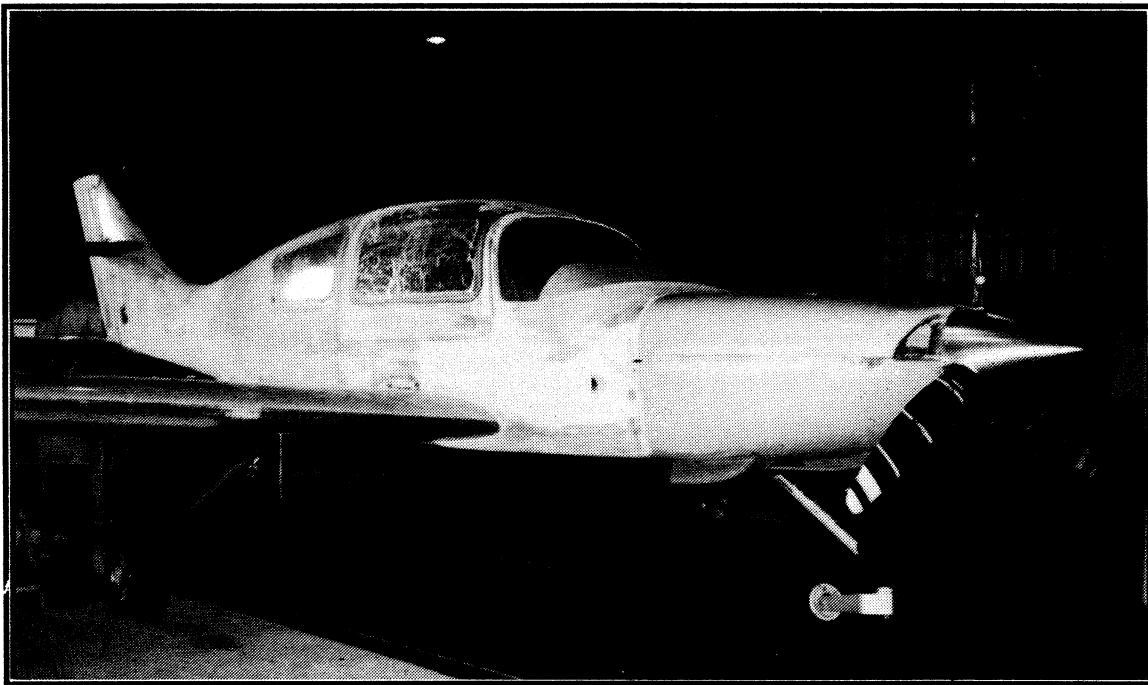


Express

LINK

NEWSLETTER

January, 1997 - No. 12



Thinking that readers might be interested in seeing just what state the CBROS project is in (and to verify that we actually are building an *EXPRESS*) the picture above shows where we are at this time. We are now concentrating on configuring the new instrument panel which we have produced. (see story on Page 3). We hope to have the final panel layout available for the next issue. Once the final layout is determined, wiring will be completed and final assembly started. The finish process has been started and the fuselage is almost ready for the first coat of primer. At this 5 minutes we are planning to fly the first test hours in primer, and paint when we are satisfied that no additional rigging changes will be necessary. We hope to be ready to fly by March or April of 1997.

Honeycutt/Bernard IO-540 Version Flies Successfully

As reported by **Theron Honeycutt** and **Ed Bernard**, Theron's IO-540 powered, cruciform tail version flew successfully in early December. According to Theron, the first flight lasted about 15 minutes and was largely uneventful. He expressed some surprise at the "vigorous" performance of the 250 HP version when compared with Ed's 200 HP version and says he is anxious to get on with further flight testing to verify the actual numbers. Only a slight deviation from "hands off" yaw

trim was noted on the first flight and was easily corrected by the pressure of resting a foot on the appropriate rudder pedal. A slight wing heavy condition was also noted which might have been attributed to an unbalanced fuel load.

Ed and Theron have promised to send a picture and a weight and balance sheet for future publication, and we hope to convince one of them to produce an article or two related to solving some weight and balance problems intrinsic to the installation of an IO-540.

Take a peek at:

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CBROS EXPRESS Fly-in Mostly A Success

As announced, the gathering of **EXPRESS** builders, flyers and curious was held on Saturday, October 26th. In spite of a 90 degree cross wind that gusted to 25 knots at times, continued throughout the daylight hours and kept at least two **EXPRESS** examples from flying in, nearly 50 people showed up during the day to check out CBROS progress and closely inspect the **EX-PRESS**es of Jerry Sjostrand and Bob Gisbourne. Both Jerry and Bob flew into Livermore late Friday afternoon, missing most of the cross wind problems. Dick Lind, who had planned to fly in from Southern California, kept close watch on the weather and canceled his planned flight as late as 10:30 Saturday morning. Dick said that he had only a minimum of time on his **EXPRESS** and no cross wind experience and decided that Livermore was not the place to make his first attempts. Irita Warner, and her son Dennis, actually made the flight from Grass Valley to Livermore and made two attempts to land before deciding that it would be safer to return to Grass Valley. We very much appreciate their interest in adding to the fly-in. We are looking forward to repeating the event in 1997 and with the number of flying **EXPRESS**es increasing almost weekly, we hope to have a record number of flying examples in attendance. (We think that the most ever in one place at the same time is 5 or 6).

In addition to the "flyers", long distance attendees included Jack Volkamer and Charlie Scott from Arkansas, John Kee and his wife Joyce, from Rock Hills, South Carolina.

In spite of the conditions outside the hangar, a great deal of information was exchanged between builders. After viewing the "streamline" installation on the upper half of the CBROS engine cowl, Bob Gisbourne decided that modifying his upper might just solve a nagging heating problem. (He's from Arizona 'ya know) He proceeded to remove his cowling, bring it into the hangar, and using surplus CBROS ex-

pandable foam and a little patience, completed the basic mod in a short time with a lot of interested spectators. A little judiciously applied "Mach 1" tape and the cowl was back on for a test flight. In spite of the windy conditions Bob couldn't wait to try out his "fix" and proceeded to do so. He came back reporting a significant reduction in CHT. Subsequently we understand that Bob has enlarged on his original installation and has seen a reduction of about 15 degrees in his hottest CHT. Needless to say, he was very pleased.

Larry Olsen, of Experimental Aircraft Technology, the Aircraft Spruce of **EXPRESS** builders, provided the group with an update on the progress of the EDI bankruptcy proceeding (nothing much to report), but Larry continues to be closely involved and plans to continue providing **EXPRESS** parts as before and is considering restarting major part production if the timing and money come together.

Jack Volkamer noted that he has attempted to form a loose group of **EX-PRESS** Builders in the "Central States" area. Included on his mailing list at present are Don Adamson, Lonoke, AR; John Boubelik, El Dorado, AR; Phil Hodge, Spring City, TN; Mike Johnson, Cordova, TN; Lou Lacey, Decaturville, TN; Bill Somer, Glencoe, MO; and Joe Polsgrove, Lexington, KY. If you are interested in another point of view and would like to participate with Jack, he can be reached at (501)443-9191.

Speaking of Joe Polsgrove, he was kind enough to send CBROS a video tape of the preparation and completion of the first flight of his **EXPRESS**. The flight came off without a hitch, but the comments from Joe and his "helpers" provided some light moments for the attendees who had just finished lunch. In talking to Joe since, he related that just as he landed, a major thunderstorm took over the airport. He said he "was not sure whether he or the storm would land first".

