop and asked for guidance: "I said to the guy, 'OK, people have their trains going around, how can I get my spaceships to fly around?' It was when I went into their Fantasy Cave that I saw their spaceships moving around [that I was hooked]."

Right: Every circus needs a tent, and in here, along with the table soccer and other toys, kids can have skating lessons on wet days

By spreading the larger pieces of his toy collection outside, Paddy makes use of every space. Here, the kids have fun with Nerf guns and skate ramps

He was also inspired by Disneyland as a child, especially the ‘old’ Disneyland.

“I had the 1960s books, and they had It’s a Small World in it and the [Enchanted] Tiki Room, with the animated birds,” he says. Disneyland very much has its eras, says Paddy, who has been to a Disneyland convention in America.

“A bit of ‘MacGyver-ing’ and bad language”

Paddy says that he enjoys the challenge of figuring out how to make displays animated. When asked by visitors how he does it, he says that he tells them, “It’s a bit of ‘MacGyver-ing’ and bad language.”

People have remarked that as soon as they walk into Paddy’s shed, they forget it is a shed. It is easy to see why – it is not just because of the visual effect of all the clowns, dolls, toys, and so on; he has used movement, lighting, and sound to great effect.

Some of the vintage toys come from donated items, like a heap of puppets that once belonged to a ventriloquist in Auckland. Some, Paddy finds in op shops around the country. A recent find was a set of papier-mâché clowns that was donated. They are nearly 100 years old and were made by local man Pat Patterson in Palmerston North. ▶

Paddy was inspired by Disneyland’s It’s a Small World exhibition and has collected some vintage Disney memorabilia

This Jar Jar Binks never blinks.

Darth Vader, complete with Mickey Mouse ears, appears to look over Paddy’s shoulder. Paddy’s not intimidated

“HOW CAN I GET MY SPACESHIPS TO FLY AROUND?”

Paddy has created a world within a world within a shed in this *Star Wars* display

‘Pinkeys Performing Pets’ is a feature of an earlier circus

Some clowns are just creepy

Vintage signs help make the vibe festive and authentic

This clown musical troupe was made nearly 100 years ago by Mr Pat Patterson, in Palmerston North

Along with the wiper motors powering the many moving objects in the displays, Paddy uses mirror-ball motors to have particular objects spin around, both upside down and right-side up, from the ceiling. Fan motors, which he uses for their oscillation, are also useful but not very strong. He explains the issue: “You know the sideshow clowns – they work off a wiper motor. Normally, it’s just one wiper motor, and the whole lot works off that. The problem with fans is that they’re not really designed to have a whole heap of weight on them.”

An imposing Joker mannequin is built around a fan.

“Initially, I had it turning, because my mind was about the sideshow clown. So, he is built around a clown, and I had him turning, but the fans … it’s got to be really light. That’s what’s cool about the wiper motors, they’re really strong.”

Paddy uses old cell phone plugs with the wiper motors. He also found that turntables are an excellent tool for spinning displays.

Like a rocking horse

There’s a rocking horse with another large clown riding it, and the thing rocks forward and backwards.

“That’s a wiper motor,” says Paddy. “A thing that people do is they use a lot of the wiper motors for Halloween. And a classic that I’ve seen lots of people do in the US is like a rocking chair – because it’s easier to get something that is actually designed to move, to move. And I think that’s where I got the idea for [it] – I was like, oh, a rocking horse.

“About a year ago, I was playing around with things that are designed to move, and one of the things that are designed to move are puppets.”

Another clown’s head turns around 360 degrees. Poppy the Troll uses an old record-player turntable as well and is powered by a wiper motor to swing back and forth on a swing. His hand is waving too, attached by fishing nylon to the motor.

There’s plenty of nylon wire, criss-crossing almost invisibly, directing the movements of the circus, while the

motors whirr on silently, obscured by the carnival or vintage TV-show-vibed music, different in each segment of the display.

One of the children's most loved displays in Paddy's shed is the monster toilet. With giant bloodshot snail-like eyes moving up and down from the cistern and blood-splattered fangs between the gaping seat and lid, it conjures up terrifying images.

While you could spend hours looking at all the toys in the entrance, a narrow pathway through colourful fabric doorways entices you from one display to the next, until you finally emerge after a U-shaped trek.

"I've had people get as far as my office there and half an hour later they're still [looking]."

The large display cabinets were built by Paddy, "I threw them up," he says.

Finding more space

"Ladies and gentlemen, it's The Muppet Show!" blasts a speaker as we move around the corner.

The various music pieces hail from vintage TV shows and movies or nostalgic carnival music. Paddy has found that music and sound contribute to the movement of the displays. He employs sound effects and lighting to bring the viewer into another world and to add another dimension.

"How far do you want to take it? You could just do layer upon layer," he says.

In a display named 'FantasyLand', the toys operate from an old washing machine motor. "I've set it up so the kids can see, and I tell them the Minions run the mechanics." The animated clowns in the fairgrounds are likely to be powered this way. "These motors are pretty powerful," says Paddy, who recalls that Helen Pratt in Shannon used microwave turntables in her own model village display named 'Flaxville'.

