

AirMaintenance

UPDATE

The Magazine for Aircraft Maintenance Professionals

Transport Canada Approved for R/T



October - November 2014

Volume 13/Issue 3



**Troubleshooting:
“tribal knowledge”
and Ops & Maint manuals**

**Electricity
and magnetism
explained**

**Big changes
in the Regulations**

Publication Mail Agreement No. 0041039024
and Return Undeliverable Canadian Addresses to
Alpha Publishing Group (2004) Inc.
Unit 7, 11771 Horseshoe Way, Richmond, BC, V7A 4V4
email: amumagazine@outlook.com

\$7.95

RAPCO,inc.



REPLACEMENT AIRCRAFT PARTS CO.

Rapco, Inc. can help you reduce maintenance costs...this is good for you and your customer. With the impact fuel prices have had on general aviation flying, and the resulting impact on maintenance facilities, everyone needs to find a way to decrease their operating costs, without sacrificing quality or safety. Rapco can help.

All Rapco parts are FAA-Approved, warranted better than the OEM, to save you and your customers money. Call now to see how we can help you - 1-800-527-2726



Visit: <http://www.rapcoinc.com/acappguides.html>
for individual specific application guides for most popular aircraft

Request an e-card
at www.rapcoinc.com



1-800-527-2726

RAPCO,inc.
REPLACEMENT AIRCRAFT PARTS CO.
www.rapcoinc.com

NO PLANE NO GAIN

visit www.noplanenogain.org

Coalition sends petition to FAA

When you're dealing with serious matters such as aircraft maintenance, it's best to keep it simple and to follow OEM procedures as they're laid out in the OEMs' Operations and Maintenance manuals. So goes the advice veteran AMU writer Mike Broderick offers this issue in his story, "Troubleshooting and other fun things I did this summer." Through long experience Mike has learned that any deviation from prescribed procedures can have disastrous consequences, even if the skipped step seems relatively minor. The message being, small things can loom very large indeed.

That was also the message sent to the Federal Aviation Administration by a coalition of aviation trade associations in the U.S. who have asked the FAA to fix a seven-letter mistake in the Code of Federal Regulations (CFR) that would create "serious" headaches for the aviation maintenance industry. The group, which includes the Aeronautical Repair Station Association (ARSA), the Aerospace Industries Association, the Aircraft Electronics Association, Airlines for America, the Cargo Airline Association, the General Aviation Manufacturers Association and the National Air Carrier Association, petitioned the FAA to correct the new repair station rule issued on Aug. 12. The amendment to 14 CFR part 145 was slated to become effective Nov. 10, but includes the improper removal of the word "serious" from a paragraph requiring repair stations to report a failure, malfunction or defect of an article to the agency within 96 hours.

By removing the word "serious," aviation repair stations are effectively required to report everything that comes through the door — an expectation that is unrealistic and inefficient, says the coalition, because it would impose incalculable cost on both the agency and industry. It was not considered in the notice of proposed rulemaking (NPRM) to which industry members submitted comments in 2012. In the petition, the coalition urges the FAA to honour its previous rule-making activity by replacing "serious."

One small word, so many potential headaches; there's a lesson in there.

(With files sent by the Aeronautical Repair Station Association.)

— John Campbell
Editor

Departments

- 4 **Upcoming Events**
- 6 **STCs & New Products**
- 8 **Industry Forum**
- 24 **AME Association and PAMA News**
- 39 **Classified**
- 42 **AMU Chronicles**
By Sam Longo

Features

- Troubleshooting and other fun things I did this summer** 10
By Mike Broderick
- Electricity and Magnetism Explained** 18
By Gordon Walker
- Big Changes in the Regulations** 28
By Norm Chalmers
- NBAA 2014: Selected Highlights** 33
- Raising the Bar: Out of Climbing Power Beech B36TC, N36ML** 34



AMU is viewable online: subscribe and download at www.amumagazine.com

AirMaintenance Update

Unit 7, 11771 Horseshoe Way
Richmond BC V7A 4V4 Canada
phone: (604) 214-9824 • fax: (604) 214-9825

email: amumag2015@gmail.com

Published by Alpha Publishing Group (2004) Inc.

Publication Mail Agreement Number 0041039024 and Return Undeliverable Canadian Addresses to: Alpha Publishing Group (2004) Inc. Unit 7, 11771 Horseshoe Way Richmond BC V7A 4V4 Canada

website: www.amumagazine.com

editor: John Campbell
art director: Gregory Kero
publisher: Bill Carter
sales manager: Bill Carter
Advertising inquiries: (604) 214-9824

Subscription Rates: 1 Year: \$40 2 Years: \$60
AirMaintenance Update is published 6X annually. AirMaintenance Update may not be reproduced in whole or in part in any form without the express written permission of Alpha Publishing Group (2004) Inc. Copyright 2014 Printed in Canada

production manager: Chrissie Harvey
circulation: Anne Gervin

contributors: Mike Broderick, Norm Chalmers, Sam Longo, Stuart McAulay, Brian McNair, Gordon Walker, Sue Yost

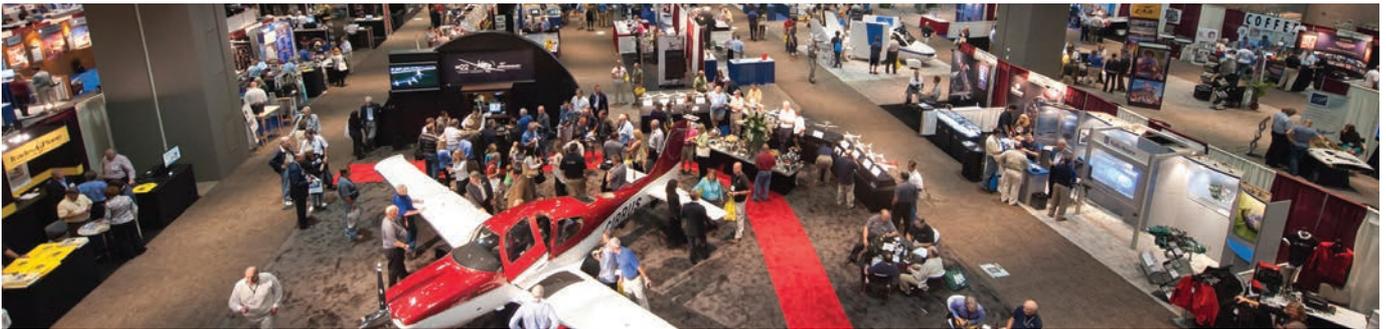


This publication neither endorses nor confirms the information contained within. The appropriate authorities should be contacted prior to commencing work on any aircraft or aircraft part or procedure.

Publications Mail Registration No. 0007198278

ISSN 1703-2318

Upcoming Events



**Helicopter Association of Canada
Conference**
November 7 – 9, 2014
Montreal, QC
www.h-a-c.ca

NBAA Annual Convention
October 21 – 23, 2014
Orlando, FL
www.nbaa.org

**ATW Airline Industry Achievement
Awards**
February 25, 2015
Washington, DC,
www.atwonline.com

**Air Transport Association of Canada
AGM & Tradeshow**
November 17 – 19, 2014
Vancouver, BC
www.atac.ca

Safety in Aviation North America
October 30 – 31, 2014
Washington, DC
www.flightglobalevents.com

Aviation Week Laureate Awards
March 5, 2015
Washington, DC
www.laureates.aviationweek.com

Canadian Aerospace Summit
November 18 – 19, 2014
Ottawa, ON
www.aerospacesummit.ca

Flying Aviation Expo
October 31 – November 2, 2014
Palm Springs, CA
www.aviation-xpo.com

**Maintenance, Repair, and Operations
Americas**
April 14-16, 2015
Miami, FL
www.mroamericas.aviationweek.com

MRO Latin America
January 13-14, 2015
Buenos Aires
Argentina
www.mrolatinamerica.aviationweek.com

International Council of Air Shows
December 8 – 11, 2014
Las Vegas, NV
www.airshows.aero

International Airspace Supply Fair
October 28 – 30, 2014
Frankfurt, Germany
www.airtec.aero

Advertisers Index

APS Brakes / Aero Incorporated	14	Eagle Fuel Cells Inc	11	Propworks Propeller Systems	31
Aeroneuf Instruments Ltd	30	Gregorash Aviation	43	Rapco Inc	2
Alpine Aerotech	5	Hartwig Aircraft Fuel Cell Repair	31	Schweiss Bi-fold Doors	35
BKD Aerospace	23	MARSS	19	StarterGenerator.com	17
Canadian Aero Accessories Ltd	7	NAASCO	13	Superior Oil Coolers	22
Canadian Propeller Ltd	15	NBAA	27	U.S. Air Tool Company	16
Casp Aerospace Inc	21	Perimeter Aviation	22	Western Propeller Company Ltd	29
Concorde Battery	20	ProAero Engines Inc.	17	WestStar Aviation	44
		Progressive Air	12		



ALPINE AEROTECH LP

BELL PLATINUM SERVICE FACILITY



ALPINE AEROTECH THE LEADING EDGE

At Alpine Aerotech LP we pride ourselves on our industry leading service expertise, product knowledge, only the highest standards of craftsmanship, and long standing tradition of excellence.

Aircraft Leasing
Major Inspections and Overhauls
Approved Structural Repair Capability
& Fixtures
Composite Repairs
PT6T Exchange/MRO via Euravia Engineering

Radio & Avionics Repairs and Installations
Component Overhaul Services
Complete Strip & Paint Services
Import and Export of Aircraft
Manufacturing



Catalogue
available online
alpineaerotech.com



PRODUCTS



SERVICES



INNOVATION & ENGINEERING

1260 Industrial Road, Kelowna, B.C., Canada V1Z 1G5
Phone: (250) 769-6344 Fax: (250) 769-6303 Email: admin@alpineaerotech.com

Abbotsford (MRO): 1640 Threshold Drive, Abbotsford
Abbotsford International Airport, Abbotsford, B.C., Canada V2T 6H5
Phone: (604) 855-1148 Fax: (604) 855-1507 Email: salesabb@alpineaerotech.com

www.alpineaerotech.com



STCs & new products

Schweiss has backup plan for big bifolds

Schweiss Doors has standard and optional backup systems that allow their hydraulic or bifold doors to be opened in the event of a power outage. Hydraulic tractor fittings come standard on all Schweiss hydraulic doors, which can also be opened or closed with a DC battery-motorized backup control station. The new compact hydraulic unit is also designed with a drill-driven backup using a 7/16 hex head. All Schweiss bifold doors can be manually operated using an emergency backup hand crank, powered generator, battery powered drill, tractor-powered hydraulic coupler fittings or 12-volt DC emergency backup.



For more information visit www.bifold.com

Heated batteries for cold weather operators

Concorde has developed heated batteries for operators in cold climates who must remove batteries and store them in heated environments, then reinstall them. Concorde's heated batteries incorporate internal AC (115 V nominal) and DC (28 V nominal) heater blankets that surround cells to equalize heating. A heater control unit offered in four different TSO authorized varieties controls these blankets. HCU-1 is a DC only unit and uses DC power supply to operate the heaters. HCU-2 is an AC only unit that heats the battery using AC power. HCU-3 and HCU-4 are dual power units that allow for either AC or DC power supply.



For more information visit www.ConcordeBattery.com

Big whack of test instruments in one box

Saelig Company's new ABI BoardMaster 8000 PLUS printed circuit board test system is a comprehensive set of test instruments, complete with built-in PC, for testing and fault-finding on most PCBs. Incorporating a range of test instruments in one compact box, the BoardMaster's hardware is installed in a transportable case that also contains the Windows PC. The software guides users through test procedures, with custom-annotated picture images, instructions, and attached datasheets to give quick Pass/Fail results. A typical configuration offers two board fault locator modules, with 128 test channels for multiple test methods. For more information visit www.saelig.com



New backpack is purpose-built tool hauler

Ergodyne's new Arsenal 5843 tool backpack features a two-compartment design, and is third-party certified for hoisting up to 50 lbs., allowing for hands-free climbing and easy mobility of tools and equipment around the jobsite. With two main compartments housing 26 interior pockets, 11 PALS webbing loops, and seven exterior pockets of different shapes and sizes, the new backpack holds a variety of tools and everyday work gear. A holster on the side panel provides a safe spot to store tools that don't fit in the main compartments and ring attachment points found throughout the bag are convenient to hook carabiners and other connectors. For more information visit www.ergodyne.com



Master Lock aircraft lockout/tagout systems

Peerless Electronics is now distributing the full line of Master Lock aviation safety products, including aircraft circuit breaker lockout/tagouts. The S2329 Master Lock aircraft circuit breaker lockout prevents accidentally re-energizing an electrical system by locking a circuit breaker in the "off" position. S2329'S universal fit accommodates long or short aircraft circuit breakers, with or without collars. In addition, Peerless stocks Master Lock S2029 aircraft power receptacle lockouts that maintain the de-energized state of the aircraft electrical system by preventing ground power plug insertion.



For more information visit www.peerlesselectronics.com

New tool for aircraft maintenance tracking

Traxxall Technologies' newly developed, purpose-built system improves customers' ability to track maintenance on their aircraft and ensure regulatory compliance through its intuitive user interface, more reliable system performance and built-in automation features. The system is available for both fixed and rotary wing aircraft and has features that include customizable screens and reports, automation of previously manual tasks, a cloud-based architecture, a holding area that acts as a digital in-tray where clients control the revisions on their aircraft. For more information visit www.traxxall.com



To announce your STC or new product, email a JPG photo and a product description to amu.editor@gmail.com or amumagazine@outlook.com

Canadian Aero Accessories Ltd.

Component Sales

Overhaul & Repair



Trusted
Experience
Since 1964



CALL US FOR THIS & MORE !

