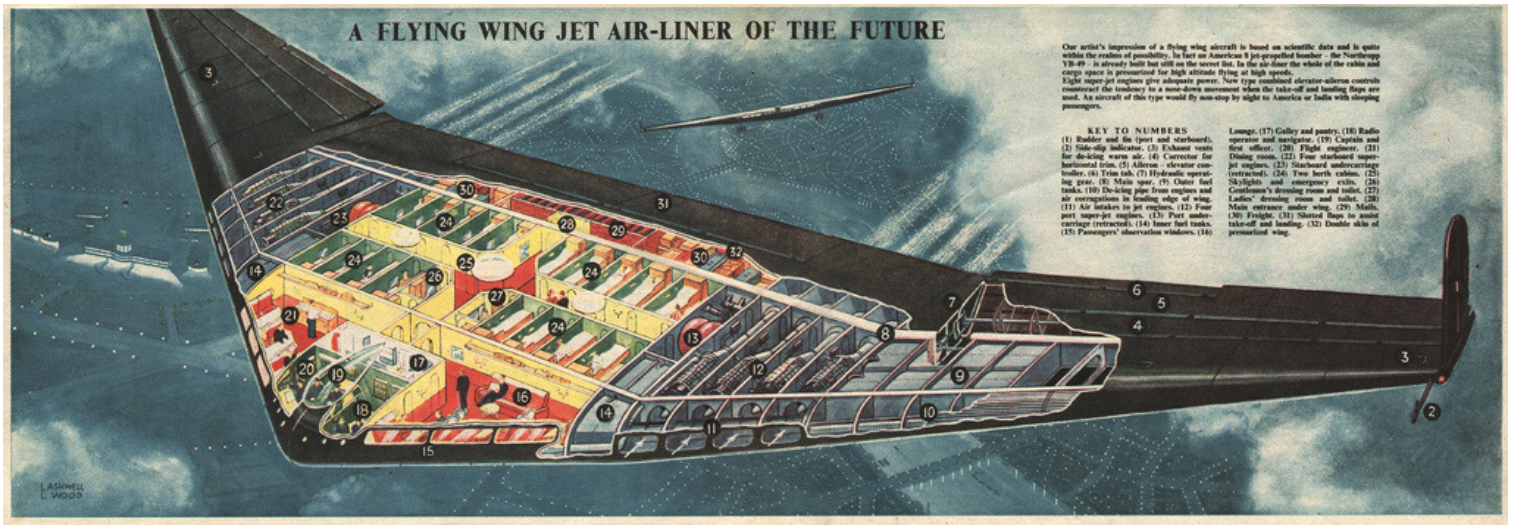
No. 384 AUGUST 2018

T.W.I.T.T. NEWSLETTER



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T.W.I.T.T.
The Wing Is The Thing
P.O. Box 20430
El Cajon, CA 92021

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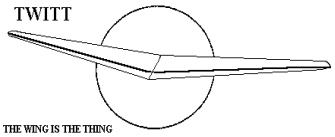

THE WING IS THE THING (T.W.I.T.T.)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation, which is dedicated to furthering education and research in a variety of disciplines.

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Gatherings are held on the third Saturday of every odd numbered month, at 1:30 PM, at Hanger A-4, Gillespie Field, El Cajon, California (first row of hangers on the south end of Joe Crosson Drive (#1720), east side of Gillespie or Skid Row for those flying in).

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PRESIDENT'S CORNER

Sorry this issue is a little late again, but better late than not having one for your reading pleasure. My thanks to Larry Nicholson for the pieces shown here and in some future issues.

As always, I am looking for material to publish so please scour your library and see if there is something you can share with the group. I know members really like pictures of airplanes so keep that in mind. You can send it to me electronically as a MS Word file along with JPEG images or if it is already a PDF send it along and I will scan it into a usable format for myi system.

Hope everyone is having a great flying season. I am still sidelined with my back that is improving but now I need a BFR and to get an annual done on the 1-26.

Andy

LETTERS TO THE EDITOR

The following information came to me in March from Larry Nicholson and I set it aside for a future issue then forgot I it. This is the first of several reproductions he sent along so will get done in the next few issues. The source for this month is: Teichmann, Frederick, Airplane Design Manual, New York Chicago: Pitman Publishing Corporation, 1942. pp. 231-235.