Paddy has gotten hold of some stuff from the old Wellington department store Kirkcaldie & Stains and is hoping to do a larger display recognising this old institution, which reigned over Wellington for many decades. He doesn't know how they animated their Christmas window displays, but he thinks it was likely to be wiper motors. ▶

Many of these clown characters are automated using a wiper motor and nylon fishing line

Paddy was pleased to add this piece from *Where the Wild Things Are*

A zombie hand reaches out from the ground towards a freaky clown mask in the corner of a tent outside. There are surprises everywhere at Toy Circus

Everyone is busy at their work in this cabinet. The clown in the foreground rocks back and forth trying to make the stubborn donkey walk forward, while another swings from a trapeze

Paddy has also collected old postcards and newspaper clippings about theme parks from history

Paddy has grouped *Peppa Pig*, *Chitty Chitty Bang Bang*, and *HR Pufnstuf* together. He often uses retro duvet covers with TV character themes as backdrops to his displays

Remember these? Vintage monkey puppets

As a young child, Paddy read comics and has retained a love of that old-school fairground vibe throughout his life

You need a bigger shed, Paddy!

"I've kind of found ways around it," he says, "by getting the old broken-down kiddy rides sitting out, various things that can sit outside."

He has also built displays in the spaces beneath the large cabinets, so that small children can have an eye-level view. To save on the expense of Perspex, he has stapled up clear tablecloth plastic, which he bought at a local import store instead, and you'd hardly know the difference.

"I worked it out, that's half a sheet basically, that'd be 60 bucks at least in Perspex, and I've done it with a piece of plastic that was about $4.

"My interest in the whole old-school fairground topic is imprinted on my mind from reading comics as a young kid," Paddy says, and also credits the little museum at Brighton Beach in the UK: "They've got some of that old-school kind of animated stuff. I've got a photo of me standing next to this silly little sort-of-animated sailor." He also stumbled across the Musée Mécanique while visiting San Francisco, which is an automata museum.

It's a small world after all

Paddy doesn't know how many people have been through his sheds; he doesn't keep a record, but they keep coming.

When international visitors are wondering what to expect, Paddy asks if they are familiar with Disneyland's It's a Small World exhibit. This world-famous exhibit takes people on a boat ride through many countries and cultures displayed via larger-than-life automated toys.

Paddy is currently on the lookout for dolls of the world, often made as souvenirs, to add to his display – but not

Being a Kiwiana enthusiast, Paddy's Toy Circus wouldn't be complete without some kiwi toys

Smurfs have long been a feature of many children's lives

Not all the displays are scary. Here, tiny mice go about their day in domestic bliss

A ghostly figure wobbles and sways to the sound of 'woooooo' from the speaker. Behind is a poster of the movie classic *Ghostbusters*

just any dolls; they have to fit in with his aesthetic.

"Toy Circus is not just about toys; it's about childhood in general," he says, "and all the things that you do." He has thought about attractions like going to the zoo, and places like Fantasyland and Rainbow's End. "And now I'm shifting and I'm doing everywhere," he says. "And then when I'm working on any given project at a certain time, that's when I'll make a concentrated effort to find particular things."

Paddy says he hopes that "the universe helps out sometimes, and those things will just come along. It's been the most amazing thing, the amount of stuff that has surfaced, to create this."

Sometimes one thing leads to another – for example, there's a 'Piggy Monster' (*Star Wars*' Gamorrean) and below it Peppa Pig, then, realising that was an English character, this led Paddy to doing a *Noddy* display. This has led to an English-themed amusement park, and Paddy has been looking for anything to do with Blackpool and Brighton. *HR Pufnstuf* followed on from that.

Movie connections

The *Willy Wonka* and *Chitty Chitty Bang Bang* movies and *HR Pufnstuf* TV show all have a similar feel, according to Paddy, and so he has placed their displays together.

"I'm not too strict on my rules," says Paddy about the way he sets up his displays in limited space, "but it's gotta make a little bit of sense that things are in a particular area, so it's not too mish-mash." He says, for example, he wanted to set up a rugby display but wasn't sure where he'd put it. ▶

