C/L Plans • Kraft Spectrum Series R/C

FLYING MODELS

flying models®

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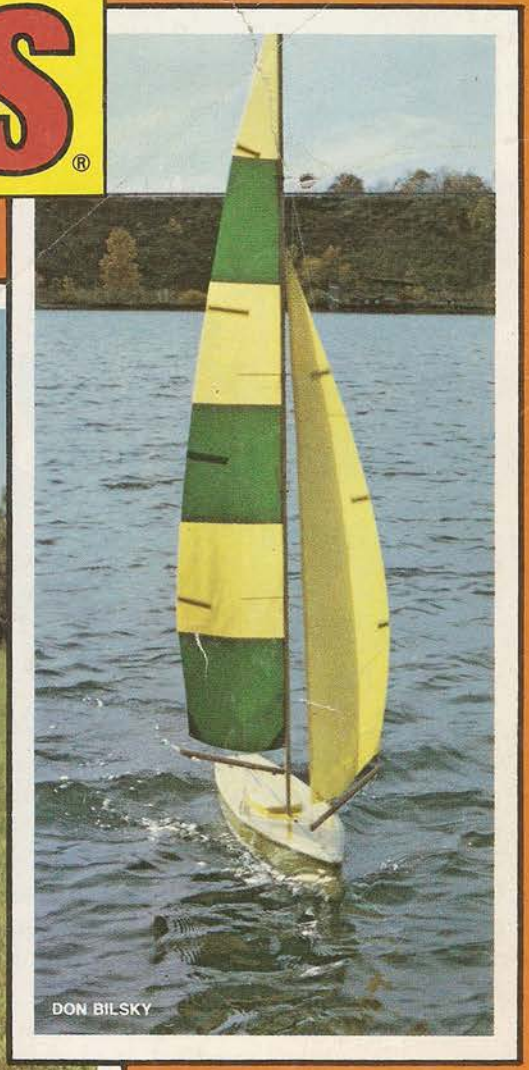

Dumas "Bingo"

2-Meter
"Free Spirit"

Futaba/FM
Grand Prix coverage!

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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.

Flying Models 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 Flying Models Magazine (Covers - Plans - Articles).

http://www.rcgroups.com/forums/showthread.php?t=2445105

AeroFred Gallery Free Plans.

http://aerofred.com/index.php

Hip Pocket Aeronautics Gallery Free Plans.

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

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Thanks Elijah from Greece.

flying models

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On the cover

Three of the many faces of the R/C hobby are featured on this month's cover. Leon Kincaid holds his 2-Meter sailplane, the Free Spirit (photo: Leon Kincaid), Dumas' Bingo sailboat is shown gliding across a lake (photo: Don Bilsky), and a few of the entries at the first annual FUTABA/FLYING MODELS Gran Prix are shown (photo: Chris Chan).

April 1981 Vol. 84, No. 4/525

Aircraft features

R/C model car racing

R/C model boating

Departments

editorial

Each one - teach one

The next time you are out flying at your club's field or competing at a contest, take a moment and look around at the spectators. They are almost always present whenever a model airplane engine is started. If you do this each time that you go flying, some of the faces will start to look familiar. Most onlookers will stay for a short while and then become bored; they're not really all that interested. Some, however, will stay behind the crowd fence for the entire day, intent on each flight and on what's happening in the pits. If you should happen to stroll by this area, on the way back to your car for more fuel, etc., you may even be asked an occasional question by one of these more serious observers. The questions asked may surprise you, as they reveal a deeper understanding of what you have been doing than you might have given credit for. Should you take the time to answer the question and chat, you may find that a potential modeler (and future club member) is trying his best to learn about this hobby of ours.

Ours is a difficult pastime to get started in. Unlike golf, tennis, or bowling, there are no training programs or classes that teach the basics. Hobby shops do their best by helping a new modeler to select the proper equipment to get started with. In most cases, the hobby shop owner will direct a new comer to one of the local clubs for instruction. Not every locality has a hobby shop to start these budding modelers along the proper path to success. Sadder yet is the fact that most clubs don't offer a beginners' program.

Once a person has reached a certain proficiency level in the hobby he will be able to fly safely on his own. At this point we find a split in the interests of newer modelers. Some will be content with sport or sunday type flying; just steering a model around the sky for thrills. This is what the hobby is all about, the modeler who does it all for fun. He makes up the lion's share of the numbers in our clubs and in the national organization, the A.M.A.

There are some, however, who will strive to go into the more competitive aspects of the hobby. Others may delve into the aerodynamics of the machines as their major interest. For these modelers there are few street signs to point the way. Magazine articles are the main source of information for these enthusiasts. The technical aspects of their particular interest areas are usually covered several times each year in the various publications. Even at that, the hands-on practical experience is hard to come by. At this point only very personalized guidance is the way to learn quickly.

I can relate the early portion of my own formative years in the hobby. After several years of sport C/L flying, I decided that C/L Aerobatics was the thing for me. I found *myself* as that spectator at local contests that we spoke of earlier. How to approach the experts I was seeing and learn the secrets of the trade seemed an insurmountable task. I would try to ask questions, but would become embarrassed by my lack of savvy. Most of the experts would take time to answer my questions and I suspect they tried to make me feel more at ease. But, my education was proceeding slowly. I always had more questions than answers.

It was at my club's field that things finally broke for me, when one of the top east coast Stunt flyers, Bill Simons, stopped by to see what was going on. He looked over the pit area at what were mostly beginners' C/L models and paused when he got to my ship. It was a full-bodied stunter that had more trim problems than flights left in it. He asked me if I was interested in stunt flying and if he could help. I went into shock. Here was a minor god in the stunt world asking me if I needed help. He gave me his phone number and said for me to call whenever I had a problem. Several weeks and several hundred phone calls later we became flying buddies. I was learning at a furious pace the many small tidbits of technical information that were needed to be successful in that event.

With Bill's leadership I began to compete locally and he would watch each flight for errors that would need work. Bill's building skills were awesome to me and I would spend hours on end just watching him carve and sand on his latest design. Whenever I had a question, Bill's response more than answered it. I've known Bill for 16 years now and I'm still learning from him.

It was this one-on-one instruction that kept my interest high through those years, and now I find myself with some knowledge that can be passed on. I've been able to work closely with a few very talented beginners and have found that this is even more rewarding than learning myself. Bill has often said that each success that I achieve he feels too. "You're like an extension of my arm, kid", is the way Bill would put it.

Group sessions are fine and they accomplish much, but to work closely with one knowledge thirsty modeler at a time is even better.

Remember too that these are the modelers that will continue on keeping the hobby alive for the next generation, and that is reason enough to search out and help those who wish to learn.

Bob

flying report

We'd like you to meet:

Earl VanGorder
FM's beginners columnist

Who is this guy, Earl VanGorder? Well, let me tell you a little about him.

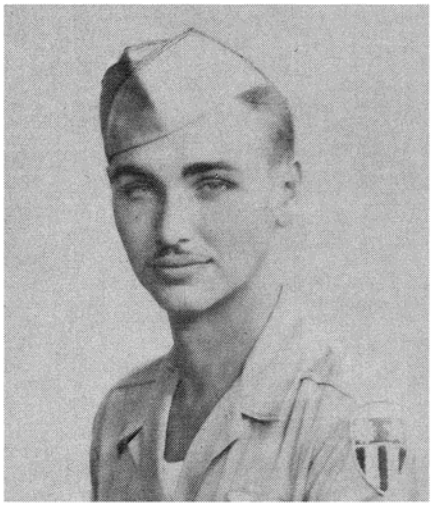
He was born in 1921 (which he still claims was a "vintage year") and grew up during the Golden Age of aviation. Like many other youngsters of the time, he was thrilled by the exploits of Lindbergh, Wiley Post, Admiral Byrd and Chamberlin - as well as all the early airmail and race pilots. He read, in all the old pulp magazines, about the exploits of the "aces" of World War I and dreamed of riding in an open cockpit with a silk scarf blowing in the breeze.

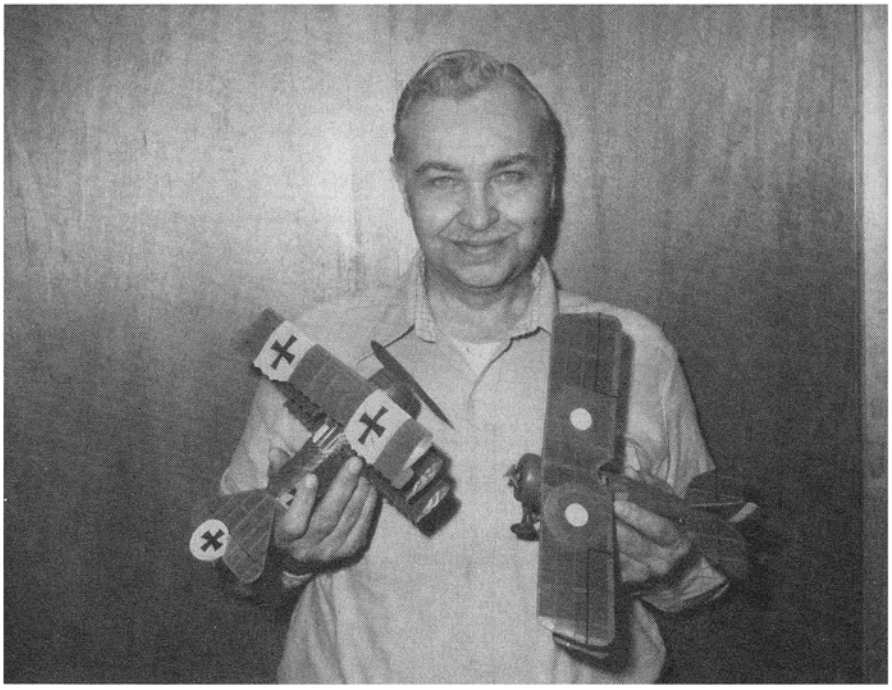
At age 12, it wasn't yet possible to climb into that cockpit so it just seemed natural to turn to model building. He built a tremendous number of the old 25 cent stick and tissue kits by companies like Ideal and Megow. While a few actually flew - most didn't - *but,* he was learning.

As time went on, he discovered girls and the modeling suffered a little but was never given up completely. He got his first "gas" engines and tried his hand at U-control and large free flight types.

His skills were starting to develop nicely when World War II started. At the time, Van was employed by the Bell Aircraft Corp. in Buffalo, NY, where the P-39 Airacobras were being built, but the war offered a chance to get into the air. He quit his job at Bell and enlisted in, what was then, The U.S. Army Air Forces. After the usual period of training at various bases, he was assigned to a unit and subsequently sent overseas. Any dreams of a role as a glamorous fighter pilot were dispelled when he was assigned to the Air Transport Command and sent to the China-Burma-India theatre of operations.

Van spent almost three years in that theatre of war and flew a total of 46 "Hump" missions - as the treacherous flight from





"The secret is in the lube: two parts green soap, two parts glycerine and one part Geritol."

India to China over the Himalaya mountains was called. He also flew a number of combat cargo missions dropping supplies to ground troops during the Burma campaign. He earned three combat stars on his campaign ribbon plus the Air Medal. His last unit was awarded the Presidential Citation.

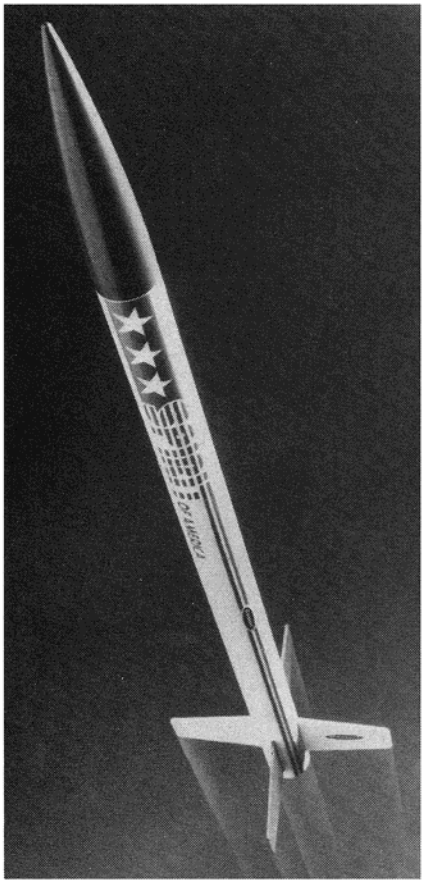
Finally, V-J Day arrived and Van hurried home and married, Dorothy, his pre-war sweetheart. They're celebrated their 35th anniversary this year having been married on Feb. 2, 1946 . . . Who else do you know who was married on "Ground Hog Day"!

Van chose the world of business to carve out a career and earn the daily bread. He got back into model building as a leisure time hobby which he strongly insisted was the best prescription for avoiding the well-known "business man's ulcer".

As his son, Mark, grew, they built and flew models together. While attending Cornell University, Mark joined a flying club and started taking lessons. Today, he is employed as chief pilot for a manufacturing firm that owns its own company aircraft. Van still has his own private pilot's ticket but says that his flying has been confined to models for a good many years.

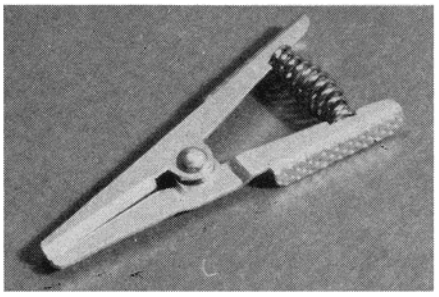
Van has to be considered an "all round" modeler since he builds free flight, U-control, R/C and scale. But, he says that he really thinks that his first love is still the small rubber, or CO2, powered scale types. He has always had a profound interest in bringing new modelers into the hobby and enjoys working with beginners and helping them over those early "rough spots". His Flyin' Things For Fledglings column certainly shows this.

If you were to talk with him, you'd probably hear this typical remark, "Heck, I'm no expert and I've never been competition-minded. All I know is that I've had a lot of fun and relaxation from this hobby over these many years. And, I'd like to think that I've been of some small help to a few of the new generation of modelers in helping to perpetuate that hobby. After all, that's what it's all about."

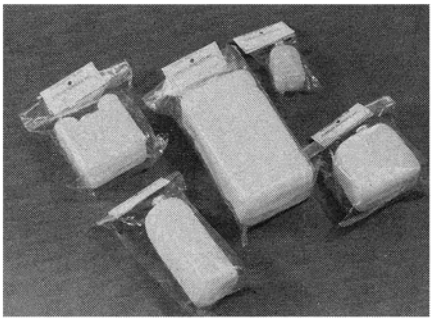


DAMON CORP., *115 Fourth Ave., Needham Heights, MA 02194,* announces its newest "sport" flying model rocket, the Spirit of America. The Spirit features fun and easy assembly with pre-cut fins, plastic nose cone, long color decal, engine lock and a full 90" streamer recover. The Spirit of America (#5344) retails for $3.50. For more information write to the above address.

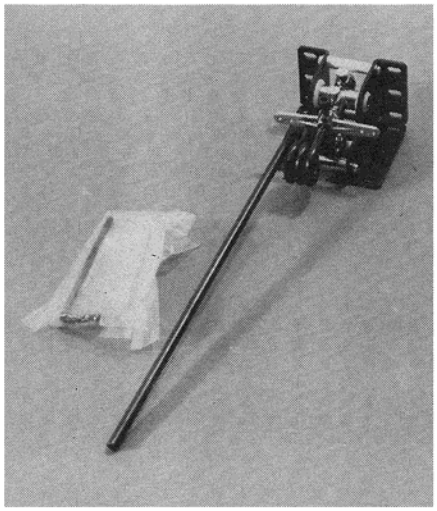
COVERITE, *420 Babylon Rd., Horsham PA 19044,* announces an improved version of their Super Coverite line of model airplane iron-on coverings. Dubbed "the second generation of Super Coverite", it features an all new Hi-Lo temperature range which allows the modeler to fine tune the amount of shrink, depending on the surface to be covered. Here's how it works: For solid surfaces, including sheeted foam, you set the temperature at a very low 250° F. Shrink is at absolute minimum, but the adhesive will fully activate and stick securely, without bubbles. At 300° F (the usual setting for plastic films), Super Coverite will now shrink tightly over many open structures, especially where the fabric has been draped properly before heating. At 350° F. Super Coverite reaches its maximum shrink. Super Coverites shrink rate at any temperature will not warp structures. Also featured with new Super Coverite is its improved "Powerhouse Adhesive" that sticks to balsa, hardwoods and once down doesn't come loose. It resists fuel creep and will not turn brittle as it ages, nor crack and shatter on impact. Second generation Super Coverite is available in two (2) sizes: 38"x47" and 47"x15 feet. A choice of colors includes, white, blue, yellow orange, hi-viz, and authentic antique tan which simulates oldtime fabric covered aircraft. For more information write to the address above.



