



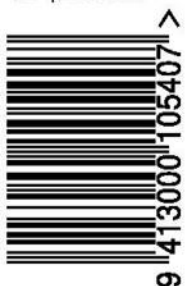
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ISSUE 129
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THE Shed

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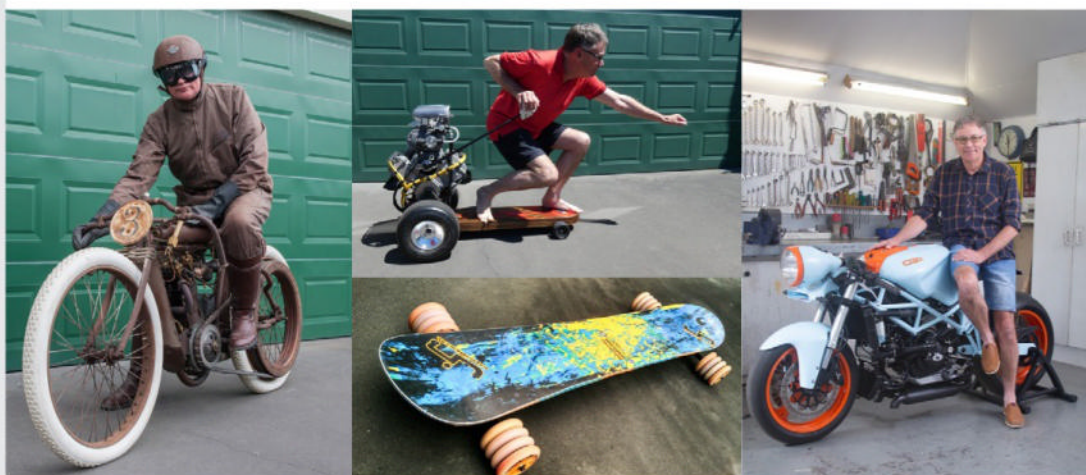
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AN EXTRAORDINARY SHEDDIE

We don't feature many sheddies more than once in the magazine, but Chris Gordon is the exception.

Chris' latest project is the subject of our cover story in this edition, and this is his most stunning project yet. We first featured the first of his many projects way back in *The Shed* Issue No. 77 in 2018. This was the tale of how he went about building a 1920s board-track racer motorcycle, and not surprisingly, this was quite an engineering feat.

He built the frame and designed the engine, based on a 1908 250cc JAP crankcase and crankshaft, a VW Beetle cylinder and piston, and a Chinese-made connecting rod; the engine was a copy of a very early Harley-Davidson one. When completed, folks couldn't tell if the bike was an original or a flawless copy, so good was the end product, complete with a precise patina finish. A project many of us would feel was our best life's work and our finest ever workshop project – but not Chris.

Next, in *The Shed* Issue No. 120, he created a fake V8 engine from a Kawasaki motorbike to build a Ed Roth-inspired electric-powered skateboard that appeared like it had a huge V8 engine on the rear driving it!

In Issue No. 122, we featured another of his "just for fun" favourite builds: A Big Finks Sidewalk Surfer skateboard, another homage to Ed Roth's 1960s Kustom Kulture. This shed project was

inspired by a rainy-day visit to the Christchurch City Council's ECO Shop, where he discovered the components which cost him about \$100 and then took about 17 days to create. These two projects were in sharp contrast to the board-track racer, but it just goes to demonstrate how much Chris thoroughly enjoys getting out into his workshop and getting stuck into a "just for fun" project.

Now we come to his latest adventure, his CGR916 café racer in this issue.

This is quite a step up from the skateboards and even the board-track racer. This mind-blowing project shows a huge amount of engineering skill and is a real credit to him.

Using a donor bike, he rebuilds, adapts, and modifies an old Ducati to create a remarkable machine that is already wowing the crowds at local events. No crankshaft was left unturned with this project, and only the very best finish would do.

Now, if there was a sheddie of the year contest, then our Chris would be right up there with these projects, which he does for no other reason than for the fun and the challenge plus the magic he finds when he is out there in the shed. With this café racer as well, he will never ride it; the project really was just for fun.

Chris gets my vote for sheddie of the year, no question. What say you?

Greg Vincent
editor@theshed.nz

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CGR916 café racer

Chris Gordon's extensive shed work continues, but this latest project comes with a Ducatisti advisory warning: His article contains graphic images and descriptions of procedures that some Ducati fans may find disturbing. Reader discretion is advised



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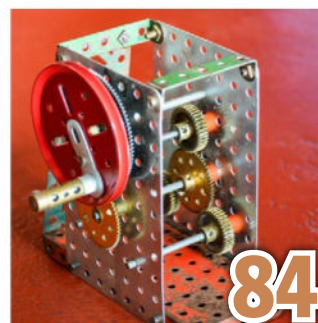
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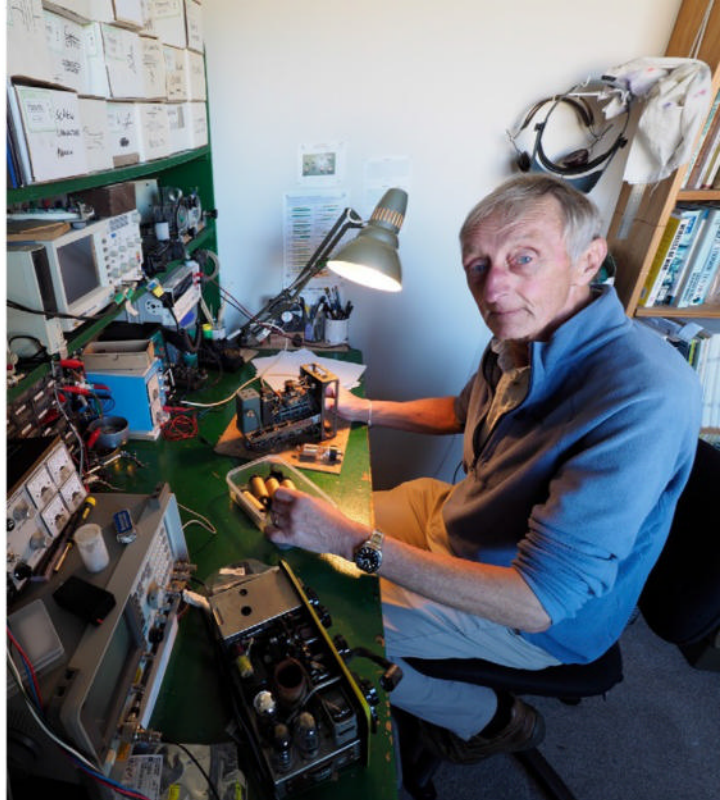
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CGR916 CAFÉ RACER

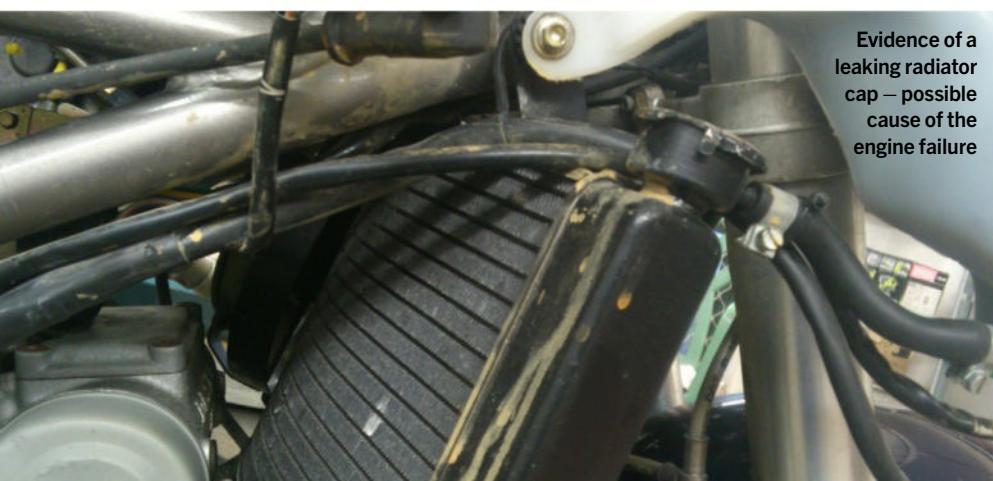
By Chris Gordon | Photographs: Chris Gordon,
Alex and Rachel Pettigrew



Chris Gordon's extensive shed work continues, but this latest project comes with a Ducatisti advisory warning: This article contains graphic images and descriptions of procedures that some Ducati fans may find disturbing. Reader discretion is advised



Ducati ST4 loaded into the van in Woodbury, South Canterbury



Evidence of a leaking radiator cap – possible cause of the engine failure



Engine lowered safely on the floor during disassembly



Wheeled trolley supporting the engine

With my previous projects completed, what to do next? Another motorcycle project would be good. I'd never done a café racer. The Gulf Racing livery is nice. What say I combine all of these? I say yes.

Consideration was then given to what base vehicle to use. By chance, a work colleague's beloved 2001 Ducati ST4 Sports Tourer had recently suffered engine failure, leaving him stranded somewhere in the bowels of South Canterbury. Although the bike had been taken to a safe location, he couldn't see a viable way forward for getting it back on the road.

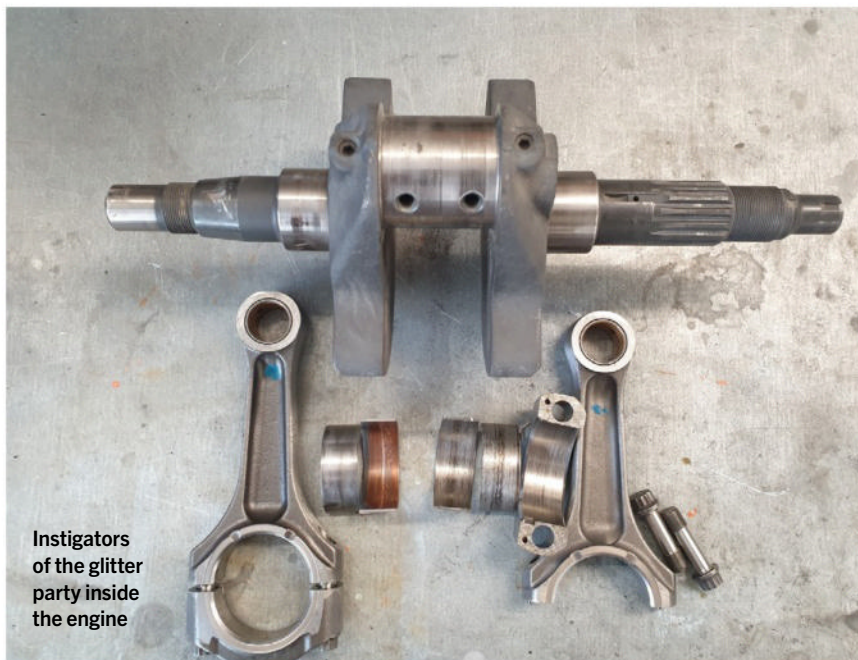
It's where?

Discussions through the week resulted in a deal being done, and I was then the proud owner. Slight wrinkle: it was in Woodbury, a small town just out from Geraldine, South Canterbury. A van trip south and the bike was in my possession.

During the loading of the bike in Woodbury, it became very apparent that this was a hefty beast. As I work alone, special considerations and handling techniques would be required to prevent further damage to the bike ... or, indeed, me.

In my shed

Back home, the bike was unloaded and wheeled into my shed.



With the front and rear wheels elevated to provide better access, disassembly began. The likely cause of engine failure soon became apparent: the radiator cap had been leaking, emptying the radiator of nearly all its fluid, the remnants looking like a caramel latte. Interestingly, the coolant system expansion bottle still had nice green liquid in it, and up to the appropriate mark. Potentially, it was unable to top up the radiator when the coolant cooled down, due to the leak and lack of contraction within the system.

Next, would the engine still turn over? Unlike a lot of other bikes I'd worked on, the 916cc L-Twin engine fitted to the ST4 model didn't have a nice hex on the end of the crankshaft for a spanner; instead, it required a special tool (see sidebar on page 13) to manually rotate the engine. This tool was made and was to be the first of many required for this machine. Using it revealed that the engine was very tight. Something was amiss.

Party time

The strip-down continued.

Each part was photographed and labelled until there was only the engine in the chassis – still quite the hefty lump and certainly more than I could lift. Eventually, a methodology was devised that enabled the engine to be unbolted from the chassis, carefully lowered away from the chassis to the floor, lifted with

a hoist onto a moveable trolley, wheeled over to the bench, and then slid from trolley to bench. Party time.

Once there, engine disassembly began. Parts were again photographed, labelled, and stored in containers for future refurbishment. Unrecoverable parts were noted and a reorder list compiled. Having travelled only 22,000km, the engine was generally in good condition.

Eventually, the reason for the bike's stranding was located. Perhaps due to the low coolant level causing overheating and thinning of the lubricating oil, the crankshaft's big-end bearings had failed. This resulted in a 'glitter party' within the engine as small fragments of bearing shell material were broken away and distributed around the engine by the oil. Also damaged were the connecting rods and crankshaft. Parts for Ducatis are very expensive. This didn't look good.

Serendipity pays a visit

Call it fate, luck, kismet, or whatever, but that very week, a complete second-hand crankshaft assembly with rods and bearings in good serviceable condition appeared on Trade Me at a reasonable price. The 'Buy Now' button couldn't be hit fast enough. The crank arrived in a few days, was inspected, looked good, and was put away for later reassembly.

Luckily, the majority of moving element bearings inside the engine had not received their invitations to the

Donor bike history



Although getting a bit long in the tooth now, the Ducati ST4 remains a popular touring motorcycle.

The particular ST4 that I've changed into the CGR916 café racer is likely to have started life at the Ducati factory in Borgo Panigale, Bologna, Italy sometime during 2001. Registered in Japan during June 2004, it then arrived in New Zealand in August 2005 with around 4000km on the clock and was first registered for use on New Zealand roads in November 2006, interestingly as a 2004 model.

This bike has had a few New Zealand owners, with the previous one to me having it for around five years. When I bought it off him, he was very sad to see it go. He did keep in touch, asking how the "repairs" were going. I didn't allude to what I was actually doing to his beloved machine.

When I'd finished the metamorphosis, I invited him to my shed. Not sure if he was happy or sad! Hopefully he appreciated that it had been given another life and that it hadn't been broken up for parts.

glitter party and remained serviceable. Also luckily, those that had joined the party were inexpensive, available locally, and easily replaced. They were ordered and put aside for later.

With the internals removed, the



Original chassis marked out, ready for surgery

engine cases, side covers, cylinders, and heads were thoroughly cleaned inside and out. Small areas of corrosion were refurbished. Loosely reassembled without the internal parts and masked off as necessary, the engine was painted and stored out of harm's way, awaiting reassembly.

Chassis modifications (avert your eyes)

The engine was now sorted but not assembled, so my attention turned to the chassis.

The intention was for a strong forward bias with a minimalistic rear end. The Ducati lent itself nicely to this, primarily

due to the ST4's interesting and compact rear suspension arrangement. As a result, the only structural part on the chassis rearward of the suspension mount was the rear support for the fuel tank and the foot peg supports. All of these were in a close vertical relationship, which meant that I could dispense with about 500mm of the rear chassis and create a cantilevered minimalistic seat unit.

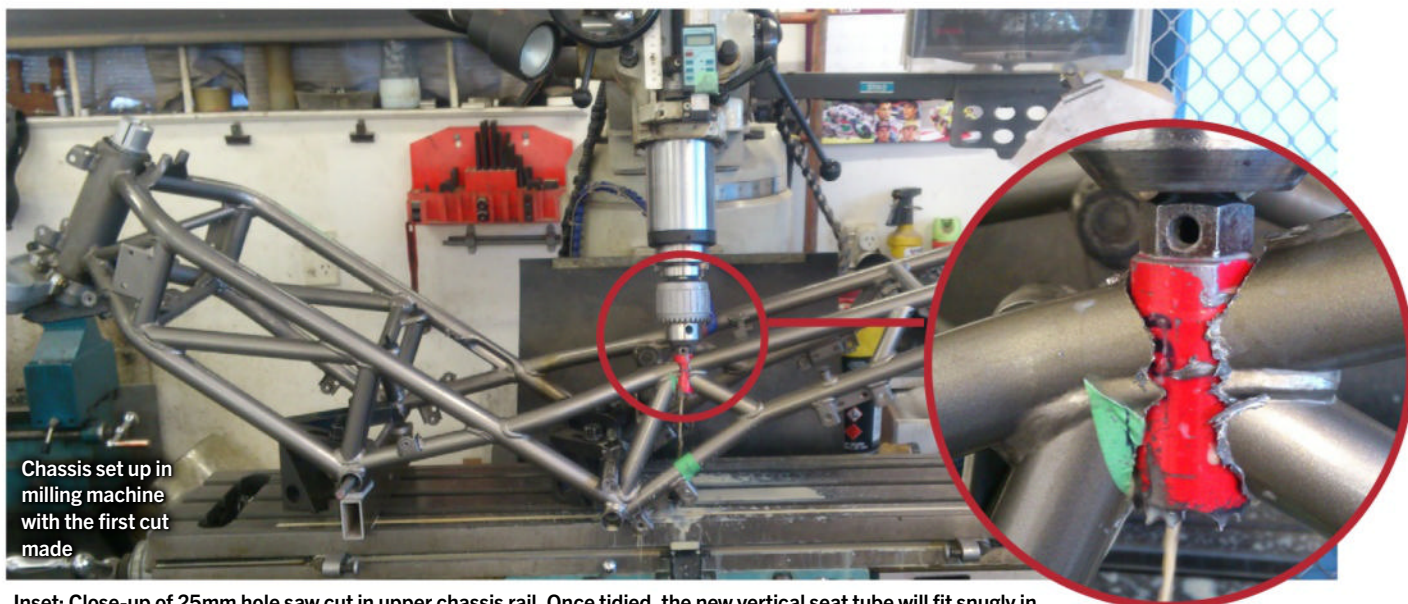
Being fuel injected, the 916cc engine required a lot of equipment to make it work. The bike was inundated with sensors, relays, fuses, and wiring. Lots of wiring. It also had a large Magneti Marelli engine control unit (ECU) that

probably wouldn't look out of place in a car. The original bike was able to hide all this componentry under the bodywork. Not so for the minimalistic design I wanted, with the chassis being one of the salient features. Therefore, all these electrical components needed to be hidden somewhere.

Hiding the electrics

At the rear of the bike, the only viable location was under the seat.

After some experimentation on the bench, I found that I could shoehorn all these parts into a relatively small steel seat structure. The chassis was secured to the table of my milling machine, and

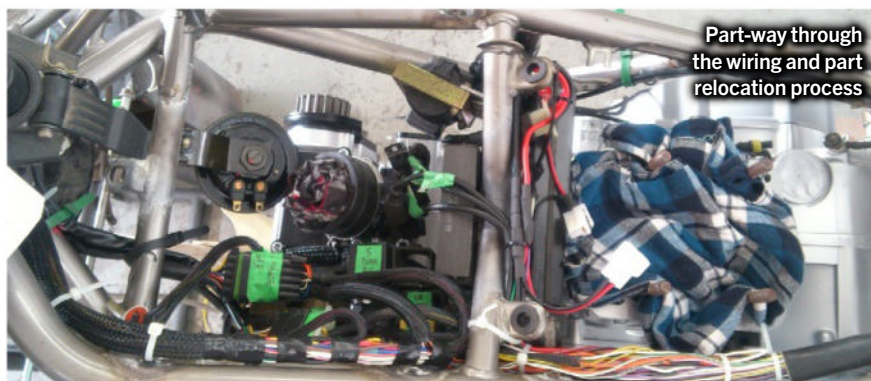


Chassis set up in milling machine with the first cut made

Inset: Close-up of 25mm hole saw cut in upper chassis rail. Once tidied, the new vertical seat tube will fit snugly in the cut



Trial fit of new vertical seat mounts prior to brazing to main chassis



Part-way through the wiring and part relocation process



Seat unit and underside cover



Bench mock-up of under-seat electrical equipment

the rear section removed using 25mm and 28mm hole saws. Short lengths of 25mm outside diameter (OD) steel tube were salvaged from the truncated rear section for use as the vertical risers from the original chassis to the new seat base via the 25mm diameter cut-outs. To connect the lower ends of these risers to the chassis, two short stubs of 28mm OD steel tube were oriented horizontally in their cut-outs, thus replicating the other mounting points on the original chassis.

Prior to attaching the seat base to the chassis, mounts for the ECU, relays, and fuses were fabricated, along with an aluminium cover panel to finish off the underside. That done, all the steel

chassis parts were brazed together.

Electrical paraphernalia

Attention then moved to tidying up the rest of the chassis, which was festooned with brackets for all the electrical paraphernalia.

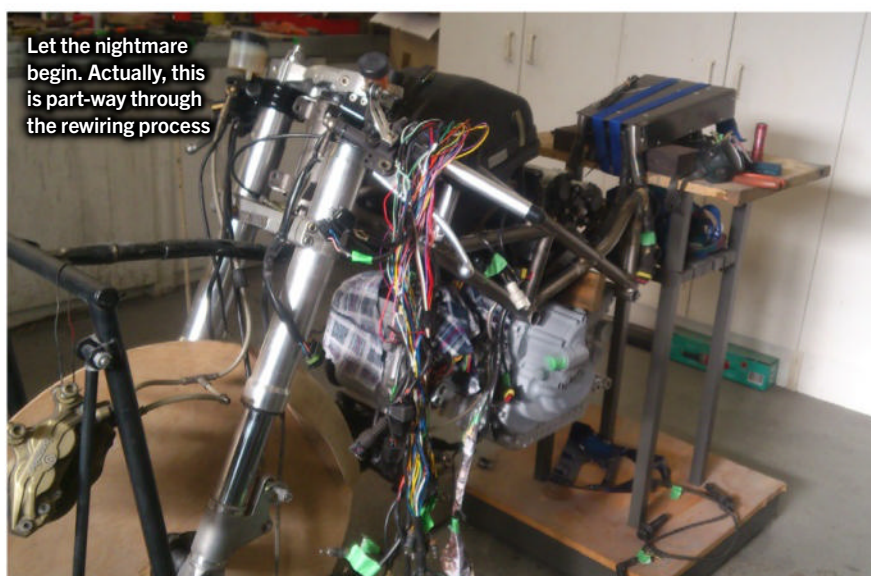
Annoyingly, a lot of these brackets were on the outside of what I considered to otherwise be a very attractive tube trellis chassis. Many, many weeks passed by as brackets were removed and the associated items relocated from the outside to the inside of the chassis rails. Special care and thought had to be given to this entire process to ensure that I wasn't going to snooker myself

by having two parts vying for the same space.

With all the parts now located in their new positions, the wiring could be done. Unfortunately, various factors intervened, turning this into quite the nightmare, with almost one-third of the total 10-month build time taken up by the wiring alone. One item that needed some serious thought was engine starting. The 916cc twin needed a decent battery and short leads to facilitate effective starting, so Ducati originally mounted the battery on the outside of its glorious tube trellis chassis, right next to the starter motor. Made sense beneath the original bodywork. ►



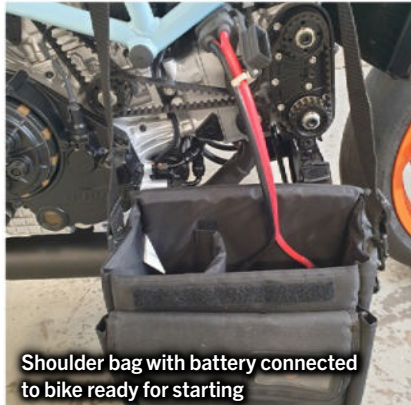
Now, if I put this here, what else is going to want that space...?



Let the nightmare begin. Actually, this is part-way through the rewiring process



Shoulder bag shown with large battery



Shoulder bag with battery connected to bike ready for starting

However, on the naked CGR916, this would not do at all.

Changing to two batteries

As there was no space to mount a large battery, I decided to use two batteries. A small, 12V, 1.7-amp-hour, sealed lead acid battery was hidden away in front of the rear cylinder to power the electrics until the engine had started and the alternator took over. Incapable of starting the engine, this was supplemented by a large external jump-start battery, plugged into the bike when required.

After what seemed an eternity, the rear and central sections of the wiring were done, leaving just the front to do. Like the rear, it also had its fair share of electrical components. Part of the café racer's original design criteria was the incorporation of an oversized headlight, partly as a feature but also to accommodate all of the electrical components up front. A seven-inch-diameter sealed-beam lamp was chosen because of its size and also because its convex front face suited the intended teardrop-shaped housing.



Headlight buck parts being glued as first step in making the headlight



Headlight buck being machined in the lathe. Roughing out was done with a lathe tool

Lighting the way

The front of the original bike had a large aluminium casting that did triple duty as engine air inlet scoop, headlight mount, and home for a myriad of brackets.

I cut off all the unnecessary parts, leaving just the scoop. This became the foundation for mounting the new fibreglass headlight assembly and front turn signal units. Using the sealed-beam lamp and a new front bezel purchased from AliExpress as the starting point,



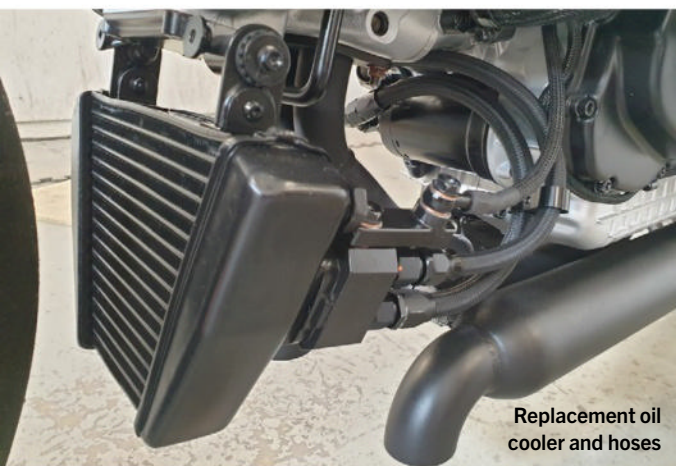
Headlight buck ready for application of the second section of fibreglass



Completed fibreglass headlight housing foundation (left) next to the buck that helped produce it



Bezel attachment and headlight housing fibreglassed together, prior to sanding and finishing



Replacement oil cooler and hoses



Coolant expansion bottle and relocated fuse box

“The oil cooler couldn’t be trusted, as it was a likely guest at the glitter party”

the size and shape for the new teardrop housing was determined. From that, a wooden buck required for the fibreglass lay-up process was fashioned from scrap wood. This was only one-eighth of the total circumference to enable the housing to be removed afterwards.

With the buck secured in the bench vice, the first layer of fibreglass was applied using 250g/m² chopped strand mat (CSM). When ripped into suitable-sized pieces by hand, the CSM left a frayed edge which created a nice chamfer when laid up with the polyester resin, ideal for tying in the multiple sections that I would be applying.

Once the first layer had hardened, it was rotated on the buck an eighth of a turn. The lay-up process continued until the full shape was complete and the buck removed. Mountings for the speedo and warning light unit were made from fibreglass and glassed into the main structure, as were the two mounts under the housing to attach it to the top of the air scoop. As the work progressed, the headlight housing internal sub-

assembly bracketry and wiring were also undertaken.

To ensure that no wiring would be visible at the rear of the bike, channels were machined into two 5mm thick fibreglass plates. Sandwiched together, these also formed the mounting points for the tail-/brake lights, the number plate, and its lights. In a similar fashion to the front, mounting stubs were added to the trailing edges of the seat base to accommodate the rear indicators.

Cool it, buster

The cooling systems had now moved their way to the front of the job queue, and both the original radiator and oil cooler were damaged in some way.

The oil cooler couldn’t be trusted, as it was a likely guest at the glitter party and successfully cleaning all the internal orifices would be almost impossible. After considering all the options, a generic replacement unit was purchased from AliExpress.

Although it needed some modifications, it was eminently cost-

effective. AN6 braided oil-line hoses and fittings were also ordered from AliExpress and, upon arrival, modified to suit the new oil cooler.

A question mark still hung over the radiator, especially the cap fitting. However, after close inspection it appeared to be serviceable, and the rest of the unit was generally OK, although the fins were a bit battered and it was very dirty inside. Internal cleaning with a rust-removal solution followed by several rinses did a good job of restoring the internal passages and tanks to a serviceable condition. Several hours were then spent straightening the radiator fins. A coat of paint made it look like new.

Get a grip

With the radiator and oil cooler sorted, further fabrication took place at the front of the bike.

The original steering assembly utilised raised handlebars to provide a relaxed riding position. For the café racer, a more aggressive stance was needed, and



Headlight housing with filler. Apertures for speedo mount and warning lights



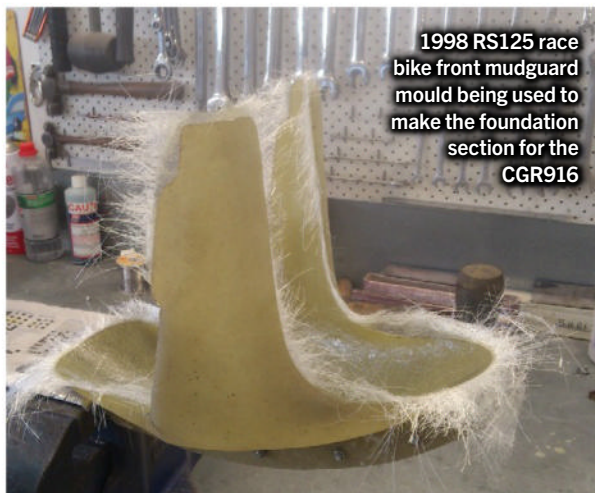
Headlight housing during application of primer-surfacer



Headlight housing masked for the orange stripe



Orange stripe applied to the headlight housing



1998 RS125 race bike front mudguard mould being used to make the foundation section for the CGR916



Primer-surfacer applied to the front mudguard



Fuel tank with primer



Fuel tank masked for the orange stripe



Tank with orange stripe, awaiting black pinsripe



Top cover for the fuel tank was also given the orange-paint treatment

that required lowering the handlebars and everything attached to them.

CNC-machined clip-on handlebar clamps that fit to the forks under the top triple clamp were ordered from AliExpress, along with new tube-type handlebars, replacement hydraulic fluid reservoir bottles, and hoses for the front brake and clutch master cylinders, plus new hand grips. When received, it was a relatively simple task to fit these components.

On guard

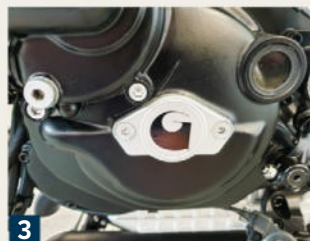
To complement the forward-bias appearance, a larger-than-standard front mudguard was necessary. Out with the fibreglass again.

To make things a bit easier, I was able to use a mould that I'd made in 1998 for a Honda RS125 I was racing at that time. A guard was made from the mould, and this formed the foundation for the new CGR916 mudguard, although considerable changes were needed to create the look that I was after.

Tank time

Being a touring machine, the ST4 had a very large fuel tank.

On a bike with a full fairing, this didn't look out of place. However, on the stripped-down café racer, its appearance needed help. The crimp-welded seam where the two tank halves met at the base of the tank was now visible and unsightly. These joints were thoroughly cleaned of original paint, filled, and sanded to provide a more pleasing radiused edge. Work was also done to fill the indentations in the top of the tank



Special tools

In almost all engineering endeavours, jigs; fixtures; tooling; and, in some instances, actual machines are necessary. These can be something simple, taking an hour or so to knock together, or can extend to months of effort if something really elaborate is required.

This was the first Ducati I worked on, and the workshop manual listed 13 special tools for the frame and 34 for the engine. A dedicated Ducati service centre would be expected to have all this factory-approved tooling. However, for me, the costs would have been prohibitive. Therefore, I either made what I needed or, if available, purchased from AliExpress. The most expensive of those was NZ\$28.

As mentioned in the main body of this article, the first

special tool I needed to make was to manually rotate the crankshaft. According to the manual, Ducati tool item No. 6: "Tool for ignition advance check, part number 88713.0123" was required. This may have been more sophisticated, but mine also did the job.

Another tool I made was for tightening the cylinder head nuts where the overhanging desmo camshaft assembly prevented use of a normal socket and torque wrench. To get around this, Ducati special engine tool No. 3: "Wrench for tightening head nuts. P/N 88713.1139" would be used, which I didn't have. One of my friends, an aircraft technician, had the solution: a ring spanner with a square-drive socket welded



1. Special tools made or purchased for the CGR916 project. 2. Close-up of the special tool for rotating the crankshaft attached to the damaged crank on workbench. 3. Left side-cover showing small plate that covers the end of the crankshaft. 4. Shed-made crankshaft rotation tool installed in side-cover aperture. Small hex is end of securing bolt, a spanner on the large hex rotates the crankshaft. 5. Spanner adapted for use with a torque wrench to enable tightening of the overhung cylinder head nuts. 6. About 20 years ago, I started keeping the mixing pots; unused pot shown front right

to it. With the torque wrench positioned at right angles to the spanner, it could be used effectively in the usual manner.

My favourite tool purchased for the CGR916 was the AliExpress clutch tool. This was a piece of engineering plastic that had been CNC machined on both sides. One side was used to hold the clutch

outer basket while the bolts securing the basket to the end of the input drive gear were tightened. Flipped over, the same tool held the inner hub while the large central nut was tightened. Some thought had gone into its manufacture, resulting in a simple, dual-use tool manufactured from the minimum amount of material.

and to smooth out the rear tank mount arrangement.

Exhausting but not really

By far the easiest fabrication work on the bike was the exhaust system. Right from the start, I knew exactly what it was going to look like and how I was going

to make it. That's why I left it until last.

The ST4 exhaust system utilised a stainless-steel pipe from each cylinder head, joining each other in a crucifix arrangement under the engine, just in front of the swing arm. Originally, the mufflers plugged into the two remaining ports on the sides of that

crucifix, exhausting to the rear of the machine. As I wanted a minimalistic rear end, an underslung exhaust layout was needed. Two sausage-shaped mufflers were purchased online from a local manufacturer, as were four pressed and welded steel tube 'doughnuts'. Although expensive,



Cutting exhaust doughnuts with slitting saw in the milling machine



Exhaust mufflers and doughnuts



Mounting arrangement for rear end of the mufflers with one of the two tension springs visible



Mounting arrangement for forward section of mufflers showing tension spring

these doughnuts were ideal for the tight radius bends required to change the direction of the gas flow from the crucifix into the mufflers. Once received, it was just a matter of setting up the mufflers under the engine in their appropriate positions and cutting the doughnuts to fill in the gap between the ends of the mufflers and the original muffler ports on the exhaust crucifix.

At the rear, simple wire loop mounts were brazed onto the new exhausts, and two long tension springs were used to pull each exhaust into the ports of the crucifix, similar in arrangement to the original bike. Up front, a simple bracket supported the ends of the mufflers onto the original front cylinder exhaust pipe with a tension spring to hold each

muffler to the bracket. This arrangement of springs front and rear would then enable the mufflers to be readily removed, thus providing easy access to the engine oil drain plug and oil filter unit for servicing.

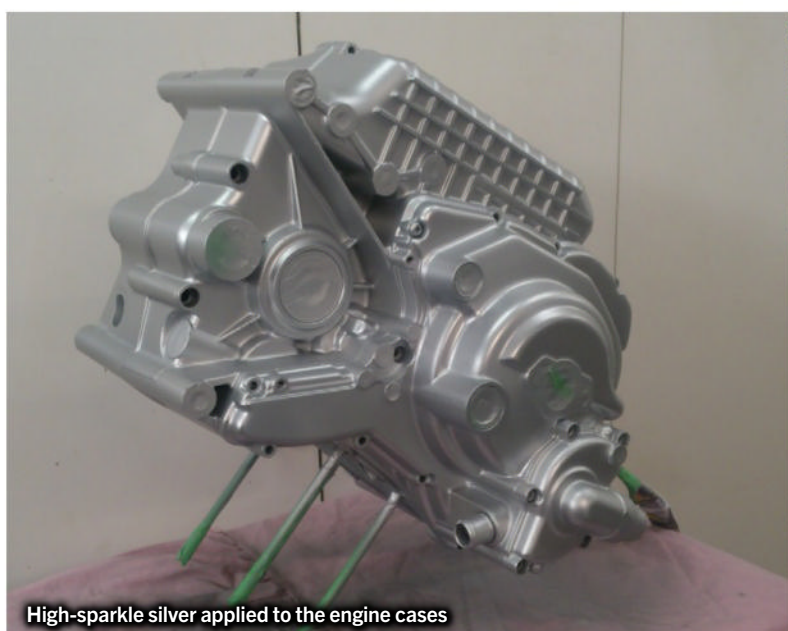
Paint your wagon

With all the major fabrication work now completed, attention turned to the painting.

When you see a bike together, you just see the bike. However, when it's broken down into its component parts, the majority of which need cleaning, repairing, priming, and then final painting, the task can be somewhat overwhelming. Normally, I would do all the painting at the same time, but for this project it was just too much to



Primer applied to the engine cases



High-sparkle silver applied to the engine cases

Decals help make the finished product look a bit more authentic



Completed underside of the seat unit prior to fitting the aluminium alloy cover



Gulf Racing livery

This famous and timeless orange and blue colour scheme earned icon status during the golden age of motorsports in the 1960s. Easily one of the most recognised racing liveries, it has seen a recent resurgence with usage in MotoGP by the Trackhouse international motorcycle racing team.

stomach. Therefore, I decided to divide and conquer.

Some parts, like the engine cases, cylinders, and heads, were already cleaned and painted, so they didn't need anything. But where to start with the rest of it?

I decided to start with the Gulf-coloured bits, beginning with the chassis, which was sent to a local company to get abrasive blasted. A week later, the chassis was back to bare metal, and the priming could begin. Priming of the other coloured parts also progressed. Having several pieces on the go at once worked out well. One being painted, another drying, and another being sanded.

With all the parts primed, it was time for colour!

Before I'd even taken possession of the ST4, I had a local paint supply shop mix up some Gulf blue and Gulf orange, having already decided on that livery. Now, it was time to apply it, starting with the blue. It was then that I discovered there had been a misunderstanding when I bought the paint. I had been inadvertently supplied with a dark-coloured VW Golf blue and not the light-coloured Gulf blue. That sorted, the Gulf blue was applied, followed by masking and application of the Gulf orange.

