The Cleco

Experimental Aircraft Association Chapter 393

Chapter Meeting: August 22, 2012

Speaker: Harvard Holmes
Subject: Glass Panel Possibilities

Kids: Devon Goldschmidt & Liam Clark
Subject: Reports from AirVenture

President's Notes
by Bill Reining

Three cheers for summer! The mountains, the beach, and spectacular air shows have provided almost non-stop entertainment.

I was fortunate to attend AirVenture in Oshkosh, Wisconsin this July. It was, as always, fantastic. The total attendance was a little less than the previous year, but still over 500,000, with over 10,000 airplanes on the field and over 800 exhibitors! Dick VanGrunsven was honored for his many successful RV aircraft. In fact, over 500 RV aircraft came to Oshkosh. To top it off, Van introduced a new model: the RV-14 (kind of a large RV-7, or you could say a 2 seat RV-10). The exhibit halls were full of nifty gadgets, especially for the iPad, along with the usual array of parts and accessories for all manner of aircraft. I really enjoyed the forums – to me it is a chance for a free education. And the people one meets are all full of interesting stories. The Saturday night air show was absolutely phenomenal! If you have never been to AirVenture I urge you to put it on your "bucket list".

While at Oshkosh I had a chance to visit the Air Academy and check up on Devon Goldschmidt, who was just finishing her week. Devon had a really super time and expressed considerable thanks to the chapter for sending her to the Academy. We will hear more from her, as well as Liam Clark, when they report on their experiences at our next general meeting on August 22.

Meanwhile, the clubhouse is really shaping up. Scott Achelis has directed a dedicated group of volunteers who are doing wonders to the place. The outside plants, bushes and trees have all been pruned and cleared out – you can actually see the building now! The main meeting room has been insulated. A new drywall "face" has been applied to the front interior wall of the main meeting room, nicely hiding the uneven surface and former fireplace area. The drop ceiling has been ordered and will soon be in place. The garage has been completely cleaned out and actually looks attractive. New plumbing for the kitchen and bathrooms is in work. Walls are being cleaned and sanded as needed in preparation for painting.

If you have time to help work on the clubhouse, please let Scott or myself know. In particular, please provide details on your availability, skills and experience. You can expect to hear from Scott as he begins to assemble work parties. Note: there are no "all hands" work days planned – Scott finds that more gets accomplished when small groups are assembled, led by folks with experience and skills for the job at hand.

The next Young Eagles Rally is Saturday morning, August 18. Please let Jack Davi know if you can volunteer, either on the ground or as a pilot. Our "Kids Fly Free" sign is hanging on Concord Blvd for several weeks, so we expect a sizable turnout.

Young Eagles Events
By Renee Robinson

Our next Young Eagles rally is next weekend. I need all the help I can get to make this run smoothly. Please sign-up as a volunteer!

Thanks, Renee Robinson

Donate your old laptop computer!
We can use a few additional laptop computers for the Young Eagles events. The only software required is a relatively recent web browser, so Windows, Mac, and even Linux is acceptable.

Dinner Menu
By Rick Bourgeois

Dinner is served at 6:30pm – Donation is $7:

- American Chop Suey
- Green Salad
- Dinner Rolls
- Chocolate Chip Cookies
- Ice Cream
- Coffee and drinks (water & soda)

Let Rick know your suggestions for future meals.

August 1, 2012 Board Meeting Notes
by Harvard Holmes

Attending: Treasurer Bob Belshe, Membership Coordinator Vi Egli, President Bill Reining, Past YE Coordinator Dick Sperling, YE Coordinator Jack Davi, Guy Jones, Meals Coordinator Rick Bourgeois, Tools Coordinator and Photographer Tom Howard, Harvard Holmes, Scott Achelis.

Treasurer – Bob Belshe
Our bank balance is $5940. Recent expenses have been for Air Academy attendees, Young Eagle handout packages, and a small amount for speaker expenses.
We have no new information from the IRS on our 501c3 application.