CIRCUS HOBBIES, INC., *P.O. Box 5213, Reno, NV 89513,* introduces the I.M. Products Fuel Shut-Off Clamp. Just the thing to prevent fuel from siphoning from the tank into the engine or to stop leaking vent lines, this Fuel Shut-Off Clamp is spring-loaded, small and has no sharp edges, so it won't damage fuel lines. For more information write to the address above.



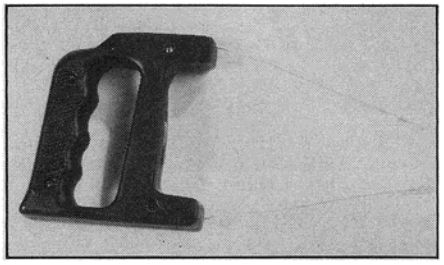
CIRCUS HOBBIES, INC., *P.O. Box 5213, Reno, NV 89513,* announce the I.M. Products line of fuel tanks. The tanks come in 24 sizes from 2 ounce to 35 ounces and five shapes to fit any tank compartment. There is even a special 16 ounce tank for airplanes with retractable nose gear. Each tank includes a weighted clunk, silicone pick-up tubing, and soft aluminum vent tubing. The seal is held in place with a conventional screw-on cap. All I.M. Products fuel tanks are compatible with all model fuels and gasoline. For more information write to the above address.



CIRCUS HOBBIES, INC., *P.O. Box 5213, Reno, NV 89513,* introduces I.M. Products mechanical Retracts. These are all metal units. The bearing surfaces have nylon bushings for smooth operation. The actuating arm throw is short enough to be operated by a 90° servo if desired. The nose gear can be floor or bulkhead mounted and parts are included so steering may be controlled by cable or pushrod. The main gears are available with ⅛" or 5/32" twin coil gear legs. Nose and main gears are sold separately. For more information write to the address above.

FOURMOST PRODUCTS, *4040 24th Ave., Forest Grove, OR 97116,* introduces their Gapless Hinge Slotter. This tool will make accurate, centered slots in four popular sizes of balsa sheet to accept the Fourmost Products, Cooney Gapless Hinge. For more information write to the above address.

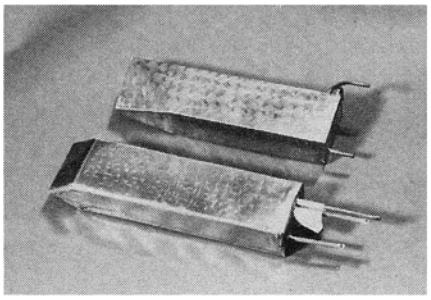
HARRIS AND ASSOCIATES, *P.O. Box 128, Harvey, IL 60426,* introduces their Fire Screen 150 for use with model rocket engines. These screens are hand made from stainless steel wire cloth and offer more firings per screen than do standard units. They are priced at $1.19 per pack of six. Included are 6 cardboard backer discs, which may be used as thin spacer discs if desired. For more information write to the above address.



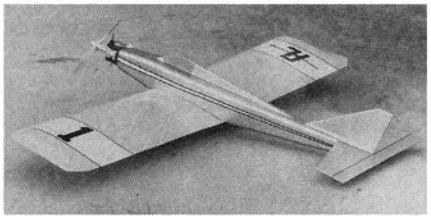
STURDI-BUILT MODEL MANUFACTURING, *4203 So. Cloverdale, Rt. 9, Boise, ID 83705,* is producing a new plastic Controline handle that has adjustable lead-out cables. It also provides more safety to the flyer, as the cable doesn't come in contact with the hand. It has been designed with a natural hand-hold for more comfortable flying. The unit is made from high impact plastic. For more information write to the address above.

KUSTOM KRAFTSMANSHIP, *P.O. Box 2699, Laguna Hills, CA 92653,* announces the introduction of the Nelson .15 Glow Engine - N15G. This engine is manufactured by Nelson Competition Engines. The engines are being manufactured in both R/C and standard configuration. Both versions will be available by June 1, 1981. The engines, as well as parts, can be purchased mail-order from Kustom Kraftsmanship or from regular retail outlets. The engines feature: Nominal displacement of .15 cubic inches, bore and stroke .575, investment cast crankcase, front intake, rear exhaust, 12mm crankshaft, ABC sleeve and piston, advanced design schneurle porting, bronze bushed connecting rod, approx. six (6) ounce weight, various head configurations available and various R/C carburetors available. The suggested retail price for the standard version is $159.95; the R/C version is $169.95. For more information send a SASE to the above address.

COVERITE, *420 Babylon Rd., Horsham, PA 19044,* is introducing a lightweight primer especially formulated for use on its three coverings (Super Coverite, Silkspun Coverite and Permagloss Coverite). Called Primex, the transparent blue liquid provides excellent adhesion for paint, not only on Coverite coverings, but also on nylon, dacron, silk, tissue and wood. Primex has been lab and field tested for long-term flexibility, and compatibility with virtually all paints. Simple step-by-step instructions for application are outlined on the Primex label. Primex and its companion thinner are packaged in ½ pint cans, easily identified by their bright yellow labels. For more information write to the above address.



MIKE MUSTAIN SHEET METAL, *455 Decatur St., Kenton, OH 43326,* is producing custom made fuel tanks for C/L Stunt airplane use. Made from stainless steel that is .005 in thickness, these tanks feature a reverse "Pittsburgh Lock" seam that is ⅛" deep. The tanks are available in a new beveled rear design that is said to steady the run of any motor, with or without pressure. Soft copper tubing is used for the venting. Uni-flow and standard venting are available. These tanks are being used by many top Stunt flyers, including Bob Hunt, Bill Werewage, Dennis Harkai and Les McDonald. The tanks are priced at $12.00 plus postage. For more information write to the above address.



FLITE LINE PRODUCTS, *3207 34th St., Lubbock, TX 79410,* has released their new kit of the Scat Cat 500. The design has been tested for over two years during which time it won the Quickie 500 Nationals held in Houston, Texas, in November of 1979. The kit features: Machine shaped parts of balsa and plywood, one piece matched fuselage sides, machine cut foam wing cores, 1/16" balsa wing covering, full size plans - and 6 hour construction time. The Scat Cat 500 retails for $41.95. For more information write to the above address.

TEKA FINE LINE BRUSHES, INC., *3704 Bedford Ave., Brooklyn, NY 11229,* is producing disposable nozzles for extending the reach of most tubed application products. These are especially useful where original nozzles have been cut due to the drying out of the product. They have an overall length of

1¼" beginning at the base with an orifice of 5/32" I.D. and ending at the head with an orifice I.D. of 3/64". These nozzles are manufactured from white flexible polypropylene. For more information write to the above address.

TEKA FINE LINE BRUSHES, INC., *3704 Bedford Ave., Brooklyn, NY 11229,* has released a Simulator Wheel that produces rivets on plastics, woods, etc. The wheel is fitted to a tapered, polished aluminum handle in such a way that it may be swiveled for ease in following around circles and curves or locked straight. For more information write to the above address.

air mail

A is for Aberle

I am writing to tell you how much I enjoy FLYING MODELS magazine and most especially the R/C product reviews by Bob Aberle. His evaluations of equipment are the best I have read anywhere.

A special thanks to Mr. Aberle for the very helpful index in the February issue. It's an idea that the other magazines should adopt.

His most recent work on the charging of batteries was excellent. How about a similar article explaining what to look for in servos. I feel that faulty servos are right behind batteries in the cause of radio related crashes.

PHILLIP BOND
Hastings, Michigan

Bob Aberle's R/C reviews and how-to articles have been praised highly since he joined the staff. The sheer amount of material covered by Bob in a year is staggering. A quick look at the 1980 index that Mr. Bond mentioned will give you some idea of Bob's capacity for work.

Bob is doing several articles on servos that will be seen soon in these pages. In this issue he takes a look at the fine World Engines line of servos—ED.

Going chrome

Henry Nelson's On Engines column is a fine one. He has the ability to explain engines in terms that I can understand.

The segment on the OS FSR .40 was most informative. In this article Mr. Nelson suggested that the sleeve on the FSR should be chrome plated for a good ring seal. He mentioned that he had performed this service for several Stunt flyers last year. Does he chrome parts for others? If so where can I send my motor to have this done?

BRUCE LEWIS
St. Louis, Missouri

Mr. Nelson is in the model engine building business and has occasion often to chrome quantities of parts. We have contacted him and he has agreed to perform this service for others. Write to him at 729 Valemont Dr., Verona, PA 15147, for prices and further information—Ed.

Innovative Avanti

I was pleased with the Avanti II article in the February FLYING MODELS. Bob Baron had many refreshing new ideas on the subject of C/L Stunt. Many of the designs seen lately have appeared to be copies of one another to a large degree.

Mr. Baron doesn't seem to mind breaking with tradition, and his placing at the 1980 National Championships shows that being different doesn't interfere with competitiveness, when the right ideas are used. More of this type of thinking would be welcome.

FRANK CASTELLI
Houston, Texas

Bob has always been one of the first to break with convention in search for better performance. He has teamed of late with model aerodynamic whiz, Bill Netzeband, and together they will be shaking the stunt world for years to come I'm certain.

Bob has just completed an article on C/L Stunt control systems. Look for it in an upcoming issue of FLYING MODELS—Ed.

timetable

DOVER, FLORIDA - March 8. IMPBA Record Trials, hosted by Florida Associated Speed Team at Lake X. Contact: Don Pinckert, 9 North Grant Ave., Masaryktown, FL 33512. 904/799-0595.

OAKDALE, CALIFORNIA—March 7-8. NAMBA District 8 Points Heat Racing, hosted by Modesto Buccaneers at Woodword Lake. Contact: Tony Ascaso, 18301 Davis Rd., Patterson, CA 95363. 209/892-8821.

MAPLE RIDGE, BRITISH COLUMBIA—April 4-5. NAMBA Record Trials, hosted by Canadian Marine Modelers at Whonnock Lake. Contact: J.M. Fraser, 21816 Dover Rd., Maple Ridge, B.C. V2X 7V7. 604/467-3580.

MARYSVILLE, WASHINGTON —April 4-5. NAMBA Record Trials, hosted by Seattle Model Yacht Club at Twin Lakes. Contact: Bill Hornell, 2533 N.E. 24, Renton, WA 98055. 206/226-7454.

SALISBURY, MARYLAND—April 11-12. IMPBA 1/16 Straightaway Record Trials, hosted by Eastern Shore M.B.C. at Posey Pond. Contact: Ed Baker, Morris Rd., Pittsville, MD 21850. 301/835-2386.

KINGSBURG, CALIFORNIA—April 11-12. NAMBA District 9 Points Heat Racing, hosted by Fresno M.B.C. at Kingsburg Lake. Contact: Milt Post, 4580 E. Clinton, Fresno, CA 93703. 209/254-5144.

MAPLE RIDGE, BRITISH COLUMBIA—April 18-19. NAMBA Record Trials, hosted by Canadian Marine Modelers at Lake Whonnock. Contact: Chris Christianson, 163 E. Windsor, N. Vancouver, B.C. V7N 1J9. 604/984-0060.

SACRAMENTO, CALIFORNIA—April 25-26. NAMBA District 9 Points Heat Racing, hosted by Sacramento Model Boat Association at Beach Lake. Contact: Guy Davis, 1304 Rozan Ct., Roseville, CA 95675. 916/783-9315.

KENT, WASHINGTON—April 26. NAMBA Heat Racing, hosted by Seattle M.B.C., at Kent Lagoon. Contact: Bill Hornell, 2533 N.E. 24, Renton, WA 98055. 206/226-7454.

MATSQUI, BRITISH COLUMBIA - May 16-17. NAMBA Heat Racing, Enduro, Offshore, Outboard and Unlimited Hydro, hosted by Canadian Marine Modelers at Browns Farm Lake. Contact: Brian Dallas, 1567 Berkley Rd., N. Vancouver, B.C. V7H - 1YS. 604/929-2873.

SALISBURY, MARYLAND - May 16-17. IMPBA 1/16 Mile Straightaway Record Trials, hosted by Eastern Shore M.B.C. at Pusey Pond. Contact: Ed Baker, Morris Rd., Pittsville, MD 21850. 301/835-2386.

FLINT, MICHIGAN - May 16-17. IMPBA Record Trials - all classes 1/16 mile and 1/3 Oval, hosted by Wolverine Miniature Race Boat Association at Thread Lake. Contact: Ken Bergman, 9452 Silverside Dr., South Lyon, MI 48178. 1-313/437-9452.

SEASIDE, CALIFORNIA - May 23-24-25. NAMBA District 9 Points Heat Racing, Offshore, hosted by Gold Coast Model Boaters at Lake Roberts. Contact: Howard Power, Jr., 2031 Marsala Cr., Monterey, CA 93940. 408/394-1200.

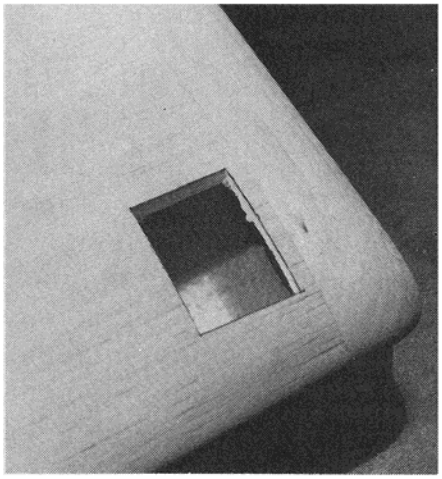
KENNEWICK, WASHINGTON - May 23-24. NAMBA District 8 Points Heat Racing, OPC Tunnel Sport 40, Offshore, hosted by Columbia Basin Boaters at Columbia Park Lagoon. Contact: Charles O. Rudorfor, 4 S. Williams, Kennewick, WA 99336. 509/783-5595.

FM clinic

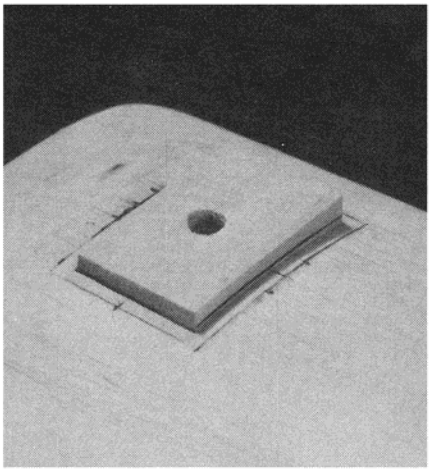
Staff tip:

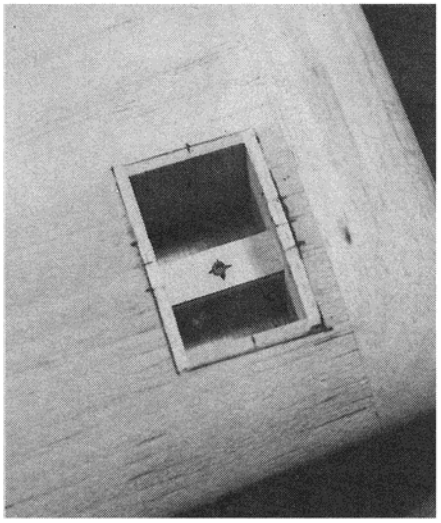
C/L tip weight boxes

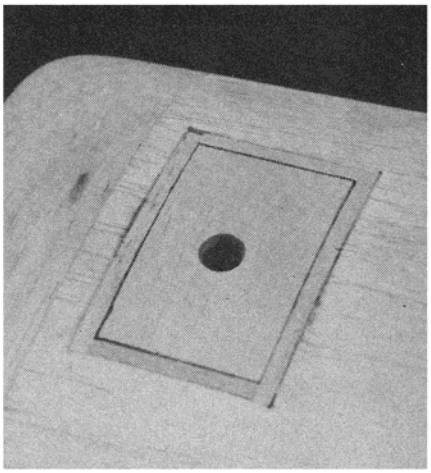
Controline airplanes should be equipped with a means of varying the amount of weight in the outside tip. Perhaps the easiest way of achieving this is to build a box into the outside wing tip. This box should have a removeable hatch cover to allow quick access to the weight for fine trimming.

