OCTOBER 1968

PHIL KRAFT WINS 1968 NATIONALS

R/C MODELER MAGAZINE

THE WORLD'S LEADING PUBLICATION FOR THE RADIO CONTROL SPORTS ENTHUSIAST

A few words about me.

I am Electronic Engineer and this is my day job.

From tender age two things attracted my interest and I managed to have them in my life.

The first was electricity and the second the bluesky.

I´ve found the model airplanes hobby in October 1973.

I love the wooden structures from scratch airplanes and boats also.

I started collecting plans, articles, books and anything else that could help the hobby of many years ago and have created a very large personal collection of them.

Since 2004 I became involved with the digitization and restoration of them and started to share the plans from public domain with my fellow modelers.

Now after all this experience I have decided to digitize, to clean and to re publish in digital edition and free of all issues RC Modeler magazine from 1963 to 2005 and others books and magazines.

Certainly this will be a very long, difficult and tedious task but I believe with the help of all of you I will finish it in a short time.

I apologize in advance because my English is poor.
It is not my mother language because I am Greek.
I wish all of you who choose to collect and read this my work good enjoyment and enjoy your buildings.

My name is Elijah Efthimiopoulos. (H.E)
My nickname Hlsat.

My country is Greece, and the my city is Xanthi.

Λίγα λόγια για μένα.

Είμαι Μηχανικός Ηλεκτρονικός και αυτό είναι το αληθινό μου επάγγελμα εργασίας.
Από μικρός δυο πράγματα μου κέντρισαν το ενδιαφέρον και ασχολήθηκα με αυτά.
Πρώτον ο ηλεκτρισμός και δεύτερον το απέραντο γαλάζιο του ουρανού και ο αέρας αυτού.
Το χόμπι του αερομοντελισμού το πρωτογνώρισα τον Οκτώβριο του 1973.
Μου αρέσουν οι ξύλινες κατασκευές αεροπλάνων και σκαφών από το μηδέν.
Ξεκίνησα να συλλέγω σχέδια, άρθρα, βιβλία και ότι άλλο μπορούσε να με βοηθήσει στο χόμπι από τα πολύ παλιά χρόνια.
Έχω δημιουργήσει μια πολύ μεγάλη προσωπική συλλογή από αυτά.
Από το 2004 άρχισα να ασχολούμαι με την ψηφιοποίησης τους, τον καθαρισμό τους αλλά και να τα μοιράζομαι μαζί σας αφού τα δημοσιοποιώ στο διαδίκτυο (όσα από αυτά επιτρέπεται λόγο των πνευματικών δικαιωμάτων τους).
Σήμερα μετά από όλη αυτήν την εμπειρία που έχω αποκτήσει, αποφάσισα να ψηφιοποιήσω, να καθαρίσω και να ξαναδημοσιεύσω σε ψηφιακή έκδοση και ελεύθερα όλα τα τεύχη του περιοδικού RC Modeler από το 1963 μέχρι το 2005 και κάποια άλλα βιβλία και περιοδικά.
Σίγουρα είναι μια πολύ μεγάλη, δύσκολη και επίπονη εργασία αλλά πιστεύω με την βοήθεια όλων σας να την τελειώσω σε ένα καλό αλλά μεγάλο χρονικό διάστημα.
Ζητώ συγγνώμη εκ των προτέρων γιατί τα Αγγλικά μου είναι φτωχά.
Δεν είναι η μητρική μου γλώσσα γιατί είμαι Έλληνας.
Εύχομαι σε όλους εσάς που θα επιλέξετε να τα συλλέξετε και να τα διαβάσετε αυτήν την εργασία μου καλή απόλαυση και καλές κατασκευές.
Το όνομα μου είναι Ηλίας Ευθυμιόπουλος.(Η.Ε)
Το ψευδώνυμο μου Hlsat.
Η χώρα μου η Ελλάδα και η πολη μου η Ξάνθη.

RCM Magazine Editing and Resampling.

Work Done:

1)Advertisements removed.

2) Plans building plane removed and hyperlinked.

3)Articles building plane removed and hyperlinked.

4)Pages reordered.

5)Topics list added.

Now you can read these great issues and find the plans and building articles on multiple sites on the internet.

All Plans can be found here:

Hlsat Blog RCModeler Free Plans and Articles.

http://www.rcgroups.com/forums/showthread.php?t=2354459

AeroFred Gallery Free Plans.

http://aerofred.com/index.php

Hip Pocket Aeronautics Gallery Free Plans.

http://www.hippocketaeronautics.com/hpa_plans/index.php

James Hatton Blog Free Plans and Articles.

http://pulling-gz.blogspot.gr/?view=flipcard

Vintage & Old-Timer RCM Free Plans.

http://www.rcgroups.com/forums/showthread.php?t=2233857

Contributors:

Scanning by ser001

Editing by Hlsat.

Thanks Elijah from Greece.

R/C MODELER

VOLUME 5, NUMBER 10 OCTOBER 1968 75¢

THIS MONTH

DEPARTMENTS

Our beautiful professional model Cheena Quan, poses with Wing Mfg. Co's first flown prototype of their fiberglass and foam WW II Zero. Extachrome transparency by C. W. Smith.

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EDITORIAL

By **DON DEWEY**

The growing interest in antique scale, or vintage aircraft, is evidenced by the increasing number of magazine construction articles and commercial kits for these pre-1918 designs. Those of you who have been following the construction of VK Models' Nieuport 17 in Kits and Pieces, will be interested in the results of this model's first contest performance. Bernie Murphy, who built the RCM prototype of the Nieuport, entered both the World War I Scale and the World War I maneuvers events at the recent DCRC Mirth of July Meet. Bernie took first in both categories, scoring 195 out of a possible 200 points! Vern Krehbiel of VK Models, captured third place in both events for a total of four out of a possible six places in the two W.W. I events — a fine tribute to an excellent kit! Second place in the World War I Scale event went to Joe Tschigri with a Fokker E5, while second place in the Maneuvers went to Dick Slutz with a Bristol Scout from M.A.N. plans.

Bernie mentioned, somewhat wryly, that he wasn't as much afraid of the formidable Red Baron as he was the fact that Maynard Hill from Flying Models Magazine was Contest Director for the entire meet and Bill Northrop was C.D. for the World War I events!

* * *

For those of you who are interested in these vintage aircraft events, we would like to call your attention to the World War I R/C Aircraft Jamboree for pre-1918 aircraft, sponsored by the IBM R/C Model Club of Poughkeepsie, New York on Saturday and Sunday, September 14-15. To be held at Cole Palen's world famous Old Rhinebeck Aerodrome, in Rhinebeck, New York, from 10:00 a.m. to 5:00 p.m., the contest will include four events Scale, WW I Maneuvers (modified AMA Pattern with scale handicap), Team Dog Fight (cooperative combat demonstration between two military aircraft), Bomb Balloon Busting (observation), Landing Skills. In addition, you will see full scale aircraft both on ground and in the air, including such famous fighters as the Fokker D VII, Sopwiths, SPAD and Nieuport 28's, as Cole Palen puts his fully restored vintage aircraft through exciting demonstration flights.

In order to assist other R/C Clubs who are interested in presenting a contest of this nature, we are presenting the 1968 Rules for the World War I R/C Aircraft Jamboree, as supplied to us by Ed Lorenz, a member of the 1968 Jamboree Committee:

1968 PROPOSAL

IBM R/C MODEL CLUB OF POUGHKEEPSIE, N.Y.

RULES FOR A "WORLD WAR I R/C AIRCRAFT JAMBOREE"

1. **OBJECTIVE:**
   To encourage the building and flying of R/C models of Vintage Aircraft. To foster an interest in and recreate the spirit of pre-1919 aviation.
2. **OVERALL REQUIREMENTS:**
   All models entered in any of the four events must be scale models of specific aircraft built and flown prior to 1919. While minor changes may be made to enhance performance, the general shape and profiles of the prototype aircraft must be maintained. Models not meeting the letter and spirit of the above may be refused registration (i.e., No "Antics", or "Das Ugly Sticks" allowed unless modified to be recognizable as a specific prototype).
   - Some proof of authenticity is required.
   - Engine(s) limit: 0.61 in.^{3} (total displacement).
   - Weight limit: 15 lbs. (ready to fly)
   - Current AMA & FCC licenses are required.
   - Entrants are encouraged to submit data and history on their entry's prototype to be read on PA during flight.
   - May enter the same — or different planes in each event.
   - A 2" per foot scale is suggested as being convenient, but is not mandatory.
   - All AMA rules apply unless stated otherwise.
3. **"BUILDERS OF THE MODEL" RULE:**
   Entrants may fly models which they have not constructed, however, no scale, appearance or workmanship points will be awarded in the "Scale" and "WWI Maneuvers" events. (Documentation points will be allowed).
4. **EVENTS:**
   Contestants fly in order from a single flight-list determined by their order of registration except for "Combat" which will be flown at an announced time. As each contestant is called to

the ready area, he will announce which event he is flying for this particular turn ("Scale", "WWI Maneuvers", or "Balloon Burst/Bombing/Landing"). Each contestant must have his frefrequency marker and score sheet for the event to be flown.
The four events of the "Jamboree" are as follows:

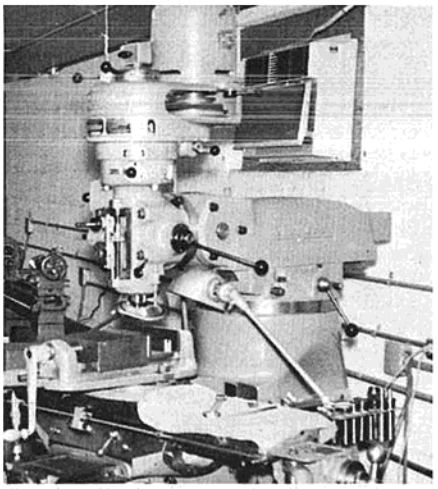
(1) **Scale:**
This is based on the AMA scale event whose rules and scoring shall apply except for the following listed changes:
1. Maximum engine (s) displacement: 0.61 in.^{3}
2. No qualification flight is required. May be scale-judged before or after scale flight.
3. Add to AMA's listed scale operations:
   a. Drop "message" or "flare" (non-burning).
   b. Fire gun(s) or rocket(s).
4. Scale Flight Plan-Contestant may perform any or all of first eight and last two maneuvers listed for the "World War I Maneuvers" Event. All scale operations must be performed consecutively. A maximum of 10 points per maneuver can total 100 points (maximum flight score).
5. Score = Flight score (Scale + Scale Operations).

Contestant Note — In arriving at flight score, the judges will consider significantly the realism and speed of flight.

(2) **World War I Maneuvers:**
This event is based on the AMA pattern event with suitable revisions to be consistent with the capabilities of the majority of pre-1919 aircraft (Maximum 10 points each, sub-total 190).
Scale handicap points will be added to determine total score (15 points maximum each category, sub-total 75 points).
Score = Flight points + Scale handicap (265 maximum).
1. Unassisted ROG.
2. Straight flight (from take-off or return to above transmitter first)
3. Procedure Turn.
4. Straight Return.
5. Wing over.
6. Two Rolls (straight or barrel).
7. One Loop
8. Immelman Turn (AMA).
9. Splits S (1/2 roll, 1/2 loop to upright).
10. Straffing run (low, straight, pass 5 to 30 feet. May be continuous from Split S).
11. Reversement (1/2 Cuban 8, 180° direction change).
12. Vrille (3 turn spin).
13. Chandelle (climbing 180° turn).
14. Falling leaf (slow nose-high approach, fall off on one wing, repeat in opposite direction).
15. Optional (Any WWI maneuver; Touch & Go, Snap Roll, Figure 8, etc.).
16. Overall realistic appearance of flight.
17. Scale speed of aircraft.
18. Landing Perfection.
19. Spot landing.
20. Realism and appearance handicap for WWI Maneuvers Event —
    a. Proof of Scale Documentation: 15 points maximum
       1. 3 views of prototype plans.
       2. Color and markings.
       3. Photographs and sketches.
    b. Self-Certification as to scale: 15 points maximum. Contestants shall furnish a written statement denoting scale factor(s) used and any deviations.
       1. Scale of wing(s), (scale ribs?).
       2. Tail surfaces.
       3. Fuselage length and cross-section.
    c. Structural Consistency (external appearance): 15 points maximum
       1. Construction similarity (sheet vs. framework).
       2. Placement of flying surfaces
       3. Rib and spar spacing, landing gear, struts rigging, scalloped trailing edges, etc.
    d. Finish and Marking Authenticity (15 points maximum):
       1. Color(s)
       2. Markings
       3. Insignia
    e. Overall appearance (15 points maximum):
       1. Maintenance of surface outline and cross-section shape.
       2. Workmanship
       3. Details (guns, steps, cockpits, etc.).
       4. Pilot in cockpit(s).

(3) **Team Combat:**
This is a cooperative demonstration between two aircraft, the object of which is to put on a realistic simulation of aerial combat between two military aircraft of **approximately the same scale.** Contestants may use smoke bombs, sound effects, etc.
The score is based on evasive actions, "firing" passes, placement in sky, content, aircraft proximity, realism and scale speed.
Total time 6 minutes (including 3 minute starting time) with up to 3 minutes of combat time (with flying start).

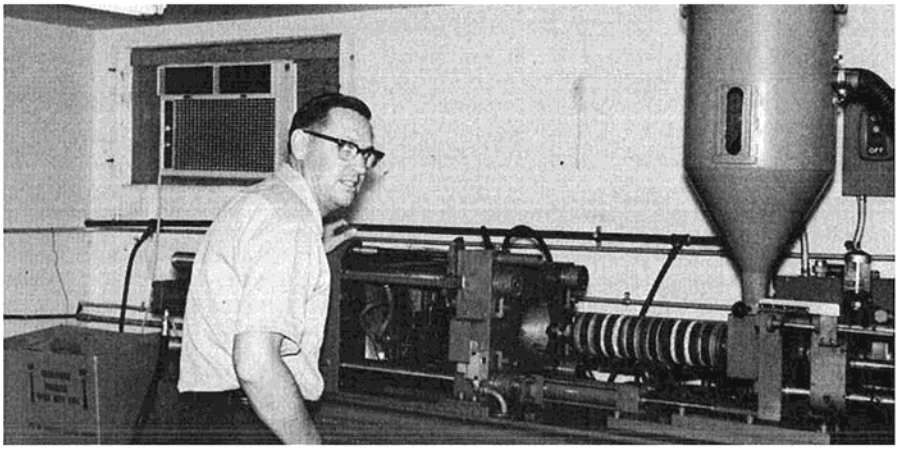
(4) **Combined Bomb Drop, Balloon Burst, and Spot Landing Event (One event):**
Scores are added.
1. GENERAL
   a. The object of this event is to drop a bomb accurately on a target, to burst a free (observation) balloon or its streamer and finally to land as close to the designated landing area as possible. (Some WWI Aerodromes were short!)
   b. Scoring is on the basis of accuracy in bombing and landing and the ability to hit or burst a balloon.
   c. The time per flight (attempt) will be limited to 3 minutes to start engine and 10 minutes overall (tentative).
2. BOMB DROP
   a. The bomb may be any non-hazardous object which satisfies the following requirements.
      1. Maximum weight of 2 oz.
      2. Minimum cross-section of 1 in.^{2}.
   b. Bomb may be released in any manner from an altitude of 10 to 100 feet.
   c. The target will consist of 2 concentric circles with diameters of 50 and 100 feet.
   d. The maximum score is 100 points for dropping the bomb in the smallest circle, then 50 points for the larger circles.
   e. 10 points wil be awarded for successfully dropping bomb (0 points if near spectator area, or lost).
3. BALLOON BURST
   a. The balloon will be from 1 to 2 feet in diameter and free floating with approximately 20 feet of crepe paper attached so that it will slowly rise.
   b. The plane must not be equipped with sharp or pointed objects (other than scale fittings).
   c. A maximum of 5 passes will be allowed per fight; the flier must call each attempt.
   d. 100 points will be scored for breaking the balloon.



EK PRODUCTS INC.

In Central Texas, the Home of Logictrol III

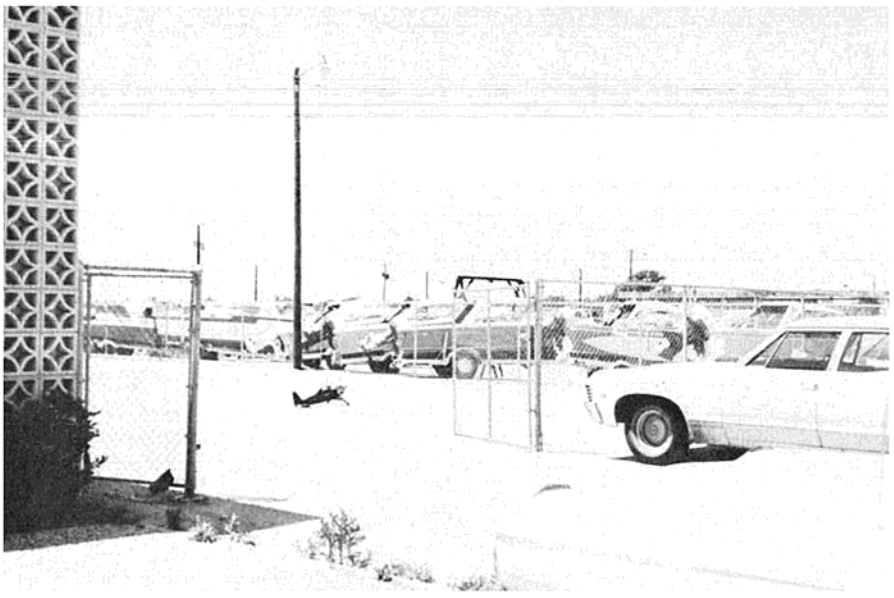
One of the most interesting of all tours — a visit to the plant facilities of a leading radio manufacturer, in this case the Hurst, Texas location of E.K. Products, Incorporated. The home of the famous "Red Box" is living proof of one manufacturer's claims for his product — creative, advanced electronic design matched to precision manufacturing techniques and demanding standards of quality control. In the photograph below, Bob Elliott, President of E.K., is at work on the molding machine, while the bottom photo illuminates a partial area of the assembly and production area.



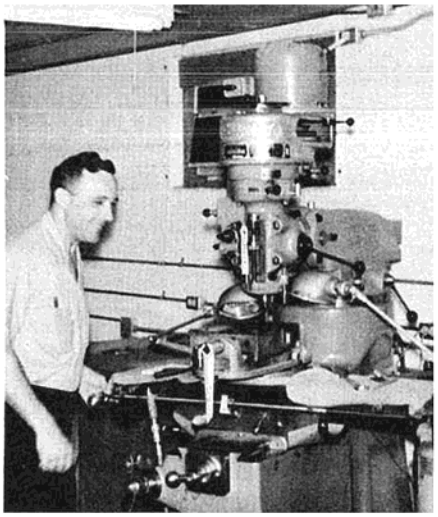
Almost two years ago, October, 1966 to be exact, EK products moved from the sunny slopes of Southern California to the even sunnier flat lands of Central Texas. The move, according to Bob Elliott, President and Gerry Krause, Vice President of EK, couldn't have been better. Since that move EK has expanded it's facilities and personnel almost continuously and now has between 50 and 60 employees working in a completely air conditioned office and plant. Another addition to the firm is Roy Klett, who heads up KEK Corporation. This branch is charged with the responsibility for research, development and sales, of plastic products and molded accessories. Roy is an outstanding craftsman, a long time R/C flier and is probably best known for his R/C hinges.

This team brings to the hobby industry something almost unique, a complete engineering group. Bob is a graduate Electrical Engineer; Gerry, a Graduate Aeronautical Engineer; and Roy, a Graduate Tool Designer from the Bremen Technical Institute in Germany.

The first of the now famous "Red Boxes" was launched under the name of Logictrol I in January 1964. It was one of the first of the Digital Proportional Radio rigs to gain wide use. The



The E.K. Products range testing area.



Roy Klett in his machine shop.

Log II was introduced in March of 1966 and went on to be recognized as one of the most reliable in the world. Log III entered the field in April, 1968. The Log III is in the new miniature size.

EK has also announced two new radio sets as companions to the Log III, a Galloping Ghost Rig, the "Digi Ghost" and a three channel proportional, the "XL-3".

The plant that turns out these Red Boxes is located midway between Fort Worth and Dallas, Texas in the town of Hurst and it is a bustling beehive of activity. You get the impression as you pass through the front door that this place is geared to move. Not only are all of the employees working hard and fast, but you have a tough time stopping Bob to talk for a minute as he moves about the plant. The production and assembly room is marked by a quiet hum of work and after being in the place for a few minutes, it becomes evident that you could also hold a pretty good beauty contest among the girls turning out the Log III sets! All of the components of the EK radio sets are made under the same roof with the exception of the electronic parts and the antennas. All of the sheet metal work for the transmitter cases, as well as the control sticks, all printed circuit work, all injection molding of the plastic parts that comprise the receiver, the servo cases of the Log III and the nylon gears, are made here.

Outside the building, in an area set aside just for this purpose, is a dummy aircraft fastened to the ground. Prior to shipment each new receiver and transmitter is range checked on this dummy to insure that all systems are go before the new set is sent on its way.

Logictrol radios are sold not only in this country, but all over the world. To better service this far flung distribution, EK is setting up servicing points on the West Coast, the East Coast and in England. On the West Coast, servicing is handled by Oddino & Salkowski and in England, by Henry J. Nichols & Son, Ltd. at the time of this writing, the negotiations had not been completed for the East Coast.

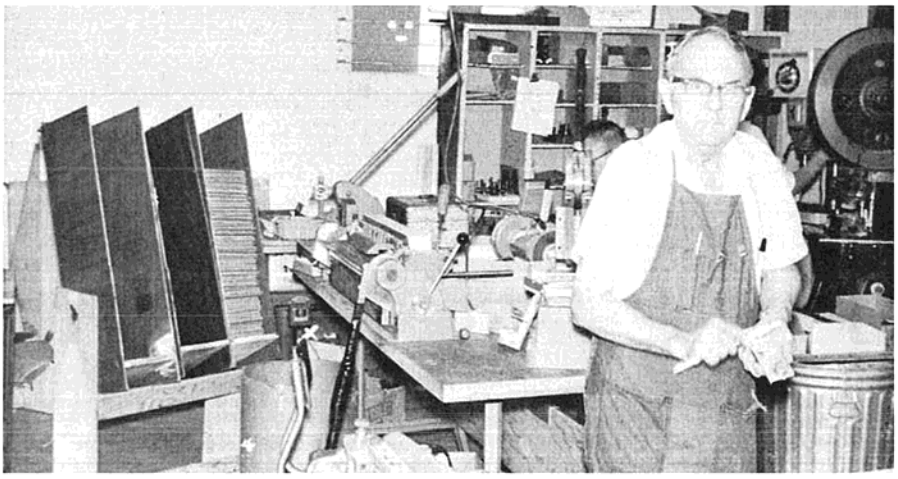
EK's policy for the future will be to continue to bring high quality, reliable equipment to the flier at the lowest possible cost consistent with this high quality. Bob won't say what he is working on next, but you can bet, someday there will be a Log IV.

The New Log III is an attractively packaged unit garbed in the familiar red color that has become the trademark of all of the Logictrol radios. The transmitter is electronically the same as the Log II. It has some of its parts swapped around for efficiency, but still retains the same size case, excellent open type sticks and overall good "feel". The covering of the case is red vinyl which keeps the transmitter looking good and easy to clean. The trim levers on both the five channel and seven channel are in a convenient position. They trim the servo electrically rather than by mechanically moving the control stick. The only real argument that I have with the transmitter is that these trim levers are too easy to move. Some type of ratchet, or stiffening would help to keep from changing trim while you are carrying the transmitter.

The real difference between the Log II and III is when you compare the old & the new sets. The new Log III is considerably smaller. The receiver is about 1/2 the size of its predecessor. The case is made of an almost indestructible plastic, as is the case on the servo and the battery pack. Again, the servo is about 1/2 the size of the older type.

The receiver case sports four mounting lugs for use on the new mounting

In the sheet metal shop, stacks and stacks of transmitter cases.



rack, one of the first of the new KEK accessories. With this rack you can mount the receiver and three or four servos. When assembled in this manner, the connecting wires from the servos to the receiver, which, incidentally, plug right into the end of the receiver case, can be cabled and tapped out of the way. Once set up, you need not disconnect the plugs, or make any changes when moving the equipment from one ship to another. All you do is simply unbolt and lift out the entire radio unit. Also, this mounting method minimizes damage in the event of a crash. Of course, if you wish, you may wrap the receiver in foam and mount the servos to rails inside the fuselage just as in the past.

The servos are of the double rack type with two lugs protruding from the top of the case. Each of these lugs has two holes and each works in the opposite direction from the other. There is never any worry about whether you have the servo turned in the right direction to give the proper control. A somewhat unique case has been designed for this servo. It is unique as compared to the earlier Log II case and other similar cases. If damage should occur and a mounting lug broken, this section of the case may be removed and replaced by the owner at nominal expense.

Another interesting feature of this servo is the concept of destruction. The gear train and output rack are designed to fail under the heavy load of a crash. This failure then prevents further damage to the servo itself. This concept is much like that of the collapsible steering wheel shaft on new automobiles. Under ordinary conditions, it functions perfectly; but in the event of a crash, it gives way to save the driver. Same thought, same function.

Another design feature of this rig is that it does not rely on a center tapped battery pack for power. This permits all of the cells of the pack to be used for both servo power and receiver power. As an added safety feature, one cell can go completely dead, cutting the voltage by 25% and the entire system will still function. EK doesn't recommend that you fly with a dead cell, but this safety margin will get you back on the ground in one piece.

Summing up the Log III, I've found it to be a compact, well designed and functional set. From a modelers viewpoint, it is easy to install, light in weight, (under thirteen and one-half ounces), small enough to fly a .15 multi, powerful enough to horse around a super-fast .61 powered stunt ship or a Goodyear Rivets, (I've flown it in all three types), and all-in-all, a very worthy successor to the famous Log II.

Editorial from page

e. 50 points will be scored for breaking the crepe paper.
f. 10 points will be scored for each time the balloon or crepe paper is hit but not broken.
g. Maximum score 100 points.

4. SPOT LANDING
   a. Landing area will consist of 2 concentric circles, 100 feet and 50 in diameter.
   b. The actual landing spot is defined as that point where, in the opinion of the judges, the aircraft is no longer airborne (last bounce).
   c. The score for landing is 50 points for small circle and 25 points for the large (100 foot) circle.
   d. Two attempts may be made providing the aircraft does not stop during the first attempt (i.e., it must "touch and go" or fly by) score best attempt only.
   e. Maximum score: 50 points.

* * *

In closing, this month, we'd like to pass on a suggestion from Max Blose of Hamilton, Texas for those readers who might have built the Heathkit IM-17 solid state Volt-Ohmmeter kit. This kit was reviewed in the March 1968 issue of Model Airplane News. It will not, however, measure transmitter voltage under a load, or any other voltage where a high level of RF is present. The meter will go to zero and beyond to the left and shifting the polarity switch will not effect this reading. The problem lies in the fact that the polypropyline case is not a shield. To remedy this, Max contact cemented aluminum foil to the three back sides of the poly-propyline case, letting it overlap so as each side would make contact with the other. Then, on the bottom of the case, he followed the same procedure, but allowing it to lap over in the slot where the slot keys in. Max then sanded the bottom of the panel at the point where the panel goes into the slot in the bottom of the case. This, then forms an effective shield and there is no longer any problem with reading DC voltages where there is RF in close proximity.

* * *

That's about it for this month. In the next issue, we're going to present the New Era, a .19 powered low winger designed expressly for the new AMA and FAI patterns with which you can take the hardware away from the .60's. This is not a "scaled-down" model, but one that has been designed for all-out performance in a small package. This aircraft has been field proven over an extensive period of time and has proved that it can equal or exceed any of the larger contest aircraft. In addition, it has the advantages of being economical to build and fly, as well as adding to the overall safety factor provided by the small aircraft. If you're a Doubting Thomas, when it comes to small models, try this one on the Top Hat and continuous knife edge back and forth across the field! In addition, we'll show you how to obtain performance from a .19 engine that will make the .60 advocates sit up and take notice. Don't miss it!

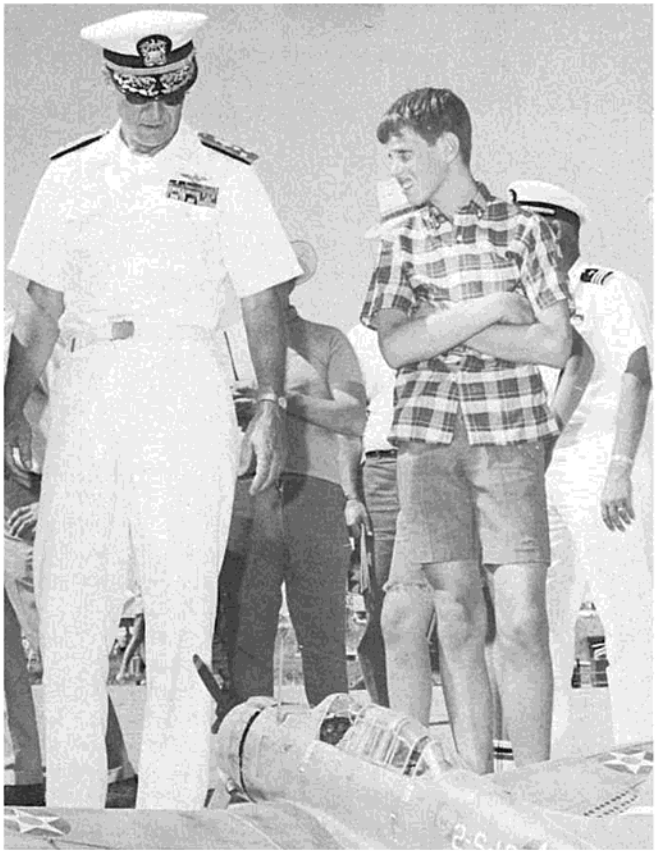
"I will now prove your evaluation of our product to be erroneous"

FORMER WORLD CHAMP, DR. RALPH BROOKE WAS EARLY FAVORITE IN THE 1968 NATS PATTERN EVENT. HIS CRUSADER STILL A FAVORITE. THAT'S SUMNER BROOKE AND TOM STROM JR. HELPING. (NAVY PIC BY JOHN THARP)

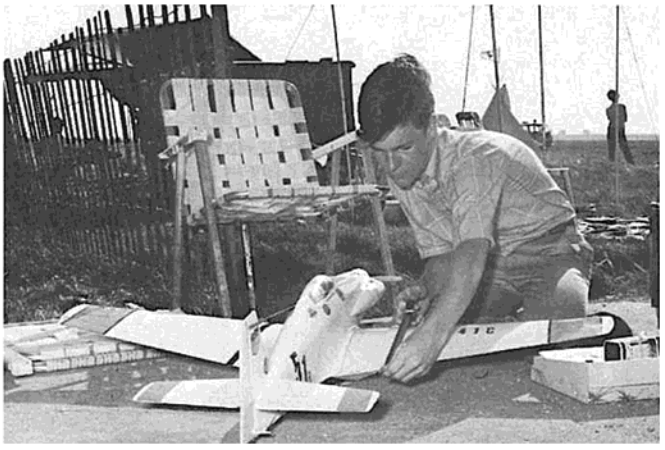
INTERNATIONAL INTEREST WAS HIGH AT OLATHE. NAVY CAPT. JOE KATZ OF METARIE, LA. WITH JAPANESE RCERS, YOSHIO TADOKORO, 1968 JAPANESE CHAMP ISAO MATSUI, AND YUJI OKI, FORMER CHAMPION. TADOKORO EDITOR OF RC TECHNIQUE. (NAVY PIC BY DICK MARX)

PHIL KRAFT WINS 1968 NATIONALS

Kraft (3215) Kwik-Fli combo bests field of 65. Kirkland (3145) second, Whitley third, as Granger Williams wins Scale and Goodyear.

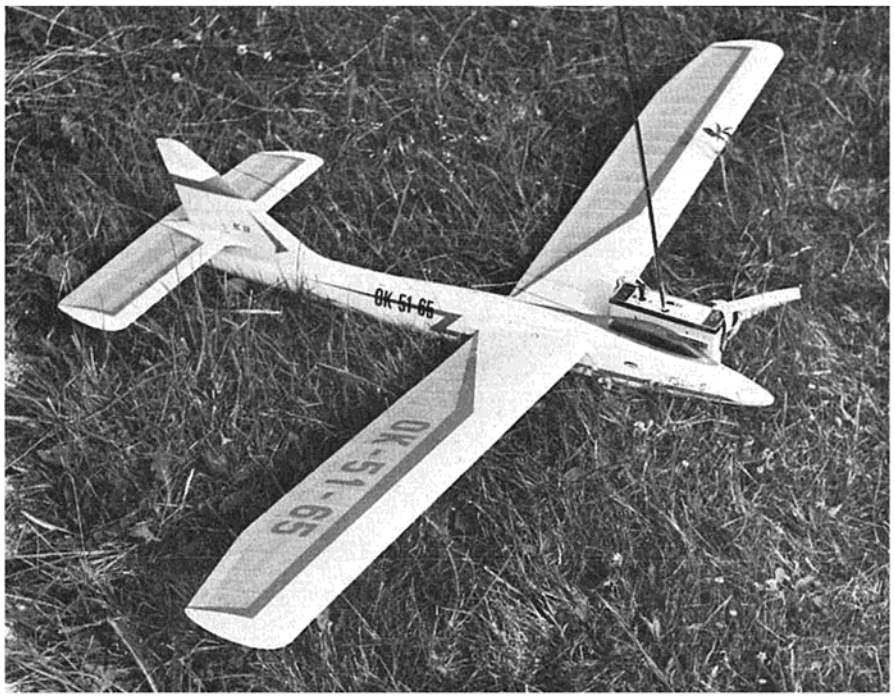


FABULOUS WAS THE WORD FOR SCALE. ADM. STREAM JOINED HUGE CROWD IN ADMIRING DAVE PLATT'S AMAZING DOUGLAS DAUNTLESS. (NAVY PHOTO)



WITT STOCKWELL, L.A. JUNIOR, MADE GOODYEAR QUALIFICATIONS. (NAVY PIC BY JOHN THARP)

MAJ. NEIL UDELL, SPOKANE N.G. F.102 PILOT, GETS DOUG SPRENG ASSIST FOR PATTERN FLIGHT. SPRENG, ALSO COMPETED, BOOSTED INTERNATIONAL CONTINGENT AT 1968 NATS. (NAVY PIC BY JOHN THARP)



WORLD RECORD SET IN CSSR

Ladislav Stefan Sets 15:02:25
R/C Glider Mark In Czechoslovakia

EXCLUSIVE RCM REPORT/**BY M. HERBER**

Ladislav Stefan, a Czechoslovakian Modeler from Vrchlabi, upset the world R/C duration mark for Radio Controlled gliders, by establishing a new mark fifteen hours, two minutes and twenty five seconds. Flying from 4,200 ft. high Gold Hill Mountain in the Czech National Park, Stefan began his successful record attempt with a hand-launch at 5:08 a.m. on July 6, 1968. The wind speed was slightly in excess of 11 m.p.h., and Stefan maintained a figure eight flight path across the slope of the hill. In order to maintain his desired altitude limitations of 164 to 493 feet in the face of increasing stronger winds and thermal activity, Stefan was forced to fly by half looping and periodic inverted flight until 5:00 P.M. that day.

