

PHOENIX



QUARTERLY MAGAZINE OF THE
AUSTRALIAN HISTORICAL FLYING MUSEUM
HISTORICAL AIRCRAFT RESTORATION SOCIETY INC.



Winter 2009



HARS contact details

President

Bob De La Hunty, OAM
HARS: (02) 4257 4333
Home: (02) 9894 5775
Mobile: 0408 235 682
Fax: (02) 4257 4388
Email: delahunty@bigpond.com.au

Executive Vice President - Marketing

John Brooker
Phone: (02) 9939 7513
Fax: (02) 9939 7513
Email: jwbrooker1@optusnet.com.au

Treasurer

Robert Greinert
Mobile: 0414 512 619
Fax: (02) 9451 4369
Email: thunderboltaus@bigpond.com

Secretary

Maureen Massey
Mobile: 0400 818 557

Manager Engine Workshop

Kevin Taylor
Phone: (02) 9521 4349
Mobile: 0422 902 545
Email: kgemtay@ezylink.net.au

General Manager Maintenance

Malcolm Hallows
Phone: (02) 9868 4463
Mobile: 0410 498 081
Email: mha33269@bigpond.net.au

Executive Committee Member

Jim Hayes
Mobile: 0421 664 199

Tour Organiser

John Martin
Mobile: 0422 278 502

Chaplain

Pst Grahame Abrahams
Phone: (02) 4256 3724
Mobile: 0429 995 649

Australian Historical Flying Museum Board Chairman:

Professor Michael Hough AM RFD ED

Board Members:

Mr Bob Barker
Mr John Brooker
Mr Robert De La Hunty OAM
Mr Dean Ribolge
Mr John Weston

HARS sponsors

HARS gratefully acknowledges our sponsors, past and present, and welcomes new names to this honour roll:

Adecs (Aust); ADC Krone; Aero Club of Arizona; Aero Weigh; Air BP;
Aircraft and Aerospace Magazine; Air Services Australia; Mr. Bill Andronicos; Ansett Australia;
Anzol Paints; AOPA; Mrs. S. Arms; Australian Aviation Magazine; Australian Native Landscapes;
Australian Steel Mill Services; Australian Timken; Aviation Trim & Upholstery; Barloworld Coatings;
Barker Lawyers; Bartrans; Bellinger Instruments; the Family of the late Mr Ron Bennett;
Ian Berryman; BlueScope Steel; BlueScope Water; Boom Logistics; Boral Portable Buildings;
Mr G Boyd; Bristol Paints; Mrs J L Brooker; Phil Buckland, Buckland Auto Electrical Pty Ltd;
Brinlay Paints; Cement Australia; Chemetall; Chevron Companies (Calif); Cleary Bros;
John and Jenny Cleary; Coates Prestige Hire; Collins Avionics Sales & Service;
Colourtrue Labels; Country Fire Services; Geoff Cuthbert; Daltrans; Capt R Darwell; Mr T Dean;
Mr R De La Hunty; Mike De La Hunty; Mr N Dennett; Dual Electrical Services (Melbourne); Ecolab;
Eric Fordham Engineering; Fish Internet; Flightpath Magazine; Frejak Constructions;
Mr R George; GNB Battery Technologies; Mr W Goodhew; Goodyear Air Treads;
Gossamer Threads; Graham John Signs; Mr R Greinert; Mrs M Greinert; Mal Hallows;
Peter and Heather Hanneman; Hatch Associates; Hazelton Airlines; Capt R Heiniger;
Hexcel Interiors; Julie and Michael Hourigan; Hurdis Plumbing; Icon Internet; IMB Foundation;
Independent Locksmiths; Industrial Maintenance Systems; Jecani Pty. Ltd.;
Jeremy Flynn Memorial Trust; Mr B Kelly; Mr S Kennard; Kiama Municipal Council;
Joy and Allan Lever; Lockheed Aeromod Center Inc (Tucson); Mr G Loudon; Mr D Lowy; Lysaghts;
Mr J McAlpine; Mainpac; Jim Marshall; Mascot Steel; Mrs M Massey;
Gordon McDonald (Elect W'salers); Metro Products & Company; The late Capt B Millis;
Minden Air Corp (Tucson); Geoff Morris; NCR Australia; Nostalgair Models; Notebook Publications;
Oilcheck; Olex Cables; Oxley Graphics; Pam Karcaji Signs; Mr G Paramour; Don Payne;
Peter Ryan Earthmoving; R J Pettitt; Pima Air & Space Museum (Tucson); Protector Safety;
Qantas Airways; Qantas Flight Hostess Club; Qantas 20 Club; QBE Aviation; Reflex;
Reliable Pest Control; Jim Ricketts; Rivers Locking Systems; Riverstone Printing;
DC Roberts Aircraft Co; Robyn-Lea Services; Rockwell Systems Australia; NR Seals;
Sharp Direct; Shell Australia; Shellharbour City Council; Miss T Smiley; Mr D Smith; William Smith;
Snap Printing Auburn; Mr G Squire; Mr A Stinson; RR Szabo; Mr A Tait; Tattersalls;
Taubmans Paints; Telstra; Geoff Timms; TPE Integrated Services; Transfield Constructions;
Transfield Services; Triangle Refrigeration; Trimble Navigation; Trojan Workforce;
Trump Property Maintenance; Valspar Corp (formerly Anzol Paints); Weekly Trading Post;
Mr K Weldon; Weston Printing; White Knight Paints; John Whitmarsh; Ms Gina Wilson;
Wiltshire Engineering; Wollongong City Council.

Phoenix Editor

Julie Hourigan
Mobile: 0409 770 803
Email: mhourii@inet.net.au
julie.hourigan@act.gov.au

All correspondence

Secretary
HARS Inc.
Cnr Airport Road and Boomerang Drive
Albion Park Rail NSW 2527

Phone: (02) 4257 4333
Fax: (02) 4257 4388

HARS web site: www.hars.org.au

Associated web site
www.notebookpub.com.au

The front cover:

Reflection of the mighty Tiger Moth
Photograph courtesy of Ben Morgan

PRESIDENT'S REPORT



This report was prepared on Monday 22 June and as you know things change. This is why I will ask you to bear in mind the date that this report was written.

The weekly briefings held on Fridays and Saturdays and sometimes Tuesdays for the benefit of the engine team do not always provide enough time to talk about everything. So I hope this report brings you up to date on the many and varied things we are involved in.

RAAF CADET FACILITY

This has been an interesting exercise to say the least over the last two years involving Defence Department personnel, their lawyers, our lawyer, architects, Air Force officers and Air Force Cadet officers, not to mention independent certifiers and our Council and their lawyers!

The whole idea was simply to provide a permanent home for 338 Squadron Air Force Cadets as a building structure within the super hangar. We have as you will know been accommodating the Air Force Cadets for over two years anyway at no cost to the Commonwealth and providing storage facilities for their equipment pre-purchased to be included in their facility.

Through the work of John Brooker and Professor Michael Hough a daily campaign was launched to bring the matter to a head and get approval to erect the structure and be paid the 40 years rent in advance which will help cover the cost of the facility and the infrastructure that is surrounding it.

We now have the Chief of Air Force and the Director General of Cadet Facilities intervening so that we can get this project behind us, the funds in to reimburse us for our expenditure and the cadets enjoying appropriate facilities for their training and contribution to the defence of Australia. I would be alarmed if by the time you read this report in the *Phoenix* magazine that the matter is not resolved.

TOURISM

With the advent of being open seven days a week between 9.30 and 3.30 and being staffed by Glenn Owens and his team we can look forward to the cashflow necessary to repay member debt and go forward with our projects. John Martin has been negotiating with the RTA to get the proper signage approved and erected and we are embarking on a campaign of publicity including bus companies and their source of tours; ranging from retirement villages, Probus Clubs, car clubs, etc, as well as the general public. If you have time to assist with the tours could you see Glenn Owens for guide training which you will find both interesting and rewarding.

RETAIL SHOP

Members and visitors coming into the facility will see work progressing on a redevelopment of our shop outlet and reception area. While still temporary, this will present a more professional image for our visitors and space to accommodate particularly large groups that arrive on buses.

LANDSCAPING

We are approaching the point where external areas will need to be landscaped and you can expect to see development in that area in the coming months as other sponsorship or cashflow from financing the cadet facility is resolved.

COCKPIT HALL

Professor Michael Hough is working with sponsors Thomas & Coffey to bring together the cockpit hall as an active and interesting feature of the museum area. This will take sometime to develop but in the meantime a number of restoration projects are on display which will add significantly to public interest. We have a Catalina

cockpit presently being prepared by Thomas & Coffey which will allow visitors to experience what it is like to sit in a Catalina cockpit. Further down the track a Convair, Grumman Tracker and Connie cockpit which we have stored at the Pima Air Museum in Tucson will also be prepared.

HUEY COBRA GUNSHIPS

Some years ago through the efforts of Gordon Glynn we were able to obtain two Desert Storm veteran Huey Cobra Gunships. Prior to the development of our site we arranged for these to be leased to one of our colleagues, Patrick Yu, so that they may be prepared for operation in support of HARS as part of the general interest of displaying Vietnam era aircraft that supported Australian troops in that theatre. Some Australians also were seconded to the US military and flew them. Recently we arranged for Patrick to relocate the helicopters to our facility so that initially they can be displayed and when funds permit recommence the airworthiness work on one of them. They are very much still leased to Patrick as HARS does not have the technical resources and the financial ability to directly operate this type but of course very much would like to see them provide support to our inbound tourism efforts and interests generally.

F111 AND CARIBOU AIRCRAFT

A large number of members have lobbied various Committee members to obtain a F111 and Caribou aircraft following the government's decision to retire both types from RAAF service. Both aircraft are very relevant and historically significant and accordingly we approached the Chief of Air Force expressing our interest. Whilst we have direct support at levels within the Air Force, the disposal of such assets are charged to the Defence Materials organisation and they are also governed by conditions set when military aircraft are acquired. At the present time the Chief of Air Force has responded confirming that our interests have been registered. We will keep you informed on these issues.

PROPELLER MAINTENANCE

As you will be aware, with all of our propeller driven aircraft the issue of airworthiness directives for propellers costs us a very large sum of money every six years to comply. With this in mind and the support of Safeair, a division of Air New Zealand, who overhaul propellers in Melbourne we are soon to construct an area in our facility and train personnel to undertake this work. The technical people attached to Safeair will help us implement this process over the next year.

ENGINEERING TRAINING

We have for many years been acutely aware of the need to transfer to younger people the many years of technical experience and expertise from our engineers. With the development of self regulation for Limited Category ex military aircraft we now see the way clear to put this process in place over the next twelve months. There will be a lot of work involved but it will enable us to properly schedule maintenance and draw on a larger group, taking pressure off our current very dedicated and skilful engineers.

AIRCRAFT ENGINE SERVICING

We recently finalised our arrangements with Bluescope Steel at Port Kembla and Kevin Taylor and his team are in the process of establishing a facility to work on engine components at Albion Park. Initial temporary structures have been provided but again over the next few years we will work to provide first class facilities. Kevin would appreciate anyone with an interest or experience in engine work to contact him. This doesn't necessarily mean aircraft engine experience but general motor or engineering work is a great foundation to be trained to work on aircraft engines. If you know any automotive tradesmen who are looking for an added challenge Kevin would love to hear.

MEMBERSHIP

We are fast approaching the point where our administration centre will be put in place and reorganised to handle membership services. We are currently investigating state of the art processes which will link in to systems to provide an onsite ability to do things

more quickly and efficiently than we have been able to scattered all over the place as we have been in the past. There will be some developmental testing of ideas as we move towards these efficiencies. Some of the systems we are looking at are like joining an RSL Club for example and how modern technology has been designed to make membership look and feel important, efficient and provide lots of information at the point of arrival and at other times, including renewals.

HARS has always been an organisation where membership has been focused on active involvement. Where the people would like to join HARS but do not believe that they will be able to provide active participation we have an alternative category currently called Aussie Connie Supporters Group. This group enables people to keep in touch, get some privileges and the Phoenix magazine but we will be looking at enhancing this and growing it in the future.

