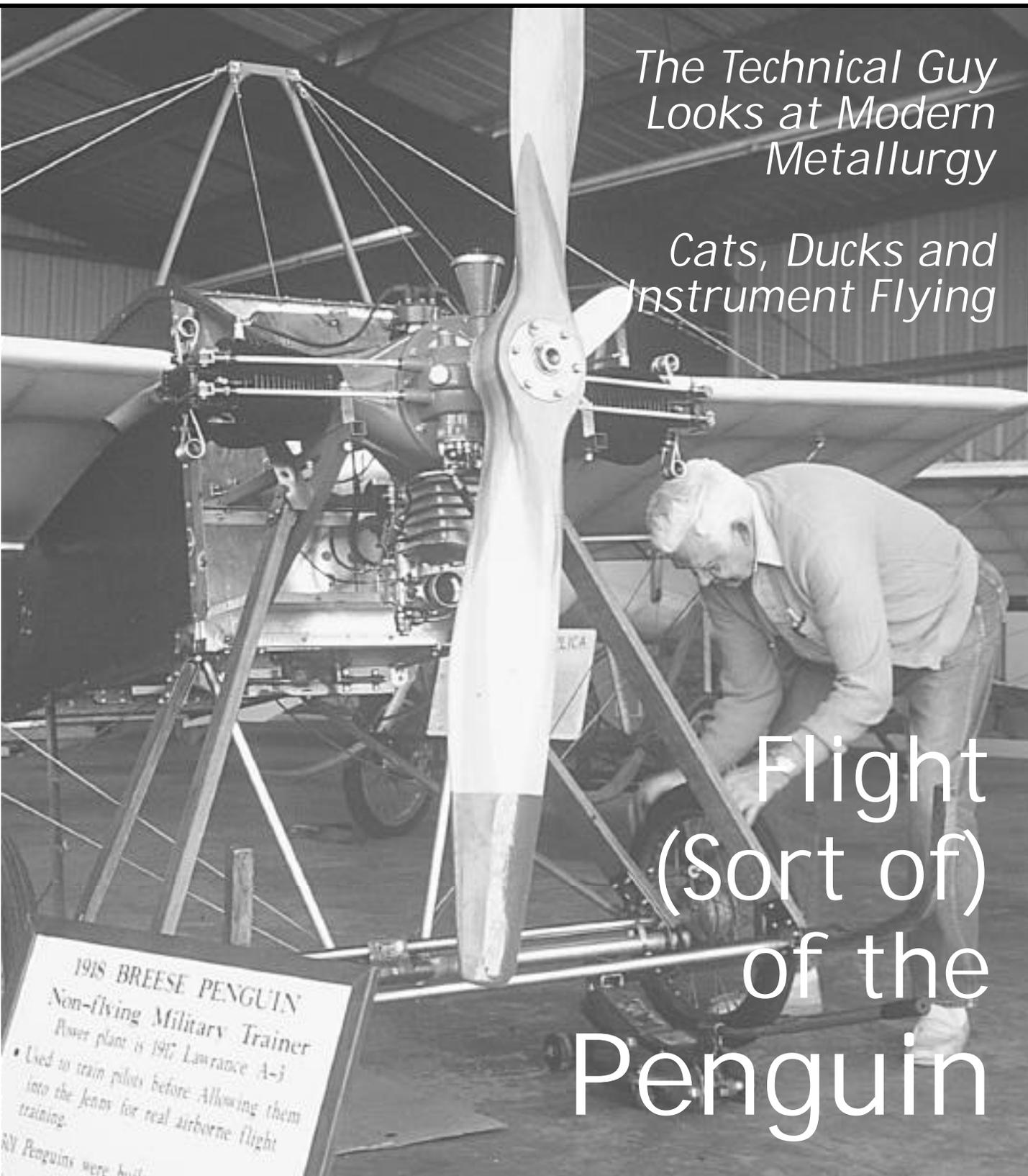


# TURN <sup>AND</sup> BANK

OFFICIAL NEWSLETTER OF RAAC CHAPTER 85

January/February 1999



*The Technical Guy  
Looks at Modern  
Metallurgy*

*Cats, Ducks and  
Instrument Flying*

Flight  
(Sort of)  
of the  
Penguin

1918 BREESE PENGUIN  
Non-flying Military Trainer  
Power plant is 1917 Lawrence A-3  
• Used to train pilots before allowing them  
into the Jenny for real airborne flight  
training.  
NY Penguins were built.



