

# EAA CHAPTER - 690 gwinnett county, georgia NEWS - COMM

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MEETINGS 2ND FRIDAY EACH MONTH AT STONE MOUNTAIN AIRPORT-8:00 P.M.

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JULY 1982

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CRAIG GOTTSCHANG WITH HIS VARI EZE

See Article "IT CAN BE DONE" by Craig Gottschang

# IT CAN BE DONE

by  
Craig Gottschang

N30CG was the first Chapter 690 homebuilt to fly with its' maiden flight on April 7th. Although it took 3 years to construct it was actually begun many years before (as are most homebuilts), as an idea and a desire within me to build a "real airplane." Not having the tools or confidence to build an all metal or wood/fabric aircraft I became interested when an Air Force buddy (Dick Rutan), introduced me to a new construction technique his brother (Burt Rutan), was designing. I was immediately impressed with the foam/fiberglass construction method and even more so with the appearance and performance of the Vari Eze. The fact that it was a two seater and would require a minimum of special tools were enough to convince me.

I started construction shortly after leaving the Air Force and settling in Atlanta. Although the building time advertised by Rutan is greatly exaggerated (minimized?) as Gerald Collins has testified, the construction manual and newsletter provided by Rutan are generally quite good. Most of the early work involved two people and my wife helped with the foam cutting and all of the major layups. It was a psychological boost to see the plane structurally "completed" after a year and a half and surprising in retrospect that it took another year and a half to install the systems (flight controls, instruments, engine, etc.,) and "finish it up." Perhaps the greatest surprise was the time, work and money required to get from the bare fiberglass to a surface ready to paint. Any one area of the plane was sanded at least 15 to 20 separate times starting with 36 grit and ending with 400 grit wet sandpaper. The actual painting, although not an easy job, was a very small portion of the total finishing process.

I was too far along in construction to switch when the "Long Eze" came out but I did manage to incorporate many of the Long's improvements such as the larger main landing gear, better pitch trim system and larger canopy. I have equipped my plane with VFR instruments, an Edo-Aire Nav/Com and a transponder.

My philosophy during construction was to complete the plane as much as possible before taking it to the airport. Gerald and I both discovered it is difficult to work and think properly with the "help" of an airport crowd and the pressures of a first flight. Fortunately everything worked fine and by the 2nd or 3rd time down the runway I had some long "bounces" 5 to 10 feet off the ground. The next time out (after the Feds had signed me off), I blasted off for the real thing. As you might imagine the thrill of a first flight is on the order of a first solo, only magnified. You also gain an immediate respect for all "test" pilots. The first landing approach felt quite comfortable and I was able to hold it off for a smooth touchdown. Rutan recommends you "fly it down" with little flare but I see no reason for this needless punishment as visibility out the front is good even at slow speeds.

Following the initial flight I began a fairly orderly expansion of the flight "envelope" which included everything from stalls to well over 200 mph and from high speed passes down the runway to climbs to 12,000 feet. Although I have cruised at over 180 mph true airspeed, the most comfortable cruise speed seems to be 150 to 160 mph with about 5 gallons per hour fuel flow. The most enjoyable aspect of flying the Eze is the fighter like response of the side stick and the wide speed range in which you can maneuver. With nearly 60 hours and over 90 landings I am quite pleased with the overall performance and handling of the plane.

The project as a whole has been a tremendous accomplishment to me. I don't think I would characterize the Vari Eze as an "easy" plane to build ( I don't think there is such a thing) but I did manage to do it with a minimum of tools and with little prior experience. The main thing is persistence and a determination that it can be done; in other words, attitude. I have said this quite a few times but will say it here again for literary posterity: the successful builder is not one who says; "I would like to fly that plane, I think I'll build one." Rather he should say; "I'd like to build that plane and fly it when I'm done." You

have to learn to enjoy building or you won't finish. I did learn to enjoy building and have further benefited from the friends I have made and the help they have given me. It all becomes worthwhile when you are able to fly to an airshow in a plane you have built and can be proud of. It can be done!

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## NEW MEMBER

Welcome to new Chapter member Stephan De Blasio. Steve originally registered at our booth at the Gwinnett Co. airshow and joined our group at the June meeting.

Mr. De Blasio is interested in homebuilt aircraft, Ultralights, and owns a Mirage Ultralight.

Please add Stephan's name to the Membership Directory you received last month. His address is 6584 I-85 Court, Norcross, GA 30093.

## AERO HELP

I.A.C. Chapter 3 is in need of volunteers to help at their Aerobatic Contest at Bear Creek Airport September 23rd thru the 26th.

If you can help at this event, please see Rex Davis at the July Chapter meeting.

