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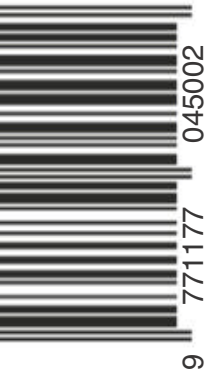
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NOVEMBER—DECEMBER 2021
ISSUE 99
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READERS' CHOICE

Shed reader Ron Panckhurst's choice for an article for the magazine was on a power hammer build

We really do appreciate it when our readers get involved in the magazine.

In the previous issue of *The Shed*, we received a letter from a reader asking if we could help them with an article on building a power hammer. We didn't have an article on that on the go so we asked if any readers could help. Happily, several readers from all over the country replied, saying they had built, or were building, one and were happy to share their project with us. So, even with the obvious difficulties of a nationwide lockdown, we managed to get an article written and photographed for this issue. A great effort from our Ritchie Wilson and unlimited assistance from our two hammer-building sheddies, Ian Knight and Mike MacMillan. Thank you all, and thanks to our reader, Ron Panckhurst, who requested the article.

If you want to choose a project that we can feature in the magazine, do get in touch. We appreciate what our readers choose.

Also on the subject of choice, *The Shed's* esteemed founder, Jude Woodside, is talking Covid jabs in his Back o' *The Shed* column this issue and, like me, is completely baffled by anti-vaxxers.

Many claim they won't get a vaccine jab because they don't know what's in it, and I totally agree with that because I don't eat KFC or most takeaways for that very same reason; I don't know what is in those, either. The difference is: one is made by a business trying to extract as much money out of me as

possible and the other is provided by our health department wanting to save my life.

When I go to an optician and he gives me a bottle of drops for my eyes, I take it even though I have no idea what's in it. If I need drains laid, I can't do that. I need an expert to do it and I trust them because they have been doing nothing else for decades. If I get unwell and go to the doctor and they say take these tablets and you will get better, I do it. I have no idea what's in those, either.

As Jude also writes, we all had the polio vaccine as kids and we had no idea what was in that. We also had TB shots as kids. When I did my OE in the '70s, I stopped in Singapore for three days, and I had to have four or five weird vaccinations to do that. Same story, and I am still here.

Anyway, this darned bug is a lot worse than anything I have seen in my lifetime; I see that Covid-19 has now killed more people in the US than the 1918 flu did, even with all the medical knowledge and support we have available these days — that is one compelling fact; this is darned serious.

If that doesn't make folks get the jab, I don't know what will. We don't want to lose any readers, any sheddies, family, and friends. So it is our readers' choice, of course, but please get the jab and let's get back to some sort of normal. We all have lots to get on with, and we can't until this bloody thing is behind us. 📁

Greg Vincent
Publishing Editor

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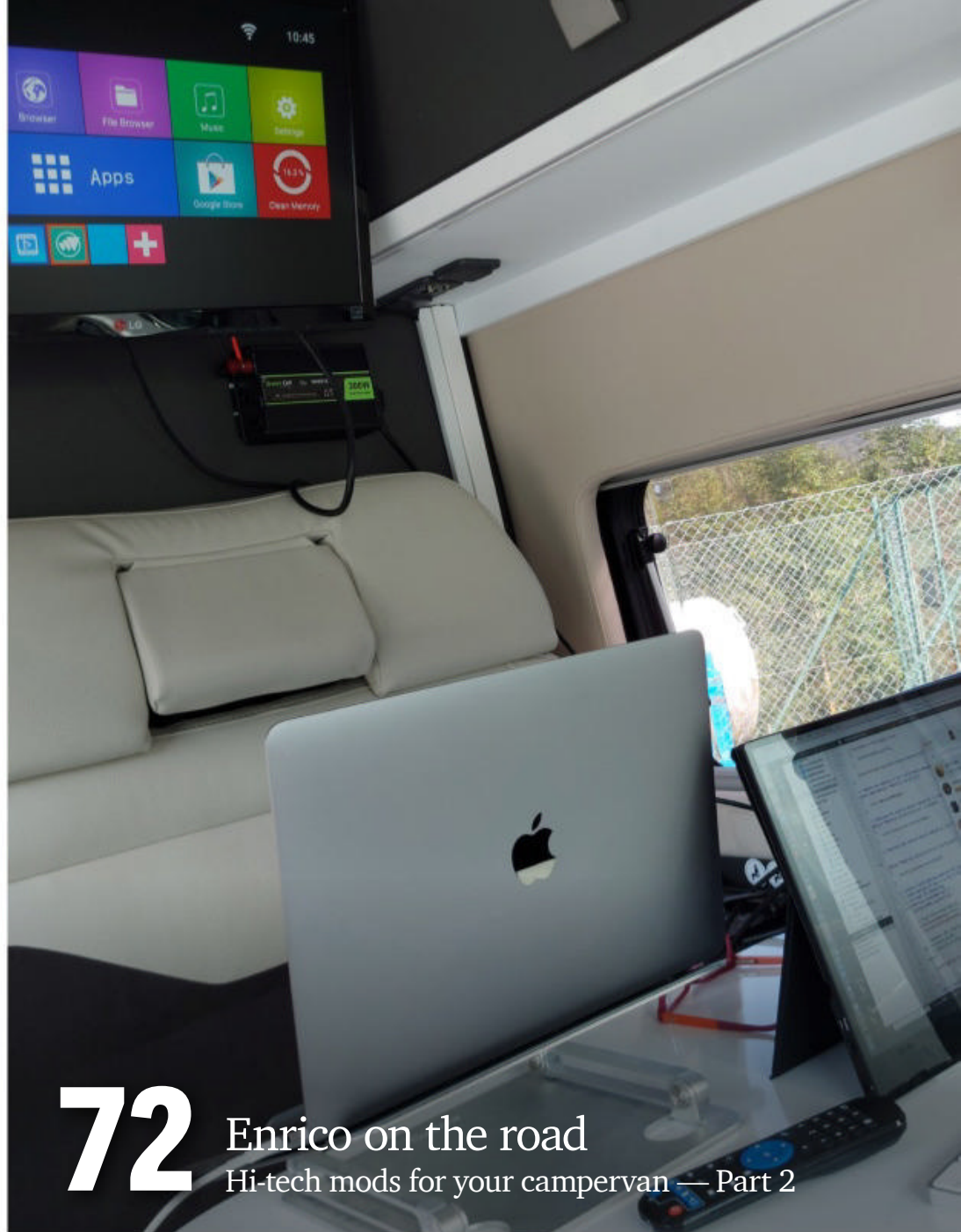
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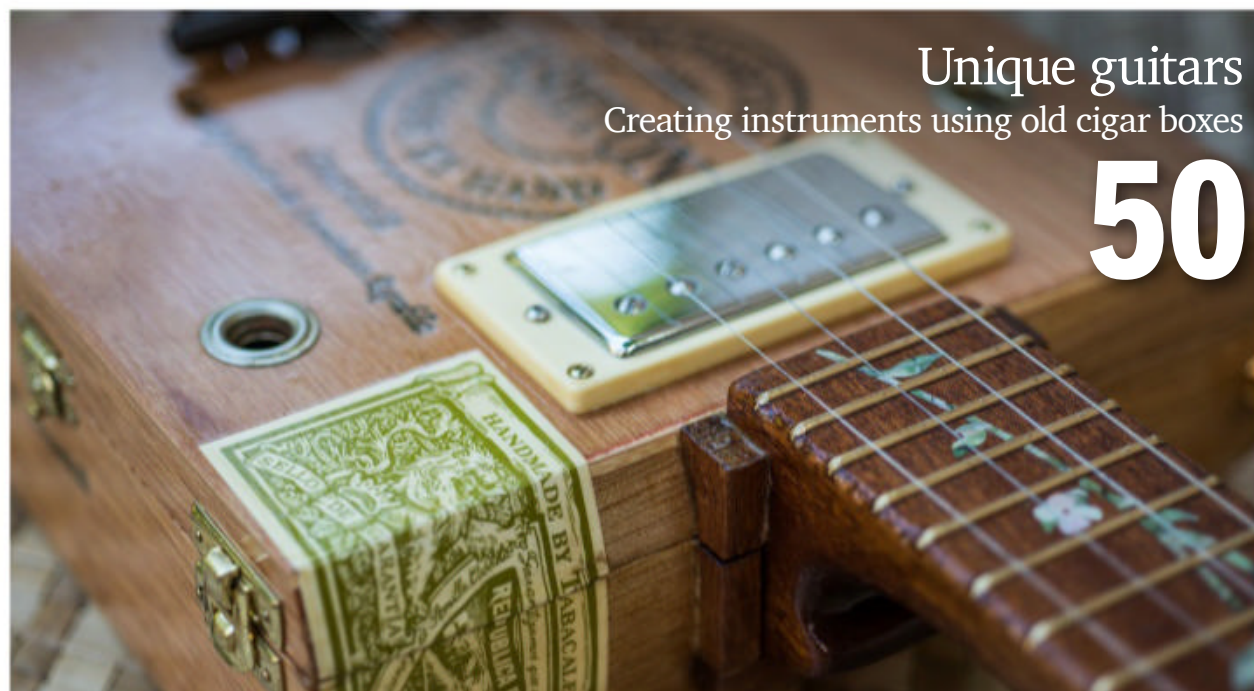
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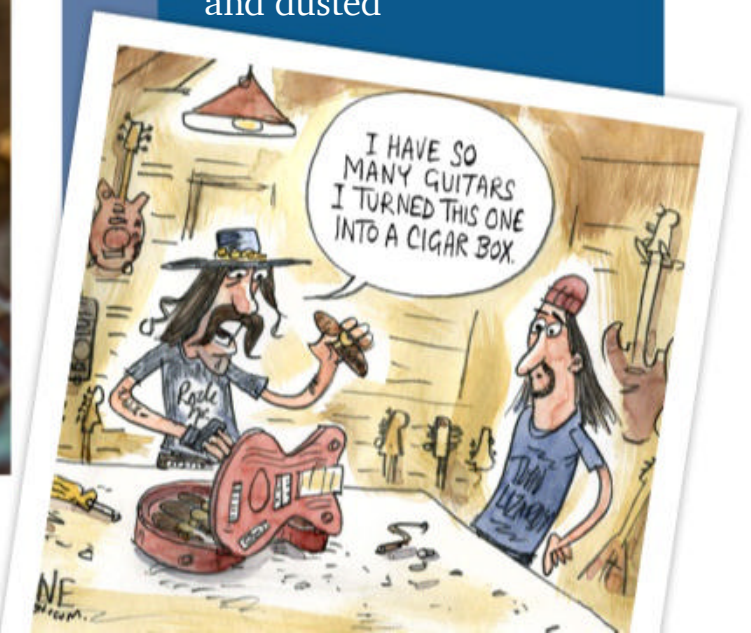
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DITCHING THE INFLATABLE

Building a versatile nesting dinghy makes a satisfying lockdown project

By Gail Varga

Photographs: Gail Varga and Dean Jones

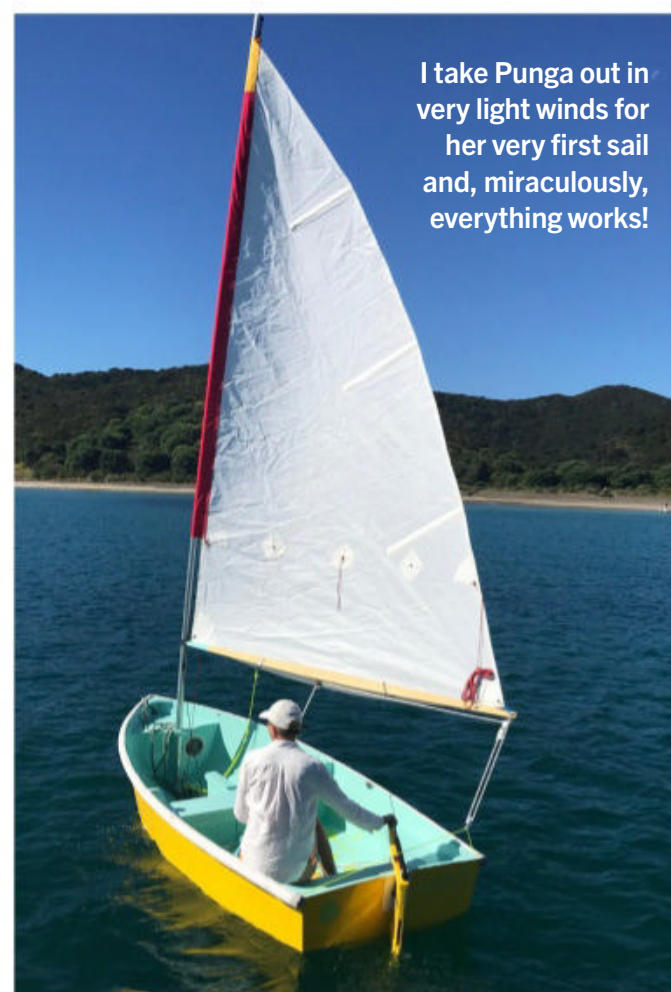




Punga was built as one boat with this pair of mating bulkheads in the middle ... then she became two boats when I sawed her in half



Unpacking the virgin sail—fresh from the sewing machine—alongside the ‘big’ boat



I take Punga out in very light winds for her very first sail and, miraculously, everything works!

To start at the very end: this is my little two-part nesting dinghy, ‘Punga’, sized and built to be the new tender to my 40-foot sailing yacht Local Talent. It is a Spindrift 10, 3.1m long and plenty big enough for two to four people, made from a design by B&B Yacht Design in North Carolina, USA. I built it in an old boat shed just up the hill from the Town Basin Marina, in my home port of Whangarei. It rows beautifully when distances are not so great, and can go farther afield under sail or motor. However, its seagoing options have also most definitely been exploited for nothing more than fun at times.

Discovering solutions

One of the chief beauties of making things myself is making them unique. This can be as a result of finding a good way to get around a problem with limited resources, simply through making creative choices about what to use or how to use it, or inventing new solutions altogether. Punga is no exception to this, and has many little quirks, the most admired of which has been its fishy interior.

When I was toying with different boat design solutions that would make storing it on our sailing yacht work, I considered making a one-

part dinghy with clear panels in the hull to allow light to come through when it was stored upside down over the light-giving forward hatch — meaning that, when in the water, the dinghy would essentially be a glass-bottomed boat.

I didn’t follow through with that idea, but it gave rise to another idea to meet another problem: a painted boat is destined to be slippery, so I solved this by painting fish inside the boat with non-skid paint — basically, grit mixed in with the paint I already had; almost as good as a glass-bottomed boat! ►



Shed owner and boatbuilder team go for a row on launch day



George Latham, still working marvels in his workshop, decades after building his own boat and sailing around the world in it



Shed owner Barbara is no stranger to small boats herself. Here we are discussing the merits of the tiller extension before I fit it to the rudder assembly in the final stages of the build

My first boat build

Way back when I started to talk about building a dinghy, the idea seemed to inspire interest around me. Although I had not built a boat before, the concept of a female boatbuilder was definitely an exciting one for some people.

Being a person with a lot of practical experience and skills in both the ‘pink’ and the ‘blue’ line, I am quite used to this novelty factor and I secretly love being the woman to blow away the notions that women can’t handle tools and materials — and note, I am anything but butch.

I am sure there were those who thought I couldn’t build a boat, or at least wouldn’t, but when it became clear that I was serious, help piled in alongside admiration, and there are not many better things to aid you in a project than the right kind of help and a bit of well-placed admiration.

“I am sure there were those who thought I couldn’t build a boat”

A borrowed shed

Crucially, a friend, painter Barbara O’Sullivan, offered to lend me her shed for the duration. At first I thought the space was extravagantly big, but it turned out to be the perfect size because it was ample enough for me to move my workbench around easily and stand away from the boat a little to assess its shape or the quality of the paintwork.

Barbara’s neighbour, George Latham, also stepped in. George is a long-standing friend and a sailor to boot. He

built the boat that he has sailed around the world in from the hull up and, as he puts it, has “made a lot of sawdust in [his] life”. Such an inspiration, and still an active sailor and carpenter at 86 years old, he did what perhaps no carpenter should ever do: he gave me the key to his workshop and the treasure of tools within. How flattered I felt. He also offered advice and helped me rip timber, whilst he and his wife Ellen did not deal in small enthusiasm for what I was doing.

More friends step up

Several other friends added to the — never large enough — store of clamps that I used; I was lent some excellent sawhorses of just the right height to construct my workbench. One member of staff at my local chandlery — also a small-boat builder — gave masses of product advice; other people lent me vacuum cleaners and helped with transportation.

I would come home tired and dirty to my dear husband — who actually loved the old inflatable, I have to say — and find that he had posted pictures of my progress on Facebook and thus amplified the chorus of oohs and aahs that buoyed me along daily.

A lockdown project

Punga began as a Covid lockdown project and, like most projects, took a little longer than expected — about five months in total — partly because I chose not to take shortcuts that would compromise the quality of boat I was going to live with at the end of the work.

Punga would have been much faster to build had I opted to build a simple rowing dinghy, but I decided it was worth aiming high and adding to its practical versatility and capacity to be used as a ‘toy’ by creating a sailing version. I also fancied building a nesting dinghy to make it much smaller to store on top of the ‘big’ boat. ►

“He did what perhaps no carpenter should ever do: he gave me the key to his workshop”



I borrowed clamps from everyone I knew, and still I did not have enough! I used a mixture of temporary screws and clamps to hold the gunwales together as they dried



Creativity aboard

Not only am I one of seemingly few women sheddies, but I am possibly one of the only contributors who does not actually own a shed!

I have lived on and off a sailing yacht for more than 10 years, cruising the Pacific, Atlantic, Mediterranean, and Caribbean. Wonderful Whangarei is my home port, and the global Covid pandemic has kept me here — perfectly happily — for longer than I might usually stay, giving me the opportunity to build my first boat in a shed nearby.

I am happiest when I have a project and have good skills across a number of disciplines, from dressmaking and sewing to concrete work, carpentry, and all manner of building work. Not only am I practical, but I am creative and have a bent for decorative arts and design. I have had great fun, for example, creating extravagant stencil designs for walls that I have plastered, and tiling the bath that I have built — using swimming pool technology — with a mother of pearl and coconut mosaic.

Living on a boat often means living with quite strict limitations. What is relevant when it comes to project-making is that I have limited space, not only for working in, and making a mess or noise, but also for storage of tools and materials. Power is not on tap, either.

Even with such limitations, the shed mentality is unquenchable. The practical projects that have been easier to realise whilst living aboard have involved a lot of sewing with a light industrial Sailrite machine — upholstery, sails, and canvas work — as well as lighter sewing with a domestic machine. It was great to spread out and make some mess with tools and materials when I built Punga, but I dream of the day when I will have my own workspace again, and be able to get creative with my own resources around me and no distractions.

A nesting dinghy is, essentially, two boats that you fit together at twin, mating bulkheads in the middle of the boat each time you launch it, thus making it one boat. The bulkheads and associated fittings were one of the areas in which I diverged from the plans, so that definitely added a lot of time to the project, but, overall, choosing to build a nesting dinghy made Punga much smaller to store on the deck on our yacht, and that is a benefit to be enjoyed forever.

Nesting dinghy plans

There was not a great deal of choice when it came to buying plans for a nesting dinghy of this size. The Spindrift 10 was the sportiest available and gave me all the options to rig it for sail and take a small outboard.

Punga’s nested size — 154cm x 55cm x 128cm — meant it would fit comfortably forward of the mast and aft of the forward hatch, allowing the hatch to be opened for ventilation; nor would light be obscured. At this size, it also fits in the back of a bigger car, making launching possibilities huge for a leisure boater.

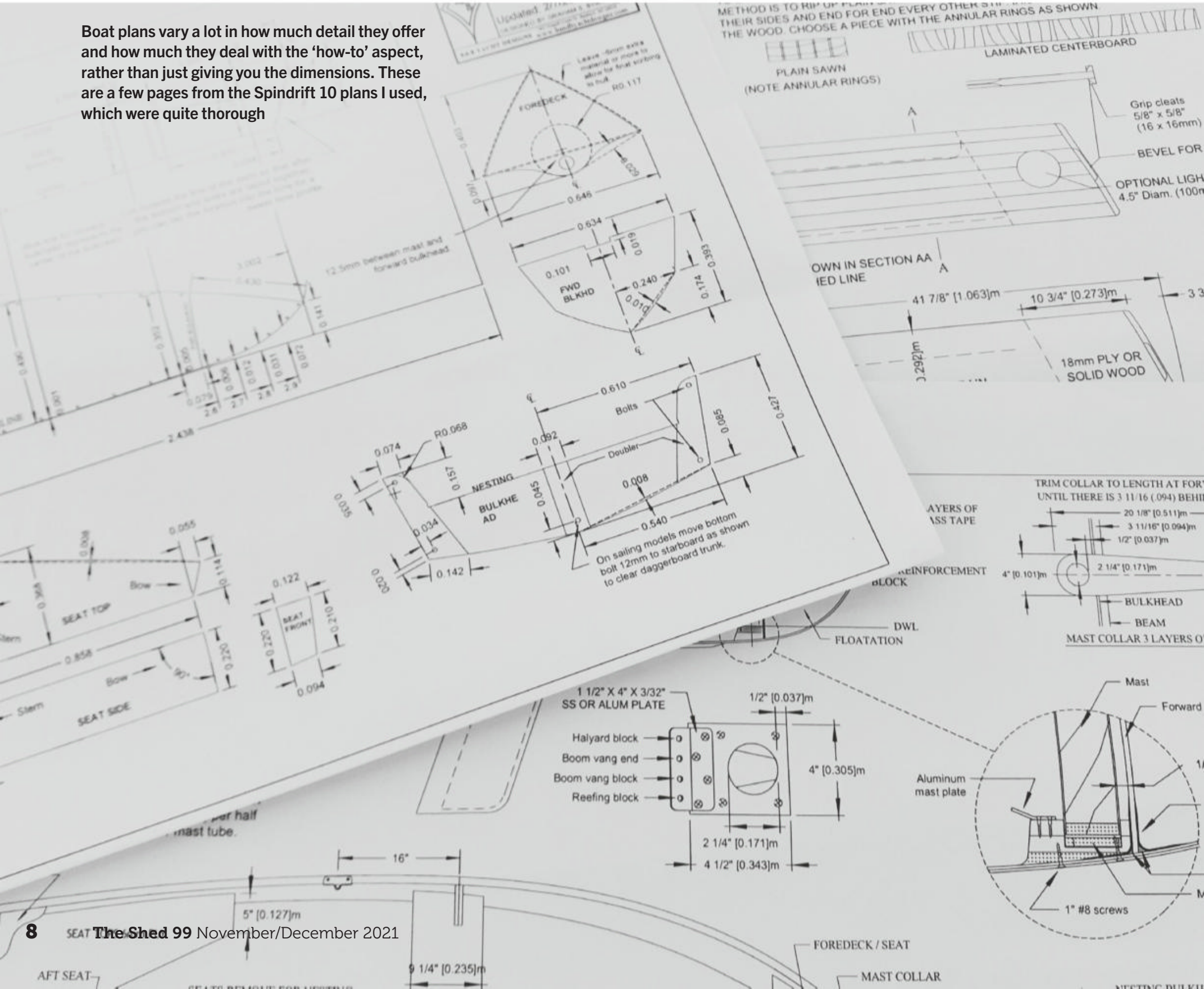
“A nesting dinghy is, essentially, two boats that you fit together”

After living with an inflatable up front for so long, I was looking forward to much better visibility forward when underway. The plans were US\$80 — sent electronically from the US — and included plenty of details and instructions, which broadly formed the outline of what I did. I was able to sneak in a couple of “Help!” emails to the designers — for instance, when it came to the lack of availability of the recommended size of aluminium in New Zealand for the mast, or other technical questions.

A stitch and glue design

Like many small boats — and some bigger boats — built by amateurs today, Punga is a stitch and glue design. Stitch and glue is an accessible technique that usually uses plywood and epoxy for making simple

Boat plans vary a lot in how much detail they offer and how much they deal with the ‘how-to’ aspect, rather than just giving you the dimensions. These are a few pages from the Spindrift 10 plans I used, which were quite thorough



Here is Punga ready to board from the water with the ladder fitted. Even when using the 3Hp outboard motor, it is very easy to get aboard at the transom.

Inflatable versus Hard Dinghy

Like most modern sailors, I have used an inflatable dinghy with an outboard motor as a tender more than anything else.

Inflatables have a lifespan of about eight years if they are heavily used, and afterwards take up a lot of landfill space. I thought I could do better than that: create a boat that was repairable — potentially for generations to come — and offered greater possibilities for fun and practicality.

There a number of advantages in the nesting dinghy that I have built against an inflatable: a boat that is practical to row — rather than being blown around; going farther afield without smell, noise, or expense; simply doodling around the anchorage for fun, by rigging it for sails. In addition, a 3hp motor is easy to lift onto its transom without a hoist and it goes quite fast enough — planes with one person aboard.

Inflatables are famously easy to board from the water, but my hard dinghy works very well, too, thanks to a small collapsible ladder that hangs over the transom. Plus, thanks to its single chine design, it is overall not too ‘tippy’. The ‘nesting’ concept — the forward half of the boat being turned around and stored inside the aft half — means that Punga takes up relatively little space when stored. Now I have more freedom to move around the deck and better vision forwards when underway. Punga also attracts a lot more attention than our old boring dinghy!



Forward of the mast and aft of the forward hatch, the nested dinghy fits perfectly. A couple of ratchet straps hold her down to the hand rails on the coachroof. We can still deploy the whisker pole from its mounting on the mast without problem



The boarding ladder is light and telescopes together (using a piece of velcro to hold it) to become very small

projects, which have the potential to be of the same high quality and as practical and durable as any boat around. The cut panels are drilled with small holes along the joining edges and are drawn together using wire or cable ties, which hold them until they are secured with epoxy, after which the ‘stitches’ are removed. It is conceptually simple, comes together to make a boat quickly, and is fun to put together this way.

The mast is made of three aluminium tubes that slide inside one another,

stopping at a fibreglass collar I added.

Alongside the tapered, rectangular cross-section, wooden boom and its pair of two-metre oars, the mast sections are stored vertically on the back of our yacht, strapped onto stainless uprights that carry our wind generator and radar, and held in self-draining bags made from old scraps of canvas. Punga also has a simple, reefing sail that I sewed to the spec of the suggested design and is certainly sporty enough to be used for racing. ▶



Non-skid painted fish save us from slips inside the dinghy and seem to delight anyone who sees them

“Like anyone who loves making things, I dwell upon the process and tweak the design endlessly”

Complex plan, simple design

With such a complex plan for its varied use, I made some choices that I felt I could to keep Punga simple in its design and future maintenance. One such example is the painter.

To attach a painter to a dinghy so that it can be tied up, an obvious solution would be to add a stainless steel eye strap or ring to the bow and tie on the line. Instead, I chose to reinforce the stem with extra wood and fibreglass and drill a hole through the lot. This means that the painter can be threaded through and tied in a stopper knot inside the boat without having any steel hardware on the outside that could potentially damage whatever the dinghy was tied up to — mainly the paintwork on our sailing yacht.

Keeping the versatility

The flotation chambers are just that: to keep Punga floating better if it is swamped with rain, by a capsize, or during towing. However, it is also possible to use these as small storage

places by adding watertight ports to the chambers.

This also appealed to my sense of increasing the dinghy’s versatility in simple ways, and the chambers have been used for storing a small bottle of spare fuel for the outboard, rags, cushions, shopping bags, and many other things. The forward round port was extremely successful, even with such a small hole for access, but the aft chambers, with larger access, leak through their ports, and I have yet to find a good solution for new gaskets that will keep them watertight.

Like anyone who loves making things, I dwell upon the process and tweak the design endlessly. I was encouraged to put wheels on the transom of my dinghy to pull it up the beach when making a beach landing. This did not sit well with me for aesthetic reasons, and also because they would have to be bolted and sealed through the transom into the aft flotation chambers, which I considered an obstacle. ►

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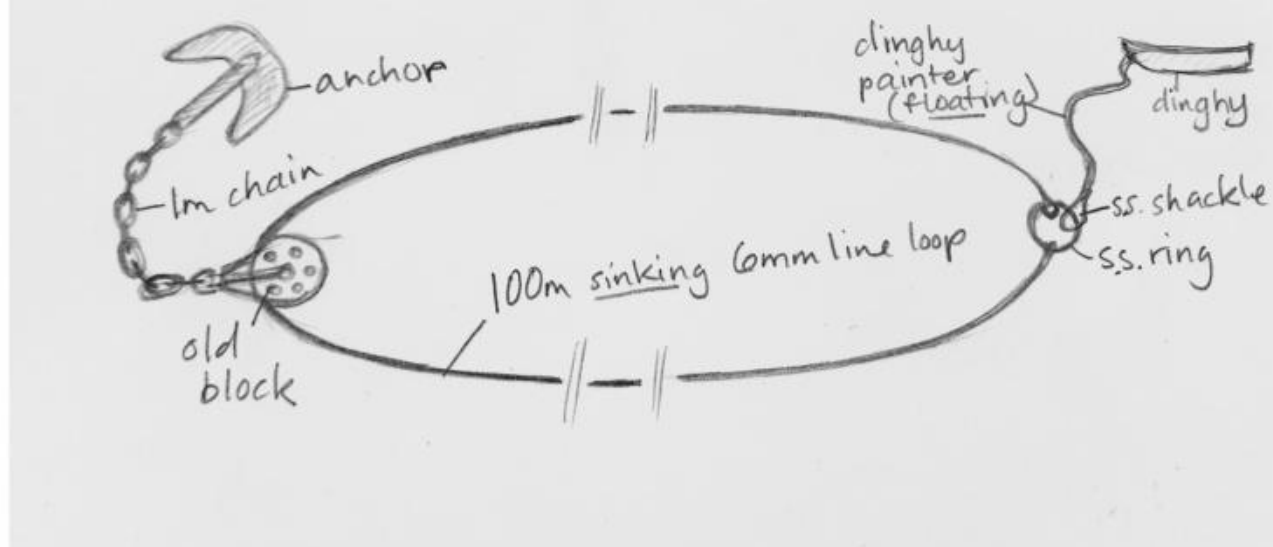
My anchoring system

So, this problem became a focus for my creative thinking. A little research, a lot of thinking, a mish-mash of new and recycled parts, and I created an outhaul (clothesline) anchoring system whose simplicity and usability surprised even me.

I started out with the longest bit of old rope I could find — about 35m of 6mm line. The line was put through a single block — biggish rather than smallish — and then the two ends were tied to the same stainless steel ring, making a circular line with a block on it.

The ring prevents the line from going all the way through the block and must be fitted this way. Onto the block I shackled one metre of light anchor chain with a good small anchor on the end of it. I made a large circle of fabric with a drawstring around the edge to act as a bag for the whole assembly. To deploy or retrieve the anchor, I lay the circle flat inside the dinghy, flaking the line in easily without the fiddling that would be necessary to get it into the opening of a normal bag. To deploy it, I throw the anchor overboard and let the line run out over the side as I row/motor ashore.

In this simple anchoring system, only the dinghy itself is at the surface of the water. The rest of the assembly is on the bottom, joined to the boat only by the painter line.



At the shoreline, I clip the dinghy painter to the ring and then 'clothesline' the boat out to the anchor — i.e. feed the circular line out. I then secure the circular line ashore by tying it to a tree or a stake — a second anchor could also be used. The whole line — shackle and everything — sinks, so it is not a danger to other water users. I ended up buying a much longer 100m line just to get the boat farther away from shore, allowing for tide and a length of line to bring up the beach to secure it. 'Fizz boat' owners used to wrestling with their boats at the beach and/or swimming out to retrieve them, have gawped in awe and been won over to this easy method. ►

The whole line — shackle and everything — sinks, so it is not a danger to other water users



I can lay the anchor bag flat like this to easily deal with the anchor, flaking the line in or letting it run out freely without getting tangled up



Happy days in the shed near the end of the project. The gunwale fendering is on, but the flotation chamber ports, traveller, gudgeons, and other small findings have yet to be installed.

The story of a shed

My little dinghy, Punga, is not the only boat to have come out of the shed up the hill overlooking the Hātea River in Whangarei.

This Punga Grove Avenue property was once the residence of Ron Davies who, in partnership with Alan Orams, founded what went on to become the highly respected Orams Marine Services Ltd, now based in Auckland. This major New Zealand marine business began its operations in the very shed that I was working in.

When the current owner — and my dear friend — artist Barbara O’Sullivan, heard that I was interested in building a small boat she was tickled by the idea that the shed could come full circle and return to its boatbuilding origins. She had used it as a painting studio for many years, but it had morphed into a storage shed in recent times and my boat project seemed to offer the promise of breathing life back between its walls.

After completing Punga, we had a major clear-out of old shed detritus and the shed is now a much-refreshed place in which Barbara has begun to paint again. We both tremendously enjoyed the fact that we were two women supporting each other in the shed department of life!

Although Orams Marine now caters to a much flashier market than I aspire to, the shed and my building project reflected its humble beginnings. I’m pretty sure that Punga represents the first boat to have come out of that shed for several decades at least.





Discovering for the first time that Punga was a great washing machine (wash in the front half, rinse in the back) gave laundry a new, fun edge... for a while!

“Putting time into thinking about how to use a dinghy full of fresh water is a more obvious exercise than some might imagine”

Outboard preparations

Planning for using an outboard motor cannot happen too early. I did not plan as early as I might have, but was lucky insofar as the transom reinforcement in the design did turn out to be wide enough to carry the fittings for the motor. Some sort of pads are needed to prevent the motor damaging the boat, and I used stick-on non-skid strips that are sold for boat decks. The material works well to protect the transom, but I found that the strips did not stick as surely to a newly painted surface as I had seen them do to decks before. A light sand would have no doubt helped.