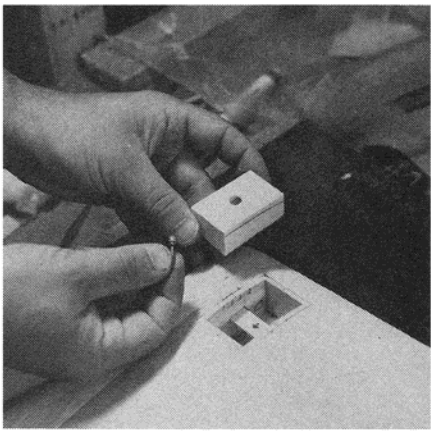


Cut a section out of the bottom of the outside wing. An opening of 1½" x 2" is fine. Fit ⅛" balsa sides, front and back into this opening. These run to the top of the wing or tip. Cut and fit a ⅛" balsa floor and glue it in place. Cut a section out of each balsa side piece approximately ½" wide and one half of the thickness of the wing at that point. Cut a piece of ⅛" plywood ½" wide and long enough to bridge the gap between the balsa side pieces. This plywood piece sits on the balsa sides. Drill a 4-40 clearance hole in the plywood hold-down and insert a 4-40 "T"-nut on the bottom. Glue this assembly into the box on the balsa sides. Fill the gap left with ⅛" balsa. When this assembly has dried, carefully block sand the ⅛" balsa sides and filler pieces flush with the surface of the wing. Cut a piece of 1/16" plywood that fits into the box, this piece will rest on the ⅛" ply cross-piece. When a perfect fit has been achieved, pull the 1/16" plywood piece from the box and glue a piece of scrap balsa block onto it. This piece should be thick enough to allow the cover to be carved and sanded flush with the surface. Carefully measure the location of the hole in the ⅛" ply wood cross-piece and transfer this measurement to the bottom of the hatch cover. Carefully drill up through the 1/16" plywood cover and on through the balsa block that is glued to it. Using a sharpened piece of brass tubing (¼" to ⅜" inside diameter), carefully cut a concentric hole around the one that you drilled in the hatch cover block. This larger hole will allow a screw and washer to sit flush on the 1/16" plywood hatch cover piece. Screw the hatch cover down tightly, then carve and sand the hatch cover block down flush with the surface of the wing.







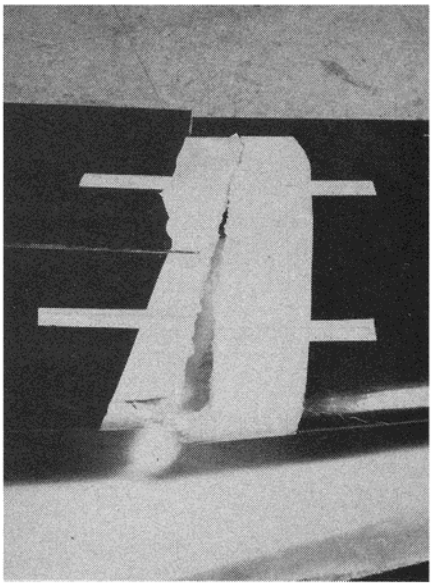


Wrap weight in soft tissue to prevent it from rattling around inside the box. The proper trim weight can be found quickly with the use of this box.

Staff tip:

Fixing foam wings

Occasionally a foam wing will break across the chord due to a hard landing or crash. When this happens, don't throw the wing away. Try this simple fix.



Sand the paint away in the broken area. If a plastic film was used to finish the plane, then simply trim away a portion to uncover the bare wood. Cut two slots spanwise (across the crack) in the top and two in the bottom of the wing. These slots are ⅛" wide, 6" long and ½" deep into the core from the surface. Cut four pieces of ⅛" aircraft grade plywood into strips ⅛" x ½" x 6". Force the wing apart at the crack and pour a liberal amount of Hobbypoxy Formula 2 epoxy glue into the crack. If you have the cradles that the wing is cut from, lay the wing down on them. They serve to hold the wing straight while the epoxy cures. Before the epoxy cures, smear some on the ⅛" x ½" x 6" strips and force them into the slots in the wing. Be sure to put a layer of waxed paper on the cradle to prevent the wing from sticking should any epoxy run out of the crack.

Free Spirit

by Leon Kincaid

This 2-Meter sailplane placed second at the 1980 Nats. It's easy to build and fly.

Out of the last two AMA Nationals, Tangerine Internationals, and the Florida 2-Meter Championships, my 2-meter Free Spirit has placed 3rd two times, 2nd two times and 1st one time, (not including other state meets). In each case the Free Spirit had the highest duration time. The failure to place 1st each time was always *my* failure to get those all-important landing points. I just do not practice like I should. The point is—my Free Spirit is carrying me. If it didn't durate so good, I would probably never place. So, if you would like to win some of those trophies or just like to have a lot of fun, build yourself a 2-meter Free Spirit. I will admit, there are several very easy to build 2-meter kits available and they fly very well, but I am convinced mine flys better.

The Free Spirit has an undercambered wing but is no more difficult to build than a flat bottom wing. One thing about this airfoil, it will not sink fast just because you might happen to build it kind of heavy. As a matter-of fact, it will not fly as well if it is *too* light. It needs the weight (but around the CG) to fly the best. The secret is to keep the tail and outer wing panels light. You will probably have to add two or three ounces to the CG for the best performance.

You will notice the rather large rudder. This allows you to cut down on the rudder throw, and get good response without quickly over controlling. My Standard and Unlimited Free Spirit's have a flying stab. I have found this old stab and elevator configuration is a lot easier for me to fly, since I need all the help I can get. You can construct the stab and rudder from 1/8" sheet balsa with holes in them for weight reduction, but I have found the built-up tail section has about ½ the weight and is just as fast to build. If you reduce the tail by just 11 grams, you can remove 32 grams out of the nose. That's 32 grams you can add to the CG if needed. The point is, your stall recovery and all around handling will be much better with a light tail. Keep the majority of the weight near the CG, on any plane.

Enough chit chat—lets build one.

Construction

The first thing I do is to cut out a plywood rib of the airfoil, but don't drill the holes yet. This will be what I call my Master template. Next cut out the six ply ribs, three for each center wing panel. These will be 1/16" smaller all around and 1/4" shorter at the leading edge. Drill the 3/16" holes as shown on the drawing in *W2 first.* These holes are centrally located between the top and the bottom. I always use a piece of 3/16" O.D. brass tubing with the cutting edge filed like saw teeth. You will notice that 1/3 of the undercamber is perfectly flat. This will not only allow you to build the wing easy, but to shim the ply ribs evenly when drilling them. Align W1 and W2 together. With a piece of 3/32" square stock, shim W2 3/32" higher than W1 and drill W1 using W2 as a drill jig. Now align W2 and W3 together and shim W3 3/32" higher. Drill W3 using W2 again as a drill jig. This should leave you with W2 drilled in the center. W1 with the holes 3/32" higher, and W3 with the holes 3/32" lower. With these ribs spaced 1-1/2" apart, this will put the brass wing wire tubes at 3½° angle and will consequently give your center wing panels 3½° dihedral. Drill the other three play ribs from these three. That will give you a set for each wing panel. Now, clamp W1 to the Master wing template (allowing for the 1/16" all around) and drill the Master. You now can build either the wing *or* the fuselage. I like to build the fuse first but I need that master wing template to do so.

Fuselage and tail section

First, cut out the fuselage sides. The forward section is from 1/8" ply and the aft section from 1/8" balsa. You can get great 1/8" light three plywood from Sig that is lower in cost and very easy to cut. In fact, I have even started to make my plywood ribs from this light ply instead of the regular 1/16" ply. After the forward and aft sections are glued together, take the master wing template and lay on one fuselage side. Align at the proper position at about 2-½°. The stab platform and about 12" of the bottom of the fuselage can be used as a 0° reference line. With the rib in position, clamp the master rib to the fuselage side and drill the wing wire tubes. Then align both sides together and drill the second side. Cut out your bulkheads. Place two pieces of 3/16" O.D. tubing through the wing wire holes and add bulkheads, C, D, and E *first.*

While this is drying, build the rudder and rudder fin next. You can then clamp the bottom portion of the rudder fin between the rear fuselage sides, but make sure to leave a 1/8" gap under the forward part of the rudder fin for the stab to slide in. Glue in place. This is a good place to use "Hot Stuff" adhesive. You can now add bulkheads F, G, and H, then B and A last. Add the 1/16" X 1/4" tail doubler. This will give the stab a better mounting platform.

Now build the stab and elevator. They are very simple and fast. Drill the elevator halves for the .045" wire connector and make sure everything is square and aligned. Add the stab to the fuselage but make sure you leave a 1/8" gap between the stab and the rudder fin. This is necessary for the wire elevator connector to pass through the fuselage and rudder. Add the bottom of the fuselage. Install the push-rod tubes and exit the fuselage sides without any sharp bends. The Su-Pr-Rods seem to be less affected by temperature change. Add an extra tube for the radio antenna and exit from either side. Once all of the rods are in, add the top of the fuselage, rudder dorsal fin, elevator wire connector, two little 1/8" square spacers on each side of the rudder fin between the elevators, nose block and canopy cover. Use four small pieces of 1/8" square stock under the canopy block as keys to keep the canopy from sliding around. I also use a rubber band to hold the canopy in place.

The only major item left is the two wing fairing blocks. Cut from 3/8" bass wood and drill holes from the master wing template. Lay the two fairing blocks side-by-side (inside up) and plane at a taper till the leading edge is a little over 1/8", leaving the trailing 3/8". Keep both planed surfaces parallel. Every so often slide the fairings on the brass tubing against the fuselage sides and check for alignment. I use a caliper to make sure the width across the fuselage and fairings are the same width at the leading edge as the width at the trailing edge. Before gluing the fairings into place, plane the outside face 3½° where the wings butt against the fairings. You *can,* if desired, leave the fairing square on the face and tilt wing rib W1 3½°. In any case, these little fairing blocks are more trouble to most people than any part of the model, but they are important as they align the wings properly. The only thing left on the fuselage and tail section is sanding. I usually sand all corners of the fuselage about 1/16"

PHOTOGRAPHY: LEON KINCAID

The author says that the Free Spirit is a design that can make an average pilot look good. A launch on the winch takes place (**opposite page**).

radius. Sand and contour the rear of the fuselage down to 1/8", as shown on the drawing.

Wings

I have a seven foot building board, so I can build a complete 2-meter wing at one time. I have also used a sheet of 1/4" balsa 48" long, and constructed ½ of a wing at a time. In any case, lay the drawing over your building board, and cover with Saran Wrap. Only the 1/3 flat section of the airfoil will be assembled directly on the board. No shims required. On my drawing I show the basic steps of assembly. Bottom sheeting first, bottom spar, leading edge or ribs, top spar and then the webs. Be sure to align the ply ribs W1, W2, and W3 properly as these will align the brass wing tubes. When cutting the balsa ribs, use one of the ply ribs as a template and cut all ribs, including one for each of the tip ribs. Then select 14 ribs (seven for each tip). Lay each tip rib over the drawing and align the rib with the bottom spar. Cut the rib to proper length at the leading and trailing edge, and mark the rib as to its position. Now cut the smallest tip rib out completely to shape as shown on the drawing. Using a scrap piece of 1/8" X 1/4" balsa, stack or align all of the tip ribs in order, using one of the ply ribs as a guide on one side and the small tip rib on the other end. The contour or shape of the undercamber does not change, so lay all ribs on the flat section of the airfoil on building board and carve, plane and sand the top of the tip ribs to shape. The tapering of the tip ribs will require you to re-cut the top spar slot. All ribs are now ready for assembly.

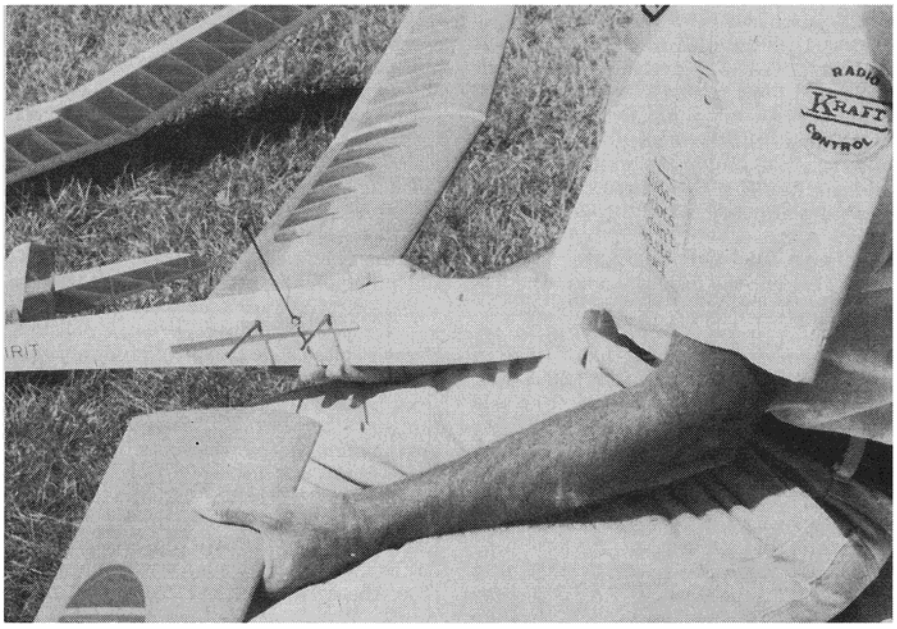
With the undercamber remaining the same contour all the way to the tip, the smaller tappered tip ends up with almost no undercamber. This results in the cord line having about 1½ wash-out built into the wing. However, you may wish to add a little more. I find that about 5/32" gap under the trailing edge seems to be about right.

Here is the way I usually complete my wing panels. Complete the basic steps for each panel. Leave out the ribs at the poly break and the top sheeting. Remove from the building board and sand poly break 4½° on each panel. This will give you an included angle of 9°. Join the panels keeping the flat sections parallel. When dry, install the 1/4" basswood brace, or, use a hard 1/4" balsa brace and add a 1/32" ply brace over the balsa brace and spars. Cut a wing rib from 1/8" sheet balsa and install at poly break. Add top sheeting and 45° wing tip, contour top of tip and sand. Add a little epoxy all around the poly break about 1/2" wide and smooth away excess with your finger.

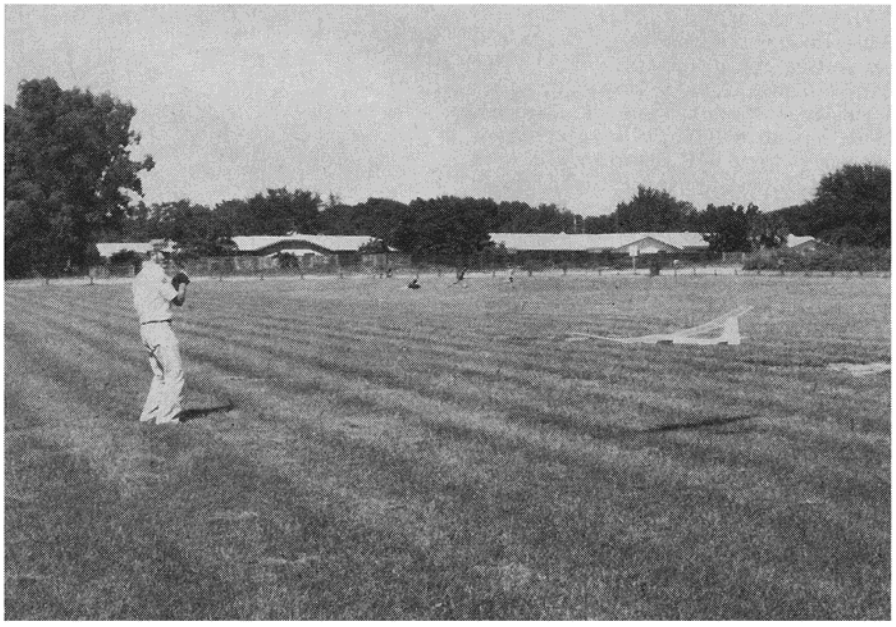
I show an optional wing construction on the drawing. If you don't like to fool around with cap strips or sheet trailing edges, you can cut the ribs from 3/32" balsa and use the standard 3/16" X 3/4" trailing edge stock, but do yourself a favor, be sure to notch the T/E about 3/32" deep for each rib to insert. It only takes a minute to notch and it gives a much stronger joint. Of two sets of wings I have constructed, there is only a difference of three grams, but the cap stripped wings are a little more rigid.