SPONSORSHIP

Our sponsors have made us what we are today and, whilst there will be a growing inflow of funds from visitors, we will never be able to afford not to recognise the valuable assistance we have from our sponsors, both past and present. We intend to build and develop better recognition facilities for our sponsors, including the use of the HARS Sponsors and Members Lounge when we are able to fund that development sometime in the not too distant future.

Thank you to all those people who responded to a recent request for donations. Your help is making things happen.

HANGAR DOORS

This has been quite frankly a nightmare over the last few years and as yet we have not put a hangar door on any of the buildings that house our operational aircraft, due to, you guessed it, "money"! Through the efforts of Jim Hayes we are close to attacking Hangar 1 and we are setting our sights on an objective of seeing that done over the next twelve months, again dictated by cashflow.

We have had a quote for Hangars 2 & 3 which comes to almost as much as it cost to build them so that process will take a little longer as you might image.

QANTAS FOUNDERS MUSEUM

As you know we have an EC121-H Warning Star Super Connie, located at the Pima Air Museum, which we bought with the support of Thomas & Coffey for the principal objective of removing the nose for the cockpit hall. We have been able to remove numerous useful items for our Connie since we have owned it and there are a number of other important bits we will ultimately reclaim. We delayed the work to remove the cockpit and then scrap the airframe as the QFM are looking to put a static Connie on display at Longreach.

Recently we have been in discussions to advance the needs of the QFM by coupling it with our own objectives.



HARS EC121-H Warning Star Super Connie located at the Pima Air Museum



Swiss Connie fliers group C121-J Connie at Avra Valley recently acquired by HARS

This has resulted at the time of writing in acquiring from the Swiss Connie fliers group their C121-J aircraft parked at Avra Valley from which they have removed many parts to keep their aircraft flying. When you add all the bits that we have got together we end up in a win/win situation where we get our Connie cockpit and spare parts and the QFM end up with an airframe they can disassemble to transport to Longreach with all the parts to make it finally complete. Also, we get two serviceable Connie engines and some remaining funds from the scrapping of the unused airframe components.

We hope this all works as it will be important for not only the QFM but ourselves to have additional engines to support our Connie.

DC4 PROJECT

The process to prepare the DC4/C54 for its ferry flight to Albion Park from Archerfield in Brisbane is progressing well. Mike De La Hunty is coordinating regular visits which in recent times have culminated in the outboard wing being installed and all flight controls and engines being prepared to run. There are still some issues with the fuel and hydraulic systems to resolve but at this stage we would expect the DC4 at Albion Park before the end of the year, knowing the usual delays that aviation can generate.

CONVAIR PROJECT

The Convair project has reached a significant state in its preparation. We are waiting on the finalisation of the cadet facility to reimburse funds expended that were used by the sponsor believing that the cadet facility would have been finalised long ago. We still continue to rent the home in Tucson and various members have been visiting to work on the project.

ROYAL AUSTRALIAN NAVY HISTORIC FLIGHT

As you know we were invited to submit an expression of interest to take over operating and controlling the Firefly, Sea Fury and C47s of the RAN Historic Flight. In the interest of aviation history, Professor Michael Hough prepared on our behalf a major submission which was accepted by Chief of Navy to take negotiations to a memorandum of understanding stage. The submission, which framed



Satellite view of the Prma Air Museum. Circles indicate the position of HARS aircraft

to cover the specifics laid down by the Navy, strongly argued that the Historic Flight should continue to be part of the Navy and the Fleet Air Arm Museum, but if it was Navy's wish not for that to be so then HARS would put forward two options, one complying with their requirements and one strongly recommending an alternative.

At the time of writing we are going into a meeting with the Navy to develop a preferred option which will involve HARS building a major facility adjacent to the Fleet Air Arm Museum at Nowra to encompass the Historic Flight and other HARS assets. This will help relieve space at Albion Park and provide an opportunity for us to regularly fly aircraft between both facilities to complement both venues and provide variety.

This will also capture the technical skills of many Navy people that will be able to engage in both facilities.

Our vision is to also include a storage facility for the eventual relocation of items from Parkes and, with the benefit of hindsight, facilities for Air Force and Navy cadet facility.

You can be assured that, whilst HARS will be responsible for the overall management of what happens should

this venture proceed, the funding will need to come from within the Nowra district, both from government and former Navy people, so that our resources are not strained. Professor Michael Hough, working with the Director of the Fleet Air Arm Museum, has had many meetings which augur well for this concept. We will keep you informed.

In summary, there are a lot of activities as you can see taking us forward, which for any organisation is enormous but particularly for a voluntary organisation. We can be proud in the way we have been able to develop as a big team of volunteers with a common goal of seeing our aviation heritage preserved for future generations and in recognition of all those who have been involved in all of the aircraft we have in our collection and the history that surrounds them.

Bob De La Hunty

TREASURER'S REPORT

By Rob Greinert



The 2008–2009 financial year has now come to close and the accounts have been ruled off and given to our accountants for final preparation and auditing. Needless to say it has been a busy twelve months. My thanks to the treasury team of Carol Dumont, Tony Abela and David Neeves who have all worked hard to bring the computerisation of the HARS records to a successful conclusion.

I am currently happy with the Society's financial position and we have great support from our sponsors and financiers. For some time now we have been carrying some debt to finance the construction program and I am pleased to advise that we have paid back one of the first loans during July. We now anticipate a further reduction in borrowings as the year progresses.

The Global Financial Crisis has hit our revenue base and for the 2009 year we are looking at a revenue drop of \$100,000 below projected income. The HARS Management Committee have put some innovative alternate revenue streams into place in order to ensure the Society's long term financial viability. As these come into effect the rewards should be felt throughout the organisation. The future is looking much brighter as we trend away from traditional revenue streams and broaden the revenue base.

I am often asked what is involved in running Treasury. So for anybody who wonders what is involved in maintaining the Society's finances or is contemplating the Treasury position at the next AGM I will provide the following outline.

The week starts Monday 9.30am when Carol Dumont, our only full time accounting person, collects the mail and updates the system. By 12 noon we are able to see what the cash position is for the week and what creditors need paying. Calculations are done and cheques are written.

Tuesday is usually spent briefing the President on the overall financial position and discussions are held as to what are the priorities. Situations with aeroplanes and other Society operations arise which may be out of the normal range of anticipated expenditures and financing of these situations has

Guaranteeing the Future

A major initiative has been launched by HARS President Bob De La Hunty and Treasurer Robert Greinert to guarantee the future supply of radial aircraft engines to the HARS fleet. Following months of negotiations with Peter Brooke, CEO of Pacific Aircraft Engines (PAE), Brisbane, agreement has been reached to acquire the assets, licenses and personnel of PAE for transfer to Albion Park.

Peter Brook is by coincidence a founding member of HARS and was present at the Society's inaugural meeting on 29 August 1979.

PAE is the last radial engine overhaul shop of any consequence in Australia and as such was the beneficiary of substantial work orders from HARS in the last eighteen months.

HARS currently has with PAE orders for three engines for the Southern Cross, two engines for the Wirraway/Ceres restorations and a pending order for the Boomerang Fighter. A review of current and future engine requirements for the Catalina and DC3 operations indicated a current/future need for another five additional engines.

The acquisition of PAE guarantees the future of radial engine supply to HARS. The Society will be self sufficient in its own internal capacity to supply engines to the fleet at a comparatively reasonable cost. More importantly it will allow us to prepare for the future by training and educating existing personnel, younger people and apprentices and further the knowledge of vintage radial engines throughout the historical aviation community. The acquisition and provision of space has been approved by the HARS Management Committee and it is anticipated that the move will occur in the first quarter of 2010.

to be contemplated. Do we get a sponsor or do we fund raise in some other manner. Negotiations may be required with our friendly financiers if an extraordinary issue arises and some bridging finance is required. Occasionally, members chip in and help with some short term borrowings when things get a bit tight and we are grateful to all those that assist. Overheads are a constant matter requiring attention. On average we need eighteen thousand dollars a month to meet fixed and variable overheads including rent, electricity, communications and an endless stream of parts and consumables for the aircraft. Big Ticket items like insurance are constantly being reviewed for potential savings.

By Wednesday the flood gates have truly opened as the continuous stream of inquiries really gets up a head of steam and doesn't stop until Friday night. Everything from membership inquiries through to the GST, payment of accounts etc comes barreling in. By Friday night Carol is exhausted and happy to be heading home.

Running accounts costs money and so far we have been able to provide these services to the Society at nil cost. Carol is a member of my personnel staff in another business that I run and her time is given free of charge to the Society.

As I am at Albion Park five days week I am able to give the job the attention it deserves, with an average four hours a day being committed to the position. Add to this the volunteer help from professional accountants Dave Neeves and Tony Abela and you have a good picture of what is involved time wise.

Finally, should you see me around the buildings at HARS or at a function and would like to ask a question or vent a concern about Society finances then please feel free to intercept me and ask away. Alternately you can email me at thunderboltaus@bigpond.com.

OVERHAUL OR BUST!

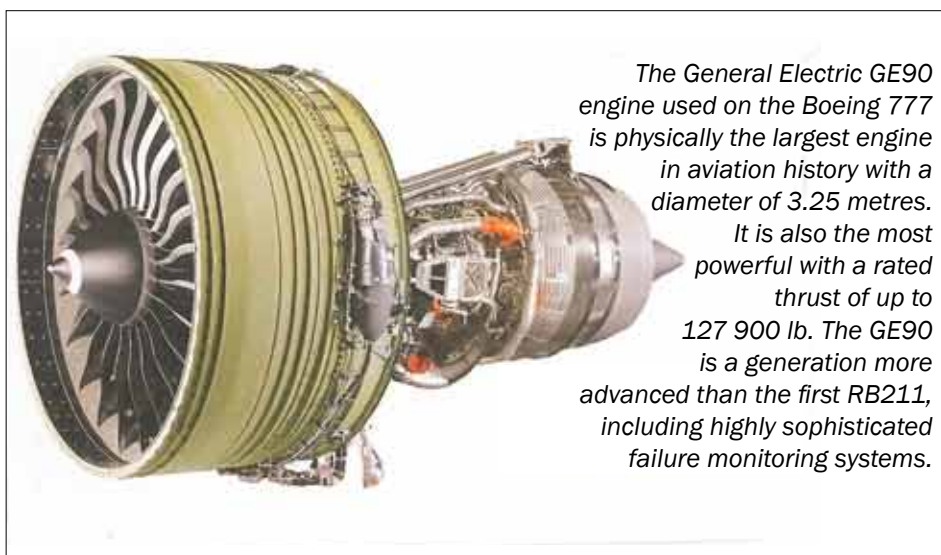
Brian van Der Water

The Wright R3350 engine used in Connie is one of the most complex machines in existence. There are hundreds of moving parts of incredible variety, exposed to different forms of wear or heat distress; some at extremely high temperatures; coupled with highly sophisticated fuel injection and ignition systems. Our expert maintenance crews have performed miracles in keeping the engines in top condition for over ten years.

In addition to regular maintenance, Connie's engines must be "overhauled" at intervals approved by CASA. An overhaul involves complete dismantling down to the last nut, bolt and washer, and worn or damaged parts replaced or repaired. The approved Time Between Overhauls (TBO) on Connie's engines is 2400 hours. In 2006, no.3 engine reached 2250 hours Time Since Overhaul (TSO) and a decision was made to replace it with a younger engine. In a major effort over several years, the HARS engine team (formerly at Port Kembla) had restored and assembled an engine which was installed in the no.3 position to replace the high TSO engine. The removed engine has been partially dismantled by the engine team and found to be in a "well worn state". The team is assembling another engine to hold as a spare.

When Qantas operated Connies in the 1950s, TBO was 2500 hours, about one year's operation. The quality of engines issuing from the Mascot workshop was claimed to be the best in the world, so it is ironic that the only aircraft lost by Qantas in over 55 years was a Super Constellation burnt out at the end of the runway at Mauritius following engine failure on take-off (no fatalities).

Overhauls are very costly affairs and there is always pressure by those paying the bills to increase TBO, consistent with safety. The TBO was rigidly controlled by the Department of Civil Aviation (DCA), now CASA and could only be increased in 200 hour steps, requiring inspection of four sample engines at each step by DCA inspectors who could, and did, call for more samples. Under this system, which originated in the 1930s, increases in TBO could take years and, to my knowledge, no airline anywhere in the world succeeded in raising R3350 TBO to much more than 3000 hours.