- Fire Bottles • Oxygen Bottles • Escape Slides • Life Rafts
- Starter Generators • AC Generators • Generator Control Units
- Boost Pumps • Fuel Pumps • Blowers • Valves • Brakes
- Hydraulics 5606 and Skydrol • Electronics/GCUs
- Actuators - Hydraulic and Electrical

Authorized repair Station For

GOODRICH

Ice protection systems PowerSystems

170 George Craig Blvd. N.E., Calgary, AB, Canada T2E 7H2

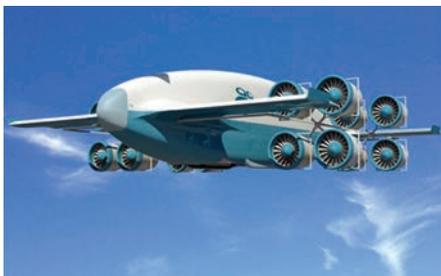
ph: 403.250.9077 • fax: 403.250.6841

sales@cdnaero.com

www.canadianaero.com



FAN POWER CREATES AIRBORNE FREIGHT HAULER



UK-based 4x4 Aviation has unveiled a prototype cargo plane that is said to be able to carry 33 tons of cargo at nearly 200 mph (320 kmh). The Versatile Vehicle-Plane (VVP) will feature four electric fans charged by an on-board combustion engine generator that will allow the plane to lift off vertically and move to a horizontal position for forward movement. The company says a special software system allows the transition from vertical to horizontal flight without relying on current mechanical tilting mechanisms. The VV-Plane has a 50-ft. (15m) wingspan and a similar size fuselage so that it is able to carry an industry-standard Twenty-foot Equivalent Unit shipping container.

HARTZELL'S SWEEP-TIP PROPS APPROVED FOR AVIAT HUSKY



Hartzell Propeller Inc. has received Supplemental Type Certificate (STC) approval from the Federal Aviation Administration (FAA) for installation of the company's new composite swept-tip Trailblazer propellers on all Aviat Husky utility aircraft. The two-blade, 80-inch

diameter prop now replaces Hartzell's aluminum constant-speed version.

The new Trailblazer is said to provide more than a 10 per cent increase in climb performance compared to the original 76-inch aluminum propeller, and a 12 per cent reduction in takeoff distance at max gross weight. The Trailblazer's carbon fibre construction features a field replaceable nickel-cobalt leading edge for demanding backcountry and bush flying environments. The structural composite construction is said to be more than five to 10 times stronger than beech wood and spruce. The two-blade version is compatible with most Lycoming 360 and 390 series engines.

NORTHERN FLIER SIGNS CONTRACT WITH BAE



Summit Air of Yellowknife, NWT has signed a two-year JetSpares rate-per-flying-hour (RPFH) spares contract with BAE Systems Regional Aircraft to support its newly acquired fleet of two 90-seat Avro RJ85 regional jetliners. To support the growing market interest for the Avro RJ in Canada, BAE Systems Regional Aircraft has worked closely with Transport Canada Civil Aviation (TCCA) to obtain Canadian Type Certification (CTC) for both the Avro RJ85 and the bigger RJ100.

Summit Air is the latest Canadian operator to acquire the Avro RJ, and following delivery of the first aircraft in September will commence FIFO (Fly-in; Fly-out) operations in partnership with First Air and De'on Cho Logistics on behalf of Diavik Diamond Mine to airlift employees to and from Edmonton to the remote mine which is situated 186 miles (300 km) north of Yellowknife and with

air only year-round access. JetSpares is a customized rotatable spares support RPFH program which is designed to allow an airline to concentrate on its flight operations while BAE Systems Regional Aircraft takes care of spares inventory, logistics and repairs. The program provides over 450 part numbers covered by the contract with Summit Air, including landing gear components windscreens and avionics.

FIELD AV EARNS BOMBARDIER AIR-MOD CONTRACT



Field Aviation has been awarded an aircraft modification contract by the Specialized and Amphibious Aircraft division of Bombardier Aerospace. Under the terms of the contract, Field Aviation will carry out extensive airframe and interior mods on a new CRJ700 NextGen special mission aircraft. Field Aviation will be responsible for the design, manufacture, integration and certification—including flight test—of a large, forward left side cargo door, along with a number of specialized systems and interior modifications consistent with the aircraft's role as a reconfigurable multi-mission aircraft. This first of type modification to that NextGen aircraft will be carried out at Field Aviation's Pearson International Airport facility and is expected to take approximately 12 months of on-airframe work once the aircraft arrives in the second quarter of 2015.

WIRELESS TIRE PRESSURE SYSTEM FOR BOMBARDIER

Crane Aerospace & Electronics has received an EASA Supplemental Type Certificate (STC) for Crane's SmartStem wireless tire pressure system for the

Bombardier families of CRJ regional jets, Challenger mid-sized business jets and Global large business jets. SmartStem is also certified on the Boeing 737NG, 747-400, 777, 787 and Bombardier Q-Series models.



To fit an aircraft with SmartStem technology, the existing tire inflation valve is simply replaced with a SmartStem tire pressure sensor, which contains special electronics. SmartStem sensors communicate tire pressure, temperature and other stored information wirelessly to a handheld reader.

CANADIAN APPROVAL FOR AVFAB JUMP SEAT



Aviation Fabricators (AvFab) has received Canadian approval for the installation of their STC approved King Air Aft Jump Seat Kits on Beechcraft King Air models 90, 100, 200, 300 and 350. In addition, AvFab has received US, EASA, Brazilian, Mexican and Indonesian STC approval for the seats. The jump seats fold down from the sidewall of the aircraft in the aft baggage compartment and are interchangeable with the OEM jump seat using the existing installation hardware. The kit includes all installation hardware, brackets, parts, the seat, complete restraint system, life vest, overhead lights, vents, oxygen drop-downs, and installation instructions.

CARGO PRESENCE IN CANADA BOOSTED WITH FREIGHTER SERVICE TO CALGARY



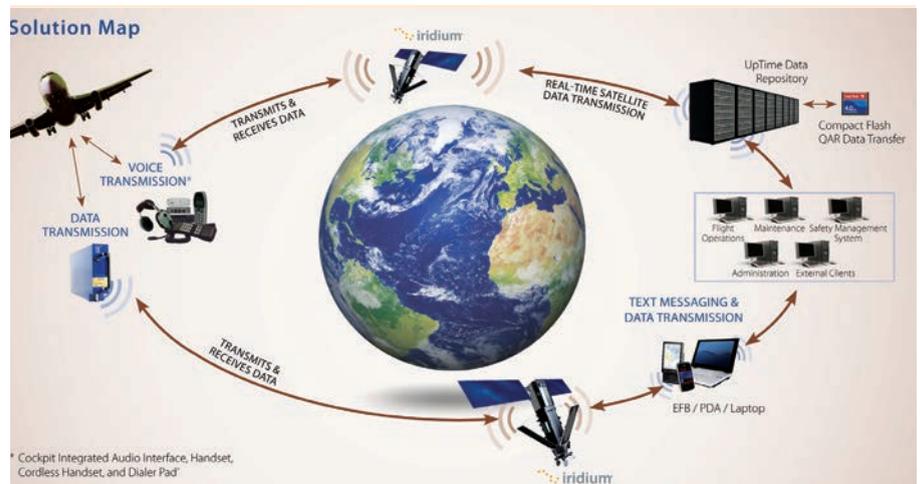
Cathay Pacific Airways announced it will boost its freighter services to and from Canada with a new twice weekly scheduled service to Calgary that was slated to begin in mid-October, pending government approval. This latest addition to Cathay Pacific's cargo network brings the total number of freighter destinations it serves in North America to 14. The new service is intended to strengthen the airline's presence in Canada, and offer customers more choice and greater flexibility when transporting commodities to and from Asia. The airline's other freighter destinations in Canada are Vancouver and Toronto.

Boeing 747-8 Freighters will fly machinery and perishables direct from Calgary to Hong Kong to connect with Cathay Pacific's extensive Asian network.

"We are pleased that Cathay Pacific Cargo has selected Calgary to be its newest Canadian partner," said Calgary Airport Authority Senior Vice-President and Chief Commercial Officer Stephan Poirier. "We've invested extensively in Calgary's cargo infrastructure over the last 15 years, positioning the airport for airlines to enter into Calgary's market."

Cathay Pacific currently operates freighter services to 44 destinations around the world.

FLYHT SIGNS CONTRACT WITH NIGERIA



FLYHT Aerospace Solutions of Calgary has signed a contract with a Nigerian airline for the sale and delivery of the Automated Flight Information Reporting System 220 on five Boeing 737 aircraft. The airline will use AFIRS to provide real-time flight data monitoring. AFIRS features include automated Out,

Off, On and In times, airframe and engine exceedances, flight tracking, automated engine data collection for real time trending, fuel management and satellite voice communications. FLYHT will provide equipment and services to the airline over a three-year contract with automatic yearly renewals. ■

TROUBLESHOOTING and other fun things I did this summer



BY MIKE BRODERICK
Helicopter Engine Repair
Overhaul Services



Long-time maintenance professionals carry a virtual encyclopedia of “Tribal Knowledge” between their greying temples. But they’re also experienced enough to know that “Maintenance by Memory Kills” and that Operations and Maintenance manuals are there for a reason.

I’M BAAACK!! Did you miss me? I must admit, I did miss you guys. Sorry I played hooky from our class session last issue. I was going to tell you that the dog ate my article, but even I don’t believe that one. But I did start a new job that caused some confusion in my schedule. Sorry I was absent, but I am here now, so let’s get to it!

Along with a new gig this summer also brought another birthday. And, along with the fact that the Los Angeles County Fire Helicopter was hovering above the candles on my birthday cake I realized that I have been playing in the helicopter industry for a long time. I say, “playing” because this has been and continues to be a great career. A big part of the playtime has been troubleshooting engine issues with my fellow helicopter technicians. Over the last 40 years I have learned some great lessons on troubleshooting that I want to share with you today. So whaddya say? Time to get started? I believe so.

In all of my conversations with other technicians a couple of things are glaringly obvious, actually four things to be specific:

1. I own all the broken engines. It is true! Because each phone call begins this way: “Your” engine:

- a. won’t start
- b. starts hot
- c. is vibrating like a dog shaking off water
- d. just made metal

I never own the good engines.

2. There appears to be big communication gap between us technicians and the helicopter driver (AKA the pilot).

3. The Original Equipment Manufacturer’s (OEM) Operations and Maintenance (Ops & Maint) Manuals are not being used effectively or in some cases not at all. At times we use our Tribal Knowledge in place of what is in the Ops & Maint manuals.

4. We all want to start our investigation with the most complicated part of the of-fending system.

How 'bout we expand these four points?

1. I own all the broken engines

I know that sounds a bit presumptuous, but it is true. Mostly I believe it is just a technician expressing their frustration over an engine problem that has them temporarily stumped. And I only mention it because I am sure there are other tech reps that hear the same thing. In all cases we are happy to listen and offer suggestions. Sometimes just discussing the problem with another technician helps solve the issue.

2. The pilots

As technicians one of the best troubleshooting tools we have is our pilot. Who knows the behaviour of the helicopter better than the pilot who has been strapped to that helicopter for two-plus hours? I know that after the helicopter



Coast Guard aviation maintenance technicians and avionics electricians perform routine maintenance on an MH-65 Dolphin helicopter.

FUEL CELLS

All Makes & Models - Piston - Turbine - Rotor - Jet

Quality and Safety.

New

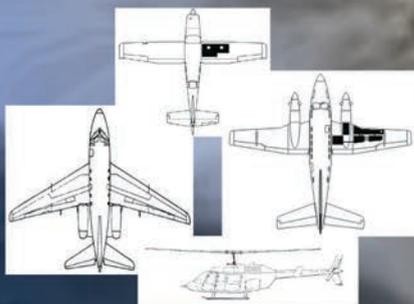
OEM & PMA Replacements
5 year warranty
Quality Installation Kits
FAA Certified TSO & PMA Mfg

Factory Overhauls

Exchanges & Major Overhauls
5 year warranty
Over 40 years of experience
FAA Certified Repair Station

Valves

Stainless steel drain valve kits



Technical Support / Sales
800-437-8732

Tel: 715-479-6149
Fax: 715-479-6344

Online Catalog
www.eaglefuelcells.com

© 2014 Eagle Fuel Cells-ETC, Inc.



A Columbia Helicopter technician works on an AL5512 engine.

lands the last whining we want to hear is that of the engine as it spools down. However, in order for there to be a smooth operation in our flight department there must be a mutual trust between those who fly and those who fix. The pilots can't do their job effectively if they are worried about the quality of the maintenance they are flying behind. And we can't do our job effectively if we don't listen to and trust what the pilot says during the post-flight conversation. We don't want to hear: "It's broke again" any more than they want to hear: "What did you do this time?"

In order for the communication to work it has to be nonjudgmental and open with the mutual goal to solve the problem with the helicopter as soon as possible. Pilots and Mechanics don't have to be spit-swapping buddies, but we need to respect the other's skills and knowledge required to accomplish our separate but equally important jobs.

3. The operations and maintenance manuals

Tribal knowledge and "tricks of the trade" can be great information that is shared among us all and is based upon our common experiences. And, truth be known the Engine Manufacturers (OEMs) used the tribal knowledge they got and continue to get from us as part of troubleshooting information they have in their Ops & Maint manuals. What the OEMs have done is organize this stuff and then put it in logical progressive order for easy reference. Then they put it all in a cool manual that our companies pay big bucks for.



PROGRESSIVE AIR

Global Distributor of Certified Piston Engines & Parts



AUTHORIZED DISTRIBUTOR FOR:



Continental Motors, Inc.



MARVEL SCHEBLER



HARTZELL ENGINE TECHNOLOGIES



KELLY AEROSPACE



CHAMPION AEROSPACE



Sky-Tec



LYCOMING



PRECISION AIRMOTIVE

1-800-667-0522



TEMPEST

www.ProgressiveAir.net/AMU

So what makes the Ops & Maint manuals special? Along with the troubleshooting knowledge you will find:

1. In general, all the facts required for the care and feeding of our turbine engines.
2. The information on component time limits.
3. Which cleaning agents and marking utensils can be used during maintenance.
4. Engine and engine accessories installation instructions.
5. Troubleshooting the most common engine maladies.
6. A brief resume on the operation of the engine and accessories.