Finish sanding all parts and do a good job. Sanding is what makes the difference between a nice looking plane and a junker. Make a small template and sand the wing leading edge properly. This is the most important part of the airfoil as far as I am concerned. Don't forget to decide what kind of rudder and elevator hinges you want to use. I have used Goldbergs thin Klett hinges, Monokote™ tab type, and am now trying the 3M plastic repair tape as hinges. The big difference is sanding the correct clearance on the leading edge of the control surface. If you use the Klett type you will have to sand a slight radius on the leading edge. If you use the Monokote™ tabs, sand to a diamond shape (two 30° angles) with the point in the middle. If you use tape or straight Monokote™ type, sand the edge at a 30° angle.

Cover with Monokote™, install radio and tow hook. Balance on the spar or slightly in front. You can move the CG forward but don't move it back.

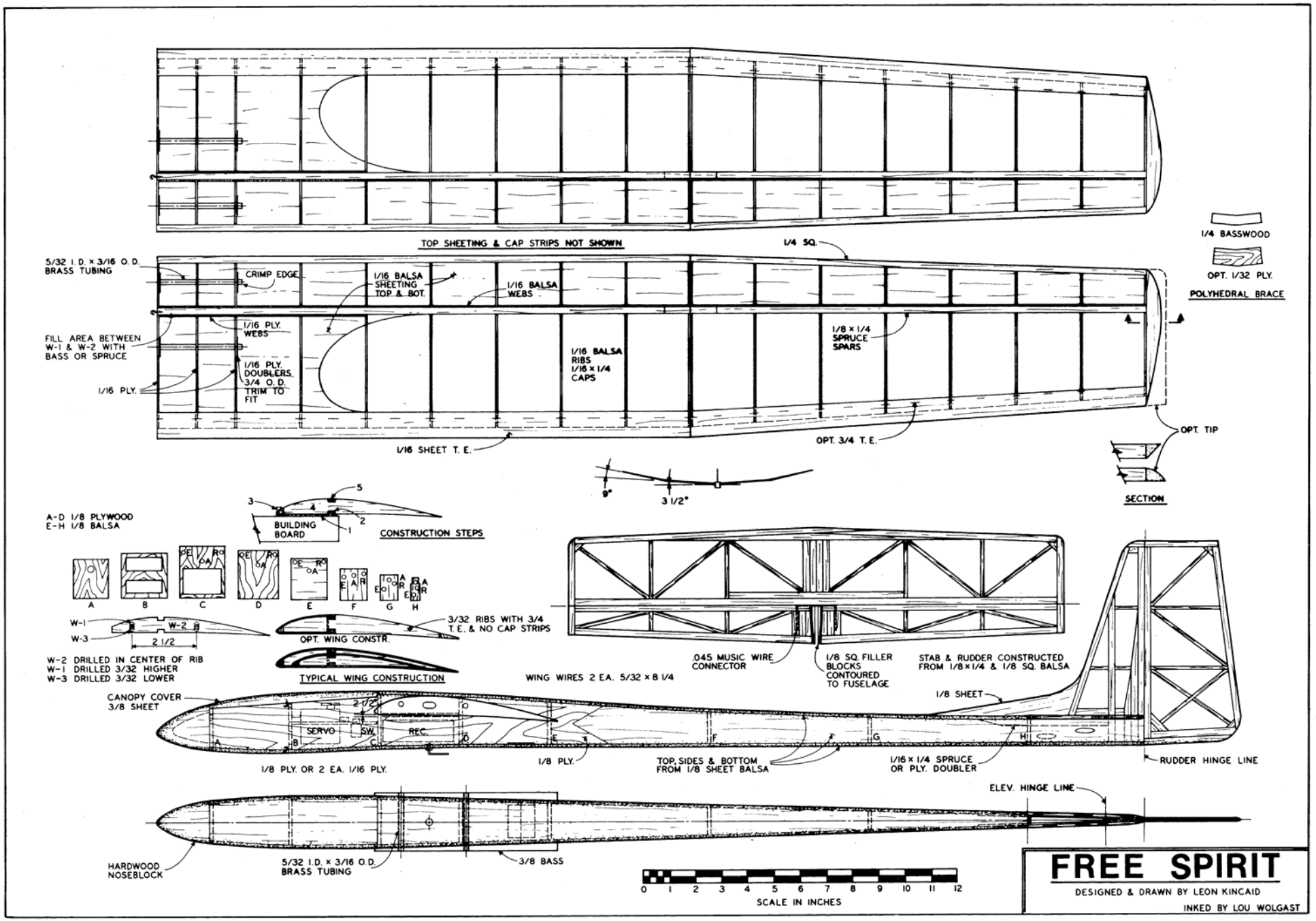


Leon is assembling the wing panels to the fuselage (**above**). Typical music wire and brass tube method is used here. The Free Spirit is being guided in for a perfect spot landing (**below**). Its easy to fly.



Flying

What can I tell you about flying? For years I have been flying with the tow hook too far forward. Now I fly with the hook right under the spar (thickest part of the airfoil) it will climb straight up with hands off the controls. Just don't give it too much extra up until flying speed is well achieved, or you will pop-off of the tow line. The large rudder will keep it straight and easy to control. Oh yes, don't hesitate to fly it in Standard Class. It doesn't know it isn't suppose to fly as well as the bigger sailplanes.



FULL SIZE PLAN AVAILABLE THROUGH CARSTENS FLYING PLANS

ORDER PLAN CF-565

Kraft Systems' Gold Spectrum

by Bob Aberle

Brand new styling and advanced circuitry are featured in this latest offering from Kraft.

Several years ago I did a series of product reviews covering the various "super" transmitters that had hit the market at that time. Modelers, in general, liked what they saw, but couldn't justify the higher costs of those systems (many averaged between $600 and $800). With the development of new integrated circuits and improved circuit technology it has been possible to reduce the manufacturing costs of these deluxe radio systems. A less expensive system stimulates higher sales which results in even greater savings because of increased production. In the December 1980 FLYING MODELS I reviewed the Airtronics XL system which had certain extra features and yet sold at a modest price. This month my subject is the new Kraft Gold Spectrum-6 radio system.

This new Kraft system for 1981, is designated as their model KP-6C and will list at $497.95. It will essentially replace the current KP-5C (five channel) dual stick system which listed for $414.95 (and had no special control features). The Gold Spectrum-6 is a completely new system for 1981 and includes a new transmitter and receiver design plus servos with new carbon pot wipers. I was somewhat startled by the new "Kraft look" as reflected in the transmitter case design. The traditional Kraft gold vinyl covered case is gone. In its place is a combination gold anodized aluminum and high impact plastic (dark brown) case which even sports a new Kraft logo. Being a Kraft owner for over twelve years, I was initially a little disappointed, possibly even upset, about these new changes. However, I have to admit that after several months now I really like the new styling and feel it is a step in the right direction. For one, the transmitter can be cleaned more easily than before. Residual fuel and exhaust certainly won't penetrate the anodized aluminum finish.

Styling wise the transmitter is a radical departure from anything Kraft has done in the past. The basic transmitter case layout is much like the "European" styling that we have seen in recent years at international R/C competitions. The sides of the case taper (smaller at the bottom and larger at the top). Both the top and bottom of the case are set at an angle. The top front panel angle means that the antenna is deployed at an angle as well. This produces a convenient and practical antenna position while holding the transmitter in the typical horizontal manner. It is certainly more comfortable to hold. After you have had a chance to try it for awhile you will wonder how you ever did without it.

Best of all, and probably the most important aspect of this new system is the special control features available at the transmitter end of the operation. Such things as reversible servo direction, dual rates, endpoint adjustments, throw adjustments and the like. All of these features will be described in detail in this review.

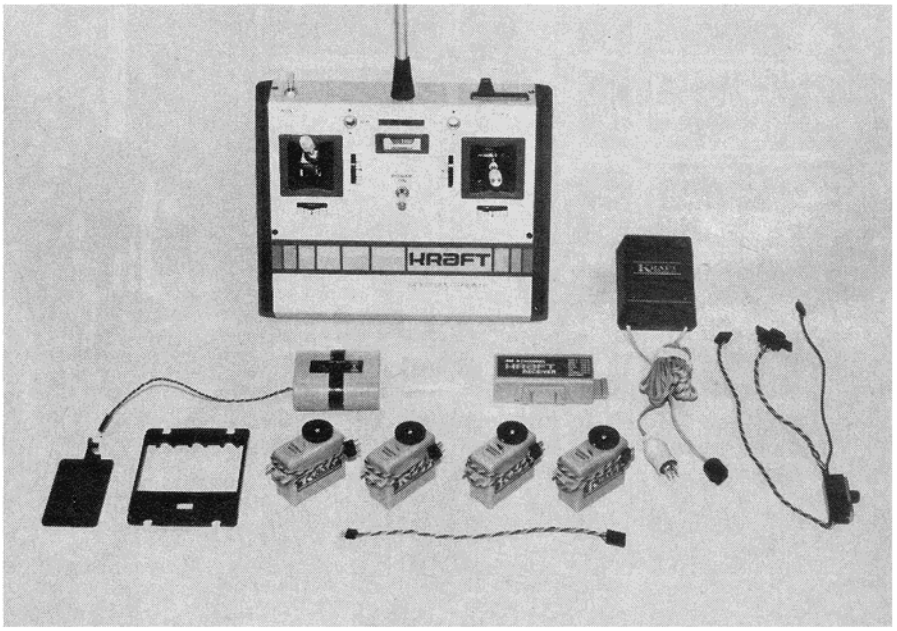
Evaluation Program Comments

This is probably the first time I was asked to participate in an evaluation program prior to receiving a final production system for a magazine review. I had a Gold Spectrum-6 system in my possession during the month of September, during which time it was extensively flown by myself and fellow FLYING MODELS author, Ron Farkas. The test program basically centered around interference checks, range checks and operation in conjunction with other R/C systems (on adjacent channels). No problems surfaced during these tests. I was a little disappointed, however, since a lot of my detailed comments and suggestions could not be inputed into the final version of this system. As it turned out the design was essentially frozen before I received the first system back in September. During this review some of my minor criticisms will obviously surface. But I must emphasize the word *minor*.

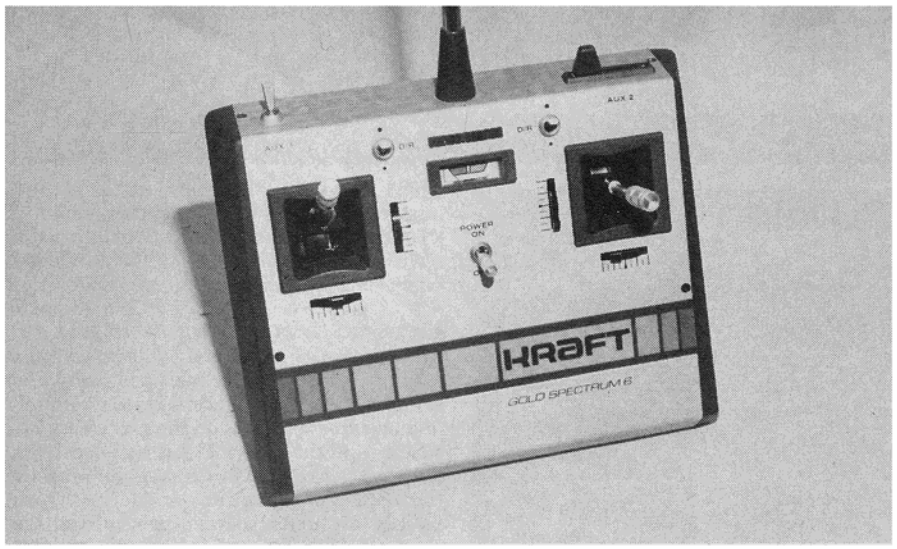
Basic Gold Spectrum-6 System

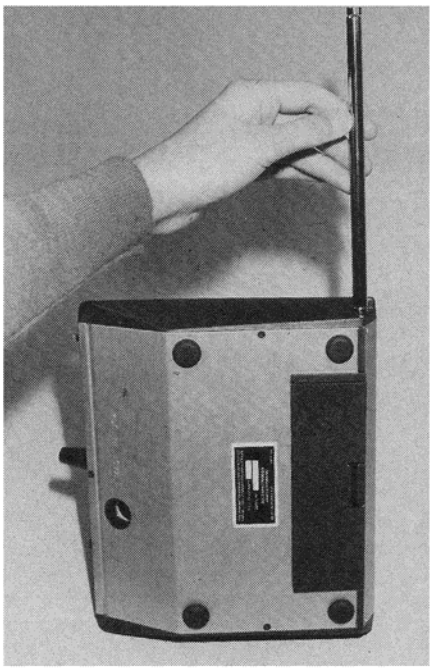
What do you get for the quoted list price? Well, the prime items include the six channel, dual stick transmitter and six channel receiver. Full nickel-cadmium rechargeable batteries are included for both the receiver and transmitter along with a new low rate (only), dual output battery charger. A choice of servos is offered including the KPS-12, 14, 15, 18 or 20. The systems shipped with KPS-18 or KPS-20 servos will cost a little more as explained later on. Some of the accessory items include a switch harness with charging jack; two types of servo trays (enough to handle the mounting of all four servos); extra output arms, an aileron extension cable; an instruction manual and an excellent booklet titled, "Fundamentals and Guidelines for Installation of your Kraft System". The one item that is not included, but certainly should be, is a color coded frequency flag. The Gold Spectrum-6 will be available on all 27, 53 and 72 MHZ (AM) frequencies. Also available will be a series of FM frequencies. At the present time FM is only legal in the U.S. on the 53 MHZ fre-

PHOTOGRAPHY: BOB ABERLE



This is the Kraft Gold Spectrum six channel R/C system for 1981. The complete system as you see it with KPS-14II servos will list for $497.95. Features include new styling for both transmitter and receiver.





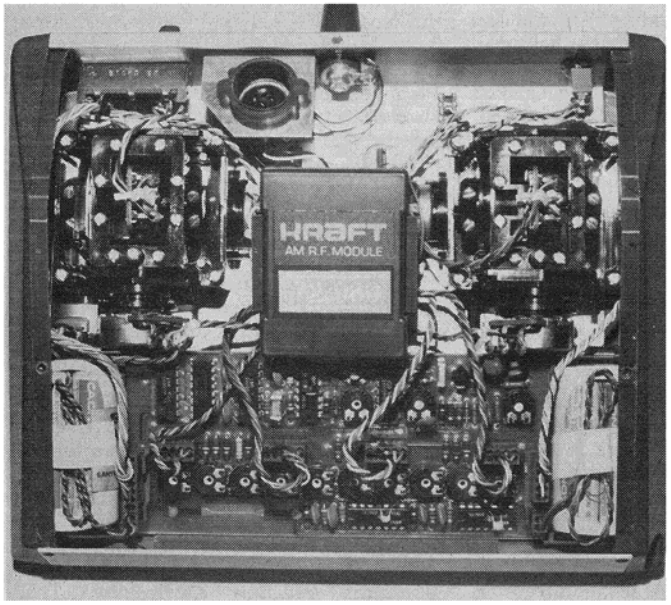
The Gold Spectrum KPT-6c transmitters styling is influenced by the European look (**above**). The front and rear covers are made from a gold anodized aluminum. The antenna can be stored in a tube in the bottom of the case (**right**). There is enough of a friction fit to prevent the antenna from accidentally sliding out of the storage tube. The transmitter side pieces are a dark brown high impact plastic.

quencies and can only be used by modelers possessing an appropriate Amateur Radio Service license. For foreign sales (export) Kraft will also offer FM on the 35 and 40 MHZ bands. In addition, a special 220 volt input battery charger may be ordered (Model KBC-SE 220V). The Gold Spectrum-6 will only be available in a dual stick configuration. The standard system will be on Mode II. Mode I will also be offered on special order (for the same price). Kraft has no plans for a single stick version of the Gold Spectrum-6 (I'm out of luck again!). As mentioned already, this Gold Spectrum-6 will essentially replace the present KP-5C system. The surprising fact is that this new system, with all of its new features, will only be *selling* for about $30.00 more than the KP-5C system. Kraft did mention that they will continue to make the KP-7CS system for those individuals who still prefer a single stick radio system.