At 6:00 p.m., the transmitter was placed on the reserve battery. An hour later, storm clouds were rapidly approaching and the weather grew worse. The most crucial point of the fifteen hour flight occurred at 7:30 p.m. when the glider encountered a period of extreme turbulence and almost crashed against the opposite side of the mountain! Stefan evidenced the piloting skill that enabled him to set this new record by successfully recovering the model in the now 27 m.p.h. winds a scant foot from the earth! The inclement weather, compounded by darkness, forced a landing at 8:10:25, for the new world mark.

The model used by Stefan was an original design called the Fakir 5, an 82½ inch span glider with a total wing area of 635 square inches. The stabilizer area was 165 square inches for a total lifting area of 800 square inches. The fuselage length was 45⅝" and the all-up weight was 4 pounds two ounces. Stefan used an E 387 airfoil on the wing and 7 degrees of dihedral.

R/C Modeler Magazine extends its congratulations to Ladislav Stefan and the CSSR on this duration record.

CHAMPION CITABRIA

The Champion Aircraft Company's Citabria is the Answer to the private pilot's demand for a reasonably priced sport aircraft with built-in aerobatic ability. The model, as well as the full-scale aircraft, is a tribute to Champion's designers.

ARTICLE/**BY ROBERT ANDRIS**

PHOTOS/**BY WHITEY PRITCHARD**


N8806A

The cover of the March '67 issue of Plane & Pilot magazine was the inspiration for this model. It was a color photo of Champion Aircraft Company's Citabria all decked out in a red and white sunburst paint job. So, with the trend toward R/C models that look like AIRPLANES rapidly gaining momentum, the decision to update the "de Bolt Champ" was made. The model was not intended to be a "scale" shop but has about turned out that way due to the excellent proportions of the full-scale bird. Only a small increase in aileron area and stab area was fed into the final layout. This is much the same effect as that obtained by the full scale boys when they clip the wings for national aerobatic competition.

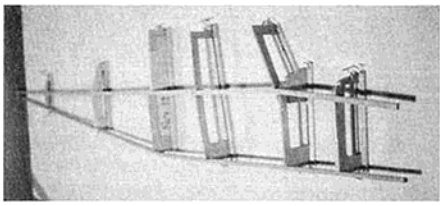
Another tribute to the Champion's designers is in order: the location of the landing gear with respect to the c.g. is ideal. The prototype is flying with a 12.4 prop turned by an Enya 45 under the cowl. If you check the plans, this doesn't give much ground clearance and yet, each and every take-off has been like falling off a log (I wish I could say the same for my landing technique!).

As you can see from the plans, a one-piece foam wing was used. The reasons for this were (1) its' quick to build, (2) it's quick to set up at the field, (3) it doesn't require struts for support and (4) it's rugged. However, the decision to use a one-piece wing caused a problem which, I'm happy to say, a good friend of mine, Mac Beauchamp by name, solved without blinking his fiberglass. The problem was — how do you simulate the windshield above the cabin. Easy. As the plans show, just roll the windshield material up-and-over, onto the top of the forward wing supports and glue it down. Then cut the appropriate sized hole in the center of the leading edge of the skinned wing and, after painting, cover the hole with the acetate windshield material too. It won't fool you at 5 inches away, but at 5 feet it's pretty effective. I remember showing a picture of the model posed with the ever popular GI-Joe, to a friend who then said . . . "Is that the airplane from which you're building the model?" One more word and we'll get to the construction. The sight of one of these birds in-flight, with the sun glinting through the open cabin, is something to behold. The extra work in building one, which I hope this design lessens, is well worth it.

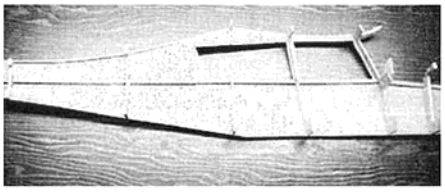
CONSTRUCTION

Fuselage:

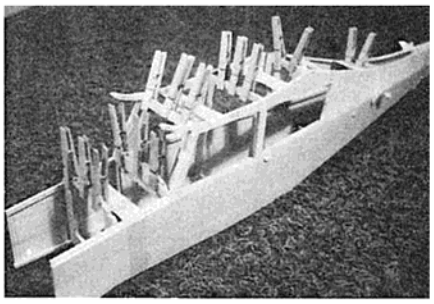
1. Cut out the 1/8" balsa, upper and lower halves of the fuselage sides. Leave some extra on the lower halves, forward of F2, so they can curve slightly toward F1 (see drawing for formers F1 and F2).
2. Cut out the 3/32" ply cabin doublers and bevel the lower portion of them as shown in the drawings for formers F4 through F7.
3. Glue the cabin doublers to the upper fuselage halves and allow to dry overnight.
4. Glue the 1/8" square balsa longerons to the upper part of the upper fuselage halves and let dry.
5. Bevel the forward and aft halves of the lower 3/16". 1/4" longeron as shown at former F3 and glue halves together over plans.
6. Bevel the forward and aft halves of the lower 3/16" x 1/4" longeron as shown at former F7 and glue halves together over plans.
7. Cut out formers F1 through F9.
8. Tack glue 1/8" balsa scrap into the center portion of formers F6 and F7, joining them together into one piece.
9. Cut formers F2 through F9 in half down their vertical centerlines (you now have a right and left half of each former except the firewall).
10. After drying, remove the upper and lower longerons from the plans.
11. Now locate all the right sides (or left sides) of formers F2 through F9 on the plans and prop into place with scrap balsa pinned on either side of each former.
12. Glue the upper and lower longerons into place on the formers (see figure 1).



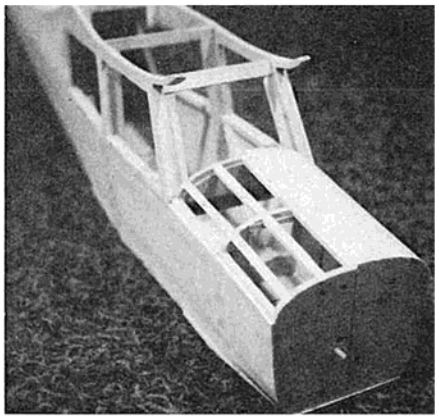
13. Put a slight crimp into the upper fuselage half at the location for former F5 and then glue the upper fuselage half down to the formers and longerons; let dry.
14. Similarly, crimp and glue the lower fuselage half onto the formers, longerons and the small portion of the cabin doubler that extends below the upper half.
15. Repeat the above procedure for the other side of the fuselage and when dry, remove from the plans and remove scrap balsa joining F6 to F7 (see figure 2).



16. Join and glue the two fuselage halves using masking tape and spring clothes pins. I used 1/32" ply scrap at most of the joints for a little extra strength. (see figure 3).



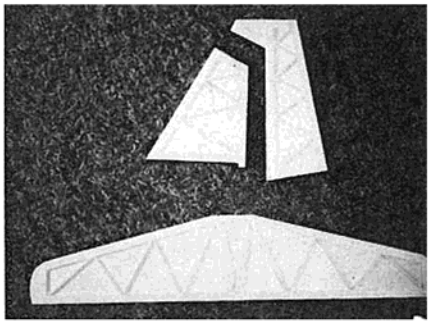
17. Install blind nuts for a Tatone motor mount into the firewall (F1) and then glue into place on the fuselage.
18. Cut out the 1/8" ply cabin triplers and glue in place, forward of F4.
19. Install maple wing bearers and internal fuselage trailing edge stock braces and all other supports while you still can get inside the fuselage.
20. Sheet bottom of fuselage, aft of F7, with 1/8" balsa; and top of fuselage, aft of F6, with 1/4" balsa (soak it in water until soft).
21. Bevel bottom sheeting at F7 and then sheet bottom, forward of F7, with 3/16" balsa and ply as shown on the plans.
22. Install 3/16" x 1/4" balsa stringers on the top of formers F1, F2 and F3.
23. Soak some 1/8" sheet balsa in water and glue on top of formers F1, F2 and F3, and their stringers as shown in figure 4. (NOTE: When wetting balsa to take a curve like this, tape it into place until it drys. Then remove tape and glue piece into place. This avoids the scalloping between formers, as the balsa drys slower than the glue).



24. Form the landing gear wires and j-bolt them to the 3/16" ply fuselage floor. Tape the axle ends together for alignment.
25. Glue soft balsa blocks along the outside of the belly from F1 to F7.
26. Install tail wheel bracket and except for a good sanding, the fuselage is about complete.

Tail Group:

The Tail group is completely conventional construction as shown on the plans and in figure 5. The surfaces look pretty close to scale (a flat framework built up out of steel tubing) and it's quick!



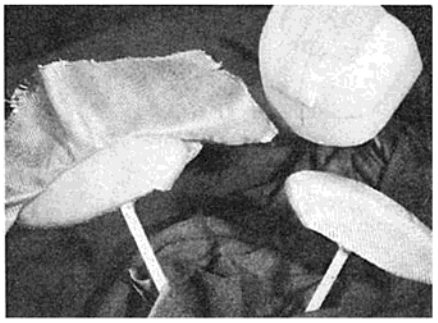
Wing:

The prototype used a "Foamcrafts" core and their construction techniques were followed to the letter. This is my first "foam-winger" and I'm sold on them.

Due to the special cutout in the leading edge of the wing above the cabin, you'll do well to check the plans carefully. The end result is neat, simulates the full scale airplane and is stronger than it would have been without the cutout. The prototype has zero dihedral and flies beautifully compared to some similar sized ships in the area, with 3 to 5 degrees per panel. However, I recommend you put in 1/2 degree dihedral in each panel so you don't have to put up with the "Hey Bob, your wings are drooping" like I have to. The boys around here think optical illusions only come in cans and amber bottles.

Cowl and Pants:

This also is pretty conventional. Simply form styrofoam blocks to shape and epoxy glue and glass cloth right over the foam. When finished, pour in some acetone to melt out the foam and you have good looking pants (on the outside only!). However, anyone who has ever tried it will attest to the fact that it is *#!?! to get the cloth to stay put until you get the entire form



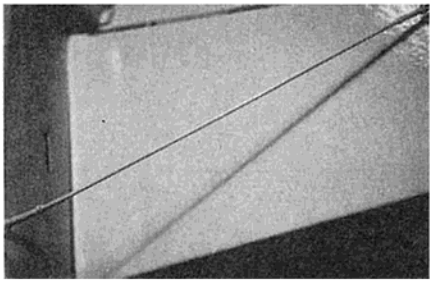
covered and get the glue on and cured. Referring to figure 6, here's a technique that worked great!

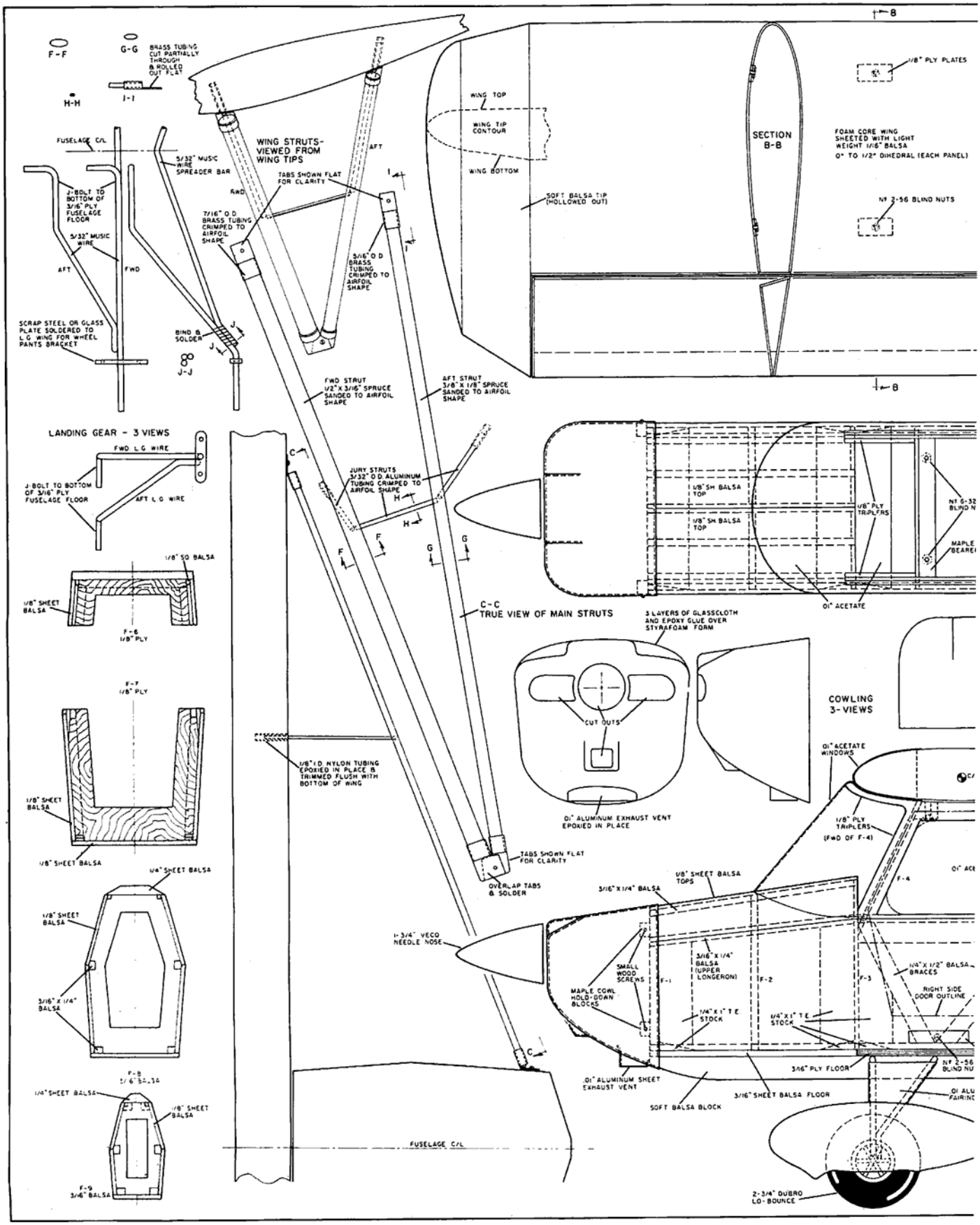
1. Make the forms up and sand smooth.
2. Glue a holding stick in place with RTV, Clear Seal, etc.
3. Cut the cloth oversize so you can maneuver it around.
4. Pay attention now . . . coat the core and one side of the cloth with COREGRIP contact cement and let dry!
5. Now as you smooth the cloth in place it stays right where you put it unless you pull it off to reposition it. Hooray!
6. If the curves get too tight, bring the cloth in from both sides and cut off excess where they meet.
7. Now apply a coat of Hobbypoxy II.
8. When the glue is partially cured (about 2 hours), but is still definitely tacky, put on the next layer of cloth and the tacky glue will hold the cloth like the COREGRIP did the first time.
9. Glue, cloth, glue. I used 3 layers and it seems more than adequate. Be careful when you overlap and trim — stagger the cuts so you don't get the weak spot in the same place every time.
10. Wet sand until you get a 400 or 600 grit. If you go through the glue into the cloth, give it another coat of glue and let it cure before re-sanding.
11. Make all cut-outs (a MOTO-TOOL works good here) and melt out the core with acetone.
12. File and lightly sand the cutouts. and you're done.

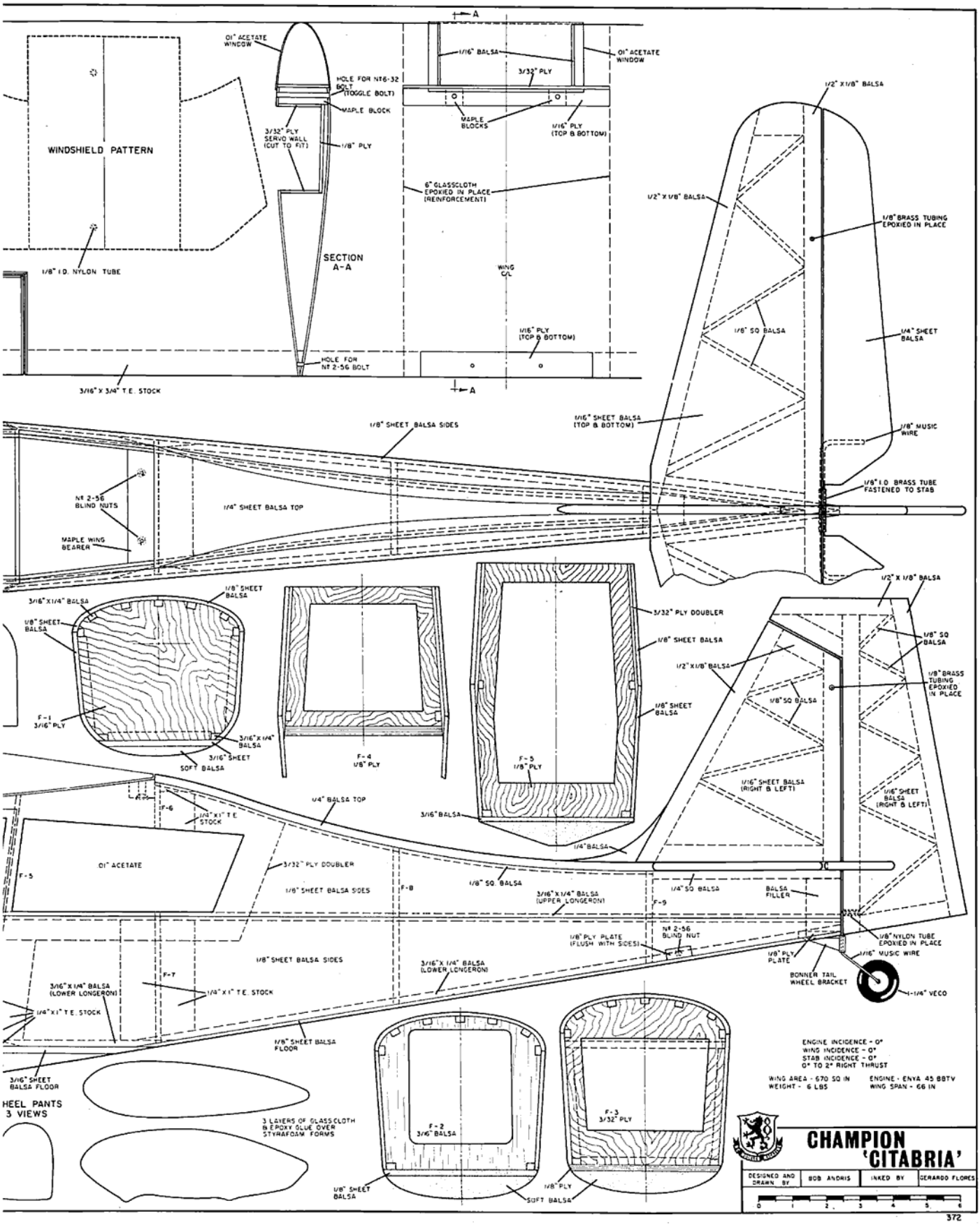
Additional Notes

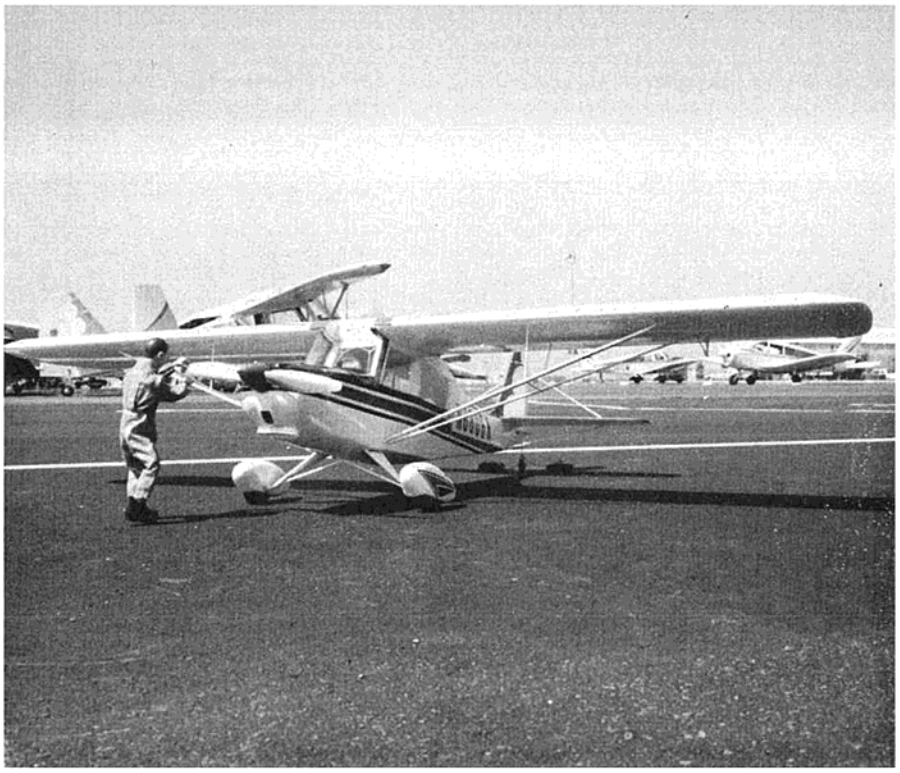
1. The brass tubing located in the fin and stab, as well as the blind nuts in the aft fuselage, are locations for the scale empennage braces. I made little fittings out of tin can stock and used 2-56 bolts to fasten them to the tail. If you string 1/16" O.D. nylon or teflon tubing between the fittings with a No. 2-56 nut glued into place with thread on either side of it, you get very scale-like braces that are extremely lightweight. Figure 7 shows

(Continued on Page 18)



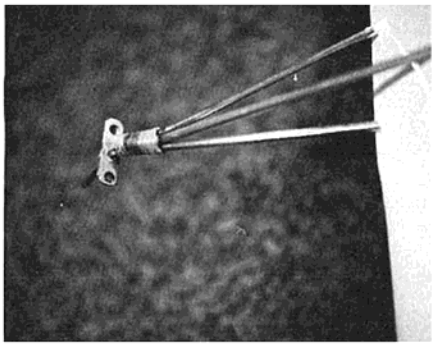

F-F
G-G
BRASS TUBING CUT PARTIALLY THROUGH & ROLLED OUT FLAT
H-H
I-I
WING STRUTS-VIEWED FROM WING TIPS
FUSELAGE C/L
5/32" MUSIC WIRE SPREADER BAR
J-BOLT TO BOTTOM OF 3/16" PLY FUSELAGE FLOOR
5/32" MUSIC WIRE
AFT
FWD
SCRAP STEEL OR GLASS PLATE SOLDERED TO L.G. WIRE FOR WHEEL PANTS BRACKET
BIND & SOLDER
J-J
TABS SHOWN FLAT FOR CLARITY
7/16" O.D. BRASS TUBING CRIMPED TO AIRFOIL SHAPE
3/16" O.D. BRASS TUBING CRIMPED TO AIRFOIL SHAPE
FWD STRUT 1/2" x 3/16" SPRUCE SANDED TO AIRFOIL SHAPE
AFT STRUT 3/8" x 1/8" SPRUCE SANDED TO AIRFOIL SHAPE
WING TOP
WING TIP CONTOUR
WING BOTTOM
SOFT BALSA TIP (HOLLOWED OUT)
SECTION B-B
1/8" PLY PLATES
FOAM CORE WING SHEETED WITH LIGHT WEIGHT 1/16" BALSA
0° TO 1/2° DIHEDRAL (EACH PANEL)
№ 2-56 BLIND NUTS
LANDING GEAR - 3 VIEWS
FWD L.G. WIRE
J-BOLT TO BOTTOM OF 3/16" PLY FUSELAGE FLOOR
AFT L.G. WIRE
1/8" SQ. BALSA
1/8" SHEET BALSA
F-6 1/8" PLY
F-7 1/8" PLY
1/8" SHEET BALSA
1/4" SHEET BALSA
3/16" x 1/4" BALSA
F-8 1/8" PLY
F-9 3/4" BALSA
JURY STRUTS 3/32" O.D. ALUMINUM TUBING CRIMPED TO AIRFOIL SHAPE
C-C TRUE VIEW OF MAIN STRUTS
1/8" I.D. NYLON TUBING EPOXIED IN PLACE & TRIMMED FLUSH WITH BOTTOM OF WING
TABS SHOWN FLAT FOR CLARITY
OVERLAP TABS & SOLDER
1-3/4" VECO NEEDLE NOSE
FUSELAGE C/L
1/8" SM BALSA TOP
1/8" PLY TRIPLERS
01" ACETATE
3 LAYERS OF GLASSCLOTH AND EPOXY GLUE OVER STYROFOAM FORM
CUT OUTS
01" ALUMINUM EXHAUST VENT EPOXIED IN PLACE
COWLING 3-VIEWS
01" ACETATE WINDOWS
1/8" PLY TRIPLERS (FWD OF F-4)
1/8" SHEET BALSA TOPS
3/16" x 1/4" BALSA
SMALL WOOD SCREWS
MAPLE COWL HOLD-DOWN BLOCKS
3/16" x 1/4" BALSA (UPPER LONGERON)
1/4" x 1" T.E. STOCK
1/4" x 1/2" BALSA BRACES
RIGHT SIDE DOOR OUTLINE
3/16" PLY FLOOR
3/16" SHEET BALSA FLOOR
SOFT BALSA BLOCK
01" ALUMINUM SHEET EXHAUST VENT
2-3/4" DUBRO LO-BOUNCE
F-1
F-2
F-3
F-4


WINDSHIELD PATTERN
01" ACETATE WINDOW
HOLE FOR NT6-32 BOLT (TOGGLE BOLT)
MAPLE BLOCK
3/32" PLY SERVO WALL (CUT TO FIT)
1/8" PLY
1/8" I.D. NYLON TUBE
3/16" X 3/4" T.E. STOCK
SECTION A-A
1/16" BALSA
01" ACETATE WINDOW
3/32" PLY
MAPLE BLOCKS
1/16" PLY (TOP & BOTTOM)
6" GLASSCLOTH EPOXIED IN PLACE (REINFORCEMENT)
WING C/L
1/16" PLY (TOP & BOTTOM)
HOLE FOR Nº 2-56 BOLT
1/2" X 1/8" BALSA
1/8" BRASS TUBING EPOXIED IN PLACE
1/2" X 1/8" BALSA
1/8" SQ BALSA
1/4" SHEET BALSA
1/16" SHEET BALSA (TOP & BOTTOM)
1/8" MUSIC WIRE
1/8" I.D. BRASS TUBE FASTENED TO STAB
1/8" SHEET BALSA SIDES
Nº 2-56 BLIND NUTS
1/4" SHEET BALSA TOP
MAPLE WING BEARER
1/2" X 1/8" BALSA
3/16" X 1/4" BALSA
1/8" SHEET BALSA
1/8" SHEET BALSA
F-1 3/16" PLY
3/16" X 1/4" BALSA
3/16" SHEET SOFT BALSA
F-4 1/8" PLY
3/32" PLY DOUBLER
1/8" SHEET BALSA
1/2" X 1/8" BALSA
1/8" SQ BALSA
1/8" BRASS TUBING EPOXIED IN PLACE
1/8" SQ BALSA
1/8" SHEET BALSA
F-5 1/8" PLY
1/16" SHEET BALSA (RIGHT & LEFT)
1/16" SHEET BALSA (RIGHT & LEFT)
1/4" BALSA TOP
3/16" BALSA
1/4" BALSA
F-6
1/4" X 1" T.E. STOCK
01" ACETATE
F-5
3/32" PLY DOUBLER
1/8" SHEET BALSA SIDES
F-8
1/8" SQ BALSA
3/16" X 1/4" BALSA (UPPER LONGERON)
1/4" SQ BALSA
F-9
BALSA FILLER
1/8" PLY PLATE (FLUSH WITH SIDES)
Nº 2-56 BLIND NUT
1/8" NYLON TUBE EPOXIED IN PLACE
1/16" MUSIC WIRE
1/8" PLY PLATE
BONNER TAIL WHEEL BRACKET
1-1/4" VECO
1/8" SHEET BALSA SIDES
F-7
3/16" X 1/4" BALSA (LOWER LONGERON)
1/4" X 1" T.E. STOCK
3/16" X 1/4" BALSA (LOWER LONGERON)
1/4" X 1" T.E. STOCK
1/8" SHEET BALSA FLOOR
3/16" SHEET BALSA FLOOR
HEEL PANTS 3 VIEWS
3 LAYERS OF GLASSCLOTH & EPOXY GLUE OVER STYRAFOAM FORMS
F-2 3/16" BALSA
F-3 3/32" PLY
1/8" SHEET BALSA
1/8" PLY
SOFT BALSA
ENGINE INCIDENCE - 0°
WING INCIDENCE - 0°
STAB INCIDENCE - 0°
0° TO 2° RIGHT THRUST
WING AREA - 670 SQ IN
WEIGHT - 6 LBS
ENGINE - ENYA 45 BBTV
WING SPAN - 66 IN
CHAMPION 'CITABRIA'
DESIGNED AND DRAWN BY
BOB ANDRIS
INKED BY
GERARDO FLORES
0 1 2 3 4 5 6
372



you what I mean.

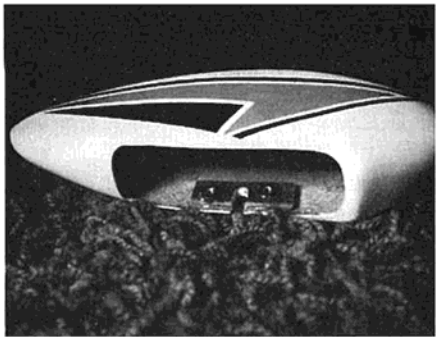
2. After completing the fuselage, painting and all, install the landing gear spreader bar and wrap the joints with wire and solder. Then solder on the wheel pants brackets



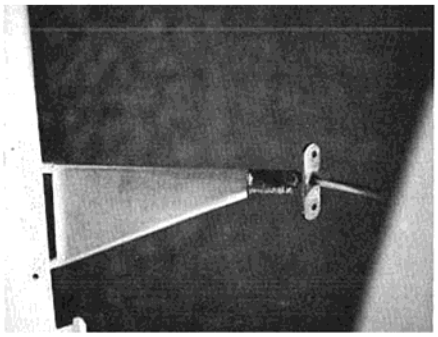
as shown in figure 8.

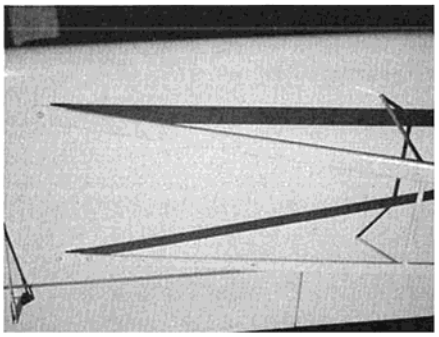
3. For the landing gear fairing just glue on some .01" aluminum linotype sheet with epoxy as shown in figure 9.

4. Mount two No. 2-56 blind nuts in a ply, or fiberglass plate and epoxy into the wheel pants as shown in figure 10.



5. The plans and figure 11 show how the struts attach. They are easily removable and this plane was designed to be able to fly without them. However, once you see them in-flight, I think you'll always use them.





PLY GUY

Julie Embree and RCM's prototype of the Ply Guy, photographed at Wilderness Park in Arcadia, California. A pretty girl, an airplane, and a summer's day . . .

OWEN KAMPEN & DON DEWEY

The Ply Guy . . . a good flying airplane, using a construction technique that provides a new dimension in creative expression.

OWEN KAMPEN:

The Ply Guy is the result of a team effort. This is unusual only in the fact that the team is separated by 2,000 miles and as yet, have never met! Improbable? Well, perhaps, but thanks to Alexander Bell and the latter day Pony Express, communications are now such that all kinds of things can and do happen — even the Ply Guy.

It all began with a telephone call from Don Dewey outlining a set of hypothetical specifications for a 4′ span, .19 powered sport-trainer to take advantage of the new proportional systems now available. As Don saw it, the plane would be stable and tame enough for the beginner, capable of operating out of reasonably small fields, yet strong and rugged enough to survive the inevitable mistakes caused by wayward thumbs and capable of aerobatics for the more advanced flier. The list went on and on! Well, it was his nickel, so I let him talk; but the plane he saw so vividly in his mind's eye does not exist and probably never will. Still, what the hell — we could try and try we did.

The trying soon boiled down to the inevitable "art of the possible." One of the key words that kept returning was "rugged." Ask any modeler, or any member of his family, to briefly describe R/C planes and it comes out — "they fly, they break." Perhaps something could be done to make the latter less likely. It so happened that, at the time, I had been doing some extensive experimenting into the bending nature of 1/32″ birch plywood and had constructed several fuselages formed out of single sheets of this material. Similar experiments were being conducted by Chuck Cunningham in Fort Worth, Texas at the same time. These fuselages were very strong, reasonably light and surprisingly fast to build. A variation on one of the prototypes became the answer to the Ply Guy fuselage. It probably contains more hardwood than anything since the English "Mosquito." It's rugged!

The wing is a typical D-tube with cap strip construction, using an airfoil which was, although similar to others, developed independently over a period of 5 years of cut, try, and fly. The raked wing tips have been tested on several planes and it's my belief that they very definitely contribute to increased lift by minimizing tip vortices. Actual tests with interchangeable tips have convinced me of this fact. Although I do not find supporting evidence in books on aerodynamics, my simple nature inclines me to believe what I see rather than the graphs I have read. More on this at another time.

The rest of the package is rather routine, like long moments for gentler control response. In any event, plans were drawn, the plywood fuselage finished and winter came on strong. Unable to wait, I shipped the whole schmear to Don. So, long distance teammate — over to you!

DON DEWEY:

Since the key to this design is the one piece folded plywood fuselage, we'll begin at that point. Before we do, however, I would suggest that you read Cunningham on R/C in this issue of RCM. Here, Chuck discusses the method of making a low wing, .60 powered model, using this same technique. The construction procedure is virtually the same as that used in the Ply Guy, except that the design, here, is a shoulder wing.

The Ply Guy fuselage is begun by cutting the fuselage template out of a sheet of 1/32″ birch plywood. Full size fuselage templates are shown on the plans available from the RCM Plans Service. If your local hobby shop does not carry the 48″ long plywood, it is available direct from Sig Manufacturing Company. After you have cut the templates from the plywood with an X-Acto knife and a number 11 blade, set them aside for the moment.