Technical Guy

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**On The Cover:**

*Gerry Borden adjusts the landing gear of his Breese Penguin replica.*

*The TURN AND BANK is the monthly publication of RAAC Chapter 85 and is intended to keep members informed as to the club's activities, and to promote safety and technical excellence in the field of sport aviation. No responsibility or liability is assumed, expressed or implied as to the content of articles contained in the Turn and Bank: the intention is to provide a forum for discussion and exchange of ideas.*

*Newsletter contributions should be mailed to George Gregory, 19470-88th Avenue, Surrey, B.C. V4N 3G5 no later than the 12th of each month. Business Fax is (604)-469-3495. Please remember to indicate "attention George Gregory" on your fax.*

*Enquiries to the Membership Chairman should be mailed to Rob Prior, #204-130 E.11th St., North Vancouver, B.C. V7L-4R3*

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**For inspections of Amateur Built Aircraft Projects contact the Recreational Aircraft Association Headquarters at 1-800-387-1028**

Regular Meetings are held on the first Tuesday of each month at 20:00 hours in the clubhouse at:

Delta Airpark, 4103-104th Street  
Delta, B.C. Clubhouse phone: 596-3644

**Mailing Address:** Chapter 85, RAAC

c/o Delta Heritage Airpark, 4103-104th St., RR#3, Delta, B.C. V4K-3N3

Executive meetings are held on the third Tuesday of each month at 19:30 hours in the clubhouse.

Chapter aircraft pilots, mail cheques (Payable to RAAC Chapter 85) to:  
Brad Short, 8052-122a Street.Surrey. B.C. V3W-7R4

# Technical Guy

Tips from EAA's Technical Counselor News

## Some thoughts on Bolts and Welding Rod

By Richard Finch,  
Technical Counselor #1143

*Editor's Note: This is a response to the letter from Mr. Vogelsong in the May 1995 issue of Sport Aviation, which was in response to Dick's article on welding rods in the March 1995 issue of Sport Aviation.*

I must clarify a statement in Mr. Vogelsong's letter. Grade 8 bolts are not more brittle than AN bolts. I have bent a 3/8 inch grade 8 bolt into a very tight 90 degree bend, and the grade 8 bolt is every bit as ductile (bendable) as an aircraft bolt.

-Grade 8 bolts are 160,000 psi tensile strength.

-AN bolts are 160,000 psi tensile strength.

AN bolts were developed during the early WWII years, and Grade 8 bolts were developed during the 1960's. There is no evidence that AN bolts are more flexible than Grade 8 bolts.

Now for the example that an FAA inspector can make a builder of an experimental take out non-aircraft bolts, that is just not true. Calvin Parker built "Jeanie's Teenie" with hardware store pop rivets' Molt Taylor built his "Paper Airplane" out of office supply store cardboard and fiberglass; Burt Rutan built his "Varieze" out of insulating foam and fiberglass, and all of us who put auto engines in our airplanes use Grade 8 bolts to hold the cylinder heads on the engines, and to hold the crankshaft main bearing caps on the cylinder block.

There are inferior brands of Grade 8 bolts, just as there are inferior brands of AN or other aircraft bolts. Right now, we are having a major AD on Lycoming aircraft engines because somebody furnished a batch of bad rod bolts for Lycoming engines.