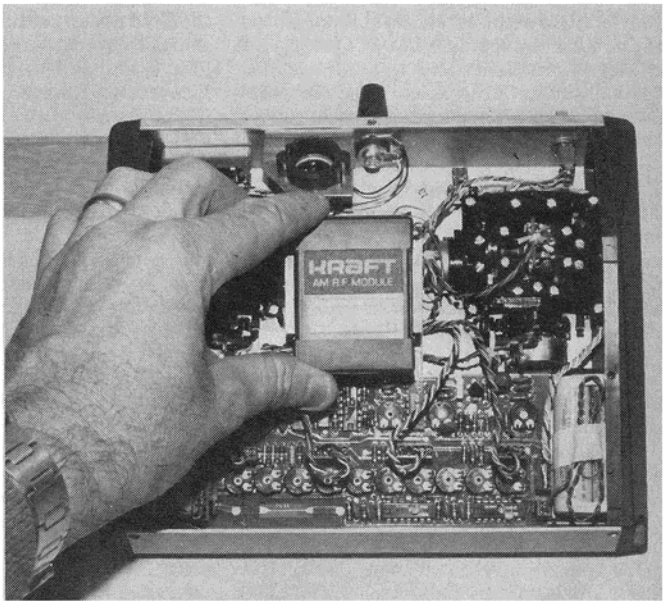
KPT-6C Transmitter

The new Gold Spectrum-6 transmitter is housed in a case measuring eight inches wide × 6¾ inches high × 2¾ inches thick (maximum-exclusive of the control stick projection). Total weight is 2.0 pounds even. Antenna is a nine section whip measuring 47 inches at full extension. It can be collapsed down to 6½ inches and it can also be removed completely. Kraft has provided a neat little storage tube for the antenna, located at the bottom edge of the case. There is just enough friction, in the fit, to prevent the antenna from sliding out of this stoage tube. Power output is measured at approximately 500 to 550 milliwatts. Total current drain is approximately 140 MA. The battery power system is certainly a new approach for Kraft. As a result of the unusual transmitter case shape and tight packaging of components, Kraft has gone to a two pack approach. Each battery pack contains four cells. They are connected up in series for the nominal 9.6 volt input voltage. Also because of the space limitations the packs are now using A-A size cells as opposed to the more usual Kraft/G.E. Sub-C cells. Kraft will be employing nickel-cadmium cells manufactured by both Sanyo of Japan and Union Carbide (Eveready) as available for this application. In either case the cells will be rated at 500 MAH and they *will not accept* the quick charge (C/3) rate of 150 to 200 MA. More will be said about this later when discussing the new battery charger. Another new innovation is the fact that both battery packs can be easily and individually replaced by the modeler. Each pack is wired with a connector which means that a bad pack can be replaced in minutes, thereby eliminating a more expensive service charge.

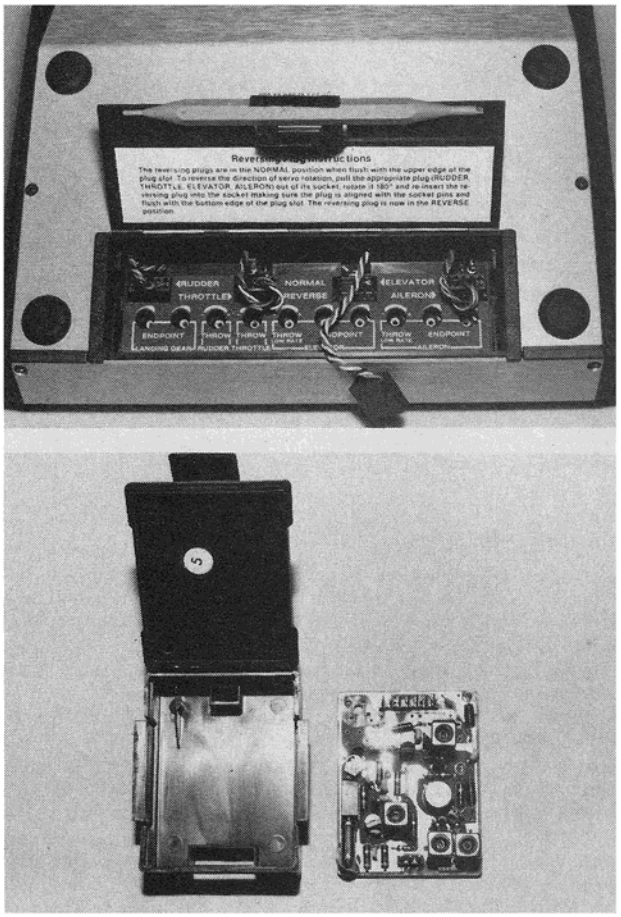
Circuit-wise the encoder appears to be an extension of the Kraft Signature series which employs a linear ramp design. A total



This is the inside of the Gold Spectrum-6 transmitter. In the very center is the frequency module. On the lower portion, either side, are the two separate battery packs. Between the packs is the encoder P.C. board.



Bob is plugging the R-F frequency module in place. This is a new module. You must first remove the rear transmitter case cover before you can actually change the module. Note the new Kraft logo.



Opening up the small cover on the rear of the transmitter will expose a series of very special controls (**top**). Note the special alignment tool that is attached to the cover flap. To reverse a servo direction you must unplug the appropriate connector, rotate it 180° and replug it in position. The controls are discussed in detail in the text. The new frequency module is not compatible with the existing Kraft modules (**above**). The modeler is not presently permitted to change frequencies on the 72 MHZ band.

of seven I.C.'s are used in this encoder (three of which are the common LM-324 variety). I am a little surprised that Kraft didn't opt for the popular new Signetics NE-5044 chip, which would have reduced the parts counts somewhat. On the other hand you can't fault the reliability and general success they have had with their Signature encoder (which is also used on the seven channel deluxe transmitters). Most of the transmitter wiring is of the modular type using connectors at appropriate points. This makes for easier manufacturing since most of the wiring can be done before final installation in the case. It also makes servicing easier and might permit the inclusion of optional circuit later on (strictly a guess on my part!). I also noted a fuse, which is deposited directly on the encoder P/C board, and appears to be inserted in the main 9.6 volt power buss. Should any short occur in the power circuit this fuse would open, protecting the remainder of the circuitry. This fuse is not mentioned in the instruction manual. If it did blow, I think it is safe to say that the transmitter would have to be sent to a Kraft service shop.

Transmitter Frequency Module

A new frequency module will be used in the Gold Spectrum transmitter. The AM version of this module is designated as Kraft No. RFT II and will list for $29.95 if purchased separately. However, one module is included with the price of each system. The new module measures 1¾ × 2¼ × ¾ inch thick. It is clearly a new configuration and is not interchangeable in any way with the present Kraft plug-in frequency modules. This lack of compatibility did surprise me somewhat and may annoy modelers who already own several of the existing modules. Another surprise is the fact that the rear case cover must be removed to gain access to the module. A trap door at the rear of the case would have seemed more logical. My experience trying to remove the module in my Gold Spectrum-6 indicates that it is be a time-consuming chore. You have to carefully pass each of the servo reversing cables up through their respective slots before the case cover will sit properly in place. The one thing that I like is the fact that the crystal (inside the module) is placed in a socket and then *cemented in place*. Kraft states clearly in their instruction manual that any attempt to make adjustments on this module will void the warranty. Remember, at the present time it is expressly illegal to change transmitter frequencies while operating on the 72 - 75 MHZ R/C channels. Kraft will also be offering a new FM frequency module which I will mention later on.

External Transmitter Controls

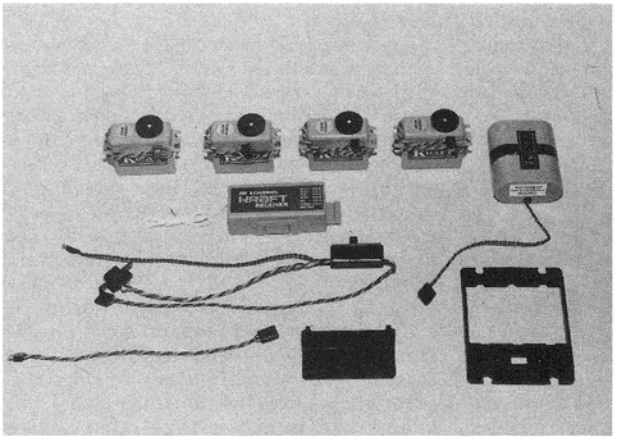
Let me now explain the external controls on the Gold Spectrum-6 transmitter. The evaluation unit is a Mode II system (aileron and elevator functions on the right stick assembly and throttle/rudder functions on the left stick). The dual stick assemblies are of the open gimbal variety made by Kraft, mainly of molded plastic parts. I believe these are the same sticks used in the popular KPT-5C transmitter. The pots are the usual Kraft enclosed carbon variety. Stick length can be adjusted from a minimum of 1⅜ inches to a maximum of 1⅞ inches, with the help of a small Allen socket head wrench (which is not provided). Spring tension can not be adjusted (but it did feel about "right"). In the center of the transmitter case is a power (on/off) switch. This switch requires you to pull out the handle first *before* it can be moved to the on or off position. (This type of switch was popular on imported sets for years, but some manufacturers have stopped using them since many unknowing helpers have accidentally broken the switch handle.) Trim locations are conventional (aileron trim by the aileron stick, elevator trim by the elevator stick, etc.). In other words the trims are not "crossed", nor can they be reset that way by the modeler. The trims do not have any ratchet device which might help prevent accidental movement. As a matter of interest the trim is handled electronically (separate pot) on the aileron, elevator and throttle channel functions, while the rudder has mechanical trim (control pot housing is rotated by the trim lever). On this particular set I found the trim travel to be somewhat restrictive. Here is an example: aileron trim is +/– 6 degrees (12 degrees total travel). None of the trim travel could be adjusted by the modeler. A relative R-F power output meter is provided. It is located directly above the power switch. This meter doesn't have expanded scale voltmeter (ESV) provisions for checking the receiver battery pack voltage through a special cable as is done on the Kraft KPT-7 transmitter. On either side of (and slightly above) the meter face are two dual-rate switches. On the Mode II transmitter's the D/R switch on the right side is for ailerons, the left is for elevator D/R. On the Mode I sets this is reversed. When the D/R switch is in the upper position, you have normal control travel. Moving the switch lever to the down position, cuts in a special pot adjustment (to be discussed later) which is used to reduce the total control throw on that channel. My only objection here is the lack of any nomemclature explaining the function of the switch position. Both switches are simply marked "D/R". They should say, in my opinion, "Ail D/R" and "Elev D/R". The top switch position should say "normal" while the lower position should say something like "reduction" or "low-travel". I suspect the idea here is to strictly learn by feel. On the top left corner of the case is the retract switch. This is a non-proportional channel (designated by Kraft as "Aux-1"). A sixth

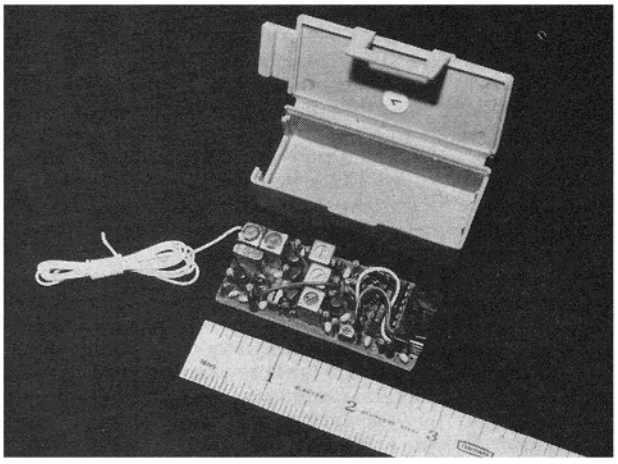
channel lever is located on the top right corner of the case. This is a proportional channel (without a separate trim) which is designated as "Aux-2". This channel is ideal for flap operation. The control pot for this sixth channel is a linear motion type.

In general, the transmitter is very comfortable to hold when flying. Controls and trim levers are easy to "finger". There is no lanyard type connector for use with a neck strap. Using a neck strap to support the transmitter is a popular way of flying outside the United States. However, Kraft is going to make available as an optional accessory a neck strap with mounting hardware, P/N 200-219, that will list for $6.95. You could also purchase the special Kraft transmitter tray (P/N 200-142 for $24.95) which contains a neck strap. When using this tray you might also want to try the Kraft extra long control sticks (P/N 200-145 for $5.98). As a predominantly single stick flyer I think I would be interested in trying this concept with the long sticks. One other comment concerning the new transmitter case. During our flight test program, we all noted that it didn't fit very well in our various field kits or boxes. This is a minor problem that the individual modeler will have to work out for himself.

Special Control Features

On the back of the transmitter (lower portion) you will find a small access panel. This panel cover can be easily "snapped" open, exposing a set of special transmitter controls. The cover is hinged so that it will stay permanently with the transmitter. Inside the cover you will find a small, special purpose, alignment tool for making the necessary potentiometer (pot) adjustments. This tool is fastened to the cover with a small Velcro fastener (so it can't be easily misplaced). All of the special control features are identified with a neat silk screened vinyl decal. This permanent type function identification is certainly better than the paper placard that was supplied with my Signature transmitter. Refer now to one of the detailed photographs of the special control panel included with this article. Starting at the right side you have the aileron controls. The two end point pots will allow you to *independently* adjust the amount of left and right aileron control throw. Maximum end point throw obtained on my system is 48 degrees in each direction. Minimum end point throw is 24 degrees in each direction. You could, of course, set the right aileron at 48 degrees deflection and the left aileron at 24 degrees, if you like (can't imagine why though!). The other aileron control is the low rate throw. If you switch the D/R lever to the down position, you introduce a low control rate pot in to the circuit. With this circuit on, you reduce any pre-set control throw down to 50% of the normal position. This is truly a proportioning type control function. If you had the end points set up at 48 degrees right aileron and 24 degrees left and the low rate pot set for maximum reduction what would you get? The right aileron travel is reduced down to 24 degrees deflection and the left aileron is reduced down to only 12 degrees deflection. This is an excellent way to handle both end point controls and dual rate cut back. As a matter of interest you will not be able to get end point control beyond the 48 degree point in each direction (total servo travel of 96 degrees). The elevator channel (next, in line) works the exact same way as the aileron function just described. You could easily add more up than down elevator which gives a differential effect which may be desireable in some models.





This is a typical Gold Spectrum-6 airborne pack with KPS-14II servos (**top**). The weight of this particular system is 12.5 ounces. The KPS-14II servos are capable of flying a .60 powered model. This is a photo of the inside of the Gold Spectrum-6 receiver (**above**). The molded nylon case has an integral cover with a hinge and catch. The circuit board can be removed for repairs/inspection in a few seconds. The receiver is quite small in size and weighs only 1.5 ounces.

The throttle control is next. In this case it is only a single throw adjustment. I'm a little disappointed with this approach. I would have liked to have seen end point controls, as employed on the aileron and elevator functions. At one extreme throw adjustment position the total throttle servo travel amounted to 40 degrees (while at high trim). In the other extreme throw position the throttle servo total travel is 90 degrees (while at high trim). At both extreme adjustment positions I found the throttle trim could add another 15 degrees of control movement (for engine cut-off purposes).

Next control on the panel is the rudder. This also is strictly a single throw adjustment. But for the rudder that is good enough. At one extreme the servo ran +/– 50 degrees at the other extreme throw adjustment position the rudder servo ran +/- 20 degrees. The final special control applies to the landing gear channel function (fifth channel). This adjustment has two end point controls. Using these two pots you can run a standard servo approximately 100 degrees total travel from either direction. So, in effect, you have servo reversal on this channel as well. To get the full 180 degree of rotation that you need with many landing gear systems you most likely need a special purpose retract servo. To fully appreciate the end point control adjustments the retract servo must have a feed back pot. All Kraft retract servos do use feedback pots. If you try to use a retract servo that has only limit switches it will simply run from one stop to the other. The end point controls would be of little use.

The remaining item to be discussed on this special control panel is the servo reversing feature available on all four main channels (aileron, elevator, rudder and throttle). To accomplish this, Kraft has employed a set of cables that terminate in special five pin connectors. Servo reversing is accomplished by unplugging the appropriate connector and re-inserting it in the opposite direction. Both the servo normal travel *and* the trim travel is reversed at the same time. Kraft indicates that they went to cables and connectors to

prevent accidental servo reversal which might cause a crash. With the cables a distinctly different effort is made to reverse the servo direction. I still personally favor the reversal switches as employed on my Signature transmitter. This covers all the special control features.