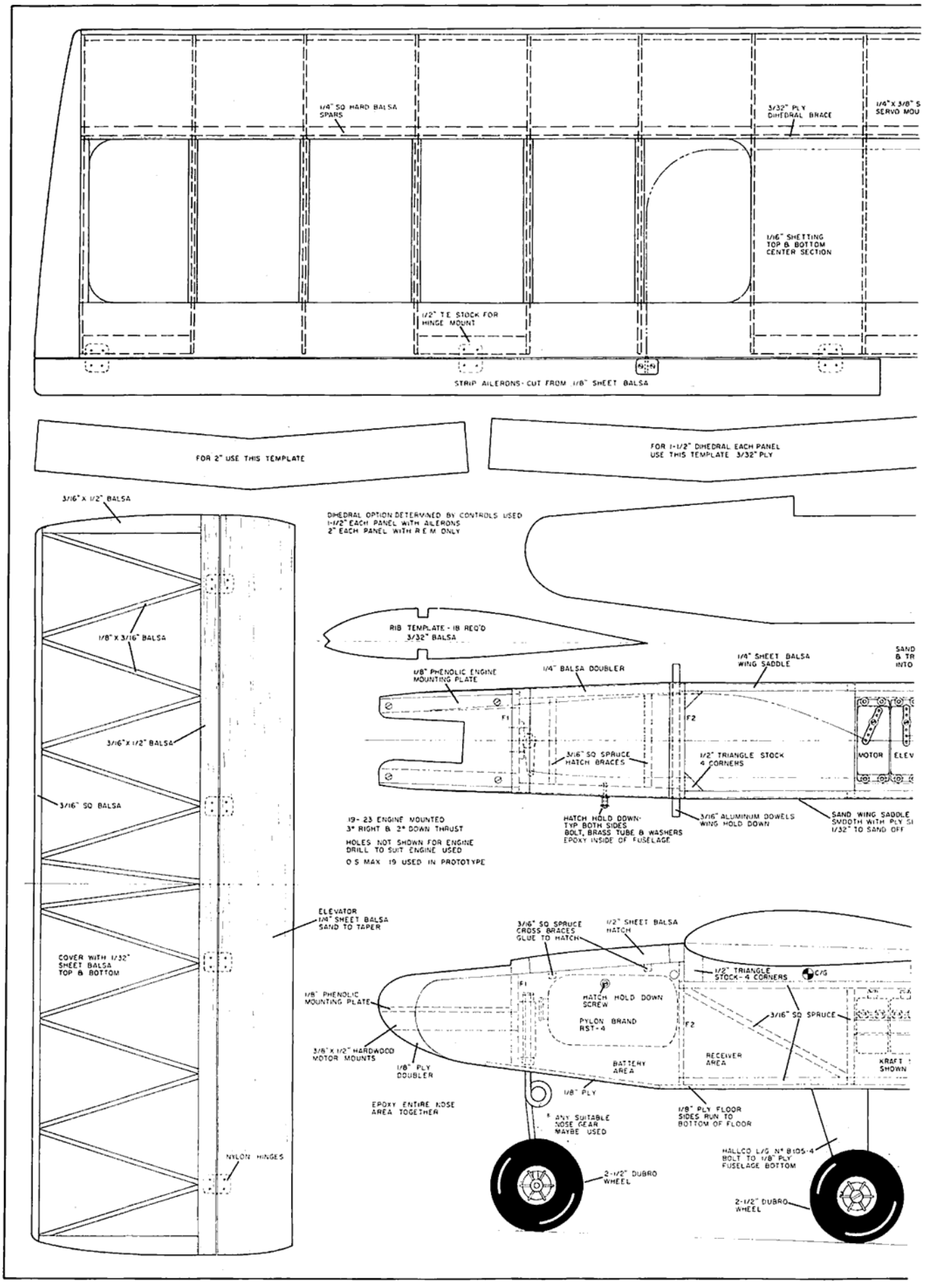
The next step is to cut the 1/8″ plywood fuselage floor to the size shown on the top and side view of the plans. Next, glue the 3/16″ square spruce runners to the outer edges of this plywood floor using Titebond glue. Using your Dremel jigsaw, cut bulkhead F2 from 1/8″ plywood and bulkhead number F3 from 3/32″ plywood. Glue these in place on the plywood floor, checking for perfect alignment with a right angle. When these are dry, add the 3/16″ square spruce top longerons and the 3/16″ square spruce upright that falls between former F2 and F3. When this sub-assembly has thoroughly dried, you are ready to proceed with forming the one piece fuselage.

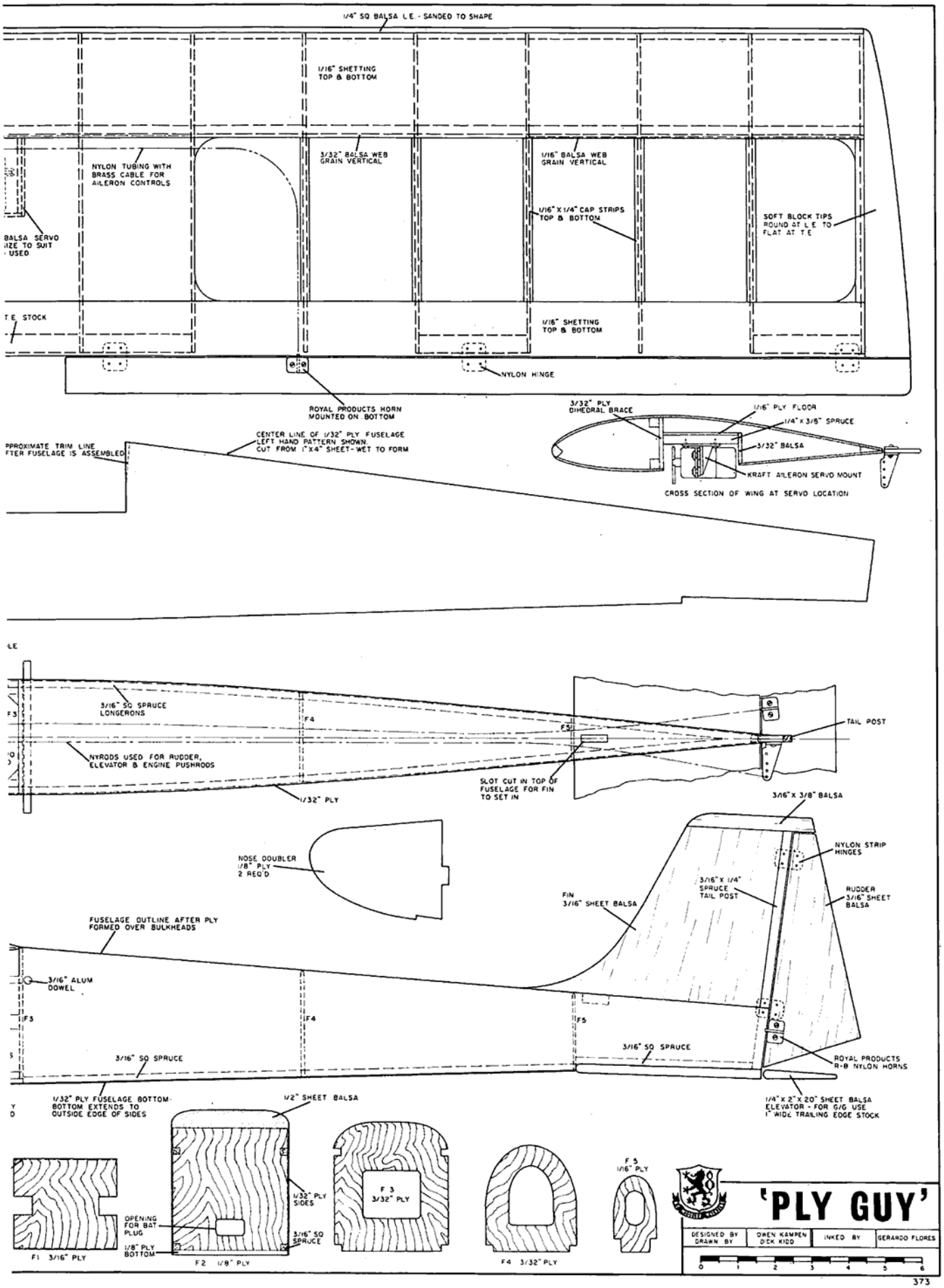
Take your plywood fuselage, previously cut from the templates and using a ball point pen, mark the positions of all remaining formers. After ascertaining that the plywood fuselage is exactly the size of the template, glue in place the 3/16″ square spruce longerons that extend from former F3 to the stabilizer and the 3/16″ spruce stringers that serve as a stabilizer support. When these have dried, take a wet sponge which has been soaked in water and to which has been added a few drops of ammonia and thoroughly soak the outside turtle deck area of the plywood at approximately two inches each side of a center line drawn down the center of your plywood piece. Allow this to dry for a few minutes, then resoak the fuselage. Do not allow water to get to the outside perimeters of the plywood, or on the inside area of the fuselage, itself. As you continue to re-soak this area, wiping off the excess runs of water, bend the fuselage with your hand. As the plywood becomes pliable, due to continued sponging, you will find that it gradually bends to the desired shape. When you feel that it is ready for final forming, mix up a batch of epoxy glue and stand by!

Spread epoxy over the sides of bulkheads F2, F3, the sides of the plywood floor and the 3/16″ square spruce stringers. Bend your fuselage plywood around to join to this assembly. Secure in place with numerous strips of masking tape, making sure that the entire assembly is completely aligned and true! While this is drying and without undue delay, cover the edges of bulkheads F4 and F5 with epoxy and insert on the lines you have previously drawn on the inside of your plywood fuselage. Make sure that these are in a true and aligned position, then secure in place with masking tape and pins, as necessary.

Add the 3/16″ spruce tail post, using epoxy glue and hold firmly in position with the use of C-clamps or numerous spring clothespins. You will experience some cracking at the top of the fuselage, however this area will be cut out for the installation of the fin, thus there is no need for alarm. Before your epoxy glue sets up, make certain that your spruce tail post is absolutely straight, since the fin and rudder will be glued to it and any mis-alignment, will cant your vertical fin to one side or the other. While the fuselage assembly is drying, you can add your 1/8″ ply nose doublers and 1/4″ balsa tank compartment doublers, using epoxy glue again and making certain to allow a slot on each side for the installation of firewall F1.

When the entire assembly has dried, add F1 and secure firmly in place with masking tape and/or rubber bands. Sand lightly the lower rear portion of the fuselage and then sheet with one piece of 1/32″ plywood, extending this plywood fuselage bottom on to the 1/8″ plywood floor. Do not set this project aside for over 24 hours without sheeting the bottom of the fuselage, since this will cause the fuselage to warp out of alignment. The plywood fuselage bottom, when glued in place, prevents any twisting or torquing of the aft section of the fuselage. Add the 1/2″ square maple motor mounts to


1/4" SQ HARD BALSA SPARS
3/32" PLY DIHEDRAL BRACE
1/16" SHETTING TOP & BOTTOM CENTER SECTION
1/2" TE STOCK FOR HINGE MOUNT
STRIP AILERONS - CUT FROM 1/8" SHEET BALSA
FOR 2" USE THIS TEMPLATE
FOR 1-1/2" DIHEDRAL EACH PANEL USE THIS TEMPLATE 3/32" PLY
3/16" X 1/2" BALSA
1/8" X 3/16" BALSA
3/16" SQ BALSA
COVER WITH 1/32" SHEET BALSA TOP & BOTTOM
NYLON HINGES
DIHEDRAL OPTION DETERMINED BY CONTROLS USED
1-1/2" EACH PANEL WITH AILERONS
2" EACH PANEL WITH R E M ONLY
RIB TEMPLATE - 18 REQ'D 3/32" BALSA
1/8" PHENOLIC ENGINE MOUNTING PLATE
1/4" BALSA DOUBLER
1/4" SHEET BALSA WING SADDLE
3/16" SQ SPRUCE HATCH BRACES
1/2" TRIANGLE STOCK 4 CORNERS
MOTOR
19- 23 ENGINE MOUNTED
3° RIGHT & 2° DOWN THRUST
HOLES NOT SHOWN FOR ENGINE
DRILL TO SUIT ENGINE USED
O S MAX 19 USED IN PROTOTYPE
HATCH HOLD DOWN- TYP BOTH SIDES BOLT, BRASS TUBE & WASHERS EPOXY INSIDE OF FUSELAGE
3/16" ALUMINUM DOWELS WING HOLD DOWN
SAND WING SADDLE SMOOTH WITH PLY SI 1/32" TO SAND OFF
ELEVATOR 1/4" SHEET BALSA SAND TO TAPER
3/16" SQ SPRUCE CROSS BRACES GLUE TO HATCH
1/2" SHEET BALSA HATCH
1/2" TRIANGLE STOCK - 4 CORNERS
C/G
1/8" PHENOLIC MOUNTING PLATE
HATCH HOLD DOWN SCREW
PYLON BRAND RST-4
3/16" SQ SPRUCE
3/8" X 1/2" HARDWOOD MOTOR MOUNTS
1/8" PLY DOUBLER
BATTERY AREA
RECEIVER AREA
KRAFT SHOWN
1/8" PLY
EPOXY ENTIRE NOSE AREA TOGETHER
* ANY SUITABLE NOSE GEAR MAYBE USED
1/8" PLY FLOOR SIDES RUN TO BOTTOM OF FLOOR
HALLCO L/G N° B105-4 BOLT TO 1/8" PLY FUSELAGE BOTTOM
2-1/2" DUBRO WHEEL
2-1/2" DUBRO WHEEL


1/4" SQ BALSA L.E. - SANDED TO SHAPE
1/16" SHETTING TOP & BOTTOM
NYLON TUBING WITH BRASS CABLE FOR AILERON CONTROLS
3/32" BALSA WEB GRAIN VERTICAL
1/16" BALSA WEB GRAIN VERTICAL
1/16" X 1/4" CAP STRIPS TOP & BOTTOM
SOFT BLOCK TIPS ROUND AT L.E. TO FLAT AT T.E.
BALSA SERVO IZE TO SUIT USED
T.E. STOCK
1/16" SHETTING TOP & BOTTOM
NYLON HINGE
ROYAL PRODUCTS HORN MOUNTED ON BOTTOM
3/32" PLY DIHEDRAL BRACE
1/16" PLY FLOOR
1/4" x 3/8" SPRUCE
3/32" BALSA
KRAFT AILERON SERVO MOUNT
CROSS SECTION OF WING AT SERVO LOCATION
PPROXIMATE TRIM LINE FTER FUSELAGE IS ASSEMBLED
CENTER LINE OF 1/32" PLY FUSELAGE LEFT HAND PATTERN SHOWN. CUT FROM 1"X4" SHEET - WET TO FORM
LE
3/16" SQ SPRUCE LONGERONS
F4
F5
TAIL POST
NYRODS USED FOR RUDDER, ELEVATOR & ENGINE PUSHRODS
1/32" PLY
SLOT CUT IN TOP OF FUSELAGE FOR FIN TO SET IN
3/16"X 3/8" BALSA
NOSE DOUBLER 1/8" PLY 2 REQ'D
NYLON STRIP HINGES
3/16"X 1/4" SPRUCE TAIL POST
FIN 3/16" SHEET BALSA
RUDDER 3/16" SHEET BALSA
FUSELAGE OUTLINE AFTER PLY FORMED OVER BULKHEADS
3/16" ALUM DOWEL
F3
F4
F5
3/16" SQ SPRUCE
3/16" SQ SPRUCE
ROYAL PRODUCTS R-8 NYLON HORNS
1/32" PLY FUSELAGE BOTTOM - BOTTOM EXTENDS TO OUTSIDE EDGE OF SIDES
1/2" SHEET BALSA
1/4" x 2" x 20" SHEET BALSA ELEVATOR - FOR G/G USE 1" WIDE TRAILING EDGE STOCK
1/32" PLY SIDES
OPENING FOR BAT PLUG
3/16" SQ SPRUCE
1/8" PLY BOTTOM
F 3 3/32" PLY
F 3 1/16" PLY
F1 3/16" PLY
F2 1/8" PLY
F4 3/32" PLY
'PLY GUY'
DESIGNED BY DRAWN BY
OWEN KAMPEN DICK KIDD
INKED BY
GERARDO FLORES
0 1 2 3 4 5 6
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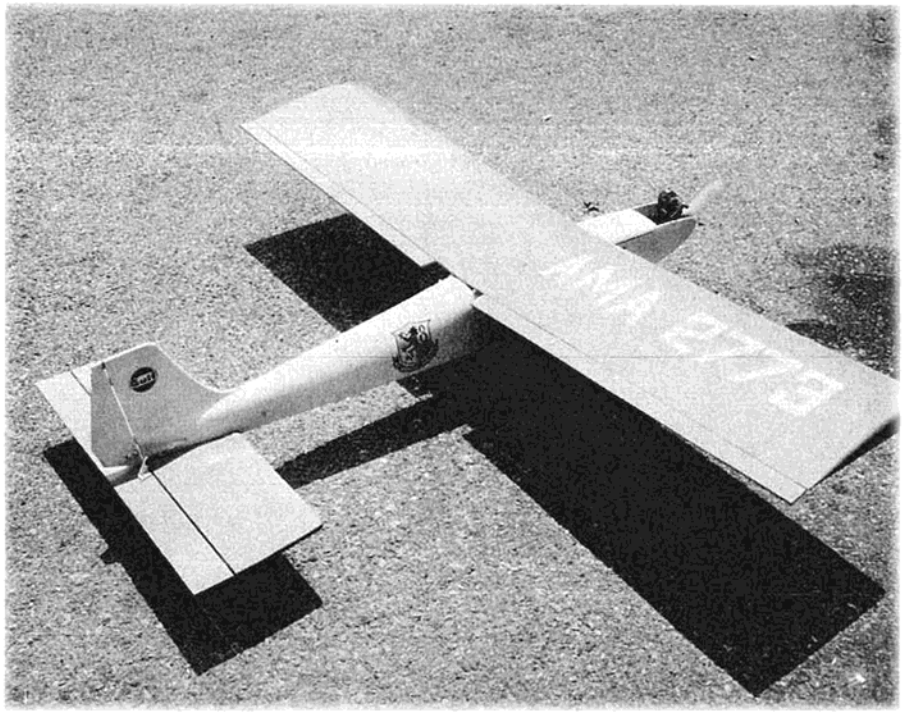


The Ply Guy after fifty-plus flights. O.S. 19 engine, Kraft KP-4, Gold Medal. Orange super MonoKote on wing and stab, white urethane on fuselage.

the forward nose section with epoxy. Using Titebond, glue in place, the 1/4" sheet balsa wing saddles and 1/2" triangular stock corner braces. When dry, sand to shape on the outside to fair into the plywood fuselage. Cut the fin and rudder from 3/16" medium hard sheet balsa and cap the fin with 3/16" x 3/8" balsa. Glue the fin in place to the fuselage and the spruce tail post. Mount your steerable nose gear bracket (we used a Carl Goldberg Unit), and drill all necessary holes for throttle linkage and fuel line passage. When you have made a trial fit of all equipment to be installed in this area, sheet the bottom of the fuel and battery compartment with 1/8" plywood as shown on the plans. Cut your motor mounting plate from 1/8" phenolic or 3/16" plywood if phenolic is not available. Be absolutely certain that you have cut your motor mounting plate to provide 3 degrees of right thrust. The required 2 degrees of down thrust is provided by adding a couple of washers under the rear mounting lugs of your engine. Drill two holes on each side of the phenolic mounting plate and through the 1/2" square maple motor mounts using a 7/64" drill and install blind mounting nuts from the bottom of the motor mounts. Using 4-40 mounting bolts, test mount your phenolic mounting plate. When this has been accomplished, add 1/2" sheet balsa triplers under the motor mounts and against the fuselage sides. Form the fuel compartment hatch from 1/2" sheet balsa. The forward hatch stop is made from a length of 1/2" sheet balsa and glued to the fuselage sides and the top of F1. Glue two 3/16" square spruce cross braces to the inside of the hatch to prevent any warping when the hatch is later painted. Add the 3/8" square hardwood servo rails to the inside of the radio compartment to suit the type of installation you plan to use. In our prototype, we used the Kraft KP-4 proportional system and the new small servos. Drill the two holes for the wing hold down dowels. These hold down dowels are not glued in place but allowed to be removed in case of damage. These are 3/16" wooden dowels inserted into 3/16" I.D. aluminum tubing.

Mount your Hallco number B105-4 landing gear to the bottom of the fuselage using 4-40 nuts and bolts. Two and one-half inch diameter DuBro Lo-Bounce wheels were used throughout.

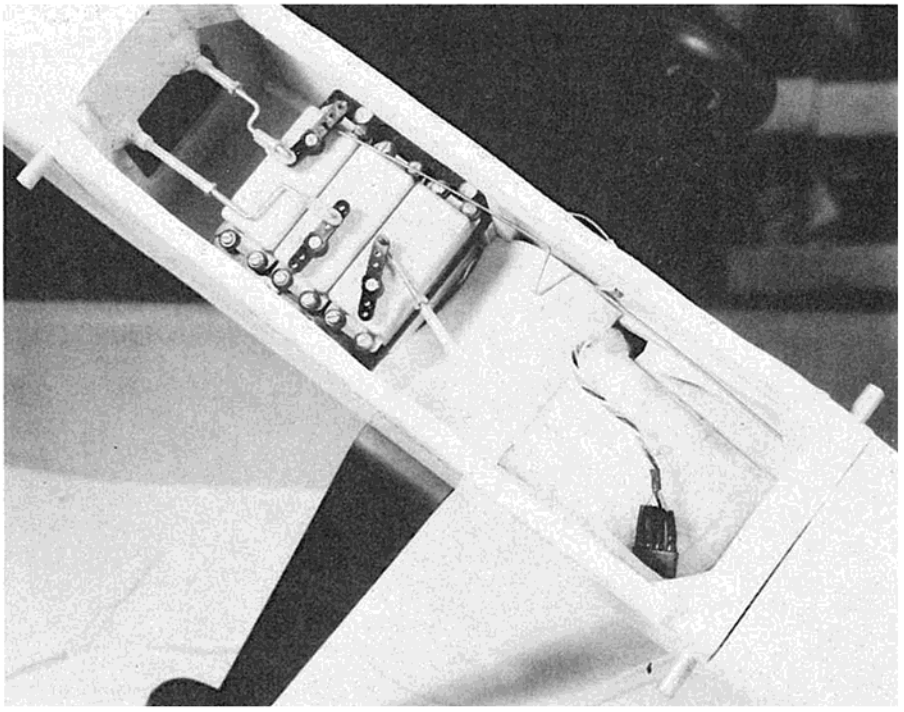
The stabilizer is a sandwich of two sheets of 1/32" balsa with a 3/16" square leading edge, 3/16" by 1/2" balsa trailing edge, 3/16" x 1/2" balsa tips and 1/8" x 3/16" balsa ribs. Although slightly heavier, we pin down the lower sheeting and then glue into place the internal framework using the epoxy glue. This allows a much faster stabilizer construction, since epoxy does not require air drying. If you use conventional glues that require air in order to thoroughly dry, the stabilizer should be completed and remain pinned to the bench for 48 hours. The elevator is a one-piece unit cut from 1/4" sheet balsa and sanded to an airfoil taper. The elevator is attached to the stabilizer using deBolt polypropyline hinges. Be certain to cut the hinge slots on a straight line so that, once installed, the hinges are free from any twists. We do not insert glue in the hinge slots, but drill two 1/16" holes in each side of the hinge insert Titebond glue into the holes and then run toothpicks into the holes. These toothpicks are cut off flush with the surface using a pair of Revlon toenail clippers. The protruding stub edges of the toothpicks are then sanded flush prior to covering the hinged surface. The rudder is hinged to the spruce tail post in the same fashion. When the stabilizer has been completely sanded it is glued to the fuselage using epoxy glue.

The wing is of D-Tube and cap strip construction and the plans should be completely self-explanatory. Before commencing construction of the wing, determine whether or not you plan to use ailerons on this design. The rudder is completely effective, so we would suggest that you build the aileron version and use only the rudder, at first, if you have never flown with ailerons. We cut two 1/8" plywood templates and stacked 9 sheets of 3/32" balsa between them and sanded to the shape of the templates. These sheets are bolted between the two rib templates using the long 4-40 nuts and bolts. When the first set of 9 ribs have been sanded to shape, they are removed and another set of 9 constructed in the same fashion. We used the homemade RCM Wing Jig to build this wing. While the wing was in the jig, we epoxied in place the nylon tubing which will hold the aileron brass cable. When the wing has been completed, remove from the jig and after thoroughly sanding, cover the center section with a 4" wide band of lightweight Sig Celastic.

Sand the entire aircraft to a point where it is as smooth as you can possibly get it. The fuselage was given two brushed coats of nitrate dope. The wing and stab were not doped since they were covered with orange Super-MonoKote. Lightly sand the doped fuselage and fin and you will notice how smooth the plywood unit is due to its close grain. We then applied two coats of sprayed on New Finish Urethane Liquid Plastic which was obtained from Standard Brands Paint Stores. This finish is the hardest and most durable finish we have ever used and even in the roughest of landings, never seems to chip or scratch.

The radio equipment was installed on Kraft servo mounts and the receiver and battery wrapped in G-Pad. Nyrods with Rand Keepers were used throughout the installation. The engine used

in our prototype was an OS Max .19, and this is the bare minimum amount of power recommended. The aircraft is quite capable of handling engines of up to .35 size. The weight of our prototype was 4¼ lbs., of which 4 oz. was lead weight added to the battery compartment to correct a tail heavy condition caused by the plywood fuselage. If you plan to use a Galloping Ghost installation, omit the ailerons and install an elevator that is only 1/2 the chord shown on the plans. The rudder should not be changed. If you do not use the ailerons, use two inches of dihedral under each wing panel. The Max .19 engine used in our prototype used a pressurized fuel system which will be described in next month's article on the New Era. This provided the reserve power necessary to fly this aircraft at this weight. When the pressure line was removed, the aircraft was marginal in performance. A Top Flite nylon 9/4 prop was used. The fuel tank is a Pylon Brand RST-4 tank.



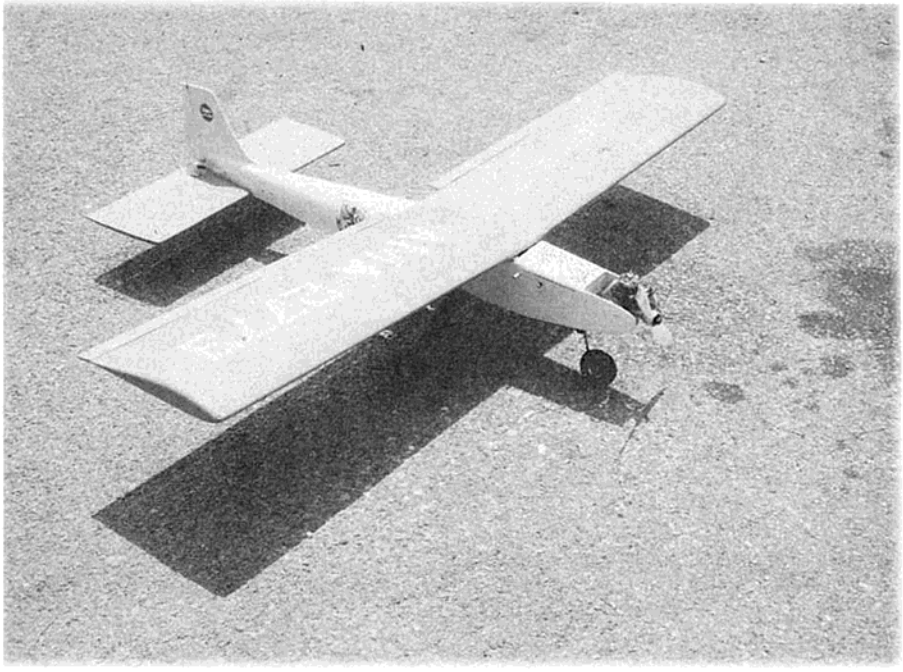
Kraft "mini-servos" and G-Pad installation. Ny-Rod pushrods should not be used in temperatures 100 degrees or above, due to expansion of tubing.

Flying the Ply Guy is sheer pleasure! Aileron response is exceptionally good and quite fast, while the response to the pitch axis is rather slow due to the long tail moment. The airplane, as set up, is not excessively fast and makes an excellent trainer for full house proportional. It does, however, require you to fly it all of the time, since it goes only where it is pointed. It does not have an inherent ability to stabilize itself from your last given command — a condition that is eagerly sought by the beginner and thoroughly cursed by the instructor trying to teach him to fly! Virtually any maneuver can be performed by the Ply Guy and it can slow down almost to a walk for a landing without any tendency to snap roll. Takeoffs and landings are quite easy and no problems of any kind were encountered. We have virtually flown the prototype in the pictures to death, and yet the plywood fuselage shows no signs of wear or abuse. This combination of plywood and urethane is one of the most rugged building combinations we have seen. The MonoKote used on the wings and stab provide a very rugged and serviceable covering material that is hard to beat.

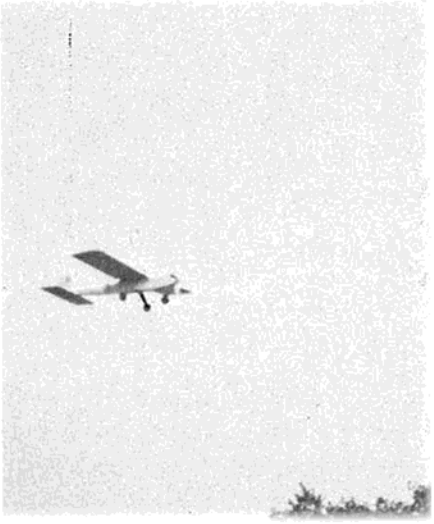
With untold hours of airtime to its credit and with numerous less-than-gentle landings on the face of a very rugged Hill, our Ply Guy is still going strong. If you want a good flying aircraft, using a new construction technique and one that can take all the abuse you can hand it, this is the model for you!

Good flying!

Midwest AMA numbers adorn MonoKote wing. Top Flite 9-4 nylon prop on Max .19.



For camera fans — the color photograph on page 22 was a 35 mm Ektachrome-X transparency taken with a Super Contaflex, F22 at 1/125 sec. Photo below, Plus-X 16 mm, Minox camera, F35 at 1/1000 sec. All others 4x5 Polaroid Type 57, Crown Graphic, F32 at 1/50 sec.

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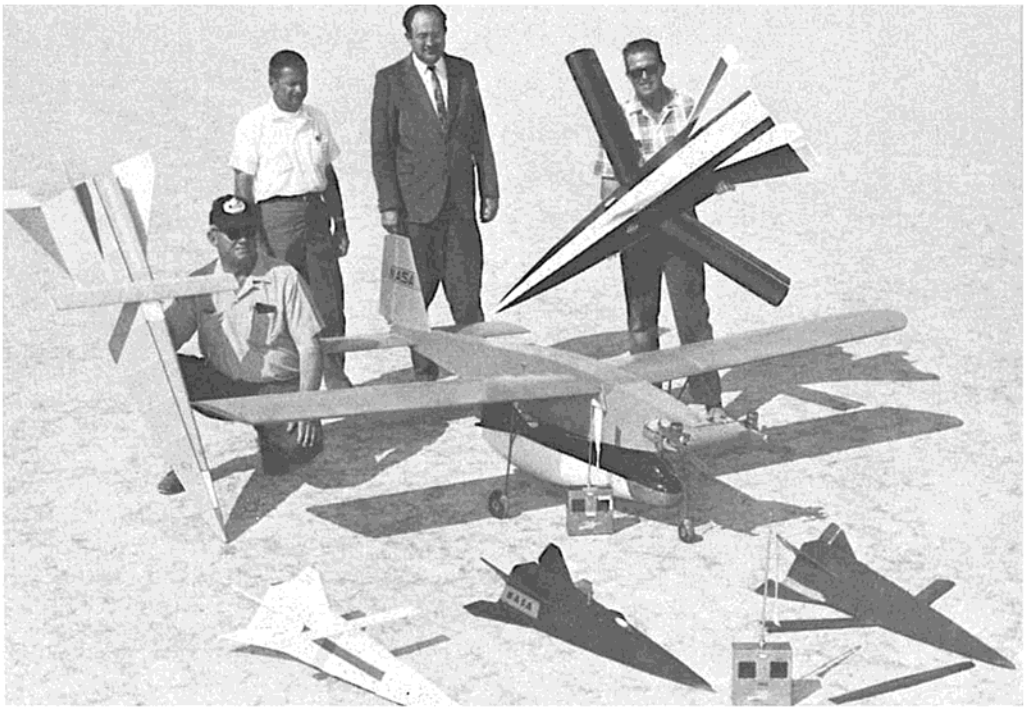


BY **ROBERT D. REED**

NASA Flight Research Center
Edwards, California

RCM EXCLUSIVE FEATURE:

Can The RC'er Contribute To Aeronautical Research?

EXPERIMENTATION IN AEROMODELING

Model aviation has undergone a complete evolution process in the last few years with the introduction of reliable and extremely versatile radio-control equipment. The pendulum has swung in the direction of emphasis on pilot skill and the specialized development of models to fly AMA stunt patterns and, more recently, pylon racers.

But what about the aeronautical experimenter? He no longer is limited to models with free-flight stability but has a whole realm before him of semi-stable configurations requiring pilot control in order to fly.

There is evidence of some activity among rugged individualists who are doing experiments with unusual "pet" configurations. Some of these experimenters have the necessary resources for equipment and piloting skill and experience flying "conventional" models and some, unfortunately, do not.

This brings the next question: Is the professional aeronautical engineer, engaged in research, missing out on a good bet by not tapping the large reservoir of skilled model-airplane pilots and fine equipment available today? I think so!

There are limits to what can be learned, however, and strict attention must be given to both inertia scaling and aerodynamic scaling to produce accurate results from model flying. In order to scale for inertia, the engineer must have in mind a full-scale vehicle which he is trying to develop. By estimating the full-scale vehicle weight and weight distribution, he can then distribute ballast properly in his model for inertia scaling. For example, the model weight should equal the model scale ratio to the third power times the weight of the full-scale vehicle and the moment of inertias about all three axes of the model should equal the model scale to the fifth power times the moment of inertias of the full-scale vehicle.

$$\text{Model Weight} = (\text{Scale Ratio})^3 \text{ Full-Scale Weight}$$

$$\text{Moment of Inertias of Model} = (\text{Scale Ratio})^5 \text{ Full-Scale Moment of Inertias}$$

Subsonic aerodynamic scaling is not always an easy task and is sometimes

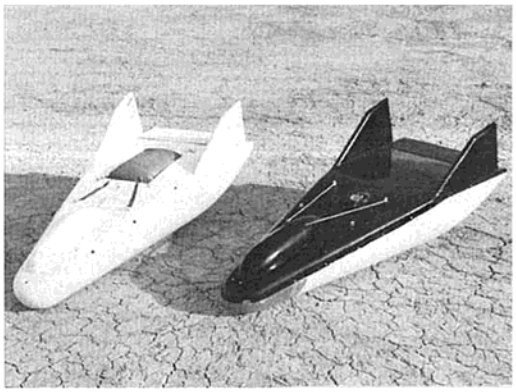
ABOUT THE AUTHOR:

Robert Dale Reed is currently responsible for the advanced planning involving advanced re-entry vehicle recovery concepts for the National Aeronautics and Space Administration's Flight Research Center, Edwards, California.

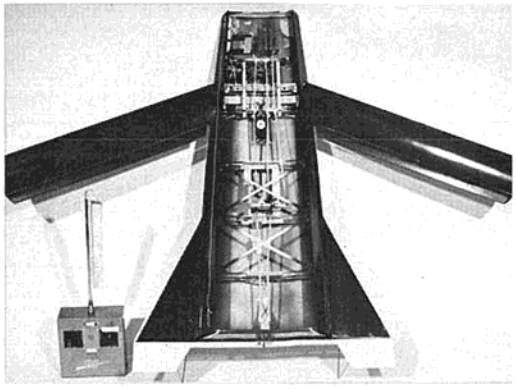
First joining NASA in 1953 as an aerospace engineer, Reed was formerly the research project engineer on NASA's M2 and HL10 Lifting Body flight program. He has also been associated with the flight testing of the X1, X5, and X15 research aircraft.

Born in Buhl, Idaho, on February 20, 1930, Reed received his Bachelor of Science Degree in Mechanical Engineering from the University of Idaho in 1953. A member of the American Institute of Aeronautics and Astronautics, Reed is the author of several technical reports and papers. Mr. Reed was awarded the NASA Exceptional Service Medal for his work in the Lifting Body research program.

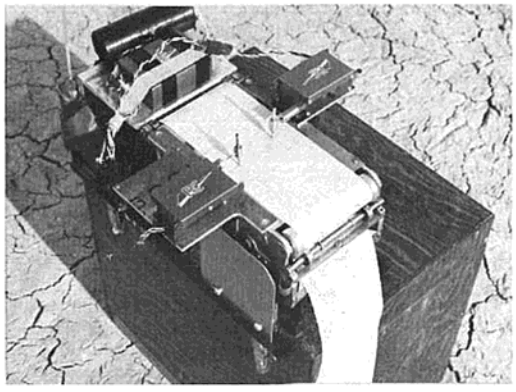
R/C Modeler Magazine is privileged to present this latest article by Mr. Reed.