Enough about Grade 8 bolts, let's examine 1990's welding rod compared to 1930's welding rod. Metallurgy has improved in the past several years almost as fast as computers and avionics have improved. Copper coated steel welding rod is like using an adding machine to design an airplane when you can just as easily use a modern CAD drawing system. Especially if you are TIG welding, the new vacuum melted, metallurgically pure welding rod is many times better for welding your structural 4130 steel airframe parts. The good, modern welding rod flows like butter with no cracks, whereas the copper coated rod tends to crack and bubble because it contains basic impurities. Why would anyone want to spend \$30,000 for a new aircraft engine and only \$3 for the welding rod to

build the engine mount that holds than expensive engine on the firewall? If you build the engine mount with the new vacuum melt, metallurgically pure welding rod, the rod will cost about \$40, and that is a minor price to pay for airframe insurance. It might be a good idea for those companies who sell welding rod to experimental aircraft builders to offer both grades of welding rod to their customers.

The really important aspect of my article about grades of welding rod is that metallurgy has improved in the past several years, just like nuts and bolts have improved, and just like electronics have improved, and we EAA people ought to be willing to look at the new technology in welding.

For more information about vacuum melt, metallurgically pure welding rod, you can contact the manufacturer:

United States Welding Corporation  
3579 Highway 50 East #104  
Carson City, NV 89701-2826  
PHONE: 1-800-423-5964  
FAX: 702-883-7776



*A US Navy jet practices takeoffs and landings with the security of a land based strip. More next month!*

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Aircraft Portraits

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# BULLETIN BOARD

If you have questions or problems with your aircraft construction, we have members who have developed some expertise in various fields who have volunteered to advise you on methods, procedures and pitfalls in the capacity of **Builders' Counselors** something along the lines of the former designee programme. Please respect the fact that these are volunteers who may not appreciate late calls, and will not return long-distance calls on their answering machines. Also, none are inspectors, and although experienced in their various fields,

cannot be held responsible. It is and remains **YOUR** project. Their names and numbers are on page two and will be a regular feature of our contents page.

Please note that the locks for the clubhouse and the club hangar have been changed. If you want a key that works in both hangar and clubhouse, give Rob Prior a call at 980-7723.

Lost and Found Dept: **Lost:** one hat! Arlington Airport Thursday July 9. Blue. RCAF Association crest plus an enameled Long-eze Pin. Give Gordon Hindle a call at

535-0592.

The **Ninety Nines** will be putting on their **19th Annual Safety Seminar** on Saturday, February 20, 1999 at University College of the Fraser Valley (Abbotsford Campus). Registration is between 8:30 and 9 AM, with the seminar itself beginning at 9 and finishing at 2:30 pm. The cost is \$15 and includes lunch. If you have any questions please contact Margaret at 431-5313 (weekdays) or Jean at 437-4219. **This seminar meets the recency requirements of CAR 401.05(2) (a).**

## Minutes

by Jim Hunter

### Minutes of the General Meeting, 5 January, 1999

**Call to order:** 8:00 pm by President Pat O'Donnell who welcomed visitors and members to our first meeting of the new year.

Meyer/Munzer: that the Minutes of the General Meeting of 3 November, 1998 be adopted as printed in the **Turn and Bank**. Discussion Carried.

#### Committee Reports:

**Treasury:** Verbal report by Tim Novak, Treasurer.

**Aircraft:** Brad Short: Turbi flew 9 hours in november and amazingly 3 in December. Turb a total of 164 hours in '98 which is great.

**Membership:** Rob Prior: Totals as at end of year. Rob has 43 '99 re-ups already. February General Meeting is the last chance to rejoin for cheap The badges will probably be available at next GM.

**RAAC:** Bruce Prior: Now receiving Minutes of Directors' Meetings held at Brampton. The revised Builder's Manual is on the way.

