AUGUST 1968

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

AUGUST, 1968 VOLUME 5, NUMBER 8 MAGAZINE

THIS MONTH

DEPARTMENTS

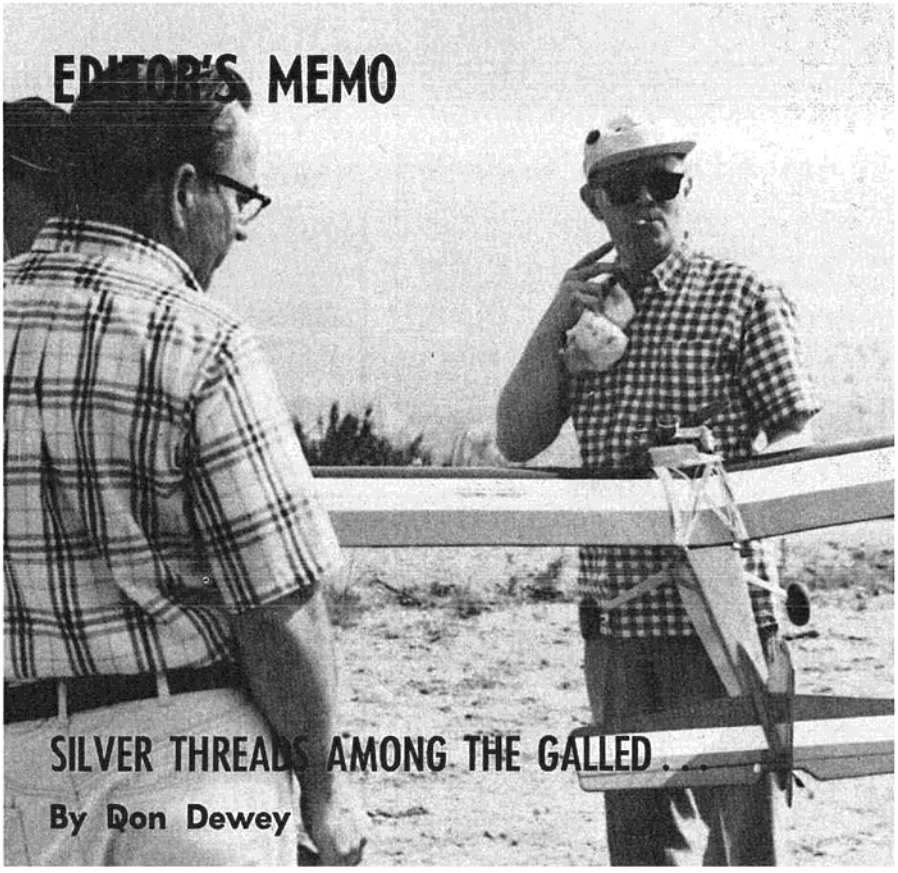
COVER

Lovely Marilyn Milano poses with Phil Garrard's striking new Delta. This unusual model is number 10 by Phil in a series of Delta configurations. Ektachrome transparency by Dick Tichenor.

R/C MODELER Magazine is published monthly by R/C Modeler Corporation, Don Dewey, President. Editorial and Advertising offices at 171 W. Sierra Madre Blvd., Sierra Madre, California, 91024. (213) 356-1066. Entered as second class matter at Sierra Madre, California and additional offices. Subscriptions $7.50 per year, $14.00 two years. Single copies 75 cents each. Add $2.00 for postage outside U.S. and Canada. (Except APO's.) Change of address notices, undelivered copies, and orders for subscriptions are to be sent to P.O. Box 487, Sierra Madre, California 91024. Not responsible for unsolicited manuscripts, which must be accompanied by return postage.

CHANGE OF ADDRESS: Allow six weeks advance notice and include old as well as new address.

R/C MODELER CORPORATION
171 W. Sierra Madre Blvd.
Sierra Madre, California 91024



EDITOR'S MEMO

SILVER THREADS AMONG THE GALLED . . .

By Don Dewey

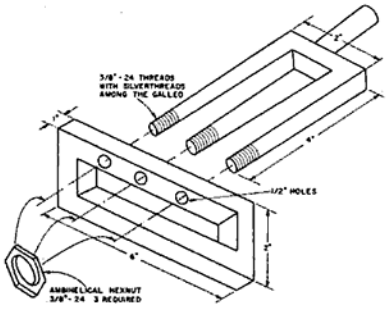
WE would like to start off this month's column by apologizing for any discrepancies you may have noticed in last month's issue of RCM. Because of the fact that over the past few months, we have experienced continual and increasing difficulties at our printer's with regard to the magazine getting out late; subscribers receiving their copies long after the same issue had appeared in hobby shops and on the newsstands; as well as a general deterioration in the quality of photographic reproduction, we had decided to change our printing facilities to the West Coast effective with the September 1968 issue. In addition to this change, we had planned several new innovations and features for the publication which we are sure you will enjoy. One of them will probably come as a surprize to you and we hope you like it. Unfortunately, however, this decision to change printing facilities effective with the September issue brought on a difference of opinion with the printer involved, and we found it necessary to immediately change our facilities with the July issue. Since this issue was already sent to the old printer, and since it had to be returned for a last minute change of printing facilities, we almost didn't make it! As it was, the entire office staff of RCM worked virtually 24 hours around the clock for a solid week in order to get the issue out at all. Since the mechanical requirements of the new printer were different than those we had used previously, and since several articles had to be substituted at the last moment, we were not all certain as to how this publication would appear. At the time of this writing, the July 1968 issue has not been completed, and so we really don't know what we're apologizing for — but with all the mix-up, confusion, and change of mechanical specifications, I'm quite certain that it will not come up to the standards which we try to achieve each month. We hope you will forgive us for this, but we all did our best, and then some, just to get the magazine out at all! It didn't help our tempers one bit during this month long week when several of our advertisers called us to inform us that one of our competitors had been telephoning them informing them that we were bankrupt and going out of business, and why didn't they switch their ads to that publication. Fortunately, this type of practice is nothing new, but you never quite get used to it. The only person we write this magazine for is **you**, and the day you stop enjoying it or getting any benefit from it, is the day that we are truly bankrupt, regardless of how much money there may be in the bank at that time.

— O —

If you were to believe everything you hear these days in certain editorial circles, it would appear that the "middle-age fraternity of RC'ers" are a group of self-centered, well-to-do individuals whose only interest is to fly their expensive toy airplanes without any concern for another modeler. Contrary to this private and very limited opinion, model aviation has never been this way, in general, and hopefully, never will be. As an example of this, I'd like to reprint a letter I received from the busy desk of Leon Shulman of New Jersey:

Dear Don: I just received your May 1968 issue with the cover showing 4 members of the Valley Fliers (California) with their 'Das Liddle Sticks.' The blue and

yellow model being held by Dick Adams, is the reason for this letter. The purpose of this is to point out the wonderful **type** *of person that the R/C fraternity has. Last July 1967 while in California to attend the Nationals, my buddies and I went to Sepulveda Basin to test fly prior to the meet. Since I had flown at this field before, about a year earlier, I knew the field layout, etc. It was very windy, and after I got my ship into the air — it was buffeted by the high winds and gusts. However, a couple of times the buffeting seemed like they might have been 'glitches.' Before I could get the ship towards the runway to land, it peeled off to the right and went into a 'death dive' with the engine going from high to low and back again. The ground came up and hit the nose real hard — and the model became disassembled in rapid order! As I went out to the crash site, a chap ran alongside me to offer assistance. The model was a 'total' and looked more like balsa dust at this stage. We brought the 'bits-and-pieces' back to the pit area and checked the Radio Gear and it worked real fine. This chap asked me what frequency I was using and it was then that I learned that* **one just doesn't fly** *at this field on that particular 72 Mc. frequency. This chap knew that I came from 'back East' and he appeared more 'hurt'*



than I felt. After introductions at this point — I learned his name — the same Dick Adams on your cover. However, the interesting point, after he learned where I was staying while in California, he mentioned that he knew the area. Well — the next day there was a knock on the door and there was the same Dick Adams with the same blue and yellow 'Das Liddle Stick' as shown on your cover. Dick had brought it over and offered to let me have the model to fly while I was in California since I had just lost my #1 Contest ship! We installed the same equipment and flew the model that same day and all week while there. I was really 'touched' by his action. It further convinced me that RC'ers all over the world are the same — the best possible type of human on this earth. In what other hobby or sport would you find someone who would 'give' of his hard work and efforts so that another might enjoy his hobby? If there were more Dick Adams' in this world it surely would be a much better place to live. Say, that sounds like you can take this 2 ways, and now that I think of it, that is exactly the way I mean it! For your info, I still have the same model here in New Jersey and it flies as good or better than the article in that issue claims. It now sports a '35' engine in the nose, and is flying 'full house' with the same CitizenShip Radio Digital System used in California on that fatal flight.

Long live the Dick Adams'!

Lee

— O —

One of the things that we, all too often to do, is to forget that there has to be a place for **everyone** in this hobby and sport of ours. Not everyone makes $15,000 a year or more, and not everyone can afford to buy a new $400.00 digital proportional system. And even if he can, is it necessary to own a Continental in order to enjoy driving? In a great many instances, a modeler spends more than he, or his family budget, can actually afford in order that he doesn't feel like a second-rate citizen with regard to his equipment. Unfortunately, our own industry is responsible to a great degree, for making him feel that it is necessary to spend more than his budget allows in order to be "on a par" with his flying buddies. This is one of the problems of our "status seeking" affluent society that has carried over into our hobby. More often than not, this same RCer could have enjoyed flying just as much with a less sophisticated, and much less expensive, piece of equipment than what he ultimately purchased in order to avoid feeling like a poor relation. It goes without saying, that the more expensive digital system is certainly the optimum in flying pleasure and performance, but is not absolutely mandatory in order to have fun in this hobby. As an example of this, I know several fliers who have the newest and the most up-to-date digital equipment, and who, more often than not, can be found at the local flying field flying a Galloping Ghost, or other simple proportional system, with a degree of proficiency that makes the multi-fliers stop and take notice. For these very reasons, we have started a new section of the magazine for the "simple proportional" flier, all the way from proportional rudder-only up through the dual actuator systems. Hopefully, this segment of the magazine, written monthly by the RCM staff, with guest articles from time to time by leading RCer's in this phase of our hobby, will get some of the dust off of the pulse proportional systems sitting on the shelf, and work some of the "Mickey Mouse" out of the units. It takes a little bit more tinkering to make these systems work properly, since so much control is demanded from a far less complex electronic and mechanical device, or devices. Despite the many different digital systems that we have had the opportunity to fly and test for the various manufacturers, we enjoy flying the simpler proportional systems for the satisfaction of simply sport flying and seeing just what we can do with the less exotic equipment. Ever since the loss of Paul Runge's fine publication "Grid Leaks" we have felt a definite loss in this phase of our hobby. This was always one of my favorite publications, as I am sure it was one of yours. We hope that this section of our magazine will bring you some of this type of material that you will use and enjoy. If this isn't your "cup of tea," you will find that the other sections of the magazine will be bringing you the contest caliber aircraft and the pattern hints and kinks, etc. We just hope that this new addition will prove worthwhile to a large percentage of sport fliers who enjoy this type of flying. We know that we are certainly enjoying the research and development work for this series which begins in this issue with an excellent article by Dr. Bob Benson.

In closing this month we would like to pass on to you Ed Stefan's Chicken Stick for Three Bladed Props. Ed Mentioned that he built the original Chicken Stick that we presented in RCM and states that it "works just fine." According to the genial proprietor of the Hobby Craft Shop in Tullahoma, Tennessee, "the extra prop keeps getting in the way, and with the backfiring and all, the prongs become bent and all out of shape." In order to correct this, Ed built a jig to true it back up as good as new. Now, all three of the prongs will hit the prop at the same time once again. Ed closes with a notation that he would like to make a deal with us — if we remove the center stick, he'll believe us and we can remove the silver threads in the center hole in his improvement upon our original design.

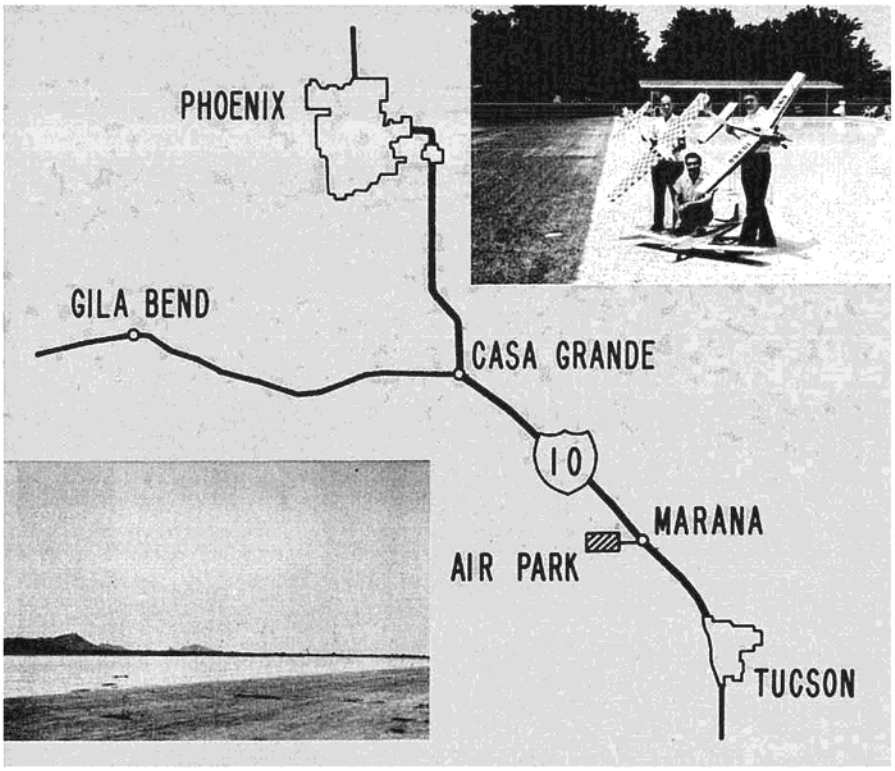
If you build this one successfully, send us a photograph!

Congratulations to Charleen and Cliff Weirick on their May 18th wedding. The 'Minnow' a gift from Jack Stafford and Associates.

— O —

What with the world situation in the horrible state that it is today, hundreds of teenagers burning their draft cards, a couple of dozen candidates not running for president, and our gold standard being torpedoed, I just had a horrible thought: With the peace talks going on in Paris, and if we are forced into a position where we have to completely pull out of Viet Nam, the whole damn country will be suddenly over-run by Vietnamese!

Peace.

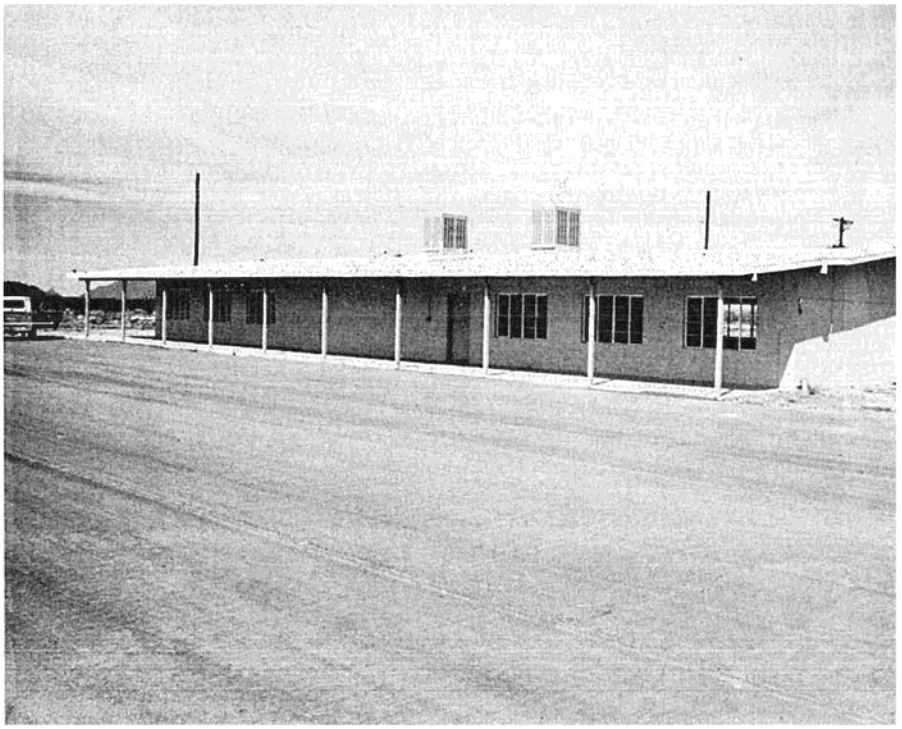


You're Invited To . . .

R/C MODELER MAGAZINE

1968 WINTER NATIONALS

November 29-30, December 1



AS most of you are probably aware by now, R/C Modeler Magazine is sponsoring the RCM Winter Nationals, a pattern and Goodyear meet over the three day Thanksgiving weekend of November 29, 30 and December 1st, at the Marana Air Park. This meet, hosted by the Tucson Radio Control Club, promises to be one of the largest and most well attended meets of the year. We have been to this site and have looked over the facilities very carefully and consider it to be one of the most outstanding R/C sites presently available in the country. For those of you who do attend this outstanding meet, we are sure that you'll leave in full agreement with us.

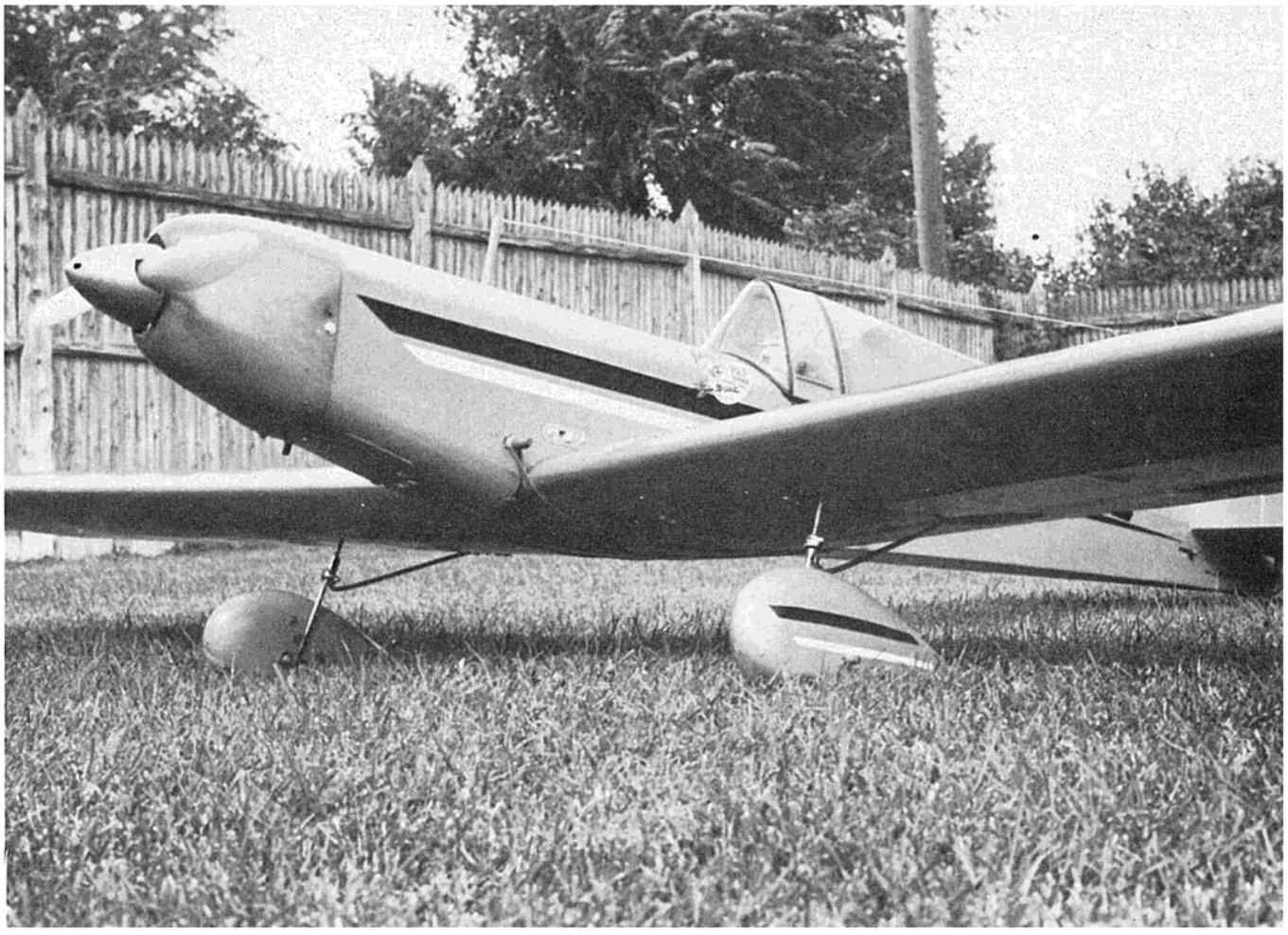
Here are some of the more relevant facts pertaining to this site. First of all, the Air Park is located in Southeastern Arizona at an elevation of about 1800 feet above sea level. It is located approximately 30 miles northwest of Tucson, just off of U.S. Interstate 10. For those planning to drive, the exit to the Air Park is clearly marked. The accompanying map shows its location with respect to both Tucson and Phoenix. The climate of this area is typical of the Southwest desert regions. During late Fall, daytime temperatures can be expected to run in the 75 to 85 degree range, with nights running 45 to 55 degrees. This coupled with the normal aridity of the area, makes this time of year ideal for any and all outdoor activities.

All necessary facilities for conducting the meet, and the care and feeding of contestants, are available within the confines of the Air Park, and contestants and their families, need never leave the facility, unless of course, you so desire. These facilities include a restaurant, banquet hall, and bar serving good food and drinks at moderate prices. In addition, a flight line snack bar will be operated during the hours of official flying activities. The Park features housing facilities for about 200 men, plus a limited number of apartment type units for families. As these latter units are limited in number, they will be reserved on a first come, first serve basis. For those who do not get their reservations in soon enough, there are a large number of first class motels available in nearby Tucson. The contest director, Ken McDaniel, or contest co-ordinator, Ben Herman, will be glad to make reservations for anyone who so requests.

For people who plan on flying to the meet, Marana Air Park offers free landing and aircraft parking facilities. Fuel service, of course, is also available.

In the way of recreation, the Park has a heated swimming pool and outdoor picnic facilities, which are available for use by contestants and their families. Of course, the attractions of nearby Tucson are all within an easy drive of the Air Park. These include the Old Tucson movie location, the Desert Museum, Sahuaro National Monument, Colossal Cave, and the many recreational areas within the nearby Catalina Mountains. Accompanying photographs show a few of the scenes around the Air Park.

All in all, this meet promises to be one of the outstanding R/C events of the year.



MISS DENVER

By JOSEPH DOLAN

I would like to introduce you to Miss Denver — a very welcome companion at a Class C stunt event or an open pylon race.

If you have already looked at the plans you will see that this is a plane that is made to look like a stunt flyer and not the latest military weapons system, or, on the other hand, some box with a wing attached. Miss Denver was designed to look like an airplane used in stunt events or sports flying while utilizing the latest and fastest method of construction possible consistent with keeping a trim weight of approximately six and a half pounds.

WHAT? A STANDARD LANDING GEAR?

Whoever took a lady to a contest that had three legs? You will find out, after a few flights, that Miss "D" will handle every bit as well as a tricycle geared plane with a lot less money spent on propellers. Also, if you would like to have the tricycle landing gear crowd hide their heads in the sand, install a set of electric brakes using right rudder; — right brake; left rudder; — left brake, up elevator — both brakes, using extreme throw of controls to actuate brakes.

Miss "D" was designed to win Class C stunt events but has proved also that an open pylon race is fair game. She has never placed less than second place in any contest entered. In the Mile Hi R.C. contest at Denver, Colorado, she placed first in Class III stunt. This contest had very formidable competition with German Fighter pilots for judges. In Wichita, Kansas, she took first in Open Pylon; second, Class III stunt. At the Colorado Fall Festival, she won top honors in Open Pylon as well as Class III stunt.

Miss "D" was not designed overnight. To the contrary, approximately fourteen months of modifications were made from the date of the original conception. Not being an aeronautical engineer, I did not take it upon myself to design the airfoil, but made several wings using semi-symmetrical, symmetrical, tapered, and straight wings, using contest-proven airfoils. The wing used was decided upon for the following reasons:

(1) Any improvement a taper could make was far outweighed by the case of building a straight wing.
(2) The airfoil had these advantages — (a) good rate of sink at low engine rpm; (b) very stable, all stalls are clean, with no snap characteristics at any speed; (c) smooth, even flight inverted or upright, no jerking or bouncing about; (d) good speed transition.

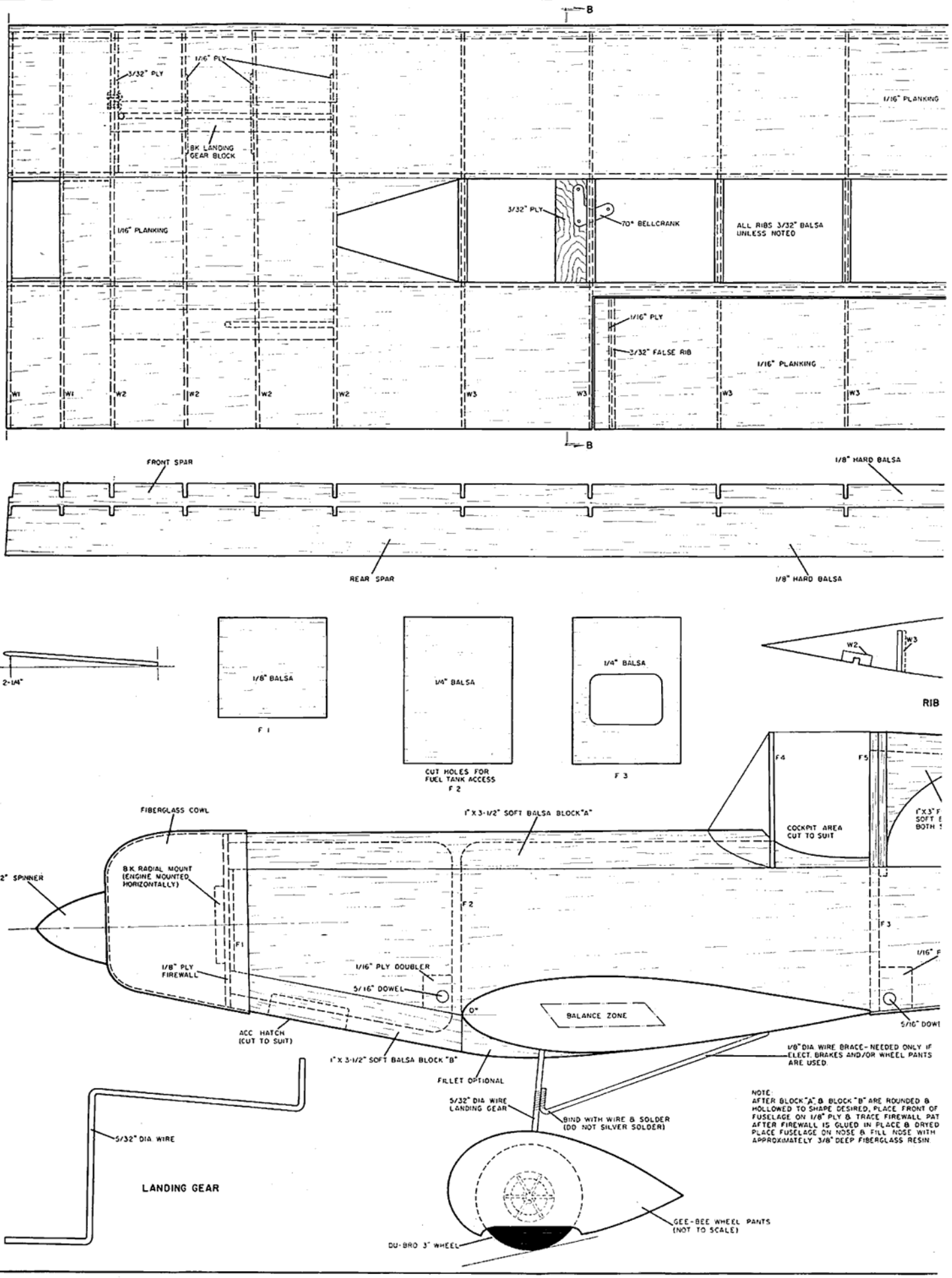
The wing-testing program was carried out with the help of Bill Kessler of B.K. Model Products, using foam wings manufactured at his shop.

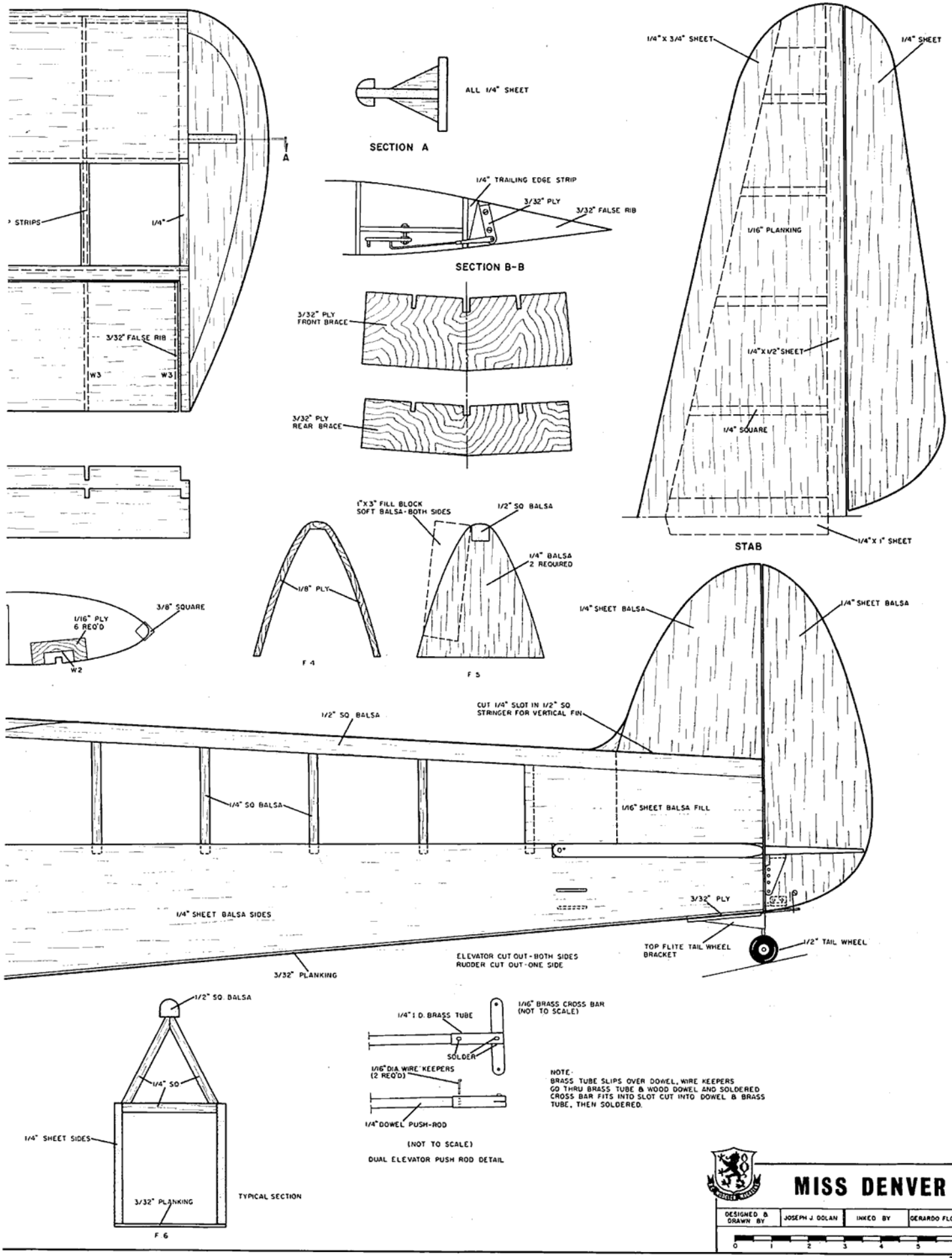
You probably noticed there is a fiberglass cowl. This is no harder to build than a normal balsa cowl and has the advantage of being stronger as well as making access to the engine very easy.

Miss "D" uses a radial mounted engine. I feel this is a definite advantage to the builder for the following reasons:

(1) Ease of mounting engine
(2) Completely clean fuel and battery compartment
(3) Unequalled strength

But most important, every engine and every different size propeller demands a different right thrust setting. More good airframes have been set aside because they wouldn't track properly through loops, etc. This was not the fault of the aircraft, but simply required a small thrust change to correct. With beam mounts this is almost


B
3/32" PLY
1/16" PLY
1/16" PLANKING
BK LANDING GEAR BLOCK
1/16" PLANKING
3/32" PLY
70° BELLCRANK
ALL RIBS 3/32" BALSA UNLESS NOTED
1/16" PLY
3/32" FALSE RIB
1/16" PLANKING
W1
W1
W2
W2
W2
W2
W3
W3
W3
W3
B
FRONT SPAR
1/8" HARD BALSA
REAR SPAR
1/8" HARD BALSA
2-1/4"
1/8" BALSA
F 1
1/4" BALSA
CUT HOLES FOR FUEL TANK ACCESS
F 2
1/4" BALSA
F 3
W2
W3
RIB
FIBERGLASS COWL
1"X 3-1/2" SOFT BALSA BLOCK "A"
2" SPINNER
BK RADIAL MOUNT (ENGINE MOUNTED HORIZONTALLY)
F1
F2
F3
F4
F5
COCKPIT AREA CUT TO SUIT
1/8" PLY FIREWALL
1/16" PLY DOUBLER
5/16" DOWEL
BALANCE ZONE
ACC HATCH (CUT TO SUIT)
1"X 3-1/2" SOFT BALSA BLOCK "B"
FILLET OPTIONAL
1/8" DIA WIRE BRACE- NEEDED ONLY IF ELECT. BRAKES AND/OR WHEEL PANTS ARE USED.
5/32" DIA WIRE LANDING GEAR
BIND WITH WIRE & SOLDER (DO NOT SILVER SOLDER)
NOTE:
AFTER BLOCK "A" & BLOCK "B" ARE ROUNDED & HOLLOWED TO SHAPE DESIRED, PLACE FRONT OF FUSELAGE ON 1/8" PLY & TRACE FIREWALL PAT AFTER FIREWALL IS GLUED IN PLACE & DRYED PLACE FUSELAGE ON NOSE & FILL NOSE WITH APPROXIMATELY 3/8" DEEP FIBERGLASS RESIN.
5/32" DIA WIRE
LANDING GEAR
GEE-BEE WHEEL PANTS (NOT TO SCALE)
DU-BRO 3" WHEEL


A
STRIPS
1/4"
3/32" FALSE RIB
W3
W3
ALL 1/4" SHEET
SECTION A
1/4" TRAILING EDGE STRIP
3/32" PLY
3/32" FALSE RIB
SECTION B-B
3/32" PLY
FRONT BRACE
3/32" PLY
REAR BRACE
1/4"x 3/4" SHEET
1/4" SHEET
1/16" PLANKING
1/4"X 1/2" SHEET
1/4" SQUARE
1/4"x 1" SHEET
STAB
1"X 3" FILL BLOCK
SOFT BALSA-BOTH SIDES
1/2" SQ BALSA
1/4" BALSA
2 REQUIRED
1/8" PLY
F 4
F 5
3/8" SQUARE
1/16" PLY
6 REQ'D
W2
1/4" SHEET BALSA
1/4" SHEET BALSA
1/2" SQ. BALSA
CUT 1/4" SLOT IN 1/2" SQ
STRINGER FOR VERTICAL FIN
1/4" SQ BALSA
1/16" SHEET BALSA FILL
1/4" SHEET BALSA SIDES
3/32" PLY
TOP FLITE TAIL WHEEL
BRACKET
1/2" TAIL WHEEL
ELEVATOR CUT OUT-BOTH SIDES
RUDDER CUT OUT-ONE SIDE
3/32" PLANKING
1/2" SQ. BALSA
1/4" SQ
1/4" SHEET SIDES
3/32" PLANKING
TYPICAL SECTION
F 6
1/4" I.D. BRASS TUBE
1/16" BRASS CROSS BAR
(NOT TO SCALE)
SOLDER
1/16" DIA. WIRE KEEPERS
(2 REQ'D)
1/4" DOWEL PUSH-ROD
(NOT TO SCALE)
DUAL ELEVATOR PUSH ROD DETAIL
NOTE:
BRASS TUBE SLIPS OVER DOWEL, WIRE KEEPERS
GO THRU BRASS TUBE & WOOD DOWEL AND SOLDERED
CROSS BAR FITS INTO SLOT CUT INTO DOWEL & BRASS
TUBE, THEN SOLDERED.
MISS DENVER
DESIGNED & DRAWN BY
JOSEPH J. DOLAN
INKED BY
GERARDO FLORES
0 1 2 3 4 5 6
355

impossible, but with a radial mount all that is required is to loosen four bolts and insert shims. It has been brought to my attention that a respected engine designer, Clarence Lee, does not think it proper to radially mount an engine. I have to disagree with this as I have used the method shown for several years with no damage to the engine and far less vibration than a beam mount.