The General Electric GE90 engine used on the Boeing 777 is physically the largest engine in aviation history with a diameter of 3.25 metres. It is also the most powerful with a rated thrust of up to 127 900 lb. The GE90 is a generation more advanced than the first RB211, including highly sophisticated failure monitoring systems.

What about jet engines? How many hours do they operate between overhauls? You might be surprised to learn that, as a result of concepts pioneered in the 1960s, large jet engines such as those in the 747 and A380 are no longer fully overhauled in the same sense as the R3350. The first Qantas 707 with Pratt & Whitney JT3C jet engines arrived in 1959, replaced by JT3D fan engines in 1961. As these engines were completely unknown, it was accepted that they too should have a 2500 hour TBO. Using the old four sample formula, the TBO crept up to 3000 hours in 1965, but by then it was obvious that the piston engine TBO system was totally unsuitable. Over the next five years to 1970, a revolution took place in "life control" as it became known, and complete overhauls of the JT3D were eliminated!

The change was motivated by two factors. Firstly, in early JT3D operations, the failure rate was little better than that of the notoriously unreliable R3350, and the failures included some spectacular events which threatened flight safety. Some of these failures occurred at as little as 1100 hours since overhaul, so it became clear that overhauls were ineffective for some failure modes and that another approach was required. Secondly, it was found that, while the "hot-end" (combustion and turbine) was deteriorated to varying degrees, the "cold-end" (fan, compressor and gearbox) was as good as new at 3000 hours, so one TBO did not match all sections.

It was concluded that the way to go was to intercept failures before they caused in-flight problems. This was achieved by

developing "failure monitoring systems". Three monitors were introduced: a magnetic chip detector in the oil system to detect incipient bearing failures; radio-isotope of the combustion section; and engine performance monitoring to detect compressor and turbine deterioration. These proved highly effective and, by 1970, JT3D removals were based solely on monitoring results and no specific overhaul period was applied.

However, the engine was still overhauled, but in sections at times which each section determined for itself. Engines were said to be "on-condition" and by the early 1970s some JT3D compressors ran for over 20 000 hours before overhaul was required. A JT3D full overhaul could cost hundreds of thousands of dollars, and elimination saved over \$2 million per annum (equivalent to over \$20m per annum today if full overhaul of a large turbofan engine today would cost about \$3m). The programme was accompanied by a series of modifications developed by Pratt & Whitney which, despite the greatly extended overhaul periods, confounded the sceptics by producing major reductions in the failure rate, and in-flight safety was greatly improved.

This programme was finalised as the much larger Pratt & Whitney JT9D fan engines in the 747 arrived. The JT9D (and RB211 and CF6) were designed with more advanced failure monitoring, and the JT9D came with 4 chip detectors in the oil system (one for each main bearing) and multiple borescope ports for visual internal inspection. Also, the engine was subdivided into modules so that, for example, the combustion and turbine modules, which deteriorated

Continued next page

most rapidly, could be exchanged in the workshop without dismantling other modules (eventually, an engine's serial number lost its meaning, as only the serial number plate remained constant).

Current large turbofan engines are a generation in technology beyond the JT9D and its contemporaries, and feature even more advanced failure monitoring and modular concepts. Reliability has also been improved to an extraordinary degree, and I read recently that the GE and Rolls Royce engines in the Boeing 787 are designed to operate for up to ten years, or 40 000 hours, without removal from the wing (in practice, however, modification programmes to improve thrust and fuel consumption usually cause earlier removals).

You might wonder, as I sometimes do, whether these concepts could have been applied to the R3350 and other piston engines in the 1950s, but the great complexity of those engines made it almost impossible to develop effective failure monitoring systems, and there was no real alternative to the time-honoured TBO system.



The author with a Qantas engineering group at Rolls Royce, Derby in 1979 with the first RB211 engine for Qantas. The lessons learnt on the JT3D and other early jet engines resulted in the RB211 being designed in modules and with advanced 'failure monitoring systems'.

WIRRAWAY A20-99 RESTORATION

By Rosemary Szabo

The two engines that came with the aircraft were shipped to Peter Brooke's facility in Brisbane at the start of the restoration. The rebuild to zero time was commenced with great optimism.

As with all things old and aeroplane the word "potential boat anchors" surfaced. A complete disassembly of the engines revealed numerous problems which could only be fixed by a serious lump of dollars being sent to the USA for spare parts. Our dream of having two fully overhauled engines for the project was looking a little bit optimistic.

Contemplating a major blowout in the engine budget caused some serious consternation until we received a phone call from HARS member Ben Morgan who rang and asked if a Ceres crop duster was of any interest. A deceased estate was trying to sell the aircraft and it came with two and half engines plus spares. Needless to say we couldn't get the money into the seller's bank account



quick enough and shipped the engines and spares off to Brisbane pronto. A brilliant save and some six months later we are now on the verge of seeing our first engine returned to Albion Park—and still within budget.

Throughout the restoration shop we see various parts of the Wirraway underway. The tailplanes are done and the fabric control surfaces have now been completed by an outside contractor. The center section has been restarted following the hiatus forced on it whilst we dealt with the engine problem.

The big push is now on to get the center section fitted out with fuel tanks and sealed up so we can mate the fuselage atop it and have "99" on her wheels for Christmas.

The Wirraway represents an important time in our industrial and aviation history and will be a valuable addition to our growing collection of historic aircraft.

Our thanks to Eric Lundberg for his foresight in sharing this treasure with us and knowing that his dreams of seeing the aircraft fly will be fulfilled.

DIGGERS AND DEALERS — 2009

By John Brownjohn



The Dak at Ceduna

The 2009 expedition to Kalgoolie was somewhat reduced to previous years in that the C47 VH-EAF was used instead of Connie.

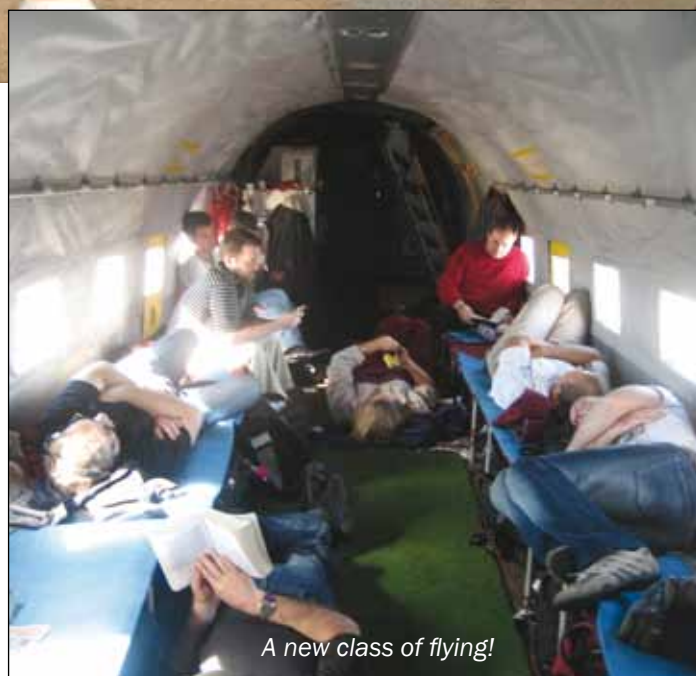
We departed Albion Park on Saturday 1 August for Adelaide with a crew of four—Don Hindle, Dick Woodrow, Neil Taswell and John Brownjohn—and ten passengers led by the redoubtable Geoff Loudon. As usual Maureen Massey had organised the whole event down to minor detail.

Geoff had decided to liven up the trip by providing Astroturf matting in the aircraft cabin centre and a bat and ball for a cricket game. Most amusing when trying to bat or bowl with the aircraft bouncing all over the sky!

Adelaide was uneventful and we departed for Ceduna on time. We refuelled there and then took off for Kalgoolie past a part of the Great Australian Bight known as the 'Top of the Gulf'. There we witnessed the most amazing sight of a collection of whales which Dick estimated to be at least 70 in number. The water was clear and shallow and the sight of so many whales, some with calves and a few evidently getting pretty friendly was overwhelming. Dick also sighted a whale and calf surrounded by a group of dolphins, possibly feeding on the placenta of a new arrival. The entire sighting was one of awe and all were somewhat affected by it. Mind blowing!

On to Kalgoolie! Not a great deal of change. The tech crew were accommodated in a house which was fully equipped and very comfortable. Since there were no daylight or night flights to carry out, we had the day to ourselves. We inspected a set of stairs similar to the ones at Albion Park which an ex-Ansett employee had obtained with the idea of converting them to a racing machine (?). They were located in his front yard and fairly easy to find. They were in very good condition and if they can be bought to Sydney would be a welcome addition to the Albion Park equipment.

We visited the big pit site and the mining museum. A most interesting event, including a tour of underground mining (after seeing this, I can confirm that it was not for me) and gold smelting.



A new class of flying!

Geoff arranged to meet us in the evening in a hotel bar and then off to dinner. The hotel had a most diverting facility in that the bar staff seemed to have the opinion that the weather was unseasonably hot and discarded a great deal, or almost all, of their clothing. It tended to take your mind off the grog!

We departed on Thursday morning for Coober Pedy across the Nullabor. This trip really makes you realise just how big Australia is. We arrived at our destination, refuelled, and then into town. The entire area is opal mining and the surrounding country festooned with mining shafts. We were accommodated in a motel which had been constructed by joining underground mine workings together. Walls and ceilings were natural stone. Quiet and cool.

Unfortunately, where the aircraft was parked and started up was not sealed and the red dust on the start up covered and adhered to all surfaces. It will require a good wash!

Continued page 28

75th anniversary of the MacRobertson Trophy Race

Mildenhall to Melbourne

This story is partly taken from an article published in TIME MAGAZINE, 29 October 1934, entitled *Mildenhall to Melbourne*

RACE HISTORY

In October 1834 a tough little band of Tasmanian pioneers rowed up the Yarra River and picked a spot which their leader, John Batman, decided would be "a good place for a village." John Batman's village became the city of Melbourne... which, with the State of Victoria, in 1934 celebrated its centennial. The grand climax of the Melbourne Centennial—the one thing which was of interest to all the world—was the MacRobertson Trophy Race from Mildenhall (England) to Melbourne.

First prize was \$50,000 and a \$2,500 gold cup; second prize, \$7,500; third, \$2,500. Sir MacPherson Robertson, the Australian candy tycoon, donated the prize money. His sole stipulation was that the speed race must be completed within 16 days.

To encourage more entries, the race was divided into a speed and a handicap division. Speed, (or scratch) first one to Melbourne won, while the handicap division allowed 16 days to finish with the lowest flying time based on a formula. The route would be similar to that of Jim Mollison's record flight of 1931. The route stretched over 11,300 miles, over 19 countries and seven seas. Five compulsory stops were designated for both the speed and the handicap division. Between these five stops pilots could select their own route. There would also be 22 other optional landing places known as 'checking points'.

First leg, London to Baghdad (Iraq) 2350 miles; second, 2300 miles to Allahabad (NW India); third, 2210 miles to Singapore, (the worst air path in the world including 600 miles over the Bay of Bengal which had never been flown over before); fourth, 2084 miles to



Darwin (over the shark infested Timor sea); fifth, 1389 miles to Charleville (a desert town) then 787 miles to the finish line at Flemington racecourse at Melbourne.

The basic rules were: no limit to the size of aircraft or power; no limit to crew size; no pilot may join the aircraft after they left England; and each aircraft must carry 3 days rations per crew member, as well as floats, smoke signals and efficient instruments.

RACE DAY

The great doors of the Royal Air Force hangars opened wide at 3 a.m. One sleek machine after another was wheeled out. The deep-throated roar of their engines being tuned up fairly shook the field. Since midnight they had been converging on the new RAF aerodrome at Mildenhall, 60 miles from London. Over the field and its floodlights hung pitch-black night. Motors warmed, the 20 planes were lined up in two rows for the start of the greatest air race in aviation history. Chattering in little groups were flyers, mechanics, officials, men in dungarees, women in evening dress from London. At 6:30 a.m. Sir Alfred Bower, Acting Lord Mayor of London, gave the starting signal. First away were Jim and Amy (Johnson) Mollison, 12-to-1 favorites in their de Havilland Comet *Black Magic*. Two minutes later Roscoe Turner, Clyde Pangborn and Reeder Nichols took off in their Boeing 247-D Warner Bros

Comet, just as an orange-red sun edged over the horizon.