KPR-6C (AM) Receiver

The all new Gold Spectrum-6 receiver measures 2⅝ inches long (less the connector retainer) × 1 3/16 inches wide × 13/16 inch thick and weighs 1.5 ounces. It is housed in a molded high impact nylon case which has a hinged cover (for easy access to the single printed circuit board located inside). A Kraft Multicon block connector is found at one end of the receiver. The connector retainer supplied with this receiver works quite well (for a change!). On the outside of the case Kraft provides a silk screened vinyl decal containing the channel function identification which is a real convenience. Kraft seems to have gone back to the permanently mounted (non-removable) antenna on this receiver (at least my particular antenna was not removable). The receiver circuit has a double tuned front end with a claimed sensitivity of 3.0 microvolts or better. The decoder employs the new Signetics NE-5045 I.C. chip. Idle current is 28 MA. which is surprisingly high in comparison to other existing Kraft receivers. Kraft states that the receiver has a separate shunt voltage regulator that improves noise immunity. However, it does result in higher current drain in the receiver. The crystal is soldered directly to the P/C board. It can't be removed for frequency changing purposes.

Servos

Kraft supplied me with KPS-14II servos with this evaluation system. These are standard Kraft servos and are compatible with all current equipment except for the Sport Series which requires the "A" servos (1.9 M.S. neutral spacing). The KPS-14II servos weigh 1.4 ounces each. These servos have been reviewed before by me in FLYING MODELS (reference July 1976 issue, page 46). Let me just touch base on some of the important points. The motor is a 12 ohm variety (16 MM in diameter). Output torque is claimed now to be 29 in. ounces, while the transit time is 0.5 seconds for full 90 degrees rotation. The amplifier employs a Kraft proprietary Texas Instrument I.C. chip plus two outboard transistors (this is the standard Kraft amplifier that has been used for years). The only real difference in this particular servo is the use of a special new carbon button pot wiper. Practically all Kraft servos available in 1981 will have these new wipers. From what the Kraft folks tell me, the carbon button wiper is evaluated for close to a year in conjunction with the standard metallic wipers. Although the metallic wipers can have longer life, they do require more frequent cleaning. The carbon wiper on the other hand requires less overall maintenance and yet is still expected to yield more hours of operating time. Metallic VS. carbon wipers is going to be the big point of contention in servo design for the next few years. My particular servos exhibited excellent centering accuracy, on the order of ¼ degree or less, which is amazing for a servo in this price range. Servo idle current is higher than expected at 20 MA. per unit.

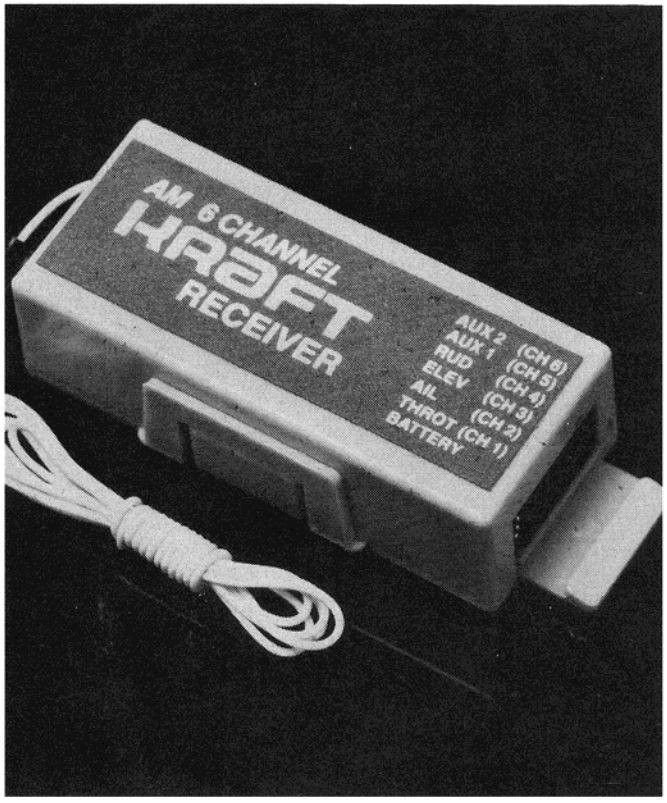
Current Drain

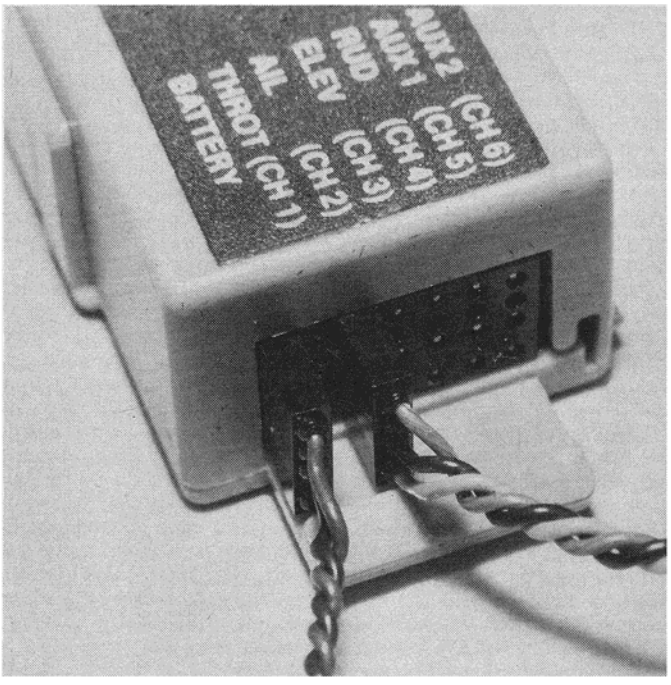
The measured idle current of the receiver and the four KPS-14II servos is a rather high 108 MA. This amounts to four servos at 20 MA. each plus 28 MA. for the receiver. Placing one servo in continuous motion (without any flight surface load) the current drain is noted as 220 MA (about 110 MA. more than the total idle current). With two servos in continuous motion the total current drain is 360 MA. This is an interesting situation! The idle current is comparatively high, yet the operating current (servos in motion) is not as high as you would expect. Although Kraft conservatively rates the airborne battery pack at one hour total flight time before recharging is necessary, you could easily get twice that much out of a full charge. But, of course, use an expanded scale voltmeter (ESV) at the field, to check on the actual battery condition between flights.

Battery Pack and Charger

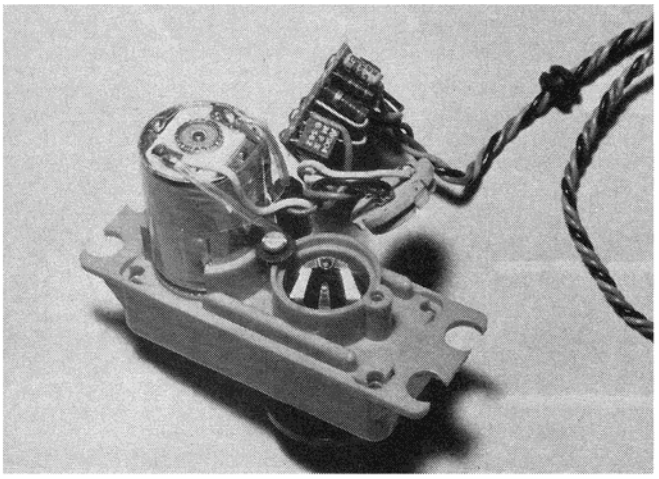
Because of the necessity to go to low rate battery packs in the transmitter (smaller physical size required), Kraft was forced to go back to C/10 or 50 MA. (low rate) conventional charging. Up till now, Kraft Systems was just about the last R/C manufacturer to still employ the C/3 quick charge rate of 150 to 200 MA. for periods of generally four to six hours.

The new charger supplied with the Gold Spectrum-6 system is designated as Model KBC-S. It is a fixed, dual output unit. You can not switch it from low to high rate as you could with the Kraft KBC-D charger. I measured the output of my particular charger at 66 MA. receiver section and

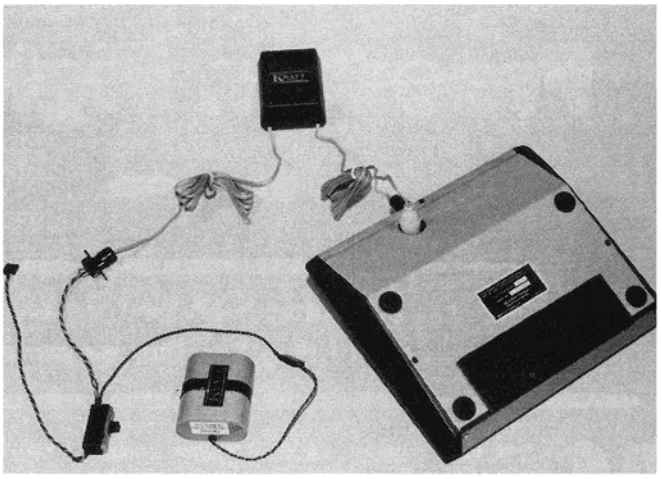




This is a close-up shot of the new KPR-6c Gold Spectrum-6 six channel receiver (**left**). The decal contains the channel function callouts, which is a great convenience. This is the connector block end of the receiver (**above**). The connectors are the popular Kraft Multicons. Standard wiring!



Here is the inside of the Kraft KPS-14II servo. Notice the new carbon button pot wiper. Bob suggests that this particular servo is quite strong for its size. No problems flying the larger models.



This is a typical battery charging set-up. The new Kraft KBC-S charger has only low rate capability. Both battery packs can only be charged at the 50 MA. rate for periods of 14 to 16 hours. The text goes into detail.

70 MA. for the transmitter side. They should be nominally around 50 to 55 MA. each. The extra current won't really hurt and it is probably better to be a little on the high side in current output rather than be low. The battery pack supplied is now designated as Model KB-5EC. It is identical in size to the popular Kraft KB-4E 550 MAH pack (both weigh an identical 4.8 ounces). Quite honestly it *is* the same pack with the same G.E. 550 MAH Sub-C cells (at least for now it is!). But to eliminate the confusion of having one pack on low rate charge and the other on high rate, Kraft decided to go to complete low rate charging. The "new" pack is stamped "Charge at 50 MA. rate only". Follow the instructions, charge for 14 to 16 hours with the KBC-S charger, and you won't have any problems. One item on page eight of the Kraft instruction booklet I take strong exception to: *"Note, We do not recommend the use of battery analyzers and other types of chargers"*. Rather than get into a long story on this subject I'd like to recommend that you read my comprehensive two part article on battery charging and testing that just appeared in the February and March (1981) issues of FLYING MODELS. I don't want to be at odds with my friends at Kraft, but I feel very strongly about the use of battery analyzers, such as the ACE Digipace and the L. R. Taylor Power Pacer. I also consider it a must to use some type of E.S.V. at the flying field between flights. Enough said for now on this subject.

Weight Analysis

The complete airborne weight of this system with four KPS-14II servos and the KB-4EC battery pack is 12.5 ounces. You can option for both smaller and larger servos with this system, depending on application. You may also obtain a 225 MAH (smaller) battery pack when using the subminiature KPS-18 servos.

Warranty and Service

A change in the normal Kraft policy should be noted here. The basic warranty is now 90 days from the date of purchase and will include all labor costs. The warranty will be further extended to a period of one year from the date of purchase, under the same terms as the 90 day period, provided that the radio, in Kraft's judgment, shows only reasonable wear and tear. If excessive wear is noted, the warranty will be void after the first 90 days. You figure this out my friend. Kraft does have one of the most extensive service networks established throughout the world. A complete listing of these service centers is supplied with each system.

Operating Instructions

Kraft's instructions are about the best available in the industry and have been continually expanded through the years. Every possible caution is included to provide for safe operation of a radio system, even by a rank beginner. About the only thing I would now add, and I suspect Kraft is in the process of doing this, is some application notes for use with the new special controls. For example, they ought to tell the modeler why he might want to use end point controls. They might also mention when it would be appropriate to switch in the dual rate control and when it is best not to use it. What types of models will benefit from these special controls? I believe this type of additional information would be especially helpful to the beginner. Remember, because of the attractive price of this system many beginners will be tempted to buy it right from the start.

Flight Performance

As I said earlier I did have the opportunity to fly another Gold Spectrum system for a period of a month or so earlier in the year. During that time I followed a complete Kraft operational test plan. The system easily met all the requirements. In several cases I had the model out about 500 feet and the transmitter antenna collapsed down to one section, without noting a glitch. The test radio at that time was operating on 72.080 MHZ (for info). Everyone who flew the system enjoyed the feel of the transmitter case (no exceptions!). Remember, this is the first "European" style transmitter design to be offered by a U.S. R/C manufacturer. I get the impression from my initial observations that this system will become very popular.

Summary

As you probably noted I did get a little "picky" on a few points during this product review of the Kraft Gold Spectrum-6 radio system. Possibly my biggest objections were the use of a totally new transmitter frequency module that required removal of the rear case cover to make a frequency change and the use of connectors instead of switches for servo reversal functions. On the other hand, I got Signature type performance at sport or economy type prices.

My review of the Gold Spectrum-6 was limited to an AM system operating on 72 MHZ with KPS-14II servos (list price of $497.95). You may also purchase AM systems on 27, 53 and 72 MHZ with KPS-12 or KPS-15 servos for the same $497 95. With KPS-20 servos the system list price would be $517.95 and with the subminiature KPS-18 servos and the 225 MAH lightweight battery pack the list would be $557.95. Also available for use in the U.S. will be an FM system operating on the six meter band for those modelers who hold appropriate Amateur Radio Service (HAM) licenses. The FM system will have a special FM transmitter module (Model RFT II FM) and a new KPR-6F receiver.

I suggest you write to Mr. Ray Forbes, Kraft's new Marketing Manager and request a complete catalog along with a separate Gold Spectrum price schedule. By the way, rumor has it that Kraft will introduce a Gold Spectrum-8 system sometime in 1981. This set will include exponential rate control and mixer options as well as all the features contained in the six channel version. Keep an eye out for this super set as well. GC

Freedom Fighter

by Dick Byron

Jet-like looks and high performance are the features of this Tee Dee powered ship.

My first experience in ½A stunt was in 1956 with a Junior Barnstormer powered by a Baby Bee. It was able to loop, and that was about all. My next attempt was a scaled down version of the Foxy by George Aldrich. I had much fun with this airplane but, again, only loops. The Baby Bee was not able to fly inverted unless you drilled out the tank and connected another stunt tank to the fuel pickup inside. I did not know this at that time.

My ½A stunt interests were put on hold when I joined the Army and they did not get fired up again until I saw Dick Mathis' Pinto design in FLYING MODELS. Without turning to the next page, I started construction. In a few weeks, the aircraft was finished and test flying was in order. The first flights were very responsive and quite fast but a tremendous amount of fun. The airplane responded well and was able to perform the entire stunt pattern. However, with the straight leading edge, the airplane just did not respond as I would have liked. I had been flying 35 size stunt ships since 1955 and expected the ½A to fly as well, but I was very happy with it anyway.

At this particular time, I came across some color photographs of the F-5-E Tiger and really liked the profile it presented. It was ideal for a stunt ship, so I decided to build a ½A version first then possibly construct a 40 size later.

Construction

The construction process is exactly like a full size built-up stunt ship, except for the fuselage doublers in front. I don't feel they are needed on a ½A. The only trick to building a tapered wing is carving the ribs. All that is necessary is to make a plywood or metal template of the inner rib and outer rib and sandwiching enough pieces of 1/16" between them to make the required number of ribs. Drill holes through the ribs and bolt together and sand them to final shape. This is very simple, very quick, and most accurate. It will produce a set of ribs to give the required taper to the wing. The rest of the assembly is exactly the same as a full size stunt ship.

