Hangar *Echoes*

Experimental Aircraft Association
Chapter 168 Dallas, Texas

October 1995
Vol 26 Issue 10

Da Plane! Da Plane!

Director's Meeting

The **Oct. 3rd meeting program** will be Pete Huff's flight to Europe.

The **Oct. 7th fly-in** will be at Hudson A.P.

The **Oct. 12th Board meeting** will be in the staff lounge at the library.

The **Oct. 31st Newsletter folding** will be at Tom Lewis's.

Bo Bauereis will be replaced by Bob Frye as **Meetings Chairman.**

The following have agreed to run for **1996 offices:**

Vern Williams - Treas

Jerry Mrazek - VP

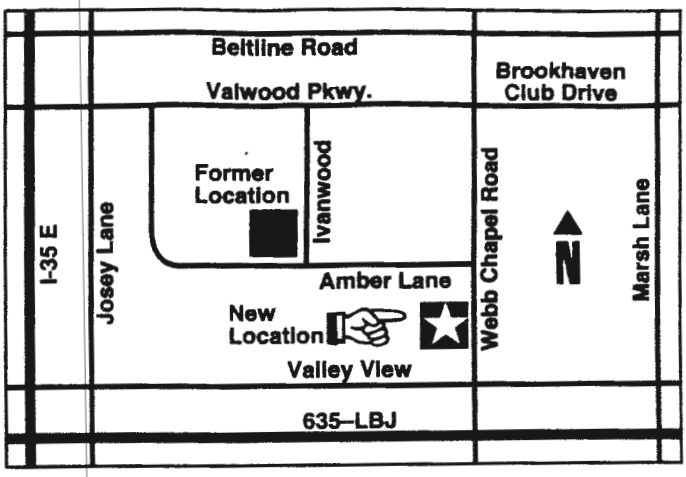
Earl Browning - VP

The **Oct. door prize** will be a ride in Dr. Don's RV4 (210 lbs max).

The repair of **Chapter trailer** was discussed. Jerry Bidle made a motion to have a committee study options for restoring it and report back in 2 weeks. Jerry will chair the committee. The motion seconded and unanimously approved.

Ernie Ludwig suggested that we consider buying **Tony Bingalis's new engine book.** It was decided to wait and inspect it Kerrville.

Sam Cooper reminded us that we must elect **new officers** next month.



Calender of Events

October 3: Regular Meeting Farmers Branch Manske Library 6:30 pm - 8:45 pm.

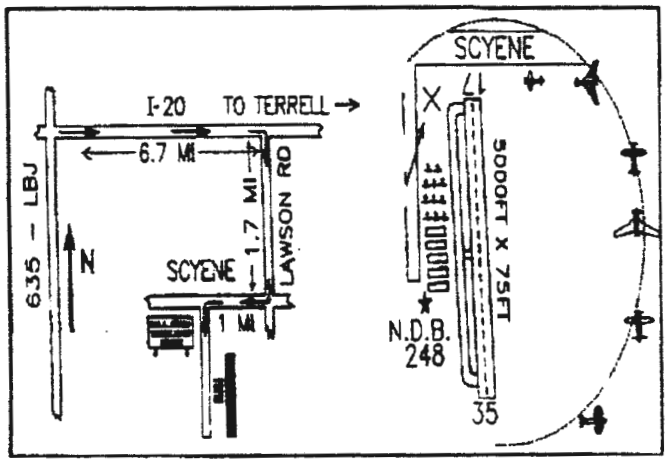
October 7: Fly-in at Hudson Airport

October 12: Director's Meeting Farmers Branch Manske Library 7:00 pm - 8:45 pm.

October 20 - 22; EAA Kerrville Fly-in, **ERV, UNICOM** 122.7, **ELV** 1616 ft

October 27 - 29: Chapter 972I; Flying M Ranch Fly-in, **UNICOM** 122.9; **ELV** 310 ft - Dave & Judy Mason (409)369-4362

October 31: Hangar Echoes Assembly host Tom Lewis; starting at 7:00pm. (394-1895)



The President's Letter

Our September 9th Fly-in/Barbecue Lunch at the Flying O airport was blessed by some of the best September weather we have enjoyed in years. After the heat of August, it was a welcome break. We had a good turnout, about 25 airplanes and 100+ people enjoying the camaraderie and spirit of a typical Flying O Fly-in. As always, the 3000' grass strip was in excellent condition. If you only make it to a few Chapter Fly-ins a year, this is the one to put on your list.