Young Eagles – Jack Davi
Jack noted that our next event is August 18, 2012 and he needs confirmation from the volunteers. Jack expressed concern about competition between the FBOs for sponsorship & fuel discounts for the Young Eagles Rallies. We need some way to equitably use both Sterling and PSA. Jack will continue to use the Civil Air Patrol (CAP) cadets for ground support. This is working out well. Tom Howard will put up the banner on Concord Avenue this weekend. It is specific to August 18th. Jack requested a poster about our upcoming Young Eagle Rallies for distribution to FBOs, local businesses and other locations. Rick Bourgeois volunteered to make the poster (with help from his daughter Simone). We need to advise the volunteers that they need to remain on duty after the ending time of the Rally to support the last flights of the day and to help clean up and put away the Rally materials (computers, handouts, etc.). Jack submitted expenses for Rally handout materials. Tom Howard moved, Harvard Holmes seconded, and it was unanimously passed to accept & reimburse these expenses.

President Bill Reining reviewed information about Eagle Flights from his time at AirVenture. He noted that the intent is to engage adults with a genuine interest in flying; it is not just to give free flights to the general public. We will need to word our invitations carefully to attract only those likely to become seriously involved in aviation activities. We need a chapter member who can follow up on this opportunity.

Bill Reining had a note from Tracy:– “She was delighted to attend the Air Academy. She can’t thank us enough.” Liam is going next week (August 6-11, 2012).

Clubhouse Renovation
Scott Achelis provided an update on the clubhouse renovation. He has four focus areas:

- installing a dropped ceiling in the main meeting area
- painting everything to freshen it up
- replacing the old plumbing

- kitchen work, especially new cupboards, etc.

There are a half dozen people or so who have been consistently helping. Scheduling is difficult, so volunteers are encouraged to call Scott or just come out to the clubhouse, mostly during the week. If you have skills, Scott will try to get you on a suitable task. If you lack skills, there are still lots of things to do, such as cleaning up, digging, painting, etc.
Harvard Holmes had a few pictures to show.

Jack Davi proposed an Open House to celebrate the renovated clubhouse. He proposed inviting local EAA chapters as well as organizations on the field. It would have to be free to attendees. (Jack noted that the Airport Tenant Appreciation events had ~300 attendees and cost ~$2000.) It would be a great source of publicity.

August 22 General Meeting
Dinner Menu: Rick Bourgeois gave the dinner menu: American Chop Suey, Green Salad, Dinner Rolls, Chocolate Chip Cookies, Ice Cream, and Coffee and Drinks (H_2O & Soda).

Speaker: Harvard Holmes on Glass Panel Possibilities

Air Academy Report: Our two Air Academy attendees will report on their experience

Future Speakers – Tracy and Jack
In September, we hope to have Gary Plomp speak on the Restoration of Propeller Airliners. Bill and Tillie Larkin are also candidate future speakers. We also request other speaker ideas.

Cleco for August – Kevin Hoos
Please submit input by August 8 for the next Cleco. Bill Reining will provide President's notes. Harvard Holmes will provide notes on the Board Meeting.

MDPA event August 4, 2012
MDPA will not have an Open House event this summer. Instead, MDPA has invited student pilots at Concord to join them August 4, for their monthly breakfast and safety meeting. After the meeting, there will be a fly-out and each student will be paired with an MDPA (or guest) pilot on the fly out to lunch. Pilots will evaluate their students and have them participate in the flying as appropriate. Currently they are short on pilots and invite any EAA members to join them. [This was a fun event – Harvard.]

Holiday Party Plans
Harvard reported that earlier this year, we had made plans to use the Black Angus Steak House in Pleasant Hill. With the renovated clubhouse available, it would be nice to use it for our holiday party. Harvard cautioned that using a caterer and the additional expenses might push the costs upward considerably, perhaps closer to $50 (from last year's $35) per person. [After the meeting, Sara Holmes looked at Sunrise Catering – costs appeared to be around $48 per person.] Harvard advised the board that a decision to have the holiday party in the clubhouse needed to be made by the end of September to have time to book a caterer.
Bill Reining reported a conversation with EAA staff about alcohol at holiday parties – that having alcohol at an event was ok, but don't engage in selling alcohol (unless you have a professional bartender).