40-inch scale fiberglass M2-F2 models containing packaged parawings ready for launch.



Lower half of experimental swing-wing model showing wing aileron, tail aileron, and tail pitch control system.



Ground recorder set up to record pilots aileron and elevator inputs to experimental model.

Engineer (Dick Eldredge) with slender lifting body containing external package parawing.

impossible for some configurations. However, there is a host of configurations that lend themselves readily to scaling. An example is the M2-F1 and M2-F2 lifting body configurations which have practically the same low-speed characteristics at model sizes and speeds as the full-scale versions. However, other lifting bodies such as the HL-10 and X-24 exhibit much different characteristics at full scale. This is probably due to the fact that the M-2 has essentially no leading edge (loosely speaking) and less boattailing than do the HL-10 or X-24.

Wing and tail surfaces having sharp leading edges usually have small scale effects; however, conventional subsonic airfoil sections do require some reshaping of the airfoil to achieve full-scale characteristics.

MODEL FLIGHT TESTING

Now that the model has been suitably scaled, how do we go about test flying it? In watching the professional and some non-professional model pilots, one may get the impression that these people can do a better job flying from outside the airplane than most pilots do from inside the airplane. This may be true of precision aerobatics and pattern flying, but the full-scale test pilot still has the advantage of "feel" when it comes to a marginally stable airplane. However, the skilled model airplane "test pilot" may cope with many of the test pilot's problems, such as neutral or slightly unstable models in pitch, nose tuck or pitch-up and roll reversal due to various causes such as adverse yaw coupled with high dihedral and low directional stability. The model airplane pilot will have difficulty in controlling oscillatory motions such as Dutch roll (roll and yaw motions together) because of higher rates (shorter time to oscillate in models) even in properly scaled models compared with full-scale vehicles.

SPACECRAFT MODEL TESTING

To gain a better understanding of the operation of gliding parachute systems combined with spacecraft configurations and of variable-geometry lifting bodies, I felt that I, and some of my engineer colleagues at the NASA Flight Research Center, could use some flight test experience in demonstrating principles of spacecraft recovery. To expedite these studies on a minimum effort and cost basis, consideration was given to the use of scaled models.

The selections of several experimental model configurations for flight test were based on an overall study of advanced concepts in the recovery of spacecraft in the final maneuvering and landing operation. These experiments represent a fairly broad scope of possible recovery concepts.

In support of the aeromodeler approach, it was observed, both gliding parachute systems and lifting bodies with continuous expanding shapes (small at the nose and large at the base or tail) exhibit small enough subsonic aerodynamic scale effects as well as ample static-stability characteristics to justify a limited free-flight model study. Hand-launching available 8-foot and 14-foot parawing/lifting-body wind-tunnel models from the roofs of buildings at the NASA Flight Research Center proved to be awkward and provided inadequate flight time, so other launching means were sought. Launches from manned aircraft were ruled out because of safety and cost considerations and the effects of the launches on delicate models; hence, a special radio-controlled carrier model was built to carry the spacecraft-model-recovery system to a suitable release altitude and to launch the combination on ground command. By using modern digital-proportional radio control gear and other modern model-airplane equipment, launches of experimental models could be made consistently and safely.

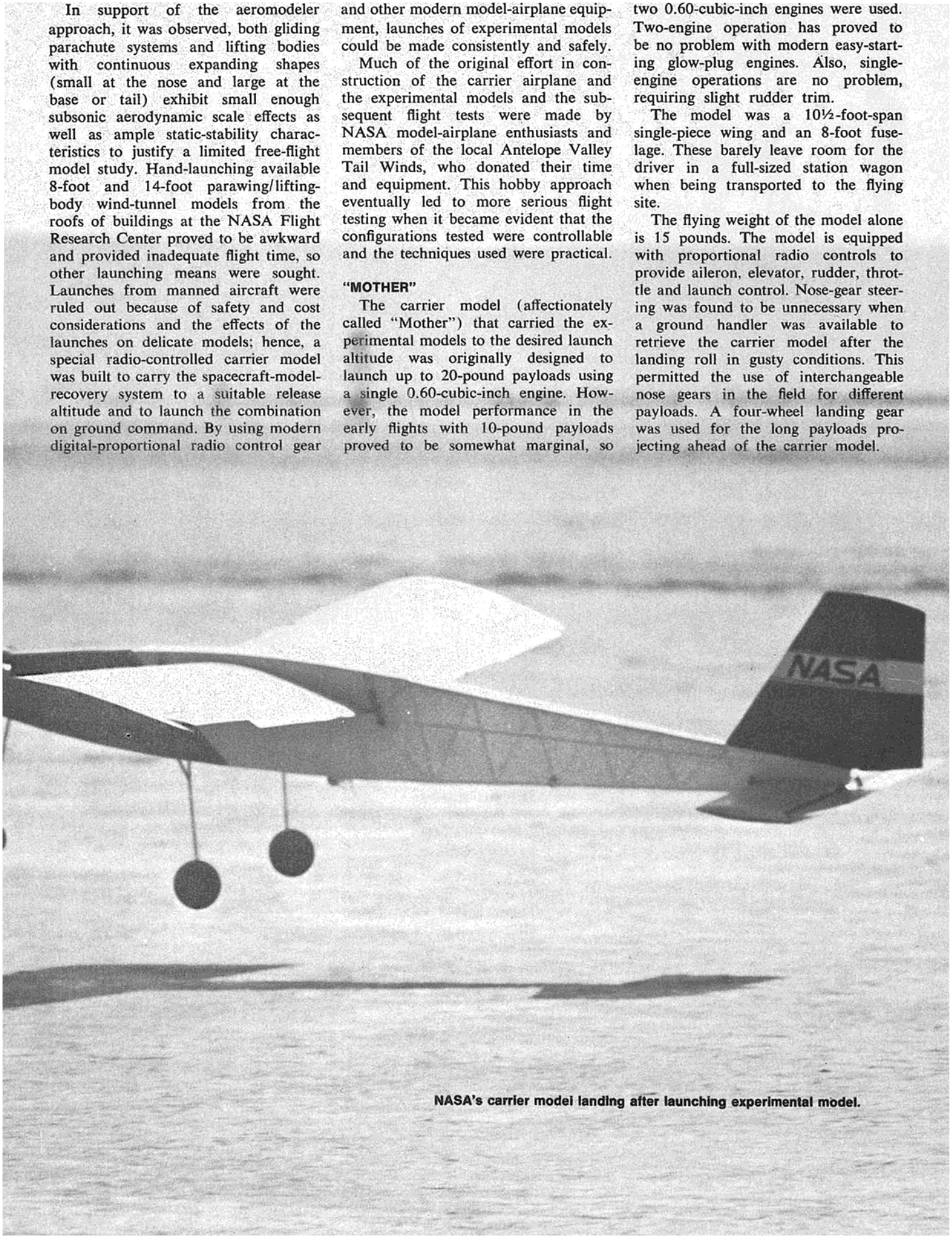
Much of the original effort in construction of the carrier airplane and the experimental models and the subsequent flight tests were made by NASA model-airplane enthusiasts and members of the local Antelope Valley Tail Winds, who donated their time and equipment. This hobby approach eventually led to more serious flight testing when it became evident that the configurations tested were controllable and the techniques used were practical.

"MOTHER"

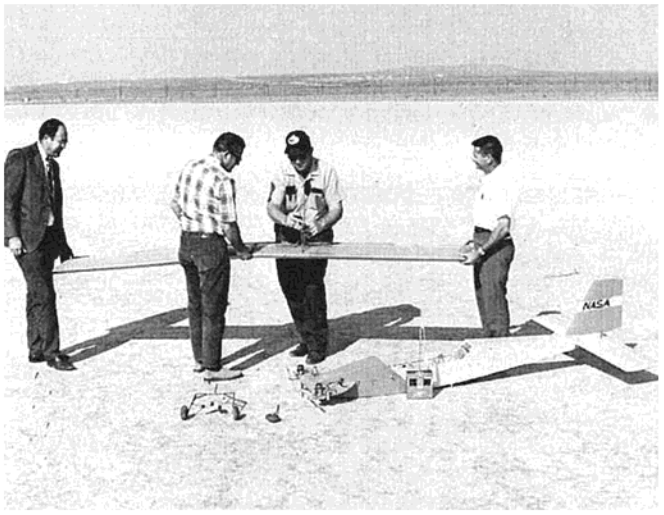
The carrier model (affectionately called "Mother") that carried the experimental models to the desired launch altitude was originally designed to launch up to 20-pound payloads using a single 0.60-cubic-inch engine. However, the model performance in the early flights with 10-pound payloads proved to be somewhat marginal, so two 0.60-cubic-inch engines were used. Two-engine operation has proved to be no problem with modern easy-starting glow-plug engines. Also, single-engine operations are no problem, requiring slight rudder trim.

The model was a 10½-foot-span single-piece wing and an 8-foot fuselage. These barely leave room for the driver in a full-sized station wagon when being transported to the flying site.

The flying weight of the model alone is 15 pounds. The model is equipped with proportional radio controls to provide aileron, elevator, rudder, throttle and launch control. Nose-gear steering was found to be unnecessary when a ground handler was available to retrieve the carrier model after the landing roll in gusty conditions. This permitted the use of interchangeable nose gears in the field for different payloads. A four-wheel landing gear was used for the long payloads projecting ahead of the carrier model.



NASA's carrier model landing after launching experimental model.



I think we need one more man to steady that wing!

Single nose gear being installed. Double nose gear on ground for long payloads extending in front of Mother ship.

Last piece to be installed.

Closing the launch hook pin.

The wing incorporates a Wortmann FX61-163 airfoil to give the best payload capability at low Reynolds number and still retain a thick wing for spar depth. The wing has no washout; however, stalls are gentle with little tendency for wing drop. Aerodynamically balanced control surfaces were used on the carrier model in order to stay within the 2- to 4-pound force capability of typical model-airplane servos. The ship is slow and graceful in flight and is very tolerant of various payloads and center-of-gravity locations. Of the 120 flights "mother" has made, only six have been made without air-launched payloads of some sort; she was meant to work!

All model tests were made from the surface of a dry lake which provided a large area free of obstructions. Experimental models were launched anywhere from 50 feet to 1500 feet altitude, depending on the objective of the test. Launches were accomplished by a simple pin-pulling launch system using a bell-crank to give the servo a 5 to 1 advantage against friction in the pin. Payloads were stabilized by using foam blocks with sponge backing and dowels fastened to "mother" with rubber bands for quick field changes. All experimental models had good launch characteristics if the launch speed was slow enough. The light models had a tendency to climb after launch at excessive speeds; however, the heavier models dropped away cleanly.

EXPERIMENTAL MODELS

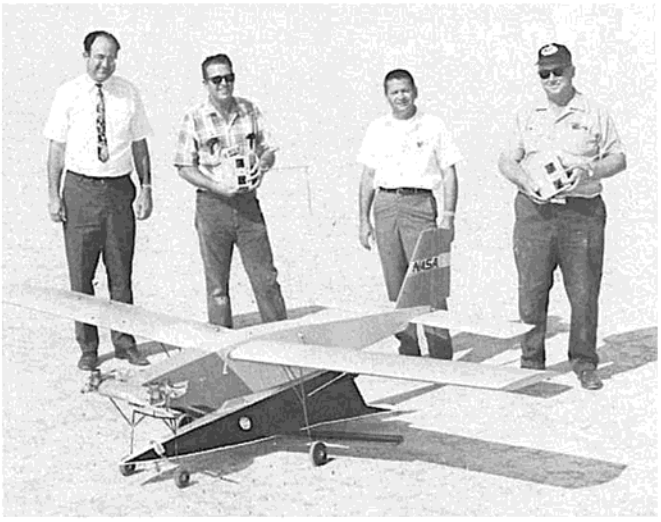
All of the experimental models were unpowered and controlled by proportional radio gear (on a different frequency than "mother's," of course) with the exception of some free-flight tests in which events were controlled by a model clock timer.

After launch a series of planned maneuvers (rolls, pull-ups, and sideslips) were attempted by the test pilot before landing the model on the dry lake in order to determine the characteristics of the test vehicle configuration. A problem soon became apparent, in that a skilled model pilot relies heavily on reflexes and post-flight interrogation does not always produce a useful history of his control inputs. A solution was found by setting up an identical receiver/servo system on the ground to that in the airborne experimental model. By attaching ball-point pens to the servos and recording on a paper strip chart, we had a telemeter data system! In comparing movie frames taken at the same time with the pilot control input records, accurate answers and conclusions were arrived at on the model response to control inputs.

Two basic types of spacecraft recovery techniques utilizing different configurations were tested in the pro-

Crew chief and test pilot preparing "Mother and Baby" for flight.

All systems go!!



"Mother and Baby" with flight test team.

Airlaunching 40-inch, 5-pound, slender lifting body with 90 ft.² double keel parawing from mother ship.

gram. The first technique consisted of various spacecraft shapes suspended by controllable gliding parachute configurations. The parachute configurations tested to date have been of the NASA parawing shapes having glide ratios as high as 3½ to 1. Control during flight has been achieved by pulling in and letting out various shroud lines by use of the model-airplane servos.

For models larger than 5 pounds, however, the servos were found inadequate in both stroke and force; so, the servos were used to drive micro-switches operating larger 12-volt motors to reel-in shroud lines. For example, scale 40-inch. 12-pound, M2-F2 models using parawings with 90 and 140 ft.² areas were flown with excellent control using this technique. It was found that the experimental lifting-body parawing combination could be maneuvered consistently to a precision landing within a 20-foot circle from a launch at 1000 feet altitude in winds of less than 5 miles per hour.

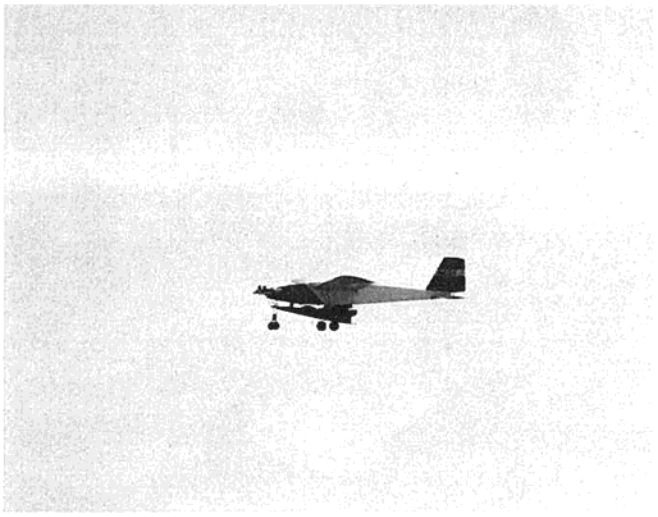
The second basic spacecraft recovery technique studied consisted of slender lifting bodies having high hypersonic performance but using extendable wings for landing. Five different models of this concept were airlaunched, ranging in size from an 8-ounce silkspan, 40-inch free-flight model to a 6-pound sheet balsa and spruce, 60-inch radio-controlled model. One of the 60-inch models was equipped with an emergency parachute system originally developed to recover models in case of radio failure by Mr. Ralph Sawyer. (See January 1967 issue of R/C Modeler for article on Mr. Sawyer's parachute system).

The experimental model was equipped with two horizontal surfaces on the aft end that acted as elevons and full-span ailerons on the wings for roll control. Although the model was launched with wings extended, provisions were made for using various wing-sweep angles. The model was constructed primarily to investigate various roll-surface configurations installed on the aft end of the body. The wing ailerons were provided for comparison.

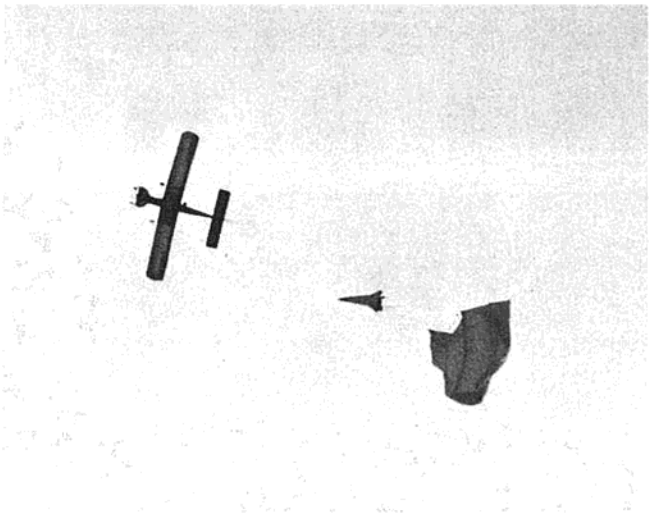
The parachute was used four times when the model encountered flat and inverted spins resulting from aileron roll reversal in two cases and marginal center-of-gravity locations in two cases. The model was finally flown successfully after larger vertical tails were added to stop roll reversal and the center of gravity moved forward to stop over-controlling in pitch.

A POSSIBLE RESEARCH ACTIVITY

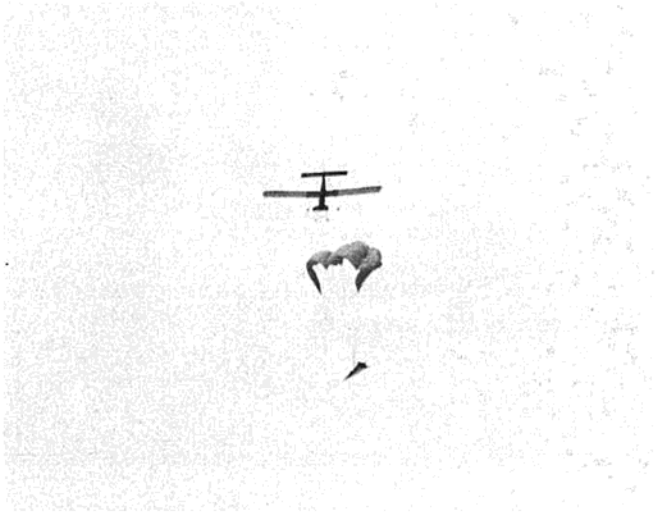
Continuation of this activity is being considered with a view toward obtaining significant quantitative as well as qualitative data through the use of model-airplane equipment and simple



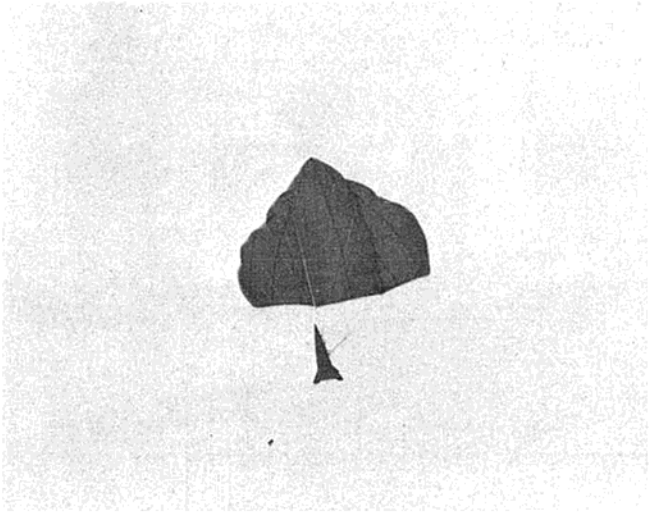
"Mother" aloft with lifting body.



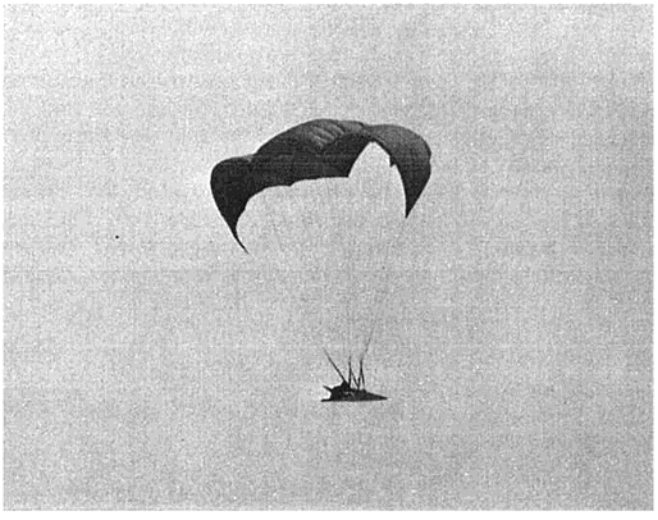
First photo of launch.



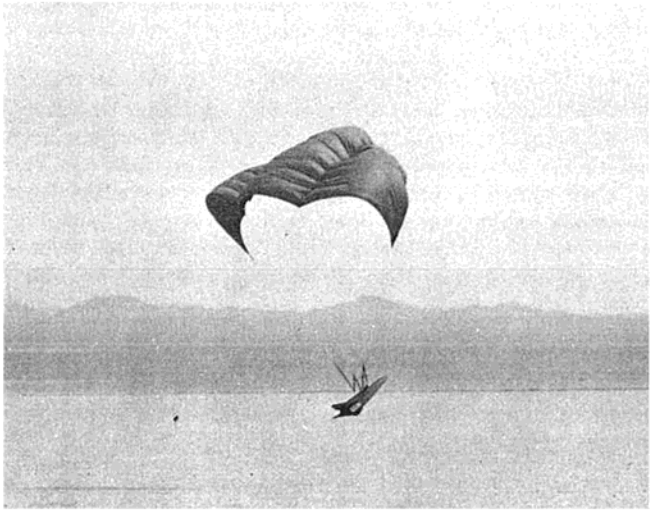
Lifting body stabilized in second photo.



Direct shot of craft and parawing.



Profile shot of descent.



Successful landing at Edwards.

Flight test in progress, ground recorder, carrier model pilot, test director and test pilot.

instrumentation gear to aid in the definition of concepts selected for full-scale studies.

Because of the increased versatility of model-airplane radio-control techniques and equipment in the last few years, I believe that many aircraft organizations can gain useful background information and preliminary flight experience through radio-controlled-model studies involving stable and semi-stable aero-dynamic vehicles of all types. Aircraft spin recovery, hover craft and some types of V/STOL craft may be areas of application, as well as spacecraft terminal-landing concepts.

I would like to thank those people who have helped me in this activity, especially those who have contributed their own time and equipment.

BOB McDONALD — *Chief test pilot, model builder, chief consultant, and member of A.V. Tailwinds*

JIM NEWMAN — *NASA craftsman, support pilot, crew chief, model builder, and member of A. V. Tailwinds*

DICK ELDREDGE — *NASA engineer, chief model designer, model builder, parawing packer and rigger, and member of A. V. Tailwinds*

RALPH SAWYER — *NASA technician, parachute and systems consultant, and member of A. V. Tailwinds*

DICK FISCHER — *NASA engineer, model builder and support pilot*

GARY LAYTON — *NASA engineer and model builder*

CLIFF WEIRICK — *Manufacturer of the excellent PCS radio gear used in this program.*

BY **ED THOMPSON** RCM TECHNICAL EDITOR

RCM CLASSIC

Part VII of Ed Thompson's versatile two to six channel digital proportional system, designed exclusively for R/C MODELER MAGAZINE. This month, the construction of the Classic PS-3 Servo.

PREFACE

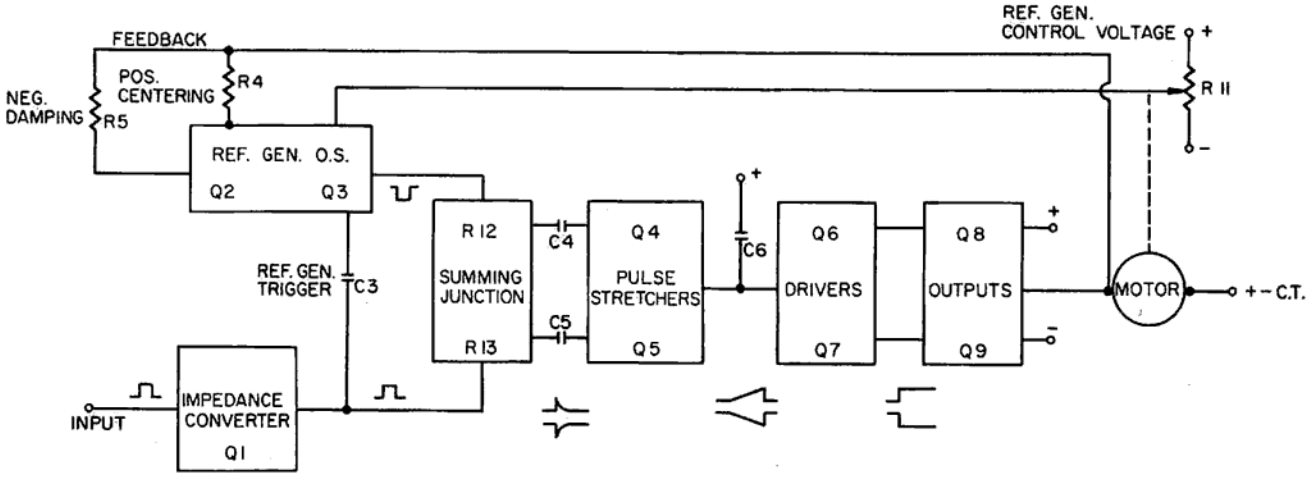
The Classic amplifier for the Orbit PS-3 servo is presented this month. All artwork is completed for the remainder of the articles except photos of the PS-2. I am not certain, at this point, whether I will present the Bonner and RMK servo amplifiers as originally intended. It will depend entirely upon you who are building the Classic. The PS-3 and PS-2 servos are hard to beat in either performance or dependability and, frankly, I'd like to get started on a new project. If any of you prefer the Bonner or RMK servo, drop me a line and I'll make a final decision based on the mail. I have had several requests for a training box that can be used with the Classic to train newcomers to fly and I would like to hear from those of you that are interested in such an item. One more request; if you would like to see as an accessory a super-failsafe built around a programmable autopilot, let me know — it could be used with most any of the Digital systems now in production.

Morris (Crash) McKenna has been flying one of the prototype systems for a while now and so far leads in the most crashes for an individual modeler who didn't have many crashes until he started flying the Classic. After four crashes in rapid succession, with a complete checkout between each one, the trouble was finally located — accidentally at that. We installed the DAMNED *Classic or* THE PURPLE SHAFT, *as Morris used to affectionately call his system, in a new airplane for a check ride. During pre-flight checkout, it was found that the channel 3 and 4 servos were not operating. Touching or moving the servo multi-connector plug would clear the problem. After checking the servo connectors and retentioning the contacts, we could still duplicate the problem. To make a long story short, we found the problem-when the heat-shrink tubing was shrunk, apparently too much heat was applied and the wire insulation under the heat-shrink tubing melted slightly and was causing an intermittent short of two adjacent wires. I doubt if this will ever happen to you but the lesson learned will be heeded by myself in the future and I'll only apply enough heat to get the job done and no more. Anyhow, the story had a happy ending and Morris is proud of his system again. He now tells skeptics that his Classic may be an ungodly purple color, but he doubts if anyone will ever mistake it for an empty fuel can that someone left at the flying field.*

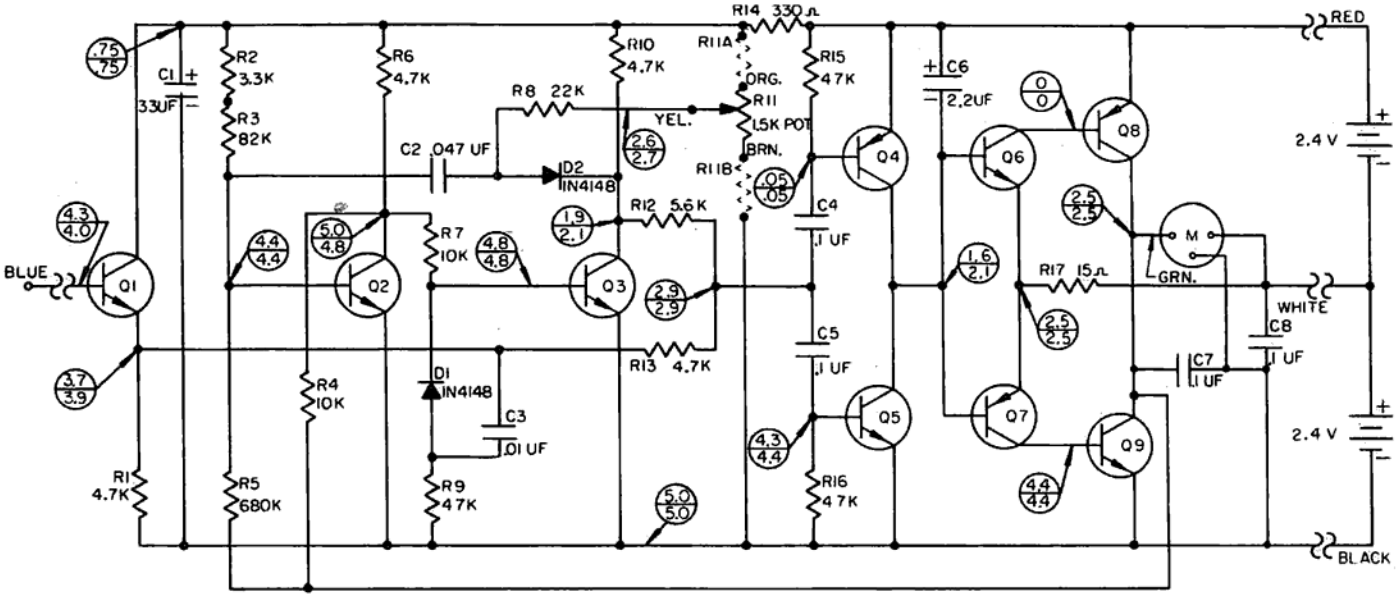
I realize that if I spent more time writing and less time apologizing about the unanswered mail, etc., I could get more done; but I would like all of those of you who have sent in articles for publication, to be patient with me until I complete the Classic articles. I have every technical article submitted to me filed and I have given each one individual attention. I have promised action on some of these mahuscripts that I can't live up to until I get some free time and magazine space. I am almost out of the woods now and many of the manuscripts are partially completed requiring only finishing touches.

Refer to the block diagram and schematic for the following discussion of the servo amplifier theory.

As explained earlier, the decoder supplies a positive pulse of variable duration, every 20 MS, to the servo amplifier input. The input pulse is variable from 1 to 2 MS and is controlled at the transmitter. The servo amplifier has a variable pulse width reference generator. The reference generator's pulse width is controlled by the output gear position via a coupled potentiometer. The incoming pulse width is compared with the reference generator's pulse width. When the in-



CLASSIC SERVO BLOCK DIAGRAM (PS-3)



ALL RES. 1/4W 10%
ALL CAPS IN MFD.
C2 MYLAR 10%; C1, C6 ARE TANTALUM 20%
ALL OTHERS DISC. CERAMIC. ALL CAPS. ≧ 10 VOLTS
Q1,2,3,5,6 — SPS 400K (M400) MOTOROLA
Q4,7 — SPS 401K MOTOROLA
Q8 — MPS 6534 MOTOROLA
Q9 — MPS 6531 MOTOROLA
R11A, R11B TO BE ADDED IF MORE TRAVEL IS DESIRED

ALL VOLTAGES TAKEN WITH RED (POS.) METER PROBE CONNECTED TO RED SERVO CONNECTOR WIRE

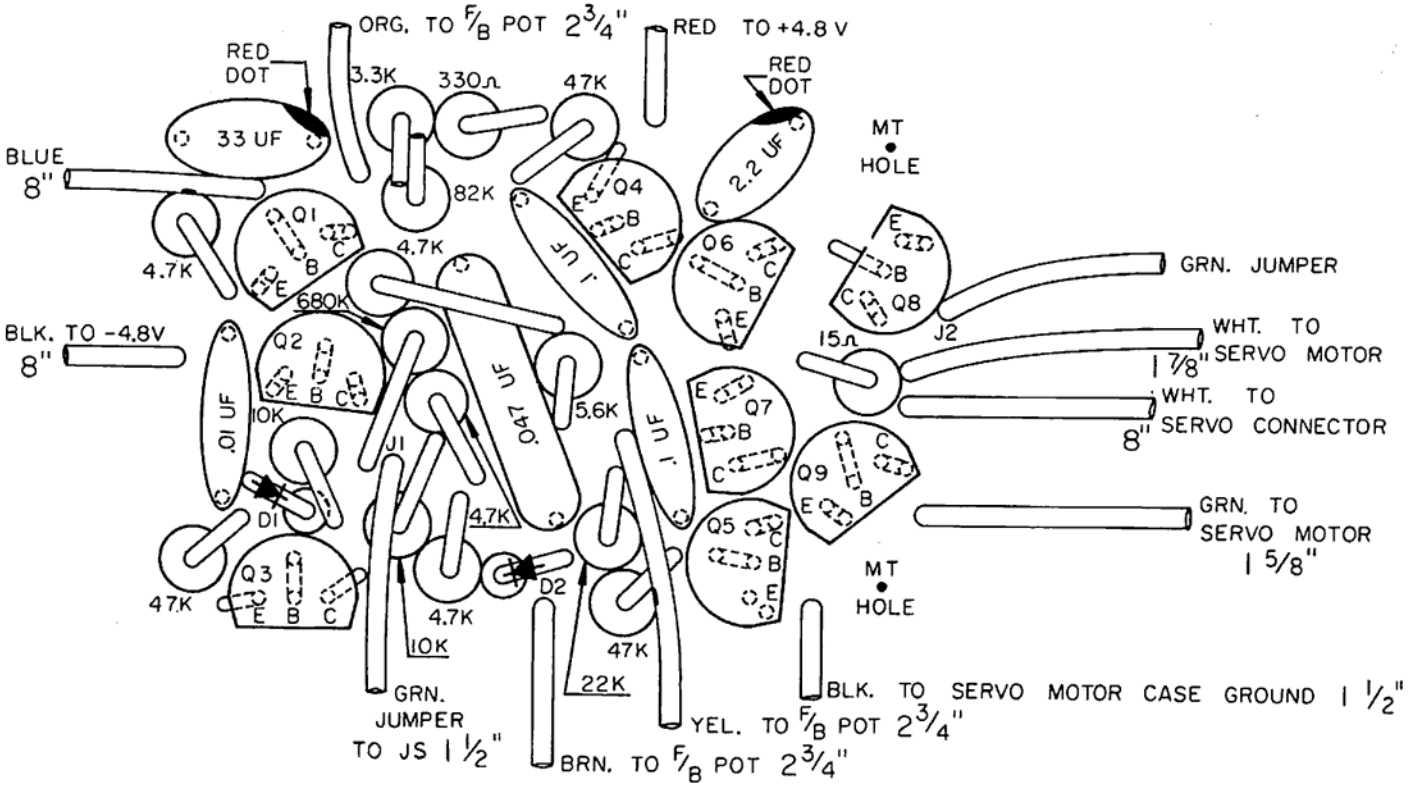
(4.3 / 4.0) VOLTAGE ABOVE THE LINE WITH TX OFF. VOLTAGE BELOW THE LINE WITH TX ON.

CLASSIC SERVO AMPLIFIER FOR ORBIT PS-3 MECHANICS

coming pulse width and the reference generator pulse width do not agree, an error pulse is generated which causes the motor to turn. The motor turns the output gear in a direction to cause the reference generator's pulse width to agree with the incoming pulse width. When both pulse widths agree, the servo amplifier is "nulled", and the servo motor stops. The incoming pulse and the reference generator pulse are compared every 20 MS. A "pulse stretcher" is used to provide motor voltage continuity and smooth servo action. Q6, 7, 8 and 9 form a complimentary symmetry amplifier. The emitters of Q6 and Q7 are connected to the battery centertap via R17. If neither Q4 or Q5 are conducting, the amplifier is quiescent. (The base and emitter voltages of Q6 and Q7 are approximately the same.) When either Q4 or Q5 conducts, one half of the amplifier will become forward-biased and the motor will operate. Electrical damping and centering are used to further enhance smoothness and resolution.

