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NEW ZEALAND **Wings**

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AACA GRAND CHAMPION

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BOEINGS ON AUCKLAND HARBOUR





ROLL YOUR OWN

Profile of a Grand Champion

by Graeme Porter

OF the group of homebuilt aircraft from the Thames Valley Chapter that flew into the recent Amateur Aircraft Constructors' Association's annual Fly In at Taieri (See April WINGS), one in particular flew home with a definite share of the competition trophies.

Trevor Parker's Pazmany PL-2 ZK-TLP, first of type in New Zealand skies, became the 1989 Grand Champion.

Obtaining an off the shelf aircraft is relatively easy. Requirements listed, features emphasised, choice made and money paid.

For those who are not able to satisfy any or all of the above, particularly the money, alternatives need to be considered - either downgrade your initial criteria for a factory-built or go off on a different tangent; roll your own.

Pioneer aviators generally had little choice but to "roll your own", employing their own designs and handiwork as, usually, no alternatives were available. During the years leading up to the First World War, would be flying Kiwis took the only course open to them, to build their own airframes. Many a newspaper carried accounts of wouldbe birdmen who had built their own device to fulfil their urge to fly, the first homebuilders. Imported factory built machines, then as now, could be expensive.

The only "add on" generally sought - although some did build their own - was an engine light enough and powerful enough to drag the airframe into the air. The lack of an expensive, purpose-built powerplant grounded more than a few visions of flight.

Achieving flight under the restraints of the pioneer "roll your own" involved vision, invention, design, time, trial and error.

Today a more scientific approach to aeronautical design reduces the trial and error aspect of amateur aircraft building but time, perhaps even more so now than back in the fledgling days of flight, is a very necessary requirement. Thousands of hours of shaping, making, building.

The motivation is still the same. To get into the air at a reasonable cost. The satisfaction of seeing your own creation take to the air.

The modern homebuilder has two broad options. Either to assemble a kitset, ready made or partially completed manufactured sub assemblies from outside suppliers. Or start from scratch with a set of plans and build up your own components in wood, metal or fibreglass. Few would consider manufacturing their own powerplants or instrumentation

although many have been tempted.

Rolling your own, either from scratch or kitset, requires financing the makings and possessing some basic skills in order to achieve a consistent result. The latter is not always present when a constructor makes a beginning, but the end result is a fairly good indicator of the skill level achieved. Beginning levels of skill and the level of expertise required usually determine the range of designs open to an individual to build. Cash resources finalise the choice.

Trevor Parker's Pazmany PL-2 came together from annealed 2024-0 aluminium, took shape and achieved its permit to fly in mid 1988 under the watchful gaze and hands of Morrinsville test pilot Brian Harvey.

ZK-TLP is a true "homebuilt" aircraft in every sense of the word. No imported sub assemblies here. No pre-moulded fittings and undercarriage units from proprietary manufacturers.

Every aircraft component was constructed on site. The raw metal, a set of quality hand tools, a small lathe and blood, sweat and the inevitable tears combined to take shape as a attractive two seat light aircraft.

It was a tale of perseverance, adversity and triumph over eleven years - twice the anticipated build time.

Trevor began with the advantage of being a car mechanic with a Te Aroha franchise dealer and had previously tested his talents on various racing car projects - including working on Formula Pacific cars; vehicles which used aircraft construction techniques and materials.

The PL-2 came off the drawing board of US designer Ladisalo Pazmany of San Diego. The design followed his earlier PL-1 but with improvements in construction techniques intended to make the aircraft easier for amateur engineers to build. Noticeable changes included an increase in dihedral for the PL-2 from 2.5 to 5 degrees and a change in the fuselage to provide for 5cm of increased cabin width.

Some 58 examples of the 150 hp Lycoming O-320 powered PL-1B were constructed in Taiwan by 1974 for use in training Chinese nationalist air force pilots while the PL-2 has been evaluated by a number of Asian air forces as a trainer. Fifty PL-2, known as the LT-200, were built in 1976 by Indonesia's Lipnur Aircraft Industry.

Other members of the Pazmany homebuilt family are represented in New Zealand by PL-1 ZK-PAZ and PL-4A ZK-PLF, the latter a single seat T-tailed craft.

Trevor notes that it was the exceptionally high quality of the plans that were the final clincher in opting for the PL-2. The plans are predominantly full scale, with some components in 1/2 scale. The 48 drawings cover an area of around 547 square feet.

Other considerations on his priority list included an all metal construction, a tricycle undercarriage and USA specifications for the project materials. Other front runners were the Thorpe T-2, Zenith and Sprite. Four place machines, such as the Bede BD4, became a passing thought after Trevor discovered they were ineligible for a NZ permit to fly.

A pilot's licence was not up there amongst the primary decision factors. Plenty of time for that. First catch your hare

The gleam in Trevor's eyes began to reflect off aluminium components as he set off on the time consuming job of manufacture - a total of some 1600 hand crafted items slowly accumulated over four and a half years of endeavour before the kit was complete.

The PL-2 is not available as a ready made kitset. Ladisalo Pazmany notes that "an average sized two place design nearly always takes about 3000 hours to build, regardless whether the basic structure is sheet metal, wood, tube or fabric. The question of kit availability is purely academic." This approach tended to make use of many proprietary sub assemblies and fittings, mostly fibreglass, but most Kiwis appear to want to be pure "do-it-yourselfers" and the resulting building time stretches out into the 6000-7000 hour bracket.

Considerable time was spent making jigs and moulds prior to actual component assembly. Some seventy components were involved before the first wingtip fuel tank could be moulded in fibreglass.