(e. - My thanks to Larry for passing this along to the membership for improving their knowledge of aircraft design.)

Fixed Angle of Wing Setting

Theoretically, an airplane designed for high speed should have its wing set at such an angle to the fuselage that the combination will give the least possible drag. This setting is difficult to determine without wind tunnel tests due to unknown interference effects.

A good compromise is to set the wing at an angle to the longitudinal axis of the fuselage corresponding to the angle at which minimum drag occurs.

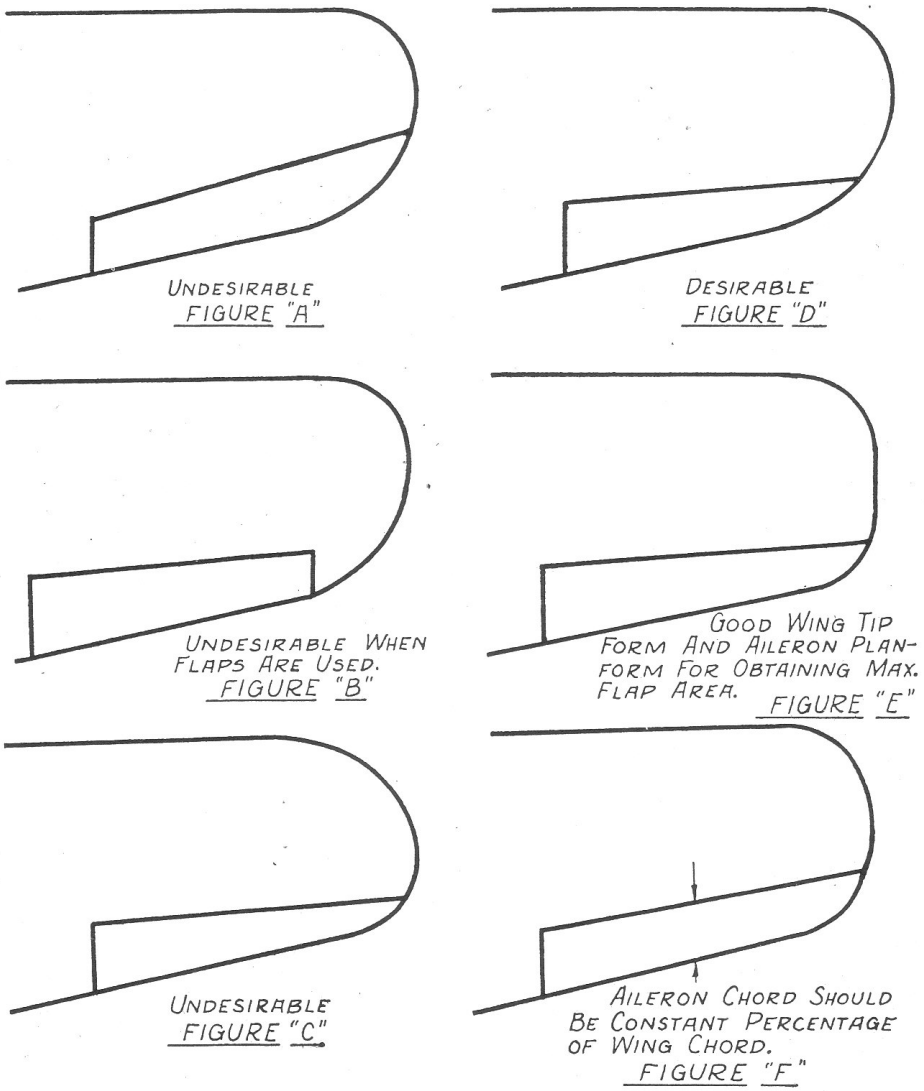

FIGURE 116. POSSIBLE AILERON PLANFORMS

Other considerations may be the deciding factors such as flap clearance in the deflected position, or the inconvenient ground angle for the fuselage when in the three-point landing position. The former case usually requires a smaller fixed angle of wing setting while the latter requires a larger angle of incidence.

