

QUEENSLAND ULTRALIGHT ASSOCIATION AUGUST 2010 NEWSLETTER

Watts Bridge Memorial Airfield, Silverleaves Road via Toogoolawah, Qld

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Your newsletter looks at the electrifying future of recreational aviation.



Question: If your plane runs a Rotax 447 or 503, what do you do when it's finally time for a new motor? According to QUA technical officer, Jorge Perez, you will ultimately install an electric motor. In fact, these motors are available already. Jorge is only waiting for the right batteries. And he firmly believes that they won't be long in coming. Using today's battery technology to replace a 503 motor and fuel, most ultralights would only have about one and a quarter hours endurance. On the horizon, though, is battery technology that can more than triple that figure. This is the lithium air battery, a battery with almost the same specific energy ratio as petrol (40.1 megajoules per kilogram compared to 44). Remember also that an electric motor is up to four times as efficient converting that energy into thrust. Read the following articles and you will see that Jorge is right. We are standing on the threshold of a revolution in the way we fly.

Article 1 (from the Internet):

Lithium-air battery technology looks to have a big future. With the potential of providing energy densities up to three times that of the conventional lithium-ion batteries found in just about every portable consumer electronics device going around (not to mention the incoming wave of electric vehicles), many companies, including IBM and General Motors are pursuing work on lithium-air batteries. Now researchers at MIT have made a breakthrough that could help make the commercial development of lightweight rechargeable batteries a reality.

Lithium-air (also known as lithium-oxygen) batteries are similar in principle to lithium-ion batteries. However, lithium-air batteries electrochemically couple a lithium anode to atmospheric oxygen through a carbon-based air cathode instead of the heavy conventional compounds found in lithium-ion batteries. This means they are able to have higher energy density because of the lighter cathode and the fact that oxygen is freely available in the environment and doesn't need to be stored in the battery.

Unfortunately lithium-air batteries haven't become a commercial reality because there has been a lack of understanding of what kinds of electrode materials could promote the electrochemical reactions that take place in these batteries. Now a new study out of MIT reports that electrodes with gold or platinum as a catalyst show a much higher level of activity and thus a higher efficiency than simple carbon electrodes in these batteries. This new work sets the stage for further research that could lead to even better electrode materials, perhaps alloys of gold and platinum or other metals, or metallic oxides, and to less expensive alternatives.

Article 2 (also from the Internet):

The lithium ion batteries used in laptops and cell phones, and tipped for future use in electric cars, are approaching their technological limits. But chemists in the UK say that there's a way to break through the looming energy capacity barrier – let the batteries "breathe" oxygen from the air.

A standard lithium ion battery contains a negative electrode of graphite, a positive electrode of lithium cobalt oxide, and a lithium salt-containing electrolyte. Lithium ions shuttle between the two electrodes during charging and discharging, sending electrons around the external circuit to power a gadget in the process.

The problem with that design, says Peter Bruce at the University of St Andrews, is that the lithium cobalt oxide is bulky and heavy. "The major barrier to increasing the energy density of these batteries is the positive electrode," he says. "Everyone wants to find a way to push up the amount of lithium stored there, which would raise the capacity." The answer is to give the batteries a breath of fresh air!

This is an idea borrowed from the use of zinc-air batteries used in hearing aids, which get their power reacting zinc with oxygen from air. Working with colleagues at the Universities of Strathclyde and Newcastle, Bruce has begun designing a lithium-air battery. The new battery has a higher energy density than existing lithium ion batteries because it no longer contains dense lithium cobalt oxide. Instead, the positive electrode is made from lightweight porous carbon, and the lithium ions are packed into the electrolyte which floods into the spongy material.

When the battery is discharged, oxygen from the air also floods through a membrane into the porous carbon, where it reacts with lithium ions in the electrolyte and electrons from the external circuit to form a solid lithium oxide. The solid lithium oxide gradually fills the pore spaces inside the carbon electrode as the battery discharges. But when the battery is recharged the lithium oxide decomposes again, releasing lithium ions again and freeing up pore space in the carbon. The oxygen is released back to the atmosphere.

Most batteries have all the chemicals they need built in from the start. "By using oxygen from the environment instead you save weight and volume because you don't have to carry the reagents around inside the battery – you just need the carbon scaffold," says Bruce. "The new design is like a battery-fuel cell hybrid," says Bruce. "Like a fuel cell it uses reactants from outside the system, while like a battery it also has internal reactants."