Naturally enough one looks around for some shared endeavour and Trevor joined with fellow PL-2 builder Arthur Ireland for mutual advantage.

"All fibreglass components are vacuum forced. A technique which saves weight without sacrificing strength. The process, I found, produced excellent high quality components with the added advantage of not having to manufacture female moulds. The parts are directly vacuum bagged over the male mould. Arthur made up the moulds leaving only final smoothing, sealing and gel coating before fibre glassing. In return I made an extra set of tanks for Arthur. Working together on these components saved heaps."

It is possible to make a mould for the plexiglass cabin windscreen and roof following the



detailed instructions provided. However the items proved to be cheaper to import than doing it yourself; one of only two significant short cuts taken - the other being a forward cowling assembly.

A process probably considered unconventional by many amongst the homebuilding fraternity was the forming of wing ribs and fuselage frames - along with other components with curved flanges - in annealed 2014-0 aluminium, and further heating treating to bring these to T-42 condition.

"To be honest I was a bit apprehensive about this process but now I wouldn't build another aircraft any other way. The distortion caused by the heat treatment is minimal and is easily rectified afterwards by refitting the parts to the mould and reworking the flange to relieve any stress," commented Trevor.

Although the working drawings were generally of a commendably high standard, a few examples were uncovered in the construction where paper and practicalities did not agree.

One such area was the flap track mechanism where a simple modification could be achieved by bending the offending item but a longer term answer lies with a minor redesign.

Another situation that defied the instructions lay with the rosette welding on the main gear master tube assemblies. A bronze bush inserted into the tube was required to be radiused, a simple enough task which defied repeated attempts. Consultation with AACA technical advisors produced a suitable radiusing technique.

The difficulty lay with in preparing the unit to specs which had resulted in the components being in shear rather than in tension. Future PL-2 builders would be well advised to contact Trevor for an easy way to deal with the problem.

As far as Trevor was concerned, communication between designer and constructor could not have been better. Designer approval for modifications was quickly forthcoming. Trevor noted that feedback to the designer is not what it should be; a number of PL-2s are flying worldwide but his query on the flap track problem was the first to reach San Diego.

The choice of a powerplant lay within a variety of horsepower ranges considered satisfactory by the designer. The hardware initially selected was the Lycoming 0-290 but its relative rarity led on to a choice between the Lycoming 0-235 or 0-320.

The 0-320 would supply more than enough horses for a good STOL performance

and, for a projected cruising speed on a low power setting, would undoubtedly come up with 0-325 economy. A sort of having your cake and eating it too.

Life is never that simple. No matter how far back the 0-320 is throttled back, the sought for economy never comes through.

When initially test flown, an overly rich condition was present at high throttle settings. Standard settings for the carburetor could not be tolerated by the engine. Drastic leaning seemed to effect a cure for the first ten hours and successive enrichment over the next ten hours realised the standard settings.

The testing programme brought very few airframe deficiencies to light and, once the engine mixture problems were resolved, the full programme went steadily ahead off Mata-mata airfield.

A stiffness in the final notch of the flap actuating mechanism and a problem with the final notch tending to jump out due to the locking pin failing to engage was solved with a few minor passes by a file.

Test pilot Brian Harvey reports himself very impressed with the aircraft, both in the standards of construction and its flight characteristics.

As the testing programme progressed through autumn and into the winter of '88, lower ambient temperatures justified the non-fitting of an oil cooler. Summer operations saw oil temperatures soar and a cooler has now been fitted close to the firewall and fed with ram air from the cylinder baffling via 50mm flexible tubing. This method, by not constructing a full cooler box, utilised an integral part of the aircraft as one side of the box to save weight.

Further testing has demonstrated a drop in oil temperatures to 85-90 F, well within the desired operating limits.

With over 50 hours of flight time on the PL-2, Trevor is beginning to feel at home in the aircraft. The flight to Taieri was well within the reach of the Pazmany's long legs and proved an ideal proving exercise.

The PL-2 is stressed for aerobatics but, right now, Trevor confesses he isn't. "It is something I will look into in the near future but right now I have a lot of straight flying to do."

The culmination of any homebuilt project is always cause for satisfaction. The last doubts begin to fade as the aircraft gathers speed into its first lift off - a feeling that is appreciated and shared only by those to gather to witness the proud moment.

From left: Four and a half years-1600 crafted kitset components....Getting down to it-Trevor Parker beneath the Pazmany....the realisation of over a decade in the building-a classic air to air photograph by Winston Davey....A pleased Trevor Parker with TPL-fronted by the trophies he bought home from Taieri;Southland Chapter Trophy for best homebuilt built during the previous year, Taranaki Trophy for best all-metal aircraft, The AeroTrim Trophy for best upholstered aircraft and Air NZ Trophy as Grand Champion.

When you shut the hangar doors at the end of the first day, the sun sinking in the west, there are no black letters emblazoned on the sky stating "The End" - rather it is a beginning of the next chapter; learning to appreciate just what it is you have created.

Rolling your own climbs to the next level of meaning.

Specifications

Pazmany PL-2 ZK-TLP

Span	9.0m
Length	6.0m
Height	2.2m
Empty weight	423Kg
MAUW	625Kg
Baggage	18Kg
Fuel capacity	2 x 50lt
Endurance	3 hours
Fuel consumption	32 lt/hr
Engine	Lyc.0-320 E2A 150hp
Propellor	Ian Henry 69x66
VNE	162 kts
V cruise 2450 rpm	128 115 kts
Max struc cruise	120 130 kts
VFE	88 kts
V approach	65 kts
Vs	45 kts
ROC	350 ft/min at 2450 rpm
Manoeuvre envelope	+6 <> -3g