Rainwater collection

An entirely unforeseen development since launching Punga was discovering its potential as a washing machine!

Having to put your two-part boat together each time before you can use it may seem like a chore at times, but there are definitely bonuses to the two-part assembly. In heavy rain, as with any boat, it fills with water. Like power, fresh water can come at a premium on a sailing boat so putting time into thinking about how to use a dinghy full of fresh water is a more obvious exercise than some might imagine. Laundry is an obvious choice,

and a nesting dinghy has the advantage of two chambers, one for washing and one for rinsing — perfect!

Friendship

Many people seem to bond with their community through digital interfaces. For me, project work and making things is a key bonding experience. Even doing the work essentially alone — as I did building my dinghy — the people who shared their knowledge and their enthusiasm, and who followed what I was doing and let me know they thought it was valuable, came closer to me and I to them. My five months of work to build Punga had a very positive, tangible, practical outcome in the shape of a new boat.

There has been, and will be, such a lot of time spent enjoying it, but the spin-off of deepened friendships forged around the work shed is just as valuable to me.

The second and final instalment about building Punga will be in the next issue of *The Shed* — Issue 100, January–February 2022.



During the building months, Barbara would turn up daily to remind me what it looked like to be well-dressed and out of overalls!

What's in a name

Finding a name for a boat you are building must be close to being as agonising as finding the right name for a new baby. It was important to me that my dinghy's name reflected something about its unique qualities. 'Punga' — or sometimes 'ponga' — is the Maori word for the silver tree fern that is the symbol for the wonderful, and safe, country that I have been harboured in during the world's pandemic chapter. Punga is also a homage to the location of the shed which made the build possible and the friends who live there, without whom the whole idea would have foundered: Punga Grove Avenue.

I added a painted spiralling koru — also a very common symbol in New Zealand culture and art. This is a Maori design based upon the fiddlehead unfurling of a new punga leaf. In Maori art, it symbolises new life, growth, strength, and peace, all of which seemed like great things to wish on my little boat. The shape of the koru conveys the idea of perpetual motion, and the inner coil is supposed to represent a return to the point of origin; these ideas seemed to set my little boat afloat in my imagination. 📖



On the dock for launch day we had a small gathering, just for those who had directly helped with the project and everyone had the opportunity to row her in the harbour



A Lea Francis owner looking for Whitworth spanners

UNWANTED TOOLS

A new type of swap meet comes to town

By Ritchie Wilson

Photographs: Ritchie Wilson

Sheds aren't only a space where time is spent, plans are made, and work is done.

Sheds are the place where gear is stored, and where tools and materials can be easily and quickly accessed. There is a definite tendency to accumulate more tools and material in the shed than is strictly needed — things that “could be

handy”. This is fine if there is a lot of space, but usually there isn't.

When unneeded items are identified, there is a choice about what to do with them. The local Menzshed will gratefully accept some, perhaps all, of the items that are too numerous and too low in value to sell.

In South Christchurch, the local,

council-run library had a different idea. The community librarian organised a ‘Shed Stash Swap’ one Sunday. The idea was that people would bring unwanted gear to the swap table and leave with more appealing items. The library was keen to highlight its large collection of DIY books and so set up a display of relevant volumes near the library entrance.



The DIY book display and the Shed Stash Swap table

Crafts beat tools

In the week or so leading up to the event, a large bin was placed in the library for donations of gear. The bin slowly accumulated small sets of spanners, wire strippers, an early multimeter, balls of twine, snips, screwdrivers, and back issues of *The Shed*, courtesy of Editor Greg.

Sunday, 18 July was the day of the swap and locals brought in unwanted items and took away ones that had caught their eye. One person donated several containers of small hardware items: cotter pins, shackles, stainless steel turnbuckles;

plumbing pipe connectors, and dozens of used nuts and bolts of various sizes. After a couple of days, only a small number of items were left. No record was kept of the number of sheddies swapping stuff; it was probably not huge — certainly not as large as the very well-attended ‘Craft Stash Swap’, for which a large queue formed.

It is hoped that the Shed Stash Swap will be repeated in the future and that it will grow in popularity as it becomes better known. The community librarian hopes her husband will be a large donor for the next one! 📁



The swap table a couple of days before the event



Correction:

In Issue 98 of *The Shed*, we incorrectly captioned a photograph in the Autonomous Vehicles article. Here is the correct caption for that photo.

Caption

From left: Mary Chen, Zaid Al-Tamimy, Mahmood Hikmet, Mohammed Hikmet, Matthew Breddy, Transport Minister Michael Wood, Hartmut Beintken

PAINTING TIPS FROM THE RESENE EXPERTS

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

Use a paint pot

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

Clear the clutter

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

Freshen up

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

Did you know?

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



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LETTER OF THE MONTH



NOW, ABOUT THOSE ELECTRIC UTES

Dear Jude,
I am not quite sure why you would write an article (Back o' *The Shed*, September-October 2021, Issue 98) that is so full of errors. "Fossilised Driving" should perhaps have been labelled "Opinion". I have been involved with electric vehicles for over 13 years. I was one of the first EV drivers in NZ, and had to convert my own vehicle — see *The Shed*, April-May 2013.

The simple answer to your ute dilemma is to wait a year or so. By then, a number of electric utes will be on the market. Of course they will cost more than comparable ICE vehicles, as they are being made in limited numbers and the technology is still new. However, some of the money you spend is like prepaying your fuel bills, and you can do your bit to protect the environment.

One of the delays in making electric utes is that the vehicle needs to be stronger for towing. It's not that EVs are underpowered; in fact it is the opposite — EVs have so much torque, towing can place unreasonable stresses on the drivetrain.

These new EVs can even be used as portable power supplies — see the Ford F-150 Lightning in the USA.

EV battery packs have three stages in their lives:

The first is in the vehicle — as you say, 10 years or 150,000 kms. The second is as storage power for houses and backup power. The third stage is recycling. For example, a company in the States is recycling over 95 percent of the lithium, cobalt, copper, nickel, gold, silver, and aluminium from EV, cellphone, and laptop batteries — see Redwood Materials:

<https://www.redwoodmaterials.com/>

Both Blue Cars in Auckland and EVs Enhanced in Christchurch provide battery upgrades. The money most people have saved in fossil fuel can offset the new battery pack cost.

Generally, the only people who believe in hydrogen technology are oil companies with a vested interest. They want to retain control of people who need to refuel at the pump. Bus and truck companies who have their own refuelling stations may find this technology worthwhile. However, look at the leaps in technology with battery packs — the Nissan Leaf started off with 24kW packs and now you can buy them with 64kW. All the packs are the same size and weight!

For accurate information about EVs, have a look at this video: <https://www.youtube.com/watch?v=FqkRe-e35dw>

This video illustrates how much energy is required to drill, pump, transport, and burning [sic] of oil. The video gives you the exact figures of how wasteful it is to make petrol cars. In the US, there are an estimated 435,000 oil wells that use pump jacks. The estimated energy for these wells is 4300GWh each month. A lot of energy to only extract the oil out of the ground. If you were to use this electricity to power electric cars directly, you could power 15 million electric cars for a month.

Regards,

Mike Rathbone

Project Manager, Dynamis Project. www.dynamisproject.co.nz

Project Manager, Electric Vehicle Research Ltd <https://www.electric-vehicle-research.co.nz/>

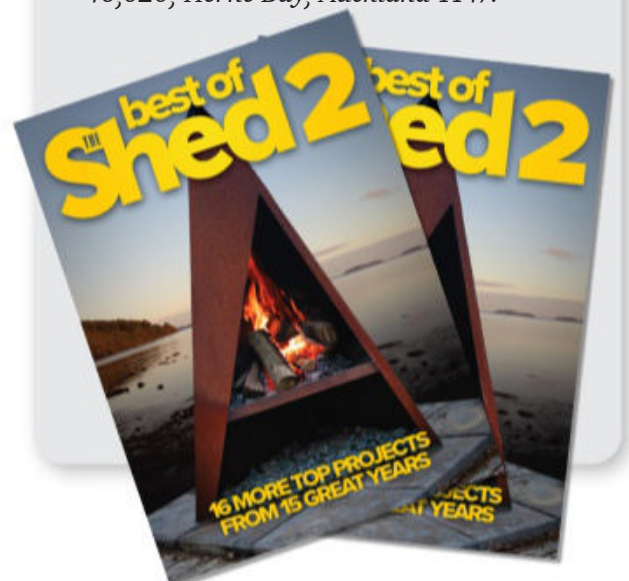
Thanks for your response. Firstly, I should make it clear that the Back o' The Shed column is just my opinion, not a thoroughly researched article. I can understand your contention that only oil companies are interested in hydrogen; that is from where a good deal of our hydrogen comes now, from steam reforming natural gas and coal gasification, but many car

LETTER OF THE MONTH PRIZE

Every issue, our Letter of the Month winner will receive a copy of *Best of The Shed 2*.

More top projects from 15 great years of *The Shed* magazine

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



companies and the heavy vehicle industry are seriously looking at hydrogen.

JCB in the UK recently developed electric versions of their excavators. They made a battery-powered version of their 20-tonne digger. The batteries added eight tonnes to the weight of the machine and it could only work for four hours between charges. Clearly, that's not an economic model. They have now turned to developing their fleet to run on hydrogen. Hydrogen has something like three times the energy of an equivalent quantity of petrol or even diesel. I'm not talking about fuel cells, either; this is hydrogen combustion using engines with modified heads and pistons. I accept that battery technology will get better but it won't get good enough for heavy industry and freight



soon enough. (<https://www.youtube.com/watch?v=19Q7nAYjAJY>)

I have the same problem with the idea of an electric ute — weight. The Ford-150 Lightning weighs 6500lbs (2.95 tonnes). The battery alone weighs 1800lbs (816kg). Some utes are already quite heavy but the addition of a huge battery to them will make them unfeasible in some of the areas they get used — my boggy farm in winter, for example.

Personally, I think if you live in the city and commute it makes perfect sense to go EV. Further, I think fuel cell technology will be the future for EVs, too, and standard in most commuter vehicles in a decade.

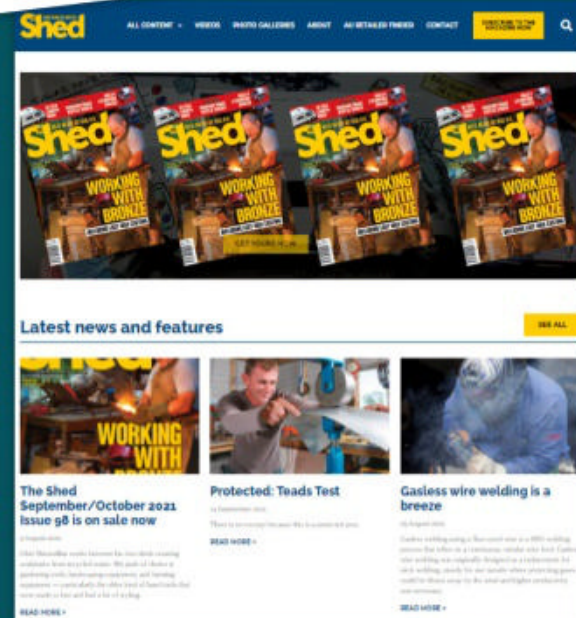
I accept that the batteries in EVs can be put to other useful purposes. There are some recycling facilities but too few and none here as yet, so how do we dispose of them?

I don't dispute the need to stop using fossil fuels but we do have to have alternatives and if there is a fuel, like hydrogen, that also has zero emissions but will allow us to continue to use the existing internal combustion technology, that, surely, makes sense — especially if we can produce it a green way through renewable energy.

For me, living in a rural environment and having to travel some distance to my nearest town, an EV doesn't make sense; a PHEV would have worked but for the cost, and they still burn petrol. I have friends in the same situation who do drive EVs, but for me the economics don't add up.

Jude Woodside

NEW WEBSITE!

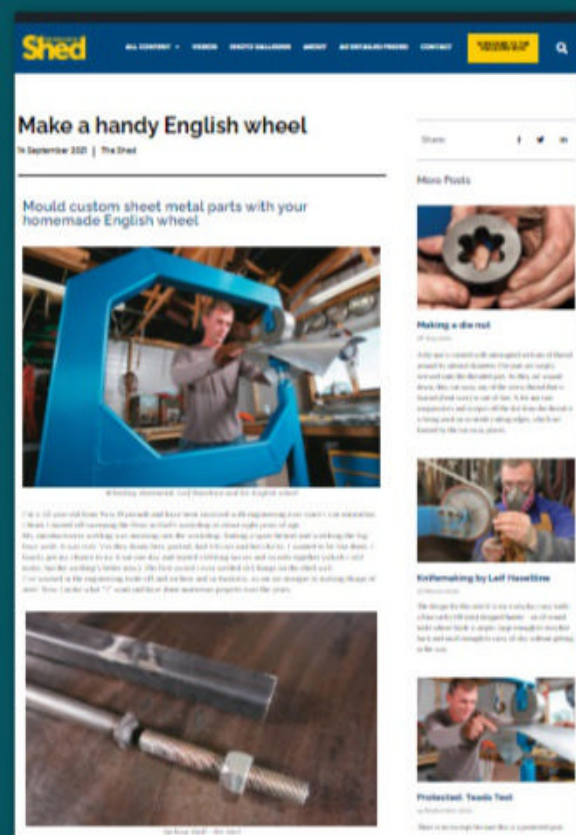


WHAT'S HAPPENING ONLINE AT THE-SHED.NZ?

Well, an awful lot to be honest.

We have used this lockdown to upgrade and completely redesign our website — more categories, and better layout and design for our nearly 2000 posts of projects and sheddie tales.

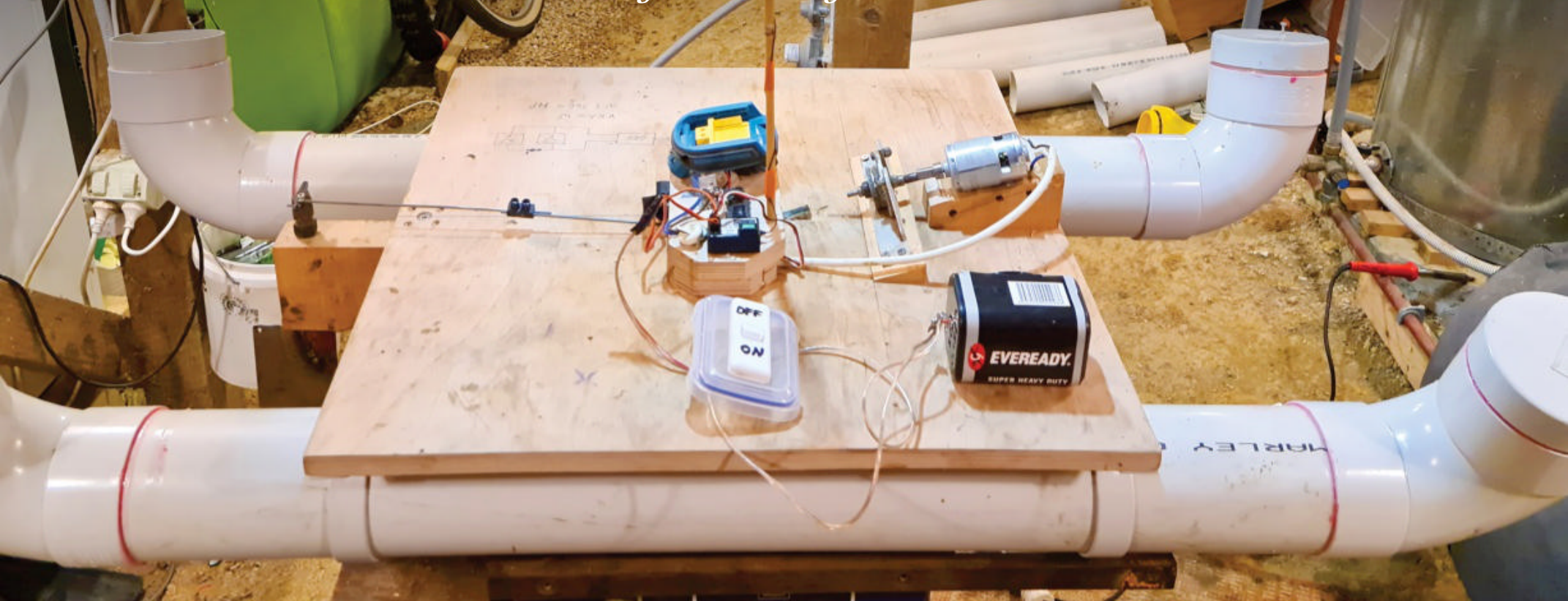
What does this mean to you? Articles and projects will be easier to locate and read while you enjoy a much better layout for your phone, tablet, or desktop PC. As we load even more articles, layouts will improve and give readers a much better online experience. So, what are you waiting for? Check out the new look the-shed.nz.



KIWI INGENUITY COMES TO THE FORE

In this latest lockdown, the nation's sheds were positively humming with activity. Sheddies everywhere were hard at it — designing, devising, developing, and building. The following are a few of our favourites among the projects that were shared with us online

By Jason Burgess



A raft of ideas — Brad Wards

Brad Wards owns a Waiheke Island house-building company called B1 Buildings. During the September lockdown, he found himself with a lot of home time on his usually very active hands. Brad's first lockdown mission in his island man cave was to create a dyno meter for an old glow-plug engine, using a

dyno motor from an old RC car.

"Because," he says, "I have always wondered how much power they make."

The answer: "380 watts or 0.5hp."

But that was just the beginning. When the same sheddie is left to play with a "nice piece of plywood", some 100m PVC pipes, a few spare remote-control parts,

and his wife Mandy's old yoga mat, then what next? How about an electric kontiki?

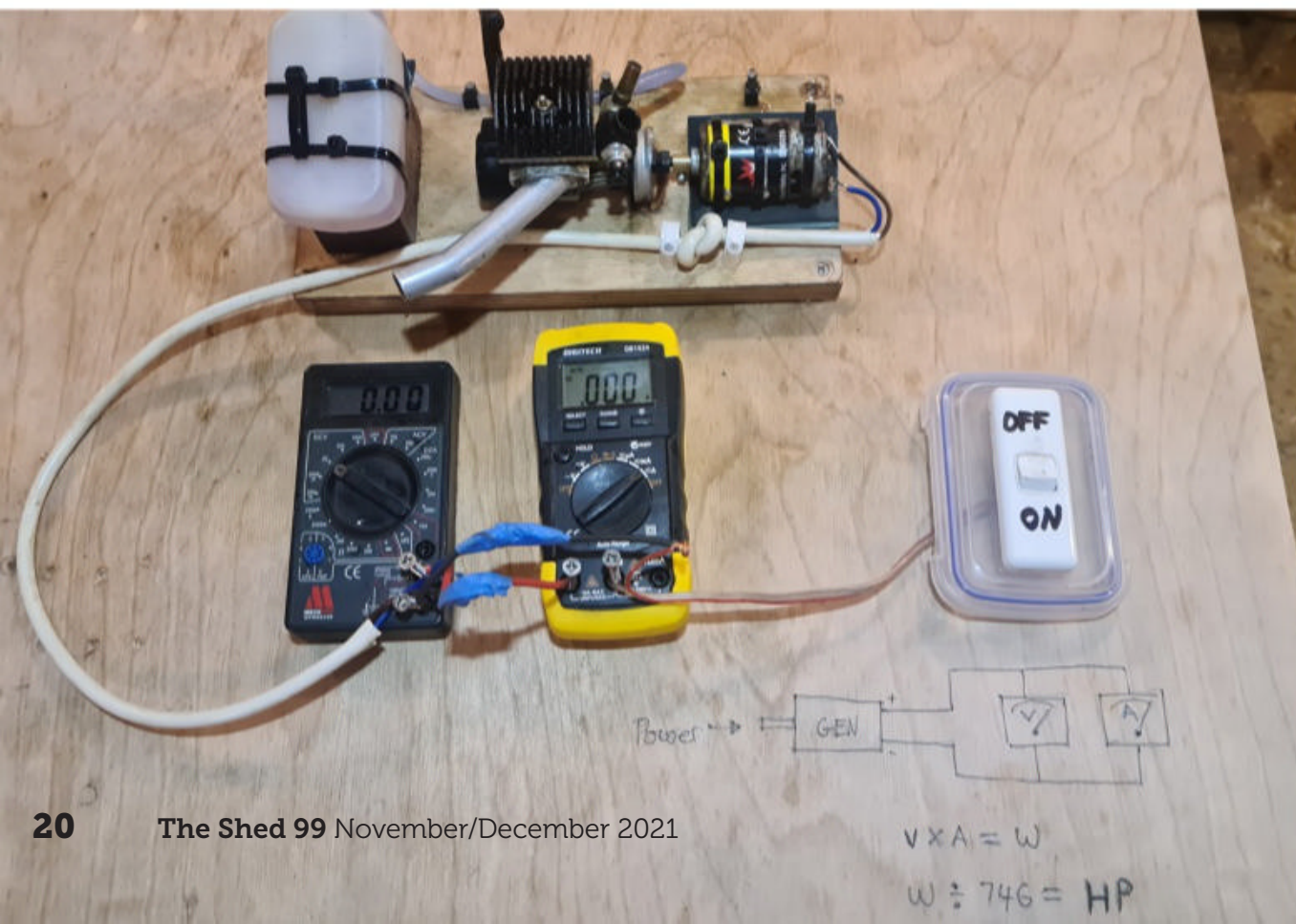
"I got to work immediately," Brad says.

Into it

Brad already had most of the elements and a few calls later he had located all the bits he still needed.

"My neighbour JA gave me a piece of kauri for the engine mount. Another sold me the elbows. Pickups and drop-offs were handled like a secret operation, with everyone obeying all the CV rules. Then, when the fishing ban at level four was lifted — on 28 August, the day after work on the kontiki began — I knew that the kontiki gods were smiling."

Brad's kon-tiki has a double-hull waka profile, with pipe pontoons. An old dive weight provides ballast near the rudder. The yoga mat offers a cushioning floor for the plastic-box electrical housing, as well as hook separation on the bait box — important when you are dealing with 20-plus hooks per set!



First sea trial

If you build it, they will come.

“An old friend, Mike Dodds, turned up for the first sea trial at Surfdale Beach. By the time I had set up and was ready to launch, a bunch of spectators had gathered — socially distanced, of course. There were a lot of doubters in that bunch, but Mike said three magic words: ‘It’ll work, mate!’”

It is said that lures catch more fishermen than fish.

“On the first run out, I managed to hook up seaweed, tuna, and a griffin — the actual nicknames of some of my mates.”

Undefeated, and having done a little

fine tuning, Brad was ready to launch again, this time at Little Oneroa beach. The introduction of a plastic cup on the backbone of his ute is a piece of number 8 wire ingenuity. It serves as a ‘speaker’ to help identify where the lure wraps are located on the long line.

Too easy

The kontiki worked like a dream.

“It took it all the way out. Unfortunately, most of the baits hadn’t been looked at but we did hook two little snappers.”

Moral of the story is you can’t keep a good bloke down. Between fishing expeditions Brad started wondering what

to do with his remaining lengths of pipe from the kontiki build. Remembering the yoga mat and Mandy’s request for a hydroponic garden in the greenhouse, Brad made good. On the first day of spring he built his beloved a solar-powered hydroponic lettuce garden.



QR Code – Watch the build video of Brad’s kon-tiki

The Taita garden bar — Ian Hamilton

For Ian Hamilton, it was not so much what he was doing in his shed during lockdown as what he was doing to a shed — well, in this case, an old bus shelter.

Ian considers his backyard an extension of the living areas in his house. Think oasis rather than garden.

“I wanted to create a beach bar in a rustic, subtropical setting. I saw these old bus stops in Lower Hutt being demolished and saw the potential.”

Everything in Ian’s garden bar — except an electric pizza oven and a Sonos Wi-Fi music system — has been sourced for nix.

“I love to repurpose and recycle. As a landscape gardener, I am lucky, I get to collect a lot of unwanted material from my jobs. I don’t hoard; I don’t like clutter. Things have to be used.”

In the case of the bar, the countertop is built from timber out of the old Eastbourne wharf. The corrugated iron fake front, Perspex weather shield, and bifold bar windows all come from Ian’s landscaping jobs, as does the near-new BBQ that he flips his bar burgers on.

A recycler’s eye

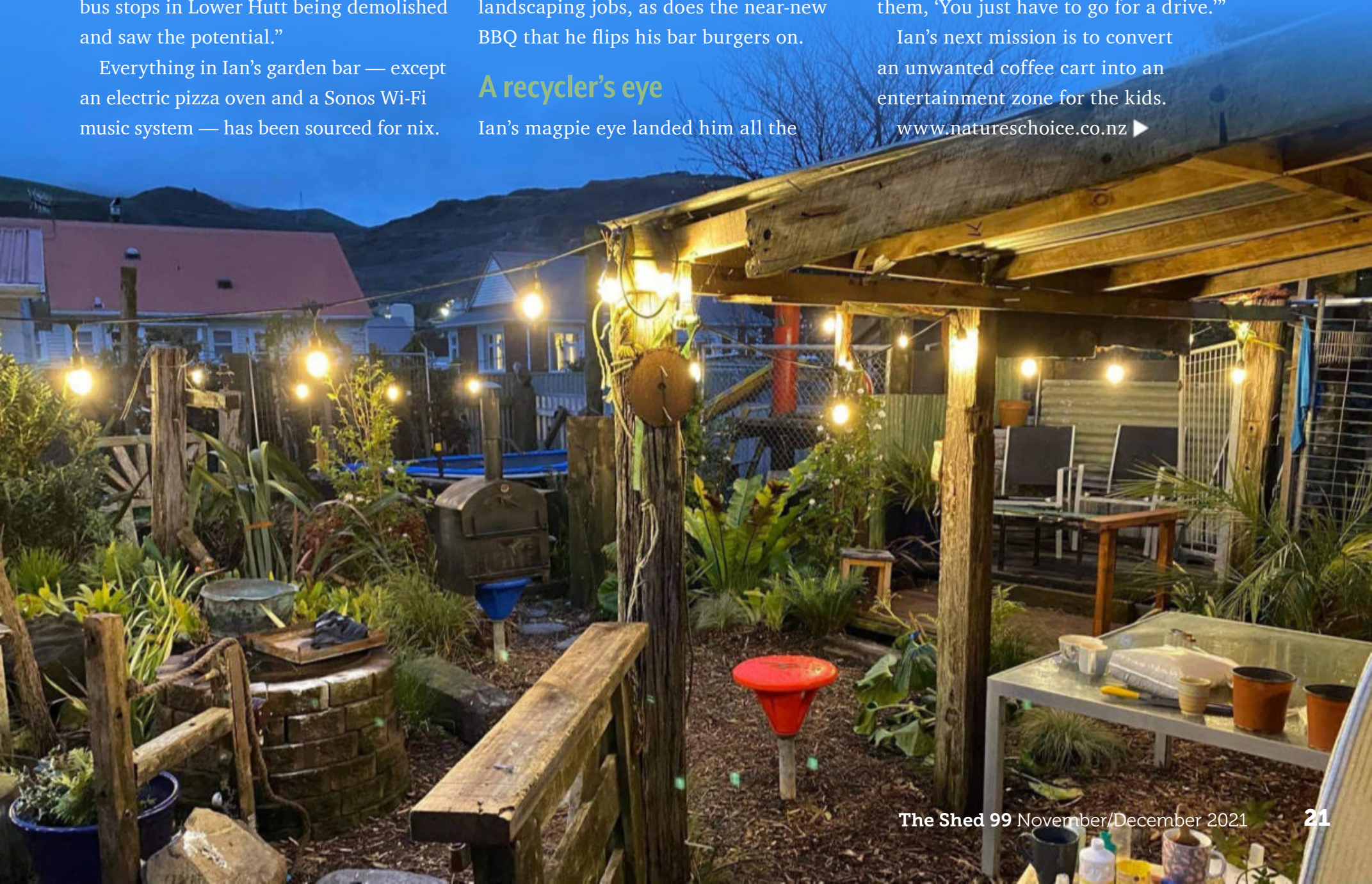
Ian’s magpie eye landed him all the

finishing touches, too, such as the gas lantern, wall signs, wharf rope, a beer crate for a bottle rack, and a 100-year-old scythe that serves as a door handle. Because the bus stop is so well built, Ian has converted the rooftop into a ladder-access sun-bathing area with a view over his subtropical paradise.

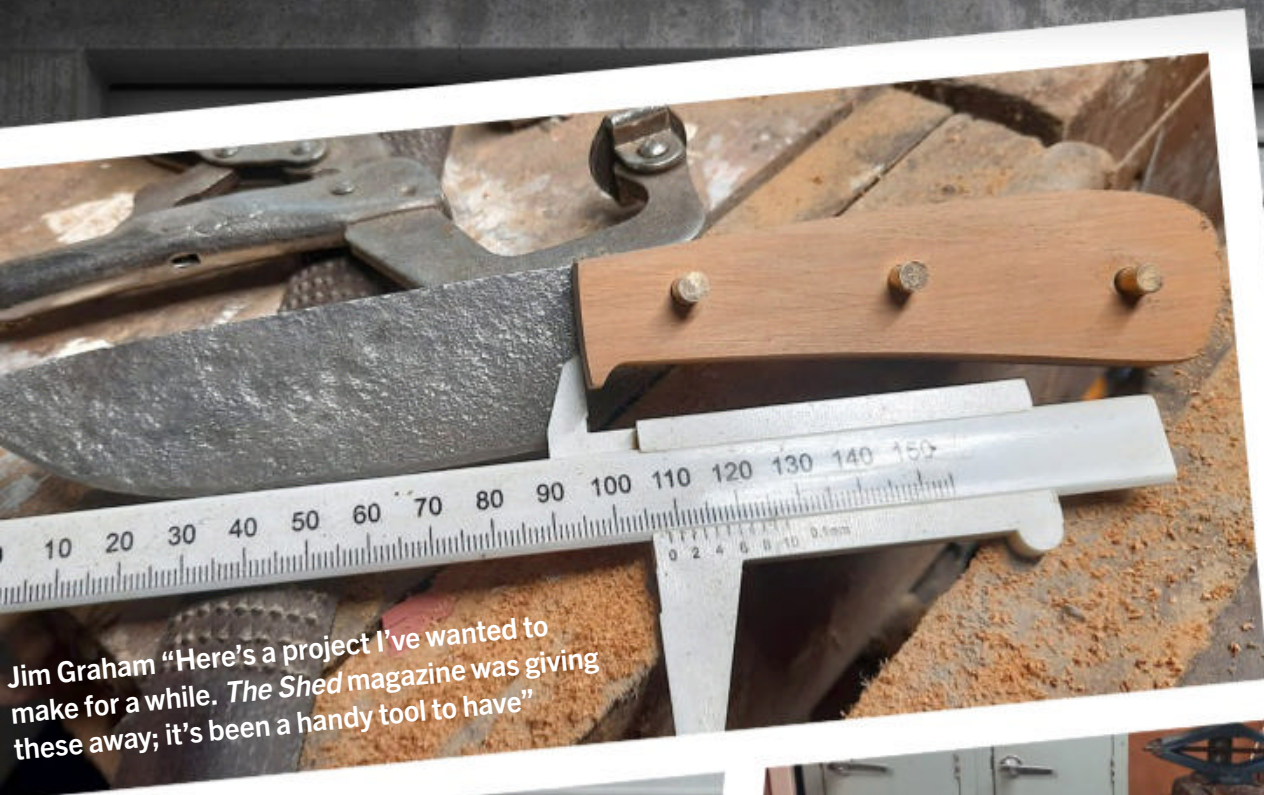
“People think they have to spend a lot of money on their garden, but I say to them, ‘You just have to go for a drive.’”

Ian’s next mission is to convert an unwanted coffee cart into an entertainment zone for the kids.