Air Academy for 2013
There was general discussion leading to a motion (by Jack Davi, seconded by Tom Howard) to support one candidate next year (approved). We will include transportation expenses in the budget when we ask the chapter to approve the expense. We will put an Air Academy pamphlet in our Young Eagle handout materials. We need a champion for this activity. Who?

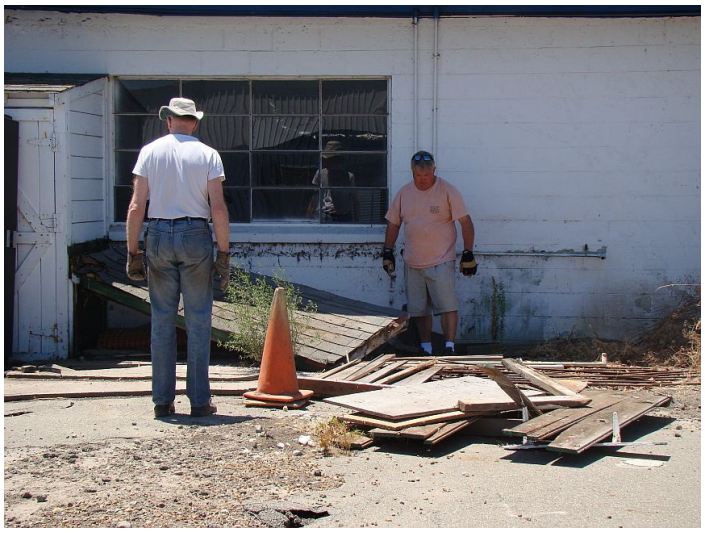
Tools – Tom Howard
Bill Reining reported that he saw "aircraft" scales for sale at AirVenture; the vendor claimed advantages over "race car" scales. Tom Howard will investigate. Tom Howard reported that Tracy will bring a cylinder to the next general meeting and give some instruction and a demonstration on how to use our borescope to view the inside of your cylinder.

Vi Egli has a wilderness survival kit from their trip to Alaska that she proposed to donate to the Tool Library.

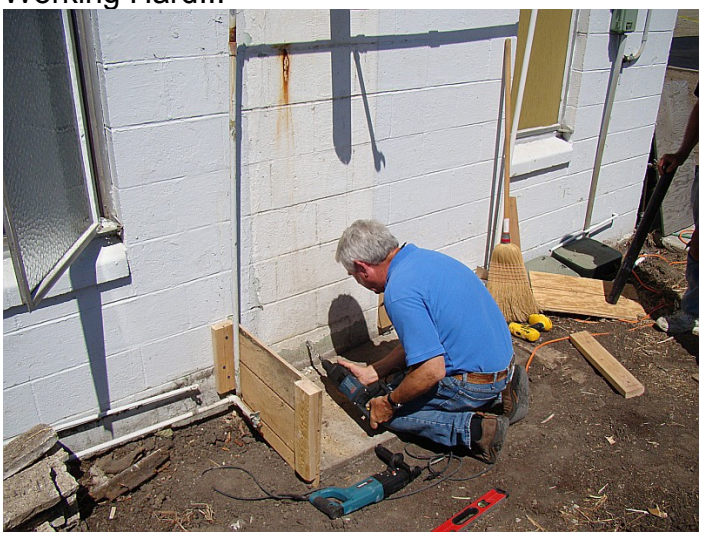
AirVenture Report – Bill Reining
Bill reported that the big surprise was the RV-14 unveiled by Van's Aircraft. It is a two seater, but larger than the RV-7. It is designed to use the Lycoming IO-390 engine.
Overall, attendance was reported as down slightly (20 to 30,000 less attendees).