Ailerons

Figure 116 shows a few possible planforms for ailerons, labeled as to whether a particular planform is desirable or not. Figure A of this group shows an aileron which diminishes in effectiveness at high angles of attack, although very effective at low angles. Figure B shows the aileron slightly too far inboard which is particularly undesirable when the maximum span for a flap as a lift increase device is required.

Figure C is a bad combination of a relatively good aileron and a bad wing tip in that the same effect is obtained as for Figure "A."

Figures D, E and F show generally desirable planforms. An aileron preferably should be not more than 25 per cent of the chord although 30 per cent is common when flaps are used for increased lift.

The next question that arises is whether the aileron should be aerodynamically balanced. For relatively slow speed airplanes and possibly for high speed airplanes utilizing auxiliary mechanical, electrical or hydraulic aid, unbalanced ailerons may be used.

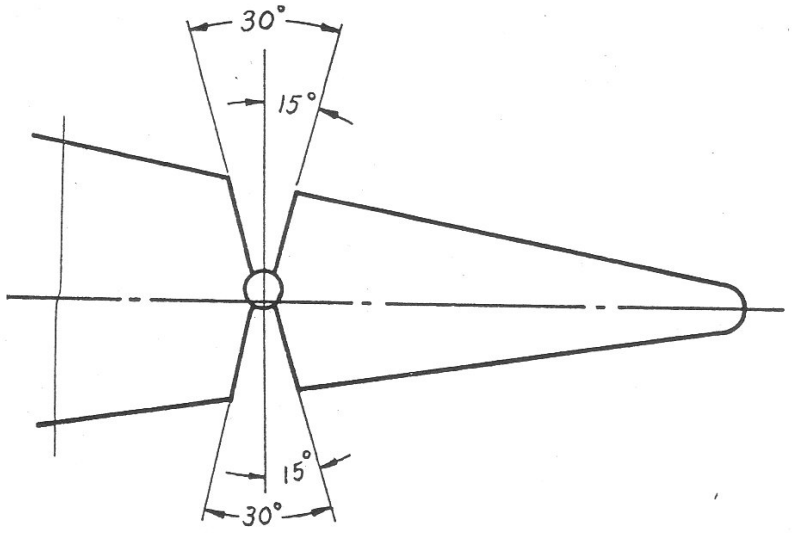

FIGURE 117. A SIMPLE UNBALANCED AILERON

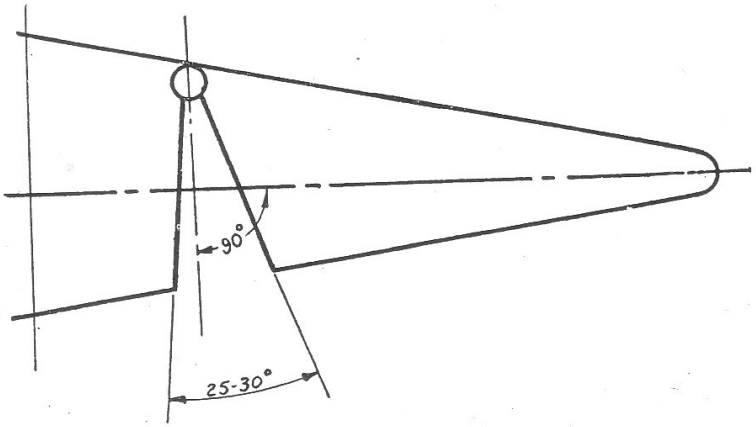

FIGURE 118. ANOTHER FORM OF AN UNBALANCED AILERON

Figures 117 and 118 show two standard forms of these unbalanced ailerons

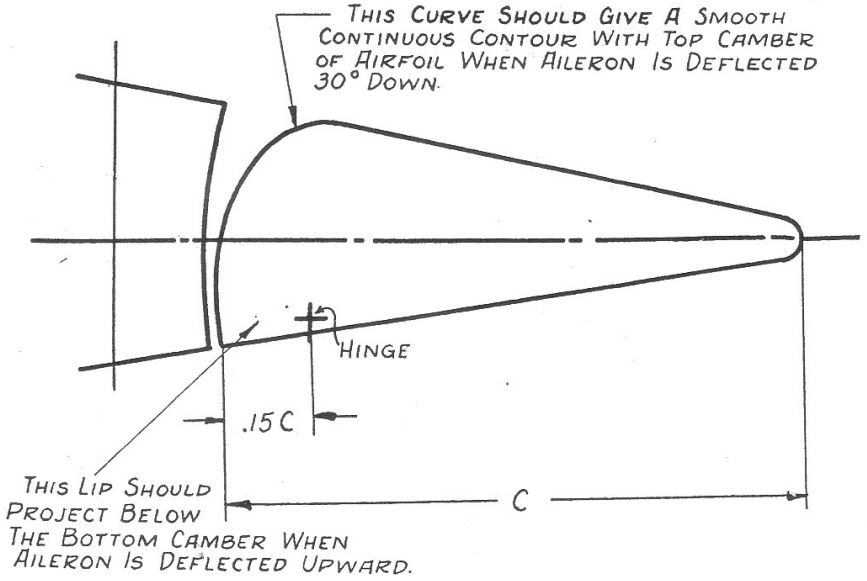

FIGURE 119. A BALANCED AILERON WHICH IS GOOD AERODYNAMICALLY, BUT MAY COLLECT ICE UNDER ICING CONDITIONS

For high speed and large airplanes, aerodynamically balanced ailerons are shown in Figures 119-122.

The leading edge preferably should not project beyond the normal contour of the wing when deflected, since ice may form on the leading edge of the control surface.

In order to reduce the manual effort to operate ailerons, a type of servo-control has been devised whereby a small surface is deflected in order to move a larger surface.