The team's prototype device has a capacity-to-weight ratio of 4000 milliamp hours per gram – eight times that of a cell phone battery. Even a tenfold improvement is possible, but tweaking conventional lithium-ion designs will likely offer only a doubling in capacity, Bruce estimates.

Chemist Saiful Islam researches batteries at the University of Bath, and was not involved in the new design. "My understanding is that the lithium-air battery indeed has the potential to deliver an eight-to-10-fold increase in energy density," he told *New Scientist*. However, work is still needed to fully understand the processes taking place in the novel battery, he adds. That should help optimise the technology so it can become a commercially viable product. Bruce and colleagues like Saiful Islam are now working to transform their proof-of-principle version into a small working battery like those used in mobile electronic devices. "But the technology could be just as important for electric and hybrid vehicles in future," he points out.

That's really interesting, isn't it? Did you know that a conventional four cylinder four stroke aero motor has over 400 moving parts. A modern brushless DC electric aero motor has only one. Engine failures are going to become so rare that they will almost be a thing of the past. It won't be at the cost of speed, either. Have a look at this little beauty:

Record Flight for Electric Powered Aircraft - 250 km/hour



June 12, 2009 — A new electric-powered aircraft that flew for the first time on Wednesday, June 10, set what's expected to be declared a new world record by flying at a speed of 250 kilometers/hour (155 mph) on Friday, June 12. A specially built Pioneer Alpi 300 - powered by a 75kW electric motor using brushless technology and lithium polymer batteries - made an eight-minute flight at the World Air Games in Turin, Italy, reaching 250 km/hour as a top speed. The SkySpark project, as it is

named, is coordinated by DigiSky, an Italian engineering company specializing in research and development of technology for aeronautical applications, working in conjunction with Turin Polytechnic University. Projections are that the aircraft will be able to fly at approximately 300 km/hour. The record flight was made by Maurizio Cheli, an experimental test pilot and the former Italian astronaut who flew on NASA shuttle mission STS 75. The Alpi 300 is one of several aircraft models built by Alpi Aviation.



The aircraft on the left is an electrically powered Sonex. The plane above is a very similar looking aircraft to the Sonex – a Moni motorglider, also electrically powered. Read about this remarkable little aircraft on the next page.

The Moni ElectraFlyer

Fit an everyday metal Moni motorglider with a custom battery pack and you've got an Electraflyer C, a small electric airplane that debuted at the Air Venture show in Oshkosh, Wisconsin recently.



The plane, which has already received its airworthiness certificate, features a 5.6 kWh lithium battery with a projected life cycle (the number of times it can be depleted and recharged) of 1,000 cycles. The battery has a max weight of 78 pounds and can be custom-built to fit the available space in an airplane. It provides juice for a motor driving a 45-inch superlight PowerFin propeller made of a foam core surrounded by an outer shell of carbon fiber and glass fabric.

Once in the air, the ElectraFlyer C cruises at 70 miles per hour. Top speed is 90 mph and the stall speed is 45. The plane can fly for 90 to 120 minutes before the battery needs recharging. When the battery winds down, just plug it into a 110V outlet — your house is full of them — and you're good to go in little more than six hours. Bump the voltage to 220 and you're flying again in two hours.



The people at the Electric Aircraft Corporation say the small plane carries some big benefits. The motor is nearly silent, which means no earplugs for pilots, and brings the potential for flying into new sites. And then there's the dramatic improvement in what the company calls "neighbourhood relations" — no droning engines to drive them nuts.

Also, electric motors don't produce any soot or pollution, and overhauls are a snap. And by combining this motor with the ElectraFlyer's slow turning propeller, you've got a flight that is practically vibration free.

But the most compelling sell is an economic one: The company estimates that "refuelling" the plane with a full charge of the battery will cost, on average, a whopping sixty cents. Now that's very interesting indeed!