One by one the rest took the air and headed south. Last off, 16 minutes after the Mollisons, was Captain Neville Stack in an Airspeed AS.8 Viceroy, carrying a complete motion picture of the start of the race.

FIRST DAY

First to drop out of the race were Wesley Smith and Jacqueline Cochran in a Grabville R-6H, the sole US woman entry. They quit at Bucharest.

First plane into Athens was the Douglas DC2 Uivers flown by pilots JJ Moll and KD Parmentier of Royal Dutch Airlines. Their longtime service on the Amsterdam-Batavia airway (three-fourths of the MacRobertson route) gave them a decided edge over other contestants. On board their plane were three paying passengers—two bankers and famed German Aviatrix Thea Rasche.

Turner, Pangborn and Nichols reached Athens an hour after the Dutch entry. Speeding non-stop from England, the Mollisons leaped sensationally into first place when they swooped into Bagdad, first control point, hours ahead of the field. There Amy kept Iraq officials waiting while she took a hot bath, her husband waiting while she made a little speech.

Hardly had the dust of the departing Mollisons settled on the Bagdad field when in dropped a second British plane, piloted by Flight Lieutenant Charles Scott and Captain Campbell Black. Scott and Black had made a previous stop at Kirkuk, where they beg-borrowed 20 gallons of "petrol" to continue. They left Bagdad close on the Mollison's heels, flew straight to Allahabad, second control point, to take over the lead. The Mollisons had landed at Karachi to refuel, had taken off only to be forced back ten minutes later with landing-gear trouble. Seven hours behind the leader were Turner Pangborn and Nichols. At Bagdad Turner became confused, made a down-wind landing, nearly cracked up. Stuck in Paris was Captain Stack with his complete newsreel of the flight's start.



Scott and Black in their de Havilland Comet 'Grosvenor House' fly into Darwin

SECOND DAY

Still far in the lead were Britons Scott and Black in their de Havilland Comet *Grosvenor House*.

Behind them as they sped over the Bay of Bengal for Singapore were the Dutchmen Parmentier and Moll. At Allahabad these two had lost valuable minutes when they carelessly took off without one of their passengers, had to return to pick him up.

Two other Hollanders, Asjes and Geysendorfer, smashed their undercarriage landing at Allahabad. Their mishap put Turner, Pangborn and Nichols in fourth place, which soon became third when they passed the Mollisons at Karachi.

The Mollisons left Karachi two minutes later, got lost, developed motor trouble, and had to limp back to Karachi. Turner, Pangborn and Nichols likewise got lost, nearly ran out of gas, but finally landed at Allahabad. First accident of the race occurred at Aleppo, Syria, when Australians Woods and Bennett in their Lockheed Vega Puck turned over on landing and had to withdraw.

Scott and Black, pushing their engines to the limit, swept into Singapore that night with heavy black smoke pouring from their exhaust. Alarmed field officials rushed out with fire engines. Scott asked for two glasses of beer, while dancing with nervous impatience to be off. Onetime light heavyweight champion of the RAF, Scott was visibly suffering from the terrific strain of his flight. Eight hours after Scott and Black's departure, Parmentier and his crew reached Singapore.

Back at Karachi the Mollisons got off for a third time, but had engine trouble all the way to Allahabad, where they

were grounded with burnt out engines. Hopelessly behind in the race was Captain Stack with the newsreel of the start at Mildenhall. Grounded at Marseille, harassed by motor trouble, Stack announced he would continue as an "amateur."

THIRD DAY

The biggest sensation of the race came just before dawn of the third day, when Scott and Black flew their scarlet de Havilland Comet *Grosvenor House* into Darwin. They had covered the last 300 miles over water on one motor and had risked death landing on a field made soggy by the first rain in seven months. Said Scott, "We've had a devil of a trip." They had flown 9,000 miles in two days, had broken the England-Australia record of 162 hours in the unbelievable time of 52 hours 33 minutes, and were only 2,000 miles from their goal at Melbourne.

First fatality of the race brought death to two Britons, Flying Officer Harold Gilman and Amateur Pilot James Baines. Bad

luck had plagued them from the start. Taking off from Rome, 10,000 miles behind the race leaders, they crashed near Palazzo San Gervasio and were burned beyond recognition.

Scott and Black, keeping up their sensational pace, flashed into Charleville, refueled, sped toward the finish where waiting thousands cheered their progress, reported over loudspeakers. With one motor dead, with only two hours sleep since leaving England, the Britons triumphantly set their scarlet de Havilland Comet *Grosvenor House* down in Melbourne at 3:34 p.m. In 71 hours, 1 minute and 3 seconds—just under three days—they had flown halfway around the world.

That evening, while Parmentier and his crew were heading for the finish line they encountered a severe electrical storm 200 miles short of Melbourne. They circled, trying vainly to contact someone. At Albury, citizens heard their engines. The mayor called the engineer at the power station and asked him to flash the town's lights to spell its name in Morse Code. The local radio station broadcast an appeal for volunteers with cars to drive to the local race track to light a landing path. Parmentier saw the improvised flarepath, landed his aircraft in heavy rain, and decided to wait for sunrise before attempting to continue on to Melbourne.

Behind the Dutch aircraft, Turner, Pangborn and Nichols had also been forced down at Bourke with a smoking engine. Oil from a ruptured line was dropping onto hot metal. Turner telegraphed ahead for permission to fly without the cowl, and was told he could remove it, but must carry it on to



The Warner Bros Comet flown by Turner, Pangborn and Nichols on the ground in Darwin. Photo taken on 23 October 1934 by A & B Richards



*The Dutch Douglas DC2 Uiver on the ground at Albury racecourse.
Photo taken by Clem Geier with a Box Brownie camera.*

Melbourne. Turner took off hoping to overtake the Dutch.

On the morning of 24 October, the Dutch aircraft at Albury found its wheels were sinking into the rain-soaked ground. Once more, Albury turned out to help the Dutch, some citizens hauling on ropes to free the aircraft while others laid a runway of planks. Parmentier got the aircraft airborne, but he left behind two crew, three passengers and the mail, to carry on by rail.

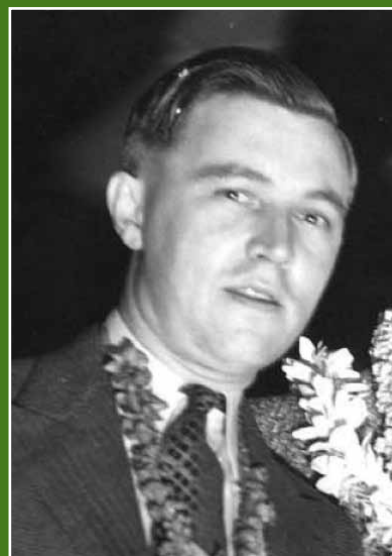
One hour after taking off from Albury, Parmentier lands his Douglas DC2 Uiver at the Flemington race track in Melbourne—second fastest with an air time of 81 hours 10 minutes.

Two hours and 45 minutes later Turner, Pangborn and Nichols arrive in the Boeing 247-D Warner Bros Comet.

The Dutch Douglas DC2 Uiver piloted by Parmentier and his crew had entered both the speed and handicap sections, but could claim only one prize. It takes some time before the their classification in the handicap section is known, as leaving behind the mail and the passengers in Albury resulted in the awarding of penalty points. But their lead turns out to be large enough to win. Having chosen to be first in the handicap section, this left second prize in the speed section going to Turner, Pangborn and Nichols in their Boeing 247-D Warner Bros Comet.

REEDER NICHOLS

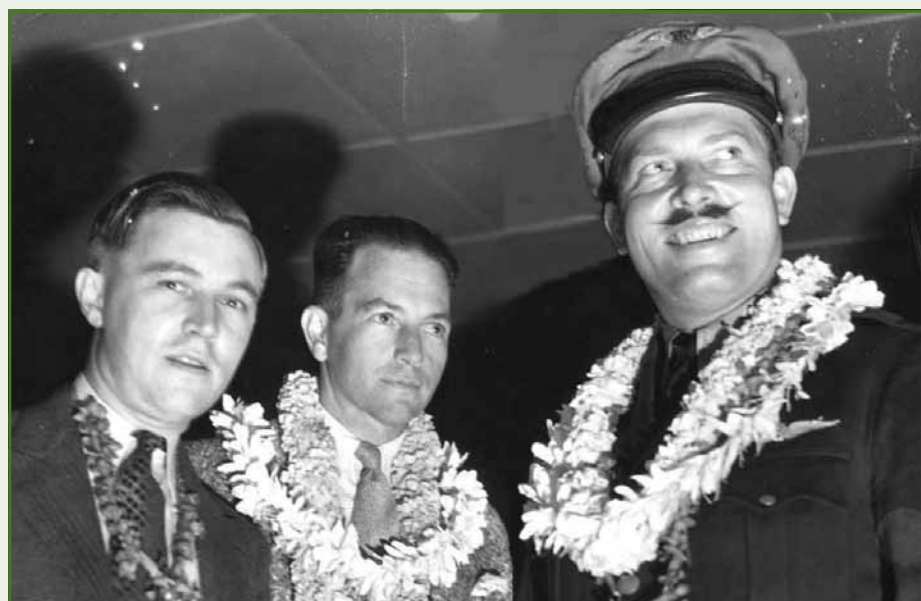
By Martin Nichols



Reeder Nichols was born in Florence, Alabama on 1 February 1904. The family into which he was born was of limited means, his father John was a fireman in the large cotton mill in East Florence. Reeder's formal education lasted until the age of fifteen, at which age he began wandering throughout the United States in search of adventure and regular employment. In 1923 he joined the US Marine Corps, as a private, and three years later made his first visit to Australia as part of the Marine contingent on board the USS Seattle. Whilst in the Marines Reeder was mentored by Commander Fred Schnell, who encouraged his interest in radio and saw to it that he developed the technical expertise he later exhibited. In 1927 Reeder was the sole survivor of a crash of a Marine Corps Foker tri-motor that crashed in Virginia en route to Nicaragua.

Following his departure from the Marine Corps in 1929, Reeder worked in a variety of positions. These included design and installation of radio transmitting equipment for Pan American Airways, supervision of communications for the South American operations of New York and Buenos Aires Airlines and a similar position with Century Airlines on the US west coast.

In early 1932, Reeder entered into a partnership with Bill Lear to establish the aeronautical radio activities of Lear developments. It was through this position that he was selected to accompany, as radio operator, Roscoe Turner and Clyde Pangborn in the



*(From left to right) Nichols, Pangborn and Turner in Hawaii on
26 November 1934 after finishing second in the
Mildenhall to Melbourne air race.*



The Boeing 247-D Warner Bros Comet prepares to fly in the 1934 MacRobertson Air Race

MacRobertson air race from London to Melbourne.

Much of the equipment was designed by Reeder and the team at Lear in six weeks, although the receiver had been developed by the US Navy and was an 'all-wave' type, covering the range from 200 to 25,000 kilocycles in a total of seven bands. Reeder had designed and built the transmitter to operate on five fixed and controlled high frequencies (short-wave) and a tuneable band to work the low frequency (long-wave) 333 and 5,000 kc/s airport and marine distress stations. The aircraft had a fixed loop aerial that necessitated intricate manoeuvring of the aircraft.

The story of the MacRobertson race is probably well known to most. If not, interested readers are encouraged to go to Carroll Glines' excellent biography of Roscoe Turner for more detail (or see the summary of the event included in this edition of *Phoenix*). However, it may be of interest to note that Reeder had been paid a flat rate per word for commentary by the North American News Agency, thus assuring a steady stream of information!

Despite nearly hitting a mountain top and the necessity of flying much of the last legs of the race on one engine, the Boeing reached Melbourne 93 hours after departure from London, in third position overall behind the custom built Comet of Scott and Campbell-Black and the Dutch DC2. Along the way the American crew were almost lost near Allahabad and had put down at Bourke in north western NSW.

I understand their arrival in this town was a great event with the 'keys of the city' being offered by the Mayor. This was, of course, Reeder's second visit to the land which would later be his home.