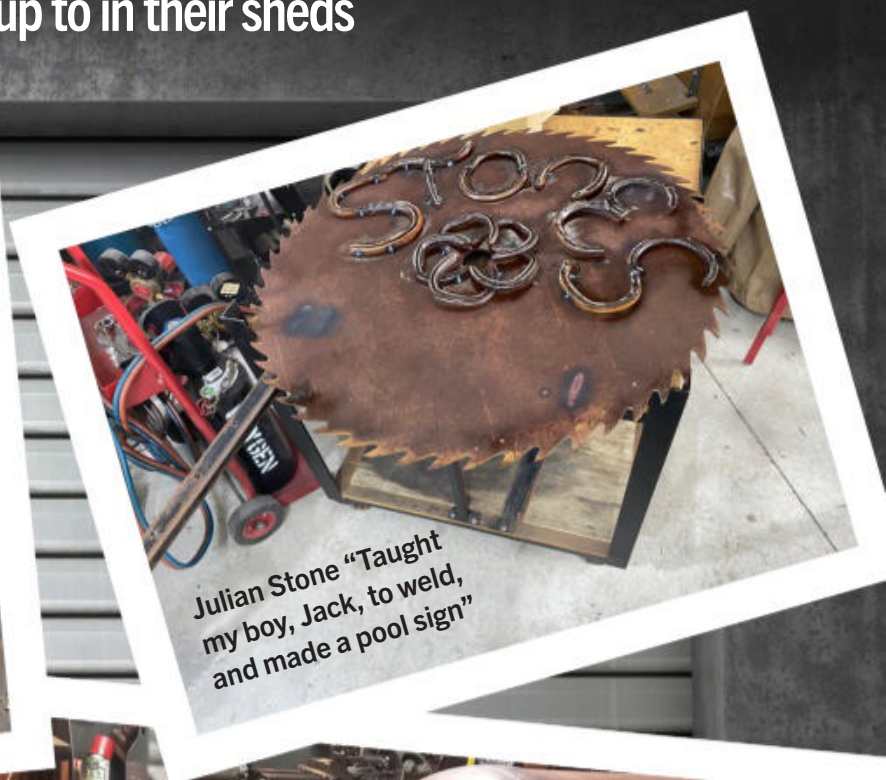
www.natureschoice.co.nz ►



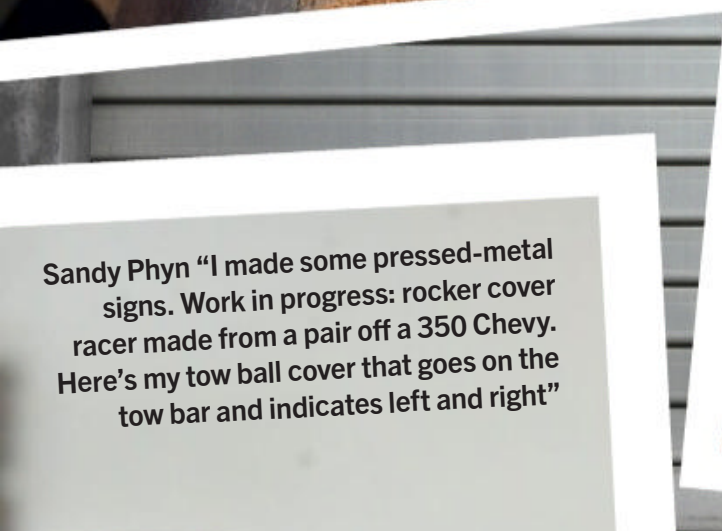
Here are more posts from our Facebook page, added during lockdown when we asked our followers what they were up to in their sheds



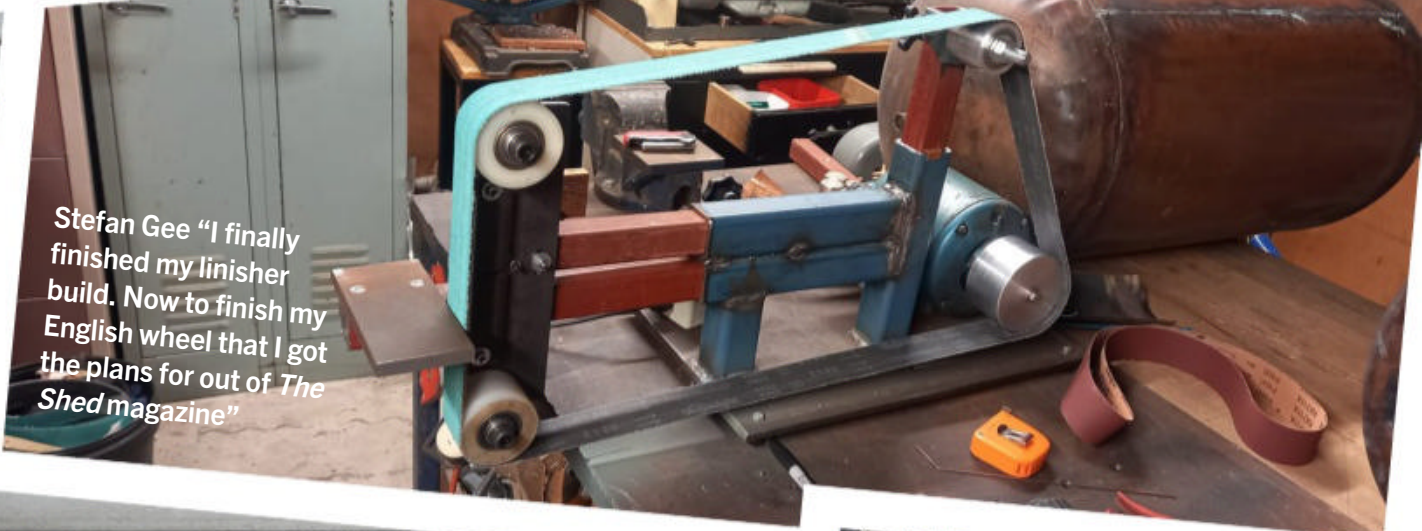
Jim Graham "Here's a project I've wanted to make for a while. *The Shed* magazine was giving these away; it's been a handy tool to have"



Julian Stone "Taught my boy, Jack, to weld, and made a pool sign"



Sandy Phyn "I made some pressed-metal signs. Work in progress: rocker cover racer made from a pair off a 350 Chevy. Here's my tow ball cover that goes on the tow bar and indicates left and right"



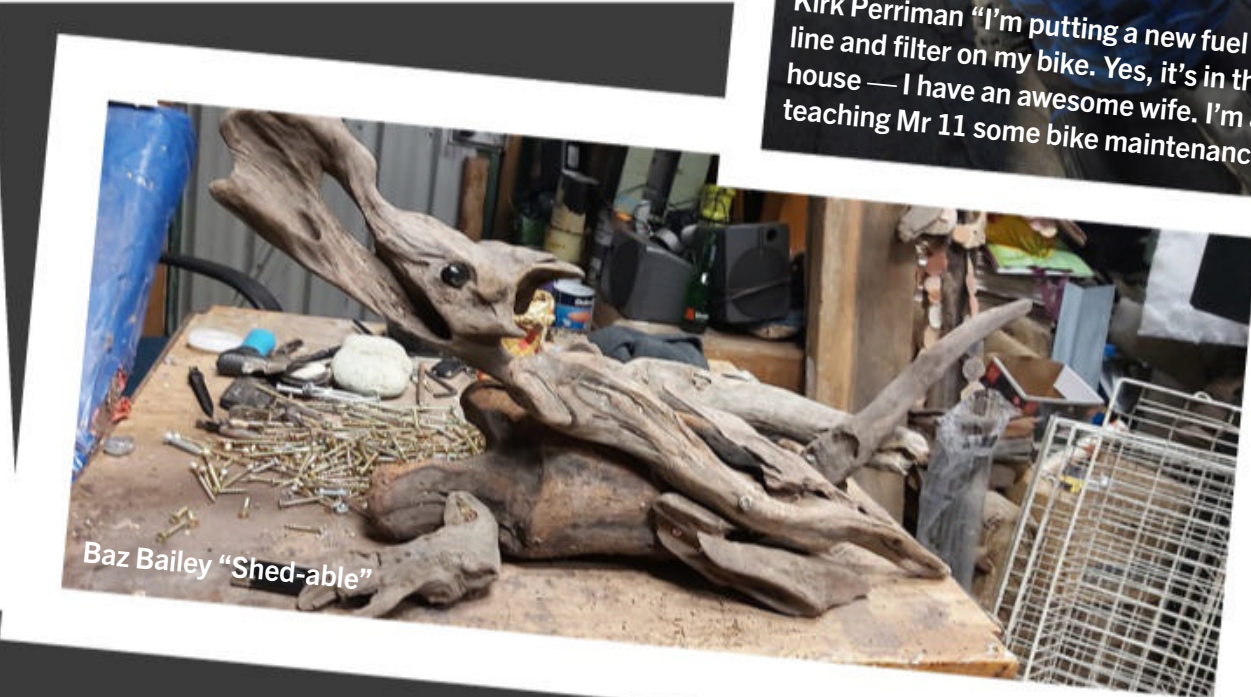
Stefan Gee "I finally finished my linisher build. Now to finish my English wheel that I got the plans for out of *The Shed* magazine"



David De Baugh "I'm putting a new bum on my boat"



Kirk Perriman "I'm putting a new fuel line and filter on my bike. Yes, it's in the house — I have an awesome wife. I'm also teaching Mr 11 some bike maintenance"



Baz Bailey "Shed-able"



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Ian Knight with his power hammer

IF I HAD A HAMMER

Two enthusiasts take on the challenge of making their own powered hammers

By Ritchie Wilson

Photographs: Ritchie Wilson, Ian Knight and Mike MacMillan

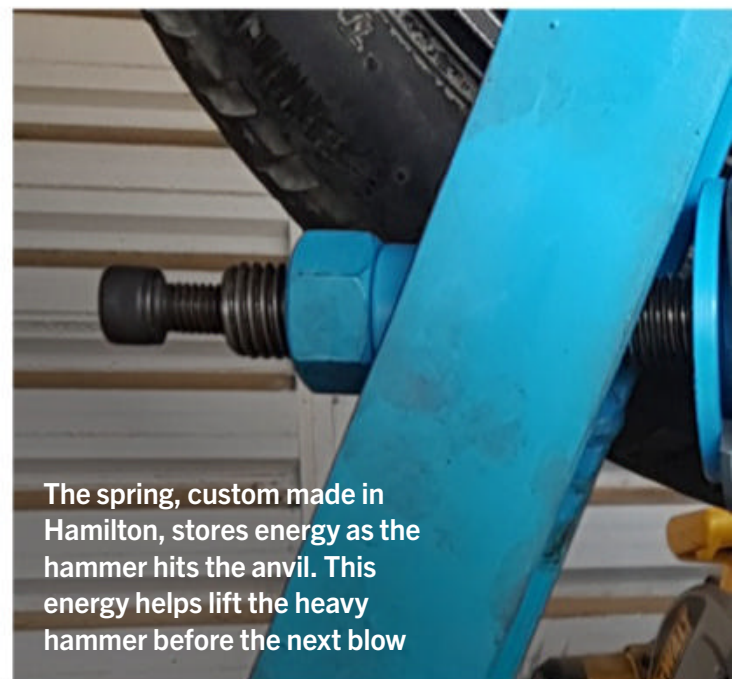
It would appear that the number of folk who have a forge in their shed, and are doing blacksmithing at home, is rapidly increasing. One clue is that there is a continuing demand for blacksmithing and knifemaking classes, another is the very high prices that anvils command. A major problem is that only relatively small items can be forged by hand; anything larger requires a hammer powered by electricity or compressed air.

Professional blacksmiths overwhelmingly use pneumatic hammers because they are virtually maintenance free and easily

controlled. Mechanical power hammers, such as the Little Giant from America (last made in 1994), are hard to find, often very large, and usually expensive.

The solution is to make your own mechanical power hammer. Plans for different types are available on line and there are numerous Facebook maker's groups to give advice and encouragement.

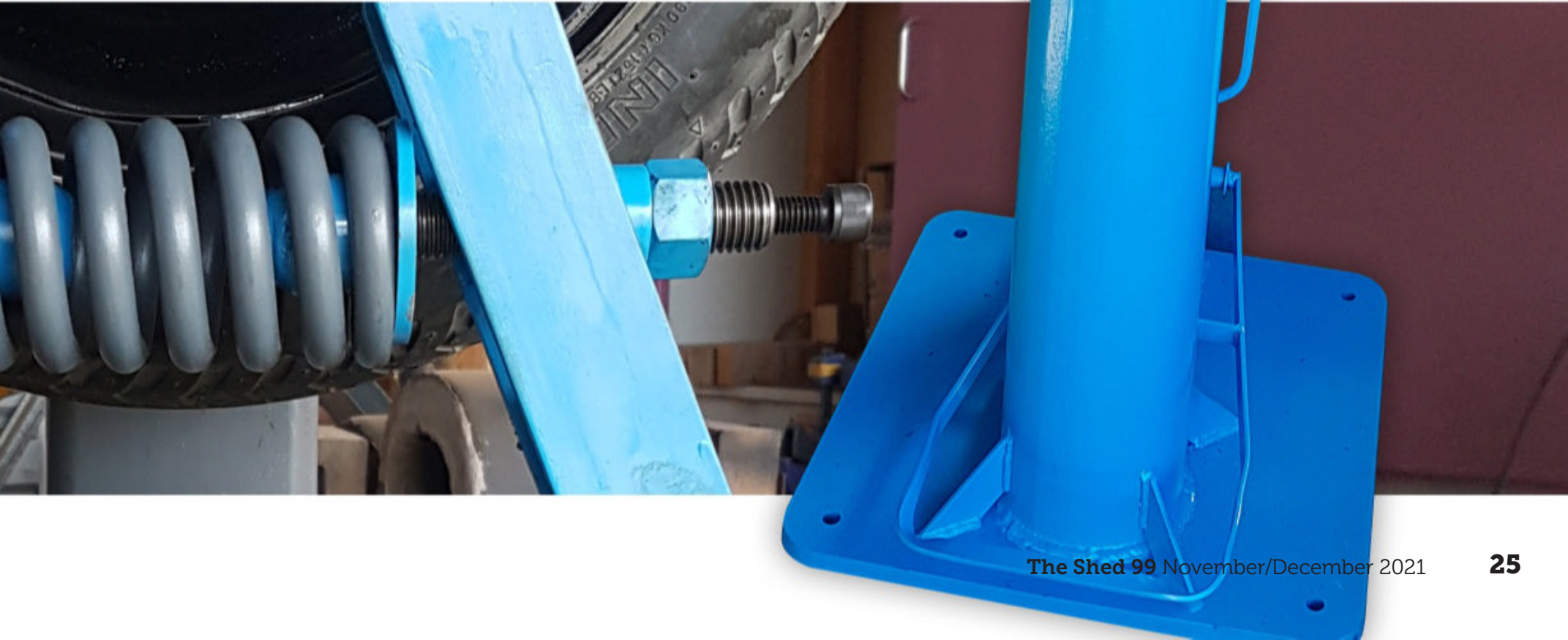
Two knife-makers from opposite sides of the South Island who have gone down this path are Ian Knight and Mike MacMillan. ►



The spring, custom made in Hamilton, stores energy as the hammer hits the anvil. This energy helps lift the heavy hammer before the next blow



Two examples of Ian's blacksmithing: a crucifix and a bottle opener, both iron forgings





Hammer and anvil



The blades of some of the knives which Ian has made

“It’s a surprisingly simple and elegant mechanism, which works very well”

A man of many interests

Ian Knight likes knives and he likes making them. He made several when he and his wife owned a picture framing and locksmithing business and he intends to make more now he is retired.

He has a wide-ranging affinity for many types of antique technology, from black powder shooting to blacksmithing. He thinks knives are attractive because they are among the first tools manufactured, and could be said to be integral to human progress. Ian also has a great admiration for the sublime skills shown by the best knife makers of today, especially their use of Damascus steel.

Power hammers for knifemaking

Ian’s local Menzshed, of which he is secretary, subscribes to *The Shed* and

so he has seen many knife making articles featured in the magazine. He has also seen videos on the internet of knifemakers and was struck by their use of power hammers to forge the steel blanks from which knives are formed. There were also videos on making your very own power hammer. Encouraged by seeing these, Ian sent off US\$30 to Clay Spencer in America and, within a couple of days, received a set of plans, and a parts and materials list over the internet for a ‘tyre power hammer’.

Power hammers convert the rotary motion of a motor to the up-and-down motion of a heavy steel shaft where the end acts as a hammer. The square section shaft is located by a snug-fitting guide or sheath attached to the device’s hefty steel frame.



The expensive piece of 200mm diameter 1045 steel which forms the anvil and its attachment to the steel plate base



Stub axles used in one of Clay Spencer’s group Tire Hammer builds



How it works

The tyre power hammer's electric motor has an aluminium wheel attached to its shaft. When the foot pedal is depressed, the motor pivots and the aluminium wheel comes into contact with the inflated tyre of a 'space-saver' car spare wheel, which is mounted on a trailer hub attached to the top of the machine's frame.

The wheel then also rotates, causing the hammer's shaft to move down and up through a 'DuPont linkage', giving the anvil a solid bash on the way. Some of the energy from the collision of the

hammer and the anvil is absorbed by a strong coil spring in the linkage, which then assists in the lifting of the hammer before it again descends. Bash, bash, bash!

When the foot pedal is released the motor is pulled away from the tyre and a brake is applied, which stops the space-saver wheel and the hammer. It's a surprisingly simple and elegant mechanism, which works very well. Many people who have seen videos of tyre power hammers being built have obviously thought: "Yeah, I could make one of those."



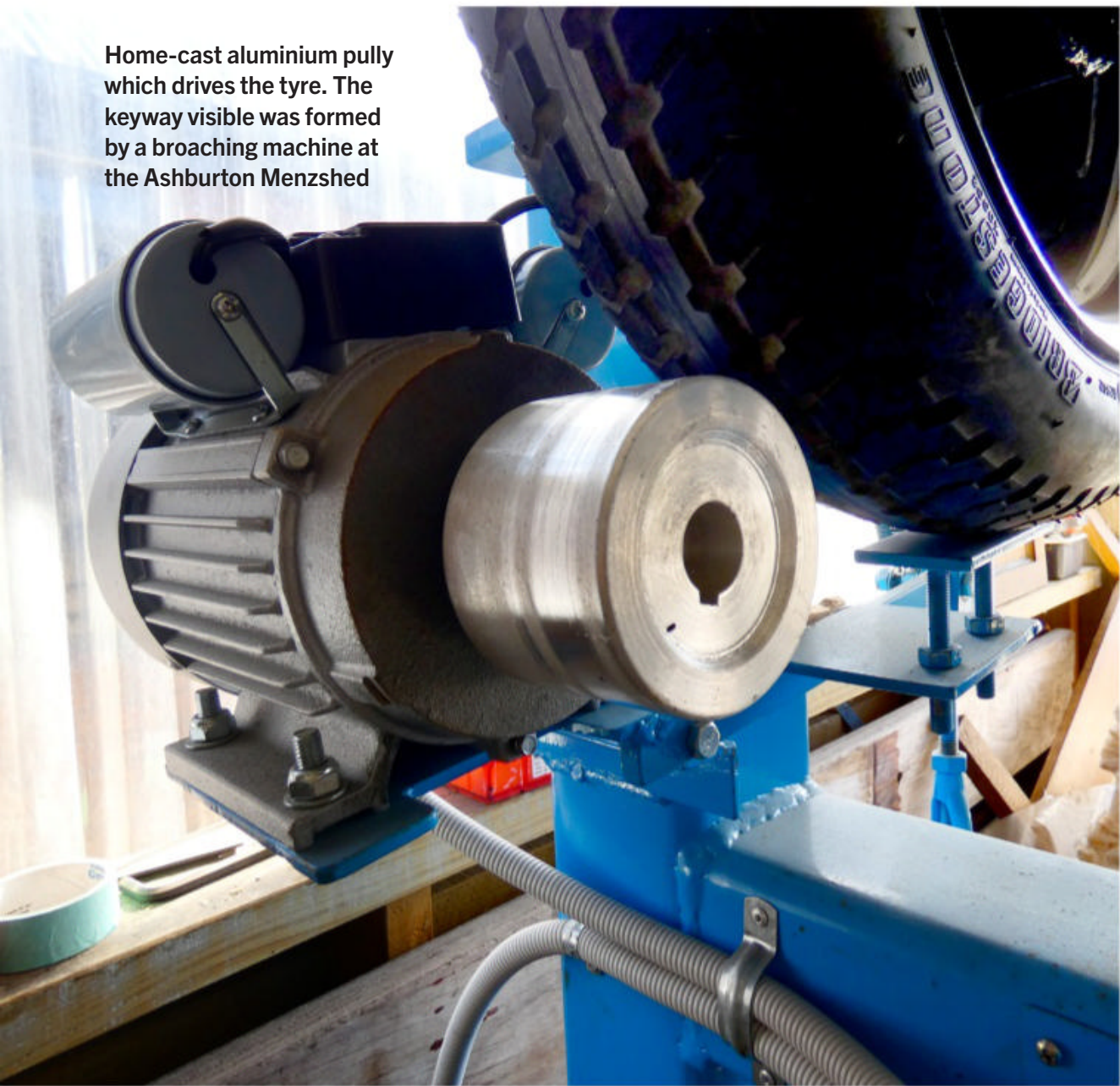
The massive anvil

Sourcing materials

The steel Ian used to construct his hammer was mainly purchased from local engineering companies, while the large support pieces — formed from 6mm thick, 125mm rectangular hollow steel (RHS) — were purchased second hand from an online auction. This same RHS was used for the hammer shaft's guide which was lined with UHMW plastic sheet to reduce friction. Steel shims made the shaft a close fit in the guide. The coil spring was custom made by Hamilton's Simply Springs, with the rest of the linkage being carefully fabricated by Ian.

The linkage employs pressed-in, self-oiling bushes which turn on 4140 HT steel pins. Ian has a plasma cutter (which is not used often, but is invaluable when it is needed) which he used to cut the steel to shape, before being cleaned up with a grinder. He says that he pushed his gasless MIG welder to its limit to weld the large number of steel components together. ▶

Home-cast aluminium pulley which drives the tyre. The keyway visible was formed by a broaching machine at the Ashburton Menzshed



“He pushed his gasless MIG welder to its limit to weld the large number of steel components together”



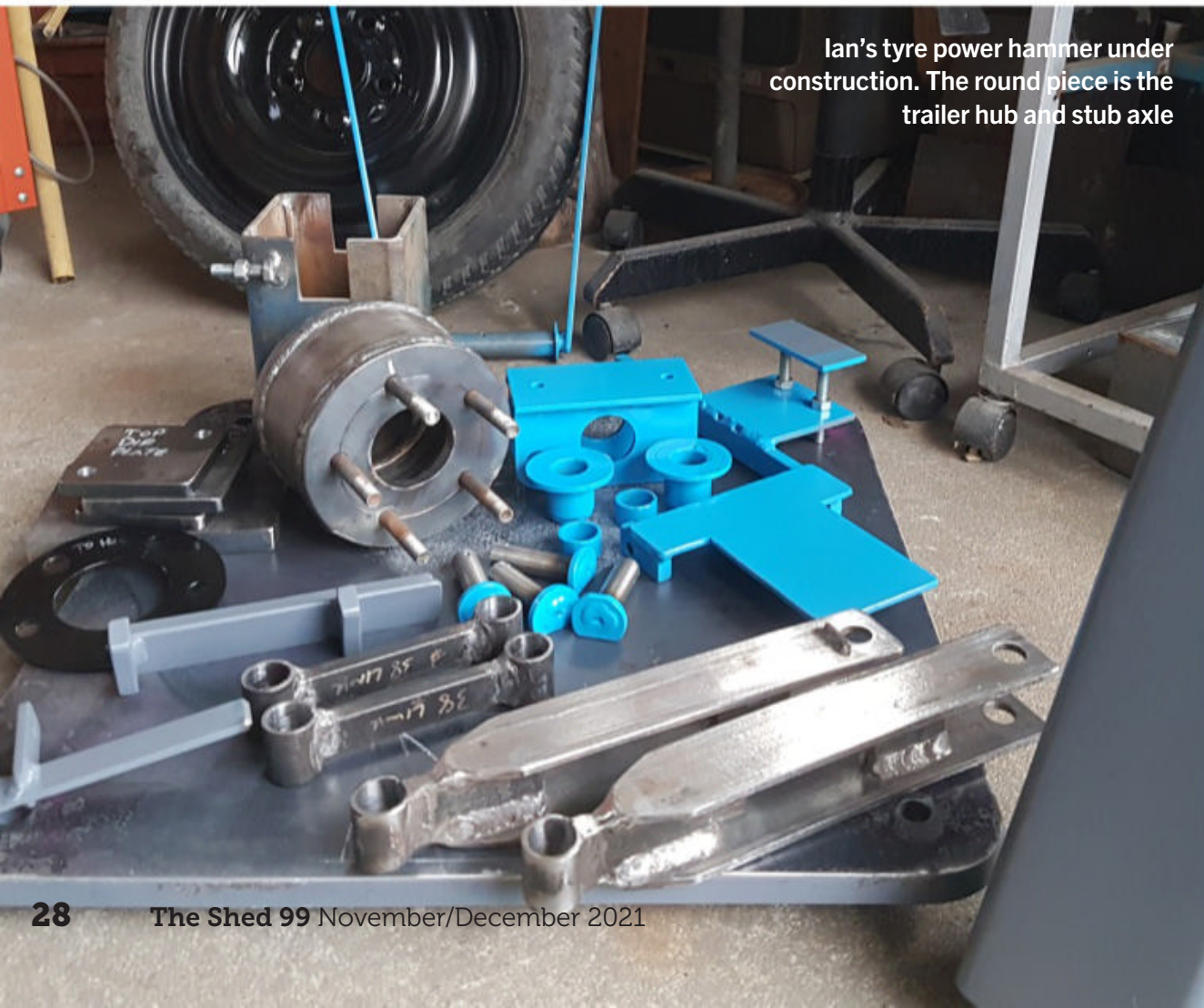


The DuPont linkage which transfers motion from the tyre to the hammer

Machining parts

One of the jobs Ian had as a young man was working for a firm called Smith's Attachments which manufactured side-cars and trailers for farm bikes, in the days before quad bikes became common on New Zealand farms. The construction of the metal trailers and side-cars required a good deal of welding and so he has lots of welding experience. Ian has a good friend, who retired at about the same time he did, who used to own an engineering business and who bought a large CNC mill as a retirement present to himself. The mill was used to machine the hammer's sides and the top of the anvil of the power hammer.

The construction process was straightforward and took about three months. One problem Ian encountered was the use of imperial measurements in the plans. For instance, he found it impossible to find a source of 1-inch (25.4mm) diameter bolts in New Zealand. Substituting 25mm bolts was unsatisfactory because the bearing the bolt was supposed to locate was only available in 24mm. The members on the power hammer maker's Facebook page, mostly American, were typically generous with their advice and were very knowledgeable, but found it difficult to fully appreciate the problem. ▶



Ian's tyre power hammer under construction. The round piece is the trailer hub and stub axle

Making a tyre power hammer

Ian emphasises that he used plans sourced from Clay Spencer in the US, which are protected by copyright. The plans were inexpensive and detailed, as well as giving a list of materials. Crucially, plans and instructions were included for making the jigs which ensure that the frame and DuPont linkage are accurately put together. If you attend one of Mr Spencer's weekend communal builds (called 'hammer ins') in America he provides the jigs.

The base is a 600mmx600mmx20mm steel plate. It provides the datum from which measurements and angles are measured. It was supplied by a local merchant cut to size.

The 2m tall section of 125mmx6mm RHS provides the frame, and was welded vertically onto the base. The hammer guide and its attachment to the frame were also 125mm RHS.

The trailer stub-axle and hub, sourced from Ashburton firm CM Trailer Parts, was welded at right angles to the frame RHS. An unused space-saver spare wheel, which attaches to the trailer hub, was bought from a local car wrecker.

The support for the hammer guide was carefully welded to the frame at right angles, and the hammer guide welded to its other end, parallel to the frame.

A 25kg bar of mild steel, which forms the hammer, was milled flat on all four faces so that it just fitted the hammer guide. Slots to attach it to the DuPont linkage were cut near the hammer's top.

The parts of the complicated DuPont linkage were fabricated, housings for bushes drilled, pivot pins turned up, and the correctly-rated coil spring sourced.

The anvil, formed from a round bar of 200mm diameter 1045 steel, was attached to the base by steel fillets. The anvil steel was the single biggest cost.

The 1.5HP single-phase electric motor had a self-cast aluminium wheel fastened to its shaft and was attached by a pivot to the frame, so that the wheel could contact the spare wheel's tyre when the foot control was pushed downwards.

A brake for the trailer hub, wiring for the motor, the control linkage, and foot pedal also had to be made.

Ian says that the bill for the majority of the steel used was \$1800, although this does include the cost of a small amount of profile cutting.



QR Code – Watch the video of Ian's power hammer in action

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Checking the hole spacing of a component against the space-saver spare



The eccentric connection between the trailer hub and the DuPont linkage (painted blue). As the wheel turns the linkage is pulled up and down



Connector between the trailer hub and the DuPont mechanism. The five studs pass through the spare tyre to be bolted to the hub. The bar at the top left passes through a bearing in the DuPont linkage

NZ differences

The finished device, which weighs about 500kg, was painted in blue Hammerite enamel, and the 200mm base, which was mounted on a layer of rubber, bolted to the workshop's concrete floor. The rubber is designed to stop the building's floor acting as a giant sounding board and disturbing the whole neighbourhood. The strike rate of the power hammer can be optimised by changing the diameter

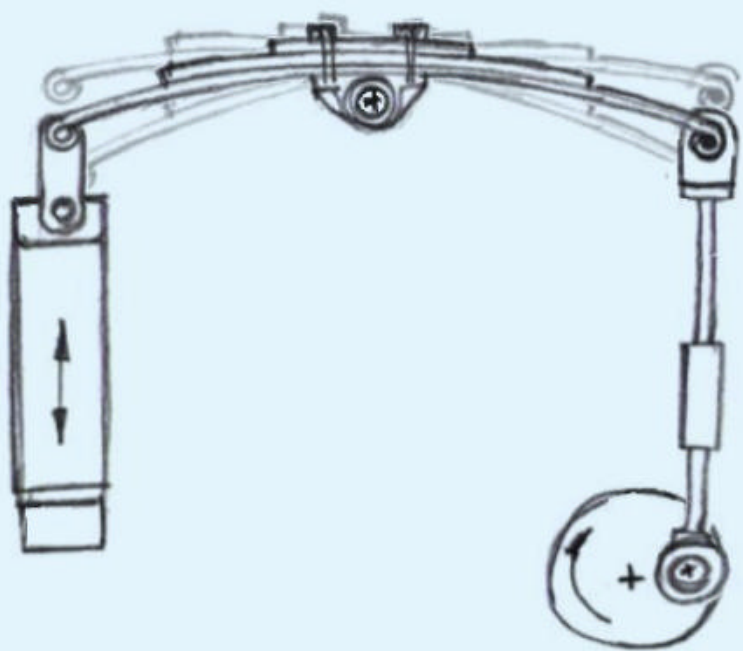
of the aluminium wheel on the 1.5HP electric motor. Ian cast the wheel himself from scrap aluminium. He had to vary the diameter from that specified in the plans because of the different RPM of electric motors in NZ.

Ian plans to use the power hammer to make knives and blacksmithing tools. He says that blacksmiths have a saying: "Want a tool, make a tool." He also says: "I just like knives." ►

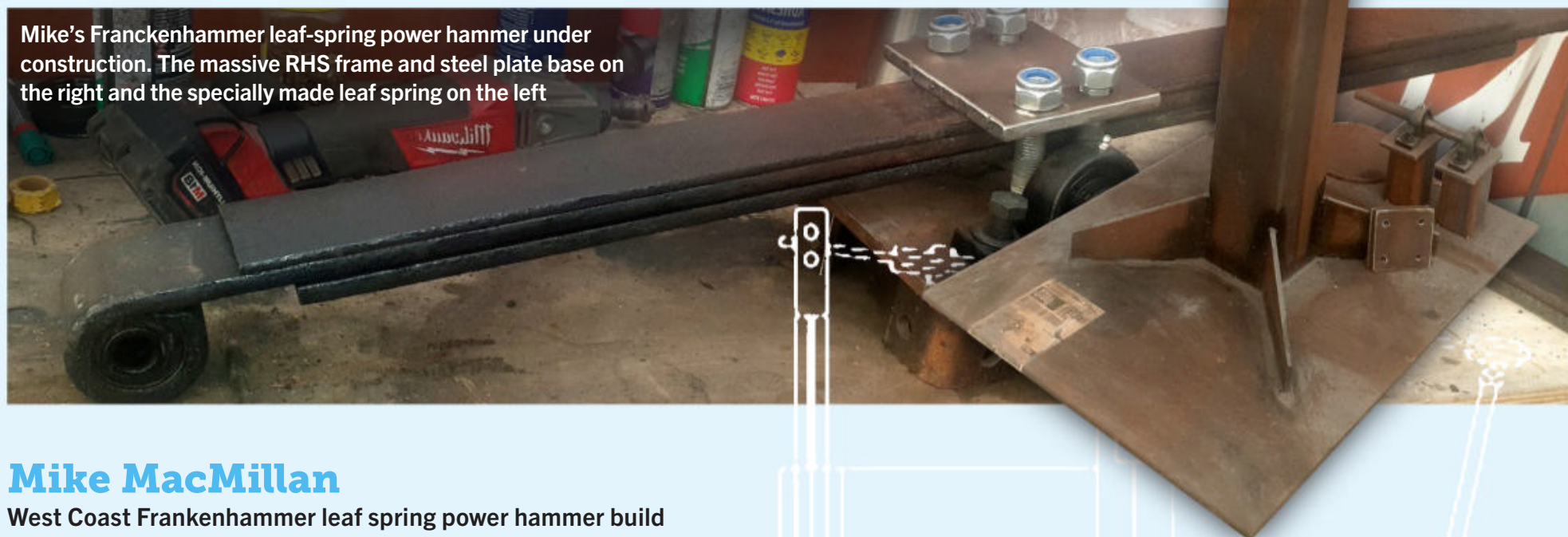
**"Blacksmiths have a saying:
'Want a tool, make a tool'"**



A hammer which Ian has forged



Mike's Frankenhammer leaf-spring power hammer under construction. The massive RHS frame and steel plate base on the right and the specially made leaf spring on the left



Mike MacMillan

West Coast Frankenhammer leaf spring power hammer build

When his first child was about to arrive, Invercargill-born Mike MacMillan looked around for a suitable place to raise a family. Having itchy feet, he had worked in engineering “all over” New Zealand, including a spell based in Blenheim while he helped build a remote back-packer’s lodge and a couple of houses in the Marlborough Sounds. He even built an Elves’ Castle for a *Lord of the Rings* movie in Wellington’s Kaitoke Forest park.

He liked Karamaea, near the top of the South Island’s West Coast, because it was green, and now works there as an automobile mechanic. He took time out from putting a new deck on a truck to talk to *The Shed* about a power hammer he is building.

He has made 10 or so knives from spring steel, but has ambitions to make Damascus steel ones. He thinks that making them by hand would be the last straw for his muscles and joints, which have been hard-worked for decades, and so bought plans for a Frankenhammer leaf-spring power hammer.

In a leaf-spring power hammer an electric motor drives a light fly-wheel mounted near the hammer’s base. As the fly-wheel turns a steel rod, attached near the

wheel’s perimeter, moves up and down. The top of the rod is attached to one end of a straightened truck spring. The spring pivots around a bearing in the middle which is attached to the highest point of the machine’s frame. The up-and-down movement of the bar causes the spring to rock about the pivot. The other end of the spring is attached to a solid square bar which moves up and down in a guide as the spring rocks. The bottom end of the heavy bar is the hammer which, as the motor turns, strikes an anvil.