The interface between the blue and orange required a thin black line. For this, I cheated and used 3mm pinstripe tape. With all the parts now coloured and striped, several coats of acrylic lacquer clear coat were applied, which

“With all the parts primed, it was time for colour!”



Painting of Gulf-coloured parts completed



Engine, chassis, and main wiring loom assembled on moveable trolley



Front section during assembly



Left-side handlebar showing new parts

gave the finish a real sense of depth. Although, the downside was that any blemish in the base coat was entrapped forever.

The knee bone's connected to the ...

Blue and orange parts now painted, final reassembly could begin.

Up to this point, the engine had been loosely assembled, sans internals, to enable various other elements of the project to continue, such as the wiring, relocation of components, etc. Now, it was time to put the engine back together properly. Some special tools were needed, but generally speaking, reassembly went well and the replacement crankshaft assembly fitted in nicely. To give the machine more of an edge, the protective covers for the timing belts and dry clutch were left off. Nofingerpoken!

With the bulk of the engine reassembled, it was slid off the bench and onto the mobile trolley. Suspended



Rear section awaiting reassembly



Café racers

Back in the 1960s, motorcyclists in London and environs would remove all the unnecessary parts from their production motorbikes and race each other to the nearest café. There, they would argue who was the fastest over a nice cup of tea and a biscuit.



high on the hoist, the chassis awaited the engine, which was then wheeled underneath. Slowly lowered, the chassis was reunited with the engine and progress could, at last, be seen.

From then on, it was a process of refitting all the components. Some of these needed cleaning and painting. However, this was now a piecemeal process that could be undertaken as and when needed, and wasn't nearly as onerous as trying to do it all at once. Plus, it had the advantage that as soon as a part was refurbished, it could be installed, reducing the opportunity for damage.

To finish off the paintwork, printed and computer-cut vinyl labels were drawn up, made by a local firm, and attached. As a final addition to the café racer's edge, a set of used slicks from a friend's race bike was fitted to the wheels.

Will it still go?

This project certainly had more than its fair share of challenges.

I'm sure most of my friends were feeling my pain, especially during the wiring phase when there was scant evidence of any progress between their successive visits. Perseverance begets progress, and various milestones helped maintain enthusiasm until the time of reckoning arrived.

First push on the starter button and it roared into life! After 10 months of dealing with a recalcitrant beast, it's like it finally gave up and decided to play nicely. I'd very much like to be



CGR916 specifications

Engine	Ducati 916cc L-Twin; bore: 94mm, stroke: 66mm; four valves per cylinder; desmodromic valve actuation; performance: 78kW at 9500rpm, 84Nm at 7250rpm, max. 10,000rpm; Magneti Marelli fuel injection and electronic ignition systems; six-speed gearbox; dry clutch with Brembo master cylinder
Chassis	Ducati steel tube trellis with CGR modifications, ~1430mm wheelbase, 24-degree steering head angle, front: 43mm Showa USD forks, rear: progressive rocker arm suspension with Sachs coilover shock unit
Wheels	Three-spoke light alloy, front: Brembo 3.5x17 inches, rear: Brembo 5.5x17 inches
Tyres	Tubeless radial, front: 120/70-R17, rear: 180/60-R17
Brakes	Front: Brembo 320mm twin steel disc with two 4-piston callipers; rear: Brembo 245mm single steel disc with one 2-piston calliper, Brembo master cylinders
Mass	~180kg

The CGR916 emerges from the shed after a 10-month transformation





Chris was looking for a new project and thought, "I'd never done a café racer. The Gulf Racing livery is nice. What say I combine all of these?"

"Or maybe that's what working in the shed's all about – just a dream"

able to extol the bike's handling, power delivery, fuel economy, and such, but I can't. As a paradox, I build motorcycles but don't ride them.

My litmus test for the success of a project is observing the initial reactions of those who see it when completed. Preference being: full attention given to observation, negating conversation, which comes after. Fortunately, there was plenty of that. The vast majority agreed after quiet reflection that it was a stunner.

Those who did comment on the hard

seat or the bent-over riding position were reminded that the purpose of the machine was to get to the next café as fast as possible. A little discomfort along the way was acceptable.

Accolades were further bolstered when the bike won the coveted People's Choice award at the Matariki Motorcycle Show, convened by The Pumphouse, in Christchurch. Receiving the trophy made me wonder if all that went before was just a dream. Or maybe that's what working in the shed's all about – just a dream. 🏠



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To date, we've installed over 100 Solar Pac kits across the country. These systems are modular and easily scalable, allowing homeowners, farms, and businesses to expand as their energy needs grow - all while maintaining reliability and compliance.



Go Off-Grid

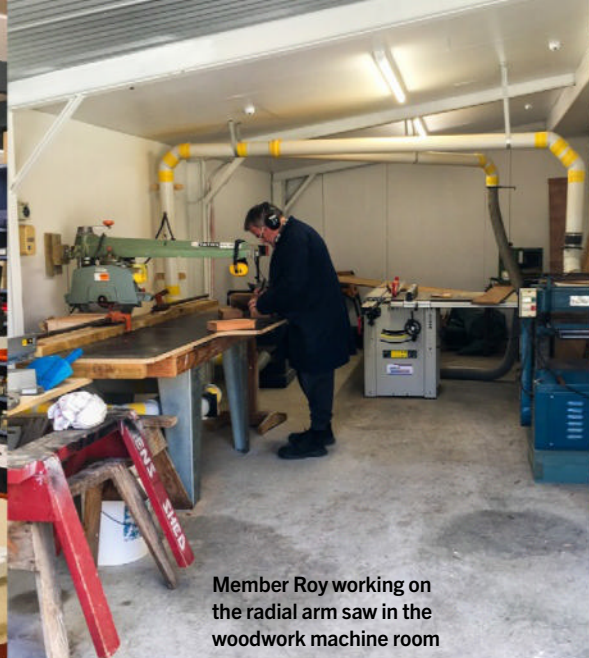
Choosing to go off-grid is about more than just independence - it's about taking control of your energy future. With power prices in New Zealand continuing to rise and outages becoming more frequent in rural and coastal areas, generating and storing your own electricity gives you stability, savings, and peace of mind.

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The converted Auto Barn provides the largest space the Whanganui Men's Shed has occupied



Member Roy working on the radial arm saw in the woodwork machine room

NEW PREMISES FOR WHANGANUI MEN'S SHED

By Helen Frances

The Whanganui Community Men's Shed Trust Inc. has found a new home.

The trust opened in March this year in what used to be the Auto Barn of Whanganui businessman and vintage car collector Ed Boyd.

After many months of searching and putting the word out in the community, local business owner Hinemoa Ransom-Boyd offered the trust a 15-year lease in the space that had once housed her late husband's large collection of vintage and classic cars.

Hinemoa came to the rescue and said, "Well, I've got the Auto Barn up there, and I've got rid of quite a few of the cars. I can move the rest out too."

President Bevan Chilcott and long-time member Ian Chamberlain gave us a guided tour of the premises, and at around 450m², this is the largest space the trust has occupied.

A six-month fit-out

Before the opening, members spent six months converting the premises into a range of fully functioning, well-equipped workstations.

Setting up the former Auto Barn to health and safety standards included installing toilets, building an office, an open-plan kitchen/meeting room with donated kitchen cabinetry, a super-efficient dust extraction system, and a hot shop in a container out the back. They also had to change its status from residential to commercial and comply with Whanganui District Council permit requirements.

The trust has kept memories of Ed, with photographs of him in 'Ed's corner' and a wall of his historic images entitled 'Memories of Old Whanganui'. At the upholstery workshop, a large photo of Ed's friends Ian Chamberlain and his wife Fay driving in one of Ian's vintage gems,

seems to race across the back wall (see article about Ian's work with vintage cars in *The Shed* Issue No. 75, November/December 201 and on *The Shed's* website).

Fifty-plus members

Every workstation is signposted so that you know whether you are in upholstery, joinery, woodturning, engineering, coffin making, or electronics, and, along the way, Gerry points out a sandblasting box made by one of the members.

A spacious general work area is where various projects are underway. Tools, machinery, and all the various hardware members may need are well organised and close at hand.

The membership currently numbers 50-plus, including three women. Members are involved in a number of different projects, both personal and for the wider community. The trust makes



At 3 Pickwick Road, the Whanganui Men's Shed has plenty of space both inside and out



This 1958 BMW Isetta was part of Auto Barn owner Ed Boyd's classic car collection



(Left to right) Bevan Chilcott (president), Ian Chamberlain (member), Gerry Gregan (secretary), and Rob Pointon (member) in front of the Memories of Old Whanganui wall

a reasonable charge for individuals needing sheddie skills, and they also do work for not-for-profit organisations such as hospices, Gerry says. Quite a variety of projects come through the door.

“We made a blind wall for the visually impaired, and a dental chair for the Tonga project that was organised by Rotary. Schools bring stuff in all the time. We made a marae playhouse for the kids to play in, and the toy library brings in broken toys and we’ll fix them if we can,” he says.

The Repair Shop

Individuals bring their home treasures to be repaired, such as antique chairs that need reupholstering or broken legs turned, glued, and varnished.

Some compare the repair work that the members do to the TV series *The Repair Shop*; however, Gerry points out they are in a different league from the BBC-funded show.

Bevan, who worked as a GP, says that the social function of the Men’s Shed is an increasingly important part of what they offer. “I think we’re now pushing the mental, physical, social aspects,” he says. “It’s part of men’s shared philosophy of mental health and physical health. For example, when a

member recently lost his loved one, the guys took food around to him. He said this morning, ‘I wouldn’t have gotten through the last month or so if it wasn’t for the shed.’”

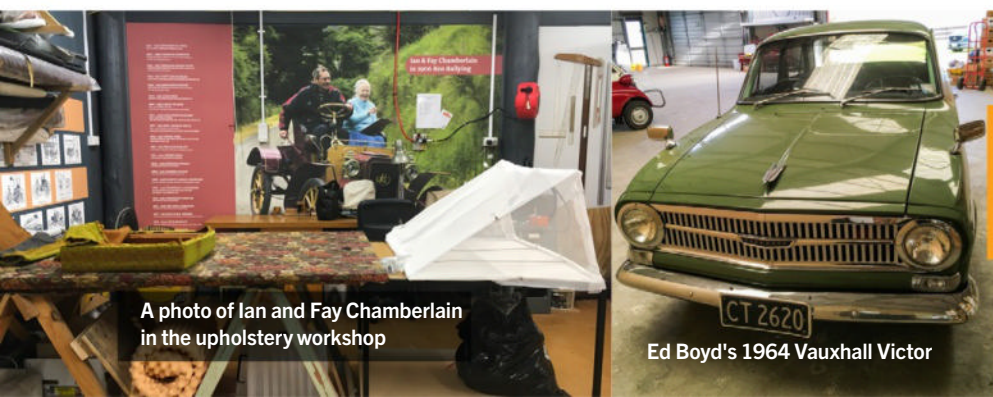
Classic cars

Behind the Men’s Shed sits another large, almost empty barn that was once home to 20-plus classic and vintage cars and motorbikes.

Today, two of Ed’s pride and joy remain – a gleaming green and silver 1964 Vauxhall Victor and a red and white 1958 BMW Isetta with the apt number plate ‘BUBBUL’. Ian opens the front door, which has the steering wheel and instrument panel attached. It has been dubbed “the refrigerator car” because the front opens outward on a hinged joint like a refrigerator door, allowing easy access to the bench seat.

Ian and Ed were long-time friends, and when Ed bought the property, they did a trade. Ed was a collector of cars, and Ian has the mechanical skills.

“When he bought this place, I just quietly said to him, ‘I wouldn’t mind that top paddock.’ I’ve built a new house up there. He kept his eye on me, and now and then he’d give me things he wanted fixing,” Ian says.



A photo of Ian and Fay Chamberlain in the upholstery workshop

Ed Boyd’s 1964 Vauxhall Victor

THE SHED ONLINE

What’s happening
online at theshed.nz?

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



A weighty subject

Give yourself a lift by making a hydraulic toe jack
<https://theshed.nz/a-weighty-subject/>



From armour to fighter

Precision rules in the armourer’s shed
<https://theshed.nz/from-armour-to-fighter/>



All hands to the tanks

A willing group of volunteers is helping to restore a gun collection of heritage military vehicles
<https://theshed.nz/all-hands-to-the-tanks/>



How to pimp your shed

A guide to eye candy for your shed
<https://theshed.nz/how-to-pimp-your-shed/>



CENTRAL DISTRICTS WOODWORKING EXPO

By John Gawith and Don Tietjens

This annual event is sponsored by the Manawatu Woodworkers Guild Inc. and Carbatec NZ, and was held on 17 May in Palmerston North.

This year, additional funding came from the Palmerston North City Council, Central Energy Trust, and The National Association of Woodworkers. The feature event of the day was the National Golden

Chisel competition. Woodturners from throughout New Zealand competed to see who could turn a particular-shaped wooden bowl from a 150x75mm macrocarpa blank. Points were awarded for speed (40 per cent), bowl shape (30 per cent), and quality of finish (30 per cent).

The Golden Chisel competition attracts a large audience, and to help everybody to see the wood-turning action close-up,

cameras were set up at each lathe, and the action was shown on two large TV screens, enabling a worldwide live stream.

Golden Chisel Trophy

This year, there were three heats, each with six woodturners, plus a final. Ian Connelly from South Auckland won the competition, taking home the Golden Chisel Trophy, a Sorby golden chisel, \$1K in cash, and Carbatec vouchers. There were also two team-turning competitions: one for making egg cups and the other for making bowls. This made for an action-packed day with something for everyone. The host for the day was the 'resident builder' Peter Wolfkamp, who came down from Auckland especially to see the event.

The day also included displays from various woodworking clubs, with each club having a table displaying 10 items of their most recent work. These pieces were judged to select Best in Show and runner-up.

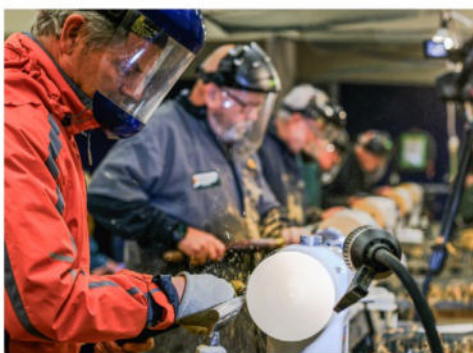
There was also a People's Choice prize, and this year both the public and the judge selected the same piece. The winner was Stephen Hall, and the runner-up was Graeme Penwarden, both from the Stratford club. The best table display was also judged, and the winner was the Kapiti club.

Good variety of trade stands

Retailers from across New Zealand come to the event to sell their wares to woodworkers and the public alike, including a wide range of specialised woodworking tools, sharpening systems and associated products.

Second-hand tools were also on sale, and demonstrations of carving, wood turning, pyrography, and scroll sawing took place throughout the day, keeping the 800 attendees well entertained.

The 2027 Central Districts Woodworking Expo will be held 16 May 2027 at Barber/Bell Hall, Waldegrave Street, Palmerston North. 📍



Woodturners from throughout New Zealand competed in the Golden Chisel competition to see who could turn a particular-shaped wooden bowl from a 150x75mm macrocarpa blank

A POLITICIAN SAYS A BIG THANK YOU TO THE SHED

Hello from California!

Checked your magazine out from our library and found some kindred spirits in more than just workshopping. But building is building, I guess. In the shed or in the streets.

Just wanted to say thanks for your call to some understanding for those of us who feel called to serve by running for elected office. As I'm sure you all are well aware, the politics here in the US has gotten pretty gruesome. It's why I chose to run for our city council here in Oceanside, CA. I am hoping that

we can start neighbor to neighbor, trying to heal some of the rupture.

We are in the thick of it until election day, November 3rd. I promise you all there in New Zealand, fellow custodians of planet Earth, that we are doing what we can over here to leave the world better than we found it. Sounds like you all are doing similar work on your patch of Earth.

THANK YOU!!

Emily Gonzales

Candidate for Oceanside City Council District 2



The now completed World War II M8 Greyhound replica

IT'S FINISHED, AND IT'S A CRACKER

Hi Greg,

I thought your readers would appreciate a finished pic of the World War II M8 Greyhound replica I built on a Mitzy Delica chassis and mechanicals that featured in *The Shed* Issue No. 65, Feb./Mar. 2016.

When I was building it, *The Shed* reporter could see how it was being constructed as it was partially done, and one side was totally open.

I completed it years ago, and have

towed it to several events like the Omaka Airshow in Blenheim, where this picture was taken.

It's a five-speed 4WD and drives fine, but there is no real armour on it. The cannon/machine guns are non-firing, made out of scrap aluminium and steel.

Cheers,

Paul Davisan



Be totally floored!

Resene Aquapoxy is a high-performing wall and floor paint ideal for garage floors.

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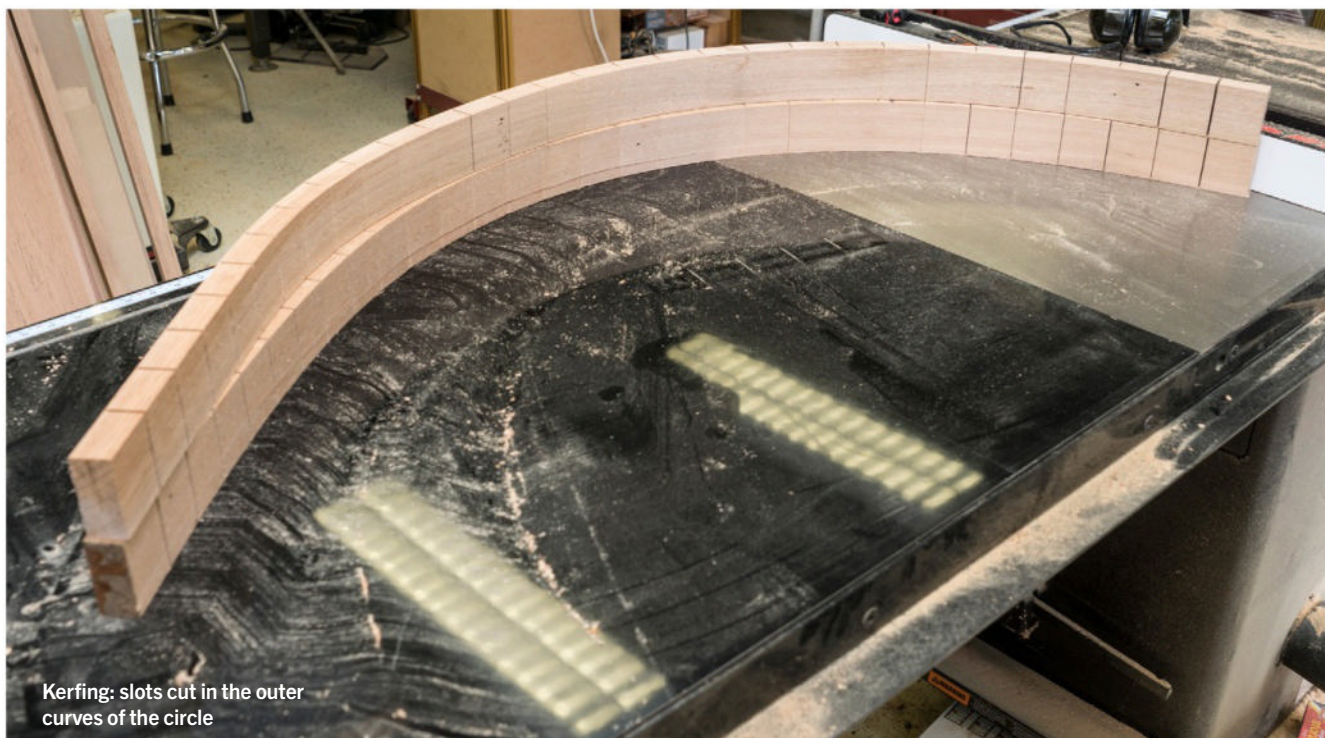


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GROWING UP

A decorative vertical herb planter is the perfect outside addition to the barbecue area for summer

By Stuart Lees | Photographs: Stuart Lees

Spring is here, and summer is just around the corner, so I've decided to work on a simple project with an outdoor feel.

Some vertical gardens out there are as simple as a couple of pallets attached to a wall, or a wooden frame with a grid of rebar attached, and these can look (and work) very effectively.

The vertical garden that I have come up with here is meant to be a combination of functional and artistic considerations. The top section contains a free-form design in timber, extensively using the timber-bending technique known as 'kerfing'. In time, the intention is to fill each section with planter foam and use plant colour to accentuate the forms.

The lower section is the more

practical/functional area, growing plants that are specifically for food – herbs and similar small, high-yield plantings. The planter boxes in this section are designed to be easily removed to make harvesting, replanting, and maintenance easier.

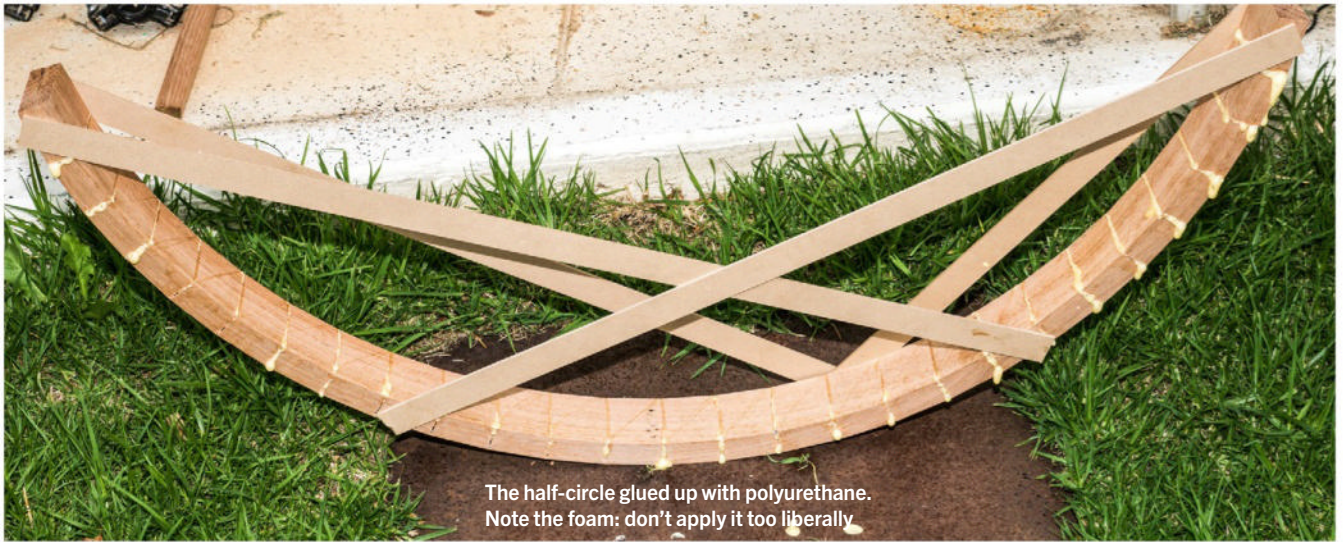
The project starts with the decorative component, as the exact size that it comes out will dictate the dimensions of the frame. The kerfing technique used to create the curved components, in simple terms, involves cutting a series of slots most of the way through a piece of timber so that what remains is thin enough to bend without cracking. The cuts must be made across the grain. If for some reason you try cutting the kerfs with the grain, the result will be a guaranteed failure.

Straight and square

Like many projects, after selecting your pieces of timber, the next step is to ensure the pieces are straight and square.

This is achieved using the planer-thicknesser combination. The planer flattens the first side and then, by placing this flattened side against the vertical fence of the planer, the first edge is planed so it is also straight, and at 90 degrees to the first face.

Next, it is over to the thicknesser to get the opposite side straight and parallel to the first side. It also allows you to size the boards exactly to the thickness required. It is best to do all the boards at the same time – that is, one after the other at each height setting, so all the boards end up exactly the



The half-circle glued up with polyurethane.
Note the foam: don't apply it too liberally



The tighter-radius
kerfed board

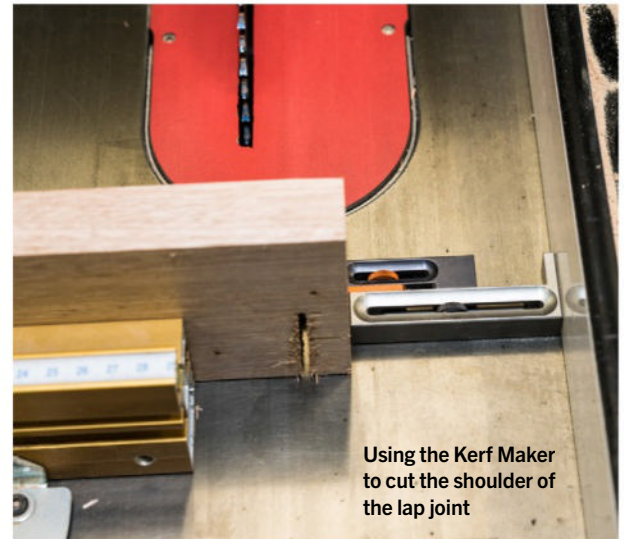
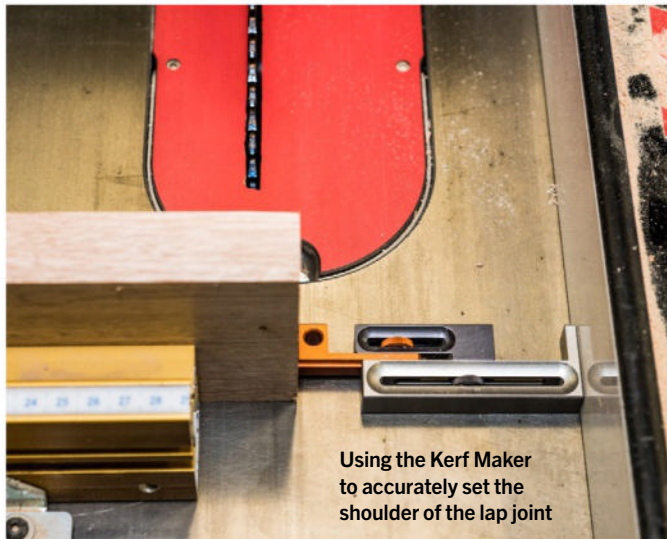


Accurately
setting the Kerf
Maker to the
actual kerf of the
blade and saw



Setting the table saw
blade to the correct height

“Straight and
smooth is
particularly
important for
kerfing”



same dimensions. Having a side that is straight and smooth is particularly important for kerfing. If it is not, then there is a high likelihood that a piece will splinter out and that will be the source of failure.

For the large circle, I didn't have a single piece of timber long enough, so I kerfed two pieces to join together. The diameter of the resulting curve is a combination of the distance between each cut and the thickness of the timber. Once the thickness has been chosen for the timber, the same number of cuts – irrespective of the distance between – will result in the same angle.

In this case, I made two complete circles, one with the distance between kerfs of about 30mm (which resulted in a circle of 1700mm diameter), and the other with about 5mm between kerfs, which resulted in a circle of approximately 300mm diameter. Both circles took the same number of cuts – in this case, 64 individual kerfs.

You can only bend the timber towards

the side with the cuts; to bend it the other way will result in a very quick failure. You continue to curve the piece until the slots are completely closed up and, at that point, it feels pretty strong (but it isn't really – it is still a piece of timber cut almost all the way through).

Weatherproof

As the resulting project is intended to stand outside, as well as getting wet from watering the plantings, I chose polyurethane glue to ensure that the project is weather resistant and strong.

Polyurethane glue is a strange animal – it looks very much like space filler and fills gaps between joints just like space filler. Considering space filler is also polyurethane, that should not come as a surprise, and, given its space-filling properties, it is a perfect glue for kerfing. Polyurethane glue is unusual for another reason – it actually needs some moisture to work properly, so before applying the glue, I use a small paintbrush and water to moisten the surfaces to be joined.

Be warned: polyurethane glue foams, so if you apply it too liberally, you'll have quite a mess to clean up. Fortunately, that isn't too hard a job and the excess foam can be cut off and sanded away easily. Glue is applied into each kerf, and then the piece is fully curved, completely closing up the kerfs. To join two curved sections together, each edge is tapered slightly to maintain a smooth curve. I found that a 2.5-degree taper worked well (resulting in a combined five-degree joint).

Another benefit of polyurethane glue is that it has a very long set-up time (about 20 minutes), giving plenty of time to bring together complex glue-ups. It also has a very short 45-minute clamping time, allowing you to quickly move through a project and not have long to wait for one step to dry before being able to move onto the next.

By using a number of pieces of timber, cut with different spacing between kerfs and therefore different diameters of the resulting curves, I constructed a freeform design within the circle. The intention is to fill the inner area with a planting foam for some ornamental plantings (providing colour and texture) and leave the outer area clear.

The outer frame was made very simply, with half-lap joints at the corners. While you can certainly make half-lap joints by measuring and marking, a few years ago I came across an ingenious tool called the 'Kerf Maker', from Bridge City Tool Works in the US. Without a ruler or pen in sight, the Kerf Maker allows you to produce joints so





Sizing the sides of the planter boxes on the table saw

tight and accurate that you hardly need to use glue at all.

True kerf

Step one is determining the true kerf of your saw and blade.

While circular saw blades come with their width (the kerf) marked on them, this is the width of the teeth only and is close to but not exactly what the blade actually cuts. Any run-out in the blade (and all blades have a degree of run-out, or 'wobble') will cause the cut to be slightly wider than the teeth. Add to that any run-out in the saw you are using, and the resulting combination is the true cutting width (kerf) of the set-up, and it changes minutely every time that you remove and replace the blade and even during operation as the blade heats up.

By cutting partway through a block, then docking that piece off, you can accurately measure the real kerf. This distance is locked into the Kerf Maker, so all subsequent settings add (or subtract) this distance as needed (orange portion).

Next, the main opening of the Kerf Maker is set to the thickness of the timber that you want to fit into the resulting slot (grey portion). By then using the Kerf Maker against a stop, first one way, then flipped over to the other, the left and right shoulders of the slot are cut. Additional cuts are then made between these two shoulders to waste away the material between, and the slot is completed with incredible accuracy. It is a bit hard to explain briefly, so if you



The planter box sides cut ready for dovetailing



Cutting the dovetails using the Gifkins jig

“Using the Gifkins Dovetail jig on the router table, I had all the pins and tails for 12 boxes cut in next to no time, all precise and accurate”



are interested, I go into more detail on my website (<https://stusshed.wordpress.com/>), or you can watch the Bridge City Tool Works video on YouTube.

Given the tendency of the recycled hardwood timber I was using to tear out, I used an 80-tooth fine blade with a triple-chip profile from toolstoday.com. It is specifically designed for cross-cutting and has a simple justification – the less damage that is done to the project during the cutting operations, the less clean-up will be required (and less damage to the visual surfaces). While not designed for rip cuts, it can still manage it (and produce a very smooth cut) by taking it a bit slower than normal to allow the smaller gullets to clear the wood chips produced.

Planter boxes

The lower portion of my vertical garden is more traditional, and for that I need planter boxes. Lots of planter boxes!

Rather than using a basic butt joint or (*shudder*) nails, I've decided to go with dovetails. They are mechanically strong, provide excellent glue area, and really look the part as well. If dovetails are not something you can contemplate, a box or finger joint is still perfectly reasonable.



Cutting dovetails for nine to 12 planter boxes may sound like an impossible order, or at least one not worth the blood, sweat, and tears, but that is where another jig is worth its weight in gold. The Gifkins Dovetail jig is by far the easiest one I have ever used to produce a basic dovetail box. It was developed by Roger Gifkins after he made all the medal presentation boxes for the Auckland 1990 Commonwealth Games. I daresay that he regretted not inventing it before that particular commission.

Using the Gifkins Dovetail jig on the

router table, I had all the pins and tails for 12 boxes cut in next to no time, all precise and accurate. I know some people claim that a real dovetail joint should have some variance and be hand-cut, but they haven't seen my woeful efforts and nor did I have sufficient time for the luxury of hand-cutting all those dovetails (even if I was up to the task).

With the boxes assembled, and a base put in each (inserted into a slot cut around the inside perimeter), they were taken over to the table saw to cut a diagonal off the top. The idea behind this was to give it more of a look of the



Gang cutting the half-lap in the rails



Gang cutting the rails for the hanging boxes set-up

plants growing up and out towards you and remove some of the visual weight of the boxes. By carefully choosing just where the cut was made, it created an interesting dovetail pin at the top front corners of each box. The blade was tilted over to 25 degrees on the table saw to achieve the cut.

Drainage holes were drilled into the base of each planter, so they don't become waterlogged. To hang each planter, a wooden hook was needed at the back, with a matching slot available in the horizontal rails.

Hanging mechanism

The hanging mechanism is simple and consists of one upward-facing, 45-degree slot on the garden frame and a matching downward-facing, 45-degree slot in a rail attached to the back of each planter.

This allows the planters to be removed easily for replanting and harvesting and for the positions to be adjusted as the plants grow. Using 45-degree slots means that the heavier the planter becomes, the more firmly it locks into the rail. This slot was easily made on the router table using a 45-degree chamfer bit, again from toolstoday.com

To ensure that the hanging mechanism was firmly attached to the planter boxes,



The hanging grid for the planters ready for assembly



Wasting away the material between the shoulders

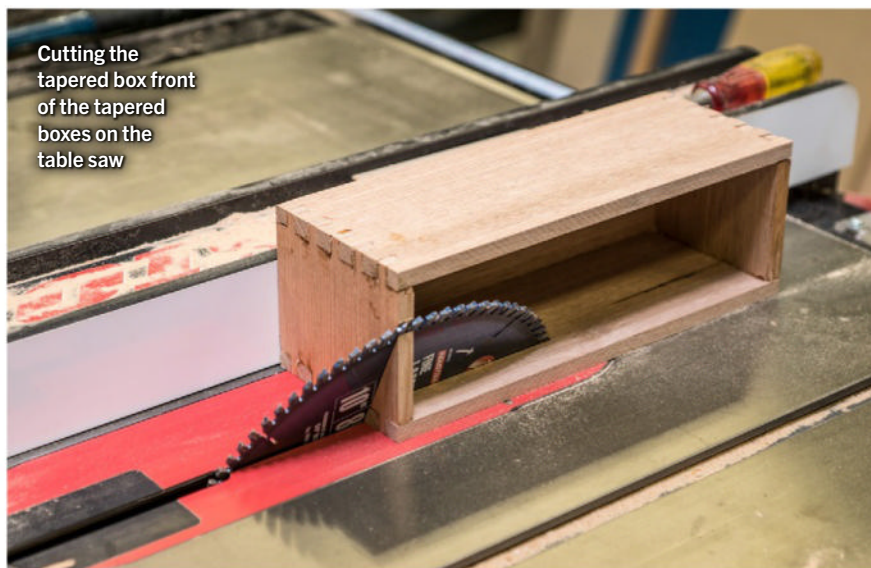
I again used the Kerf Maker to cut a dado across the back of each box to the exact width of the rail and polyurethane glue to bind them in place.

To create the timber matrix that the planters will hang off, it was a combination of three uprights and six horizontal rails, all with half-lap joints cut. The Kerf Maker was certainly paying for itself this day. With so many to cut, they were all done at the same time, and cutting first one end, then the other, so that the set-up didn't need to be changed between cuts, ensured that it went quickly and consistently.

Finally, the frame, the circular component, and the plant matrix were all screwed together (so it can be taken apart at a later date if need be) and the whole unit protected with varnish. The end grain darkens up considerably with the varnish, so it really makes the dovetail joints pop.

Summer aromas

I didn't have time to attach the frame to the wall (or to insert plants into the upper section, unfortunately), but a last-minute trip to a garden centre and a very early morning planting and you can at least see how the completed vertical garden will look. ►

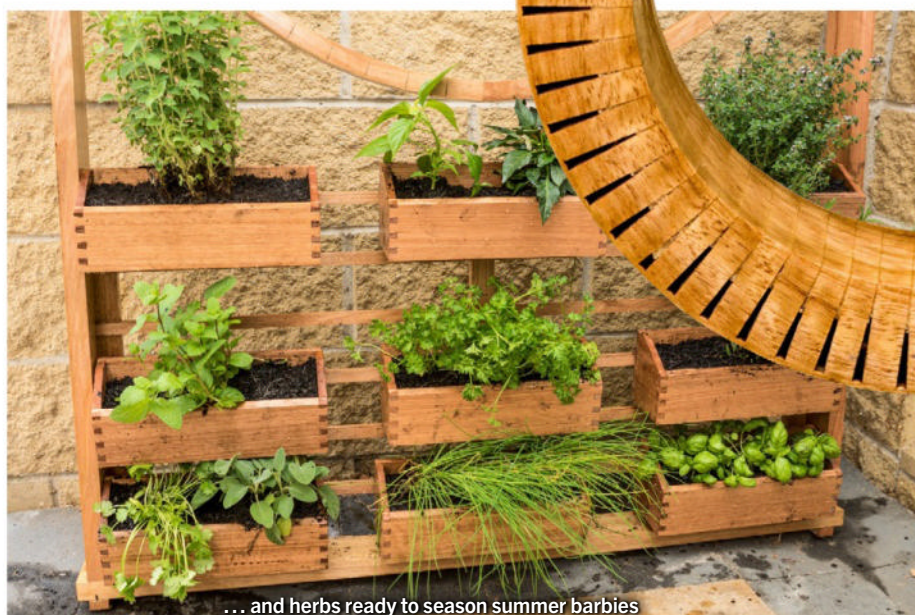


Cutting the tapered box front of the tapered boxes on the table saw

“To create the timber matrix that the planters will hang off, it was a combination of three uprights and six horizontal rails, all with half-lap joints cut”



The finished hanging garden ...



... and herbs ready to season summer barbies

The whole project was completed in a weekend from recycled hardwood. The main glue used was polyurethane (available from a number of suppliers), and the dovetail boxes were glued together with Titebond 3, which, like polyurethane glue, is also fully waterproof.

Even while planting the herbs in the vertical garden, the benefits were quickly becoming apparent with the aroma of sage, basil, thyme, and coriander wafting around, making me want to pluck some and get cooking. Combined with my other *The Shed* magazine projects, the barbecue table/ prep area and the barbecue itself, this little corner of my home is becoming quite the outdoor kitchen area – just in time for summer. 🍷

... with the kerfed curve ...



