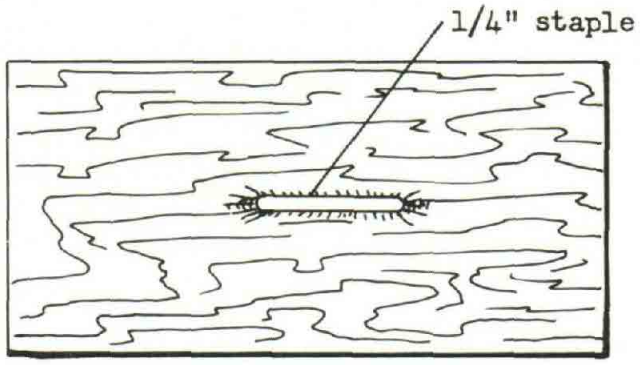
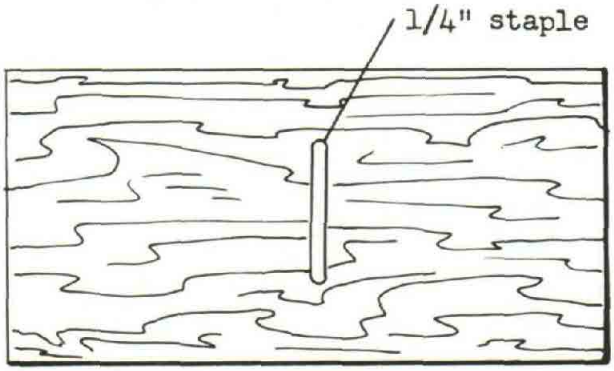
# From The EAA Designee File




WRONG




RIGHT

Wilbur Smith, Designee No. 66, of Bloomington, Ill., brought the following to our attention:

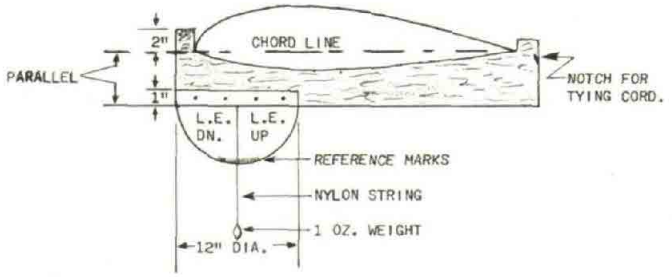
"I am enclosing a sketch that might save some trouble when using staples to assemble light plywood pieces such as skinning and gusseting.

"I found that when stapling wing rib gussets to the cap strips, that when they were stapled with the grain there was quite a bit of fracture in the plywood, especially in mahogany plywood.

"I made a simple twist test on some scrap pieces, after stapling with the grain and across the grain. I found that the fracture impressions, after removing the staples, cause the wood to break about 25 percent easier than when the staples were inserted cross-grain. This indicated a definite decrease in strength, even if it is on the top or outside ply. The strength of the ply depends upon its entirety."


SECTION CUT

Note wood fibre fractures when staples are inserted with the grain




## INCIDENCE AND RIGGING JIG

*By David W. Mason, EAA* 8828
*EAA Designee* 188
14107 Queensbury La., Houston, Texas

One of the most important items in building or restoring an aircraft is the wing incidence. Most plans and aircraft specifications state what the incidence should be at various parts of the wing for the craft to be stable and have good control.

Many homebuilders have a problem in accurately determining the actual wing incidence as they build the wing support structure and in final rigging. I have made an "incidence jig" that will work easily and in many cases makes it a one man job.

Cut a piece of one-half to one inch thick wood so that the bottom of the board is parrallel to the chord line of the wing, and the bottom of the wing sets into it deep enough to have about two inches of wood above the chord line at front and rear. Cut a 12 in. diameter semicircle of .020 aluminum and fasten it to the bottom of the jig board at the front end. Using a protractor, mark the aluminum with degrees corresponding to the incidence desired, or in degrees about five degrees either side of O, which would be straight down. Next, fasten a 12 in. length of nylon string to the center of your aluminum "protractor", and tie a one-ounce weight to the end of the string.

To use the jig, tie it to the bottom of the wing with a cord, or elastic, so that the jig fits flush with the bottom contour of the wing at the stations where you need your incidence readings, such as the wing root and wing tips. After leveling the fuselage, you are now ready to block the wing into the desired setting so that wing attach fittings can be welded to the fuselage or to adjust the wing for final rigging. I strongly suggest that, after you have the plane rigged, you keep a record of the incidence at the roots and tips of all wing panels for future reference.

# Igor Bensen Cops World Records In His "Gyrocopter"

EIGHT NEW AVIATION world records were recently brought home to American shores by Igor Bensen, EAA 577, with his Bensen B-8M "Spirit of Kitty Hawk", N-2588B. International records were set in speed, distance, and altitude categories for all autogyros.

Sanctioned by the Federation Aeronautique Internationale in France, and monitored in this country by the National Aeronautic Association, the records have been confirmed and entered.