CONSTRUCTION NOTES

The construction of Miss "D" is straightforward and should not cause any problems if instructions are followed.

A wing is a wing and I don't know of any method to build one up any easier. I prefer to use dihedral board but the method described works well in wing construction. B. K. Model Products, 4765 E. Iliff, Denver, Colorado, manufactures a foam wing, radial engine mount, landing gear and maple landing gear blocks for Miss "D", if desired.

Titebond should be used throughout the construction with the exception of the stabilizer and wingtips where contact cement is used.

Olso, it had probably caught your eye that the balance envelope on Miss "D" needs no magnifying glass to locate. She flies very well balance is moved back in the envelope.

For contest work a good sixty displacement engine is required. For sport flying, a forty-five will do fine.

WING

Standard ailerons are used rather than strip because their efficiency is good throughout the complete speed range in addition, the roll yaw does not rear its ugly head with this type aileron and a seventy degree bellcrank. The extra work (very little) to make these ailerons will pay dividends when flying. The vertical fin may appear too small, but if you notice the lateral area behind the cockpit, this should relieve any doubt of its efficiency!

BUILDING STEPS — WING

1) Cut out the main spars, and notch, using ⅛" hard balsa. Cut out 3/32" ply dihedral braces. Now glue the
2) Cut out the wing ribs, which are all 3/32" balsa except the two ¼" balsa tip ribs.
3) Slip the ribs on one side of the spars and glue in place.
4) Now lay down the 1/16" bottom trailing edge planking. Set the tibs on the planking using ⅛" longerons. Build up under the main spar until the ribs lie smoothly, and glue.
5) Pin the ⅜" square leading edge longeron in place and glue.
6) Now cut four false ribs from 3/32" balsa. These are W-3 ribs from the rear spar back. Glue two in place.

6a) Now cut two false ribs using 3/32" ply. These are made using the W-2 pattern from the front of front spar forward for a pattern. Glue in place as noted on plans.

7) Plank the leading edge using 1/16" balsa. This is butt-jointed to the ⅜" leading edge longeron.
8) Plank the center section and glue in the cap strips.
9) Glue in the 3/32" ply bellcrank mount.
10) Now lay the wing on other side and follow above steps.
11) After the wing is dry, turn over.
12) Install the maple landing gear blocks and 1/16" ply doublers.
13) Install bellcranks and 1/16" wire push rod.
14) Install the landing gear clamps, making sure they line up with the holes in maple block. (These are available from Top Flite.)
15) Plank the leading edge using 1/16" sheet, butt joining onto the ⅜" longerons.
16) Plank the center section and cap strip. Build the wing tips separately using contact cement for lamination. Now set the tips aside.
17) Cut the ailerons out, following the line shown on the plans for the two end cuts; for the long center cut, measure back 5/16" from the rear of the rear spar. Cut as deep as a number eleven X-Acto blade held at approximately a thirty degree angle, facing toward the front of the wing. You should now, with a gentle movement, be able to break the aileron out.
18) Leaving the top sheeting on the wing alone, cut out the rib pieces and cut the bottom sheeting even with the rear spar and glue ¼" trailing edge stock in place.
19) Even the front of the ribs off on the ailerons. Glue 1/16" balsa sheet in place. Now pin the ailerons back on the wing and allow to dry. This will keep them from warping.
20) Glue the wing tips on.
21) Remove the ailerons and trim for proper fit.
22) Sand the wing and ailerons.
23) Glue a gauze strip onto the front and top of the ailerons and on the top and rear of the aileron slot in the wing, using model cement.
24) Fibreglass the center section of the wing using #7 glass cloth. Use a strip of cloth approximately 9" wide. This will protect the leading and trailing edges from rubber band damage as well as strengthen the landing gear area.
25) Cut a hole in the center section to fit the servo desired and glue in the mounting boards.
26) Glue the 1/16" false plywood ribs in the ailerons.

STABILIZER

The stab and vertical fin should be built before the fuselage, since it will save time during the actual fuselage construction.

1) Take two 1/16" x 6" balsa sheets the length of the stab, lay on top of each other, and cut the full size stab pattern out of this material.
2) Now lay one 1/16" sheet down and content cement all ¼" thick wood, shown on the stab plans, in place.
3) Glue all joints with titebond, being careful not to get any on top of the ¼" wood.
4) Contact cement the top 1/16" sheet in place.
5) Using a balsa plane, shape the front and rear of the stab, then sand.
6) Lay the stab on a flat surface and pin down to dry.
7) Cut the vertical fin out of ¼" balsa sheet. Round off the edges and sand.
8) Glue the vertical fin to the stab, making sure it is straight.
9) Cut out the elevators and rudder from ¼" sheet, then shape and sand.

FUSELAGE

A careful selection of wood is necessary. All wood should be soft balsa, especially the two ¼" x 4" x 48" sides and blocks A and B. The ½" x ½" longeron must be perfectly straight.

Very little plywood is used, since adding plywood will do nothing to strengthen the design but will affect performance and damage the radio equipment in case of a crash.

Dowels are used to hold the wing in place but the design is such that other methods will work as well.

1) Cut both sides out of ¼" x 4" x 48" soft balsa.
2) Place the sides together; drill the dowel holes and make slots for the elevator pushrod.
3) Glue in formers F-1, F-2, F-3. NOTE: before gluing in F-2, cut the hole in F-2 to fuel tank size. This is to allow tank entry and not to hold the tank in place.
4) Insert the elevator pushrod and glue the sides together.
5) Set the fuselage on its top; glue in the 1/16" ply dowel doublers and the 3/32" balsa bottom sheeting.
6) Tack glue Block B in place, using model cement.
7) Turn the fuselage over; tack glue, and install Block A. Now glue in the ¼" square cross members.
8) Glue the stab in place. (NOTE: The vertical fin should already have been glued in place.)
9) Allow to dry thoroughly.
10) Round off Blocks A and B to suit.
11) Remove blocks A and B and hollow out. The top block should be hollowed out to ¼", and the bottom block to ⅜". Cut out cockpit and accessory hatch.

11) Glue blocks A & B in place using titebond.

13) Install F-5. (two required).
14) Slot the ½" x ½" longeron to fit over the vertical fin and glue in place.
15) Install the ¼" square longeron braces. (NOTE: F-6 pattern.) Be certain these are inserted far enough so as not to make contact with the silk covering. The only exception is the section directly in front of the vertical fin. This is inset only 1/16" to allow the balsa sheeting to fit.
16) Glue the fillet behind F-5 in place; this is 1" thick soft balsa. Glue the 1/16" sheet fill above the stab in place.
17) Set the nose on ⅛" ply and trace the firewall. (Remove F-1.)
18) Glue the firewall in place. If you will nail the firewall in place using pins approximately ½" apart around the edge of the firewall, and leave them in place, it will strengthen this assembly.

19) Glue the 3/32" ply tail sheet mount in place.
20) Allow to dry thoroughly.
21) Set the fuselage on its nose and pour approximately 3/8" thick fiberglass resin behind the firewall. Allow to set up. NOTE: The resin is what the number 4 sheet metal screws go into to hold the cowl in place. It also binds the front of the fuselage together!
22) Sand and shape the fuselage.
23) After the fuselage has been covered and doped, notch block A and install F-4.

COWL

The fact that the cowl is made out of fiberglass should not be a problem. If you haven't used this method of construction before, you will find, after it has been tried, that it is strong and unbeatable as a styling aid in any future models you may build. I have found, after making several cowls, that the best results will be achieved if Hobby Poxy cloth is used for the first layer and #7 glass cloth for the second layer. Fibreglass surfacing resin is used adding enough catalyst to make it set up as fast as possible.

1) Carve out the cowl block. (NOTE: Silhouette shown on plans for cowl was used because it allows you to raise or lower the engine, if desired, without having to build another cowl.) After the cowl block has been shaped, contact cement the 1/2" thick balsa sheet to the rear and finish cutting the cowl block to the fuselage contour to allow cowl attachment.
2) Insert the dowel in the bottom of the cowl block and put the bottom of the dowel in a vise to hold the cowl block upright.
3) Cover the block with Saran Wrap, making certain it is completely covered.
4) Lay the Hobby Poxy cloth over the cowl block, smoothing as many wrinkles out as possible. Now brush on a thick coat of resin.
5) Select a rubber balloon that, after being filled with air, will go over the cowl block as the air is let out, but will still exert strong pressure on the cloth. Cover the complete block with the balloon.
6) As soon as the resin has set up, install another layer of cloth, using #7 cloth in the same manner.
7) Trim the excess cloth off of the rear of the cowl. Remove from the block.
8) Bolt the engine to the firewall horizontally (use four 3/32" shim for right thrust) making certain the exhaust is facing down, and using 6/32" bolts and blind nuts. (These are available from Dubro.)
9) Cut the cowl to slip over the engine. Now drill holes through the cowl into the 3/8" resin, using #4" x 5/8" sheet metal screws to hold the cowl in place.
10) Remove both the cowl and engine.

COVERING

The entire plane is covered with silk or silron in the standard manner. The only exception to this is the area between the cockpit and the stab. This is covered in one piece. Be sure to apply 3 or 4 coats of clear dope to all balsa before covering.

FINISHING

After the model has been covered, apply multiple coats of clear dope until the surface is smooth and reflects light evenly. Paint and trim as desired.

INSTALLATION OF AILERONS, ELEVATOR AND RUDDER

These are all installed using nylon hinges. Stitch in nylon safety hinges, using approximately 3 stitches for each.

EQUIPMENT INSTALLATION

Install your equipment in the normal manner, mounting servos as far back as possible. The battery is placed below the fuel tank. The center of the fuel tank is placed approximately 1/2" higher than is normally used for tricycle gear installation.

FLYING

Miss "D" is a very smooth and gentle plane to fly and yet will respond quickly to the controlls when required. When attach to the hole in the control horns farthest from the control surface. As you become familiar with the flight characteristics, move the rods inward one hole at a time, until the plane flies best suited to your preference.

My own radio is a Micro Avionics, so the plane was designed with proportional radio in mind, but it will fly well with reed equipment. These minor changes should be made for reeds: Add approximately 3/32" shim to the top of the radial mount for added down thrust and position the elevator to approximately 1/8" positive throw when the controls are in neutral.

GOOD FLYING!

AN RCM CONSTRUCTION FEATURE

Designed for Galloping Ghost or small digital proportional systems, the Li'l Pinto is capable of inside's, outside's, vertical eights, Immy's and inverted flying. For .09 to .15 engines.

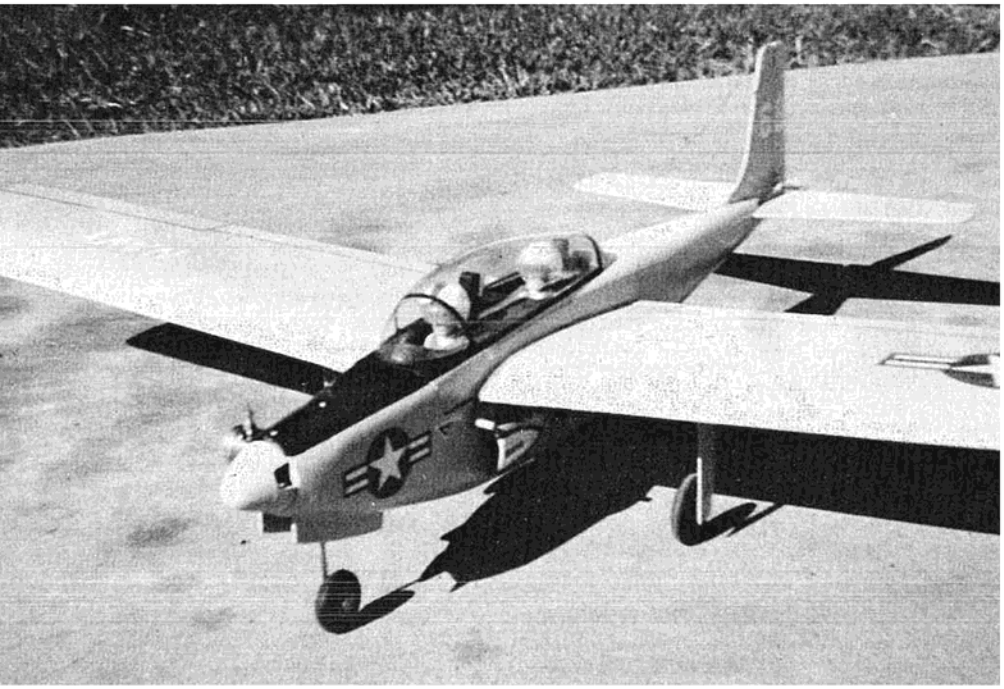
Semi-Scale Temco 'Li'l Pinto'

by BRAD SHEPHERD

HAVING designed and built a few small racers, as well as a combination racer and stunt plane for Galloping Ghost, I was looking for something different and unusual to tackle and had been "toying" with the idea of using the T-33 jet as a subject, although this idea never did "gel." When I received a copy of the October 1967 issue of Sport Flying, there it was — an article on the Temco TT-1 jet trainer. My mind, feeble as it is, got into gear, and this model resulted. The basic layout of this plane is close to that of the racers and stunt plane which proved so successful, and should give you many hours of flying satisfaction.

This is not one of those "puppy dog" planes ARF!! ARF!! (almost ready to fly) yet is not difficult for a **modeler** to build. It has only 3 basic formers in the fuselage, the 1/32 inch ply doubler has proven itself, and the "egg-crate" front-end is easy once the parts are cut out, making for a "stout" front-end assembly. The wing is the only part that could cause some difficulty, but using the jig leading edge and exercising some care, even this is not too bad. After all . . . the bigger the challenge, the more satisfaction, and this is a **modeler's** project! If you do prefer to use a foam wing, I am sure Midwest's foam wing and stab kit could be made to fit and look respectable, although the area is somewhat smaller, resulting in higher wing loading. Installing the main gear in the wing would be a challenge, so if you go this way, I would appreciate hearing from you on the results via RCM.

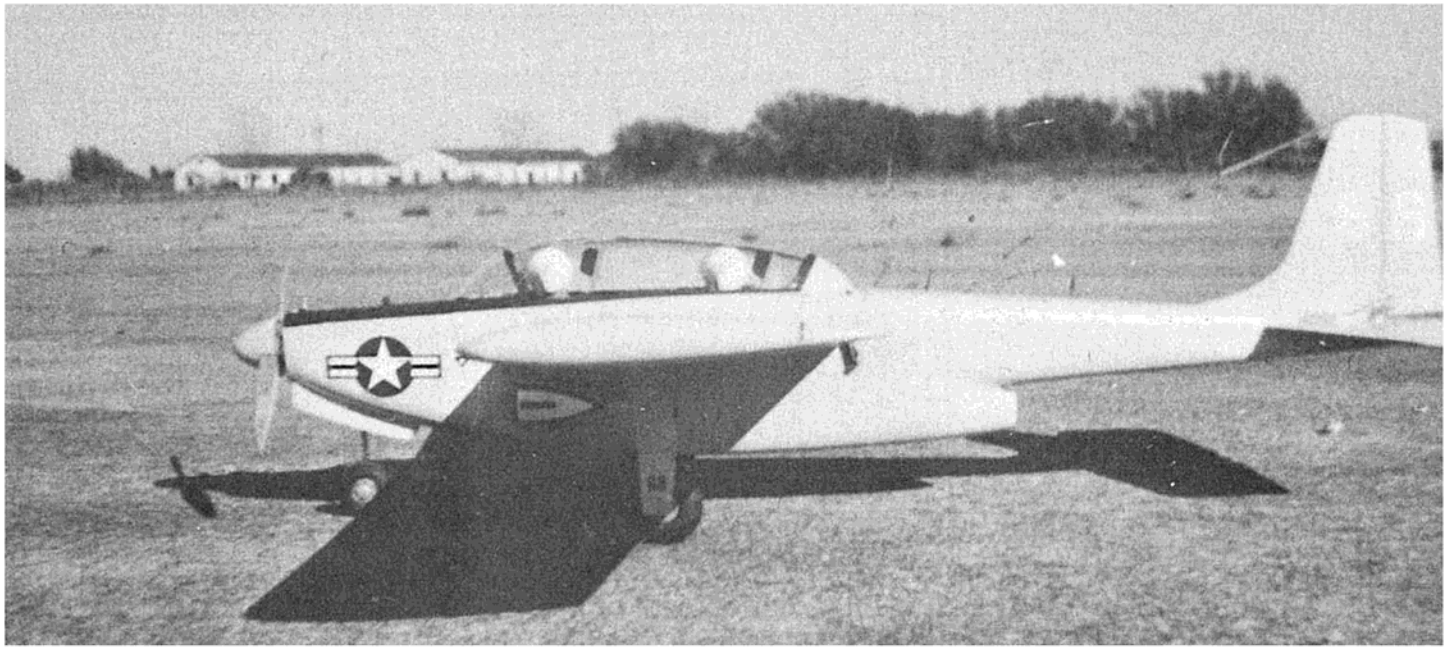
The side mounted engine, decals, and cockpit details, all add to the scale — like realism of Brad's Li'l Pinto.



This model did not fly right out of the shop window like another feller I know of who is a "bye-plane" nut, but fly it did, and was making low level passes on the test flight. Succeeding flights were made in 20-30 MPH winds which showed that this little plane has the ability to fly in weather usually reserved for its bigger brothers. The only change that was made to the prototype was to enlarge the rudder, a change which is reflected in the plans. The landings are pure joy as long as the "nut" on the end of the stick that protrudes from the little "box" goes easy. It doesn't slow down too fast, so allow for this on the downwind leg, or you will come in hot! I have done insides, outsides, vertical eights, Immy's and inverted flying with the Lil' Pinto. The rudder action is the same inverted as it is right side up, e.g., right is right, and left is left. It will not roll on rudder, so the addition of ailerons, if you are using a small digital rig will, or should, make this a good acrobatic plane with all the looks of a real jet on one of those low level, wide open passes. I would recommend using a .15 engine if a small digital system is employed.

FUSELAGE CONSTRUCTION

Using two sheets of 3/32" x 3" x 36" Q-grain, lay out the basic fuselage sides. Using the engine thrust line, and the stab platform as a guide line, cut the basic sides out, recessing the section between the



Full side view of the Li'l Pinto evidences realism achieved by use of noes wheel door, wing mounted main gear, and jet exhaust.

firewall and the front bulkhead 1/8" to receive the landing gear mounting plate. Also, cut out the wing outline that is below the thrust line.

Now take some 1/32" ply, (you will need a 24" sheet for this) and lay one of the fuselage sides on it. Trace the outline on the plywood, then move the side up 1/2" to allow for the 1/2" triangle stock, and draw the bottom line again. Cut two doublers from the ply using the top outline just drawn. Now cut the aft top deck side piece from 3/32" sheet and glue in place on the basic side. When these are dry, glue the 1/2" triangular pieces on per the plan, making sure you have a right and left side. While these are drying, cut out the 1/16" ply bulkheads, 1/8" sheet balsa bulkhead, and the top deck formers "A" and "B," from 1/16" ply.

Using contact cement (I prefer Sig's) coat the inside of the fuselage sides to be covered by the doublers, and coat the doublers themselves when the contact cement is dry, carefully lay the doublers in place and press firmly on to the sides.

Using "Titebond" or epoxy, glue the forward and aft bulkheads in place. (I pin the sides to my bench upside down, and get everything square, then glue the bulkheads in place.) While this is drying, take some 1/8" ply and cut out the crutch and engine bearer doubler as well as the two firewall pieces. The hole in the crutch can be cut at a slight angle to receive the 2 oz. Debolt clunk tank. Epoxy the engine doubler and the tank to the crutch. While this is setting, cut out the 1/8" landing gear ply plate, which plate **extends to the outside of the fuselage sides.** Use the top view of the plan for the outline.

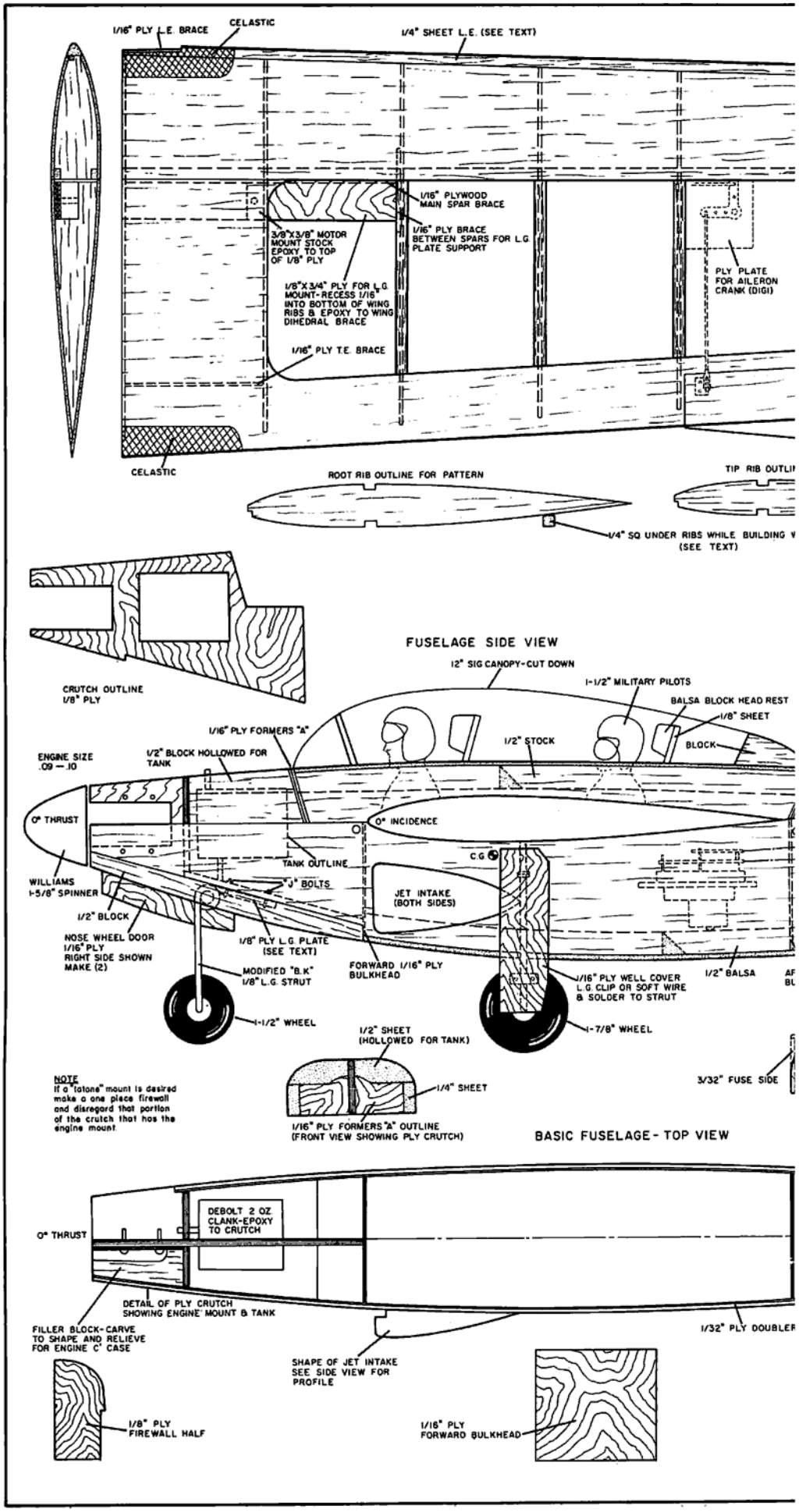
I used a BK 1/8" nose gear and modified it by putting a bolt through the spring, clamping it in a vise, and bending it to the shape shown on the plans. The leg is then bent to make the axle. If you bend your own nose gear, "rots o' ruck!" In any case, bolt the nose gear to the plate with "J" bolts. Now go back and epoxy the two firewall sides on to the crutch, relieving the one side for the fuel tank feed line. If you use an Enya .099, or Cox .099, the tank will have to be put on the opposite side of the crutch from that shown on the plans. In addition, the engine bearer doubler will have to be located on the opposite side. Incidentally, I used an OS .10 on the original.

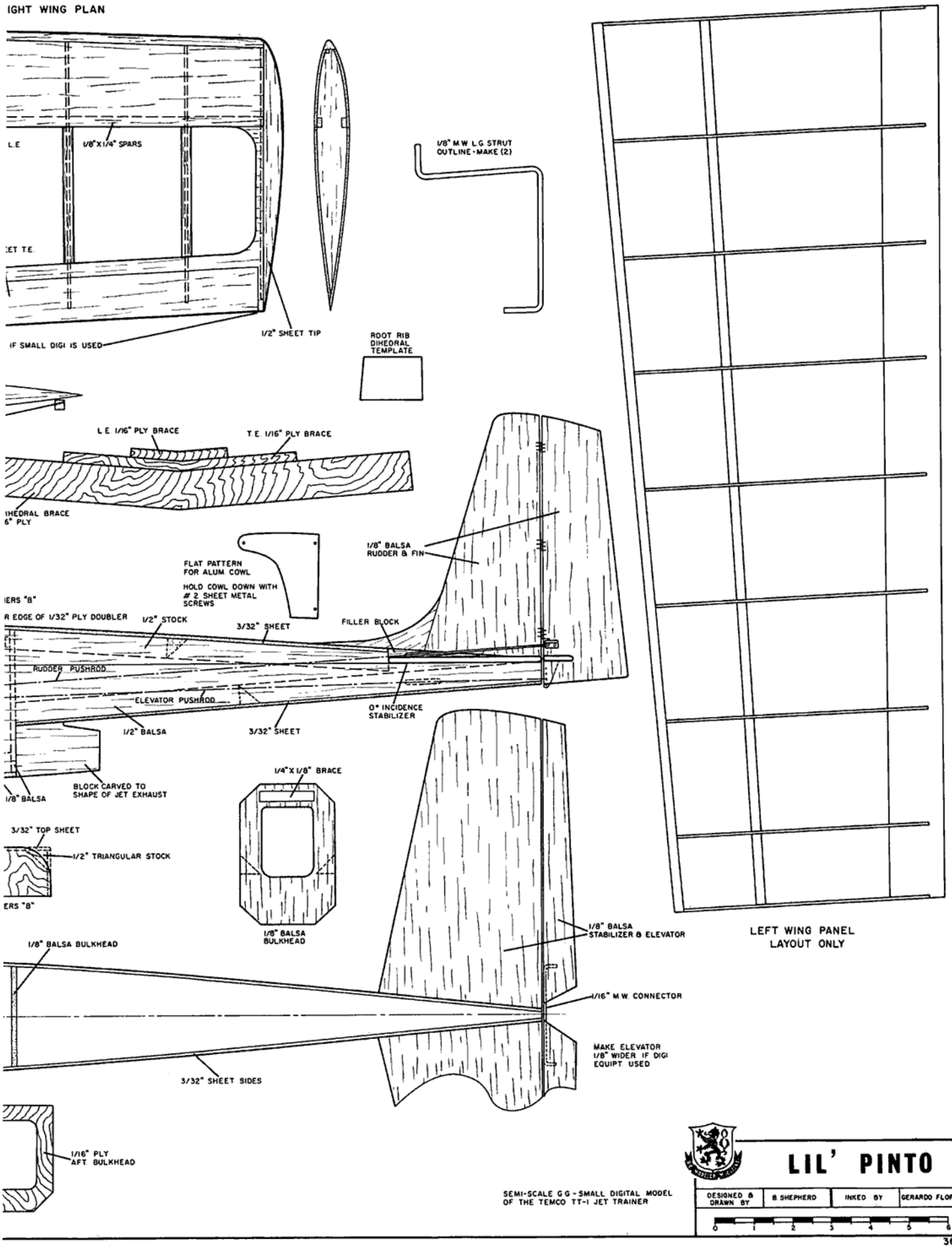
While you're waiting (unless ya wanna' go to bed) cut out a root rib, and a tip rib from 1/32" ply, or aluminum sheet; cut out 18 pieces of Q grain 1/16" balsa 1" wide, and 9" long; stack 9 of these together between the two rib templates, pin or bolt together; set in a vise and carefully carve to the outlines around the templates. (Cut the notches for the spars with a zona saw, making sure you have a right and left set.) The wing is semi-symmetrical, not fully symmetrical, and it would be well to number the ribs as you take them out of the stack. Also mark the top of the ribs so you don't boo-boo and put one in upside down. Keep the right and left sets together with pins or masking tape, and lay them aside for a while. I have not found an easier way to make ribs for a symmetrical compound taper wing as yet.

Now take the fuselage and trim the 1/2" triangle strips at the rear so the sides can

Holding the Li'l Pinto is the lovely lady who has put up with Brad for the past nineteen years!

LIL PINTO


1/16" PLY L.E. BRACE
CELASTIC
1/4" SHEET L.E. (SEE TEXT)
1/16" PLYWOOD MAIN SPAR BRACE
3/8"X3/8" MOTOR MOUNT STOCK EPOXY TO TOP OF 1/8" PLY
1/16" PLY BRACE BETWEEN SPARS FOR L.G. PLATE SUPPORT
PLY PLATE FOR AILERON CRANK (DIGI)
1/8"X3/4" PLY FOR L.G. MOUNT-RECESS 1/16" INTO BOTTOM OF WING RIBS & EPOXY TO WING DIHEDRAL BRACE
1/16" PLY T.E. BRACE
CELASTIC
ROOT RIB OUTLINE FOR PATTERN
TIP RIB OUTLI
1/4" SQ UNDER RIBS WHILE BUILDING W (SEE TEXT)
CRUTCH OUTLINE 1/8" PLY
FUSELAGE SIDE VIEW
12" SIG CANOPY-CUT DOWN
1-1/2" MILITARY PILOTS
BALSA BLOCK HEAD REST
1/8" SHEET
BLOCK
1/16" PLY FORMERS "A"
1/2" STOCK
ENGINE SIZE .09 — .10
1/2" BLOCK HOLLOWED FOR TANK
0° THRUST
0° INCIDENCE
C.G.
TANK OUTLINE
WILLIAMS 1-5/8" SPINNER
"J" BOLTS
JET INTAKE (BOTH SIDES)
1/2" BLOCK
NOSE WHEEL DOOR 1/16" PLY RIGHT SIDE SHOWN MAKE (2)
1/8" PLY L.G. PLATE (SEE TEXT)
FORWARD 1/16" PLY BULKHEAD
1/16" PLY WELL COVER L.G. CLIP OR SOFT WIRE & SOLDER TO STRUT
1/2" BALSA
MODIFIED "B.K." 1/8" L.G. STRUT
1-1/2" WHEEL
1-7/8" WHEEL
1/2" SHEET (HOLLOWED FOR TANK)
3/32" FUSE SIDE
NOTE
If a "tatone" mount is desired make a one piece firewall and disregard that portion of the crutch that has the engine mount.
1/4" SHEET
1/16" PLY FORMERS "A" OUTLINE (FRONT VIEW SHOWING PLY CRUTCH)
BASIC FUSELAGE - TOP VIEW
0° THRUST
DEBOLT 2 OZ CLANK-EPOXY TO CRUTCH
DETAIL OF PLY CRUTCH SHOWING ENGINE MOUNT & TANK
1/32" PLY DOUBLER
FILLER BLOCK-CARVE TO SHAPE AND RELIEVE FOR ENGINE C' CASE
SHAPE OF JET INTAKE SEE SIDE VIEW FOR PROFILE
1/8" PLY FIREWALL HALF
1/16" PLY FORWARD BULKHEAD


IGHT WING PLAN
L.E
1/8"X1/4" SPARS
ET T.E.
IF SMALL DIGI IS USED
1/2" SHEET TIP
1/8" M.W. L.G. STRUT OUTLINE - MAKE (2)
ROOT RIB DIHEDRAL TEMPLATE
L.E. 1/16" PLY BRACE
T.E. 1/16" PLY BRACE
HEDRAL BRACE
6" PLY
FLAT PATTERN FOR ALUM COWL
HOLD COWL DOWN WITH # 2 SHEET METAL SCREWS
1/8" BALSA RUDDER & FIN
ERS "B"
R EDGE OF 1/32" PLY DOUBLER
1/2" STOCK
3/32" SHEET
FILLER BLOCK
RUDDER PUSHROD
ELEVATOR PUSHROD
0° INCIDENCE STABILIZER
1/2" BALSA
3/32" SHEET
1/8" BALSA
BLOCK CARVED TO SHAPE OF JET EXHAUST
1/4"X1/8" BRACE
3/32" TOP SHEET
1/2" TRIANGULAR STOCK
ERS "B"
1/8" BALSA BULKHEAD
1/8" BALSA STABILIZER & ELEVATOR
1/16" M.W. CONNECTOR
MAKE ELEVATOR 1/8" WIDER IF DIGI EQUIPT USED
3/32" SHEET SIDES
1/16" PLY AFT BULKHEAD
LEFT WING PANEL LAYOUT ONLY
LIL' PINTO
SEMI-SCALE G G - SMALL DIGITAL MODEL OF THE TEMCO TT-1 JET TRAINER
DESIGNED & DRAWN BY
B. SHEPHERD
INKED BY
GERARDO FLORES
0 1 2 3 4 5 6
364

be pulled together. Glue the 1/8" balsa bulkhead in place, and pull the sides together at the rear, clamping with a clothes pin. It may be necessary to relieve the 1/2" triangle just behind the 1/8" balsa bulkhead in order to allow the sides to come together at the rear. To accomplish this, take your zona saw and cut almost completely through the triangle. When this has "set," glue 3/32" sheet to the bottom of the tail cone, crosswise to the fuselage, then glue 1/8" sheet to the bottom from the 1/8" balsa bulkhead to the forward ply bulkhead. Glue the block for the jet exhaust in place and epoxy the landing gear plate to the front end. Now put this aside to dry and we will start on the wing.