There is apparently a little problem between RAAC and DOT regarding the financing of the AIR-ABA program. DOT

Provided funding for the initial implementation but has not continued to do so (at least fully) . Recollect that the inspection of home-builts has been given entirely over to RAAC whether or not the builder is a member (although a builder can have this done by DOT at his own and presumably greater expense or if he is not prepared to accept an AIR-ABA's opinion). Doubtless will be resolved.

**Buildings:** Colin Walker: OK. Colin is wishing to retire as Building Chairman and we need a good member to assume this essential job. Talk to Pat.

#### Old Business:

- 1) Monthly Breakfast this Sunday.
- 2) Dirk Post retiring as Fly-out Chairman. If game, talk to Pat.

3) Gary Ewing has a full squad working on the J-5 rebuild but more members are welcome and needed. Talk to Gary.

Munzer/Meyer: that we adjourn. Carried.

Following which - a very good talk by Bob Cutting and Beat Meyer on their recent adventures and doings as AIR-ABA Inspectors. Most important is that they are INSPECTORS and not building advisors or consultants. Suppose most of their clients are sweet and lovable like us but it's more fun to hear about the really "other" ones. Many seem to subscribe to the "only kick the length of your leg" theory and see the AIR-ABA guy as another odious agent of government.

Jim Hunter, Secretary.



*Ernie Rice's Tri-Pacer and Charlie Longstaff's Emeraude bask in a Delta sunset. What could be better?*

# The Penguin Flies (almost)

Text and Photos by Mark Munzel

The Breese Penguin was a monoplane, nineteen feet long with a span of just fourteen feet. It had good -- that is to say, bad -- "flight" characteristics in and about all three axes. The landing gear even incorporated bungee cords, so the fuselage could roll in turns. The Penguin was powered by the Lawrance A-3, the US Army's first air-cooled aircraft engine. It produced only 28 horsepower at its rated speed of 1400 RPM.

Deliveries of production Penguins from Breese's Long Island factory were held up by problems with the engines, such as defective prop hubs, reversed carburetors,

*Continued next page*



*Gerry fiddles with the landing gear of his Penguin replica.*



*Gerry Borden's Breese Penguin replica awaits its next non-flight at Carson City, Nevada, in September 1997.*

**A**S THEIR PROJECTS near completion, some homebuilders are gripped by a fear that their new airplanes will not fly. Gerald Borden of Carson City, Nevada, likely had a different concern: What if his did? Gerry built a full-scale replica of the Breese Penguin, for which being ground-bound is a mark of authenticity -- the tiny Penguin was as flightless as its namesake!

The Penguin was a little-known training "aircraft" for World War One fighter

**...his plane was so suitable for its role that, when the prototype did become airborne by accident, it immediately crashed. Impressed, the Army asked him to supply 300 more Penguins.**

pilots of the US Army Signal Corps. In 1917, basic trainers like the Curtiss Jenny were slow and simple to fly. Fighters like the Nieuport 28 or SPAD XIII were not. Their vices included overpowering torque

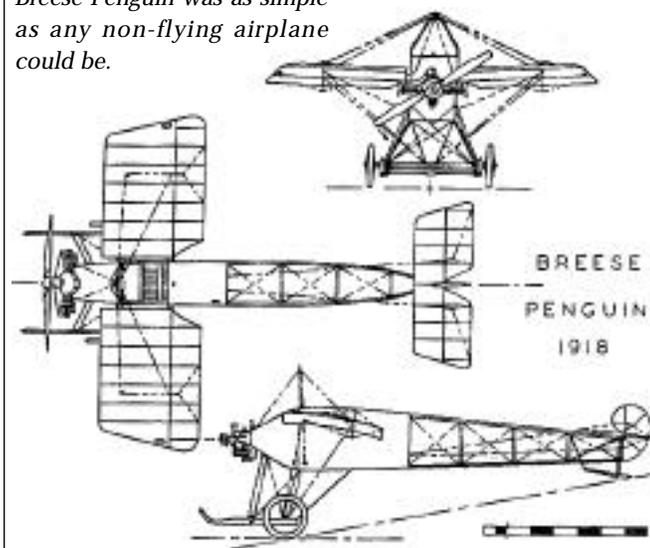
from their rotary engines, evil departure characteristics, and frail structure. In the hands of newly-trained pilots, such aircraft were unacceptably dangerous. Yet the Army had no planes which could help novices to transition from Jennies to the tricky fighters.