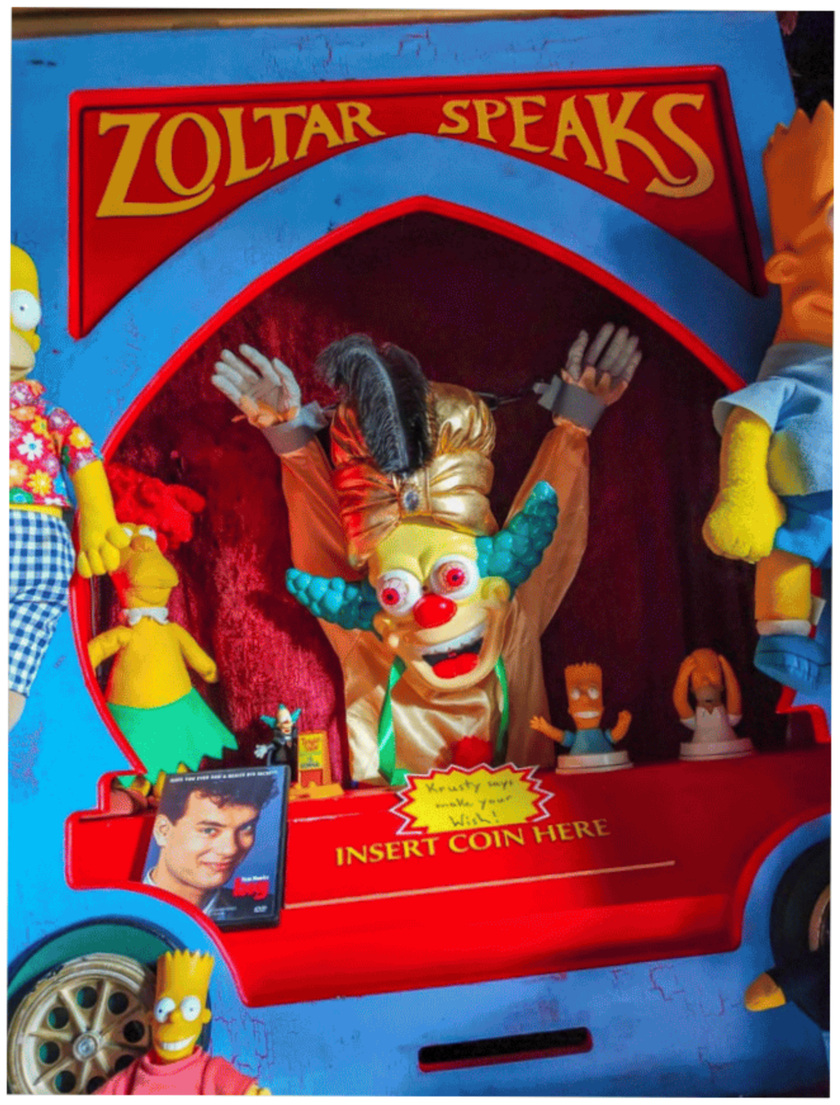
The outdoor areas provide surprises around every corner and places where people can pose for photos. This clown keeps an eye on those who would try out the skate ramp.

Smurfs, troll, and Little Boy Blue display is in the storybook display shed

"TOY CIRCUS IS NOT JUST ABOUT TOYS; IT'S ABOUT CHILDHOOD IN GENERAL, AND ALL THE THINGS THAT YOU DO"

Visitors walk through a 'TARDIS', aka police call box, into the *Doctor Who* display area

Doctor Who memorabilia, including a guy with a red eye atop a Dalek



A classic in the UK, Zoltar Speaks has a transformation in Paddy's shed

Colourful moving lights add another dimension to Toy Circus, along with different music in each section

"So sometimes there are funny ways of how I've connected the dots, and some people might get it, and some people might not," he says.

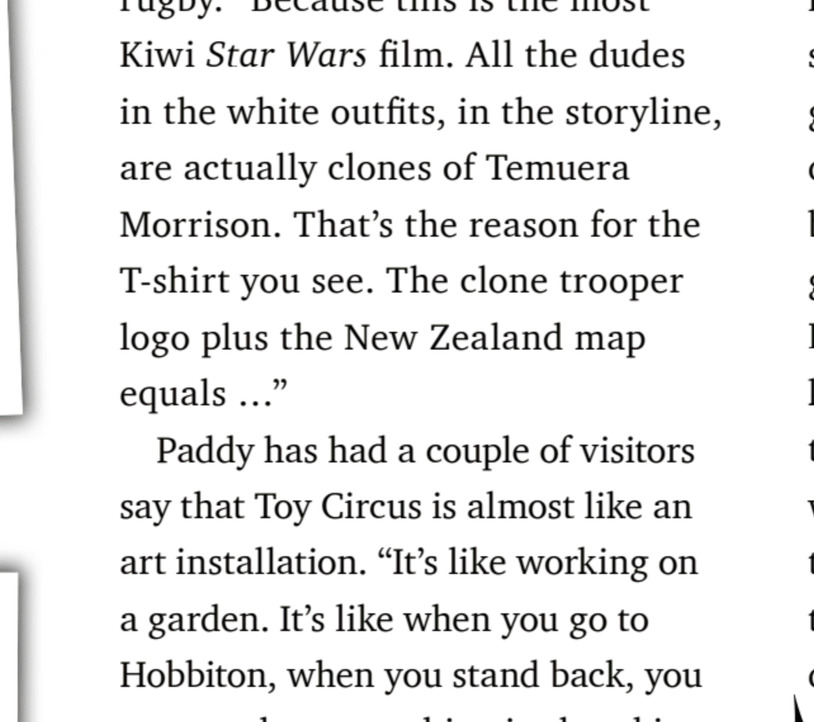
For example, "Some of the visitors might not get the gist of what is going on here," says Paddy about the *Star Wars* clone troopers playing rugby. "Because this is the most Kiwi *Star Wars* film. All the dudes in the white outfits, in the storyline, are actually clones of Temuera Morrison. That's the reason for the T-shirt you see. The clone trooper logo plus the New Zealand map equals …"

Paddy has had a couple of visitors say that Toy Circus is almost like an art installation. "It's like working on a garden. It's like when you go to Hobbiton, when you stand back, you can see that everything is placed in an [intentional way], it's not just random, and I do the same thing. It's not all just random, where I've sat stuff. It's like creating a scene or a picture.