All of us need to thank Mary Jane and Henry Odlozil, along with their extended family, for hosting such a great Fly-in at the Flying O in Ennis. Thanks, we all had a great time.

The 1995 EAA All-American Sport Aviation Fly-in went off safely and fairly smoothly at the end of August. In spite of the heat, there were approximately 13,000 visitors over the three days, with 2500+ aircraft operations. After paying the bills, the organizers have funds left over that will serve as seed money for 1996. The 1996 event will again be a 2 1/2 day affair at the end of August.

As the organizer of the non-Warbird Aircraft Marshaling effort of the 1995 EAA AASA Fly-in, there were many people who helped make it happen. First, Ann Asberry did a terrific job assisting me with the details of preparing for the event. She also recruited a number of our volunteers. Without her assistance, it would have been much more difficult for me to run my portion of this event.

Second, I want to thank all of the Chapter 168 members who volunteered some of their time on the flight line: John Whatley, Cris Harrison, Tom Emerson, Frank Prokop, Bo Bauereis, David Cheek, Bonnie and Tom Lewis, Vern Williams, John Hammond, Leon Rausch, Peggy and Bob Fry, Pat and Gary Vandergriff, Don Christiansen, Johnnie Eskue, and Gary Hansen. I truly appreciate the time you donated to help us marshal aircraft for the Fly-in. It would not have happened without you.

In addition, we had other volunteers from several other organizations: Chapter 34, Chapter 323, the NTUPA, the TI Flying Club, the Northern Telecom Flying Club, and the SCCA. These people also made it happen.

Speaking on behalf of the officers of the 1995 EAA AASA Fly-in, thanks for volunteering your time. You contributed greatly to the success of the event.

The 1995 EAA Southwest Regional Fly-in at Kerrville, TX on October 20-22, is rapidly approaching. Brochures on the event will be at the October Chapter Meeting. Once again this year, Chapter 168 is handling the Flight Line Operations (directing aircraft on the taxiways), for this Fly-in. If you attend the Fly-in, please donate some of your time to this, or any other, volunteer effort. Two hours of your time will help the event run smoothly.

The Chapter Board is reviewing the Chapter Trailer situation. A BOD Meeting on the Trailer will be held before the October Meeting. We will keep the membership informed of what steps will be taken to either repair or replace our current Trailer.

I want to thank two new Chapter members who have recently stepped forward to fill a Chapter Officer position. Bob and Peggy Fry are stepping in as our Meetings Officer (refreshments for Chapter Meetings), in place of Bo Bauereis. Bo has served admirably in this position all year, and deserves our thanks for having provided this service to the rest of the Chapter.

I want to thank Ann and Mel Asberry for hosting our August 29th Hangar Echoes newsletter assembly. I expect the Zenair to be flying in a few months.

Let's keep building and restoring, so we can keep them, and us, flying.

- Sam Cooper

Flight Counselors Corner

Airspeed

Or lack of it. Langwische has a chapter called "Gaits of the Airplane". In it he discusses the various speeds that a plane may use to produce particular benefits of flight.

I have spent a lot of words on my primary students explaining the benefits of economy cruise. Langwische makes the same point. At ranges near the limit of the air craft fuel range it can actually save time to slow down and avoid a fuel stop by stretching the range. At the risk of starting another round of a long running debate I introduce the discussion of the relationship between the throttle and elevator in controlling "airspeed".

One possible starting place is on the ground. Sit in the plane and move the elevator to all its possible positions. The speed does not change. So it must be the throttle that makes speed. Another test can be performed up high. Close the throttle and establish a glide, then push the stick forward to the "high speed position" and note that the speed really begins to increase. From this test it is obvious that the elevator controls speed. Oops. we have just demonstrated contradictory results.

The debate about which controls speed has to be limited by a "bunch" of conditions. One very important condition is that there must be available energy. In the ground test the energy is low to zero. In the gliding test the energy is being derived from the loss of altitude and the force of gravity.

The most readily available source of energy in most flight conditions is the "throttle". But slow the airplane to near stall speed (at a safe altitude) hold the stick well back and start applying more power. You will find that speed does not increase much, you get lots of noise, lots of shaking and a difficult to control airplane but not much speed. The elevator has placed the wing in such a draggy condition that the "Power" is unable to produce speed. You are behind the power curve. A condition one should avoid near the ground.