From May 1936 until December 1941 Reeder occupied the position of Chief,

Radio and Electrical Section of the US Civil Aviation Agency. In that time he was involved in the investigation of the Hindenburg disaster and other aircraft mishaps.

Following Pearl Harbour, Reeder was given a direct commission to the US Army Air Corps and directed to Australia as 'Technical Advisor for Airways', his third visit to Australia. During the period to September 1942 he assessed the radio needs of Northern Australia and New Guinea and finalised a Lend-Lease contract for equipment worth (in today's terms) about \$200 million.

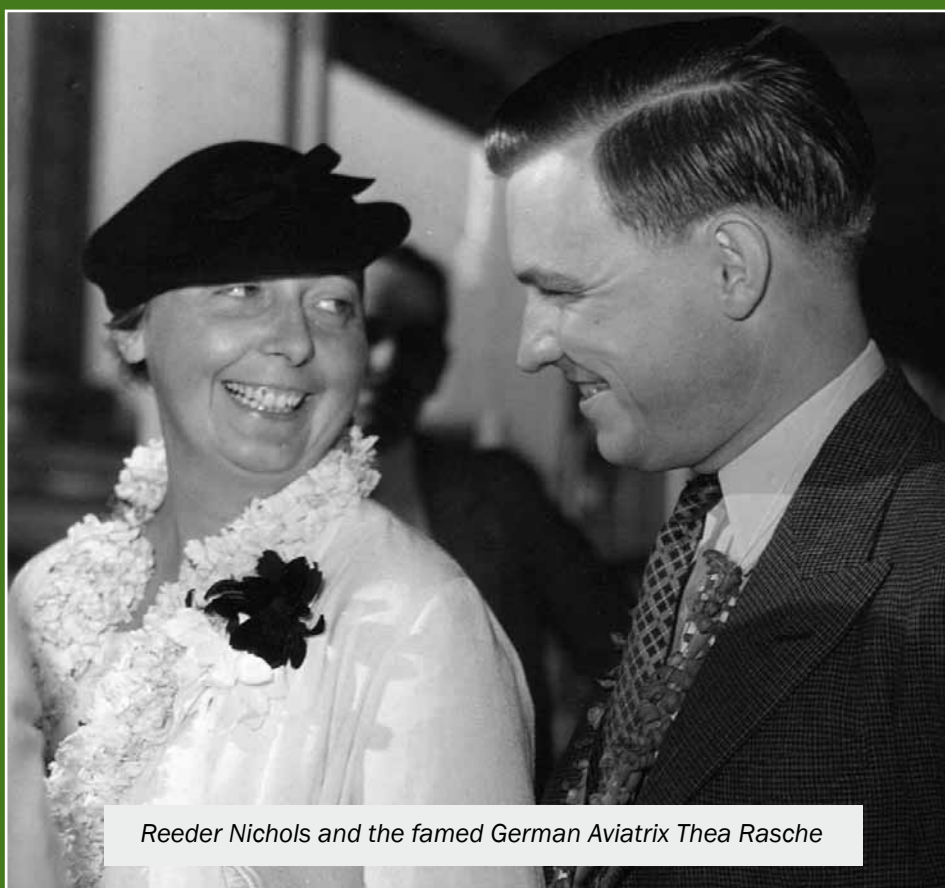
From September 1942 Reeder commanded the US Army Air Force's radio group for Australia and the South West Pacific, as part of which he was involved

in campaigns in New Guinea, the Philippines liberation and the occupation of Japan. The group ultimately comprised over 5,000 men. He oversaw the first group of US armed forces to land upon mainland Japan, 23 aircraft and personnel, which landed at Atsugi Air Base in August 1945. For his work he was decorated with the Distinguished Service Medal, Legion of Merit and Air Medal. He ended his military career as a Brigadier General, having gone 'through the ranks'.

From 1945 to 1950 Reeder travelled constantly for the International Civil Aviation Organisation but finally settled in Australia on 1 January 1950. He held positions with a number of telecommunications firms here, including the Telecommunication Company of Australia and Standard Telephones and Cables. His retirement in 1969 allowed him to develop his own consultancy firm with heavy involvement in the development of microwave communications systems.

Following his death in 1975 he was honoured by the naming of a mountain after him in Western Australia's Pilbara region, 'Mt Reeder Nichols'.

Reeder Nichols is survived by his sons Jack, Reeder and Martin.



Reeder Nichols and the famed German Aviatrix Thea Rasche

Celebrating 20 years since the recovery of Neptune 566



"Now I had two Neptunes.
All I had to do was to get this one back to Australia.
That started another great adventure..."

Some of the original crew who spent time in Tahiti working on Neptune 566.

From left to right: Gordon Glynn, Kim Slattery, Bob De La Hunty, John Wilson, Mike De La Hunty, and Bruce Ibbotson.
Other members of the group (not in the photograph) included Kevin Taylor, Matt De La Hunty, Ian Martin, Margaret Nichol, Sonya Varley, Gordon Varley, Paul Shields, Bob Livingstone, Alan James and Vanessa Viede.

Also helping the project back in Australia was Dennis Baxter (as President of HARS).

Help was also provided by the following Frenchmen in Tahiti: Paul Emery, Karl Emery, John Bossinard and Bernard Chancerelle (CO of Escadrille 12S).

A man with a plan—

(In 1996 Mark Barnett, AOPAs editor interviewed Bob De La Hunty. Here is part of that interview)

When I was 12, my father and brother and myself were fishing at Tuggerah Lakes and a Neptune flew very low over the top of us. It fired my imagination up. Every time I saw a Neptune after that I had a lust for one.

Some years later, my mate Gordon Glynn and I heard of some Neptune engines that were for sale and we thought we'd acquire them to have in the garage as a piece of aviation archaeology.

In 1987, I attended a conference in Tahiti at a time when the French were paying off their Neptunes. They were burning them in a fire dump! But there was one sitting next to the fire station which hadn't been burnt and had only just come out of a major service when they decided to take the Neptunes out of operations. It was about 99% complete. It had a flat nosewheel and a few instruments were missing. Even so, I put my hand on the side of it, had my wife take a photograph of me and 'my' Neptune and thought, 'they're not going to burn this'.

So straight away, I started negotiating with the French and Americans because the aircraft had been provided to the French by America under the military assistance program on long term lease.

In the meantime, back in Australia, I had to get checked out on the Neptunes, so I took a charter up to north Queensland and called on a guy, Peter Rundell, who owned and operated a Neptune. I discovered that Peter was concerned that the future of his Neptune wasn't

looking good, so Gordon Glynn and myself made an offer for his Neptune.

On April Fool's Day 1988 we went and acquired the Neptune (273) on the understanding that Peter taught us how to maintain it and how to fly it. We did a check out up there, got a permit and flew it initially to Tamworth and then on to Norwa.

I had by this time given up hope on the Neptune in Tahiti. However, about six months later I received a letter from the Americans and French in Paris saying that while it wasn't the normal custom to allow Lend Lease aircraft to be disposed of in other countries, they would transfer the Neptune I wanted to me.

Now I had two Neptunes. All I had to do was to get this one back to Australia. That started another great adventure.

I got my crew together and we went to Tahiti and started work on the aircraft.

Background

Lockheed Neptune P2V-7 (566) was one of 26 operated by the French armed forces from 15 April 1969 and was allocated to French Marine Escadrille 12. The aircraft was eventually based on the French Polynesian territorial island of Tahiti in the Pacific and was operated on patrol duties during the early 1980s in connection with the French nuclear test program on Muroroa Atoll. 566 was retired from French Marine service in 1984 and stored at Papeete International Airport, Tahiti.

An inspection of Neptune 566 revealed that, although some instruments were

missing, the aircraft was in sound condition and its tanks still contained 2000 lbs of fuel. The aircraft was located in an area that could easily be described as a swamp, into which it was slowly sinking.

The original intention was to acquire and dismantle the aircraft as a source of spare parts for our other Neptune (273) however, after viewing the documentation, the decision was made to restore the aircraft to flying condition in Tahiti and fly it back to Australia.

There were a number of trips to Tahiti before Neptune 566 was finally made ready for the ferry flight to Australia in July 1989.

Neptune 566 was placed on the Australian civil register as VH-LRR, and after a number of public appearances at air shows, was positioned to Tamworth for storage and care. In September 1999 the aircraft was ferried from Tamworth to Bankstown and then in January 2003 it was flown to its new home at the Illawarra Regional Airport where the overhaul work continues pending return to full flying status.

On Saturday 24 July 2009 we celebrated 20 years since 566 arrived in Australia. Many of the original crew who worked on making 566 ready for its flight to Australia were at Ablion Park for the day.

Bob De La Hunty showed video of the trials and tribulations of getting the aircraft ready for its flight and the day was capped off with 566 having an engine run and taxi down the runway.

Very soon 566 will once again be seen in the skies above Albion Park.

Neptune 566 looking good as she does a engine run at Albion Park on Saturday 24 July 2009



Aviation articles by Air Vice Marshal Jim Fleming (ret'd)

The RAAF's French Lady

During its twenty five years of RAAF service the Dassault Mirage IIIO was known as the "French Lady". This was a very apt description. She was certainly good looking with all the right curves in the right places and moved with a certain dignity and poise. But the French Lady had some of the less celebrated traits of her Gallic counterparts. Occasionally she was guilty of doing things that were not entirely predictable nor logical, sometimes she was moody, often spiteful and always expensive to maintain. But, in her more intimate moments she left no doubt as to her ability or usefulness. With all her faults she was admired by all who met her.

The Mirage III came into service in December 1963. The fleet was built to a total of 100 Single seat IIIO's and 16 dual seat IIID's. Over the next twenty four years 43 aircraft were lost and 14 pilots were killed. Despite these rather sombre figures, The French Lady remained very popular with its pilots and many achieved over 2000, and seven with over 3000, hours on type. The aircraft, in a clean configuration, had a sparkling performance despite a relatively modest thrust/weight ratio. An exhilarating acceleration and rate of climb in full afterburner and an amazing rate of roll. Very few aircraft could match it in roll rate. All this coupled with the best feeling flight controls of any of its contemporary aircraft made it a sheer delight to fly.

Several RAAF fighter aircraft types established themselves as worthy of their own special niche in RAAF history. The Mirage 1110 is one of those select few. Despite the fact that it was never

used in combat, in its long service, it was the RAAF's frontline fighter and served the RAAF very well. It was pilot's aircraft and a superb example of the aerodynamicist's art.

It must be remembered however, that the Mirage was designed as a medium to high level interceptor to counter the nuclear bomber threat in the European theatre. The Matra missile being the primary weapon backed up by a 30mm gun pack. In this configuration the aircraft performed very well. However when, for Australian conditions, it was configured with two supersonic external fuel tanks and two Sidewinder missiles plus the Matra a lack of available power was apparent. The Mirage IIIO was underpowered in the configuration required by the RAAF. This was a definite handicap if offensive air interceptions had been required.

Also, the aircraft was typical of French engineering techniques, in that, when a solution to a problem is found, they go no further on that particular problem. With the Mirage the tanks are refuelled individually using mechanical valves. The system worked well but, as the aircraft was designed as a short range interceptor, no thought was given to single point refuelling for all tanks which would have enabled in-flight refuelling. This significantly handicapped the aircraft's capability and radius of action as external drop tanks were required for all long range operations.

The initial search for a Sabre replacement came down to two contenders, the Lockheed F104 Starfighter and the Dassault IIIO Mirage. Both were designed for the pure interceptor role and both were later adapted for limited air to ground

attack work. Many consider that the F104 would have been better for the RAAF, not least of all because it was an American aircraft and the RAAF had a long history of successful cooperation with the USAF in aircraft production. The choice of a French design resulted in many shortcomings for the Mirage program and the French influence was the direct cause of the Mirage not being employed in Vietnam. The result being that two generations of RAAF fighter pilots never saw a shot fired in anger. However, in view of the the appalling F104 loss rate in Vietnam, perhaps these same fighter pilots have reason to be grateful that they had a beautiful aircraft to fly, if not to fight.

AVM Jim Flemming, Canberra 2007



RAAF Ubon, Thailand

In 1962, as a response to a threat to Thailand from across the Laotian border, four member Nations of SEATO, the USA, Britain, New Zealand and Australia sent armed air units to create a holding force in Thailand. These units were intended to withstand any initial attack until full scale reinforcements could be sent.