The incoming pulse is applied to the base of Q1. Q1 is an impedance converter (emitter follower) which isolates the decoder output from the low impedance summing junction. The incoming pulse causes the voltage at the top of R1 to rise and fall in phase. The leading edge of this positive-going pulse supplies the trigger for the reference generator (Q2 and Q3) via C3, through D1, to the base of Q3. This positive-going signal is also applied to R13 which forms the lower half of the summing junction. R12 forms the top half of the summing junction and the reference generator supplies a negative-going pulse at this point, (collector of Q3). The positive pulse width applied to the lower half of the summing junction is determined by the transmitter via receiver and decoder. The width of the negative pulse applied to the top half of the summing junction is dependent upon the timing of the reference generator (one shot multivibrator) and is determined by the setting of R11. R11 is coupled mechanically to the output gear and as the motor turns the timing of the reference generator is varied. If the incoming pulse from the decoder, supplied to the lower half of the summing junction, is longer in width than the pulse supplied by the reference generator, a positive differential will remain at the junction of C4 and C5 after the reference generator has returned to its quiescent state. This will cause a positive pulse to be coupled via C5 to the base of Q5. The collector of Q5 will then go negative and forward-bias Q7. Q7 in turn will forward-bias Q9 and the junction of the collectors of Q8 and Q9 will go negative with respect to the battery center tap and the motor will turn; having a positive voltage on its right terminal and a negative voltage on its left terminal. The feed-back element is coupled directly to the motor (via gears), and will turn in a direction to lengthen the reference generator's pulse width. When the motor has turned the output gear, which in turn turns the reference generator potentiometer, sufficiently to cause the negative pulse-width at the top of the summing junction to be equal to the positive pulse width applied to the bottom of the summing junction, a "null" condition will exist. In a "null" condition, the summing junction differential will be below the conducting point of either Q4 or Q5. This will remove motor driving voltage and the servo will stop in that position. The pulse supplied via C5, to cause the motor to turn, was very short in duration; pulse stretching was needed to supply continuous voltage to the motor. This was accom-

2X PC BOARD FOR SERVO



CLASSIC SERVO AMPLIFIER FOR ORBIT PS-3 MECHANICS

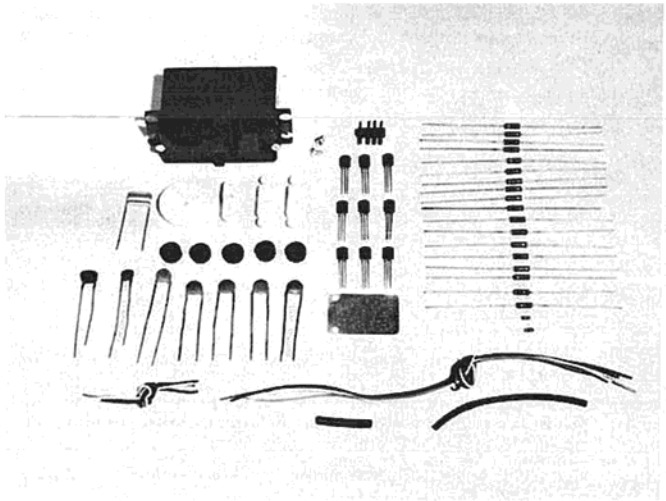
plished with C6. When the collector of Q5 went to ground, it charged the capacitor negative through a very short time constant (collector/emitter junction of Q5). When the summing junction pulse decayed below the conducting point of Q5, C6 discharged through a much longer time constant (base/-emitter junction of Q7) and pulse stretching occurred. The time constant of the pulse stretcher was selected to provide forward-bias to Q7 during the resting period between pulse trains, which occur every 20 MS.

The action necessary to cause the servo to turn in the opposite direction is very similar and will occur when the incoming pulse-width is shorter than the reference generator's pulse-width. In this case a negative pulse will be produced at the output of the summing junction and will forward-bias Q4 via C4. Q4 conducting will discharge C6 to a more positive voltage and Q6 will conduct, forward-biasing Q8; the motor will then turn with the left side being positive with respect to the right side. The motor then turns the output shaft, which turns R11 in a direction to decrease the reference generator's pulse width until the servo is nulled.

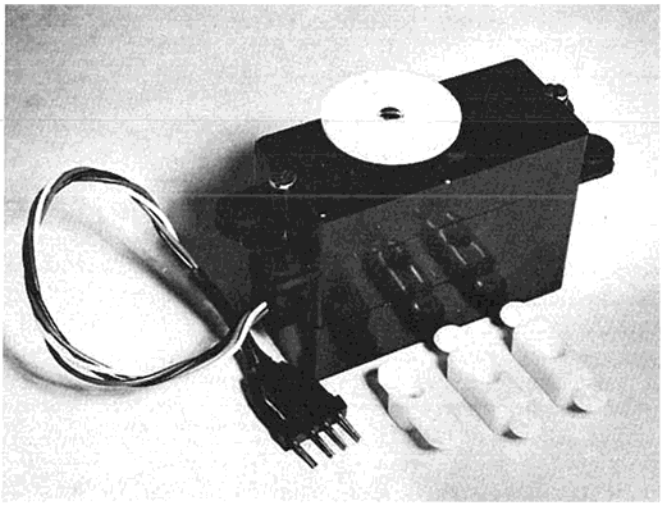
Both positive and negative feed-back are used in the Classic servo amplifier to provide smoothness and resolution. The negative feed-back is used to dampen the servo action and allow it to coast into center position without excessive overshoot. The positive feed-back is used to nudge the motor into electrical null position and prevent the motor from drawing excessive current. This combination of positive and negative feed-back was selected to provide the best compromise between overshoot and electrical centering.

R14 and C1 provide decoupling to the reference generator portion of the servo. R11a and R11b allow a means

Parts required for PS-3 servo.



The completed Classic PS-3 servo.



of adjusting the total servo travel for a given input pulse width change. The reference generator is a one shot multivibrator and its operation was extensively covered in the Digitrio series of articles. Silicon transistors are used in the output stage of the servo amplifier to eliminate the possibility of thermal runaway. It also eliminates the need for base strapping resistor which were previously used with germanium transistors for the prevention of thermal runaway. C7 and C8 filter electrical noise produced by the motor.

SERVO-GENERAL

The Orbit PS-3 is a miniature servo providing a choice of rotary or push-pull linear output. It was selected as the basic servo for the Classic system based on comparative tests with others available at the time. The feedback pot used should provide trouble-free service for the lifetime of the system. Lubrication of the servo is not necessary and is not advised. The Orbit PS-3 servo mechanics are delivered fully assembled and aligned at their center position. Do not change position of the output shafts by exerting external pressure on them — it is highly probable that internal gear damage will result if you do. Do not tighten the top cover hold-down screws excessively. These screws are lightly tightened during factory assembly and over-tightening may cause excessive gear drag.

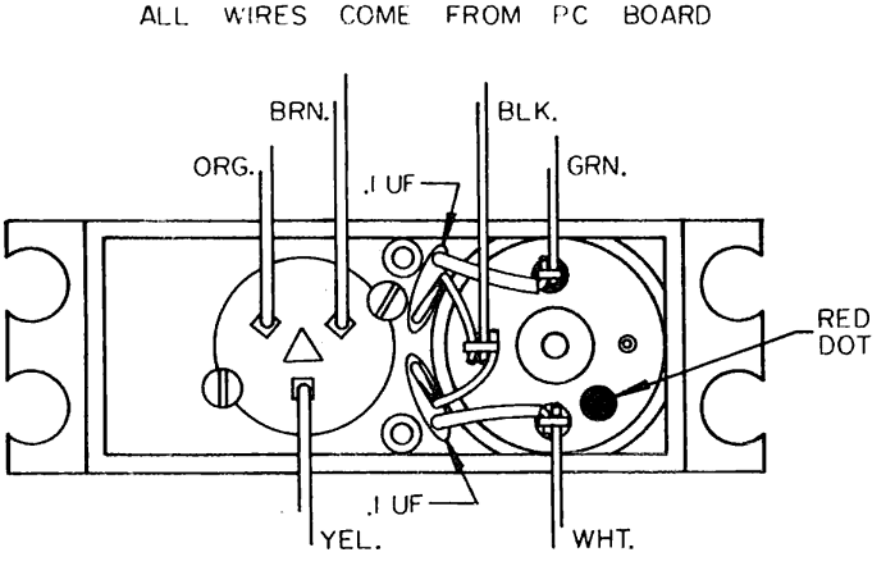
SERVO CONSTRUCTION — PRELIMINARY

- ☐ Check the parts against the parts list.
- ☐ Remove the servo case bottom by removing the two 4-40 hold-on screws.
- ☐ Check the fit of the PC board in the case, bottom-sand the edges lightly, if necessary.
- ☐ Reassemble the servo with the PC board in place and check for proper mating of the case bottom and center section. If a gap exists, slightly trim the plastic posts for proper fit.
- ☐ Shape all three motor terminals as shown in figure 1 and tin lightly with solder. Ensure that none of the terminals or solder extends above the top of the rear motor bearing housing.
- ☐ Prepare two .1 uf caps (C7 and C8) as shown in figure 2 by slipping a 9/16" piece of #24 insulation over one lead and bending the other as shown.
- ☐ Mount and solder the prepared .1 ufd caps to the motor terminals in figure 3. Do not remove the motor from the servo case to accomplish this step. NOTE: Caps fit in a pocket behind the posts (see photo/figure 4).
- ☐ Tin the three feedback pot lugs.
- ☐ Place the servo mechanics aside.

PARTS LIST SERVO PS-3

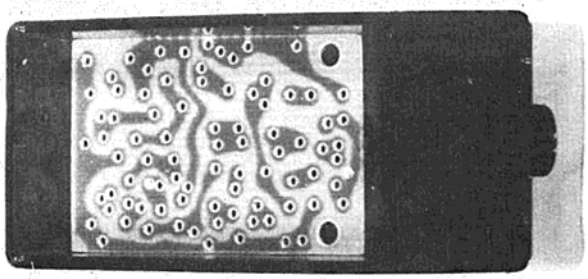
ITEM	DESCRIPTION	PART No.	MFG. or SOURCE
	Capacitors		
C1	33mfd, 20% tantalum	TSD2-6-336	Semcore
C2	.047mfd, 10% mylar	C280Ae/A47K	Amperex
C3	.01 mfd, 20% disc	Co69B160E103M	Sprague
C4, 5, 7 & 8	.1 mfd, 20% disc	DD600BC	Murata
C6	2.2 mfd, 20% tantalum	TSD1-20-225	Semcore
	Diodes		
D1	Diode, silicon signal	IN4148	I.T.T.
D2	Diode, silicon signal	IN4148	I.T.T.
	Resistors		
R1, 6, 10, 13	4.7k, ¼W, 10%		IRC or Ohmite
R2	3.3K, ¼W, 10%		IRC or Ohmite
R3	82K, ¼W 10%		IRC or Ohmite
R4, 7	10K, ¼W, 10%		IRC or Ohmite
R5	680K, ¼W, 10%		IRC or Ohmite
R8	22K, ¼W, 10%		IRC or Ohmite
R9, 15, 16	47K, ¼W, 10%		IRC or Ohmite
R11	1.5K variable (supplies with servo mech)		
R11a & R11b	See text		IRC or Ohmite
R12	5.6K		IRC or Ohmite
R14	330 ohms		IRC or Ohmite
R17	15 ohms		IRC or Ohmite
	Transistors		
Q1, 2, 3, 5, 6	NPN, silicon	M400 or 2N4124	Royal Elec. Motorola
Q4, 7	PNP, silicon	SPS401K or 2N4146	Royal Elec. Motorola
Q8	PNP, silicon	MPS6534	Motorola
Q9	NPN, silicon	MPS6531	Motorola
	MISCELLANEOUS		
Servo mechanics (Orbit PS-3)			Royal Elec.
Hook-up wire #26, stranded			Royal Elec., RC Craft, etc.
Heat-shrink tubing, large and small			Royal Elec.
Male Connector-previously listed in decoder parts list.			Orbit
PC board (etched)			Royal Elec.
Insulating tubing #24 (1¼")			Royal Elec.

A complete kit of parts or individual parts available from **ROYAL ELECTRONICS,** 2101 South Leyden, Box 22204, Denver, Colorado 80221

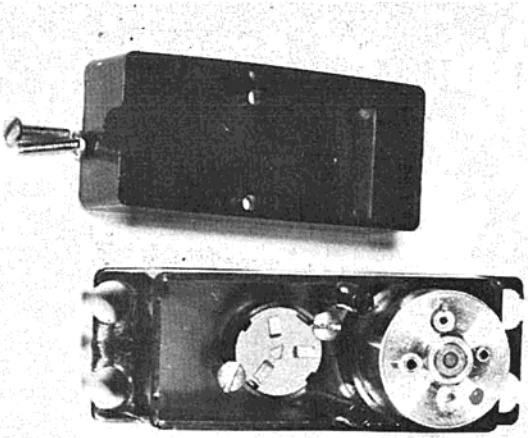


PS-3 CASE BOTTOM VIEW

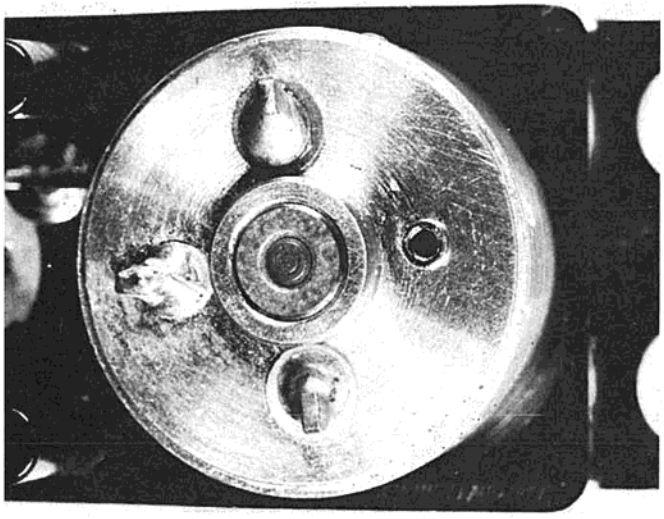
FIG. 4



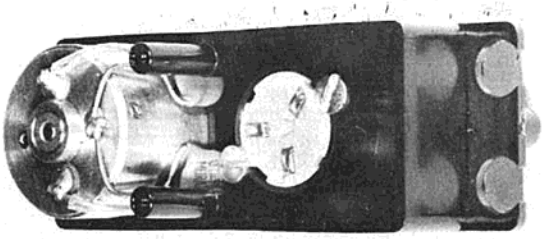
Checking PC board for fit.



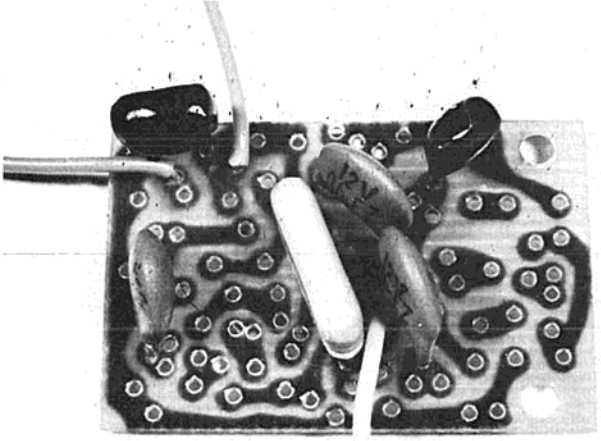
Servo with bottom cover removed.



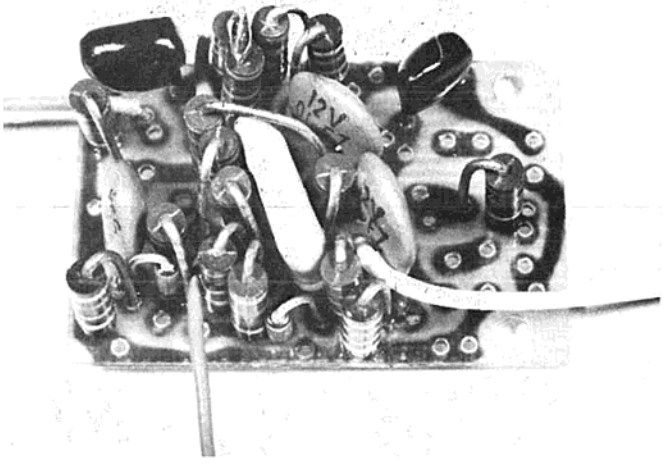
Motor terminals formed and tinned.



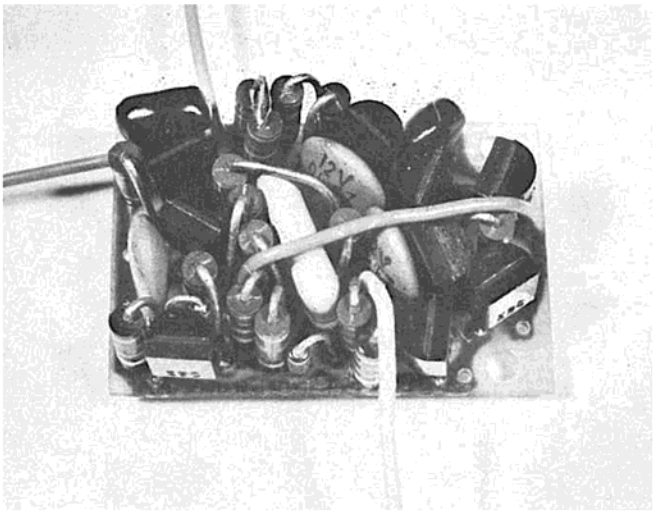
C7 and C8 installation.



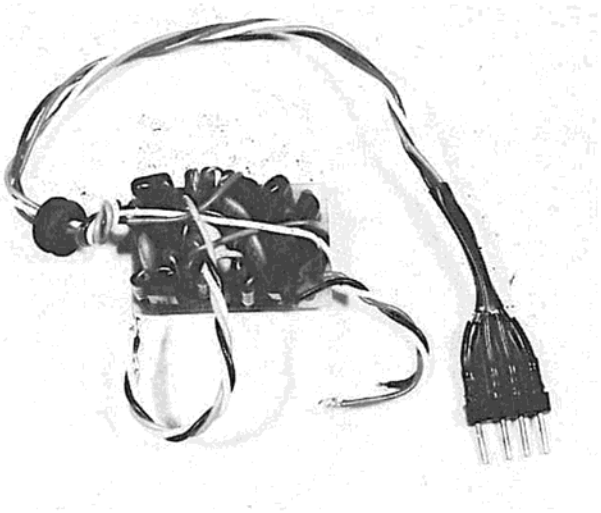
Capacitors installed on PC board.



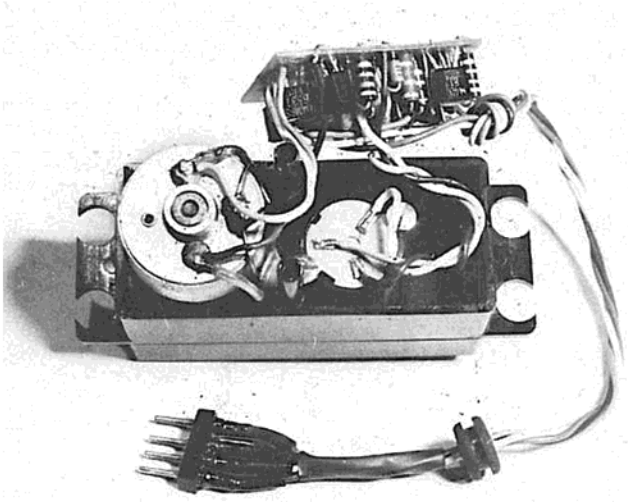
PC board ready for transistors.



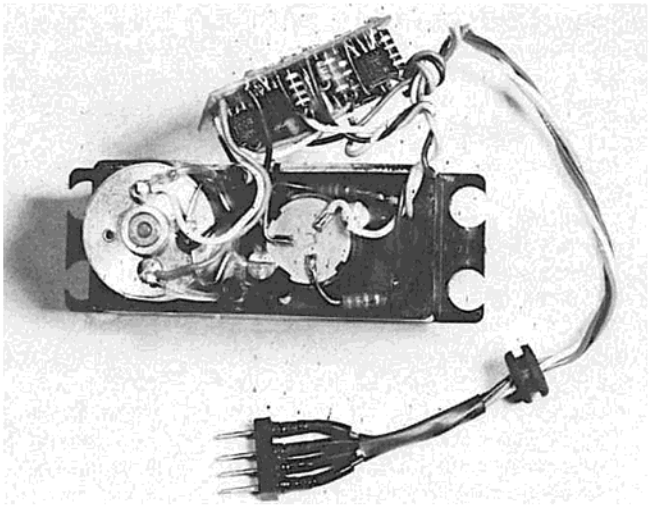
All PC board components installed.



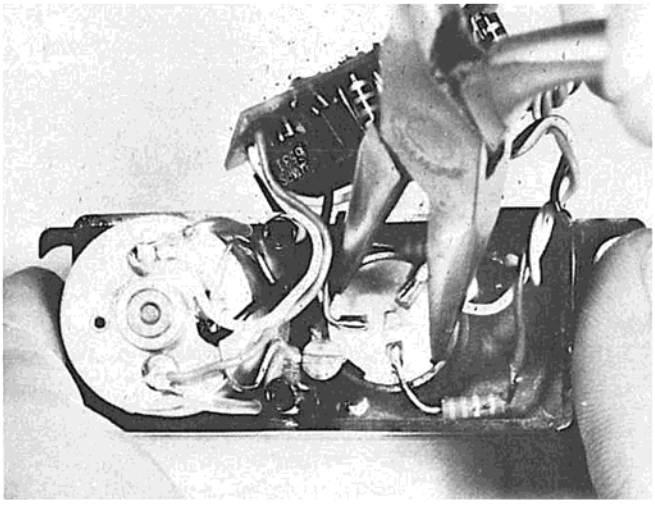
PC board completed.



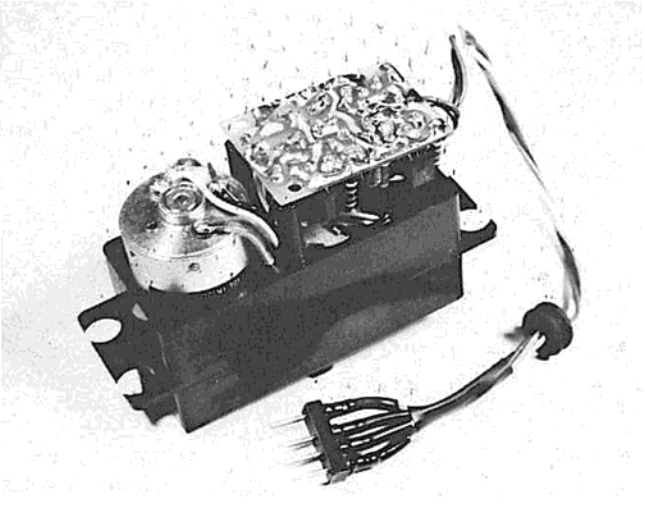
Interwired PC board and servo mechanics.



R11a and R11b installation (optional).



Adjusting R11 with long nose pliers — be careful not to break ceramic disc.



Servo ready for bottom cover.

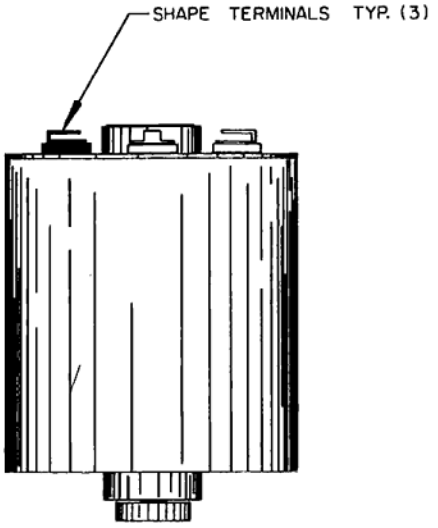


FIG. 1

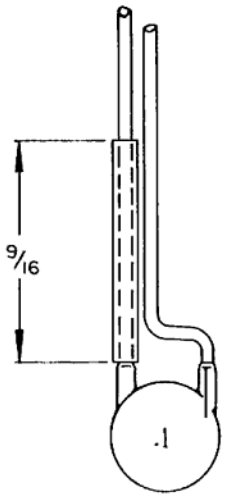


FIG. 2

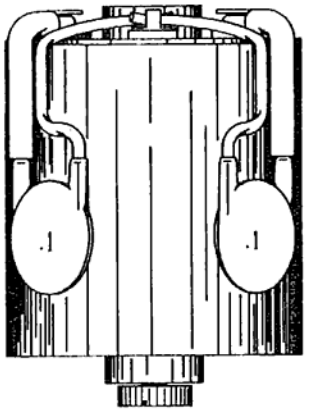


FIG. 3

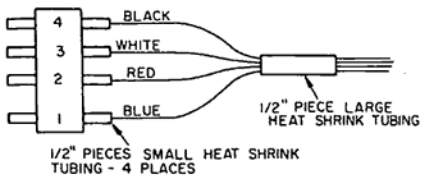
PC BOARD ASSEMBLY

NOTE: All caps should be mounted close to the board.

- ☐ Install the two .1 mfd disc caps (C4 and C5) in the center of the PC board.
- ☐ Install the 2¾ inch length of yellow wire.
- ☐ Install the .01 mfd disc cap (C3) at the left side of the PC board.
- ☐ Install the 8 inch length of blue wire.
- ☐ Install the 2¾ inch length of orange wire.
- ☐ Install the 33 mfd tantalum cap (C1) at the top left side of the board. Observe polarity. The red dot should face to the right. Clean flashing off leads close to the body of the cap to insure good solder joints.
- ☐ Mount the .047 mylar cap (C2) at the center of the PC board.
- ☐ Mount the 2.2 mfd tantalum cap (C6) at the top of the PC board. Clean flashing off leads close to the body of the cap to insure good solder joints. Observe polarity; the red dot should face the top edge of the PC board.
- ☐ Mount the two silicon diodes (D1 and D2). Observe polarity. The bar end of each diode should be down.
- ☐ Install one end of a 1½ inch length of green jumper wire at the hole marked J1.
- ☐ Install a 4.7K resistor (R13). The top lead of this resistor is routed over the top of the .047 mfd cap (C2).
- ☐ Mount the 3.3K (R2) and 82K (R3) resistor at the top left side of the PC board. The top leads of these resistors are bent over and soldered together. Clip off the excess lead lengths.
- ☐ Mount the remaining 13 resistors as per overlay.
  NOTE: Mount transistors so their tops are even with adjacent components.
- ☐ Mount the three M400 or 2N4124 NPN transistors (Q1, Q2 and Q3) on the left side of the PC board. Twist Q3 slightly after installation, if necessary, so that it doesn't overhang the edge of the PC board.
- ☐ Mount the remaining two M400 or 2N4124 resistors (Q5 and Q6).
- ☐ Mount the two SPS 401K or 2N4126 PNP transistors (Q4 and Q7).
- ☐ Mount the MPS 6534 PNP transistor (Q8).
- ☐ Mount the MPS 6531 NPN transistor (Q9).
- ☐ Insert and solder the free end of the 1½ inch green jumper wire at the hole marked J2.
- ☐ Install the 8 inch lengths of black, white and red wire.
- ☐ Install the 1⅞ inch length of white wire.
- ☐ Install the 1½ inch length of black wire.
- ☐ Install the 2¾ inch length of brown wire.
- ☐ Install the 1⅝ inch length of green wire.
- ☐ Twist the 8 inch lengths of red, white, black and blue wire together and tie a single knot in the cable 1/4" from the left side of the board.
- ☐ Slide one of the rubber grommets over the twisted wires.
- ☐ Slide a 1" piece of large heat-shrink tubing over the twisted wires.
- ☐ Cut the ends of the twisted wires to the same length. Strip and tin the free end of each of the twisted wires 3/16".
- ☐ Slide a 1/2" piece of small heat-shrink or insulating tubing over each of the tinned wires.
- ☐ Solder the connector plug to the prepared wires as shown on the connector wiring diagram.
- ☐ Slide the heat-shrink tubing in place and shrink with a match.
- ☐ Strip and tin the free end of the remaining wires 3/32".
- ☐ Flat the PC board solder mounds with a fine file until they are between 3/64" and 1/16" high — if the solder mounds are too high, the case bottom will not fit properly — if the solder mounds are flatted too much, the reliability of the solder joints will decrease.
- ☐ Clean the copper side of the PC board with acetone or dope thinner until all trace of flux and foreign material is removed.
- ☐ Check the component side of the PC board for adjacent lead shorts and gently move components where necessary.
- ☐ Check the copper side of the PC board for solder land bridges making corrections as necessary.
- ☐ The PC board is now completed.

INTERWIRING THE PC BOARD AND SERVO MECHANICS

- ☐ Place the PC board on the plastic servo posts with the components facing toward the servo.
- ☐ Loop the green, white and black motor wires downward from the PC board and back up to the motor as shown in the photos. Solder the ends of these wires to the proper motor terminals as shown in figure 4.
- ☐ Lift the PC board slightly and twist the brown, orange and yellow wires lightly together. Solder the ends of these wires to the proper feedback pot terminals, (see figure 4).
  NOTE: The physical positioning of the feedback pot element may not be consistent between servos. The physical positioning of the feedback pot element is determined by the position of the rotating wiper assembly, at-



CLASSIC SERVO CONNECTOR WIRING

tached to the output gear shaft which is located directly under the feedback pot element.

NOTE: Electrical checks should not be necessary if care was used while building and wiring the servo. Voltage checks can be preformed by comparing voltages with those shown encircled on the schematic. The voltages shown below the line were taken with a transmitted center signal (1.5 MS). The voltages shown above the line were taken without a transmitted signal. All voltages were taken with a 20 K ohm/volt meter and with the red (positive) test lead connected to pin #2 (red) of an unused decoder servo connector. All voltages may vary ± 20%.

SERVO ALIGNMENT

A properly aligned transmitter and receiver/decoder will be needed for the servo alignment. The output wheel should be installed on the servo.

- ☐ Connect the servo to the channel #1 decoder output connector Channel #1 can be identified by the brown signal lead going to pin #1.
- ☐ Turn on the transmitter and receiver/-decoder. The servo should run to a position determined by the transmitted signal. Operate the transmitter stick controlling channel #1 and verify proper servo operation. Allow the transmitter stick to self-center and center the corresponding trim lever. If the neutral position of the output wheel is not exactly centered, loosen the two feedback element locking screws. The feedback element can now be rotated the amount necessary to center the output wheel. Re-tighten the feedback element, locking screws gently.
- ☐ Check servo throw by moving both the transmitter control stick and trim lever alternately to both extremes.
- ☐ If more servo throw is desired, resistors (R11a and b) can be added in series with the orange and brown leads at the feedback pot element (see photo). The values used will depend on how accurately the transmitter encoder is aligned; 220 ohms will give slightly less than stop to stop throw with a 1 and 2 MS extreme input pulse width variation.
- ☐ Use a small amount of Clear Seal or equivalent on the feedback pot leads and motor connecting wires to hold them in place and prevent vibration fatigue.
- ☐ Replace the bottom servo cover and check for proper fit-make fitting corrections if necessary.
- ☐ The servo is now completed.

NOTE: The direction of servo travel may be reversed by reversing BOTH the white and green motor wires and orange and brown feedback pot wires. Servo centering will probably be necessary after rewiring.

"RUBE GOLDBERG" FLAPS

BY **CHUCK CUNNINGHAM**

The drawings on this page comprise a mechanical method of obtaining flap action if you do not have a five channel proportional system. Many modelers have requested a method of obtaining flaps as an auxiliary function, but have a four channel proportional system with no provision for the addition of a fifth servo to operate that function.

The method detailed here is not the optimum, and a fifth servo independently operating the flaps is certainly to be preferred, if available. If not, this system, if proper care is taken in the installation and final setup of the linkages, will provide flap action from your throttle servo. Basically, you utilize only the first half of your stick throw, on the throttle stick, as your full throttle range. In other words, your throttle throw is reduced in half, while retaining your full idle range. Once the throttle reaches the mid position of its throw, the lower of the transmitter stick throw is used for lowering the flaps. A study of the drawing, and the close-up of the take-up linkage detail, should clarify exactly how this flap linkage works. This method has been used quite successfully by a number of modelers, as well as by the author, for a way to obtain flaps without trading in that four channel proportional system. Again, be careful in installing all linkages and be sure that they work absolutely free and true on the bench before ever attempting to operate the system in the air.

If you decide to use the system, and make any improvements on it, we would certainly like to hear from you.