So what about this “Tribal Knowledge” that hasn’t made it to the Ops & Maint manual and may not? As we discussed earlier, Tribal Knowledge is what we learn about the engine/helicopter as we go about our day-to-day maintenance duties, and should be used in conjunction with, not instead of, the information in the Ops & Maint manual. Of course, in a lot of cases, Tribal Knowledge is



Airframe work can be complicated. Sometimes a senior tech needs to be consulted.

Increase your starter generator reliability with NAASCO's Mercury Mod™ upgrades

Advanced cooling
for greater
reliability!

**Mercury
Mod**
Phase II

Approved for:
Agusta • Bell • Bombardier • Eurocopter
MD • Schweizer • Sikorsky

HAC

NAASCO



NAASCO NORTHEAST CORP.

FAA repair station # FD1R135K • EASA.145.4687

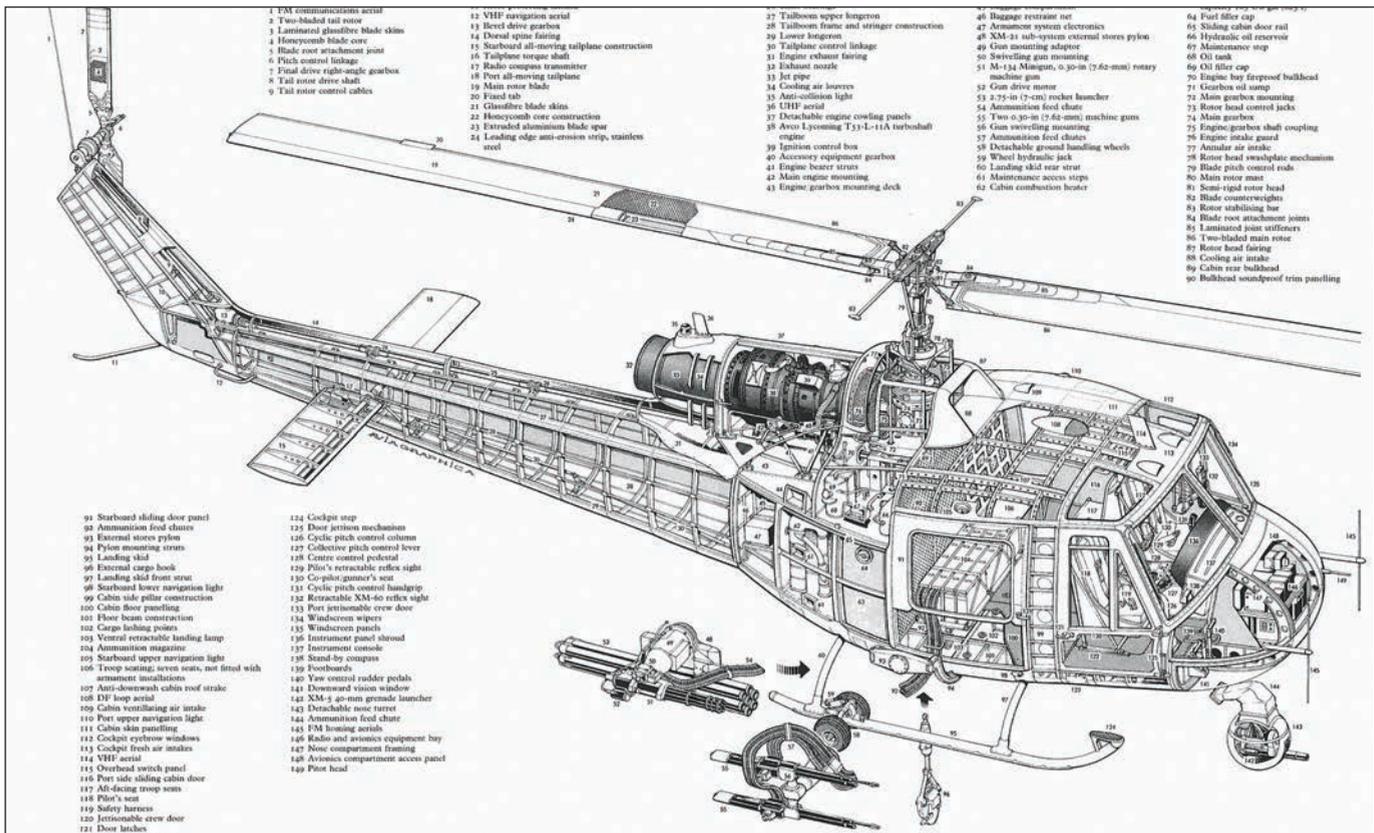
www.naasco.com

Scan QR



for more information

To learn more about our cost-saving repair and overhaul programs, contact NAASCO today!



There are hundreds of moving parts in a helicopter, and they all have tight tolerances. It's always better to use the OEM manual than to rely on memory.

"BlackSteel"
The
PROVEN ORIGINAL

Precision Tolerances
Proprietary Heat-Treatment
Sinusoidal Radius

HIGH PERFORMANCE STARTS WITH THE RIGHT PARTS

APS has designed a high quality brake disc that has established itself as the benchmark among aircraft brake discs. A true blend of strength and durability. CNC machined from a rigid one piece design these brakes are built to provide unparalleled performance. Heat treated to give it the "BlackSteel" appearance, with our "BlackSteel" name proudly engraved on the side; APS offers the ultimate in braking performance.

Find all of our available brake components at
WWW.APSBRAKES.COM

APS
aviation products systems, inc.

not written down anywhere. Thus, like anything that is passed along verbally, these cool maintenance tidbits can get distorted. And if we rely solely on doing maintenance by what we have heard or because we have "always done things that way" we are heading for some serious trouble.

The accident reports where maintenance was the cause are replete with instances where the maintenance procedure was a deviation from the instructions in the Ops & Maint manual, and anyone who has worked with me knows my maintenance mantra: Maintenance by Memory Kills.

Also, think about what you are signing in the engine logbook: "This inspection was completed in accordance with the instructions in the Engine Manufacturers Operation and Maintenance Manual."

This, my friends, is what we are promising the pilot and confirming with our signatures. So then, Tribal Knowledge is bad? No, it is not, when it is used in the proper context. I will give some examples a little later on.



Ashley Cuchins, left, and Jeremy Crutcher of Vector Aerospace, repair a helicopter engine.

4. Using the K.I.S. method

What is the K.I.S. method? KEEP IT SIMPLE! When the pilot reports an issue, get all the facts, listen carefully to what they are saying including the flight profile; any unusual instrument readings; if the problem came on suddenly, etc. and, well, you get the point. Get as much information as you can. This leads to another bit of maintenance advice. We (pilots and technicians) should learn the operational habits of our helicopters when it is running as advertised. For example:

- a. Know what the engine idle temp is just before the engine is shut down.
- b. Learn the vibration signature of the aircraft when it is on the ground.
- c. Know what the oil pressure and the engine torque pressure is at idle.
- d. Pay attention to the length of time the engine takes to start and reach idle.
- d. Go for a flight with the pilot and learn engine temps during a nomad flight. Feel the vibration signature of the helicopter during this flight.
- e. Do a power check.



CANADIAN PROPELLER LTD.

“Aircraft Propeller Specialists”

Western Canada’s Factory Authorized Propeller Facility



1-800-773-6853
24/7 & AOG Technical Support
www.canadianpropeller.com

Complete Maintenance Support & Sales:

- Metal & Composite Propellers
- Turbine & Reciprocating Governors
- NDT and On wing Maintenance
- Experienced, factory trained with licensed, certified personnel



EASA 145.7253 & AMO 175.91

If you and your pilot both learn how the helicopter behaves when all is operationally good when stuff begins to change or changes suddenly you will have a baseline from which to work. And that is the type of Tribal Knowledge I am talking about: that, when used with the Ops & Maint manual, it will make your job easier and keep your helicopter safe.

About the K.I.S. method

We are all proud of our knowledge, and given the opportunity, we want to dem-

onstrate it. If anyone understands this it is me. However, we have to resist the temptation to go to the most complicated part of the system we are working with and begin the wholesale removal and replacement of parts and components all in the name of “troubleshooting.” Start with the easiest thing and work logically towards the complicated. Here is an example:

The pilot reports the engine has low power. Get as much info as you can from the pilot about their flight profile. If you know what the last power check was

compare them. Next, since turbine engine power is a function of turbine temperature compared to engine torque and outside air temperature, make sure the engine instruments are reporting correctly. Next, check to see if there are any engine air leaks. Next, verify the operation of those engine-mounted components that could have an effect on engine power. By starting with the easiest stuff and working toward the more complicated sections we take the trial and error out of our troubleshooting and get the problem solved quicker.

Conclusion

Let me conclude with a couple of things that have worked well for me:

1. The pilot reports the sensation of a vibration during flight. You and the pilot have had a good conversation and he tells you this has been coming on for a while and getting worse. You have noticed that you are replacing engine hardware more frequently. Also, you have had to replace the light bulbs within the aircraft marking lights or the anti-collision light. With the engine running on the ground you feel a vibration in the sheet metal next to the engine bay. Okay, it is now time to get out the engine vibration analyzer and the Ops & Maint manual and determine which component, engine, main rotor, tail rotor or drive system, is causing this and proceed accordingly.

2. The pilot reports an engine chip light. Trust me, if you have ever been in a helicopter that had this occur it will get everybody’s attention. Most of the time you will have an excited pilot explaining where they were and what they were doing. Again get as much information as you can. Then as most engines have multiple chip detectors investigate which chip detector attracted the metal. This will help you possibly determine which bearing or gear within the engine is shedding metal. Remove the metal, refer to the Ops & Maint manual to determine as to what is and what is not acceptable and proceed as directed. It doesn’t take much metal to complete the circuit on the chip plugs. If the piece of debris can be considered “normal” save it and make

The advertisement features a collection of power tools including air drills, angle attachments, and drill bits, each with a model number label. The tools are arranged on a blue background with a faint pattern of tools. In the center is a logo for USATCO U.S. Air Tool Co. featuring a globe and a helicopter silhouette. Below the logo is the text 'Serving the aerospace & metal working industries since 1951!' and four small inset images showing hands using tools on metal parts. At the bottom, contact information is provided: Toll Free US & Canada: 800-645-8180, www.USATCO.com, and addresses for Ronkonkoma, NY and Rancho Dominguez, CA with their respective phone and fax numbers.

a note in the engine logs of the engine time. Then if you get a repeat occurrence you will have a record of what the last metal looked like, and the operating time between occurrences.

Okay, I am sure you get the point. Always keep your line of communication open with the pilot. Determine what has changed operationally from when the engine was working correctly. Small changes are harbingers of larger problems if not caught early. Use the K.I.S. method for troubleshooting. Use the information in the Ops & Maint manual for guidance. And if you get to a point where you want to get another opinion, call your assigned technical representative. Trust me we love to help. So with that said I will let you all get back to work.

Once again thanks for attending today, and if you have any Tribal Knowledge you want to share send it to Air Maintenance Update. After all isn't that what this magazine is all about? Take care and remember even the best pilot can't fly until you say it is okay to fly.

Over the past 35 years MIKE BRODERICK has served as a shop technician, engine shop supervisor, Engine Program Director, Director of Maintenance, Director of Operations, and owner of a Rolls-Royce engine overhaul and MD Helicopter component overhaul shop. He is a certified A&P, and holds a Bachelor of Science degree in Aviation Administration. As well, Mike has been appointed as an FAA representative for the FAA Safety Team (FAAST) and is a member of the HAI Tech Committee. Mike is a regular contributor to Air Maintenance Update. ■

We Buy Starter Generators



We buy excess starter generator inventory and cores of all makes, models & conditions.
Convert your unwanted excess into usable cash or trade-in value today!

StarterGenerator.com

ph 281.298.9779 • fax 281.298.9979
Contact: Garrett W. Schwarz • garrett@startergenerator.com

ProAero

ENGINES INC.

Lycoming & Continental Piston Engines and Accessories

- Repair
- Overhaul
- Exchange
- NDT Services
- Aircraft Maintenance



1-800-667-0522

www.ProAeroEngines.com/amu

2965 AIRPORT RD., KAMLOOPS, B.C. V2B 7W8



Electricity and Magnetism

explained



Whenever there is relative motion between a conductor and a magnetic field, a current flow will be induced in the conductor. This and other mysteries are revealed here now!



BY GORDON WALKER, AME 'E'
Professor of Avionics, Centennial College

As an airline employee and college professor,

I've lived most of my life in large urban centres, such as Toronto and Montreal. The bustle of big city living and international airport employment in a reasonably high-tech, electronically based profession has meant that I've always been "tuned in, turned on, and wired up." A recent (and wonderful) change of circumstances now sees me living in a small hamlet on the north shore of Lake Erie. Although not quite as low tech as my many Amish neighbours, I now live without television or telephone, and with the expectation of multiple power outages each month. During a recent 4.5-hour blackout, the only sounds

I could hear from my front porch were the crashing of waves against the Erie shoreline, and the distinctive "whoosh ... whoosh ... whoosh" of the 77-metre long blades on a nearby wind turbine (calculate the tip speed of THOSE babies turning at 20 rpm!). This got me thinking about aircraft generators and alternators, and Transport Canada's requirement in AWM 566 for AME students to "Explain: Magnetism, electromagnetism, and Electromagnetic induction."

The relationship between electricity and magnetism is a mysterious and fascinating thing. It is the phenomenon that enables us to create and harness electricity as well as convert it to mechanical energy in the form of motors and actuators. In order to understand how this "magic" works, we need only to know two very fundamental facts. These are:

1. Whenever electrical current flows through a conductor (wire) a magnetic field will be created around the conductor.
2. Whenever there is relative motion between a conductor and a magnetic field, a current flow will be induced in the conductor.