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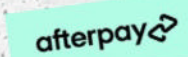
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WELDING A WORKSHOP BENCH

We use three CRC products to prep our steel workbench frame

A good workshop bench needs to be more than just strong. It needs to withstand years of hard use, knocks, spills, grinding dust, moisture, and whatever else gets thrown at it in my busy workshop. When I set about welding and finishing my new steel workshop bench, I knew I should place as much emphasis on preparation and protection as I did on the fabrication itself.

I found three CRC products were particularly useful throughout this process: CRC Metal Armour, CRC Zinc It, and CRC Etch 10, with each product performing a different job for prepping the steel.

Preparation

The first priority was keeping the steel protected during the fabrication process.

Steel can quickly develop surface rust,

particularly when it is being stored or worked on in an often damp workshop environment. CRC Metal Armour was used to provide protection to the steel surfaces during preparation and between stages of the build. This helped keep the material in good condition while measurements were made, components cut, and the bench prepared for welding.

Once the fabrication was underway,



areas of the steel were cleaned and prepared before being welded. Personally, I only use acetone before applying any product in any steel fabrication project; removing contaminants and ensuring that the surfaces are properly prepared are vital for achieving clean, consistent welds. My bench was then assembled and welded, creating the solid steel framework required for a piece of workshop equipment that, in my workshop, will be expected to handle plenty of abuse.

Corrosion protection

With the welding completed, the focus shifted to corrosion protection. Welding, grinding, and fabrication inevitably leave areas of bare steel that will need to be protected. I used the CRC Zinc It on the exposed steel to provide a zinc-rich protective coating. This was particularly useful around fabricated and welded sections where the original surface protection had been removed during welding.

Finishing coat

The final step was getting the metal ready for its finishing coat.

For this, CRC Etch 10 was used as



“The preparation and protection of the finished steel are just as important”

part of the surface preparation process, helping create a robust surface for subsequent coatings/finishing. Good preparation is always the difference between a finish that looks good initially and one that continues to perform for you, after years of rigorous workshop use.

It is easy to concentrate on cutting,

welding, and assembling when building a project such as this, but the preparation and protection of the finished steel are just as important. After all, a workshop bench is built to be used – and the better the steel is protected from the outset, the longer it should remain a useful part of the workshop. 📄



Present arms: straight-shooting Matt Debono at the door to his shed

ROTTING HULL TO SPEARGUN PRO

Restoring a boat with a rotting hull gave Matt Debono a challenging apprenticeship that equipped him with the knowledge and confidence to make high-quality hardwood spearguns. And he quickly discovered the benefits of a CNC machine

By Jason Burgess | Photographs: Jason Burgess,
Boat photographs courtesy of Matt Debono

When first-time boat buyer Matt Debono discovered that the hull of his newly purchased vessel was plagued with rot, he decided not to jump ship but to rebuild it himself.

It was a significant restoration job for any budding boat builder, yet for greenhorn skipper Matt, whose only completed woodworking venture to date was a stool crafted in high school, the learning curve could not have been any steeper. It was an apprenticeship

by fire, one that would furnish him with the knowledge and confidence to attempt another passion project: making superior-quality hardwood spearguns.

Five years on, and after spending a decade of weekends rebuilding the boat, Matt is now redeploying his energy towards upscaling his speargun side-hustle into a full-time, wholesale-capable company. It is a huge leap forward, one that he is making with the aid of a freshly minted Genesis computer numerical control (CNC) machine; technology which in itself presents both

a new set of digital challenges and a frontier for innovation.

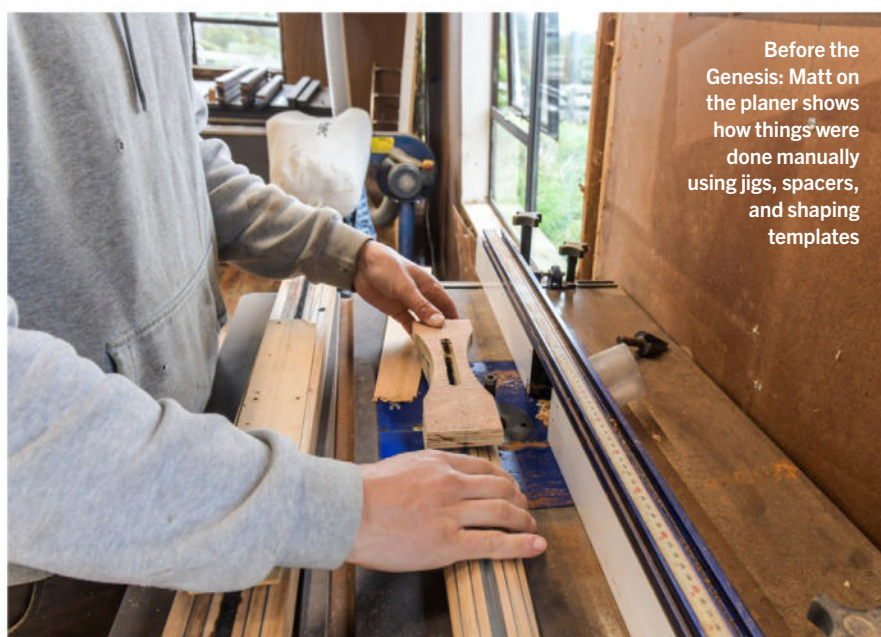
Every obstacle is an opportunity

Maybe it is his army training, or his unbridled childhood spent exploring Southland's rugged outdoors; whatever it is, on first meeting, Matt seems genuinely unfazed about taking on new endeavours.

While he still works full-time with a private security detail back in Auckland, he has recently moved his young



Inspecting Cobweb's hull



Before the Genesis: Matt on the planer shows how things were done manually using jigs, spacers, and shaping templates

family to nine neglected acres near the Matakana Coast. Here, restoring existing buildings, fences, and pastureland would be daunting for most, but for Matt, they are “just” future projects.

The real draw of the property, though, was the 12x8m former wool-sales shed. In this, he found the perfect space to house an industrial-scale CNC unit, with room enough to machine full-size sheets and stack materials without interfering with other workstations or workflows.

Visions of upscaling

Before the Genesis arrived, most of Matt’s spare time was taken up on the tools: hand drawing and laminating, shaping with a bandsaw and planer, and finishing up with the spokeshave.



Workstations and the space to grow the Debono business

Eventually, demand caught up with him; there are only so many hours in a day, and he could see no viable business future in that way of working. He acknowledges that, “Even in my six-by-six double garage at our last place, I knew I needed to move to CNC. Right up to the time that I was about to buy the machine, I was constantly coming up with templates, jigs, and ways to help make things faster. But at that stage, my brand was not quite out there, so I was cautious, because it was a sizable investment into the business.”

While the CNC machine will take care of most of the manual shaping processes, reducing his build times by at least 10 hours per gun – a major point of difference in a Debono gun is in the ►



Sharpshooter: Matt checking a new gun



Recoil, balance, and rigidity

For Matt, his guns not only have to look right; they have to perform well. Particularly when you are bagging Marlin or 30-plus-kilo kings. He reckons that there are many advantages to owning a wooden speargun; the most obvious one is the density of the stock. “The density adds recoil absorption, which helps with directional accuracy,” he explains. “Out of the water, carbon tube guns are lighter to pick up, whereas a heavier wooden gun will always float in the water prior to ballasting.” Matt’s system of calibration may be unsophisticated (see following), but by adding lead ballast to his stocks, he says, “You end up having this perfect balance in the water, basically neutrally buoyant, a little bit heavy at the front, so it settles. Carbon or aluminium guns often sink despite being light out of the water. Guys come to me because they’re getting a sore wrist because their guns are heavy in the water, particularly near the front; setting them up with a wooden one makes all the difference.”

Debono guns use a carbon-fibre laminate construction. By bonding timber with carbon, Matt can reduce the bulk to create a sleek product that uses a much lower volume of material, mitigates timber

movement, and ensures rigidity and dimensional stability.

“The key to laminating a full timber gun is to run laminates with opposing grains, so they’re all fighting each other. That will work absolutely fine, but by adding the carbon and applying the same technique, it just hits another level of effectiveness; it cannot possibly move. The more basic models I made do not have the carbon, and they are still fine because they are laminated with opposing grains, but compared to the carbon shafts, they look really rudimentary now,” he says.

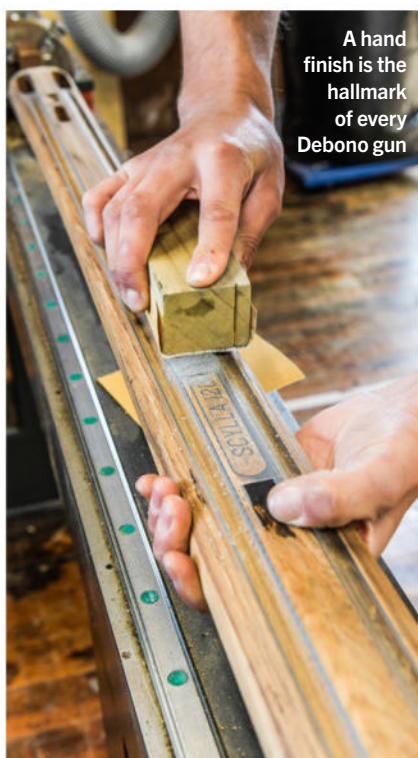
When it comes to shaping, Matt admits that some design lines have been governed by the profiles of his different tool heads. His MO for any gun is to first remove 3mm of height (i.e., from top and bottom, combined) from the original surface of the blank to clean up the lamination and check for faults in the bond. Chamfering the edges at a 15-degree angle reduces mass, streamlines the aesthetic, and improves hydrodynamic performance. A critical consideration for any spearo is how well the gun tracks through the water. Matt says, “A lot of wooden spearguns have a kind of rectangular look and are clunky in that regard.”



Matt stripping out Cobweb's hull



Restoration of Cobweb's hull well under way



A hand finish is the hallmark of every Debono gun

finish, which still requires the human hand and the kind of finer touches that Matt learned on-the-job during his yacht restoration.

Caught in a cobweb

Matt first caught sight of his yacht *Cobweb* during his decade-long service in the army.

It looked ideal for taking the family sailing. Before purchase, he did some due diligence and had a marine survey done. Matt recalls, "They were going around looking for rot with a hammer, tapping and listening for tone changes. Tap, tap, tap, then there's a tone change; they keep tapping and said, 'Look, you've got about a square metre of hull to replace.' I thought, *OK, the boat goes fine, and surely, I can replace 1m of timber.* We brought the thing, but it

turned out that that 1m was the good part! It ended up being 16m² of rot and all of the framework underneath."

Undeterred, he started buying up tools and machines for the job – a bandsaw, thicknesser plus planer, and a how-to manual – and slowly began structurally rebuilding the yacht. He says, "My father Pete is handy, so, you know, a lot of that rubbed off on me. I figure it is just reductionism; everything is a sum of its parts. So even though a boat has minimal straight lines, I looked at the hull and the ribs of it; it is made up of straight timber strips, and they are just formed to shape. Once you break things down, everything is relatively easy."

Miracle in a woodshed

There was one further snag to overcome before he could properly



Matt on the Genesis setting coordinates for tooling a new spear blank

**“She took
me into the
workshop.
Wow! It had
everything”**

start refurbishing the boat: sourcing suitable timber, “Three skins of six mil’ kauri.” He struck gold when an army buddy introduced Matt to his neighbour, a widow of a woodworker, who was looking to downsize. Before she could move house, she needed to offload her late husband’s stock of salvaged native timbers. Matt remembers, “She took me into the workshop. Wow! It had everything. I bought all she had. She was happy, and we became friends. I sold off the stuff I didn’t need, like tawa flooring, which pretty much paid for everything. Most of the kauri was tongue and groove, so I had to re-saw it through the bandsaw, but we got there.”

Start-up, stop. Start again

About the time that the hull took shape again, Matt quit the army to join a short-lived start-up as an employee.

When that company failed, he was left jobless, but having already made several successful spearguns for himself while working on the yacht, he thought, “Well, I really enjoyed building the boat, and I like making spearguns; I’ve got the gear – everything that I would need for a start-up – so that kicked me off.”

When he began, he says he had no design skills and was operating from intuition rather than a blueprint. If he had an idea, he would simply get a piece of pine and “run it through”, trying a few different shapes until he settled on one that ticked all the functional boxes too. “I built a couple for myself; initially they were clunky, so I brought carbon in to reduce the mass,” he says. “If I could have drawn them first like I can do now, then I would have done it that way.” ►

Keeping buoyed

Despite working hard to hone his processes, Matt can still be found waist-deep in the tide at his local beach, checking the buoyancy of his latest batch of guns. To date, he has been rigging up each gun up in a more-or-less completed state. “They always float, which is the aim; you want them to float, so that you can add ballast to get the balance perfect,” he explains.

He hangs bags of lead from the front and the back of the speargun to establish equilibrium. From there, he casts the necessary lead into slugs and slots them inside the body of the speargun before capping the timber off for a seamless finish.

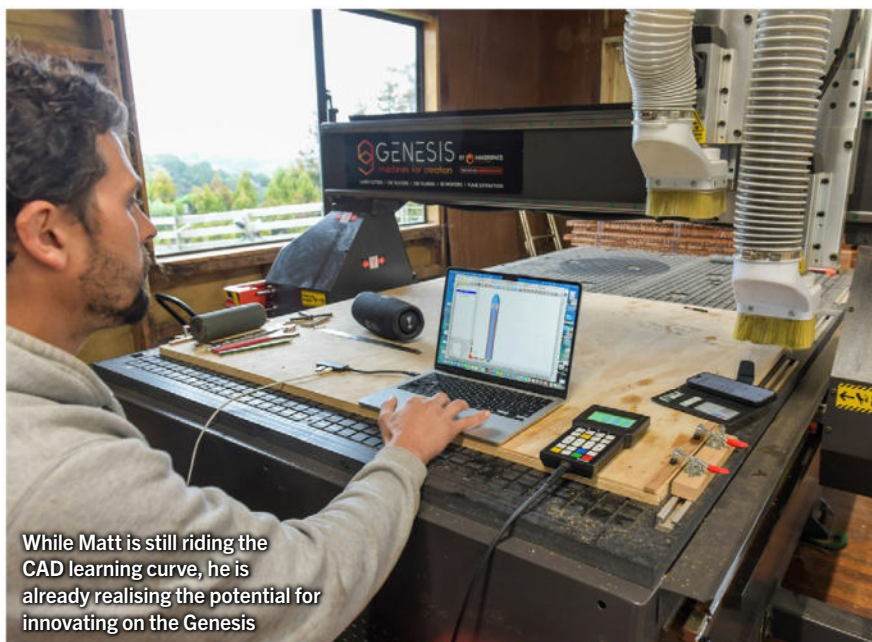
Matt admits, “When I started doing this, I naively thought that if I am making 10 identical spearguns, I could ballast one and then replicate that. But every piece of timber is different. There was one instance where I had two identical spearguns; one didn’t need any lead at all, the other needed 100g. Ballasting takes a bit of time: going down to the beach with a bag of



A lead slug ballast beside the cavity housing to complete the buoyancy calibration

lead and some rubber bands, balancing them, and making sure you note everything correctly, because you don’t want to put the wrong weight in the wrong gun. It is one of the few things I need to do faster. I am building a tank for the workshop, so I can just do it all here, instead of driving to the beach and wading out into the water, then having to disassemble and wash everything down before finishing them.”





While Matt is still riding the CAD learning curve, he is already realising the potential for innovating on the Genesis



The last of 20-plus 'events' on the Genesis will reveal the name badge

Computer Numerical Control

When the Genesis CNC machine first landed, Matt was in no hurry to start it up. "It sat here for three months before I turned the darn thing on – I was working out what I was going to do with it, how much I'd have to learn, know, and how much I'd have to outsource," he says.

His original plan was to contract out the computer work, but it soon became obvious that he needed to manage it in-house to avoid back-and-forth tweaks with third-party machinists. Another exponential learning curve, a crash course in computer-aided design (CAD) ensued.

Fortunately, a friend, Mark – a Kiwi product designer living in the UK – drew up two of the Debono speargun models in CAD to get Matt kick-started. From there, Matt taught himself how to manipulate and tweak the drawings in CAD to the point where he could recreate them.

Getting a handle on the CNC machine's control systems requires a whole new area of expertise. At the time of writing, Matt had recently completed tooling trials by running pine and macrocarpa blanks through the CNC, pushing its parameters and cataloguing all the tool files. He is currently embarking on his first batch of CNC-produced guns. He says, "I've learned what I need to learn to grow; now I can produce and finish them, then get to a new space, which is learning more about design. CAD is a language; if you don't speak it, you will lose it."

In-house innovations

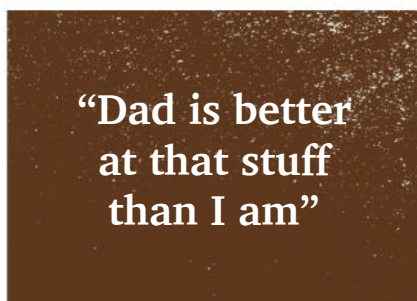
From day one, Matt's speargun-making MO has been to review existing parts and accessories to see how they can be modified and bettered for use in Debono guns.

If he found fault in available products, he would sketch-up tweaks and variations and get his dad, Pete, to render digital drawings of his concepts so that they could be sent to fabricators. Matt confesses, "I'm not tech-savvy at all. Dad is better at that stuff than I am. He's pretty happy now because he doesn't have to do that any more; I can draw up things for him!"

Matt might only be four months into his new workflow, but he is already busy



A fresh set of laminated blanks awaits shaping on the Genesis



Branding badges

planning and rendering new products in CAD to prototype on his Genesis. He is currently playing with packaging concepts, cutting negatives for the reel and the shafts from high-density foam, and creating a plywood travel box to add to the brand experience. More important, he is finalising new-look safety mechanisms that he would like to produce in the near future.

Next project off the ranks will be

Debono solid carbon-fibre reels with in-house production in mind. "I will do the prototype here and weigh up if it is going to be cost-effective to produce them too. Before this machine arrived, I wasn't doing any of this design work. It sat here, and about three months ago, I thought, *Wow, summer is creeping up, and I'm not going to have any stock* – that's when I got serious about using it. I really didn't think it would be able ►



The fourth axis in action



To finish

As important as it is to get the lamination right at the beginning of the process, it's also important to take time with the finishing.

Both are done by hand. For the latter, Matt begins sanding with 60-grit, sometimes even 40, and works down from there. The muzzles are all sanded to shape by eye. From 120-grit to 240, it's then on to scouring pads for a fine finish before oiling begins. He explains: "A lot of people use varnishes or epoxy hard coatings. They look great initially, until you get a crack and water gets under it. A customer can never get that finish back. With oil, they can. I use Burmese Teak, the same stuff they use on yacht decks. It is really expensive stuff; it's super waxy and water-resistant. So, you don't even need to oil these, and they'll be fine. The oil finish may fade quicker than a hard finish, but all it takes is an hour of someone's time to disassemble it, give it a quick sand and re-oil. It will look brand new again. It's easier for everyone."



Matt on the CNC rotary axis

He says, “I have a three-axis CNC machine with an attached rotary axis. The three axes define the tool’s placement in Cartesian space on three planes: forward (Y), sideways (X), and up/down (Z). The rotary axis is effectively a fourth axis, which moves the work relative to the tool, as opposed to the other three axes, which move the tool relative to the work.

“Without the rotary axis, I’d have to interface with the machine more often by flipping blanks around and recalibrating. Self-centring chucks at both ends hold the speargun blank by the centre laminate, so I never have to align the centre or flip the work. This saves me time and reduces potential error inputs.

“The rotary axis can simply do the flips between indexed three-axis operations, or can work in unison with the other three-axis – continuous four-axis machining – which is the operation I use for the cleaning pass of the speargun when the last 1mm of skin is removed.”



The flip-side of a Debono

to do all this. The great thing is, I can see the machine freeing up time so I can focus on developing the business. It opens up the option to sell wholesale. With the narrow margins associated with wholesale, making them by hand is not a realistic option. The number of hours you put in for the money you get back, you might as well get a job.”

With a little help from his friends

Matt acknowledges another mate, Geoff at 3DWORX, who came through when it counted.

Geoff does custom CNC work and has been producing ‘Debono’ name badges for years. “He has been talking to me about these machines for a while,” Matt says. “He put me in touch with Marcus at Makerspace and was part of the process in helping me figure out what I needed. Geoff came out here on delivery day and got me started to the point where I could sort of snowball on my own. Just knowing there was a guy willing to talk

me through how to use it really gave me confidence. Marcus has been great too; he really took some time with me because I knew nothing about these machines. He basically customised something for my needs. I was the perfect worst customer for Marcus: all of these niche needs but no technical understanding of CNC machines; I commend his patience with me.”

Timeless timber

Wooden spearguns are a boutique market, so Matt foresees a large part of his job is in growing awareness of them. As well as selling to local ‘spearos’, Debono’s have already been exported to Europe, where wooden spearguns are more common, and to Australia and the US. He says that his designs are a fusion of Euro and American guns with a nod to old-school boat lines. “I sort of took a lot from classic boat history and tried to incorporate that into the guns,” he says. “I like to make something that will last, something that people will always want. Like a great T-shirt or jeans, you know, timeless.” 📄

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The seat and tank removed; the bike is slowly taking shape

RESTORING A 1952 AJS

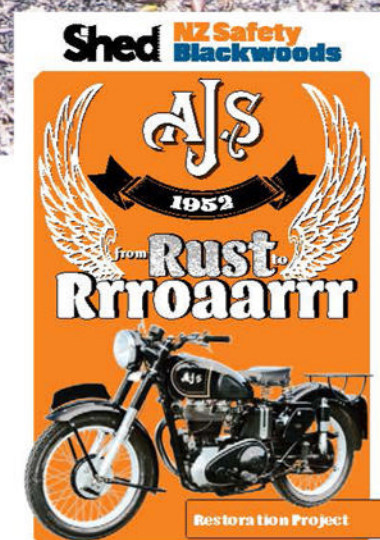
By Peter Barton | Photographs: Peter Barton

Part 12

In this issue, Peter laments some restoration errors. Installing some parts, he finds that before he did X, he should have done Y. Perhaps because many parts come from a variety of machines? Some dismantling and reassembly is now called for

It's been two years since I started writing these articles here in *The Shed* about my old 1952 AJS 'bitser' motorcycle; originally, I thought the whole project would take about one year.

There's no doubt that that would be true if I put 40-hour weeks into it, even allowing for the setbacks I have encountered. The latest problem I found, mentioned in my last instalment, was that I could not fit a new clutch cable



due to my incorrect (reversed) fitting of a couple of frame plates between the motor and the gearbox. At first sight, it looked as though I would have to dismantle the bike to swap them over.

Getting the order of assembly correct

Several times I have found myself having installed parts only to find that before I did X, I should have done Y.

The fact that my parts come from a variety of machines (and I can't much remember partial disassembly done 50 years ago) is a possible excuse in some cases, but really the problems come from me not thoroughly inspecting and measuring the bits, or analysing

the procedures beforehand; also not checking and questioning the assembly as I have proceeded. The clutch cable problem is a case of this, as was another issue that I discovered involving the clutch and its position relative to the rear chain.

The latter issue arose from poor positioning of the 'tinware' chain-guard that surrounds the primary chain; this chain links the engine crankshaft output to the clutch assembly, and theoretically its guard holds oil.

The rear part of the chain-guard should fit between the clutch and the gearbox output sprocket, but without touching either of them (the sprocket drives the main chain, delivering power to the rear wheel).

Darn, I missed that

Working around the clutch area, I saw that the gearbox sprocket, its chain, and the chain-guard were rubbing.

This was something I should have spotted much, much earlier – another snake in this game of snakes and ladders. The problem was caused by my using an incorrect spacer, slightly short, on an engine bolt. The clutch assembly, engine crankshaft sprocket, primary chain, and chain-guard all had to come off; the spacer corrected; then all bits reinstalled.

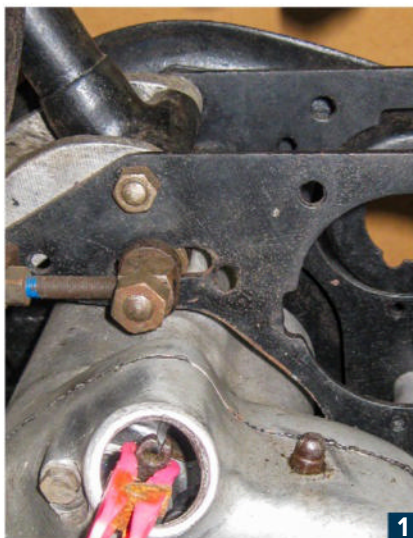
The clutch is held onto the gearbox shaft by a large nut, which is locked by a tab washer. To tighten the nut, I put the bike in gear, stood on the rear brake, and then used my primitive torque wrench.

I took the opportunity to secure the nut not only with a home-made tab washer whose tabs fold over the flats on the nut – the manufacturer's method – but also by the old technique of punching the thread, and also painting the thread with nail polish.

Why those differences?

Returning to the clutch-cable problem: I knew there were minor differences between the two frame plates I had, but I made the mistake of not asking why.

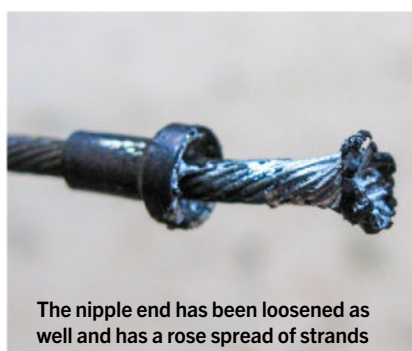
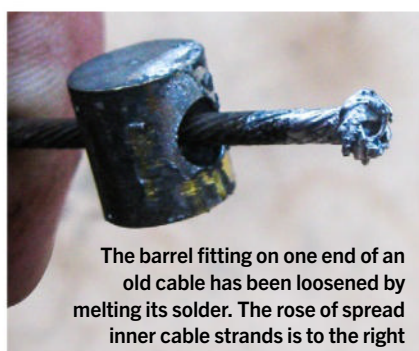
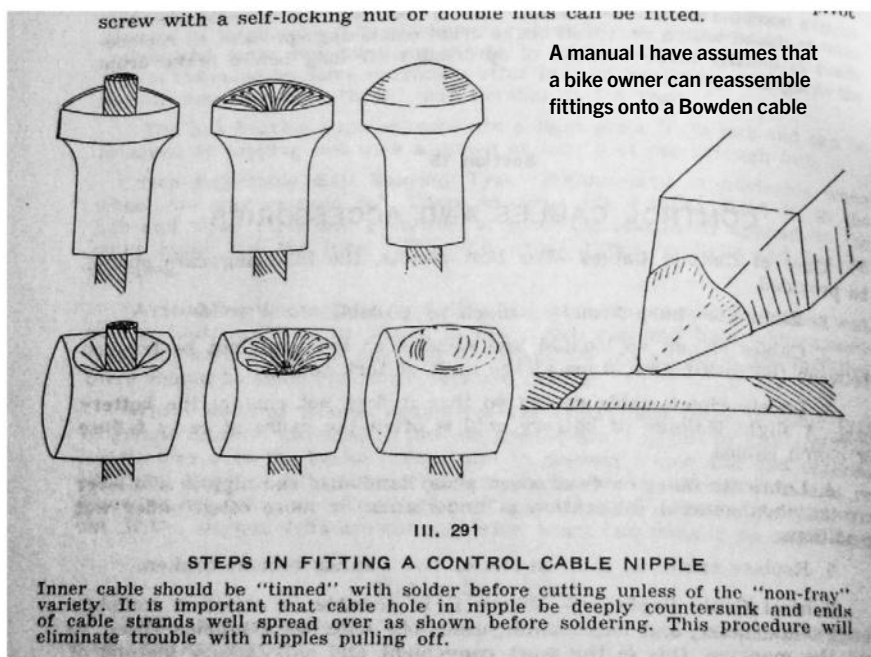
But after all, my parts list for 1952 AJS/Matchless bikes simply lists two frame plates, without distinguishing between left and right. It turns out that



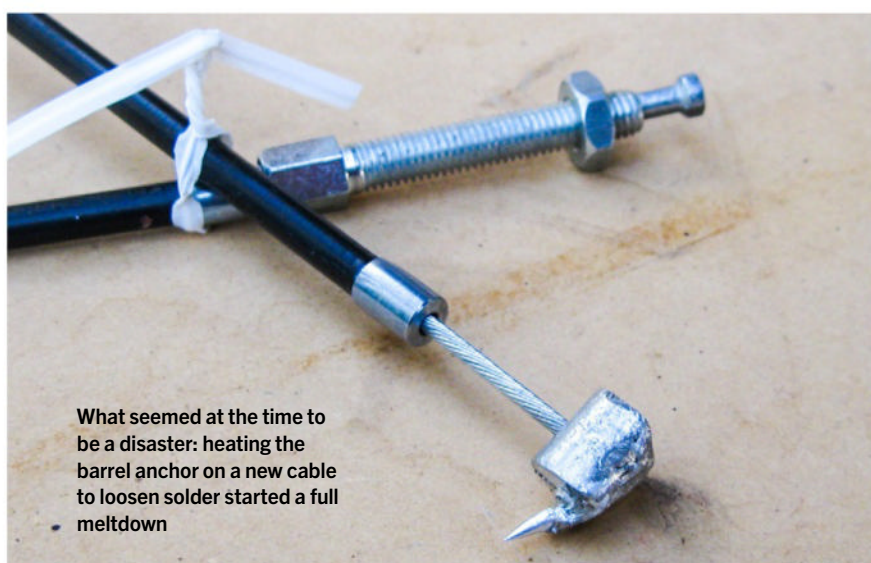
“It looked as though I would have to dismantle the bike to swap them over”



1. The frame plate problem: the clutch cable has to pass somehow through the black plates, and engage with the clutch lever held by a pink peg. 2 and 3. Melting solder to loosen Bowden cable fittings; a trial on a spare cable. 4. The driving sprocket for the rear chain is far too close to the primary chain-guard, the black shape on the left. 5. The clutch roller bearing assembly is always a pain to assemble, but grease will hold the loose rollers in place. 6. The clutch assembly, which fits on the splines, had to be removed before the chain-guard could be refitted



"This was something I should have spotted much, much earlier"



one plate has a hole large enough for the Bowden cable fittings (screw thread adjustment and nut) to pass through to the gearbox; the other does not.

The two plates may have come off two different bikes, as I can see in the manuals; another type of Burman gearbox has a different clutch cable arrangement. I had a 50/50 chance of accidentally getting the two plates arranged satisfactorily and unknowingly blew it. Barton's luck.

There were options for solving the problem without tearing the bike down. One was to reach in with a drill and make a hole large enough in the problem engine plate for the cable bits to go through. I didn't like that idea much – creating a weaker frame component – but it could have been plan B.

Plan A was to switch attention to the cable itself: remove one of the troublesome large fittings from either end, pass the cable through where it needs to go, and reattach the fitting. Way back, decades ago, my father fixed a Bowden cable on my push bike by unsoldering the nipple at one end, chopping off some frayed cable, and resoldering.

Bowden cable repair

One of my books, *Modern Motorcycle Mechanics* (JB Nicholson, Nicholson Brothers Motorcycles Ltd, Saskatoon, 6th edition, 1969, page 648), has a section dealing with Bowden cable repairs, and this supported my notion of plan A.

A web search for repairing Bowden cables yielded results as well. I had a spare old front brake cable and got started on practising with a burner and solder: the solder joint melted, and the fittings loosened, and therefore no problem.

If I removed the smaller clutch cable nipple (on the new cable) that goes inside the gearbox and didn't do a good enough job, it would be out of sight, inconvenient for any repair, and could also drop into the box. So I decided to remove the larger, cylindrical barrel



Above: Melting off the entire barrel anchor on the new Bowden cable. **Right:** The chopped end of the new cable is visible at the bottom; hammer, cold chisel, and vice also visible, and Sellotape to stop the inner cable from disappearing into the sheath

anchor on the other end of the cable, which fits into the clutch lever on the handlebars.

With a little heating, I got what seemed like a near disaster: the entire anchor piece – about 10mm in diameter and 10mm in length – started to melt. I investigated: my older practice cable had a brass fitting; my modern one had a lower-melting-point one of some kind of pot metal.

Maybe my neighbour has some

Out of curiosity, I checked my Mico metals catalogue; Mico carries 10mm round brass rod in stock, but only in 3.6m lengths. A bit more than I could use, but it meant my engineering neighbour may have had bits in his collection. I also found a website (bowdenzug24.com) selling all the various bits for Bowden cable work; no doubt there will be New Zealand dealers.

However, the old front brake cable anchor-piece was the correct size to fit into the handlebar clutch lever. I had loosened it – in my mentioned practising – and so I slid it off after cutting the cable just behind the old solder rose.

The best way to cut these cables is to use an anvil or the back of a vice frame, lay the cable on it, and smack it in the right place with a sharpened cold chisel and hammer. (The Crowood Press, in its brilliant series of workshop guides, has a title *Sharpening Common Workshop Tools*). It helps if the cable has been pre-tinned with solder around the cutting point. That way the strands in the cable are less likely to spread out: if the strands do fray out – as from trying to use a hacksaw or side cutters – then recutting will be needed.

I melted off the cylindrical anchor on the new cable and smacked off the remaining solder rose using the cold chisel. The anchor seemed to have at least some zinc in it, judging from a

small amount of oxide slag that looked yellowish when hot, then cooled to white.

I then used a little of this ‘zinc/solder’, and heat, to coat the end of the cable and secure the strands. A wrap of Sellotape stopped the cable-inner from disappearing into its outer sleeve, reducing the risk of strand-spreading if it had to be pushed back through.

Refitting the clutch cable

Time to fit the clutch cable through the wrongly, reverse-assembled frame plates and then put the threaded adjustment and small cable nipple into the gearbox.

A small worry is that the shortened cable may not now have enough slack to give a little free play in the clutch control, even with adjustment, but there is an adjusting nut on the clutch assembly that I thought at the time could be an offsetting help.

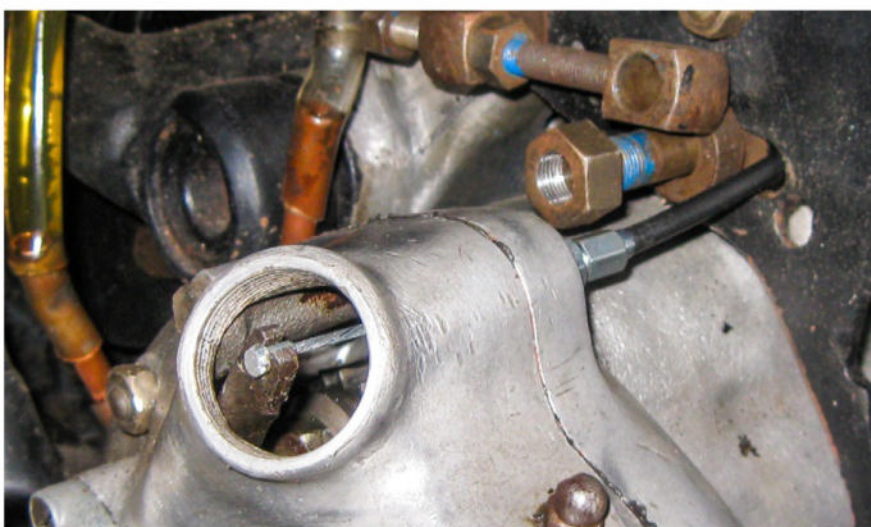
The nipple was a wee bit too big to get through the threaded hole in the



The clutch cable threaded through the small hole in the frame plate. The barrel anchor is to go up at the handlebar control lever. The pink peg holds the clutch lever



The cable adjuster screws into the gearbox shell: instead of the small hole in the frame plate, the cable goes through the adjustment slot for less kinking. Bowden fittings would still have had to be removed



This end of the cable is set to operate; the nipple engaged with the clutch lever

gearbox case, so it had to be filed down slightly. The primary chain adjustment bolts – which fix the gearbox into position – had to be undone and swung aside out of the way to get the cable adjustment lined up and screwed into the gearbox case without risk of cross-threading. Much faffing about and many comments about the bike's designer and my stupidity.

At this point I could finally fit the cable nipple onto the clutch lever within the box. An astute observer will note that the cable now actually goes through the slot for the gearbox positioning: this gives the cable less kinking – not easily seen in the photograph angles – and will only be an issue if I want to move the gearbox and loosen the primary chain, which is not likely, since it is maybe a bit loose anyway.

The other end of the Bowden cable is to go into the handlebar clutch lever, but of course it first had to have the barrel anchor reattached by soldering.

No pretty rose

I put a drill bit through the old anchor to clean up its hole, and re-countersunk it where the strands of the inner cable, once spread, were to go.

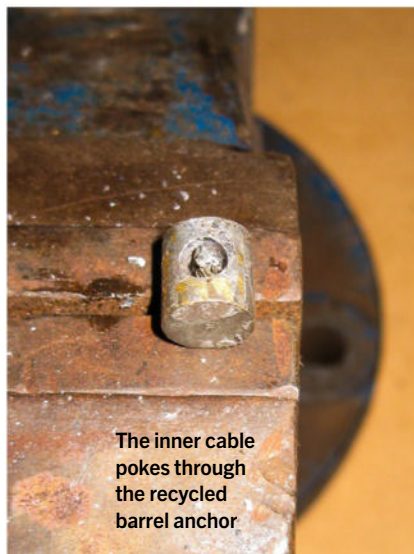
The cable-inner went through, then I chopped the previously soldered end of the cable – sharpened cold chisel again – to get free strands that I could spread into a rose. I made a hollow-point punch by drilling into the end of a bolt and used it for the spreading. I didn't get a very pretty rose but did spread the strands.

The inner cable got a degreasing dip, then was very gently heated in a distant part of a propane burner flame and plunged into some acid flux. I think it may be a mix of zinc chloride and hydrochloric acid; plumbing or copper flux, or resin-cored, aren't much good. Bad fumes.

It was important not to heat the cable too much, not much more than about 100°C to 200°C; any tempering had to be avoided.