Another interesting test is a variation on the gliding test. At a safe altitude, trim the plane for low cruise with "low cruise" power. Note the speed, reduce the power, leave trim setting alone and observe that the plane will begin to loose altitude but will automatically establish a gliding descent at very near the speed observed before the power was reduced. The elevator has used its "speed control power" to establish speed. The loss of altitude is supplying the needed energy. The other side of this test is to again establish a low cruise at low cruise throttle setting, note speed etc., then increase power by 15% or so but leave the trim at its original setting. The plane will start climbing and stabilize at very near the original speed. Again the elevator has controlled the speed. The added power has been absorbed by increasing altitude.

William K. Kershner in his Flight Instructor manual puts it this way, ". . . think of the elevator and power as being separate entities. Then 1. the elevator or stabilator controls airspeed, 2. the throttle controls altitude. . . ." He further explains "Addition of power will cause - (either) a. an initial climb, b. an increase in rate of climb, or c. a lesser rate of descent." And further - "a reduction of power will result in (either) a. a lesser rate of climb, b. a descent, or c. a greater rate of descent."

In the final analysis we find that if you wish to go faster than you are at any given moment you must use forward pressure on the elevator control. If you wish to go slower you must use back pressure on the elevator control. Power will need to be adjusted to achieve the desired ascent or descent. These conditions persist in virtually any right side up and reasonably wings level condition. Inverted flight and various other unusual attitudes will require other control applications to maintain safe flight.

Reliable reports indicate that the U. S. Navy teaches that speed is controlled by use of the elevator. And ascent/descent is controlled by power.

Every pilot was given training in the "stability demonstration" exercises. This demo sets up a standard cruise condition with power and trim set to maintain hands off level flight. -

Contluned

Be-at-rice

I would like to share with you information about a delightful place in the heart of the midwest, the name is Beatrice. The town of Beatrice (not to be confused, if you please, with Be-atrice, the locals will quickly let you know you have mix-pronounced the name of their fine community, its Be-at-rice) along the south eastern border of Nebraska is home of some industries whose name is virtually a common shop word, namely Vice Grip. It is a fine town in the middle of Americas heart land, but what I found most appealing was not the fact that they are the home of Vice Grip but rather the exceptional service and hospitality I received when we flew into their municipal airport. My brother and I flew to Be-at-rice to participate in a fly in of Meyers airplanes. This occurs once a year among Meyers owners and this year Beatrice was chosen, for obvious good reason. Incidentally the Meyers was built until 1963 and looks very similar to a Navion, although you would never dare to express that obvious characteristic in front of a Meyers owner. I called for airport advisory in my usual dutiful manor. The response began with "Be-at-rice winds are.... and runway 2~ is favored", with the emphasis on correcting my pronunciation. All was well, I responded with "66R roger" then began the real surprise. Beatrice unicom came back to me with "how can we help you 66R?". I was taken back, I had never experience such a come back. I responded about our intentions to attend the Meyers event and planned to stay overnight and to get fuel. They acknowledged. As I exited the runway we were greeted by a ground handler who guided us up to the fuel pumps. OK, so nothing so unusual, except the ground handler was the airport Manager himself who greeted us very cordially and with a sincere appreciation for our being there. While one attendant fueled the aircraft, another proceeded to clean the leading edge of the wing.... yes he was going along with a spray bottle of cleanser and carefully removing all the bugs that had accumulated on the wing during our 3 hour flight. In all my years of flying I have never seen this kind of service before, and it doesn't stop there. They were more than happy to toe my Bonanza to a hanger for the night, of course AT NO CHARGE, after all I had purchased their fuel, they were glad they had the space (the fuel was $1.89/gal). On top of this, when we got ready to go to our motel and check in, they gave us the use of one of their curtsy cars, just handed us the keys and said to bring it back when we were done and of course at no charge.

The next day as we were settling our tab, they gave us a visitors goodie bag. It consisted of a set of! wheel chocks with their name embossed on them, several large plastic paper clips which came in very handy while managing the VFR charts on the way back, and a sample of fruit cake baked in a local bakery. I am not the most traveled pilot in this chapter however I have been to many airports during the last 20 plus years of flying and never have I ever received such Red Carpet service as I received that weekend at Be-at-rice Nebraska Should you ever do a cross country that come close to this fine airport, I would highly recommend you go out of your way to drop in and sample their first class service and appreciation for pilots. while at beatrice NE they had on their wall an interesting glossary of aeronautical terms that I had to pass on to you, i think they are good!