Mike has been working for about six months on and off on the hammer and, living in a remote location, has found it challenging sourcing suitable steel. He says that if he lived in the city he could have found almost all he needed to build the hammer in scrap yards. In America a hammer built from waste steel is called ‘rusty’, or even ‘super rusty’.

The purchase of a little over a square metre of 12mm thick steel plate for the base was particularly painful. The truck springs used also had to be sent out of the Coast to be straightened. Mike is a very experienced welder who used both stick and MIG welders in fabricating the frame and

linkages. He says there was lots of welding involved. Lots and lots.

He hasn’t stuck religiously to the plans and has called on a lifetime of metal working knowhow to modify some details. Some components, like the base, have been lightened, while others, which seemed to him to be undersized, have been beefed up.

The main part of the frame is attached to the steel plate base and is an 1800mm long section of 200mm RHS. The hammer shaft is a 20kg piece of 63mm square bar. The hammer is calculated to strike the anvil three times per second. Even though the device is to some extent experimental, Mike thinks that there shouldn’t be too much fine tuning needed when it’s finished. He’s also building a forge — the hard work is done — which should be working at about the same time as the power hammer.

Mike has definite views on knife making, which may seem glamorous, but which also requires tolerance of cuts, noise, and grime. It also needs skill, patience, and perseverance. He has been collecting wood for knife handles for years, such as oak off-cuts from the Elves’ Castle, and black walnut from his family’s home. Elastoplast is also being stockpiled.



Ian's two LPG forges made from old gas bottles. The one on the right with one burner, the larger one on the left with two burners

joint with the base, are cut using his smallest router, rather than by a rebate plane.

Coopering uses metal for the hoops which hold the barrels together. Originally these would have been made by a blacksmith, who would have formed them out of wrought-iron strips by riveting. You could say that coopering is a trade where woodwork and blacksmithing meet.

The woodworking machinery is used for other tasks as well. He makes toys such as rocking horses and wooden trains for his grandchildren, and he has made furniture for his house: bookcases, and a stool copied from a Japanese original.

Ian's other interests

Ian's shed is a 9mx6m Versatile garage which was built at the same time as his house. This large (but, of course, not large enough) structure contains the gear for all his hobbies. Apart from the power hammer and the welder, there are two LPG-fired forges and a large anvil, but the majority of the equipment is for woodworking, some left over from the picture framing business.

He has a modern saw bench, drop saw, bandsaw and thicknesser, a venerable Tanner buzzer, and three electric routers. He uses these to make wooden barrels and buckets because coopering is another of his hobbies. He sources the oak timber for the barrels from trees felled in his suburb — the latest one was part of

an avenue of trees in a street called, appropriately enough, Oak Grove. Again the appeal of coopering is in its history and the fact that it has been bypassed by modern materials. Ian makes barrels and wooden buckets which are, he says, indistinguishable from similar items made a couple of centuries ago. That isn't to say that he makes them using pre-industrial methods. Coopers had a wide repertoire of specialised tools, especially planes, and Ian has a few fascinating examples, but he uses his electrically powered tools to do the work. When he says old-time coopers would have used these if they had had them, who could argue? So the rebates cut across the ends of the staves forming the sides of a wooden bucket, to form a water-tight

He sources the oak timber for the barrels from trees felled in his suburb



A barrel made by Ian, as shown by the IK maker's mark. Note the riveted barrel hoops



Ian's blacksmith's leg vice. These are made of forged steel and can survive very heavy use



Tutors and pupils at a Hammer In

Links Tyre Power Hammer plans and forums

Plans cost US\$32

Send money order to Clay Spencer, 73 Penniston Private Drive, Somerville, AL 35670 USA

E-mail clay@tirehammer.com

Also, Clay leads workshops for chapters or groups to build 15 to 20 hammers and even has tyre hammers for sale.

<https://www.facebook.com/groups/Tirehammer/>



Antique firearms

From an early age Ian has been interested in antique firearms. He started off being a member of a small-bore rifle club, graduated to muzzle-loaders, and then, with two friends of similar age (one the owner of the CNC mill) formed the Ashburton Pistol Club in 1973. The pistols used were modern reproductions of antique pieces; Italy has a large industry involved in their production.

Ian casts his own bullets from a mixture of scrap lead and 5 percent tin, which give the projectiles greater hardness. These days his main gun-related activity is Cowboy Action Shooting where a competitor, dressed in western clothing, has to hit 24 targets as quickly as possible, using two five-shot pistols, a lever-action rifle and a shotgun, all of pre-1900 design. 12 seconds is the time to beat. 📄



QR Code – Watch the video



Steam hammers

Blacksmiths form steel implements by forging. This involves heating the metal white hot so that it's more easily deformed and then pounding it with a hammer on an anvil to form its new shape. This is hot and heavy work and blacksmiths were famously muscular — “The smith, a mighty man is he.” The larger the piece of steel, the greater the amount of force needed to shape it, so there is a limit to the size of a forging produced by hand. A hammer powered by something more powerful than human muscles was needed to forge a large object.

The earliest powered hammers were driven by water-wheels. The hammer was lifted as the wheel turned and then dropped to bash the hot component. The number of suitable sites for waterwheels is notoriously limited and so one of the first uses of the power of steam was to lift heavy forging hammers before they fell under the attraction of gravity.

It was soon realised that steam could not only lift the hammer, but also power it downwards with admirable force. It became possible to forge very large steel components, such as the propeller shafts of steam ships and the barrels of large guns, and so the industrial age was born. Huge steam hammers were constructed, the very largest in America.

Large powered hammers are not much used today — modern hydraulic presses are very powerful and their more gradual application of force produces stronger forgings with fewer internal faults, and they are not deafeningly noisy.



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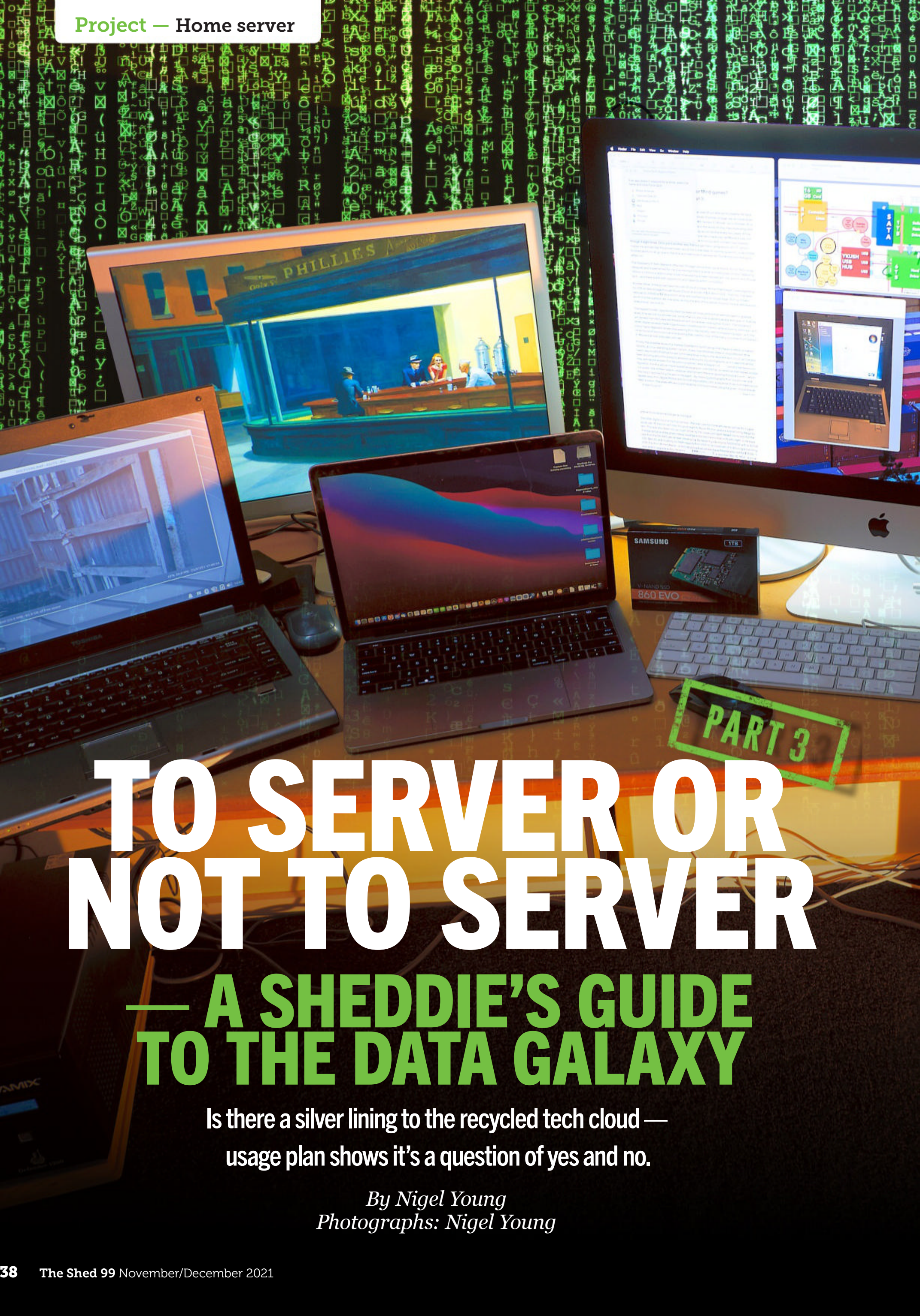
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TO SERVER OR NOT TO SERVER

— A SHEDDIE'S GUIDE TO THE DATA GALAXY

Is there a silver lining to the recycled tech cloud —
usage plan shows it's a question of yes and no.

*By Nigel Young
Photographs: Nigel Young*



My iMac with two older monitors that came with the original G5 Mac, the Toshiba and MacBook laptops, assorted mice, drives, and a mix of memories and longterm plans

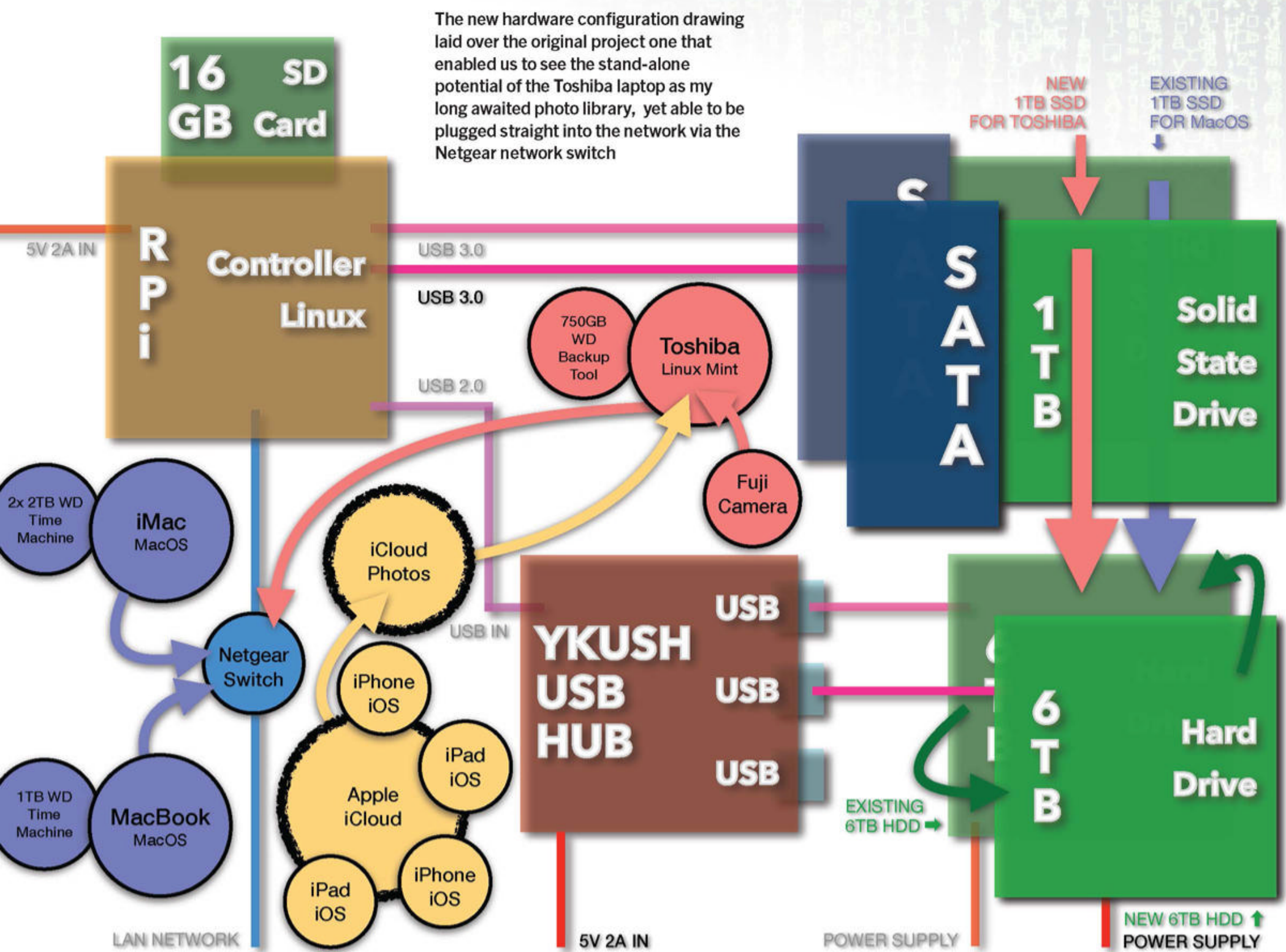
“By the end of this article I hope to have a definitive and unequivocal ‘yes and no’”

Recycling old tech is about pros and cons, and in the case of our attempt to breathe life back into a 15-year-old G5 Mac and various external hard drives of similar vintage, we’ve come down on the side of the cons. Sadly, I might add. Back in 1965 Gordon E. Moore — a co-founder of microchip manufacturer Intel — predicted a rate of change in the world of chip manufacture by stating that the number of transistors required for each chip would double every two years. At the time he envisaged a 10-year projection for what has now become known as Moore’s Law, still consistent almost 60 years later. Applying Moore’s Law to our project, our tech has iterated through it eight times. Or to put it another way, that’s a geometric progression of 128. Which makes me wonder, has this project been about the noble ideal of minimising landfill, or about the troubled ability to let go due to the time and memories it represents? Some pop-psychology to reflect on.

Project drivers

The Raspberry Pi NAS (Network Attached Storage) device that Lance Hastie of Com Technology designed and implemented for me is achieving more in a small wooden plywood box measuring 165mm x 125mm x 400mm than would otherwise have been realised with our assortment of older tech — and there is still both opportunity and capacity within our solution.

Another driver of this project was the cost of cloud storage. At the time I began, I was signed up for 2TB of data storage through Apple iCloud at a cost of \$16.99 a month. That has now been reduced to 200GB at \$4.99 a month while still maintaining a family package. But has it been worth it is the question we now pose, and by the end of this article I hope to have a definitive and unequivocal ‘yes and no’. ►



The biggest hurdle/opportunity here has been all those photos that we now take for granted every time we pull out our phones, some of which are now so extensive and well specced that major camera manufacturers are threatened, with some even closing their doors. This happened when digital cameras made huge inroads in traditional film-based cameras 20 years ago, with many highly regarded names disappearing from the industry. Well it's happening again, with the initial round of survivors now re-evaluating their viability—one of the many outcomes from Gordon E. Moore's almost 60-year-old law.

Is this the answer?

Finally, the possible reuse of a Toshiba Satellite Pro S200 laptop, which already has Ubuntu - a Linux variant—already loaded on it. (It also has Windows Vista on

its partitioned drive — need I say more?) This has turned out to be a silver lining to the recycled tech cloud, as I've also been scouting about for a way to establish a library for my photographs, and it seems that this may well be the answer.

For the previous article I drew a diagram of Lance's hardware configuration. For this article I have layered a usage plan over the top, an exercise that helped us plan our goals. One of them was to create an alternative to the ever-growing iCloud account — which has begun approaching the plan limits again — by diverting photographs from our phones and tablets away from Apple Photos and its cost implications, onto a separate drive controlled via our NAS solution. The sheer efficiency and reliability of iCloud makes using it a given, it's just the degree and convenience that we're looking at.

“This has turned out to be a silver lining to the recycled tech cloud, as I've also been scouting about for a way to establish a library for my photographs”

Success, a photo library

The other digital input is my Fuji camera which I use for these articles as well as personal use. At the moment they too go straight to Apple Photos, which is exacerbating the problem. This was also taken into account. Drawing the usage plan layer helped me to see that the Toshiba laptop and the photo library could be a standalone solution in its own right, quite separate from the RPi NAS we've been developing. By replacing its original 50GB HDD with a 120GB SSD (\$44.85), and doubling its RAM capacity from 2GB to its maximum of 4GB using a matching 2GB DDR2 chip from Molten Media — a tech recycling trust where it was fitted and tested for \$10 — I was able to upgrade a very decent laptop from around 2008 for less than \$60.

Mint — a Linux derivative that Sandy Ferguson at the Rolleston Men's Shed has been advocating — was installed complete with Pix, a free photo management app that comes with it. This now means we have the front end of a photo library. The 15-inch LCD screen — sufficient to sort and catalogue, but not sufficient to process or edit the pics themselves — meant that I will now be able to manage and search for pics as they are required. My wee Fuji camera plugs straight into it, thus bypassing the home network completely. A standalone solution that can still be plugged into the network, making it mobile and able to be worked on anywhere, yet available from

Intel Core 2 Duo T7100 (Socket P) specifications

Get specs

The specs can be used for short-term listings on auction and classifieds sites

General information

Type

CPU / Microprocessor

Market segment

Mobile

Family

Intel Core 2 Duo Mobile

Model number

T7100

CPU part numbers

LF80537GG0332M is an OEM/tray microprocessor
BX80537T7100 is a boxed microprocessor without fan and heatsink

Frequency

1800 MHz

Bus speed

800 MHz

Clock multiplier

9

Package

478-pin micro-FCPGA
1.38" x 1.38" (3.5 cm x 3.5 cm)

Socket

Socket P

Price at introduction

\$209

S-spec numbers

Part number	ES/QS processors					Production processors
	Q3NF	Q4FC	Q4YX	Q4QY	Q4YV	SLA4A
BX80537T7100						+
LF80537GG0332M	+	+	+	+	+	+

Architecture / Microarchitecture

Microarchitecture

Core

Processor core

Merom

Core stepping

M0 (QWOY, SLA4A)

CPUID

6FD (QWOY, SLA4A)

Manufacturing process

0.065 micron

Data width

64 bit

The number of CPU cores

2

The number of threads

2

Floating Point Unit

Integrated

Level 1 cache size

2 x 32 KB 8-way set associative instruction caches
2 x 32 KB 8-way set associative write-back data caches

Level 2 cache size

Shared 2 MB 8-way set associative cache

Multiprocessing

Uniprocessor

Extensions and Technologies

- MMX instructions
- SSE / Streaming SIMD Extensions
- SSE2 / Streaming SIMD Extensions 2
- SSE3 / Streaming SIMD Extensions 3
- SSSE3 / Supplemental Streaming SIMD Extensions 3
- EM64T / Extended Memory 64 technology / Intel 64
- VT / Virtualization technology
- IDA / Intel Dynamic Acceleration technology

Security Features

- NX / XD / Execute disable bit

Low power features

- Stop Grant mode
- Sleep mode
- Deep Sleep mode
- Deeper Sleep mode
- Enhanced Deeper Sleep mode
- Dynamic Cache sizing
- Enhanced SpeedStep technology
- Dynamic FSB frequency switching

Integrated peripherals / components

Integrated graphics

None

Electrical / Thermal parameters

V core

1.0375V - 1.3V

Minimum/Maximum operating temperature

0°C - 100°C

Minimum/Maximum power dissipation

7.1 Watt (Enhanced Deeper Sleep mode) / 53.3 Watt

Thermal Design Power

35 Watt

Notes on Intel Core 2 Duo T7100 (Socket P)

- Bus frequency is 200 MHz. Because the processor uses Quad Data Rate bus the effective bus speed is 800 MHz

Specifications

Compare 2 CPUs

Price chart

FAQ

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The spec sheet on the Toshiba that enabled me to down load the 64bit version of Linux Mint, rather than the 32bit version I had expected to. At least I learned that much from my YouTubing



Left: The Toshiba Satellite Pro S200 from around 2008 reconfigured with extra RAM and a new hard-drive, along with Linux Mint as its operating system. Sitting next to it is the 750GB WD drive and the USB boot drive I used to load Mint. Eventually

my iMac when needed. We now had two separate projects, both easier to define and execute, and yet thoroughly integrated into our existing network. I bought a seven-port Netgear switch to handle the traffic, which also meant that I now had access over WiFi to a printer that was previously unavailable.

Backing up

I say 'front end' because if I was filing all my photos onto the 120GB drive, it would soon fill up. However, turning back to the original Raspberry Pi NAS created for me by Lance, we decided to add a second 1TB Samsung SSD dedicated solely to the Toshiba. This would forward everything from it to the existing big 6TB Seagate HDD, which has space to spare for a long time yet. A second 6TB Seagate will be added to mirror the first, so now they can also back each other up should one fail. ►

Imaging a computer

Imaging, as the name suggests, is the complete copying of not just your files and data, but also includes all aspects of your operating system settings right down to your desktop background choice. When I was doing a CAD course some years ago, all the computers in the classroom had been imaged, which meant that I could use any computer in the room and it was identical to any other computer in the room. All software, system settings, and student log ons were identical. This made it much easier for the polytech technicians to update or service them whenever the need arose. Think copy and paste on a much larger scale. But first make sure there aren't any errors or bugs, as they would also get imaged across the classroom.

But wait — there's more.

Up until now, Apple's Time Machine had been my primary back-up system for both my iMac and more recently my MacBook. I had started using one of the older LaCie 500GB drives for this, but it's a clunky solution. It's much easier just to plug in a small Western Digital (WD) drive and let it run. I also want the MacBook backing up to the NAS as the iMac already does, so this is another consideration that needs to be allowed for. I have traditionally bought WD external USB drives for this role, and am about two thirds of my way through the current 2TB one. Would I also need to buy another one of those? And how long do you keep older drives for anyway? More questions for Lance.

Neat solutions

The upshot of this line of inquiry was that I did buy another 2TB WD drive, but now I would operate it alongside the current one in tandem, rolling them over as needed.

I can do this because Time Machine is more about backing up the system than just the data as it carries an image of my iMac. Should it be stolen or damaged, I can just buy another one, plug in the 2TB WD drive, and completely reload the new computer to exactly how it was prior to its demise at the time of my last Time Machine back-up.

But going back to upgrades and iterations — Moore's Law again — do I really need an image of how my computer looked five years ago? The laptop I had at the time is no longer, so what would I be 'imaging' exactly? So, now the two older WD USB drives are available for repurposing. I did that by assigning the 1TB drive to my MacBook as a Time Machine drive, and the smaller 750GB drive as a portable back-up to the Toshiba using the Linux Back up Tool app. I now had some neat solutions with minimal outlay due to repurposing existing tech.

The new 6TB Seagate and 1TB SSD drive intended to both backup the Toshiba separately and the two bigger drives collectively



Installing Mint

Installing Linux Mint onto the Toshiba was interesting, as this was all new territory for me. The Toshiba is very well specced — I'd taken a photo of it with its System description up in Windows mode before taking out the hard drive, and from there learned that even though Vista is a 32-bit operating system, on further investigation the processor is 64-bit. That meant I could download the 64-bit version of Mint.

I then loaded it onto a USB stick, along with an app that would enable it, and put it in the Toshiba. Holding down the F2 button when I started it meant that the Toshiba would give me the option of where to boot from. Choosing the icon of the USB drive, I hit enter and ... nothing happened. The computer didn't recognise the USB drive, and I had forgotten that it was formatted for my Mac. Right. Time passed along with various attempts and iterations. Still nothing. My ignorance is

The Netgear seven-port switch that gave me back a printer and into which the Toshiba laptop can be plugged as needed



“My ignorance is showing rather badly. I didn't know how to turn the USB into a boot drive”

showing rather badly. I didn't know how to turn the USB into a boot drive, and despite watching various YouTube clips, I still couldn't get it right. I did however have Linux Ubuntu on a CD — it was going to be installed on the G5 back at the beginning of this project — so I decided to try that to at least see if everything was all in working order. I had been careful when taking out the existing 50GB hard drive and had worn an anti-static strap, but I was way outside my comfort zone and wanted to check that all was well.

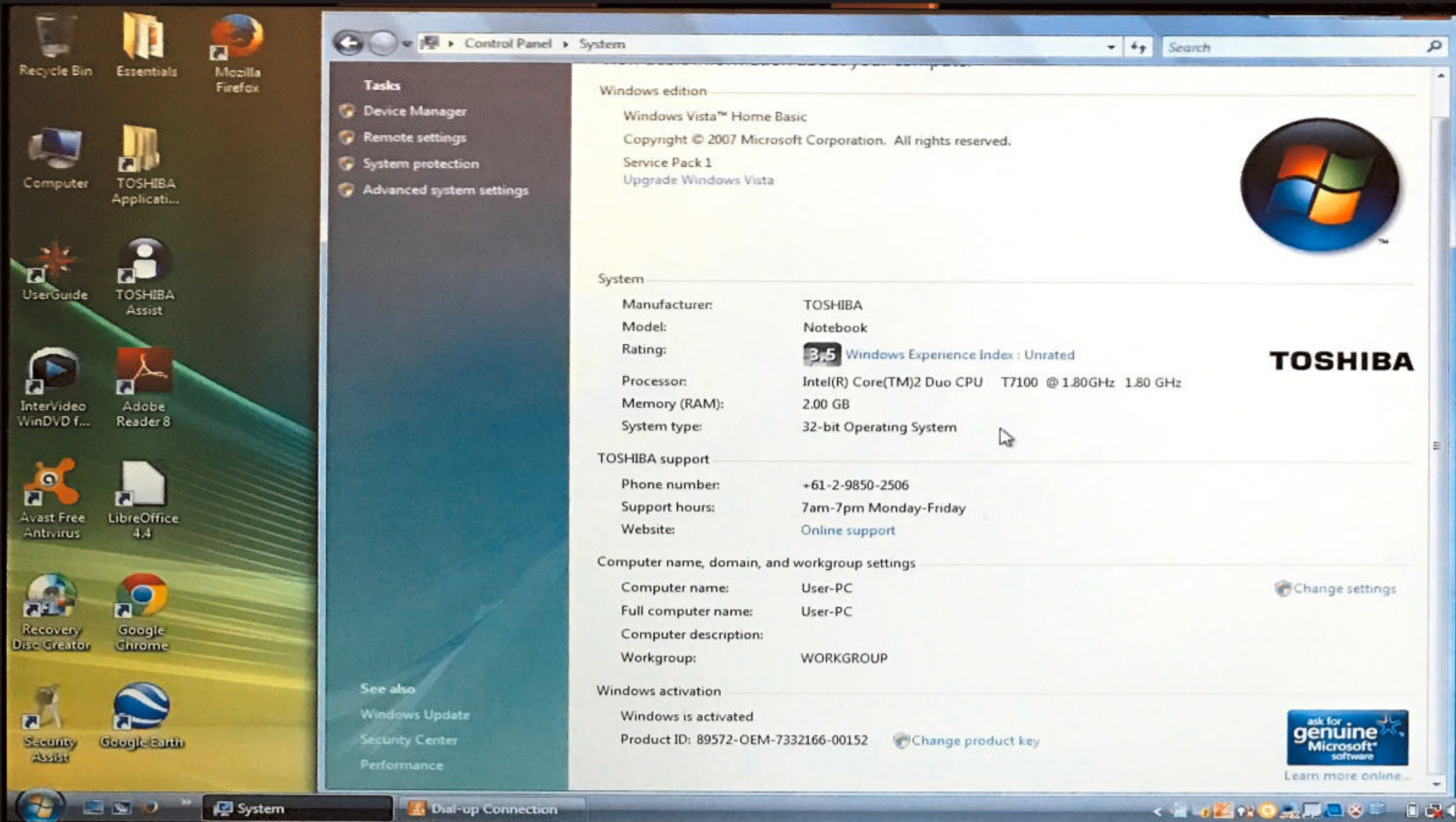
Ubuntu loaded perfectly, demonstrating that all was indeed well, and left me feeling pleased with myself. Ironically, while searching for other Linux stuff, I came across a site that enabled me to form the USB boot drive very easily and quickly, and within a short time I had Linux Mint installed as originally planned. I had gone from 0 to 2 in a couple of hours. (<https://www.balena.io/etcher/>)

Some questions

So much for the hardware requirements, but how exactly is this achieved? What are the software implications? Does anything need to be written for this, or are there already solutions out there that can be used? We'd previously used Sync Folders Pro+ by GreenWorldSoft at \$15, but that had proved to be less than useful. We're currently running the NAS on a slightly older yet seemingly more reliable app called Get Backup Pro 3 by Belight, which is about \$10 dearer, depending on the exchange rate.

The August lockdown has meant that while I have ordered all the parts needed to upgrade the original Raspberry Pi NAS to the new configuration, I'm unable to get Lance to do his side of it until we're able to connect again. Getting the Netgear switch enabled me to get rid of a mess of wires taking up bench space by building a small shelf beneath. This in turn meant that the plywood box with the





Windows Vista finally doing something useful—it gave me the spec for the processor—shown here as ‘Intel(R) Core(TM)2 Duo CPU’ which lead to the spec sheet which lead to the discovery that I could use the 64bit version of Mint

“But progress can also be measured in terms of reuse, reconfiguration, and recycling”

Below: In the end a reasonable price for a bespoke and interesting problem. See also my comment regarding 5 engineers and 10 solutions

Raspberry Pi NAS was no longer on the floor — I was never happy about that but initially had few options — and was now more secure as well as more accessible. I may have to build a larger box once the final hardware configuration is complete, or I’ll pay a visit to Molten Media and see if I can find a metal case that I can put everything in.

It is said that if you give five engineers the same problem, you’ll get 10 different solutions. In this case with a final outlay of \$1,418.82, a very specific solution which included the reconfiguration of an older but still very good laptop.

Is it a good solution? Given my

requirements, it’s an excellent and compact one that gives me confidence that my files and data are secure, and my long-awaited photo library is finally happening. I fired up the old G5 Mac the other day, trying some new tricks I had come across, but still no joy. At the moment it’s a rather large ‘bookend’ under my work area, but I’ll try a bit more before I finally give up on it.

Measuring progress

Moore’s Law doesn’t take expenditure or extension of use into account, it’s just a projection of development progress. But progress can also be measured in terms of reuse, reconfiguration, and recycling. According to their website, Molten Media’s mantra is to promote “ethical recycling of electronic equipment and computers with an ultimate goal of zero waste to landfill”, and are currently diverting around 80-90 percent of it through refurbishing, dismantling, and sales of some still perfectly good hardware.

I felt like a kid in a toy shop, recognising some stuff and being inspired by other stuff, with the ‘what ifs’ beginning to take shape. But is that the past still talking, or an interesting new future taking shape? Some pop-psychology to reflect on.

The dollars	
Finally, the costs. At the end of the first round I had spent \$814.74. This final round would add the following :	
Seagate Expansion 6TB Plus Desk Hub	\$216.52
Samsung SSD 1TB hard drive	\$209.00
Netgear 7-port switch	\$ 71.09
USB3 2.5 SATA HDD adapter cable	\$ 25.65
Kingston 120GB SSD drive	\$ 39.00
5v USB power supply	\$ 22.00
2GB RAM	\$ 10.00
2x3m network cables	\$ 10.82
Total	\$604.08

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STATE OF THE ART DRILL PRESS

Sometimes a fix just won't cut it

By Mark Beckett

Photographs: Mark Beckett

There is a point in life when some of the tools you have don't work as well as they used to.

If it is a power or hand tool then the solution is easy — fix or replace it — but in this case it's not the physical tools but the tool using them.

I own a small drill press that I sort of inherited. It was originally purchased for light duty use, but, as with all things mechanical, it tends to be used for things well beyond its capability. Belt drive drill presses require the pulley ratio to be changed to suit the drill bit speed, and the slower the speed the greater the torque. This particular one had three speeds — slow, bearable, too fast — and, with the stretch on the belt, one speed always caused the pulley to rub on the cover, so the cover was often open.

Never going to work

Every time I tried to drill a decent-sized hole, the belt would slip or the motor

would stall, and I never tried a hole saw as I knew that was just not going to work.

As a result, the electric drill tended to be used and thus the problems with 'the tool using them' kept cropping up. Clamping the work was fine, but the drill moves around and in the worst case throws you as it grabs. Visibility also becomes an issue as you need to have a certain stance, which is not the range needed to observe what you're doing — even with extra light.

So, this year I decided to shout myself a new drill press that would hopefully solve all my drilling issues. I have a new project that involves quite a few holes and includes a number of large diameter holes, so there was a good reason/excuse. I purchased a Nova Viking drill press from Carbatec in Auckland.



Just fits — note the ‘Heavy’ label



“Think of it as a battery drill on steroids”



Add the base so you can tip it up — carefully

DVR

The Nova Viking is a direct drive drill, which means it doesn’t have belts and pulleys. Instead the motor is electronically controlled, which gives you finer control. Using electronics provides an opportunity to include other features, so torque limiting, auto start, auto stop at a certain depth, and reverse are built in.

Think of it as a battery drill on steroids.

Real-world testing

There are plenty of videos and reviews about the functioning parts, but I was more interested in the added parts that make it easier for us ‘experienced’ readers. We’ve reached that stage in life where we appreciate quality but more important is something that makes it easier for us.