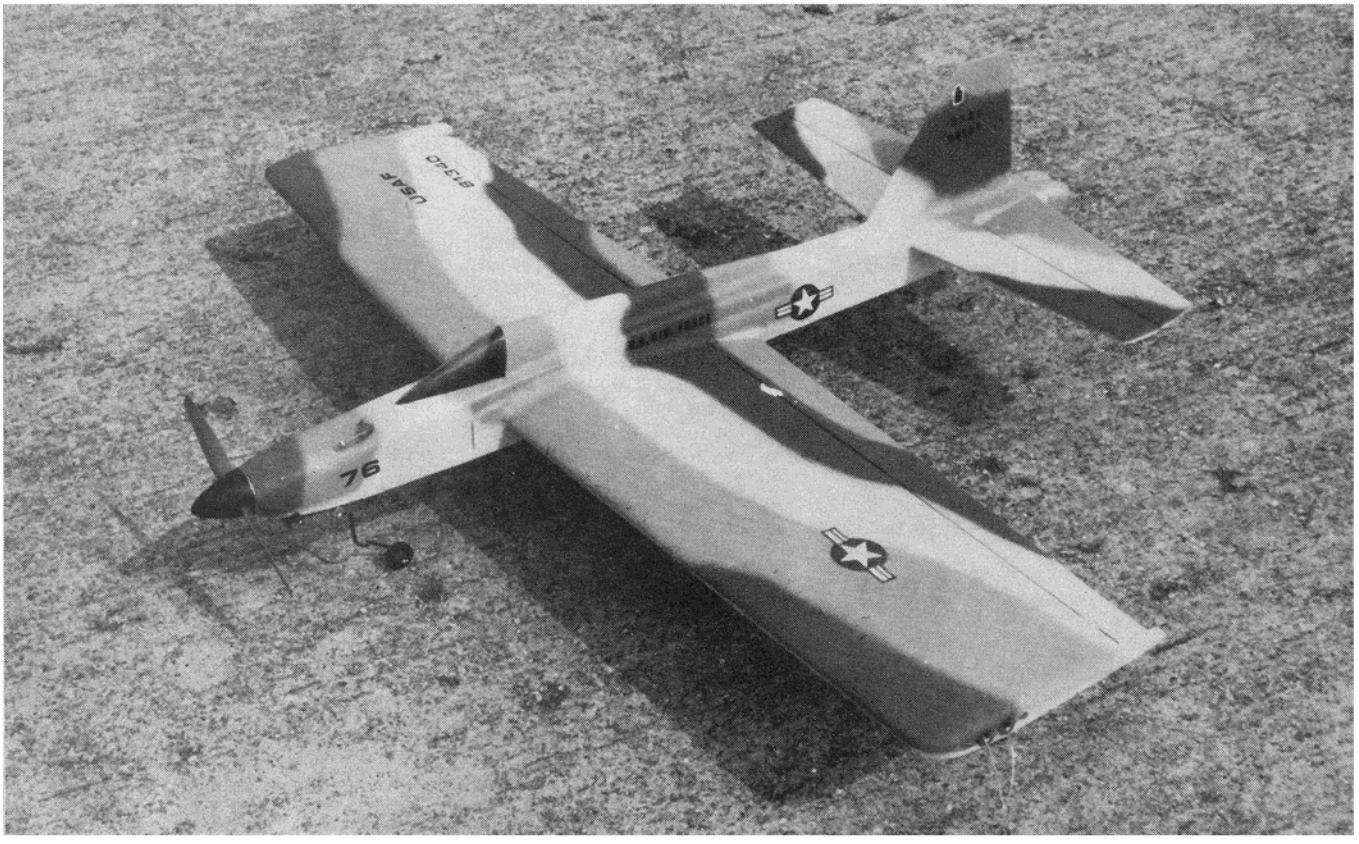
In building the aircraft, you must use contest grade wood to keep it light. "Hot Stuff" will help to cut the weight so use it everywhere except where extra strength is needed, such as around the motor mounts, plywood formers, landing gear mounts and bell crank mount.

The secret to successful stunt flying is very simple to say but hard to achieve. Keep it light, keep it straight, keep it clean, and it will fly. The only additional item is practice, practice, practice!

Of special note is the use of a heat sink on the Tee Dee engine. This is primarily used for additional nose weight, not engine cooling, but a benefit is derived in cooling as well. The fuel tank should hold 1.25 ounces or 1.5 ounces depending on how lean you run the engine. I like to get maximum rpm using K & B 1000 fuel plus 5¼ × 4 grey Cox propeller.

The Tiger was first flown on 52 foot .008 braided cable, but I eventually reduced the line length to 42 feet. The control handle was as light as possible so that I could feel the aircraft throughout the maneuvers.

PHOTOGRAPHY: BOB HUNT

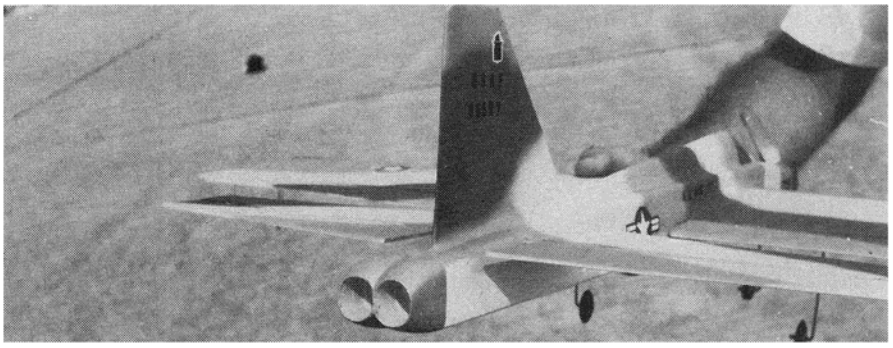


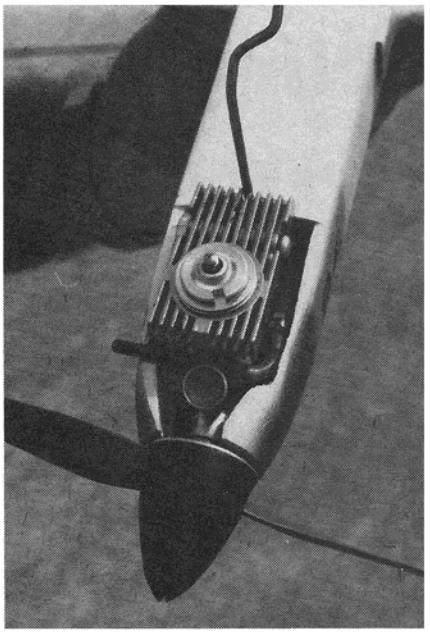
The original F-5-E placed in the 1979 NATS held in Lincoln,' Nebraska. It was the only aircraft that had two complete flights with no engine problems.

One of the most important things that you must do is become totally familiar with the Tee Dee engine and keep the fuel clean and fresh. I use an old Dynamic ½A metal filter in the line, and I am sure it has helped tremendously. The needle valve is the custom unit produced by Kustom Kraftsmanship, P.O. Box 2699, Laguna Hills, California 92653, (714) 830-5162. If you do not use this needle assembly, you will not be happy with the engine's performance at all, as it just will not maintain a setting without it.

The aircraft was finished with Sig dope throughout. The camouflage finish was applied with an airbrush, adding almost no weight at all for color paint. This was the lightest finish I could put on the aircraft. After final colors were applied, dry transfer lettering was used. Then I simply sprayed a couple of coats of Aeroglos flat clear and "presto", all the little nicks and scratches disappeared.

In closing, all I can say is, if you don't want a large, expensive, fuel-gulping stunt ship, but still want to fly and learn about trimming, put a Tiger in your hand and you will be pleasantly surprised at the outcome. One additional item that was overheard from a suspicious character with the initials BH, "It's cute!"





The heat sink on the head of the Cox Tee Dee .049 engine serves double duty as extra nose weight (**above**). ½A engines run just fine inverted. A photo of the rear of the F-5 shows the simulated jet exhaust outlets (**left**). The camouflage paint adds realism to the ship. The details help too.

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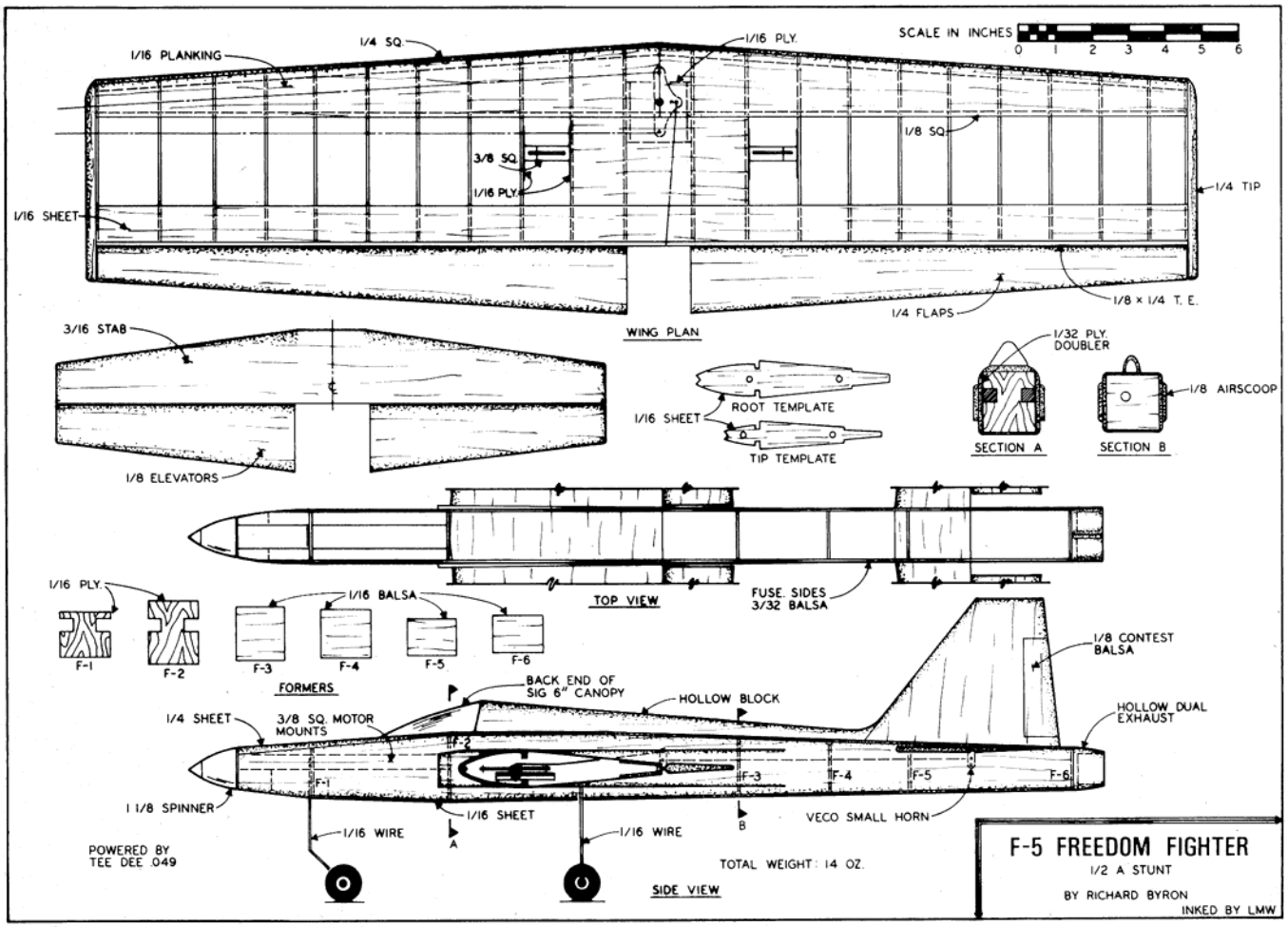


An FM How to:

Hinging

by Bill Winters

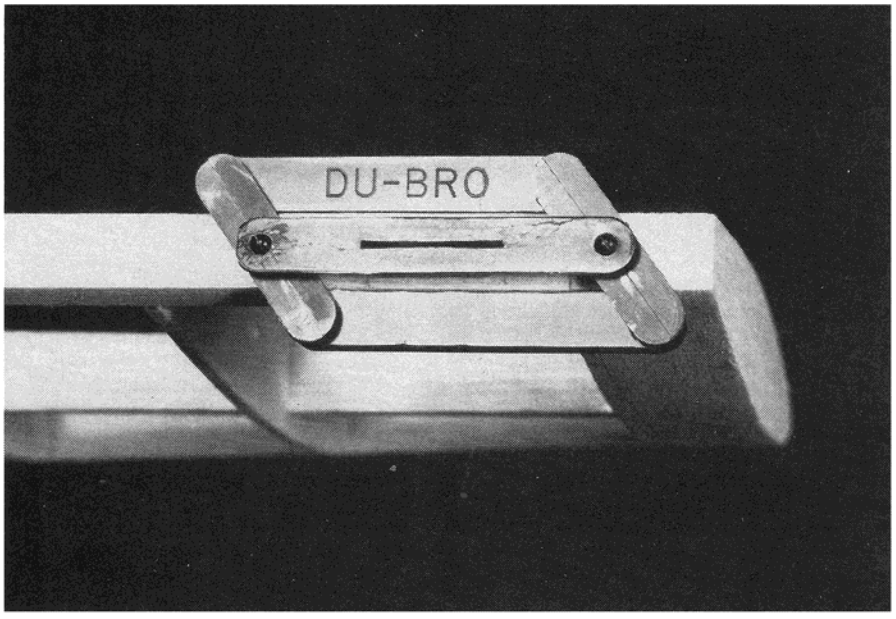
Proper hinging techniques are a must for safe flying. Read on for some valuable hints and tips.

Just as the old saying has it, there are more ways than one of skinning a cat. And, there are many ways to hinge the control surfaces on your R/C model. But in the overwhelming majority of cases you will find yourself involved with pinned or creased metal or plastic hinges which require the slotting of the structure for the insertion of hinges which are held in place by epoxy. Such hinges are most common in kits. Installation of such hinges is a pain-in-the-neck job for anybody and for most of us at least a messy undertaking. It need not be that way.

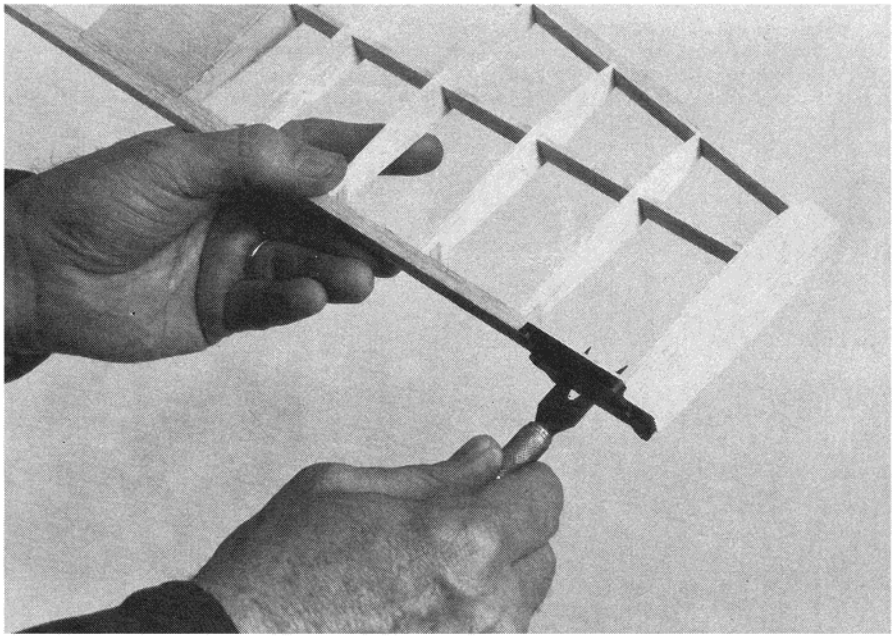
Hinge-slotting tools can be found at your hobby shop. They make the slotting part of the operation a manageable task. The thing no one helps you with is learning how not to get excess epoxy into the hinge itself. You may work the hinge loose enough to work, but the controls will be stiff to move, which increases servo loads and battery drain—to say nothing of lousing up your development as a precision pilot.

The pictures show the use of slotting tools and the sequence of steps in attaching the hinges. The captions include much missing information to smooth your ride. We'll say it here, and in captions, that hinges should be pinned (with toothpicks) in place to eliminate the in-flight departure of control surfaces from the plane—an all too common an experience for beginners. Many clubs won't approve beginner instruction unless the newcomer has pinned-in-place hinges. Ailerons are particularly susceptible to in flight failures because loose ailerons tend to flutter; flutter builds up until the hinge either lets go or the wing explodes. You don't want that to happen.