The US, which had just entered WWI, routinely sought the assistance of France in aviation matters. The French were viewed as experts on flying, having made such wise contributions as ailerons to early aviation. In this case, the French recommended that the Signal Corps procure an intermediate trainer with flaws similar to those of the fighters. To minimize the risk of crashes, the new plane should not be able to climb to a great altitude. No altitude at all would be ideal. Fledgling aviators would careen across training airfields, pitching and yawing their "penguins" without actually flying.

Not surprisingly, this French idea would prove less successful than ailerons...

To construct a non-flying aircraft with poor handling is not hard. The American inventor who did it was Sidney Breese. According to legend, his plane was so suitable for its role that, when the prototype did become airborne by accident, it immediately crashed. Impressed, the Army asked him to supply 300 more Penguins. Breese first had to produce drawings of his creation; in the finest entrepreneurial tradition, he had built the prototype without any.

As this drawing shows, the Breese Penguin was as simple as any non-flying airplane could be.



and an inability to reach full power. By the time the planes began to reach training airfields in the US South, the Army was also receiving Thomas-Morse biplane trainers that combined fighter performance with decent flying manners. Most of the flightless little birds were never even taken from their shipping crates.

Time has largely forgotten the tiny Breese trainer. Only one original Penguins survives, inside a museum in New York State.

**Most of the flightless little birds were never even taken from their shipping crates.**

Historians have recorded few details of the craft's design. Imagine the challenge of creating an "airworthy" reproduction of one.

Gerry Borden, a retired Lockheed employee, built his Penguin for the Yesterday's Flyers air museum in Carson City. Lacking better references, he based his project on an old three-view drawing and a 1930's magazine article. Gerry did all the woodwork himself, building the wings, fuselage, and tail. His wife, Dorothy, stitched all the fabric coverings. Their product is an authentic-looking recreation of the Penguin, with only a few modern additions. For example, the replica has brakes and a tailwheel where the original had neither.

The Lawrance engine is one part of the Penguin replica that is genuine. One of just six A-3's still in existence, the engine was donated to the museum by a California couple and overhauled by a museum volunteer. Being a primitive two-stroke design, this "flat two" powerplant is very rough running and, in Gerry's words, "The noisiest damn engine ever." However, later, larger, and better-known descendants of this engine included the classic Wright Whirlwind.

Gerry's Penguin is just part of a flock of vintage replicas operated by Yesterday's Flyers; others include Deperdussin and Le Demoiselle monoplanes and a Pfalz DIII fighter.

The Penguin has received awards since its completion in 1997; most notably, it was chosen as "Best Replica" at last spring's Watsonville, California, fly-in. Like many aircraft projects, it was brought to the show on a car trailer. Unlike other projects, it will forever be trailered. Yet the replica helps to remind us all of the oft-overlooked history of ... non-flight.

Acknowledgements: Thanks to Gerry Borden for showing his project to Don Souter, Rob Prior, and me back in September 1997. Additional thanks to Bill Coughlin of the Cradle of Aviation Museum in Farmingdale, New York, for the historical information. *T&B*



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*Ads that have been in for more than 6 months are subject to removal if space is required for other stuff. Please contact George the editor if you want it kept in.*

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Wings: ribs and minor spars done. Spar diaphragms done. Two spar-grade spruce planks. No other wing parts.

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#### **FOR SALE:**

1 set (8) 60810 (68763) M10 main bearings \$295 per set

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*Classified continued on page 8*

**Classified Ads**  
(Continued from page 7)

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George Gregory 882-8016

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\$35,000 Canadian. (604) 478-6048

Will consider small antique aircraft engine as trade-in.