"I knew early on with Toy Circus; it had to be participation-based."

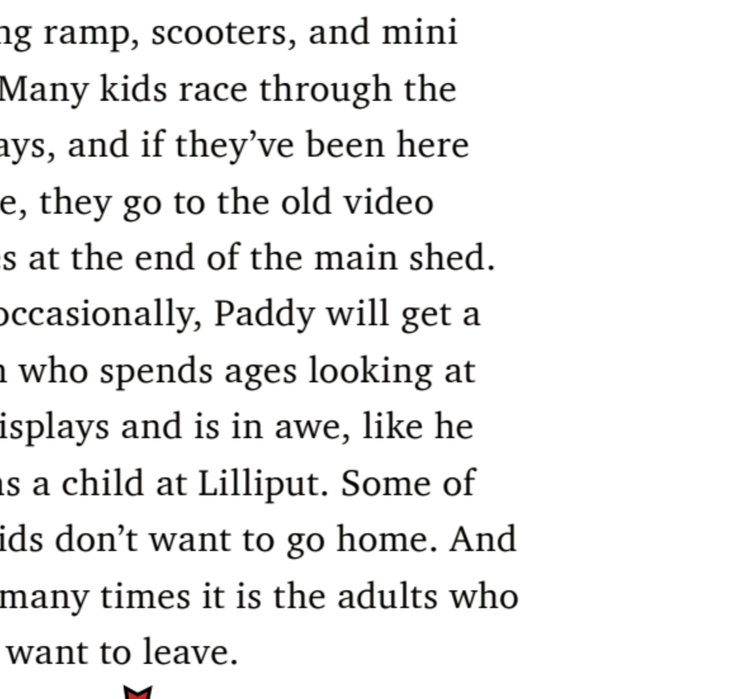
Outside, in the skating tent, there are numerous crazy clown bikes for the kids to ride, as well as the skating ramp, scooters, and mini golf. Many kids race through the displays, and if they've been here before, they go to the old video games at the end of the main shed. But, occasionally, Paddy will get a kid in who spends ages looking at the displays and is in awe, like he was as a child at Lilliput. Some of the kids don't want to go home. And then many times it is the adults who don't want to leave.

Rambo oversees an Action Man display



"I'VE HAD PEOPLE GET EMOTIONAL AND TEAR UP HERE TOO. IT'S THE MEMORIES"

A giant eyeball watches a magician on a little stage and Mr Potato head looks on, unimpressed



Minions are hard at work behind the Perspex

Old TV cases are useful for dioramas that are portable if need be

Superman flies overhead above his own display

More retro duvet covers used by Paddy as backdrops. Some remind adults of sleepovers in their childhood

Not just toys in a shed

Paddy tells of a time a rather large gang member from the East Coast turned up with his partner. Paddy wasn't sure how things were going to go, but at the end of it, the guy wanted to give Paddy a hug.