Drilling into a bolt to make a 'hollow punch' for spreading cable strands



The inner cable pokes through the recycled barrel anchor



Not a very nice new rose, but the strands have been spread

“There were options for solving the problem without tearing the bike down”

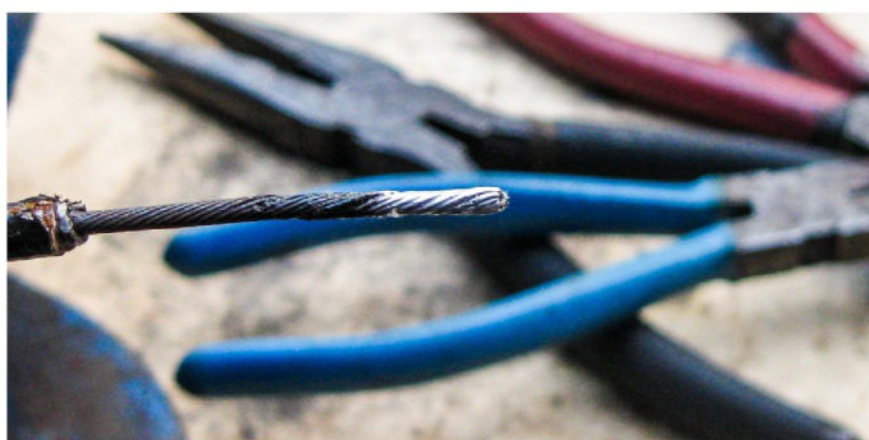
I repeated the fluxing a couple of times. The solder to use is 60:40 tin to lead, as it has a relatively low melting point, about 180°C. I heated until the flux bubbled slightly in a distant part of the flame, then applied the solder.

The solder soaked up – as in a wick – into the strands of the steel cable, to about 15mm in length; all good. So the cable end is tinned. The cable end was then fitted down into the countersunk hole, and final soldering applied.

A risky gambit

A small snake in the game appeared: now there was not enough play in the cable – not enough length difference between the Bowden cable inner and the outer sheath – to fit the cable into the handlebar lever.

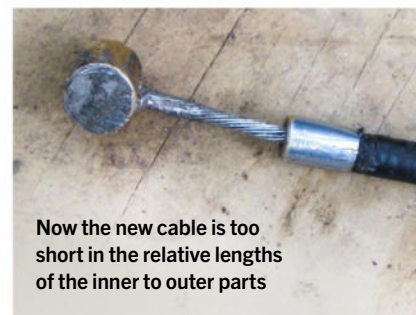
I didn't want to remove the barrel anchor I had just fitted; it would have



Practising tinning on the old Bowden cable: the acid flux and 60:40 solder perform well

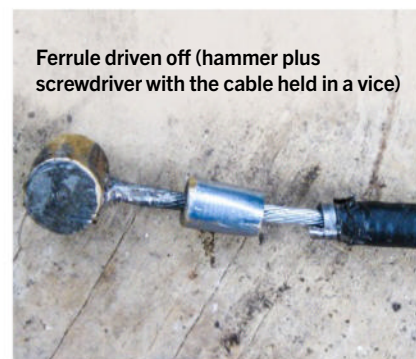


The anchor for the new cable soldered in place



Now the new cable is too short in the relative lengths of the inner to outer parts

meant even more inner cable shortening, so I decided to take a punt on a risky gambit: cut back the outer sheath while the inner was in place. Any slight damage to the strands of the inner was an absolute no-no. There is some clearance, diameter-wise, between the inner and the outer cable parts, and I have a Dremel-type tool – actually a



Ferrule driven off (hammer plus screwdriver with the cable held in a vice)

Ryobi – with tiny cutting blades, so it seemed a viable approach.

It went quite well: the ferrule tapped off, the plastic covering whittled off with a knife, the spring-steel outer sheath slowly cut away spiral by spiral, and the ferrule replaced. No marks on the inner, and the cable fitted to the control lever. The clutch system was now ready for adjustment; done.

I want brake lights

For safety's sake, I wanted brake lights that would operate from either or both of the front or rear brakes.

Early 1950s AMC bikes such as mine had no brake lights at all, but the Ay-Jay at some stage had a switch fitted to the rear brake rod. Nothing for the front. Jaycar stocks various microswitches that are SPDT (single pole, double throw) and have three contacts, meaning I could choose two of them. This could be wired into the circuit, so that when the control is pressed in, the switch is off (open), and when it is released, the switch is closed (on).

I mounted such a switch on the handlebar front brake control so that when the lever is pulled, the switch goes to On.

I didn't want to weaken the handlebar control pillar, so I avoided any drilling



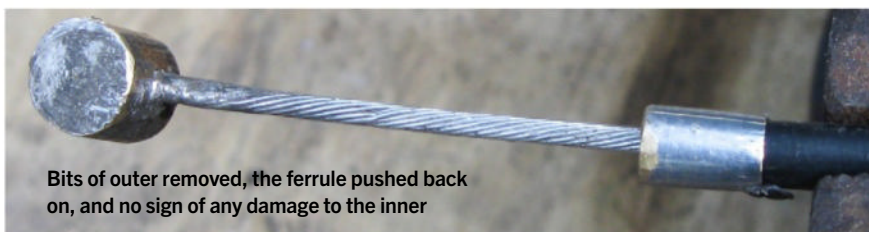
The outer plastic sheath whittled away



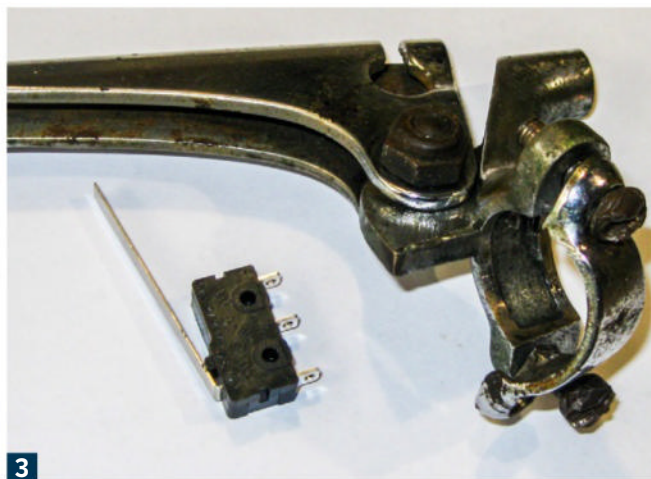
The spring steel spirals forming the outer cable very carefully cut away



Part-way through the cutting



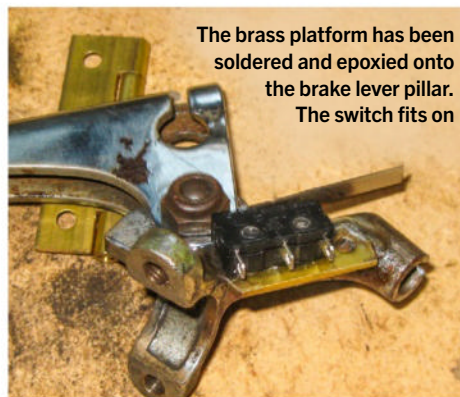
Bits of outer removed, the ferrule pushed back on, and no sign of any damage to the inner



1. The hand (front) brake lever; easier to fit a switch on this rather than down by the wheel. 2 and 3. An SPDT miniature switch from Jaycar easily handles 6V and milliamps of current for the brake light – positioned here with the hand lever



A brass hinge marked out (to cut) to provide material for the mounting platform



The brass platform has been soldered and epoxied onto the brake lever pillar. The switch fits on



Switch epoxied onto the brass platform

into it, and instead soldered and epoxied a brass platform – cut to shape from a brass hinge – onto the control pillar, which was luckily brass as well. I sanded off any chromium plate first with a flap disc on the angle grinder.

Fitting the switch

Next, I bolted the switch onto the platform, then painted nail polish onto the threads after double-nutting the wee bolts to stop any loosening from vibration.

I fitted a trigger, also made from the brass hinge, to the fulcrum bolt of the control, which rotates with the brake lever. A blob of solder on the brass trigger keeps it in position relative to the lever. It occurred to me that the tubular piece of the hinge, where the hinge pin once went through, could be threaded to allow adjustment; this was not done, though.

The whole arrangement sits on the underside of the handlebar, theoretically less exposed to the weather; we'll see. Some sort of soft rubber boot perhaps should go over it. The electric leads were soldered to the two outer tabs of the switch, and heat-shrink insulation fitted, which helped to make everything a bit more robust. The leads will then join the bike's main loom within the headlamp shell.

The hinged mudguard

The extension piece to the rear mudguard, which carries the rear light unit, and which I mentioned in my last



1

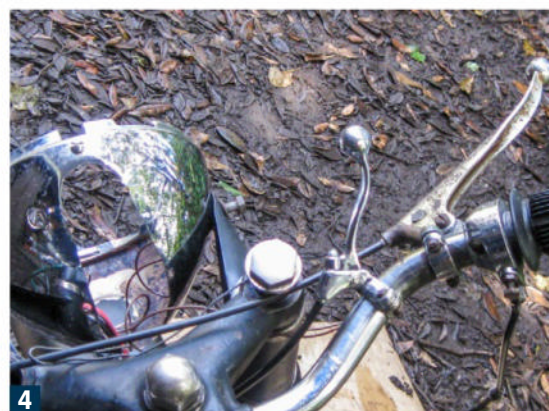


2

1. The switch is also bolted, double-nutted, and threads fingernail polished to give security; the switch lever is cut back, and another piece of brass hinge makes a trigger; blobs of solder lock the trigger in place relative to the handle. 2. Wiring soldered, and heat shrink insulation over the joints – this view is the underside of the handle



3



4

3. Remains of an old hinge ground off from the rear mudguard. 4. Finally attached; the switch wires can be seen in the headlamp shell

article, is being fitted to the mudguard.

The extension piece has to somehow swing out of the way before the rear wheel can be slid back out for puncture repair or tyre replacement. I had been told that some AMC extension bits like mine had a hinge, and others used a sliding type of tongue.

Armed with that information, I

could recognise that my mudguard had hinge remnants: I took them off with a grinder, so I could fit another hinge. The two mudguard parts will interfere with each other if they are swung too much, but there would be – I think – sufficient movement to allow for wheel removal. These bits of tinware need more work to make a nicer joint. ►

There should be two mudflaps of rolled-edge thin steel, bonded to each side of the extension piece, to match up with similar flaps on the main mudguard. I don't have such, and I don't have anything which can produce them. I hope my engineering neighbour has some, say, 3mm steel plate off-cuts that I can shape and then round off the edges to give that rolled-edge look. The little extra weight would be unimportant.

These two flaps should also bolt to a couple of handholds that, on my bike, had been ground back; I'll have to rebuild them.

Using what I have

I decided to use one of the rear-light and number-plate supporting units I already had on hand; it is definitely not original to the bike; maybe a reader can identify it, but it will serve the purpose.

In the long term, I may change it – make a smaller one – because at present it detracts from the nice little flare-back on the end of the mudguard. I feel that this would be especially important if I change the seat to a wee solo leather one, down low between the rear mudguard and petrol tank. Aesthetics, you know. Unused holes in the mudguard will need to be plugged, of course.

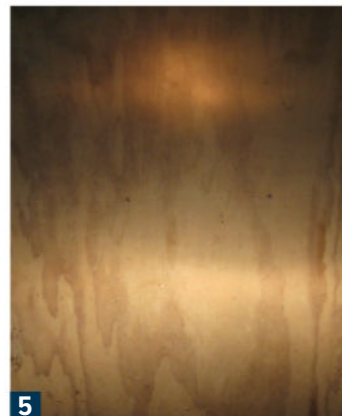
My work on the Bowden clutch cable made me feel bold enough to tackle an issue I have with speedometer cables. I have two such cables.

One has a long enough inner, but is missing a threaded fixture at one end. My other cable has the threaded fixtures at each end, but the inner is too short. Sometimes I feel like I've gone down a rabbit hole on this project, and there are loads of side tunnels.

How good is my high beam?

Before I remove – grind off – the headlight lens from its reflector, I thought it would be a good idea to compare its high beam with that from a car on low beam. Interesting result.

No apparent bad shape from the rusted portion of the reflector, but not



1 and 2. The tail lamp unit sits on the rear mudguard extension – I'm not happy with the diminished view of the rear flare of the mudguard; a tin can props the extension off the tyre – the hinged joint needs more work, and side flaps need to be fabricated for the extension.

3 and 4. Ongoing sub-project: one speedo cable has correct end fittings but an inner cable too short/broken off, and the other has a good inner but somehow an end fitting is missing; a ferrule screwing-off in the vice. 5. Ongoing electrical issues: the top spot from my bike's high beam, the lower spot from a dipped car headlight, onto a shed wall; can you see which one is better? Which battery has the better grunt?

much light either. But it seems definite that the battery needs charging, and I don't have a 6V charger. I intend to build one that will use the 12V output of the computer power supply, which I used for the nickel-plating. Then more comparisons. This is yet another side-tunnel rather than a snake.

The saddle and fuel tank are still off the machine, and I'm going to get

the electricals, including the loom, all properly sussed before the two items go back on. 🛠️

Coming up in Part 13

More electricals and speedo work, more back mudguard too. Hopefully, yet again, the seat and tank will go back on, and maybe a wee ride on the driveway?

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A MASTERPIECE HITS THE RAILS

MOTAT was gifted this Whanganui city tram back in 1967. Now, after decades of work and storage, its rebirth is complete. A remarkable product of love and persistence, the result can only be described as exquisite

By Chris Hegan | Photographs: Various

If this event had the air of a gala outing to the seaside, it is because, in a sense, that is what was being recreated.

When the big ribbon was cut in March of this year, MOTAT celebrated the end of one of its longest-running projects,

the restoration of the Wanganui Borough Corporation's tram trailer No 21, now reunited with and pulled by a vintage steam tram motor from the same home town. The track ran to Castlecliff, Whanganui's beach suburb, and the trailer's fully opening sides were no

doubt a part of the attraction of a tram ride to the seaside for Whanganui's last century citizenry.

The restoration is a remarkable product of love and persistence, and the result can only be described as exquisite. Every part of the tram, down to the



tinest detail, is perfectly finished, so much so that long-term project volunteer John Miller concedes that the trailer probably looks better now than it ever did during its working life.

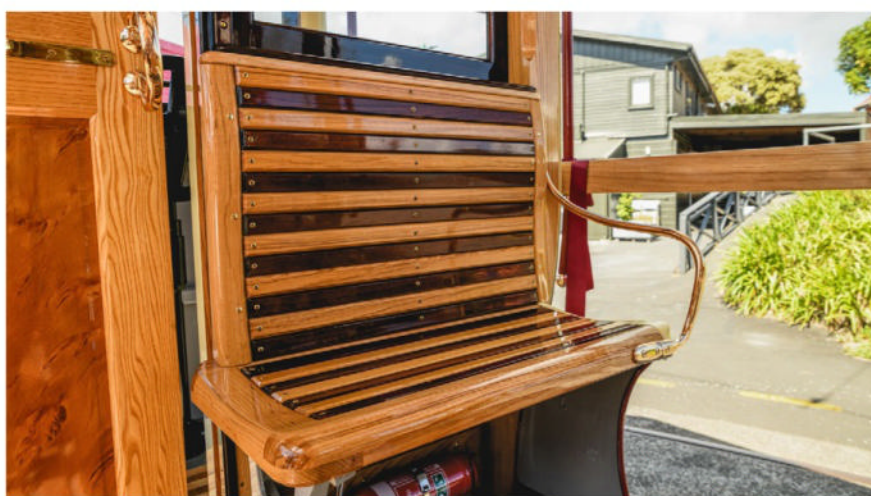
“When Boon & Co. made the trailer in Christchurch,” says John, “it was a commercial job with a budget and a deadline, and they wouldn’t have gone to the trouble that we have to make everything as good as it can possibly be.”

Focus on perfection

This attention to detail is the result of extreme patience, craftsmanship, and project head Leyton Chan and his team’s fanatical focus on perfection, even to the alignment of the screw-head slots with the wood grain.

It is the kind of finish you might expect on a very expensive yacht – no surprise that Leyton’s day job is as a design engineer in the boat-building business.

When the Whanganui trams were retired in 1950, a number of them ended up as makeshift baches at Turakina valley to the south of the city.



Facing page: Take us to the beach – conductor Josh Garratt punches tickets (photo: Jack Mensah)

Above top: Boon & Co. would be proud (photo: Leyton Chan)

Above: Perfect to the last detail (photo: Jack Mensah)

Right: In the beginning ... Leyton Chan, broom in hand, contemplates the job ahead (photo: Evan James)





No. 21 as a bach

Photo: I W Stewart



Taking delivery

Photo: I W Stewart



One trailer, flat-packed (photo: David Cawood)

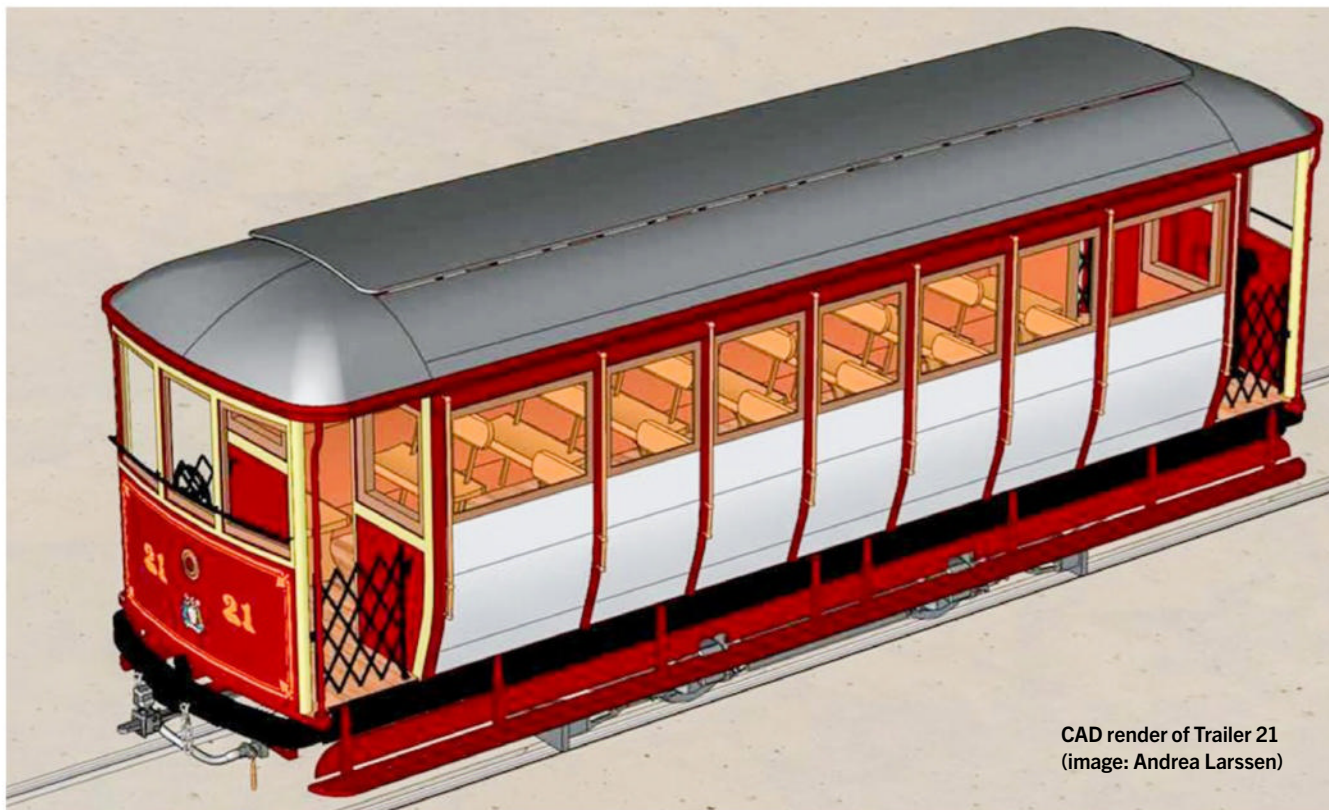
For reasons of economy and capacity, several of the tramway's conveyances were trailers pulled by powered trams. The absence of machinery made them ideal for baches. MOTAT was gifted two of these, Nos 10 and 21, in very tired condition in 1967, but work on No. 21 did not start until more than a decade later as a Temporary Employment Project (TEP) scheme.

With the TEP scheme coming to an end in 1981, the team carefully dismantled the trailer, to the point that it ended up packed on a spare tramway truck and put into storage. (Ironically, it was stored as a flat pack at the Sylvia Park site that now hosts IKEA.) First priority went to the restoration of the steam tram, a major project in itself, and it was not until 2011 that the physical restoration of the trailer got under way.

Years of planning

Leyton's involvement began earlier, starting with research in the late 2000s, then moving on to sorting and planning. CAD design is his bread and butter, but this was the first time an entire tram-car had been modelled to this detail.

"Every piece of wood in the trailer has been modelled," he says. "Every wedge for the wedged tenon and mortise joints."



CAD render of Trailer 21
(image: Andrea Larssen)

The work continued despite the constraints of lockdown – Leyton recalls being handed parts through the locked MOTAT gates. “The CAD model was my lockdown project.”

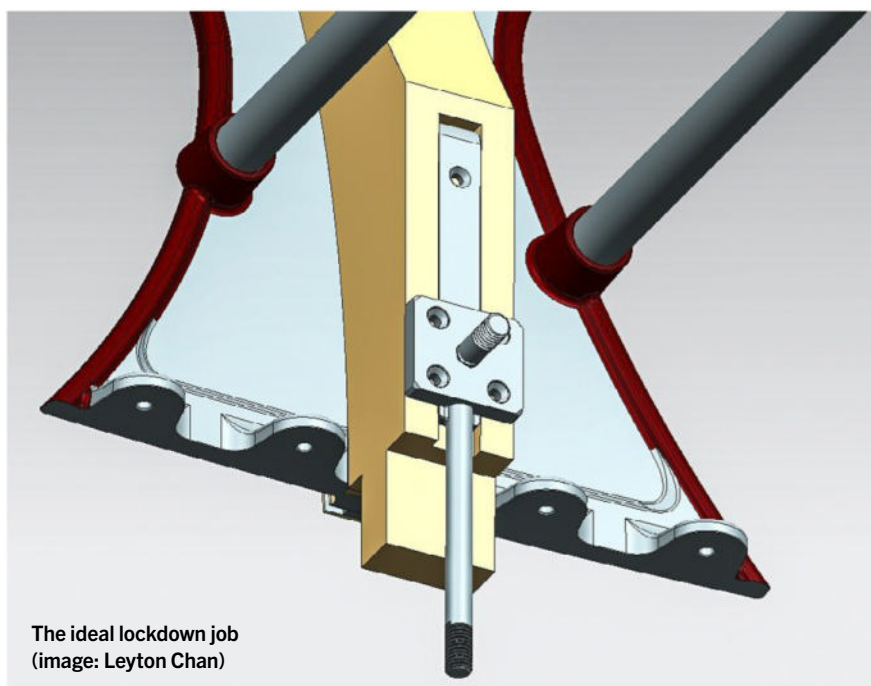
A trailer it may be, but it is far from a simple box with seats, having a remarkable number of moving parts. Every seat is next to a corrugated aluminium siding and a window, both of which slide up under the roof for the open-air experience when a safety rail along the sides drops into place. The seat-backs flip so that the passenger can always face forward.

The front and rear doors slide into bulkhead panels, and the trailer has mechanical brakes that can be operated on board. The safety gates at the entrances are concertina iron gratings. The trailer rides on a central four-wheeled truck, with long overhangs fore and aft, with adjustable truss-rods to the wooden chassis to correct the ends’ tendency to sag over time.

Missing parts

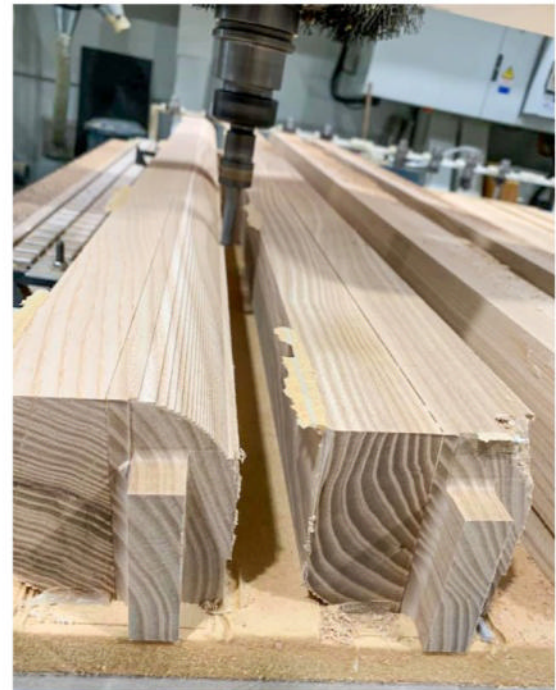
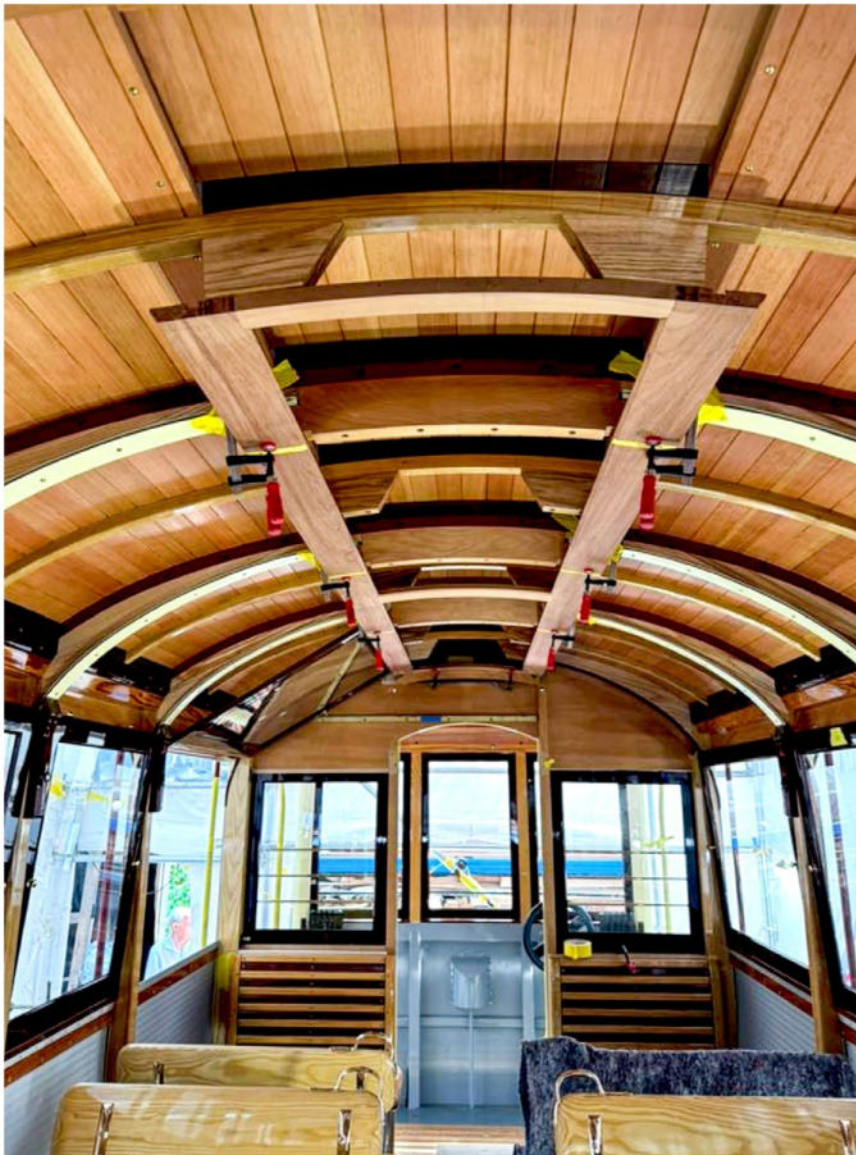
After its years beside the sea, many parts were missing, not always a show-stopper if there was one piece needing to be copied.

The surviving aluminium sidings were badly corroded from their long stay in



The ideal lockdown job
(image: Leyton Chan)

“A trailer it may be, but
it is far from a simple
box with seats”



Left: A curvy problem – fitting the ceiling frames (photo: Nick Shah)

Above: CNC machine cutting beam tenon ends (photo: Jackson Industries)

Below left: Not your everyday joinery job (photo: Nick Shah)



the sea air, but the Tramway Historical Society in Christchurch had made its own press for a similar restoration and supplied new ones. The parts picture was complicated by the long lay-by in various storage yards.

“Over the years,” says John, “people would find something odd and think, *That probably belongs to the tram trailer over there*, and they would chuck it in.” The team learned that if it could not figure out where some part fitted, it probably didn’t.

As with all MOTAT projects, much of the work has been done by volunteers, but the extent and complexity of the work necessitated hiring Leyton as project leader. Later, Nick Shah was brought on, initially to solve the problems of the roof, which curved in every direction and had fittings both above it and suspended below, creating complex joinery and sealing challenges demanding know-how and skill.

Nick is a production manager specialising in joinery and restoration/reconstructions, much of it with museums, including London’s Victoria & Albert Museum, possibly the best institution in the world for preservation

and restoration work. Support from the Jelas Foundation made it possible for Nick to stay full-time with the project until its conclusion, helping and training volunteers and keeping the coach workshop running.

Traditional tools called for

Although some of the timber has been formed using CNC, the technology has limitations and all the fine joinery has been done by hand, often using traditional tools such as the brace and bit for drilling big holes in hardwood. “Using a bit-brace gives you plenty of torque,” explains Leyton, “and you can completely control the pressure and speed.”

CNC cannot produce a clean enough surface for fine joinery and all timber including the joints was hand-finished. All timber visible in the trailer, whether machined or hand-cut, was hand-planed and hand-sanded before finishing.

Every detail, every surface of Trailer 21 has its story. The original maker, Boon & Co. of Christchurch, was a coachbuilder, inheritor of a craft developed over centuries of making horse-drawn vehicles intended to look as fine as possible and expected to endure decades of travel over unpaved roads, all done with hand tools and glue made from horses’ hooves. Reproducing this work called for a combination of experience and invention.

Clever thinking

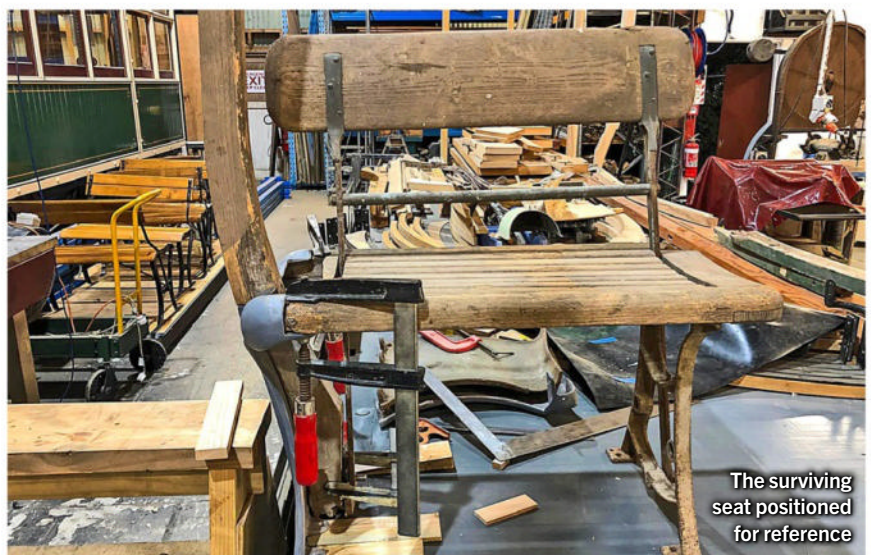
To take just one example, it fell to John Miller to fit the seat-backs into the cast U-shaped ends of the long pendulum hinges that enable the seats to flip to face either way.

The fittings were modelled in CAD by volunteers Tony Messenger and Andreas Larsson, 3D printed for a mould, and then cast in bronze. The wooden backs had not only to be rebated to snugly fit into both sides of the U, but the seat-backs also had to sit at right angles to the wall, parallel to the floor and forming a straight line down the six seats on either side. John first made a dummy out of waste wood and shaped it to a perfect fit. Then he had to make and fit 12 exact copies in the pieces of American ash that had already been

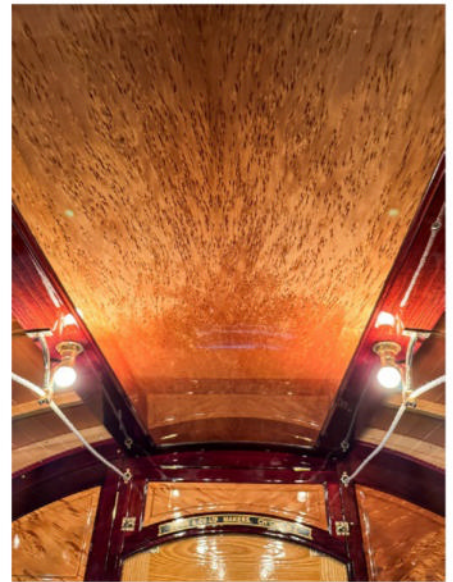


No tool like an old tool
— an American Stanley
10-inch brace and bit

“Then he had to make and fit
12 exact copies in the pieces of
American ash”



The surviving
seat positioned
for reference



Left: A perfect fit (photo: Jack Mensah). Right: Mottled kauri, American ash, red cedar (photo: Leyton Chan)

shaped and finished, leaving not even the slightest margin for error.

He also took on the fitting of the bowed pieces that secure the rails for the windows and sidings to slide up under the ceiling. The curve was not a perfect parabola and also subtly varied along the length of the trailer, so a template had to be scribed for each bow and the piece shaved and sanded to perfectly fit the roof, the iron rail, and the rebates, allowing for hidden bolt heads. No filling

gaps with bog here.

Fitting the new timber to the iron casting, it was vital to achieve a match within a 2mm tolerance. Any more and the windows fell out.

American ash is under attack

Each of the timbers used on the project also has a story.

Sadly, American ash is in abundant supply, as the race is on to cut it ahead of the depredations of the Asian emerald

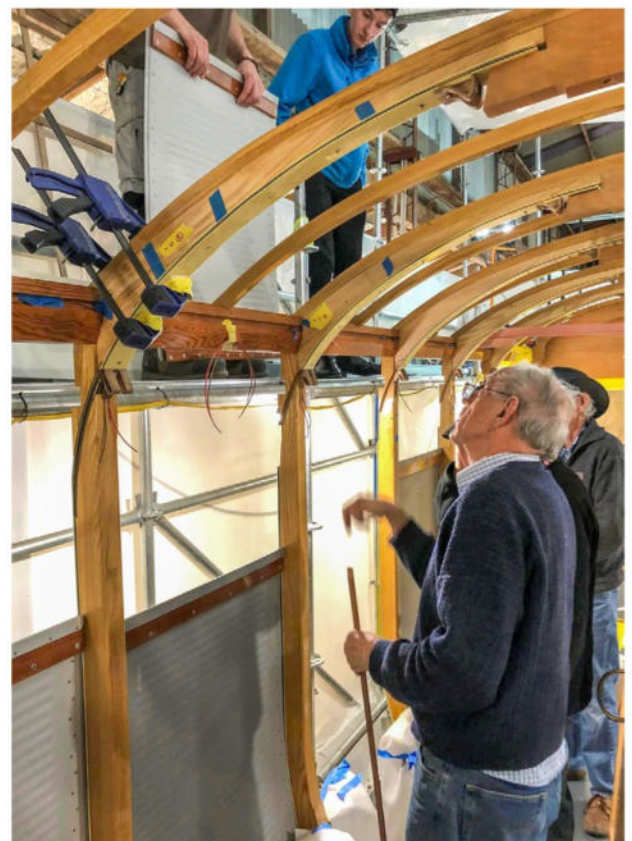
ash borer, a small beetle causing havoc to the species in the US.

At the other end of the supply spectrum, the pattern of the beautiful mottled kauri used on the ceiling and some of the panels is estimated to occur naturally in only one tree in 10,000.

One of the principal timbers used is Australian red cedar, all of it cut from a single log in Port Macquarie, with one exception – the passenger bell-push mountings. After the cedar had been



A joiner's nightmare (photo: Leyton Chan)



John Miller tests panel fit (photo: David Cawood)



sourced and delivered, the team was nonplussed to discover that the large tree in MOTAT's Victorian Village that had died in 2011 was in fact Australian red cedar. It had grown too quickly to be useful in most joinery, but it served for the bell-pushes. The white porcelain push-buttons were made specially for the project, as were many other parts, including the screws.

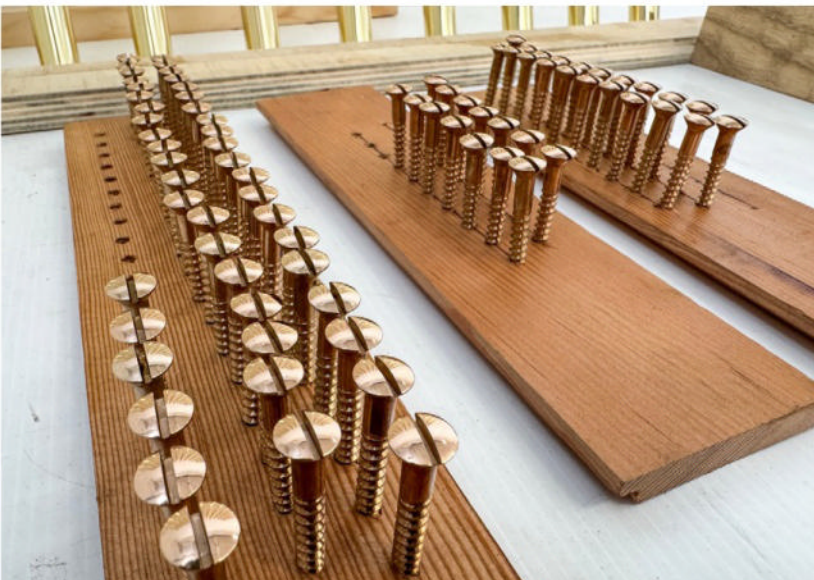
"Boon and Co. used square-drive oval-headed cut-thread brass screws in some



Above: Mottled kauri bulkhead quarters before clear coating (photo: Nick Shah)

Right: Home-grown cedar and a custom-made button (photo: Chris Hegan)

Below: Oval-headed cut-thread bronze screws mounted for buffing and lacquering (photo: Leyton Chan)



Serendipity Helps

Apart from devotion, skill, and perseverance, a project like this relies on a certain amount of luck.