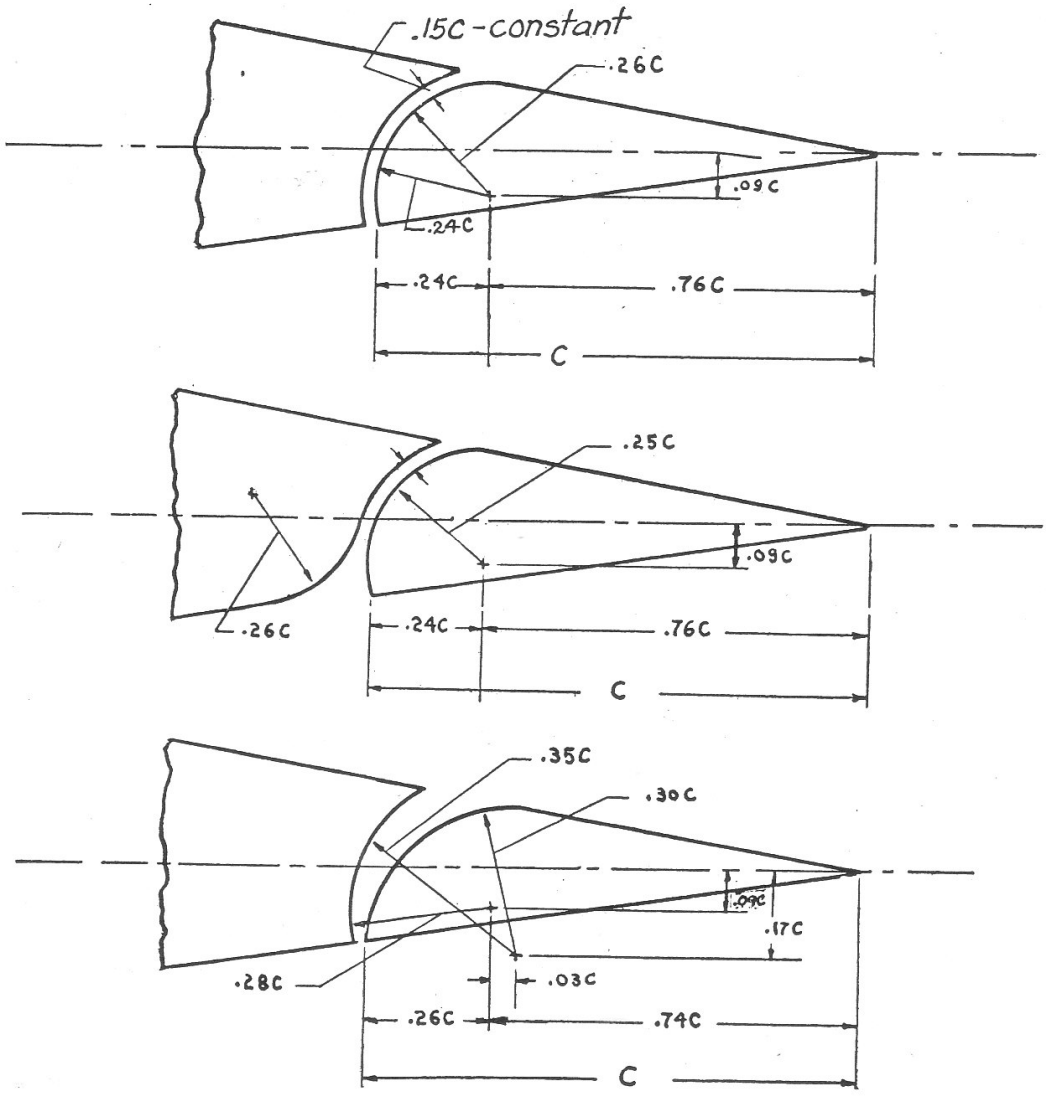

FIGURE 120. VARIOUS AILERON DIMENSIONS
The top aileron is best for avoiding ice formation under icing conditions.

For control purposes, these trailing edge flaps or tabs should have as high an aspect ratio as possible and about 10 to 12 per cent of the total movable area. A smaller percentage is sufficient when the tab is intended for trim purposes. Reference to the chapter on tail surfaces should be made for further explanations.

Aileron areas vary from 8 to 12 per cent of the total wing area (including the aileron area which is considered as the wing area).

Lift Increase Devices

To attain a high top speed it is desirable to have a high wing loading, but unless some lift increase device is used, the landing speed may be well beyond the desirable limit.