**FOR SALE:** Some Cont.0-200 parts: Case (checked, no cracks) Camshaft, Gears, Rods and Pistons; Carb and spider, Starter (pull type) and Generator, mags (one is dis-

assembled). \$2500 for the package, offers considered on individual parts. Also, Prop hub for Cont. tapered shaft, \$350, Wing parts for Taylorcraft BC-12D (disassembled) including ribs, spars, compression struts, brace wires and strut fittings. Offers?

Contact David Smith (604) 513-0353  
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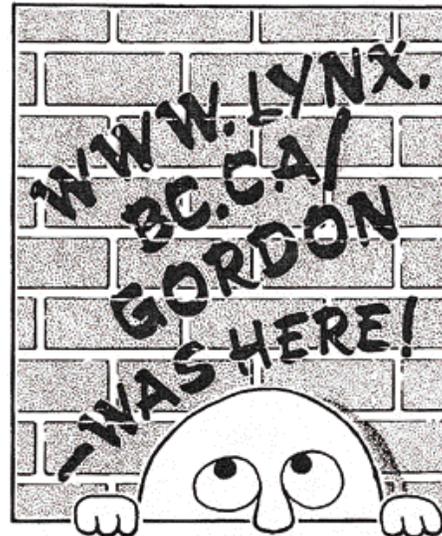
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E-mail:sgear@infoserve.net

**FOR SALE:** Set of instruments, switches, breakers, sheet metal tools, misc aircraft parts and materials.

Grant 536-6945



**A** FEW MONTHS BACK I was handed a couple of brief articles by worthy members for the Turn and Bank. As promised, here is the second of them.

Cat and Duck  
Instrument Flight Rules

*Although we do not know who authorized the Cat and Duck flight method, we are indebted to Lt Col. Alton J. Hilton, CAP's Director of Safety, for passing it along to us. We trust it is not too technical for you, and offer it to assure your future flight safety.*

Basic Rules:

1. Place a live cat on the cockpit floor. Because a cat always remains upright, he or she can be used in lieu of a needle and ball. Merely watch to see which way the cat leans to determine if a wing is low, and if so, which one.

2. The duck is used for the instrument approach and landing. Because any sensible duck will refuse to fly under instrument conditions, it is only necessary to hurl your duck out of the plane and follow it to the ground.

There are some limitations to the Cat



and Duck method, but by rigidly adhering to the following checklist, a degree of success will be achieved which will surely startle you, your passengers, and an occasional tower operator.

1. Get a wide awake cat. Most cats do not want to stand up at all; it may be necessary to carry a large dog in the cockpit to keep the cat at attention.

2. Make sure your cat is clean. Dirty cats will spend all of their time washing. Trying to follow a washing cat usually results in a tight snap roll followed by an inverted spin.

3. Use old cats only. Young cats have nine lives, but old used-up cats with only one life left have just as much to lose as you do and will be more dependable.

4. Beware of cowardly ducks. If the duck discovers that you are using the cat to

stay upright, it will refuse to leave without the cat. Ducks are no better in instrument conditions than you are.

5. Be sure that the duck has good eyesight. Nearsighted ducks sometimes fail to realize that they are on the gauges and

will go flogging off into the nearest hill. Very nearsighted ducks will not realize they have been thrown out, and will descend to the ground in a sitting position. This maneuver is difficult to follow in an airplane.

6. Use land-loving ducks. It is very discouraging to break out and find yourself on final for a rice paddy, particularly if there are duck hunters around. Duck hunters suffer from temporary insanity while sitting in freezing weather in the blinds, and will shoot at anything that flies.

7. Choose your duck carefully. It is easy to confuse ducks with geese because many water birds look alike. While they are very competent instrument fliers, geese seldom want to go in the same direction as you. If you duck heads off for Canada or Mexico, you may be sure you have been given the goose!

T&B