WING CONSTRUCTION

The wing is built in a semi-jig manner using the leading edge as the jig. Start by cutting 2 pieces of straight 1/4" sheet balsa 3/4" x 5/8" x 23" long. Now mark a line, with a ball point pen, the length of it 7/16" up from the wide end, and 5/16" up from the narrow end as a reference line for the 3/32" x 3/32" strip which will be used to rest the front end of the ribs on when building the wing panel. Now glue the 3/32" strip to the leading edge, and while this is drying, cut 4 pieces of 1/16" sheet, 23" long by 2" wide on one end, and 2 3/4" wide on the other end for the leading edge sheeting. Since the trailing edge sheeting is 1 1/2" wide, I used a 3" sheet of Q grain and sliced it in half.

Pin the leading edge and the bottom spar to the plan. Start with #1 rib, and using the dihedral angle template for the proper rib angle, glue it in place. Proceed to put the remaining ribs in place. Some slight trimming may be necessary at the leading edge of the ribs in order to make them fit properly. Glue the top spar on when all the ribs are in place, then slide a 1/4" square piece of balsa under the trailing edge of the ribs till it touches all the ribs. Eyeball the T.E. of the ribs for squareness. Pin in place, glue the top trailing edge sheet on and pin, glue the leading edge sheet in place, then glue the cap strips in place.

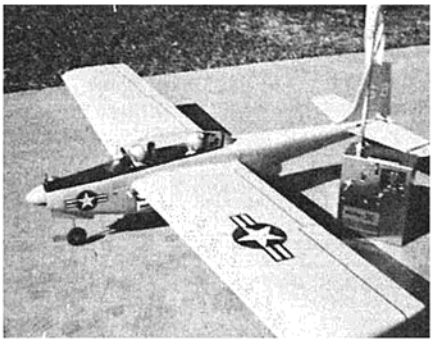
After this is dry, turn the wing over, pin down at the spar, and using the 1/4" square again to line up the trailing edge, glue the trailing edge sheet, leading edge sheet, and the capstrings in place. (I used clothes pins to hold the trailing edge together while drying.) Repeat this same procedure on the left wing panel using the simple layout drawing on the plans. When both panels are dry, sand the center section root ribs with a block to even up the spars, sheeting, etc. in preparation for glueing together.

Block one tip up, (or both tips from the center, whichever you prefer) smear "Titebond" on the center section root rib, then put both halves together and check the alignment, making sure you do not glue a "twist" into the wing. Let set, and cut the dihedral braces from 1/16" ply while it is drying.

Using your zona saw, relieve the 4 center section ribs behind the spars to accept the main dihedral brace. "Titebond" the latter in place, relieving the center ribs 1/16" at the location of the trailing edge dihedral brace. Glue this in place when the wing has dried thoroughly. (Preferably overnight.) Trim the leading edge to receive the leading edge dihedral brace, and glue in place.

Cut out the 1/8" landing gear plate mounts and the piece of 3/8" x 3/8" motor mount stock. Make a 1/8" x 3/4" cut-out on the bottom of the 3 inside ribs on each panel to receive the leading gear plates. Glue the two plates in place with epoxy or Titebond. Glue the two 3/8" blocks on the top of the plates inside of rib #2, then cut out and glue in place a piece of 1/16" ply to fit in between the spars at rib #3 for the outboard landing gear support. When this assembly is dry, drill a 1/8" hole in the 3/8" block to receive the landing gear. Sheet the center section of the wing. Use 1/16" x 1/4" strips, glued flush with the front and back of the landing gear plate so the wing covering will be flush when doped on. Glue the tip blocks in place, and set the wing assembly aside to dry thoroughly.

Now go back to the fuselage and glue the top sheeting to the tail cone, cut two pieces of 1/4" sheet to shape for the sides of the fuel tank compartment and glue in place. Cut a piece of 1/2" sheet to shape for the top of the fuel tank compartment and hollow as necessary to clear the tank. Glue in place one each of top deck formers A and B to the front and rear of the radio



compartment, sanding the fuselage sides and blocks to get a good square fit. While this is drying, take some straight Q grain 1/8" sheet and cut out the tail surfaces and sand them smooth. (Glue the two pieces of the stabilizer together if you used 3" stock.)

Take the fuselage and drill 2 - 3/16" holes for the wing hold down dowels. Glue these dowels in place. Sand the wing to shape, smoothing out the center section sheeting. Place the wing in the saddle, rubber banding it in place, and aligning it up straight with the fuselage. Cut out 2 sides of the "cabin" from 3/32" sheet according to the plans and glue 1/2" triangle stock to the sides, flush with the top (one right and one left again!!). While this is drying, take the other 2 plywood formers, top deck A and B, and using Saran wrap, or waxed paper against the existing formers, pin these in place. Take the two sides of the cabin, and sand each one until they fit flush with the top of the wing, and formers A and B. Glue in place, MAKING SURE THE WING IS STRAIGHT BEFORE YOU DO SO! When dry, glue the top 3/32" sheeting to the cabin sides, removing the pins that held the A and B formers in place before sheeting. You can now glue the horizontal stab in place, and lay the works aside to dry.

Bend the main landing gear struts to shape according to the outline on the plans. Cut the landing gear doors from 1/16" plywood, and the nose wheel doors from 1/16" plywood. If you use 2 Williams Brothers pilots (no, I don't own any stock in Williams) like I did, now would be a good time to paint them. The head rests can be fabricated at this time as well.

When the fuselage wing assembly has had time to dry, take it apart and sand the fuselage to shape, rounding off all the corners, and shaping the jet exhaust to final shape. When this is done, place the wing back on, and sand the cabin to shape to conform with the fuselage top.

Glue the vertical fin on, making sure it is square fore and aft, as well as upright. I use scrap balsa sheet to make 90° angles, and pin these to each side of the fin while drying. Glue the filler blocks in place when the fin is dry.

The entire structure is given 2 coats of dope, and when dry and sanded, the wing and fuselage are covered with Silron, (or silk if you prefer). The tail assembly is covered with lightweight silkspan.

After covering, the entire plane was given 5 coats of clear, sanding with fine paper between coats. The cutouts for the pilots are now made, the headrests are glued on, the inside of the cabin is painted green to simulate zinc chromate primer, and dull black for anti-glare. Glue the pilots in place, and cut a 12" Sig canopy to shape. When the canopy glue has dried, mask it off, and you are ready for the color dope. I used Sig White and Gray mixed in a 2 to 1 ratio: 2 pints white, and 1 pint gray. It only took 3 coats for a good finish, and this was topped off with 2 coats of clear. The anti-glare black was made by adding some talcum powder to black dope. Finishing Touch decals were applied to give it that "look." The main landing gear is installed using Midwest nylon 1/8" landing gear clamps and sheet metal screws. The aluminum cowl is held on with sheet metal screws also.

Install your radio gear at this time. I see no reason why one of the small digital rigs cannot be used on this model, although I used the MIN-X GG-1R system which weighs a mere 7 oz., so if you go to the larger heavier equipment the wing loading will go up too (natch). A few words on the Min-X GG-1R: I have flown escapements, single servos, multi-reed, and now single propo (I have my reed set up for sale) and I have **never** enjoyed flying as much as I have since I purchased this system. It is compact, light, **and reliable;** has suffered two hard crashes, and still works fine!

One little trick I use, and maybe some of you have already used it, is to run the rate trim lever about 3/4 the way up (fast pulse) and get my mechanical neutral on the plane from that point. This gives a faster neutral, with more solid control. The pushrod for the rudder has to be in the inside hole for enough throw because of the now reduced throw at the actuator, but it also eliminates the "gallop" due to the faster rate. Whichever system you use, I hope you derive as much satisfaction and fun from this project as I have. Drop me a line c/o RCM, and let me know of your results!

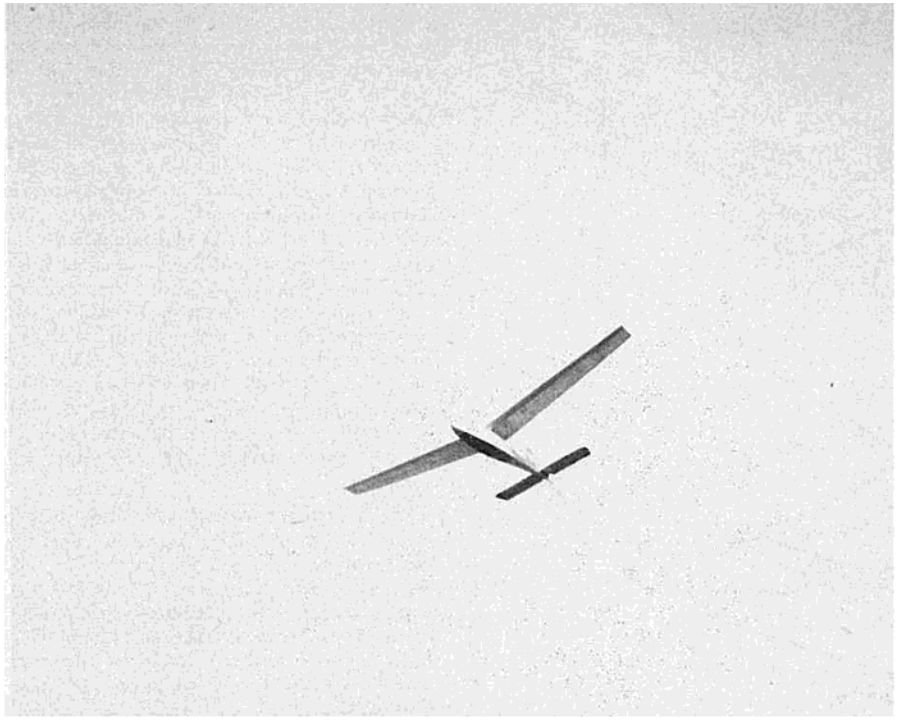
Barnacle with beefed-up stock wing.

The Design and Fabrication of A

FOAM GLIDER WING

By NICK LINARDOS

The Barnacle, with new foam wing, in flight.



MY first attempt at radio controlled slope soaring consisted of the "Barnacle" kit and rudder/elevator proportional controls. After numerous crashes. expensive radio equipment repairs, and six new wings, I began to wonder if it was **all** my fault. I observed other "Barnacle" models and realized that the other pilots were experiencing the same problems. The "Barnacle" wing lacked stability and structural integrity. I had failed two wings in flight while executing loops, and had resorted to a beefed-up wing on my sixth try. It had hardwood spars and caps, and a full "D" section leading edge. The "Barnacle" was still squirrelly during landings. I had moved the c.g. from 50% of MAC (per the plans) to 30% of the MAC and improved the flight stability, although landings were still partially controlled crashes. Apparently the lift contribution of the horizontal stabilizer is negligible and should not be considered when locating the wing c.g. position. I was determined to design and build a wing which would have high lift and inherent stability.

The selection of the airfoil shape was based on data obtained from Frank Zaic's Model Glider Design Book, and from my model building associates, Vic Brock and Jerry Huben. Jerry has made an extensive study of airfoil sections which have desirable characteristics at low Reynolds Numbers for model glider application. All sources agreed that it would be hard to beat the NACA 6412 for this application. The configuration selected is shown in Figure 1 and compared to the stock "Barnacle" wing.

In order to avoid stall at the tip, because of the smaller airfoil section, 2° washout (aerodynamic twist) was selected. This would (I hoped) create a uniform stall along the full span, eliminating the tip stalls. Dihedral of 5° was selected from observation of some stable flying gliders, and again, free advice from Vic and Jerry.

Now the problem was to build a highly undercambered wing, tapered and with twist. I had designed a wing which was extremely difficult to fabricate. I showed that configuration to another R/C associate, Bob Evans, an advocate of foam wing construction. Bob had been after me for months to give up the conventional, tedious method of wing construction for the foam method. He told me it would be like shooting fish in a barrel and explained that using the hot nichrome-wire cutting technique it would only require a root chord and tip chord template and any twist desired could be cut into a foam wing.

The following illustrations (2 through 5) describe the construction techniques of the wing. The foam selected had a density of one pound per cubic foot "B" board (expanded Polystrene beads) available from local manufacturers. Be sure to allow for at least ¼-inch around the envelope of the root rib template when determining the thickness of the foam required.

Figure 2 illustrates the design of the cutting tool. The nichrome wire stretched between the bow is approximately .010 thick and available at most model shops. Insulate the ends of the wire as shown

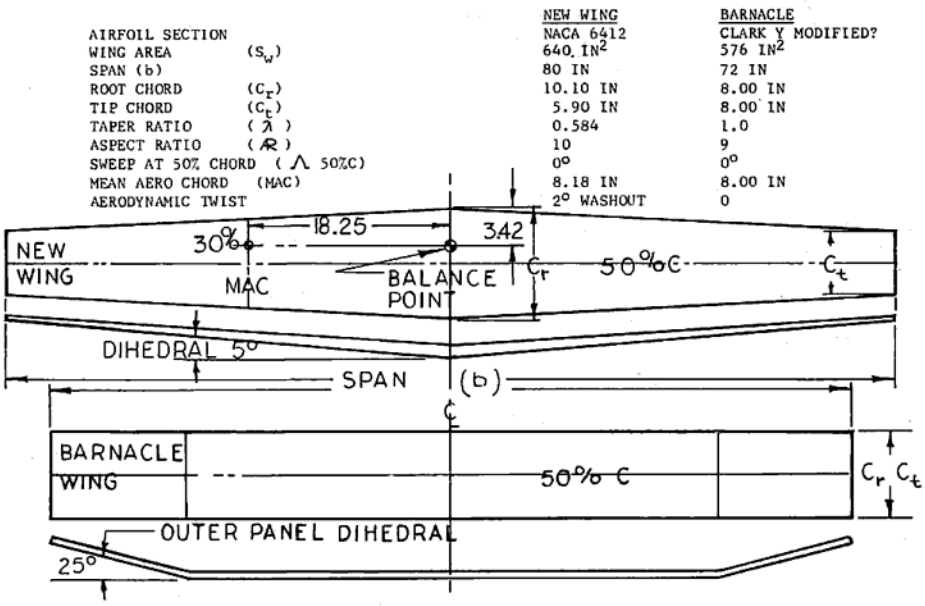


FIG. 1

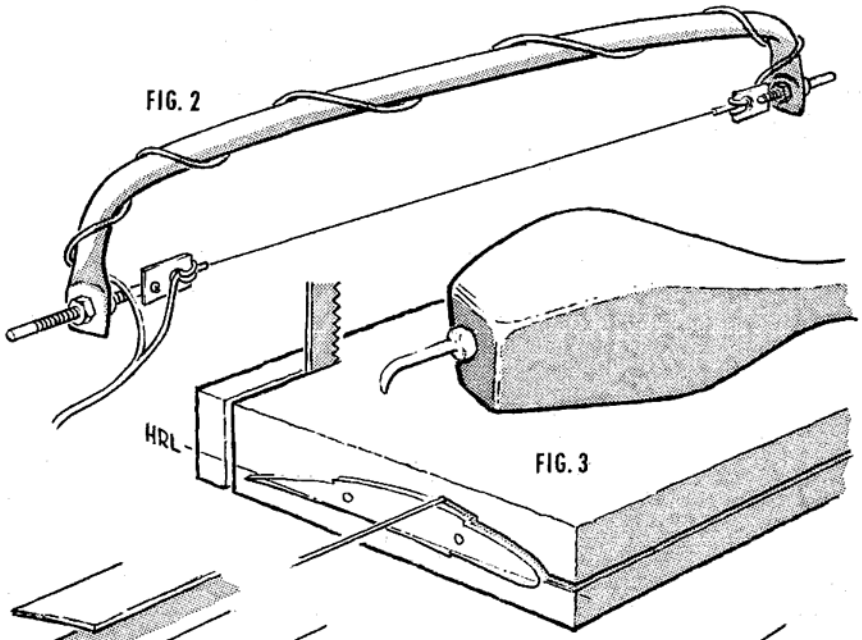


FIG. 2

FIG. 3

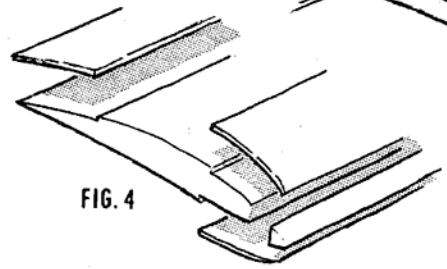


FIG. 4

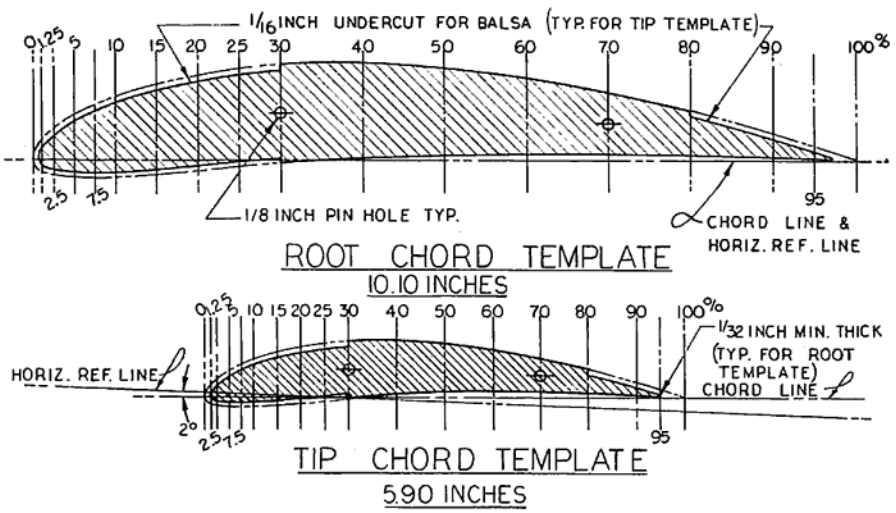
FIG. 5

and provide some method for regulating the tension in the wire. A threaded handle at one end of the bow, as shown, is one method that will work well. Cut the foam with a band saw or saber saw as shown in Figure 3, allowing ⅛-inch to ¼-inch around wing planform. Square off each end at the exact half-span of the wing and place the root and tip chord template (see Figure 6) at their respective ends with ⅛-inch pins. Connect the wires from the cutting tool to a toy train transformer. Adjust the temperature so that the wire cuts through the foam smoothly without hanging up, but not hot enough to melt the foam and leave undercuts on the wing surface. A bit of practice on a scrap piece of foam is recommended before starting the wing. An assistant will be required to hepl cut the foam when the proper temperature has been selected. Place enough weights on top of the foam to hold it securely. Enter the wing at the leading edge and move until contact is made with the end templates. Proceed along the upper surface on common percent lines at each end template. This will keep the wire running along element lines and is very important in order to produce the proper intermediate section. Break through the trailing edge simultaneously. Place the upper piece of foam back on the upper surface of the wing section, turn over, with the lower surface of the templates facing up, weight down properly, and cut the lower surface of the wing in the same manner used for the supper surface. You now have cut one-half of the wing. Repeat the procedure for cutting the opposite wing, and be careful not to end up with two L.H. or R.H. wing halves!

If you intend to cut more than one wing, I suggest fabricating a fixture to allow cutting the centerline canted joint with the nichrome wire to produce a close, even fit required for the butt joint to give 5° dihedral.

Figure 4 illustrates the assembly procedure. All the balsa components are bonded to the foam with Foam Stick, Sig Foam, or equivalent. **Be sure not to use model airplane cement or dope as it will dissolve the foam.** Trim the leading edge of the cut foam 3/16-inch constant to allow for a ¼-inch thick leading edge member. This will bring the leading edge member out to the basic air-foil leading edge. The leading edge member is bonded to the foam first, then shaped to match the airfoil section leading edge radius and foam contour. The upper and lower leading edge skins are next, followed by the trailing edge upper skin. Feather the upper and lower leading edge skins with sandpaper to fair into the leading edge. The dihedral joint is made with three fiberglass straps, overlapping as shown in Figure 5 with Hobby-Poxy Formula II or equivalent. A little light sanding and the wing is complete.

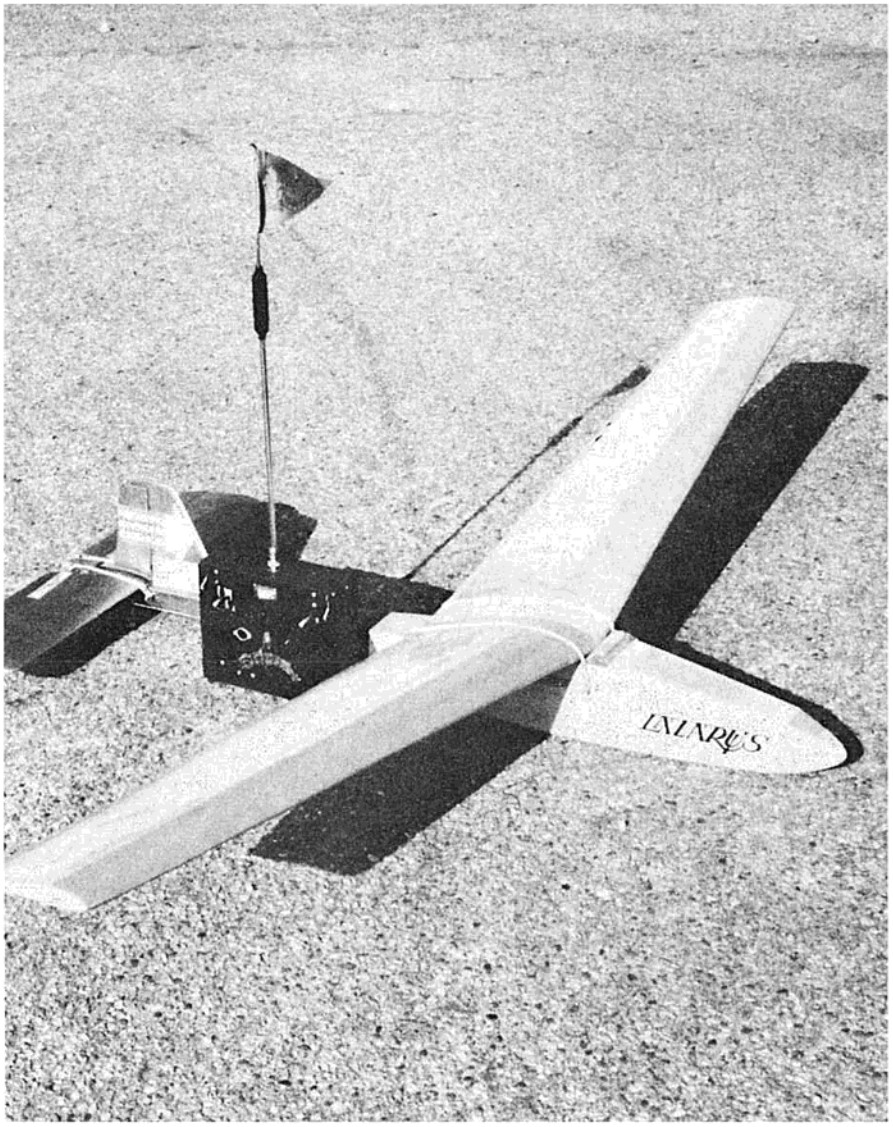
No external covering over the foam is required for strength, however, for appearance or for use with fuel, it can be covered with Coverite, MonoKote or equivalent. A weight/strength comparison of the foam wing and the beefed-up "Barnacle" wing indicated the foam wing was superior. Both wings weighed the same, but the foam wing is much stronger. It



MAKE FROM 3/32 OR 1/8 INCH PLYWOOD

FIGURE 6

NACA 6412 AIRFOIL ORDINATES		
100 INCH SECTION		
STATION	UPPER	LOWER
0	-	0
1.25	2.73	-1.23
2.5	3.80	-1.64
5.0	5.36	-1.99
7.5	6.57	-2.05
10	7.58	-1.99
15	9.18	-1.67
20	10.34	-1.25
25	11.14	-.78
30	11.65	-.38
40	11.80	.20
50	11.16	.55
60	9.95	.78
70	8.23	.85
80	6.03	.73
90	3.33	.39
95	1.79	.16
100	(.12)	(-.12)
100	-	0
L.E. RADIUS: 1.58		
SLOPE OF RADIUS THROUGH END CHORD: 6/20		

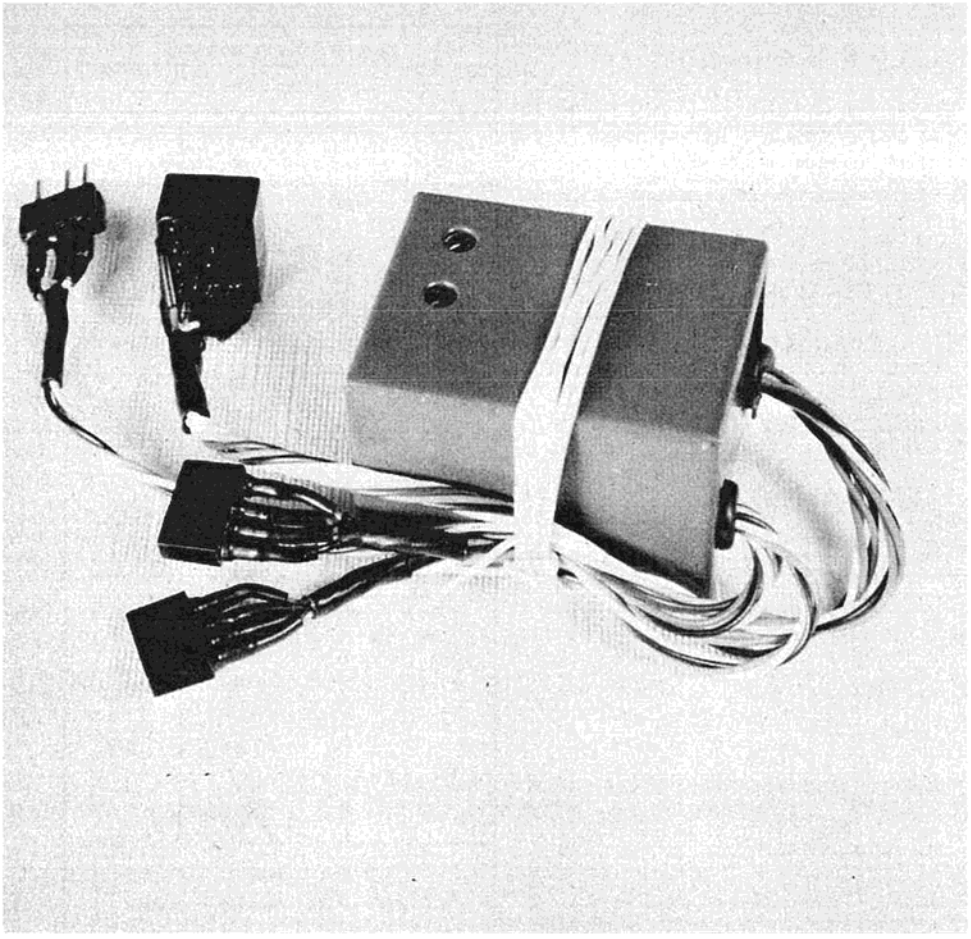


Barnacle with new foam wing installed.

should be noted that prudent use of the heavy materials, such as epoxy and glass, during construction is essential to maintain the superior strength-to-weight ratio. The new wing, balanced as shown in Figure 1 (at the 30% MAC), will give you a fine flying "Barnacle." I have logged many hours of trouble free soaring with this wing. The glider, when trimmed properly, requires very little stick input to maintain level, straight flight. I have had hands off the transmitter for periods greater than one minute. Landing with the new wing is greatly improved. The wing stays level all the way to touchdown; I never could keep the "Barnacle" wing level during landings. The only undesirable characteristic of the new wing occurs during a climbing turn stall at which time the model falls off sharply on the opposite side of the turn.

As far as strength is concerned, I can vouch for the superior strength of foam construction. Many times, due to pilot error, I have run into obstacles and made one point nose landings without sustaining as much as a dent in the wing. Consecutive loops have been accomplished without any noticeable wing deflections. I am so impressed with the performance of the foam wing that I have started the design of a 12-foot wing with an aspect ratio of 20 to use on a 5-foot glass-laminate fuselage.

Good flying.



The completed receiver-decoder with all plugs attached. One of the smallest units available today.

by ED THOMPSON
RCM TECHNICAL EDITOR

RCM CLASSIC

Part V of Ed Thompson's versatile two to six channel digital proportional system, designed exclusively for R/C MODELER MAGAZINE. This month, the first of two installments on constructing the decoder.

PREFACE

Why do magazines that have been using cheaper pulp paper for years decide to use slick paper?

Why do champions for peanuts suddenly woo the elephants?

In a word, the answer is COMPETITION!

The rush of silvered words from pious lips would have you believe otherwise. In fact, they would have you believe almost anything else! One of the REFORMED may adjust his white hat and dismount his white charger to take you into his confidence. Of course, he will probably JAB you to believe that he has built and flown over 100 radio control models to keep you in your place. When the SMOKE clears though you have a feeling you've been had again! It's the same old song all over again . . . a mixed-up defensive dissertation complete with patronism and parables. The ironic part of the whole charade is that, while the operation might offer some relief, the patient still remains on the critical list. You can't effect a lasting cure for a chronic illness by feeding symptoms, especially when the doctor's specialty is trephining! It takes more than face lifting and promises of Utopian content to put BREATH IN A SOUL SO DEAD!

It appears that the latest Rx for a model magazine that suffers from competitionitis is to copy a better magazine. We at RCM don't mind the imitation. In fact, we welcome it as recognition, by the other magazines, of what the modeling reader should expect for his money.

Who knows, if the competition tries hard enough, they may even come up with something original in electronics instead of the current trend to BORROW a kit from a manufacturer or rehash ancient circuits in an attempt to keep up.

To get to the business at hand, the first half of the decoder is presented this month. It was necessary to break the decoder down into two parts due to space limitations.

GENERAL

Since silicon-controlled switches are used in the decoder, I will attempt to give a basic rundown on how they work. The best place to start is with silicon-controlled rectifiers (SCR's). The SCR is a 4-layer device that has the ability to block applied voltage in either direction. In other words, with the device connected in a circuit such as figure 1A and with voltage applied, in its OFF condition, it will block current flow and will not allow the relay to operate. This is an important characteristic of an SCR but hardly makes it a useful device as yet. In order to make it useful we must be able to cause it to draw current through the relay and close the contacts. Figure 1B shows how this can be accomplished. When the switch is closed the SCR will conduct and current will flow through the relay. Here is the selling point for the SCR's existence; when the switch is opened and voltage is removed from the gate it **will not** cease to conduct. In fact, it will continue to conduct forever if we don't disturb the circuit. The only way we can turn the SCR off is by removing the applied voltage. Figure 1C shows a switch in series with the relay that will accomplish this.

Let's recap: once an SCR is OFF or BLOCKED it will remain in that state until we apply a forward-biased voltage to its gate. When we cause an SCR to conduct it will continue to conduct without necessity to maintain forward-bias on the gate. The only way the SCR can be turned off is by removing the applied voltage to the circuit. What I have said so far applies to the circuit of figure 1 and should satisfy the average modeler. To explain a little further for the experimenter it will be necessary to dig a little deeper. The SCR is like a rectifier except we can control the TURN-ON by external circuitry. Conduction will continue until the current flowing through the device falls below the holding current (Ih). When this happens the device reverts to its OFF state and the gate is again ready to exercise turn-on control. This makes the SCR the solid-state equivalent to a vacuum tube thyratron. In order to grasp the turn-on mechanism the SCR can be compared as an NPN and PNP transistor interconnected to provide positive feed-back. Figure 2 shows this comparison. Note that the anode, gate and cathode are analogous to collector, base and emitter respectively. When the anode is positive, with respect to the cathode, the center junction (corresponding to the two collectors and shown by the dotted line) will be reverse-biased as long as neither transistor is conducting and the loop gain is below unity. In this condition the anode to cathode current (Ia) is, for all practical purposes nil, and the device is in its BLOCKING state. It will remain in this state until we cause the loop gain to equal or exceed unity, whereupon it will become regenerative and conduct. Since the conducting state is regenerative the device will turn on at a speed determined by the effective frequency response of the two transistors and current will be limited by the effective saturation resistance of the two devices and the external circuitry.

To clarify the regenerative action of the transistor pair, assume the device is in its BLOCKING state and we have just applied a small positive voltage to the gate. This will cause conduction of Q1 which will create a small current flow from the anode through the emitter-base junction of Q2 down through the collector of Q1 to the cathode. The current flow we caused at Q2's emitter-base junction forward-biases Q2 and causes it to conduct heavily. This heavy conduction provides a path for Q2 to cause current flow between the emitter-base junction of Q1, forward-biasing Q1. We no longer need the gate voltage we previously applied to start things off as the collector current flow will sustain conduction.

Let's try again and see if we can condense the operation down to a few sentences. The collector of the NPN transistor drives the base of the PNP transistor and the collector of the PNP transistor drives the base of the NPN transistor. This forms a positive feed-back loop with a gain equal to the product of the two transistor gains. The circuit will remain blocked as long as this gain is less than unity and become self-regenerative when the loop gain reaches unity. When a positive current is introduced to the gate the NPN transistor conducts. The gain rises with increased current flow and a point will be reached where the loop gain becomes unity and the device will become regenerative. The transistors will drive each other into saturation and the device conduction becomes independent of trigger current. It will remain in conduction until the loop gain is reduced to less than unity.