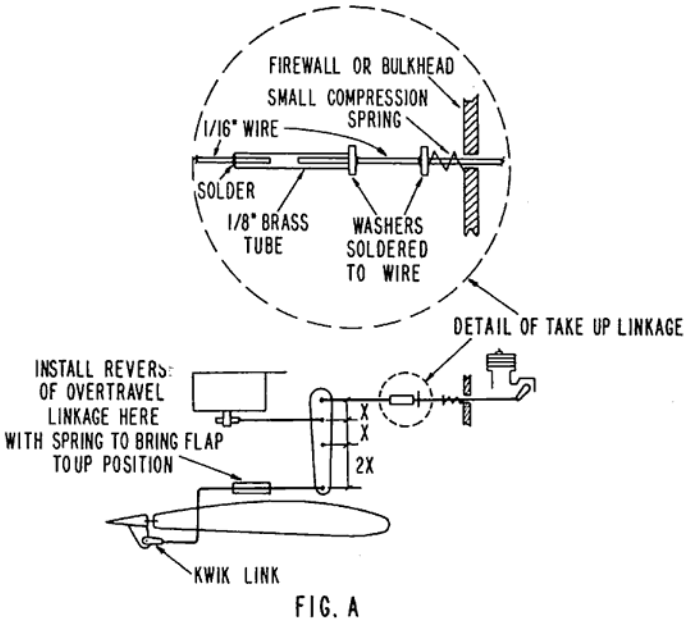


FIG. A

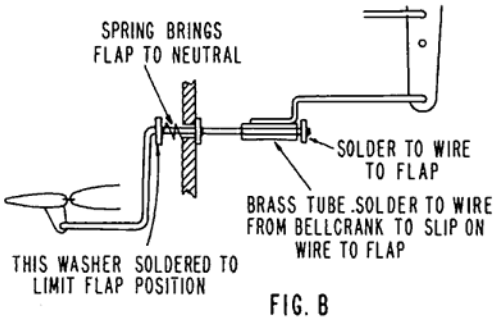


FIG. B

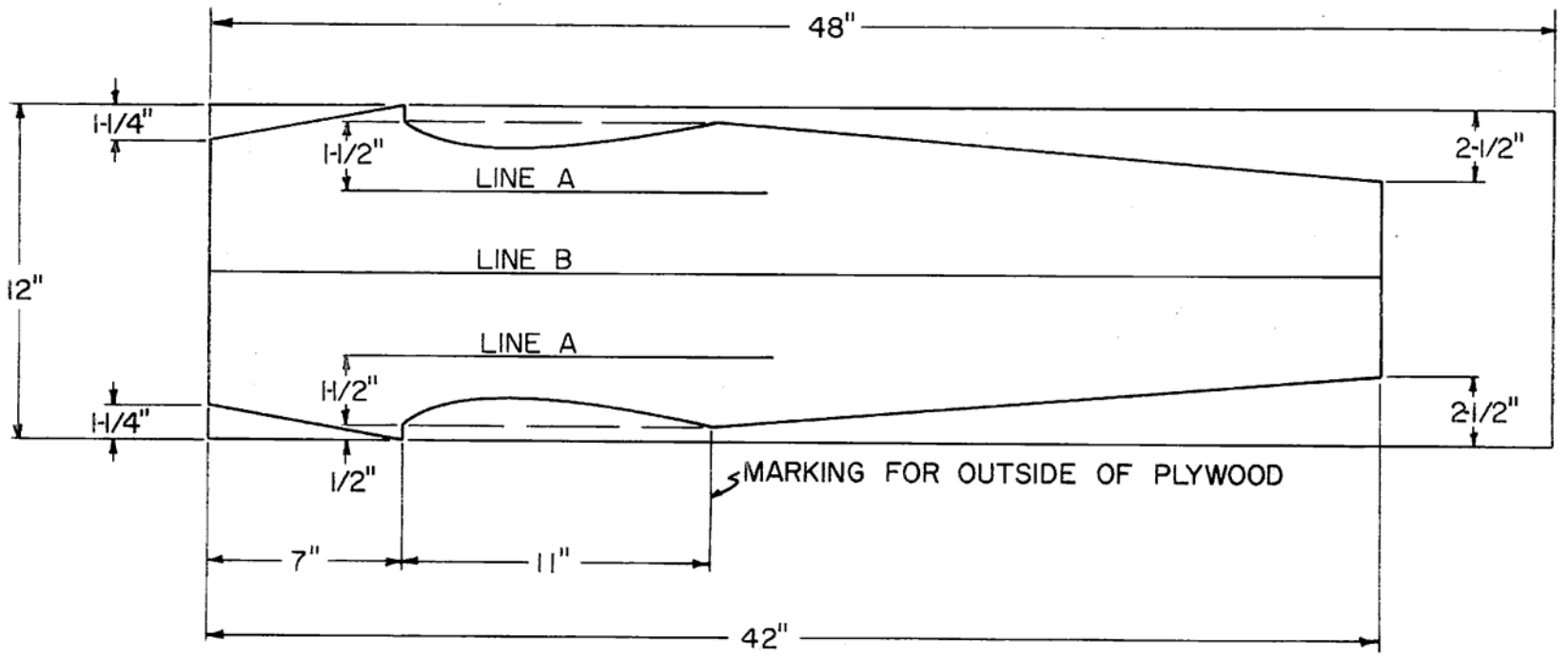


FIGURE 1

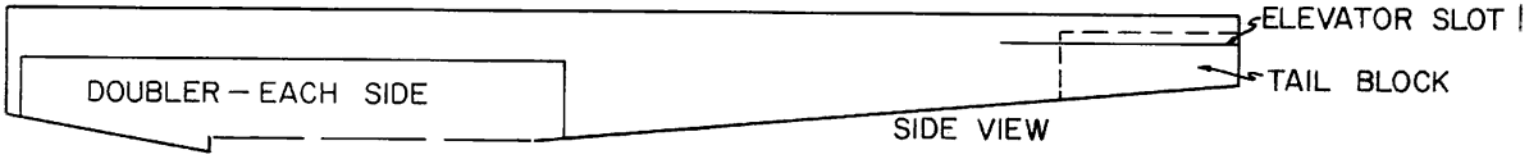
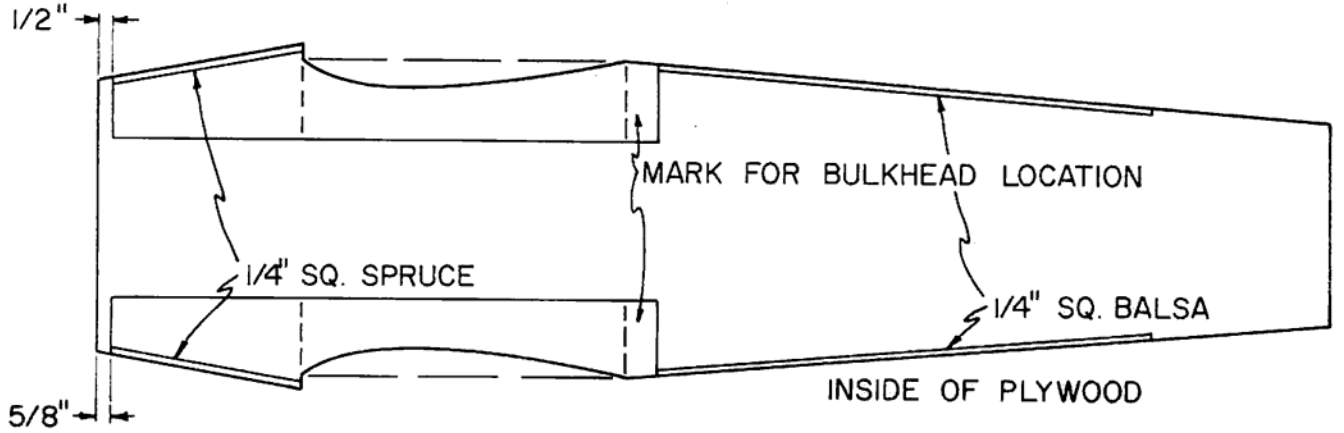


FIGURE 2



CUNNINGHAM ON R/C

RCM's Prolific Purveyor Of Pleasurable Pursuits, Presents His Plywood Panther...

Last month we discussed numerous time and money saving ways to build your next R/C aircraft. This month we are going to present one of the simplest, easiest, and quickest ways to build a fuselage; one fabricated from 1/32" plywood, with a bit of balsa tossed in just for old times sakes. This type of fuselage may be used on any size model, although all of the ones that I have built have been used on .60 powered aircraft. The same technique, however, may be used to construct a fuselage for a .10 GG model, for example. At the present time I am designing a Continental Class Racer with this type of fuselage and in the winter months plan to build a bipe using this same technique. As you can see, the applications are almost endless.

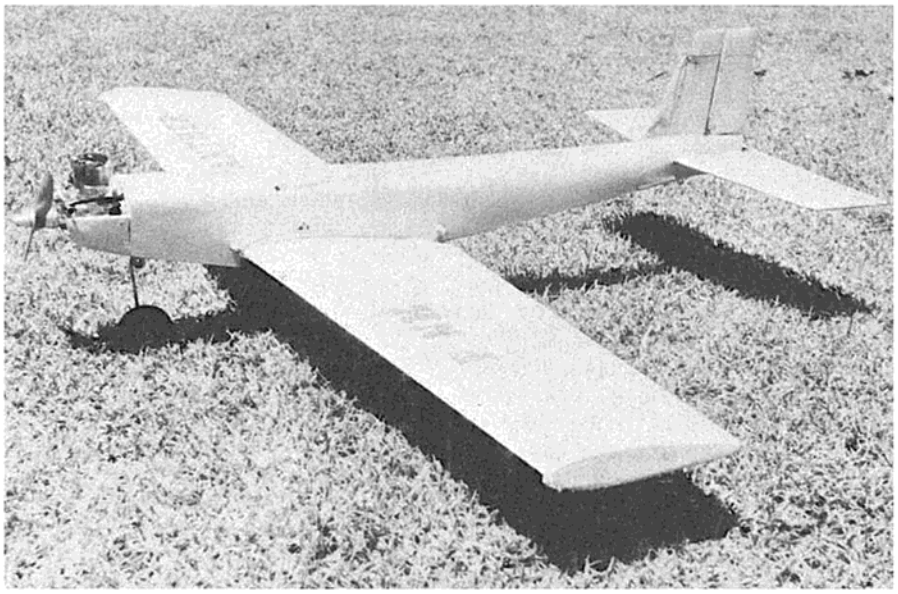
The prime of large plywood sheets for this method of construction is Sig Manufacturing Co. Purchase their 1/32" plywood in the 12" x 48" size. That is not a mistake, the thickness is 1/32," not 1/16" or 3/32". The 1/32" is very strong and yet light in weight. You will also need material for doublers. I use 1/8" Poplar plywood and you will need a piece 1/8" x 8" x-24". This is not generally available in hobby shops, and I purchase it in 4' x 8' pieces from the lumber yard. This material may be used for a number of things, so don't worry if you have such a large sheet to use up. You may make the doublers from 1/16" aircraft plywood, the same type as the 1/32" ply if you wish. You may even make the doublers from 1/8" balsa, but this seems to be back sliding just a bit. On smaller aircraft it would be well to use the balsa doublers to save weight. The main purpose for the doubler is to give additional rigidity to the nose of the aircraft and to provide a wider saddle for the wing. In fact, at the wing saddle, an extra doubler of 1/8" balsa, about 1/4" deep will help, since the width of the finished fuselage side is just 5/32".

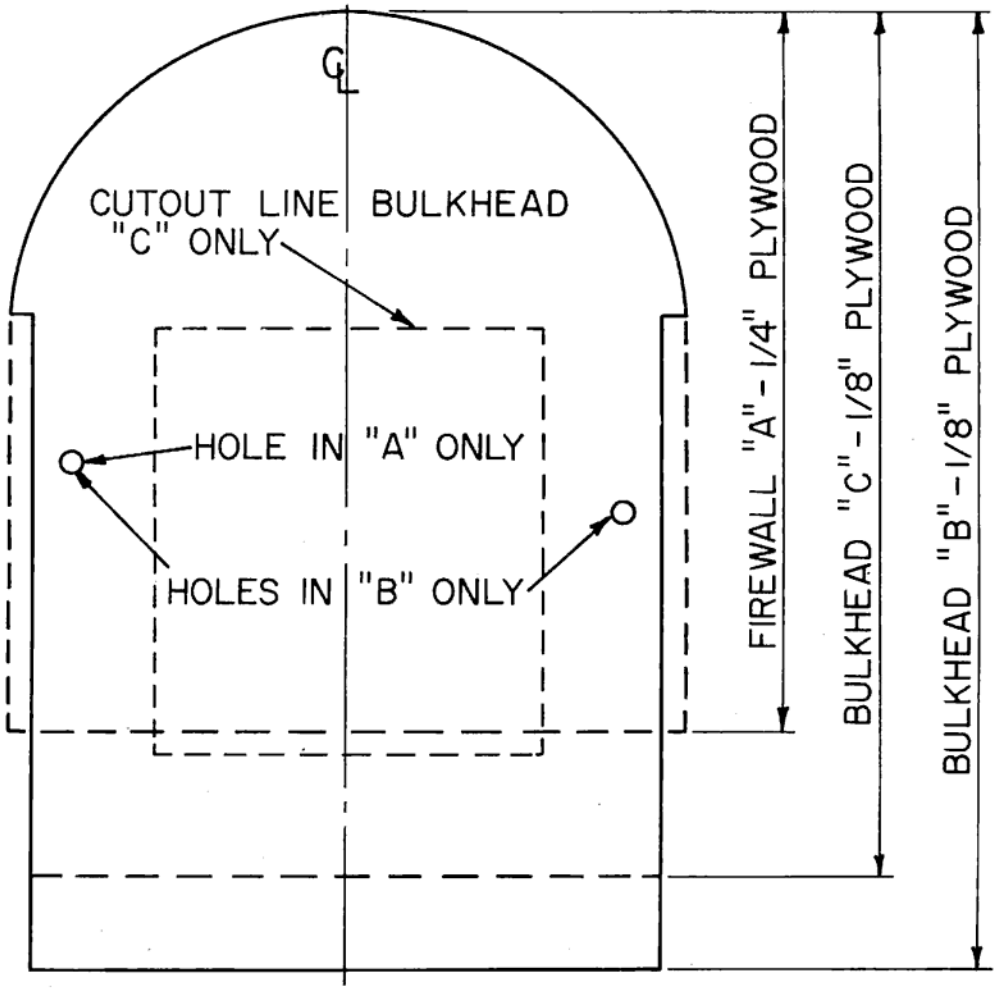
Several other pieces will be needed, a 1/4" square piece of balsa x 36" long. This is used for longerons at the rear of the fuselage to provide an additional glue surface for fastening the bottom sheeting in place. I also use a tail block of soft balsa. This forms the tail as well as making a solid mount for the horizontal and vertical stabilizers. You will also need a 1/4" piece of plywood for the firewall and a bit more plywood to use for the bulkheads and bottom hatch cover. Again, I use the 1/8" Poplar wood for these pieces. I also use 1/4" square pieces of white pine, stripped from a board with a table saw, at the nose for extra firewall bracing and for the supports for the hatch cover.

We will use just two types of mastics, or glue, in constructing the fuselage; contact adhesive and epoxy cement. Any good rubber base contact cement will do, but I suggest that you use something that comes in a large can rather than the very small 29 cent bottles. For the epoxy on this type of fuselage I suggest that you use Sears Filled Epoxy Cement. It is a two tube formula, a black tube and a white tube, which together forms a rather gunmetal grey cement. These two five ounce tubes are sold for only $1.79 and provide you with 10 ounces of good epoxy. It is very stiff when mixed and will not run, so it is also suitable for fillets and other joints.

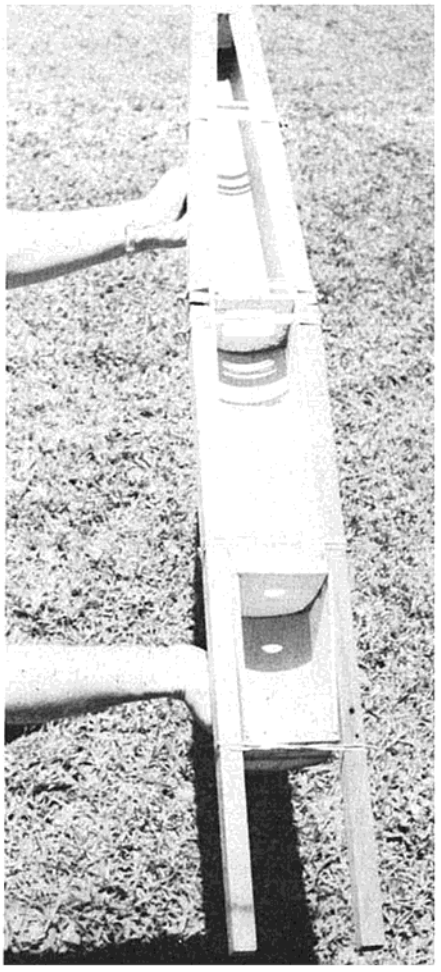
If you have all of the material handy, let's begin. You can build this entire fuselage in one evening, up to the point where you set it aside to dry. The bottom skin, as well as the nose blocks, may be installed the following morning and you could be painting the second evening. One other thing that you will need is an extra pair of hands. It just requires too much digital gymnastics to be able to do all of this with just your own mitts. As usual, press your long suffering wife into service as your holder. Prepare her to hear just a few cross words, because at just one point, you're going to cuss me just a little bit. Woops, I almost forgot, before you do start, take time to make four wooden braces. Make these from scrap 1"x1½" pine, each about 24" long, with wood screws fastened to each as shown in the drawings. These will be used to hold the complete fuselage

The Pink Panther. Our own Tiny Tum evidences influence of last visit to California and the Strip's Pink Pussycat. They do everything bigger in Texas.





PATTERN FOR ALL BULKHEADS



while it is drying. Also keep a box of #64 rubber bands handy to use.

The plans show a fuselage layout that is pretty much standard for a .60 size aircraft. This fuselage may be altered in dimension to suit yourself, but I suggest that you use it as shown. Also, this fuselage is designed to use a Tatone or Midwest type, radial mount. Nose blocks of soft balsa are added after the plywood portion is complete in order to give you a smooth streamlined look. I flew one version for quite some time with no nose cowling and even though it looked like a fugitive from a baseball bat factory, it flew well and due to the extra drag, was a joy on landings, slowing down due to the extra drag.

The first step in construction is to lay out the fuselage outline onto the plywood. Check the plywood to see if one side has a better look to it than the other. Choose the best face for the outside. Lay out the fuselage dimensions as shown on Figure #1. This is the outside. Be sure and mark the lines marked A and B. Mark with a soft pencil, and do not press hard. If you do, you'll have a permanent mark when you get to the painting stage. Mark the outline of the wing rib that you plan to use on the wing saddle. Make sure that if you are using a semi-symmetrical wing section you have the top surface correctly marked. Next, mark the inside. You do not have to lay out the fuselage all over again, simply draw in the locations for the doublers, and the positions for the bulkheads.

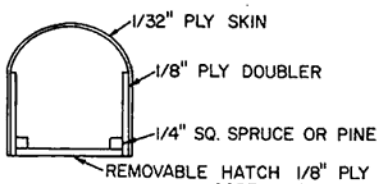
Cut the fuselage outline from the sheet of plywood. You may use a razor blade or a razor knife if you wish, but the easiest way is to use a good pair of scissors, or a small pair of tin snips to do the cutting. Don't use your wife's sewing shears since you might find that extra pair of hands has turned into a fist and one-eyed plywood-fuselage-builders don't fare too well!

Cut out the plywood doublers, all bulkheads and tail block on a Dremel jig saw (if you have one) or with a coping saw. Make sure that you do *not* indent the firewall with a notch on each side. Make the notches only on bulkheads B and C. At this point, take the time to drill all of the holes in the firewall for the radial mount bolts and the nose gear blocks. It is much easier now than later. Also, mark a center line on each bulkhead and the firewall to aid you in making a positive alignment. One other word, when cutting out the doublers, you will notice that the plans show them to be a bit shorter at the nose than the plywood skin. Be sure and mark them for the proper position. This 1/8" difference in length is for the built-in right thrust in the completed model. Glue the doublers to the sides with contact cement. Glue the 1/4" square stringers in place at the tail. Make sure to cut them short enough to allow for the tail block location. At the same time glue in the front 1/4" square pine pieces for the hatch support. Leave a 1/8" space between the 1/4" square and the edge of the doubler to allow for the 1/8" hatch thickness. Set this aside to dry for just a bit. Make all of the bulkheads and the tail block. Try and cut the tail block to be as square on each plane as it can be. Take a kitchen sponge and with it a bit more than damp, wet down the outside of the 1/32" plywood skin along the center line only, a band about 3" wide. Don't get it too wet, just damp. It will begin to curl in just a few minutes.

Mix up a pretty good sized batch of epoxy glue and get your extra pair of hands ready. Now comes the cussing part. If you're careful, it won't last long, but at this point you have to form the fuselage to shape, glue in the

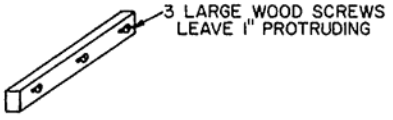
firewall, and wrap it with rubber bands. Keep a rag handy to wipe the glue off of your hands and ear plugs for your wife.

Take the firewall and liberally coat the edges with epoxy. Make sure that you have the front to the front. Let your assistant hold the fuselage skin in a semi-formed shape, then insert the firewall in place against the skin and butt against the doublers. Wrap a couple of rubber bands around the



CROSS SECTION THROUGH
FINISHED NOSE AREA

firewall and the skin. Next, glue in bulkheads B and C. The main thing here is to get the three bulkheads into position and the fuselage wrapped around them. Don't worry about alignment, yet. Now, take two of the long braces and place them into position at the front of the fuselage as shown in the pictures. Hold them in place with rubber bands. Cut the bands that you had used first to hold the fuselage in shape and remove them so that the braces lie flat with the sides. Use plenty of rubber bands to insure a good clamping action.



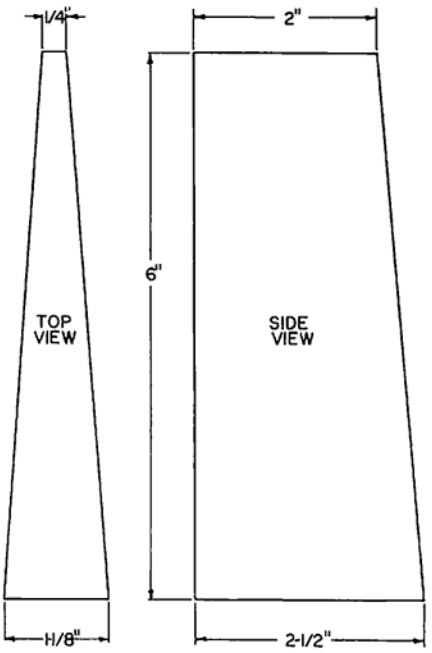
1" x H/2" x 24" PINE BRACE
FOUR REQUIRED

Now, go back and line up all of the bulkheads so that the centerline mark lines up all down the front of the fuselage. Coat the tail block with a very liberal coat of epoxy and then pin it to one side of the skin. Bend the fuselage sides together and bring the other side against the block. You may experience a slight cracking of the skin at the top of the tail due to the very short radius, but ignore it for now. Try and hold the tail block in place, with extra pins if needed, until you can bring the second pair of braces into place on this rear section. It is tough to get everything into just the correct position, but stick with it. This type of epoxy has to cure overnight, so you have plenty of pot time to get everything into position. When everything looks right, wrap a few more rubber bands in place, some over the top of the fuselage and some under. Check the alignment once more and then set it aside to dry overnight. It is a good idea to glue in at least two cross braces between the aft stringers. Use 1/4" square balsa for this purpose.

The bottom sheeting is cut from the scrap portion of the full size sheet of 1/32" plywood. Keep in mind that you are going to use some of this when cutting out the fuselage and leave the scrap in one piece so that you will have enough for the bottom. The front hatch is located at the bottom of the fuselage and may be made from a flat piece of 1/8" plywood. Use small wood screws to hold it into position on the completed fuselage.

Location of the horizontal stabilizer is the next slightly tricky bit of work. You will note that the fuselage is just slightly swayback. This is due to the folding effect of the plywood. It will not be noticable on the finished model but you cannot lay out a location for the stab before the fuselage is formed. If you have built carefully, lines marked 'A' will serve as a reference point. Extend these lines to the rear of the fuselage with a straight edge. Mark a parallel line on each side of the fuselage about 1" above the extension of lines A. This parallel line will be your center line for the horizontal stab. Cut a slot for the stab, make sure that it is parallel to the wing saddle and then you are ready to glue the stab in place. Cut a slot in the top of the skin for the rudder. You have the centerline to use as a reference line. When installing the rudder, be sure and butt glue the base of it to the tail block, as well as attaching the sides of the fuselage to the rudder.

Cowl blocks are added to the nose, and butt glued in place. You may wish to remove the small portion of the skin that projects beyond the firewall before



SOFT BALSA TAIL BLOCK

You'll find the Panther's one-piece fuselage to be fast and strong. Use foam wing and enamel paint for fast finish.

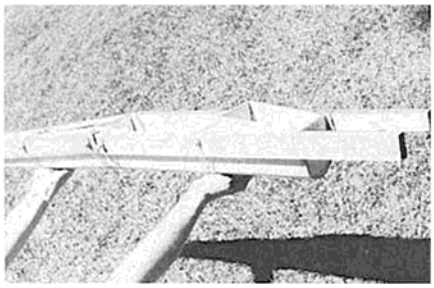
butt gluing on the cowl blocks. This skin extension was used only to help keep the firewall in place during the initial construction.

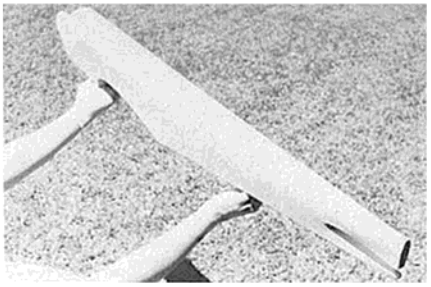
That's about all there is to it, and it may sound harder than it really is. The tough points are in getting everything in place while getting yourself smeared with epoxy glue.

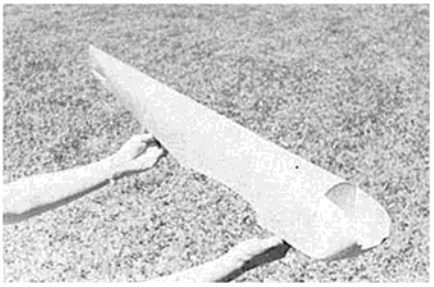
I've found that, in use, this type of fuselage is much, much stronger than the conventional balsa body. They are really almost indestructible. This construction, coupled with a foam and cardboard wing, will give you a completed multi ship that will cost almost nothing. In fact, the balsa for the tail assembly and ailerons will cost you more than the entire fuselage and wing if you hot wire your own wings.

Painting the plywood fuselage is a joy since the grain is so tight very little filler is needed to give you an extra special smooth paint job.

Good luck with this project and I'll see you at the field with your plywood fuselage.







The RCM Flight Training Course

PART VI: ALIGNMENT

One of the greatest problems that has confronted us in the presentation of this series, is that of determining what to include and what to omit. You might wonder why we might consider omitting *anything* in a series for beginners, however it must be considered that this series could conceivably stretch out for the next five years if we wern't somewhat selective in the material that we presented! It has been brought to our attention, since we first started the Flight Training Course, that some of our explanations have not been too clear. We had decided, prior to commencing this series, not to cover any of the items that had been carefully detailed out in articles previously published in RCM during the past 12 months. What we had failed to consider, however, was that a lot of our beginners were, in fact, new readers, or, simply, had not read these articles. In many cases, the back issues were in short supply, or not available at all. For this reason, we are going to back up a bit and comment even further on some of the items we have discussed to date.

First of all, however, we would like to clarify one point that has confused a few of our readers. This was our reference to covering the RCM Trainer wings with Bristol Plate. The latter is a form of cardboard sheet available from most stationers. We used this terminology since we were assured that this was a common term for this particular type of cardboard, although we have since discovered that it is a term used primarily in the West and Midwest. If you have experienced any difficulty in covering foam wings with cardboard, we strongly suggest that you obtain a copy of Volume 1, number 1 of R/C Limited Magazine, which we recently published. There is an article in this Summer 1968 edition that is the most comprehensive article on coring and covering foam wings ever published. This edition of RCL is available from your local hobby dealer, or direct from R/C Modeler Magazine, for $1.50. This one article alone is well worth the price, since it will save you untold time and money if you plan to use foam wings in the future.

Last month we briefly discussed checking the alignment, the decalage and thrust of your RCM Trainer. Here, again, was a case where we had assumed that most of our readers had read our previously published article on the subject, entitled Trammeling, by P. W. Preston, which was published in the March 1968 issue of RCM. It was pointed out to us, however, that a great many people had not, in fact, read this article and were left somewhat confused by our brief description of this process. This, perhaps, is one of the most important aspects of building and flying R/C. for an improperly trimmed aircraft is about as worthwhile as a beer stein with a hole in the bottom! Even some of the more experienced sport flyers have never fully learned the procedures for checking the alignment of a new aircraft as evidenced recently by a modeler of some 10 years experience who tried to fly a beautifully finished multi with approximately 3 degrees of negative incidence in the wing! So, in order to revive this somewhat forgotten art in an era of proportional R/C where it is assumed that the radio will compensate for all design and building deficiencies, and that "anything will fly," we are, herewith, reprinting P. W. Preston's article from the March 1968 issue of RCM entitled "Trammeling":

"Would you try to run a race with your head and shoulders aimed off to the right? Well, you ask your airplane to do that and worse, if it is misaligned. For example, if the wing is tilted the plane tends to bank. This creates a turn which is usually corrected by offsetting the rudder until the yaw produced cancels the effect of the built-in bank. Reduced efficiency and increased loading of control surfaces results.

All that is required to properly

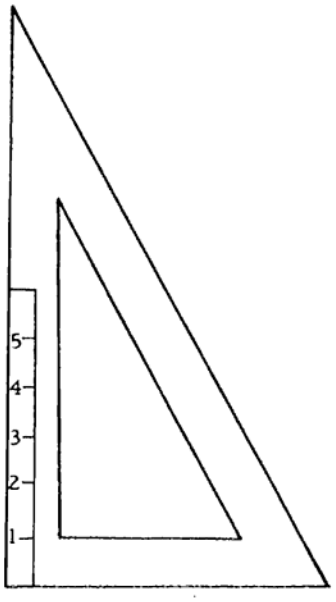
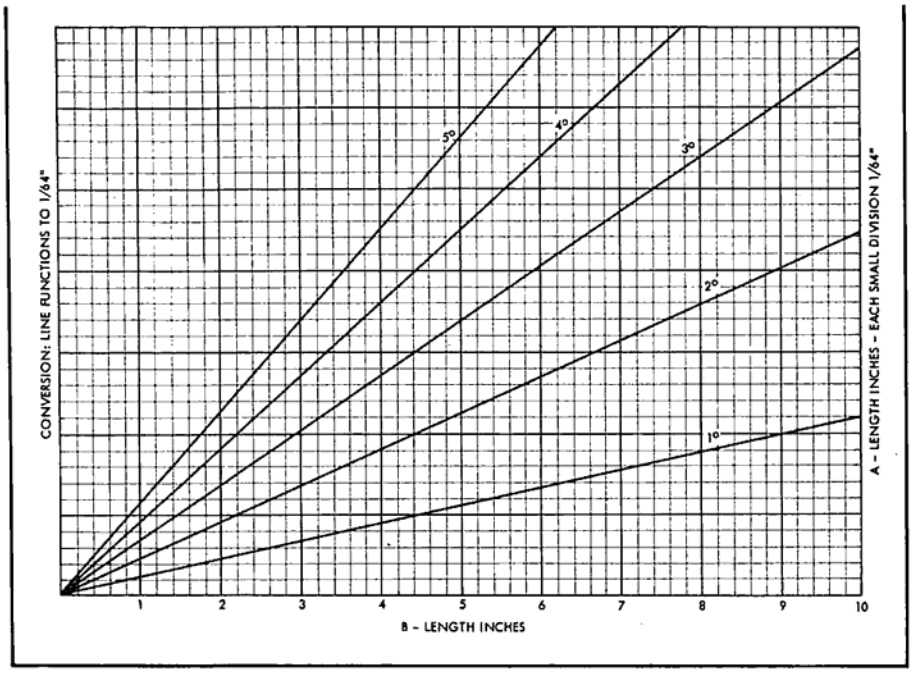


FIGURE 1



align an airplane is a piece of string with a pin at one end, a 30° - 60° triangle and a 6" machinist's rule. The rule should be taped or epoxied to the triangle as shown in figure 1, with the 1/64" divisions at the edge. The string must be non-stretching, most synthetic materials will not do.

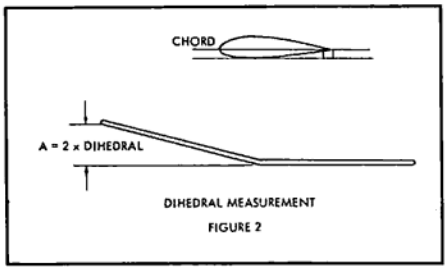
The graph is the sine or tangent functions of small angles expressed in fractions of an inch. With this table it is easy to accurately set up incidence and thrust without resorting to a protractor. For lengths greater than on the graph multiply A and B by any convenient factor; e.g., for a deviation of 3° at a distance of 40" (4 x 10"), the displacement would be 2$\frac{3}{32}$" (4 x-3$\frac{5}{64}$" divisions).

DIHEDRAL

Place the wing on a flat surface, blocking up the trailing edge on symmetrical sections so that the chord is parallel to the surface. Refer to figure 2 and measure the height to the leading edge at the tip (alternately measure to the chord and subtract the chord height from the reading). If the dihedral is expressed in degrees, convert the reading using the table.

WASH-IN/WASH-OUT

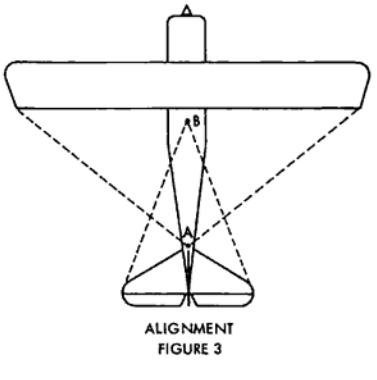
Compare the leading edge height at the chord with the trailing edge at each rib. Be sure to check both wing panels as this can upset flight trim drastically. Steam the wing and block until it conforms to the specifications, usually no wash-in or wash-out.



DIHEDRAL MEASUREMENT
FIGURE 2

ALIGNMENT

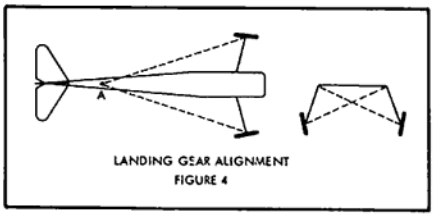
Install the wing and stabilizer using the fasteners with which you will fly (this insures that no change is caused by the tension of the hold-downs). Place a pin in the fuselage at point A of figure 3, exactly in the center of the fuselage and measure with the string to each wingtip. Skew the wing in the saddle until the distance is equal and then install pegs or blocks to return it to this position each time it is installed. Follow the same procedure for the stabilizer using point B of figure 3 as the reference.



ALIGNMENT
FIGURE 3

LANDING GEAR

Check landing gear run-out as above with a reference near the tail. This will allow the airplane to travel in a straight line on the ground. Then check the landing gear height by measuring as in figure 4. This should be adjusted for as level a condition as possible as later



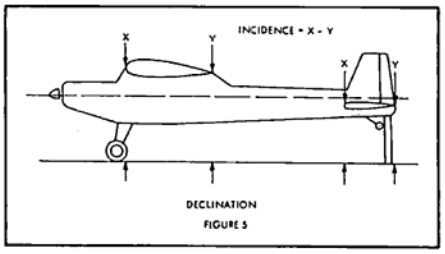
LANDING GEAR ALIGNMENT
FIGURE 4

checks will depend upon it for accuracy.

TILT

Block up the tail until the wing chord is parallel to the surface as in figure 5. The height of the wing tips should not be equal. Likewise, the tips of the horizontal stabilizer should be parallel to the surface. Adjust either one by shimming the saddle and then recheck the alignment.

The top of the vertical stabilizer should be equidistant from the horizontal stabilizer tips. Offset of the vertical stabilizer can then be checked by placing the long edge of the triangle against it and along the fuselage. Zero offset is indicated by the triangle falling one-half the width of the stabilizer to the side of point B on figure 3.



DECLINATION
FIGURE 5

DECLINATION

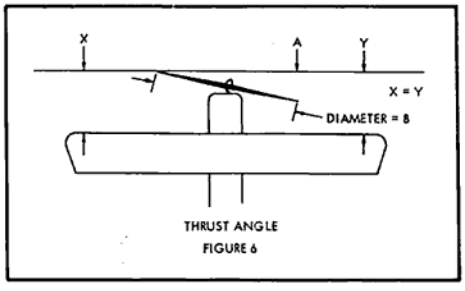
Referring to figure 5, block up the tail until the longitudinal axis (or the reference specified in the plans) is parallel to the surface. Measure and adjust the incidence of the wing and horizontal stabilizer using the graph to convert from an angle to fractions of an inch. Positive angles denote a leading edge that is higher than the trailing edge.

It is a good idea to repeat the alignment checks if shims are placed under the wing or stabilizer. It is also wise to glue the shims in place so that they will not shift or fall out.

THRUST

Place the airplane parallel to a wall with the tail blocked up as shown in

(Continued on Page **47***)*



THRUST ANGLE
FIGURE 6

(Continued from Page 46)

figure 6. with the propeller horizontal and touching the wall with one tip, measure the distance to the other tip from the wall. This distance is A on the graph and B is the propeller diameter. Read the graph for side thrust. Repeat the procedure with the propeller vertical for down thrust.

Now, about that title. Trammeling is the forgotten art of aligning an airplane by adjusting the tension on the wires that hold the wing and tail, a la Curtiss Junior, etc."