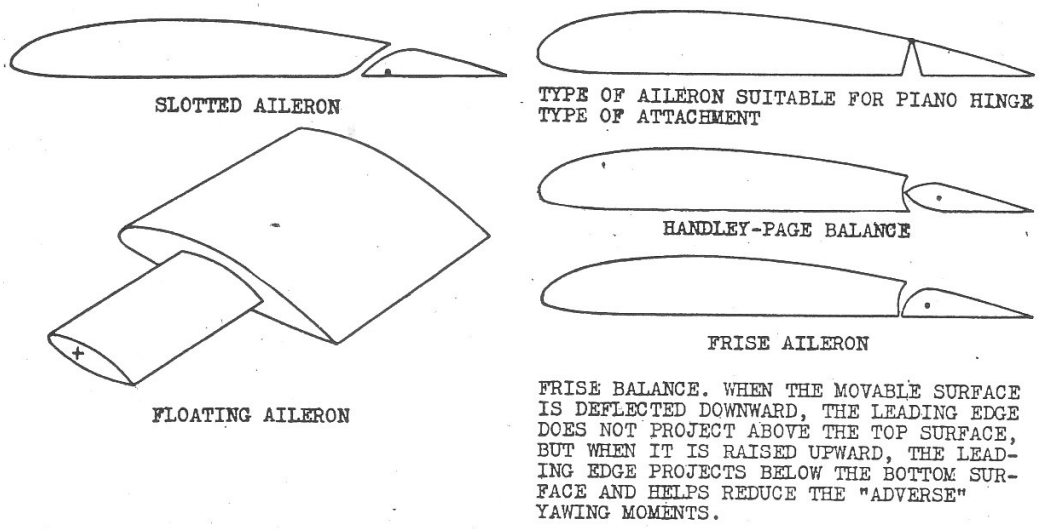

FIGURE 121. AILERON AND BALANCE FORMS

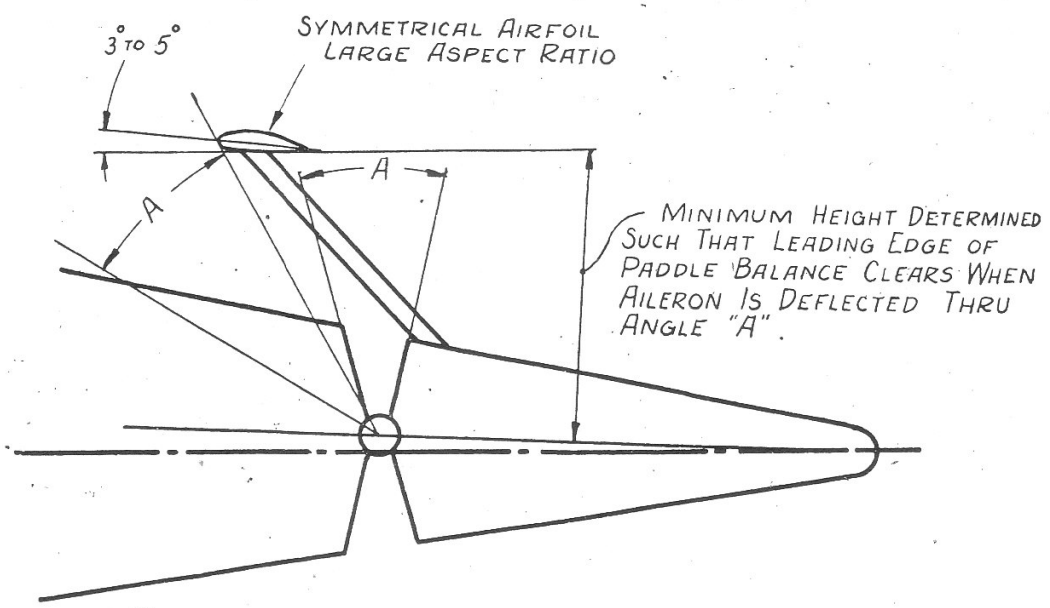

FIGURE 122. A BALANCED AILERON (PADDLE TYPE) SUITABLE FOR MODERATELY HIGH SPEED AIRPLANES

Various lift increase devices have been invented, and a few likely ones are shown and briefly described in Figure 123.

For all types of flaps it usually is customary to deflect the flap not more than 45 degrees, and to make the flap chord about 30 per cent of the wing chord so that attachments may be made to the rear spar in a two spar system.

For an airplane equipped with conventional size ailerons, the maximum lift coefficient for the entire wing area is often arbitrarily assumed to have been increased 40 per cent.

AVAILABLE PLANS & REFERENCE MATERIAL

VIDEOS AND AUDIO TAPES

(ed. – These videos are also now available on DVD, at the buyer's choice.)

VHS tape of Al Bowers' September 19, 1998 presentation on "The Horten H X Series: Ultra Light Flying Wing Sailplanes." The package includes Al's 20 pages of slides so you won't have to squint at the TV screen trying to read what he is explaining. This was an excellent presentation covering Horten history and an analysis of bell and elliptical lift distributions.

Cost: $10.00 postage paid
Add: $ 2.00 for foreign postage