Let's go on to the SCS's and see what the difference is between the two devices. To start with, the basic difference is that an SCS cannot only be turned on by a positive current at the gate, it can also be turned off with a negative current ap-

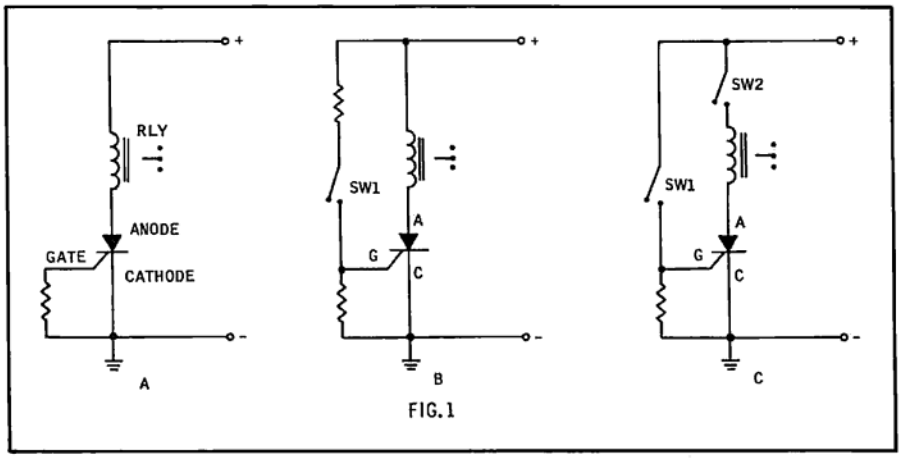


FIG. 1

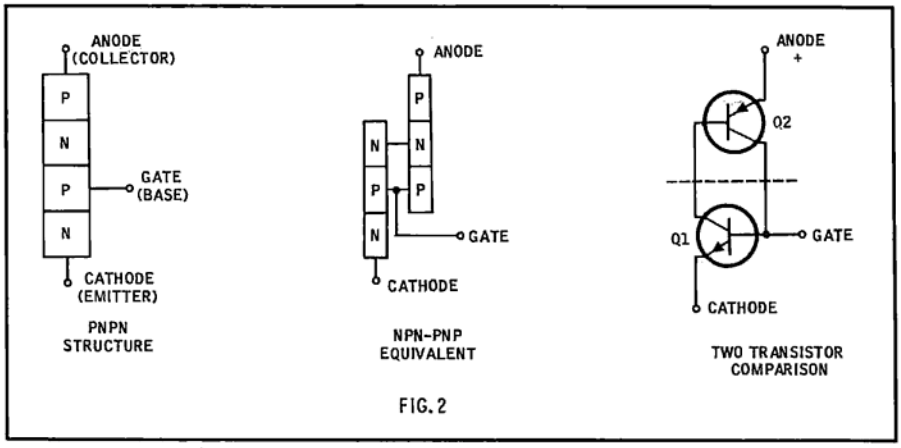


FIG. 2

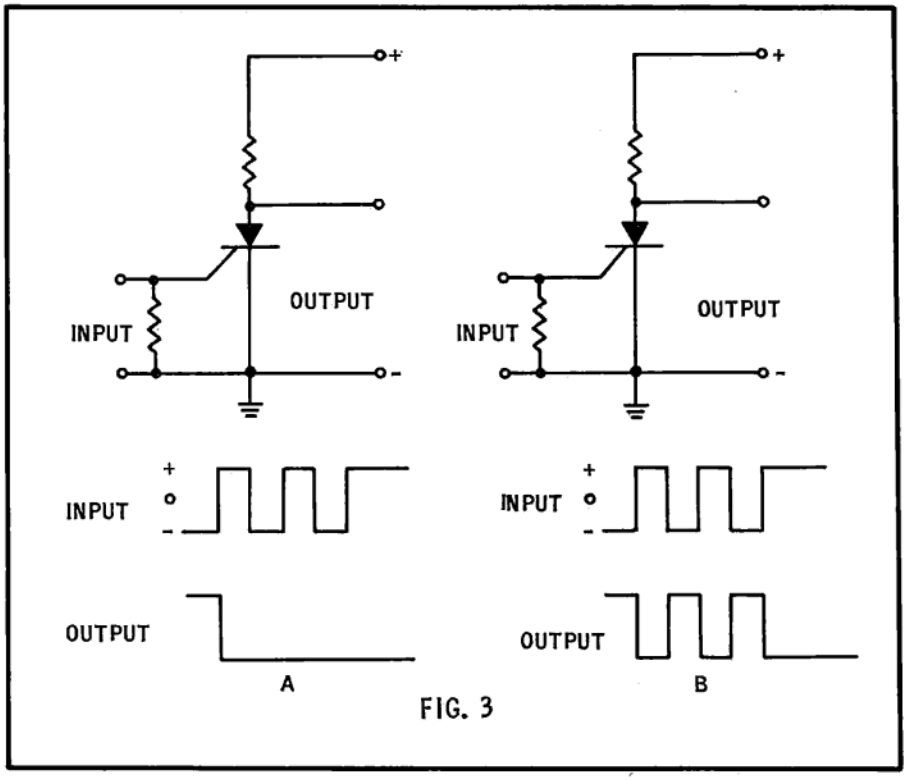
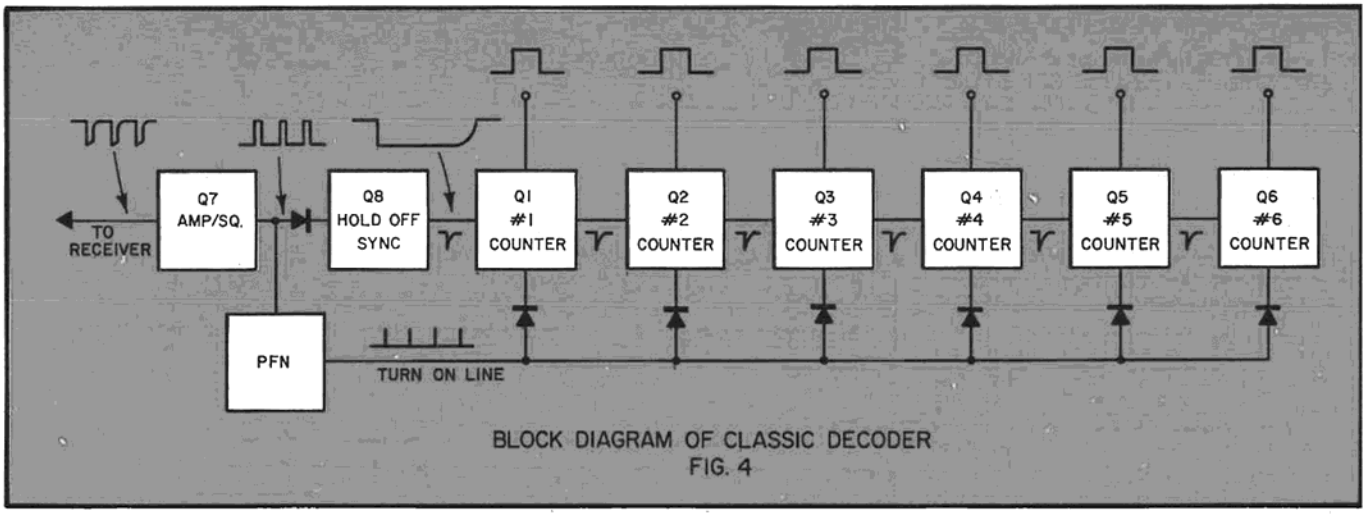


FIG. 3



BLOCK DIAGRAM OF CLASSIC DECODER
FIG. 4

plied to the gate. Figure 3 shows two circuits with some waveforms. A is an SCR and B is an SCS. As you can see, the SCR turns at the leading edge of the first positive-going pulse and continues conducting even though the input alternately goes positive and negative. This was explained before and is due to the fact that the gate lost control of the SCR. The only way to turn it off is to remove the voltage to the circuit. The SCS, on the other hand, turns on at the leading edge of the first positive-going input pulse and turns off at the trailing edge when it goes negative. It turns on when the input goes positive and turns off when the input goes negative. The output, therefore, follows the input with a 180 degree phase difference. To achieve turn-off without removing circuit voltages we must adhere to the holding-current characteristics of the 4-layer device. Holding current (Ih) is described as the minimum anode current at which the device will remain in conduction under specified circuit conditions and temperature. Assume that (Ih) for our circuit is 1 MA and in its ON state the SCS is drawing 5 MA. It's obvious that we could disconnect the anode lead and the current would drop to 0 MA. This would drop the anode current (Ia) below the (Ih) and the device would turn off. We can also control the OFF state of the SCS, by lowering (Ia) below (Ih) with the application of reverse bias to the gate. That is the selling point for the existence of the SCS. We can control both the ON and the OFF state of the SCS by application of either forward or reverse-bias to its gate without the necessity to sustain the bias for operation in either state.

The foregoing discussion concerning the inability of the SCR to turn-off with reverse-gate bias is theoretical in nature and based on manufacturer's literature. The gain may be reduced below the regenerative point if enough reverse current can be applied. At high anode currents this would not be practical, and even at low anode current special circuitry would probably be required for consistency. On the other hand the SCS was deliberately designed to be turned-off with the application of reverse-gate bias. The reason for the difference in the operating characteristics of the two devices is in their inherent design and they are controlled during manufacture to operate in the different manners that I have described. It is beyond the scope of this article to go into all the different parameters of either device or include typical circuits which would give a better understanding of how they work. If you are interested in digging further into theory or application there are many reasonably-priced books for sale at most of the electronic, radio and TV parts outlets.

Before I go on with the decoder, I would like to mention that the particular SCS used is a GE 3N84. This SCS has two gates which are designated as (Gc) and (Ga). (Gc) is the gate closest to the cathode and the one used in the foregoing discussion. (Ga) is a gate connected to the collector of Q1 (figure 2). It provides an additional control of the device in basically the same manner as the one which we discussed. However, it requires more power and opposite polarity to accomplish the job we will require from the device. The gate we will be using is effective at the current levels used in the decoder and during construction we will clip the (Ga) lead off. The (Ga) lead is not shown on the schematic drawing for clarity.

THEORY OF DECODER

If the foregoing discussion of silicon-controlled switches left you a little confused I would suggest that you re-read it again. The main thing to remember is that a positive pulse to the gate will turn

RCM CLASSIC

PARTS LIST DECODER

ITEM	DESCRIPTION			PART #	MFG. OR SOURCE
	Capacitors				
C1	.005 Disc Ceramic		20%	CO23B101E502M	Sprague
C2	.22 Tantalum		20%	TSD1-30-224	Semcore
C3, 4	.01 Disc Ceramic		20%	CO69B160E103M	Sprague
	Diodes				
D1	Diode, Germanium, Signal			1N34	Amperex
D2	Diode, Silicon, Signal			1N4148	I.T.T.
	Resistors				
R1	22K	¼W	10%		IRC or Ohmite
R2, 5	220K	¼W	10%		IRC or Ohmite
R3, 6, 8, 10	2.2K	¼W	10%		IRC or Ohmite
R4, 7	4.7K	¼W	10%		IRC or Ohmite
R9	10K	¼W	10%		IRC or Ohmite
	Transistors				
Q1-Q6	SCS	NPNP		3N84	General Elec.
Q7, 8	PNP	Silicon		SPS401K or 2N4126	R.E. or Motorola
	Miscellaneous				
Hook-up Wire	#26 Stranded				Bonner, RC Craft, etc.
Servo Conn.	4-Pin and/or Multi-Block				Orbit
Switch/w Cover	4 PDT				RC Craft
Insulator	1/64" Sheet 1-9/16" x 1¼"				Royal Elec.
P.C. Board (Etched)	1/32"				Royal Elec.
Battery Conn.	3-Pin (Cut Down from 6-Pin) RMK				Royal Elec.
Mounting Screw	#2 Self-Tapping				
Heat-Shrink Tubing	Large and Small				Royal Elec.

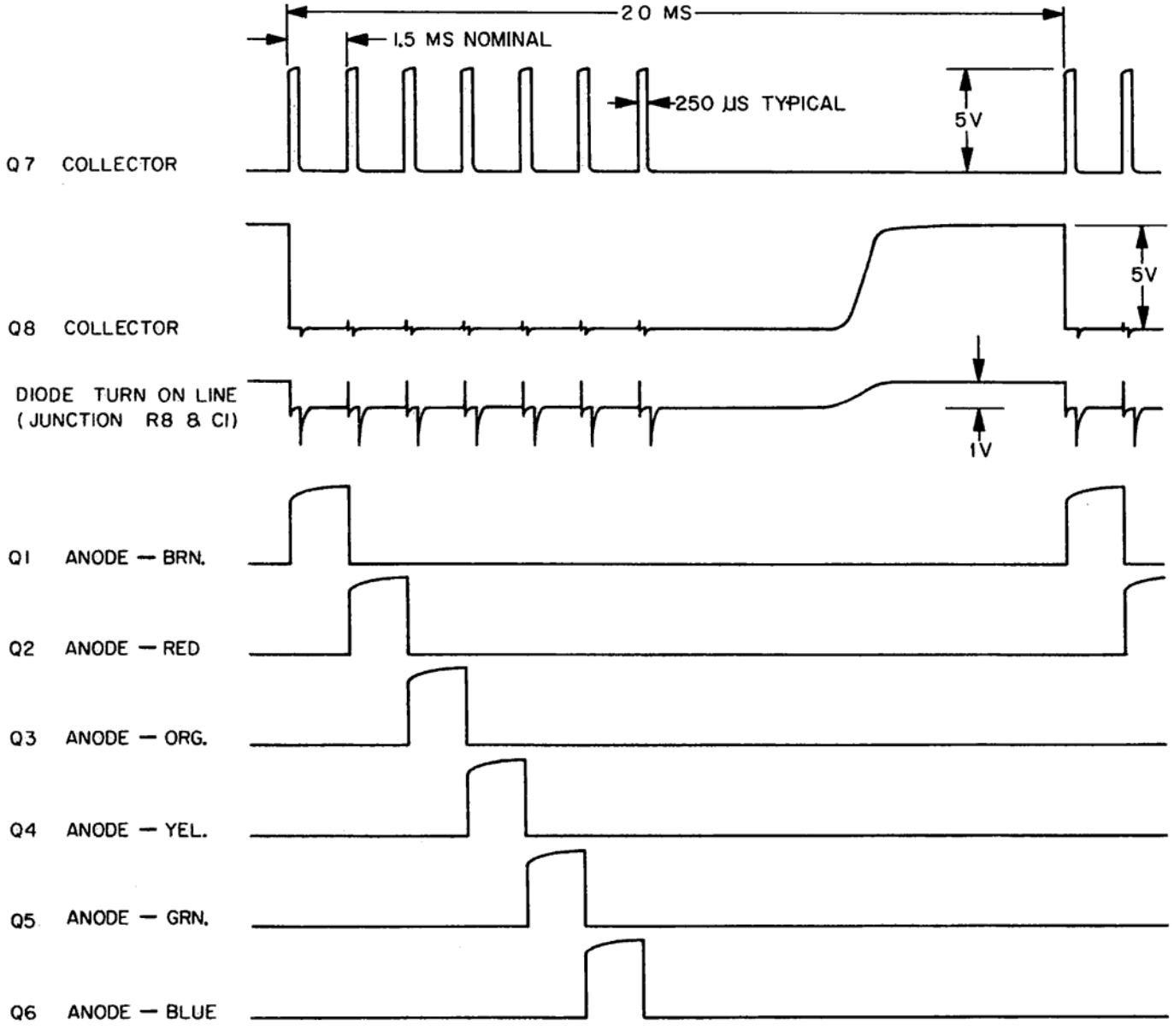
BOLDFACED: Electronic Part Numbers usage and/or amount depends upon number of channels desired — see schematic and text.

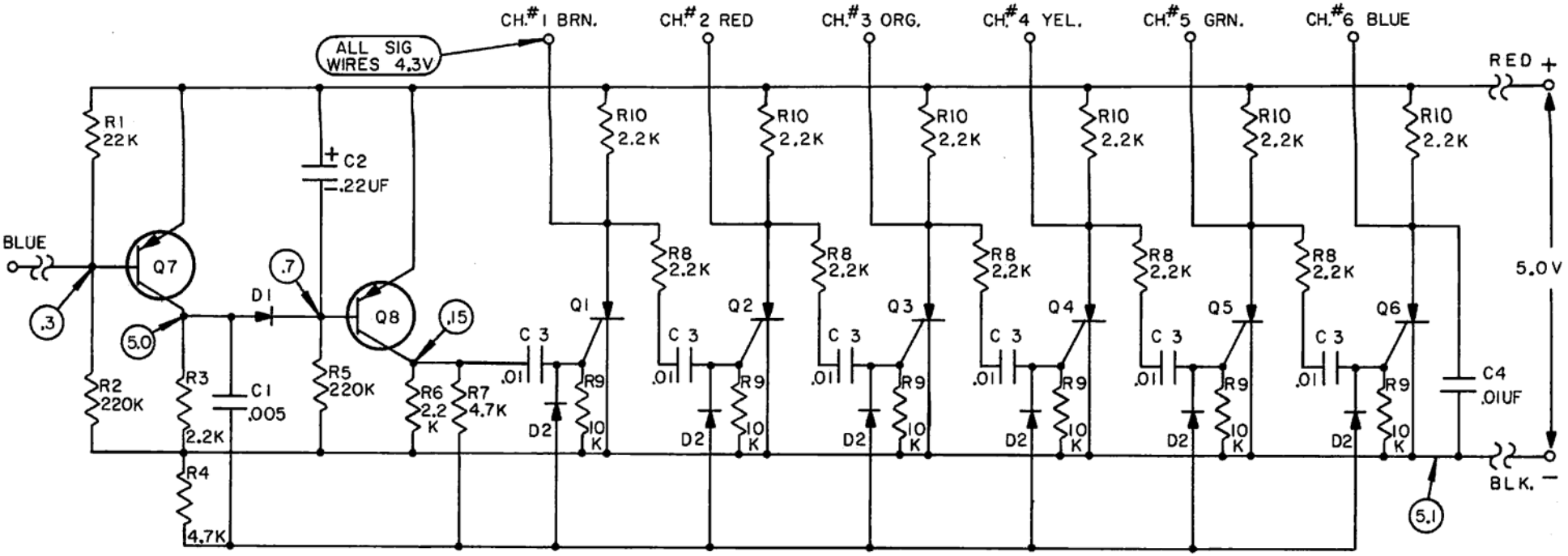
Complete Designer Approved Kit or individual parts available from Royal Electronics.

an SCS ON and a negative pulse will turn one OFF. Your local Einstein may be able to help if you have any remaining questions. The block diagram of the decoder shows the various stages involved. I will run through the operation quickly for those of you who don't want to get too involved.

The Classic sends a series of relatively wide pulses which are processed by and through the receiver. The number of pulses sent will depend upon the number of channels desired and will be equal to the number of channels desired plus one. These pulses are applied to Q7 which amplifies and squares them. From the collector of Q7 they are applied to the pulse-forming network (PFN). The pulse-forming network changes these pulses into very short pulses to be used as trigger pulses to TURN ON the SCS's. The pulses are also applied to the hold-off sync stage (Q8) which senses the first pulse of the pulse train and holds off until after the pulse train is completed. Once the sync stage is in its hold-off state it does not see any further pulses. The first incoming pulse does two things: it causes the sync stage to hold off and applies a positive pulse through the PFN to the turn-on line, turning on any SCS that was previously off. When the sync HELD OFF at the first pulse it also applied a negative pulse to the #1 counter (Q1) turning it off. This initiated output pulse #1. When the next incoming pulse arrives it will create another turn-on pulse which will turn counter #1 back on and complete the #1 output pulse. When the #1 counter stage turns on again it turns off the #2 counter, initiating output pulse #2. The next incoming pulse then applies another turn-on pulse through the PFN and turns on counter #2 completing pulse #2. This action continues until the incoming pulses have created the required number of output pulses which command the servos. Remember that the sync stage HELD OFF after the first pulse and was blind to the other pulses. This prevented the #1 counter from turning off at any pulse but the first. However, the sync stage knows when the incoming pulses are no longer present and after waiting for approximately the time it takes to send two pulses, comes on again. This occurs during the sync pause between pulse trains and the decoder is ready to process the next pulse train that arrives. This action continues at a 20 MS repetition rate. That is basically how it works and I would advise you to read it over a couple of times as it may be helpful if you have to trouble-shoot the system later on.

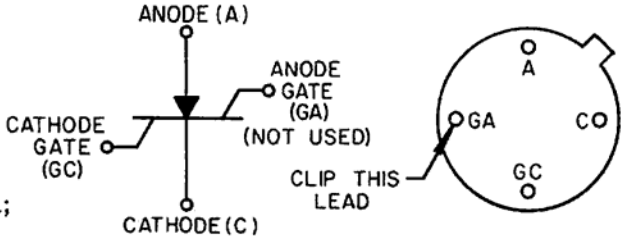
To detail the operation a little better I will go through it again. The incoming pulses are amplified by Q7 and applied to the pulse-forming network. The pulses are differentiated by C1 and R4 which make up the pulse-forming network. The junction of C1 and R4 is the turn-on line. Diodes D2 pass the positive pulses on to the individual SCS's and isolate the stages from each other. The input pulses are also applied to Q8 (hold-off sync stage) through D1. Normally this stage will be conducting, being forward-biased by R5. C2 is charged by R5 also. The inverted appearance of Q7 and Q8 is due to the schematic drawing and a close look will reveal that the polarities are correct. The first incom-





ALL RES. 1/4W 10%
ALL CAPS. IN MFD.
C2 20% TANTALUM, ALL OTHERS
DISC CERAMIC 20%
Q7 & 8 SPS-401K
Q1-6 SCS-3N84 G E
D1 GERMANIUM DIODE IN34
D2 SILICON DIODE IN4148
RES. CHECK 2.5K
CURRENT CHECK 15MA.
VOLTAGE READINGS TAKEN WITH 20K Ω/V MULTIMETER-NO SIGNAL;
RED (+) METER LEAD CONNECTED TO POSITIVE (+) BATT. LEAD;
USE 1K RES IN BOTH METER LEADS AT PROBES.

6 CHANNELS SHOWN: FOR LESS CHANNELS DELETE HIGHER NUMBER SCS STAGES AND USE C4 FROM ANODE TO GROUND AT LAST STAGE. i.e. THREE CHANNEL WOULD CONSIST OF SCS STAGES #1 THRU #3

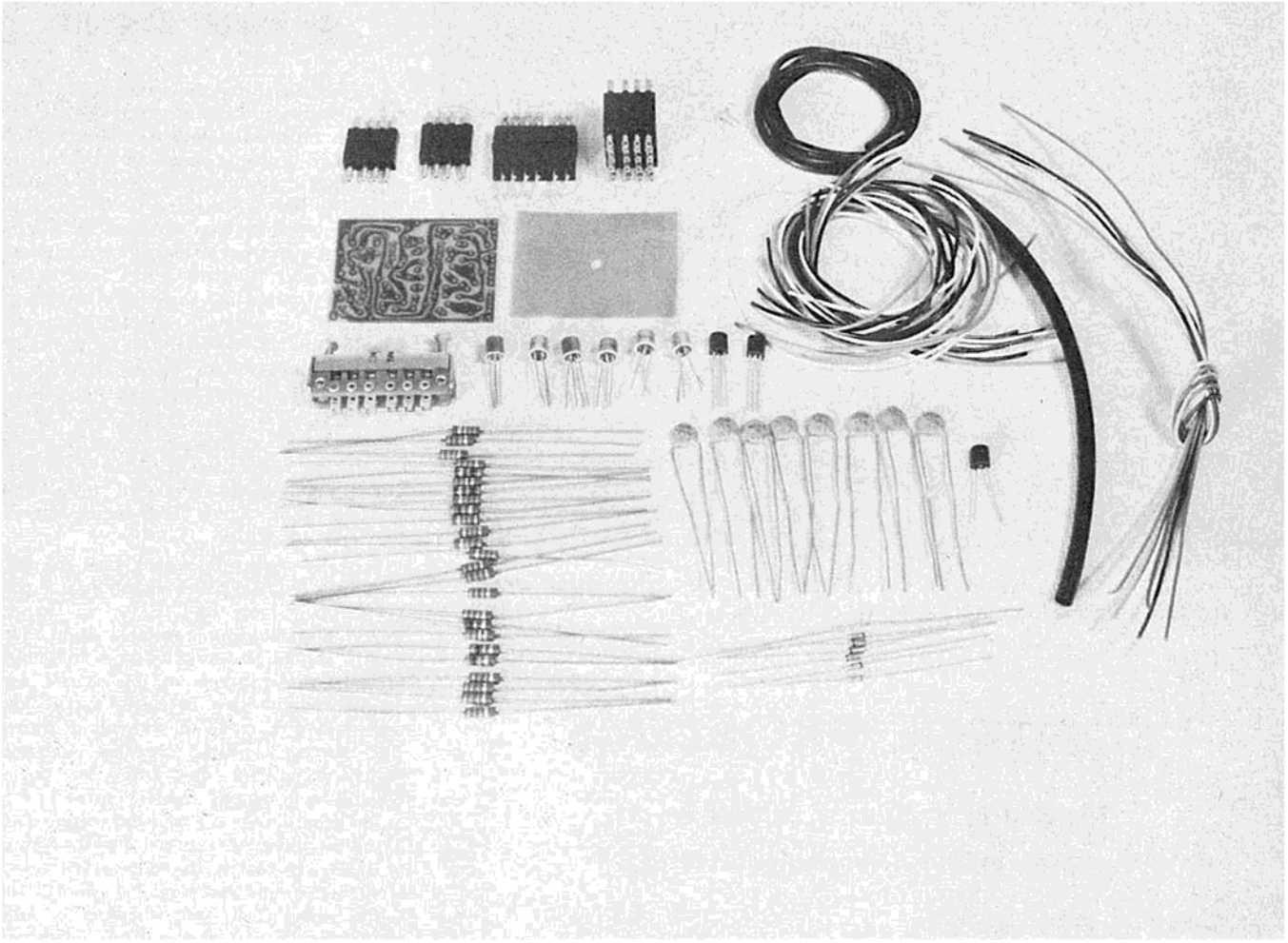


3N84 SYMBOL

3N84 BOTTOM VIEW

401 K BOTTOM VIEW

CLASSIC DECODER

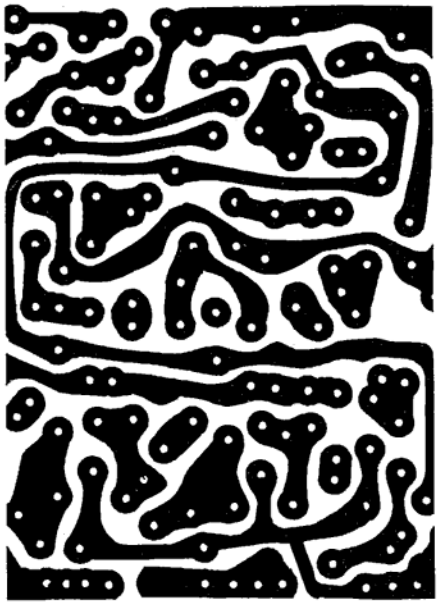


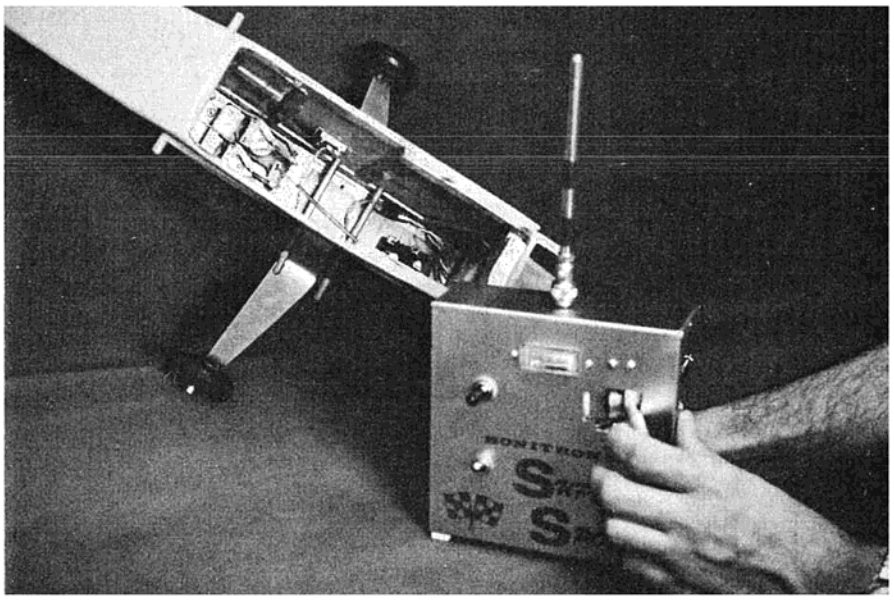
ing pulse causes D1 to conduct, through Q7, discharging C2 — this causes Q8 to cut off. The time constant of R5/C2 will keep this stage cut off for the duration of approximately two input pulses. Therefore as long as pulses are present this stage will hold off. As soon as the pulses are removed R5 will charge C2, and Q8 will conduct. At the end of each pulse train it does just that and prepares the decoder to accept the next pulse train. When the pulse train arrives and Q8 turns off its collector going negative allows C3 to discharge through R9. (Its left side was charged positive while Q8 was conducting). This transfers a negative pulse via C3 to Q1's gate turning it off. For you who caught it, the fact that both the positive pulse from the PFN and the negative pulse via C3 are present at Q1's gate at the same time has already been allowed for. The pulse duration of the positive pulse is made considerably shorter and the negative pulse wins every time. The next incoming pulse (#2) doesn't affect Q8, which is still holding, but it does turn Q1 back on with a positive pulse via the PFN.

Let's pause here and discuss the output pulses to the servos. Q1 through Q6 are normally conducting and the anodes are close to ground (neg.) potential. Since the input transistors in the servos are NPN's they are cut off. When we turn off one of the SCS's its anode goes positive and the servo input transistor conducts. When we turn the SCS back on, the servo input transistor cuts off again, and we have produced a decoder output pulse (or servo input pulse). Since Q8 holds throughout the pulse train Q1 cannot be turned off again (Thank God!) until after the sync pause and arrival of another pulse train. Q1 stays conducting until turned off again by Q8 CUTTING OFF on the first incoming pulse and the action just described repeats. When the first servo pulse is completed and Q1 conducts it transfers a negative pulse via R8 and C3 to Q2's gate turning it off. Although we again have two pulses of opposite polarity present at the gate, the negative pulse wins due to the longer duration. The next incoming pulse (#3) after being differentiated turns Q2 back on and it transfers a negative pulse via R8/C3 to Q3's gate turning it off, etc., etc. As each output pulse is completed the associated SCS remains on. Each SCS stage can only be turned OFF by the preceding SCS stage turning ON (except in the case of Q1 which turns off when Q8 cuts off), so the circuit counts the pulses down. As you can see the duration of each servo pulse is dependent upon the time between the leading edges of the adjacent pulses in the incoming pulse train which control it. The value of the components used in the SCS stages were selected for proper time constant and establish operating parameters to allow optimum results. R7 is used to insure that all SCS stages will turn on during a sync pause by applying a positive voltage directly to the turn-on line when Q8 is not holding during the sync pause. A 10K resistor is used from the gate to cathode of each SCS (R9) for temperature stabilization. C4 is used from anode to ground of the last SCS stage to enhance its ability to respond to the relatively short turn-on pulse.

DECODER PC BOARD

(SHOWN TWICE SIZE)



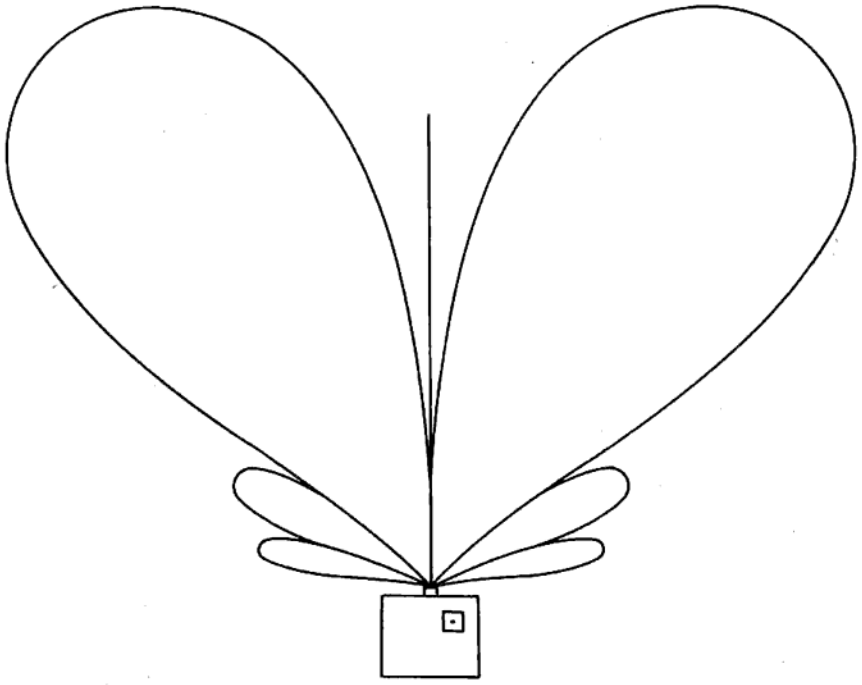


Proper adjustment of actuators to prevent cycling under extreme movement of stick and trim controls help avoid airborne difficulties.

CONTROL PROBLEMS

The first in a series of articles on all phases of Pulse Proportional Flying.

Antenna radiation pattern of typical RC equipment results in a minimum signal when pointed directly at aircraft.



ANTENNA RADIATION PATTER OF TYPICAL RC EQUIPMENT RESULTS IN A MINIMUN SIGNAL WHEN POINTED DIRECTLY AT AIRCRAFT.

FIG. 1

By ROBERT BENSON

AFTER watching the experienced flyers perform a complicated series of maneuvers repeatedly with no apparent difficulty, the beginner wonders why his less sophisticated equipment gives him so much difficulty. Surely, learning to fly is enough to keep a fellow busy without his having to worry about uncertainties of equipment performance! Is there some basic difference that makes the expensive system inherently far more reliable than the simpler one or are things just naturally more troublesome for the beginner?

Actually, the differences in the systems are sufficient to give an inexperienced flyer unnecessary difficulties unless he understands the operation of his system and guards against the errors of installation and operation which may cause "unexplained" difficulties.

First let us be concerned with the performance characteristics of the digital proportional systems that allow the expert flyer almost continual reliable flight. The digital system transmits a series of pulses, actually interruptions of the carrier frequency, which are received, sorted and passed to a number of individual servos. The sorting process contains elements which recognizes the group of pulses which are to control rudder, elevator, etc., as a group and resets itself after each group to make certain that the first pulse in the group goes to the appropriate servo. Under certain conditions of flight, the signal received by the airplane is sufficiently weak that the control pulses are of insufficient magnitude to be sent to the individual servos. For the digital system, the circuit is designed to cause the servo to remain in its previous position unless an actual pulse is received. This is accomplished by comparing the received pulse to a second pulse generated by a circuit containing a potentiometer which indicates the actual servo position. Without the receipt of a pulse for a particular servo, the second pulse is not generated and the servo drive motor is not activated.

The loss of signal for a digital system therefore results in the momentary loss of control, but the airplane continues in its path determined by the previous commands. Usually the loss of signal is momentary and due to adverse orientation of either the transmitting or receiving antenna. During the period when the digital system has actually lost control, the plane maneuvers into a more favorable orientation and control is restored. Momentary loss of control in a digital system is therefore not obvious, other than a slight sluggishness in response to command.

It would, therefore, appear that the digital system is sufficiently forgiving, that it is an ideal choice for the beginner. Yet, several other factors must be considered, including cost. The loss of signal due to antenna orientation certainly can cause control problems, but the beginner is likely to lose at least one aircraft in learning to control the airplane through the desired maneuvers. The cost of the airborne equipment at stake, not only radio equipment, but the airframe, en-

gine and accessories, makes all beginner errors extremely costly.