SEPTEMBER 23-26, 1982 — ATLANTA, GEORGIA — 4 Category South-eastern Aerobatic Championships sponsored by IAC Chapter #3 to be held at Bear Creek Airport. Practice and registration the 23rd. To pre-register send completed 1982 paperwork to Kathi Parks, 1297 Myrtle Creek Drive, Norcross, Georgia 30093. For more information, contact Bob Shaw, Contest Chairman, 106 Applesseed Ct., Peachtree City, GA 30269. Phone: 404/487-8322.

## MEMBER PROFILES

FRANK JOHNSON - My interest in light airplanes and sport flying goes back to the twenties, but I did not get involved full time until 1936 when I joined Luscombe at Trenton, New Jersey. This was after mechanical/aero engineering at the University of North Carolina and three years as surveyor with the Forest Service. At Luscombe I became director of the school division and, as a project, initiated the design of the "Model 50", the first of the "Silvairs".

In '38, on to Kansas City as structures engineer for Rearwin Airplanes, and in '39 and '40 became Chief Engineer of Porterfield. It was there that I met my wife, Leah, who was then working for CAA (now FAA). We have two children, Leah Smith, an economics professor at Swathmore, and Jane, who lives with us at Norcross.

During WW-II, I was with General Dynamics ( then Consolidated Vultee). Assignments included Control Surfaces Group Engineer in San Diego and Fort Worth on the B-24, PB4Y, B-32 and B-36, and Chief Design Engineer at the Stinson Division at Wayne, Michigan. Oh happy day--back on light airplanes! There I produced the L5-H, L-13, Skycoach and the Voyager 108-1.

In '46 I started 30 years with Lockheed. Design and engineering assignments have been on the P2V Neptune, C-130 Hercules, C-140 Jetstar, Polaris, Posiden, the Lockheed Supersonic Transport and considerable design research.

In addition to EAA, memberships include the Society of Automotive Engineers (SAE) and Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA). Am also a registered Professional Engineer in California and Georgia.

Our once extensive personal flying has been inactive for many years. Although retired, I am still hooked on light airplane design. Am now working on details of how to achieve a goal of 100 seat miles per gallon for the next generation of personal/utility types. That goal is about 40% over today's most economical the Mooney 201.

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HAROLD STALCUP - I am a salesman for American Cyanamid, a large chemical products company. I sell a refined mineral called Titanium Dioxide (TiO2). TiO2 is used as a whitener and opacifier primarily in the manufacture of paints. The proper amount of TiO2 in a gallon of paint will enable "1 coat coverage", lesser amounts result in poorer "covering power".

Kay and I have three sons: Hal: married and serving in the Air Force at Wright Patterson in

Dayton, Ohio. Thom: married, recently graduated as a M.E., and hunting a job. Jim: High school senior and operator of a partially rebuilt 1949 Chevy pick-up.

I soloed in 1969 and accumulated approximately 50 hours in a Cessna 150. The expense of flying became prohibitive and I had given up flying until I met a guy who was building a Thorp 18.

This opened a new path to flight and here I am trying to build a Zenith CH 200. My project is about 2/3 complete with the hardest, most aggravating 1/3 to be done.

I joined the National EAA when I got my plans in 1974 and have belonged to local Chapters where possible. The help, assistance and encouragement that results from EAA membership is immeasurable. You meet and know men and women who won't admit that something is impossible, who "make do" with what is available, and who are super scroungers. EAAers are a breed apart, I guess because of their dedication to flight and flying.

Although the building of an airplane is a one man activity many times help is needed and it is freely given by Chapter members on a moments notice knowing that the time will come when it will be they who need help.

After a slow start and some growing pains, Chapter 690 is off and running. There is a spirit of camaraderie developing which I haven't experienced in other Chapters. It makes membership in 690 that much more enjoyable for me.

Progress on my project has been slow for two reasons. The travel required by my job, and the need to devote time to my family. I have set my sights on having my Zenith ready for final check-off in the fall of 1984.

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## MEETING DATE CHANGE PATCHES

Our guest speaker for this month could not be with us on our regular monthly meeting night so the Chapter meeting night has been changed from July 9th to Friday July 16, 1982, at the Stone Mountain Airport at 8:00 p.m..

At this months meeting we will reopen the discussion on the Chapter patches and a "nickname". Please be thinking of these items and present them at the Chapter meeting.

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We are fortunate to have as our speaker for this month Mr. Ron Maness, who is a former member of the Air Force Thunderbirds, and now a pilot for Eastern Air Lines. Mr. Maness will be talking to us about his tour as a member of the Thunderbirds, formation flying and precision aerobatics.