One such instance resulted in the proud display of the historically correct Wanganui Borough Council coat of arms, thanks to a gentleman called Graham Stewart who travelled around the country in the 1950s visiting tramways and, showing considerable foresight, collected from council paint shops copies of their coats of arms – no whizzy logos in those austere times. Thanks to the late Mr Stewart, No. 21 sports its pristine coat of arms along with its authentic and complete colour scheme.

The trailer arrived at MOTAT with three of its four concertina safety gates. Reproducing a fourth would have been difficult and expensive, but luck intervened again when Leyton spotted an identical gate for sale on Trade Me, and it was quickly snapped up. No surprise: the seller was from Turakina.

Above: Wanganui Borough Council coat of arms (photo: David Cawood)

Below: Archivist and tramway historian Graham Stewart (photo: Graham Stewart Collection)





Left: Once bitten ... Pre-priming monitor roof canvas (photo: Nick Shah). Right: Casting, with plastic mould and new end-piece (photo: David Cawood)

places, which were unavailable and we had to get specially made in Taiwan. They have cut threads, which we still use in boat-building,” explains Leyton. “Rolled thread screws have shanks smaller than their threads, which means the clearance hole to install them has to be larger. This leaves the shank loose in the hole, potentially letting water in.”

Every one of hundreds of screws –

most windows took 24 screws and others more than 30 – was hand-buffed and lacquered, every hole in the beadings hand-drilled and countersunk.

Cast-iron seat supports

More inventiveness and technology were brought to bear on the problem of one of the curvy cast-iron seat supports, which had an end missing, presumably cut off

to make room for something during its bach days.

Andreas made a 3D scan of an intact support, then slightly enlarged it to allow for contraction of the metal as it cooled after casting. He then 3D-printed a new end section that was cast in a foundry and welded in place so successfully that it is indistinguishable from the others.



A trailer for all weathers (photo: Jack Mensah)

Of course, there were hiccups along the way. One frightening moment occurred when the first coat of the special two-pot Marine Shield paint was applied to the canvas roof, a sheet of 12-ounce cotton duck imported from England at a cost of £800 because they could not source a single piece wide enough locally. Ironically, that piece of fabric cost more than the £500 originally paid to Boon & Co. for the whole trailer body – they have the transaction’s documentation, including, luckily, a hand-drawn original design.

The paint, an isocyanate paint too toxic to be applied by volunteers and requiring Nick to wear full PPE, was applied in the rigged-up paint tent. After applying the first coat, Nick returned the next day to discover the expensive canvas in a mass of wrinkles caused by a gas generated by interaction with the acrylic mesh underlay. Fortunately, the fabric survived immediate removal and stretching, and with the acrylic

replaced by light cotton, 40 thin coats were rolled on without problems.

After that harrowing lesson, the canvas for the monitor roof that sits on top of the main roof was stretched and primed before being deployed.

The stunning result

All this craft and loving attention mean that Trailer 21 is not only beautiful but also durable and can be expected to give decades of service, with plenty of opportunities for the

public to enjoy a ride.

The third Sunday of every month is a MOTAT LIVE day. Check the MOTAT website and social media to keep track of what will be operative on any given occasion, which can vary according to the weather, volunteer availability, and other factors. As an added bonus, the project was exhaustively recorded and photographed from the outset, and the entire record is available in Facebook Groups – search ‘Western Springs Tramway’. 📷

“Trailer 21 is not only beautiful but also durable and can be expected to give decades of service”



Nick and Leyton selecting timber (photo: Evan James)

Black DMM



By Sandy Ferguson | Photographs: Sandy Ferguson

BASIC ELECTRICAL PROBLEMS

WHY DOESN'T IT GO?

A registered electrician for most of his life, Sandy Ferguson offers some basic electrical info to readers and extols the virtues of owning a \$12 digital multimeter

Everything is electrical today – there is the voltage that runs things and the wires to get it there.

There was a recent *The Shed* magazine letter to the editor by a reader who had problems with his battery-driven tool. The problem was the chargers weren't working. A tool, a digital multimeter, which costs only a few dollars to purchase, would have quickly pointed him in the right direction. They are available for less than \$12, probably with a manufacturer's label, Protech or Crowman. Exactly the same meter with

a different label might be as much as \$40 from some shops.

A meter would have saved a lot of time

Does one need to know how to use and read such instruments accurately? No. In that *Shed* letter, if the writer had a meter, there would have been nothing to read from the chargers, so it would have been fairly obvious where the problem lay. Without a meter, buying unneeded items, such as extra batteries, could have been avoided.

As this article is for those who are not registered electricians, there are

some limits. If it runs on a supply lower than 50V, yes, you can work on it when powered up. If it is mains supplied, all work or fault-finding on the input side has to be done with it unplugged.

See the website here for what you can do legally – worksafe.govt.nz/managing-health-and-safety/consumers/safe-living-with-electricity/getting-electrical-work-done/doing-your-own-electrical-work/.

Some basics

When you have an issue, the questions are: Is the voltage supplied to the item OK (high enough), and is it able to get 'there'?

The 'unable to get there' is usually due to broken wiring or corroded contacts. Where replaceable batteries are involved, corroded contacts are always something to look for.

A crude way of looking at electricity is as a water tank with a tap. The tank

is the battery, the voltage supply. The tap is the ON/OFF. How much the tap is opened, and the pipe diameter, is the resistance limiting the flow, and the water falling from the tap is the current.

The higher the tank is from the ground, the higher the voltage.

A meter

Now to a measuring device.

An analogue multimeter has a dial with a pointer, and was what we all used to use back in the day. I still have my own and my mother's multimeters. She was using one for appliance servicing in the 1960s.

However, technology has moved on, and the meters used now are usually digital, telling you what things are with numbers displayed. Very accurate ... maybe. So besides knowing where to put the probes, it's also about understanding what the numbers displayed are actually saying.

Because this article is about using the cheapest meters, we'll look at what is shown. Where the voltage, resistance, and current ranges vary with some makes, and some expensive ones don't have ranges – they figure it out automatically. Just set them to what you want to know: the voltage, resistance, or current, and they sort out what range to best display.

Voltage and resistance – place the probes across the points to be measured.

Current, in series with a wire, rarely needs to be measured.

The DMM meter

The digital voltmeter (DVM), or DMM digital multimeter (DMM) – either term is commonly used, though DMM is technically more correct – usually has a large rotary knob. Usually, pointing up is OFF. One I often use, and looking the same as all the others, has an OFF/ON



Left: YF-370 multimeter. Right: Sandy's mother's meter, which he has personally used for decades



A couple of DMMs

switch below the rotary switch – just to be different.

There are commonly three sockets: (1) ground/negative, (2) voltage/resistance/low current, and (3) high current.

The odd – usually blue – socket with lots of holes is for transistor testing and for common simple use of the meter; it can be ignored.

Rotating the knob anticlockwise gets to the DC voltage range. Of these, the 20V and 2000mV (2V) ranges are the most commonly used. The most common items to be measured are batteries. ►

“As this article is for those who are not registered electricians, there are some limits”

>> Continued on p119



MODERN MUSCLE, VINTAGE STEEL

**Easter 2027 – Friday 26 – Sunday 28 March
– Cromwell Racecourse, Central Otago**

Cromwell Racecourse, venue for Central Otago Tracks & Wheels, Easter 2027, with the Pisa Range behind

There is something uniquely satisfying about a big piece of machinery doing what it was built to do.

The rumble of an old diesel, the hiss of steam, the clatter of steel tracks and the sheer power of modern earthmoving equipment all have a language of their own. At Easter 2027, that language will be heard loud and clear in Central Otago when Central Otago Tracks & Wheels – Modern Muscle, Vintage Steel takes over Cromwell Racecourse for three days of machinery, history, competition and family entertainment.

The event is the inaugural show from the Central Otago Wheels and Tracks Trust, and is set to become a regular fixture, being held every second Easter. The idea is simple: bring together the machinery of yesterday, today and tomorrow and put it to work in front of an audience.

Different but all the same

As MC and major sponsor Jono Robertson from JRLI explains, the event may have a new identity, but the connection with previous shows remains.

“New location, new name, but the same old favourites from past events will be there, from vintage to modern.”

This will be the first time the event is held at Cromwell Racecourse, a venue already well established as a host for events throughout the year. The scale of the show will make it a significant addition to the venue’s calendar.

“This will be the first time this event is held at this new venue, and it’s the biggest event ever held at Cromwell Racecourse, which hosts many events throughout the year,” says Robertson.

This is not simply a static display of polished machinery. Across the three days, visitors will see tractors, trucks,

steam engines, crawlers and modern earthmoving equipment working, competing and parading in a celebration of mechanical heritage and modern engineering.

World record muster attempt

One of the biggest challenges of the weekend will be the World Record Massey Muster.

The target to beat is 285 Massey machines. The muster is open to Massey Harris, Ferguson and Massey Ferguson tractors of any age and in any condition – provided they roll. Whether it is a beautifully restored example, a working tractor that has spent decades on the farm or a machine that has seen better days, it has a place in the line-up.

The official count takes place at 4.20 pm on Saturday and again on Sunday, giving Massey owners two opportunities to be part of the attempt.

Every tractor taking part will also receive a commemorative sticker, making participation part of the event's history. The Massey Muster is just one part of a weekend packed with moving machinery.

It's all here

The Grand Parade will take place twice daily, once in the morning and again in the afternoon.

This is where Central Otago Tracks & Wheels really brings everything together, with steam engines, vintage tractors, trucks and modern earthmoving gear forming one long procession of iron.

It is a chance to see machinery from very different eras sharing the same piece of ground. The contrast between vintage steel and modern muscle will be impossible to miss, from the slow, deliberate movement of a steam engine through to the power and precision of today's heavy equipment.

For those who like a little competition with their machinery, the Tractor Pull will provide plenty of action. Held on a 120-metre hillside track, tractors will take on the sled in a test of power, traction and determination.

The appeal of a tractor pull is its simplicity. Hook up, open the throttle and see how far you can get. Old machines and modern muscle will face the same challenge, providing an entertaining demonstration of just how much technology – and plenty of horsepower – has changed over the generations.

Purpose-built arena

While the vintage machinery will have plenty of opportunities to show what it can do, modern machinery will also be very much at home at the show.

The Working Earthmoving Arena will put today's excavators and earthmoving equipment to work in a purpose-built arena positioned right on the fence line. That means visitors won't simply be looking at modern diggers from behind a barrier – they will be able to see them working at close range.

For anyone who has ever stopped to watch an excavator operator working a bucket with millimetre precision,



Classic Baker Construction haulers and loaders in action



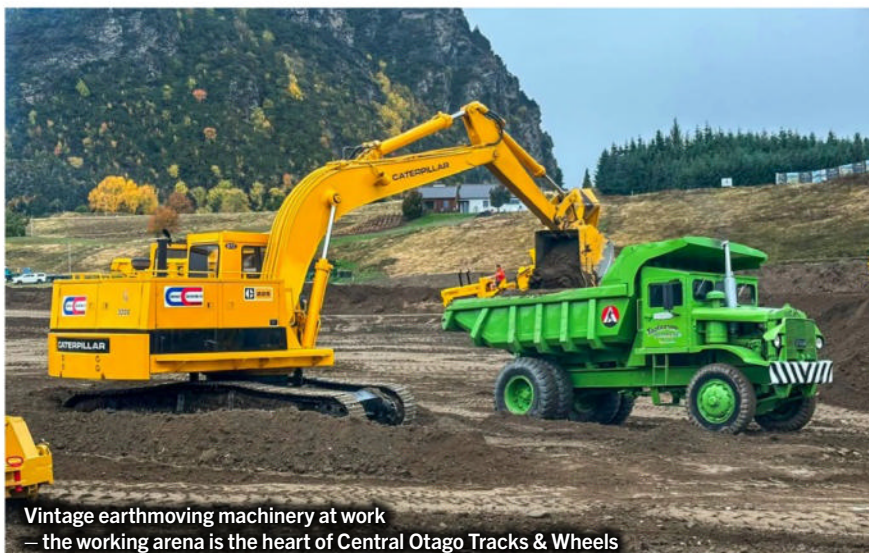
Restored classic trucks on the move in Central Otago



A Volvo F88 of M.W. Brensell, Tapanui – vintage trucks are a core part of the Tracks & Wheels line-up



A restored Massey Ferguson 135. Organisers want every Massey in the South Island at the world record muster, from concours restorations to the one in the back of the shed



Vintage earthmoving machinery at work – the working arena is the heart of Central Otago Tracks & Wheels



A restored Farmall A, one of the vintage tractors bound for Central Otago Tracks & Wheels



Restored Euclid crawlers of the kind that will work the Tracks & Wheels arena

this should be one of the weekend's highlights. The arena will demonstrate the capability, skill and sheer scale of modern earthmoving equipment.

Away from the main action, the event will provide plenty for machinery enthusiasts to explore. Vintage tractors, steel-wheel machines and crawlers will have their own paddock, creating a dedicated area where visitors can get up close to machinery that helped shape New Zealand agriculture and industry.

There's plenty of steam too

Steam engines will be in steam throughout the weekend, while stationary engines will provide another reminder of the mechanical ingenuity that once powered farms, workshops and businesses around the country.

Vintage trucks and transporters will add another dimension, while vintage farm bikes will bring a different type of nostalgia to the event. For many visitors, these machines will be just as familiar as the tractors and trucks, bringing back memories of machinery that was once an everyday part of rural life.

And then there are the Clydesdales.

Working Clydesdale demonstrations will show these magnificent horses doing the jobs they were traditionally bred and trained to perform. Their inclusion is a fitting part of a show that is ultimately about the changing relationship between people, machines, animals and the land.

A family event

Central Otago Tracks & Wheels is also designed to be a family event.

A giant sandpit loaded with toy

diggers will give younger visitors their own construction site to explore, while a dedicated kids and family zone will provide plenty of space for families to enjoy the weekend together.

Market and trade stalls will add another reason to wander around the site, while food trucks and coffee will keep everyone fueled for a full day of machinery action.

The newly named event is being run as a non-profit event, with the focus firmly on bringing enthusiasts, families, exhibitors and the wider community together for a weekend celebrating machinery.

"This newly named event is run as a non-profit event," Robertson says.

The Easter timing should make it an ideal opportunity for enthusiasts to make a weekend of it and head to Cromwell for three days of machinery, demonstrations and family entertainment.

For Central Otago, Cromwell Racecourse provides a fitting home for an event of this scale. The region has a strong connection with farming, transport, engineering and the practical machinery that keeps rural communities moving. Bringing all of those elements together at Easter creates an event that should appeal equally to serious machinery enthusiasts, families and anyone who simply enjoys seeing big machines in action.

The philosophy

The philosophy behind Central Otago Tracks & Wheels is perhaps best summed up by its title: Modern Muscle, Vintage Steel.

It celebrates where machinery has

come from while showcasing where it is today. It is about the owners who preserve old tractors and engines, the operators who work modern earthmoving equipment, and the families who keep these machines alive for another generation to discover.

Whether your passion is a Massey Ferguson, a steam engine, a vintage truck, a crawler, a classic farm bike or a brand-new excavator, Easter 2027 offers a reason to head for Cromwell.

And if you own a Massey Harris, Ferguson or Massey Ferguson, there is an even bigger reason to be there – 285 is the number to beat!

With the event now gearing up for Easter 2027, tickets are now on sale online, while machine entries and trade sites are also open.

For tickets, machine entries and trade site information, visit tracksandwheels.co.nz.



Scan the QR code for more information





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MORTISE AND TENON

A Cabinet Project

Part 2

By Edward Prince | Photographs: Edward Prince

Last issue, Edward explained how to make a mortise and tenon joint. Now it's time to put that knowledge into practice with this stylish cabinet project

The idea for this cabinet design was initially inspired by furniture from the English arts and crafts designs of the 1920s.

I intended to design a project that incorporated different types of mortise and tenon joints for both practical and aesthetic purposes. I hoped this design could have several uses depending on where you want to stop making. Ranging

from a side table to a fully enclosed cabinet with doors and a drawer, built to a size you want, a level of complexity suited to your ambition and using hand tools or machines.

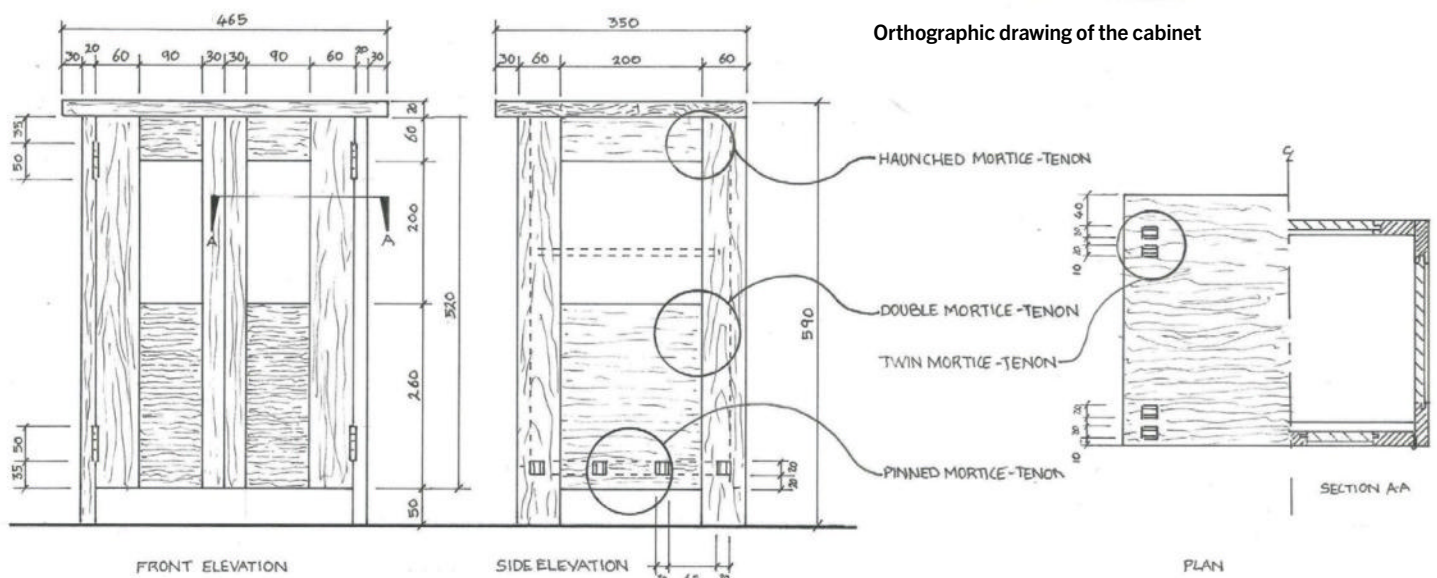
This project will challenge your skills, yet the design has the flexibility for it to be constructed in several ways. If you don't want to attempt the feature jointing or delve into the process of chopping out mortises and sawing tenons, use biscuits

or dowels instead. Just have fun with it.

Step 1: Prepare and machine the timber

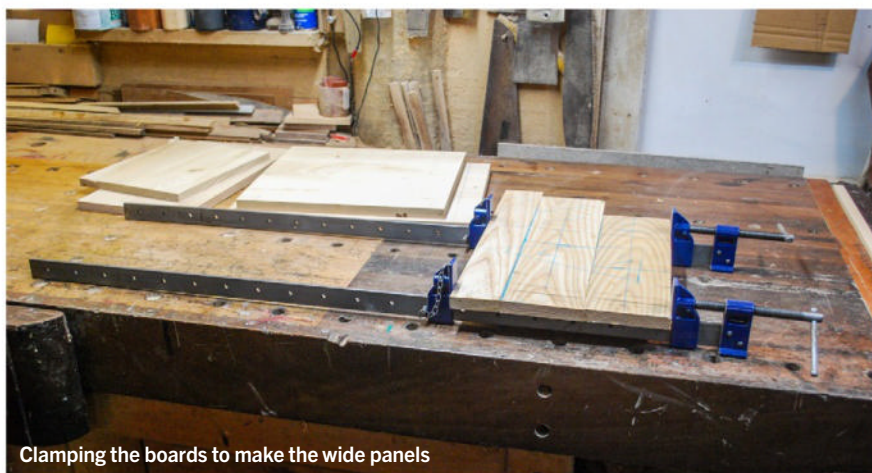
Decide what sort of timber you want to use, whether you want to use cheap pine, recycled wood, or go the full monty and splash out on some nice hardwoods.

Roughly plan the cutting out of your boards for efficiency, and ensure that the





Checking the edges are square



Clamping the boards to make the wide panels

“This early planning aims to have parts matched and cut from the same board if possible”



Finding the centre for scribing lines with the mortise gauge



Drilling the waste with a brace and bit



Planing the boards flat

grain patterns are balanced with straight grain or crown cuts. This early planning aims to have parts matched and cut from the same board if possible, so that colour is even on parts that are glued together.

Cut your boards to rough length and width. Use the buzz / surface planer to get a flat face and square edge, and then put everything through the thicknesser. Arrange the boards so the grain pattern looks good, and mark the face side, then plane the edges with a jack plane so that everything is perfectly square and machine marks are removed. Then, very importantly, mark the face edges on the inside edges.

Hand-plane out machine marks with a jack or try plane to keep the glue line invisible. You can use dowels or biscuits to join the wide panels, but if the edges are perfectly planed, it's not necessary, as the panels are short.

Glue your boards together with light clamping pressure and check that surfaces are flush. When the glue has cured, plane the panels flat and sand the faces to 180-grit paper.

Step 2: Make the side and door panel mortises

At this stage, it may help to reread the previous article in *The Shed* Issue No. 128 about making the mortise and tenon joint just to refresh your memory.



Sawing out the tenons with the back saw

Cut the cabinet side and door stiles and rails to length. Measure and mark the width of each part and transfer the marks around the rails and stiles. Set the mortise/marking gauge to the width of the mortise chisel (if you have one), or a standard bevel-edged chisel. Working from the face sides, scribe the joints with the mortise gauge.

Cut out all the mortises with a mallet and chisel, drill, router, or mortise machine. If you are brave enough to do this by hand, make sure the chiselling is completely perpendicular to the sides, or the final assembly will be twisted.

Clean out the mortise so that everything looks crisp on the inside.

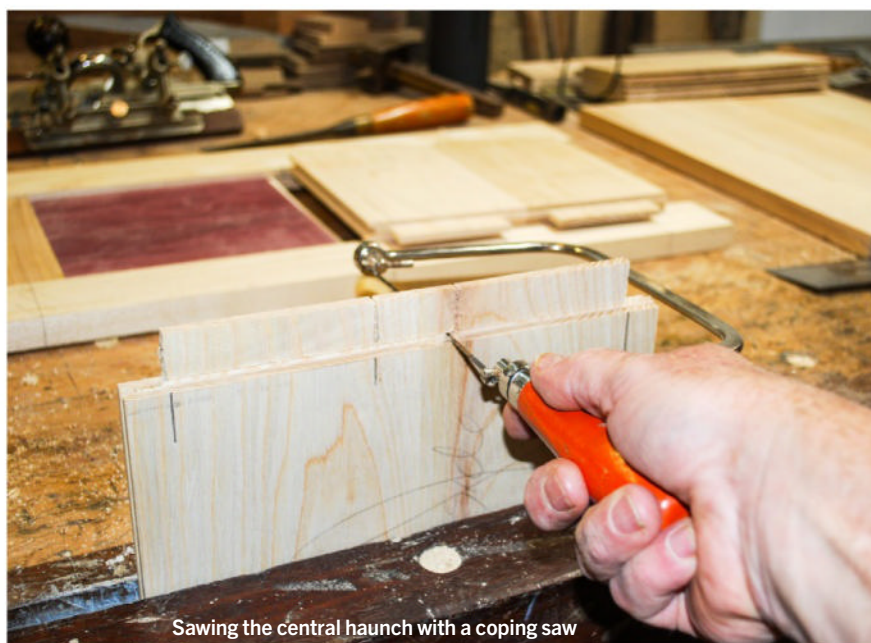
Step 3: Sawing the tenons

Saw off the tenon cheeks for the rails of the cabinet sides, the back, and the door frames either by hand using a tenon saw or by machine on a table saw / mitre saw. Remember the golden rule: Cut to the line, not through it, and you'll do fine.

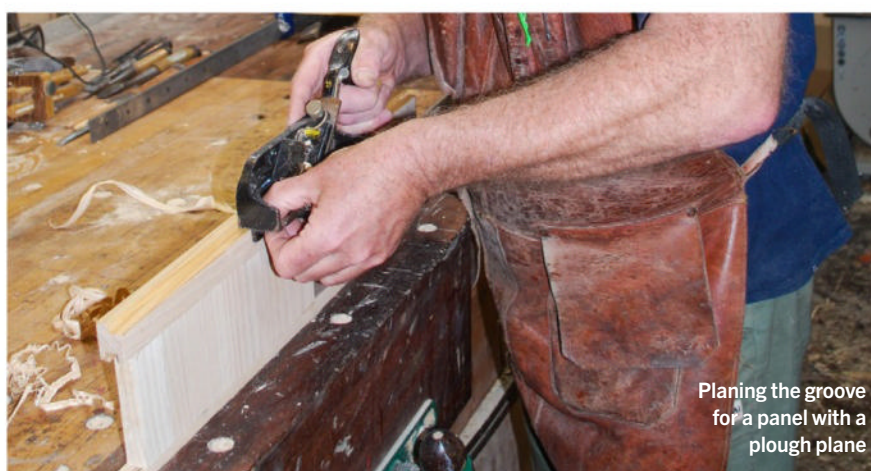
The bottom rail of the door panels uses a double tenon, so once the cheeks are cut, saw out the centre with a coping saw.

Step 4: Making the panels

To set the panels into the frames, you need to cut a groove on the inside edge



Sawing the central haunch with a coping saw



Planing the groove for a panel with a plough plane

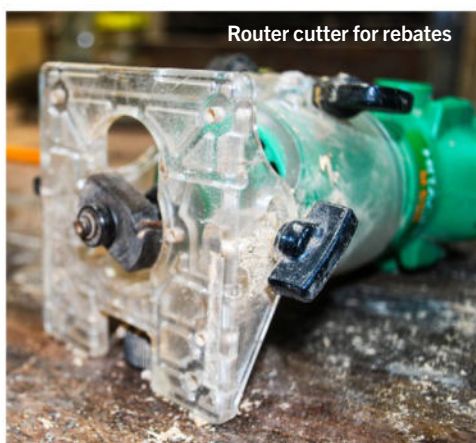


Decorative panel variations

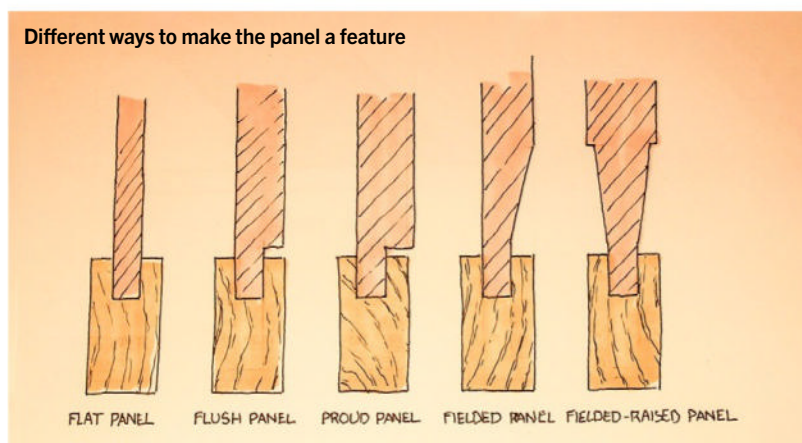
“A traditional fielded panel, a special piece of timber with a striking grain pattern or colour, a decorative veneered design.”



Routing the tongue on the centre panel



Router cutter for rebates



Different ways to make the panel a feature

of the stiles and rails.

This can be done in many ways; traditionally, a plough plane is used; alternatively, you can use a table saw or a router to make the grooves for the panels.

The panels are the perfect place to individualise the design. Some examples are shown here. A traditional fielded panel; a special piece of timber with a striking grain pattern or colour; a decorative veneered design.

There is nothing stopping you from incorporating carved panels, decorative pieces of glass, ceramic tiles, metalwork, fabric, woven cane; let your imagination run free.

To make the tongues on the panels that slot into the groove, either use a tongue on the panels or a cross-grain

loose tongue set into the panel. I used a tongue on the panel by setting up a router on a router table.

You can achieve the same result by using a rebate cutter in the router and making a tongue on the panels. Or cut the panels to the exact size, groove the edge on the table saw, and make a plywood tongue.

Step 5: Gluing up the panels

Before you apply glue to the sides, door, and back, do a dry run to make sure that everything fits and nothing is twisted or the wrong way around.

I use a good-quality waterproof aliphatic resin. Coat each face of the joints with a brush, then tap the parts together with a rubber/soft-faced mallet or a block of wood (to protect the



Gluing up the sides, back, and doors

surface) and a hammer.

Lay the clamps on your bench and clamp the parts with light holding pressure, not excessive force. I usually cover any metal edges with masking tape to avoid the glue causing rust marks because of the moisture in the glue. Make sure you check that the panels are square and especially check that they are flat – a twisted door is a nightmare to rectify. Then, rigorously scrub with a damp cloth to remove excess glue.

Step 6: Making the pinned mortises and tenons

Mark out, saw, and trim the tenons on the cabinet base and the tops of the side panels with a sharp chisel.

This is the time for you to be particularly careful with your marking out; check that marks are always working from the datum. Scribing everything with a sharp knife will help with accurately cutting the joints.

Mark out the mortises on the sides and on the top. Place the tenons that you have just cut to check for accuracy. Again, scribe the mortise lines with a sharp knife. Drill out the waste with a Forstner bit, which will make a clean hole, then carefully chisel the waste back to the lines, making sure that everything is square and crisp.

Step 7: Jointing for the back

Cut a rebate for the door and back panel



Marking out the mortises and tenons on the bottom of the sides



Marking out the tenons on the tops of the sides



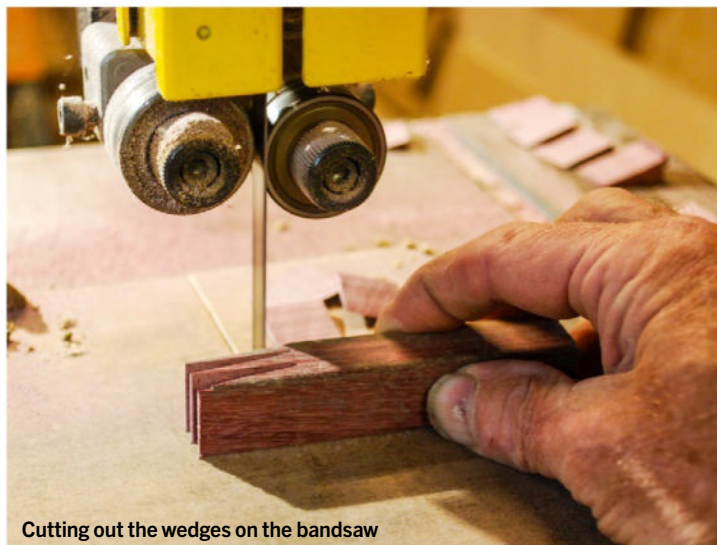
Drilling holes for the mortises with a Forstner bit in a pillar drill



Cutting a rebate in the back



Routing a groove for the back in the top



Cutting out the wedges on the bandsaw

“Check that everything is square by measuring the diagonals, which should be exactly the same”



The back with loose tenons ready to be assembled



Clamping the carcass



Side table option — no doors or back

in the base panel using the table saw or a rebating plane. Rout out a groove on the underside of the top with a router, or chisel out the waste or use a hand router plane.

Step 8: Assembly of the carcass

Saw two slots 5mm from the edge of each of the tenons on the side panels and the cabinet base, and then cut out the wedges.

Apply adhesive to the tenons and let it soak into any end grain for five minutes, then reapply more glue, as it will have soaked into the end grain. Assemble the carcass parts, making sure that the shoulders are tight, then bang in the wedges; check that everything is square by measuring the diagonals, which should be exactly the same.

Thoroughly clean up any excess adhesive. You can stop here, and this project can be a simple side table featuring your beautifully cut and wedged pinned-through tenons.

An alternative way of making the door

and back panel is to run a groove on the inside edge of the rails and stiles. Make a loose tongue the same width as the groove from plywood or timber, with the grain running in the same direction as the rails.

The back was cut 20mm larger than the opening, and a 10mm rebate ran round all sides to form a tongue the same width as the groove.

Step 9: Fitting the doors

The design has proposed a rebated inside stile, as only one door needs a catch – traditionally, they worked with a single lock on the stile and helped keep the internal contents of cabinets dust-free-ish. Make the rebate with a rebate plane, router, or table saw. The door that will be the closer needs a subtle angle on the inside, or it will bind. You may need to test fit each door to ensure that there is no gap at the top.

To mark out for brass butt hinges, set a marking gauge to the centre of the pin for the width of the hinge and slightly less than the centre for the thickness. ►



Planing the central rebates for the doors



The door rebates

PROJECT CUTTING LIST

Part	No.	Length (mm)	Width (mm)	Thickness (mm)	Notes
Top	1	460	350	20	Mortise, 20x5mm deep groove at the rear
Base	1	404	295	20	2mm extra on tenons, 20x10 groove in the back
Inside shelf	1	360	260	12	
Shelf support	2	250	20	6	
Side stile	4	590	60	20	Mortise top and bottom, 6mm inside groove
Side top rail	2	280	60	20	40mm haunched tenons, 6mm inside groove
Side bottom rail	2	240	260	20	20mm double tenons, 6mm inside groove
Side panel	2	220	220	15	10x6mm tongue
Door stile	2	520	60	20	Mortise top and bottom, 6mm inside groove
Door right middle stile	1	520	30	20	Mortise top and bottom, 6mm inside groove
Door left middle stile	1	520	35	20	Mortise top and bottom, 6mm inside groove
Door top rail	2	140	60	20	40mm haunched tenons, 6mm inside groove
Door bottom rail	2	140	260	20	20mm double tenons, 6mm inside groove
Door panel	2	220	110	15	10x6mm tongue
Back stile	2	496	60	20	6x15mm groove inside edge and both ends
Back top rail	1	240	65	20	6x15mm groove inside edge and both ends
Back bottom rail	1	240	69	20	6x15mm groove inside edge and both ends
Loose tongue	4	40	30	6	Plywood
Back panel	1	382	260	15	12mm tongue all round
Brass butt hinge	4	50			
Bullet/Magnet catch	2				
Handle	2				



Setting the marking gauge to the centre of the pin



Chopping out the hinge recess



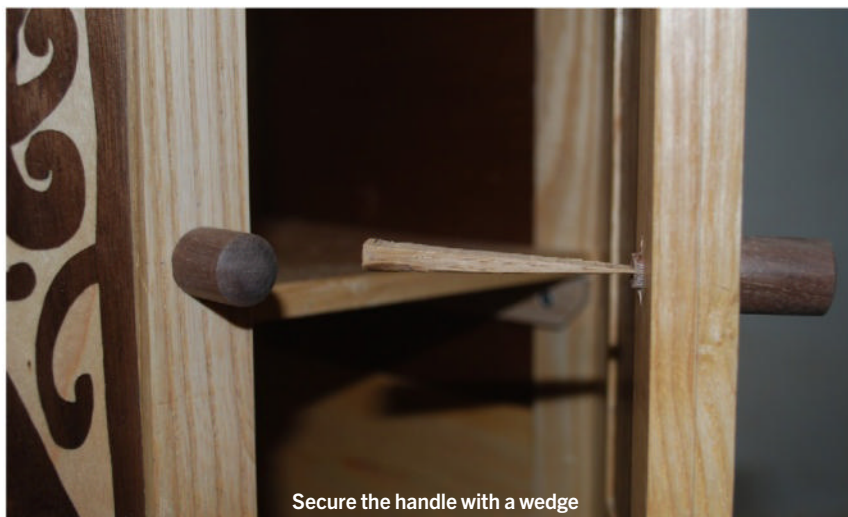
Marking out the positions of the hinge on the carcass



Brusso bullet catches



Turning the handles



Secure the handle with a wedge

Use a pencil to indicate the position of the hinge on the carcass, then scribe the width and thickness lines with a knife and marking gauge.

If you were making a few cabinets, you would make a template to rout out the slot with a top-bearing copy cutter in a router trimmer. It is far quicker to cut only four recesses by hand using a chisel to remove the waste.

Make a series of gentle cuts across the grain and then trim down to the scribed lines. Put the hinges in place, drill a pilot hole just smaller than the screw diameter, and carefully screw in the brass screws.

Screw in a steel screw before using the brass screws, because the brass screws break easily – dipping them in wax first can also help.

Place the door in the carcass, leave a 1mm gap at the top, then mark the position of the hinges with a knife. Scribe the position with a marking gauge and knife, remove the waste, drill pilot holes, and use one screw to screw the door in place, checking everything is perfect.

**“I chose to turn
some out of walnut
to match the
marquetry panel”**

Refine the gap around the door either by adding a paper shim or chiselling away extra wood so the gap around the door is equal all the way around.

Fit ball catches on the closing door and attach the handles. I imported Brusso bullet catches and drilled them into the top of the door with a striker on the underside of the top. These are discreet and effective. You could also use a double ball catch on the top of the door or inset magnets on the bottom.

The choice of handles today is huge. I chose to turn some out of walnut to match the marquetry panel. I made the pin the thickness of the door stile and secured it with a wedge of contrasting timber on the inside.