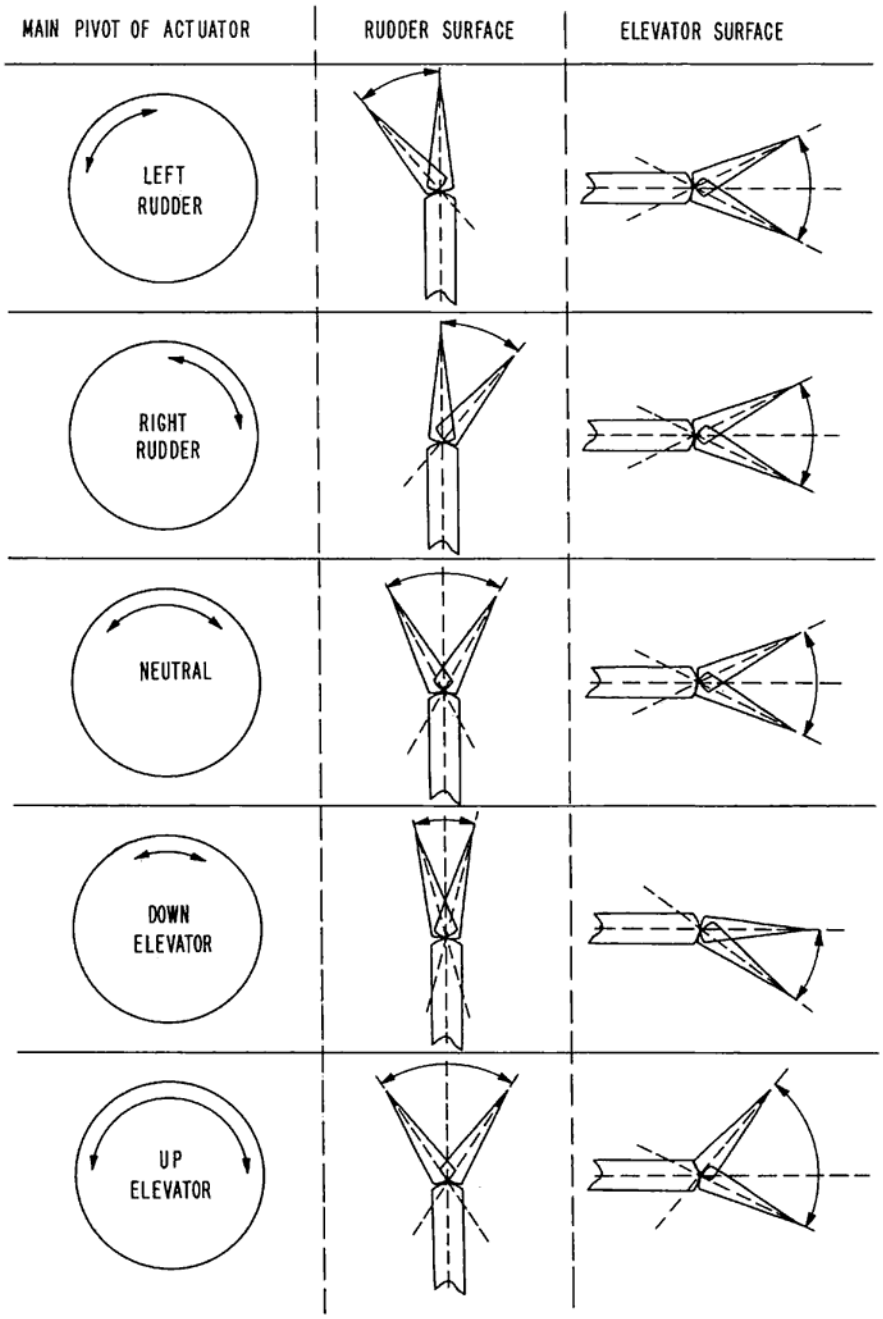
The most popular of the less expensive systems is either the galloping ghost or, perhaps, the more sophisticated fast pulse dual actuator systems. That portion of the initial investment subject to crash damage, the airborne portion, is much less expensive and with the proper choice of equipment, aerodynamically more forgiving.

First of all let us assume perfect equipment functioning, and a beginner pilot error. The radio equipment including actuators are relatively rugged, relatively inexpensive, and economically repaired. The airplane required is easily constructed from a kit costing but a few dollars. A plane such as the ROYAL COACHMAN is extremely rugged, suffers minor crash damage, and can be easily repaired. It is relatively heavy for its size, a little more difficult to fly, but almost always comes through in shape for a little epoxy repair. The TRI-SQUIRE is a less rugged, lighter aircraft for its size, but extremely stable when airborne and easy for the beginner to learn the basic maneuvers. Crash damage can require the construction of a second aircraft.

Both the Coachman and the Tri-Squire are economical approaches for the beginner. The engine requirement is minimal and yet reasonable maneuverability is attained with rudder, elevator and motor control. Take-offs, landings, loops and even rolls may be mastered with planes of this variety.

Now let us consider the adverse side of flying ghost or fast pulse systems. A first problem that must be considered for the good installation is the loss of signal similar to that described for the digital system. It will be possible for the airplane to be maneuvered into an orientation where the signal is too weak to provide control of the actuator. Under these conditions, loss of signal results in a cycling of the actuators similar to that which occurs when the signal of low motor is given. For the experienced flyer, it is known that the aircraft will again be in control in but a few seconds, but the beginner may have difficulty knowing how to maneuver the plane back to the desired course. It is therefore desirable to minimize, if not eliminate, undesired actions of the aircraft.

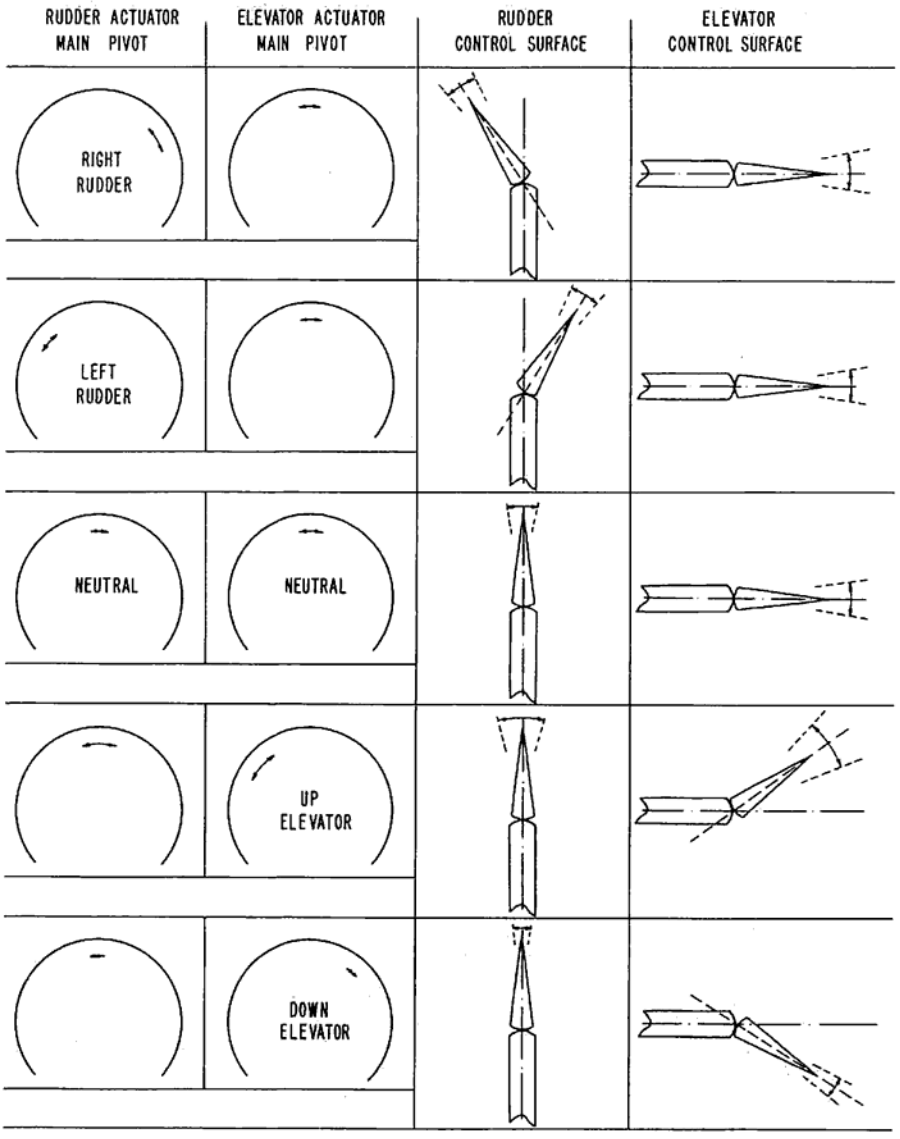
Without risking the expense of an airborne digital system, can the ghost or pulse proportional system be flown successfully? If so, what should you know to maximize performance and minimize difficulties? The less expensive systems use a method of sorting the rudder and elevator information by recognizing both the rate of pulses being sent and the width of each pulse. The ghost system utilizes a mechanical decoder to determine the position of the actuator and, thus, the position of the control surface. The fast pulse systems utilize an electronic decoder with a mechanical system that establishes neutral. During an interval of time when signal is lost either system recognizes the loss of signal as zero pulse rate and zero pulse width. Therefore, the actuators cycle. Although poor, insensitive equipment will cause this situation, even the best equipment available can cause similar problems without consideration to good installation practices.



SLOW PULSE
FIG. 2

Adjustment of actuator and actual control surface for galloping ghost system, average position of control surface is the effective control position.

The major cause of loss of signal with well tuned, good equipment, is antenna orientation. The transmitter antenna commonly furnished with all RC equipment is, at best, a fraction of a quarter wave length, which is recommended. The reason for this is that a quarter wave length is approximately 9 feet long and would be most unwieldy for an individual to handle. The shorter antennae, with sacrifice in signal strength, typically have patterns as illustrated in Figure 1. It is seen that pointing the antenna directly at the plane results in the weakest signal. Proper procedure is therefore to "lead" the aircraft so that the antenna is never pointed directly at it. Similarly, the receiving antenna is short so that it may be conveniently installed on typical models. Any aspects of the installation which detract from the receiving antenna's efficiency can help cause loss of signal. For example, the use of excessive metal in the pushrods running parallel to a horizontal antenna will decrease the efficiency of the antenna. Even in small models it is recommended that the pushrods be constructed of hard wood, with the exception of the extreme ends where the pushrod



Adjustment of actuators for fast systems results in proper operation of the actuators and prevents airborne cycling.

connects to the actuator and the control surface.

Since antenna orientation can cause loss of signal, consideration should be given to the use of a vertical whip antenna in locations where difficulties are experienced. Flying sites which are in the vicinity of buildings, power lines, or hills, can result in reflections which cause faulty performance. Under such circumstances the use of a vertical whip antenna constructed of music wire with sufficient stiffness to maintain its orientation should be considered. The presence of reflective obstacles will result in loss of control in selected places. The flyer should experiment with the orientation, not length, of his antenna in order to eliminate such problems. The choices of installation are horizontal to either tail or wing tip, and vertical.

Excessive cycling or loss of control of the pulse proportional system can also be caused by improper adjustment of the actuator mechanism. Assuming that sufficient distance is achieved by the use of a ground check, cycling which occurs during maneuvers can usually be attributed to improper adjustment of the actuator mechanism. For both the ghost and fast pulse actuators, it is absolutely necessary to properly adjust the centering and range of the controls to assure proper operation. It must be remembered the cycling of the actuators is a proper function to provide motor control. The cycling should only occur when the motor control command is received.

In order to adjust the actuators properly, it is desirable to ignore completely the position of the actual control surface and observe the operation of the actuator. Figure 2 illustrates a typical commercial ghost actuator, where the output for both rudder and elevator are derived from the motion of a wheel. The pin illustrated in the Figure is caused to oscillate back and forth at the pulse rate. The amount of motion decreases with increasing pulse rate. The Figure illustrates the proper amount of motion for extreme positions of both the rudder and elevator controls. It should be noted that the trim controls on the transmitter also affect the performance of the actuator, so extreme positions should be obtained with extreme stick and extreme trim control position for each function in each direction.

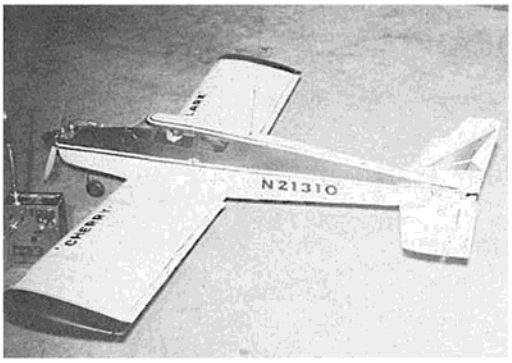
Only after assuring proper operation of the actuator should the actual movement of the control surface be examined. The pushrod length should then be mechanically adjusted to result in correct motion of the control surfaces, both rudder and elevator, as illustrated in the Figure. This procedure will result in the proper operation of the system and will eliminate any loss of control due to airborne adjustment of the trim controls to provide straight and level flight. It should also be noted that the proper adjustment of the actuators results in a restriction of the control surface movement for maneuvers. The beginner is therefore advised to choose an aircraft which requires a minimum of skill to perform the required maneuvers.

The adjustment of the fast pulse systems using double actuators and electronic decoding requires a procedure similar to that outlined above. An illustration of the proper adjustment of the actuators is given in Figure 3. It is noted that the movement of the pin is much reduced due to the higher pulse rate corresponding to neutral elevator. A second major advantage is the fact that both rudder and elevator surfaces move symmetrically about neutral when caused to cycle for motor control. In the ghost system, cycling causes up-elevator due to the nature of the mechanical decoding of the signal.

It is noted that both systems require the adjustment of centering and range of the actuator to achieve a condition of maximum control without cycling. A system should therefore be selected which has provisions to make the required adjustments for the particular actuator that is selected.

In addition to adjustment of the actuator and proper installation of the antenna, it is further necessary to be concerned with vibration isolation of the electronic and mechanical system within the aircraft. Engine vibration can cause intermittent control due to faulty wiring, switches, loose plugs, etc. In addition, both systems require a continual movement of the actuator for proper control. The superposition of vibration due to the engine can also result in cycling of the actuator. It is, therefore, advisable to observe the operation of the actuators for their behavior at all engine speeds before attempting flight. The actuator should be observed for all extreme positions, that is, left and right rudder, up and down elevator, while the engine is throttled to all of its possible speeds. Unusual combinations of engine speed and actuator position can result in unwanted cycling. The selection of aircraft and proper engine size can minimize problems arising from vibration.

Proper attention to the various factors discussed above result in a system providing good control and thus a minimum of problems. The selection of aircraft, engine and radio equipment is but the start of successful flying. Proper installation and adjustment of the equipment results in the successful system. Flying experience is achieved when the equipped model performs consistently under control of the flyer.



THOUGHTS UPON A CHERRYLARK

THOUGHTS UPON A CHERRYLARK
being a thinking man's guide to the utilization of the Rand Dual-Pak, modification of existing kits into "20 foot scale," opening of new vistas into radio accessibility, and CAR for pulse proportional aircraft with "knock-off" wings.

LET me open with a note of frankness; this article is **not** intended to be a gourmet's guide to dual pulse proportional, nor do I expect the reader to be able to duplicate the "Cherrylark" through a crystal-clear progression of steps. Rather, I wish to chronicle some of the interesting features of the project through the medium of photographs and sketches. Perhaps other pulse-propo experimenters (who are now numbered in the thousands, bless 'em!) will find some of these features which parallel or augment their own experiences. If so, I would like to extend an invitation for them to drop a line to Walt, Wagger, and myself in care of Reedley College, Reedley, California, 93654. We have enjoyed the comments of you "tail waggers" over the last several years, and we look forward to many more.

The prime purpose of this project was simply to test fly the new Rand Dual-Pak. Arter two years of constant flying with the basic Rand LR-3 and the later GG-Pak, I began to read occasional scattered accounts of a scheme to combine TWO actuators by means of electronic decoding. This apparently meant that rudder and throttle were combined in one "go around" actuator as before but the elevator "pulse-rate" information was picked-off electronically and sent to a separate Rand actuator of its own. Curiosity fully got the better of me, and I obtained a Dual-Pak and reopened communications with Herb Abrams of Rand Manufacturing (who just **has** to be the world's most sincere and cooperative manufacturer!). I then found it necessary to return my Min-X 800S transmitter and SH-1 receiver to the factory for relay removal and conversion to the higher pulse rate required by the Dual-Pak. This I didn't mind, however, since it was high time for my battle scarred equipment to be checked over by the experts. I might add that, other than updating the case and making the pulse conversion, Min-X found it unnecessary to make **any** repairs or modifications to the transmitter. Such is the quality of modern radio gear.

I then looked around for an aircraft which would meet the following test objectives:

1. It must carry the slight additional bulk and weight of the Dual-Pak without penalty of performance.
2. It must allow for a mechanical coupling of **ailerons** with the rudder, to give multi-type performance. The Dual-Pak "dithers" rather than "flaps" which means that the additional drag of the ailerons would be negligible.
3. It must be a low wing aircraft which would lend itself to conversion to a "20 foot scale" model. (That means it resembles a full-scale aircraft when you look at it from 20 feet away! Stop and think; do you ever see a model any **closer** than that while it's flying anyway?)
4. It must allow for conversion to a full-length hatch **on top** to allow easy access to actuators and linkage as well as the fuel tank and battery pack.
5. It must be able to contain a full-length "unitized" engine bearer truss which would also mount the actuators and serve as the source of strength for the long open hatches.
6. It must contain either a steerable or limited-swivel nose wheel to allow reasonable ground maneuvering.
7. The conversion and radio installation must call for as few special tools or extra parts as possible, to be a legitimate advance to the "state of the art."

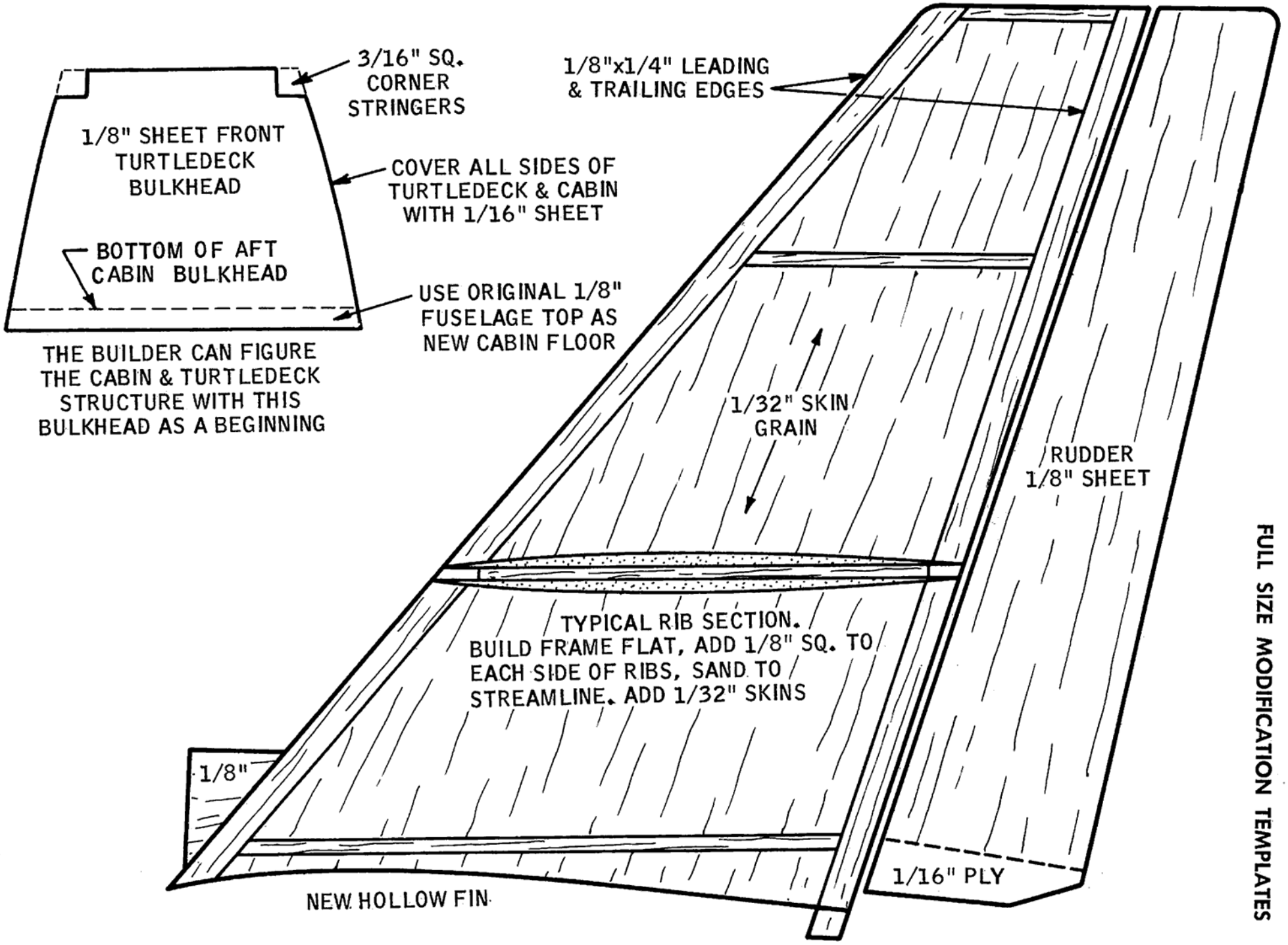
Since the days of the "Rand-D-Twin" experiments (a Goldberg Junior Skylark sporting two .020s and resembling a Cessna 310) I have been intrigued with the possibilities of converting another Skylark to a Piper Cherokee "20 foot scale". An examination of the kit confirmed that it would conform to the 7 points listed above. Thereby, with the assistance of my GG buddy, Art Heil, to take pictures at many odd hours, the "Cherrylark" was born. Let's take a look at the pictures while we examine some of the things that were done.

Picture #1 First light of day for the Cherrylark, showing the bones of the Skylark sticking through. The following changes are evident: new and deeper ¼" firewall, additions of ½" balsa nose bowl and belly fairings, elimination of normal sheet covering on fuselage top which was replaced with turtledeck and removable cockpit hatch, re-contoured tank hatch to fair into cockpit, new hollow 1/32" balsa fin which is increased in area and shaped similar to Cherokee fin. Note that the nose is not yet finished.

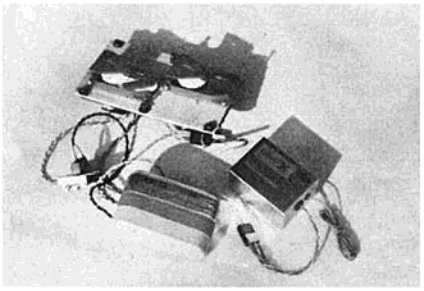
Picture #2 This is the Rand Dual-Pak mated up with the SH-1 relayless receiver. It makes a beautifully prewired package. The slide switch was later replaced with a sturdy toggle switch after

A semi-scale Cherokee from an existing kit, featuring three-axis controls plus throttle; ground maneuverability; muffled .19 engine; practical coupled ailerons and rudder; dual actuator puls operation.

by LOREN DIETRICH



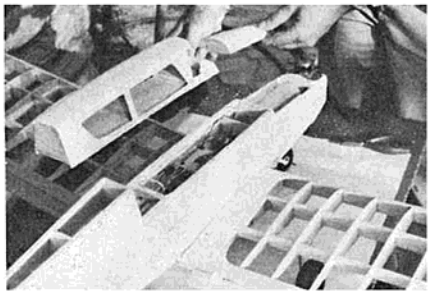
FULL SIZE MODIFICATION TEMPLATES



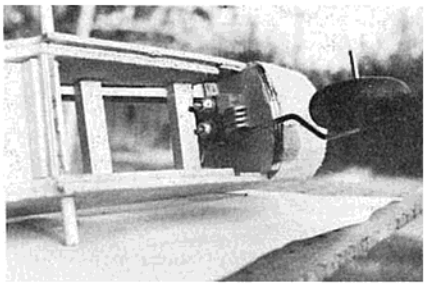
a 150 foot descent to Mother Earth, however, since a post-crash examination indicated that the switch had neatly slid to the "off" position while shooting stalls! A hurried examination of these slide switches was conducted by several manufacturers about this time, with the result that several thousand of them required modification. I would definitely suggest that you be **extremely** suspicious of **any** slide switch that seems to move too easily or have vague detents, and change it while you can! Units delivered after January of 1968 should not have this problem.

Notice also the method of mounting the two Rand actuators. They are staggered slightly because I lacked room to put them side by side within the full-length engine bearers. Notice also that the 1/8" ply mounting board will be fastened to the bearers by 6 wood screws through shock absorbing grommets. Actually, I drilled oversize holes and then countersunk them on each side. Next, black "GE Silicone Seal" was squirted into the holes and formed into a button which will not come out of the board. After the silicone sets, the wood screw and washer are simply forced into it and presto! Instant grommet! People with a little more side clearance can use the new shock-absorbing Rand mounting plates and eliminate this step. **DO** use some form of shock-absorption, however.

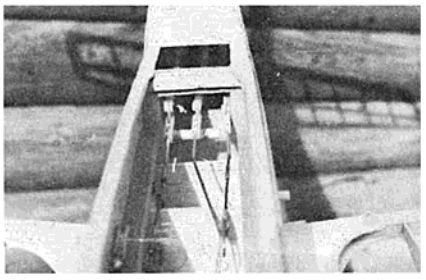
Picture #3 Showing one reason why I love the Skylark for these conversions: the triangular strip that funs the full length of the top fuselage sides. On the Skylark, these are meant to be rounded off after installing the flat top sheet. However, notice how easily you can add two turtle-deck sides instead by fitting them into this natural "notch". Also, the removable top hatch can have its 1/16" sides extended down into this "notch" for a beautifully leak-proof joint. Skylark 56 fanciers will also notice that the new firewall was moved forward considerably to allow installation of a 4-ounce tank. This was done **without** lengthening the sides. Note also that provision for installation of ailerons was made at this time, by notching the trailing edge slightly and mounting the Rand hinges. Ailerons are 1/8" sheet and were later cut to 11/16" width. First flights were made with rudder, elevator, and engine only.



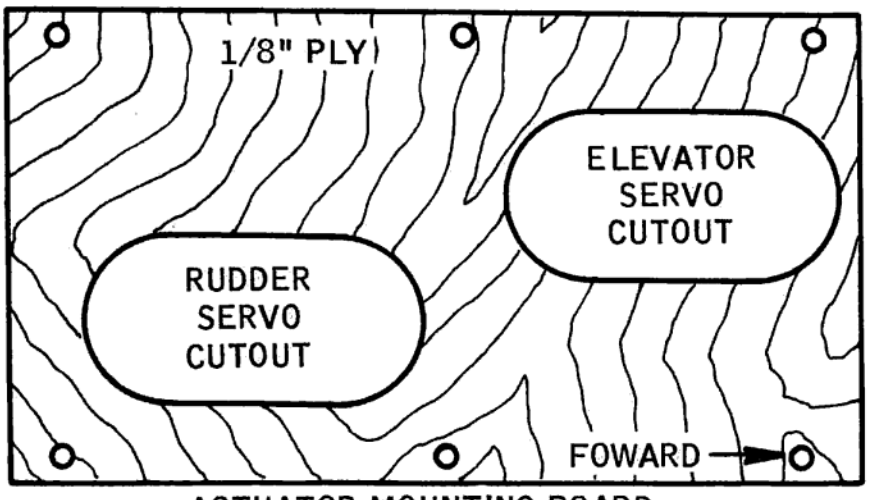
Picture #4 Things are looking up. New firewall and deepened nose showing again, also a glimpse of the full-length extended engine bearers. Forward cross brace is to limit nose wheel travel, aft brace just supports tank. Original Skylark nose wheel strut was used, but it was mounted between two micarta blocks, which were then bolted to the firewall. Top leg of gear strut was twisted slightly to allow strut to pivot about 10 degrees in each direction. The wheel was moved out close to the end of the axle to place it directly under the pivot centerline. It works well and allows reasonable ground control if the wind is gentle. I thought I might steer it later, but so far I'm happy with letting it swivel and steering with prop blast over the ample rudder.



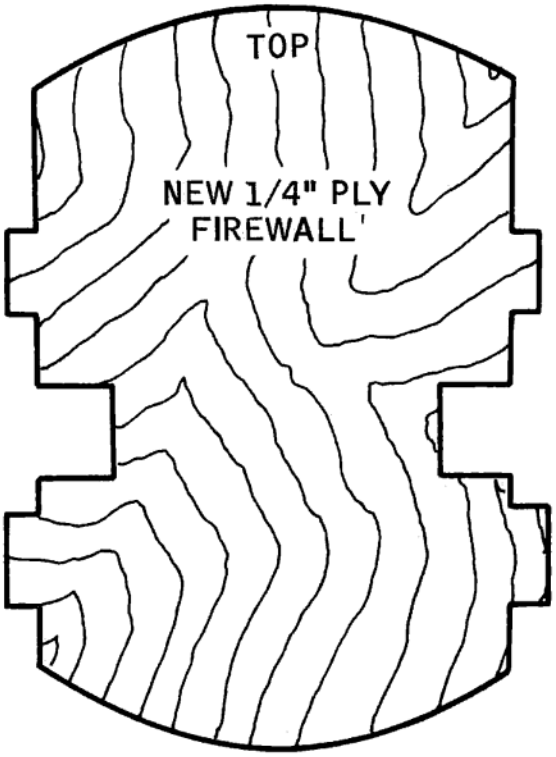
Picture #5 You're sitting in the battery pack compartment and looking to the rear at the mechanical "brains". They are three 90 degree bell cranks which come as part of a molded nylon set made by Midwest. They are mounted on a piece of piano wire which passes through the fuselage sides and which is secured by a washer soldered on each end. The spacers

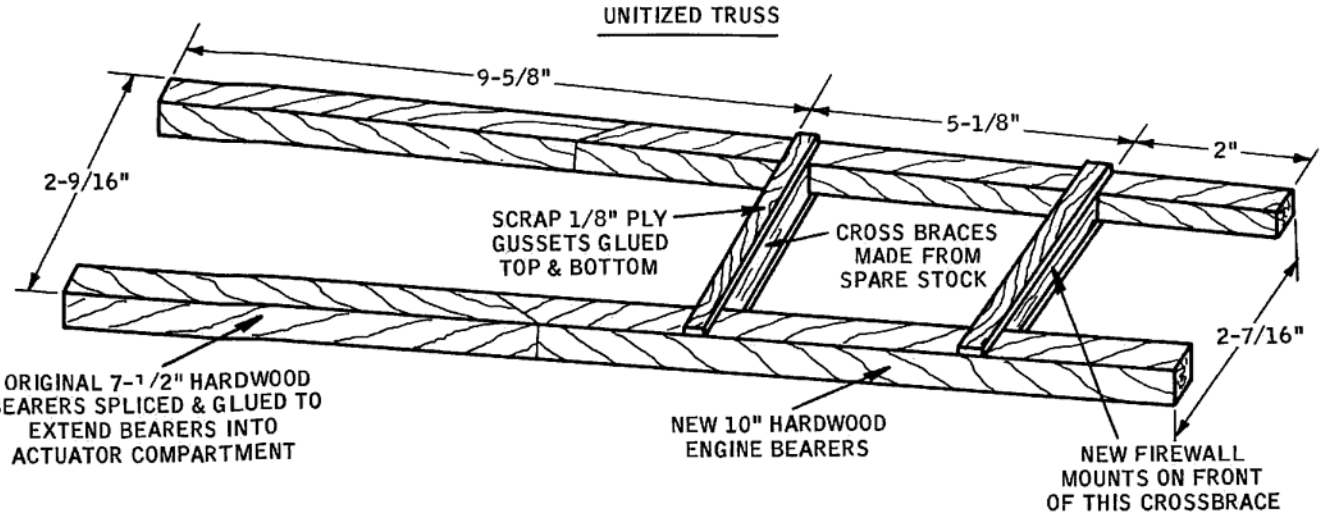


FULL SIZE MODIFICATION TEMPLATES



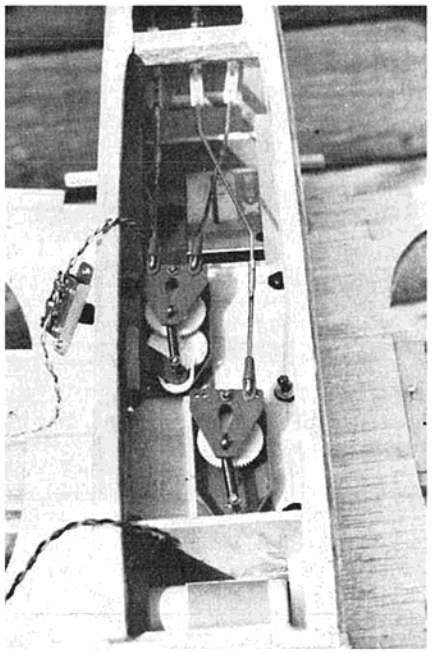
ACTUATOR MOUNTING BOARD





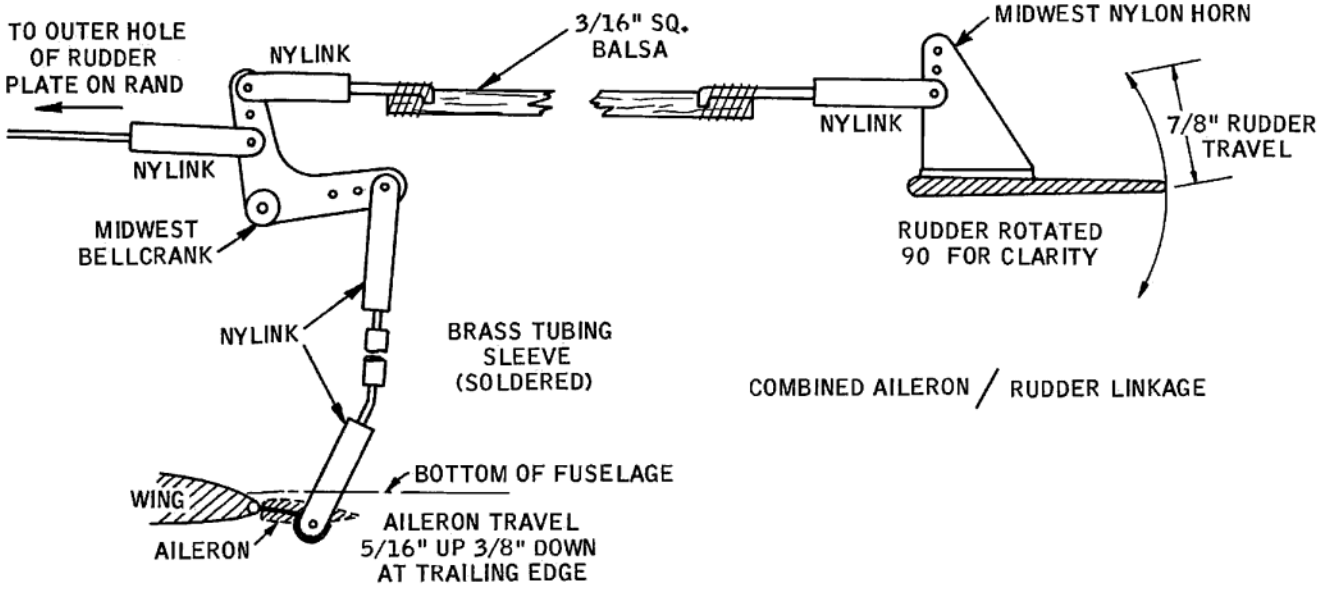
are drilled pieces of hardwood dowel. Notice that the pushrods from the actuators to the bellcranks are fastened to the bellcranks close to the pivot, while the pushrods to the surfaces are in the outermost holes. This gives a necessary "gearing up" action to get good surface travel for stunts.