### NEW SPORT AVIATION BOOK

Budd Davisson's new book, WORLD OF SPORT AVIATION, will be available July 15 and premier at OSHKOSH '82. Published by Hearst Books, the 288 pages contain 240 pictures and 32 pages of four-color photos. EAA provided input for the book along with POPULAR MECHANICS. Paul has written the forward for the book. It's a high quality book and we are happy that a writer of Budd Davisson's caliber was enlisted to write this book.

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### REPAIRMAN'S CERTIFICATE FOR ANTIQUES

Over 130 letters have been received at EAA Headquarters regarding the proposed Repairman's Certificate for Antiquers. We need many more letters than this before we can represent the true feelings of the membership. PLEASE WRITE Paul at EAA Headquarters with your comments on this proposal. A committee headed by Antique/Classic President Brad Thomas has been formed to continue this effort.

### KEEPING TRACK OF PLANE PARTS:

Building a homebuilt plane or restoring a classic antique aircraft usually takes years of spare time. Such projects require a large number of small parts. Keeping parts in order for assembly can be a real challenge for one's memory. A big help is to store parts in 6" x 9" clasp envelopes or 1 lb. size (small) grocery bags. A notation on the envelope to identify the part, such as "aileron in-board bracket bolts", is made on the front. Added information as to head of bolt direction and sketches will be a big help. Store the bags or envelopes in cardboard boxes obtained from the local supermarket. Have a box for wing parts, another for fuselage parts. In this way parts can be kept clean and orderly.

# TECHNICAL TOPICS

## MAGNETOS — Part I

By Rolland LaPelle (EAA 55705, A&P 210007)  
2526 Buena Vista Ave., Walnut Creek, CA 94596

As originally published in INTREPID AIRMAN Santa Clara Valley, California Chapter 62's Newsletter

The magneto is essentially a small AC generator, constructed so that the pulse of the voltage wave produced reaches a peak at a certain rotation position, (See Figure 1). When coupled to an engine crankshaft, this feature can be utilized to fire a spark plug. Adding a breaker causes an interruption of voltage at maximum peak, thereby causing a rapid voltage decay. When this sudden steep voltage change is seen by a spark coil or transformer, it results in a very high induced voltage. At the very same instant, this high induced voltage is delivered to the plug.

Of course, most aircraft engines have more than one cylinder, which means that a spark voltage must be delivered to each cylinder in turn. In order to do this, the speed of the magneto crankshaft must be controlled. The ratio of the magneto shaft speed to the engine crankshaft speed is represented by the formula:

Number of cylinders

Twice the number of magneto poles

Utilizing this formula for a 12 cylinder engine with a 4 pole magneto with uncompensated cam, (Typical), then the ratio of magneto shaft speed to crankshaft speed becomes:

12 cylinders	12	Thus, the magneto shaft must turn at a speed 1.5 times crankshaft speed.
2 x 4 poles	8	

A typical 4 cylinder installation with a Bendix mag, (2 pole, uncompensated cam), becomes:

4 cylinders	4	or the magneto shaft speed is the same as crankshaft speed.
2 x 2 poles	4	
6 cylinders	6	mag shaft speed must be 1.5 times crankshaft speed.
2 x 2 poles	4	

When using standard, certificated engines, this critical item is taken care of by the manufacturer of both the engine and the mags. A non-standard engine might present a problem to the uninformed.

## ENGINE TIMING:

When the magneto becomes aligned with the pickup poles, there occurs what is known as the "E Gap", or neutral position. As the magneto approaches this position, the current causes the flux to build up in the iron

high tension system so that a relatively low voltage would be delivered to the primary coil of a step up transformer located close to the plug. The main disadvantage of this system is that a coil is needed for each spark plug. For starting the engine, two main systems are currently in use; impulse coupling and the so-called "shower of sparks" system.

## IMPULSE COUPLING:

Either or both of magnetos in use on a particular engine may be fitted with an impulse coupling system, together with a spark retarding feature. These devices typically retard the spark from 20 to 30 degrees, so that the spark will fire after Top Dead Center, (TDC). The impulse coupling itself works by locking out the shaft rotation, resulting in the storage of the rotational energy in a spring. At a predetermined position, the catch is pulled away from the dowel stop and the spring drives the magneto rapidly through the firing position, resulting in a very hot spark. When the engine fires and starts, the magneto begins to spin faster, and centrifugal weights force the catch away from the dowel, preventing the impulse coupling from engaging. This usually occurs between 400-600 RPM. Anytime you have prop started an engine, the loud click you hear as you pass the maximum compression point is the sound of the impulse coupling releasing. If your engine is fitted with one or more impulse mags, allowing the engine to idle too slowly will result in the impulse couplings engaging continuously, and excessive wear will inevitably result. Idle RPM's should always be kept at 800 or more in order to prevent excessive impulse coupling wear. As some of you have found to your sorrow, they are expensive to replace.