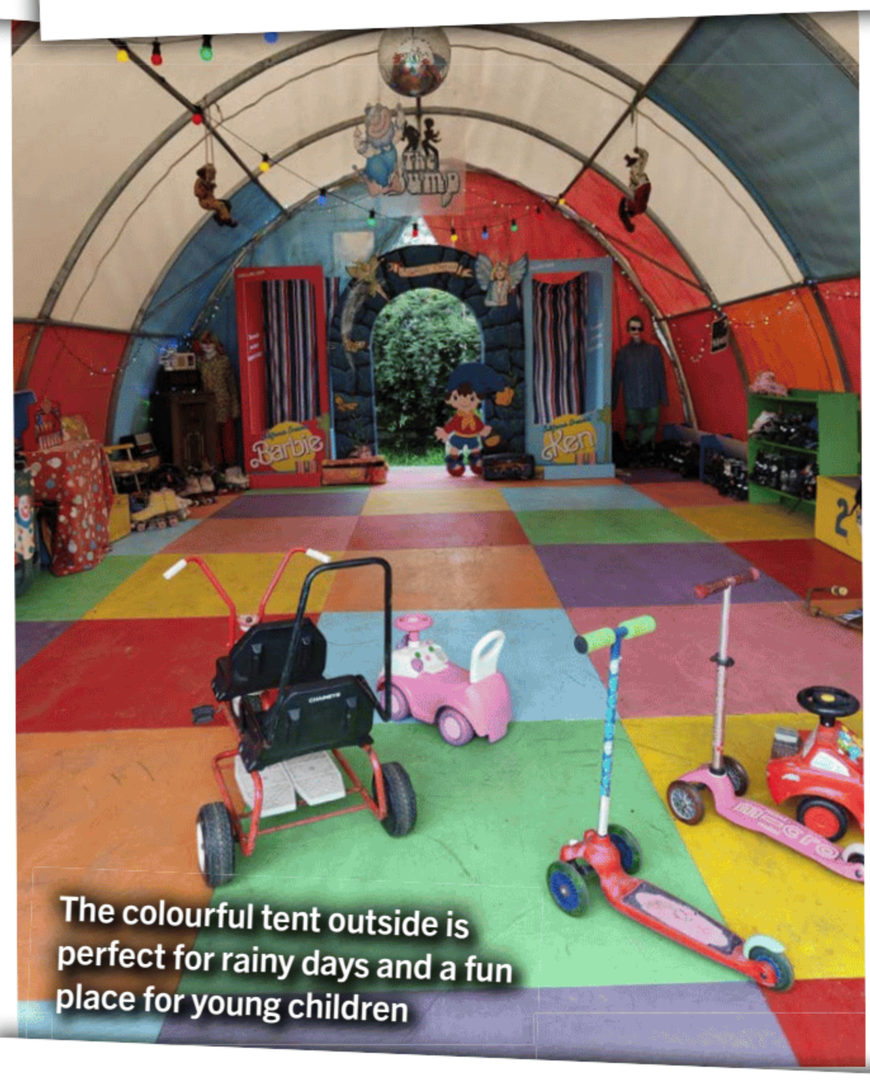
"I've had people get emotional and tear up here too. It's the memories." Paddy still gets excited about discovering new old toys. About six months ago, he found Splish Splash, a game from his own childhood that he'd forgotten about.

"I was so excited when I found it at the op shop. I posted it online, and I shared it with my best buddy from primary school, and he's like, 'Man, I remember playing that around the back of your place, on a sunny day', and he was very descriptive. And his description brought back memories for me that I'd forgotten. And we used to sit at the back of my house and play that damn game."

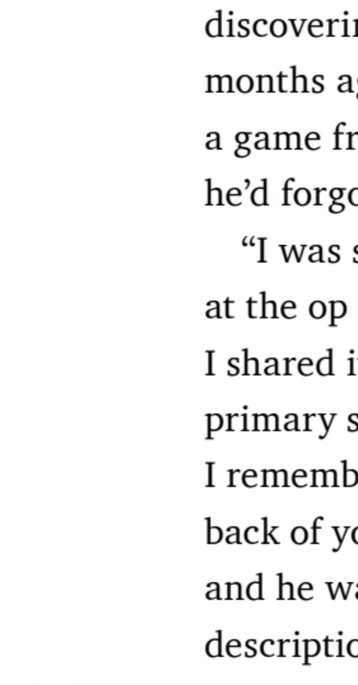
There is no doubt that Paddy's shed is full, but he is still chasing Kiwiana. He was stoked when he recently found a video called *Shaker Run*, a Kiwi film full of car stunts, and one Paddy had forgotten about until he spotted it in an op shop. He's yet to find the Kiwi classic *Goodbye Pork Pie*.

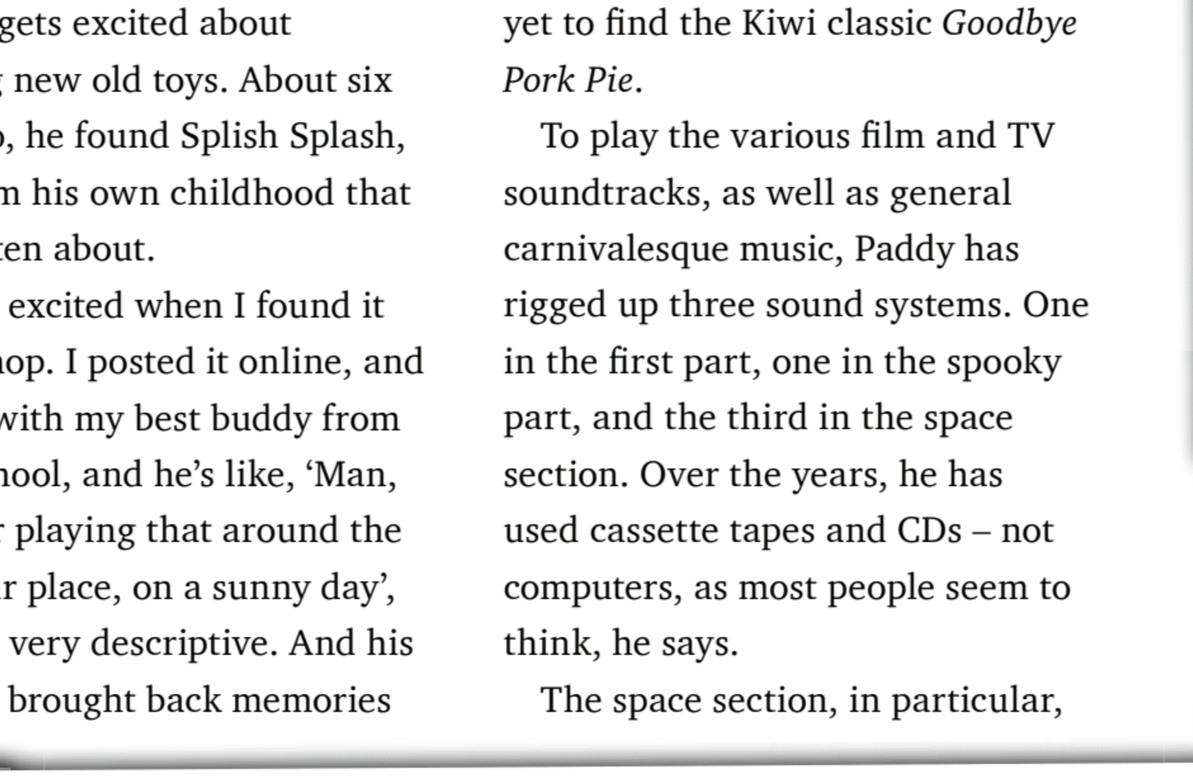
To play the various film and TV soundtracks, as well as general carnivalesque music, Paddy has rigged up three sound systems. One in the first part, one in the spooky part, and the third in the space section. Over the years, he has used cassette tapes and CDs – not computers, as most people seem to think, he says.