The good news is that you can plug it in and use it, so the manual doesn’t need to live beside it. The menus are easy to drive, and the LCD screen is large with great visibility. Some LCDs need you to angle your head a certain way, and adjust the lighting to be able to make out what the symbols are, then refer to the manual for an educated guess at what it does — try changing modes on your air conditioner — but not here, plain English, large and backlit. ►

“Combined, these work together to ensure you only need one hand to do the drilling”

My old drill press did have a lamp fitted but that came to a smashing end one day and was never repaired, so I was glad to see the Viking has both a light and laser guidelines, which are independently controlled. The light is underneath so you don't have the shadow error that comes with side lighting.

Wobble

Run-out is the amount of wobble that the drill has, and it tends to get worse the deeper the hole. You could use a ruler on my old drill press so anything was going to be better. The specs are 0.02mm (0.787 thou) at the spindle, so that's unlikely to be a valid excuse for my hole-drilling errors.

Auto start seems like something added by the marketing department but the reality is it is very useful. Most drills have the on/off on one side and the quill — the bit that adjusts the height — on the opposite side. If you're holding the work with one hand, then this hand-swapping game is not useful. This feature starts the drill rotating as you advance it 7mm toward the work, and stops it at 6mm from home. Combined, these work together to ensure you only need one hand to do the drilling.

There is a digital depth indicator on the screen, but you can also program the drill to stop at a certain depth. Unlike the double nut on the depth indicator,

Clear, large, easy-to-read display of revs and depth



which comes loose after a few holes, the electronic one doesn't move and is easily changed. It works by stopping the drill and reversing the bit for three seconds, but you have some other options that can be configured.

Conclusions

For some time I'd looked at replacing my anaemic drill press, and I'm glad I waited until the NOVA Viking came along. The extra features over a belt-drive model are well worth the cost and make it much easier and safer to use.

Rather than finding an excuse or alternative, I now look forward to using the drill press. 📦



Recycled draw set allows it to be shifted where it suits



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A trio of Big Smoke bespoke CBGs featuring vintage cigar boxes and antique keys for bridges

Don tests out his
'Viking' four-string
guitar specially built
for the *Shed* shoot



OUTSIDE THE BOX

A self-taught craftsman discovers the joy and musical
freedom of creating his own low-tech instruments

By Jason Burgess
Photographs: Jason Burgess

There is a spirited musical revolution ringing out from backyards, lounges, and stages across the planet. It is a joyful, noisy uprising; picked and strummed by a passionate community of makers and players of handmade cigar box guitars (CBG).

These humble lo-fi instruments are capable of producing new sounds and unorthodox voices without the need for digital inputs or hard drives. Call it a rebellion against technology; they are innately unique, and can

reawaken a sense of musical freedom in any virtuoso. Their reverberations were heard loud and clear — some time ago — by self-taught, Auckland CGB creator, Don Buckley of Bigsmoke Guitars. ►



Sliding into the first note on the Viking. Don's ethos is to 'Always play what you make. This way you can get your head around the unique sound of each new CBG'

"The first rule of cigar box guitar making is ... there are no rules"

Rules, rules, rules

In the past half-decade Don has built more than 60 bespoke guitars; they are one-of-a-kind creations that he calls instrumental artworks.

"The first rule of cigar box guitar making," says Don, "is there are no rules. The second rule is to have fun. It is easy to get addicted, because, by the time you finish one, you're already thinking how to make a better one next time."

Don is a bookbinder by trade and an aspiring landscape architect, but before he heard the call of CBG he had never

been a musician. His odyssey into the CBG paradigm began as he approached his 50th run around the sun.

Unlike most novices, it was never Don's intention to make just one guitar. His mission was to make 50 guitars — each with its own theme, backstory, and sound.

"From the beginning, I said that when I reach my goal I want to hit it at a professional level. As I closed in on the big five-o, I was making really good guitars in my sleep. I mean, you can go to war with these things."

He called his project Forest for the Trees, and saw it as an interactive installation for art galleries. However, he could not find a venue as he was not considered an 'established artist'. Instead, he packed up his quiver and a tent, and headed down to Womad. There, on multiple visits, his efforts were vindicated when musicians of all persuasions let loose on his guitars in what ostensibly turned into three-day jam sessions.

"It was a buzz seeing people coming in and playing them. A father and son jamming; a student and his music teacher who hadn't seen each other for 20 years playing together. One music scholar told me, 'I thought I had music down to an art, but I hadn't done that. I had to think horizontally. I now have a new interest.'"



Notes from Don's 'head-shed' featuring vintage CBG postcards and private notes on his handmade and hand wound pick ups

Inspiration

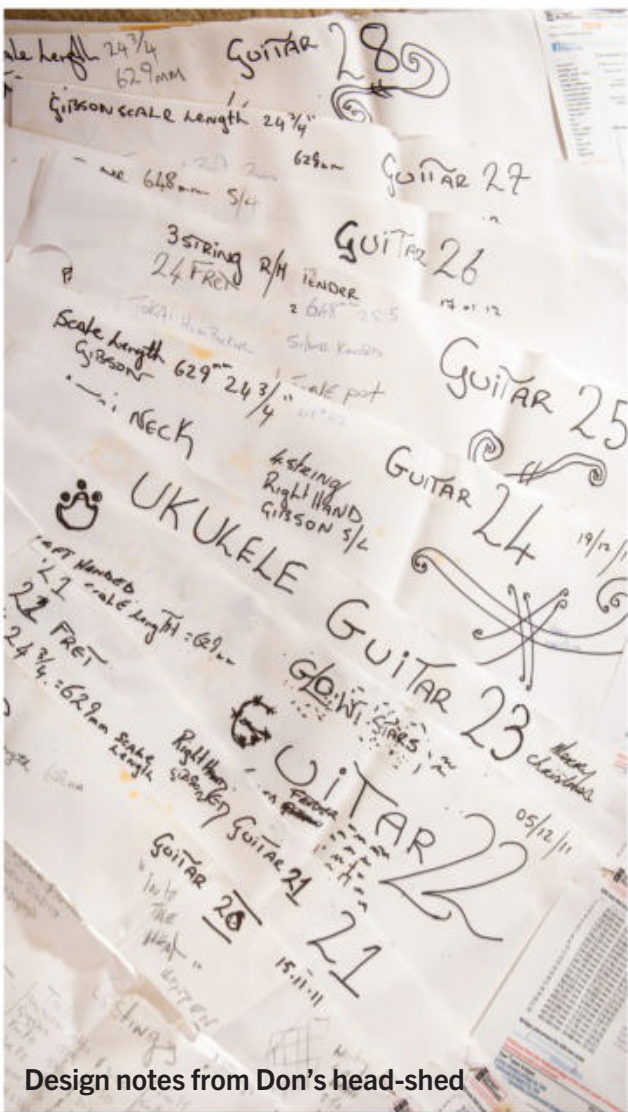
Often ridiculed as lowbrow, novelty instruments, CBGs, or ‘poor man’s guitars’, have deep musical roots reaching back to the late 1700s.

On the tobacco farms of the American south, it is said that the plantation workers would undo the wire on an old broom handle, slip the handle through a hole cut in a disused cigar box, and then string the wire back over and fasten it to the handle base. In no time, they would be thumbing a tune. Similar devices such as banjos, fiddles, and one-string basses were later played during the American Civil War; popularised with children in 1884 by one of the founders of the Boy Scouts movement in the States, Daniel C Beard; became instruments of choice for

vaudeville acts in the early 1900s, and were often made and played on the front lines of both world wars.

While Don delved deep into CBG history, he was simultaneously inspired by the sounds of contemporary musicians such as bassist the late Mark Sandman from the band Morphine, who made and played his own guitars — as did other ‘axemen’ like Ry Cooder, Brian May, and BB King.

“King and Hendrix both learned off cigar box guitars, and Hendrix played a broom before that. Sandman made a two-string bass because he was looking for his own sound, something called ‘low rock’. When I retire I think I’m going to grab a slide bass and learn to play for the rest of my life.” ►



Design notes from Don’s head-shed

Don’s tips

Go to the head shed first. If you are musically minded then you know what to look for in a guitar. I wasn’t, so I kept it simple in the beginning, sketched out my ideas, and started with a box, a neck, a bridge, a nut to put the scale lengths on, and tuners to tighten it. Then I was away.

It is best to make the first guitar fretless and uncomplicated.

I use the best materials I have at hand; take my time — because enthusiasm can take over — make the best possible job I can, and try to better myself from there.



A range of well-worn hand files to shape the necks and headstocks



BK: Black Whenge W: White AM: Maple A: American S: Spanish		42 gauge AWG wire Whenge Black. American Spanish American Maple White.			
No	Type of Pickup	Description	OHMS Pre-Way	OHMS Post-Way	TOTAL WINDS
1.	1 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	1.77 OHMS	1.75	10,225 winds
2.	1 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	1.28 OHMS	1.27	7,932 winds
3.	1 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	1.38 OHMS	1.37	8,310 winds
4.	1 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	2.04 OHMS	2.02	10,795 winds
5.	1 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	0.85 OHMS	0.87	6,152 winds
6.	3 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	4.53 OHMS	4.50	11,021 winds
7.	3 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	4.95 OHMS	4.86	12,003 winds
8.	3 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	2.65 OHMS	2.55	6,300 winds
9.	3 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	3.70 OHMS	3.60	7,055 winds
10.	2 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	3.80 OHMS	3.77	11,770 winds
11.	2 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	3.80 OHMS	3.70	11,726 winds
12.	2 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	5.03 OHMS	5.01	11,540 winds
13.	3 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	4.16 OHMS	4.13	10,210 winds
14.	4 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	4.79 OHMS	4.73	9,778 winds
15.	4 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	6.10 OHMS	6.0	11,555 winds
16.	6 Pole	1/2 AWG wire, Alnico 5 magnet, Chrome Ring, N.A.	9.02 OHMS	8.85	11,761 winds



The time for focus and accuracy comes in the drilling out straight tuner holes before shaping the neck

Acquiring the skills

After months researching CBG-making techniques, from plans and equipment to sound dynamics, Don was ready to begin.

“I needed to learn the skills of a luthier because I knew what I wanted to achieve. I had to become electrically proficient; study up on woodworking and get a grasp on all the musical aspects. Initially I was making fretless because that is what cigar box guitars were originally,

and they were played with a slide. As I got better, I learned about fretting because that’s what people expect on a guitar. Fretting — I now know why they call it that! It is so hard because every fret has to be right. If it’s too low or incorrectly spaced, you’ll get a buzzing or a flat note. For a time, it got too serious and took away the creativity, so I parked it and got into making ukuleles. I don’t mind fretting now, because I have a little Zen ‘get in the zone’ thing going.”

Notes on the neck blank

I carve and bend the headstocks. I step them down for the tuners as you need to bend your string. I prefer a depth of 50mm as it allows me to carve and bend all within the same piece.

Depth of the neck should be about 25mm to stop it breaking. You could take 5mm off at 2–3mm above the neck for slide.

Hardwoods are preferable for necks but a lot of manufacturers are using pine now and they still sound cool.

The neck should be straight and positioned in the centre of the box. You can screw or glue the neck into your box. Keep the glue off the soundboard/face of your guitar.

Save all the offcuts from the neck. They will come in handy later for things like strengthening box walls and providing pickup covers. That helps form a cohesive look.

When positioning the pickups on the soundboard, you may have to cut a space in the neck beneath to cradle the pickup.

Traditionally, the neck ran through and protruded from the bottom of the box, the string ends were then attached through it. A simple hinge is useful for hooking and anchoring the strings through the soundboard into the box.

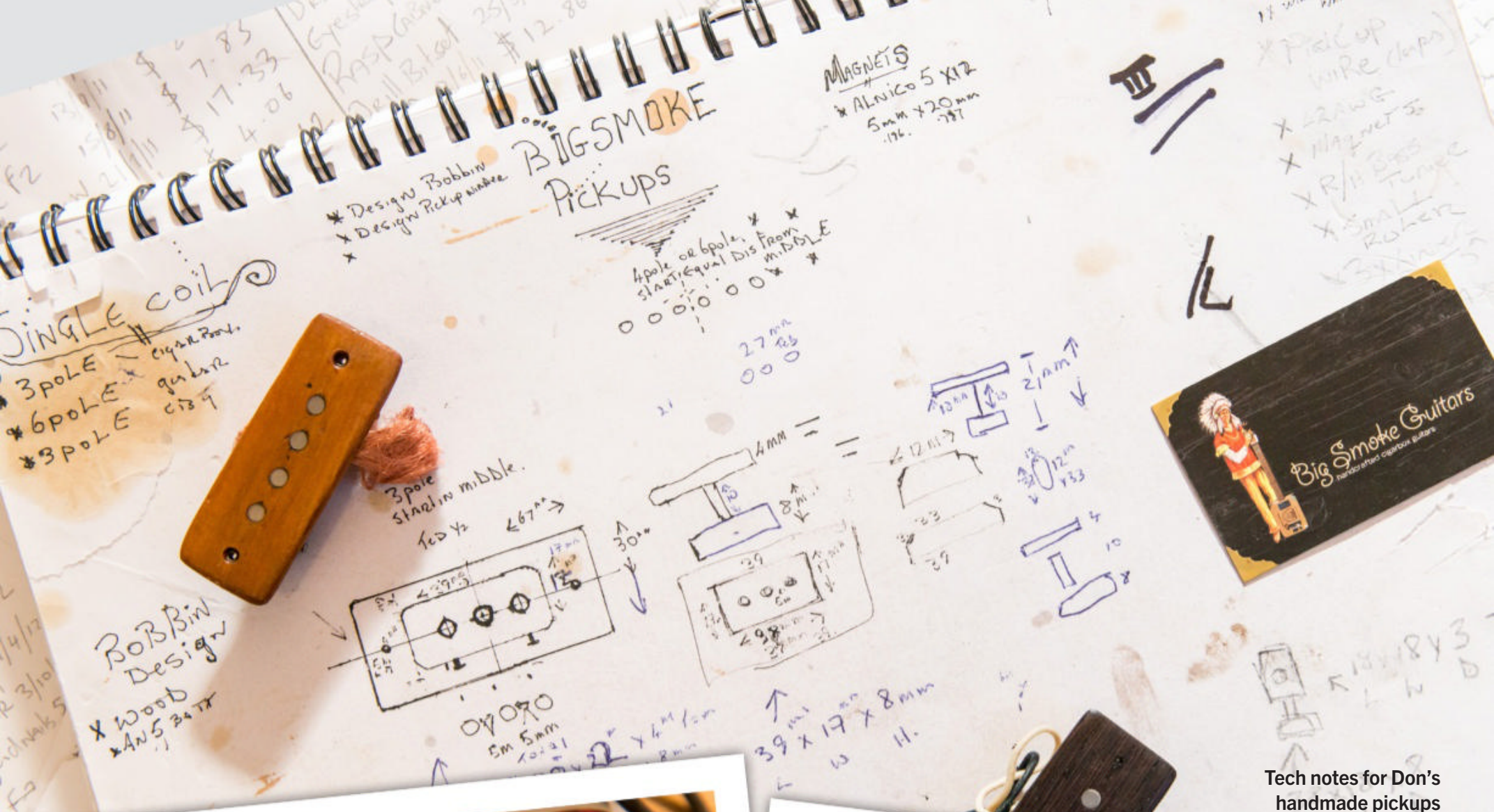
To finish: boiled linseed oil mixed with French polish creates a lovely colour. I sometimes apply up to 40 rubs into a neck.



Four Bigsmoke Guitar headstocks each with their own individual shape and theme



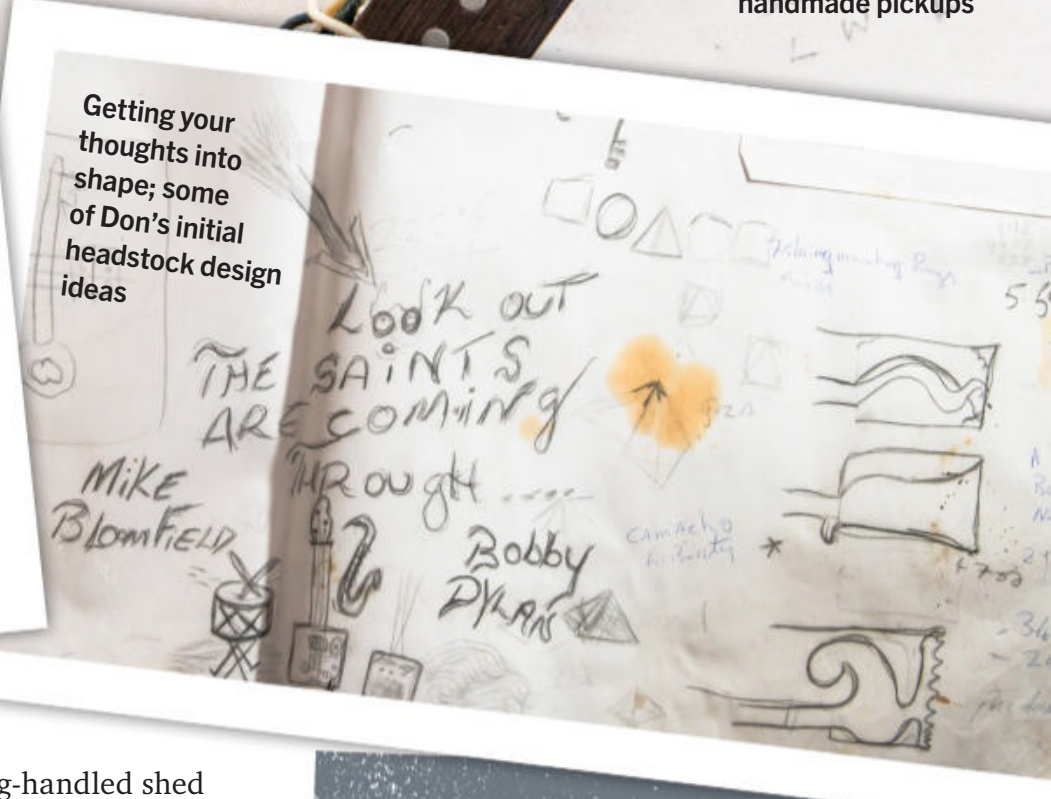
Checking the action before the action of playing the new Viking



Tech notes for Don's handmade pickups



Adornments for the Viking include an antique key, bolts, coins, and rugby boot sprigs



Don's head shed

Whether building a CBG for five bucks or for five grand, Don believes in using his 'head shed' before committing financially.

"The head shed is my store of ideas, knowledge, and inspiration. I sketch them out then write down all the materials I will use and any thematic I want to draw on. Notes of inspiration, lyrics, and thoughts, all inform my headstock designs. It is a great resource to go back to. I can see what I did, why, and how. If I hit a problem I can see how I overcame it. I have made 61 guitars, and I keep all their drawings; I can see what strings I used, what tuning — the root, the fifth, the octave."

Upcycling is fundamental to the CGB ethos. Necks can be created from old floorboards, pool cues, and table legs. Oars and paddles lend themselves well

to the task, as do any long-handled shed tools such as rakes and shovels.

"Don't get hemmed in by the term cigar box; a sound box could be as simple as a flat plank of wood. Or turn your old dog bowl over, put a piece of wood across it, string your strings over it, and there's your resonator."

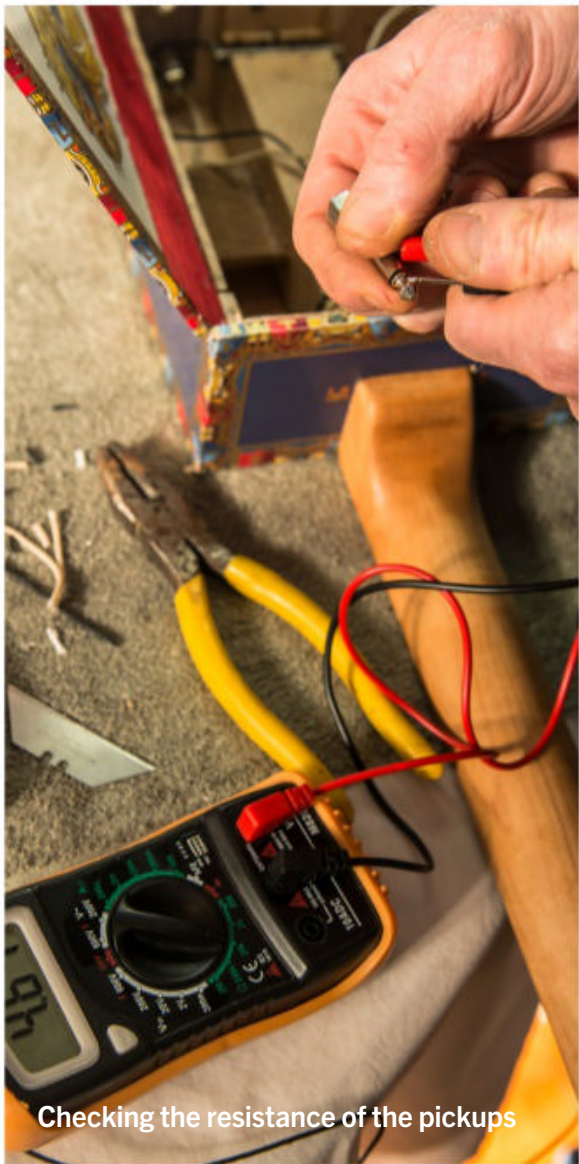
In Korea, GIs used bullet cases and old petrol cans. But equally, this could be a lunchbox, packing crate, toolbox, or even an old suitcase — they all make great amplifier cases, too. When Don first started, he wanted to do the best he could with the materials he had on hand.

"I had collected cigar boxes from my travels, some good ones like old Partagas boxes, built with slivers of Spanish cedar. Man, that's what they make flamenco guitars from! The beauty of cigar boxes feeds the creativity." ►

"Turn your old dog bowl over, put a piece of wood across it, string your strings over it, and there's your resonator"



Grounding the strings to help stop unwanted noise by running the strings over a simple bolt



Checking the resistance of the pickups

“You need a hard wood that can take the pressure, not bend, and sound good”

Fender template

Don uses Fender and Gibson scale lengths — i.e. bridge to nut — as a rule of thumb for gauging neck sizes. A Fender, at 25.5inches (647.7mm), makes for a warmer tone. For a brighter tone, he suggests the shorter Gibson at 24.75 inches (628.65mm). For necks and headstocks, his timber of choice is wenge.

“You need a hard wood that can take the pressure, not bend, and sound good. I stick with wenge, mahogany, and Tasmanian oak, but it’s hard to find. I upcycle where I can and get a woodsmith to finish it. It has to be from a reputable source. Ethically pure. Nothing from

China because it’s most likely hardwood from Indonesia. Everything we do and say is a circle that comes back to us. If you can keep that circle clean you can get really creative.”

Don has made a few acoustic guitars but prefers amplification and adding volume and tone.

“When I make one of these, I want them to be a loud, badass dinosaur. When I showed my original circuit to an electrician, he started laughing. It is such an archaic way to hook stuff up. But to me, I knew I had to make a circle without any breaks in it and then in I go. Even today, my soldering looks like a battle zone.” ▶



Don's Southern Cross guitar featuring a Seth Lover humbucker pickup



A neck blank with design pencilled-in and ready for shaping



Don's 'battle zone' soldering



Shotgun shell control knobs



Don looking stoked after the first run on the Viking



Off cuts can be re-purposed for pick-up blanks

Sound thinking

Tuners / machine heads are extremely important — they keep the strings in tune. One of the earliest discoveries I made! I found a quality tuner in the Grover Sta-Tite.

Don't scrimp on pickups. Single coil pickups are OK but Humbuckers with two coils are best with CBGs. Humbuckers have a 500K pod. The K is the resistance value, with more treble response as in a 'brighter' sound.

Remember, the strings will act as antennae; if they are not grounded to the circuit they can produce a background hum.

A deeper box generally gives a richer sound.

Sound holes contribute to the sustain and can deliver a brighter sound. Sound holes are experimental, really, and are governed by the size of the box. Some people argue for them; others say they are not necessary. One thing is: if it is too big all you will get is feedback. They need to be much smaller than on regular guitars.



Hand-winding on a handmade pickup winder



Skull head control knobs and three sound holes to harness the cavernous sonic possibilities of a deep box



'The Vegas' featuring a seven string pickup on a three string guitar. "This one is all about extravagance and over-indulgence"



'Blues Notes' reuses old bank notes from Don's travels to cover up unwanted tobacco warning labels

Upcycle beyond the obvious

When searching for cigar boxes ensure they are made from wood, not cardboard.

A larger — 11-inch — cigar box is ideal to start with as it offers a sizeable sound chamber and plenty of room to work with. Guitars this size are also more comfortable to play.

Always strengthen the inside walls of cigar boxes.

Old sink holes, curtain ringlets, and tree of life coins make great sound holes.

Control knobs can be personalised with rugby sprigs, dice, shotgun shells, and thimbles.

Aesthetically, I love layering, adding things from around the house: coins, old bank notes, postage stamps, and souvenirs. Each adornment contributes another layer to the theme of a guitar.

The bridge and nut areas are two exciting places to get creative. Antique keys and old bolts serve the purpose well. Even a bone with nicks for your strings can work.

Tuners can be improvised; think old nails with a hole drilled through them and the string threaded through and then turned around. You could also use bolts or a wooden dowel.

Vintage pickups

Don found old tuners/machine heads and vintage pickups online.

"At the time, a lot of players were throwing out gold-foil pickups; the early Epiphone and 1970s Strats. I bought some off a guy and he threw in two pickups I couldn't identify. Boy, they sounded good. Twelve-ohms that packed this punch straight from the 60s; today they're normally around five-ohms."

Don cites Ry Cooder's use of old gold foil pickups in his Fender Jaguar.

"They were out of Japanese Teisco guitars — cheap as chips, but what a sound.

"Piezo pickups, which sit inside the cigar box, are a bit low and muffled to me. I want something in my hands like a firecracker — that is the southern blues sound." Single coil magnetic pickups are prone to producing low static when they power up; humbuckers with two coils running take care of that. These days, I wind my own pickup coils. It took a long time to master, and it can be incredibly frustrating. Sometimes you are winding up to 7000 times and, if you go too fast, you may get to 6000, then it snags and breaks and you have to start all over again. Occasionally, I have ended up knee-deep in hair-thin, 42-gauge wire." ►



The Rugby CBG with collectors' item lead figurine of Michael Jones' 87 World Cup try



A hinge and a coin anchor the strings from the soundboard into the box



“I want these things to sound like bad-ass dinosaurs with a built-in excellence that will outlast me”



The hand carved head of the neck
“A friend calls it a Bishop’s hat, I call it four Viking canoes”



Nearly there: the neck fixed to the body ready to string



A selection of 15 Bigsmoke bespoke 'instrumental artworks'

Right: CBG plans date back to the American Civil War; they were once found in children's books and *Popular Mechanics* magazines. These days they can easily be sourced online

Resources

There are so many great sources of knowledge online, which makes it really easy to research the basics, download free plans, and get inspired by the ever-growing CBG community.

<https://cigarboxnation.com/>

<http://handmademusic.ning.com/>

<https://bigsmokeguitars.com/> Don features a range of his guitars, and offers custom builds and pick-ups.

<https://www.stewmac.com/FretCalculator>, for drawings on how to position a bridge, nut, and tail.

For parts:

<https://www.cbgitty.com/>

<http://www.trademe.co.nz/>

Local music stores



“I achieve what I want in my guitars because I do it myself. I want them to outlive me”

Homage to heroes

Don carves his own headstocks and draws on his collection of personal ephemera to embellish his Bigsmoke guitar motifs. He pays homage to heroes Hendrix and Sandman in some, and in others spotlights environmental issues such as whaling and plastic in the sea.

After witnessing the burning of the rainforest in Sumatra he made ‘Black smoke for white hope’. In ‘Yin and Yang’, he celebrates balanced energy. A Mexican coin commemorating the last Aztec emperor in one build and a 1914 coin featuring the head of a Native American topping the neck of another talk about the denigration of earlier nations,

while a limited-edition lead statuette of a try-scoring Michael Jones serves as the bridge for a Rugby World Cup commemorative guitar.

Whatever the theme, a prerequisite for Don is delivering sonic excellence.

He says, “I achieve what I want in my guitars because I do it myself. I want them to outlive me. They come with the weight of the old craftsmanship that I remember from when I was kid. Old guys who used to say, ‘Don, this will last longer than you or me.’ I attach worth to longevity or longevity to worth. I strengthen the boxes for a lasting creation of sound quality. This is something that is often missing today.” 📄



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Corner grinding a cutting tool

Mastering the lathe — part 7

HAND-GROUND TURNING TOOLS STILL HAVE A PLACE ON THE LATHE

By Bob Hulme

Photographs: Paul Barrett

It used to be the norm to grind turning tools to shape from stock pieces of high-speed steel (HSS). Then convenient tungsten carbide cutting tools with screw-on inserts became commonplace. However, hand-ground tools still have a place in the thrifty sheddie's workshop and indeed in commercial workshops where a tool with a particular shape is needed.

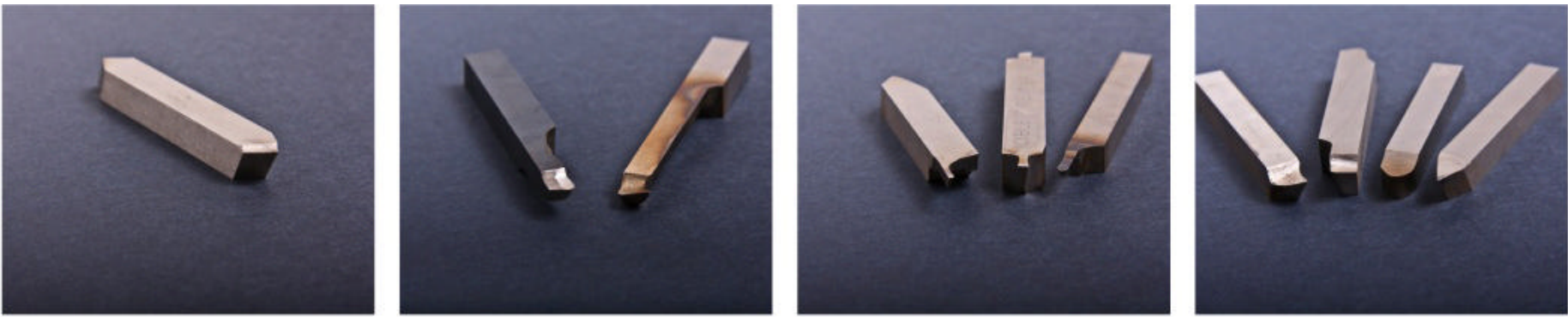
Before HSS was developed, we had alloy tool steels. They would cut metal parts but would easily become

blunt, even at slow cutting speeds. The reason was mainly that early tool steels became soft as they got hotter. The faster the cutting speeds, the hotter and softer the tool tip; the workpiece material was then harder than the tool, and the cutting edge failed.

Metallurgists discovered that by adding tungsten to the alloy tool steels and employing a double quench hardening process, the 'red hardness' could be vastly improved. This enabled faster machining — hence the



Steel blank (bottom) and first stage of shaping a point



Turning tools — from left: chip breaker, internal boring, grooving, general purpose

name high-speed steel — and easier machining of the tougher steels then being developed.

High-speed steel

The typical composition of the steel in HSS is iron with 0.6 percent carbon, 4 percent chromium, 18 percent tungsten, and 1 percent vanadium. A variation of HSS is cobalt HSS, which contains in addition 4 percent to 10 percent cobalt. This has a higher red hardness at the expense of some toughness, so is more brittle. It is good for continuous cuts but not the best for interrupted cuts where there is a shock loading on the cutting tool.

Over time, different steel makers have produced a variety of HSS formulations. Today, lower demand has meant a rationalisation of the market and, essentially, you will find the only choice is between HSS or cobalt HSS. While tungsten carbide tools have

taken over most turning applications, HSS is still widely used for drills, taps, dies, and milling cutters.

Beware of cutting tools described as being made from ‘carbon steel’. They are cheap for a good reason, and reinforce the old adage that you get what you pay for. For example, drills that are not made from HSS are fine for drilling wood or the occasional hole in sheet metal. If you want to be saved from the frustration of struggling with drills that don’t stay sharp, always buy HSS.

Taps and dies are also best in HSS — carbon steel is OK for cleaning up damaged threads, as opposed to cutting new ones. Identifying the various angles ground on a typical turning tool will make it easier to discuss their function and effect on the cutting process.