Picture #6 Standing in the tank compartment looking down and back. Equipment is installed temporarily. Notice the arrangement of the components; battery pack is vertical in front and snuggles up to a plywood bulkhead which is backed-up by part of the "unitized" truss. (It was later wedged in and padded with styrofoam for shock absorption. No foam rubber here!) To the rear we have the actuator mounting board, firmly screwed to the long engine bearers with the 6 wood screws through the silicone grommets and butted up to another plywood bulkhead. Farther to the rear we see the receiver sitting in its own braced balsa box. (The wing opening has been previously closed-in with 1/16" sheet.) Throttle pushrod ducted through tank and battery compartments inside plastic tube and just visible to left. Notice use of Nylinks on at least one end of all push-



rods to keep from stripping actuators in case of crash damage. Rand keepers were used at the actuators for quick disconnection.

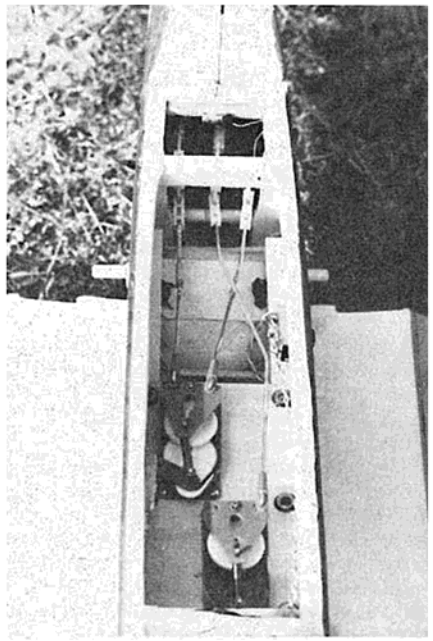
When we first bench tested the Dual-Pak, we noticed that the control surfaces overtraveled quite a bit during "go around" throttle changes. Also, the actuators would occasionally rotate only 180 degrees instead of the intended 360 degrees during this change; after this, they would sit in the **rear** of the slot (with the return spring extended) dithering rather violently around neutral. This would then give reversed controls until the pin snapped back to the front position again. An examination of the problem seemed to indicate that the situation would be lessened by leaving the slot intact where it is normally used for control and then widening the slot into a cam-shaped opening where it is used for "go around" only. This serves two purposes: it eliminates the overtravel of the surfaces (helpful when you are already swinging them wide) and also gives less resistance to the pin when it is in the wrong or reversed position. Consequently, the next control movement called for will usually cause the pin to snap back forward with a minimum of control reversal or delay. This slot reforming



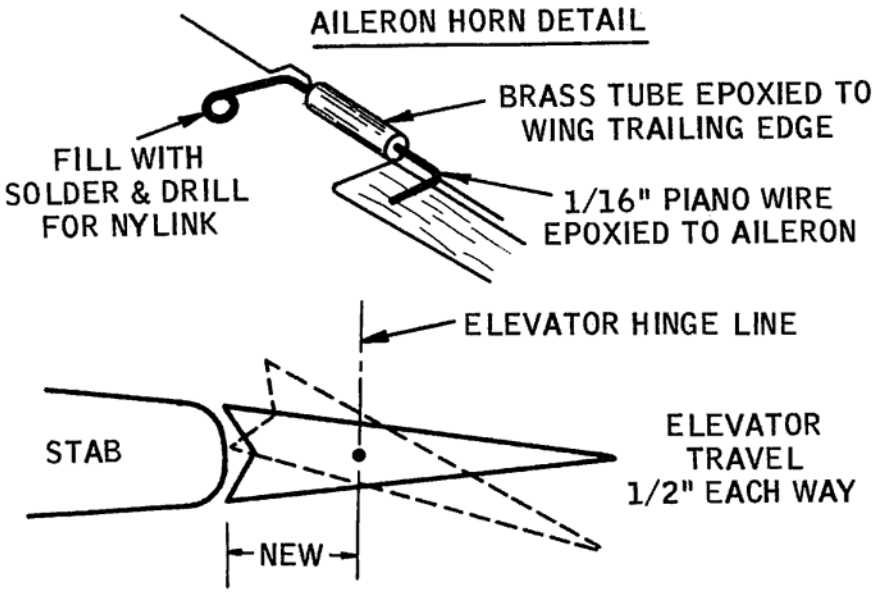
can be done with a model knife and emery paper according to the templates supplied here. I might add that Herb Abrams feels that this modification is a matter of personal preference, and I would agree. I prefer it and have noticed several other people have arrived at similar solutions. Spare actuator plates are cheap if you wish to give it a try. Just be sure to make the slot change gradually and **smoothly.**

Picture #7 Similar to #6, but almost ready to go. Receiver is nestled in its box at the rear, padded in foam and secured with a piece of 1/16" ply slipped under the bearers and spotted in place with silicone dabs. I am ashamed to admit that the Cherrylark has been straight into the ground **5 times** from no less than 150 feet up (for a variety of reasons) **but at no time** has the radio equipment moved or suffered any damage nor has the fuselage deformed in the hatch area. I will admit that rain-softened dirt helped cushion the blows, but notice that it would be impossible for battery pack or actuators to go slithering through that delicate little receiver even if the structure **did** fail. Makes sense?

Another point of interest; I prefer vertical antennas for absolute radio contact. For this aircraft, a bicycle spoke hipple was soldered to an old copper soldering lug which was then epoxied to the bottom of a crossbrace to the rear of the hatch area. The shortened receiver antenna lead was then soldered to the lug and secured with silicone. A bicycle spoke was then used for the bottom part of a vertical antenna. For a bonus, this antenna passes through the cockpit and serves the dual function of holding down the aft part of the cockpit hatch.



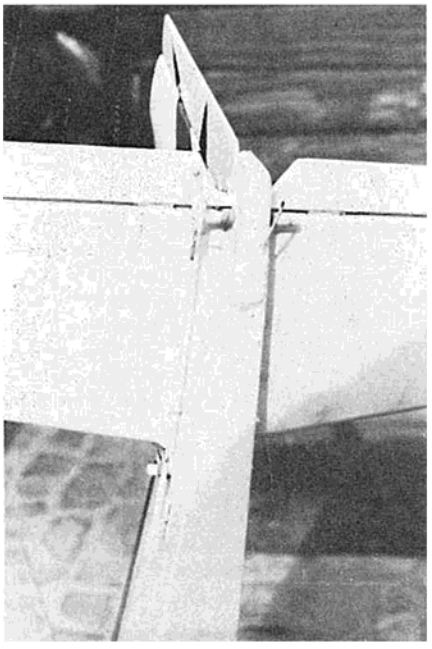
Picture #8 Good view of the hollow 1/32" fin minus its final fairings. Be **extremely** careful of weight addition to aft ends of any Falcon or Skylark because of their short nose moment arm; notice that the elevator of the Cherrylark has been drilled full of holes to help compensate for the extra weight of the trutle-



DETAILS OF 2" LONG AERODYNAMIC BALANCE ADDED TO EACH ELEVATOR AT TIP. NOTICE DEFLECTED POSITION

deck. While we are speaking of the elevator, I found it necessary to add two features not seen here. First, an extra 5/16" strip was added to the width. Second, a ¾" by 2" aerodynamic balance was added to the leading edge tip of each elevator as seen in the lead picture and the sketch sheet. Although its shape is a little odd, this configuration was found necessary to get the counterbalance out of the stabilizer "shadow area" and pick up some dynamic pressure to help keep the elevator from straightening out in dives.

Picture #9 Bottom view showing elevator horn and pushrod. Horns are from the same "Midwest Nylon Builders' Accessory Kit C-5" as the brain bellcranks in the fuselage. Notice the dowel stabilizer keys to prevent shifting in flight. These are essential. Details of control surface travel are given in sketch. **Picture #10** This is the busniess end during test flights and prior to final nose modification to accept 2" spinner. Powerplant is the O.S. Max .19C, a jewel of an engine if there ever was one. Starts easily and will idle all day long. An interesting point is the modified O.S. muffler without which I never fly anymore. The only problem with these things is that they normally sit too close



to the fuselage and tend to spray that oxidized castor oil into all the fuselage openings. We minimized this on the Cherrylark installation by inserting an additional spacer between the muffler and the engine. It is then necessary to

choose two additional screws from the assortment and butt weld them to the original screws; this makes them long enough to fasten the lengthened muffler assembly to the engine. Works well.

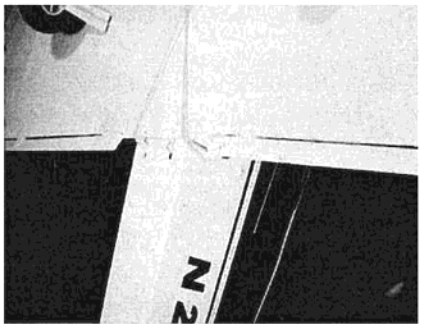
The prop shown was not the best. For all around use, I prefer a Top Flight 9/4 nylon. However, in cool weather a 9/6 wood will really make it scat and allows a beautiful idle.

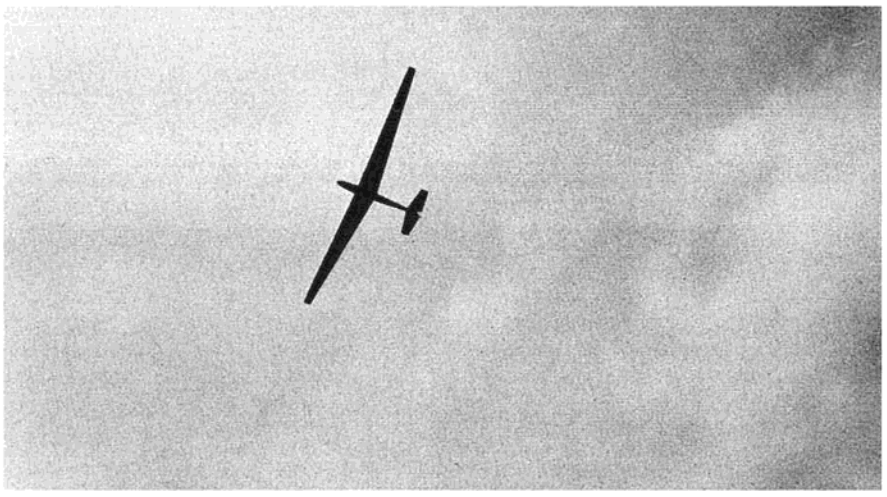
Picture #11 As she looked during testing, with simple paint job to give visibility while allowing easy damage repair.

Flight details An analysis of the control linkages of the Cherrylark will show that the ailerons will definitely cause a yawing action to the outside of the turn. However, they are mechanically coupled to the rudder which counteracts this yaw in normal flight. A bonus to this feature is that the rudder is more effective than the ailerons at low speeds, allowing ground control and rudder maneuvers to be better than a straight "aileron only" aircraft. Consequently, the Cherrylark has performed these maneuvers time and again: taxi from start, ground turns right and left, takeoff, consecutive inside loops, horizontal rolls (not barrel rolls!), wingovers, rolling eights, cuban eights, Immelmans, spins to left, inverted flight, vertical rolls, touch and gos, taxi back to tool box. Some of these are a little less coordinated than multi but then the system costs only half as much, too! At any rate, it looks very multi-like in the air and is very enjoyable to fly.

Well, there she is. I hope that some of you find this chronicle helpful in moving on to Dual Pulse Proportional and the delights of "20 foot scale"! My sincere thanks also to Herb Abrams, Min-X Radio, Don Dewey, and Carl Goldberg for their interest and assistance in "fun" projects such as these.

What a terrific hobby, huh?





Beautiful shot of Jerry Nelson's KA6E.

SOAR-IN

by KEN WILLARD

TWENTY seconds!"

Four sailplanes maneuvered for position behind a starting line established visually by the race director as he sighted along two poles and looked out at the blue waters of the Pacific Ocean.

"Fifteen seconds!"

The sailplanes continued to mill around, but if you watched closely, it became apparent that each soarer was establishing a definite pattern of flight. The patterns were different: each in accord with the theory of the individual R/C pilot as to what he believed to be the best way to get a good start. One plane held an almost constant position, flying more high to the wind and climbing, yet remaining about 20 feet behind the starting line. Another had headed back from the starting line to a point about 150 feet away. The third was orbiting in circles, while the fourth was flying back and forth parallel to the starting line and just behind it.

"Ten!" From now on each second would be called, but the first sailplane made its move. It was the soarer, 150 feet back, and it headed for the starting line. The others continued their holding pattern.

"Nine!" The soarer headed for the line and was picking up speed; the one paralleling the line was headed out to sea, into the wind; the one holding a relatively constant position nosed up slightly, gaining a little more altitude and drifting slightly back; the circling glider continued its orbit.

"Eight!" The plane headed for the starting line was coming up too fast! Or was it?

"Seven!" Yes, it was, and would cross the line before the start was signaled unless the pilot corrected! Immediately, he did, by moving up and turning slightly.

"Six!" The plane that was headed out to sea started to turn back.

"Five!" The hovering soarer drifted slightly further back. The one that was turning back to parallel the start line completed its turn.

"Four, three, two, one—GOOD START."

During the final 4 seconds everything seemed to happen at once. The plane that had started 150 feet back was doing about 35 miles an hour, yielding a ground speed of about 20 miles per hour into the quartering headwind of 18-20 mph, and crossed the starting line just a split second after the starting signal.

The sailplane that had headed out to sea and then turned back was coming in at the hill at about 50 miles an hour, (the combined speed of the plane plus the tailwind) and just before the final second turned sharply behind the starting line, crossed it, and was away.

The hovering sailplane went into a steep dive, picking up speed and crossing the line almost simultaneously with the other two.

The fourth plane, which had been circling, had misjudged slightly and had to bank around sharply, thus losing some speed and crossing the line about 20 feet behind the others.

The four sailplanes silently glided along the side of the hill, crabbing slightly into the wind, which was blowing in from the ocean at about a 45° angle, giving both lift and a headwind component. One soarer was maintaining a good straight course — the others were making slight corrections resulting from excess speed (the one that got a diving start), or a high speed turn (the one that had raced in toward the hill at the start), or a quick turn from the wrong heading (the one that had been circling).

As they headed for the far pylon, about 500 feet from the starting line, they began to position themselves for the first turn.

The 4 flagmen, each of whom had identified himself with one of the racers prior to the start, were watching closely; as the sailplanes approached the pylon line, they raised their flags.

The first racer passed the pylon (it is not required to go around the pylon — just go past it) and his flagman dropped the flag.

"Turn, Jim!" The helper, or co-pilot, which he really is, called out the order. The pilot guided the sailplane around in a smooth turn, and it picked up the tailwind and flashed back toward the downwind pylon.

"Turn, Bob!" The second racer had passed the pylon. But this time the sailplane nosed sharply up, performed a wingover, and dived back downwind. This is a different technique, and very effective if performed properly.

The third glider made a sharp vertical turn. This kept it close in, but valuable speed was lost.

The fourth racer had been slowly gaining altitude on the way to the pylon. At the command to turn, the pilot made a diving turn downwind. The combination of the dive speed plus the tailwind built up so fast that the racer almost immediately overtook and passed the one which had made the tight turn.

At the downwind pylon the planes repeated their turning techniques, but several position changes occurred as the pilots made slight errors in allowing for the following wind and went too far downwind before starting their turns (the pilot judges his own turn position on the near pylon).

The beautiful setting of the Soar-In is shown in this shot of Paul Forrett launching his original design from the hill high above Sunset Beach, 200 feet below.

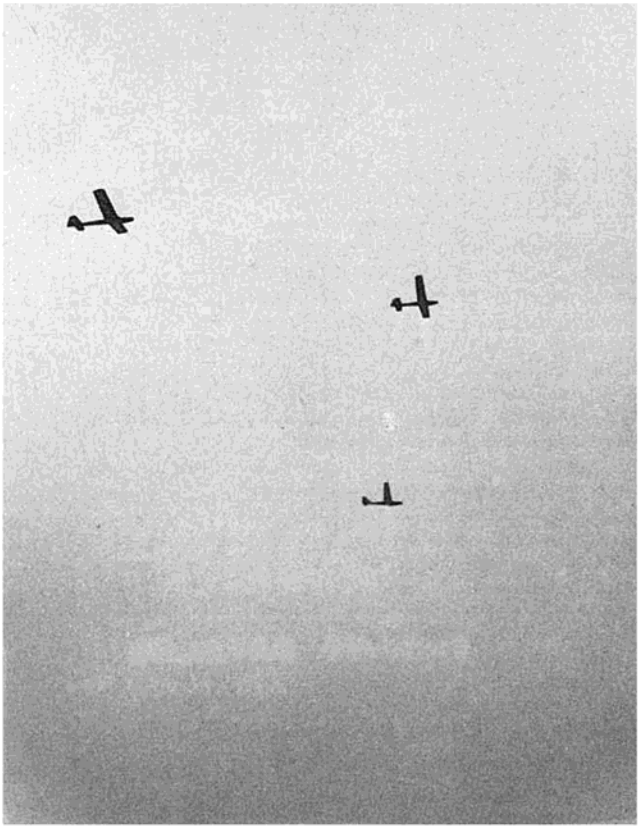
For four more laps the racers glided swiftly back and forth between the pylons, except one, which, on one downwind turn, turned towards the hill instead of away from it. Too close in at the start of the turn, the sailplane slid over the crest of the hill, lost the lift component of the wind, and was forced to land.

The others, as they finished, zoomed up, circled over behind the hill, and landed in the designated area. The race was over.

And that's the way it was, for two days, at Sunset Beach, a California State Park about 10 miles south of Santa Cruz, on April 27 and 28, where the R/C Bees of Santa Cruz held their Spring Soar-In.

In almost perfect soaring weather, thirty-six contestants gathered, some with two sailplanes each, to vie for the R/C MODELER MAGAZINE Perpetual Tro-

Left: Flagman Paul Forrett, Vic Larsen, and Cort Lorenzen at the far pylon. Right: Three soarers hovering behind the starting line, preparing to dive across at countdown.



Left: Gene Downey with 2nd place Rideghawk, Above, right: Proud winners on the hill — Jim Stevens, 1st place (in center) holds winner's trophy and the RCM Perpetual Trophy. Gene Downey, on left, second. Jerry Arana, on the right, third.

phy, or whatever they could win. Some came more for the fun than the contest. The R/C Bees had distributed a flyer announcement several weeks in advance, and interest was very high. Then, on Saturday, April 27, they distributed a printed set of rules and conditions which clearly instructed all participants on how the event would be run. For the benefit of all R/C soaring enthusiasts, all over the world, we are reproducing those rules here to show you that a real "fun" race can be run without a lot of complicated regulations.

"Soar In"

Welcome to the R/C Bee's two days of Sailplane Goodyear Style racing. It was decided this year to eliminate time trials and to race two full days. Unlike powered craft, we have only a four hour period to race each day. The wind comes up about one o'clock and turns off around four o'clock. Anticipated attendance is more contestants than can be raced in one day. Elimination time trials were considered for Saturday but this would have meant that some contestants would not have a chance to race at all. Consequently, we are going to start racing Saturday and at the end of the day give out merchandising awards to those in top positions and continue racing Sunday with Trophy awards at the end of that day.

If some contestants arrive Sunday, who have not been subjected to the elimination races Saturday, they will not be allowed to compete in the Trophy races.

If there are enough new arrivals Sunday to form a small race sequence, they will be allowed to race for a merchandise award.

PYLON COURSE

The pylon course is laid out along the top of the cliff. The objective is to fly the sailplane past the course alignment poles NOT around them as in a powered event.

Pylon flagmen with colored flags will signal when your plane has flown past the pylon alignment poles allowing you to reverse the direction of your sailplane. Prior to starting a race, you will hold your sailplane up so that your flagman can identify your plane and you in turn will know the color of your pylon flagman.

RACE POSITION & ELIMINATION

Races will be conducted the same as in Goodyear power events. Elimination heats will be flown five aircraft at a time.

SAILPLANE QUALIFICATIONS

There is no ruling on sailplane wing area or configuration. Contestants will be allowed two planes the same as in the Goodyear event. The second plane will be processed if the first plane is inoperative or if wind conditions change making the second aircraft more desirable to fly. One fuselage can be used with two different wings. This will be viewed as two different ships.

As this is a two-day race event, the wind conditions may be considerably different one day from the other. The two wing provision is to allow the contestant to choose which wing (or plug-in wing tip) or aircraft he wishes to fly at the start of each day of racing. Once he has chosen a configuration or aircraft for that day of racing he may not change. He can only change on the next day of racing and once again he must retain the same aircraft and wing in which he enters the first race of the same day.

The intent is to get more aircraft in the air rather than contestants sitting on the hill. For example: if the wind is strong on Saturday, a contestant would race with a small wing or an aircraft with a high wing loading. Conversely, if the winds were light on Sunday he would go to more wing area. If he was obliged to use the wing in which he raced on Saturday, he may not be able to fly at all. It is a bit of a game of chance because the air might be light to begin with and pick up

later in the day. He cannot change his aircraft in any manner other than ballast once he starts racing for that day.

TRANSMITTER IMPOUND

All transmitters will be kept in an Impound Area. When you are called to fly, you will be issued a frequency paddle. You must have the frequency paddle in your possession before you will be allowed to pick up your transmitter.

At the conclusion of each race, return your transmitter and frequency paddle directly to the Impound Area. Do not retrieve your sailplane first. Have your co-pilot retrieve the sailplane while you return the transmitter. This will save time and allow the races to get off faster.

COMPETITION RACES

The start of the sailplane races will be conducted different than a powered event. The race start will be conducted the same as sail boat races.

Competing sailplanes will be launched prior to the race and will have to orbit outside of the race course. It will be the contestants' problem to circle outside of the Start/Finish line and position his plane to dive across the Start line as the Start flag is dropped. Pilots will be notified prior to a count down at which time a twenty second count will be given and the race flag dropped.

Should a contestant cross the Start line prior to the end of the count and dropping of the flag, he will be required to circle back and re-establish his start.

The Start/Finish flagman will notify a contestant of a false start as soon as possible. As it might take several moments to establish the identity of the violating aircraft, a considerable handicap can result.

In the event of a false start; (jumping the gun) the judgment of the Start/Finish flagman and contest Director will be FINAL.

RACE COURSE JUDGING

Five official laps of the course will be flown. If a contestant's sailplane should fail to fly past a pylon course pole, he will be required to re-establish that turn point prior to proceeding. The pylon flagman will signal a cut pylon turn by a continual waving of the flag.

COLLISION COURSE

Last year there were several head on sailplane collisions that were rather catastrophic. This potential will always exist and can be expected as one of the hazards of racing. To reduce this possibility, you are asked to fly next to the hill going up the course and to fly out from the hill on the downwind leg. At the pylon turns anything goes.

CO-PILOT

Each contestant should have a helper to call flag signals for him when he is flying. As the pilot of the sailplane cannot watch the flagman and the aircraft at the same time, it is the helper's task to watch the flagman and advise the pilot when his colored flag drops so that he may make the pylon turn. In addition, it is the helper's task to retrieve the sailplane on landing. The pilot should return his transmitter to the Impound Table when his flight has terminated. At no time during the event should the pilot leave the controlled flight launch area with his transmitter.

Jerry Arana, on left, with 3rd place Foka. Jim Parsons, on right, was 4th with his Purple Parrot II.

Jim Stevens launches his 1st place winner. Ken Willard to Jim's right, and Sig Sigelkoff to the left.

CONTROLLED AREA

The Sailplane Launch Area and Start/Finish Line will be roped off for spectator control. The Transmitter Impound Location and Master Recordkeeper will be arranged at the rear edge of the controlled area. Prior to entering the controlled area you will obtain your frequency paddle from the Master Recordkeeper.

LANDING ZONE

A semi-controlled landing zone will be arranged to the right of the Launch Area. Contestants retrieving planes must at all times watch for descending aircraft. It will be permissible to re-circuit the course "going with the traffic" if a landing abort or go-around is required.

During the break periods, and after the races were over, fun sailing took place. At one time, when there were eight sailplanes soaring majestically along the cliff, Jerry Nelson called over to me and said, "Hey, Ken—would you call that a 'gaggle of gliders'?"

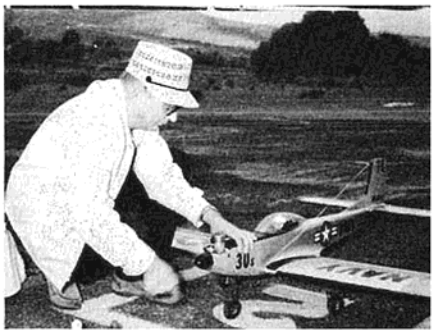
I turned to answer him. "No—that's a 'swarm of R/C bees'!" I was flying my Slopemaster at the time, and when I turned back, I almost dumped it on the hill before I could sort it out from the others! Great sport!

Everybody there agreed it was one of the most enjoyable contests they'd ever attended. Prizes were awarded to nearly everybody for one reason or another (I actually got one for dumping my plane on the hill during a race!) but for the record, here are the real winners:

1st—Jim Stevens, East Bay Radio Club. Oakland
2nd—Gene Downey, East Bay Radio Club, Oakland
3rd—Jerry Arana, R/C Bees, Santa Cruz
4th—Jim Parsons, R/C Bees, Santa Cruz
5th—Dale Willoughby, Harbor Slope Soaring Society, Newport Beach
6th—Tom O'Shaughnessy, R/C Bees, Santa Cruz

The R/C Bees are to be congratulated for an outstanding event that bids fair to become a major West Coast occasion and I heartily recommend that all of you soaring enthusiasts, wherever you are, get a gang together and have a sailplane Goodyear style race. You'll be real glad you did, I promise you.

JERRY KLEINBURG



Don Coleman fires up winning Citro. Merco 61 and Kraft propo radio. Don's rock steady flying technique out-pointed U. S. and Mexican pattern competition.

Cal Scully, and Mr. Ed., Port Arthur, Texas pair took hard earned 2nd place in 1968 Mexico City FAI pattern competition. Enya 60 and logitrol.

HOW HIGH THE MOON?

FROM time to time the temptation rises to begin a listing of all the possible reasons that impel us to build model planes. Not just the RC variety, but any kind. And since, on an equal number of occasions, the urge has been set aside to pursue less philosophical — and perhaps less rewarding — labors, the enumeration has never been made. One reason, however, that keeps popping up, came to mind again as we were making our way back from Mexico City on one of Braniff's brightly painted birds. Cruising at 25,000 feet would naturally lead to thoughts about altitude, and of "breaking the bounds of earth to wing among the clouds," as the poets put it.

But first, one other item observed on that 100 minute flight between Mexico City and San Antonio deserves brief mention because it is the first time we have seen this particular phenomenon in over 4000 hours as a pilot and several hundred as a jet passenger. Stretching from our window, almost to the tip of the starboard wing, was a visible shock wave produced by the air flowing over that large lifting surface. The light must have been just right, or perhaps the temperature and humidity helped, but there it was, an inch or so high looking like a visible wrinkle in an otherwise invisible rug, and we watched and noted how it varied with the aircraft's attitude or speed changes. A real wind-tunnel display, without a wind-tunnel — or the biggest tunnel of all, come to think of it.

Nevertheless,, altitude and models flying at altitude came to mind again as the panorama of mountains and clouds unfolded during that 100 minutes. For a long while there has been a mounting concern over the fact that models of all sorts are soaring into airspace that is becoming more and more populated with full-sized aircraft that are not only getting bigger in size, but going faster with each passing year. Under these circumstances, it is reasonable to expect that the risk of a model-and-airplane accident is increasing all along. While consideration of such a risk factor may be somewhat theoretical (although the **FACTOR** itself is **NOT**) it is time to **act** to demonstrate the responsible awareness that exists among modelers, and that modeling is not being practiced in a way that will cause damage or loss to others. Although this is a fine sounding objective, unless immediate action is taken on safety rules to display resolve to control model flying, and to offset the increasing accident risk, it will all sound pretty hollow if action comes too late. And any day it could be too late.

It isn't presumed here to tell free-flighters (non RC flying) how to run their affairs; but along with RCers, all modeling interests have to face up to today's realities and not allow a default to occur due to any hesitancy or rationalization of the problem. **Time, unfortunately, is not on the modelers' side.** And since the general public doesn't know the difference between a hand launched glider and a $1000 multi — a model is a model, they believe — all modelers are in the same boat heading for a storm that could swamp them. Modelers who have read Arthur Hailey's latest book, AIRPORT, or have followed the increasing volume of published information about aviation air traffic growth, are acutely aware that it is possible to be caught up in a nutcracker involving some important economics as well as the legal and emotional whirlpool that surrounds the current air traffic crisis. It is obvious that at today's jet liner speeds (with or without visible shock waves), with the increasing complexity of letdown and traffic procedures, along with the growing volume of traffic over and around all major cities, pilots don't have time to watch for — or see — models. It is up to us to do the watching out.

Leaving free-flighters to best devise their own solutions (hopefully soon), without further to-do, the RC Contest Board could readily act to restrict RC flying to under 500 feet, except for sanctioned (and FAA cleared) record trials. Such a rule would also mean AMA insurance would be similarly limited and would aid in underscoring the seriousness of the rule. None of this would unduly restrict normal flying but would tend to isolate unorganized elements who might wish to ignore the unsafe situation. In the recent past there has been a good deal of apprehension voiced over the possibility of restrictive action by the FAA with regard to RC models. Initiative on the part of modelers themselves is by far the best way to demonstrate management of modeling affairs without such outside "help." It is manifestly a matter now of self-protection to not delay a day longer!

CON-TRAILS

The 7th Mexico City International Contest last April was the first of five contests to be held at various Mexican cities to select an RC team to represent Mexico in

TV line-up at Pistas Paraiso. Planes and surrounding green hills grace 7200 foot flying site of Asociacon Mexicana de Radiocontrol, Mexico City RC Club.

Jack Sabine and modified Vespa (Sphex.) Borrowed Enya 60 made it fastest in race. Felix Pratt helps with green and gold winning ship.

Humberto Esteves shows "Chicken Inspector" to Bob Dunham. VECO 61 powered beauty is modified K/F III. Flying into chicken roosts earned title for genial AMR flier.

Jim Witt gets well wishes from Elias Villegas. Jim's ship, a half-size Kwik-Fli III, did well in FAI pattern event. OS 19 powered, Kraft miniatures.

Germany in 1969 at the International Championships. The Mexico City meet this year was sponsored again by the Association Mexicana de Radiocontrol (AMR), and this kick-off affair was as perfect a meet as we have had the pleasure of attending. Held at picturesque Pistas Paraiso, during ideal weather, three days of competition saw Don Coleman of Citronelle, Alabama — flying his well-trimmed Citron — outpoint a solid field of U.S. and Mexican pattern pilots. Cal Scully of the Port Arthur Oily Birds, using his original Mr. Ed, nosed out Salo Feiner of Mexico City for second place in the pattern event where a shortened FAI maneuver list was used. Judges for the contest were the contestants themselves, and based upon the uniform and equitable results, this arrangement gave conclusive evidence that there is a great deal to be gained from doing business in this way. More on this later.

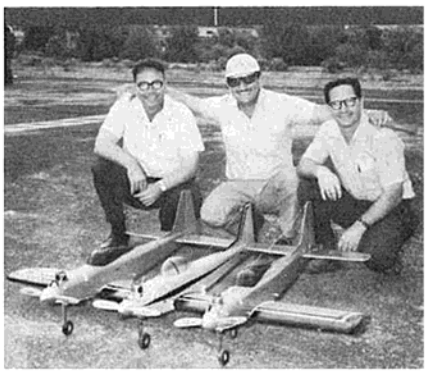
An exciting feature of the meet was introduction of a Thompson Trophy Race — an unlimited pylon event for planes with any engine up to 3 HP, with extra points for scale. At the 7200 foot altitude of Pistas Paraiso, flying has special conditions and problems, consequently the unlimited race saw interesting results. Jack Sabine of Mobile, Alabama, made it a clean sweep for the U.S. fliers (and Alabama) by winning this wide open event with his Enya-powered, modified Vespa he calls the SPHEX — another breed of wasps from the Italian vespas. Although some of the Goodyear racers flown in the event may have been faster, Mexico City's altitude — where stalling speeds are a lot higher and engine and prop performance are significantly reduced — eliminated much of this advantage and allowed the clean but lighter wing-load Vespa/Sphex to compete on just about even terms. Jack's exceptionally smooth and uniform circuits around the 20 lap, 500 meter two pylon course was the deciding factor that gained the top place for him at 94 mph! After a performance like this, especially considering the altitude handicap, we feel many RCers will increase their interest in the Brisaghella designed beauty. Enrique Velasquez was the chief race steward and it was largely through his organizing and operating efforts that the Thompson Trophy show was well run, efficient, and a definite attraction to spectators and RC pilots alike. Jack was awarded 1000 pesos and a silver-faced plaque along with 1/3 ownership in a handsome 3 foot tall silver trophy which could become all his with two more wins — a real challenge to build future plans upon. Second place went to Luis Castaneda followed by Gaston Mathelin in 3rd.

All the leading Mexican RC clubs were well represented at the meet — Guadalajara, Puebla, Monterrey, and the Kilometro 14½ RC Club which is another Mexico City group in addition to AMR. Mexican pilot skill — exemplified by contenders such as Salo Feiner, Dr. Alex Elizondo, Luis Castaneda, Angel Taboada, Gaston Mathelin, Pepe Rivera, Luis Brunner, Jose Sadurni, and others — continued to obviously advance, while planes and equipment also matched U.S. levels in finish and refinement. The copy of the Spreng TWISTER by Luis Brunner was especially notable for its clean finish while the model's smaller size and power loading provided by the Super Tiger 60 G, appeared to offer a good solution to the 7000 foot altitude. Fact is, the way it moved caused a lot of speculation as to what could be expected at lower altitudes where the ST could really turn on! In addition to the many familiar faces, this year's meet say many new fliers and we also noticed a good representation of 2nd generation RCers on the flight line as the 16 to 20 year old group continues to increase in Mexico as it is in the U.S. and elsewhere. (This is an important aspect of RC that hasn't attracted serious attention be-

A big prize for a big man! Leia Feiner helps Jack Sabine hold permanent silver trophy sponsored by Cyclone for unlimited pylon race. 1000 peso pot sweetener went with silver plaque. One down, 2 to go . . .

Gaston Mathelin and sweethearts. Irma and foam wing ST 60 powered Robin helped to 2nd place in close pylon event. Won 750 pesos and silver plaque. Gaston, ringleader of KM 14½ RCers . . .

Kwik-Fli III, with a vengeance! Elias Villegas (c) borrowed extra fuselages from Cal Scully and Bill Feldschau for make believe setup. K/F III popularity growing fast.



Judge line at Mexico City meet. Elizondo, Downs, Scully, Witt, and Villegas make up 5 judge group. Rotating judging system for each flier was manned by contestants, worked very wel, scoring almost impeccable.

Jorge Bustos and another K/F III. This one with VECO 61, Orbit 6-12 IC and 11 x 8 Top Flight prop. K & B plug, too. Jorge member of Kilomero 14½ RC club, Mexico City sport flying group.