So let's look at what these facts actually mean, and how we can use this information to better understand the practical applications as they apply to aircraft maintenance.

The fact that current flowing through a wire causes a magnetic field to be created around the wire means that we can easily create a magnet or more correctly an "electromagnet" by simply connecting a wire to a power source and allowing current to flow through the wire. The more current we pass through the wire, the stronger the magnetic field will be. We can further increase the strength and effectiveness of the magnetic field by winding the wire into a series of coils.

A common application of this principle would be the operation of a relay or solenoid. A small amount of current passing through the coil of the relay/solenoid creates a magnetic field that is used to move the contacts. A more elaborate example of the same principle is the antenna of a radio transmitter. When radio frequency (RF) current is coupled to the transmitter's antenna,



Bill Connelly (left) and Aircraft Electrician Paul Brown discuss the installation of an engine wiring harness.

Maintenance and Ramp Safety Society

A Non-Profit Society Dedicated To
Reducing Aviation Human Error

ORDER YOUR
POSTERS TODAY!

The tools that we offer to help achieve a zero accident rate consist of:

- ▶ **Posters**—High impact, non stop reminders how to reduce human error
- ▶ **Videos**—High quality productions that show how to reduce human error.
- ▶ **Membership**—Access to human factor specialists help reduce human error
- ▶ **Training**—Courses designed by experts to help you reduce human error
- ▶ **'GroundEffects'**—Specialized articles to help you reduce human error

These Tools Save Lives and Money!

Are you going to deny yourself and your company the most important wish of all—SAFETY?



121 - 19140 28th Ave, Surrey, B.C. Canada V3S 6M3

▶ tel: 604.531.9108 ▶ fax: 604.531.9109 ▶ email: marss@marss.org

Visit our website to view the full selection or to order your posters today! ▶ web: www.marss.org

REMEMBER!
Safety and Profit
Work Together



Aerospace Engineer John Herzberg (left) and Aircraft Electrician Anthony Dennis discuss the wiring of a fuel quantity system on the wing of a P-3 Orion maritime patrol aircraft.

REPUTATION PROVEN

BY YEARS OF RELIABLE LIFE AND PERFORMANCE

Concorde sealed lead acid batteries are on mission critical operations every day where dependability matters most – Military, Medevac, Airline, Offshore Support and Flight Training. RG® Series batteries are designed to deliver unmatched performance and reliability.

Operators worldwide trust Concorde – shouldn't you?



RG-380E/44

CONCORDE BATTERY CORPORATION
626.813.1234 | ISO 9001 + AS9100
WWW.CONCORDEBATTERY.COM

...the heart of your aircraft®



an electromagnetic field is created around the antenna, which is radiated in the form of a radio transmission signal.

The second fundamental fact states, “Whenever there is relative motion between a conductor and a magnetic field, a current flow will be induced in the conductor.” The term “relative motion” simply means that either the conductor is moving relative to the (stationary) magnetic field, OR the magnetic field is moving, relative to the (stationary) conductor. This is the principle upon which the operation of generators and alternators is based. In the case of an alternator, the mechanical energy of the engine is used to move, (in fact rotate) a magnet. This rotating magnetic field spins in close proximity to a number of conductors that are wound into coils known as “stators” or “stator windings”. Since the magnetic field is moving relative to the stators, a current flow is induced into the stator windings. We can now use this current to power our various aircraft electrical systems.

In the case of a generator, the magnetic field is stationary, and mechanical

energy from the engine is used to rotate the coils of wire (called the “armature”) within the magnetic field. A current flow is then induced into the armature windings, and this current is used to power the aircraft’s electrical systems.

The amount of electrical power required for the operation of a large aircraft will of course vary throughout the course of any given flight. Requirements for thermal anti-icing, lights, passenger accommodations and so on will constantly be changing and so then will the amount of electricity we need our alternators or generators to produce. The amount of current being generated is dependent upon the RATE at which the conductors are cutting the lines of magnetic flux. This rate can be changed in three ways:

1. Speed of rotation. If we rotate the field or the armature more quickly, we will induce more current.
2. Number of windings. By increasing the number of stator or armature windings, we will increase the amount of current being produced.
3. Magnetic field strength. By increasing or decreasing the strength of the magnetic field, we can control the amount of current output from the generator or alternator.

It is obviously impractical to consider re-winding the generator/alternator to meet current demands, and adjusting engine speed for that purpose is equally unsuitable for aircraft requirements, so that leaves us with controlling the strength of the magnetic field. This is indeed how aircraft voltage regulators control the output of the generators and alternators, to meet the constantly changing demands placed on the electrical system.

The magnetic field used by aircraft generators and alternators is actually an electromagnetic field powered by the generator/alternator’s own output. By passing more current through the field windings, we create a stronger magnetic field, and therefore increase the amount of current being induced into the armature/stator windings.

Whether your aircraft uses a simple belt driven alternator, similar to that on your car, or a 100 KVA, three-phase,



The amount of electrical power required for the operation of a large aircraft varies through the course of a flight as the demand for systems such as thermal anti-icing, lights, passenger accommodations, and so on, change.



CASPA aerospace inc.
Since 1970

Aircraft Safety and Life Support Equipment
Repair • Overhaul • Exchange • Sales

Fire Protection



Cartridges



Floor Covering



Oxygen Cylinder Assemblies



Crew Masks



Securplane Batteries, Camera and Security Systems



Inflation & Pneumatic



Securplane Batteries, Camera and Security Systems



www.caspaerospace.com
98 Columbus Street, Pointe Claire, Quebec H9R 4K4
Tel: 514.630.7777 • Fax: 514.630.9999 • info@caspaerospace.com

PERIMETER

Aviation

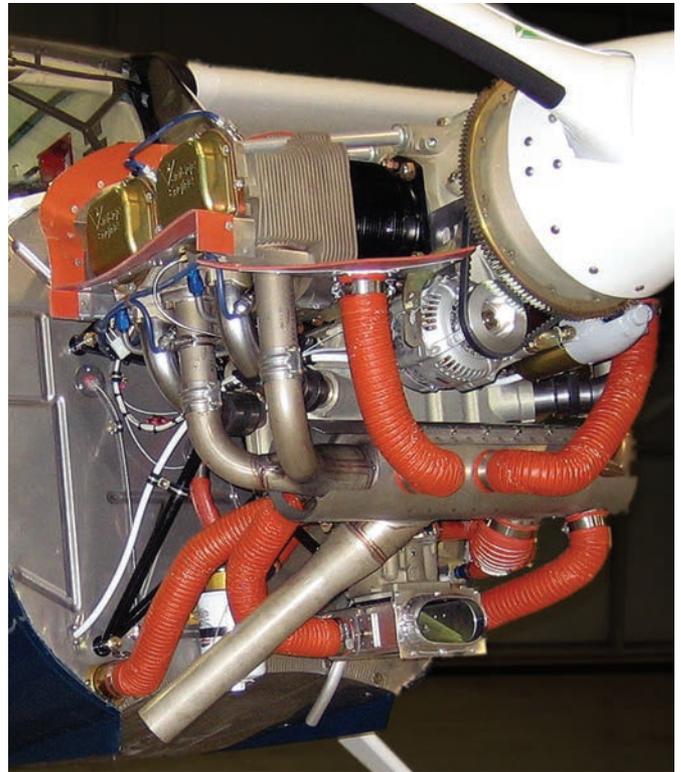
- Garrett TPE-331-1 thru -11 Overhaul, Repair, Camp HSI/GBI, Field Service
- Avionics Shop Specializing in King, Collins, S-Tec
- Certified NDT Shop
- On-site Design Approval Representative (DAR)
- Structural Repair/Modification Services
- Manufacture & Repair of Cargo Nets
- Large Inventory of new & used Fairchild Metro and Beechcraft light twin parts

AMO 37-74



Tel: 204.480.4006

Email: info@perimeter.ca www.perimeter.ca



Superior Air Parts of Coppell, Texas uses lightweight alternators on all of the company's O-360 and IO-360 engines.

Superior Oil Coolers

Superior OIL COOLERS

Your Newest Certified Oil Cooler
Overhaul Repair Shop In Canada

With state of the art equipment —
over 65 years experience to serve
your needs — old and new.

WE OFFER

Full Overhaul & Recertification
or Inspections, Flushing,
Welding, and 24 Hour A.O.G.

Including Turbine Oil Coolers
Oil to Fuel Heaters
& Heat Exchangers

contact: Terry

1487 Dublin Avenue, Winnipeg, Manitoba R3E 3G8

ph. 204-775-4200 cell: 204-781-0084 fax: 204-779-9402

400 Hz, brushless monster, the principles of operation can be understood and problems diagnosed using the two basic facts:

1. Whenever electrical current flows through a conductor (wire) a magnetic field will be created around the conductor.
2. Whenever there is relative motion between a conductor and a magnetic field, a current flow will be induced in the conductor.

Now if you'll excuse me, I'm off to the local pub to make some phone calls, and watch Monday Night Football.

Question: How does a voltage regulator control the output of a generator?

Answer to previous question:

Q: If a voltage of 24 volts is applied to an eight-ohm resistance, how much current will flow in the circuit?

A: The formula for calculating current is $I = E/R$ therefore current is equal to 24 volts divided by eight ohms = three amps.

GORDON WALKER entered the avionics industry after graduating from Centennial College in 1980. His career with Nordair, Air Canada, CP Air, PWA, and ultimately Canadian Airlines took him to many remote corners of Canada. Since leaving the flight line to pursue a career as a college professor, Walker has continued to involve himself in the aviation/avionics industry by serving on several CARAC committees concerned with the training and licensing of AMEs. As well, he has been nominated to the CAMC Board of Directors, and has been elected President of the National Training Association (NTA). ■

the **Amazon** stairclimber

the **AUTOMATED** lifting solution



- safe, dignified passenger transfer
- self-propelled: no lifting required
- versatile: used on commercial and corporate aircraft
- simple and easy to operate: training provided
- lifts 350 lbs. / 160 kg with the push of a button
- portable: use at base or take it with you



- compact and lightweight
- transports passengers quickly
- ensures fast and efficient turn times
- reduces risk of injury to staff and passengers
- unique, specialized design
- patented braking system



BKD Aerospace Industries Inc.

Call us for a quote or visit our website for more details.
Watch our online videos at www.bkdaerospace.com

Tel: (604) 247-2128
Fax: (604) 214-9825

info@bkdaerospace.com
203 - 4360 Agar Drive
Richmond BC V7B 1A3 Canada

PAMA SoCal Chapter



The SoCal Chapter would like to thank Mr. Lew Wingate, VP Distribution and GSTE, Mr. Chris Stanley, Director GSTE and all at Barfield Inc. for their time and generosity hosting the June 2014 Chapter dinner and annual Scholarship Awards meeting at the 94th Aero Squadron Restaurant in Van Nuys, California. Special thanks to guest speaker Mr. Randy Scheib, Director of Sales of Imperium for an excellent technical presentation on "First Line Defense in Finding Internal Composite Damage" including demo of Imperium's AutoCam tester. To learn more about Barfield's and Imperium's lines of ground test support equipment, contact Lew (lew.wingate@barfieldinc.com), Chris (Chris.Stanley@barfieldin.com) or visit www.barfieldinc.com.

June 2014 Scholarship Fund

Raffle Drawing: \$458! 100 per cent of proceeds from raffle ticket sales and scholarship donations benefit the SoCal PAMA Scholarship Awards Program. Thank you Chapter supporters: Aero Distribution Services, Aero-Nasch/Jet Brella, Aviall Van Nuys, Business Aerotech, Clay Lacy Aviation, Consolidated Aircraft, Corporate Air Parts, Duncan Aviation, Extraord-N-Air, Greg Potter, Member HRD Aero Systems, Idea International, Pacific Southwest Instruments, Rotorcraft Support, Universal Avionics, Western Jet Aviation.

2014 SoCal PAMA Scholarships

Congratulations Winners:

David Lipniski, Reginaldo Mata, Jr., Jessica Anderson, Mark Crittenden, and Nicole Forrest, all from Chaffey College.

2015 Scholarship applications posted at SoCalPAMA.org

Job Opening to Post?

Get the word out through SoCal PAMA. Send postings to SoCalPAMA@gmail.com. The SoCal Chapter offers employment and educational opportunity postings free of charge to the aviation maintenance community worldwide.

SoCal PAMA Website

Advertise your company at SoCalPAMA.org and support SoCal PAMA. It's only \$50 for 12 months. Contact Nikki King or Gail Erwin for posting a new ad, renewal fees, or artwork updates: nikki@extraordnair.com, gailjerwin@verizon.net.

SoCal PAMA Board of Directors

- President: Greg Potter, greglpotter@verizon.net
- Vice President: William (Bill) Johnston, bill@vlog.aero
- Treasurer/Broadcasts: Dan Ramos, socialpama@gmail.com
- Secretary/Newsletter: Gail Erwin, gailjerwin@verizon.net
- Sergeant At Arms: Tina Campos, tcampos@claylacy.com
- Website / News / Events: Nikki King, nikki@extraord-n-air.com
- Meeting Coordinator: Chris Cancelosi, chris@rotorcraftsupport.com

PAMA Mission Statement

The mission of PAMA is to promote continuous improvement in professionalism and recognition of the Aviation Maintenance Technician through communication, education, representation, and support.

Central Ohio PAMA



Welcome to Central Ohio Aviators Golf Outing 2014

Every year in September, Central Ohio aviators look forward to this day of golf with their friends and coworkers. This year, we had beautiful weather and filled the course for a fourth straight year. 138 players teed off on September 5 to enjoy a day of relaxation, food and raffle prizes for our local aviators, sponsors and guests.

This event, which is co-hosted by the Professional Pilots Association (PPA), has been the main fundraiser for the COPAMA Scholarship Fund, which provides monetary awards for tuition and testing fees of local student Aviation Maintenance Technicians. Your participation helps the event proceeds keep the fund ready to help those who request testing scholarship help for next year.