There were still more than 30 hearty souls left when dinner, (consisting of BBQ pork and tri tips) time rolled around and no one went away hungry.

Coincidentally, the Livermore Airport held an open house on the same day as our fly-in. They were mostly "blown out" also, but vowed to try again next year - as will we.

Our thanks to everyone who attended. We hope each one came away with some useful information or at least inspiration.

New Subscribers Welcomed

Since the last issue we have acquired several more subscriber/builders. They include:

Don Adamson, Lonoke AR; Glen Farley, Marysville OH.; Rick Fernandez, Cape Coral FL; Jim Lewis, Mineral VA; Werner Maag, Switzerland; Tom Magill, Chesterton, PA; Glen Parks, Marysville, OH; John Pels, Tomball, TX; Charlie Scott, Bentonville, AR; and R.O. Wagner, Deland, FL. Addresses and telephone numbers can be furnished for the above, so if you see someone in your area with whom you would like to contact, feel free to call CBROS at (510)455-1036

Experimental Aircraft Technology, Inc., Expands Service to EXPRESS Builders

Larry Olsen has advised that his company now has the ability to furnish complete hardware for the Series 90 (or Aruiga) tail. Furnished are the fabricated metal parts intrinsic to the Series 90 tail, without AN hardware (or I suppose with, if you prefer).

Larry also advises that he has a limited number of propeller blades which could be used on your **EXPRESS** project. For the Lyc. IO-540/ Cont. 550 he can furnish, for a three blade hub, blade No. F7663D-2R, 76 in. dia. (twisted to optimize cruise). For an IO-540, for a two blade hub, blade No. F8477-8R (from a Pitts S2B), 76 in. dia. Larry said that the two blade set up, including hub can be had for approximately \$4,500, and the three blade set up will go for approximately \$5,500.

Also according to Larry, he can now work with builders desiring to use the MT composite line of propellers.

Builders are urged to shop with Larry as the last, best source of **EXPRESS** parts, without which many of us would be up the proverbial "creek".



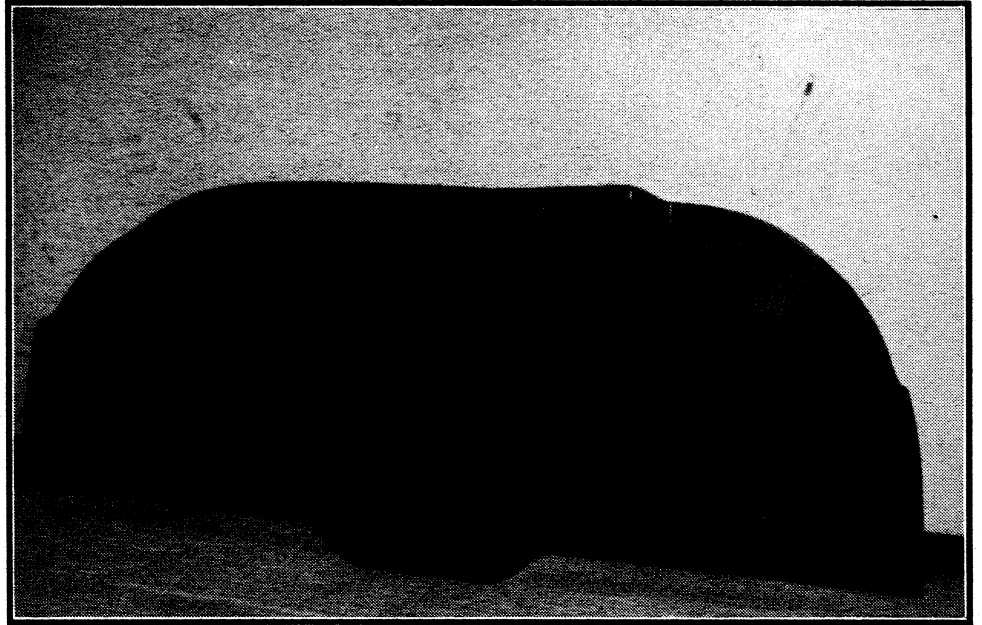
Instrument Panel - Decision By Committee

CBROS has found that the choice, mounting and layout of the instrument panel has turned out to be a surprisingly difficult problem to solve to everyone's satisfaction. To begin with we had acquired several different fiberglass molded panels including the standard Wheeler double offset panel, a custom, double offset panel from a builder in Tucson, and a single offset panel produced by a builder from Canada. If you throw in consideration of a flat panel as contemplated by the template and material furnished with Kit 5, deciding which one to use was the subject of a lot of debate as building progressed to the place where a decision was required.

We considered using one of the double offset panels as mounted in 540EX which provided enough room to mount three rows of three primary instruments, but ultimately rejected this configuration because the upper, rounded "corners" did not readily blend with the shape of the cowl, making the glare shield appear "awkward". The flat configuration did not fit our image of a modern composite aircraft interior.

The remaining choice was to use the single offset panel as it conformed nicely to the shape of the cowl, made construction of the glare shield relatively simple and produced a balanced, pleasing shape.

To our dismay, we found that the vertical dimension of the single panel did not allow for three vertical rows of 3 1/8 inch instruments, which we considered necessary to ultimately support a full IFR panel. We needed an additional 1.25 inches in height. No choice here but to take the band saw to the perfectly good single offset panel (after first pulling a mold for future reference), slicing it along its length, then rejoining the pieces with an insert of the appropriate dimension. Finished with paint for use as a plug, the patched panel looked good enough to use, but was structurally unsound. The mold produced from this plug allowed us to produce an acceptable, single offset panel with the room we needed. Now our problem was that



Above: The "second generation", single offset panel

we got only an acceptable quality panel the first time we laid one up. Using black Gel Coat as a base, the resulting panel ended up with some air pockets and poorly laminated areas. We were disappointed overall as the time and material required to lay up a panel is considerable and we were reluctant to scrap this first attempt.

Enter "Charlie". Charlie Spencer is a Giant Scale modeler whom we found here in Livermore producing a fascinating series of Giant Scale kits including a P-51, an F-82, a Tigercat you have to see to believe, a P-38, and an Aero Commander- all perfectly molded fiberglass. Following Charlie's instructions and demo our next effort turned out perfectly, no pinholes, no air pockets, and perfect laminations. The result (which is for sale, by the way) is the panel shown in the above photo. As you can see, we did not use Gel Coat on this panel, as we rationalized that a builder would probably end up painting the surface to his liking.

Having mounted the original, black panel in the airplane, we are now in the process of freezing the instrument layout.

During this process we have determined that we need to mount the primary instruments and the circuit breakers in removable aluminum inserts to

allow for maintenance and we are now in the process of modifying the mold to accommodate an 0.090 aluminum insert flush with the surface of the panel. We will let you know how the new, third generation configuration turns out. We expect to furnish readers with a drawing of our final panel layout in a later issue.

CBROS has decided to make the single offset panel available for use by other builders. If you are interested in considering the single, offset panel for your *EXPRESS*, give us a call to discuss costs and delivery.

Strings Too Short To Save !

- From Down Under - Nev Curry has completed certification of his CT *EXPRESS* in Australia and has successfully flown. We know no details on his project but hope to be able to share more in coming issues.
- Ken Boling is looking for a break from the FAA, and the weather, to test fly his *SECOND EXPRESS*. It is a mystery to us how he manages to finish them so quickly.
- On the telephone with Ralph Kenner today (Jan 24th) he advised that the bankruptcy proceedings are still stalled, but that he hopes to break the "Log Jamb" soon !