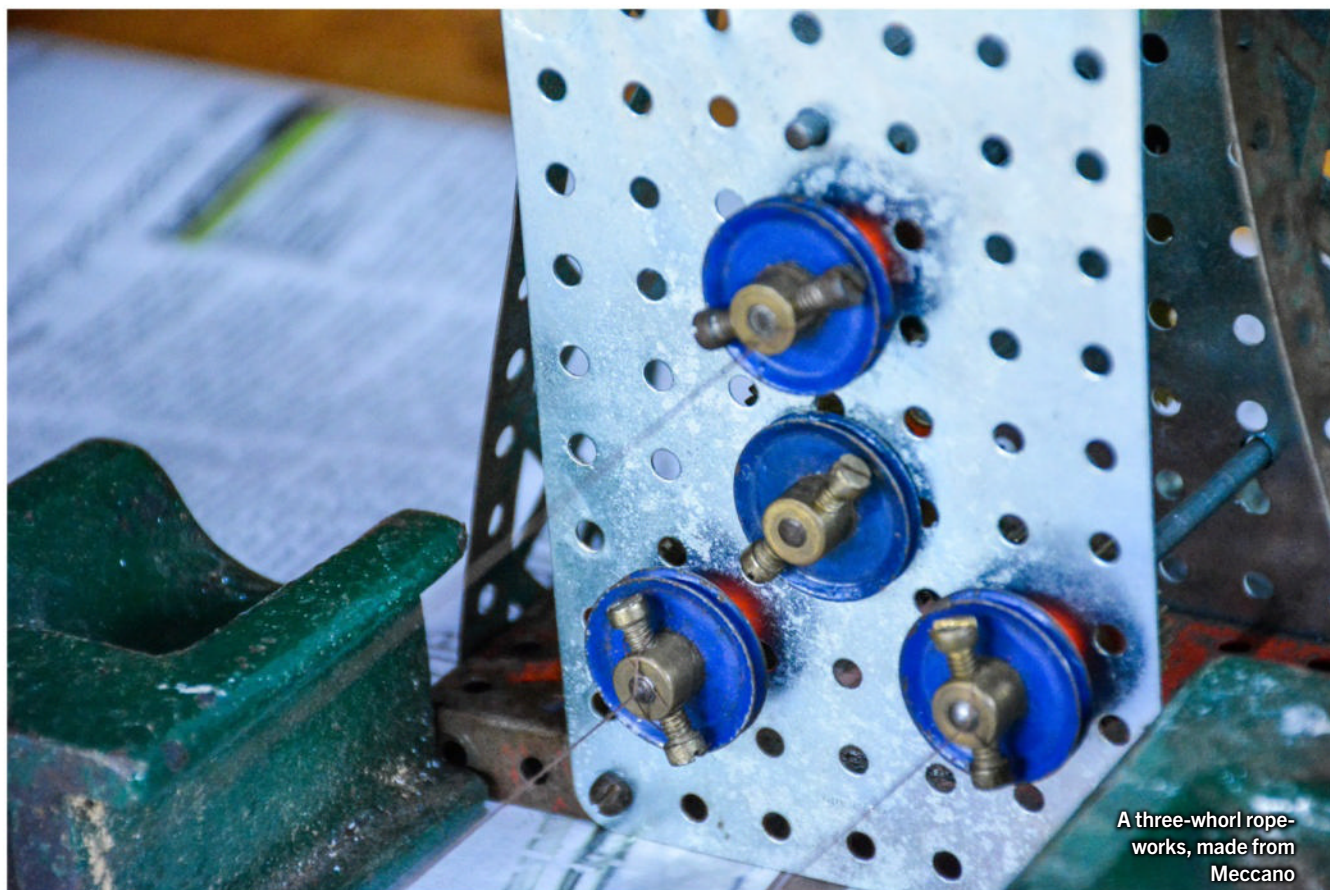
I have found that the handle can come loose in the future with just screwing or gluing a pin into a hole.

Sand everything to 240 grit, apply your choice of finish – Danish oil; wax; synthetic; or as I do, two coats of shellac and beeswax.

Step 10: Finishing

Assemble the parts, screw the back in place from the underside, hang the doors, and screw in the shelf supports. If you really fancy a challenge, make a drawer like that shown in *The Shed* Issue No. 127. 📄





A three-whorl rope-works, made from Meccano

CONSOLIDATING, PHILOSOPHICALLY

With management out of town, Murray turns the sitting room into a rope maker's workshop to complete his favoured *Amokura* model. Happily, YouTube clever buggers and the current world situation with oil keep him alert and focused

By Murray Grimwood | Photographs: Murray Grimwood

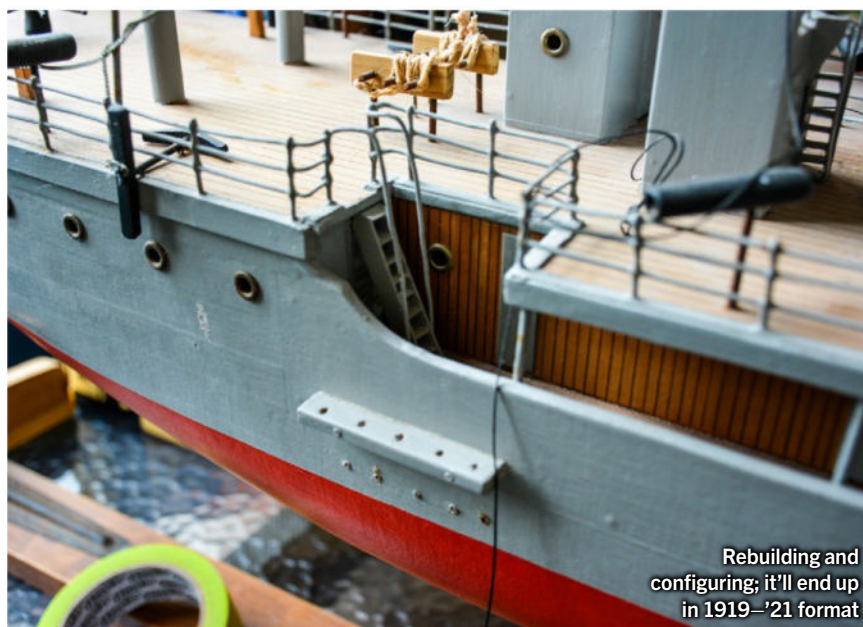
New things are dopamine hits, for sure. But if you're not into perpetual discarding – and I'm not – there comes a time when you need to finish; to do; and, increasingly, to fix what you've already got. So I'm attempting to finish off the unfinished; to do the yet-to-be-done; to fix the broken. To consolidate.

Plus which, she's been away in Oz again. Says it's to visit her ailing mother (I note this isn't the first time that excuse has been used ...).

So for a while, the *Amokura* model got to live on the sitting-room table, Humbrol cans strewn everywhere. And I added some gingerbread to the inside of the house. The latter meant dust and shavings trodden from a-----

to breakfast-time; the latter becoming increasingly variable, depending on how long I stayed up going down YouTube rabbit holes.

The period started with a high, when I came away from prize-giving with a satisfying haul of silverware, including Otago Yachtsperson of the Year. It ended with a low, when I went to do a winter race and found the starboard hull and



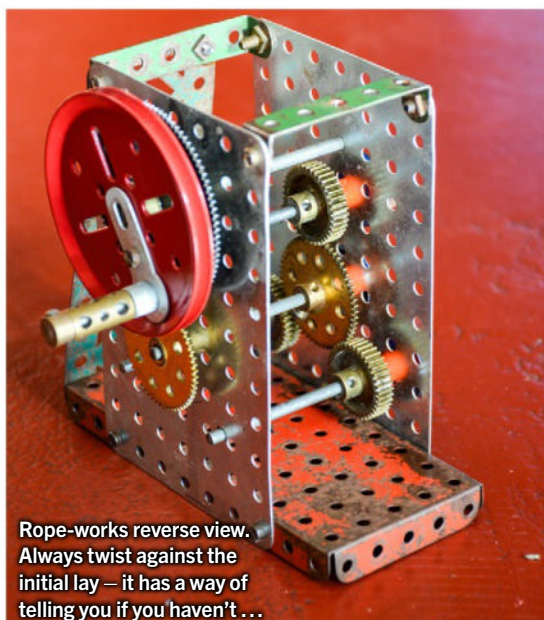
deck had parted company (how dare a lightly-built, hard-sailed, 42-year-old boat do that!). During the period, global geopolitics rumbled on, the media maintained a determined adherence to the gospel according to economics, and I did some serious thinking about future-proofing my sheddery.

Money for old rope

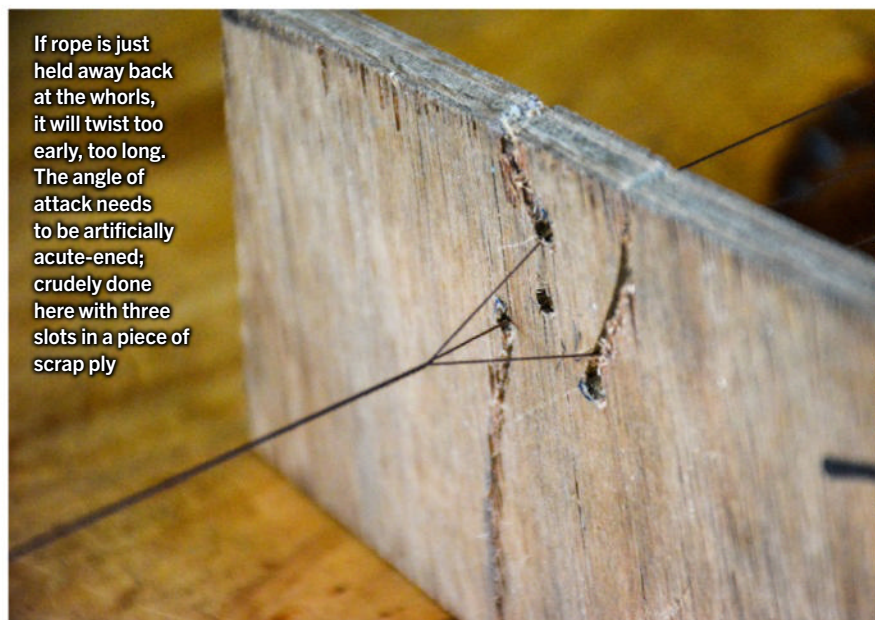
Some *Shed* readers may remember my article on the *Amokura*, New Zealand's first sail training ship and a poignant part of our history.

The model, bought at auction, triggered an in-depth delve into her history, which hasn't slowed and may end up as a book, or at least a booklet. You may also remember that I sweated over whether to restore her as the builder – almost certainly an 'old boy' – had made her, or to render her more accurate to the original. That, in turn, opened a can of worms I hadn't anticipated; *Amokura* changed a lot between 1905 and 1921 – what version do you call original? By the time the dust had cleared from that little exercise, I knew a bit more about what had changed when, and the model tells

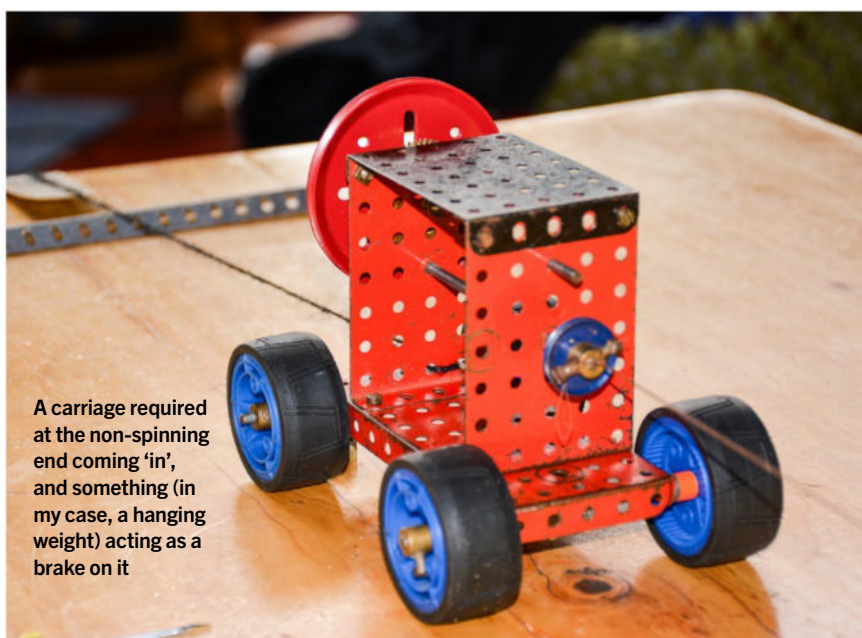




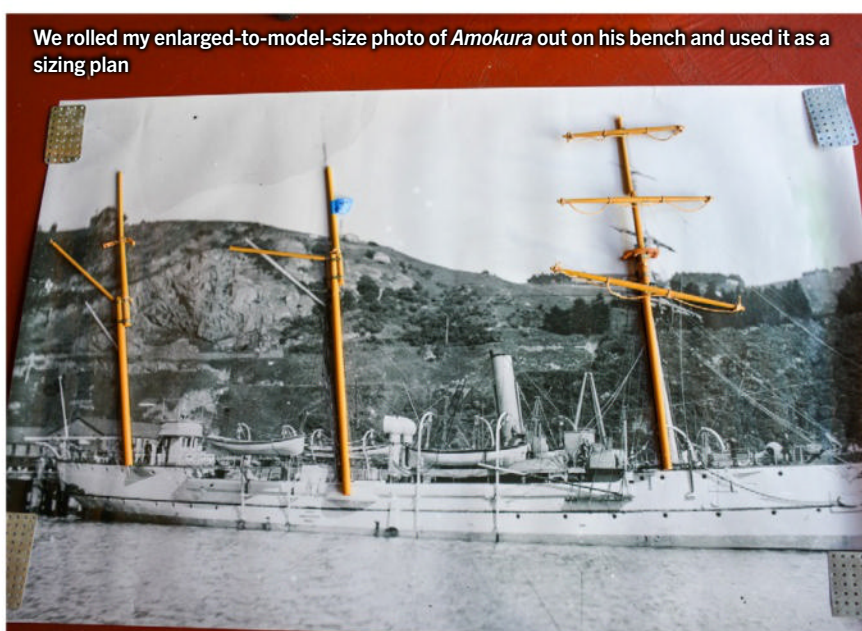
Rope-works reverse view. Always twist against the initial lay – it has a way of telling you if you haven't ...



If rope is just held away back at the whorls, it will twist too early, too long. The angle of attack needs to be artificially acute-ened; crudely done here with three slots in a piece of scrap ply



A carriage required at the non-spinning end coming 'in', and something (in my case, a hanging weight) acting as a brake on it



We rolled my enlarged-to-model-size photo of *Amokura* out on his bench and used it as a sizing plan

us he must have been aboard in 1919; 1920; or, at a pinch, 1921. So that is the version she'll be optimised as.

In all this researching – and I know of a few more pleasurable pastimes – I came across the still-existing vessels *HMS Gannet* and *HMS Warrior*. A modeller named William Mowll spent four years, three days a week, immaculately modelling *Gannet*. He did so in tandem with her restoration, then wrote a detailed book with excellent photographs of both, which I ordered. Fatal move – rabbit hole upon rabbit hole. He'd replicated the 1200 copper sheets she was anti-fouled with, and made his own ropes.

Challenge accepted

Well, you can't turn that kind of challenge down ... so, out with the Meccano, and here we go building a rope-works, which got set up on the kitchen table (maybe her mum is in perfect health, come to think of it; maybe I just don't read the room too well).

Much fun was had, trying to create a non-stretch rope to scale (0.7mm diameter). Turns out (get it? Come to think of it, I'd probably have been turned out if she'd been here) that rope shortens as you make it, which requires a carriage at the non-spinning end coming 'in', and something (in my case, a hanging weight) acting as a brake on it. Many generations of Dunedinites grew up familiar with Donaghys rope-works,



My friend Keith showing me how to plane (left) and size (right) model ship masts on a cold Dunedin day



and the building still exists, preserved, but I reckon I was probably the only local actually producing rope during the frosty nights of July '26.

The coppering I figured I'd cheat; using sticky-backed copper tape (actually sold to counteract garden slugs!). It won't be as perfect as on the *Gannet* model – but I haven't got 4x52x3 days to spare, either. A rolling pricker (like a miniature pizza cutter with serrated rim) will do the nail-look.

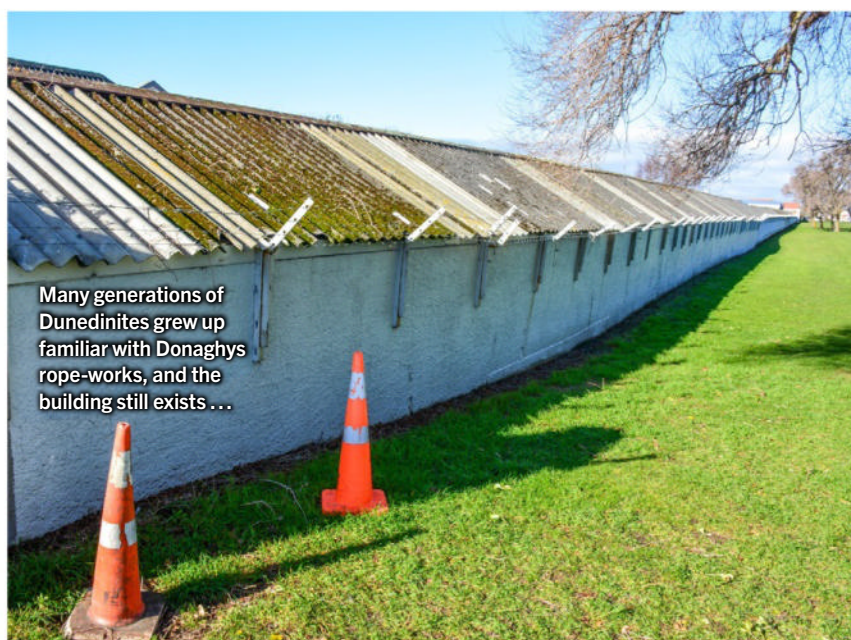
These things can lead to other happy things too; one fellow more practised than me offered to show me how to make round tapered masts from square stock. It was about 2°C outside his unheated garage – but we didn't notice. We rolled my enlarged-to-model-size photo of *Amokura* – taken around 1914 in Port Chalmers – out on his bench and used it as a sizing plan. Very satisfying.

The house at Pooh Corner

Our house is log framed and is (internally) 17mm ply braced.

I'd always meant to get around to adding some decorative edge flitches in the hallway around the loo door, to make the ply-and-post look a little less formal; a bit more 'loggy'. It only involved four pieces of timber, but it took two whole days; old age and hand-fitting, which required endless returns to the workshop for just a little more off, saw to that. I was getting close to her return too; cutting it mighty fine.

Then No. 2 son called; grandson is



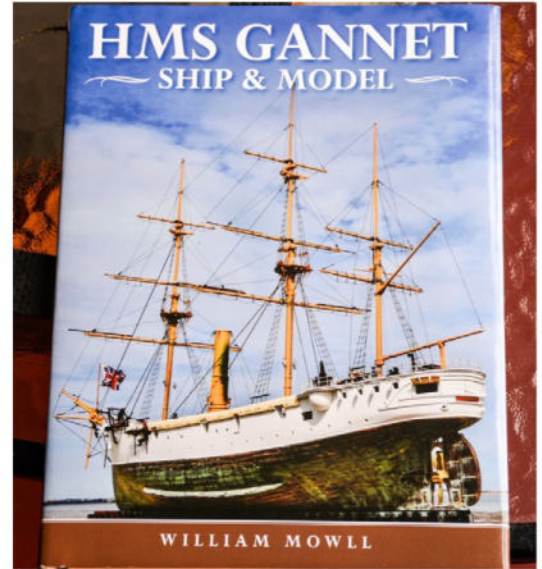
Many generations of Dunedinites grew up familiar with Donaghys rope-works, and the building still exists...



A little less formal; a bit more 'loggy'



Trimming with a draw knife – one of my favourite tools



The finished door surround – more in keeping with the style of the house

doing a poetry recital at school, calving is turning into a saga, and another child is sick; they can't get to the recital – could Pop attend? Down tools; drive for an hour; listen for an hour; take the wee fellow home afterwards; another hour home. Wouldn't have missed it for the world. But it meant that the last bugle screw went in about midnight, with the house looking like a bombsite and her plane due at 7am. Where are Thing One and Thing Two when you need them?

Keeping energised

During this period, I tried to get the media to become a little more energy-savvy, not that you will have noticed.

In recent months, the global system

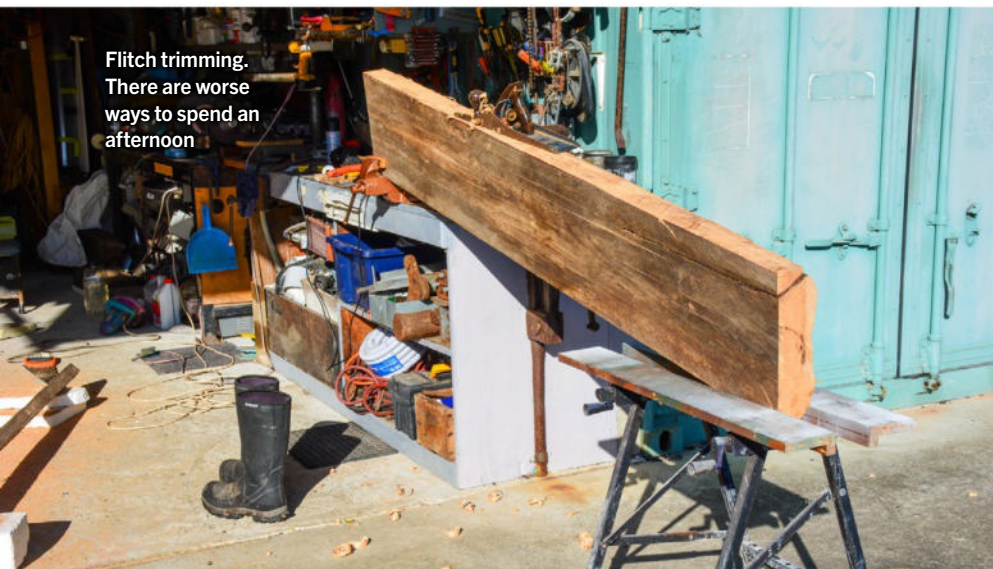
has been getting by on up to 20 per cent less oil being extracted ('produced' is not quite the right word; it isn't conjured up), refined/catalysed, or delivered. We were going through about 100,000,000 barrels a day, so down closer to a possible 80 million. Plus gas outage, plus refining capacity out of action, and shipping stymied. One way or another, 20 per cent less work is being done globally (or offset) – and a lot more is being expected to repair conflict damage.

Yet the media conversation is all about "price"; about "cost". Well, you can print money, but you can't print energy. Some of the reduction got compensated for by drawing down "reserves"; some



When the cat's away; flitches being oiled in the conservatory

Flitch trimming.
There are worse
ways to spend an
afternoon



by what is euphemistically described as “demand destruction” – which just means poor people can’t afford it. But globally, significantly less work is being done, and the destruction happening in parallel – from wildfires to drone attacks to deferred maintenance – means we may never get back to where we were in 2025.

Oils ain’t oils

The same media glibly mention oil as if it is one thing, but of course it can be anything from light sweet crude at pressure, to water-flooded (water injection), to sour (sulphurous – as in Venezuelan crude), to kerogen (from shale), to tar sands (essentially bitumen), to converted coal (which the German

military ran on during World War II). Oils ain’t oils, as the advert went.

They do share one common factor: no field lasts forever. The biggest of them all – Ghawar in Saudi Arabia – was discovered in 1948; extraction started in 1951, peak production was back in 1981 at 5.7 million barrels per day (MBPD), and production is currently down to 3.8 MBPD. As many barrels of seawater get pumped in, then disentangled from the oil – a corrosive process, obviously – daily.

Some folk are addressing the reduced-energy predicament, almost totally unreported and still imperfectly. If you search interest.co.nz for my name, Murray Grimwood, you’ll see an appraisal with further links.

Mix in some brilliantly inept geopolitical leadership, and we are likely looking at a new world order, with ramifications for supply this far away from everywhere – both in availability and affordability. And a major rethink about what we do, and don’t do. Others are starting to address this now – see [youtube.com/watch?v=nGEv-NyJoM](https://www.youtube.com/watch?v=nGEv-NyJoM) or search YouTube for *Focus on Fixing: Politicians Sound Alarm on Infrastructure Funding*.

What to do?

What can we sheddies do?

My answer is as it has been for years: Teach youngsters real hands-on skills. How to wield a hammer, pop a rivet, use a saw, a chisel, clamps and callipers, sockets and spanners. Some things don’t change; a millimetre will always be a millimetre; a twist drill will always bore a hole. Oh, and old-school still works – and will still be working long after complexity has been binned.

As the song says, teach your children well. It’s come back to me as I write: No. 2 son just stumbled onto two curtain sider bodies on Facebook Marketplace – he’s repurposing one as a firewood shed; did I want the other as a carport-slash-shelter? Did I what!

So one lesson – the one about adapting and repurposing – has stuck. There’s hope yet ... 📁



Did I want the other as a carport-slash-shelter? Did I what!



Museum owner Paul Robins moved to Geraldine in 2013, planning to finally build a space big enough to house everything that he had collected over the years

ROUTE 79 MUSEUM

Inside Geraldine's hidden treasure. A passionate, varied collection of vehicles

By Melissa Hannon | Photographs: Melissa Hannon

Geraldine could claim to be New Zealand's museum capital.

Despite its small size, the town offers plenty to explore, with around five different museums. Tucked just off State Highway 79 on the way through to Mackenzie is Route 79 Museum. We went along to check out Paul Robins' ever-growing collection for ourselves.

What began as one man's passion for

all things mechanical has grown into an impressive private collection that continues to expand year after year. Paul's museum is packed wall to wall with cars, tractors, motorbikes, artillery, machinery, and memorabilia. Each piece tells a story, and somehow there always seems to be room for one more addition.

Paul gets his dream shed

Paul moved from Pleasant Point to Geraldine in 2013 with a plan to finally

build a space big enough to house everything that he had collected over the years.

In 2014, that plan became reality when he built what he calls his "dream shed", a project that took only about three months to complete, which would house his ever-growing collection. As Paul puts it, "It's escalated since I built the shed."

Before all of this, Paul spent around 30 years working as a helicopter



Hard to miss the signage on State Highway 79



The workshop under construction / overflow area



A Brabham BT21 sits next to a tidy 1975 Corolla

“That
plan
became
reality
when
he built
what he
calls his
‘dream
shed’”



This World War II tank takes pride
of place near the entrance



V6 1970
Mark IV
Zodiac



Friends
regularly lend
their vehicles for
display, meaning the
museum's collection is
always changing



Paul has restored much of the military machinery

engineer and mechanic, building a career around machinery before turning his attention to restoring and collecting it. His background explains a lot when you walk through the doors. Everything feels intentional and appreciated for the engineering that goes into it.

Inside, classic cars sit beside military displays, old tractors line up next to motorbikes, and walls are lined with memorabilia. Paul likes swap meets and searching dump shops for hidden treasures. Something he jokingly calls an “addiction”.

Ever changing

The collection itself is forever changing.

Some vehicles belong to family and friends and rotate through the display, meaning each visit can be slightly different from the last.

One of Paul's favourites, and probably the vehicle he talks most passionately about, is his 1985 AC Cobra running a 289-cubic-inch (4736cc) small block Chev. He bought the kit back in the late 1990s and built it himself. Then, among the ever-changing line-up, there are a 1938 Austin Seven, a 1980 Ford Cortina, a 1970 Mark IV Zodiac, and a 1975 Corolla.



A wide variety of vehicles

There are also some unexpected finds. Sitting among the collection is a Brabham BT21 race car with local history attached; an ex-Australian Army truck fitted with a Unimog deck; and even an old railway jigger, originally from Pleasant Point, running an 8hp (6kW) Briggs & Stratton engine.

A passion for military history

Paul's interest in military history is impossible to miss.

One section of the museum houses an impressive World War II collection, including a 20mm Oerlikon anti-aircraft gun, a 37mm anti-tank gun, a 5.5-inch (140mm) field gun, a 40mm Bofors anti-aircraft gun, and a six-pounder anti-tank gun – many of which Paul restored and painted himself.

He says that what drew him to military equipment was the engineering behind it: "I was intrigued with this stuff because the technology in it was greater than what the cars were at the same time."

On the other side of the shed sits Paul's workshop, with projects waiting their turn. A fire engine is also tucked



From two wheels to four and everything in between

"It feels like walking through decades of passion"

away due to lack of space in the main display.

That seems to sum up Route 79 Museum perfectly. It feels like walking through decades of passion, curiosity, restoration work, and stories.

Paul welcomes the public, car clubs, and events. Entry is \$10 per adult; children under 16 are free.

If you are passing through Geraldine on the way to the Mackenzie District, it's well worth stopping for. 📍

TRIUMPH'S FINEST YET

THE NEW SPEED TWIN 1200 TFC

There's a new limited-edition Triumph Factory Custom (TFC) model on the way, and this one is a true collector's item

For more than a century, Triumph has built motorcycles that combine timeless style with genuine character.

For 2027, the British marque has raised the bar again with the Speed Twin 1200 TFC – the latest and arguably most desirable model to wear the prestigious 'Triumph Factory Custom' badge.

Limited to just 750 individually numbered motorcycles worldwide, the Speed Twin 1200 TFC is based on the acclaimed Speed Twin 1200 RS but takes exclusivity, craftsmanship, and performance to another level.

Factory Custom excellence

The TFC programme represents the very best the Hinckley factory can produce.

Every TFC model is built in limited numbers, combining premium materials, bespoke styling, and carefully selected performance upgrades. Each Speed Twin 1200 TFC carries its unique edition number on the billet aluminium top yoke and comes with a signed certificate of authenticity.



**"PRODUCING
105PS AND
A HEALTHY
112NM OF
TORQUE
FROM JUST
4250RPM"**



Carbon fibre is used extensively, from the front and rear mudguards to the heel guards and side panels. Gold anodised fork lowers, a gold drive chain, and blacked-out engine detailing reinforce the premium feel, while machined bar-end mirrors and a beautifully finished leather-and-suede seat complete the handcrafted appearance.

The striking Obsidian Gold paintwork combines metallic black with subtle gold flakes that shimmer in changing light, creating a sophisticated finish worthy of the TFC name.

Sharper dynamics

The upgrades extend well beyond cosmetics.

Clip-on handlebars and rear-set foot pegs create a sportier riding position, while fully adjustable Öhlins suspension front and rear provides exceptional composure and precise rider feedback.

High-spec Brembo Stylema brakes with a radial master cylinder deliver outstanding stopping power, while lightweight seven-spoke wheels and Metzeler Racetec RR K3 tyres sharpen steering and maximise grip.

Together, these upgrades promise an even more engaging ride than the already impressive Speed Twin RS.

Classic character

Power comes from Triumph's charismatic 1200cc High Power Bonneville parallel twin, producing 105ps and a healthy 112Nm of torque from just 4250rpm.

It's an engine that delivers effortless mid-range performance while retaining the unmistakable feel and soundtrack of a classic British twin. Twin Akrapovič titanium silencers with carbon-fibre end caps enhance both performance and sound, producing a deep, purposeful exhaust note that perfectly

complements the engine's 270-degree firing order.

Modern performance

While the styling is unmistakably classic, the technology is thoroughly modern.

Three riding modes – Road, Sport, and Rain – allow riders to tailor throttle response to conditions, while Optimised Cornering ABS and lean-sensitive traction control provide added confidence without intruding on the riding experience.

Triumph Shift Assist enables smooth, clutchless up and down gear changes, while the traditional round instrument combines an LCD display with a colour TFT screen and integrated USB-C charging.

Built to be ridden

Previous TFC models – including the Thruxton, Rocket 3, and Bobber – have quickly become sought-after collector's





machines, and the Speed Twin 1200 TFC looks certain to follow.

Yet this is far more than a garage ornament.

Every upgrade has been chosen to make the motorcycle faster, sharper, and more rewarding on the road. It combines the soul of Triumph's Bonneville heritage with premium engineering and craftsmanship that few manufacturers can match.

For enthusiasts who appreciate modern performance wrapped in timeless British styling, the Speed Twin 1200 TFC represents the pinnacle of Triumph's Modern Classics range.

Deliveries begin in October 2026, and with only 750 examples being built worldwide, this is one modern classic that's unlikely to stay in dealer showrooms for long. 📦



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WE LOVE BUGS!



A bit of TLC that became a major restoration

The 1302S, or 'Super Beetle' as it became known, was built for two years before it too was replaced by a further enhanced Beetle, the 1303, continuing an amazing 65-year lineage for one of the world's best-known shapes.

Our feature car, a 1972 1302S Super Beetle, was found by Dave and Michelle Dickie in Mosgiel a few years back. It was a runner, but like most VWs of this age, it needed a little TLC. They were looking for a daily driver for Michelle when they first came upon the VW being sold locally on behalf of its owner. "The owner offered it to his grandchildren, and they didn't want it, so he got the guy out at Mosgiel in the Mobil petrol station to sell it for him, and he put it on Trade Me for them. We never met the owner, and we were always dealing with the guy at the petrol station. We put a bid on it, and we were the only people that bid on it."

Their bid was eventually successful, eight years ago. Not knowing much of the history, in situations like that, it's always a risk buying a car, but they were in for a bit of a surprise.

Also in this issue:

Tony Roberts profile, Porsche 911, Andy Buchanan interview Part 2, 1975 Morris Mini, 140 years of Mercedes celebration, 1955 Ford Thunderbird, low 'n' slow 1993 Cadillac, Rallye des Princesses Part 2, Kiwi-built Trailmaker, Studebaker Hawk, Lotus Excel, the heady years racing at Australia's Longford racetrack Part 2, MOTAT's classic cars, vintage caravans, Stewart's Classic Car Museum, racing reports, book reviews, classic car news, and so, so much more ...

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Part 3

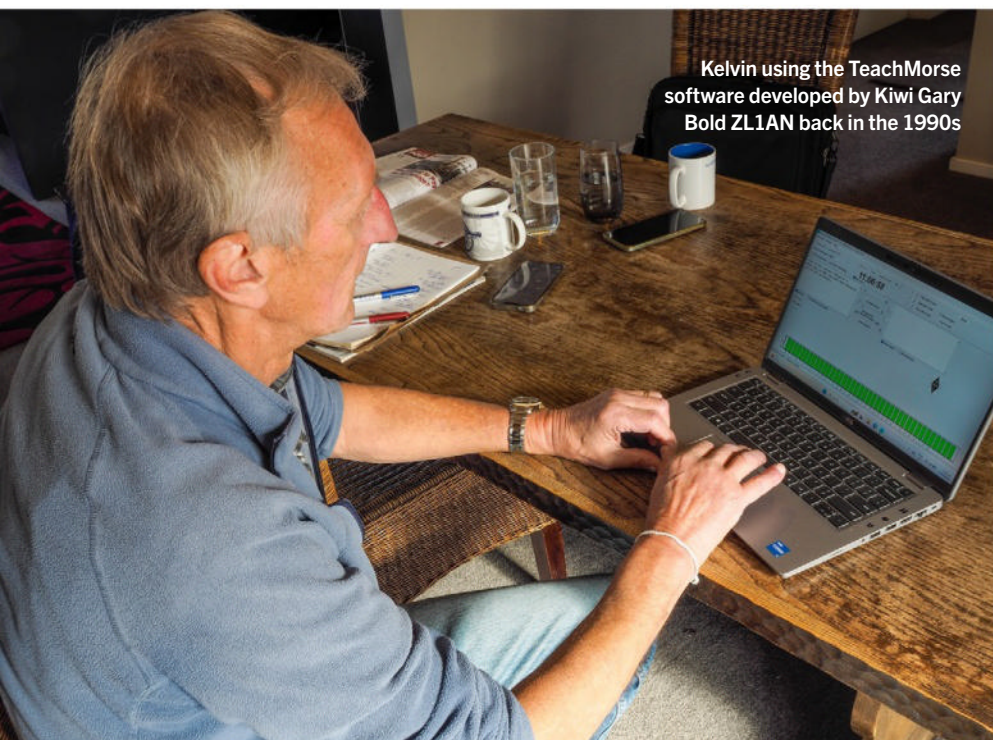
EXTENDING THE REACH

Going deeper to learn all he can about ham radio, Nigel is surprised to discover the strong use of Morse code, and explores aerials, antennas, the tricky moonbounce, and the future of this unique method of communication

By Nigel Young | Photographs: Nigel Young



ZL3KB using the 1960s set called 'A13'



Kelvin using the TeachMorse software developed by Kiwi Gary Bold ZL1AN back in the 1990s

In the previous article, we looked at two interesting amateur radio projects.

The first involved the International Space Station (ISS) and Diamond Harbour School. The other was sufficiently significant in the world of radio communications that the AI that I use said: “That passage you’ve shared is hugely significant in the amateur radio world – it’s not just a technical achievement, but a moment of real exploration and boundary-pushing ... That’s like whispering across a continent and being heard clearly. It defies normal expectations.”

The project in question was the 2040km long Trans-Tasman link-up using the 10GHz frequency, a frequency which is usually considered very successful if you can get 100km long. In other words, 10GHz is typically associated with short line-of-sight contacts.

The Hepburn map

One of the contributing factors to the success of this project was the use of the Hepburn map to strengthen tropospheric ducting – for more on this, see the sidebar in the previous article in *The Shed* Issue No. 128.

The point I’m making, however, is that in many ways, amateur radio is a case

of connecting the dots, and what a lot of interesting and variable dots there are. I had asked ChatGPT for a list of special interest groups within amateur radio – three pages came back, and it was time to visit the Christchurch Amateur Radio Club for some more direction.

Catherine de Croy ZL3CATH – the club’s president – looks through the list and points to a line on the last page: “That’s it there: ‘building something nobody has tried before and seeing whether it works’. That’s what amateur radio is all about.”

Further down the page, in answer to the central question of what exactly does an amateur radio operator do: “almost anything involving radio, communication, experimentation and curiosity”. In other words, how long is a piece of string? Or to put that another way, which dots do you want to join this time?

Has amateur radio plateaued?

I find Roger Corbett ZL3RC – experimenter and co-operator behind the Trans-Tasman 10GHz link-up – who reads through the list, making comments as he goes.