We'd like to thank the following sponsors for their outstanding support of this year's Central Ohio Aviation Golf Outing and the management and staff of Kyber Run Golf Course for their help in making it happen:

Breakfast Sponsor - Textron Aviation; Snack at the Turn Sponsor- Dallas Airmotive; Lunch Sponsors - Bombardier Aviation Services and Rockwell Collins; Trophy Sponsor - West Star Aviation; Beverage Cart Sponsors - Duncan Aviation, Honeywell, Turbine Engine Specialists and World Fuel; Closest to the Pin Sponsors - Apex Aircraft Detailing and Support Air; Longest Drive Sponsors - Aircraft Inspection Service and Spirit Avionics; Hole Sponsors - Aero Battery, Aircell, CAMP Systems, FlightSafety International, Global Appearance Group, Lane

Aviation, Satcom Direct, Standard Aero, Stevens Aviation, Textron Aviation, The Immaculate Touch, TriTex Corporation, Winner Aviation and Worthington Industries; Raffle Prize Sponsors - Aero Battery, Bombardier, Constant Aviation, Duncan Aviation, Honeywell, Immaculate Touch, Nationwide, Standard Aero and Textron Aviation.

Ride for Richard Lunch Follow-up

The bicycle enthusiasts at Limited Brands Flight Department invited everyone to a fundraising lunch July 29 for the local Pelotonia 2014 Event completed, August 8-10. One hundred per cent of all funds raised by Pelotonia Riders, Virtual Riders and Volunteers directly supports cancer research at the Ohio State University Comprehensive Cancer Center- James Cancer Hospital and Solove Research Institute (OSUCCC-James). Pelotonia dollars support four key areas at Ohio State's cancer program; The Pelotonia Fellowship Program, Idea Grants, Tools for Discovery and Bringing the Best to Ohio State.

The barbecue plate lunch was held in Lane Aviation Hangar #4, with 165 people in attendance. The flight department provided the lunch so all of the \$10 donations go to Pelotonia. Richard Cady, a member of their flight department and a COPAMA board member, was in attendance and met by attendees wearing their "Ride for Richard" T-shirts, which were on sale to help support the event.

Richard was diagnosed earlier this summer with Adeno Carcinoma and is currently receiving chemotherapy treatments. He enjoyed the support and well wishes of those who attended the lunch and tried to see and greet everyone. The members of the flight department should be proud of their efforts to bring everyone together and a few

even shaved their heads to display unanimity with Richard. We sent our best wishes for good weather and safe travel to the Pelotonia Riders who pedaled the many miles over Ohio that weekend.

The following message comes from Gary McCauley of Aero Battery

Aero Battery would like to let all our friends and customers know of our secretary, Tonya, who passed away on June 30, 2014. She worked for us eight years and enjoyed helping customers, working hard solving problems for both you and us. We will miss her since she was a very good worker and friend. We were told it was a heart attack; no matter 39 years is much too young. Please say a prayer for her family.

Omaha Beach and others remembered on D-Day Anniversary

We paused on Memorial Day, May 26 to remember all those who have fallen in service to our great country and are now only days away from the 70th anniversary of D-Day, June 6, 1944. Ceremonies were held with thousands in attendance to remember those who crossed Omaha Beach and the other beaches on that day. Many traveled from around the world to be a part of this historic event.

Today, the carnage on both sides of the invasion is replaced with a tranquil shoreline looking out on the calm of the English Channel. In the Normandy American Cemetery and Memorial, the crosses, bleached by the sun, stand witness to a portion of the lives given that day in the quest for liberation and peace.

Atlantic AME Association



The following success story from the College of North Atlantic is about one young man's path into Aircraft Maintenance Engineering.

Nowhere to go but up!

(Stephenville, NL) Like many students preparing to leave high school, Drew Hendrickson wasn't sure what direction he wanted to head in. He always had an interest in aviation but for some reason he can't explain, he turned to computer science. The 24-year-old St. John's native says that decision caused him to struggle academically, and eventually he dropped out of university.

"I quickly found out that my skills for mathematics were pretty dismal and I struggled through a couple of semesters at Memorial University before dropping out," he said. "I didn't have much of a backup plan, all of my childhood dreams were professions like video game designer, musician or professional athlete. Professions that people usually started young required a lot of skill and more importantly, luck."

So without any idea of who or what he wanted to be, Drew set out to hitchhike across Canada to find himself. Once he was back in

his home province, he says he worked a dead-end job and lived in downtown St. John's.

"I paid all the bills, had friends and family close, but yet I still longed for my life to have some kind of definitive meaning—a goal. So, one night I just sat down at the computer and went through all of College of the North Atlantic's (CNA) programs. The one that got me was Aircraft Maintenance Engineering Technician (AMET). I saw it on the CNA webpage and started to do some research about the career."

While Drew admits he had never picked up a wrench or screwdriver in his life prior to this program, he took a chance and hasn't looked back since.

"I took the program because I was ready to be somebody. I had always admired airplanes, airports, etc. Traveling was always a blast for me and deep down I would have loved to learn to fly. With that being out of reach in a monetary sense, I decided to do the next best thing; fixing planes instead of flying them."

He says the location and cost were factors in his decision to enroll at CNA: "It was an amazing experience for me. It's a unique program, allowing students to train in both M (maintenance) and E (avionics) disciplines. Most colleges in Canada have specific programs, focusing

on only one of the disciplines. It's a great mix of classroom and hands-on learning."

He also has high praise for the instructors.

"The instructors make this program. They are the strongest assets that the program has in my opinion. Their love for their careers and the aviation industry is infectious. They really care about the program and try to give their students the best possible learning experience they can," he said, adding the instructors were always available to help and genuinely care about their students.

"If someone was failing a certain course or struggling with a project, they would find time to stay after hours or during lunches to help that student better understand the topic. There were times when I thought I was in way over my head. I had never used tools extensively, never knew how electricity worked; didn't even understand the basic concepts of how an engine worked and a lot of my classmates did, but the instructors did such a good job teaching that I never missed a beat. They really go above and beyond for their students. I hope they all know how much I appreciate and admire their work."

He says CNA has many assets crucial to learning about the AMET field.

"The campus has a spacious hangar with a wide variety of functional aircraft residing in it, separate shops for sheet metal, batteries, non-destructive testing, composites, engines and avionics, a fully stocked and well maintained stores department and even a Boeing 737 out back! There's always enough equipment to go around and the facilities are always clean and well kept."

All of these factors are important and Drew says he would suggest to anyone looking for an exciting, hands-on learning experience,

to consider the college's aircraft programs (the college also has Aircraft Structural Repair Technician).

"They teach you to do everything right; no cutting corners, no excuses. That's very important in this industry where attention to detail matters. I've seen some very poor work on some aircraft and it makes me proud to know that I am doing things the right way, the way my teachers showed me. It gives me confidence in my abilities and lets me know that I'm on the right track for an amazing career as a professional."

Drew completed the program in June 2013 and had a job waiting in Saskatoon, Saskatchewan before he even graduated. He was snatched up by Saskatoon Avionics Ltd., a small team of four, which offers avionics installations, troubleshooting and maintenance for general aviation aircraft.

"I love everything about being an AMET. I love the responsibility that comes with it and knowing that, at the end of the day, my work matters. I'm keeping aircraft in the air and people are relying on me to get it done. It's a very rewarding career if you put the time and dedication in," he said. "I have gotten so much out of this program that I can't say enough good things about it. I've already started spreading the word about the wonderful program at CNA now that I'm out west. To everyone at CNA Gander campus, thank you. I love my career and couldn't have done any of it without you. I will never have enough good to say about this program."

For more information about CNA's Aircraft Maintenance Engineering Technician program at Gander campus, visit www.cna.nl.ca.



If you'd like to contribute your professional association's newsletter to AMU magazine contact our editor, John Campbell via email :

amu.editor@gmail.com



NBAAA2014

BUSINESS AVIATION CONVENTION & EXHIBITION | OCTOBER 21, 22, 23 | ORLANDO, FL



Join 25,000 industry professionals for the most important three days of business aviation this year, with over 1,000 exhibitors, 100 business aircraft on static display, and dozens of education sessions. Visit the NBAAA2014 website to learn more and register today.

www.nbaa.org/2014/amu



Big changes in the REGULATIONS



BY NORM CHALMERS
Pacific Airworthiness Consulting

For those of you new to the aviation industry and/or new to Canada, the following abbreviations are all commonly used in the aviation industry and you may come upon them in your day-to-day work:

CAR: Canadian Aviation Regulation, which is a law of Canada; **MEL:** Minimum Equipment List; **RVSM:** Reduced Vertical Separation Minimum; **SDR:** Service Difficulty Report; **SMS:** Safety Management System(s); **TC:** Minister or “tower of darkness” or “the Tower” indicates Transport Canada headquarters in Ottawa; **TC Holder:** Type Certificate Holder/Owner

Below you will see that *Italics* denotes a quotation. I do this in some cases because of the large amount of material that I quote. Remember this as you read on.

Good day! Here we are again. Eight weeks older and wiser. We recently had some interesting happenings much to our delectation. There have been rays of light emanating from the tower of darkness (stirrings of life?). Admittedly, some of that light is infrared. There have been changes to the CARs in several areas. Together these amendments make some of the biggest changes to the regulations since the 1990s saw the demise of Air Regulations and Air Navigation Orders. These latest changes are mostly to do with flight crew licensing and privileges, flight rules, aircraft equipment requirements, commercial flight operations and corporate aviation operations. I have addressed the changes that relate to maintenance below in numerical order.

CAR 101 is Part I General Provisions, Subpart 1 — Interpretation. This is the CAR that defines words and terms used in the other CARs. The first two

definitions listed below affect operations that carry relief flight crew on-board. The third definition will affect operators without formal flight dispatch operations, which includes most of the smaller operators.

“flight relief facility-bunk” means a bunk that meets the requirements of Aerospace Recommended Practice ARP4101/3, Crew Rest Facilities, published by the Society of Automotive Engineers (SAE), and is configured in accordance with the requirements of section 3.2.9 of Aerospace Recommended Practice ARP4101, Flight Deck Layout and Facilities, published by the SAE.

“flight relief facility-seat” means a fully reclining seat that is separated and screened off from the passengers and flight deck, that is equipped with a call device, a restraint system designed to restrain a sleeping person and portable oxygen equipment, and that is not subject to distraction from noise generated in the cabin.

“pilot self-dispatch” means the responsibility of the pilot-in-command for all decisions respecting the operational flight plan and for the flight watch.

CAR 103.12 is Part I General Provisions, Subpart 3—Administration and Compliance. In this amendment, the definition regarding the “Principal” of aviation organisations now includes persons responsible for maintenance or quality control. It starts out:

103.12 For the purposes of paragraphs 6.71(1)(c) and 7.1(1)(c) of the Act, “principal” means

The significant parts here are the references to the Aeronautics Act, which states:

6.71 (1) The Minister may refuse to issue or to amend a Canadian aviation document on the grounds that (c) the Minister considers that the public interest—which may include considering the aviation record of the applicant or of any principal of the applicant, as defined in regulations made under paragraph (3)(a)—warrants the refusal.

7.1 (1) If the Minister decides to suspend, cancel or refuse to renew a Canadian aviation document on the grounds that (c) the Minister considers that the public interest—which may include considering the aviation record of the holder or of any principal of the holder, as defined in regulations made under paragraph 6.71(3)(a)—warrants it.

Together these laws of Canada mean that any person with an unsavoury aviation enforcement record or criminal record can be kept out of aviation management.

CAR 602 is PART VI—GENERAL OPERATING AND FLIGHT RULES, Subpart 2—Operating and Flight Rules. The changes to this subpart are numerous regarding flight operations but now specifically refer to the new CAR 604 regarding private or corporate operations. This whole subpart warrants a review by all flight operations managers.

CAR 604 is Part VI Subpart 4—Private Operators. This subpart is a large document of about 50 pages and 24,000 words including many new aircraft maintenance requirements.



IN 1947, A LEGACY BEGAN

FOR 65 YEARS, WESTERN PROPELLER HAS BEEN THE PROPELLER AND GOVERNOR MAINTENANCE PROVIDER OF CHOICE FOR THE GLOBAL AVIATION MARKET. WE OFFER THE HIGHEST QUALITY OVERHAUL AND REPAIR SERVICES AVAILABLE.

VISIT US ONLINE AT WWW.WESTERNPROPELLER.COM AND BE PART OF THE LEGACY.

1-877 870 PROP (7767)

WESTERN PROPELLER



AirMaintenance
UPDATE

The Magazine for Aircraft Maintenance Professionals



We invite you to write an article on your field of expertise. By contributing to AMU, you educate readers, and make them aware of your business and your talents.

To view our editorial guidelines please visit www.amumagazine.com

AERONEUF

INSTRUMENTS LTEE/LTI

REPAIR - OVERHAUL - CERTIFICATION - SALES
RÉPARATION - RÉVISION - CERTIFICATION VENTE

 Transport Canada AMO 27-91

 EASA.145.7189

Since 1988
Depuis 1988

 Hamilton Sundstrand

 SIGMATEK

 AIM

 Honeywell

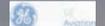
 AMETEK

 Rockwell Collins

 THALES

 AEROSONIC

 Bendix King

 SEXTANT

 GOODRICH

 Kollsman

 rc allen instruments

Now in Laval, located between
Mirabel and Trudeau airports to
better serve you !

Maintenant à Laval – Entre les
aéroports Mirabel et Trudeau
pour mieux vous servir !

Your solution for
Avionics Maintenance

Votre solution en
Maintenance d'Avioniques

Ground Equipment
Équipement au sol

600, 3^e Avenue, Laval, Québec, H7R 4J4
Tél: (514) 631-2173 Fax: (450) 627-2199
www.aeroneuf.com • info@aeroneuf.com



This is significant because there are about 300 Canadian private operators out there that previously were operating under a government order. This subpart is a harbinger of things to come in other areas including CAR 703, 704 and 705 operators. For that reason, you commercial operators ought to read on and become familiar with these changes.