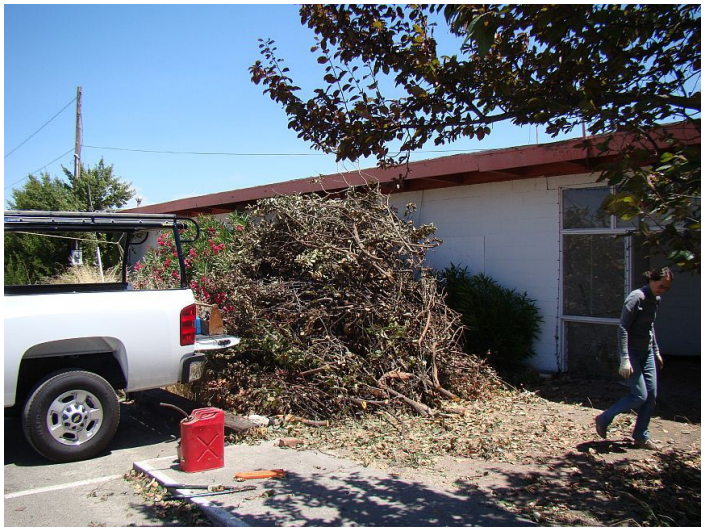
ClubHouse - Photos
By Harvard Holmes

Before...



Working Hard...





Portrait of an EAA Member

By Marilyn Sperling

Richard Sperling was inducted into the Western Michigan University, College of Aviation, Hall of Honor on June 15, 2012 at an awards dinner at the W.K. Kellogg Airport in Battle Creek, Michigan. The award was presented by Lester Zinser, Richard's flight instructor at WMU. While a business major and ROTC candidate, Richard pursued a passion for for flying by earning his private pilot license. After graduating from WMU as a Distinquished Military Graduate, with a Bachelor's of Business Administration in June 1965, he entered the US Army where he became an officer and helicopter pilot. During his military career he earned numerous awards including the Legion of Merit, the Air Medal with 22 Oak Leaf Clusters and the Distinquished Service Cross for extraordinary heroism when rescuing a downed aircrew in Vietnam. His career in the Army and Army Reserves spanned 30 years, retiring at the rank of Colonel. As a civilian, Col. Sperling was a commercial pilot with United Airlines, flying Boeing 737, 757, 767, and 747 aircraft; logging over 16,000 flight hours until his retirement in 2002. After retirement he continues to share his passion for aviation as a Boy Scout Aviation Merit Badge Counselor and EAA Young Eagles volunteer. The “Colonel Richard A. Sperling Distinquished Service Cross Endowed Scholarship” at WMU was established in 2008 to be awarded annually to select US Army ROTC cadets enrolled in Aviation Flight Science. The scholarship recognizes scholastic and military excellence in cadets who are pursuing careers in Army Aviation.

Controlling Your Aircraft – Part 1

***Sport Aviation* - 5/98**

By Ron Alexander

In previous articles, I have discussed most of the hardware items needed to build your airplane. The last article in the April issue detailed rivets and their installation, aircraft screws, turnlock fasteners, and small miscellaneous hardware pieces. Again, emphasis needs to be placed on using only quality hardware purchased from a reliable source. In this article I will present information concerning the hardware items comprising control cable assemblies.

The performance and safety of an aircraft can be categorized into three main areas. The first is the airframe structure and design, second is the powerplant and related systems, and the third category is primary control systems. A loss of any one of the three would produce a ride one would not soon forget. This article will focus on the last category. To the operator of any piece of machinery, the turn of the wheel, pull of the handle or push of the knob should produce certain results. Failure to obtain the desired result in an aircraft control system could be catastrophic. I remember experiencing the loss of directional control in a 1950 Plymouth automobile years ago. As anxious as I became I felt assured that the brakes on that car would soon end the carnival ride I was experiencing. Unfortunately, air brakes, if your aircraft is so equipped, are not as effective. With this in mind, I will examine the components and procedures necessary to build, install, and maintain a reliable primary control system.

Cables and their related hardware is the most widely used linkage in primary flight controls on smaller aircraft. Cable type linkage has the advantage of being strong and light along with its flexibility making it easy to route through aircraft structure. Cable systems are mechanically efficient and may be adjusted without leaving backlash. This is important for precise control and to aid in preventing control surface flutter. Cables and their related components, like other aircraft hardware, are manufactured according to AN (Army-Navy) or MS (Military Standard) specifications.

Certain aircraft designs utilize a system of push-pull tubes for their primary flight controls. These tubes are usually fabricated out of an aluminum alloy tubing with threaded rod ends riveted into the tubing. Bell cranks are then used to change the direction of travel of the controls. This type of control system will often be partially or completely assembled in many kit aircraft. It is a relatively simple and effective way to move the aircraft controls. Even though our discussion will focus on cable assemblies and their fabrication,

push-pull tubes offer a very viable alternative for flight controls.