Latest From The Lancair "Skunk Works"

As we have related here before, "our spies are everywhere!" To prove our point we offer for your consideration the photograph below, which is the latest to be smuggled out of the Lancair "Skunk Works".

You may have heard by this time that the dedicated folks at the Lancair lair have just broken ground for a new production facility for the "Certified ES" at the Bend, Oregon airport.

What you don't know is that for the past several months, while planning the new expansion, they were also working on a modification of their 360 model which will make it easier to build and a greater challenge to fly, as well as being fitted with a Sun Roof to provide additional ventilation on those hot days at the air patch.

You are seeing it here for the first time anywhere.

Notice the attractive brace running from the lower front to upper rear corner of the "canopy". We understand this is installed so that the pilot will have a place to rest his elbow while otherwise

unoccupied in the landing pattern. There is some question as to the apparent vertical attitude of the "windshield". We have it on good authority that this is stealth technology assigned to reducing bugs impacting anywhere in front of the pilot. We do not know if it has been tested with the proverbial 250 mph chicken.

Note also that the windshield appears to be opaque. (Wonder why they're worried about the bugs?) This is more stealth stuff designed to upgrade all pilots of this aircraft to instant instrument ratings. We confess to being more than just a little curious as to how the "canopy" is opened and closed as it appears to be stuck in place with Bondo.

Perhaps pilot and passenger use the sun roof feature for access and egress. No problem if the only baggage you can carry is a briefcase.

This is all the data we have on this revolution in aviation technology. If we hear of other great solutions to those little nagging problems (like how to install your door(s) and windows), we will be certain to pass them on.

EXPRESS STUFF FOR SALE:

**CRUCIFORM EXPRESS.
MOSTLY COMPLETE INCLUDING
ALL KIT FURNISHED COMPONENTS, A MID TIME (1135
HRS) LYCOMING, O-540, AND
MANY OTHER "EXTRAS".**

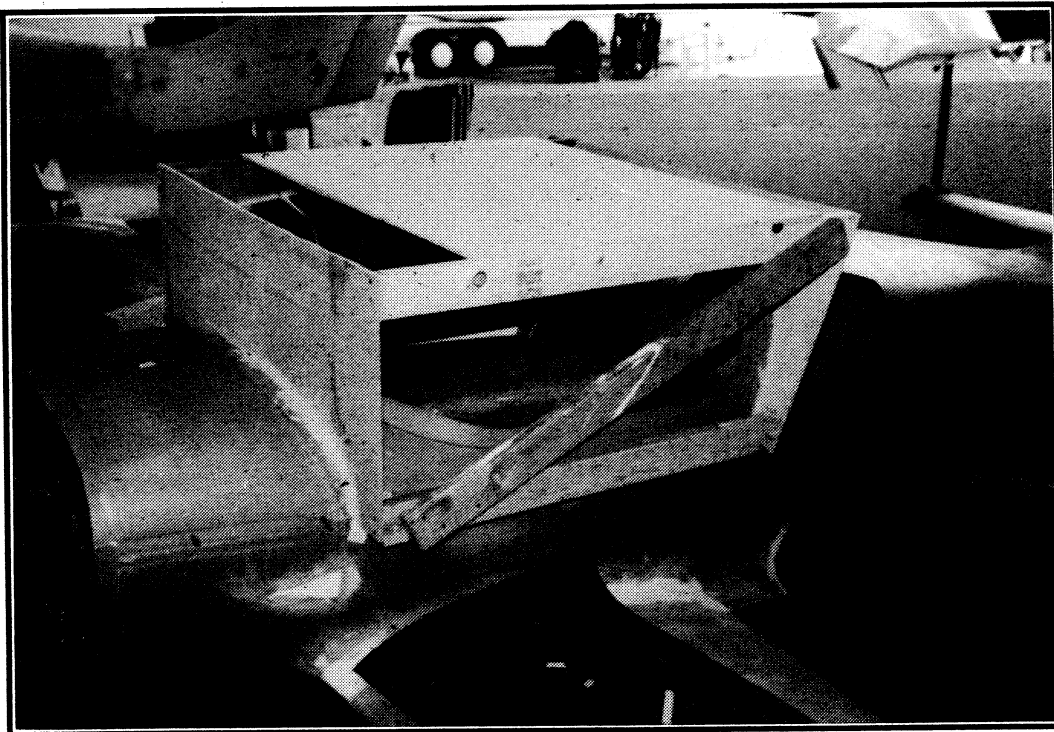
Brought to its present stage of completion by an experienced, careful builder who was killed in the crash of a Glassair, this project provides an outstanding opportunity for an owner who likes to fly as much as build. Left to complete construction are the flaps and ailerons, installation of windows and windshield and mating of the wings to the fuselage.

This project is very complete. For example, the engine is complete as removed from a Call Air within the last two years including the original baffling, starter, alternator and oil cooler. At the same time, also furnished are a new, in the box, lightweight starter and alternator and vacuum pump and an EDI engine mount. Also included are Cleveland brakes and wheels. Other "extras" include yellow tagged instruments such as a Collins Nav receiver and coupled, rectilinear glide slope indicator, with a power converter, a Collins Comm transceiver, a Collins audio panel and a wet compass.

CBROS Inc. has personally inspected this project and have found the workmanship to be above average, and the kit very complete. We have made a video tape of this project which documents the stage of completion, the quality of workmanship and all components included with this project. If you are interested in obtaining a copy, a call to CBROS Inc., at (510)455-1036 and a check for \$15 (to cover cost of copying) will get one on its way.

(Continued on page 5)

Below: Latest technological breakthrough in Lancair cockpit configuration.
Photo courtesy of Brand X Labs.





Main Gear Bracket Modification

It has come to our attention, and we have passed it on in an earlier issue, that the U bolt which is used to clamp the steel main landing gear leg to the bracket bolted to Rib R seems to have a tendency to deform in the corners, enough to allow the gear leg to "rattle" around some. This is probably not structurally critical as the gear leg "hangs" on this bolt, but if the gear leg is not secure in the mount, it could aggravate the deformation at an accelerated pace toward a real problem, or at least have some effect on wheel alignment (or even make a disconcerting "bump" during landing).

Feeling just a little uncomfortable with the above possibility, we asked a nearby **EXPRESS** Builder, **Del DeLaTorre** from Morgan Hill, CA, who is a machinist by vocation, to make up a set of aluminum brackets which are nearly the mirror image of the upper portion of the landing gear leg clamp as furnished by the factory. The only difference is the depth of the portion cut out to fit the gear