1996 Officer Elections

The 1996 Officer Elections will occur at the October Meeting. The slate of nominees is as follows as we went to press: Vice President: Earl Browning, Jerry Mrazek Treasurer: Vern Williams The results will be announced at the October Meeting. In the event of a tie for an Officer position, the Chapter President will cast the deciding vote. The new Officers will assume their posts on January 1, 1996.

Electronic Fuel Injection Simplified

For those of you that had a hard time programming your VCR (me included) just the thought of electronic fuel injection probably makes you break out in a cold sweat. Doubts that you could actually wire it up, lingering thoughts that you did it correctly, imagining the worst that when you turned the ignition switch on you would see smoke come rolling out. To allay these normal reactions I am going to give you a guided tour of a typical automotive multi-port fuel injection system and prove that you don't have to be an electronic engineer or trained technician to make it work. It may also ease your mind when faced some day with a car fueling problem. I will start with the various information input sensors and the functions they perform. I will then cover what the Electronic Control Unit (ECU) does with these signals. To keep the information organized I have included wire color codes and ECU connecting points associated with these sensors. In reality, these colors and connecting points differ from vehicle to vehicle and between manufacturers. Reference to respective shop manuals is necessary when dealing with specific vehicle ECU packages.

SENSORS

Throttle Position Sensor (TPS)

The TPS provides a voltage signal that changes relative to the throttle butterfly position. Signal voltage will vary from less then 1.25 volts at idle to about 5 volts at wide open throttle (WOT). The TPS signal is one of the most important inputs used by the ECU for fuel control and for many of the other ECU controller outputs Actinn like a rheostat. it is located on either the carburetor, single port throttle body, or air inlet throttle body, directly opposite the throttle plate linkage. An ohmmeter is used to verify its operation.

Connection	Wire Color	ECU
TPS +5v	blue/orange	C14
TPS	black	D2 (gnd)
TPS varies	yellow/blue	C13

Oxygen Sensor (02)

The 02 sensor is found on the exhaust manifold near the engine exhaust ports. Acting as a battery, it generates a DC voltage as the tip is heated above 600 degrees F. The voltage will vary between 0.10 volts in a lean oxygen exhaust stream to 1.0 volt when sensing rich oxygen content. If the 02 sensor is below its normal 600 degrees F. operating temperature the engine goes into what is called a open loop condition. Thus at startup, the ECU ignores the 02 sensor signal and substitutes a pre-determined value programmed into the ECU, normally to provide a richer mixture. Some 02 sensors have heating elements built in to increase their sensing function.

O2	Blue	D7
O2	Black/Blue	D6 (gnd)

Coolant Temperature Sensor (CTS)

The CTS uses a thermistor to vary a signal voltage to the ECU. As the engine warms up the voltage will stabilize at 1.5 volt to 2 volts. CTS is used by the ECU to control fuel delivery & idle air control.

CTS +	Gray/Black	C10
CTS -	Gray/Black	C11 (gnd)

Intake Air Temperature Sensor (IAT)

The IAT sensor uses a thermistor to vary the signal voltage to the ECU. The ECU applies a voltage (4 to 6 volts) to the sensor. When the intake air is cold the sensor resistance is high therefore the ECU will see a high signal voltage. As the air warms the resistance becomes less and the voltage drops. The IAT helps control fuel delivery.

IAT +	Blue/Black	c12
IAT -	Blue/Black	D2 (gnd)

Manifold Absolute Pressure Sensor (MAP)

The MAP sensor responds to changes in manifold pressure (vacuum, or pressure in the case of turbocharging). The ECU receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle idle to 4 to 4.5 volts at WOT (low vacuum, near atmospheric). This sensor will also signal the changes in altitude pressure. This input to the

ECU adjusts the richness/leanness of the air to fuel ratio.

MAP signal	Gray/Red	C11
MAP -	Gray	A11
MAP + ref	Blue/Orange	C14

Crank Pulse Reference Sensor(CPR)

A variety of means are used to determine engine rotation. These on-off voltage signals to the ECU principally determine the rate at which fuel injectors open and close.