Check out the diagram, which shows the names of the angles. The clearance angles are needed so that the sides of the tool do not rub on the workpiece. The only contact we want is with the actual cutting edge. The clearance for the tool itself will be automatic when

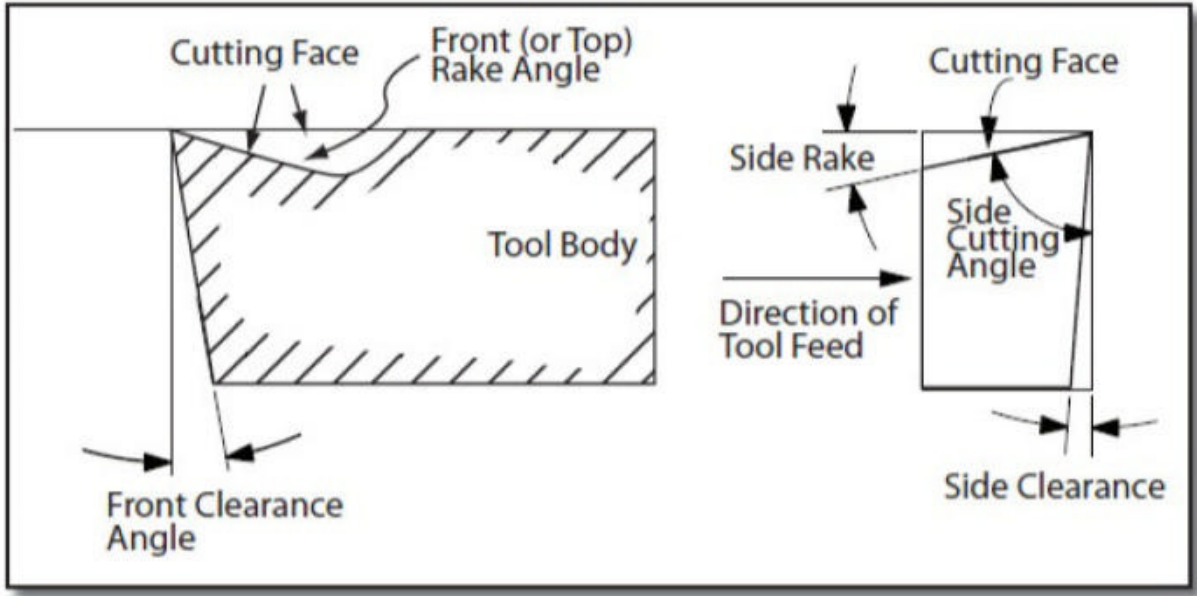
Material being cut	Top Rake Angle (degrees)
Mild steel	3 to 6
High tensile steel	4 to 8
Brass	0 to 3
Cast iron	6 to 8
Aluminium	8 to 30

there is side clearance on both sides of the tool front.

Top rake, side rake

Top rake is an angle that is varied according to the type of material being turned. The table shows the typical angles for a range of materials. Note that these are suggestions only, and will vary depending on whether the cut is continuous or interrupted as well as on the rigidity of your lathe. Side rake ensures that swarf is directed away from the workpiece and the clearance angles are no more than necessary. If clearance angles are excessive, then the actual cutting edge is more acute and therefore weaker. When you are grinding tools for internal boring

“Beware of cutting tools described as being made from ‘carbon steel’”



The angles on a turning tool



Star dresser (left) and diamond-tipped dresser

or grooving, remember that more clearance will be needed to prevent rubbing. Typical applications of HSS turning tools — apart from regular turning and facing — include internal and external radii, grooves for circlips or O-rings, and screw cutting.

Chip breakers

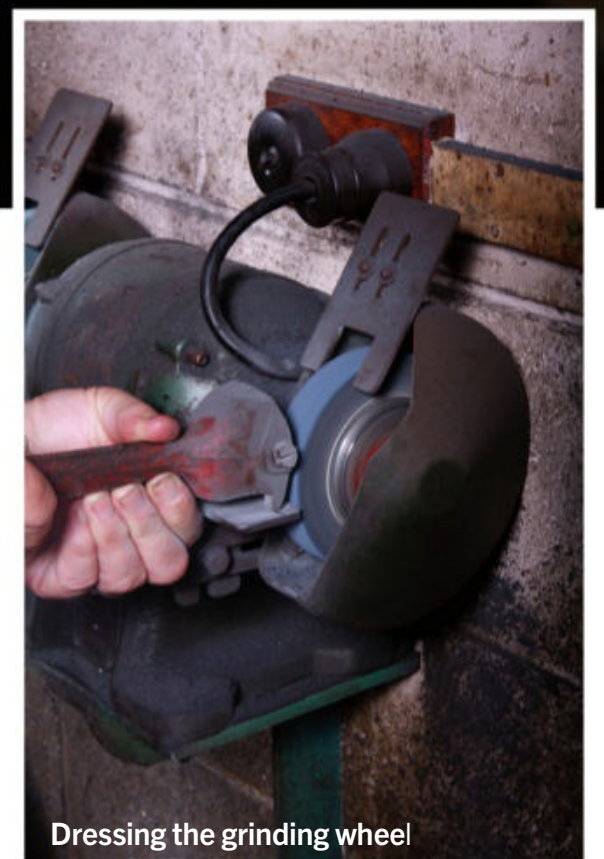
A quick way of creating a turning tool from an HSS blank tool bit is to grind the basic shape with side clearances then, for the top rake, use just the corner of the grinding wheel to make a groove along the cutting edge. This produces a turning tool with a curved top rake area, which causes the swarf to chip rather than peel off in a continuous and rather messy stream. This tool is called a chip breaker.

Corner grinding

Now, before you write a letter to the editor to say the corner of the grinding wheel should not be used, I must say

that I agree in principle. Only the outer face or circumference of a grinding wheel is intended for grinding. Using the sides of the wheel is definitely not on and can be dangerous. This suggests that using the corner is half right and half wrong. In my opinion, it is OK to use the corner for something like this, where you are not putting much load on the grinding wheel.

What does happen is that the wheel wears away and the corner becomes more rounded; when we want to grind



Dressing the grinding wheel

“If you want to be saved from the frustration of struggling with drills that don’t stay sharp, always buy HSS”

“Now, before you write a letter to the editor to say the corner of the grinding wheel should not be used, I must say that I agree in principle”

a flat up close to a step, we cannot do it until we dress the wheel face back to restore a sharper corner. This shortens the life of the wheel. Grinding HSS tool bits will be easier if you keep the wheel dressed. With use, a grinding wheel can become loaded with particles from the workpiece and the exposed grit can lose its sharpness. The purpose of dressing is to expose fresh grit as well as get rid of grooves made in the wheel from repeated grinding in the one place.

Dressers

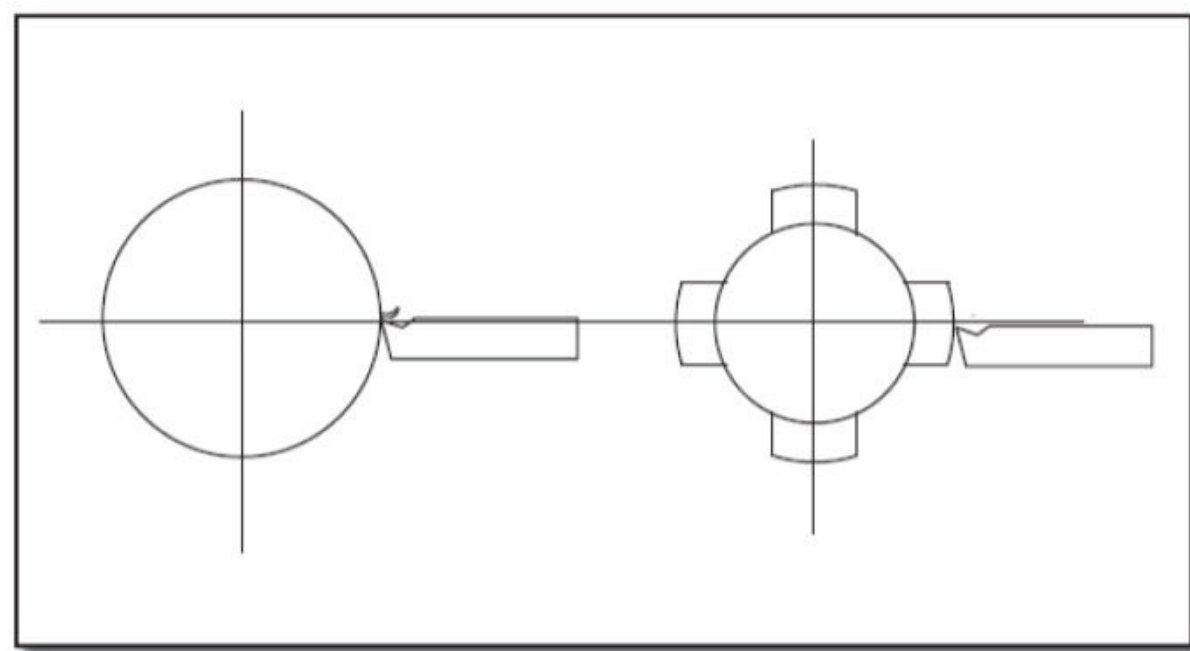
There are a few different dressers available. Star wheel dressers are the lowest priced and are quick to use. They take off the excess surface particles that have accumulated. They do produce a reasonable surface but not as straight and nice as you can achieve with a diamond dresser, which will true up the wheel. There are two types of diamond dresser. The first has one diamond mounted





“Keep an old baked bean tin with water in it next to the bench grinder to cool off the tool bits as you grind them”

Finished cutting tool



Continuous cutting (left) and interrupted cutting

in the end of a steel rod. This can be traversed across the grinding-wheel face, using the rest as a guide. A more recent diamond dresser innovation is a T-shaped stick with small diamonds impregnated into the top bar of the T. You simply put it on to the grinding wheel face and it's done. A nice straight face is restored.

The correct specification of the grinding wheel is also helpful. I recommend that you ask your supplier for an A36 wheel for roughing and an A60 wheel for finishing. You can have one at each end of your bench grinder. The A60 is good for sharpening drills and tool bits and the A36 for general steel grinding and roughing tool bits. If you buy a new bench grinder, it will usually come with grinding wheels on. Before you buy, check with the supplier about the cost of replacements and their specification. Keep an old baked bean tin with water in it next to the bench grinder to cool off the tool bits as you grind them. They get too hot to handle, so frequent dipping in between grinds is essential. I like to use water with a soluble cutting oil in it to stop the tin rusting. Grinding HSS tool bits is limited only by your imagination and the time that you have available to experiment. 📄



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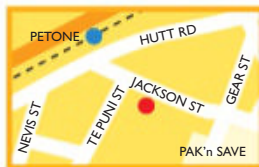
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My wee lockdown project, a tractor for my grandson

FUTURE ENERGY NEEDS

RETHINKING THE 'ECONOMY'

By Murray Grimwood

In lockdown, and with no worthy projects to report, I thought I'd carry on where Jude Woodside (Back o' *The Shed*, Sept–October 2021, Issue 98) left off and take a look at future energy options. That involves challenging the way we currently value things. My simple argument is that energy underwrites money; therefore, we should be counting the energy cost, rather than the money cost, of energy.

Let's start with a simple diagram, originating from ecological economist Nicolai Georgescu-Roegen. The circle

is the planet — scientists would call it a 'bounded system' — and the box is, well, everything we do! The problem is that economics only studies what is inside the box. Those two arrows — materials (often called resources) and energy — and the two arrows departing from the right, are regarded by economists as 'externalities'. The economists' theory is that, as the supply of something depletes, the price goes up and either more is found, or a substitute is. That theory works until it doesn't.

That ancient energy store

Inside the box— choosing to be guided by those economists — we started chewing into the stuff available from the left: a huge one-off store of ancient solar energy, and an untapped planet full of resources. Of course, we went for the best of everything first, meaning that every 'next' option is 'worse'. Looked at another way, every 'next' option demands more energy to obtain it. Fossil energy has this problem, too; energy quality is measured in energy return on energy invested (EROEI)

and has been dropping for a century: 100:1 has dropped to below 20:1, meaning that where we once got 100 barrels of oil-equivalent (BOE) for the expenditure of one barrel, now we get fewer than 20. Use that worsening-quality oil to get at a ton of copper ore, which once took the removal of 10 tons of overburden but now requires 400 tons to be removed, and we have a compounding litres-per-ton problem.

Dr Tim Morgan, on his Surplus Energy Economics blog, uses simple graphics to show the energy-cost trend.

Notice that things initially get easier via economies of scale and technology; then they don't. Notice, too, that the energy costs of renewable energy — RE, right-hand graphic — have trended down, reflected in the oft-stated: “Renewable energy and battery technologies are getting cheaper.”

The important thing to note is that the energy cost of energy is rising, and that means our ability to pay for it — after all, we have to do work to repay debt, and work takes energy, right? — must be diminishing. The difference, unsurprisingly, is showing up as ever-increasing debt.

What to do?

Obviously, we need to look outside the box in the first diagram. That, in turn, will change the way we value things — massively. Jude? That's your wallet. Sorry, but I think we are coming to the end of 'cheap' energy.

In practical terms, we need to address New Zealand's energy future. Big picture: our grid is worth keeping, no matter what. The inference — bearing in mind that rising global ECoE — is that any effort we put into increasing its resilience now has to be worthwhile. There will never be a better time, and we'll never regret the effort. Equally, looking at ways to unload grid demand — passive solarising and insulation of housing, for instance — should be a top priority.

Along with Norway, Iceland, British Columbia, and not many others, our grid sources mostly renewable energy but has storage limitations. Currently, I'm as wary of chemical batteries

as Jude is; they have the same life/replacement questions at grid scale as they do at vehicle scale; although we may well see improved techniques, recycling still requires energy.

‘Water at height’, though, doesn't rely on overseas mines or global transport links and can be dumped non-pollutively; it has to be a winner. For this reason, I tend to think of the Lake Onslow project as worth doing — I see it as money in the bank, energy-resilience wise — and signal to those who will fight it on environmental grounds while still expecting to flick their switches at will.

Transport

We must remember that 60 percent of our total energy use is still fossil fuels and, regardless of climate implications, those are leaving us. The transport question isn't: How can we power or repower our cars? It is: Why are we lugging a ton (or two) of metal with us to go and get the groceries/kids/

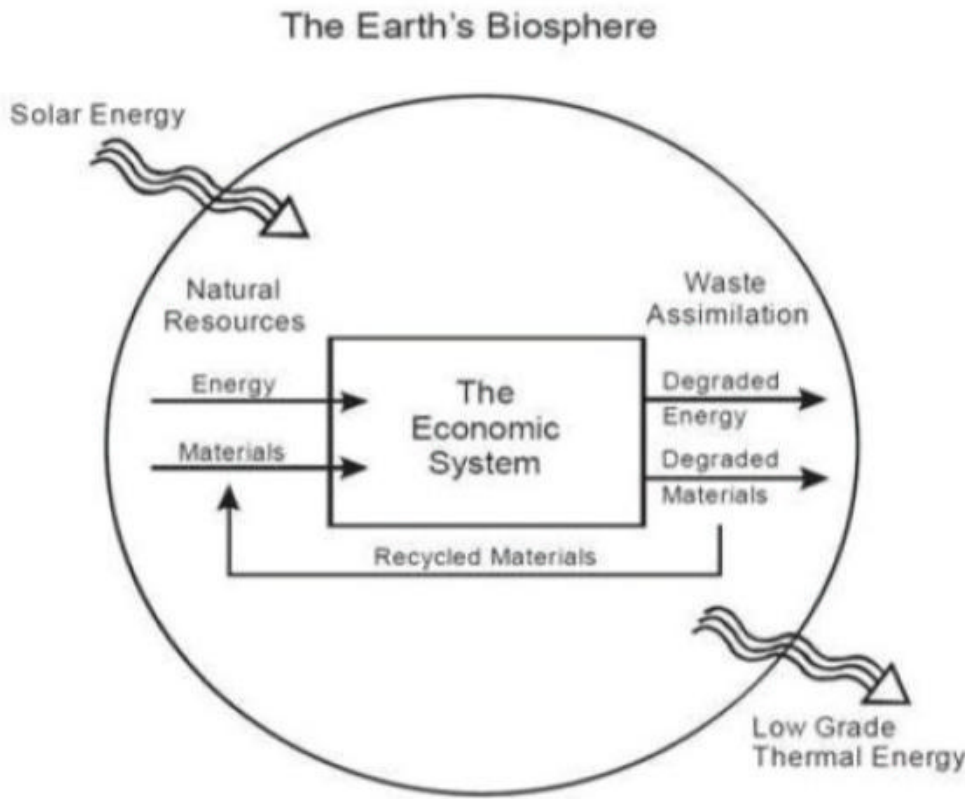
next coffee? Lugging those tons over those distances was an indulgence we all got used to, but they're a waste of energy when shifting a couple of bags of groceries. Then there's the little-addressed fact that the road surfaces we all take for granted are sourced and laid by fossil fuels.

How about we relook at rail? Two steel tracks — no bitumen— gentle gradient, minimal rolling resistance. Biodiesel electric is fine, fully electric is better; inter-city travel in low-impact comfort. Then we could decant and urban-commute — using? Something weighing as little as possible per person carried is my trite answer!

Closest to source

Energy cannot be destroyed, but every use we make of it degrades it — as it traverses from left to right in that first diagram. We can trace solar energy into acres of plants, which are eaten either by us or by animals that are then eaten by us. We then use the energy to

“The economists’ theory is that, as the supply of something depletes, the price goes up and either more is found, or a substitute is”



walk down the street, leaving slightly warmer air behind us, both from us getting work-warm internally and from a little air friction. The same goes for our vehicles. Oil extracted, refined, shipped, trucked, pumped, burnt — with warmer air being left behind from radiator and exhaust. In neither case is it worth running along behind with a butterfly net scooping up the low-grade heat; it would require more energy to do that than the collected energy would return.

The logic, then, is simple: go for energy as far to the left in the diagram — as close to the solar input — as possible. That is why fossilised sunlight was so kind to us. Given that there are losses in every transaction — be it eating plants or sending electrons down a wire — we should also be reducing these losses as much as possible. For instance, domestic solar energy being used for domestic hot water reduces the demand for some litres to be sent through a hydro lake turbine, and reduces capacity demand in the grid.

Further away

If the highest quality energy is the earliest in that left-right traverse, we can be increasingly sceptical of options in rough proportion to the number of steps they require. Hydroelectricity requires stored water, generation, transmission, use. Hydrogen would require stored water, generation, electrolysis, transport, decanting, use. Clearly further away. The same can be said of mitigation efforts at the right-

hand side of the box; the closer/earlier we do them, the less energy they will demand. One CO² capture at Huntly, for instance, would be many times more efficient than trying to offset or capture the ejection of a million exhaust pipes.

Close to home

The discussion always ends up at one place: home. The more we can reduce our demand and the more we can produce our own energy, the better. Storing our energy in batteries has downsides, such as resource supplies and recycling; so does storing it as hydrogen — electrolysis losses, compression, leakage. The literature seems to point to batteries being better energy storage for small vehicles. For trucks, tractors, and diggers, New Zealand-grown biodiesel would seem a lower hassle way to power existing vehicles than hydrogen; the distribution infrastructure is already in place and biodiesel doesn't require electricity. For houses, the best storage is the 'water at height' that is most of the grid; taking our load off the grid when the sun shines/wind blows/ creeks run, and tapping into it when they don't, is our best option.

Conclusion

There are macro issues this article has not gone into — the lower set of arrows denoting resource depletion and recycling rates being one; pollution dissipation another; and population, per-head consumption, and conflict

potential a third. Just to address the capture, storage, and use of energy: we have enjoyed an energy surplus that allowed us to be casual about the use of energy, but that era is leaving us. The future will be a mix of frugalities and efficiencies, and we will value energy much more — perhaps above all else. Our myopic, inside-the-box-only economy will have to change to some system that accounts for the bigger circle — for the real world, in other words. We may replace words like 'cheaply', with 'of low energy demand'; indeed we may come to see our solar arrays as we once saw our pocketbooks: as money in the bank.

Footnote: Well, actually, I did have a wee project. I made No. 1 grandson a tractor — he's 15 years away from his licence. Maybe we can file it under carbon sequestration ... 📁

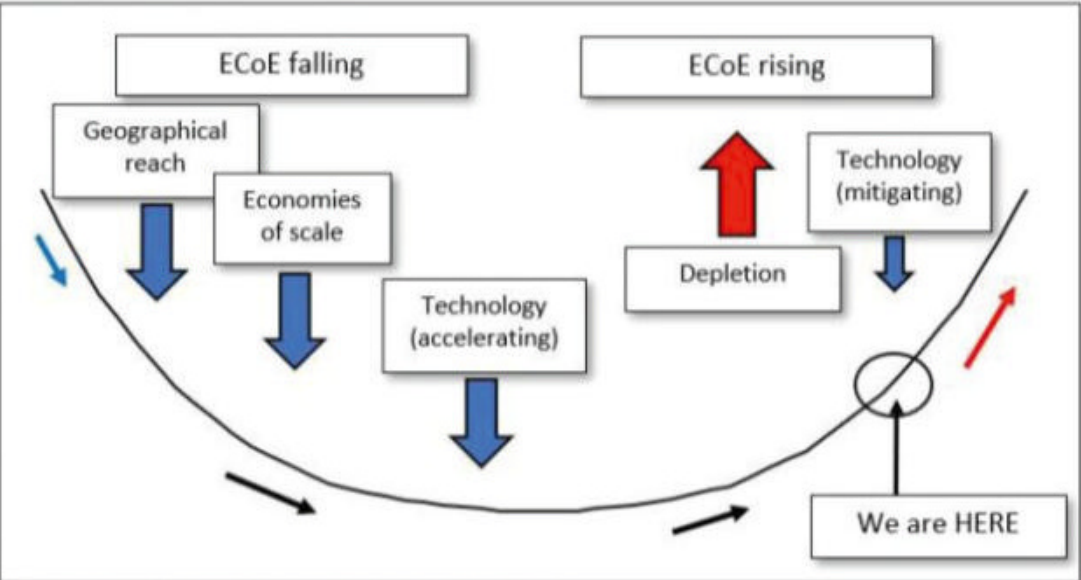
Further reading
For readers interested in further pursuing energy, economics, and limits:

<https://advisory.kpmg.us/articles/2021/limits-to-growth.html>

https://www.researchgate.net/publication/354067356_tools.envirolink.govt.nz/assets/Uploads/ARDEEM-McDonald-2005-thesis-02-whole.pdf

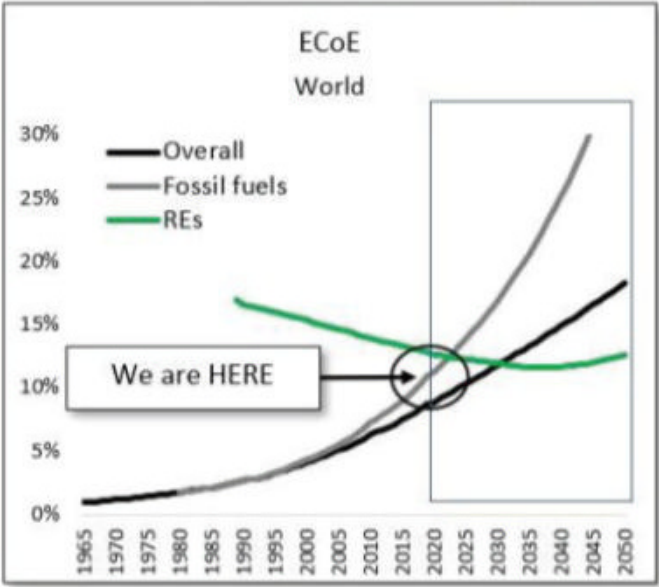
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The Energy Cost of Energy



Source: SEEDS ©Surplus Energy Economics 2021

Trend Energy Cost of Energy by Segment



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The van workplace in the single and double work area set-up; when possible, I prioritise working with battery-powered laptops but in some cases — such as the first work area set-up — I use my powerful Mac mini, which is plugged directly into the 220V AC power. Here, the secondary top monitor is connected to the Android machine, the third device, used as the development target.

IMPROVING YOUR MOTORHOME'S TECHNOLOGY

PART 2

Building a secure and efficient WiFi network for a camper van

By Enrico Miglino
Photographs: Enrico Miglino

In the previous issue, we installed what I consider to be one of the most essential components of our smart van project: the solar cell and the inverter to give 220V AC.

In this second instalment, we will prepare and install the hardware needed to create the internal network. We will demonstrate the configuration and show

the set-up working properly in the next issue of *The Shed*.

I have also installed a fixed 21-inch LCD monitor — useful not only for work but also for leisure.

The projects to create this smart van, including some original solutions to make the environment secure, have been possible thanks to element14.

com, for providing part of the hardware, Altium Designer (at altium.com) for the circuit design, PCBWay.com, for the creation of the prototype PCB boards here and there, and the invaluable helpful contribution of my friend Jan Cumps, one of the most eclectic and proficient electronic engineers I have ever met.

Network hardware and control panel

Before investing time and money to set up a relatively complex internal WiFi network architecture in the camper van, we should answer some questions.

Why implement this when public WiFi can be accessed in almost any camping and stay area? Why create an internal network when the same data can be accessed with a cheap commercial mobile router or using the mobile hotspot provided by a smartphone?

These are the questions I asked myself before designing the van network; I found as many answers about whether it was worth the investment as I found good reasons to proceed. So, I started thinking about how to make a secure and efficient campervan network.

Mobile hotspot

The easiest way to provide internet access on the move is to use a smartphone mobile hotspot. The disadvantage is that not all devices can support multiple connections. Another problem is the limited amount of data that can be exchanged according to our personal mobile data plan. In my case, for example, I am using two different SIM cards with 40Gb a month each, but every time I change the hotspot settings the connected devices lose some of the previous configurations.

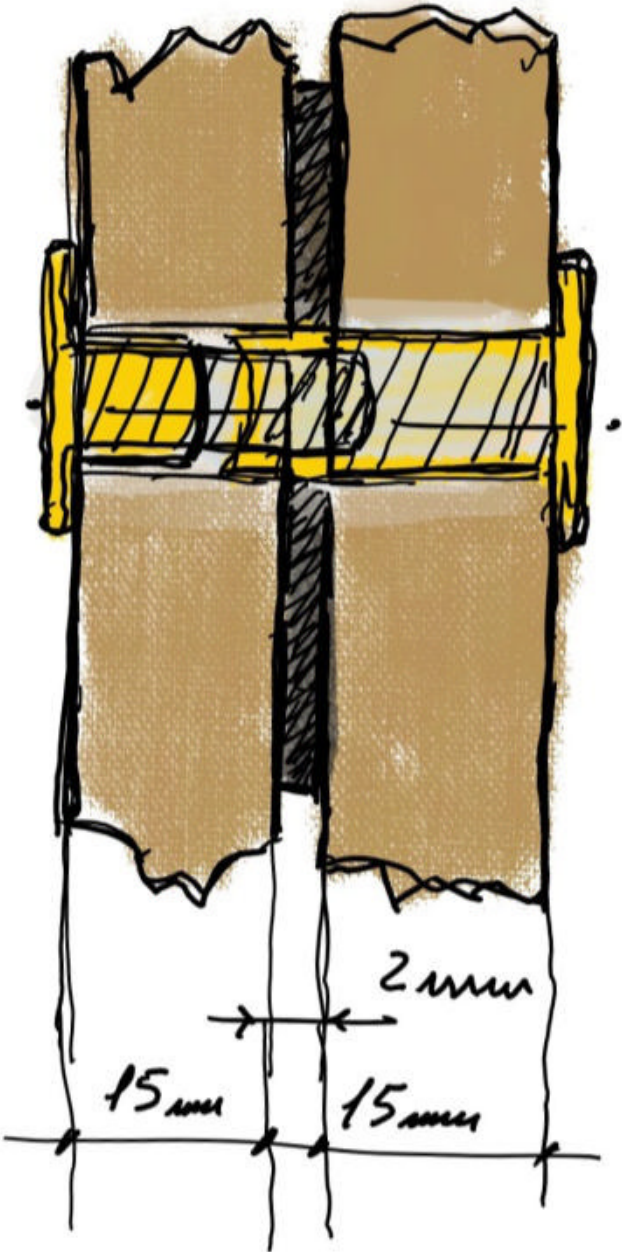
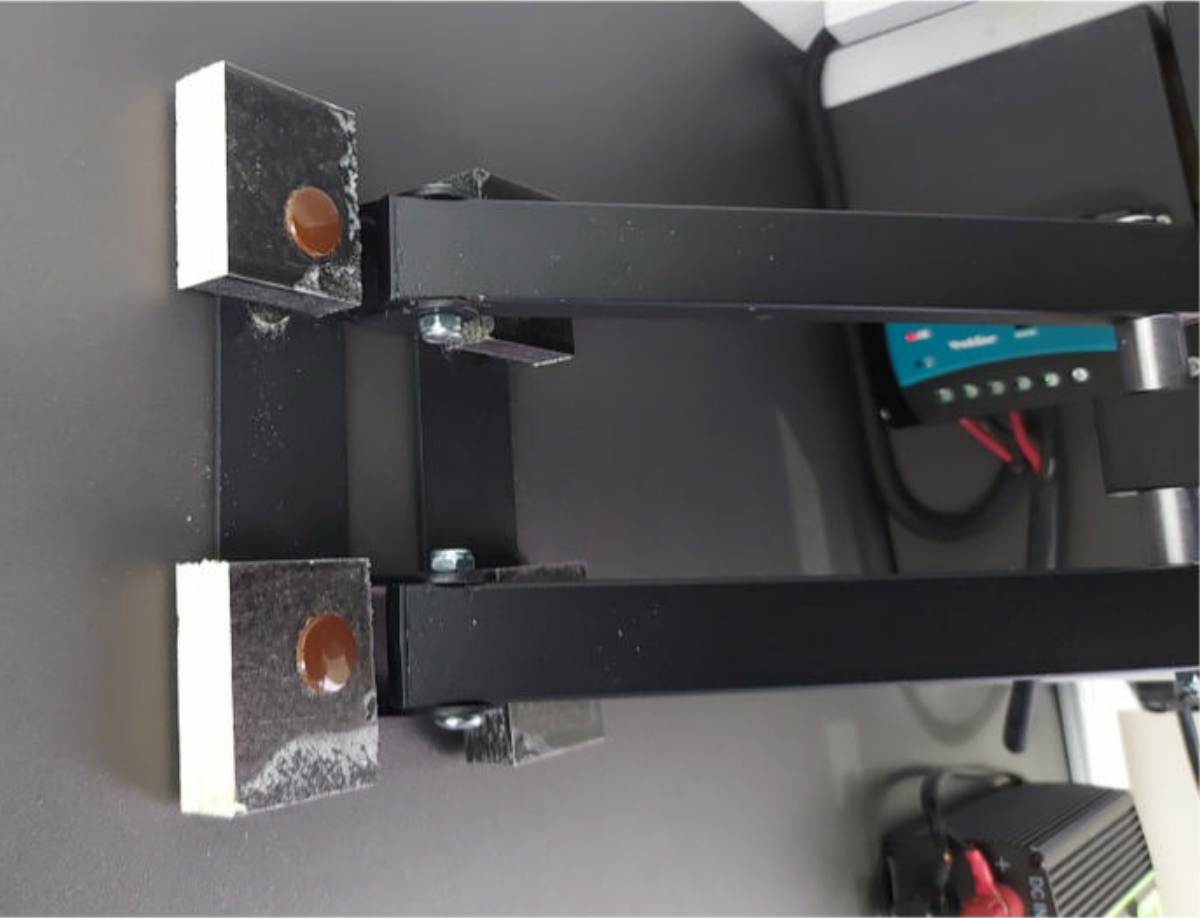
The other issue occurs when I need to move out of the van: the whole internet connection goes down, as well as the connections between the devices.

Conclusion: this method is useful only with a small number of devices, and only works if the devices do not exchange data between themselves — where no internet is needed. ▶

“Before investing time and money to set up a relatively complex internal WiFi network architecture in the campervan, we should answer some questions”



A 21-inch, full-HD, HDMI monitor has been fixed on the high side of the van wall. This is a multifunction device to be used as the second laptop monitor, but not only so. To make it easy to position for multiple points of view, I have used a lightweight extendable wall mount. For better robustness, I fixed the base of the mount to the external wall of the shower, doubling the thickness — the wall is 15mm compact plywood — with four blocks of the same material. The assembly is locked with four 30mm screws that also act as seals for the holes.



Detail: scheme of the joint ‘clamping’ the monitor’s 2mm-thick monitor support between the wooden wall and the block on the opposite side.



The wall-mounted 21-inch monitor is not only used as the second screen of the laptop but can also be good for entertainment media. Behind the support, there is also a multiple power supply in which to plug either the Amazon Fire Stick, to enjoy Netflix and Prime, as well as loads of other digital channels, or video games. It is also possible to set the screen to be visible from the outside of the van; the HDMI audio output is plugged in a USB-powered transmitter to use the headphones or a Bluetooth speaker when I am watching my favourite TV shows from outside the van.

“One of the problems with mobile routers is they are not very secure; they are easy to hack”



Mobile router

This is another handy solution for limited requirements. These devices — some of them are provided by the mobile operator — are essentially identical to the home ADSL or fibre optics home router.

After powering the mobile router, you have a WiFi connection available to connect your nearby devices. One of the problems with mobile routers is they are not very secure; they are easy to hack. I prefer not to use them, especially when I need to use the internet to access sensitive data such as online payment, etc.

Indeed, the smart way to use a mobile internet router is to have an extra SIM with its own unlimited monthly data plan.

Public or pay-as-you-use WiFi spots

This is another solution, available in many campsites, but I have already tried it with poor results.

In most cases, it is a service at the campsite or road stop area, but it requires access to the internet login from a

browser. What if you have two devices — for example, a laptop for working and the Amazon Fire TV Stick for watching your favourite series on Netflix? You need to pay twice and, if you need to connect multiple devices together, such as a MacBook and an iPad, there is no way to share the network.

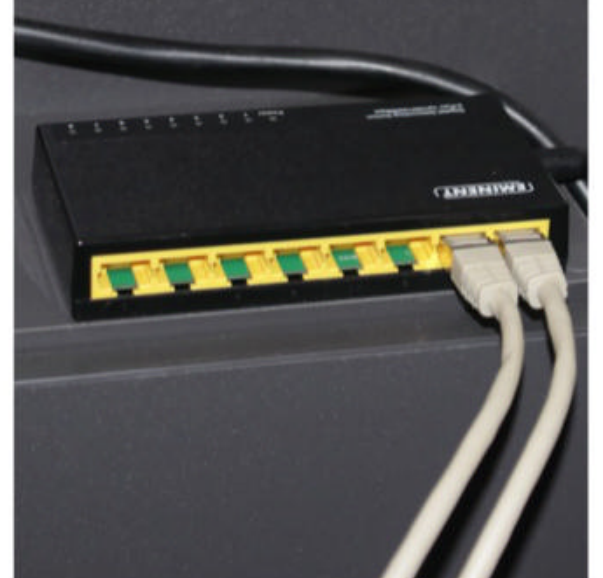
The Raspberry Pi network and control panel

The van network essentially uses a couple of Raspberry Pi 4B connected through a 1Gb Ethernet switch. I tried to design the network architecture so it's easy to implement and maintain; thanks to the power of the Raspberry Pi 4B Linux Machine, the existing devices can be expanded upon, adding more features without the investment of a lot of money.