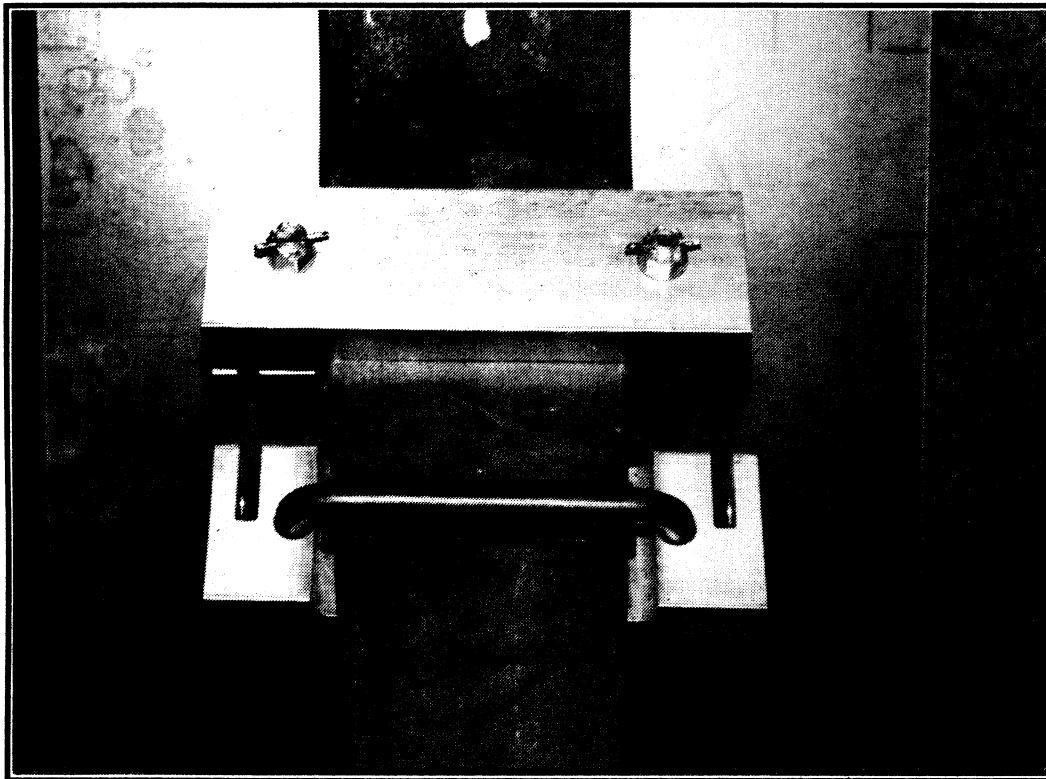
leg.

Del came up with the great looking part pictured below, as it would be retrofitted on the gear leg, compared with the standard U bolt. If you look carefully at the U bolt installation, you can see what appears to be a strip of metal between the U bolt and the gear leg. Actually, that's exactly what it is. This part was apparently originally designed to distribute the load on the U bolt further out into the radius and is relieved to allow the U bolt to center the piece and hold it in place. **Sjostrand** says that his gear legs are installed using these "spacers" and he has not experienced any trouble with the U bolts relaxing their grip on the gear legs.

It is our intention to install the new aluminum bracket using a 1/8 inch hard rubber pad between both upper and lower brackets and the gear leg and substituting high tensile strength bolts of the proper size to secure the gear in place.

Del advises that he will produce these brackets for any **EXPRESS** builder at a very reasonable cost. You may contact him directly at (408)683-2373.

Below: Both styles of "clamps" on a steel gear leg. Note that the U bolt clamp is located too far down the leg in this picture.



EXPRESS STUFF FOR SALE:

(Continued from page 4)

A STRUCTURALLY COMPLETE SERIES 90 EXPRESS ORIGINALLY INTENDED AS THE EDI, SERIES 90, TURBINE DEMONSTRATOR.

Owner/builder **Ed Watson** is unhappily offering his "extremely" fast build **EXPRESS** kit for sale. Constructed by **Ed**, under the watchful eye and with the help of **Dick Lind** of Complete Composites, this aircraft provides a new owner with a quick way to a flying, Series 90, **EXPRESS**

The only significant modification to the original kit design was to include extra reinforcing layers of fiberglass on the leading edges and aft shear webs of the wings. **Ed** was contemplating the installation of an Allison B-250 with the support of **EDI** and Allison to fly around the country as a factory demonstrator. When **EDI** quit and Allison was acquired by another company, his original plans went out the door.

All structural components, including control surfaces are complete, with the exception that the rudder has not been closed. Doors and windows have not been installed, but are included in their original packaging. No instrument panel installation has been planned by **Ed**, and no engine or engine mount is included. Also missing is a flap actuator and door hinges, both of which are easy to come by.

Ed is asking \$40K, and actually has more than that invested in kit components, not including the investment of his time.

For more detailed information contact **Ed** directly at:

7461 Batista Street, San Diego, CA

Tele: (W)(619)291-7311, x1887

(H)(619)277-8818

FAX(619)277-9748

Dick Lind's IO-540 Cruiciform

On a recent visit to Livermore, Dick Lind spent the better part of a morning with CBROS just to prove that his *EXPRESS* was indeed up and flying even though he was not able to attend our October Fly-In

Pictured below is the installation of an oxygen system located neatly on top of the spar carry through behind the pilot's seat. Dick says, "I am getting to the age where I use some oxygen on most every flight and was surprised at what a difference it made in terms of my energy level at the end of a flight - just when it's needed. I feel it is a real safety factor that is largely overlooked and recommend it to anyone making cross country flights at altitudes above 5000 feet".

Pictured at the right is the amount of area which Dick has added to the leading edge of the horizontal stabilizer.

Beginning at the outboard tip at about 2.5 inches it tapers to zero at the inboard end. While it is hard to see in this picture, Dick has also added the leading edge "cuff" that was originally added to the factory owned 540-ED. Dick added both features by securing foam to the leading edge in the proper dimensions and fairing the rough shape with "Bondo" to its finished appearance.

Dick reports that, while he has not yet completed the stall series of stability tests, the modified configuration has not been detrimental to low speed handling and has definitely improved pitch control during the touch-down/rollout phase of landing.

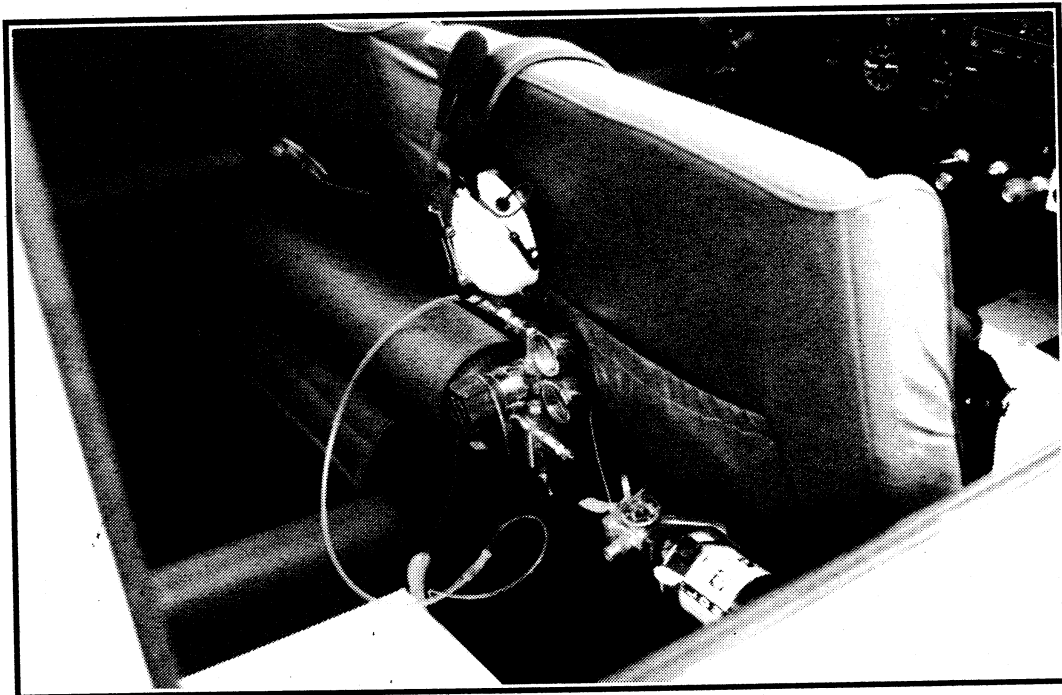
Other features of Dick's *EXPRESS* include an engine cowling with no externally exposed fasteners, center hinged ailerons, a cargo door, (a la Sjostrand), position



lighting at the leading edge of the wing tip, (a la Gisbourne), a very interesting main gear fairing, and a full sized, panel mounted CD Player to mention but a few.