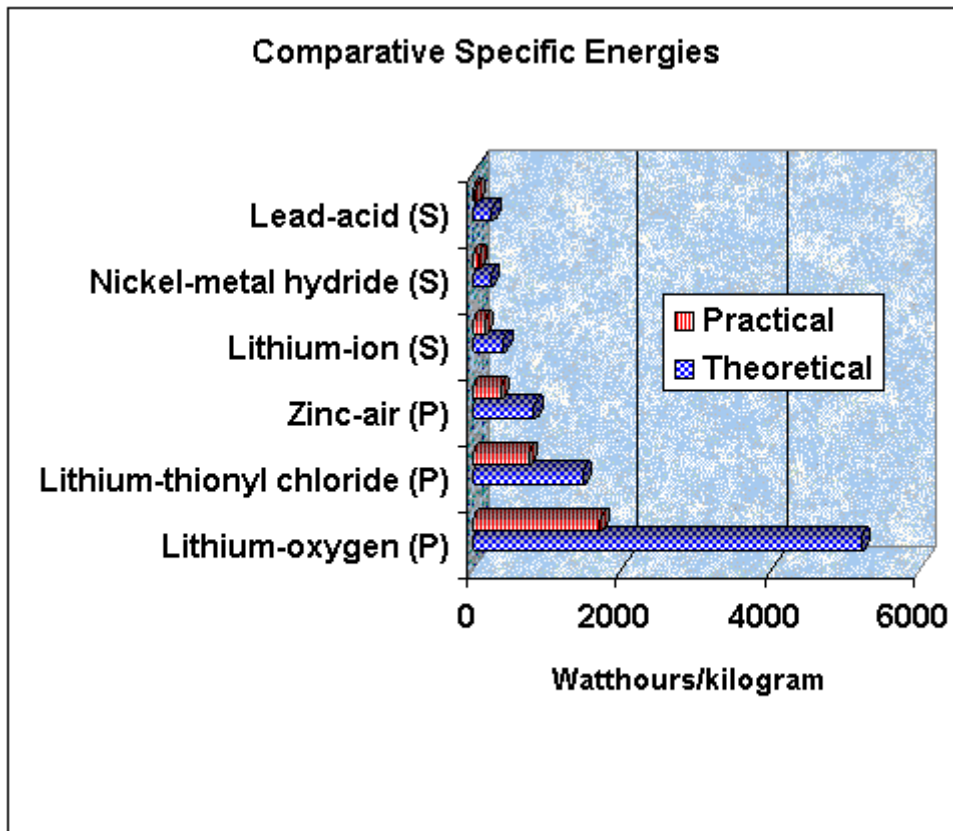
One more: This marvellous machine comes from the People's Republic. Got a spare \$89K?

Yuneec's E430 electric airplane has up to 2.5 Hours' endurance!



The Yuneec E430 electric light sport airplane is built in China. The two-place high-wing composite aircraft is powered by a 40 kilowatt (approximately 54 horsepower) electric motor driven by a "three-pack" of lithium polymer batteries, all designed and manufactured by Yuneec. The airplane is said to have an endurance of 1.3 to two hours cruising at about 53 knots. With a five-pack battery configuration, endurance is said to be 2.25 to 2.5 hours. Empty weight with a three-pack is 550 pounds with a max takeoff weight of 1,050 pounds. The five-pack adds about 110 pounds to the empty weight. It takes about three hours to charge the batteries from regular AC power outlets. Batteries are expected to last about 1,500 hours and cost about \$6,500 to \$7,000 per pack. That's a cost of about \$15 per hour including the cost of electricity and battery replacement. Yuneec's founder, Tian Yu has announced plans to open a 260,000-square-foot factory in Shanghai on October 8 with production starting later in the year. First deliveries are expected late next year at a selling price of \$89,000.

Finally, before we leave the electrifying future of aviation, let's look at the relative specs of different types of batteries. Note of the theoretical potential of the Lithium air (O₂) type:



And now back to the more immediate future. It's just about time for

the

2010 Watts Bridge Festival of Flight!

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And just in case that won't be enough flying for you this weekend:



29 AUGUST 2010
GYMPIE (YGYM)
Texas Hold'em Poker Run
hosted by the Gympie Aero Club
(proceeds to the GAC clubhouse fund)

- Get there anyway you can; aircraft, car, boat or bike!
- \$5 per card wins a possible \$200 first prize
- **Trip by road is 650klms/ 7 hrs return Gympie**, bribery is encouraged, xtra cash will get you xtra cards and can shorten your trip?
- **Trip by air is 212 nm/ ?? hrs return Gympie.**
- Every fifth person to arrive at each airport gets an xtra card. No prize for first so take care.
- **Gympie Airport** start 0730hrs see Blair to buy your cards at Savannah 7377
- **Wondai Airport** see Tony to buy your cards at Decathlon MCM
- **Eidsvold Airport** see Mac to buy your cards at Mooney
- **Gayndah Airport** see Blair to buy your cards
- **Biggenden Hotel** Lunch 1200hrs/ see Tony to buy your cards here and enjoy lunch
- Draw will be about 1300hrs