The space section, in particular,

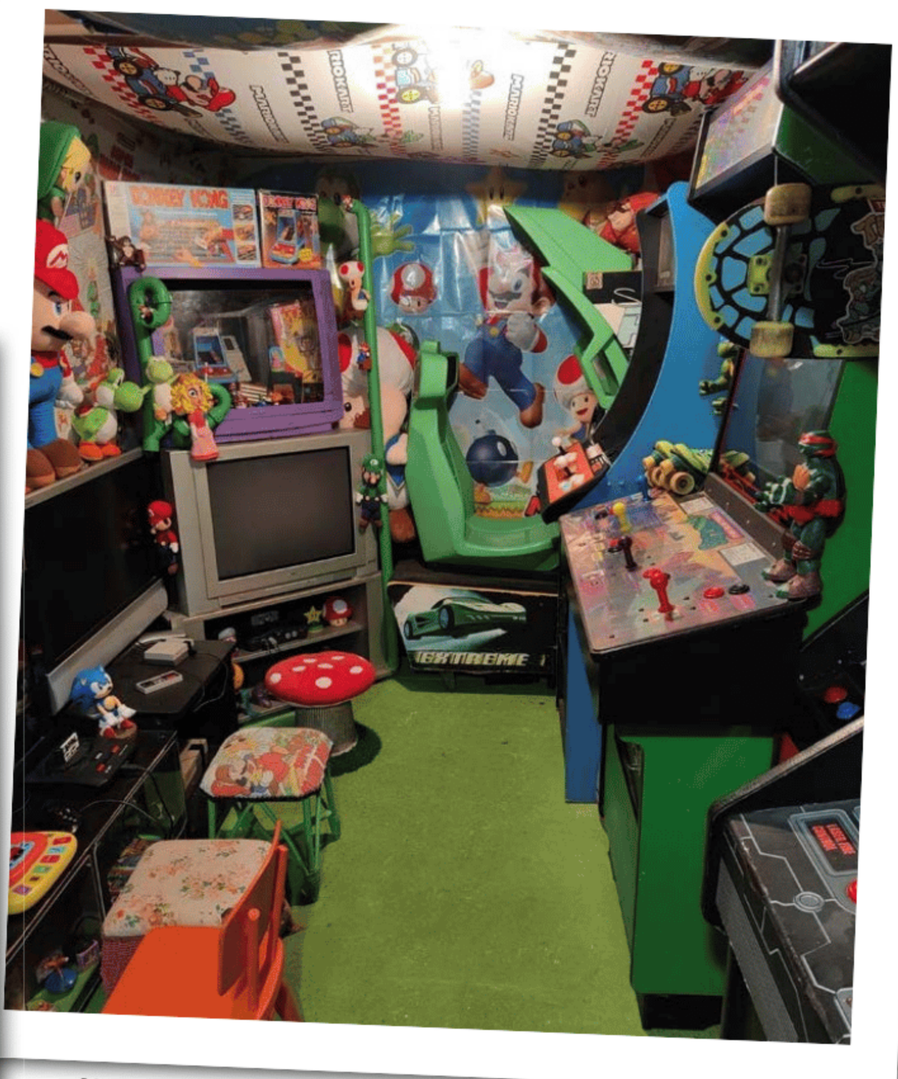


The colourful tent outside is perfect for rainy days and a fun place for young children





Ole King Cole with his musicians and Little Jack Horner sit in the nursery rhyme corner



Kids who have been here before often zip around to the retro video machine tent – unless they are one of those kids who really takes their time taking it all in

At the front of the main shed, two suitcases are overflowing with dress-up costumes for kids and playful adults to put on for photos

Above: These guys are a recent addition to Toy Circus and Paddy's chuffed to have found them. They remind him of the grumpy old men in *The Muppet Show*

Paddy is as colourful as his collections

"THERE IS SOMETHING MAGICAL ABOUT MAKING SOMETHING MOVE, LIKE BRINGING SOMETHING TO LIFE THAT ISN'T ALIVE"

is set up like an old-fashioned Santa's cave and is an immersive experience. The colourful fabrics hanging from the ceiling channel the visitor through a cave-like tunnel. The lights newly embedded in the tunnels and tents were inspired by a visit to Carterton during the town's mid-winter festival. Paddy noted that, on a cloudy day, the lights could still be seen, and so he bought strings of lights to decorate the museum. He says it was a cheap and easy way to add to the magical atmosphere.