## "SHOWER OF SPARKS" SYSTEM:

This system requires a vibrator, and consequently, a battery to power it. When the starter switch is turned to the "start" position, the magneto without the starting breakers is turned off, (shorted), along with the primary points. The vibrator then supplies alternating current to the secondary points. When the points close, a continuous shower of sparks is provided until the points open. These points are always designed to close after top dead center. When the engine starts, and the starter is turned off, so are the secondary points. At the same time, the magneto is again turned on, and thereafter operates normally.

NICE TO KNOW

HARDWOOD  
BLOCKS - SCREW  
TO BENCH

John Poppo  
3508 Bowling Green Way  
Doraville, GA 30340



EAA Chapter 690  
3416-B Water Vistas Pkwy  
Lawrenceville, GA 30245

#### SHOP TIPS BY BOB HALEY, DESIGNEE 64

*From the Hartford, Connecticut Chapter 166, Newsletter.*

##### CENTER DRILLS FOR AIRFRAME BOLT HOLES:

A push fit of airframe bolts in metal parts up to one half inch thick can be obtained by using a lathe center drill. This drill will make round, tight holes for optimum fit, in a one-step drilling operation. It works this way: The pilot drill portion of the center drill enters the work first, then the counter sink follows reaming out the pilot hole to the desired size. Center drills can be purchased in 3/16", 1/4", 5/16" and 3/8" diameters at industrial supply companies. For best results use a drill press and cutting fluid.

##### WELDING WITH "C" CLAMPS:

When welding small parts and using a "C" clamp to hold the pieces during a bench assembly, it's sometimes difficult to position the job for easy welding. A second "C" clamp used at 90 degrees and clamped to the frame of the assembly "C" clamp will make a firm base and provide a variety of welding positions.

##### CONTINENTAL AIRCRAFT ENGINE SERVICE BULLETIN: OIL ANALYSIS

Some engine operators have found it advantageous to submit samples of engine oil on a regular basis, to a laboratory to determine the presence of wear metals or other contaminants.

The interpretation of the test results depends largely on a continuity of tests and the change in contaminant level between successive tests. It is, therefore, most important that all samples from one engine be submitted to the same laboratory, and that oil sampling instructions supplied by the laboratory be carefully followed for each sampling.

Teledyne Continental can make no interpretation of results for individual cases, since it has no control over different sampling or testing techniques between laboratories.

The operator using an oil analysis service is reminded that an oil analysis does not reveal all abnormal engine conditions. It should not be used as a replacement or substitute for routine maintenance and inspection procedures recommended in the Operator's Manual, Service Bulletins, or other directives.

##### PROTECTIVE COATING ON SHEET ALUMINUM:

Stits zinc chromate epoxy primer lightly sprayed onto an aluminum sheet that has been metal prepped, will give the sheet a protective coat against scratching and corrosion. Parts can be cut from the sheet, bent and dimpled with a minimum loss of paint film. A final light spray coat when the part is finished will seal cut edges and fine scratches. Other primers would work as well but as I have only used the Stits brand it is the one recommended here.

##### C-172 CORROSION

*From FAA Aviation Standard Service Difficulty Reports*

The cap plate of the wing spar had exfoliation corrosion, and was almost completely destroyed. The submitter says the problem area cannot be seen without removal, from the main spar. He suggests if substantial surface corrosion is found on visible side of cap plate a further investigation should be made. This corrosion was found on a C-172.

##### FREE PLAY IN CONTROL SURFACES

*From the Grand Haven, Michigan EAA Chapter 211 Newsletter*

Sometimes when noticing free play movement in control surfaces on homebuilt aircraft, the question has arose, "How much free movement is permissible?" i.e. the total up and down movement at the trailing edge, in the case of ailerons, without any stick or wheel movement. An FAA engineering report entitled "Simplified Flutter Prevention Criteria for Light Aircraft" provides guidance for aileron systems on aircraft with Vne (never exceed velocity) less than 160 mph. This report states, "The total free play at the aileron edge of each aileron, when the other aileron is clamped to the wing, should not exceed 2 1/2 percent of the aileron chord aft of the hinge line." This could mean in the instance of an aircraft with ailerons having a 10" distance from hinge to trailing edge; a total free movement of 1/4", or total up and down movement of 1/8" for each aileron, could be permissible. Other factors which can affect need for closer tolerance on movable control surface are torsional rigidity of the fixed surface to which the control surface is attached whether or not the surfaces are statically and aerodynamically balanced and the Vne speeds expected.