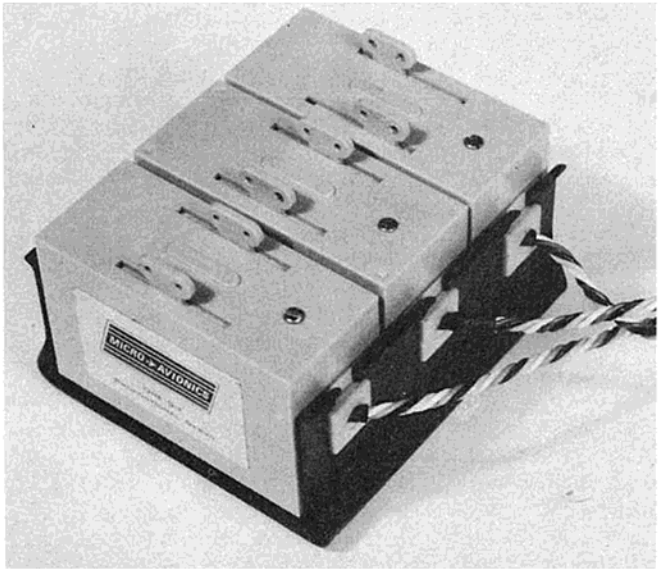
And there you have it — a simple, step-by-step method of checking out that new aircraft for proper decalage and thrust.

Another subject we discussed last month, was the installation of your radio equipment. We did not elaborate, or go into great detail on this particular subject, since we believe in one cardinal rule — follow the radio manufacturer's instructions for mounting the radio equipment you have purchased. If the manufacturer makes a servo mounting tray for his digital servos, by all means use them. And although the manufacturer's instructions sheets often stress the importance of not screwing these mounts down too tightly, many beginners make this very mistake again and again. These servo mounts, or trays, are designed to absorb shock that might otherwise damage the servos. Basically, these servo mounts, or spring clips, are designed to suspend the servo in such a fashion that the servo mounting tray grommets will absorb the transmitted vibration from the engine, or severe shock sustained in rough landings. If you screw the servo tray hold-down screws too tightly, you will compress the rubber shock grommets and defeat their very purpose. You then have a rigid servo installation which, in effect, becomes a part of the fuselage structure, itself and thus allows shock and vibrations to reach the servos. All that is necessary to ensure a good servo mounting arrangement, is to screw the wood screws down just tightly enough so that the washer under the head of the screw just barely compresses the servo tray grommets. You can check the effectiveness of your servo mounting by moving the installation with your hand and noticing whether it remains flexible, or if, in fact, you have tightened the entire unit so tightly that it has become rigid.

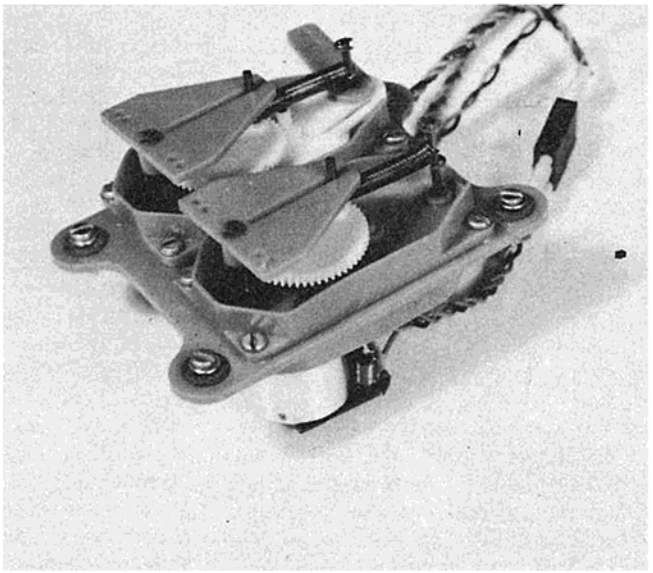
As we mentioned last month, the receiver should be encased in G-Pad, then wrapped in a material such as Saran Wrap. The battery is treated the same way as the receiver. This not only affords complete protection to these two units, but the smooth surfaced Saran Wrap allows the frictionless passage of control cables over these units. In no case, in your installation, should the antenna wires, or your control cables or push rods, come in contact with the receiver, the switch harness, or any of the plugs and wires. These items should be routed out of the way so as to avoid any possible radio interference due to noise caused by friction of two or more elements of your installation.

While we're on the subject of friction, one of the greatest deterrents to proper servo action is the binding of control surfaces due to improperly installed hinges and/or pushrods. With regard to hinges, there are a many good commercial hinges on the market today and are all suitable for your R/C installation. Among these are: RK, DuBro, Rand and deBolt. These should be installed exactly as per the instructions on the hinge package, making absolutely certain that the plastic hinges which are inserted, for example in the trailing edge of the stabilizer and the leading edge of the elevator, are on a perfectly straight line. If you cut a crooked slit into the control surface, you will have a "snap bind" which will defeat the precision action of your servo. If you are using a plastic hinge with a wire hinge pin, either disconnect the hinge pin, or do not install the hinges until after the aircraft is painted. One of the most frequent causes of binding hinges is that of a build-up of paint on the hinge surface. If you must install the hinge prior to painting the aircraft and you cannot disassemble the hinges, put a small drop of light-weight oil on each hinge prior to painting. The paint will not adhere to the oil and thus, will stay away from the hinge area. Do try to avoid getting oil on the surface to be painted! If you are planning on a Galloping Ghost installation in your RCM Trainer, use either the Rand hinges, or the figure 8 stitch hinge using heavy-weight thread. The freedom of hinge action, although important in any installation is of paramount importance in a pulse proportional system where the servo power is severly limited. Any binding in this type of installation will completely prohibit servo action.

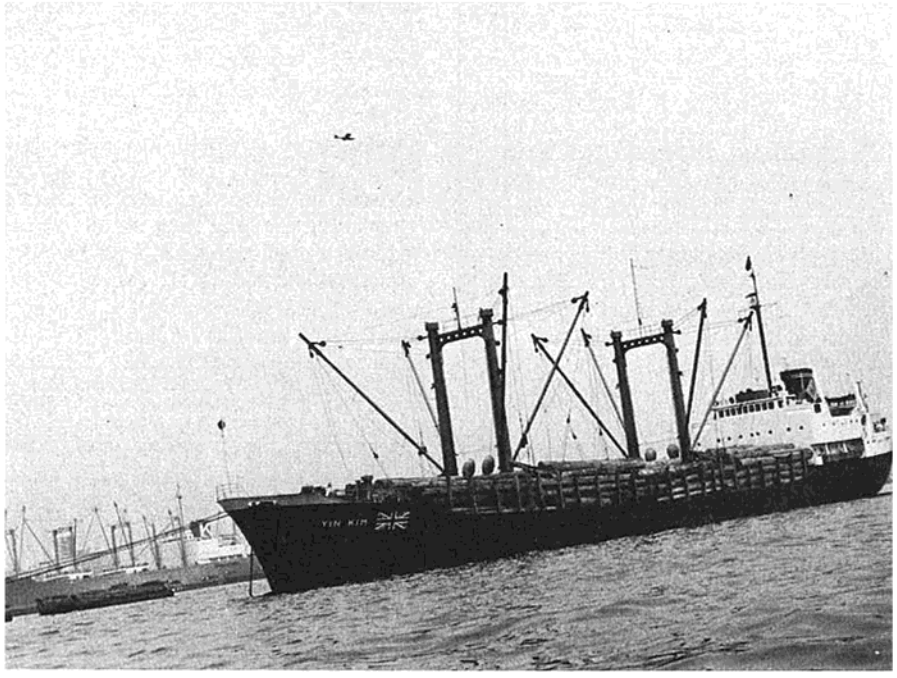
Micro Avionics servos in spring cup mount.



Rand Dual Pak in Rand shock mount.



KEN WILLARD



This month it's your turn to write the column again — and boy, did you do a good job.

First, however, I want to use this opportunity to thank all of you who wrote, phoned, or sent cards to me when you heard through the grapevine that I'd had a mild heart attack. I had told Don Dewey not to make a big thing out of it, and he went along with me, but I forgot about a couple of club newsletters whose editors put in a get well message. Then from there on I got so many cards and phone calls that I can't possibly send all of you a thank you note — some of you didn't even put in a return address — but I want you to know it really helped and by the time you read this I will have been back to work for several weeks and in better shape than ever. Once again, thanks to all of you.

One of the most interesting letters in the mail came from Tokyo. Captain T. Y. Lo skipper of the Motor Vessel "Yin Kim", which plies between Sandakan and Japan carrying timber. Here's his report from the Far East:

16th May 1968
Port of Tokyo.

Dear Ken,

I am a HongKong Chinese, one of the refugees as you may call. I have been wanting to write to you for years but never got down to it. I can still remember the fun I had flying one of your earlier designs (flying boat) which appeared in the M.A.N. or America Modeller about nine years ago, including the plastic nipple covering the toggle switch part.

Enclosed is a snap of your Shearwater, shall I call her "SHEARWATER 1.5", because I enlarged your design by 50%. Only three channels used on my Micro-Avionics. I was surprised at her R.O.W. capabilities, she managed to get off the water every time in less than a hundred feet, in rough water, even less! As I flew the usually in open harbours, never had any ideal condition. I remember, not too long ago, somebody wrote and criticized this particular design, "flush deck, sharp corner, ugly looking and all". May God bless him! Personally, I think she is quite good looking, easiest construction than any multimodel I have ever built. I managed to finish in five days. 1/16" plywood was used for the fuselage top and bottom, even a double bottom was constructed in the radio compartment, just in case. Once I managed to land her on top of No. 4 hatch accidentally, result: one broken crankcase Enya 45. Now, an O.S. 50 has been installed, flies like a sky scorcher. I am going to build a symmetrical wing and put ailerons on it.

Being in the seafaring career, I have plenty of time to build but very little time to fly. Suddenly I realized that seaplanes are the best compromise. Many occasions, I travelled some 30 miles by taxi just to do a few flights. It sounds absurd but it is true. This R/C modeling is habit forming alright, I think I am worse than a drug addict. At sea, I spent most of my time in my little hanger. Well I guess I better close now, I will send you some of the flight shots later. Wishing you all the best,

Yours sincerely,

When I received that letter, I wrote Captain Lo right away and asked if he had any flight shots. Back came another letter, together with some of the most fascinating R/C pictures I've seen. Here's his reply — and take a look at his "Shearwater 1.5" performing amongst all that shipping.

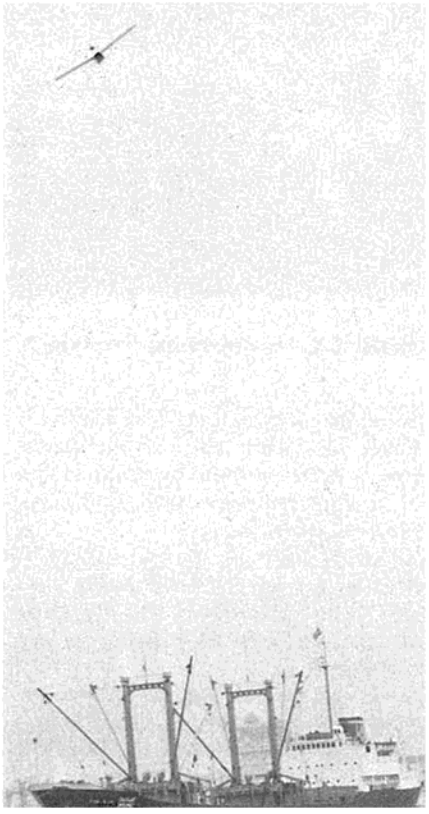
Hong King,
M.V. "Yin Kim"
20th June 1968,
Tokyo.

Dear Ken,

Thank you for your delightful letter of the 22nd of May. Gosh! I never thought that you would publish my letter in your future column, it was written in haste, so please do correct my bad English and make it understandable to all readers before publishing!

The Shearwater 1.5 is having her third Engine now (2nd one, OS50 sunk). I flew her for three continuous mornings, in here. The new Supertigre 46 is wearing out after some 2 gallons of fuel burned. Most of the flights were hand launched in the boat due to the extremely heavy swell. ROW had to be done on the lee of the ship at a dangerously close proximity. The sub-rudder is quite big but still not too responsive in water. I have kept clear of the No. 4 hatch this time alright, but in one occasion, I flew her too low and fouled my ship's aerial, she dropped and sat right on top of No. 1 Lifeboat canvas cover with the Engine still running! Only a negligible dent on the leading edge sustained. She managed to find the only soft spot on the ship, it was more than a miracle.

I am enclosing a few flightshots, all were taken by my 4th Engineer, Mr. F. K. Li, my great comrade. He has become very interested in this hobby



Captain Lo's "Shearwater" flying from the freighter "Yin Kim". How's that for an unusual flying field?

too. I gave him all my single channel equipment. Because of the hazy weather in here, plus bad photography and flying technique, the snaps did not turn out satisfactory enough.

I am sailing for HongKong this afternoon and then Sandakan Tokyo again, I can hardly wait for the satin smooth water in the Sulu seas where I can do some nice R.O.W. and touch and go. I am also looking forward that someday we can go flying together. A pity indeed, that my ship is only employed in carrying timber from Sandakan to Japan.

Till then, cherrio and all the best of everything to you,

Yours,

Incidentally, that's 5000 tons of balsa logs on the deck of the "Yin Kim!"

From the other side of the world comes a letter written by John Hageman, a flight engineer with Lufthansa Airlines. John writes:

Dear Mr. Willard:

First of all let me congratulate you on the high standards of the magazine that you and your fellow editors are publishing.

I am a Dutch Sunday flier and through my profession as flight engineer I visit many countries. I met a lot of radio control enthusiasts in the past years and all over the world the good and friendly spirit between them is a surprise over and over again.

That is one of the reasons too, that I ask you the following question: Would it be possible to publish now and then the location of the flying sites of the most active clubs in the U.S.A., so that foreign modelers will be able to visit them during week-ends.

I come to the U.S. quite regularly and until now have never met any modelers on the field.

Although our stop-overs here are usually not longer than 24 hours, now and then we stay over for a few days, mostly in places like New York, Chicago, Philadelphia and San Francisco.

If we know where the activity is, it will be a big help in making new friends. I hope this does not take too much of your precious time and in return will be glad to help you out with any information you need about modeling activities overseas. . . . . .

Furthermore I wish you very much luck and inspiration at your work for R.C.M.

Sincerely yours,

John's request for a sort of "directory" of flying sites makes a lot of sense — and there is a way it can be done. The AMA has a file of affiliated R/C clubs together with the name and mailing address of the club secretaries. As a matter of fact, when Testor's put out their Skyhawk, they included in the package a list of active clubs that newcomers could contact for help. The difficult part, of course, is keeping such a list up to date — and probably the only organization that could do it is the AMA, since they require annual renewals from the clubs.

Captain T.Y. Lo aboard the "Yin Kim."

So, until something can be worked out, my suggestion is that any of you modelers coming to the U.S. for a visit and hoping to see some R/C activity write to the Academy of Model Aeronautics, 1239 Vermont Ave. N.W., Washington, D.C. 20005, tell them what city or cities you plan to visit and request the name and address of the secretary of the R/C club in that area. Then write him and find out where the flying area is — it may be in a different location than it was before, because fields have a way of being eaten up by housing developments and other encroachments of civilization.

And if you happen to be coming to San Francisco, let me know. I'm forty miles down the peninsula from the city, but there are several clubs in the area — the Pioneers, the San Francisco Vultures, the Santa Cruz R/C Bees, the East Bay R/C'ers and the San Jose Wavemasters to name a few — and we'll see to it that you get to one or more of the fields if you have time. Call me in Los Altos, at 967-3823.

Now back to the Far East. From Viet Nam, SP/5 Thomas L. Smelley — who signs his letter "Larry" — comes a trimming hint that makes a lot of sense.

Dear Ken,

Yes, even people in Viet Nam get a RCM every now and then. Let me start out by saying that I'm no great modeler, only a Sunday afternoon flyboy. I sport an El Tigre with Orbit reeds and a ST 61 in the nose. What really moved me to write was when I read someone needed help with trimming. Although Mono-Kote would probably be the first and best choice for you and I, it sometimes isn't easy to get. Therefore we are left with the question of HOW?

I spent a tour in Korea and there we did this:

Masking tape is great, if all you do is lay it flat, right? The way it comes on ANY size roll it is impossible to use. Therefore one must alter it a bit. Obtain a decent size plate of glass (a mirror will do fine). Lay the tape down

in strips lengthwise. Next take a ruler and square the ends with a pointed blade. Next split the strips in widths of 1/16". These then can be peeled up and applied where ever needed. Granted, they are tricky to handle and care must be taken in keeping edges straight, but you will find they can be bent in just about any shape you care to try. It must be kept in mind that a slight pulling should be maintained while trying to go around that impossible corner and the tape must be pressed into place. If you get this far, a coat of clear should be applied to seal the edge to prevent running. Once the paint has been applied and left to dry, then comes the hard part. Remove the tape by pulling it outward, "NOT UPWARD". The chances that you don't peel up the trim are about 1,000 to 1, unless you follow that step to the letter. Well, I don't have anything else to say except you have a great column. Keep it up.

You man in Viet Nam, Larry.

It just goes to show that even in Viet Nam, war or no war, the R/C modeler will find a way to pursue his hobby and sport!

Sunday fliers being what they are causes their wives to react in various ways. Mrs. Grace Morgan, in Victoria, B.C. decided to express her viewpoint. Here it is:

Dear Ken,

My husband is a modeler. He has been one for some 24 years. I was introduced to the hobby about 4 years ago, when I married my modeler. Since then I have done some building and a little flying and have become very interested in the hobby.

The main reason I'm writing you is this. Several years ago I received a write-up from a friend in the service. It was entitled "What is a Soldier?" Being that my husband or fiance at the time was in the service, I kept it. The other day I remembered having it, I pulled it out and began to change it. The results, "What Is A Modeler?" I think your readers might enjoy it. So here it is.

WHAT IS A MODELER?

Between the security of childhood and the insecurity of second childhood, we find the fascinating creature called a modeler. They come in various shapes, sizes and status of society. They can be found anywhere, in the kitchens, at the flying field, in a hobby shop, anywhere models are and always busy.

His work bench can be anywhere from being tucked away in a small dark room in the basement, to spread about the dining room table. And if you look real close behind piles of plans and books, or under heaps of balsa shavings, you're sure to find him.

Children love them, wives tolerate them, other adults ignore them, and M.A.A.C. protects them.

A modeler has glue on his fingers, paint on his shirt, nylon in his pocket and balsa shavings hanging from his pant cuffs

They have the energy of a turtle; the brains of an idiot; the stories of a combat pilot; the sincerity of a liar; the likeliness of a casanova; and when they want something it is usually in the form of a request.

Some of his interests are dope, balsa, glue, planes, proportional radio, motors, kits, galloping ghost, plans and of course model magazines. His dislikes are, wind, rainy days, broken radio, winter, no plane to fly, crashes, rough ground, a sick motor and no field to fly in.

No one else can cram into one pocket, a screwdriver, pliers, nut, bolts, wire, neoprene tubing and enough elastics to lift anyone of his monsters off the ground.

He likes spending some of his money on dope, some on balsa, some on glue and the rest foolishly.

His idea of a perfect day is, no kids, no wife, a quiet room, a pile of balsa, and lots of glue and paint. Or his prize model making several beautiful flights.

A modeler is a magical creature, you can lock him out of your kitchen, but you can't lock him out of your heart. You can get him off your dining room table, but you can't get him off your mind. He's the one and only good for nothing bundle of worries, but all your shattered dreams will come true, when he comes home after an evening of flying, looks at you with those blurry blood shot eyes and says, 'Hi honey I'm home.

So there it is. I hope your readers enjoy reading it as much as I enjoyed doing it. Thank you.

Yours truly, Mrs. Grace L. Morgan.

Now, to top off the Sunday Flier situation for this month, I'd like to reprint the "Wife's Lament," which I first picked up from the Pioneer's Newsletter and which has been in several others, but I think it deserves national recognition.

WIFE'S LAMENT

Editor Al Signorino, of the Carrier Wave, Bridgeton, Missouri, writes . . . "imagine, if you will, a modeler's home in the middle of the night; he's working on a wing downstairs and his wife is upstairs reading a book:

"As I lay
Upon my bed
Often wondering
If I'm wed
All my wants
They are in vain
While Big Daddy
Works on his Plane
My heart does pine
For some woo'n
While that Son-of-a-Gun
Is down there glue'n
Yet I know
That all my woes
Will never yet
Come to blows
For while the glue
Is down there dry'n
He'll be up here
Really try'n"

'Nuff said.

BERNIE MURPHY'S

KITS & PIECES

ANTIQUE SCALE

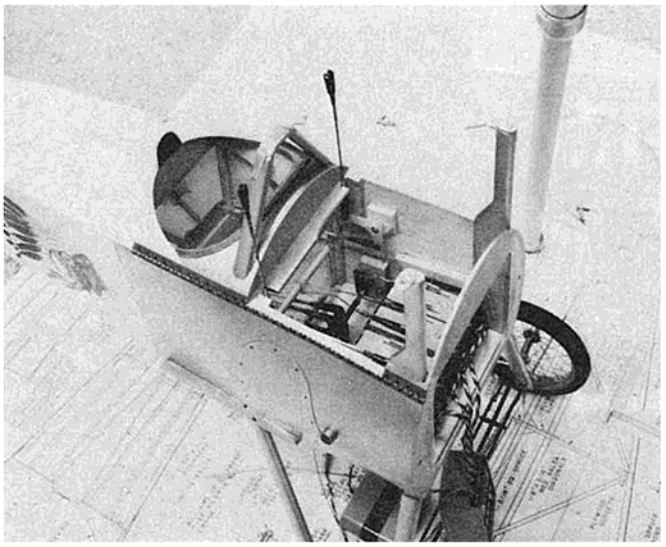
If the cover on the September issue of RCM didn't turn you on, read no further. On the other hand, if you could hear the intermittent roar of a rotary engine, and smell the castor oil in the air, join us!

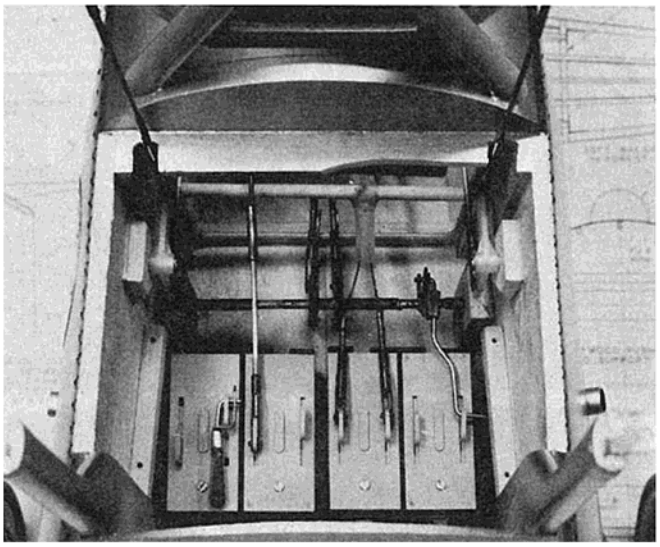
Much of the romance of WWI flying and many of the thrills and spills are being revived in R/C. Two kits have already reached the dealers' shelves — Sterlings' Fokker D VII and the VK Nieuport 17, with more in the works from other manufacturers.

In the September issue, we discussed the construction of the VK Nieuport 17 and gave our impression of the kit, however, space ran out before we had a chance to outline the completion of the ship. If you missed the September issue of RCM, we suggest you borrow one and read it first — *then*, send in a subscription so you won't miss another issue. In any event, a brief recap. The ship is true scale in outline in all views (based on available data). The structure is very close to scale in all areas visible through the covering and even in some areas that don't show. Construction is primarily of spruce, bass, balsa and plywoods. The woods have been carefully selected to give maximum strength where required. Die cutting ranges from good to excellent, with many machined hardwood parts, all of unusually good quality. On our test kit, all formed wire parts checked perfectly, with no signs of bending fatigue. The kit is complete with 1/16 thick ABS cowling, five color decals and most hardware. Three 31" x 45" sheets of plans are included, *rolled*. These are exceptionally good. For the builder, this kit is a ball! Once you start on it, you won't be able to stop. A word of caution, however, in our opinion, this kit should be tackled only by an experienced modeler — it is not a beginner's kit. Though not a difficult ship to build, the built up structure requires the extra care and ability that is usually only gained by experience.

Since the structure is light (not fragile), we recommend the use of covering materials with a minimum or controlled shrinkage. We used silk on our ship, applied DRY. Care should be taken to align the covering material grain straight with respect to the surface being covered, minimizing the chances of introducing a twist. We do not recommend wet covering with silk, or silk rayon blends, as the shrinkage will be excessive and bow the structure. Materials such as Shrink Tite and Coverite would seem to be excellent choices for covering, since their shrinkage is controllable.

Finishing also should be carefully watched. We used Kampel model aircraft dope on our ship, adding a small amount of dibutyl phthylate (1/2 teaspoon per 8 ounces) to the dope after the fourth coat as a shrinkage retardant. This plasticizer will also work





Micro Avionics XL6 installation. Note rocker arms and cable take-offs. Four servos side-by-side on floor of Nieuport.

with Aero Gloss and butyrate dopes. HobbyPoxy finishes would also be a good choice for reducing or eliminating finish shrinkage. In any event, keep it light.

Due to the short nose moment on the Nieuport 17, the radio installation is quite critical in placement, in order to eliminate the need for nose ballast. Our ship sports a new Micro Avionics XL6 miniature system. The four servos are mounted side by side on the floor in Micro's spring mounting clips, with the front of the servos as close to the firewall as possible. Take offs to the surfaces are via Nyrod, or in our case cables. A tray is mounted above the servos, which holds the fuel tank (Pylon RST8), battery pack (against the firewall) and receiver (behind power pack). If more nose weight is needed, or if space is insufficient for your radio, the power supply can be mounted on the front of the firewall. This proved to be unnecessary on our ship, as the CG worked out perfectly and space was adequate for the small Micro Avionics radio. Total weight, including E. B. Wire Wheels, checked in at a mere 5¼ pounds!

The initial test flight time had arrived. Much thought and effort had gone into our ship, since it was a prototype and we were somewhat apprehensive (Ed. Note the word is "chicken"). Vern Krehbiel (Mr. VK) had asked that we fly the ship in the WWI events at the DCRC Mirth of July meet on July 13 & 14. This was to be the first true WWI event since the exciting Rhinebeck meet last Fall. In all honesty, we had reverted to a "Sunday Flyer" with little or no interest in contest participation (our last contest was in 1952 flying what, if our memory serves correctly, was called control line stunt). The WWI events and the attitude of the participants, one of fun and friendliness, rather than cut throat competition, had stirred our imagination and we had happily agreed to enter the DCRC meet. Time, however, was not about to wait for us, it was now Friday July 12. At 3 o'clock in the afternoon four of us left the office and headed for the flying field — one pilot, one mechanic and two photographers. Once on the field, we prayed that our new Merco 49 would refuse to start, anything for a delay. Refuse it did, it refused to answer our prayers and sprang to life instantly. Taxiing trials will prolong things somewhat, so we taxied all over the field, to cheers of "Fly-Fly" from the ground crew. Time had run out, the ship was brought back to the starting area, headed into the wind and the throttle retarded. A quick glance got an approving nod from the ground crew. The throttle was advanced slowly and the ship began to roll. Slowly at first, then faster, faster — she's starting to veer to the left — right rudder — she's turning right — left rudd — OOPS-ground loop! Our fears that the rudder might not be effective enough for ground handling, were completely erroneous. It is so effective with large throws, that our aging fingers could not keep up with it (hold max travel to 1 in. each side of neutral). About half of the available right trim was cranked into the rudder to compensate for initial torque and we were ready for another try. This time the ship headed straight out, gradually picking up a shallow right turn, as speed increased. At about 3/4 throttle, the ship lifted gently into the air, a little up elevator and a shallow climb out, holding the wide right turn. The right rudder trim was removed and the ship grooved straight and flat (still at 3/4 throttle). Full throttle created a very shallow climb, with half to three quarter throttle producing level flight and low throttle a shallow descent. These slight changes are due principally to the lifting airfoil and changes in airspeed with changes in throttle settings. The variation in pitch attitude is easily trimmed with elevator or, as we prefer, can be left untrimmed allowing attitude changes via throttle.

With knees still shaking, the ship was pretty well wrung out, performing every command easily. Landing time had arrived and the spectre of Ground Loop had once again risen in our head. With the throttle cut and the nose high — slower — slower — fifteen feet — ten feet — slower — five feet — slower — two fe — OOPS — STALL!

The second flight was pretty much a repeat of the first, encountering only our own mental blocks on take off and landing. We decided to call it quits while the ship was still intact — we knew it was quite airworthy — even if we weren't. Besides the big DCRC contest was the next day.

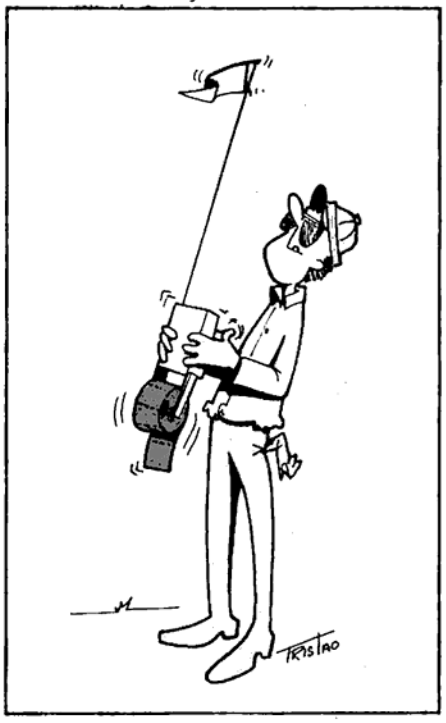
Saturday dawned bright and hot, a fifty mile drive and then — our turn to fly. Applying the experience gained the previous afternoon, right rudder trim— then hands off! — the Nieuport lifted easily into the blue. One by one the aerobatic maneuvers were logged as our shakey fingers manipulated the controls. With the pattern completed and only landing to be accomplished and time to spare, we decided to fly a little on our own and maybe pickup a few extra points for flight realism (and become a little more familiar with our bird). The ship was behaving nicely.

With fuel running low, we announced our landing. Downwind leg — 150 feet — left turn onto base leg — 125 feet — left onto final — 0 feet — OOPS. Straight into the paved strip from 100 feet! CRY — CRY. Some guys just ain't made to fly! Cause — one pilot. (Ed. Note: Too much blackberry brandy.) Our first thought was to quietly slip away, leaving the splintered wreckage where it fell, but in order not to be a litterbug, we set out to pick up the remains.

Upon reaching the disaster scene, we were astonished to find the ship in one general piece! The engine had been pushed through the firewall into the radio compartment, the cowling had split and the landing gear was totalled, but the airframe was intact, except for a few minor stress cracks (all that hardwood pays off!!).

Saturday night was spent with the glue bottle — epoxy tubes — a pair of cans of Sig Epoxolite and the kitchen oven for quick curing.

By 11 AM Sunday morning we were repacked and ready for the fifty mile trip back to the scene of the crime. We arrived at the airstrip just in time to see the flight preceeding ours in the air — hurry-hurry. We did manage to get in our flights on Sunday and the ship and pilot both kept their cool. The fact that the ship and the Micro Avionics XL6 survived Saturday's plunge into the pavement is a tribute to both manufacturers. The VK Nieuport, although lightly constructed is *extremely* tough. That the radio survived is unbelievable (especially on 72 Mhz with its tissue thin crystals), but true. Should you doubt us, the foregoing was witnessed by editors of the three other model magazines. (Ed. Note: WHO?)



Subsequent flying of the Nieuport has shown it to be an extremely easy flying and handling ship. Take off and landing procedures are simple once learned. Do NOT attempt rudder corrections on take off until you are thoroughly familiar with the ship. Trim in about 1/4 inch of right rudder before launch, then leave it alone. Advance the throttle to 1/2 for .60's, 3/4 for .49's and the ship will quickly accellerate in a reasonably straight path (don't panic and try rudder if it turns — it will straighten out), a *little* up or up trim and the ship will easily lift off. Now ease to full throttle, remove the right trim and enjoy the thrill of being a WWI Ace. Incidentally, the Nieuport loves to fly at half throttle.

On landings, do not attempt a low, slow, nose high approach, rather fly it in on short bursts of 1/2 throttle (she'll sound like a real one), cutting to full low just before touch down. Using this approach, to take off and landing and heading dead into the wind, every flight will be a pleasure. You too can be an Ace!

* * *

Now that we have you interested (we hope) in WWI aerobatics, why not drop in for the annual Rhinebeck meet, September 14 and 15 and join in the fun or just see first hand what you've been missing. The location is Cole Palen's Old Rhinebeck Aerodrome, just north of Hyde Park, N.Y. Here is the real atmosphere for a WWI R/C event, in the midst of Cole's full scale Sopwiths, Spads, Triplanes, Nieuports, etc. This event is certain to be a pleasant experience for spectator and contestant alike. Hosted by the Poughkeepsie IBM R/C Club, contact B. E. Blake, 12 Shale Dr., Wappingers Falls, N.Y. 12590 for further information.

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Although we generally don't get into the area of book reviews, one, on WWI aircraft deserves mention. For those interested in WWI ships, "Heroes and Aeroplanes of the Great War — 1914-1918" is a must. This book, written and illustrated by Joseph A. Phelan is outstanding. Included are background and development data on many of the ships, and profiles on the Aces that flew them. The book is profusely and accurately illustrated with hundreds of drawings — most in full color. An excellent book — "Heroes and Aeroplanes of the Great War 1914-1918" published by Grosset and Dunlap. Now in its second printing, it should be available at any good bookstore. If not, they can order it for you — $7.95.

See *you* in Rhinebeck — September 14 and 15.

SHOP & FIELD

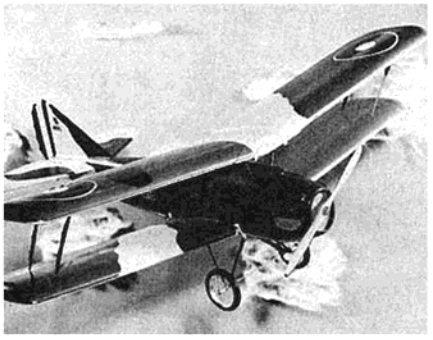
PRODUCT NEWS

SIG MANUFACTURING COMPANY, INC.
Route 1, Box 1, Montezuma, Iowa 50171
. . . has finished the test flights on the prototype of their new Champion Citabria kit. Equalling its excellent flight characteristics, Maxey Hester finished the prototype with white and blue Airolac by Sig, to win the Testor Award for Best Finish at the Wichita Midwestern Championships. Maxey also placed second in Scale at the same contest with the Citabria, just behind Bud Atkinson with a Sig T-34. Price for the forthcoming kit has not yet been announcd by Sig.

X-ACTO, INC., 48-41 Van Dam Street, Long Island City, New York 11101
. . . announces the release of their 99 Super-Set Tool Cabinet, containing a complete assortment of hobby tools, knives and blades fitted into a handsome, 'specially designed, Phillipine Mahogany cabinet. This is X-Acto's most extensive, self-contained Kit of hobby tools, blades and finishing equipment that a model maker or do-it-yourselfer could need for even the most intricate and demanding projects. The cabinet measures 13" wide x 19" high x 5½" deep. The weight is 13½ pounds. Priced at $60, the X-Acto Super-Set Tool Cabinet is on sale at all leading department, art and hobby stores.