Paragraphs 604.08 and 604.09 specify the duties and accountabilities including those of the maintenance manager.

Paragraph 604.56 addresses RVSM maintenance requirements mandating continued airworthiness compliance. That is referring to TC Holder manuals, advisories and other documents known as Instructions For Continued Airworthiness or ICA.

604 Division VII—Emergency Equipment starts at paragraph 604.116 and goes into detail including how and where this equipment must be stored. This kind of tasking usually needs the cooperation between maintenance and flight personnel.

604 Division VIII—Maintenance is very imposing and mandates some of the requirement found in CAR 706. It goes on to detail:

604.126 *The maintenance manager is responsible and accountable for the maintenance control system.*

604.127 *A private operator shall have, in respect of its aircraft, a maintenance control system that includes . . .*

This topical area goes on listing requirements, (a) to (k), including numerous procedures similar to those for commercial operators. The best way to address this is with a formal procedures manual. Well-written procedures provide employees with guidance regarding compliance with the CARs and the company way of doing things. These procedures can also provide management with up-to-date training materials, which have been approved by management. Procedures can be changed and approved by company management unlike manuals approved by TC.

Paragraph 604.128 (1) states *No private operator shall authorize a person to perform maintenance or elementary work on any of its aircraft unless . . .*

This area addresses the training and authorization requirements for personnel doing these tasks and the requirements for task completion.

Paragraph 604.129 Defect Reporting and Control Procedures states:

A private operator shall have procedures to ensure that . . .

This goes on addressing the reporting, recording and control of in-service aircraft defects. This involves the usage of journey logbooks, defect deferral procedures and MELs. Take care when writing these procedures because problems will occur if the maintenance and flight operations personnel are not using coordinated procedures that control, and show control of, in-service defects.

Paragraph 604.130 mandates SDR reporting. If you submit an SDR, keep a copy in a separate file available to auditors and TC.

The next paragraph 604.131 states, A private operator shall have procedures to ensure that

(a) it is aware of the aircraft service information that the holder of a design approval document produces in respect of the aeronautical products used by the private operator;

(b) the aircraft service information is assessed, and the results of the assessment are signed and dated by the maintenance manager and retained for six years; and

(c) the maintenance schedule or any other procedure is, if necessary, amended in response to the assessment.

This topical area is very interesting to me because I have long emphasized the need for my clients to perform and record these actions. You need to formally consider implementing the actions addressed in documents such as service bulletins and other service documents supplied by the TC Holder. You then need to make a record of your considerations and your decisions. Hand-written notes made directly on the service bulletin or other documents, signed and dated by maintenance and flight operations management, are simple ways to show compliance. Retain that record for six years or forever whichever you like. This area also addresses the need to amend any related approved maintenance schedule if it is affected.

Paragraph 604.141 regarding Operations Manager Qualifications and Responsibilities clearly delegates aspects of maintenance to the operations manager. It states,

(2) The operations manager is responsible for the operational control of the private operator's operations and shall

(a) coordinate the activities that affect operational control, including activities relating to

(i) maintenance,

Paragraphs 604.147 mandates icing training (ref. 604.181) and paragraph 604.148 mandates SMS training (ref. 604.183). CAR 604 Division X—Training Program goes from paragraph 604.166 to paragraph 604.183 and is very detailed including the training requirements for maintenance and ground personnel. Paragraph 604.149 addresses training records that all managers need to be aware of to ensure compliance.

Paragraph 604.182(1) addresses training required for persons performing maintenance and elementary work and 604.(2) addresses training required for persons performing servicing. Paragraph 604.183 details SMS training.

CAR 604 Division XI—Operations Manual—General Requirement goes on with requirements that effect maintenance personnel as follows:

604.197 (1) A private operator shall have an operations manual that sets out the processes, practices and procedures applied in the course of its operations. The operations manual shall include a table of contents and shall deal with the following topics:

(a) the duties and responsibilities of all operational and maintenance personnel, and the hierarchy and chain of command within management;



THE BEST PLACE IN THE WORLD TO TAKE A LEAK

FUEL CELLS

QUOTES ON:
Cherokee Tanks
Fuel Cells & Metal Tanks
Repair, overhauled & new
Technical Information or
Free Fuel Grade Decals

**NEW TANKS -
10 YEAR WARRANTY**



MONARCH PREMIUM CAPS
Premium Stainless Steel
Umbrella Caps
for your
Cessna 177 through 210

www.hartwig-fuelcell.com info@hartwig-fuelcell.com

HARTWIG
AIRCRAFT FUEL CELL REPAIR
Keeping aircraft in the air since 1952

US: 1-800-843-8033 **INTL: 1-204-668-3234**
CDN: 1-800-665-0236 **FAX: 1-204-339-3351**



PROPWORKS
PROPELLER SYSTEMS

Overhaul • Repair • Sales

Winnipeg 1-888-679-2965
Edmonton 1-888-457-1910



Avia • Dowty • Hartzell • Hamilton Standard
Hamilton Sundstrand • McCauley • MT Propeller
Sensenich • Governors • Non-Destructive Testing

FACTORY TRAINED TECHNICIANS - EASA APPROVED
AMO #105-99

www.propworks.ca

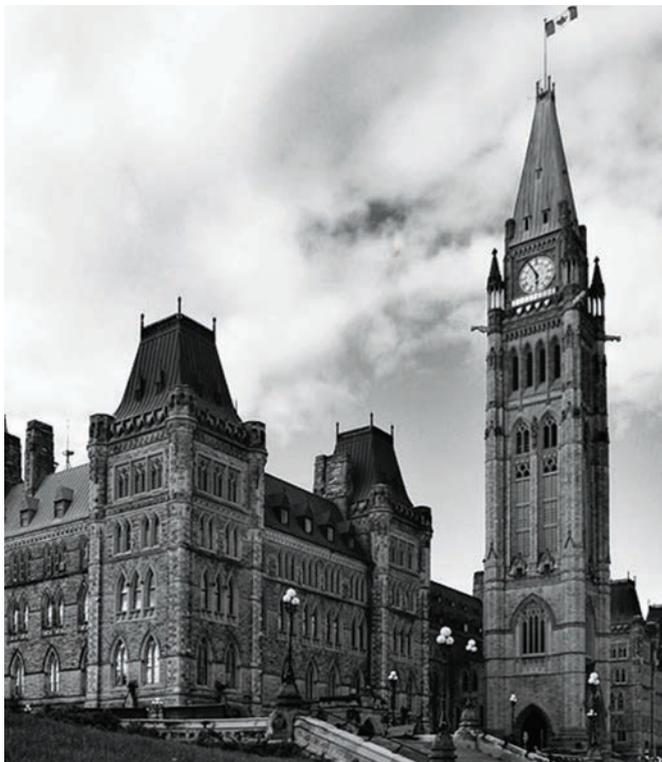
- (b) the organization and operation of the safety management system;
- (c) personnel training and qualifications;
- (d) record keeping;
- (e) the organization and operation of the maintenance control system;
- (h) procedures, if any, relating to minimum equipment lists;
- (n) accident and incident response considerations;

Paragraphs 604.203 to 604.205 addressing the detailed requirements for an SMS may not be a significant change for some 604 operators because most already have some sort of SMS program in place. These paragraphs go into great detail and will likely require a significant re-write of most SMS manuals. I have, and will again, state my opinions regarding TC's approach to SMS as I stated to Canadian government House of Commons Committee on Transportation as I detailed last issue. Paragraph 604.206 brings in new requirements for quality assurance programs similar to CAR 573 and CAR 706 but not in as much detail. Paragraphs 604.207 and 208 require that operators conduct independent reviews of the SMS program.

Moving on to CAR 605 changes, most of them are made to include the new CAR 604 requirements. In paragraph 605.04, the two references to "604.27" are changed to "604.37".

In paragraph 605.10(1)(c) the reference to *private operator certificate* is changed to *a special authorization issued under subsection 604.05(2)*. Paragraph 605.36(2)(b)(ii) now includes competency checks.

In CAR 605 Schedule I regarding recording requirements for journey logs, the heading references now includes reference to the new Paragraph 604.127(i).



In CAR 700.02 regarding Requirements for an Air Operator Certificate, a new subsection is added following subsection (4) as follows:

(5) *Despite subsections (1) and (2), a person who does not hold an air operator certificate may operate an air transport service, or operate an aeroplane or helicopter to conduct aerial work involving the transport of passengers or goods, if . . .*

It goes on to define the condition for this. To understand the impact of this we need to understand three definitions found in CAR 101 as follows:

"aerial work" means a commercial air service other than an air transport service or a flight training service;

"air transport service" means a commercial air service that is operated for the purpose of transporting persons, personal belongings, baggage, goods or cargo in an aircraft between two points;

"flight training service" means a commercial air service that is operated for the purpose of conducting flight training;

Here I begin my tangential dissertation. Last issue I copied the entire text of the presentation I gave to the Canadian government Standing Committee on Transport, Infrastructure and Communities. The purpose of those meetings was to answer questions posed by the Minister of Transport that include the effects of SMS on aviation safety. To date I have heard or seen no comment or result of those meetings but I will report to you if anything related does occur.

Since I am running out of space and time, I make this final note. TC's own website information states that TC has about 5,200 staff in all the transportation modes with less than 1,200 people doing the actual front line work. In my mathematics, that's about four bosses and support staff members for every inspector. I'll have more to say on that and other related topics in our next issue. Please write a letter to our editor at AMU, suggesting topics to discuss. When you do write to us, you will become a member of a rare and endangered species. That's all for now folks. Good day and take care.

Please be aware that I am not a lawyer or legal expert. What I write in my column is not legal advice or legal opinion. If you face a legal issue, you must get specific legal advice from a lawyer and preferably one with experience in the aviation matters in your own country/state.

NORM CHALMERS worked with Transport Canada as an Airworthiness Inspector for 25 years. Before this, from 1967 to 1983, he worked in the aircraft maintenance industry in and around Western Canada and in the Arctic. His industry experience includes the operational maintenance of normal and commuter category aircraft and smaller transport category aircraft in the corporate sector as well as several years working in major repairs in the helicopter sector. As an Airworthiness Inspector, he has been responsible for most duties related to the position, including the approval of all aspects of maintenance, manufacturing, training, and responsibilities related to distribution organizations. Norm now operates Pacific Airworthiness Consulting; www.pacificairworthiness.ca. ■

NBAA 2014



The most important convention in the aviation business once again brings together industry colleagues and friends, as important new ideas, products and information are presented during three high-energy days in Orlando.

The NBAA Business Aviation Convention & Exhibition scheduled for October 21-23 in Orlando, Florida, is the year's most significant media event for the business aviation industry. This event brings together business leaders, government officials, manufacturers, and corporate aviation department personnel—an estimated 25,000 aviation professionals from the United States and around the world—involved in nearly all aspects of the business. Here is the premier opportunity for aircraft purchase decision makers, entrepreneurs and other business leaders to meet and conduct business and discuss current trends involving the use of aircraft for business purposes. As the fourth-largest trade show in the US, the convention features more than 1,000 exhibits displayed across one million square feet of floor space, as well as two aircraft displays—one outside, with about 100 aircraft, the other inside the exhibit hall, with nearly a dozen light business airplanes.

The show will also feature dozens of education sessions covering topics of interest to all attendees, from those considering the use of an airplane to support their business needs, to those who have long used an airplane to help their business succeed. Several Maintenance & Operations sessions (M&Os)

are offered by exhibiting original equipment manufacturers as well.

Among the many education opportunities, you can learn how to use new technologies to your company's advantage during three cutting-edge sessions. The first is Mobile Technology: Learn How to Manage Devices, which will be held on Tuesday in Room S320F at the convention center. Presenters from Jeppesen and Air Watch will share their insights on mobile device management.

On Wednesday in Room S320C/D, Implementing Weather Technology in the Cockpit with the FAA's Gary Pokodner will provide an overview of the research being done by the agency's Weather Technology in the Cockpit (WTIC) program.

Also on Wednesday, Technology in the Cabin, presented by Bombardier, Boeing and Gulfstream will cover everything from cabin management systems to connectivity in the cabin to the future of satellite technology. The session will be held at 4:30 on Wednesday, in Room S320H.

See the complete list of education sessions and other convention information at: www.nbaa.org/events/bace/2014/agenda/program-schedule/



Out of climbing power



Induction icing overwhelms a Beech aircraft on a cross-country flight.

On December 1, 2013, about 1303 Mountain Standard Time, a Beech B36TC, N36ML, was destroyed when it impacted terrain while maneuvering near Yellow Pine, Idaho. The airplane was registered to and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. The instrument rated private pilot and his four passengers were fatally injured. Instrument meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for the personal flight. The 234 nautical mile cross-country flight originated from Baker City Municipal Airport (BKE) Baker City, Oregon, about 1222 with an intended destination of Butte, Montana.

Information provided from the Federal Aviation Administration revealed that the flight departed from BKE under visual flight rules. At 1226, when the aircraft was about 10 miles south of BKE at an altitude of about 6,200 feet, the pilot contacted the FAA Air Route Traffic Control Center (ARTCC) requesting to activate an IFR flight plan to Butte, Montana.

At 1230, the controller issued the accident airplane the BKE altimeter and identified the airplane was located about 13 miles south of the BKE VOR. The controller then cleared the flight to Butte as filed and directed the pilot to climb and maintain 13,000 feet. The pilot acknowledged the clearance and altitude. The controller followed with a clearance for the flight to proceed direct to the Donnelly VOR. At 1240, the controller advised the pilot that the McCall Municipal Airport (MYL), McCall, Idaho, altimeter setting was 30.04. The pilot acknowledged about one minute and six seconds later. At 1256, the controller asked the pilot to confirm he was level at 13,000 and established on victor airway 121. The pilot responded with, "Negative, three six mike lima's picking up too much ice, uh, we'd like to divert to, uh, Salmon."