Types of Control Cables

The actual cable used for the primary control of an aircraft is generally manufactured from galvanized steel (zinc coated) or corrosion resistant (stainless) steel. Its material, diameter of the wire, and type of construction describe the cable. Corrosion resistant steel is usually more expensive than galvanized cable but it has slightly less strength. Stainless steel cable should be used where corrosion will be a problem. Stainless cable also has a glossy appearance that is preferred by many builders.

The diameter of the cable obviously has an affect on its strength. A large number of aircraft use 1/8 inch diameter cable. Using this diameter as an example, its breaking strength is approximately 2,000 pounds. Production aircraft are required to use a minimum of 1/8 inch cable for primary controls. The diameter of cable you are to use should be spelled out in your plans or assembly instructions. It will usually be provided as part of your kit. It may be less than 1/8 inch and, if so, it should have been properly tested for the particular aircraft design.

The type of cable construction is somewhat more involved. One is termed a 7 x 7 control cable. That simply means that the cable is comprised of 7 strands of wire with each strand being made up of 7 individual pieces of wire. The second example shows a 7 x 19 cable. That means it has 7 strands of wire with each strand consisting of 19 individual wires. The 7 x 19 cable is more flexible than the 7 x 7 cable. However, the wires in a 7 x 19 cable are smaller and therefore more easily damaged. 1 x 19 cable is also available but it is non-flexible. This type of cable is often used for bracing purposes, drag wires, etc.. Again, the type of cable should be specified in your plans. The military specification number for aircraft control cable is MIL. W-83420.

Types of Control Cable Assemblies

Once you have selected the type of control cable to use there are obviously other hardware parts that complete the entire assembly. The type of hardware is dependent upon the method of fabrication. Three methods are commonly found and each has a different type of fitting on the end of the cable. The three types of end terminals are swage type, nicopress, and woven splice.

Swaged fittings have a tube like portion that allows the cable to be inserted directly into the fitting. The fitting is then compressed onto the cable using a swaging tool. See Figure 2. This type of fabrication has the advantages of being very strong and attractive in appearance. The big disadvantage is the swaging tool. They are very expensive ($3,000+) requiring most builders to either rent one or have someone else who owns the tool fabricate the cable. This is certainly an alternative that is available at a lot of repair stations or FBO maintenance facilities. You may prefer this type of cable assembly. It certainly has advantages.

The most commonly used method of control cable assembly involves the nicopress system. This method is very simple to use and the cost of tools is minimal. Nicopress fittings are made of copper while swaged fittings are made of steel. Copper fittings are easily compressed using hand tools. The standard nicopress tool costs less than $150. See Figure 3. This tool must be used to compress the fittings. Do not attempt to use pliers or anything other than the nicopress tool. Remember our earlier discussion—we are talking about a primary aircraft component that certainly affects aircraft control and safety. Utmost care should be taken in manufacturing control cable assemblies.

Lets look at the hardware parts that constitute a nicopress cable. A thimble is the first item. Thimbles are used to spread out the load of a cable to protect it and to allow the cable to reach its full rated strength capacity. Thimbles (see Figure 4) are designated as AN100. They are made in different sizes according to cable diameter. They also are zinc plated or stainless. A typical designation is AN100-4—defining a zinc plated thimble used with 1/8 inch cable. An AN100-C4 is a stainless thimble for a 1/8 inch cable. A round cable bushing is also occasionally used in certain applications. These are similar to thimbles and their designation is AN111. The next piece of the assembly is a sleeve. The

sleeve (see Figure 5) is slipped over each end of the cable and then compressed using the nicopress tool. Sleeves are either plain copper that is used with galvanized cable or zinc that is used with stainless cable.

The last type of cable end fitting is the hand-woven splice. This method of cable assembly was used on a number of older aircraft but with the advent of the other two methods of cable fabrication it is seldom used today. The hand-woven splice requires a lot of time and patience and is no longer necessary because of the newer alternatives. Unless you are a real fanatic for originality of an antique I would not consider this as an option.