Dick is in the business of composite aircraft construction and has some very practical answers to many of the questions we have as *EXPRESS* - builders such as "where can I get a set of rudder pedals"?

Dick encourages builders to call him with questions or problems. He can be reached at: (714)858-9275.



Builder Input

Rienhart Metz has kindly submitted the material presented here for use by **EXPRESS** builders. Some of the following procedures are offered as supplements to factory documentation and some procedures are unique to his **EXPRESS**, but generic enough to be of use to most **EXPRESS** Builders.

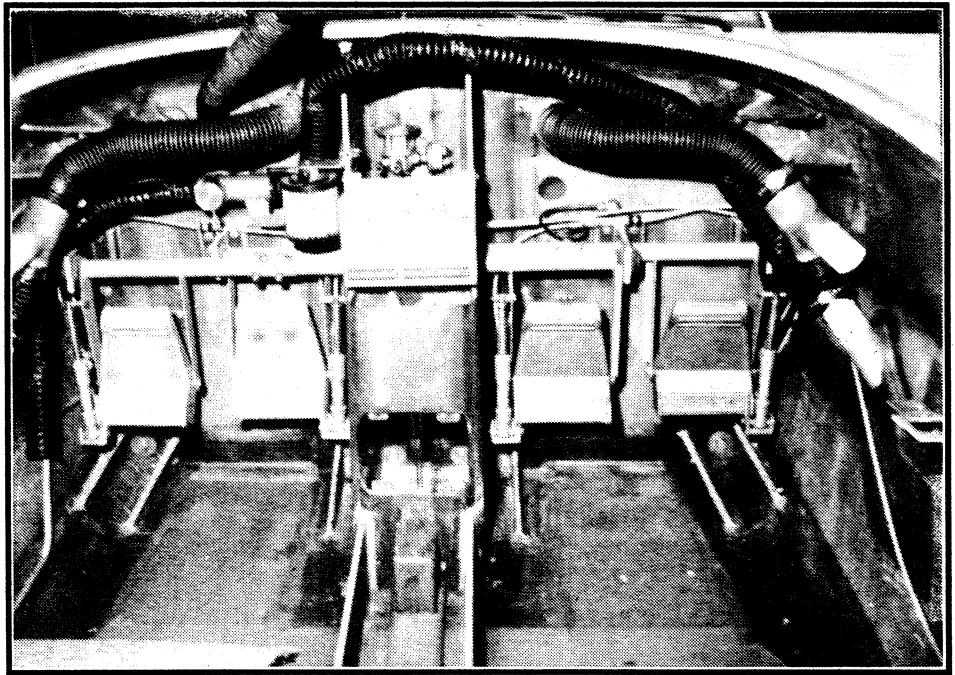
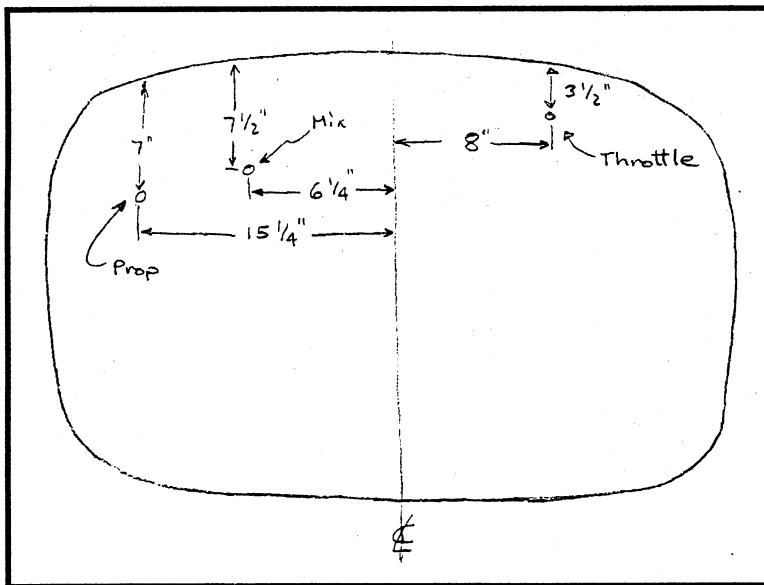
Throttle, Mixture, and Propeller Control Cable Selection, Hole Locations, and Mounting:

Keeping in mind that the following applies to **IO - 360 installations only**, numerous arrangements are possible and can all work. A considerable amount of time can be spent in trial and error to determine the kind and length of cables and terminations to use, where to put holes in the firewall and how to route, terminate and mount at the fuel servo and governor.

Following is a table of data on each of the cables used with the Lycoming I-O 360C1C6.

Cable	A.C. Cat. No.	Length	Termination
Throt	A600BL0600	48"	10-32
Mix	A-750-20-0600	48"	10-32
Prop	A-750-30-0600	48"	10-32

Figure 1, below, shows the location of the holes through the firewall to accommodate these cable runs. Basically, a used governor cable bracket from a Piper AR-



Picture No. 1 Above: Ducting on Aft Side of Firewall

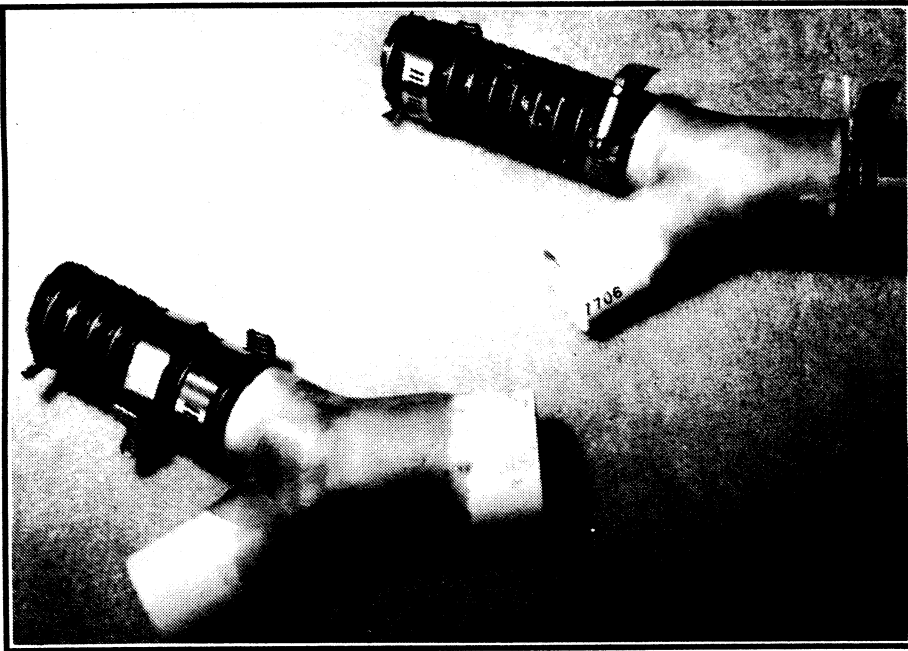
ROW IV installation, modified with an extension bracket works with the Spruce cable. At the fuel servo, the throttle was reversed and the cable mounted on the side of the intake tube bracket, also from an ARROW IV installation (which is where most any C1C6 will come from). The mixture cable attachment utilizes a home made bracket which is attached to an Experimental Aircraft Technology's (Larry Olsen) supplied intake repositioning tube.