I point to the line Catherine had commented on. “She’s right, but the truth is nobody seems to be doing

anything like that any more,” he says. I comment on the Trans-Tasman link-up, but he reminds me that that was seven years ago. What about the Diamond Harbour School link-up with the ISS? “While that is new if you haven’t come across it before, it’s not particularly new in amateur radio terms,” he says. This raises the question as to whether amateur radio has plateaued, or is just taking a breath before identifying the next set of dots – and connecting them in ways only ham radio operators seem to think of.

Special interest groups

Time to take a look at several special interest groups within the world of amateur radio and how they extend its reach. In this third part of this series, we’ll look at:

1. Morse code
2. TOTA – Things On The Air
3. antenna design
4. EME (earth–moon–earth) – moonbounce.

In an article like this, this can only be very introductory, but maybe it’ll spark enough interest for you to consider contacting your local amateur radio club. You can find them at nzart.org.nz.

1. Morse code

Perhaps the biggest surprise is the interest in Morse code – the original medium for transmission and the one that gives us the name ‘ham’ – short for ‘ham-fisted’.

This wasn’t meant to be complimentary, as it referred to an operator’s competency in terms of speed and accuracy. Morse code is essentially an encoding system for language, in that a good operator recognises words rather than just the sequence of dots and dashes as they go past – perhaps it could be compared to braille in that regard.

Interestingly, users invariably have ‘personalities’ that are identifiable by other operators who become familiar with whom they are transmitting and receiving. This was illustrated in the movie ‘The Imitation Game’ about the German coding machine, the Enigma, when, during a break, Alan Turing overheard a clerk who listened in to German transmissions comment on



Aidan and Leo at the top of Mount Herbert

recognising the ‘fist’ of the operator at the other end. This observation brought with it a light-bulb moment for Turing – but if you haven’t watched the movie, I won’t spoil it for you.

Teaching Morse code

Christchurch Amateur Radio Club member Kelvin Barnsdale ZL3KB teaches Morse code to those who are interested, using a piece of software developed by a Kiwi back in the 1990s.

Called ‘TeachMorse’, it was used to train amateur radio enthusiasts in Morse code – at that point, it was a requirement of the exam used for obtaining a radio operator licence. That requirement was dropped back in 2004, but, interestingly, the enthusiasm for it is still there. In an email, Kelvin writes: “This software was originally written by Gary Bold ZL1AN (now silent key – radio speak for ‘dead’), who was a long-time contributor to NZART’s official journal, *Break-In*, and was known as ‘The Morseman’ by many in the amateur community. The software is now maintained and enhanced by Andrew Mitchell ZL1AF.”

According to ChatGPT: “Gary was no casual programmer. He was an academic/scientist with published work involving ionospheric propagation, acoustics and computer-network

analysis, as well as being a prominent Morse enthusiast.”

Gary’s contribution survives, and perhaps that is one of the ultimate compliments that can be given to ham operators as they continually investigate, iterate, and ultimately integrate new frontiers with existing technologies, or perhaps just re-explore and expand existing frontiers with good old-fashioned Kiwi thinking.

Does things well

Kelvin’s background is formidable – it includes work on the Space Shuttle programme, the development of GPS, the initial development of drones, and he currently teaches radio and robotics to intermediate-age children.

Yet even at this level of advanced technology, Kelvin can see the advantages of Morse code. “Morse survives not because nothing better has been invented, but because it still does certain things extraordinarily well – and because mastering it remains a human achievement,” he explains.

While the Morse key has largely been replaced by the keyboard, the essence of the dot-dash format and the role of the ear in effectively an instinctive muscle-memory exercise remains. This is reflected in the mental shift required to be proficient in Morse code: the ability

to move from character recognition to word recognition while still writing everything down, without consciously interpreting it as you go.

Kelvin comments that sometimes he has no idea of what he’s written down, and has to read it back before he knows just what it is about. This level of competence is a reminder of the awesome – and quite frankly almost overwhelming – degree of specialist knowledge and experience available to anyone who wishes to enter the fascinating world of amateur radio.

“Morse code is very good at cutting through noise,” Kelvin comments. This reinforces the idea that moving forward doesn’t mean ignoring the past – Morse code might be almost 200 years old, but it is clearly still as relevant now as it was then.

Morse: The only solution

The Morse key, however, is not dead yet.

Kelvin told me about his son Aidan, who went tramping in the Three Passes region of the West Coast. He took with him three methods of communication: his cell phone, which had no conventional signal; a satellite-texting app on his phone that failed; and a small homemade radio with 5m of cable for an antenna, which he spread over the tussock.



Braden ZL3BRK
fixing his ZC1 radio



Leo ZL2LEO on his
ZC in Hagley Park

With this, he used Morse code, bouncing it off the ionosphere in a 'straight up, straight down' method known as 'near vertical incidence skywave' (NVIS). This is how he checked in with his parents each night, letting them know all was well.

Kelvin teaches the MorseCram course at the club, where he begins with recognition by sound before any form of visual reinforcement, including tapping on a Morse key. Pattern recognition

rather than initial tapping competence is the priority.

In terms of the dot-joining metaphor I mentioned, the underlying dots here are 'person <-> person'.

2. TOTA – Things On The Air

In the last article in *The Shed* Issue No. 128, I referred to 'SOTA', 'POTA', and 'LOTA' – these are 'OTAs' – On The Air, a worldwide competition to transmit from, well, pick your spot, really. There are so

many more than the ones I mentioned – which are, respectively, Summits, Parks, and Lakes On The Air – as the map from the ontheair.nz website demonstrates. At one meeting, I suggested BOTA – Breweries On The Air. This seemed to be well received.

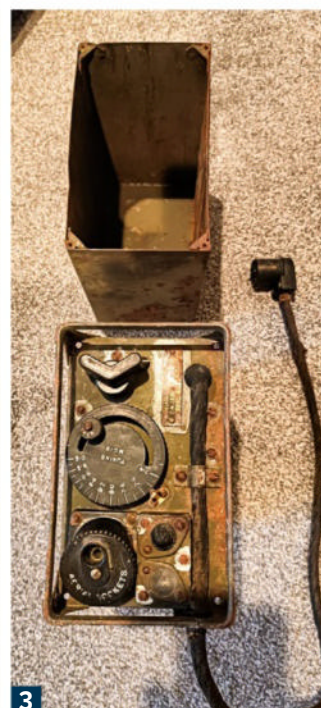
The OTAs are about 'activation' and 'chasing', with a verification step known as 'qualified', and come under the heading of 'ZLOTA – ZL (New Zealand) On The Air'. ►



1

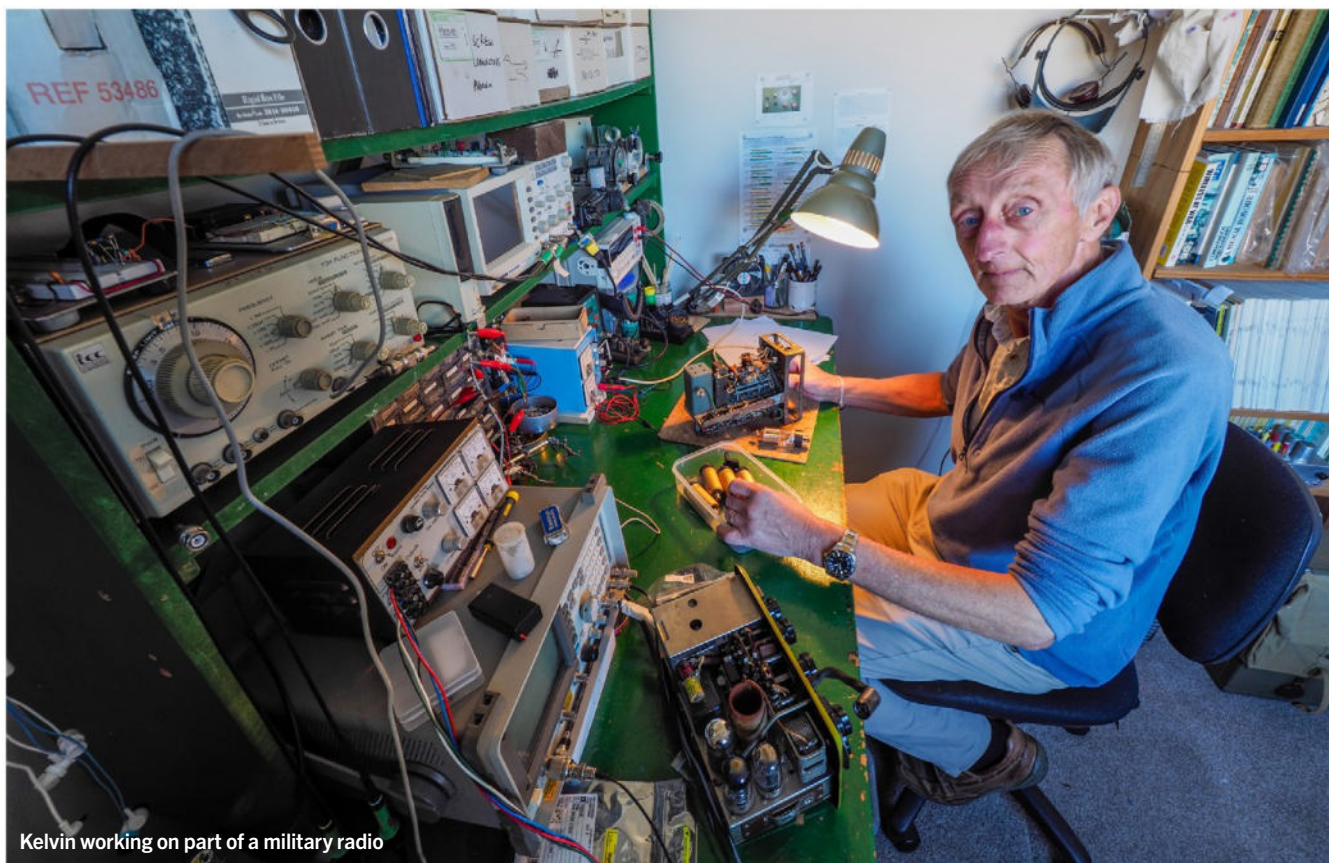


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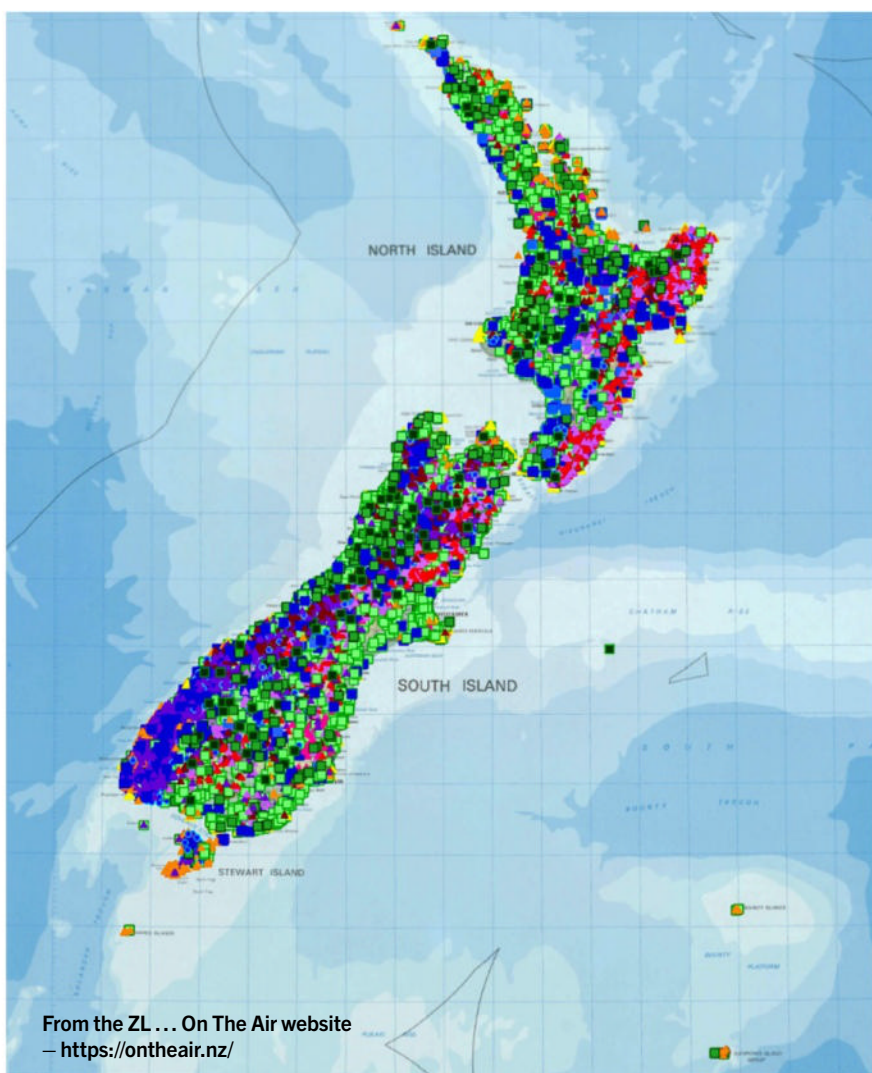


3

1–3. Parts from a military radio to be restored



Kelvin working on part of a military radio



From the ZL ... On The Air website
– <https://ontheair.nz/>

They are provisionally referred to as POTA – ‘Portable On The Air’ – and have strict rules around qualifying. Each activation is logged within its own criteria, depending upon its category. A contact from a backcountry hut requires only one activation within a 100m radius, for example, while parks – which are highly defined and catalogued against Toitū Te Whenua – Land Information New Zealand’s Protected Areas database – require four contacts from within the park boundaries.

Islands, lakes, volcanoes, beacons, and lighthouses – breweries, anyone? – are just a few examples. And like all specific interests, it has its own jargon. ‘Activation’ and ‘activation zone’ are described above. ‘Bag’ is your personal list of ‘OTA achievements’; ‘chase’ is the operator on the other end of your activation, who can be at their home base or out and about achieving their own activations. More information is available at ontheair.nz.

A completed radio contact

These are measured against a QSO within a UTC.

A ‘QSO’ is a completed radio contact between two operators, having

accomplished the set criteria for the particular location. The 'Q' is a leftover from Q-code previously used in both radio and Morse, with QSO standing for: "I am communicating directly with ...". In other words, a successful contact.

It was part of a broader 'Q' response system, originally established in 1909. Examples include 'QTH', meaning a location; 'QRM', meaning interference, and 'QRZ?', meaning a query as to who was calling.

'UTC' is a time standard measured using Coordinated Universal Time, and is important because all amateur radio operates within it. Aotearoa New Zealand, for example, is UTC+12, so instead of midnight to midnight as you would expect, it's midday to midday, and allows all logging to be against the same clock.

LOTA, VOTA, and POTA were all achieved

One notable activation was very recent and took place on 15 August, by ZL1GGL. Rotorua was the location, and the significance is that four separate OTUs were involved at once – Lake Rotorua, Rotorua Caldera, and a recreational reserve. Thus, a LOTA, VOTA, and POTA were all achieved, with 22 contacts.

It is one thing, however, to arrive at that interesting place; it is quite another to transmit and receive from it. Your radio is one thing, but what about your antenna? In Adrian's case, it was a 5m cable rolled up in his backpack. But there is more to antenna design than you might think.

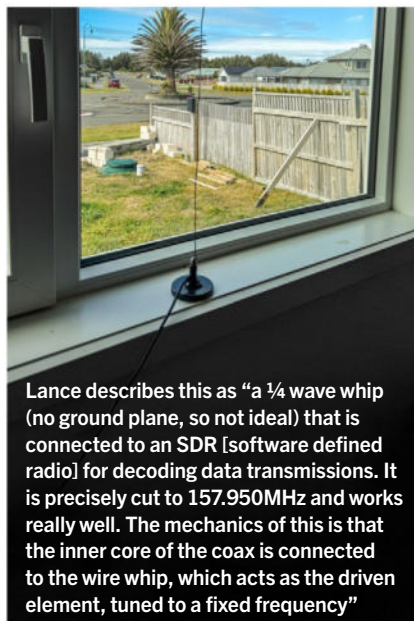
I contact antenna designer Lance Hastie ZL2TUF for some explanations. He writes back: "So you are tackling the black art of all topics – the invisible world of radio waves and trying to explain it."

The underlying dots here are person <-> place <-> person.

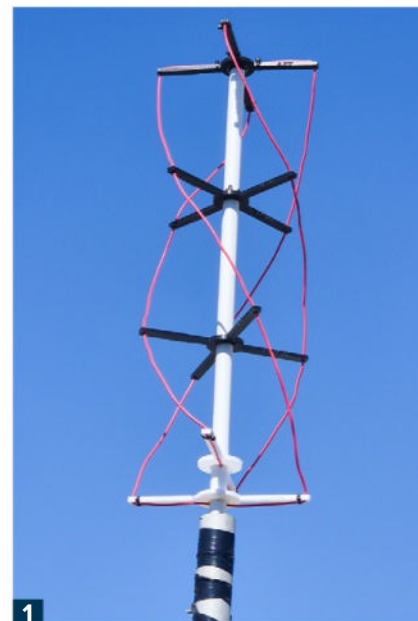
3. Aerial? Antenna?

What is the difference between an aerial and an antenna?

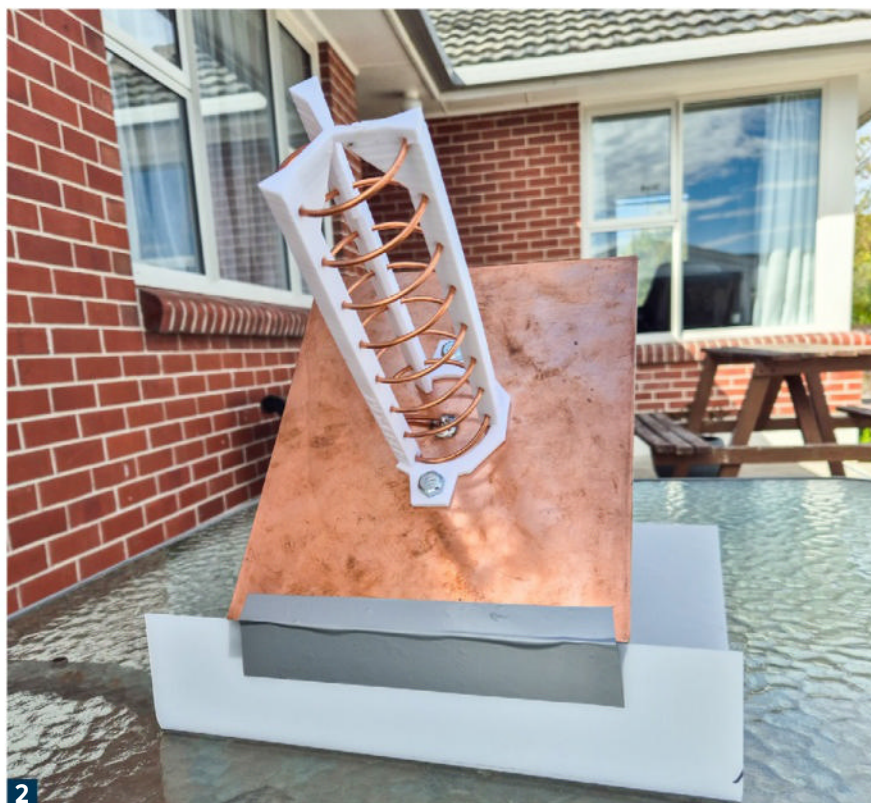
Nothing, really – it comes down to context and origins. Aerial has British roots and tends to be the physical item – we talk about a car aerial or a TV aerial for example.



Lance describes this as "a ¼ wave whip (no ground plane, so not ideal) that is connected to an SDR [software defined radio] for decoding data transmissions. It is precisely cut to 157.950MHz and works really well. The mechanics of this is that the inner core of the coax is connected to the wire whip, which acts as the driven element, tuned to a fixed frequency"



1



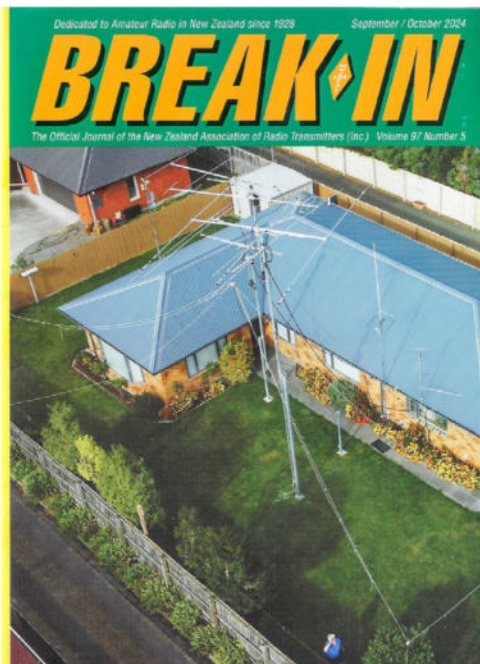
2

1 and 2. Experimental antenna by Rob Ramsey ZL3TCM

The Americans picked up 'antenna' from Marconi, who originally used it to describe a pole that he was using as an aerial. As well as – in Marconi's case, the pole – it tends to refer to all the individual components, along with the electrical engineering equations that include radiation patterns, feeds, impedance, arrays – the list goes on. Lance describes an antenna as: "the physical interface between the radio and the invisible wave. Just like the radio has to be tuned to a frequency to receive

it, so does the antenna."

So what is required to design an antenna? Where exactly do you start? In answer to my question, "What I'm looking for is how you might go about determining what you need when designing an antenna", Lance writes: "The short-form answer to the question has a few pre-qualifying conditions – the most significant being the intended purpose. There is also the binding relationship of frequency and wavelength. ►



Left: Ross in his shack at the operations end of the antenna shown at right. **Right:** The antenna in Ross' front yard – all meticulously engineered – particularly for high-wind events

- “1. The frequency the antenna is to be optimised for – knowing the wavelength changes as the frequency changes and therefore the resonant length of the tuned element = physical space it occupies.
2. The geographical location of the antenna (in a valley, on a hill, surrounded by metal-clad buildings, boundary fence location, and local by-laws).
3. Wave propagation orientation (horizontal or vertical wave, or circular if you're aiming for space).

Considerations

“Considering point 1: an antenna tuned for the 80m or 3.5MHz band uses a much longer tuned element than the 70cm or 440MHz band.

“If your intended communication uses the VHF or UHF bands, then the antenna will be very compact compared to one at HF.

“Considering point 2: if you are on the top of a large hill, have no

neighbours in close proximity and lots of free space, then any antenna can be accommodated, tuned for that frequency/band. If you are in an urban environment, then an HF antenna becomes a balance between engineering nous and antenna characteristics. The ever-popular G5RV wire design won't fit all backyards or family environments. If you are only targeting the local VHF repeater, then a $\frac{1}{4}$ wave whip antenna can be very discreetly installed on a rooftop and look like a piece of standard plumbing.

“That then leads into point 3 and the antenna orientation.

“Typically, VHF and higher use vertical polarisation (the antenna tuned element is straight up and down). Then why are digital TV aerials horizontal in Canterbury? For the simple reason the flat Canterbury plains allow for a broader coverage area, with the transmitting antenna being in the horizontal plane. If the signal is traversing hills or more rugged terrain, then vertical

waves will bounce up and over more effectively than horizontal.

“Getting back to your question: it really comes down to the radio frequency of operation. Very High Frequencies (and higher) use shorter/smaller antennas, inversely for lower frequencies.”

The future for ham radio

I ask Lance for a spot of crystal ball gazing:

1. Presumably the principles around antenna design don't change – is there anything interesting on the horizon that might challenge that?
2. Where do you see the future of radio development and amateur radio in particular going?

He responds:

- “1. The principles have been well established and stable. AI's use to further evolve this will produce refinements.
2. **Two-part answer:** The future of radio development is in broader use of the frequency spectrum, and that

“What if we could bounce a signal off the Moon?”



Roger Corbett ZL3RC and a moonbounce from home

will be better realised through AI engineering. Amateur radio has a growing relevance as people seek to simplify layers of communication and connectivity reliance on others, bringing it back to point-to-point and simplicity. Meshtastic is another example of people taking connectivity into their own hands.”

The understated partner to the radio

The simplicity comment is interesting, as it seems to apply across many social and communal activities. ‘Meshtastic’ is amateur radio speak for networking, and we’ll look at the implications of that in part four.

Antenna design and construction, then, is clearly the radio’s understated partner. According to ChatGPT:

“The antenna is literally the interface between the radio and the world. The central idea is wonderfully simple – an antenna determines where the energy goes and where it comes from. The attraction to ham operators is that tiny

changes can matter – what happens if I change this? This is quintessential amateur experimentation. Furthermore, unlike buying a better radio, an antenna can be made from wire, aluminium tubing, bits of pipe, salvaged material – whatever works.”

This leads us into ‘homebrew’ radio, another topic we will look at in the next issue. The underlying dots here are equipment <--> environment.

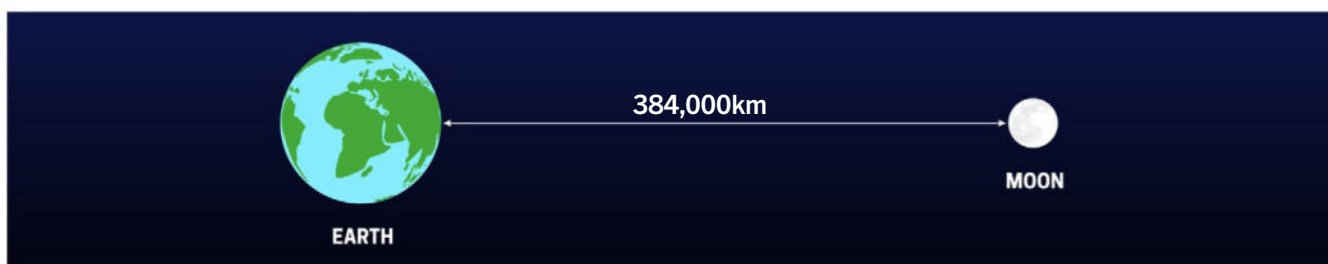
4. EME – moonbounce

The moon: Calculated at 384,000km away, though this ranges from 363,000 to 406,000 due to its elliptical orbit. For a signal to be picked up on Earth, it has to travel somewhere between 726,000 and 812,000km there and back, bouncing off an object that is only 3475km across. Taking only 2.4–2.7 seconds.

There are a number of issues to consider, not least the fact that every substance in the universe emits some degree of electromagnetic radiation, including within the frequency range

the amateur radio operator is using. So thermal radio noise from the moon, from the earth, and even the universe in general all have to be factored into the approach used by the operator. Variables such as the frequency range the operator has chosen, the position of the sun in relation to the moon, seasonal weather conditions, the actual position of the room in relation to the earth at any particular time of day, distortions produced by the atmosphere and the ionosphere during both transmission and reception of the radio signals – the list goes on.

Clearly, a moonbounce is not for the faint-hearted. But the satisfaction levels must be very high, as, to achieve one, the operator has to essentially identify and recover the returning signal from within the surrounding noise already being produced. The earliest record of a moonbounce was Project Diana, which was undertaken by the US military on 10 January 1946, when radar pulses were transmitted – and received back 2.5 seconds later. ►





Roger Corbett ZL3RC and a portable moonbounce

Interference

Other interference factors, according to ChatGPT, include: “the amount of power needed to transmit across the distance while allowing for the extraordinary loss of signal strength along the way; the physical nature of the parabolic dish or antenna array being used, including its diameter, surface accuracy and ability to focus the signal; and the accuracy with which it can be continually pointed at and track the Moon as it crosses the sky. Bigger dishes provide more gain, but also produce narrower beams, meaning greater accuracy is required.”

Keep in mind also that the moon itself is not a highly reflective surface – it is curved, covered in rock and dust, and ultimately only about seven per cent of your signal even gets there, before having to turn around and come back. All in under three seconds.

I’m going to let ChatGPT have the last word on this one: “Put all this together and the achievement begins to look slightly preposterous. An amateur operator directs a radio signal towards an object less than 3500km across and nearly 400,000km away. Most of the

signal misses it. Most of what hits it is absorbed or scattered. What little returns has to travel another 400,000km through an atmosphere and ionosphere full of complications, while the Earth and Moon are both moving and the universe contributes its own background noise. Yet somewhere on Earth another amateur can still identify the signal and reply.

“Perhaps that is the real attraction of a moonbounce. Nobody needs to communicate this way. Satellites, the Internet, and telephones do the job far more efficiently. Moonbounce exists because somebody looked at the Moon and asked one of amateur radio’s recurring questions: ‘What if we could bounce a signal off the Moon?’”

The underlying dots here are earth <-> moon <-> earth.

Conclusion

I set out to extend the reach of amateur radio, and have introduced the persistence of Morse code – particularly from the perspective of a highly competent professional with a background in radio transmission, electronics, and goodness knows what else involving the Space Shuttle and GPS

development just for starters.

A tour of the countryside with a radio transceiver and a rule book, an attempt to tackle “the black art of all topics – the invisible world of radio waves and trying to explain it”. And let’s not forget bouncing off the moon – just because you can.

In my next and final article, we’ll relook at the radio itself, along with two very interesting uses for it – and how you can make much of what you need to get started, on a reasonably modest budget.

Keep in mind that 100 years ago, amateur radio enthusiasts went so far as to learn how to blow glass to make their own thermionic valves. In 1925, the magazine *Wireless World* published an article entitled How to Make Valves: An Inexpensive Method of Valve Construction Within the Reach of the Amateur, while in 1930, the New Zealand magazine *Radio Record* had an article about an operator who blew his own glass valve envelope, fitted a lamp filament, evacuated it, and sealed it – and got it to work.

The enthusiasm of the amateur radio operator, it seems, knows no bounds. Just pick any combination of dots that interests you and go – you might even end up making history. 📡

“The enthusiasm of the amateur radio operator, it seems, knows no bounds”

COMING UP NEXT ISSUE

THE Shed

ISSUE 130

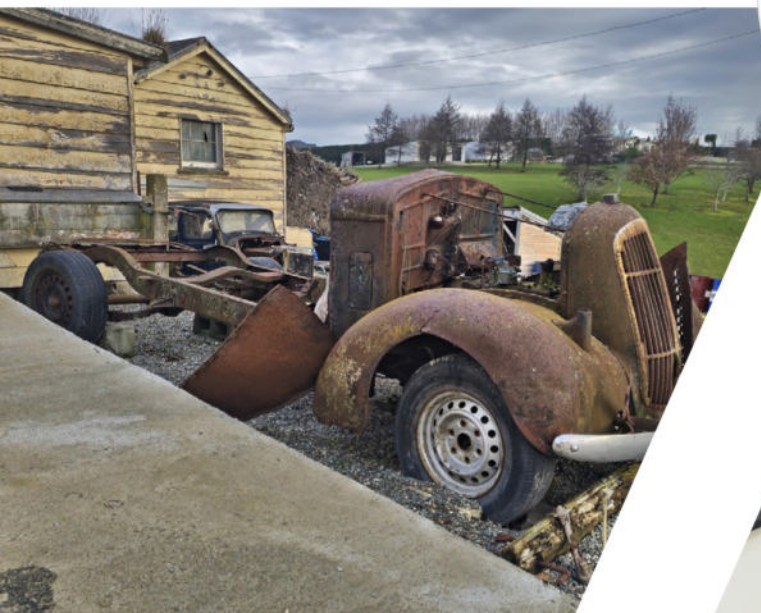


We visit the shed of midget racing legend Michael Pickens and check out his workshop and collection of classic racing midgets

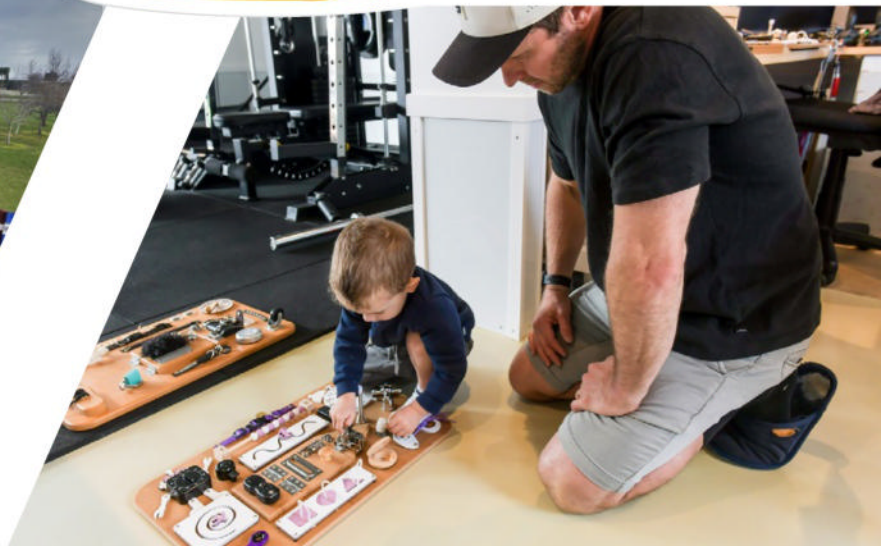


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We visit the shed of Ben Weston, who has been cranking out 'busy boards' in the hundreds, all in his spare time. A now very successful business that started out as a first-birthday gift for his son, Grayson

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BEYOND THE VALLEY OF THE DOLLS

By Jason Burgess | Photographs: Jason Burgess

In the 1970s, Glen Wilkin-Holland was sent to the Purfex mannequin factory by the Department of Labour. He had long hair, too much jewellery, and make-up. Purfex owner Austin Purdy was a rugby, racing, and beer sort of bloke. He took one look at Glen and said, “You’re a creative type, you’ll be perfect for the job.” Now Glen owns the factory, one of the very last of its kind in New Zealand





The exterior of the Purfex shed

In the medium-density suburbs of Auckland, backyards are becoming something of a novelty, sheds even rarer.

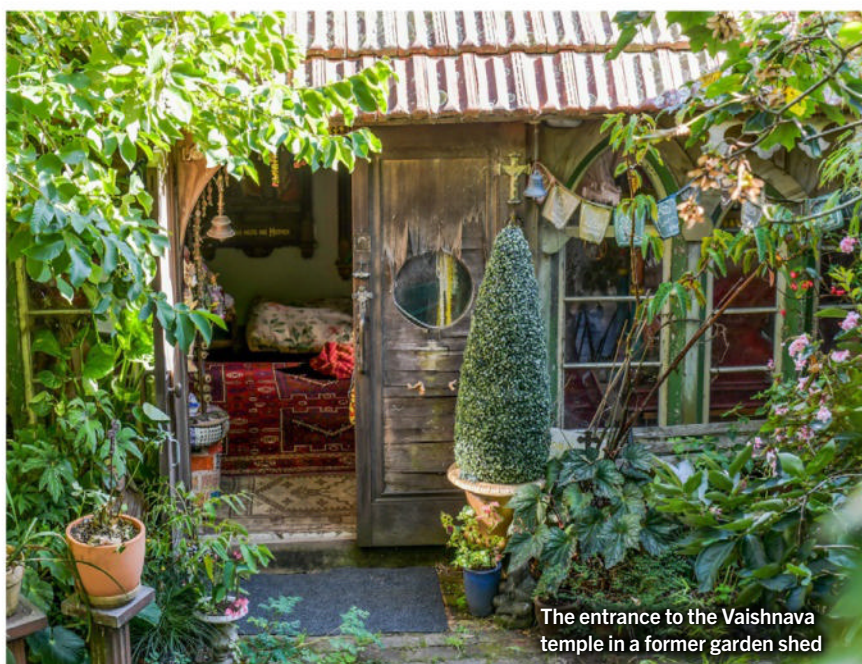
Yet, on Glen Wilkin-Holland's overgrown quarter-acre in the heart of New Lynn, not only does he run a shed-based, mannequin-making business called 'Purfex', but he has also converted a former tool shed into an active Vaishnava interfaith temple and operates an informal, though thoroughly maximalist, mannequin showroom from inside his home.

This humble enterprise is the last local mannequin company standing, upholding an 80-plus-year legacy of pioneering mannequin-maker Austin Purdy. It could be said that Purfex, which began life in a suburban basement back in 1939, has come full circle, back to the 'burbs.

A world apart

Stepping into Glen's house and garden is like entering a world within a world. His home feels more like a mannequin museum than a showroom: heads above the pantry and cupboards, and full bodies behind the balustrades on the stairwell. Holy statues and deities grace the place in various divine poses. There is even an effigy that resembles a young Glen at the front door.

His garden is strewn with figures,



The entrance to the Vaishnava temple in a former garden shed



A garden angel

fully formed and partially decayed. Here, trails paved in vintage New Lynn brick might lead you to a staircase ascending a tree trunk to a mezzanine-level deck overlooking the garden, Glen's temple, and a larger-than-life figure of archangel Gabriel. Further in, past the collapsing gazebo and random parade of heads, the Greek god Pan rears up from a veggie garden. On one side of the yard, incense perfumes the entrance to the shed-temple, while opposite, an open-sided shed – fringed with plastic flowers, fibreglass heads, hanging body parts, and a collection of bench tools – is where all the making takes place.

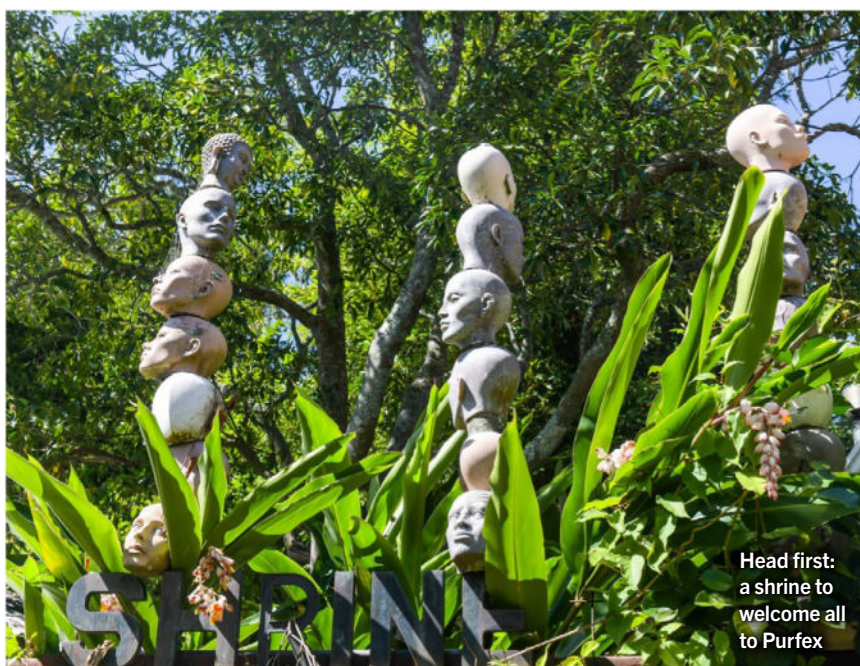
Then and now

In its 80-year history, Purfex has moved through many iterations and locations; expanded and contracted; survived receivership, wars, and recessions, many with Glen onboard.