Feeling Lucky ? We're running another round of the **Flying Ace Card Draw (FACD!)**

contact admin@gympieaeroclub.com.au we look forward to your support and participation

Tell your friends, the more, the merrier, be part of the action aviation team

I have to admit that this is not an original idea – I stole it from the QVAG newsletter. The main difference is, however, that they used a genuine photograph and I'm using a virtual one. A second difference is that if you are the first to email mailout@qua.org.au with the name of this aircraft, you will get absolutely nothing – nothing except a very brief moment of fame, that is.



Coming aviation events:

- Aug 28 Betoota, QLD, Betoota Races
- Aug 28-29 Watts Bridge Airfield, near Toogoolawah, QLD, Festival of Flight
- Aug 28-Sep 10 PNG, QLD, International Comanche Society PNG Safari
- Aug 29 Tumut, NSW, Tumut Valley Fly-in
- Sep 3-4 Birdsville, QLD, Birdsville Races - Win a trophy for your club!
- Sep 4 Luskintyre, NSW, LAFM Lunch with the Tiger Moths ****CANCELLED****
- Sep 4 Temora, NSW, Aircraft Showcase - V-12's
- Sep 5 Yarrowonga, VIC, Wagga Aero Club BBQ
- Sep 10-11 Bedourie, QLD, Bedourie Races
- Sep 10-11 Bedourie, QLD, Outback Ute and 4WD Wagon Muster
- Sep 10-12 Cessnock, NSW, Cessna 182 Association 6 monthly Fly-In
- Sep 11 Warnervale, NSW, Warnervale Fly-In 2010 ****CANCELLED****
- Sep 11 Warwick, QLD, 2010 Wings Over Warwick
- Sep 11-12 Goolwa, SA, AAAA Chippy Rally
- Sep 12 Goondiwindi, QLD, Goondiwindi Fly In Breakfast
- Sep 12 GYMPIE, QLD, PROGRESSIVE FLYING DINNER
- Sep 15-17 Hyatt Regency, Coolum, QLD, RAAA Annual Convention
- Sep 17-19 Cowra, NSW, SAAA National Convention
- Sep 17-19 Coffs Harbour, NSW, ICS Fly-In and AGM & GM
- Sep 18 Temora, NSW, Aircraft Showcase - Trainers
- Sep 18-19 Williamtown, NSW, Defence Force Air Show Williamtown 2010
- Sep 18-19 RAAF Base Williamtown, NSW, RAAF Williamtown Defence Force Air Show
- Sep 19 Boonah, QLD, Annual Drifter Breakfast

Stop the press! The newsletter is very proud to announce the appointment of a new cadet photo journo, complete with brand new, out of the box, Pentax DSLR camera. Yes, we are all very lucky indeed to have secured the services (after extensive negotiations in relation to an attractive salary package, fringe benefits, perks, bonuses, superannuation, days off in lieu, not to mention kind words of praise, etc,) of none other than the very talented and equally charming, Ms Glenda Faint, fresh and recovered (well almost) from recent harrowing experiences, but now full of pixels and rearing to go. You will hopefully encounter Glenda at the Festival of Flight and, when politely asked to smile and say cheese while standing in front of your rag and tube pride and joy, you will of course enthusiastically comply. Actually, we are doubly lucky to have Glenda coming back on deck because she has also graciously offered to have a go at organising and posting photos into the gallery pages of the QUA website. A very sincere welcome back to Glenda.

Stop the press again (Festival of Flight)! The Queensland Vintage Aircraft Group have gotten themselves into a bit of bind. They've contracted with their outside caterer to operate the sole food outlet. Now, their hearts were in the right place, but in their enthusiasm to put on a really great show, they've probably promised a little too much and, as a result, we've been asked to help them out by not selling to the public.

As the QUA has already invested in many dozens of cans of drink, these will be available for QUA members, family and friends. If anyone comes past and asks for a drink, we will sell them one at the QVAG price. The ice-creams that were to be available for sale will not now be ordered.