Class II Goldberg Skylane by Rafael Ramirez of KM 14½ RCers. Olympic motif reminder of Mexico City Olympics coming this fall. Cox .09 hauls Orbit 6-12 gear.

fore. Those whom may ask where the juniors are, might look in the direction of RC where volume in numbers has evolved to a satisfactory form of quality built upon serious commitment and a toughness of spirit to stick with and overcome the complexities and vicissitudes of RC!)

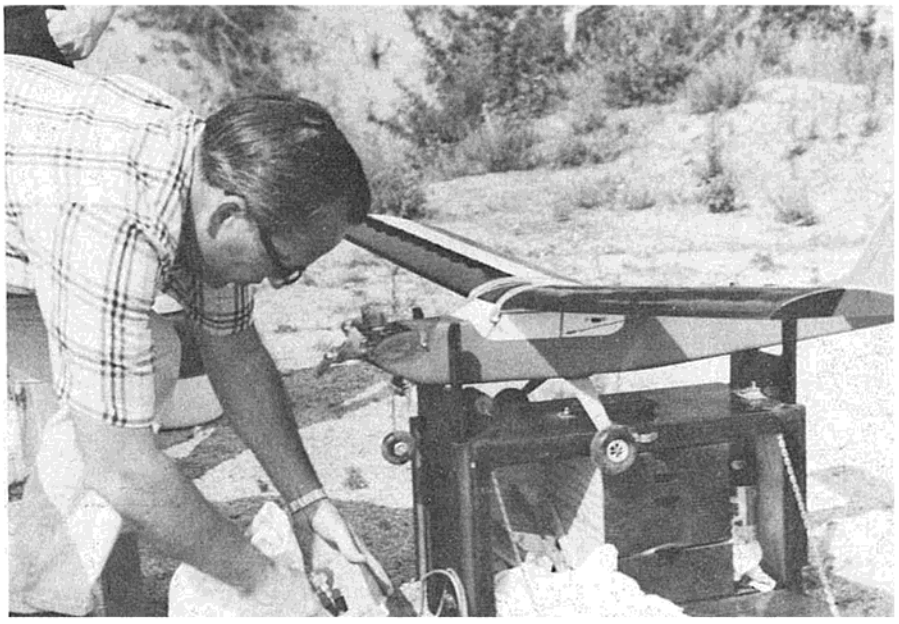
Judging and scoring of the contest, as mentioned before, was a noteworthy item of the meet. Since this was a one-flight-a-day contest (they are really the toughest kind!) each flight was important, so pilots wanted to be sure of equitable and level judging. Tony Covarrubias, the CD, along with Bob Guzman (who continues as AMR's president), Paco Gallegos, Humberto Estevez, and Felix Pratt decided to try using the contestants in a 5 judge rotating system arranged so that on each flight a new grouping of judges resulted. Rarely was it necessary for a judge to officiate more than one flight consecutively. Scores were processed in the international manner where the highest and lowest judging impressions are eliminated and the remaining scores totalled. No averaging was employed, so no fractions were involved. Universal acceptance of the judging by all contestants (not a gripe — big or little — was heard) pointed up the workability of this approach. Scores were surprisingly level, with the winning flights by Coleman, for instance, showing under 5% change from flight to flight. Incidentally, Don's flying which gained wide notice during the 1967 Nats in L.A., continues to reflect his increasing mastery of the pattern art and this important win will help to increase his position among leading U.S. fliers. Another leading U.C. RC contender who competed in Mexico City was Jim Witt of California who brought two airplanes that attracted much attention. One was a ½-size Kwik-Fli III, fitted easily with the latest miniature Kraft servos and receivers. The other ship was an .09 powered Quarter Midget pylon racer that just about collared the regular Goodyear hotshot racers during the unlimited race. Jim's practiced flying showed the mini-racer to best advantage, while its drag characteristics actually made it faster than the Goodyears on the upwind leg. Based upon Jim's performance with this little one, it is easy to predict a lot more will be seen of this class of pylon polishers that give a good account of themselves and lend easily to pocket-size races — a factor worth attention for space and spectator advantages. The ½-size pattern ship was brand new and although an initiation at 7000 feet is hardly an ideal way to feel out a new design, once Jim changed the Enya 15 in it for an OS 19, the ship showed much promise in Jim's expert hands. This ship could also be an important design and concept straw in the wind that deserves further consideration from pattern buffs.

As usual, a visit to Mexico City means a lot more than flying. This trip was no exception. Besides the munificent hospitality at the home of Leia and Salo Feiner, we were treated one evening to the amazing show of Light and Sound at the ancient Toltec pyramids of Teotihuacan that is bound to become a world-wide attraction. The show was especially notable during our visit since the performance went on during a threatening thunderstorm, and the chill wind and lightning flashes added an unforgettable dimension to the story of Quetzalcoatl and his 1000 year old Indian culture and legend. I may be accused of "coloring" this account, but there were about 2000 witnesses who will confirm that as Vincent Price's words about the Feathered Serpent rolled out over the night darkened ancient scene, almost miraculously, at the very moment he spoke the lines, ". . . and the rains came!" yep, they did! Not a lot, but enough so that all the visiting RCers wondered to the Mexican hosts how they could manage the skies so amazingly. Although any special powers were denied, as we left after the contest we did overhear someone say, "Come back next year — we'll visit the pyramids and we'll see what we can do to **top** this year's arrangement!"

Aeromaster bipe by Rene Cardenas Galvan, Toluca, Mexico architect. VECO 61 powered this new ship initiated during 7th Mexico City RC meet. Orbit 6-12 IC.

Pretty blue Mustang by Saloman Lopez gets go from front intake K & B 40 and 10x6 Tornado prop. Goodyear racers touchy at Mexico City's 7200 foot flying site.

Cyclone Thompson Trophy Race lineup. Humberto Esteves and Enrique Velasco check field of unlimited pylon match. Event enthusiastically received.



COVERING & FINISHING THE RCM TRAINER

LAST month, we discussed the actual construction of the RCM Basic Trainer. We hope that you have not encountered any difficulty in the construction of this model, and are ready for this month's discussion of covering and finishing your aircraft. This subject is one that seems to run the gamut from the sublime to the ridiculous. At every flying field you will find the superbly detailed aircraft with a mirror finish sitting in the pits next to another model that either looks like it was painted with barn paint, applied with a rather stiff spatula, or alternately, has no other finish than a hastily brushed on coat or two of clear dope. If you were to line up the owners of all of the aircraft with the magnificent finishes, and you had a dozen such aircraft, you would probably receive a dozen different ways of finishing your model. On the other hand, the guys that apparently finished their aircraft with log oil and a sand blaster, will usually tell you that they'd rather fly than build, and who cares about a good finish anyway? By the time you listened to everyone's views on how to, or how not to, finish your model, you'd probably be very thoroughly confused.

Here, at R/C Modeler Magazine, we usually have to build six or seven models each month — many of these are built for the purpose of checking out a given set of plans, or are new kits built for testing purposes. Other times, they may be simply new designs with which we are experimenting. Obviously, with the amount of limited time available, we can't spend a month of Sundays, hand rubbing 85 coats of lacquer! Still in all, our models must look presentable, since they are often used for the lead photographs of feature construction articles. Thus, over the years, we have had to find a happy medium in this aspect of our hobby, utilizing the fastest construction and finishing techniques consistent with overall presentability and creative pride in our own projects. We're going to give you some of the methods we use, but ask you to remember that there are many and varied products available for finishing your model aircraft, and an infinite variety of methods for using these products. In our continuing process of testing and evaluating new products for use in our sport and hobby, we have done extensive testing on virtually every finishing material that you will find in your local hobby shop, as well as many other products which are not generally available in the hobby industry. Some of these products provide a fast finish, others require more laborious and painstaking efforts, but produce a better end result, while still others stress durability and crash resistance, etc. We have found that each of these numerous products have their own "built in" set of advantages and disadvantages. Those materials that we routinely use for our own aircraft, here at RCM, are not necessarily recommended above all others—they simply represent that "happy medium" which we mentioned earlier. If you are a newcomer in radio control, and we are assuming that you are if you are following this series of articles in the Flight Training Course, we hope that you use these finishing techniques as a starting point. If you do, and you mix well the ingredients with 50% elbow grease, you will have more than acceptable results. When you have mastered this technique, you are on your own to experiment further with other materials and other products. And once you think you have accomplished the "ultimate fiinish," go to the Toledo Conference and look at the line up of entrants competing for the R/C Modeler Magazine Best Finish Award—it's enough to make you want to go home and hide the best model you ever finished, that is, after you finish crying!

Finishing an aircraft falls into four basic categories: (a) preparing the basic structure for covering (b) covering the structure (c) preparing the covered structure for finishing (d) final finishing of the model. A wise man once said that two pounds of paint will cover a multitude of poor construction techniques and improper surface preparation, but will result in an airplane that has only a mediocre finish and is two pounds heavier. The final color coats, regardless of how well they are applied and rubbed out, will always reflect the amount of consideration given to preparing the structure for this final finishing process. A poorly prepared undersurface will always show through the final finish. Patience, elbow grease, a wide assortment of sandpaper (and a willingness to use it), and a tack rag, are far more important than your choice of final finishing materials.

Undoubtedly, the fastest known method of finishing your Basic Trainer would be to cover it with Super MonoKote. This will give you an extremely high gloss, durable, and easily repairable structure. This material has a built in finish, and will save considerable time in application, although it is more costly than the finishing technique that we will describe herein. If you decide to use this material for finishing your Trainer, follow the instructions contained with each roll of Super MonoKote, and obtain a Sealectric Iron from Hobby Lobby International in Nashville, Tennessee. This particular tool, originally designed for use in applications such as sealing meat packages, is a Teflon covered hand iron with a small heat transfer surface which is ideally suited for the application of this type of material. This item is described in this month's Showcase '68 section of the magazine. If you do decide to use MonoKote, use the Super material for covering the entire structure, followed by the application of Regular MonoKote applied without the use of heat, for the trim areas of your Trainer.

Our method for finishing the red, white, and blue prototype of the Basic Trainer, which you have seen in various photos in the past two installments, consisted of the following steps:

(1) Rough sand the entire model with 120 garnet paper until you have sanded away all bulk excess balsa, such as wings, leading edges, wing tips, fuselage, corners, etc.

(2) Sand the entire airframe with #320 wet-or-dry paper, used dry. Go over the entire model again and again until it is as smooth as you can get it with this grade of paper.

(3) Inspect the entire model for nicks, cracks, dents, and any other surface imperfections. Using Aero Gloss Plastic Balsa, fill all such imperfections and smooth out the applied balsa filler material with your fingertip dipped in butyrate dope thinner. Allow the filled areas to dry thoroughly.

(4) Carefully sand the entire airframe once again, with #320 wet-or-dry paper, used dry.

(5) Using #500 wet-or-dry paper, used dry, sand the entire airframe again. When it is as smooth as you can get it with this grade of paper, use a tack rag to remove all dust, lint, and sand. A tack rag is basically a static magnet, which picks up all surface dust. One word of caution when using a tack rag, however, and that is not to allow the tack rag to dwell on the surface since it does contain an oily material.

(6) The next step is to seal the framework of the aircraft, and provide as smooth

a surface as possible, prior to covering the airframe. Without a doubt, the finest sealer that we have ever used is a product called Stazon Sleek, a hot fuel proof, butyrate wood grain sealer, manufactured by the House of Mel, in Burbank, California. In our opinion, this product has no equal. A one quart can sells for $2.65. Although it is not available in all areas, it is stocked by some major West Coast mail order houses, such as Nemo Hobby Distributors, 4720-22 Peck Road, El Monte, Calif. 91732. Stir this material thoroughly, since it is quite thick, and contains a high solid content. Brush on with a full brush. Allow three quarters of an hour for the entire framework to dry.

(7) When the wood grain sealer has dried, sand the entire framework with #400 wet-or-dry paper, used dry. Inspect the entire surface and see if the wood grain is completely filled. In many cases, a second coat of Sleek will be required, and this should be allowed to dry thoroughly and, once again, sanded with your #400 paper.

(8) When the surface is completely filled, spray or brush on, one coat of clear butyrate dope thinned out 20% to 50%. At this point we would like to say that we do **not** use butyrate dope thinner with our butyrate dope. Rather, we use Ditzler Duracryl DTA-105 extra high gloss acrylic lacquer thinner. This material is available from major paint stores at a cost of slightly less than $3.00 per gallon. If Ditzler thinner is not available, ask for either Dupont or Nason extra high gloss acrylic lacquer thinner. You will find that, by using this extra high gloss acrylic thinner in conjunction with dope, that you will have a much higher gloss finish, as well as a deeper penetration of the entire finish. In addition, the slightly slower drying time of the acrylic thinner acts as a retarder to eliminate the "blushing" so often associated with the application of butyrate dope in slightly damp or cool weather conditions. When this final overcoat of clear dope and acrylic thinner has dried, lightly sand the fuzz on the surface with your #400 paper, and you are ready to cover the framework.

Before going on to Step #9, we would like to mention that there are a great many covering materials available for your use. These include silk, nylon, silkspan in various grades, blends of silk and synthetic fibers, and newly introduced fabrics such as Coverite with an adhesive back, and Shrink-Tite, which is a lightweight version of the material used to cover a great many of the full size fabric-covered aircraft. In our own applications, we use Super Shrink-Tite on the wings of every aircraft that is .19 size or larger, and Regular Shrink-Tite on the fuselage and other fully-sheeted surfaces. This material is more expensive than the normal silk or synthetic fabrics, but its cost is more than offset by its ease of application, its quick filling capacity, and its almost unbelievable strength-to-weight ratio. A complete article was published on the application of this material, complete with step-by-step photographs, in a past issue of RCM. In addition, complete instructions are included with each package of the material that you purchase. Use the article and the instructions as your guide for applying this heat shrinkable covering material. In using the light-weight material on the fuselage and sheeted tail surfaces, we pre-ironed the material to eliminate any packaging wrinkles, since the shrinking potential is not necessary on a fully-sheeted surface.

(9) Apply Super Shrink-Tite to the wing, using Aero Gloss C-77 cement. When dry, apply heat in the prescribed manner to completely shrink the entire wing structure.

(10) Apply the pre-ironed Regular Shrink-Tite to the fuselage using unthinned butyrate dope brushed through the material itself. Smooth this material out with your fingers as you go.

(11) When the entire structure has been completely covered set the fuselage aside temporarily and begin filling the pores of the material on the wing, since we have an open framework in this area.

(12) Thin your butyrate dope 30% with the specified acrylic thinner. Do not load your brush, but apply sparingly, as you do not want the butyrate dope to "blob-up" on the underside of the fabric. The first step is to brush on a thinned out coat of dope over the leading and trailing edges, and the tips of the wing.

(13) When this phase has completely dried, carefully brush on a coat of dope over the upper wing surface in the open spanned areas, being careful not to touch the wood areas underneath. While the top surface of one wing panel is drying, turn the wing over and repeat this process on the underside. By doing one panel at a time, first one side and then the other, you will go a long way toward preventing warps caused by the shrinkage created by the application of dope to one side only.

(14) Repeat this entire procedure until you have a smoothly doped surface with the pores apparently filled. When the entire wing has dried, fill your spray gun, or aerosol spray gun, with straight acrylic thinner. Holding the wing upside down over your head, fog on a coat of straight thinner. Since dope has a tendency to go through pores of any fabric and lie on the interior surface, this process will bring the butyrate dope to the outside surface. When you are satisfied that you have a completely even coat and smooth surface, set the wing aside and allow to dry for 24 to 48 hours.

(15) Brush on one coat of dope, thinned approximately 30% or more with acrylic thinner, to the fuselage and all other previously covered sheeted areas.

(16) Apply several coats of Stazon Sleek to all such areas, brushing this material on with a full brush of the wood grain sealer. Sand with #320 or #400 wet-or-dry paper, used dry between each coat. Be sure to allow 45 minutes drying time before sanding each coat. Approximately five or six coats of the material, sanded between each coat, should be completely adequate. Look at the entire surface structure at an oblique angle, which will show any grain that is showing through your finish preparation. If you see any evidence of fabric grain, apply one or two additional coats of the wood grain sealer, sanding between each. After the final coat of sealer, sand lightly with #500 wet-or-dry paper, used dry.

(17) Spray on one coat of butyrate dope thinned out at least 30% with acrylic lacquer thinner. Set the fuselage aside to dry.

(18) At this point, you should decide whether or not you want to apply a coat or two of the wood grain sealer to the entire wing structure. If you have done a good job of filling the pores of the fabric, it may not be necessary. On the other hand, if grain is still showing through the doped surface, thin out some of your Sleek with acrylic lacquer thinner, approximately 30%, and either spray or brush on one or two coats directly to the entire wing. Use the upper and lower panel method, as previously described, to prevent warping. As each coat of the sanding sealer dries, sand the entire wing lightly with #500 wet-or-dry paper, used dry. Unlike silk, or synthetic silk blends, the Shrink-Tite material is very rugged and durable, and if normal precautions are taken, you can sand the open framework areas without going through the fabric itself. When you are satisfied that the surface is thoroughly filled, spray on another thinned out coat of clear dope and acrylic lacquer thinner.

(19) Decide on what colors you are going to paint your aircraft. At this point we would like to mention the factor of orientation once you have your model in the air. This may not seem important to you, but as a beginner, you will have enough problems without trying to figure out which way your aircraft is going when it is at a distance from you. For this reason, we recommend that your basic paint scheme use one of the highest visibility colors. These include: Red-yellow, red, yellow, white, and green. Each of these colors has a visibility range varying from 2½ to 3½ miles in the air. We strongly recommend that you use a different color pattern on the under surface of your wing, than you do on the top, since this will enable you to determine whether you are turning right or left, depending upon the wing high condition when the plane is at a distance. In addition, we strongly recommend that you paint a white stripe along the entire leading edge of the wing, to help you determine whether or not your wings are lined up level on your landing approaches. This may seem unimportant to you now, but it will be a definite aid when you are learning to make your first landings. **Don't** try to get too fancy and use color patterns such as a checkerboard paint job—this may look extremely pretty in the air, but for a beginner, it is one of the most difficult painting schemes to follow with the eye.

(20) We use AeroGloss hot fuel proof dope which is available nationally. One of the finest butyrate dopes that you can use is Kampel's which is readily available in the East. Randolph's butyrate dope is also excellent according to reports from the East and Midwest. Regardless of your choice of dopes, you should thin the material out approximately 50-50 with acrylic lacquer thinner. If you are using a commercial spray gun, set your tank pressure at approximately 50 pounds. Aerosol spray units, available at most hobby shops or local hardware stores, can also be used, but these can be quite expensive when you consider the cost of purchasing the aerosol can replacement units. We do **not**

recommend the use of airbrushes for general painting work, since the amount of pressure, and the surface they will cover per stroke, is not sufficient except for final trim. When using your spray gun, make sure your dope-thinner mix is thoroughly stirred, and then fog on the first coat around the complete perimeter of the edges of either the wing or the fuselage. the edges of the ail surfaces, etc., since these areas usually receive the least amount of finishing material. When this is dry, fog on another coat of the dope-thinner mixture until you have just barely covered the entire structure.

21) Now, setting your gun for less air and more paint mixture, use side strokes, stopping at the end of each stroke, and cutting your gun back in again on the back stroke, and flowing on wet coats of dope until you have reached the desired color density. Do not stand too close to the surface being sprayed since this will cause unsightly runs which must be sanded out prior to the application of succeeding coats and finishing material. We strongly recommend the use of a painting jig for the wing, such as the RCM painting jig which was presented in RCM in 1967.

(22) When you have reached the desired color coats, remembering that every coat of pigmented dope adds a definite amount of weight to the aircraft, stop, set the structures aside, and allow it to dry for one to two hours.

(23) Using #400 or #500 wet or dry paper, wet sand the entire structure, including the open framework areas of the wing (assuming you use Shrink-Tite) using liberal quantities of water. When you have completely sanded the entire area, wipe the structure dry and then go over the structure to be painted with your tack rag.

(24) Take your #50-50 dope and acrylic thinner mix and add approximately another 10 to 15% of acrylic thinner. Spray the entire structure once again. This method, in combination with the acrylic lacquer thinner, will give you an extremey high lgloss finish with very little tendency to blush, even in damp or cool temperature areas. When this is completed set the entire structure aside to dry overnight and thoroughly clean all of your painting equipment.

(25) When your base coat of paint has thoroughly dried, mask off the areas you want to paint with your trim color. We strongly recommend the use of a commercial quality 3M paint masking tape available at most automobile paint supply houses. This masking tape has less "ridges" in it, adheres better, and allows much less seepage of the paint under the tape. When you have taped the area enclosing your trim design, use brown wrapping paper, and completely protect the previously painted area which will not receive the second color. Take a small tipped brush and cover the edge of your masking tape with clear dope to seal it against any possible paint seepage.

(26) Mix up your dope in the same proportions as before and spray the trim areas.

(27) Follow all of the same procedures as above. Allow the dope to dry for approximately 30 minutes, then carefully remove the brown paper protective wrapper, then remove the masking tape. The latter is best accompishedl by pulling the masking tape straight back and flat across itself, pulling slowly and carefully, to avoid lifting the paint underneath. The less time you have allowed the paint underneath to dry, the more chance there is of lifting the upper paint surface. When the tape has been completely removed you will find that any paint areas that have overlayed the masking tape, and did not come off with the removal of the masking tape, can be easily rubbed off with the finger when the paint has thoroughly dried.

(28) If, by this time, you are thoroughly tired of painting, and never want to see a can of dope or a spray gun again, you can spray on a coat or two of clear dope thinned 50-50 with acrylic thinner. This will give you a final high gloss, but not as professional appearing a model as the steps to follow.

(29) The final finishing process consists of obtaining a jar of Sig Rubbing Compound, or Dupont White Rubbing Compound from your local automotive paint dealer. Using a dampened soft cloth, such as a baby diaper, rub out the entire model. When using rubbing compound, it is not the amount of pressure that counts, but the amount of time you spend firmly rubbing back and forth. Do not cross directions when you are using rubbing compound, and do not rub in a circular motion. On the wing, for example, rub back and forth, spanwise, rubbing lightly with a dampened cloth and a small amount of rubbing compound, and finishing up with a clean dry cloth. Repeat this process until you are satisfied with the deep lustre you will obtain. For a final touch, if you so desire, you can use any one of the good silver polishes available in any supermarket. This brings a high lustre up to a superb finish and eliminates any surface scratches or brush marks. When the airplane is completely rubbed out to your satisfaction, use a good grade wax for your final finish. We use either Sig or Stazon finish wax. Both are excellent.

(30) As a final step, send a self addressed, stamped envelope to R/C Modeler Magazine, and we will send you off an RCM decal which is identical to the crest on the cover of the magazine. Be sure to enclose a small note telling us why you're sending us the self addressed, stamped envelope, or we might just mail you back a California scorpion from The Hill, in which case you won't have to worry about painting your next model. If we run out of decals before we receive your request, we'll send you a scorpion anyway so you won't feel left out! At least the decals are prettier than one of our local kit manufacturers who has "make love not war" and "help send a hippy to boot camp" painted on either side of his wing!

The procedure we have described to you for finishing your model aircraft may seem long and involved, but it's really much simpler than it appears in print. Once you have become use to it, you will find it is a matter of habit, and not really difficult at all. For the barn paint and roller types, such as Chuck Cunningham, there is very little hope, anyway, and they're going to continue to paint their balsa boxes with creosote no matter what we say. For guys trying for the trophy at Toledo, this simplified process would probably horrify them, so we'll exclude them from our group as well. Since a couple of items that we mentioned in this article were to be obtained from the local automotive paint supply dealer, you will undoubtedly become intrigued by the many hundreds of colors available in the various acrylic lacquers. Since you probably will ask if they can be used, here is a method with which you can experiment, which will produce a beautiful finish, but we recommend that you use it only after you have mastered the previously described process on at least several aircraft. Since there are, virtually, several hundred various colors available in acrylic automotive finishes, they can be used for your aircraft finish, but are much more touchy and sensitive than the process described. If you plan to use this type of finish, go through the same process described above up to and including the complete applications of wood grain sealer to the fabric followed by one or two coats of clear dope, to seal this sealer. Then use either Mason or Dupont acrylic lacquer primer, thinned with Dupont #3661 acrylic thinner until it reaches spraying consistency. Next spray several coats of this primer, sanding between each coat with #500 wet or dry paper. Use the paper dry until the final coat of primer, at which time you can wet sand. If you have the patience, allow the aircraft to sit for a week or two, preferably in an area when the sun can reach it for several hours a day. This will allow a complete curing, and bring any imperfections to the surface. Follow up with one more coat of the primer. This should be a fogged coat and then very lightly sanded. The surface should feel like glass.

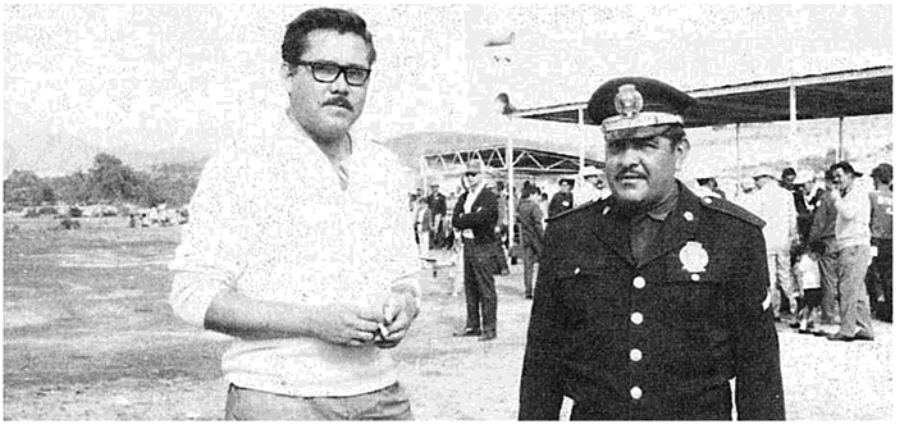
In picking your acrylic lacquer color, or colors, that you plan to use, again mix the lacquer with an equal portion of either clear butyrate dope, or a color of butyrate, that is very close to the color of acrylic lacquer you have selected. Use Dupont 3656 thiner for these color coats, or the Ditzler high gloss acrylic thinner previously described. Now spray on several coats of this lacquer-dope mixture until you have achieved the desired color density. Drying time of this mixture is only slightly slower than that of straight butyrate dope. Allow to dry thoroughly, and trim with the same acrylic-dope mixture, or straight acrylic lacquer. Do not use straight butyrate dope over an area which has previously received this lacquer-dope mixture.

As we mentioned, this is a further step in the painting process with which you may care to experiment. Some of the most beautiful finishes we have ever seen have been accomplished with this method. On the other hand, some of the top models in the country have been finished in a manner very similar to the straight dope method we have described using infinite patience and lots of elbow grease!

Continuity to page 48

SUNDAY FLIER

KEN WILLARD



THIS month the Chief Sunday Flier (as identified by our friendly editor) went to Mexico and the Mexican National Championships. I'll tell you about them, but first you might be interested in the story of how I happened to make the trip. It surprised me—and it may give some of you an idea in the future. Here's what happened:

Last summer I went to the U.S. Nat's at Los Alamitos, and flew down there on Pacific Southwest Airways, a real go-go airline that operates intrastate here in California. Their motto is "One flight on PSA is worth a thousand words." For me, in this case, it certainly was. I got aboard the plane without anything to read, so, like everybody else, I burrowed around in the pocket on back of the seat in front of me, where the airlines always keep their promotional material—along with the urp-sacks—and after reading about all the advantages of PSA's 727s and Lockheed Electras, I came across an entry blank for a contest that PSA was running. The folder said, "Enter PSA's exciting contest! Write one thousand words describing a flight on PSA—like fast, friendly, great, economical, quiet, wow, exciting, smooth, etc.! Be different—be creative!" First prize was an all-expense paid trip for seven days and six nights to Mexico City, second prize three days in San Diego, and then there were about twelve dacron shirts for the runners-up.

Well, I thought, there are only so many adjectives, and everybody will come up with the same ones—seems sorta silly to even try. But, I didn't have anything to read, and the more I thought about it, the more intrigued I became. "Be different," it said. So, for kicks, and to help pass the time, I decided to write an essay, exactly one thousand words long, telling why you **can't** describe a flight on PSA with only one thousand words.

I didn't finish the essay on the way down to the Nat's, so on the flight back I went at it again. Then, when we landed at San Francisco airport, I took some color photos of the planes, the pilots, the stewardesses (they all enjoyed posing) and some of the friendly ground personnel. Then, when I got home, I put the whole thing together in a sort of brochure, turned it in to PSA, and promptly forgot about it. For about three months, anyway.

Then one day last October I got a phone call. It was PSA. "Mr. Ken Willard?"

"Yes."

"This is PSA calling."

To myself I thought "Oh, oh, how about that. Bet I won one of those dacron shirts!"

"We've just completed the final judging of the entries in our contest, and we're happy to inform you that you've won first prize!"

I nearly fell off my chair. You hear about such things, but you always figure the first place winner is the judge's Aunt Maude from Petaluma. Tain't so! I can vouch for it now. So next time any of you guys feel like entering a contest, go ahead. You too can win first place!

So that's how come I got to go to Mexico City.

Naturally, since the prize was for a trip for two people, I could take someone with me, and my son Don was dying to go, so we set it up for his Easter vacation — and that fitted almost perfectly, since the Mexican R/C Championships are always held on Easter weekend. We did have to leave before the contest was finished, but that wasn't serious. I was more interested in covering the event from a human interest viewpoint rather than to list the winners — and as it happened, Jerry Kleinburg was there, and he'll give the official results for those who are interested in that phase.

Before the championships began we had four days to see the sights. We spent two days in Acapulco — and your old Chief Sunday Flier, who recently became interested in sailplanes, but who has always been interested in sailfish, caught himself a beauty — 130 pounds, ten feet long! And it's still out there, 12 miles off Acapulco, if you want to go after it, because we took pictures of it and then, much to the dismay of the Mexican skipper (Senor! If you will only let me bring him in and display him. I will have feefty feesherman asking me to take them out next!) I ordered the deckhand to put the sailfish back in the water, where he swam slowly away. But he'll strike again when he gets hungry.

Back in Mexico City the next day, we were scheduled to go with a group of the modelers out to the Pyramids for a big pageant — but just at that time Montezuma, as the saying goes, decided it was time, and hit me with his "revenge."

So, off to bed instead, with every "stopper" I could think of, because I was determined to get to the field the next day.

Next morning Enrique Velasco (gosh, I hope I've spelled that right—Montezuma had me pretty groggy when I was making notes) called for me, and we drove out some twenty miles or so to "Paradise Runway" as their field is named. On the way I tried my best to converse with his attractive wife — but we finally gave up and Enrique translated for us. My Spanish is limited to "Buenas Dias, chile con carne, y cerveza fria." Thus, I can always greet someone and at least get something to eat and drink — even if I **always** wind up with heartburn!

As we came to the field, I was enthralled with the sheer beauty of the place. The field is completely surrounded with mountains — far enough away that they don't cause tricky wind currents, but close enough to make a beautiful setting for the contest. You can see them in the background of some of the pictures.

The altitude of the field is 7500 feet — and does that make a difference in the performance of the planes! For example, Jim Witt had a small, about three foot span version of the Kwik-Fli, with the new small Kraft radio, and an .09 up front. Normally, this set-up would result in a really lively performance, but at 7500 feet it was barely able to stagger off!

The Mexicans were well prepared, though. Their models in almost every case had the next larger engine size than you would normally expect to see, this due in large part to their high altitude.

When we arrived, the precision flying was already under way. They were flying the F.A.I. pattern, and Marco Antonio Covarrubias, the meet director, told me they have hopes of organizing a Mexican team to go to the International Championships. That's Marco, in the photograph with the police officer. The policeman, even though he may look like it, is not related

to Marco. I asked him to pose with Marco because he typified the quiet and unassuming Mexican police officers who were at the field to keep the spectators under control. And that was quite a job in itself!

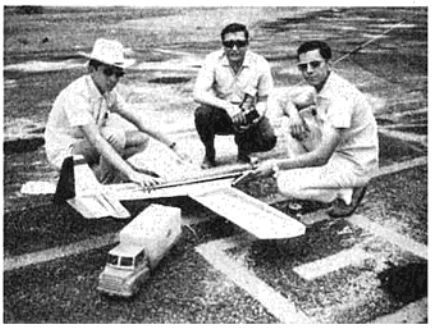
Compared to the American Nat's, the contest was small—about twenty five contestants, about six of whom were from the United States.

For the most part, the planes were what you might call standard contest types — Kwik-Fli's, a Twister, and several original designs, like Gaston Mathelin's beautiful open cockpit low wing design. Gaston is a hobby dealer in Mexico City, and a very avid R/C fan. Then there was Emilio Lo-

zano, also from Mexico City, who had a strikingly well built Twister (with some of his own innovations, of course).

One of the most unusual setups I've seen — and it drew plenty of comment — was the arrangement used by three modelers who had come from Monterrey, Mexico. I wasn't able to get the name of the lad on the left of the photograph, but the others are Senors Quantanilla and Lomeli. The thing that's different, of course, is the gas truck! And it really is a gas truck, which they used for fueling the model before each flight.

By now you probably have noticed the size of the mills they have up front, and even so, it was noticeable that some of the maneuvers called for maximum power from those monsters.



International friendship was given a maximum effort test. Ray Downs had ar-

rived without his pattern ship, so his good friend Francisco Gallegos — known all through Mexican R/C circles as "Paco" — loaned him a gorgeous looking original design which Paco had been developing. One of the photos shows Ray firing up for his first flight, with "Tequila Kid" Dunham giving him an assist. Another picture shows Paco on the left mournfully surveying the remains while Ray checks the receiver. Somehow, along about three minutes after the flight started, all aileron control was lost, then it seemed like the elevator went, and naturally, all this had to happen right over the runway, so that when the plane hit, it virtually disintegrated. With characteristic chivalry, all Paco said was "Hah! I would have happened to me anyway. It's just the luck of the timing!"

For sheer concentration when flying, you'd have to go a long way to find somebody trying harder than Salo Feiner. His photograph is a study in tension, with Salo biting his lower lip, and Roberto Guzman lending body English to the plane's maneuver, while Salo's daughter, Rita, is intent upon giving all the moral support she could to help dad win.

I didn't hear how Salo made out, but he was second to Don Hartman in the first round of flying. Incidently, his plane was the only one there with retractable gear.

After the first round of pattern flying finished, they set up the pylons for what they call their "Thompson Trophy" racing event — and it's quite different from our Goodyear. There are only two pylons instead of three, so that means two tight turns on each lap instead of one tight turn and then a smooth rounding of two pylons which is the normal course in Goodyear. And to top it all off, their race is thirty laps! Not ten, Thirty! That means bigger gas tanks, more turns, and a need for greater consistency over a long period of time. It was quite apparent during the first day's racing that the fastest plane was not necessarily the one that was going to win — it was the smoothest pilot that had the edge.

There were some ten entries in the racing event. Kneeling in the foreground of the lineup photo is Humberto Estevez with his Mustang, and that's Enrique Velasco, director of the racing event, facing the row of racers.

The next photograph shows a rear view of Enrico doing one of the things he enjoys most — starting off the racers for the Thompson event. Looks almost like the same scene which is repeated all over the United States — except again, look at those beautiful mountains in the background!

Typical of the racing designs was that of Dr. Alex Elizondo. It's one of Jerry Nelson's "Li'l Knarf" designs, with Alex's modifications added to make it suitable for the Thompson event.