He joined the company in 1979 and, with his late partner, Fraser, purchased Purfex from the Purdy family in 1998. In the years before the Global Financial Crisis, they employed 15 full-time staff. But competing with cheap imported products was not where Glen wanted to head. Instead, he brought the business home and scaled back operations. Now, as a one-man band with a handful of outworkers to call on, he says he is busier than he has been in a decade. ►

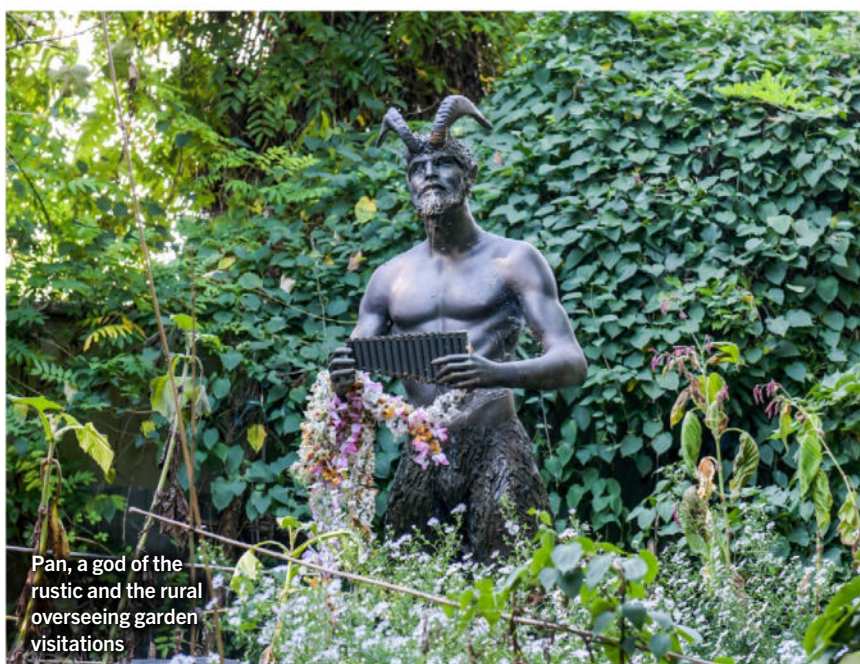


The way to Purfex



Head first: a shrine to welcome all to Purfex

“This humble enterprise is the last local mannequin company standing”



Pan, a god of the rustic and the rural overseeing garden visitations



A couple of exhibitionists in the showroom

The Purfex point of difference is that Glen is the only mannequin producer in the country capable of producing limited-edition runs and bespoke orders. Coupling his fertile imagination with a mix and match range of figures and body-part moulds – some almost a century old – you could say that anything is possible at Purfex, including repairs and repaints of vintage mannequins.

More than product

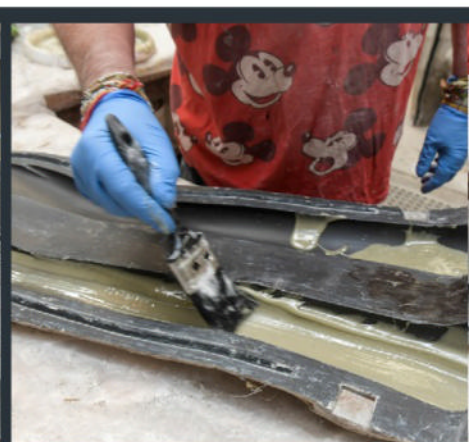
For Glen, mannequins and statues are more than just products for sale.

He sees them as “Reflective of us, they help tell stories about us. A mannequin is a supporting act for what you want to project onto them. Often, they are idealised versions of the human form; necks are longer; features symmetrical; and usually, they are surreally beautiful.”

If he has one industry bugbear, it would be that “Too many imported mannequins are out of proportion; necks wrong, heads too small, and torsos contorted. While they may be made for a European base, they are coming from a culture that has no idea. I call it cultural dislocation.”

Austin and Glen

When it comes to mannequin making, Glen believes that his former boss and mentor, Austin Purdy, was a trailblazer

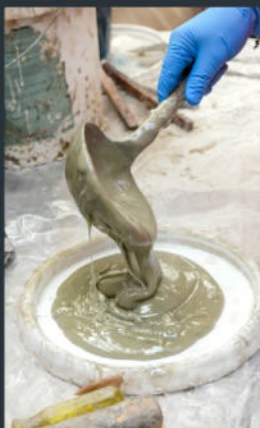


Process

Austin’s original papier-mâché and plaster mannequin-making techniques did not go the distance in New Zealand’s damp climate, so the company moved to epoxy-fibreglass early on, and it is this method that Glen still uses today. He concedes that, “It is an old-fashioned, hand-made process. But it is simple, like surfboard cavity moulds – pour one side, then the other, let them harden, fettle or trim the edges, apply join-mix goop (thickened with roving and some talc), then join the moulds together. Tap around the perimeter to make a good join. The next day, that

and visionary. “He began Purfex by repairing and restoring plaster mannequins from the basement of his parents’ home in Mount Eden,” Glen says. “He actually started mannequin making by taking moulds from the repairs that he liked and rebuilding

them with papier-mâché and plaster. He built the firm into an industry leader over the decades, bringing leading-edge international trends and products into the New Zealand market in the ’50s, and was still doing so when I first became involved in the late ’70s.”



comes out complete.”

Fibreglass is very forgiving; holds its detail; and creates a durable, strong and easy to repair final form.

Socket plates for the arms and legs to slot into are embedded in the mould and the casing. Fibreglass at the waist, metal on the arms to hold the arm in position. “The arm plates have to be welded; you have to weld a cap onto it to make sure that the hole is not obscured when you put fibreglass onto it, that cap has a flange on it that acts as an anchor. Interlocks and slides inside the arms,” Glen explains.

He stays away from magnetic sockets, as they do not hold over time. He admits to using imported poseable arms with some of the calico forms for things like photo shoots, but he warns that they also lose their integrity and will likely droop after six months of use.

Many of Purfex’s oft-used epoxy-fibreglass moulds are now 40-plus years old and still withstand the continual whacks, glueing, and prising apart. Glen laughs, “In the past, if newbies were hitting the moulds too hard, it felt like they were hurting me.”



Glen was sent to Purdy’s by the Department of Labour.

“I had long hair, too much jewellery, and make-up. Austin was a rugby, racing, and beer sort of bloke. He took one look at me and said, ‘You’re a creative type, you’ll be perfect for the job.’”

As it turns out, Glen did have the requisite background for multitasking his way through the company. He had studied pottery at school, had a builder for a father, and a mum who was good at handicrafts. He recalls, “My parents could do all those traditional things,

but I thought, *No, I’m not going to do anything like that. I’m going to use my mind and get a degree, and never use my hands.* Instead, I ended up at Purfex, starting out sanding fibreglass, and well, here I am, almost 70, still working with my hands and most likely will be



Vintage Purfex



Glen adding calico to a torso

'til they take me out of here in a vat of resin. So, I guess those skills really were helpful."

Serendipity

Glen's interest in mannequins predates his start date at Purfex.

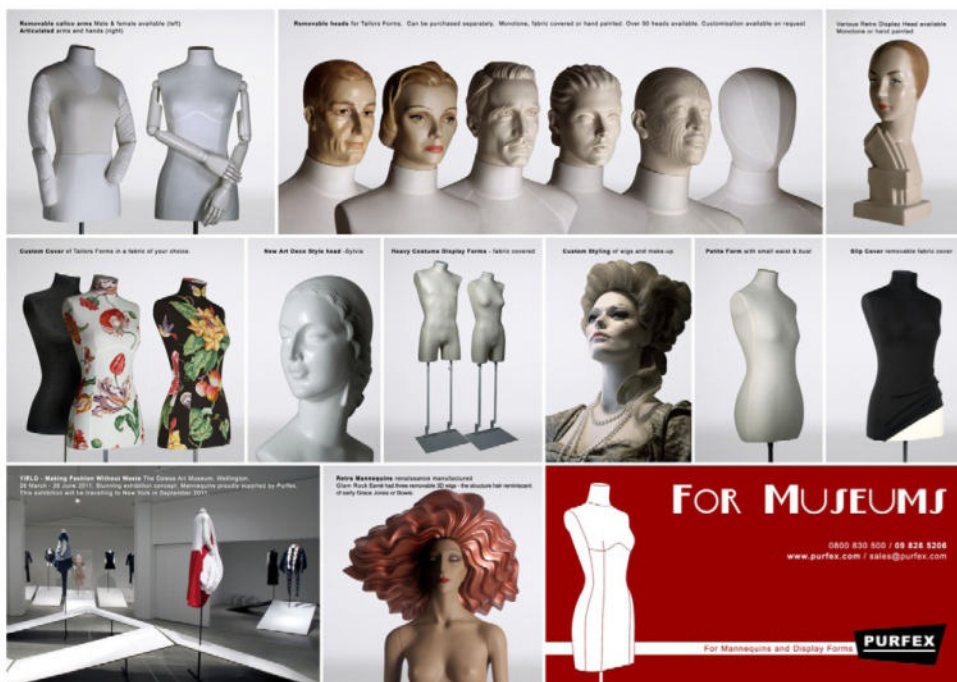
He says, "I have always had an interest in the representation of the human form ... us. When you look at it from a theological perspective, they – mannequins, religious statues, deities – are for us, about us, and serve us. It was serendipitous that I was sent to join the

business because, before Purfex, I was buying and selling at Cook Street and the International Markets. Sometimes I would buy old Purfex plaster forms that I then on-sold. In a sense, when I started at the company, I already knew their product. And the more I got involved, the more I saw some of the things that I had sold come in for repairs."

Trading is still a big part of Glen's life, and most weekends he can be found trawling Auckland's suburban markets. He reckons that his home is more or less furnished from the markets. One of his

favourite Auckland stores is Junk and Disorderly. "The owners Richard and Nicol are friends," he says. "They have an eye and a thing about mannequins, they have a nice collection and a lot of stuff from Purfex."

As far as the Purfex legacy goes, most of it is stored off-site in two 40-foot shipping containers. Not so long ago, Glen began divesting his personal collection of 150 mannequins due to a lack of display space. He acknowledges that there are other collectors around who have great private collections. In an



A small sample of Purfex styles through the ages. Glen still holds the full range of mannequins in two off-site shipping containers

“Here I am,
almost 70, still
working with
my hands and
most likely
will be till they
take me out of
here in a vat of
resin”

ideal world, he would love to see a public mannequin museum. “If there was one, I’d donate my entire collection.”

See and be seen

At the time of our visit, Purfex had just completed 14 mannequins for the upcoming *THIS IS NOM*d* exhibition at Dunedin Art Gallery.

The mannequins were customised specifically for the show. Another project Glen is most proud to have contributed to was a *Lord of the Rings* (LOTR) exhibition that travelled the world. The mannequins he made were faceless, but the body shapes had to resemble the LOTR characters: bust, weight, and height measurements. “We adapted our moulds to the individual characters and measurements. A crouching mannequin made for a tween series was used as Golem crawling up a wall.”

High-profile multimedia artists like Yuki Kihara, Michael Parekowhai, and John Iaone have commissioned Purfex forms too. Parekowhai’s *Kapa Haka* figures were the largest moulds that Glen has ever made. “It was rubber, two sides, like a gigantic sarcophagus; we had to use a fork hoist to lift the top off,” he says.

On John Iaone’s *Hula Boy*, Purfex also fitted a windscreen wiper motor to drive a hula skirt.

Glen is confident that “Many people will see Purfex in their daily lives. If you are looking at clothes in a shop or an ►



Faces

Heads and faces are created using rubber moulds.

They receive an initial grey primer undercoat, which etches into the body of the glass; the second coat is an acrylic white. Faces need to be sanded to smooth out any holes before applying a second undercoat. Usually, at that stage, all holes are sorted and ready for the top coat.

There are over 60 head choices in the Purfex catalogue, all individually named, including an ‘Austin’ and a ‘Diane’ – after Glen’s mum – in the retro range. “When Austin first started, he ripped Diane from an early 1900s haberdashery form. Clients can have any head, on any body,” Glen says.

His most controversial head has a full-face moko. Glen says, “They were commissioned by Te Puia and carved at the Institute of Māori Arts at Te Puia, but I have people come in here and challenge me. They say it is illegal for me to own one or that it was done as mokomokai (preserved tattooed heads). It was not. It was carved by Māori for Māori to display in their design store, and it was made by me. These are our stories.”





artwork in a gallery, whatever, Purfex is there as a support act.” Recently, he noticed some of his older works artfully modelling fetish gear in the windows of a nearby adult shop.

Religiosity

In addition to custom commissions, Glen hires out mannequins from his personal collection. Film crews are regular clients. When TV productions like *The Brokenwood Mysteries* are shooting religious scenes, the art department will likely approach Glen first, as he still has a large personal collection of religious statues and accoutrements.

He says, “I’ve always been attracted to holy statues; it’s just how I am. When I started hanging around with Catholics, I really liked the pilgrims, saints, and Our Lady of Lourdes. My grandmother was an Irish ‘Proddi’ and definitely against that Catholic stuff!”

Until recently, Glen produced his own range of holy statues, which, really, was a labour-of-love job, but he says, “It was important for me to make them here, in New Zealand, because they were reflective of and grounded in our culture and faith in the ‘more than’.

“I sold my historic religious moulds – including a life-size Jesus – to a Catholic group in the South Island. I still miss them, and I regularly get asked to make an Our Lady of Lourdes. I will probably make another mould because, from a spiritual perspective, I really like putting her out into the world. Of all the saints and the corpus, the most popular thing was Our Lady of the Lourdes.”

On a completely unrelated Catholic matter, Purfex was commissioned by the church to create a one-of-a-kind Bishop Pompallier mannequin. This was first sculpted in clay from printed imagery. A plaster cast was then taken off the clay, and a fibreglass cast was created from the plaster one, which was then worked on until perfect, before rubber moulds were taken from it.

Chapel/Temple

As to Glen’s own spiritual journey, he says it began at age 15 when he first walked into a Hare Krishna temple.

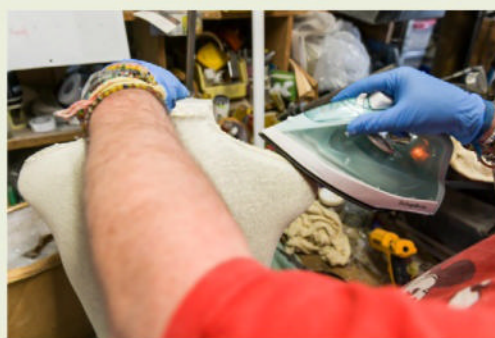
It was an experience that changed his outlook on life. As a practising ►



The interior of Glen's Temple of Peace



Body parts and body moulds



Surfacing

"Most of the forms we make today are calico cloth—covered forms from the Tailors Collection. They are very easy to use, and they can be taken to pieces," Glen says.

Once the mannequins are freed from their moulds, then cheesecloth is first glued to the form, which serves as an undercover.

For a finer final cover, Glen outsources to his friend Kat to cover the mannequins with calico. He says, "Austin's wife, Vera, was a milliner/seamstress, and always did it this way, and that is how I've carried on."



Every room of Glen's home constitutes a mannequin showroom

“Working
with our
hands heals
our bodies”

Vaishnava, aka Nanda Kishor, or ‘Son of Nanda’ – with a polytheistic interest – his backyard temple is used as much for groups as it is for personal prayer, and he says that he dresses the deities once a month.

The temple was built in 2008 and holds special significance not only as a place of worship but also as a memorial to Fraser, who died that year.

“We had bought all these kauri church

windows from Richmond Antiques near Nelson. And I had old roof tiles to match the house, so I got a builder to help extend the existing tool shed,” Glen says.

From floor to ceiling, the interior is every bit as ornate as any small temple in India. The key difference being: Glen’s display of random Stations of the Cross tablets and an ‘Our Lady of Time’ statue, which was made by a school gardener

who Glen says had had a vision of her. For Glen, all references to the divine are reflective of the “more than”.

The same could be said for entering the Purfex shed and Glen’s world. More than just a workspace, it is a celebration of the practice of craft and manual work. As Glen says, “It’s a biodynamic thing; working with our hands heals our bodies.” 🏠



Our Lady of
Time in the
Temple of
Peace



Glen holds an assembled but unfinished body destined for the wardrobe department on an undisclosed movie set



YF-370 leads, meter, and book

<< Continued from p69

Current

'DC' is 'direct current' and is what comes out of a battery. 'AC' is 'alternating current' and comes out of a mains power socket or a transformer in a device or power supply.

Note that the maximum numbers shown will be 1.999 on the 2V range and 19.99V on the 20V range. In most cases, the last two digits can be ignored. For example, if you're using the 20V range and seeing 17.28V or 17.47V, this is near enough to 17V. If that is from an 18V supply, it is possibly 'near enough'.

Resistance

The next section is resistance and this should only be used with any supply voltage OFF.

The ranges go from a maximum of two megohm (MΩ) to a 200Ω range, the lowest resistance range for checking wires and switches for their OFF/ON.

The next measurements measure semiconductors for continuity, and some understanding of semiconductors and transistors is really needed if it is to be used.

At the top, to the right of the OFF position, two AC voltage ranges are marked 'V~'. The wavy thing (~) means AC.

The current range usually has a fuse

in series with the middle socket, and it is common for someone to have blown it.

The high current range (third socket up) doesn't have a fuse, so in desperation it might give a bit of information if needed. Is there any current flowing down 'this' wire?

What use is a meter?

There are so many reasons why the battery/ies for that power tool don't work. Questions: Do they have any voltage and is it near what it should be? Is the charger putting out anything?

The transistor radio isn't going. Batteries flat? If they are OK, is the problem dirty contacts?

The TV remote is not changing channels. It can be checked using a digital camera or phone's camera to see if it is putting out a light signal, so if nothing is seen, are the batteries OK?

The car is not starting. Is the battery 11V or less? If over 12V, what happens when you try to crank it? If it is low or the voltage drops greatly, maybe it is a battery fault.

Your ukulele or guitar tuner isn't displaying. Battery or the tuner unit? And you can check everyone else's tuner at your weekly group music meeting, and be thought better of, if your playing isn't as good as it could be!

A mains-supplied power tool or appliance is intermittent. Start with using a resistance setting, ON switch

ON and then measuring across the plug's phase and neutral pins (the ones at an angle). Wriggle the cord, try switching it on and off. Thump it. Yes, a little violence might show something such as a loose contact.

Connecting things

Two common ways of connecting wires are using a 'chocolate block' or soldering the wires.

The chocolate block is so named because it looks a little like a block of chocolate. Common ones come in a strip, and as many as needed are broken or cut off, wires inserted into the holes, and screws clamped down on the wires.

If soldering, for most domestic use, a 25 or 30W iron is enough. Solder – tin 60 per cent and lead 40 per cent – is the alloy we used to use. It might be found with the name 'Duratech'.

It melts at a lower temperature than its replacement, but it does have lead in it. This article's author, having used this all of his life, might not live to much more than 100 years of age, and for someone who does a solder joint once or twice in a decade, lead poisoning won't be any problem.

The replacement solder is tin and copper, lead-free solder, which melts at a higher temperature. The solders come with flux in the solder wire, and if the joint is clean, extra flux is usually not needed. 📦

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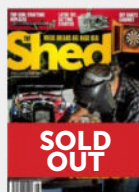
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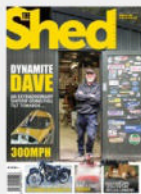
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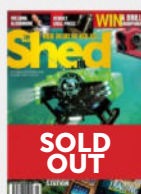
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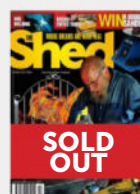
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A shed brings men together in one community space to share their skills, have a laugh, and work on personal projects or within a group for the shed or community.

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repairing old bikes for community distribution, building planter boxes for the main street of the local central business district, the list goes on.

The shed is a great place for blokes to learn new skills. We see builders teaching

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Penama Provincial council, Saratamata, Ambae Island, Vanuatu

LOCAL FOCUS



Mark meets an ex-police officer who has not only done exemplary service here for us but also served overseas in conflict zones and trained locals in policing

By Mark Seek | markseek@rocketmail.com
youtube.com/@theshedshrink
seekthrive.co.nz

Well, *Shed* readers, here we are already halfway through the year.

I hope this issue finds you happily tucked away in the shed, up to your elbows in grease, oil, paint, wiring, wood shavings, or whatever your latest project demands.

With fuel prices showing no sign of easing, it seems a good time to look closer to home and enjoy what's sitting in our own backyard. With that in mind, I pointed the old Softail towards Ashburton and found plenty to keep me interested at the Vintage Car Club (VCC) Swap Meet. Punters headed home with treasures under their arms, while vendors moved everything from hard-to-find parts to half-finished projects at sharp prices.

The strong showing of modern Japanese classics was a welcome surprise too, clearly hitting the mark with younger enthusiasts and showing

youth culture at its best on two and four wheels. It was my first time at this annual event, so well done to the organisers. I later learned that it lined up with Wheels Month in Ashburton, which explained the hot rods, classics, and bikes dotted around town. Put it in your 2027 calendar; it's well worth the ride.

Who wants to be in *The Shed*?

Keeping things local, I put a call out on the Selwyn Facebook Community Page looking for story leads for *The Shed*.

To my surprise, Matt Emery's wife got in touch. Matt was a little hesitant at first but kindly agreed to sit down over a cuppa and share a few yarns from his career. Thanks, Matt, for giving us a rare firsthand look into the life of a veteran New Zealand Police officer and Armed Offenders Squad (AOS) member.

Matt's first posting after police college

took him back to the streets of Porirua, his hometown, where community policing gave him the grounding to become a good cop. He says the ability to talk with people, listen properly, and show respect has stayed with him throughout his career. Most of the time, he reckons, respect is returned, though as any front-line officer will tell you, some days don't quite follow the script. When I asked about support for officers on the front line, Matt said debriefs are now a vital part of the job, helping build trust and ease the fatigue and stress that can build over time.

Overseas deployments

After nine years on the front line, Matt was promoted to sergeant in 2002 and soon found himself on the first of many overseas deployments, beginning in the Solomon Islands.

In 2004, he served as shift inspector in Honiara, mentoring members of the Royal Solomon Islands Police Force and leading 30 police staff from 10 Pacific nations. It was a role that showed the practical value of New Zealand Police experience, training, and steady support in the wider Pacific.

Matt is also quick to credit his wife as the rock behind the scenes, particularly during the long stretches away from home. In 2006, he returned to the Solomon Islands for a five-week emergency deployment following rioting in Honiara. By then, he had already been promoted to senior sergeant, later serving in Wellington Central,



Matt heading up a leadership course, Santo Island, Vanuatu

Professional Standards, and Porirua before moving to Selwyn in 2007 with his growing family.

Training police recruits

In 2010, Matt deployed to Afghanistan as part of a three-person New Zealand Police team based at Kiwi Base in Bamyan Province.

Working alongside New Zealand, Singaporean, and US military personnel, he helped train Afghan National Police recruits from five neighbouring provinces, supported the Bamyan Police Quick Reaction Force, and helped develop command-and-control training later adopted by the European Union Police Mission in Afghanistan.

Back home in New Zealand, Matt held several senior sergeant roles, including sub area supervisor Christchurch and district operations planning manager, where he helped plan policing operations for major events and official visits. From 2013 to 2017, he deployed each year to Tonga, mentoring the Tonga Police Tactical Response Group in armed-offender response. In 2017, he became Canterbury rural area prevention manager and later completed a secondment in Ashburton.

Alongside that work, Matt spent 21 years with the AOS. He joined Wellington AOS in 1998, was later seconded to the Special Tactics Group, and joined Christchurch AOS in 2008 as second-in-command. Over the years, he led many AOS operations and instructed on qualifying and command courses.

Nearly 30 years of service

His most recent overseas posting was as senior advisor with the Vanuatu Policing Programme, where he spent two years helping the Vanuatu Police Force strengthen community policing, decentralise services, and build prevention-focused strategies. He also assisted with Covid-19 planning and, after Tropical Cyclone Harold, deployed to Santo to support emergency command and control as the only New Zealand Government representative based there.

Matt's final police role was officer in charge of Harewood Patrol Base, overseeing Christchurch Airport Police and the Canterbury Police Dog Section.

A few of Matt's yarns from decades of service

"In the Solomon and on my first patrol, a man came running up saying in Pijin, 'Quick, quick, man kilim wife.' I feared we were dealing with a homicide, but soon learned 'kilim' means 'hit', not 'kill'. The offender was found, arrested, and charged with assault.

"District training in Afghanistan, the day after the first Christchurch earthquake in 2010. I began explaining the damage back home, then realised the class already lived without reliable power, water, or intact buildings. I moved on pretty quickly.

"One Christmas Eve in Porirua, we executed a search warrant at a house with a large Rottweiler. A teammate grabbed a dry-powder extinguisher instead of CO₂, filling the room, the furniture, and our uniforms with white powder. It turned into an unexpected white Christmas. I later had my eyes checked, but no damage was done."

He retired from New Zealand Police in November 2022 after 29 years and eight months of service – a fair innings by any measure. 📄



Matt with members of the Crime Prevention Unit, Vanuatu

THE Shed QUIZ NO. 10

1



What capacity power bank do I need to recharge an average Android cell phone twice?

- a) 5000mAh
- b) 12,000mAh
- c) 25,000mAh

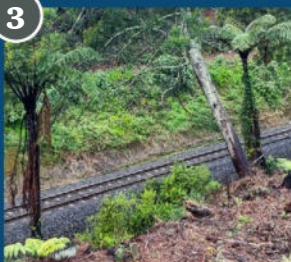
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What size solar panel do I need to recharge an average Android cell phone once on a sunny day?

- a) 10W, approx. 25x30cm
- b) 15W, approx. 30x35cm
- c) Either of the above

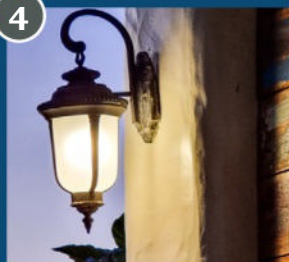
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What timber was originally used to make railway sleepers in New Zealand?

- a) Tōtara, rimu, and mataī
- b) Kauri
- c) Jarrah

4



What material is the filament made from in most incandescent light bulbs?

- a) Nichrome
- b) Tungsten
- c) Titanium

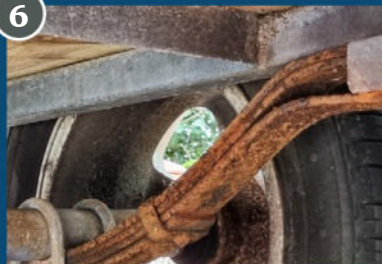
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Who patented coil springs for use in transport?

- a) James Watt
- b) Joseph Whitworth
- c) Richard Tredwell

6



Who invented flat springs?

- a) Isaac Newton
- b) Charles Darwin
- c) Nobody knows

7



What is the purpose of anodising aluminium?

- a) It makes the aluminium more resistant to corrosion
- b) It makes the aluminium more resistant to wear
- c) It can provide a decorative appearance
- d) All of the above

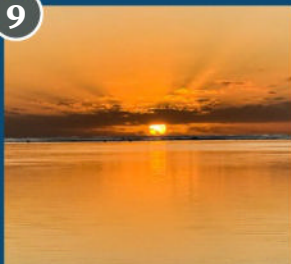
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How hard is the anodised surface of aluminium?

- a) Second only to diamond
- b) Similar to steel
- c) Similar to powder coating

9



On clear days, there is a green flash that can be seen at sunset.

- a) True
- b) False

10



The titanium nitride coating on drill bits helps them to last how many times longer than uncoated drills?

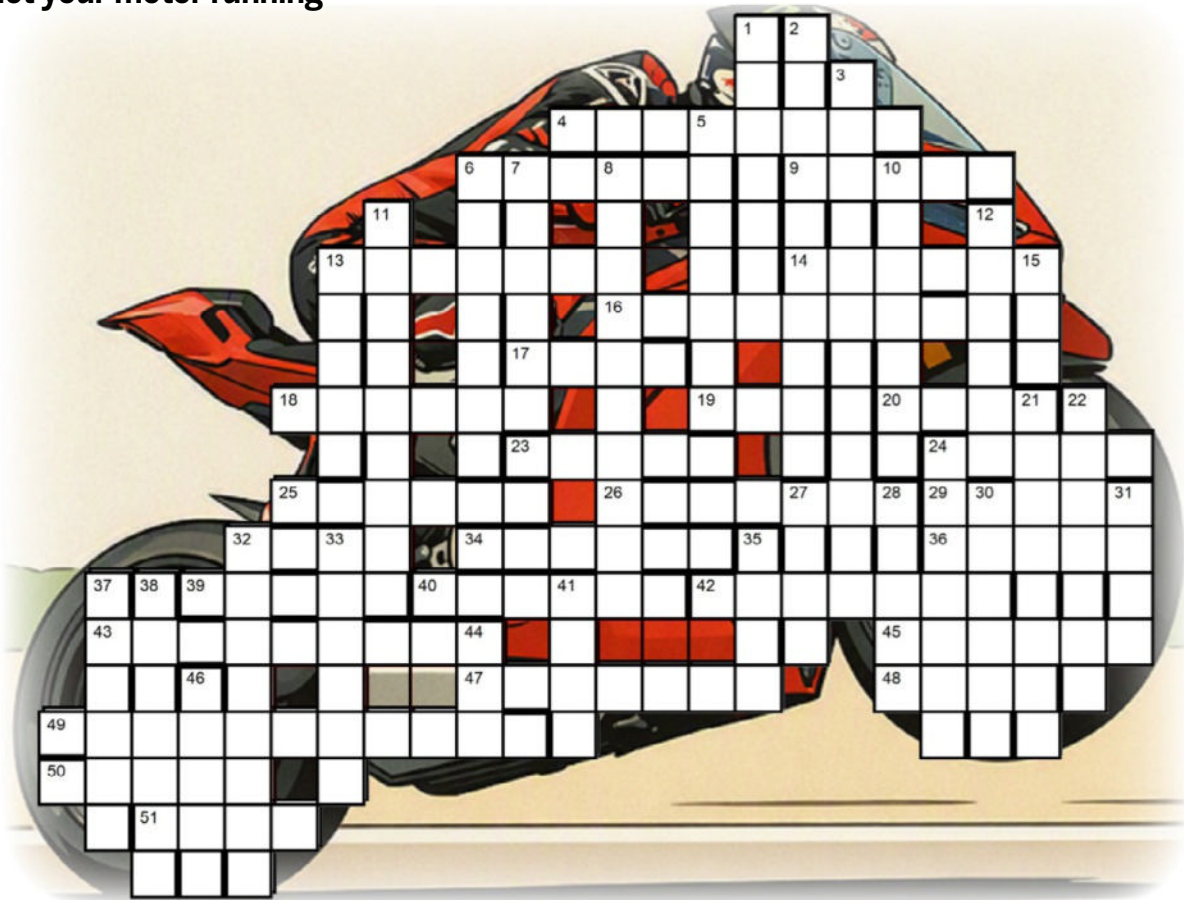
- a) Ten times longer
- b) Five times longer
- c) Three times longer

Answers: 1. (b) 12,000mAh. Taking 5000mAh as an average cell phone battery size and allowing for efficiency losses. 2. (a), (b), and (c): each answer is correct, but the 15W panel will provide a faster charge rate. 3. (a) Tōtara, rimu, and mataī, as they were hardwoods that were easily available at the time. 4. (b) Tungsten. 5. (c) Richard Tredwell in 1763 patented 'Springs for Carriages'. 6. (c) Nobody knows. The history of flat springs goes way back. An early example is an archer's bow. 7. (d) All of the above. 8. (a) Second only to diamond. 9. (a) True. It only lasts one or two seconds and is caused by light refraction. 10. (c) Three times longer.

THE SHED CROSSWORD NO. 7

Get your motor running (Questions or comments? Visit <https://mayaofauckland.substack.com> or email crg1955@gmail.com)

By Māyā



Across

- 4 NZ song admits profound about race? (8)
 6 Mr Munster loses his head for good revealing nationality of those credited with building the first 8 (6)
 9 Not quite finally, he has the sky on his shoulders (5)
 13 See 38
 14 8 manufacturer of the French acid, it's said (6)
 16 Drift to Everest or bust (9)
 17 Soldier with hands on young woman (4)
 18/32D Engineer Leonard shy around eager 8 manufacturer (6-8)
 19 McGlashan's dress? (3)
 20 Baker's 29, hatless? (4)
 23/5 Roy Allen dropping large answer for 8 manufacturer (5,7)
 24 Different article, gilt-edged (5)
 25 See 38
 26 Caught Dennis with e.g. a customised 18/32D from 11D (7)
 2 Unit of capacitance is nothing bodacious (5)
 32 See 14 Down
 34/13/25 Scout infiltrates Dawn's dos in disguise (6,7,6)
 36 Plants papers stolen from

the State (5)

- 39 See 39 Down
 40 Chief Lambert oddly without PPE (6)
 42 Duck! Here comes the 34 13 across steam locomotive! (7)
 43 Exciting the clergy? (7,2)
 45 Commander, for example, is from north or to north? (6)
 47 True, one is travelling (2,5)
 48 Glide from outskirts of suburbia with the Italian (4)
 49 Moulded braids doing as a form of cornering used in 4 (11)
 50 Toasts antagonist in "The Simpsons" and "M*A*S*H" (5)
 51 "___ diel" to make an entrance (4)

Down

- 1 Nice if went like a 3 back to 8 attachment (7)
 2 EM Forster's novel could be a clue for 'D'? (7,3)
 3 Eponymous heart of Michael Lee Aday's debut album (3,3,2,4)
 5 See 27 Across
 6 Best friend from the south admitting Hooper to retire (2,2,3)
 7 Greeny could produce a clean version of this? (6)
 8 Spy captured conservative who caught cold and caught

Answers: The Shed Crossword No. 6



- conveyance (10)
 10 51 perceive reportedly what James Bond has (7)
 11 Nauseous loper having no leads for the adventures of Peter and Dennis (4,5)
 12 Let it stand about regarding this way (6)
 13/32A Fortune holds remote manipulators decapitated, which is enough to kill (5,4)
 15 See 31
 21 Song thrush gets time for special valve (8)
 22 Transmission from actress hiding hand to vote (7)
 24 Spoilt ace in fast car is away from the 12 (3-4)
 27/15 Piano I'll redesign, taking out a back seat (7)
 28 Rulers of Gormenghast not

- good for horses (5)
 30 Buzz heard in spacecraft? (6)
 31 French precursor to daylight? (4)
 32 See 23 Across
 33 What Desirée wants to do with the clowns in humorous ending (4,2)
 35/39 About to fix, without hesitation, a sport 8 (4,5)
 37 Peter out switching ends for practice ... (3,3)
 38 ... achieves notes, registers cuts, snaps bugs ... (7)
 41 ... told score to 6 across political philosopher (4)
 44 Lock up inept naked turn (3)
 46 Leading hotels and nightspots of Italian capital (5)



Jim Hopkins and Mark Beckett man *The Shed*'s Big Boys Toys stand in 2014

JIM HOPKINS

A KIWI SHED LEGEND



“His support and interest in homegrown innovation was long-standing”

By Jude Woodside

I was shocked to hear that Jim Hopkins had died recently.

Jim was my predecessor in this column, something that we have had since the start of *The Shed* magazine. Jim was a major influence when I started the magazine back in 2005. His books on *Men and Sheds* and *Inventions From the Shed* demonstrated that there was an opening for the kind of magazine that I envisaged for *The Shed*. Something for artisans and tinkerers alike. So Jim was one of the first people I contacted and asked to contribute.

A background in television

He made this column his own for 12

years. “Absolutely, old boy” were his exact words, as I recall, when I put to him the prospect of his helming this column. He often spoke like an Edwardian escapee from a PG Wodehouse novel. Probably something to do with Christchurch being ‘more English than the English’ thing.

When we hosted a pavilion at the Big Boys Toys show in 2014, Jim flew up from Christchurch to be available at the stand, autographing magazines and chatting to our visitors. He was instantly recognisable to our visitors and quite an attraction. He always expressed a real interest in the magazine content; it was clear that he

read every issue.

His support and interest in homegrown innovation was long-standing. He had been involved in a television series, *The Inventors*.

Jim had a background in television, writing for early New Zealand soaps and appearing on panel shows, and he made his own documentary version of his book *Inventions From the Shed*. He was a skilled presenter and in demand as an MC, hosting the Farmer of the Year shows for 21 years up to 2011. He had shows on Canterbury TV, including *The Knackered Chef* and *Jim Hopkins Tonight*, with his trademark red-framed glasses and tape-measure suspenders.

Serving his community

Jim did everything with enthusiasm.

He pressed me to turn *The Shed* into a TV series. However, having a background in television myself, I appreciated the logistics involved, and I suspected we couldn't do a magazine and a TV series.

But aside from the jocular, effervescent presence, there was another more introspective side concerned with the welfare of the community. He spent four terms on Banks Peninsula Council before moving to Oamaru and being elected to Waitaki District Council in 2007. He served on the council as deputy mayor for nearly two decades, where his wit made long meetings more bearable. He was reputedly an assiduous reader of reports and could be relied on to have read the material up for discussion in fine detail.

Despite Jim's compelling presence on TV, in words and wit, in his political contributions, he was always in tune with his audience, and a man whom fellow Waitaki councillor Brent Cowles said could “break into song at the most unexpected moments.”

The Shed editors Terry Snow and later Sarah Beresford were at times despairing of getting copy [I can sympathise; the incumbent has similar habits – Ed.], but it always materialised just in time.

He is sadly missed. Vale Jim. 📄

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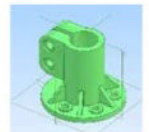
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