CPR	Yellow/Red	B5

OUTPUT DEVICES

Fuel Injectors (FI)

These are spring loaded devices that open and close at a fixed rate depending on the throttle position and other inputs to the ECU. Fuel is fed to the fuel injectors (only one in the case of a throttle body injector-TBI) at a regulated value of pressure, typically about 36 pounds.

FI #1 & #2	Blue/White	D15
FI #3 & #4	Blue/Yellow	C15

Intake Air Control Valve (IAC)

This electrical control valve allows air to be fed into the intake manifold to maintain a constant idle, This is controled by the CTS, IAT, and the TPS.

IAC	Blue/Black	C12
IAC	Black/White	D2 (gnd)

ECU WIRING

The heart of the the ECU is a PROM, or Programmable Read Only Memory. When powered up the PROM recalls its memorized instructions and compares them to the signals being sent by the engine senors. These instructions are complex by nature of almost infinitely variable driver demands, the engine design parameters, vehicle drag, and restraints imposed by fuel economy and exhaust emissions requirements. To achieve the optimum compromise for each specific vehicle model, engine control designers spend thousands of hours fine tuning the intricate PROM instructions. Running changes incorporating further improvements are common place. Fortunately no one except the PROM designer, need to be concerned about the internal workings of the ECU. Short of a comlete disruption of battery power the PROM goes on ticking under environmental extremes of temperature, humidity, and altitude. Performace PROMs are available in the hotrod marketplace but their advantages withrespect to use in auto conversions for aircraft remain unproven. For aircraft use the ECU can be powered up by an ignition key or a DPST switch. This switch also power the fuel injectors. The sketch shows the correct connections., Solid grounding of the switch tometal is important; the airframe, engine, engine mount, or the metal instrument panel can serve as suitable grounds. Sensors are directly connected to the ECU according to the general ECU connection schematic. The ECU provids internal grounds for the various sensors(A11, A12, D1, D2, D6). The ECU can be reset by removing the power totally. This causes the ECU to clear the memory and on the next power up it will go to the ROM and start the instructions from there. On start up the ECU will look at block temperature and determine if the block is cold and if it is it will increase the fuel flow to richen the mixture. At the same time is looking at the TPS and the O2 Sensor. As the engine warms up the ECU will start leaning out the engine by reducing the fuel flow from the injectors. This is determined by taking samples from the IAT and O2 sensors. As the RPM increased the ECU will monitor the MAP and TPS sensors to change the fuel mixture to give the maximum power output while leaning the engine to produce the smallest amount of unburnt fuel. Like an aircraft carberator the electronic fuel injection can change the mixture at any time but it can do it with very minute changes.

When installing an auto conversion with electronic fuel injection controls it is virtually mandatory to refer to the respective shop manual for the numbered and colored coded connection instructions. These systems are subject to change so pay attention to the specific year (and make -ed) is always prudent. Shop manuals are a great source of information; most local libraries will have recent model year copies which can put you in

command of this technology - ***Steve Parkman*** reprinted from '***CONTACT!***'; San Deago EZ FLYER newsletter.

Continued from page 4

Then the plane is pushed into a shallow dive and left to stabilize flight, hands off. A second fact is being demonstrated, with fixed power and elevator settings the plane speeds up and begins to climb, then slows down and begins to descend it repeats the oscillation about the speed set by the elevator until it damps out and remains at near the altitude (set by the power) and speed (set by the elevator) at the beginning of the exercise.

On a day when the air is still it will build confidence and skill to practice these control exercises while you fly for fun.

- Brownie Seals

Be-at-rice Continued

- air foil... sword used for dueling in flight
- air strip... inflight performace by exotic stewardess
- cock pit... area where chicken pilots are kept
- dive... pilots lounge
- down wind leg... when a girl is standing sideways to the wind, skirt will be lower on this leg
- elevator... device for raising runways, thus preventing pilots from "droppin in"
- final aproach... last pass pilots make at a girl b4 giving up
- flaps... birds do it, not recommded for fixed wing aircraft
- gross weight... 350# pilot
- nose wheel... device sometimes bent by pilots
- pilot nose... usually bent just after nose wheel
- propeller... fan that keeps pilots cool, must be the case, watch them swet when it turns off
- roger... most popular name on radio
- rpm... initals for a large corperation that builds tachs
- piper cherokee... flying indian musican
- runway... place where stewardesses start the air strip
- sky jack... devtce for changing tire inflight
- slip... apparel worn by some pilots
- stall... place where planes are kept
- super charger... pilot with wallet full of credit cards
- tail drager... pilot who lost bout with bottle last night
- thermal... student pilots discription of a container of hot coffee
- sulu time... used by african pilots

Editors Corner

Wow! Thats all I will say about the B-2. Wow' Dallas Love Field lots of stuff on the ramp: B-29 (FIFI), B-17 (Texas Raider), B-24 (Diamond Lil), C-5A, and lots, lots, lots more.