Shortly after, the pilot requested to descend to 11,000 feet. The controller advised the pilot to maintain 12,000 feet for terrain clearance. The pilot acknowledged 12,000 feet.

At 1257, the controller then asked the pilot if he would like to divert and the pilot subsequently verified that he would like to divert to Salmon. The controller cleared the pilot to Salmon via direct to the Salmon VOR and again instructed the pilot to maintain 12,000 for terrain clearance. The pilot acknowledged with "Maintain one two thousand six mike lima."

At 1300, the controller asked the pilot to confirm he was still on victor airway 121 and the pilot responded with "Establishing victor 121." The controller directed the pilot to turn right 15 degrees to be established on the airway. The pilot acknowledged. The controller then issued the pilot a low altitude alert, instructing him to check his altitude immediately. The controller stated that the minimum IFR altitude was 11,900 and instructed the pilot to climb and maintain 12,000 feet immediately. When asked to say altitude, the pilot advised that he was at 11,500 and climbing. The controller reiterated to the pilot that they had to maintain 12,000 feet for terrain.

At 1301:04, the pilot advised the controller that he was having engine problems and 15 seconds later advised that he needed to "go to three uniform two immediately." The controller asked the pilot to verify his altitude, which the pilot responded he was at 10,000 feet. The controller then asked the pilot if he was able to climb, and the pilot responded "negative." The controller advised the pilot that MYL was 24 miles behind him and asked if he wanted to divert. The pilot responded affirmatively and asked for guidance. The controller suggested a heading of 253 degrees and reminded the pilot that the minimum IFR altitude was 11,900.

At 1302, the pilot reported, "36ML just lost its engine" and asked the controller to "Say again heading for six mike lima." The controller advised that MYL was at the pilot's six o'clock position and suggested a heading of 253 degrees, adding that 3U2 was right below their position. The controller stated that he had information for the airport and asked the pilot if he'd like that information. There was an unintelligible response that could not be associated with any specific aircraft. The controller attempted to re-

lay communications via other aircraft in the area and broadcast 3U2 airport information to N36ML in the blind. There were no further communications with N36ML.

The FAA subsequently issued an Alert Notification (ALNOT) at 1328. The United States Air Force Rescue Coordination Center (ARCC), Civil Air Patrol, local law enforcement, Idaho Air National Guard, Idaho Department of Aeronautics, and volunteers commenced search and rescue operations throughout the area where radar contact was lost. There were no reported ELT signals within the area of the last radar target.

The wreckage was located in snow covered wooded mountainous terrain on January 10, 2014 by a ground search team about 1.5 miles east of the last recorded radar target.

Personnel Information

The pilot, age 51, held a private pilot certificate with an airplane single-engine land and instrument airplane ratings. A second-class airman medical certificate was issued to the pilot on March 27, 2013, with the limitation stated "must wear corrective lenses." The pilot reported that he had accumulated a total of 1,050 total flight hours at the time of his most recent medical application. The pilot's logbook was not located.

Aircraft Information

The six-seat, low-wing, retractable-gear airplane, serial number (S/N) EA-375, was manufactured in 1983. A Continental Motors TSIO-520-UB3F rated at 300 horsepower powered it. The airplane was also equipped with a McCauley 3A32C406-C adjustable pitch propeller. Review of partial copies of the aircraft logbooks revealed that the most recent annual inspection was completed on June 3, 2013, at a tach time of 1,611.85 hours. The engine was overhauled on March 19, 2010, and subsequently installed on the airframe on April 1, 2010, at a tach time of 1,275.67 hours.

Review of the Raytheon Aircraft Company model B36TC pilot operating handbook, section 2, heading KINDS

OF OPERATIONS states in part "... flight in icing conditions prohibited."

Section 3, Emergency Procedures, revealed that under the heading "BLOCKED INDUCTION SYSTEM," a checklist included the following:

1. Alternate Air T-Handle ... PULL AND RELEASE
2. See INDUCTION SYSTEM BLOCKAGE later in this section.

The heading titled "INDUCTION SYSTEM BLOCKAGE," stated in part "... if the alternate induction air door becomes stuck in the closed position, it can be opened by: ALT AIR PULL & RELEASE T-Handle (lower left sub panel) ... PULL AND RELEASE. The section further states, "With the induction air filter completely blocked, the alternate air opening will provide sufficient air to allow the engine to develop maximum continuous power up to approximately 13,000 feet. Above that altitude, the manifold pressure will drop at a rate of approximately 1 inch per 1,000 feet."

Section 7, Systems Description, heading INDUCTION SYSTEM ICING states in part, "... the possibility of

New One Piece 800-746-8273

DOORS

- AVIATION
- AG DOORS
- SHOP DOORS
- BARN DOORS

HYDRAULIC
"One-Piece" DOOR
OR
BIFOLD
STRAP LIFT and auto latch

Say YES... to Strap-Lift Doors
Say NO to Cable Lift

SCHWEISSDOORS.com

...Lift Straps



Pilot and Beechcraft — Photo credit: websleuths.com

induction system icing is reduced by the non-icing characteristics of the Bonanza's fuel injected engine and an automatic alternate induction air source. Under certain conditions, however, impact ice can form at several points in the induction system. If the air intake or filter becomes clogged with ice, a spring-loaded door in the air intake duct will open automatically and the induction system will operate on alternate air. If the alternate air source door becomes frozen in the closed position, a pull-and-release T-handle is provided to force the door open. With a completely blocked induction filter, full power can be expected up to approximately 13,000 feet."

The airplane was last refueled at Baker Airport's self-serve pump on November 27, 2013. The amount of fuel was undetermined due to a system recording error.

Meteorological Information

A National Transportation Safety Board (NTSB) staff meteorologist prepared a factual report for the area and timeframe surrounding the accident. The National Weather Service (NWS) regional radar mosaic for 1300 depicted a large area of echoes to the north of the accident site and no significant echoes over the accident site or over the McCall area, which was reporting light rain at the time of the image. The NWS Weather Depiction Chart for 1200 depicted an area of IFR conditions by a shaded contour over the Washington and Oregon coasts, and a separate area of eastern Washington and northern Idaho, surrounded by an area of marginal visual flight rules (MVFR) conditions. A second area of MVFR conditions was depicted extending over eastern Oregon, southern

Idaho, and into western Wyoming, which included the accident site. Two small areas of IFR conditions were embedded within the region.

The closest weather reporting facility to the accident site was from McCall Municipal Airport (MYL), McCall, Idaho, located approximately 27 miles west at an elevation of 5,024 feet and along the immediate route of flight. At 1251, recorded weather conditions were wind from 140 degrees at 11 knots, visibility nine miles in light rain, ceiling overcast at 2,400 feet above ground level (agl), temperature 2C, dew point 0C, altimeter 30.04 inches of mercury (Hg), remarks: automated observation system, sea level pressure 1017.9-hPa, hourly precipitation 0.03 inches, temperature 2.2C, dew point 0C.

The closest upper air sounding or rawinsonde observation (RAOB) was from the NWS Boise (BOI), Idaho, located approximately 90 miles south of the accident site at an elevation of 2,867 feet. The 1700 sounding depicted a surface based temperature inversion to 1,500 feet agl with the lifted condensation level (LCL) immediately above at 1,914 feet agl (4,781 feet msl), and a convective condensation level (CCL) 7 at 4,988 feet agl (7,855 feet msl). The expected top of the clouds was at 13,465 feet. The freezing level was identified at 8,455 feet with the sounding indicating a relative humidity greater than 80 percent from 8,000 to 12,000 feet with temperatures below freezing that supported icing conditions.

At the accident airplane cruising level of 13,000 feet the wind was from 300 degrees at 53 knots with a temperature of -8.5C, with a potential for trace of rime type icing. The icing potential increased at lower levels and reached a 77 per cent



Yellow Pine, Idaho

probability of moderate clear type icing at 8,500 feet. Between 12,000 and 11,000 feet there was an approximately 80 per cent probability of light clear icing with relative humidity of 95 per cent and temperatures between -7 and -5 C.

The Geostationary Operational Environmental Satellite number 15 (GOES-15) satellite image for 1300 depicted several bands of low, mid, and high clouds over the area. The radiative cloud top temperature over the last radar target was -59.16C, which corresponded to cloud tops near 35,000 feet and indicated cirrostratus clouds. Several lenticular cloud bands were also observed supporting mountain wave activity over Oregon, southern Idaho, and northern Nevada, with overcast clouds over the accident site.

There were six pilot reports of light to moderate rime icing conditions below 18,000 feet scattered over Idaho prior to the accident, and nine reports after the time of the accident. There were also several reports of mountain wave activity and of light to moderate turbulence at altitudes above 18,000 feet. After the time of the accident there were also two urgent pilot reports from aircraft reporting moderate to severe turbulence in the vicinity of Idaho Falls over southern Idaho.

A full series of Airmen's Meteorological Information (AIRMETs) issued by the NWS were current for the time-frame and intended route of flight. The active AIRMETS included AIRMET Zulu for moderate icing, AIRMET Sierra for mountain obscuration and AIRMET Tango for low-level windshear and turbulence.

The pilot of N36ML logged on to the Direct Users Access Terminal System (DUATS) and filed an instrument flight plan at 1200 on December 1 with a requested altitude of 13,000 feet.

No formal weather briefing information was requested on the DUATS system and there were no records of any contact with the FAA contract Flight Service Station. It is unknown if the pilot utilized any additional sources of weather prior to the flight.

Wreckage and Impact Information

Examination of the accident site by representatives of Textron Aviation under the supervision of the NTSB IIC revealed the airplane impacted terrain about 1.6 miles northwest of the Johnson Creek Airport (3U2) at an altitude of about 7,619 feet msl. The initial point of contact was identified by a group of about five topped trees, about 40 feet in height. A swath of seven topped trees, each reduced in height as the debris path progressed on a heading of about 078 degrees magnetic. Portions of right and left wing, and tail cone were observed within the swath of topped trees.

The aft portion of the fuselage, vertical stabilizer, rudder, and elevators were located about 104 feet from the initial point of contact. A large impact crater was observed immediately adjacent to the aft fuselage. Portions of left and right wing structure were observed between the aft fuselage and the forward portion of the fuselage and engine, which was located about 138 feet from the initial point of contact. All major structural components of the airplane were located within the wreckage debris path.

The engine and remaining attached forward airframe structure was found inverted and exhibited fire damage. A portion of the right inboard wing was found folded upward and positioned over the forward fuselage structure. The aft portion of the fuselage exhibited fire damage. The cockpit area was fire and impact damaged. Continuity was established from the cockpit engine controls forward to the engine.

Examination of the recovered wreckage by representatives from Textron Aviation and Continental Motors revealed that the fuselage was fragmented into multiple sections and exhibited fire damage. The engine remained attached to the airframe via various wires and hoses. The induction system from the induction air filter aft was intact and fire damaged. The alternate induction air door remained attached and exhibited thermal damage. The spring was intact and remained attached to its respective mounts. The control cable was thermally damaged and remained attached to the actuator arm, however, it was separated about an inch from the attach point. The remaining portion of the cable was continuous to the cockpit area. The actuator arm functioned by hand and the alternate induction air door opened and closed freely.

The instrument panel was thermally damaged with multiple instruments displaced. Partial flight control continuity was established throughout the airframe to all primary flight controls. Multiple separations in the flight control system were observed. All separations exhibited signatures consistent with tension overload.

The right wing was displaced from the fuselage and separated into multiple sections. The leading edge structure of the inboard portion of the right wing from the flap aileron

junction to the wing root was displaced to the main wing spar. The left wing was displaced from the fuselage, separated into multiple sections, and exhibited slight thermal damage. The leading edge structure of the left wing from the flap aileron junction was separated from the main spar inboard to the wing root. A circular impression was observed on the outboard portion of the separated leading edge structure.

The vertical stabilizer was separated from the airframe. The leading edge of the vertical stabilizer exhibited a circular impression on the left side from the base of the stabilizer to about mid height. The right side of the vertical stabilizer exhibited buckling from the impression aft to the aft spar. The rudder was separated from all its mounts. The rudder was bent and buckled throughout and exhibited fire and thermal damage.

The left horizontal stabilizer was separated from the fuselage. The inboard portion of the left stabilizer was bent and buckled from the leading edge to the trailing edge. The left stabilizer aft spar was mostly separated from the stabilizer. The right horizontal stabilizer was separated from the fuselage. The leading edge of the right horizontal stabilizer from the root to about mid span was torn away from the spar and bent downward. A portion of the right horizontal stabilizer leading edge skin was compressed aft to the spar and exhibited a circular impression. The leading edge structure exhibited a downward circular impression at about mid span.

Examination of the recovered engine revealed that the starter and the right magneto were separated from their respective mounts. All six cylinders remained attached. The exhaust remained intact and exhibited impact damage. The induction system for cylinders two, four, and six, were impact damaged and one, three, and five were intact. The induction crossover balance tube was crushed upward. The top sparkplugs, fuel pump, vacuum pump, and starter adapter were removed. All six cylinders were examined internally using a lighted borescope and were unremarkable. The engine was rotated by hand using a hand tool attached to the crankshaft propeller flange. Rotational continuity was established throughout the engine and valve train. Thumb compression and suction was obtained on all six cylinders.

The top sparkplugs were removed and examined. The number one and six sparkplugs were damaged. All six sparkplugs were oil coated and exhibited normal wear signatures.

The turbocharger was intact and remained attached to the engine and exhibited thermal damage. The turbocharger would not rotate by hand, however, debris was observed within the turbine side. The waste gate was intact and thermally damaged. The turbo controller was intact and thermally damaged. The relief valve was intact and thermally damaged.