VHS tape of July 15, 2000 presentation by Stefanie Brochocki on the design history of the BKB-1 (Brochocki,Kasper,Bodek) as related by her father Stefan. The second part of this program was conducted by Henry Jex on the design and flights of the radio controlled Quetzalcoatlus northropi (pterodactyl) used in the Smithsonian IMAX film. This was an Aerovironment project led by Dr. Paul MacCready.

Cost: $8.00 postage paid
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An Overview of Composite Design Properties, by Alex Kozloff, as presented at the TWITT Meeting 3/19/94. Includes pamphlet of charts and graphs on composite characteristics, and audio cassette tape of Alex's presentation explaining the material.

Cost: $5.00 postage paid
Add: $1.50 for foreign postage

VHS of Robert Hoey's presentation on November 20, 1999, covering his group's experimentation with radio controlled bird models being used to explore the control and performance parameters of birds. Tape comes with a complete set of the overhead slides used in the presentation.

Cost : $10.00 postage paid in US
$15.00 foreign orders

FLYING WING SALES

BLUEPRINTS – Available for the Mitchell Wing Model U-2 Superwing Experimental motor glider and the B-10 Ultralight motor glider. These two aircraft were designed by Don Mitchell and are considered by many to be the finest flying wing airplanes available. The complete drawings, which include instructions, constructions photos and a flight manual cost $140, postage paid. Add $15 for foreign shipping.

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