Australia's contribution would be No. 79 Fighter Squadron equipped with big engined CA-27 Avon Sabre jets to be based at RTAF Base Ubon . . then a small airfield near the Laotian border.

The airfield at Ubon had not much in the way of facilities, except for a runway and a control tower. Some Thai Air Force T-28s operated from there and the U.S. had set up a Lion radar unit. Our tents, ground support equipment and squadron supplies were flown in from Australia by C-130 Hercules, and we established our operating base.

The Australian version of the Sabre flew in on 1 June 1962. Four days later the Sabres were operational . . and they would remain so for the next six years.

The Squadron's primary role was the air defense of the area, but because of political restraints were unable to contribute to the shooting war in the North. To achieve this role, during daylight hours, two Sabres armed with 30mm HE ammunition and AIM-9B Sidewinder missiles would be scrambled within a two minute alert time.

As the war in Vietnam intensified, a large build up of the base was undertaken by the USAF. And eventually it became a major F-4 operating facility, and home of the 8th Tactical Fighter Wing, the 'Wolfpack'. By this time, the RAAF had a more permanent camp with accommodation and recreation facilities on one side of the runway, and a maintenance hangar and aircraft keyways on the other. The USAF called our RAAF camp and our maintenance area ' Kangaroo Valley.'

To maintain a constant state of readiness our two alert aircraft were usually scrambled at least twice per day, then guided by ground radar to intercept the Phantoms returning home from combat. These intercepts had been organised by Wing Commander Colonel Robin Olds due to his concern that many of his new pilots from the States had little or no air to air combat experience. The F4 had no gun. So air combat training had been denigrated in favour of missile tactics. With the cooperation of the RAAF commander (after the returning aircraft had been air-refueled) Colonel Olds planned and organised an effort to give his returning pilots some ' air combat experience.' Now, F-4's returning from combat missions, were bounced regularly by the Australian Sabres.

Colonel Olds' flight leaders were notified of the 'attacks' by the Sabres, but the returning element leaders, wingmen, and the back-seaters were not advised.

Because of the high performance of the larger-engined, modified Australian Sabre, and its very low profile, it was an ideal substitute for a simulated MiG attack. The RAAF pilots, who were frustrated by political direction that they could not cross the borders of Thailand, had a great time 'hassling' with the returning F4's. And many memorable ' dog fights' took place over the Laotian border.



Quite a few ' newie F4 pilots got a big fright when they thought they were being bounced by MiGs. Later, on the ground, until the situation was explained . . some very terse exchanges occurred between members of the 8th and the Australian fighter pilots.

Some of the USAF squadron commanders with Korean experience, remembering several shoot downs across the Yalu near Antung airfield, recalled the landing MiGs' vulnerability. In particular, 'Hoot' Gibson, Commander of the 433rd TFS 'Satan's Angels', was insistent that all his combat crews were to be intercepted by the Australian Sabres, at every opportunity. Although uncomfortable for the returning tired operational F4 aircrews, he said that this training was invaluable in assisting to ensure their survival around 'Down Town' Saigon.

Later, in a 'Bell Ringing' ceremony in the USAF Officers' Club, the USAF Wing Commander praised Australia's 79th pilots, stating that 'many of the aircrews in the 8th TFW who were present owed their lives to the lessons learned while hassling with the 79th RAAF pilots.' The 79th Squadron Commander and the RAAF Base Commander were then awarded Lifetime Honorary Memberships in the 8th Tactical Fighter Wing as a token of its appreciation.

This more than made up for the few black eyes and fat lips incurred earlier in the programme. And the esprit and camaraderie of the USAF and RAAF remained at the very high level—where it has always been—and WHERE IT STILL IS TO THIS DAY!

Jim Flemming, Former-Commander RAAF Ubon, Thailand

Nozzle Failure at 70,000'

In 1958, being the first TAC squadron to be re-equipped with the F104C Starfighter, the 476th TFS had to do a lot of operational testing of tactics, procedures and capabilities. These included Phase 2 nozzle tests and high altitude operations.

There had been a spate of nozzle failures in the J79 engine fitted to the F104C. It was found that the nozzles, being operated by the engine oil system, were failing to open or close due to sludge on the oil filters. The system was changed so that the nozzles were controlled by the engine fuel system and the problem was solved. The aircraft were being modified at the next major inspection so some squadron aircraft continued to operate without the oil system control being modified.

For the high altitude tests we were fitted with the early 'Moonsuit' pressure suit which was based on the same principle as the 'G Suit' but with a full body fitting. Prior to donning the pressure suit you were required to be powdered all over

with talcum powder and then don long underwear, inside out, so that the seams would not cause irritation points which could not be reached while wearing the 'Moonsuit'. Sitting for an hour in the crew room pre-breathing oxygen was a most boring experience.

I was scheduled for a high zoom flight to 65 000', and after the required pre-breathing, I carried my portable oxygen unit out to my F104C, 56-899, strapped in, converted to the aircraft oxygen system and departed for the high speed area 'Stovepipe' up over Death Valley.

My scheduled profile was to climb to 36 000' and level, run out to Mach 1.7 in full AB and a pull to 1.5G. When the Machmeter showed Mach 2 or better, I was to then increase to 3G for the zoom. At 38,000' the Machmeter was indicating Mach 2.1 with about 35 degrees nose up. The airplane was zooming like an angel and we rapidly passed 50 000' where all indications were normal.

As the airplane neared 60 000' I had to throttle back to keep the EGT within limits. The AB blew out and when the throttle was near idle I heard a slight

'thump' down the back end but all seemed normal. The Starfighter was still climbing but at a reduced angle of attack, about 20 degrees. As 65 000' was reached I stop-cocked the throttle to prevent an over speed over temp and eased the stick forward to about level attitude. The cockpit de-pressurised and I felt the suit pressure come on. It was like being in an all-over G suit and it was difficult to move my arms or legs. The outside light was poor due to the blue/black sky and I had to pull out the instrument panel shades to help the cockpit lighting.

I thought that the aircraft would start to descend but, to my amazement, we kept climbing in a level flight attitude. As we reached 70 000', I eased the stick forward to get a more nose down attitude. The airspeed was about 155 knots and the attitude changed but the Starfighter kept slowly climbing until it peaked at 72 300' when it started to pitch down and descend with wings level. As the speed increased I popped the speed brakes, slowly increased the dive angle, and commenced a glorious high speed dive down to lower levels.



At 40 000' I tried a relight without success. At 35 000' I tried another relight procedure with the same result. At 33 000' I managed to get a relight and was delighted to see that the RPM and EGT started to rise. With everything appearing normal I turned towards George, passing over the base at 30 000' prior to entering the pattern. At this stage I knew something was wrong, as an increased throttle movement produced the desired RPM but no apparent increase in thrust.

Fortunately, I was aware of the nozzle failure problem where the nozzles remain open and you have a perfectly good engine but no thrust. This was my situation then. The book indicated that level flight could be maintained at 2 000' above sea level in this configuration. With the altitude at George at 1 800' I was not about to test this theory. At 25 000' and descending I declared an emergency and requested a straight-in approach to Muroc Lake which was almost right in front of me. I turned so that the approach would be to the North East and at 15 000' commenced a high key-low key dead stick approach, which I had practised many times, on to the world's longest runway marked out on the lake bed.

On final approach the engine was developing a little thrust but I continued the dead stick approach, dropping the gear at 250 knots and touching down well into the lake bed at about 185 knots. When I came to a stop, Edwards Tower told me to vacate the airplane and await pick-up. I shut down the engine and when I descended, by hanging over the side of the airplane, I saw that the nozzles were stuck wide open. On looking around I could have been on the Moon; nothing but desert to all horizons. After about fifteen minutes, I was pleased to see a chopper coming over the horizon from the West. The rescue crew took me back to civilization and I had a pleasant time in the Officers Club before being returned to George by car that evening.

After the maintenance crew at the Test Pilot's School had completed the engine oil/fuel nozzle control modification 56-899 flew on for some years before being destroyed in an accident in Spain in the early sixties.

Jim Flemming, Canberra

Tour of HARS by Air Canada pilots

Good morning John [Martin],

I am writing to let you know how much my crew enjoyed the tour of your HARS facility. I think you have done and are doing an amazing job. Your large hangar complex is indeed impressive and allows you the ability to house and maintain much larger aircraft than we can at the Canadian Museum of Flight, Langley B.C. If you are unfamiliar with our Museum you could google it, as we have an excellent web site.

Since I've been back in North America, I have mentioned our tour to a number of other Air Canada pilots who have expressed interest in the tour. Hopefully Rod Hitchenson of Sydney Golf tours will bring a few more of our boys by, now that he knows where you are. Most of the Air Canada pilots who flew Neptunes and Trackers (off of the Bonaventure and the Magnificent) are retired now, but interest levels are still high among a great many of our young pilots. I am sure they would consider an afternoon at HARS well spent.

I also wanted to thank you for the magazines which were brought out to the van as we left. I have not had time to read them all, but will pass them around to the fellows at our Museum. I know they will be most impressed with your facilities and what you have done with the Super Connie. It helps to know what others are doing and accomplishing with respect to aircraft restoration.

Thanks again John for a great tour. I'll continue to spread the word about what your members are doing.

I've included a couple of pictures of my small restoration projects. Hope you enjoy them.

All the best,
Captain Garth Vickery
Air Canada Boeing-777



Drover Day celebrations

By Allan Black



Imagine being called to the boss's office and being told you are going to design an aeroplane. You're going to build it, test it and then the company you work for is going to sell it to airlines. That doesn't happen very often, and in Australia ... almost never.

But it did happen, it did get built, flown and sold, and in Sydney.

It happened in 1946 just after the second World War and I remember my father nailing up a horseshoe on the back veranda in Wollongong. He painted on it in red... 'Good luck 1946' Good luck indeed, the three men in this story must have thought something like that, but they were young, just out of university, just starting out on their careers and the world was their oyster. The three men among others, are Bob Walker, Louis (call me Lou) Gardiner and Bill Downes and they worked for the famous de Havilland (DH) aircraft company at Bankstown. By the way there are no oysters in the Milperra River which runs nearby.

Bankstown wasn't like it is today. In 1946 DH had almost completed building their contracted aircraft for the war effort. They built the Mosquito, Dragon, Tiger

Moth and gliders and the momentum was being carried over to peacetime. When you work in a positive atmosphere like that it's hard to slow down and ease up and the company wanted to stay in business.

The managing director, Major Allan Murray Jones at DH in Sydney, obviously wanted to keep going and keep his team together. So he came up with the idea of building a successor to the DH Dragon, but better suited to Australian conditions, one of which was the rough unpaved landing strips in the outback of the country.

In the tech office run by chief engineer Martin Warner at DH in 1946, can you imagine the atmosphere? I can't find the exact date except that it was early 1946 so you can expect it was hot. There was no air conditioning, it was probably a Monday morning just after tea. Of course the announcement surprised the group, who made a few notes and asked when did the MD want to see some progress?

Outside in the plant it might have been different. A few exclamations of 'Oh boy' 'Whooa' and others wouldn't have been out of place.

And so it was on 15 August 2009 at HARS—63 years later.

No official anniversary for the date, except the realisation I should have done this previously. HARS has one of the only two Drovers still flying out of 20 built at Bankstown. The chronological history of the Drover is for other stories, but here it's the old story, the more I delve into this, the more I'm finding. Locating Bill, led me to Bob, led me to Lou then to Bill Hill and I'm happy to say we're now friends.

So, Drover Day. I first proposed the idea 12 months ago and they were decidedly less than enthusiastic. I told my wife and she says, "Yeah but they haven't met you yet—or Bob, or Maureen, or Sandy and the others at HARS."

So here's a history of our three guests of honour.



Bob Walker

(accompanied by his wife Marian)

Early in 1946 Bob joined de Havilland at Bankstown after graduating in Aeronautical Engineering at Sydney University.

In early 1947 he joined the design team for the Drover at Bankstown as Structural Test Engineer. Testing was conducted at Bankstown, the University of Sydney and the NSW Railways workshops at Everleigh in Sydney.

In January 1948 he flew in the prototype as flight test observer when all flight controls and attitudes were tested.