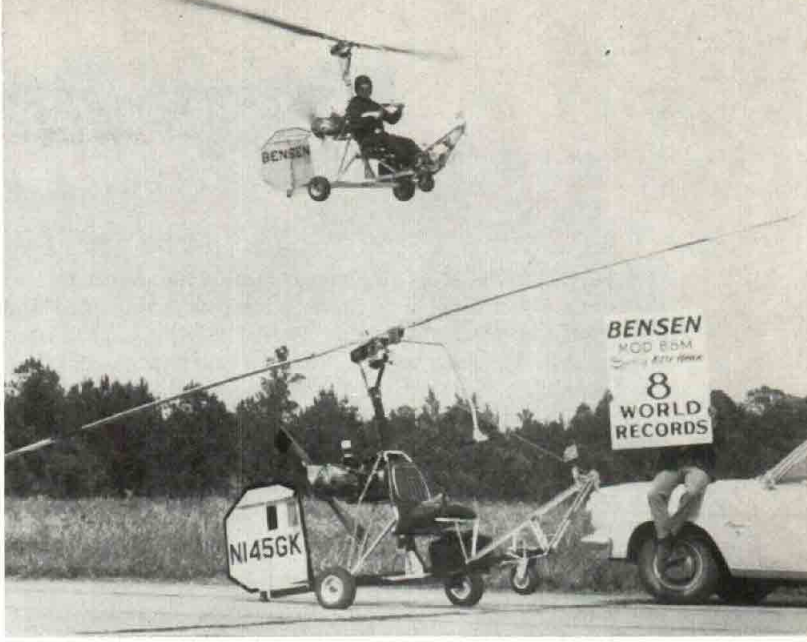
Actually, four events were flown, but claims were filed for two classes of aircraft for a total of eight records: (1) Class E-2, all autogyros; and (2) Class E-2a, autogyros weighing less than 500 kilograms. The four flight events and records claimed were:

1. Distance in a closed circuit (119 kilometers)
2. Speed over a 100 km. closed course (82.5 km./hr.)
3. Distance over a straight line (133.3 km.)
4. Maximum altitude 2217 meters.

The record flights began at the Raleigh-Durham, North Carolina airport at 7:00 A.M. on May 15, 1967, and ended four hours later at Winston-Salem, North Carolina. First to be completed were the closed circuit runs . . . three round trips between Raleigh-Durham and Raleigh Municipal Airports. At each end, Bensen turned around the pylons previously surveyed and referred to official U. S. Coast and Geodetic Survey benchmarks. A chase helicopter was used to carry the official NAA-FAI timer equipped with precise recording instruments. Four closed circuit records were set during this single flight.

The second flight proceeded immediately after refueling the homebuilt craft when Bensen took off cross-country from his home base at Raleigh-Durham for Winston-Salem. Again accompanying him were official FAI observers in an airplane and a helicopter. The flight lasted 1 hr. 25 min., and covered 133.3 kilometers (84 miles), setting two more world records.

The final flight, setting the world altitude record, began at Winston-Salem's Smith-Reynolds Airport and gave a few anxious moments to all participants. The weather began to deteriorate rapidly, bringing high winds and low clouds, which soon obscured the aircraft from ground observers. The chase plane soon lost the "Gyrocopter" in the clouds and returned to the airport. Only the helicopter carrying the NAA-FAI observer continued to follow Bensen through the thickening overcast. Meantime, winds picked up to 75 mph, blowing both craft far off their pre-arranged course. Finally, at 2200 meters altitude (7200 ft.), on signal from Bensen, the climb was arrested, and both craft dove through the last remaining hole in the thick cloud cover. Below the clouds they were met by tornado strength gusty winds, but managed to reach the safety of the airport. Tornado damage to several communities in the area was reported later.




**Igor Bensen flashes by the finish line to complete the series of flights netting him eight official world records. A homebuilt "Gyro-Copter" similar to the record breaking craft is parked in the foreground.**

This unprecedented group of flights made aviation history by achieving eight world records within four hours time, flown by one pilot in one aircraft. Bensen and his "Gyrocopter" now hold all records for autogyros, past and present.

Commenting on his feat at the news conference after the flights, Bensen said, "Adverse weather kept me from showing the full capacity of this fine little bird. We could have achieved higher figures on all flights, but since we were establishing all new records, we were grateful to obtain what we did."

Four more attempts will be made later, he declared, seeking world speed records on a 3 km. and 15 km. closed circuit speed course.

The craft that Bensen flew was his standard B-8M "Gyrocopter", hundreds of which have been built and flown throughout the world from plans supplied by him. Its predecessor, Bensen's model B-6, is now exhibited at the Smithsonian National Air Museum in Washington, D.C.

---

## WHAT'S THE FLAP ALL ABOUT . . .

(Continued from page 22)

of attack to maintain the same lift. Thus, if airplane acceleration is slow through the flap retraction speed range, the angle of attack must be increased to prevent the plane from sinking. This situation is typical after take-off when gross weight, density altitude, and temperature are high.

When flaps are lowered for landing, essentially the same items must be considered:

1. The increase in drag for a given value of lift requires a higher power setting to maintain air speed and altitude.
2. Lowering the flaps requires retrimming to balance the nose down moment change.
3. The angle of attack required to produce the same value of lift is less. For example, flap extension tends to cause the plane to "balloon" or gain altitude.

In many aircraft, the effect of intermediate flap extension is of primary importance in certain critical operating conditions. Small initial deflections of the flaps cause noticeable increases in maximum lift without large increases in drag. This is especially true of craft equipped with slotted or Fowler flaps. Large flap deflections past 30 to 35 degrees do not create the same rate of lift change but do cause greater changes in drag. A characteristic of most airplanes is that the first 50 percent of flap deflection causes more than half the total change in drag.

With the increase in high performance aircraft, high lift devices will become as common as retractable landing gears. And that's what the flap is all about.