Hot/Cold Fresh Air System:

The "hot" part of this system is an afterthought for builders in the West and South !!, but for the builders where there occasionally is "frozen-tundra" this is an important, a-priori consideration!

The fresh air duct plan begins with a dismissal of the factory described NACA duct intake, and an adoption of the Ed Bernard style upper cowling intake system. The key advantage of this approach is that airflow is available as soon as the engine is running - even without the airplane moving. For winter defrost, this is important. The cowl ports are split at the top into a pair of glass juts that run along the tip of the cowl to a pair of 2 inch diameter tubes that run through the firewall. Both tubes include a butterfly shut-off valve for use in case of an engine fire - similar to the Beech Bonanza installation. From there the two ducts are split with one branch going to eyeball vents in the instrument panel, and the other branch going to a duct leading to the rear seats. All four terminations utilize the Chief Aircraft Eyeball vents. For warm air control a Glassair mixing/distribution valve is used supplying two ducts to the floor and two to the windshield. (See picture No.1, above, showing the duct routing on the aft side of the firewall). The "splitters" are made using PVC pipe and fittings and fiberglass. (See picture No.2, page 8) (Reinhart says he calls them "fiberglass aortas")

(Continued on page 8)



Picture No.2, Above: Fiberglass "Aortas"

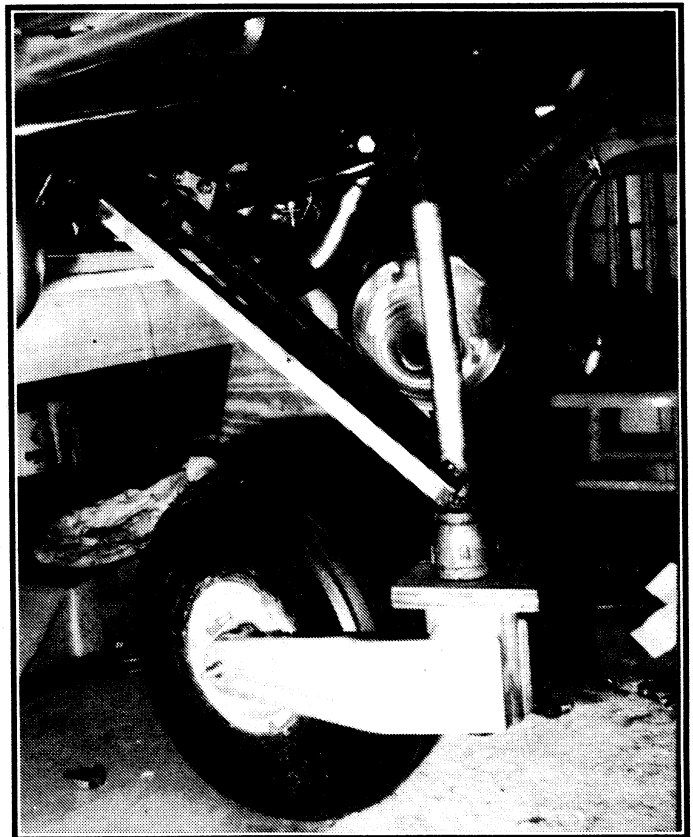
Temporary Wheels Provide Mobility in Tight Places:

If you are working in a confined space such as a garage, as Reinhard is, there comes a time when the ability to move the fuselage around on "wheels" becomes necessary. If the main gear dolly is constructed as shown in Picture No. 3, below, then the standard nose gear leg would be too long, making it impossible to clear the garage ceiling/door. The "nose gear" shown in Picture No. 4, below, was welded together using angle iron and black pipe along with the standard tire and wheel.

(Continued on page 9)



Picture No. 3,
Left: Main gear
dolly



Picture No. 4,
Right: Temporary
nose gear made
from scrap mate-
rials welded to-
gether

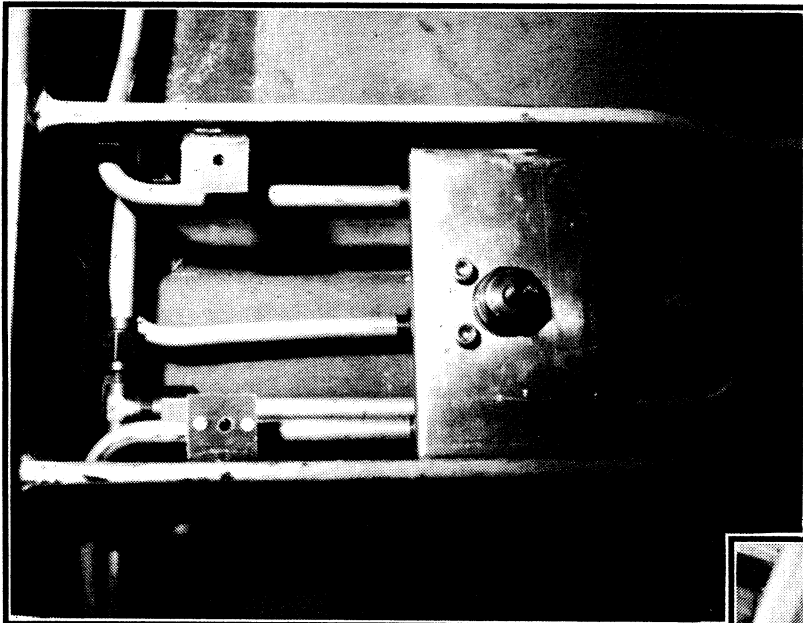


(Continued from page 8)

Fuel Selection Plumbing:

A casual survey of the available fuel valve options, if you are using the aux tank option, very quickly leads to a dead end unless you are willing to pay the high price for something out of an A36, etc. The solution shown in Picture No. 5, below, plumbs the Aux tanks together allowing the use of the Wicks or Spruce three position valve, which includes a fourth "off" position. The valve is then set up for Left, Aux., Right, and off.

Picture No. 5, Below: *Fuel Management Console*



Hinged Instrument Panel:

Particularly annoying to most is having to work under and behind an installed instrument panel. To avoid some of this nausea and annoyance, a hinged instrument panel was a particularly attractive option as it allows access from the top, even after the completed panel is installed. Integrated with this hinge mechanism is vibration isolation. The general procedure consists of two hinges installed at the left and right ends of the panel, at the bottom, iso-

lated from the fuselage mount by a pair of rubber shock mounts, as shown in picture No.6, below. The top, back of the panel has a pair of shock mounts that engage a vertical flange on the side of the fuselage as the panel is raised to the vertical, as shown in Picture No 7 on page 10.