Lou Gardiner

(accompanied by his wife Gwen)

From 1939 to 1942 Lou studied Aeronautical Engineering at Sydney University. In January 1943 he joined the de Havilland Mosquito Support Group at Bankstown and flew on the first production models built there. In mid 1946 he started work on a two engined aircraft to replace the de Havilland Dragon. During 1947-1948 Lou was responsible for the complete wing design of the Drover and flew on the first test flights. He also supervised the later

introduction of the Lycoming engines and their test flights.

Lou assisted with the introduction of the Drover into regular service with Qantas, TAA, the RFDS and Fiji Airways.

Bill Downes

(accompanied by his daughter Lawrie)

In 1941 Bill joined de Havilland in Sydney and graduated with honours in Aeronautical Engineering at the University of Sydney in 1942.

From 1946 Bill was appointed Drover Design and Development Engineer then Chief Project Engineer. In 1971 he became Hawker de Havilland Australia's Chief Engineer, then Staff General Manager. He retired in late 1986.

As some of our guests don't drive, Bob and Marian Walker travelled with me to Albion Park. On the way down, Bob asks if they can listen to ABC-FM to a program about their favourite composer Ravel. So we motored (his word) along the top of Mt Ousley with the top open, Ravel playing on the wireless, wonderful weather—you could see for miles—and I thought it can't get any better than this.

But it did!

The day went like clockwork, exactly to time with the tour and welcome speeches. The icing on the cake was Sandy Howard's proposal for the two flights which were gladly accepted by most of our guests.

Bob and Marian Walker talked about it all the way home to Chatswood.

On Sunday morning I had calls from the families thanking us all and Bill Downes saying he thinks the HARS administration must be amazing.

Thanks to all who contributed to a great day; the welcoming committee, Bob De La Hunty, John Brooker, Maureen Massey and Michael Hough. Also thank you to Marj Meares, Julie Hourigan, Fran Abrahams and Tony Duggan for the morning tea and lunch. Sandy for the two flights, John Martin for press coverage, Jim Hayes for setting up the dais and PA and Mike Hourigan who took these pictures.

You rarely get a chance to do something like Drover Day, I'm very proud to have done so.

Dick Smith visits Albion Park



Well known Australian aviation adventurer and businessman, Dick Smith, visited HARS on Saturday 1 August 2009.

Dick arrived in his helicopter and spent time inspecting and reviewing the ongoing work on our Catalina flying boat. Dick is a long-serving sponsor and supporter of HARS, who's keen interest in the Catalina restoration project continues to spur internal work and progress.

We thank Dick for his ongoing support.

CATALINA PROJECT



**This project was instigated and
is proudly sponsored by
Mr Dick Smith**

Other major sponsors are:

Mr Neville Kennard

Sir Michael Kadoorie

Mr Kevin Weldon

Lady Marigold Southey

Members of the Sea Plane Pilot
Association

many HARS members
and supportive citizens

The object of this project is to provide a
living memory to the men who flew,
operated and maintained the Catalina
aircraft during World War II, many giving
their lives in rescue missions and in
service to their country.



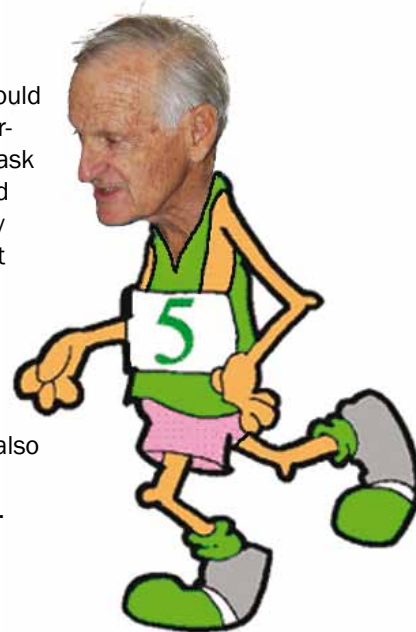
City to Surf

Most regular HARS members at Albion Park would recognise him in his overalls working on our aircraft or in his Connie uniform performing the task of Flight Engineer. But who would have realised that this man is also the fit fellow who, not only competed in the City to Surf event recently, but successfully beat his time from last year!

Our Edge Adams completed this year's event in 2hrs 4 mins and 10 secs—beating last year's time of 2 hrs 28mins.

After the event Edge and his wife Evelyn, who also competed, adjourned to their 26th floor luxury hotel room in the centre of Sydney for a sauna. The day was capped off with a fine dinner that evening.

Well done Edge and Evelyn!



Congratulations HARS



Well done John and Sharyn Martin for making this submission to the South Coast Tourism Awards.

**HARS picked up bronze for our tourism event
'Wings over the Illawarra'.**

The finalists were:

1st The Bluejuice (Catholic Diocese of Wollongong)—
The Pope's World Youth Festival event

2nd South Coast Camping and Caravaning expo

3rd 'Wings over the Illawarra'.

Dates to remember

**Tuesday 22 September to
Friday 25 September 2009**

Neptune 273, Catalina and Dak 94 to depart for RAAF Edinburgh to help celebrate the 70th Anniversary of 10 and 11 Squadrons.

Our aircraft will take part in a flypast with an AP3C Orion (11 Squadron) on Thursday 24 September over Adelaide and RAAF Edinburgh.

Our members will be invited to attend festivities on Thursday evening.

The Catalina crew will also represent HARS at a formal 'black tie' dinner on Friday evening.

Friday 25 September

Neptune 273 and Dak 94 will depart RAAF Edinburgh and fly to RAAF Townsville to take part in the RAAF Airshow.

**Monday 5 October to
Friday 9 October 2009**

Safari trip on Dak 94 to Arkaroola.

Saturday 5 December 2009

HARS Annual General meeting starting at 2.30pm. All members are asked to attend.

Date and time to be advised

HARS 30th Birthday celebrations

HARS, Fashion and Film

By Sharyn Martin



The magazine crew, including our very own Sharyn Martin

HARS is becoming quite well known in some unexpected areas outside the world of aviation in general and historical aircraft restoration and preservation in particular. For instance, not many people would associate HARS with ladies fashions however, HARS recently played host to *InStyle* magazine who were shooting a fashion spread with an aeronautical theme. The photographic shoot took place on Friday 19 June and appears in the September issue of *InStyle* magazine released in late August.

The fashion shoot featured actress Brooke Satchwell, a delightfully friendly, down-to-earth young woman who appears totally unaffected by her fame. Brooke greeted everyone with a beaming smile and a hearty handshake. During the day, Brooke was photographed by *InStyle* in a variety of outfits selected from a wide range of labels and a vast variety of price brackets, all set against the backgrounds of several of the HARS aircraft.

A series of photos of Brooke departing from the bright yellow Tiger Moth, effectively reflected in a pool of water on the tarmac, and with the natural beauty of the escarpment forming the perfect backdrop, provided some spectacular shots. These photos contrasted sharply with other portraits of Brooke seated on the side of the air-stairs at the entrance

to the hangar with the aircraft fleet and its fleet of workers in the shadowy background.

The magazine crew took advantage of the engine run of one of the DC3s to get some spectacular shots of Brooke walking away from the aircraft with the smoke from the Dak's engines billowing out behind her. Once returned to the hangar, the Dakota provided a further dramatic setting with Brooke seated in its doorway doing a very graceful and expensively clad impression of Amelia Earhart.

Their final shots were of a carefree Brooke, in casual garb, circling in front of the camera crew on an old bicycle. Brooke's cheeky grin was infectious as she skilfully handled the bicycle while posing for the camera.

The entire *InStyle* crew were all quite excited about the results of their day's work and expressed how greatly they were impressed by the HARS facility and by the number of aircraft in the HARS fleet. They were also most impressed by, and very grateful for, the courtesy and assistance rendered to them by all the volunteers with whom they came in contact throughout the day.

When the world of fashion met the world of historical aircraft it was profoundly evident that, although the nature of

the two organisations are poles apart, their dedication to their chosen fields of interest and their attention to detail is very much on a par. It was also quite striking to see all the camera crew's state-of-the-art camera and computer equipment at work among the stately, historical, grand old ladies of the air— old and new technology working in harmony together.

Three weeks after the *InStyle* fashion shoot, Connie was featured in a short film entitled *Almost* which was made by the Australian, Film, Television and Radio School (AFTRS). Filming took place in and around Connie on Friday 10 July. As Connie was undergoing maintenance work at the time she could not be moved out onto the tarmac to facilitate filming, therefore the film crew set up large reflectors which were used both inside and outside the hangar to deflect the natural daylight into the cabin windows, thus giving the illusion of an airside setting.

Among the crew on this occasion were Sonia Todd of *McLeod's Daughters* fame and up-and-coming young actresses Maeve Dermody and Kari Yarratt (I hope I have those names correct) all of whom were very friendly and co-operative in complying with HARS on site rules and regulations, as were the entire film crew.

As with the earlier fashion shoot, AFTRS equipment was all very high tech. In fact, the 'steady cam' used to film the on board scenes, is one of only two such movie cameras in use in Australia at the present time. Perhaps their method of elevating the camera for shooting the boarding scene at the top of the air-stairs was a little more mundane though, as for that purpose they enlisted the aid of the HARS scissor lift complete with HARS overall-clad driver!

The setup of equipment—cameras, reflectors, filming platforms, etc.—took about two hours. The actual filming required about one hour. There were a further couple of hours involved in dismantling all the gear and reloading it into the crew's vehicles. All in all, about five hours work for approximately three to four minutes of film time. No wonder it costs so much to make full length feature films!

As they had been with the magazine people, the HARS volunteers were all very accommodating and did all they could to facilitate the film crew's work—sometimes at the expense of having to delay their own work for a short while. None-the-less, it was a very worthwhile exercise as apart from the extra income generated for HARS by these events it also provides HARS with invaluable advertising via site and screen credits, word of mouth, and the showcasing of HARS and/or the aircraft on screen and in print.

During both the fashion shoot and the film work the crews happily complied with HARS requirements to be escorted by a HARS member throughout the duration of their visit and also complied with security requirements to have a member holding an ASIC pass accompany them at all times whenever they had need to venture a short distance onto the tarmac.

Given the positive feedback received with regard to the genuine pleasure derived from their use of the HARS site, and the satisfaction of the results achieved by both the AFTRS and *InStyle* magazine crews and stars, it is to be hoped that favourable reports will spread among their compatriots and that HARS will thereby gain future bookings to further elevate the prestige of the facility and to also give the coffers an added boost!



Selected pages from the latest edition of *InStyle* Australia which is now available in stores.

TRIPLE TAIL TREAT

Brian van Der Water

Without a doubt, the triple tail is the feature which most distinguishes Connie from any other aircraft. It is responsible for its instant recognition, even to many not in the aviation fraternity, and I believe that Connie's elegant appearance, which has not been matched by any airliner before and since, is the result of the low profile of the tail combined with the curved upper fuselage shape. It is certain that Connie would not have the same visual appeal if it had employed a high profile single fin*.

But why does Connie have triple fins when, to my knowledge, no other production airliner in aviation history utilised this feature? All other aircraft managed to operate with, at most, twin fins. The original design of the Douglas DC4 in 1938 did have triple fins, but these were replaced by a single fin when the DC4 went into production in 1942. Boeing's huge 314 flying boat of the late 1930s did have triple fins, but the centre fin was an afterthought, added when stability problems were encountered. Lockheed, on the other hand, incorporated triple fins on the Constellation at an early stage of the design.

The answer to this question undoubtedly centres on the influence of one individual who was inextricably part of the success of Lockheed for over 40 years. To understand his role in Connie's design, we must first go back to the early 1930s when Lockheed, Boeing and Douglas were tiny companies by comparison with the giants they later became in WW2.

Boeing launched the era of the "modern" airliner in 1933 with their twin engine 247 which was the first all aluminium, semi-monocoque** airliner with retractable landing gear. But the 247 was rapidly surpassed by the larger and more productive Douglas DC2 which entered service with TWA in January 1934.