Things get spooky

To the backdrop of ghostly 'wooooos' and witches' cackles, in a smaller adjoining shed, Paddy shows us his latest project, the Ghost Train.

Designed not to be too scary so that pre-schoolers can enjoy it, it nevertheless has a spooky atmosphere. This project was kicked off by a woman donating a *Thomas the Tank Engine* child's bed to use for kids to have their photo taken in it. Paddy was on the commuter train to Wellington one day, and the idea came to him to put wheels on the bed and make it into a ghost train instead.

The kids sit in 'Thomas' and 'Paddy' pushes them through the tunnel surrounded by ghostly apparitions; creative lighting; and, of course, the sound effects. "I've pushed the odd adult too," he says.

His next project, just underway, is making a *Labyrinth*-themed labyrinth that leads into the mini-golf area. He's found that a lot of the '80s mums loved that movie in their childhood.

The power of play

Paddy says creativity is built into us: "Like the way Darwinism works, it's built into us. Like everything in nature, it's all very creative and diverse. That's how nature survives."

Paddy says Toy Circus has been an awesome project.

"You know, when you first have an idea about doing something – it's turned out to be a lot cooler than I could first imagine," he says. His thinking leads him to thoughts that often start with something like, "How can I recreate a $250M ride for $250?"

People throughout history have been fascinated by mechanical things that move, and sheddies of long ago were tinkering to make automata for entertainment. There is something magical about making something move, like bringing something to life that isn't alive. This could explain the eeriness of clowns – they are real and yet not. Paddy's shed is brimming with automata that stand astride this dividing line between the inanimate and the living worlds. It is where the magic happens, and Paddy has nailed it.

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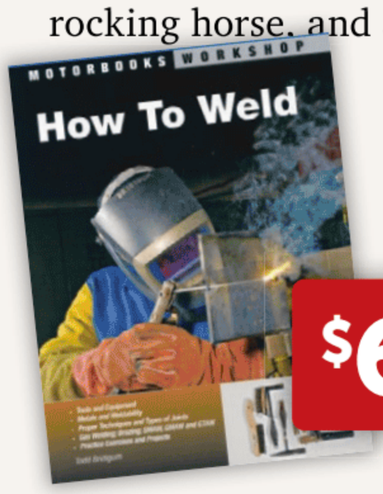

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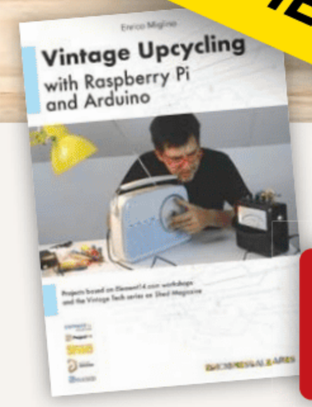

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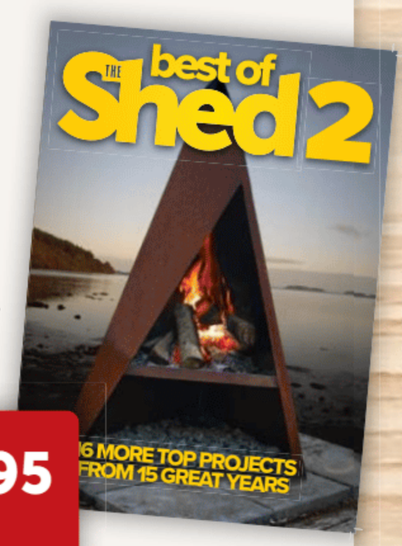

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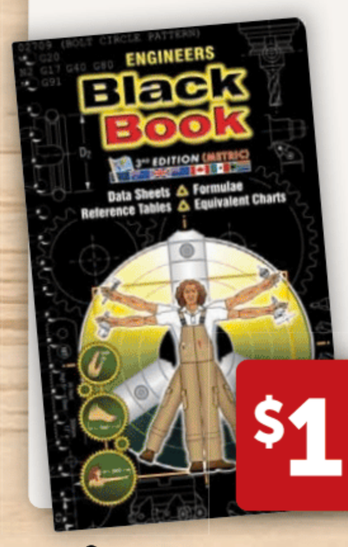