Having a network inside the van that is almost identical to the one at home has the advantage of being able to configure one of your devices to connect to the WiFi access point.

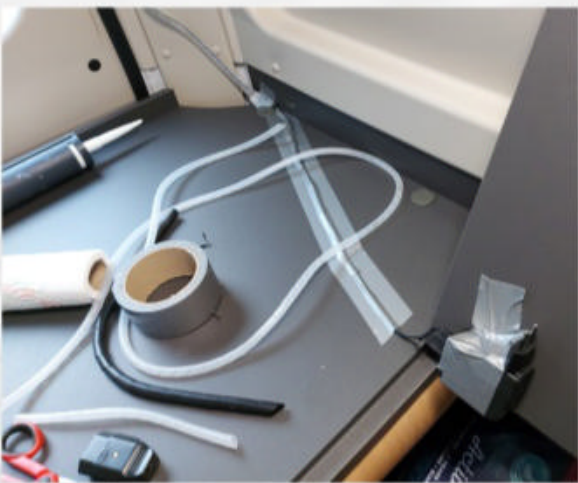
In addition, all the devices connected to the campervan network can communicate and exchange data even ►

To create the protected LAN/WiFi access point, the two Raspberry Pis need to be wired through a wired Ethernet network. As these devices can work at 1Gb max Ethernet speed, I have connected them to a high-speed Ethernet switch. Using a five-port switch device — or eight in this case — it is possible to connect up to five other five devices, such as laptops, to achieve the highest data transfer instead of just relying on the WiFi connection speed.



Installation of the rear camera and the Raspberry Pi

This is the third device of the main node inside of the van — the main node consisting of three Raspberry Pi 4B 4Gb devices — with its role being a rear camera for motion detection when in ‘security mode’, as well as a rear dashcam.



As the USB webcam is used for several different roles that can be easily selected by the user, instead of an automated system, I opted for a custom setting supported by the power of the Linux operating system.

Instead of a long-distance USB power cable of about six metres, I decided to wire the Raspberry Pi power supply with a 220V cable. This solution is more efficient for the whole current plant as the impedance of the 5V DC over a long cable may be a risk factor, as well as increase the power consumption.

The set-up of the wires shown in the photos is not the final one; until we are sure after a complete test that the system runs without problems, it is good practice not to fix the wiring to its permanent position.

The last image shows the camera-streaming test on a laptop; the streaming will be accessible from any device connected to the van network through a fixed IP address. This Raspberry Pi hosts 120Gb SSD storage; it will be used for circularly storing the dashcam video sequences. If any accident or dispute occurs, it is possible to review the last few hours of recording in blocks five minutes in length.

The final set-up of the rear camera: the exposed wiring is protected. The flexible

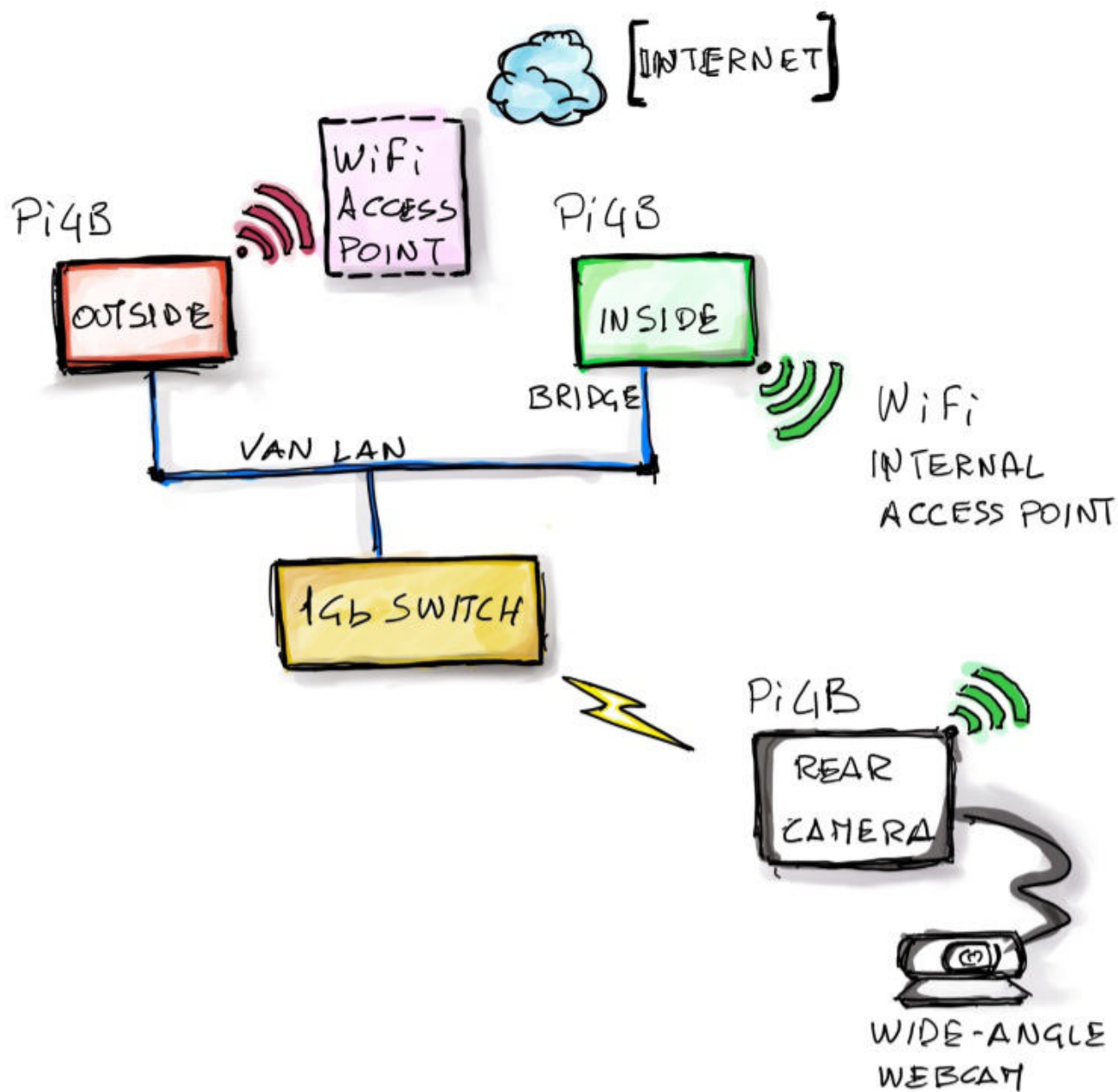


cable cover connecting the camera and the Raspberry Pi 4B is needed because the back door will open. However, the white cable duct will be covered by a mattress.

The internal Raspberry Pi 4B is connected to the router through the Ethernet cable. This device acts as the bridge between the router and the internal network. It is the van WiFi access point to which all the other devices — laptop, tablet, etc. — should connect. Both this device and the rear camera are ‘headless’, meaning they do not need any display as they will work automatically. The image shows the first test set-up with five 220V plugs.

Not all the initial settings worked as I expected. In the first 220V plug set-up, I used a five-plug power strip, then I realised that three were permanently occupied by the Raspberry Pi power supply — it is not a matter of the number of devices you connect but of the overall power required — so I replaced it with a longer power strip, in a more accessible, under-the-table position.

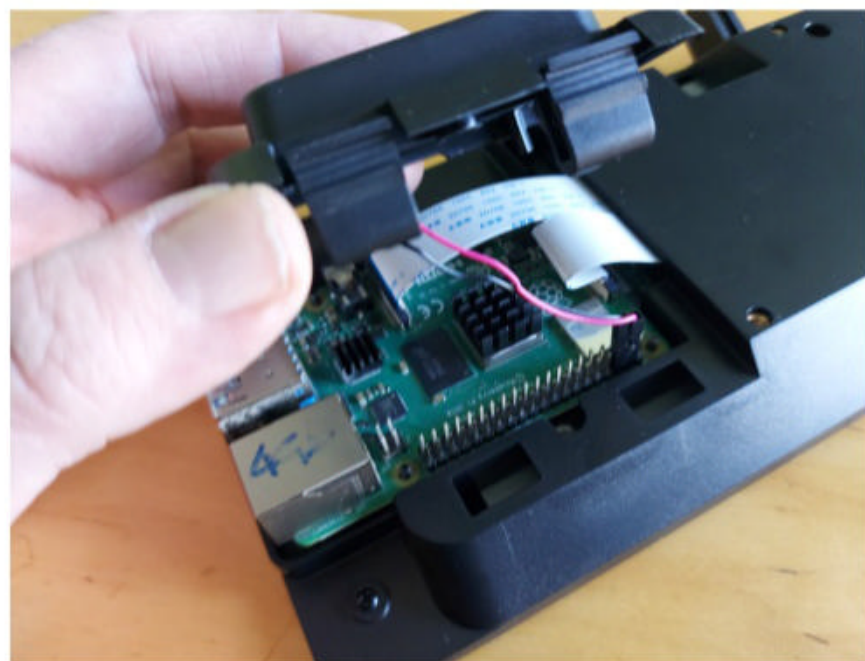
I strongly recommend using a power strip with surge protection; that way, if something occurs the power to the plugs is immediately cut to avoid damaging the connected devices.



The scheme of the secure network-connected device, including the multifunction rear camera — the assembly uses the Raspberry Pi 4B 4Gb and an eight-port 1Gb switch. The switch needs only two ports so the remaining ports are available for the user. The Raspberry Pi managing the rear camera uses a wide-angle, high-resolution USB webcam that can be used as a motion detector as well as a normal rear camera streamed on a tablet or smartphone.

Using a couple of Raspberry Pi 4Bs connected through an Ethernet cable, it is possible to create an external device that can connect to any WiFi network — including a smartphone mobile hotspot or a mobile router.

The second Raspberry Pi 4B exposes an internal WiFi access point, protected by a firewall, giving access to the internet while the data transfers between the internally connected devices — through both the internal WiFi access point and the Ethernet cable — do not need any internet connection.



► when there is no internet connection; this means that all the network operations can be completed at any time.

Using the dual-Pi architecture, it is possible to include a firewall between the two devices — the installation and configuration of the software will be shown in detail in the next issue — to block access to certain sites, control the data traffic, and avoid intruders accessing your devices through a public network.

The dual-Pi architecture

The first Raspberry Pi 4B, named 'outside', acts as a router; when it starts it attempts to access the external WiFi

access point — if any — and creates an internal Ethernet network: its IP address is 192.168.100.1 and all the other devices that will connect to the Ethernet switch will have an IP address in the same net. A group of 100 addresses is also reserved to assign them via DHCP (Dynamic Host Configuration Protocol). The second Raspberry Pi 4B, named 'inside', acts as a bridge; it is connected through the switch to the same Ethernet as the router and behaves as a WiFi access point to which any device can connect wirelessly.

With this configuration, regardless of whether or not the Pi is connected outside to the internet, all the devices connected

The outside Raspberry Pi 4B has been assembled inside a case, together with the seven-inch touchscreen display. This Raspberry Pi unit does not only act as the external WiFi-to-Ethernet router but will also be used as the main control panel — as we will see in the next issue.

The original case has been modified to host a 120Gb SSD used for historical data storage and for hosting the Raspbian Linux File System — normally installed on the MicroSD — for better performances and longer life for the main data storage. The fact is, when stressed by frequent data read/write cycles, MicroSD cards can often fail.



to the van network can interoperate. If there is internet access, any device can also navigate the web, send and receive emails, etc.

Using a Raspberry Pi 4B may sound like a redundant choice; however, these machines have sufficient processor power to perform other tasks at the same time. The router, for example, is assembled with a seven-inch touchscreen and a Pi camera as it is also the control panel for the entire project, with a graphical touch user interface, and is part of the installed alarms. ►

“With this configuration, regardless of whether or not the Pi is connected outside to the internet, all the devices connected to the van network can interoperate”

Cost

The components of the network architecture described above have a cost of about US\$350. All prices are in US dollars.

Raspberry Pi 4B ‘outside’:	\$70
Seven-inch LCD touchscreen for Raspberry Pi:	\$74
Pi camera V2 8Mp:	\$39
Raspberry Pi control panel case mount (estimated):	\$30
Raspberry Pi 4B ‘inside’:	\$70
Raspberry Pi 4B minimal case (estimated):	\$10
N2 Raspberry Pi power supply:	\$16
Eight-port 1Gb Ethernet switch:	\$25
Ethernet patch cables (estimated):	\$10
If you need a lot of extra data storage — for example, to save your images — you can add a 2.5-inch 120 Gb SSD for about \$30–40. Using a SATA-USB3 adapter, the access speed is the same as the SSD we can find on most of the modern laptops; the adapter costs between \$7 and \$20.	

Camera costs

The multifunction rear camera components cost about	US\$150
Raspberry Pi 4B ‘rear’:	\$70
110-degree widescreen USB webcam (estimated):	\$30
Raspberry Pi 4B minimal case (estimated):	\$10
120Gb storage (or more): from	\$35
Raspberry Pi 4B power supply:	\$8

Monitor costs

The monitor installation, including the Amazon Fire TV and the Bluetooth audio transmitter will cost between US\$189 and US\$244 or more. The price depends on the choice of the monitor.	
21-inch HDMI full-HD CD monitor, 220V AC with power adapter (estimated):	\$120
Amazon Fire TV Stick with Alexa built in:	\$30
Extensible lightweight TV support (max 25kg):	\$25
HDMI cable:	\$6
Four-outlet power strip:	\$8
Long-range Bluetooth stereo audio transmitter/receiver (optional):	\$54



“The availability of a good HDMI display is a pretty good option for the second screen of a laptop, as well as working with a tablet with a more comfortable, larger screen”

The Raspberry Pi 4B fulfills several roles, including, but not only, control panel, WiFi router, and data storage in its final position. Obviously, there is not a specific point to install the control panel but I suggest fixing it in an accessible position, easy to control without impacting van-user movements. It is good practice to fix it near a window, as it should be able to get the signal of any external WiFi when you are not using your mobile data access point.

The rear camera

I based the rear camera design on a Raspberry Pi 4B, a 120Gb SSD, and a wide-angle USB high-definition webcam. On Amazon and other online providers, you can find good-quality rear cameras for between \$150 and \$200. What is the difference with this custom solution?

Again, using a Linux-powered system, it is possible to achieve results difficult to find in a commercial product — at least, for a similar price and in a single/combined product.

As we will see in the coming instalments, the rear camera can perform many tasks: dashcam rear camera with circular storage, parking assist camera with graphic overlay, motion detection camera, and alarming module.

Installing the external monitor

I need to take a few moments to explain what I think are the advantages of an LCD display over a digital terrestrial, or satellite, television system. I see many campers with an external TV antenna or, in some cases, a satellite antenna on the roof and the TV cabling inside.

Nowadays, I think it is easier to use an internet receiver that accesses more or less the same digital content as what is available on terrestrial television. There are very few events, including sport, that are not available through some internet broadcasting channel and need a digital TV system or a satellite receiver. The price of a campervan television system is considerably higher than for an internet

streaming set-up; plus, apps are now available for almost all digital TV services.

The availability of a good HDMI display is a pretty good option for the second screen of a laptop, as well as working with a tablet with a more comfortable, larger screen.

There are two possible options: a 12V monitor that can be directly powered by the van's 12V power system or a 220V monitor; as mentioned in the previous issue, the important parameter to take into account is the power of the device. If you are buying one, it's probably a good idea to search for a 12V DC monitor. I already owned a couple of 21-inch 220V AC LG monitors as spare components so I decided to use one of them. The device comes with its power adapter and the power needed is max 25W so I decided to use it without purchasing a new one.

To easily change the viewing angles, I fixed it to lightweight extensible support with a screen inclination of about 30 degrees. It is possible to move the screen into different positions, including being able to see it from outside of the van, through the side door.

I have also added a Bluetooth audio transmitter to connect a Bluetooth speaker or headphones, avoiding extra cabling.

A four-plug power strip fixed to the extensible arm can power the whole installation. When not used as the additional laptop screen, it is connected to an Amazon Fire TV. As it is a full-HD display, it can also be used to connect games consoles. 📺



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rites of passage

SOMETIMES A HOT ROD IS MORE THAN JUST A CAR

By Mark Seek
www.seekandthrive.com

Late Sunday evening the old Wigram Air Base is deserted; daylight is fading rapidly and the old flathead V8 hot rod I've taken for a "quick spin" decides to give up on me with no warning.

No tools except my lucky screwdriver on my key ring. It's probably a fuel filter issue. I give that a try but it doesn't make any difference. I suspect it's the coil — damn, the only thing I didn't replace and now it's come to bite me in the rear; this wasn't planned. Now I'm looking like a complete idiot standing on the footpath with no backup plan. How did I end up in this predicament? Safe to say, I'm now looking for a miracle.

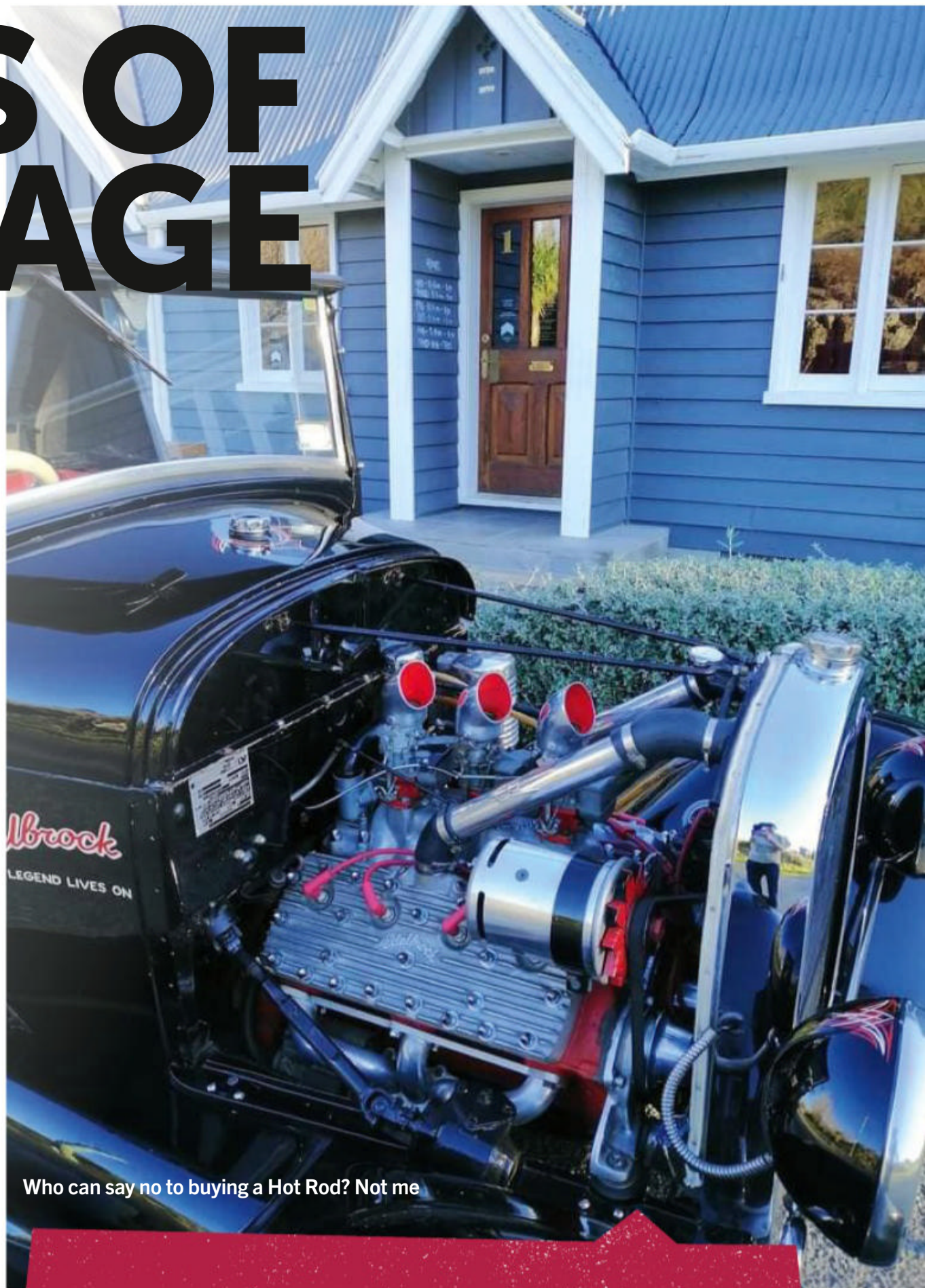
Primeval times

This is when I'm reminded of being stranded other times in my life and all I have is a sense that somehow it will work out. How many of you can relate to this? Is it a bloke thing going back to primeval times, perhaps? I now need to text the wife to let her know I'm going to be late and to reassure her I've got it all under control!

Time to rewind the clock as to why I was taking this car for a shakedown run.

Several weeks ago I was minding my own business, watching my pie whizz around inside the microwave at work, when I was approached by a woman from across the hall.

"Mark, do you want to buy a car?" she pipes up, to which I just cast my



Who can say no to buying a Hot Rod? Not me

"Safe to say, I'm now looking for a miracle. How did I end up in this predicament?"

eye back on my pie and with my finger point in the direction of the office car park and say, "That big truck, she's mine."

Two days previously I had signed up for a new ute to replace the wimpy BMW hatch — somehow the commute to Ashburton had been too much of a strain on it! I had apparently destroyed

the driveshaft and other important bits that make it go.

'Ding' — no time for conversation I'm telling myself; I must eat pie.

But it's a hot rod

Before I can take a bite, the woman is right in my ear. "Mark, it's a hot rod. Do you know what that is?"

Hot rod! Did she just say hot rod? What is she doing with a hot rod? She doesn't look like the sort — I am trying to rationalise, really. A hot rod for sale!

Immediately my brain goes into hyperdrive — it always does when I see an opportunity to buy some object of desire. My wife would need to be convinced that this was a divine sign. I would have to plan this with



The term 'barn find' came to mind

meticulous execution, drip-feeding the information so as not to arouse suspicion. I'd already convinced myself it was probably meant to be — bugger the pie, I tell myself.

Here we go

I took several deep breaths and shelved my thoughts; I followed the woman to her office, whereupon she gave me the address where the car was stored. I left work early and headed across town. To be completely honest, I was a little excited when I found the lock-up and first set eyes on the car. It was indeed magnificent.

'Barn find' comes to mind as a term used to describe what I was actually looking at. I took a few mental notes of the radiator surround, the big fenders, traditional paint and wheels — covered in a thick layer of dust and grime, but wow! I used my phone to record images then I headed home, heart racing!

During the following few days, reality burst the dream bubble and I had to face facts. We were building a new home and the Covid-19 circus had come to town, which really meant I

could only refuse her generous offer to sell me the hot rod. I did suggest that I could sell the car on her behalf to save her the mammoth task of dealing with tyre kickers and joy riders — yes, we've all seen how that works out.

I agree to help

We agreed on a fair price with a little wiggle room. I would take some decent photographs, take on the project of returning the Model A to a roadworthy state, and advertise it.

A few weeks went by and the rod was certified and WOF'd, and in my possession. I hadn't driven a hot rod for some years, but it all came back to me: the exhilarating feeling of listening to the tri carb set-up and the old flathead roaring through the headers; nostalgically bouncing along on the coilovers sitting in a bare-bones cab with red tuck 'n' roll bench seat. Memories of my early hot rodding days as a fresh-faced 18-year-old came back to me. I recalled attending NSRA and

"What is she doing with a hot rod?"



When I first set eyes on the car, It was indeed magnificent

The purchaser drove it several hundred miles home without a glitch



“I remember how important those impressionable years were for me”

numerous swap meets.

I recalled, too, many late-night shed builds with some of New Zealand’s top rod builders, and driving all over the North Island through the night with the paint still drying to get to an event. I remember how important those impressionable years were for me; you could call it a rite of passage.

Loyalty, equality, and respect

In my professional capacity, working in the mental health field, I know it’s

tremendously important that young men transition into adulthood with influences around them that are positive; where there’s a sense of loyalty, equality, and respect.

The importance of developmental assets both internal and external — these are often fostered through recreational sports clubs or other communities outside the immediate family; all vitally important. For me, hot rodding came at the right time in my life, when I was looking for



The car had a real “wow” effect on me

direction and identity. We all need this.

So how does this story end, you ask. Did I have to push the car 20 blocks home from the old Wigram base, or did I find myself sleeping in the cab until Monday morning?

The miracle happened

Well, a funny thing happened! As you will recall, I was waiting for a miracle. I was stranded, and it seemed I had no options. What happened next will confirm what I have always thought.

You see, a lone hot rod appeared out of nowhere like some kind of ghost machine and stopped — well, actually, I did run out in the middle of the street, hands waving frantically. I couldn’t believe that ending, either.

I will just remember that I trusted something would provide a solution.

The car that Dennis built sold three weeks later to a chap in the North Island and, undeterred by the inclement weather, he drove it several hundred miles home without a glitch. The woman from work was incredibly happy, the car went to a good home, and, as for me, well, my life was enriched by the experience and my faith in human kindness was also restored. 📖

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My finished table. A fair bit of effort rewarded with a stunning patio focal point

MISSION IMPOSSIBLE

PART 2

Some lateral thinking and grunt work results in a rustic table fit for a crowd

*By Mark Beckett
Photographs: Mark Beckett*

Back in Issue 92 Sept/Oct 2020, I detailed rescuing a very large tree with the aim of turning into an outdoor table.

While there were some interesting challenges involved with the first part of the project, the second stage required a bit more lateral thinking to achieve the finished result.

Once I had cut the log down the middle, the surface needed to be flattened.

I purchased a large belt sander and

hauled out an old surface planer to see what might work. The planer lasted five minutes before the belt disintegrated (who knew they had a 10-ish year lifespan?) and the belt sander worked better than expected. Neither of these was going to surface 5m and up to 20mm depth, but they would be useful.

Making a jig

Doing some research on YouTube for flattening slabs, I found a common theme where they used a router in a slide. It

was moved across the surface and then shifted and slowly the surface would be flattened. Most involved packing the slab, but I did find one that had vertical height adjustment.

All of the designs involved moving the slab into the jig, which was never going to work on half a tree that weighed a ton or more.

My solution was to make a jig that sat on the surface and had four adjustable feet. Unlike a slab where you want an even thickness, I only had to make it flat.

One end needed very little removed, while the other end needed up to 20mm.

I found a couple of bits of metal that were suitable and some MDF offcuts that were rescued from another project. The welder got used to fit brackets for the sides, along with nuts for the adjustable feet, and before I knew it the frame of the jig was done. ▶

“The planer lasted five minutes before the belt disintegrated (who knew they had a 10ish-year lifespan?)”



Frame and slide showing the adjustable feet to allow it to sit level

In use by 15 people





First cut done



Slide showing slot to clear router bit and locknut

Designing the sides

The slide needed to be longer than the gap between the sides, remain flat but not so thick that you had no cut depth left, and have a large slot cut for the router bit so you could do more than one pass across the surface before shifting. While it's tempting to have deeper sides to stop it bowing in the middle, you still need to operate the router plunge controls, so it's a bit of a compromise.

I chose to have the sides go past the metal frame, which allowed me to finish each end of the table rather than having to use a 'sky hook', or some other means of finishing the ends.

Having worked out roughly how much needed to come off the far end, the log was packed for level both ways, and a digital level was used whenever the frame was shifted.

Initially, I thought the whole thing may slide around, but even when I swapped the rubber feet for coach bolts it stayed put, so shifting was only a matter of lifting off the router and slide, moving the frame, checking the levels, and attacking the new surface.

Chips off the old block

The whole process took several days and created a pile of wood chips. If you can imagine removing 4-5sqm in several passes to about 20mm depth while reaching over and trying not to move the log, you can appreciate I had a few sore muscles. However, I wasn't as damaged as the router which seemed intent on swallowing the fine dust and depositing it in the power switch mechanism — a right pain to disassemble just to clear it out. In the end I bought a different model router to finish the job, which was a final pass a few millimeters deep to catch a few shallow areas.

I'd been thinking about the legs to hold all this up and, while my last table used half trees shaped to fit the curve, someone suggested gabions (rock-filled metal baskets) to contrast with the timber. I decided that I would support the table on metal legs and fit 'dummy' gabions around the legs. This meant they could be shaped to the underside curve and could be moved if the whole thing needed to be shifted.

“Initially I thought the whole thing may slide around, but even when I swapped the rubber feet for coach bolts it stayed put”

Fitting the legs

Once the surface was flat, it was time to fit the legs which required the table to be turned over. One tractor, some tyres, and an oversized lever strapped to the table worked well but a crane would have been easier. Once levelled it was ready for the leg construction phase.

Each leg would use two pairs of 50x25mm verticals, spaced 150mm, and bolted to the tree using M10 threaded inserts. The bottom would be a rectangle and sit on four plastic spacers to keep dirt and water away. This design should stop any longitudinal horizontal movement if guests decided to get carried away. I did have to check the base width so there was no tipping movement and thankfully it all fitted in the width of the table top.

The final height is 700mm from the ground, so a height guide was knocked up to provide a means of holding the vertical legs during construction. ▶



Checking for centreline



First coat—can't wait until the final coat



Rotation time



Close enough to level. I used this throughout the build

Table made for my daughter from one of the 75mm flitches



Height jig



The shape of the tree meant there was no exact science

The shape of the tree meant there was no exact science for the locations, so there was some trial and error before welding a 50mm-wide flat for the bolt. It was then clamped to the guide to measure for the spacers.

Once the first half of each leg was tacked together, it was bolted in place before the second pair of verticals were made and attached, before drilling the

second set of inserts (just in case).

Happy with the verticals, the 700mm level, centreline, and width was marked before they were removed and the horizontal base was welded on.

Measure twice and cut once is great — unless you forget the 25mm horizontal base ... so a few cuts and more welding before finally having something that worked and looked right.



Legs fitted and ready to transport



First half of legs

“Luckily, it has a soft start and variable speed as it tried to rip my arms off”

My deadline is looming

About now my deadline for finishing was looming and the weather hadn’t exactly been playing ball.

I’d removed the bark and cleaned up the underside and got one coat of the sealer on. With two days’ break in the weather matching my work schedule, I was able to roll it back over, do a final skim, and sand the surface with the rather large belt sander. Luckily, it has a soft start and variable speed as it tried to rip my arms off, but it did make short work of the slight variations left

by the router with no further finishing required.

By now it’s three days out from the deadline with unpainted legs, a flat table that needs sealing, and no idea of how I was going to move it into place on the concrete patio ... no rush then.

Luckily, the moisture content had reduced so it was light enough to pick up with the tractor — just — but was just enough for Plan A. I wasn’t going to risk having the tractor on the slab, but a couple of wheel dollies would allow it to be shifted into place. ►

Leg trimming to suit tree shape





Landing on wheel dollies. The cardboard is to stop the metal wheels marking the concrete coating

“Overall it suits the space and looks better than the pile of firewood that it could have been if it hadn’t been rescued”

Done and dusted

By now the deadline was today so a final coat of sealant, adding the painted legs, and then gingerly moving it around the house onto the dollies all went far better than I could have wished. Once it was in the right place, the portable engine crane lifted one end at a time off the dollies for touchdown.

All done in time to head out and meet the guys and gals at 1pm ... just.

The new table got christened that night with eight of us spaced out enjoying

some brilliant weather. Apart from a trim of a couple of small bits of branch, it was ready for the 30-odd guests the next night.

Needless to say it was one of the highlights of the evening and made a great launch platform for the drone.

The gabions are still a work in progress and I need to find a suitable epoxy to seal the bark inclusions, but overall it suits the space and looks better than the pile of firewood that it could have been if it hadn’t been rescued. 🏠



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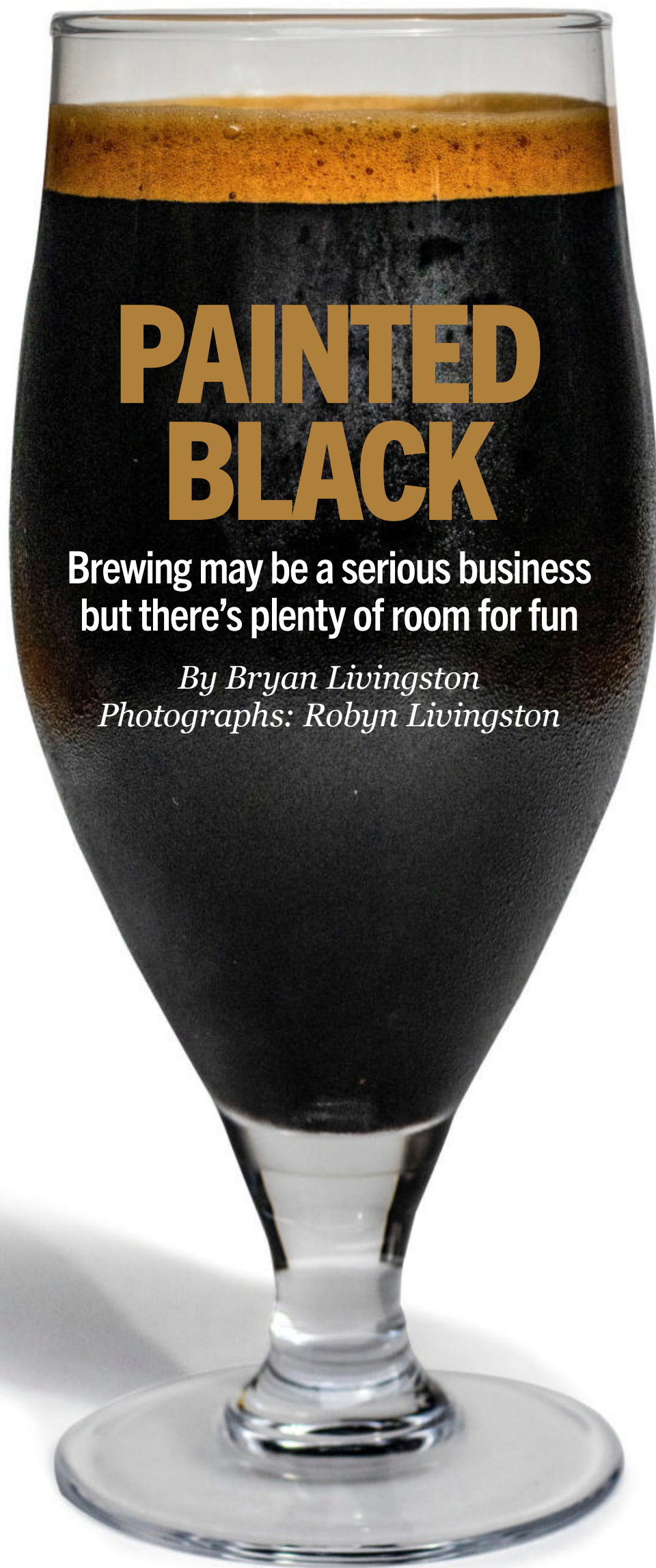
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PAINTED BLACK

Brewing may be a serious business
but there's plenty of room for fun

By Bryan Livingston
Photographs: Robyn Livingston



“So how did
most of us pick
up chocolate
and coffee
notes?”

been added to one to make it dark.