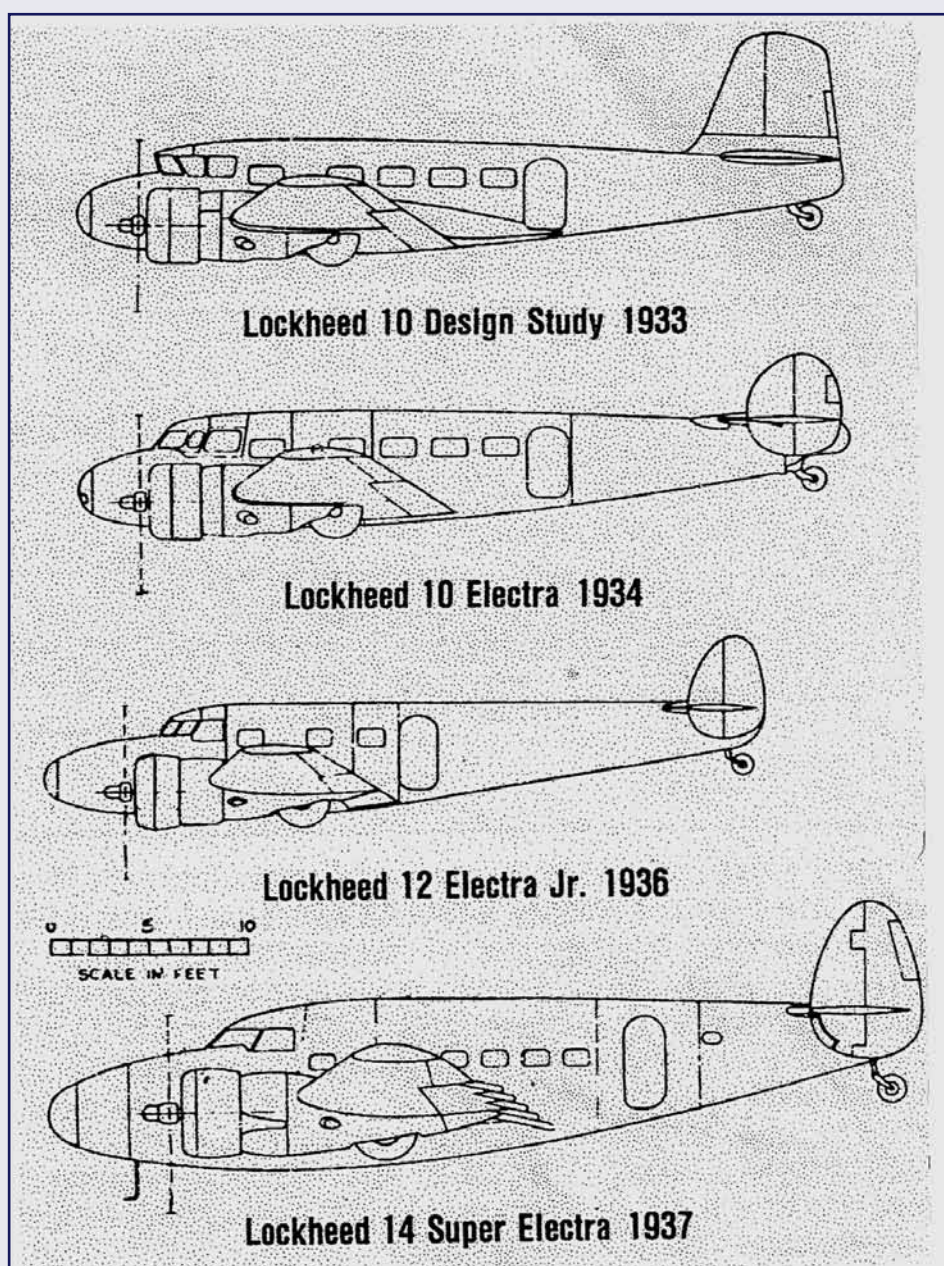
Lockheed at this time was producing a range of elegant and successful single engine aircraft, of which the Altair is the best known in Australia as the aircraft flown by Charles Kingsford Smith when lost in 1937. Lockheed was at risk of being left behind in the rapidly expanding market for twin engine airliners. Realising that they could not produce an aircraft

in time to compete directly with the DC2, Lockheed identified a niche market for a smaller "feeder" airliner and launched the design of their model 10. This decision started an evolutionary design sequence which culminated in the Super Constellation twenty years later.

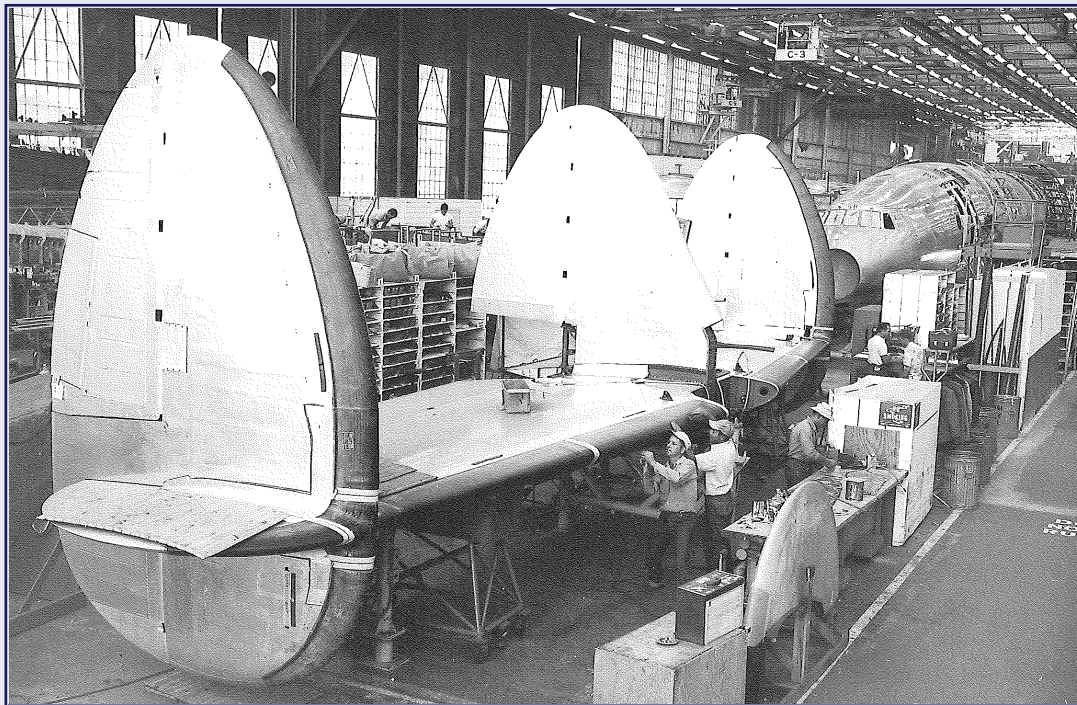
The initial design of the Lockheed 10 had a single fin as shown in the accompanying diagram. Before finalising the design, Lockheed sent a model of the aircraft to the University of Michigan for testing in their wind tunnel. The tests were carried out by a young engineer named Clarence ("Kelly") Johnson who recommended that Lockheed replace the single fin with twin fins to prevent

a potential stability problem. Lockheed adopted the recommendation and were so impressed with Johnson that they offered him a job. This started a career in which Johnson rose rapidly through the ranks to become VP Engineering and, later, founder of the legendary "Skunk Works" which designed such revolutionary aircraft as the U2 and SR71 Blackbird.

So the 10 was manufactured with twin fins, each shaped as an oval of almost round proportions (see diagram). The 10 was a commercial success and Lockheed followed up with the 12, which was a 10 with a smaller fuselage to cater for specialised markets. The 12 adopted a



These diagrams show the evolution of the fin and rudder shape on Lockheed airliners from the original model 10 up to the model 14. The model 14 shape was adopted for the Constellation and was in turn adopted but slightly modified on the Super Constellation.



The Super Constellation tail in the factory. Note the small straight part of the leading edge of the nearest fin/rudder just above the horizontal stabiliser. This shows where a parallel section has been added to increase the area of the fin and rudder (see text).

more egg shape fin profile which leans back slightly. The 12 is of particular interest to HARS because the Nowra RAN museum owns a Lockheed 12 which, at time of writing, was probably coming under the care of HARS.

The 12 was followed by the larger model 14 which was a commercial success in many countries, including Australia. The 14 was transformed into the Hudson bomber built in large numbers during WW2. You will see from the diagram that the fin profile on the 14 settled on the final symmetrical egg shape—which was in turn adopted for the Constellation.

Fins on multi-engine aircraft are sized to keep the aircraft straight when an engine fails. If engine power is increased, a larger fin will be required. Twin or triple fins have the advantage that the outboard fins are in the propeller slipstream and are more effective for the same, however they have disadvantages, including increased horizontal stabiliser weight and potential vibration problems. Although popular in the 1930s, twin fins were not employed on any major commercial aircraft designed after the 1930s.

Boeing and Douglas never employed twin fins (except on the Boeing 314), and the prominent twin fins on the Consolidated B24 were replaced by a single (huge) fin on the later Privateer versions. Lockheed started the design of the Constellation

in 1938 and I believe that a single fin could have been employed (note that the 1940s Lockheed Neptune has a single fin). However, in 1938, Lockheed had accumulated four years experience with twin fins and it would be logical to continue with a tried and proven design. Alternatively, some reports claim that a single fin was not employed because TWA insisted on multiple fins to allow entry to some of their smaller hangars (or was the real reason that Johnson was too embarrassed to abandon a concept he had convinced Lockheed to employ in the first place?).

The original 049 Constellation was the first aircraft designed with the, then, very powerful 2200 hp Wright R3350 engines, and it is certain that twin fins of a disproportionate, large area would have been needed to cope with two engine failures on one side. This would have involved structural problems and undesirable aesthetics. The triple fins were a neat solution by adding a centre fin, thereby providing the total fin area required while keeping the outboard fins to a reasonable size.

The same fin size was standard on all Constellation models from the 049 to the 749 as they all had essentially the same engine power. However, the Super Constellation introduced the much more powerful 3400 hp R3350 turbo-compound engine, so increased fin

area was necessary. This was achieved, without substantially altering the shape of the fin, by inserting a parallel section just above the horizontal stabiliser. This gives Connie's fins a more elongated appearance by comparison with the earlier Constellations.

So the origin of Connie's triple fins can be traced back to a decision by Lockheed to compete with Boeing and Douglas in a growing airliner market in 1934. Ironically, in 1970, Lockheed was again in a similar competitive position with Boeing and Douglas, but this time responded with a design which became a financial disaster. Boeing was producing the 747, and Douglas the DC10. Lockheed's product was the 1011 Tristar powered by the Rolls Royce RB211 which bankrupted both Lockheed and Rolls Royce. Lockheed was saved by an emergency loan from the US government (shades of GM!) and Rolls Royce was nationalised.

* The correct term is "vertical stabiliser" which comprises a fixed fin with a moveable rudder—but "fin" is used here for brevity.

** In semi-monocoque construction, most of the loads are carried by the skin.

Diggers and Dealers –2009

Continued from page 9

On the other side of the airstrip, in a depression, was the wreckage of a small aircraft. It seems that the pilot had swung the propeller, the engine started and the plane took off across the runway at high speed and into the ditch. The engine finished up under the upside down port wing with bits everywhere.

We headed off on Friday for Broken Hill around North Lake Eyre. This was somewhat of a disappointment as the lake is drying out very quickly. On arrival at Broken Hill we refuelled and then received the news from Don that the weather enroute to Sydney was shocking and we were to stay overnight. After a very good overnight stay we departed for Albion Park on Saturday.

A most excellent trip with EAF behaving itself!



Glen Owens and Michael Hough receiving the Heritage Branch Heritage Award

HARS receives the Heritage Branch Heritage Award

The Historical Aircraft Restoration Society in Albion Park recently received an award at the Sustainable Cities Awards Dinner hosted by the Deputy Premier, The Honorable Carmel Tebbutt MP, Minister for Climate Change and the Environment.

The Sustainable Cities program recognises outstanding environmental initiatives implemented by local government authorities, schools and community groups and businesses while raising public awareness of a range of environmental issues affecting metropolitan NSW.

The Historical Aircraft Restoration Society received a Highly Commended Award in the Heritage Branch Heritage Award for its strong record in rescuing aviation history for display to the Australian public, particularly aircraft which have been influential in the development of aviation and air transport in Australia.