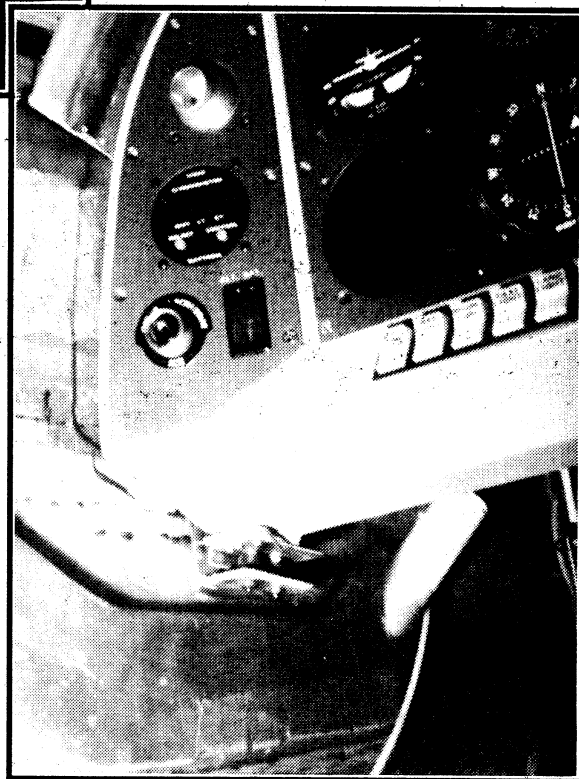
The system shown requires that the radio stack be mounted separately on brackets which must be loosened to allow the panel to be rotated down.

Ed Note: This is not all of the information furnished by Reinhard. More will be included in future issues of the *EX-PRESS LINK*. We are certain that more detailed information on each of the above described procedures can be obtained by contacting him directly at (630)668-8562(H) or (630)979-5508(W).

Our thanks to Reinhard for this great information!

Picture No. 6

Right: Shock mounted hinge system supporting the bottom of the instrument panel



ARCHER ON ANTENNAS

The following is a general discussion of antenna design and installation submitted by Mr. Bob Archer of SPORTCRAFT ANTENNAS.

Mr. Archer has recently retired from TRW where he worked on the antennas for most of their spacecraft projects since 1958.

Speaking specifically of the **EX-PRESS**, if it is anticipated that two Nav-Coms are to be installed, it is suggested that two separate Com antennas should be installed. One, in the vertical stabilizer and another in the aft fuselage, perhaps behind bulkhead 162, would be the best combination. A minimum separation of about four feet is recommended. One can also use a special switching and use a single antenna. More on this later.

A Nav antenna can be installed in each wing, toward the tip, or in the cabin top if the wings are closed. Using two Nav antennas for VOR reception will give a range increase of up to 25%, all things being equal, over a single antenna with a two set coupler.

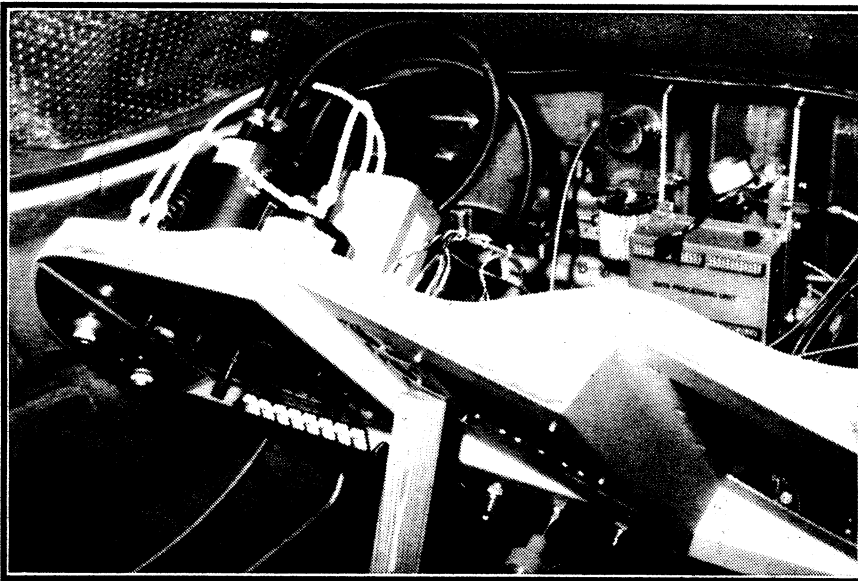
The glide slope signal may be coupled off with a "coupler box" rather than installing a separate glide slope antenna.

It goes without saying that all antennas should be installed before sealing up any ultimately inaccessible locations.

RG58A or C/U type cable is fine for these frequencies. RG55C/U, with 50 ohm impedance is double shielded and has a bit less loss, but is somewhat more expensive. RG142B/U is an excellent Teflon cable that is double shielded and has about 10% less loss than RG58, but is considerably more expensive.

The art of installing antennas internally into composite aircraft has left many people confused and perplexed. Here are some tips and general information on the subject based on my experience. Some people have tried to install monopole antennas internally with a ground plane for the antenna to work against. This is just totally bad practice. To work properly a ground plane should be at least one half wave length in diameter and, at VHF

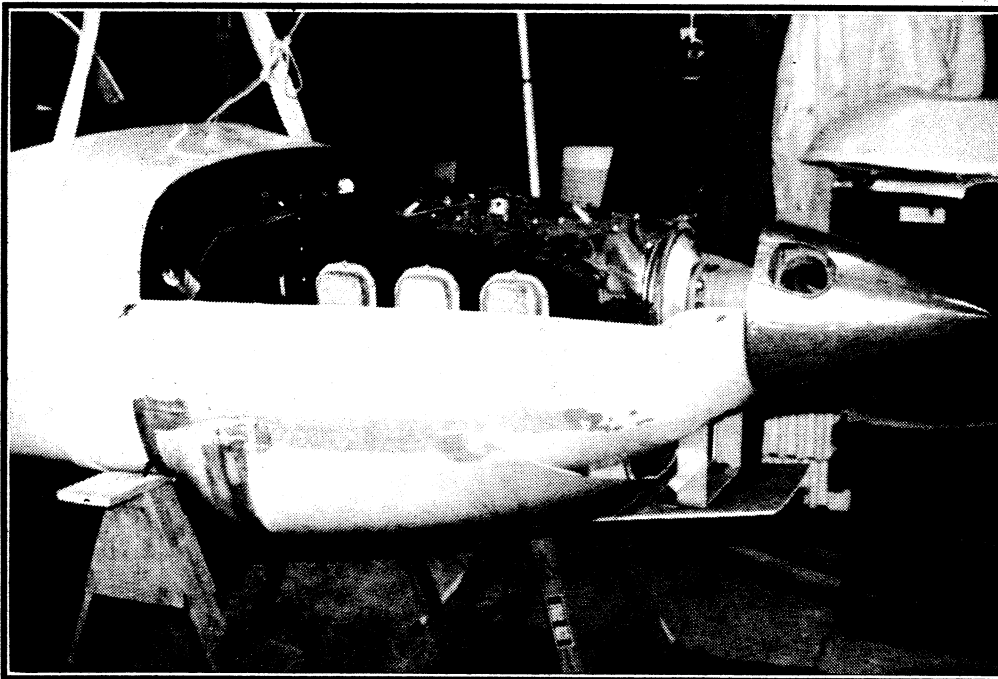
(Continued on page 11)



Above Picture No 7: Instrument panel in "hinged" position

High Altitude Performer- Revisited

Following the distribution of the last **EXPRESS LINK**, CBROS has received photos of the continuing installation of the turbo charged IO- 540 **EXPRESS** as being completed by **Doug McMillan** in San Martin, Ca. The photo below shows progress in the area at the bottom of the cowl as required for the turbo installation. Doug advises that he has since modified the extended area and will add an extended fairing aft of the firewall. We will keep readers up to date on his progress.