Fabrication of Control Cable Assemblies
For purposes of this discussion, I will assume that you want to use the nicopress method of assembly. With that in mind, lets step through the actual process of building up a control cable.

- Determine the length of cable necessary. This should be stated in your assembly manual. If not, you can use a stretchless cord the same diameter as the cable to be installed. Route this cord as the cable will be routed then mark it for cutting.
- Cut the cable. Invest in a pair of cable cutters. They are inexpensive and they will save you a lot of time and effort. After marking the cable, place a piece of masking tape around the cable where the cut will be made. This will leave a nice even cut and will keep the strands of wire in place during assembly. Do not cut with a torch or subject the wire to excessive heat in any way.
- Take the thimble to be used and cut off the 4 tips you will see on the thimble. This will allow the sleeve to fit more snugly.
- Route the cable through the sleeve and then through the turnbuckle end fitting or the fitting that is being used. Then route it around the thimble. (Remember, copper sleeves for galvanized cable and zinc sleeves for stainless cable).
- Place the taped end of the cable through the other portion of the sleeve to complete the initial assembly. Be sure to leave a sufficient amount of cable extending past the sleeve—usually an inch or so.
- The compression process will be easier if you slide a cable clamp over the loose end of the cable and push it securely against the sleeve.
- Make the necessary compressions of the sleeve as shown in Figure 6. Cables larger than 3/32inch diameter must have 3 compressions done in the sequence presented. The first compression is made in the center followed by a compression next to the sleeve. Then the final compression is made. Before making the final compression remove the cable clamp. Also, prior to beginning the first compression, insure that a minimum of 1/8 inch of cable will protrude out of the sleeve after the assembly is complete. The compression is better performed with a helper. If no one is available then clamp one arm of the nicopress tool in a vise. That will allow you to properly perform the compression without assistance.
- When all three compressions have been completed, use the "go-no-go" gauge that comes with the nicopress tool to check the width of the crimps. The widest part of the compression should slide into the appropriate slot of the gauge. If it does not, it means the sleeve has not been properly compressed.
- Carefully cut off any excess cable and leave at 1/8" inch protruding beyond the sleeve. Do not nick the working cable in any way.
- Mark the portion of cable that protrudes with a red paint. This will allow you to see if any slippage has occurred during subsequent inspections. You may want to slip a length of clear heat shrink tubing over the cable before you begin the nicopress crimping. When complete, you then slide the tubing over the loose end of the cable until it is against the sleeve and shrink it down. This prevents snagging a hand on the sharp strand ends of the cable and still allows you to view the red mark for slippage.

- A final recommended step is to test the cable by doing a pull test up to 60% of the rated strength of the cable. Using the torque-arm formula, a weight suspended from a beam on a fulcrum may be easily constructed to perform this test. The rated strength of aircraft cable may be found in Advisory Circular 43-13. Even if you purchase cables that are already assembled or have someone swage the fittings the pull test is desirable.

Installation of Cable Assemblies

After we have fabricated the control assemblies we now must install them in the airplane. Cables must be routed throughout the structure using fairleads and pulleys. These also insure proper movement without cable damage. Fairleads have no moveable parts. See Figure 7. Fairleads are used to prevent a cable from sagging and to allow a very slight change in cable direction—usually less than 3 degrees. Fairleads are commonly made of a plastic material that is softer than the cable to prevent cable damage. When a change of direction of more than 3 degrees is required in the cable a pulley is used. Pulleys are made of phenolic or aluminum material and have a ball-bearing center. Pulleys must also have some type of guard to prevent the cable from slipping out. Common designations of pulleys are AN210, AN220, and MS24566. All of these are phenolic pulleys. It is also very important that the installed cable be aligned with the pulley. This will prevent the cable from riding on the flanges of the pulley and chafing against any adjacent structure or the pulley guard. Pulleys are manufactured in different sizes according to the size cable used and its application.

After routing the cables through the aircraft structure, the cable tension must be addressed. Without proper tension the cable cannot do its job. We also need a way to remove a cable for a possible repair. The hardware item used to solve these problems is called a turnbuckle. Turnbuckles also solve the problem of making small errors in cutting and fabricating cables.