And just to prove that the international bonds of friendship may have been strained, but remained intact, picture number twelve shows Paco Gallegos flying his pylon racer, while Ray Downs is busily piloting Paco through the course!

Finally, one of the things which all of you Sunday Fliers are familiar with is the necessity for keeping your women happy and smiling if you want to go flying. One way is to tiptoe out at dawn, get your flying in, then return in time to have breakfast and then help with the breakfast dishes or do other chores around the house. Another way — slightly more expensive, but perhaps a lot more effective, is to take your wife right along with you when you want to go to the big meet — either to watch or to compete. It's particularly effective if the big meet is in Mexico City. Look at that smiling bevy of beauties in the photograph. Left to right, there's Phyllis Sabine, from Mobile, Alabama; Mary Jane Coleman, from Citronelle, Alabama; Natalie Betancourt, Carmen Elizondo, Lourdes Pratt, three charmers from Mexico City; and on the right, from Guadalajara, that's Mercedes Covarrubias, wife of the meet director, Marco Covarrubias. They really look like they're enjoying a few days away from the kitchen!

So, if the static gets pretty bad around the house next time you want to go flying, why not offer the little sidekick a chance to go with you to the next meet in some city where she can get away from it all? For example, next September — I think it's the 14th and 15th, there's another big meet down Mexico way, in Guadalajara. They say it's beautiful there in the early fall, and there are lots of interesting shops and market places where the women can dicker with the shopkeepers. And there are many bargains in Mexican art — if you know how to go about it.

I hope you found this description of the Mexican Nationals an interesting departure from the usual Sunday Flier discussions of designs, adjustments, problems, and radio equipment. It was one of the most interesting modeling experiences I've ever had, and I thought I'd share it with you.

Meanwhile, if you should happen to go to Mexico, or plan on going to Guadalajara later, here's a word of advice — known to all, but worth restating. "Don't drink the water — unless you get the pills from Dr. Alex first!"

Covering by page 45

With your model sitting there in a resplendent new suit of paint, we'll bid you adieu until next month, at which time the RCM Flight Training Course will discuss the proper installation of radio equipment and the overall alignment of the model and its control surfaces. In the meantime, since this series o farticles from the beginning construction of the aircraft through the final flight stages, takes many months to present, you can spend each weekend going to a different flying field, setting your newly finished bodel down on the flight line, and walk around, listening for comments of praise on your new aircraft. As long as you don't fly it, whose going to know it's your first aircraft.

The RCM Flight Training Course

This RCM Flight Training course is a unique program devised by the RCM staff for the many newcomers to R/C who have never, as yet, soloed, as well as for those countless others who are experiencing difficulty in learning to fly. The objective is to teach you to fly, with RCM as your instructor. You will be given a thoroughly field tested aircraft on which to learn. You will be shown a professional way to learn to fly with proportional control, using the assistance of one of the more advanced fliers in your local area. As you gain confidence and proficiency, you will be shown how to upgrade your training aircraft to keep pace with your abilities. In short, you will learn how to fly radio control.

This series has been prepared for presentation by RCM by Don Dewey, Herman Stroup, Kathleen Acton, Chuck Cunningham, Dick Kidd, Dick Sonheim, and Bill O'Brien.

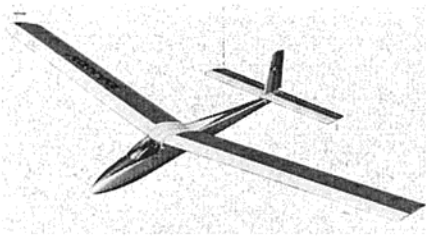
PART IV: COVERING AND FINISHING

The phenomenal growth of radio control over the past few years has brought with it its own complex of problems. One of these is the ueprecedented influx of newcomers to our hobby and sport. While this is beneficial to the present and future growth of the hobby in general, it has created a situation of an industry that was, and still is, to some degree, unprepared for the novice adult R/C'er with little or no modeling background. This is evidenced by the many magazine construction articles that contain the phrase, "This is not a beginners project," as well as the majority of kits on the market which assume a vast modeling background on the part of the modeler.

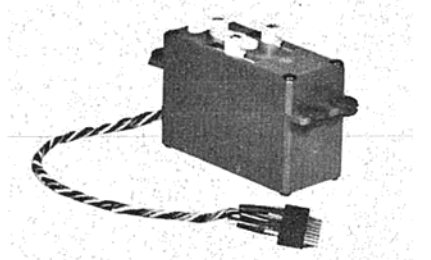
This leads us to another problem — the endless array of construction articles, kits, and radio equipment available to the new R/C'er. He is expected to make a choice, and if his choice is wrong, he will encounter a great deal of disappointment and frustration, rather than success, in his attempts to get started in the sport of his choice. This quandary in whch the novice finds himself, is evidenced in the hundreds of letters we receive from beginners each month. These letters literally plead for specific recommendations as to a choice of first airplane, engine, and radio equipment. And, although we have made general recommendations in the Shop & Field section in the past, it is apparent that more specific recommendations be made. This, is the second installment in a Shop & Field series of articles presenting a tested and proven program that will literally guarantee you, the newcomer, a relatively high degree of success in building your first aircraft and, subsequently, learning to fly that aircraft. This is, certainly, not the **only** way to learn to fly — but one that is based upon the combined years of experience of a great many people, as well as one which eliminates as many pitfalls as possible.

SHOP & FIELD PRODUCT NEWS

Commerecial items for test and evaluation should be addressed to Product Editor, R/C Modeler Magazine, P.O. Box 487, Sierra Madre, Calif. 91024.



Citizen-Ship Radio Corporation, 810 East 64th St., Indianapolis, Indiana 46220, says that "versatile" is the word for their new DP-4 Proportional System. In fact, if you are the owner of a Citizen-Ship DP-5 or DP-3 that would like smaller servos and/or receiver, their new DMS servo will plug right in anyplace the older DPC servo was used. The speed and smoothness of the DMS is almost unbelievable, and permits the flyer to concentrate on flying through maneuvers, such as the 8 point roll, without leading the airplane. In addition to the servo, Citizen-Ship will convert any Citizen-Ship DP-3 or DP-5 transmitter to the new stick assembly for $15.00. This price includes new sticks, double yoke assemblies, heavy springs, and nylon inserts for the openings in the transmitter case, plus tuning and setting up the transmitter. If you want a smaller receiver for your next aircraft, the DPR-4 will give 4 channel operation from your DPT-5 transmitter, or three channel operation from your DPT-3 transmitter. Matching of the receiver to the transmitter is not necessary but please be sure to specify the frequency when ordering. If you would like the advantages of a modern up-to-date system without investing in a complete new system, now is the time to investigate updating your older Citizen-Ship Proportional System. Speaking or ordering, Citizen-Ship suggests you see your hobby dealer, and if he is out of stock on the DP-4 System, the manufacturer will ship to him within 24 hours after receiving his order.



Aero Publishers, Inc., Fallbrook, California 92028, announces the publication of Volume four of the "Racing Planes and Air Races" series written and illustrated by Reed Kinert, which brings the air racing buff up-to-date through the very last official competition, the National Championship Air Races held last Fall in Reno, Nevada. Author Kinert, an ex-racing pilot himself, along with artist Dustin Carter, were in Reno armed with camera and notebook in order to present the latest possible photos and facts, making this the finale of a truly "complete history of Air Races." Volume 4 begins with the 1946 races and has been expanded to 112 pages instead of the 96 pages in each of the previous 3 volumes. It includes a warm narrative of high adventure liberally sprinkled with facts, figures, charts and illustrations, along with countless rare photos and detailed 3-viewed drawings by Dustin Carter. Midget racers are tallied as well as full size souped-up Mustangs, Grumman Bearcats, Corsairs, along with many oddball craft that bite the dust. All 4 volumes are now available through local book stores, hobby shops, or directly from the Publisher. Price is $3.00 per volume.

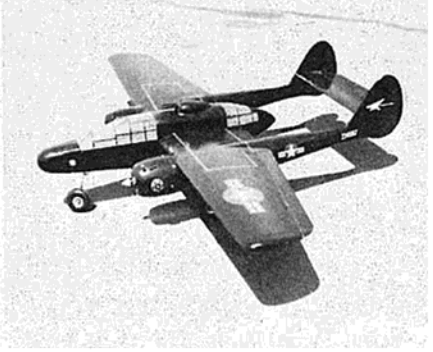
Kayeff, Inc., 511 Campesina Rd., Arcadia, Calif., announced the arrival and current distribution of their new "Dragon" sail boat, made in Denmark. This is a 31" hardwood model, built in accordance with International Racing Model Regulations. Scale is 1:12 as indicated on the illustrated sheet available from the distributor. Keel plate, ribs and planking are of fine quality hardwood, in finished form. Drawings and details are excellent. First indications and comments received from hobbyists who have actually built the model, seem to indicate that here is an excellent kit — one which may well prove to be the new contender in smaller racing craft. The Dragon kit sells for $16.00 with an optional Fittings Set for an additional $12.00.

Bonner Specialties, Inc., 9522 W. Jefferson Blvd., Culver City, Calif. 90230, has answered the demand for a 6 channel system equal to their Bonner Digimite 4RS. Bonner has introduced the circuitry of the Digimite 4RS in the new system — a circuit which has proven itself efficient and dependable in operation throughout the country, according to the manufacturer. Introduction of the new 6 channel system by Bonner permits the R/C flyer to install capacity control in his plane with a total airborne weight of only 14.8 ozs. This weight includes 4 servos, receiver, battery, and switch harness. Additional Bonner servos weigh only 2.2 ozs. each. Complete system sells for $435.00 and is now available at local hobby dealers.

Aviation Magazines Plan Service, 24248 So. Crenshaw Blvd., Torrance, Calif. 90505, has informed us that they have virtually all general aviation magazines, model airplane magazines and plans, aviation books, and early air war pulp magazines, in stock from 1928 to the current issues. All magazines offered for sale have front and rear covers with no cut pages. Condition varies from good to excellent with no junk issues being offered for sale. All magazines are returnable if not fully satisfied, although all offerings on current listings from this company are subject to prior sale. Stock changes daily, and this factor should be considered when sending in an order to Aviation Magazines Plan Service. It is advisable to send a second choice with your order. Prices listed on their price sheets are postpaid, with a minimum order of $5.00. No mail orders will be accepted from within a forty mile radius of Torrance, Calif. This is an extremely valuable

source of data and information for the serious scale builder as well as the RC'er who wants to complete his collection of back issues of the various model magazines.

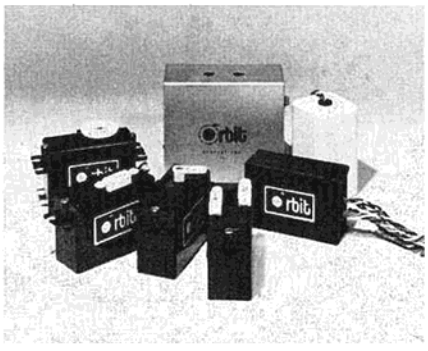
Bee Line, 4510 East 138 St., Grandview, Missouri 64030, is adding scale aircraft to their line of fiberglass-veneer covered foam airplane kits. The P-61 Black Widow in ¾" .15 to .20 engines and full house operation is now available. Coming soon will be the P-38 in 1½" scale for .45 to .60 engines, as well as the A-20 Havoc. These kits feature fiberglass fuselages, veneer covered foam wings and stabs, with engine, aileron, flaps, and elevator pushrods as well as full size plans. Bee Line's test model P-38 now has recorded 33 flights and approximately 5 hours airborne time. The P-61 has 6 flights. Bud Atkinson has conducted most of the test flying and was so impressed with the ease, reliability, and realism of twin engine flight that he is developing a twin engine entry for scale competition. The presently available fiberglass-veneer-foam kits are of the Warlock, Miss Dallas, Aerobee, and the P-61.



Hobby Lobby International, 2604 Franklin Road, Nashville, Tenessee 37204, announces the availability of their Deluxe Sealector Heat Sealing Iron, a heat shrinking iron

for use in applying MonoKote, Super MonoKote, Coverite, SPL Shrinktite. The Sealector iron has a rheostat controlled heavy duty heating element that is thermostatically controlled to maintain temperature within close tolerances required for model airplane heat sealing-shrinking jobs. The Deluxe iron has a Teflon coated heated surface that glides easily without sticking to surfaces. The small heating surface is much easier to use for model airplane work than the conventional household iron, and the shape of the heating surface permits sealing of fillets and corners as well. The air cooled handle fits the hand perfectly and keeps the electrical cord away from the work. With the popularity of the many new heat-shrink model coverings, the Sealector Deluxe Heat Sealing Iron should prove to be a useful addition to the modeler's shop equipment. This item is available directly from Hobby Lobby at a retail price of $9.95.

Orbit Electronics, Inc., 11601 Anabel Ave., Garden Grove, Calif. 92640, is offering their airborne integrated circuit system as a separate unit consisting of a receiver, four PS-3 D servos, power pack, and charger. The new integrated circuit system is 100% compatible with any Orbit Digital 4-8, 6-12, or 7-14 transmitter. Flying weight is 14½ ozs. The only requirement with this system is that the purchaser must return his transmitter to the factory in order that the new IC unit may be tuned to it. He will then, in effect, have two systems (the old and the new) working from one transmitter. Prices are as follows: 4-8 IC at $300.00; 6-12 IC at $315.00. Add $7.50 for 6 meter or 72 Mc frequencies. Also available from Orbit is a complete line of accessories for the all new PS-3 servos. These include a Servo Mounting Tray which holds 4 servos, a Servo Mounting Tray which holds 3 servos, a Servo Side Mount to hold one servo, and a Servo Accessory Pack which includes disc, linear output, and rotary arms. All of these items are available at local hobby shops or direct from Orbit.



Lafayette Radio Electronics Corp., 111 Jericho Turnpike, Syosset, L.I., N.Y. 11791, announces a new super multitester, Lafayette's 50,000 ohms per volt multitester. This is a battery operated, completely portable multitester that is ideal for service, industrial, and lab applications. An overall coverage of 57 measurement ranges are obtained without sacrificing any of the high performance characteristics. This unit measures resistance in 4 ranges up to 10 Megohms plus there is a switchable expanded low ohms range that offers full scale meter readings up to 2K ohms; 12 dc-voltage ranges from 0 to 1,000 volts with a full scale accuracy of +—2%; 12 ac-voltage ranges from 0 to 1,000 volts with accuracy of +—3%; DC microamperes from 0-25μA at 125mV and 0-50μA @ 250mV; DC milliamperes from 0-500mA at 250mV and 0-250mA @ 125mV; DC amperes 0-5A @ 125mV and 0-10A @ 250mV. DB measurements are from —20 to +81.5dB in 10 AC volt ranges. Meter is usable at frequencies up to 100kHz. Easy to read 5¼" meter has springbacked jewels and self-shielded movement. Features polarity reversal

switch and easy to read range indicator on meter face. Built-in meter overload protection. Size: 5¼" x 2¾" x 6½". Complete with batteries and test leads.

The Autocon Corp., 250 Orchard Rd., East Patchogue, L.I., N.Y. 11772, are the manufacturers of Marvelite completely covered, ready built and stock and custom foam core wing panels. These are the foam wing cores available in most popular designs, as well as custom cut wings and stabs, which are covered with .0156" plywood veneer. These wings are light and fantastically strong, and offer completely true surfaces. They are easily finished because of the fine glue impregnated grain, four or five coats of clear dope will give a glass finish. No sanding is required and the foam cores are covered with a continuous plywood sheet with no seams. This covering material is not affected by heat, cold, humidity, or even when put in hot water before the finish is applied. This is a resilient skin surface which is not as susceptible to dents as the common balsa covered foam wing. All landing gear blocks are installed ready to accept gear wire when required. A spruce trailing edge for warp resistance and secure aileron hinging is provided. Spruce spars are installed in the cores for superior strength. The dihedral is precision cut with no gussets required. Simply join the wing halves and wrap with 4 or six inch fiberglass boat tape. Stock wings are shipped the same day as order is received. Custom wings are shipped within 3 days. Price is $30.00 for all stock design wings, and $35.00 for custom cut wings. Stock wing designs using full span ailerons are $25.00.

Spaceport Products, Merritt Island, Florida, has developed a new fuel especially blended for the radio control modeler. It was formulated for the Sunday flyer, but more than adequate for the contest participant. The fuel has undergone an extensive test program before reaching the final formula. Spaceport SPL Blend is basically a triple filtered methanol, caster oil mixture with three additives to insure: (1) A more reliable idle, (2) lower fuel consumption, and (3) cleaner burning. A major problem with model aircraft engines is the build-up of carbon and varnish which leads to poor performance and short glow plug life. One of the ENYA 60 test engines was equipped with a K&B glow plug. It has burned over 10 gallons of fuel with the original plug still glowing. Internal examination of all test engines showed they were in perfect condition with no trace of varnish or carbon. The secret behind this great fuel is in the additives. One is the lubricative detergent used to clean the reciprocating parts. The secone is to slow the combustion rate of the nitro-methanol mixture, therefore giving a smoother burn propagation in the combustion chamber to give a more reliable idle and ower fuel consumption. The third additive forces fuel during the combustion cycle to decompose and burn its hydrocarbons, therefore leaving only the basic lubricating properties in castor oil to be exhausted. This leaves a well lubricated engine with the absence of carbon and varnish. Spaceport SPL Blend is available through Hobby Lobby International, Nashville, Tennessee.

CUNNINGHAM ON R/C

IN June, we took up flying the first part of the new AMA Pattern. This time we are going to take a gander at the last half of the maneuvers. Before we get started, though, I think that it is well to repeat the most important item in this two part article, and that is, **practice.** You must work hard at it if you really want to be good. Don't spend a lot of time at the flying field showing off with low level inverted passes, or a dive at the strip followed by a snap roll. Sure, these look great to the crowd, and are a lot of fun, but get the work done first. Then, if you have any battery time left, have a little fun.

FAI Horizontal Eight: If you grew up in the sport of flying models then you probably have accomplished this with your old U-control ship. since this maneuver is the same as a U-control figure eight. The critical part is to be sure that the aircraft is vertical at the intersection of the eight. Enter this maneuver from straight flight, and flying into the wind. Pull up into a nice round loop. Cut back to about ½ throttle at the top of the loop, come on around to the ¾ position, then go from up-elevator to down-elevator and do a complete outside loop. After you have switched from the first loop to the second, and after the aircraft has begun the outside loop, again go to high throttle to pull up the back side of the outside loop. Cut back on the throttle at the top of this second loop, come to the ¾ point on the second loop, (the aircraft being in the vertical position), and, again, change over from down-elevator to up-elevator. Complete the unfinished portion of the first loop, and exit the maneuver on the same elevation and heading as you entered it. The object of this bit is to make two loops side by side; one inside, the other outside. The aircraft should make the cross-over in a vertical position. Speed should be kept pretty much the same throughout the maneuver. You may run into trouble when switching from the inside loop to the outside loop if you do not throttle back since you can often build up a terrific amount of speed, and a sharp down elevator can snap roll you out at the bottom with some rather unpleasant results if you are not careful.

Three Ouside Loops: This is a hold over from the old pattern, and is one of the least difficult maneuvers to perfect, provided you have adequate power and a true airplane. Start by flying down wind from straight and level flight. When you come even with the transmitter, cut back the throttle to about ½, then nose over with down-elevator. At the bottom of the loop go back to high throttle again, and leave it there throughout the remainder of the three loops. Some aircraft will snap roll out at the bottom of the outside loops, which is often caused by excessive elevator throw, excessively high wing loading, warps, or several other reasons. If you are having trouble with the outsides, use several throttle settings until you can find the one that will pull you through. Remember you enter this one from flying **down** wind, and you may have up too much speed to complete the first loop without a snap.

Loop with 1½ Snap: Wow, if you're good, you can do it; if you're lucky, you can do it some of the time; if you're a fumble thumbs, then "rots-a-ruck . . ." Anyhow, here's what you're supposed to do to get this one to come out right. This maneuver is a complete loop, except that at the top of it, you gyrate wildly through the air coming out right side up and completing the loop as an outside loop. Got that? No? Okay, start by heading into the wind, and at full power. Begin at moderate altitude since all of this is done above the level of entry. Pull up into an inside loop, not too tight, but a nice, open loop. As the aircraft nears the top you go to a full snap condition; that is, full left aileron, full left rudder, and full up-elevator (or to the right, your choice). Hold this control until the aircraft has made **exactly** (note that word, exactly, how the heck can you tell?) one and one-half snap rolls. Neutralize the controls just before the culmination of the ½ snap so that the aircraft stops the snap just at the top of the loop. The ship should now be upright and on the same heading as it was before beginning the snap. Continue on around the loop with down elevator. At the bottom, roll upright again, and exit on the same level, and at the same heading as the entry. The throttle should remain at a high setting throughout this maneuver, yet, some very fast aircraft may fly through this better if you come back on the throttle just as you enter the first snap.

Cuban Eight: Another left-over, but still a toughie to do. This is similar to the FAI Horizontal eight, but is jazzed up around the middle. The entry is made heading into the wind, and at a moderate altitude. Pull up into a nice round loop, come through the top, then as the ship begins to head downward at a 45 degree angle, roll either right or left to an upright position. Let the ship continue on the 45 degree path, then pull up into another inside loop, again at the 45 degree point roll and upright, continue on, then pull out at the same level, and in the same direction as the entry. The big trick here is to get the intersection between the two loops at the same point, the same size, and to make both rolls at the same rate. You need not change throttle during this one.

Inverted Three Turn Spin: I can remember, not too long ago, when it was a pretty good accomplishment just to get a spin, now we do 'em inverted, yet! Again, the design of the aircraft that you are flying will have a lot to do with this maneuver. One with a barn door rudder and a good amount of elevator throw is needed. The entry for this is done at a high altitude, flying into the wind. As you near the entry point, roll inverted, hold the nose up with a little down elevator, chop the throttle and pull up into a stall. Just as in an upright spin, the moment the ship stalls, put in full down elevator, full aileron and full rudder. But wait! Since you're upside down, the rudder has now become reversed, so if you are going to spin to the right, put in full right aileron and full **left** rudder. The aircraft should nose into a spin. At about two-and-one-half spins, neutralize controls, then fly out of the last spin in the same direction as the entry, but remember to pull out of the spin in the inverted position. You must continue to fly out inverted, without rolling upright right away.

Slow Roll: You have a full five seconds to complete one roll in this maneuver. It sounds easy, just one roll, but stretching it out is the hard part! You need to keep the aircraft on the same heading and at the same elevation throughout this roll. Entry is made flying down wind, at full throttle. Roll either to the right or to the left, but do not push in full aileron deflection. Hold the altitude with elevator and top rudder. As you come over into the first quadrant of the roll, feed in some opposite rudder. If you are rolling to the right, feed in a little left rudder — not a full deflection, just about half, or enough to keep the nose up. As you continue on over in the roll, release the left rudder, and put in down elevator. Again, as you continue the roll, release down elevator, and add in top rudder — this time, right rudder. You don't want to put in too much so that you corkscrew out of the roll, just a bit to keep the nose up. Finish up at the same elevation as the entry. This one looks very pretty when you have mastered it.

Tail Slide: Sometimes you make it, sometimes you don't! Mostly, you don't. The other evening I was watching some movies of Harold Krier doing a tail slide in his Chipmunk. He uses smoke to clearly define this maneuver, as in most, and watching him slide back down this column of smoke in slow motion is really something to see! The purpose of this maneuver is to stall out the aircraft, slide back down the entry path, and, finally, pitch forward. This is best done flying down wind so that the pressure of the wind blowing against

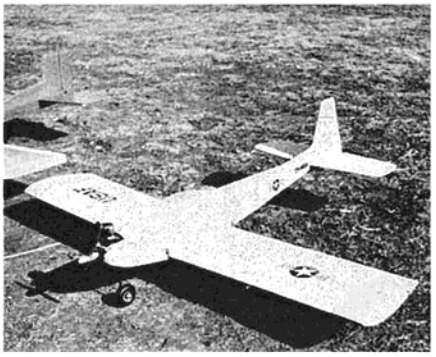
the tail surfaces will help to keep them in place. Enter from straight flight, pull up, chop throttle and let the speed of the aircraft pull it straight up. When it gets to the point where gravity takes over and begins to pull it back down again, apply just a little down elevator to keep from falling over in a tight inside loop. After completion of the fall, apply power again, pull out on the same heading and level as the entry.

Reverse Cuban Eight: As the name implies, this is a backward Cuban Eight, and is about as difficult as the Cuban Eight. Enter this from straight and level flight. Pull the nose up, and (try this one on a down wind entry) then roll inverted and complete the loop with the up elevator. At the three quarter point, make another half roll, and complete the second inside loop. Pull out on the same level and heading as the entry. Again, the idea is to make the two rolls intersecting, and the two loops of the same size.

Square Vertical Eight: Here we need lots of power, a clean flying ship, plenty of altitude for those first trials, and a sufficient supply of rubber bands holding on the wing! Enter this one into the wind, remembering that half of the maneuver is above the entry, and the other half is below the entry, so enter with sufficient altitude. This maneuver is the same as a regular vertical eight, except that the corners are square, and the legs are vertical and horizontal, not rounded. Fly straight and level, pull in full up elevator, then neutralize, let the ship climb straight up, pull over the top with another square corner, throttle back, pull up sharply again, fly straight down (this is flying?), pull another sharp corner, fly straight to the point of the first corner, pull a square corner outside this time, dive at the ground, pull a sharp outside corner, apply full power, fly level (inverted), pull another sharp outside corner, fly straight up (now here's where the power is needed), pull another sharp outside corner, and level out at the same elevation and direction as the entry. Fun, wasn't it? If you pull out of the square outside bottom loop six feet under the ground, don't bother to pick up the pieces — they won't be worth much any more! The main thing to do is to try and make both the top and bottom "loops" the same size. Only the very best pilots can do this!

The final wind-up to the pattern is in the traffic approach and landing, and we won't go into this part of the pattern. Practice it, since this is the cherry on the chocolate sundae, and there is no sense going through all of the hard flying we have been talking about only to goof up on the landing!

Since we seem to be moving more toward the total FAI Pattern, and as this is being written, the Nationals this year are planned to be only the FAI Pattern, it would be worthwhile to study the portion of the AMA booklet set aside for the FAI maneuvers. Most of the new AMA pattern includes the FAI pattern, the only exceptions being the Combined Immelman and inverted Immelman, and vertical eight. The FAI pattern uses the Regular Vertical Eight rather than the Square Vertical Eight we have just been describing. To complete this flying guide we will fly through the Combined Immelman and Inverted Immelman.

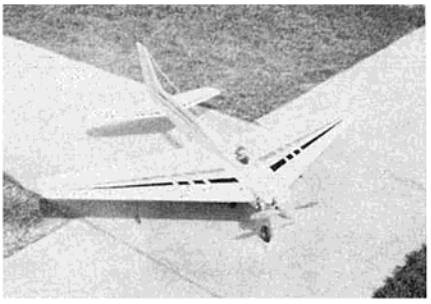


A two-and-seven-eighth's Kwik-Fli II. Modified Jensen kit with changed fin and rudder plus sub-fin and split elevators.

This is best entered flying into the wind. Fly at full power and pull up into a half loop. Just prior to the top of the loop, roll out, either to the right or to the left, to an upright position. Fly level for at least one second, push over into one half of an outside loop, and at the bottom, roll out into an upright position and recover at the same elevation and heading as the entry. You may need to chop some throttle at the top after the first Immelman to kill some of the speed for the outside loop portion. Experiment to see just what seems to be the best speed. The Vertical Eight really doesn't need a further description since it is the same basic maneuver as the square eight.

This year will possibly see a change in the design of stunt or pattern type aircraft. Quite probably, most of this season's contests will be flown with old style aircraft, but, if the pattern remains the same, a design change is definitely coming up. As you can see, if you have flown the new pattern, or have followed the description of it, the emphasis is more on the aircraft's ability to fly through a difficult situation, changing speed from high to low, and continuing to wind up on course rather than to blast through something on sheer brute force. It is quite probable that a slow flying ship with lots of lift, and some drag will be better at this game. The only real requirement of brute power is in the Top Hat and the Vertical Eight. If weight is held low, drag will not hurt quite so much, and will really **help** in some portions of the pattern. Last year's ship simply is so clean that it accelerates too fast when coming toward the ground. I have stated in the past, and I still feel, that the best type of ship may turn out to be a bipe. **Don't** rule them out. It will take some development, and some experimentation by outstanding fliers to really find the full potential of the biplane. It's this sort of thinking that really keeps you awake in this sport since just when you think you've got it made, another challenge comes along to upset all of the prior planning.

Good Luck, and don't forget to pull out **above** the ground!



Dennis Kohlman's New Delta, Trigon.

C-VUES

By

Ben Herman

and

Jack Capehart

RCM Contributing Editors

WE attended the recent FAI trials and Goodyear event, held by the Phoenix ARCS, over the weekend of April 27 and 28. True to Arizona fashion, the weather was ideal for a full weekend of flying, and the ARCS did their usual fine job of hosting the meet. While we were there, we had the opportunity to see Dennis Kohlman's (ARCS prexy) new, delta planform pattern ship, which he calls the "Trigon." Besides the overall planform, the unique feature of this ship is the landing gear arrangement. The best way to describe it is a "bicycle with training wheels!" Due to the midwing configuration, a standard wing gear would necessitate unusually long struts, so Dennis solved the problem by employing a tandem arrangement of nose and "main" gear. The outrigger gears are small with thin wheels and prevent the plane from tipping over onto a wingtip. We might add that this setup works to perfection, and is a neat solution to the midwing gear problem. Denny made repeated touch and go's with this setup, each one to perfection. Another advantage of this gear configuration is that brakes may be hooked up to the "belly" gear, facilitating a much simpler installation than for the conventional, or nose wheel brakes. Incidentally, Denny intends to build a repeat, with both the nose and belly gear retractable! As a final bonus, the plane performs the complete AMA and FAI patterns with ease. Denny is a relative newcomer to pattern flying, but from watching him, and the Trigon, perform we feel he will soon be giving the troops a run for their money.

Another highlight of the Phoenix meet was a speed job by Bruce Kunasehk, and when we say speed job, that **just** what we mean! Ted White, that man from the next "Galaxy," agreed to wing out Bruce's plane on its maiden voyage. We use the word "voyage" advisedly, because if the plane had been pointed straight up at take-

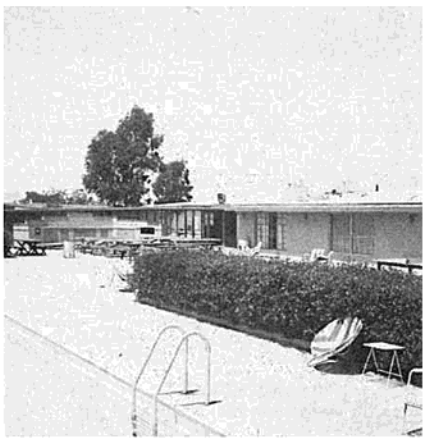
Left: Bruce Kunaschk and Ted White with Bruce's speedster. Right: Ted, after flight, looking like Bruce did before the flight.

off (actually, Ted says it was, it being hand-launched) it would shortly have been visiting Ted's relatives (in the next "Galaxy," that is). Estimates of the speed of this machine ran around 180 mph, although it was not officially timed on this flight. The accompanying photo shows Bruce holding the Galaxy equipped plane, while Ted holds the other part of the "inertial guidance system" (developed especially for this missile by Galatron, Inc.). Other specifications on the plane: weight, 4 lbs.; wing area, 178 sq. inches; and McCoy .60 and Missile Mist fuel. It was a little difficult to determine who designed what on the aircraft, because after the initial, successful flight, all of Bruce's and Ted's buddies claimed credit. Apparently it was a committee effort. The other photo is the best proof we have of the plane's speed. The visibly shaken gentleman on the left is Ted White, immediately after the flight, ably supported and consoled by none other than Jack Capehart himself. We might add that Ted apparently recovered rapidly as he did come through with another fine performance with his "El Gringo" to take first place honors, while second and third places went to Jack Capehart and Toby Tomooka, respectively. Toby also took first place in Goodyear, second and third places going to Bob Angus and George Sing.

Turning to another subject, if your flying field is anything like ours these days, you're probably seeing more and more plastic and less and less of the expensive balsa variety. This is a trend which, we think all will agree, is bound to continue. Our experience with the Laniers has been completely satisfactory. The ones that have appeared locally have all literally flown hands off, first flight. A person would have to really work at it to goof up the construction of one of these to the point where they won't perform. In fact, their flying qualities are so good that we are recommending them for newcomers so long as they are willing to have an experienced flyer "train" them. A note to these newcomers, we believe is in order: Swallow your pride, and let an experienced flyer help you through those first flights and until you get the feel of things. It is virtually impossible to be successful on your first RC flight on your own, regardless of how many hours of "real" stick you have. We have all seen the overconfident newcomer who is sure he can do it by himself. The result is always the same — three seconds air time followed by three months building time, or another plastic toy! Since we consider an experienced flyer necessary for the beginner, our philosophy is that the beginner may as well learn on a "hot" low-wing type as on a slow, stable high-winger, as is recommended by so many. Once you've learned the basic rules on a low-winger, there is no relearning process to go through, while many who start out with the ultra-stable top winger find that further help is necessary when switching to their first "pattern" type aircraft.

Getting back to the Laniers, as we have said, their flight characteristics are quite satisfactory. On one of our models, however, we decided to balsa sheet the wing to give it extra "ding" resistance. Upon flying it, we were horrified to find that the aileron response was practically zero. After considerable thought, the obvious reason, and solution, occurred to us. Upon sheeting the wing with 1/16" balsa on top and bottom, we had added 1/8" to the wing thickness without changing the ailerons. We concluded that the airstream around the thicker airfoil prevented the airstream from striking the ailerons, even in their deflected positions. The solution of course was to replace the original ailerons with thicker ones to match the wing thickness of the trailing edge. This fix returned the Lanier to its normal flying state. All in all, we have found that these plastic ships are ideal flying machines and serve a further purpose of keeping you in the air while you are building that super contest job. The only trouble is, once you've got the plastic bug, those super jobs seem to take longer and longer to finish!

One further note on the RCM Winter Nationals. We recently visited our fearless leader to discuss plans for this meet, and he insisted on bringing us up to The Hill. All the way up the mountains Don was grumbling about our not having brought any planes with us (we offered to fly his, but he declined!). Finally, it came out! He admitted that once we saw the hill, we would never bring a plane up there. He was right! We left The Hill wondering what type of person would bring his plane back there a second time, let alone use it for his regular flying site! Now we know where the nickname "Fearless" comes from.



Part of the Recreation facilities at Marana.

Anyway, one of the things firmly decided upon for the meet at the "high level" conference (held on top of The Hill, that is) was that there would be a special event, open only to editor-publishers of West Coast RC girlie type magazines. We agreed, and are currently thinking of a suitable award for the winner out of the expected large entry in this event. A special runway is being constructed on the top of the nearby Picardo Peak in order that all entries will feel right at home. The Marana helicopter service will provide transportation for all entrants on Friday morning with pickup arranged immediately after the conclusion of the meet on Sunday afternoon. Entrants will be expected to provide for their own food, clothing, bedding, and oxygen.

See you at Marana Air Park!

View of the flying strip at Marana Air Park.