(Continued from page 10)

frequencies, would require a ground plane about four feet in diameter. Needless to say, this would be difficult, if not impossible to achieve, even on an **EXPRESS**.

I believe that only dipole type antennas should be used in composite (non conductive) airframes and that the best location for COM antennas is in the vertical stabilizer, with the second best location in the fuselage tailcone. The reason for this statement is that COM antennas are vertically polarized and therefore require a vertical space of about 46 inches for a half wave dipole. The **EXPRESS** has enough height for an aperture of a full, half wave length, but there is some advantage to shortening the space required. Think of aperture as the capture area of an antenna. Mounted high in the vertical tail the antenna is high enough to "see" through 360 degrees, while a fuselage mounted antenna may suffer some signal loss due to interference from the engine, passengers and miscellaneous "stuff".

SPORTCRAFT ANTENNAS SA006 COMM antenna is designed to replace some very bad antennas that were sold in the early days to builders of small two place composite aircraft. This antenna is constructed of 0.016 Aluminum so that it can be made to conform to a curved surface and is 26 inches in height and 12 inches wide. The SA-008 COMM antenna is designed for installation in aircraft with larger vertical tails such as the **EX-PRESS**.

I do not recommend any antenna on the market that has a "little black box" in the center of the antenna. This is a ferrite transformer which provides a very good VSWR and a very good bandwidth, but at the cost of high signal loss. An antenna which can be easily made by the average homebuilder, is made up by soldering quarter wave elements, such as copper foil tape, to the inner and outer (braided shielding) connectors of the coaxial cable and install, properly polarized, depending on whether it is to be used as a NAV or a COM antenna, and bond in place. If you are planning to install your "homemade" antenna according to designs published by RST, don't bother with the ferrite beads. At the frequencies you will be using, the beads don't do anything that I can detect

in the RF lab. A good balun would work better as a dipole feed because it balances the current on the elements and matches the impedance at the same time - and it doesn't absorb RF energy.

When installing any antenna, remember that antennas do interfere with each other when installed too close together and that metallic or conductive objects (don't forget graphite and carbon) that are as long or longer in the same polarization/plane will reflect RF energy away from them. Close, in this instance means one wave length or closer and closer being "worse". At VHF frequencies one wave length is about eight feet. Spacing less than a quarter wave length is really risky from both a VSWR and radiation pattern stand point. The formula for wave length is: $11803/\text{FREQ}(\text{in MHz}) = \text{wave length in inches}$.

If you have come to the place where you feel that there is only one good location for an internal COM antenna, and since antennas don't work well when mounted close together, it follows that there may be a need for a two set switching device of some type. I recommend an RF, single pole, double throw type. Such a switch will allow transmission and reception on a single frequency when switching from one radio to another. This type of switch is available from HAM radio outlets. Another type of switch that allows receiving on two radios at the same time, while transmitting straight to the antenna, is available from **SPORTCRAFT ANTENNAS**.

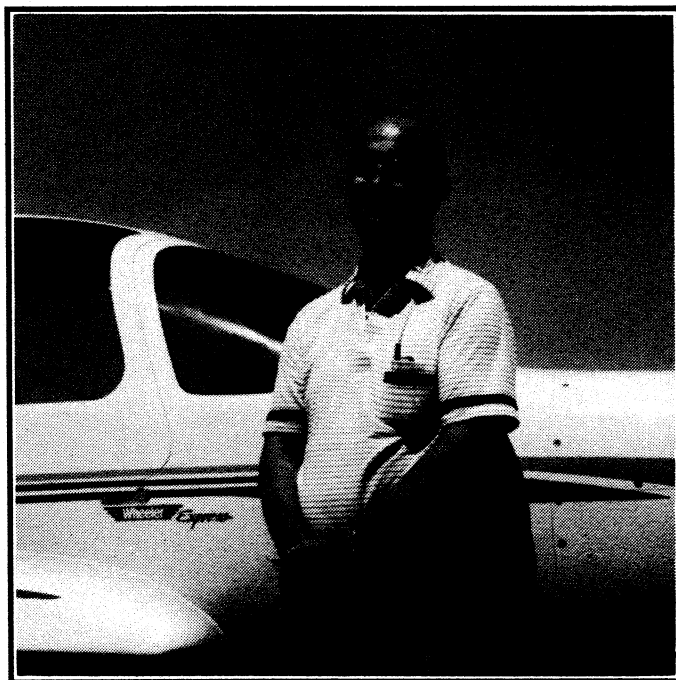
Ed Note: Our thanks to Bob for this valuable information. This short article only scratches the surface of the information which Bob has at his fingertips. He will happily answer your questions if you contact him at:
SPORTCRAFT ANTENNAS,
 21818 Ocean Avenue
 Torrance, CA 90503.
 Telephone: (310)316-8796.

SJOSTRAND'S FURTHER EXCELLENT ADVENTURES

It may seem to some that the **EXPRESS Link** is becoming the "Sjostrand Reporter", however, at the present time Jerry's **EXPRESS** is the most recognized example of the fast growing number of excellent aircraft flying, and Jerry has often said that he is proud to be able to represent the **EXPRESS** marque at air shows and other like events. So, we are happy to report yet another of Jerry's successes.

At the EAA Copperstate Fly-in held at the former Williams AFB, in Mesa, Arizona, Jerry received the Best Custom-Built Composite and Grand Champion awards for his efforts. While the "coverage" of the event in a recent Kit Planes edition barely mentioned the award and did not include a photo, we can all share in another of Jerry's accomplishments by trying to produce more fine examples of the **EXPRESS** which will confirm the excellent qualities of Ken Wheeler's original dream. Congratulations Jerry, press on!

To correct the Kit Plane Mag omission we include a photo of Jerry, who many of you may not know by sight, posing with his award winning **WHEELER EXPRESS**, below.





.....**EXPRESS LINK**

Subscription Information: Subscription to the *Express LINK* will be based on a 8 issue volume for the subscription price of \$36.00. Subscriptions entered during each volume will entitle the subscriber to all back issues of the current volume. There are 8 issues in Vol. 1, dating back to July '92. Back issues from the earlier volume may be obtained upon request for \$3.00 each which includes shipping and handling.

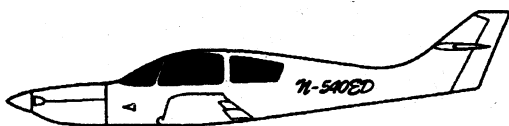
Documentation: CBROS, Inc has retained an extensive file of patterns and templates for all procedures through flap and aileron construction. We will be happy to share them with any builder for the cost of copying them. If you have a particular need, give us a call at (510) 455-1036.

Materials/supplies available: CBROS, Inc. can furnish vacuum bag material, 7781 fiberglass cloth, and self stick window covering, for use on your *EXPRESS*. If you are interested in any of the above, call John or Bill at CBROS, Inc. for prices.

Component construction: CBROS, Inc is prepared to assist other builders with their projects. It is not our intention to build complete airplanes, but to assist with component construction of parts such as wings, lower fuselage/firewall, empennage, and control surfaces. Our plan is to parallel the Factory "quick build" program, but on a more customer controlled basis. As each project is unique, if you are interested in speeding up your *EXPRESS* project, call CBROS, Inc. to discuss costs and scheduling.

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CBROS, INC.
4863 PRIMROSE LANE
LIVERMORE, CA 94550



.....**EXPRESS LINK - No 12**