A typical turnbuckle assembly consists of a brass barrel and two steel ends. The two steel ends have different threads—one left hand and one right hand—to allow tightening and loosening. A few of the different pieces that comprise a turnbuckle assembly are as follows:

- AN155 - turnbuckle barrel
- AN161 - fork open end piece that fits over a bellcrank or tang (piece of metal attached to structure)
- AN165 - end fitting in the shape of a pin eye designed to fit inside a fork
- AN170 - cable eye end fitting that matches a cable and thimble

Placing these end fittings and barrels together produces a complete turnbuckle assembly each of which has another set of AN numbers. An AN130 turnbuckle assembly is an example. See Figure 8. The entire assembly consists of an AN155 barrel, an AN170 cable eye end fitting, and an AN161 fork end fitting. Gets confusing doesn't it. Again, your plans should specify what you need and if not, the aircraft supply catalogs will spell it out for you. An additional note, the turnbuckle barrel is available in long and short lengths. The turnbuckle end fittings are manufactured with both right-hand and left-hand threads. Virtually any necessary combination is available to construct your cable assembly.

Once a turnbuckle is installed in our control system it must be properly secured to prevent the ends from vibrating loose and releasing from the barrel. This is accomplished by using .040 safety wire. One method of safetying is shown in Figure 9. This is termed a single wrap method of safetying. Other methods are depicted in AC43-13. As an alternative to safety wiring the turnbuckle, you may want to purchase a special type of turnbuckle that uses a clip to lock the turnbuckle in place. The designation for this type of turnbuckle barrel is MS21251. Using this type of assembly precludes the use of safety wire and replaces it with simple clips (MS21256).

To be continued....

Wednesday Fly-outs - Information

By Harvard Holmes

To maintain our proficiency, a number of pilots get together on Wednesdays and fly somewhere for lunch. Many of the aircraft owners in the chapter participate. Passengers are always welcome. Not only is it a great way to see the Bay Area, it's also fun to see and ride in our members' aircraft. The email address is WedFlyOut@eaa393.org You may contact Renee Robinson webmaster@eaa393.org to be added to or removed from this list.

Generally, someone who wants to go flying will send a suggestion to this list a day or two before. Those who can go will respond, and a destination gets selected. Recent destinations have included: Half Moon Bay, Petaluma, Santa Rosa, Ukiah, Boonville, Shelter Cove, Willows, Auburn, Sacramento, Lodi, Stockton, Merced, Watsonville and Salinas. If the weather is poor, a destination may be selected as late as Wednesday morning.

The most active pilots on this list are Harvard Holmes, Bill Reining, Bob Belshe, Ron Robinson, and Phil Jenkins. Pilots sometimes advertise that they have empty seats, but not always. Harvard Holmes and Bill Reining are most likely to have extra seats (4 seat aircraft). My advice is to contact a pilot in advance to make sure they have room and to get directions. Typically, you'd get to the airport by 11:30am and return by 3:30pm.

FOR SALE: 1962 Comanche 250,

Cherry condition, fully loaded, new paint, new annual, always hangared. Call Keith Martz for details and avionics. Available for viewing any day, by appointment, at Buchanan Field. Call Keith Martz, 925-933-1424 (Home) or 925-818-7235 (Cell).

Thanks to our Donors and Sponsors

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Thanks to our Donors and Sponsors!

Meeting and Event Schedule

Board	Y Eagles	General	Fly-out	Other
Aug 1	*Aug 18*	***Aug 22***		
Sep 5	*Sep 15*	***Sep 26***		
Oct 3	*Oct 20**	***Oct 24***		
Nov 7		***Nov 28***		
Dec 5				

(* Events for Girl Scouts & Sea Cadets)

Our meetings are open to the public. Join us for dinner at 6:30 pm ($7 donation) with the general meeting at 7:30 pm on the above dates in the building at 161 John Glenn Drive north of Sterling Aviation. Enter from the airport side of the building.

Chapter 393 fly-outs are open to chapter members and guests. See the newsletter for arrangements.

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EAA
The Leader In Recreational Aviation

We are on the Web!
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