



# The Story of RAI (doing it the old fashioned way)

Contributed by Jim McEwen

Romeo Alpha India is a familiar sight at gyro events in the North Island and keen gyro observers will know it has evolved from the first version that owner Jim McEwen created from plans some years back. RAI is a great example of 'doing it the old fashioned way', from a time before the availability of turn-key aircraft, when if you wanted a gyro, you made your choices and built one. If you're so inclined, there's no reason not to build the same thing from plans today.

**EDITOR** Michael Norton asked me if I'd write about my gyroplane Romeo Alpha India. As he's a persuasive chap and a strong supporter of the gyroplane community I found myself sitting down and writing this.

Most modern gyroplanes owe a lot to pioneer Igor Bensen's designs, which used McCulloch target drone engines with small pusher props. This kept the mast height low and the thrust line very close to the vertical centre of gravity. McCulloch engines were legendary for two things, the noise they made and their unreliability – after all, they were only designed to be shot down! Gyro designers had few powerplant options until light, reliable Rotax engines arrived complete with reduction drives which enabled larger, more efficient props. The downside was that people bolted them onto Bensen-style airframes, raising the engine and extending the mast for prop clearance.

Accident statistics began to climb. Florida builder and engineer Chuck Beaty realised that thrust lines had become significantly higher than centres of gravity and began writing about "powered pushover". The only thing holding these gyros the right way up in flight was the drag of the rotor right at the top of the mast. In a sudden downdraft the rotor could momentarily unload causing the prop thrust to rotate the machine forward about its centre of gravity. Beaty calculated it could go through 180 degrees in 3 tenths of a second, way faster than any pilot could react.

I could see what Beaty was on about and bought a set of plans from designer Ernie Boyette in Florida. His Dominator design was the first serious attempt to eliminate powered pushover. With its high seat and long landing gear it looked pretty strange, but I decided it was more important to stay alive than look good.

Life got in the way and it took me five years to build RAI.

Early on I decided to use a 1 litre 3-cylinder Suzuki Swift engine instead of the Rotax. This meant building a reduction drive and redesigning the landing gear. Finally it was (nearly) ready to fly. NZ Autogyro Association magazine readers had to put up with a series of progress reports as I found it didn't have enough power to get far off the ground. I improved it by changing to ever-larger rotors until settling on 25' Dragon Wings. Weight reduction eliminated the super-soft suspension. The engine went from being a smooth, whisper-quiet lovely, to a harsh, high compression, cammy beast with a horrendous 3-cylinder vibration between 4 and 5,000rpm. But it flew, and I began to enjoy my time in the sky. As the theory claimed, it proved extremely stable in flight, eminently more so than the side-by-side two-seater I used to porpoise my way around the circuit in whilst learning to fly.

RAI became a fixture at Tauranga. Its looks generated a lot of laughter and even the tower called it "the flying hospital bed"! It wasn't over-powerful and I remember wondering if I'd clear the power lines on Hewletts Road on hot summer days when taking off from runway 34. Another day a coil failure resulted in a forced landing on the beach at Matakana Island – just after crossing the harbour and doodling around over the forest! After Rob Sanders gave me a lift in his Rotorway helicopter back to the hangar for another coil, things got interesting. The engine started instantly but the tide was well in and I only had a couple of metres of sloping beach to take off on. I engaged the pre-rotator to spin up the rotor but the inertia combined with the slope to turn the gyro 90 degrees and it ran into the waves, wrecking the prop in the process. By the time we'd caught barges to trailer it from the island my half-hour Saturday morning tiki-tour had turned into an 8-hour odyssey.

Sometimes I enjoy working on RAI as much as flying. The engine finally had to go and I chose an EA81 Subaru coupled to a Rotax C box with a larger 66" prop. It was a good move. Quieter (a bit!), smoother, more powerful and no heavier, flying was a lot more relaxing. During the transplant I'd fitted a larger radiator in the traditional place below the engine. Unfortunately it masked the rudder so badly it was almost useless with power off. I'd heard that front-mounting the radiator "improved the handling no end" so I gave it a go. It certainly transformed the rudder authority but



RAI in 2009, resplendent in new red and white livery after a rebuild instigated by a mishap on the road while being trailed.



Left: The original RAI, with 3 cylinder Suzuki Swift engine. Right: At Pauanui in 2004 with front mounted radiator complete with electric fan.



Left: RAI at Tokoroa in 2006. Right: The new 'office', post rebuild.

required an electric fan to get air through it when taxiing or "hovering" – one of the fun things you can do in a gyro. It was always a bit disconcerting to feel my right foot heat up when the fan in front of it cut in though! Worry about getting scalded from a leak finally saw me selecting a more compact radiator and fitting it back below the engine.

RAI had a major refurbishment a couple of years ago after I was towing it home on the trailer. I forgot I had it on the back and whipped around the corner as usual only to realise what I'd done as I saw it tip over in the mirror. I'm reminded every time I come home and see the groove the rotor head made in the road... Still, it needed a spruce-up. Damaged parts were replaced, everything was stripped and powder coated and I even found an old pod to keep me warm(er) on frosty mornings. Black and yellow was replaced by red and white and a complete re-wiring job was topped off with a klaxon. This always gets a wave from farmers' wives if I toot when flying overhead - must land and meet some of them one day...

In the last 13 years there have been a lot of adventures, plenty of frustration and loads of laughs. One day an Airforce Iroquois pilot asked the tower if I was "a model helicopter or something" approaching from the south, and I can't count the number of people who've told me I "must be nuts to fly that thing". RAI might look like a psychiatric hospital bedstead, but ask the editor – it's a gyro and that means it can be a helluva lot of fun!

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