I want to thank the member who wrote Be-at-rice, please let me know who you are, well done. You get some at-a boys. Brownie thank you again.

Now about the disk that I need. If you have a computer and have the urge to write, and you don't know how to make a floppy please call me. 620-2486, pager 410-6842 - ***ed***

Classifieds - Aviation ads can be placed by Chapter 168 members free of charge.

Panes

Sonerai II - Low wing taildragger, 2 place. On Gear. Have all parts to complete, including wing modification, 2180cc VW (Monnett conversion) 0 hrs. $4,000 - Gene 424-9880

Christavia MKI. 285 hrs TT. Lyc IO-235, 180 hp rebuilt by certified shop. Prop is yellow tagged Sensenich. All elect equip was purchased new; Val 760 Com, Flybuddy Loran, NARCO AR-850 encoder, starter. Aircraft located at Clover Field south of Houston Hobby. Can send photo. $16,000 - Mike Burkhalter (713)996-7931

Appcee w/ Doyn Geronimo Convertion. 4100 hr TT and 700hr 180 hp engines with fresh anual. $38,500 - Bob at Lancaster Airport

Parts and Things

Fuel Trailer, 38 Gal. Welded Aluminum Tank, 13gpm 12volt pump, room for storage, service station type nozzle. $550 - Mel Asberry 517-5070

Carburetor, MA3A. P/N 10-3103 yellow tag - venturi and metal float, AD c/w by J&G Carburetor in July 94. $700 (no exchange) - Earl Browning 684-7670

Cylinders, Continental 0200/300. Chromed, less rocker arms and valve covers. $70 ea. - Philip Welsch 423-2636

Propeller - McCauley Met-L-Prop DM 7651. 74" 8 bolt Continental 0-300A. - Philip Welsch 423-2636

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Real Estate

Lot in Horseshoe Bend Air Park (South of Weatherford). Lets make a deal. $4,000 - Jim Mahoney, Ste. 636, POB 917729, Longwood FL 32791, (813) 647-7044

Home 5/3/3 in Air Park Dallas. Satellite TV and home theater audio system, elegance of wood paneling, built-ins and trim. Attached Hanger/Shop/Garage - Howard 248-4104 or Joe Harker 733-8783

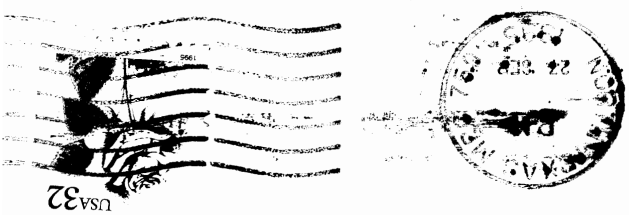
Want To Buy

Parts for Starduster II project: ailerons, elevators, rudder, fuel tank, engine mounts. New or Used. - Hernan Matos, POB 37441, Airport Station, San Juan, Puerto Rico 00937-0441

National EAA Offices:

Experimental Aircraft Assn., EAA Aviation Center, P.O. Box 3086, Oshkosh WI 54903-3086

EAA Membership (800) 322-2412 Phone (414) 426-4800 FAX (414) 426-4828



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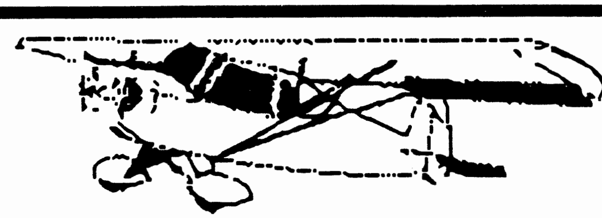

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Rentals Include J3 Cub and C-150
Lake Dallas.... Metro 817-321-6223