ANGEL MINI-FLITE COMPANY
Box 437, Fitchburg, Massachusetts 01410
. . . . announces the release of the Blue Max Series of semi-scale, all plastic, A. R. F. World War I Biplanes. The

first three kits include the Fokker D-7, S. E. 5A and the Spad. These models feature completely assembled impact resistant bodies, plastic covered tail units with full length butt hinges, factory covered foam wings with full length spars, dihedral braces and scale wing tips, welded cabane unit and landing gear, plus a complete hardware assortment of aluminum motor mounts, plywood firewall and servo rails, screws, nuts, cement and wood-grain fairing tape. A moulded scale cowl and engine parts complete the package. These models have been flown on single channel through small multi and the manufacturer recommends engines from .19 through .35. Detailed instructions show aileron installations and scale tips. A free Solo Certificate suitable for framing is included with each kit. The lightweight plastic used in these kits has been developed to permit the use of dope or paint, so that scale painting and marking may be used. Price of each kit is $34.95 each, available through hobby dealers. Tested, approved and recommended by RCM.



MIDWEST PRODUCTS COMPANY
400 S. Indiana St., Hobart, Indiana 46342

. . . . has brought back their Bebe Jodel D-9 due to the popular demand for kits of homebuilt type aircraft for R/C. The full sized Jodel is one of the most popular homebuilts in Europe because of its ease of construction and its overall economy in using a Renault or Volkswagen engine. The Midwest Jodel Model is ideal for Galloping Ghost or single channel proportional. The wing span is 40½" with an overall area of 296 square inches. The engine range is .049 to .10. The famous tip dihedral makes it one of the most stable of all low wingers. Although not shown on the plans, the addition of scale type ailerons, the installation of a .15 or .19 engine and a small digital proportional system, makes this an excellent scale aircraft. Tested, approved and recommended by RCM.

STINGER MANUFACTURING COMPANY
537 E. Mission Ln., Phoenix, Ariz. 85020

. . . manufacturers of accessories for model boats, announces several new products for R/C boat enthusiasts. The first of these is a series of megaphone exhaust stacks made of alloyed cast aluminum with large built in exhaust baffels, which eliminates the use of carburetors. This will allow your boat engine to run full out, yet still idle back for easy docking. These stacks are angled up to 20 degrees for use in SK boats as well as hydroplanes, thus allowing your boat to remain much cleaner inside. Two sizes are available, the first designed for .29 to .40 size engines and the second for engines in the .45 to .71 categories. Prices are $8.95 and $9.95 respectively. Also available from Stinger are two sizes of cast aluminum motor mounts with three-drill mounting holes. These mounts are completely engineered for the greatest possible strength and support incorporating special webbing. A complete line of hydroplane hardware and hardware sets are available from the manufacturer and a price list will be sent upon request. In addition to their line of accessories, Stinger also manufactures the Big Hoss hydroplane which is priced at $129.95. The Lil' Hoss and the Mini Hoss will be available by the time this is in print.

TAB BOOKS, Blue Ridge Summit, Pennsylvania 17214

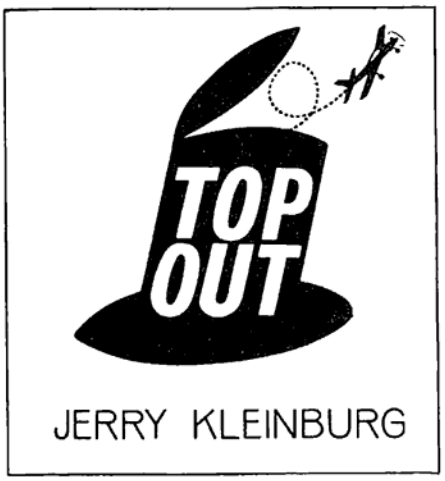
The publishers of the Gernsback Library Books, have just published two additions to their line which will be of interest to R/C'ers interested in electronics. The first is the Electronic Hobbyists IC Project Handbook by Bob Brown and Tom Kneitel. This is a brand new book containing fifty integrated circuit projects for hobbyists, experimenters, technicians, hams, audiophiles and even professional designers. Included are devices such as a one Watt phono amp and IC power supply; an electronic organ, an RIAA equalization preamp; a tachometer with bulb alert and many others. This is the first book of its kind and contains over fifty projects in its 160 pages. Profusely illustrated, Tab Book number 464 is available at $6.95 in hardbound edition, or $3.95 in paperback. The second publication from Tab is entitled "Working With The Oscilloscope" by Albert C. W. Saunders. Priced at $6.95 in the hardbound edition or $4.95 in the paperback edition, this is a really different, practical workshop manual for anyone needing guidance in the use of the oscilloscope. Even if you have never used a scope before, you will learn everything you will need to know from this single manual. Complete lessons are included to thoroughly familiarize the reader with the inner workings of a scope. The real meat of this book, however, is contained in the workshop test projects which show, step-by-step how to set up the scope for making various tests and measurements. Once the basic steps are mastered, the book, shows how to measure phase shift, check amplifier response, test transistors, check color TV band pass response and demodulator action, horizontal deflection systems and major TV circuit outputs. Finally, the reader will learn the fundamentals of analyzing wave forms with examples which explain how to determine what is wrong with circuits under test from the waveform displays obtained. One hundred and four pages, over one hundred illustrations in the five chapters, plus 27 projects.

KEILKRAFT OF ENGLAND

. . . furnished us with a kit of their new fleet wing, a 54" span radio control model, suitable for 3 or 4 channel proportional equipment and .23 to .35 engines. The kit contained pre-formed and die-cut balsa parts, a 4 ounce plastic tank, 2½" diameter sponge rubber wheels, nylon spinner, ballcranks, preformed wire parts and full sized plans and easy to follow instructions. The Fleetwing has been designed for modelers who have progressed beyond single channel radio control and now want to progress to multi channel flying. Designed by Dave Platt, the Fleetwing is reminiscent of the low wing, open cockpit homebuilt aircraft. Designed for fixed tricycle gear operation, a steerable nosewheel could easily be employed. Price of the Fleetwing will be in the $20-$25 bracket and should soon be available from American Importers and Distributors of KeilKraft Products. Tested, approved and recommended by RCM.

DU-BRO PRODUCTS INC.
7667 Milwaukee Ave., Niles, Ill. 60648

. . . has an excellent and most functional accessory in their No-Noise Strip Aileron Linkage hook-up. Consisting of 22 pieces, this is a complete linkage "system", and is fully adjustable and designed for use on any high, mid, or low wing RC aircraft. Priced at $2.95 and available at all hobby dealers, this item has been thoroughly tested and is approved and recommended by RCM.



CONTEST LOOPS — or THINK SHRINK

The R/C flying season will be rolling on toward the slower paced fall period as this is being read . . . However, at the time of writing-in early July — it's another matter with every weekend seeing several first class affairs primed for action minded RCers. Results from these and earlier meets pour in from field correspondents and it's possible to begin to see the beginnings of trends resulting from the latest equipment developments as well as

from the continuing surge of flying as a consequence of an evergrowing number of R/Cers.

Serious beginnings of development of pocket sized' stunt competition models have sprung up in several areas simultaneously with Phil Kraft's Kwik Fli III/2 (or there about) being the most notable at this time. This design direction, of course, results directly from advent of the new micro-sized receivers and servos now available from the Big 6 (Bonner, EK Logictrol, Kraft, Micro Avionics, Orbit, PCS) radio equipment manufacturers, as well as others. Not as well recognized, but an important factor as well, is the power plant situation where engines such as OS and ST 19's have been waiting to be "discovered" for their power output and idle dependability. With the new formula fuels (Tiger R/C, etc.) the glow mill picture is thusly changing in step to further encourage aircraft design "shrink." Incidentally, plane developers are finding that shrinking ship designs is more than a matter of merely putting a pair of proportional dividers to a current favorite. Higher wing loadings, CG's further forward, lower aspect ratio wings, slimmer airfoils, higher aspect horizontal stabilizers, are a few of the factors receiving attention in addition to normal construction considerations. Next month, Don Dewey's "New Era" makes its debut as a pocket sized aircraft that has been designed expressly to WIN under the new rules.

Of course we're also seeing some big ones these days (Hubner's Lear, Sherlock's 747, etc.) but these only serve as a counterpoint melody within the larger R/C orchestration . . . This is just a glimpse at the picture of where R/C is heading for many and since modelers like the idea of reduced fuel and construction costs that are possible with smaller ships for sport, training and competition, they may just catch on in a big way. In the meantime this year grinds on, adding considerably to the sum of R/C experience being gained by a larger than ever number of pilots benefiting from better than ever radio equipment . . . As a sample of R/C action, here's a rundown on a few contests where much of the 1968 action has occurred so far . . .

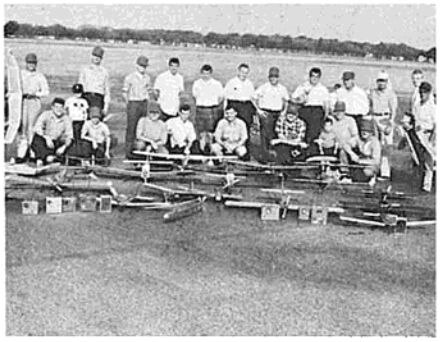
YORKTON R/C 6TH ANNUAL MEET — Yorkton, Saskatchewan. In cold and wind, 30 contestants stuck it out to see Ed Cebry, Jerry Fingler and Ray Lievre finish 1-2-3 in Scale flying a Piper Cub, Macchi 202 and a Waco Sport, respectively in battling for the big Scale Cup which is a feature of the meet. Terry Peppler just about ran off with the rest of the events, winning ETA, Spot Landing, Spins and naturally, Most Flights. Rod McRae did manage to salvage the Duration Event, making the most miles on 2 ounces of fuel. Cliff Swartz took the Crash Trophy (glue and Celastic) home to Winnipeg with the remains of 2 dings . . . (Source: Brent Reusch, Ian McDougall, CRAMS).

RCNC INVITATIONAL — Ashville, N.C. "The RCNC in Ashville was fantastic! It was the largest fly-in ever held there with 103 registered flyers from 6 states. There was almost constant flying with 6 or 7 planes up at a time. There were twin-engined planes, a 9′ Custom Privateer, a 9′ Taylorcraft, a canard, a flying wing, an all aluminum plane, a flying bandana and all sorts of more normal planes. Cliff Weirick won Goodyear with a plane

Yorkton Scale winners, Cebry, Fingler, and Lievre and winning ships. Canadian RCing is moving up . . .

about 20 miles per hour faster than any other. Two planes had retracting gears. The weather was perfect all three days . . ." (Bob Cording, Tri-Cities Aeromodelers Newsletter.)

FIESTA OF FIVE FLAGS — Pensacola, Fla. Preliminary information from Capt. Russ Verbael about the annual Fiesta Week meet indicates an oustanding turnout of 40 contestants enjoyed good weather and Florida fun while flying a record number of competition flights. Jum Whitley, the 1966 Nats



Pensacola RC Club at Corry NAAS field, site of 6th Annual Fiesta of Five Flags RC Meet. Group flys all varieties of models, RC most popular.

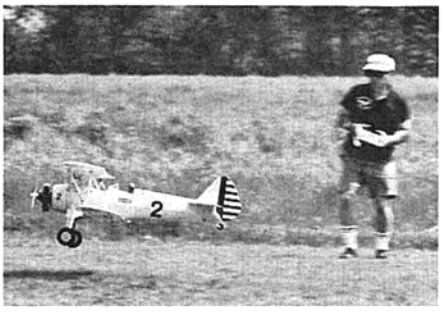
Capt. Russ Verbael and 'hard' landed Cherokee. A fine ship and popular with many fliers. Russ, sparkplug for Pensacola RCers, promoted big turnout for 6th annual meet.

Champ, won C Expert while Capt. Paul Byrum took the honors in C Novice. Major John Woods enjoyed first place in A pattern and Lew Penrod, back on the contest circuit after a stint in Korea, snagged the top spot in the

Carrier event. Ron Chidgey, Dist. VP, was CD for the meet. Next year's meet, the 7th annual, is being planned to be even bigger and better, Russ enthused and will be staged at Corry Field where the 6th meet was held. It will again be a part of the Fiesta of Five Flags.

9TH ANNUAL N.Y. STATE CHAMPIONSHIPS — Rochester, N.Y. Harold (S.O. B.) Goldclank provided his inimitable brand of R/C humor for the occasion where Tony Bonetti did some serious pattern flying to win C Expert in this FAI qualification contest. Near perfect weather allowed the 48 contestants to concentrate on air work and in addition to Tony's win, Mike Heckler won in C Novice while Norm Bell and Ralph Perillo garnered B and A respectively. 600 sq. in. Continental Pylon went to Bob Noll who in turn was edged by Dennis Sawyer in the 450 sq. in. Goodyear Formula I race when he missed a pylon. Scale drew 5 entries and a lot of spectator interest for Charley Petrevan's WWI Albatross D-VA. Hale Wallace, with higher flying points, got the nod for his scale P-63. Plans for the 1969 contest include provisions for added flight lines for the pattern events.

Rochester 9th Annual Pylon winners: Dennis Sawyer (left), Goodyear; Bob Noll, 600 sq. in. Continental. Sawyer's Midget Mustang used a K&B rear valve 40. (Bob Clemens Pic)



Tony Mangos, Williamson, N.Y., brings in his Sterling PT-17. Ship sported a yellow finish and was fully rigged. Finished fourth in Rochester 9th Annual.

Albatross D-Va, scratch-build by Charles Petrevan of Rochester, N.Y. Placed third in scale; Bonner Digimite radio. A crowd-pleaser. (Bob Clemens Pic)

Tony Bonetti's sleek "Trouble Maker" lifts off on one of its winning flights. Enya 60, Kraft Gold Medal radio. The Emerson, N.J. C Expert winner was FAI qualifier at 9th Rochester N.Y. State Championships. (Bob Clemens Pic)

HI-PLAINS R/C WINTER BUILDING CONTEST — Kinsley, Kans. Helping to keep off-season interest high was the Hi-Plains R/C Club's winter design contest that was won by Jim Brittain and an original design he calls Fugitive II. The $25 1st prize winner's plane features an 18° swept wing with 658 sq. in. and a symmetrical section. Flaps and oversize ailerons are other features of the Enya 60 powered, acrylic beauty. The second prize of $20 went to Bob Mummey and his semi-scale scratch-built AT47 that sports a hand formed canopy and VECO 61. Third place and $15 was awarded Jarold Schmidt for his modified Sr. Falcon that went low wing and powered with a Merco 61. (Source: Jim Mowrey)

4TH OILY BOID ANNUAL — Port Arthur, Texas. A mis-mailed registration kept Don Downing from qualifying for the FAI finals at this early season contest. Following by 3½ points in C Expert was Don Coleman whose registration was in order for the Citron flier from Citronella, Alabama. Dan Carey of Ft. Worth was 3rd followed by Bob Lien of New Orleans. 5th in the field was Norm Rhodes in a tight event where 10 points blanketed the top 5 fliers! Fred Duval took C Novice honors while B went to Ron Bear followed by H. Kliesser and R. Van Dyke. L. P. Ford of Alexandria, La. flying a neat J-3 Cub walked off with 1st in Scale. Cal Scully CD'd. (Source: Bob Talley)

HPRC Winter Building Contest winners — Jim Brittain, Bob Mummey, and Jarold Schmidt with winning creations. Fugitive II, an original by Brittain, a semi-scale by Mummey, and a modified Sr. Falcon.

8TH ANNUAL FLORIDA STATE R/C CHAMPIONSHIPS — Winter Park, Fla. Jim Kirkland leaped back into the R/C competition trail in a decisive way by out-pointing Ron Chidgey and Tom Drake and a field of Class III fliers in this early season meet. It was also a test outing for Jim's new ship, the TRIDENT which resembles an F-86D. Novice went to Ray Davis followed by Dr. Wm. Tyle and Don Rothman. Classes I & II were also featured at the 2 day meet and saw Mark Taylor, Juette Forehand and Jim Roberts line up in the rudder class while Dr. Wm. Woodall, Bill Ford and Ken More topped Class II fliers. Scale was won by Dan Strong who came from Midland, Texas for the Florida meet. Juette Forehand and George Jordan won 2nd and 3rd honors in the scale event. Goodyear Pylon was enjoyed by the spectators that numbered about 6000 who saw Ron Chidgey outrace Don Rothman and Dan Strong around the triple pylons. Open pylon was also featured where Bob Roberts, Tom Drake and Dr. Wm. Tyle went 1-2-3 over the other pilots. Most propo sets were on the new 72-75 Mc frequencies with 72.24 experiencing intermittent interference. No planes were lost, however. This meet was one of 3 sanctioned contests staged by the 46 member R/C Assn. of Central Florida. They will host the First Tangerine International R/C Championships at the Winter Park RCACF flying site — one of the best in the U.S. — on December 29-31, 1968 and plans are being made to combine the contest with a trade show to afford R/Cers with a full-scoped mid winter affair. (Source: Dan Run)

1968 IRIS INVITATIONAL — Sumpter, S.C. Sixty-two fliers from 4 states joined the South Carolina Radio Aircraft Modelers (SCRAM) at their 2nd Invitational where a slate of special flying events and a Saturday night banquet made it a memorable occasion. *Open Pylon* was one of the exciting events featured and was won by Mel Richardson, with Marty Barry, Jim Stegall and Dick Pope sharing the honors. *Limbo* went to Len Purdy of Lanier fame, while John McDermott and Tony Dula

W. W. Trotti, SCRAM Sec-Treas. and 9' Talorcraft at 2nd annual Iris Invitational Meet, major S.C. RC gathering. 62 fliers registered.

followed him under the paper tape. Jim Stegall and Harold Haigler shared *Goodyear* honors while *Best Finish* was "Boots" Tisdale, Doug Hobbs and Jim Stegall go 1-2-3 in the spit and polish

Charley Johnson, Ray Thompson, register record turnout for 2nd Iris Invitational. Charley edits SCRAM Bulliten, club newsletter.

event. *Best Design* notice was taken off Vic Fogaly's effort and a *Longest Distance Traveled* went to Terry Rollins who came from Jenks, Oklahoma. New officers for SCRAM were also announced during the meet with Ray Thompson taking over the President reins with Frank Dosser as VP and W. W. Trotti as Secretary-Treasurer. Chas. Johnson remains as editor of their popular newsletter. (Source: Chas. Johnson)

Larry Nash gives the needle to his well done Stearman Trainer. Scene was at S.C. Iris Invitational. Fine performer.

SOMORACC FLY-FOR-FUN MEET — Sault Ste. Marie, Ontario. The Soo Modelers R/C Club chanced weather and a wet field to hold their early season Fly-In and found good conditions on both accounts. Pattern, Open Pylon, Limbo, Slalam, Combat and Balloon Burst were run off in good order that found Bob Campana, Paul Butcher (he won the Kraft propo at Toledo in February) Glenn Allen, Bill Fleet, Barry Cooper, Jim Elgie, Holgar Lundhild, B. Nosen, John Klassen and Lloyd Aemisseger dividing honors in the various events. Spectators enjoyed Combat the most, we're told. The SoMoRaCC's are a MAAC club (Canadian AMA) but have a large percentage of U.S. fliers from south of the Canadian border (wetbacks?) belonging to the club. (Source: Glenn Allen)

SoMoRaCC Fly-In winners gather at Sault Ste. Marie, Ontario flying site. Combat was spectator favorite . . . Note hardhats, Soo innovation for safety are painted with frequency colors!

6TH WRIGHT BROS. MEMORIAL R/C CONTEST — Dayton Ohio. Considered by many as the No. 1 R/C contest in the U.S., 80 contestants converged upon the WORKS for their annual big weekend of flying and prize winning at W-P AFB where 10 events were run off on 4 flight lines! C Expert had Don Ballreich of the Toledo Weak Signallers leading the pack and followed closely by Don Wehrheim (Pres. of the Chicago R/C Assn.), Norm Page, Tony Bonetti (still hot from the Rochester win), Ed Izzo, Jim Grier and Charley Reed. Novice went to Jim Goad, Tom Taylor and Bill Hannah (using the latest Heathkit Propo, we assume). Dan Powers, George Estes and Clarence Houk were Class B leaders, while Jim Hill, Jim Klym and Gene Early took Class A open honors. The 6th WBM Meet also featured a Jr.-Sr. Class A event that saw Bob Greer and Tom Poelking go 1-2 there. Excitement went big in Goodyear with Hal deBolt topping the field at 2:17.5. Ed Keck was hot on his heels with a flat 2:18.0 and had Matt Poelking right there at 2:19.5! Pete Waters, the Welsh R/Cer, took everyone's measure in Open Pylon but had Hal deBolt, Dave Keats and Jim Grier close behind. Hal deBolt added more Grand Champ points in Combat also by heading Bill Welker of Citizenship, Charley Reed and Paul Bender. Scale went to Bill Bertrand and an amazing Fokker D-VIII, followed by Hal deBolt (more points!) and Pete Reed. Grand Champion, naturally, went to Hal deBolt whose smile and corncob pipe we hear, never went out during the 2 day meet. (Source: Don Lowe)

TRI-VALLEY R/C CLUB MEET — South Bend, Ind. Al Morse took on his first R/C meet as a CD and came up with a good one as 33 contestants turned out for 7 rounds of pattern in C Expert, C Novice and A at the Tri-Valley club's flying site. The hot mid-90's weather was matched by the competition in Expert where Jim Grier finally bested Norm Page and Elmer Helfert. Andy Lukaszewski put on a heck of a bipe demonstration with Buck Zehr's after which Jim Goad went on to another first in C Novice ahead of Bill Denson and Andy's teammate, Bill Hannah, who will be glad to see Jim Goad graduate to Expert . . . In Class A, Bob Hill, Buck Zehr and Chuck Elles, Sr. (first contest for the latter two) went 1-2-3. (Source: Jerry Smith — Tri-Valley R/C News)

FRESNO 8TH ANNUAL — Fresno, Cal. The madera flying site of the Fresno Radio Modelers saw some 40 pattern buffs take the measure of ABC competition. It was an FAI qualification meet which concentrated attention among the expert class event which went to Phil Kraft handily followed by Joe Foster with Larry Leonard 2 points behind for 3rd. The FAI qualification trophy when to Leonard since Kraft previously qualified by virtue of being a U.S. team member at the last Internats in 1967 and Foster had not registered for FAI competition at the time of the

meet . . . 12 California R/C clubs were represented at the meet which swelled the Class C Novice event which was won by Tim Symes, who also took home the Testers Best Finish Award. Brian Ehmke, Alex Chisolm and Paul Steiner were other top scorers . . . Bob Smith, Delmar Rose, Neal Lowell and Morris McKenna were the top 4 in Class B, while Jim Graham, Don McKinley, Al Richardson, Bill Allen, Bud Freeman, W. Garrison, Don Magrini and George Steiner lined up for Class A in an event the Peninsula Channel Commanders just about called their own . . . CD for the popular meet was Alex Chisolm. (Source: WATTS NEWS, June 1968)

HOUSTON R/C MEET — Houston, Texas. Anderson Field was the site where 30 contestants from 6 R/C clubs of Texas and Louisiana enjoyed perfect field conditions and weather for a full slate of R/C competition. Ft. Worth dominated Class C Expert with Dan Carey, Bob Pearce and Jack Devine hauling off the hardware. Ft. Worth influence carried over into C Novice also where Ed Rankin and Sam Fly (really) shared honors. Ron Beard and Pat Hartrick saved some trophies for Houston by taking top places in B. Craig Bliss led Will Cowen of Austen and Bill McCormick to the winners' circle in Class A. Craig Bliss' pa, Jim, did an outstanding job on the PA system and kept all spectators interested as the Goodyear racers took to the air for a series of first class heats that saw Bill Anderson head off the fast flying of Don Yocky and Ed Rankin. Scale was also well done with Ray Weaver, Pat Hartrick and G. B. Meyers taking honors there. Highlight of the meet was award of the Pelech Memorial Trophy for Sportsmanship which was presented to Lt. Ivan Munninghoff of the USAF and a member of the San Antonio ARCS. Dan Carey was Hi-Point winner. (Source: Don Williams)

KCRC FUN-FEST — Kansas City, Mo. High wind and temperatures didn't stop a good turnout of KCRC pilots who responded to the 4 event meet. Dick Shaw and Bernie Drummond did best in the *Spot Landing* event, while Bob Almes and Jerry Smith took *BomB*. Ken Gottschall garnered *Taxi* and Bob Rodkey took *Duration*. (Source: Ken Gottschall)

LIDS 10th ANNIVERSARY

THE MAIL BAGGE . . . From here and there, a few missives from readers.

Dear Jerry,

The LIDS had their 10th Anniversary party this January. We are a large club, with a membership that fluctuates between 75 and 125. We are not restrictive in our membership requirements; all an R/Cer has to have is the interest, the dues, an AMA license and an FCC license. I have never known a prospective member to be turned down.

Most of our members fly at Mitchell Field, which is an official Nassau Co. Parks Dept. model flying field. Other clubs using the site are the Merokes and the NAGS. All 3 clubs are having meets this summer, so there should be lots of action. The field is being developed, so we won't be using it for too many more years. However, the county people are looking for a new site, either in an existing park, or on other unused land in the county. Regular meetings are held with county officials and other club representatives about field ground rules, schedules, etc. A new flyer is issued a county learner's permit, which allows him to fly only when a licensed flyer is standing by. He may, at any time, take a simple test from one of the club members who is an official county examiner, to obtain a county flying license. The test consists of a landing, takeoff (who takes it off initially, Oscar? Ed.), *and a few simple maneuvers of the airplane to demonstrate control over the aircraft. All pilots must have AMA and FCC licenses. Club membership is not required, but county residence is. Field operation is self-policing, with very little county supervision. Mufflers, naturally, are required. In addition to the Annual LIDS Meet, we keep up good public relations by holding orphans picnics and the like . . .*

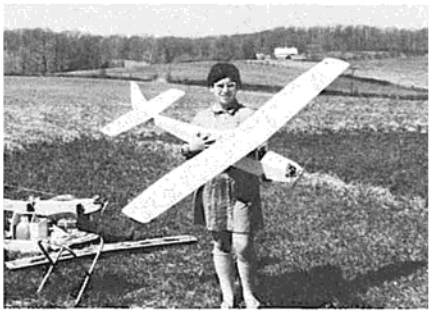
Oscar Weingart,
Sec.-Treas.
Long Island
Drone Society
251 Cedar Road
E. Northport, N.Y.

MUFFLERS?

Hello, Jerry —

These are my comments on a subject . . . mufflers. For some time—close to 3 years — we have had to use mufflers at Valley Forge Park. There were many gripes at first but after awhile we actually enjoyed the lack of snarling engines. You know how un-nerving a 60 can be while its owner adjusts the needle valve while on the flight line . . . well, what a pleasant difference with mufflers! After awhile you naturally use a 60 where a 45 or 50 would have been first choice — but the fuel economy is the same, believe me. Mufflers are coming, so why AMA is dragging on this beats me! By the way, Delaware R/C Club is divided as to whether we should or shouldn't but it's inevitable . . .

Arnold Lipschultz
Delaware R/C Club
801 Brandywine Blvd.
Wilmington, Del.



Lipschutz products, Sue Ellen and her daddy's Apprentice. Both fly. Arnold Lipschutz is active member of Delaware RC Club.

LUNDHILD'S TORQUE

Dear Jerry,

What has prompted me to take up my pen is the extract from Holger Lundhild's article in your column in the May '68 RCM . . . The points in the extract concerning the smallness of the torque effect are well made. But this applies only to the actual engine/-prop reaction. There is another effect, usually overlooked, which is mainly responsible for the effects attributed to torque. This is the fact that the slipstream itself is rotating. Any given particle of air leaving the prop does not travel straight along the fuselage . . . it goes in a spiral. And this spiralling air is the real culprit which produces most of the effect associated with torque. If you visualize this stream of air rotating in the direction of normal prop rotation, it becomes clear that when it gets to the fin, the fin area above the thrust line is getting air which is coming from an angle from the left, and the area below the thrust line is getting air from the right. (The effect on the lateral area of the fuselage is small and may be ignored . . .) Since in most models there is more fin area above the thrust line than below, the model tends to turn left under power. Adding down thrust tends to position the thrust line further up the fin and the turning effect is reduced. Putting a ventral fin under the fuselage, and thereby adding more area below the thrust line, the effect is still further reduced. If we go all the way — as some free-flighters do — and put the fin entirely underneath the fuselage, we can actually make the airplane turn right under power. This disposes at once of the bogey of right thrust working against you when the airplane is inverted, because you have also inverted the fin area!

Charles Peake
43 Liningstone Ave.
Pymble 2073
N.S.W. Australia

TRCC GOES PICTORIAL

Jerry,

At last, I have broken down and bought myself a decent camera! Now I can take pictures of TRCC's goings on and pass some on to you . . . Here's one of OUR field. How it became OURS is a real story Ben Herman and I plan to write about one of these days. Please note the Ramada . . . One noteworthy feature are the buried car tires. No wild airplanes screaming along the ground into parked planes, or up our backs as we work on equipment. An airplane can smack them pretty hard without damage, so we feel it's a worthy safety feature. We have only another year of minor work to really complete OUR field . . .

Ken McDaniel
Tucson R/C Club
4808 E. Fairmont
Tucson, Ariz.

TRCC flying field scene. Tucson club will host 1st Annual RCM Winter National at the Marana Air Park on 29-30 November. Note safety guards and ramada at the club's Tucson location.

JR. PROBLEM?

Dear Mr. Kleinburg,

I belong to the AMA chartered club, The Sky Knights, of Hamberg, N.Y. although most of the flying activity of my Dad and I goes on at a new field in Boston, N.Y. We lost the old field in Boston due to "noise" complaints by a few "citizens". I go to school in Eden, where I'm in the 8th grade. I'm 14 and this summer I'm hoping to get my Jr. hunting license . . . so I can get some of those woodchucks that have been plaguing my grandfather's farm which is also my private flying strip! R/C airplanes are my main hobby though, with shooting second . . . Before I leave off, keep up the good work in your column. It's people like you that try to wake up most modelers (or try to!) to what's going on in the politics side of our hobby. Even though most (like me, sometimes) don't watch, if something we want is taken away and we find out we could have stopped it, then the screaming starts! Too late, of course. I got my first taste of this in the 1968 AMA rules book about Class I, and although not much can be done now, I'll watch the candidates for election closer next time, along with other things.

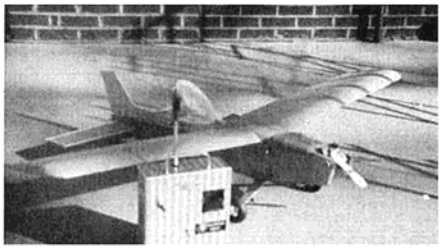
Sincerely yours,
*Franklyn Meyer, Jr.**
8484 N. Main Street
Eden, N.Y.

**My Dad's name is also Franklyn, as was his Dad's.*

Dear Jerry,

First of all, as of about a week ago, my ship Paddy's Pig was test flown. (RCM Plan) I was very happy with the performance of it and of my radio equipment. I must admit I had my doubts about the GG system, but that stuff works fine! I use Fox Superfuel in an Enya .09 with a 7x4 powerprop on the nose. I have a Fireball glow plug in the engine and a 1 ounce VECO tank mounted directly behind the power plant. Also used on the Pig were 2½" dia. DuBro wheels. I have a Controlaire Galloping Ghost system in it with REM. I started about 2 years ago in R/C with a home made glider which flew fairly well. Through the years I've advanced to pulse propo with Paddy's Pig and the way it looks, this one might be around awhile. I am 16 years old and a Jr. at Joliet West High School. I would like to be an engineer when I'm older and have plans to go on to technical school . . .

Sincerely yours,
Neil Liptah
325 O'Neil St.
Joliet, Ill.



Paddy's Pig of Neil Liptah gives good service with Controlaire GG radio. Joliet, Ill. Junior has been RCing for 2 years.

NEW ZEALAND

Dear Jerry,

We, out here all use American gear, motors and designs and although N.Z. may be a small country our interest is very high in R/C! Our N.Z. team visit to Australia was a great success although the Aussies beat us. Our local club, the Palmerston North "Aeroneers" will be hosts to the Australian return visit in October this year. Look for

photos and details . . . Incidentally, single channel and intermediate is not very strong in our area . . . more propo gear. Gliders very popular now.

Russ Johnson
35 Seddon St.
Palmerston North
New Zealand.

New Zealand soaring . . . Bob Milne and Dave Whitehead enjoy outstanding soaring site 300′ over Pacific. Fine picture by Ross Johnson of Palmerston North RCers.

MORE ON THE CAMERA SHIP

Dear Jerry,

This plane (a Cessna 310, see Sep. column. Ed.) *was built from an Aristo kit except that the plastic cabin canopy was discarded and replaced with a solid top. The only other modifications from the kit was widening of the forward part of the fuselage to make more room for the camera and the separate camera servo. I've flown this plane 35 flights and have taken 800′ of super film. This has been edited down to about 400′ with an added 100′ taken from another camera to show outside shots of takeoffs and landings that correspond to pictures taken from inside the plane. This gave me a 500′ reel which I have shown at our local club meetings (Raleigh-Durham R/C Club) and to other clubs in this area.*

The film is rather exciting, especially the takeoffs and landings, along with rolls and loops. The camera is mounted so in normal level flight it points down at about a 10° angle. This gives beautiful views of the close horizon when flying as high as 1000′. One of the hardest things I have found to do is to come down at a steady angle to keep a group on the ground in a fixed position in the center of the film. I've been able to accomplish this once or twice out of 4 or 5 tries. I have also learned to cut off the camera in sharp banks since the horizon goes by so fast it makes viewers dizzy! Pictures so far have been extremely sharp without any effect from engine vibration. The camera is shock mounted on foam rubber to eliminate these vibrations. Plane and radio equipment ready to fly empty comes to 11 lbs. 2 oz. The M-16 Instamatic electric camera weighs 1 lb. 4 oz. with batteries and film. With 12 oz. of fuel in each engine nacelle the ship totals 13 lbs. 14 ozs.

For takeoff, I use about 5° of flaps which allows the plane to takeoff after a 100′ run on grass without the use of UP elevator. Climb is steady and gentle with flaps in this position, so a good view of the ground is afforded the camera in the climb-out to altitude. When flaps are retracted the plane flattens out in level high speed flight. For taking pictures, I generally slow the 2 Enya 45's down to about ½ throttle and put the flaps down about 15°. This requires a little down trim to keep the plane from climbing and slows the plane down for better pictures. In landing, I come in with the flaps at 15° and cut out the engines at about 20° for a good slow landing. Considering the plane's weight, I don't figure the landings are too fast.

I have found idle adjustment for the engines very critical for taxing. They must be adjusted perfectly at all ranges of throttle to keep the taxi of the plane under good control. There doesn't seem to be any noticeable problem of engine synchronization at full throttle in flight. The two throttles are interconnected to a single servo with nylon adjustable clevises for fine adjustment. Incidentally, I have been active in R/C for the past 8 years.

Yours very truly,
Paul Stahl
102 Harrison Ave.
Raleigh, N.C.

SUN PARLOR?

Dear Jerry,

Regarding your query as to why our club is called the "Sun Parlor R/C Flyers", if you will look at a map of North America, you will see that part of Canada is actually SOUTH of the United States. This area in Ontario is Essex Co. and our home town is the city of Greater Windsor. We are bounded on 3 sides by the Detroit River and Lake Erie which makes our climate milder in many places only 100 miles away, hence we are called the "Sun Parlor" of Canada. At one time we were tempted to call our club the "Banana Belt Balsa Busters", but decided against this flippant approach for such an 'austere' body of R/C flyers! Fortunately our weather enables us to fly throughout the winter and although we have been subjected to such minor hazards as light snow, rain, fog, winds to 40 mph, frozen fingers, numbed feet and reluctant servos, we have managed to pursue a rather consistent program of flying . . .

Regards,
Wally Walker
570 Goyeau St.
Windsor, Ontario


N9027L