Also, Sandy is planning to do some catering for QUA members, family & friends. He intends providing dinner for those wishing to stay at the field on Friday and Saturday nights. The Friday night menu item will be Lasagna made by his lovely wife - a fantastic meal for only \$6 per head. Saturday night will be equally as delicious with meat loaf and salad, again at only \$6 per head. For the Saturday and Sunday daytime BBQ sizzle, he will be providing meat (hamburgers at only \$5) and sausages (given away for \$2). Drinks will be available as well as tea and coffee.

Important: Sandy has requested that QUA members RSVP for whichever days they intend to be there, so that quantities can be decided on and purchased.

Sandy will be at the clubhouse with Scotty and Ernie (and probably others) from Friday midday until Sunday late afternoon. As well, he has invited the Redcliffe Amateur Radio Club to join us at the clubhouse. They will set up a display on the Saturday. Approximately twelve of their members will be coming. Sandy invites all of you to come and have a chat and check out their gear. He will be catering for them. So, come with your friends. The fridge will be well stocked.

Festival of Flight Ground Frequency

Ground Frequency for the Weekend: There will be a **Ground Frequency** in operation at this year's "Festival of Flight" event! Please note this as **127.9 Mhz**. You are requested to switch to this frequency as soon as you have egressed the Runway! The use of this frequency will provide the Marshalls with the opportunity to speak with you direct and assist in the orderly movement and parking of your aircraft!

Camping Fees: Watts Bridge Memorial Airfield Association now charges \$10 per day per site camping fees. If you are a current member of WBMA, you can camp free of charge. A member of the WBMA on arrival will collect the camping fees.

MINUTES OF AUGUST 2nd 2010 GENERAL MEETING

- MEETING OPENED 08.14 pm (with apologies from Richard & Glenda Faint, Ivor Parsons, Vern Grayson, Lloyd & Robin Salisbury, Olaf Weedbrook
- MEMBERS PRESENT Thirteen.
- PRESIDENT'S REPORT Proposal to make Lloyd Salisbury a Life Member due to the contribution Lloyd and Robin have made over the years to the QUA. Moved Col Thorpe, Seconded Mike Smith, Motion Carried.
- As Will has paid \$80.00 for setting up the QUA web page a request was made to forgo Will's membership cost for 2010.
Moved Ian Ratcliffe
Seconded Danny Fowler
Motion Carried.
- Festival of Flight is on 28 / 29th of August.
Like to encourage all members to attend over the weekend if possible.
Plan is to sell drinks and ice creams from the clubhouse plus tickets for the Tool Roll Raffle. QVAG Dinner is on the Saturday evening.
Work continues on the QUA Clubhouse. Kitchen tiles have arrived and a new bench top needs to be ordered to match the cupboards & sink.
- TREASURERS REPORT
- | | |
|------------------|-------------|
| Opening Balance | \$ 9,195.96 |
| Plus deposits | \$ 806.65 |
| Less withdrawals | \$ 3,872.88 |
| Closing Balance | \$ 6,129.83 |
- SECRETARIES REPORT Some emails from Watts Bridge.
- WBMA REPORT Reports of low flying aircraft at or near Watts Bridge from some of the airfield neighbors. This can be reported to CASA who may investigate. Richard Faint has been doing a great job on the WBMA web page and keeping all the information up to date.
- SOCIAL REPORT
- The Poker Run was successful once again despite the rain, drizzle and low overcast. Numbers of participants were down compared to previous years. \$311.75 was raised from the entry fees and food sales. The Tool Roll Raffle tickets will also be sold at the Festival of Flight.
- The Natfly at Temora was different and well attended. There was an air of freshness due to the new location. The local council put on a good effort to prepare the airfield and venue.
The Monto Fly In was also well attended with many aircraft present. The local people were very enthusiastic as was the local council.
It was cold for the campers at night.
- GENERAL BUSINESS
- A motion to give a gift voucher to Lloyd & Robin Salisbury was made. Proposed Col Thorpe, Seconded Danny Fowler, Motion Carried.
Col to arrange purchase.
- A Rinai Hot Water System is to be installed at the clubhouse.
A question was asked regarding the advantages of the QUA Inc being affiliated with the RAAus due to the annual membership cost.
- NEXT QUA MEETING Sunday September 5th at 10.00am at QUA Clubhouse, Watts Bridge. Working bee and BBQ included
- THANKS To Peter & David for supplying supper again
- MEETING CLOSED 08.56 pm.