The propeller was separated from the crankshaft propeller flange. Propeller blade No. One was separated from the propeller hub and exhibited slight twisting near the blade tip and chord-wise striations at about mid-span. Propeller blade No. Two was intact and exhibited slight aft bending. Propeller blade No. Three was bent aft about 12 inches from the blade tip and exhibited slight leading edge gouging at the tip. No evidence of any preexisting mechanical malfunctions was

observed with the recovered airframe and engine that would have precluded normal operation.

Medical and Pathological Information

The Valley County Coroner conducted an autopsy on the pilot on January 17, 2014. The medical examiner determined that the cause of death was "... severe blunt force trauma."

The FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma, performed toxicology tests on the pilot. According to CAMI's report, volatiles, and drugs were tested, and had positive results for 46 (mg/dL, mg/hg) ethanol detected in muscle and no ethanol was detected in liver.

Tests and Research

A Garmin GPSMap 396 was recovered from the wreckage and subsequently shipped to the NTSB Vehicle Recorders Laboratory, Washington, DC for further examination. Power was applied to the GPS unit and the data was successfully downloaded. The GPS unit contained 40 recorded sessions from July 13, 2013 to December 1, 2013.

Two flights were recorded on November 27, 2013, one from BKE to Butte, Montana, and one returning to BKE. The tracks to and from Butte were predominantly a direct course over mountainous terrain. Review of the track log from the day of the accident depicted a departure from runway eight at BKE. The flight continued on a southerly course until turning to an easterly course at 1231. The data depicted that the flight leveled off at an altitude of about 13,000 feet, at 1237. The flight continued on an easterly heading with altitudes fluctuating around 13,000 feet and groundspeeds between 200 and 228 knots. At 1244, a decrease in groundspeed was observed while altitude remained about 12,900 feet. For the following six minutes, the recorded groundspeed decayed to the slowest recorded groundspeed of 165 knots, however, it then increased to a maximum of 200 knots while the recorded altitude fluctuated between 12,800 and 13,000 feet.

The data further depicted that at 1953, a decrease in groundspeed and a descent from an altitude of about 13,000 feet started. The descent continued for about four minutes before a climb was initiated from the lowest recorded altitude of 11,591 feet. Throughout the following two minutes, the flight ascended to an altitude of about 12,014 feet and groundspeed of 139 knots. The data then depicted a constant descent and fluctuating groundspeeds between 123 knots and 179 knots for about four minutes to the end of the recorded GPS data. During the last two minutes of recorded GPS data, heading changes to the southeast, northeast, and east were observed. The last recorded GPS position was located about 0.19 miles west of the accident site at an altitude of 7,989 feet, groundspeed of 123 knots, and ground track of 083.5 degrees.

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's continued flight into known light-to-moderate icing conditions over mountainous terrain. Contributing to the accident was the loss of engine power due to induction icing. ■

Aviation Services

MACHIDA

MAKE YOUR VISUAL INSPECTION EASIER!

BORESCOPE KITS

VIDEOSCOPE KITS

CUSTOM SCOPES

ENGINE APPROVED



VSC-3-140NL

WWW.MACHIDASCOPE.COM



40 RAMLAND ROAD SOUTH ORANGEBURG NY 10962 1-800-431-5420 / 1-845-365-0600

HPA Consultants

Now offering "Effective Auditing"

- two-day course covering audit procedures from start to finish, including creating your checklist

Check website for dates and places

Online: HF initial and update, HF for pilots doing elementary work, and QA

Check www.flysafe.ca for all courses

Contact info@flysafe.ca or call Sue at 519-674-5050 for information



Quality Assurance Specialists

- Confidential Safety & Internal Audits
- IS-BAO Audits
- On-Site Tech Rep
- Maintenance Analysis & Planning
- SMS Program Development & Audits
- MCM & MPM Manuals & AMO Approvals
- Aviation Project Management
- Regulatory Requirements

9295 E. Saanich Rd. Sidney, BC, V8L 1H6
t: 250-656-5433 • c: 250-413-7583
john@lattaaviation.com
www.lattaaviation.com

Leading Edge Technology



Beaver & Otter Safety & Performance Modifications

- Beaver – STOL Kits
- Wing Angle Kits
- 5370 Upgross Kits
- Otter – STOL Kits
- 400-lb. Upgross Kits
- Float Stretch Kits
- "Yukon" Cargo Door



Walter Turbine Otter Conversions
"the most cost effective Turbine Otter Conversion on the market"



TC approved (AMO# 80-07) for Maintenance, Repairs, Structures, Welding & Manufacturing

www.stolairus.com / stolairus@telus.net
 6095 Airport Way, Kelowna, BC V1V 1S1
 (North end of Kelowna Int'l Airport)
 Phone: (250) 491-7511
 Fax: (250) 491-7522

Aviation Services

FLYRITE
ACCESSORY OVERHAULS
AMO 98-97 EDMONTON, AB

OVERHAULS BY THE BOOK! **STARTER-GENERATOR**

**Overhauls
Modifications
Service
Training
Rentals**



GOODRICH ▶ APC ▶ AUXILEC
(formerly TRW Lucas)
BENDIX ▶ B&C STARTERS

1-888-439-6020
flyrite@incentre.net
Ph. (780) 439-6020
Fax (780) 439-6106



Heli Technology Inc
SPECIALIZING IN BELL HELICOPTERS
204, 205, 206, 212 & 407

- Dynamic Component Overhaul •
- Genuine Bell Parts Sales •
- Exchange & Rental Program •
- Field Maintenance •
- In-House Reworks & Machining •

OVER 30 YEARS EXPERIENCE
Phone: (250) 566-4401
Fax: (250) 566-4333

PO Box 18, 3010 Selwyn Road
Valemount BC V0E 2Z0

CANADIAN
Aircraft Maintenance Engineer
Logbook



Navion Co.

Available at carsfortheame.com

SAVEONJETFUEL

- **Enviro Tanks**
- **Bulk Jet Fuel**
- **Avgas**

Toll Free: 1-866-353-3030
www.saveonjetfuel.com
SERVING THE HELICOPTER INDUSTRY

When flying is what you do, we're here.

Sealand Aviation, located at Campbell River on Canada's West Coast, provides experienced and efficient aircraft maintenance and service.

- Transport Canada approved for repairs, maintenance, structures, welding and manufacturing.
- A&P and IA on staff for US inspections and US annuals.
- EASA Part 145 Approved



SEALAND AVIATION Ltd.

- 2300 Airside Drive, Campbell River Airport
- 2880 Spit Road, Campbell River Floatplane Base

www.sealandaviation.com • 1.800.331.4244

Aviation Services



SINGLE PISTON • TWIN PISTON • SINGLE TURBINE • TWIN TURBINE
JETS • HELICOPTERS • APPRAISALS

Certified Aircraft Appraisals
Member of National Aircraft Appraisers Association

LORNE GRAY AGENCIES LTD.

TEL: 403-547-1024 FAX: 403-547-0037 EMAIL: INFO@AIRCRAFTCANADA.COM
www.aircraftcanada.com

Canadian Aero
Accessories Ltd.



Component Sales
Overhaul & Repair



Authorized repair Station For



Ice protection systems
PowerSystems

170 George Craig Blvd. N.E.,
Calgary, AB, Canada T2E 7H2

ph: 403.250.9077

sales@cdnaero.com
www.canadianaero.com



Pitot-Static
Test Adaptors

For all Types of Aircraft

Nav-Aids Ltd

1-877-332-3055 www.navaidsltd.net



NDT & Inspection

CARs AMO 76-90
ALL NDT METHODS

X-ray • Ultrasonics • Bond Testing
Eddy Current • MPI • LPI

EXPERIENCED STAFF OF CERTIFIED TECHNICIANS

#8, 2280 Pegasus Way N.E. Calgary, AB T2E 8M5
p: (403) 274-8214 • f: (403) 274-8457 • w: www.rtdquality.com



Membership has its privileges

It is not a fancy Health Club, nor is it a swank Golf and Country Club, and despite my shining melon, it is definitely not “The Hair Club for Men.” The club that I am speaking about is far more beneficial to one’s health and definitely more grass-roots in nature. There are no membership fees or secret handshakes, yet the number of inductees into its bedraggled ranks is growing like wildfire.

The idea for this club was a direct result of taking early retirement at age 54. After 22 years of teaching Aircraft Mechanics at Centennial College I was ready to move on. At the retirement party held in the Aircraft Maintenance Hangar I made a short but sweet speech, stating, in my humble opinion, the three key ingredients to a happy retirement. Number One: make sure you are still smiling when you leave (no one likes a grumpy teacher). Number two: make sure you have plenty of hobbies to keep you busy. Finally, and perhaps most importantly, keep your wives working for as long as possible!

My male colleagues met this last piece of sage advice with uproarious applause. However there were more than a few scowling glances from the bouquet-wielding wives in attendance. Of course it was a good-hearted joke and fortunately my wife Irene has a healthy sense of humour. Ultimately, that was the moment when the seed was planted for the RDWW. Or as I refer to it: the RD-Triple-W Club (Retired Dudes With Working Wives).

Surprisingly, in the six years since I retired I have come across quite a few of my friends that have also found themselves in this unique and enviable predicament. Some of my latest recruits include a retired police officer, an X-ray technician, a professional photographer, and even a Canadian air force captain. There are no barriers or segregation when it comes to our happy little club. Of course there are pros and cons to this singularly satisfying situation, and it can be prone with perilous pitfalls.

To have even a slim chance of becoming a successful candidate, the wives in question must really want to continue working for all the right reasons. Ideally they wish to continue because they truly love what they do. Otherwise this newfound freedom can easily generate petty jealousies, especially if the club member simply goofs off once his spouse departs for the realities of her working world.

The trick for each club member to excel in his new role is really quite simple. You must strive to become the ultimate househusband. Your goal must be to provide unwavering support to your woman in every way, ultimately providing her

with a higher quality of life. This requires that you step up to the plate and cook dinner, dust, vacuum, do dishes, walk the dog, garden, maintain the house etc. etc. so that her “non-working” time is greatly enhanced and therefore much more relaxed. Okay, no one said being a member would be easy, but despite these “cons” there are still more than enough “pros” to make it worthwhile. If you are organized, you can intersperse your own agenda into your ongoing domestic chores. For me, restoring and riding vintage motorcycles is a pleasant retirement pastime that helps balance the boredom of dusting the bedroom furniture and unloading the dishwasher. You must, however, be diligent in arranging these activities into a cohesive, common sense order.

For example, don’t think you can rebuild the engine of a 1965 Honda Superhawk in the late afternoon and then squeeze in making a meatloaf for dinner. Switching rapidly from garage coveralls to a kitchen apron is not advisable and can make for some disastrous dinner conversation. Wife: “What is that rather unique flavour in the meatloaf dear? Sheepish response: “Hmmm, it could be vintage Honda.” In this particular case, saving the day might involve selecting the appropriate wine — perhaps a nice Pinot “Greasio.” But I digress.

As mentioned earlier, being a member of the RD-Triple-W is not for the faint of heart. If you have the ability to retire early and find yourself in this position, the club will welcome you with open arms. However, be aware that it is a very slippery slope to attain this level of domestic nirvana. Your masculinity may be challenged if caught exchanging recipes or discussing laundry detergents with other members over coffee at Tim Horton’s. Be prepared to explain the benefits of your situation, while simultaneously quoting sports statistics and the latest horsepower figures of the new Harley-Davidson Dyna Glide.

Part of your job is to lead by example. I’m not sure if he qualifies as an official member, but to quote the infamous Red Green: “Keep your stick on the ice; we’re all in this together” immediately springs to mind. No truer leadership words were ever spoken, and this could well serve as the mantra for our group. The RD-Triple-W needs you! Househusbands have a voice in this club, and because of that fact, we desperately need all the support we can get. Membership still has its privileges and it sure does beat the heck out of working. Believe me, I’m not just a member; I’m also the president!

For more published writing by Sam Longo, please visit www.samlongo.com ■

GROUNDED? NOT FOR LONG.



At Ultimate, we provide a wide range of Coolers, Valves, Heat Exchangers and Oil Tanks for your piston or turbine engine. With experienced technicians, we offer a solid warranty and 24 hr AOG Service.

**FROM FIXED WING AIRCRAFT TO HELICOPTER
CUSTOM OVERHAUL • EXCHANGE • RE-CORE • NEW**

1.800.561.5544 | BRINGLAND@AERORECIP.COM

ULTIMATE
Oil Coolers

A GREGORASH AVIATION COMPANY



ACCESSORY OVERHAULS: RIGOROUSLY TESTED AND FINELY CALIBRATED, JUST LIKE OUR STAFF.

All Aero Recip accessories are tested and calibrated in house by factory trained technicians with decades of experience. With quick turnarounds and exchange units readily available, we invite you to put us through your most rigorous test.

GUARANTEED QUICK TURNAROUNDS

CUSTOM OVERHAUL • EXCHANGE • REPAIR



AERORECIP.COM | 1.800.561.5544 | INFO@AERORECIP.COM



A GREGORASH AVIATION COMPANY





MAINTENANCE Experience Is Everything.

To You. And To Us.



Experience **West Star.**

There are always two sides to experience when it comes to aircraft maintenance. First, it's the hands-on, real-world, wrench-turning experience of our factory-trained, FAA-approved technicians that know your particular aircraft inside and out. It's the decades of aviation experience that our program management and customer service specialists have. But there's more to it. Lots more.

The other side of experience is yours. Did your last job come in on time and on budget? Were your expectations exceeded at every possible turn? At West Star, this side of experience is just as important as ours. We want your experience of working with a truly unique MRO to be the best it can be. This means attention to detail, communication and going the extra mile for our customers.

When it comes to aircraft maintenance, we don't take experience lightly. And neither should you.

To see first hand how both sides of experience shine at West Star visit www.weststaraviation.com today.



Where **Experience Shines**®

Falcon | Citation | Gulfstream | Learjet | Hawker | Challenger
Global Express | Embraer | King Air | Conquest | Piaggio

www.weststaraviation.com