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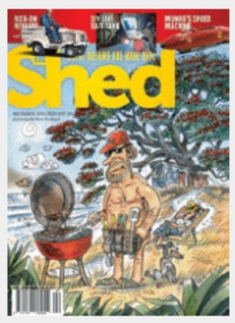

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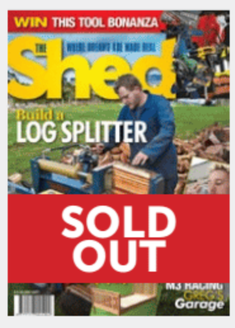

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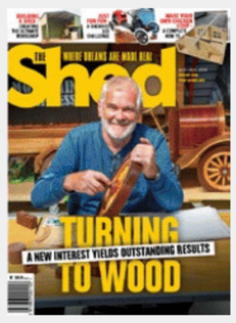

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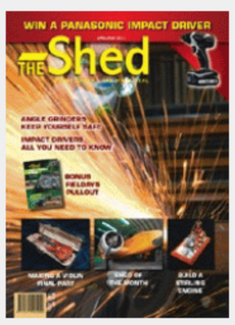

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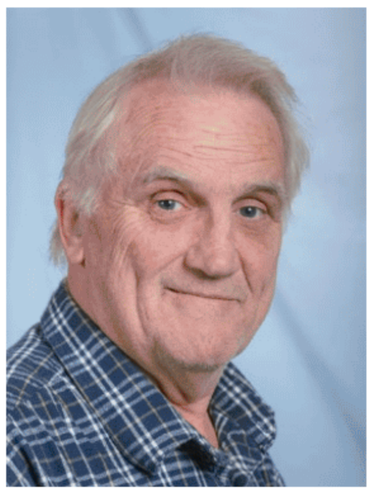

Jude discovers that sometimes the answer to a misbehaving tool dilemma is not as complicated as it may first appear to all and sundry

By Jude Woodside

As I write, I can sense spring is just around the corner. I'm looking forward to it. My pile of firewood is diminishing alarmingly, and I'm getting very tired of the winter clothing.

In my insulated, light and bright shed, however, things are coming together. I have fitted the shed out with a French cleat running around the parts of the shed that are accessible and where it makes sense to have one.

I have moved my old tool cabinet in (see *The Shed* Oct/Nov 2006). I have subsequently built a utility bench, a power tool garage and begun populating a new toolbox I bought so I can sort things more rationally. Suddenly, I have space.

A bit rusty

It's a very liberating feeling, and I confess to getting the old dopamine hit again, being able to actually perform work in a space rather than on it.

It's been a bit of a learning curve, too, getting re-acquainted with my tools, some of which I haven't been able to use in four years. Like some of them, I have become a bit rusty. So I'm going slowly, hoping to minimise the mistakes I often make.

Speaking of which, I am a bit reluctant to recount this saga, but there may be a moral in it for us all. I have a *Hammer C3-31 combination machine. It has been a source of great pride and real utility for me.

However, after three years in a damp shed, it was looking somewhat shabby. The cast-iron tables had a film of surface rust. I cleaned the tables. But I couldn't get it to run. All I heard on startup was the buzz of a relay and no engagement. This was a major concern for me, so I explored the online forums and found what I thought was the solution: the electronic braking module wasn't working. I rang the distributor to order one, only to be told that they didn't stock them, but they could replace the entire control system for $2000 and a 10-week wait.

The moral of the story

I contacted the company that makes the electronic components in Germany and found what I needed. It was only €40. They would only post to Europe, so I had it sent to a friend in Amsterdam who forwarded it to me.

I duly removed the control box and replaced the component, no luck.

The dust collection hose needed replacing, which led me to look at the spindle moulder; the dust hose exits underneath it.

The machine has two safety cutoff switches, and looking at the closest, a light bulb went on. It was in the activated position. Surely it wouldn't be as simple as that? It was.

I suppose the moral of the story is always look for the simplest answer first, then check and recheck.

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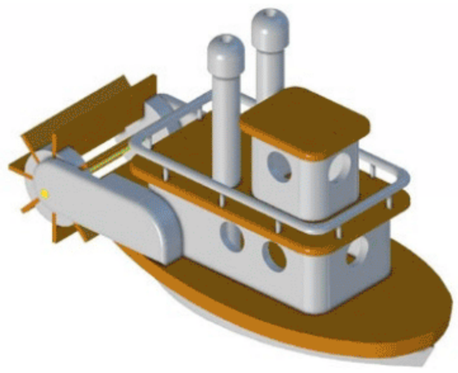

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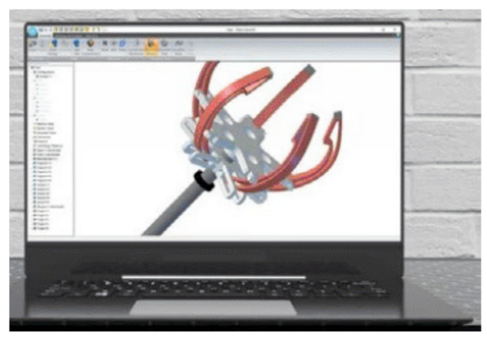

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