So how did most of us pick up chocolate and coffee notes? Well, it's a matter of expectation. Because we saw the colour of the beer was dark, our minds conditioned us to expect tastes often found in a stout or a porter — i.e. chocolate, coffee, etc.

This little story sets us up nicely for the style of beer that really plays with your mind — the Black IPA. Just as in the story above, the beer looks dark and first impression is that it's a stout. However, upon tasting, you are pleasantly surprised to find the beer is a thinner bodied IPA with tropical fruit and citrus hops and none of the taste or mouthfeel that you expect in a heavy, full-bodied stout.

Do we really taste with our eyes?

This question is best answered by a chef. Why do fine-dining chefs put so much focus on presentation? We often taste the dish before the plate is set on the table. The first impression is made on our eyes; how the plate is presented impacts our taste of the dish. If we don't like the look of the plate then we are unlikely to enjoy the taste, no matter how well the food is prepared. What we experience with a Black IPA is exactly the same. ►

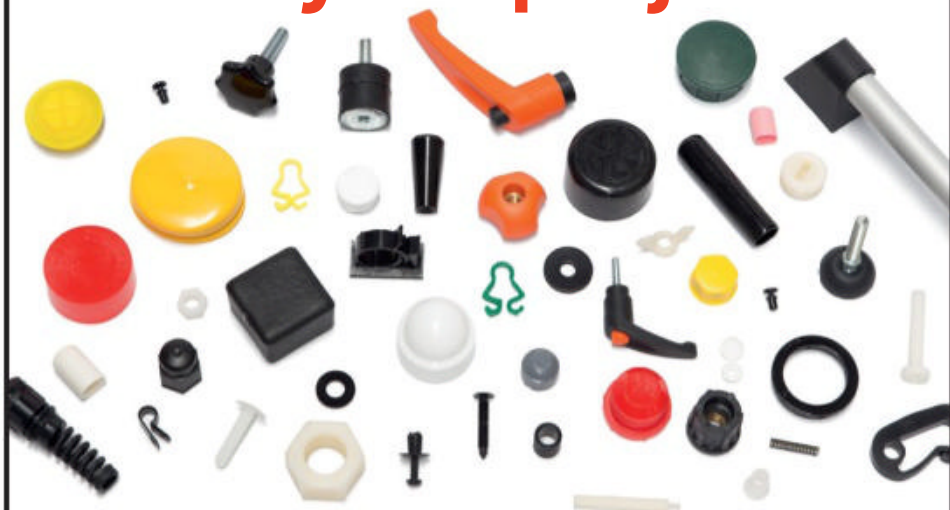
Several years ago I was at a conference and we were given two different beers to taste and evaluate. The first was golden in colour and the second dark black. We were tasked with using our taste to describe the malt characters in each beer.

The golden ale had a good malt backbone with bready crackers and

biscuit notes. The second dark beer had similar characters but most delegates also picked up additional subtle coffee and chocolate notes.

When the host resumed speaking, we were in for a shock. We were told that the two beers were actually the same beer; the only difference was that a tasteless brewers' colour additive had

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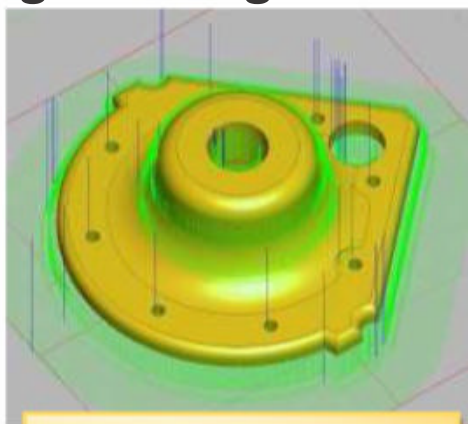
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“The art to a good IPA is changing the colour without affecting the taste”

Changing colour

The art to a good black IPA is changing the colour without affecting the taste. While food colouring will do this, it just doesn't seem right to be using food colouring in your crafted beer. So, what I use to alter the colour of my black IPAs is dehusked roasted barley or dark roasted wheat. The dehusked barley called Carafa Special 3 has the husk removed so it doesn't add any bitterness to the beer. And, because you only use a small amount to change the colour, you shouldn't get any roasty notes or chocolate or coffee notes.

Eclipse wheat will do a similar job. It doesn't have a husk, so small quantities of Eclipse Wheat can be used in place of the Carafa Special 3.

Hops

The hop selection for a black IPA is the same as for a standard IPA. New World hops are often favoured to give those juicy tropical fruit and citrus aromas. Citra, Simcoe, Mosaic, Cascade, and Sabro are popular. New Zealand hops, including Nelson Sauvin, Motueka, Nectaron (Hort 4337), Taiheke, and Pacifica, are also worth using.

When judging beer competitions, we judge according to the style guidelines

set out for that competition. Most competitions use the international Beer Judge Certification Programme (BJCP) style guidelines. The comments on Black IPAs are as follows:

Overall impression of the Black IPA is a beer with the dryness, hop-forward balance, and flavour characteristics of an American IPA, only darker in colour — but without strongly roasted or burnt flavors. The flavour of darker malts is gentle and supportive, not a major flavour component. Drinkability is a key characteristic.

Funky ingredients

The thing I like about this style of beer is the drinkability aspect. It's fun making different beers with funky ingredients but, with some beers, after drinking a glassful you know you don't really want another 22 litres of it. While the Black IPA colour might put you off, the taste is refreshing and enjoyable. I have no problem finishing off the batch each time I make this beer.

One of my favourite recipes is called Friday 13th — yes, Black Friday — so I'm sharing it as both an all grain and an extract partial grain recipe for you to make. It's a great summer beer, and you will enjoy messing with your friends' minds at the summer BBQ. Enjoy! 🍷

Friday 13th Black IPA (All grain recipe)

MALT

- 5kg NZ Pale
- 500g German Light Munich
- 340g Carafa Special 3
- 350g Gladfields Light Crystal
- 250g UK Amber
- 200g German Wheat
-

HOPS

- 10g Citra (60 min)
- 40g Centennial (20 min)
- 40g Simcoe (flame out for 10 min)
- 40g Mosaic (flame out for 10 min)
- 40g Citra (flame out for 10 min)
- 60g Simcoe (dry hop five days)
- 60g Mosaic (dry hop five days)
- 60g Citra (dry hop five days)
-

YEAST

- Two packs Lallemand Bry-97, or MJ M44 West Coast Ale
- Vol 23L
- Est OG 1.067
- Est FG 1.015
- Est ABV 6.8%
- IBU 44
- Mash 65 degrees for 60 min and a 60-minute boil.

(Partial grain recipe)

- Replace the 5kg NZ Pale malt with two cans of Black Rock Light.
- Use the other grains and hops as per the recipe above.

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Fred and beloved dog Pipi (Pipster) in the multi-purpose verandah backed by a screen of locally sourced bamboo. Travels in Indonesia have influenced Fred and Deb's sustainable lifestyle

SUSTAINABLE SHEDDING

A satisfying lifestyle underpinned by sustainability
and how little you actually need to live

By Helen Frances
Photographs: Tracey Grant

Retired landscaper, Fred Frederikse, lives a semi-hippy lifestyle with wife, Deb, in pole sheds beside the Whanganui River. Fred and friends have built the sheds, including a recording studio where he plays in a band.

A largely self-taught builder and self-confessed “dropout from the School of Architecture”, Fred works out of his head, without plans. He says he learned about building by demolishing a house, and as a landscaper built anything from fences to decks, to retaining walls, to fountains and waterfalls, to lighting systems.

“The next thing you build is always different so you learn as you go. I’m not a conventional builder,” he explains.

Fred and Deb used to live much further up the Whanganui River.

“[We] lucked into a piece of land and built up there. There was no power and we lived for three years in a geodesic dome with a wood stove, but I think square walls are much more sensible than geodesic so I decided to live in a house.”

Demo timber

Fred built their next house from scratch in the 1970s, at Atene, further up river, using demolition timber and a large, ornate window he salvaged from Villa Maria, a Catholic boarding school,

he has worked out over the years — but more of that later.

“Every time I built something I learned what not to build next time. When we went up the river the first time it was driven by idealism. The design was

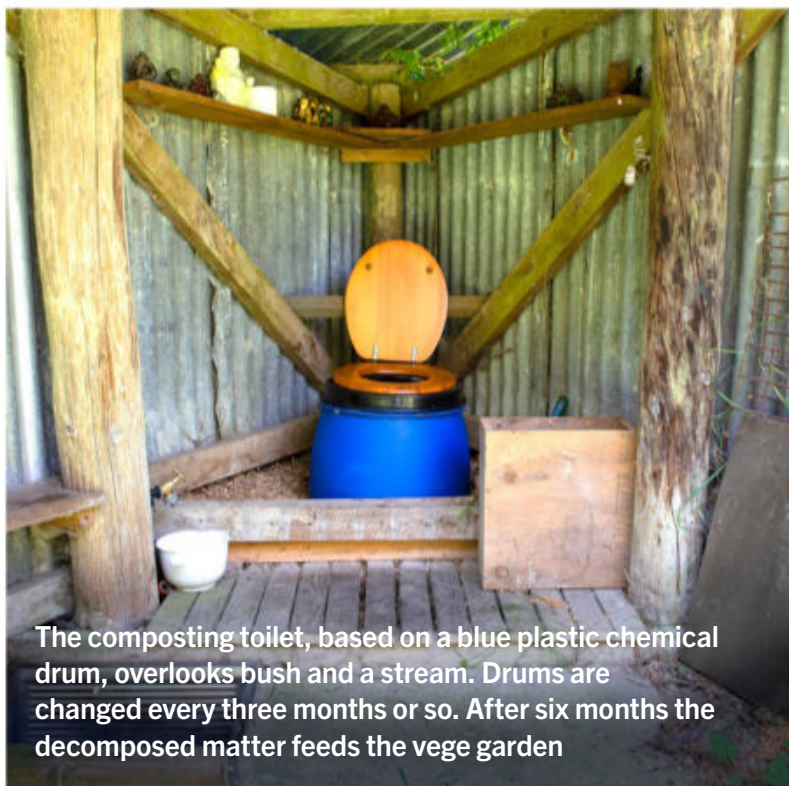
full of romance and short on practicalities — too far from work and town — but we did manage to build a home without a mortgage and shelter the family.”

The children have long since flown the nest, and Fred and Deb are living closer to town with access to the comforts of modern technology.

“There is an Inspire Net tower just behind us that provides very fast Wi-Fi and we can watch Netflix. Back in the days when we were living without power, this would have seemed like a dream.”

Not ‘house and garden’

Fred says the pole shed and caravan, where he and Deb sleep, are technically part of a transition from their house in town, which they sold, to their Keith Hay home in Delhi Village, an eco co-housing community established on farmland in



The composting toilet, based on a blue plastic chemical drum, overlooks bush and a stream. Drums are changed every three months or so. After six months the decomposed matter feeds the vege garden

originally called Hutchison’s Folly after its previous owner and built in 1876. The land is now the site of St Mary’s Church in Whanganui. The outside dunny he made then was the beginning of what is now an efficient composting system



At one end of the shed-house their 1960s lantern-top caravan/ bedroom sits under a carport style roof. Fred bought the caravan through Trademe, complete with its Dr Ropata number plate.

Villa Maria

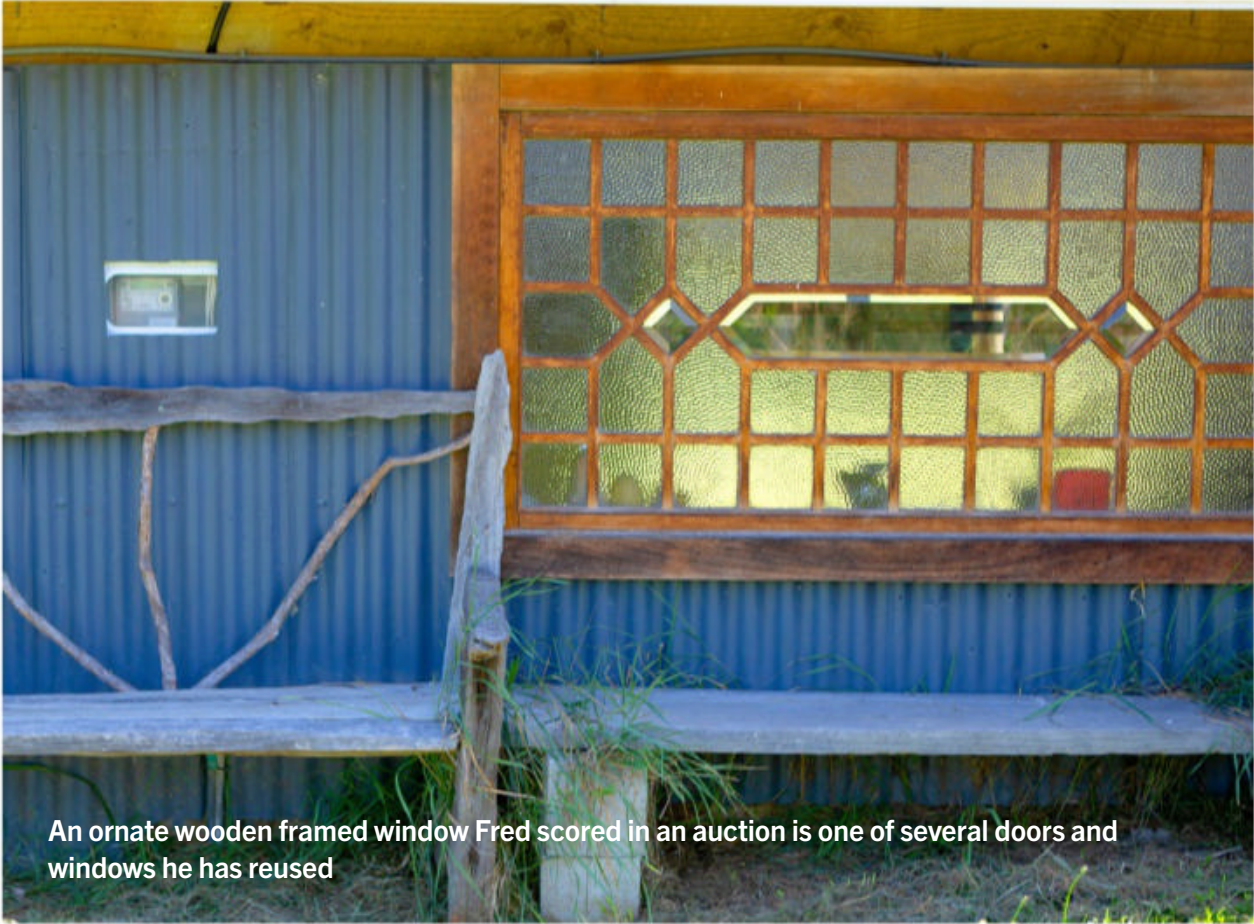
This building opened in Cameron Terrace in 1898 to accommodate Catholic boarders of all ages and for use as classrooms for primary pupils. The building, called locally Hutchinson’s Folly for its former owner, had plenty of rooms and extensive grounds for pupils to play in. The ‘Villa kids’, as they were known, moved to a new site in Guyton Street in 1944 and their little school was renamed St Monica’s. It closed in 1963.

<https://www.nzherald.co.nz/whanganui-chronicle/news/museum-catholic-education-in-whanganui/6CYMS3MYHBZTHONE0263CE05JI/> and <https://whanganuiregionalmuseum.wordpress.com/2014/05/28/a-house-with-a-history-hutchisons-folly-villa-maria/>



Whanganui. However, Fred says he prefers to continue living where they are right now. “This project is not ‘house and garden’; it’s a garden with bits of house spread through it [and] a bit of an exemplar in terms of sustainable housing. The whole design is driven by how little you actually need to live on. We have been lucky to have a few trips overseas, backpacked through Asia — and you end up realising that a lot of those places work really well. So I thought we could do something like this.”

At one end, their 1960s lantern-top caravan/bedroom sits under a carport style roof. Fred bought the caravan through Trade Me, complete with its Dr Ropata number plate. He designed the caravan shelter with the help of an engineer and the whole complex, including the caravan, cost \$35,000. “I had young people helping me — I’m 72 now; I can still do it but it’s slower by yourself. Wrestling poles around and putting them in holes is harder on my own.” ▶



An ornate wooden framed window Fred scored in an auction is one of several doors and windows he has reused

► The caravan fit-out

Flexible solar strips, used on yachts and boats, curve around the caravan roof. The sun's power tops up batteries that run a radio, lights, and phone charger when they are on the road. Fred custom-built the kitchen joinery. He did the fit-out twice because it went through the 2015 flood — or rather, the flood went through the caravan, up to the window. The spare tyre, a 1960s Humber Super Snipe, floated away in the flood.

“When I bought the caravan it didn't have a spare. I found one in Smash Palace in Horopito so I went back and they had the other one.”

In the caravan bedroom, they are kept warm by electric blankets along with a small oil heater they flick on for 15 minutes before going to bed.

“For two old people, we have never been so warm. The caravan isn't insulated but it's such a small space. It's got air vents so there's no condensation, no smell.” ►

“For two old people, we have never been so warm. The caravan isn't insulated but it's such a small space



In the pole shed Fred has set up an acoustically lined recording studio and put in a window between the studio and the garage/workshop side where he parks his truck, and has located the sound control. Cables run under the door and he has abundant power points in the studio where the sound desk and operator sit



Fred and Deb in the living room/
kitchen/dining area, a warm,
fully insulated hub with polished
concrete floor and purpose
built, Indonesian ply joinery. The
electrics are positioned high up
in case of another flood



Caravan bedroom at one end, ablution block at the other and living and storage areas in between make for a simple, pole shed home — “a bit of an exemplar in terms of sustainable housing. The whole design is driven by how little you actually need to live on”

Sheds galore

The old workshop is now a pantry housing the freezer, preserves, water pump, dry stores such as walnuts and hazelnuts, tools, etc. and 107 volumes of Supercook, from A to Z. The door that states ‘No Admittance’ was given to Fred by the Wellington Anarchists.

There’s a living room/kitchen, a shower/laundry, a woodshed and tool shed, and a veranda type of area that provides additional space for gatherings, barbecues, garlic storage, and any other activities that may need to spill outside. A comfy couch is backed by a screen of locally sourced bamboo.

“In an Indonesian setting, they don’t have much land. It stays open and is multipurpose — they’ll fix a motorbike and clear up, clean some rice and clear up, have a family meal and clear up. It’s just usable space that’s used a lot. We can entertain half a dozen people or dry garlic. Even though the inside space is quite small, we don’t feel pinched in or confined. We have a large open view — indoor-outdoor flow. It’s anything but house and garden — well, it is in a way but in a very practical, unpretentious way.” ▶

Even though the inside space is quite small, we don’t feel pinched in or confined



This door was donated by the Wellington Anarchists in Cuba Street, Wellington



Taking a break out back of the pole shed recording studio



In the kitchen the electrics and utensils are positioned high up in case of another flood

Flood proofing

On 20 June 2015 a month's worth of rain fell on Whanganui in one day. The river rose, flooding large parts of the city. Fred and Deb had a metre of floodwater through their sheds. The 1990 flood had reached the edge of the bank outside but did not go onto the lawn.

Fred said the 2015 flood coincided with a full moon and king tide, which peaked up the river near where they live.

"It was like slurry, so there was lots of mud left behind. I had to wait for six months to let it dry out then get a digger in and scrape it off. Even today you find it inside door locks. The electricity box actually survived being under water but the electrician has put all the electrics above the flood line now."

The ceiling is 20mm Indonesian ply packed with Batts in the cavity and the polystyrene insulation in the walls won't soak up water if they are flooded again. The insides of the ply walls are screwed on and can be unscrewed and cleared out if needed. There is not a single piece of MDF in the entire place after the kitchen cabinetry turned to Weetbix in the flood.

"So, like they do in Jakarta, you design for it to happen. It will need to be cleaned up but won't have to be demolished." ►

"I had planned to build my retirement house out of that but it all went in the flood, too"

Fred's not fussy

The living room/kitchen/dining area has an easy-to-clean, polished concrete floor. Fred picked up the doors and windows from various places. The front door came from his daughter's house, an aluminium-framed window from the demolition of Jubilee Hospital in Whanganui, and he scored an ornate wooden-framed window in an auction.

"I'm not too fussy — just whatever happens to be around, and cheap. The pantry and sink joinery were purpose built by Simon Shaw, who plays bass in a band I played in. It's Indonesian ply. I had planned to build my retirement house out of that but it all went in the flood, too."



Deb and Pipster in their fertile garden, nourished by human and plant organic matter



In the unlined ablutions block Fred built the shower cladding is Zincalume



Scott Brothers

Domestic and commercial grade stoves and ovens gradually became the mainstay of Scott Brothers Limited. In 1878 the first coal-burning cast-iron ranges were produced.

In 1931 the company introduced its new Atlas electric ranges. These gradually changed from cast iron to pressed steel, and in 1961 a large, 75kW porcelain enamelling furnace was installed. In 1962 the foundry was closed and the company concentrated on the production of electric ranges. Porcelain enamel baths, kitchen sinks, and enamelled street signs were also produced. [https://en.wikipedia.org/wiki/Scott_Brothers_\(locomotive_manufacturers\)](https://en.wikipedia.org/wiki/Scott_Brothers_(locomotive_manufacturers))

An oldie and a goodie - the kitchen/living/dining area is warmed by home grown firewood in this Scott Brothers stove.

Natural resources

Fred and Deb grow their own firewood, which is good for the power bill. Fred cuts the wood to fit the Scotts Brothers wood stove in the living room. The Christchurch engineering firm produced its first coal-burning cast-iron ranges in 1878 and the stove looks vintage. Fred says it cooks bread and roasts beautifully as well as heating the place efficiently.

They use gas for hot water, and have two water tanks — a 25,000 litre and a 1000 litre. An electric pump provides water pressure, and if there is a power cut the smaller tank always has water in reserve.

Fred built the ablutions shed — unlined, so it’s a bit cold in winter. The shower cladding is Zinalume, and Fred made the unisex urinal out of a converted handbasin.

“A bit cold to sit on. I keep urine separate from faeces, and most of us pee a lot more than we poo. We are lucky we live on pumice here so it is well drained. I just send it underground into an

overflow and it seeps out from there into the soil. A pipe with a U-bend carries it away — so you don’t get smells wafting back up.”

Fred says the tamarillos and rhubarb further down the hill seem to be thriving from the liquid human fertiliser.

Composting toilet

All the couple’s waste, including grey water, goes back into the ground. At the composting toilet outside, a stainless steel laundry bench serves as another urinal, inviting people to pee before they poo.

The blue throne, in a minimal shelter, looks out over a bush-clad gully. The toilet is based on blue plastic chemical drums Fred gets from Tasman Tanning. He changes the drums around every three or four months, as there are only two of them using it. There are no flies, and there is no smell unless the users urinate too much or the lid is kept shut, causing condensation and a proliferation of anaerobic bacteria.



The urinal is a converted hand basin

Fred on his way to the pole shed recording studio





Fred with the guitar he plays in a band. The “ox-blood” coloured concrete floor is a bit of a feature, painted with Bondall, garage and factory floor protector



Fred fixes an Italian Pinocchio puppet acquired on their travels

A scoopful of sawdust, topsoil, pumice, and a small amount of lime help get the ratio of nitrogen and carbon right and encourage aerobic bacteria to break down the organic waste.

“In the old days, I used to shovel it from one bin to another, which is not good because I had to reach in. Then I got the blue plastic chemical drums from Tasman Tanning and put a few holes in the bottom to allow for drainage into the pumice soil here. I let it fill to a point where I can still lift it out of the hole, strap a lid onto it, lift it out, put a new one in, and then roll it to where I want it to continue the decomposition.”

In another blue plastic drum with the bottom cut out, Fred layers the decomposing matter from the first drum, in between layers of topsoil, leaves it for six months, then lifts it off like a cake tin.

“You’ve got a thing that looks like a Christmas cake with worms wriggling in it and it’s just perfect topsoil. You put it around your fruit trees and your fruit trees look really happy” — as do the vegetables flourishing nearby.

“A billion Chinese can’t be wrong; that’s the way they do it and they are legends at growing vegetables. It’s just that we have cultural issues with it.”

The recording shed

Fred plays guitar in a band but avows he’s not a great musician — “I like hanging around them because they have creativity, commitment, and integrity, and I have yet to meet a politician who has all three of those qualities.”

The Easttown pole shed, built by contractors, complete with concrete floor, cost \$28,000 and provided the base for the music studio. They have done a few jams in the studio, which is still a work in progress, but Fred says the sound is good and his take on lining for acoustic quality seems to be working.

“When it came to lining the pole shed, you’ve got vertical poles with horizontal 150mm x 50mm that the tin is screwed onto from the outside, so when I lined the inside I just put building paper down — so you’ve got horizontal joists with building paper. Then I put vertical 2x2s to

“A billion Chinese can’t be wrong; that’s the way they do it and they are legends at growing vegetables”

give me 600 centres for my ply to screw onto and you end up with two air spaces. There is no insulation inside the walls — simply two air spaces with black building paper in between. I was operating on the theory that when sound moves it runs into this black building paper, which acts a bit like a speaker cone. It picks up the sound.”

While Fred was aiming for sound insulation, he says it provides heat insulation as well.

The sign of a landscape designer and self-taught builder



A Bali mask travel souvenir grins from a kitchen beam



“I go for minimum, but quality-grade, hand tools”

Keeping an eye on the truck

Fred put in a window between the studio and the garage/workshop side where he parks his truck and has located the sound control. Cables run under the door and he has abundant power points in the studio where the sound desk and operator sit.

The painted concrete floor is a bit of a feature, painted with Bondall garage and factory floor protector. The first coat, terracotta, was well thinned; the second coat, ferric red, was stirred but not thinned, and brushed, not too neatly, to give an ‘oxblood’ finish.

This is the first time Fred has had a proper workshop.

“As a landscaper you load all your tools onto your truck and you do all your work on site. So I operate mostly a mobile system and don’t have a lot of gear. But now I’ve got a flat concrete floor, so I’ve treated myself to some new sawhorses. I go for minimum, but quality-grade, hand tools.”

Among his minimalist collection of tools a few favourites are an Estwing hammer and a Bosch battery drill. A particular favourite is a Chinese Tooline saw bench.

“I took a hacksaw to the safety guard — you can do just about anything with it. The sawdust goes onto the grass — it’s my landscaper’s approach to building; a bit rough but it works.” 🏠

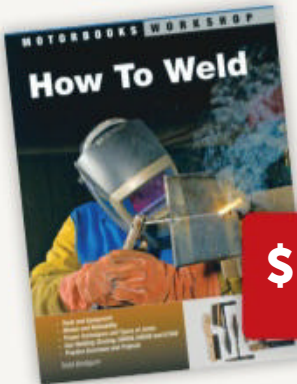
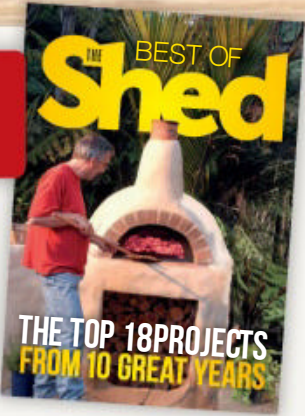
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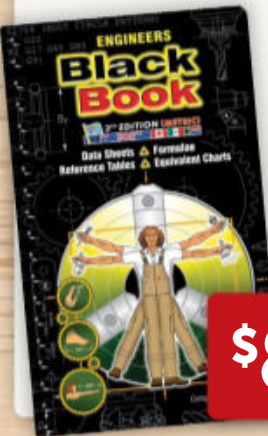
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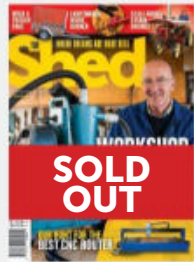
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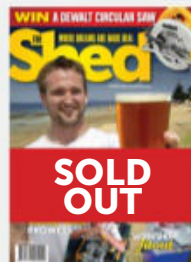
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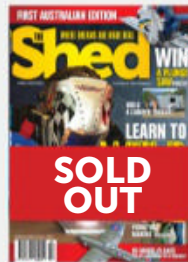
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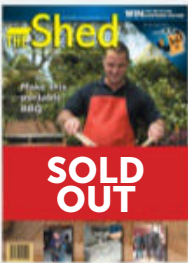
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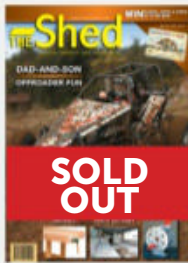
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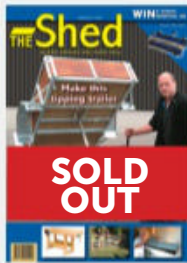
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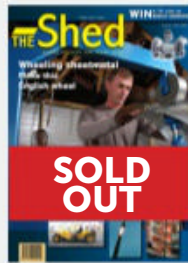
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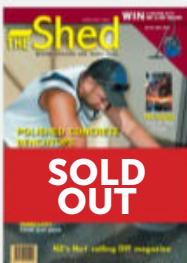
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JABBING AT THE RABBIT

The tug of war between science and superstition goes on

By Jude Woodside

Well, I've done it; I have had my jabs. It was a painless process, other than the sore arm after the first one. Still, I've had worse.

So now I have joined the herd, received the tracking device, magnetised myself, am tuned into 5G, and all the other absurdities that those opposed would have us believe.

What concerns me in no small way is how many of my friends and associates have gone down the rabbit hole. My partner, the Lady of the Grey Havens, tells me I am too rigid in my thinking and I should be open to other people's ideas and at least listen. To be fair, she has a point; my tolerance for BS is very narrow.

No one of my generation should be averse to vaccines. We lived through the end of the polio epidemic and saw the eradication of smallpox. Vaccines for most childhood illnesses followed, and we all benefited from them.

This is old news

Opposition to vaccination is not new. It goes back to the 18th century when the smallpox and cowpox vaccines were discovered, but the basis for the opposition was the same — ignorance and fear of the new. The publication by Andrew Wakefield — the now disgraced and struck-off doctor and researcher — of a paper claiming a link between the MMR vaccine and autism helped to start a resurgence of anti-vax sentiment. That his research was seriously flawed is one thing, but what is less known is that he had received funding from vaccination litigants and hid that from his fellow researchers.

Of course, the lie has already circled the globe twice before truth has her pants on.

This misinformation has led to many new outbreaks of measles, which, make no mistake, has killed kids. The

same sentiments have caused polio vaccinations to be halted in Pakistan and parts of Africa, when the world was so close to eliminating it.

A corrupt individual

I should be more understanding and open to the ideas of others, but for an educated person to tell me that one of the fundamental achievements in medicine, since clean water, is wrong, and they will have no part of it, does tend to wind me up. It means they are prepared to endanger their own children for a discredited thesis by a corrupt individual published for personal gain, while

“Of course, the lie has already circled the globe twice before truth has her pants on”

ignoring the selfless work of thousands of highly qualified people with their welfare in mind. In doing so, they embrace superstition and fear and that's the portal to the rabbit hole.

I have tried to avoid the tide of rubbish that gets flushed through social media from the US but I have seen some and, while most is rambling from the gullible, there is a component that is well produced and sounds credible — until you look closer. Many of these YouTube videos quote papers and research to back up what they say, but they don't give you links to the source and further follow-up shows that there is often a reason for that: it doesn't exist or it is being quoted out of context. It demonstrates how 'a little knowledge is a dangerous thing'. But the true believer doesn't do the follow-up.

For everyone's sake

While people refuse to get vaccinated, the virus will remain in circulation and will mutate and, as the Delta variant has shown, could become more infectious and even more deadly. Meanwhile, I hear people who will happily eat fast food and swallow paracetamol or cattle wormer explaining that they won't have the vaccine because they don't know what's in it.

We are one of a very small subset of countries that took the right decisions early and have all but eliminated this virus. We can still do it but it requires people to overcome their fear and do it. If you haven't already, I urge you, for your own sake and that of your neighbours, friends, and mokopuna: get the jab. 📄



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