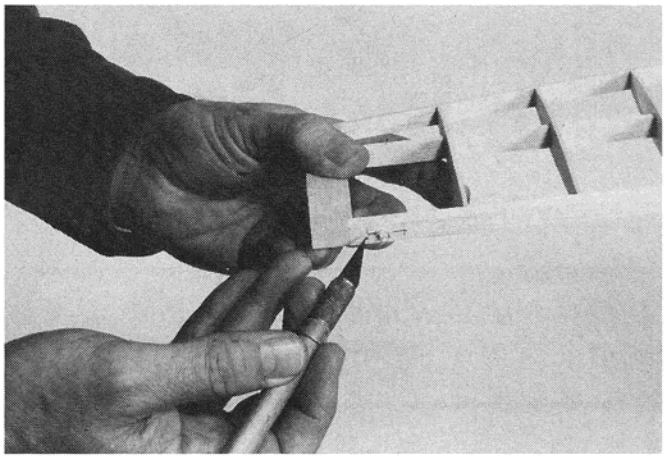
PHOTOGRAPHY: JOHN PRESTON

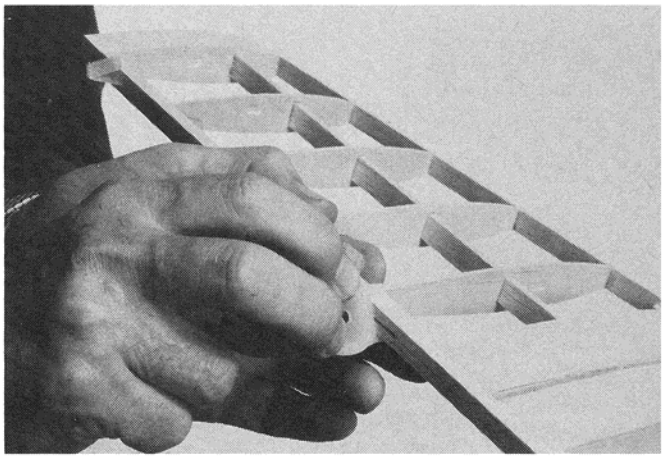


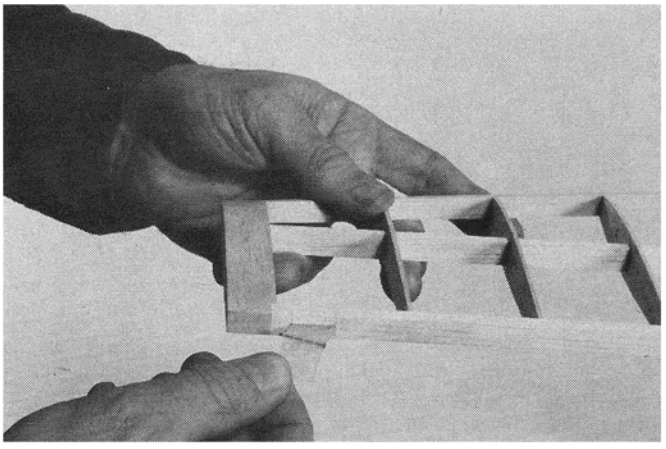
The Du-Bro hinge slotting jig can be pivoted to match any thickness of wood. It is shown here on the trailing edge of a Goldberg Models Falcon 56. The slot automatically lines up so that insertion of the slot-cutting tool will be on the centerline of the wood.



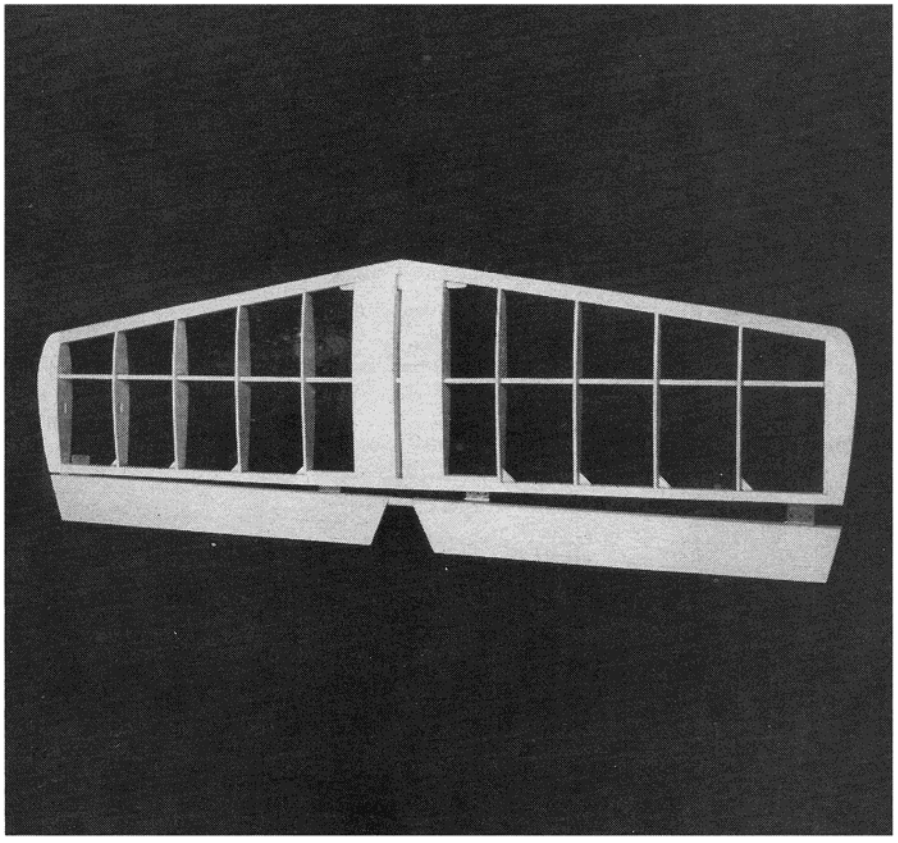
The forked cutting tool is carefully forced through the slot and the wood, being careful that it is at right angles to the part being slotted. A slight rocking back and forth motion will help it work its way through the wood. The shape of the blade captures most of the removed wood and pushes it out the other side.







The slot cleaning tool, which fits the same handle as the cutting tool, has a tiny hook at the pointed end of the blade so that shreds of wood can be pulled from the slot (**above**). The Goldberg Models hinge slotting set includes this simple marker jig which has two short arms that ride on the top and bottom of the part to be slotted (**above right**). A small plastic point scribes the center-line. Tilting the marker as shown matches it to varying wood sizes. The Goldberg hinge slotting blade and cleaner blade are generally similar to the ones shown. After the slot has been cleaned, the hinge is trial fitted (**right**). The hinge should slide into place, but the slot should not be so sloppy that the hinge fit is loose. Too tight a fit will cause the hinge to produce a lump on the surface. You may compensate for a slightly loose fit with extra epoxy when installing the hinge.

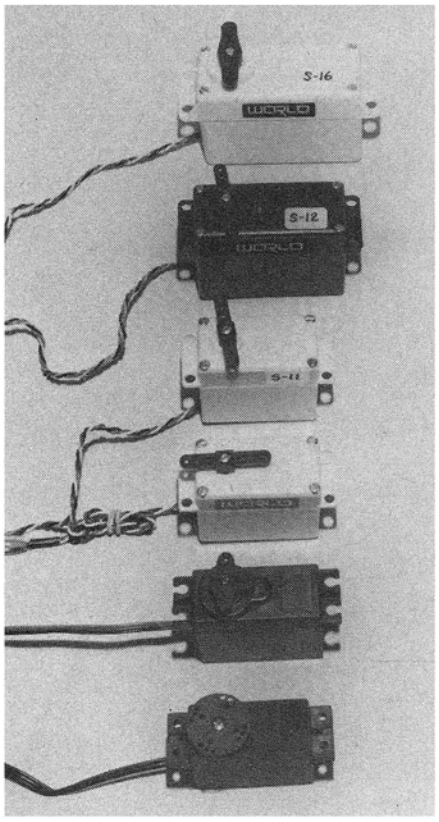


After all of the hinges have been trial fitted to both surfaces to be joined, the moveable surface with hinges in place (not yet epoxied) is trial fitted to the fixed surface. Use 45 minute epoxy so you run out of time while aligning the hinges. Use a toothpick or thin pointed stick to work the epoxy into the slot and then wipe the excess away. As you slide the hinge into place it will push the epoxy ahead of it. The special holes in the tabs of the hinge will retain enough epoxy to prevent the hinge from coming out. It is a good idea to put a very light coat of Vaseline on the barrel of the hinge before sliding it into place. This will prevent any epoxy from getting into the hinge and retarding its movement. After the surface is covered, drill a $^{1}/_{16}$" hole vertically through the wood and each hinge tab and insert a piece of toothpick into the hole using white glue or Hot Stuff. When dry, block sand the surface smooth. A final word of caution—be sure that the hinges are lined-up perfectly with the hinge line and that the barrels of all of the hinges are on one line. This will assure long life and smooth operation.

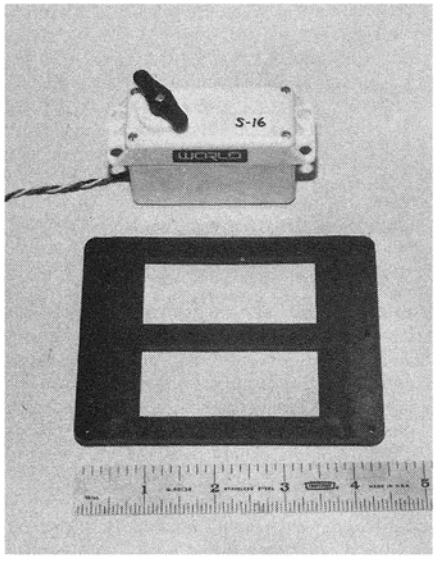
World Engine Servos

by Bob Aberle

A look at the entire new line of servos that has something for every R/C modeling interest.



This is an overall view of the six typical World Engines servos. The top servo is the S-16, S-12C next in descending order, S11B, S-11 standard, S-19 and finally the S-14 at the bottom.



This typical two-servo tray is available from World Engines expressly for the S-16 (**above**). This tray is quite heavy. Remember that control surface loads get transmitted by the control rods, thru the output arm down into the servo case. Your servo won't be of much use if it pops out of its mount under high loads. Inside the World Engines S-16 servo we find a 25mm in diameter motor with a resistance of just 2.5 ohms (**right**). Note the heat sinks on the four output (bridge circuit) transistors used on the amplifier.

Looking back over my hobby trade show notes recently, I realized that I had spotted two new World Engines servos during the past two years. In 1979 they introduced as S-12 precision servo and in 1980, a very large, high output servo designated as their S-16. Realizing that I had somehow neglected these servos from my product review schedule, I contacted the folks at World Engines. To satisfy my curiosity they loaned me not only S-16 and S-12 servos, but also a representative sampling of their complete servo line. This review, therefore, will specifically cover the following World Engines servos: S-16, S-12C, S-11, S-19 and S-14.

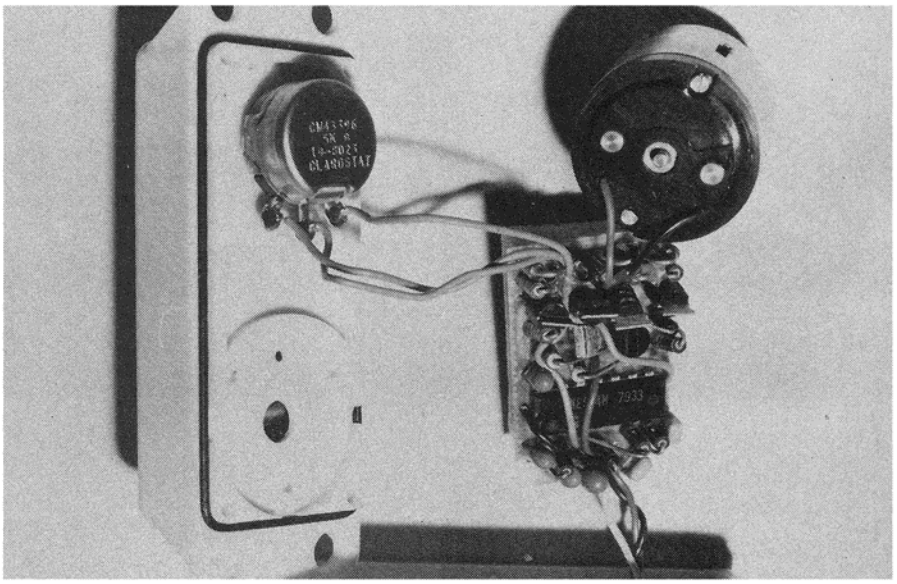
S-16 Servo

The S-16 servo was actually the prime motivation for this entire product review. Although displayed at the 1980 WRAMS and Toledo Shows and advertised several times throughout the past year, this servo has received very little overall attention. With the growing interest in large, quarter scale R/C models, I found that fact somewhat hard to believe. I also found it hard to believe that R/C boating operators were actually trying to connect two servos in parallel to gain higher steering output, when they could have just as easily used a single S-16 servo. Because of its very high output (claimed to be *156 in. oz.* of torque) and the fact that it was also waterproof, it was the ideal subject for both of these special interest R/C groups. Most surprising of all, the S-16 list price recently was reduced to $49.95 (a real bargain when you consider what you are getting!).

From a size standpoint the S-16 servo measures 2 9/16 inches long × 1⅞ inches high × 1⅛ inches thick (exclusive of the output arm and the mounting flanges). Weight with the connector and cable is 3.6 ounces. World Engines claims the S-16 is capable of lifting a 13 pound weight at a point ¾ inch out from the center of the output shaft. The connector supplied is the World Engines/Mitsumi type which has three gold plated pins and can easily be soldered by the modeler if ever necessary. Nominal neutral spacing is 1.5 M.S. The neutral position can be adjusted by inserting a jewelers screwdriver down through the center of the output shaft. You can, in most cases, adapt this S-16 servo to other R/C systems (other than World Engines) with good success. World Engines own radio systems generally operate on a frame rate of 20 M.S. You should try to operate this servo under roughly the same parameters for best results.

Inside the S-16 you will find a rather "heavy duty" looking amplifier, consisting of

PHOTOGRAPHY: BOB ABERLE



a basic Signetics NE-544N I.C. chip, two additional driver transistors and an additional four transistors (each with a small heat sink) connected in an output bridge circuit. The motor is a Copal 25 MM in diameter variety with a very low resistance (as you would expect) of 2.5 ohms. The feedback pot is a sealed Clarostat 5K ohm unit with carbon element. World Engines claims that you can get 300-400 flights on these pots. Replacement pots cost only $3.00 and can easily be installed by the modeler. As you might expect with a 2.5 ohm motor, this servo will require a lot of power. In my testing I measured the current drain at 750 MA. while pulsing the output continuously (moving the transmitter control stick as fast as possible to achieve an average meter reading). Stall current is hard to determine, but it appears to be in excess of 1.5 AMPS. Idle current is eight MA. which is typical for most current servos.

From a design/construction standpoint I noted several interesting items. First of all the motor is actually keyed to the case with several alignment pins. These pins are carefully molded into the case cover. With the high torque available, a press fit on the motor casing is obviously be impractical. The output shaft is supported with a really large ball bearing (I'll let you guess where the bearing comes from—keep in mind World Engines also sells model engines!) Also of interest is the fact that the output shaft measures 7/32 inch (square). Most servos usually have an output shaft of 5/32 inch. I have heard stories about quarter scale flyers breaking the output shaft of their servo due to heavy flying loads. World Engines must have had this in mind when they designed the S-16 servo. A large, rectangular shaped, "O" ring seal completes the water-proofing of the servo. All S-16 servos come with both the ball bearing output and the waterproof seal. There is nothing extra to purchase.

Although I didn't have a chance to fly a model with this servo, I did operate it for quite some time on my test rig. In general the resolution and centering accuracy was surprisingly good for such a large servo. It was also very quiet during my evaluation. A noisy servo can quite often be an indication of gear train problems. In actual operation (in a model) you would have to concern yourself with the choice of a proper size battery pack. World Engines recommends that at least a 1.2 AMP/HR. battery pack be used for aircraft control (generally when using two or more S-16's). Also available from World Engines is a special new 1.6 AMP/HR. nickel-cadmium battery pack. I think this would be my personal choice for aircraft use. For boating use you could probably get away with using a 550 MAH battery pack and resort to "lakeside" fast charging (if it became necessary) in the interest of saving weight.

A typical quarter scale aircraft modeler might employ three S-16's (aileron, elevator and rudder functions). A full airborne system including a lighter weight throttle servo (estimate 2.0 ounces); receiver (estimate 2.0 ounces) and the 1.6 AMP/HR. battery pack and switch harness (estimate 9.0 ounces) might total around 23.0 ounces. On a typical 25 pound total weight model, that only represents six percent of the total weight. (But think of the piece of mind you would have both in servo power output and available battery capacity.) Again the best part is the list price of $49.95.

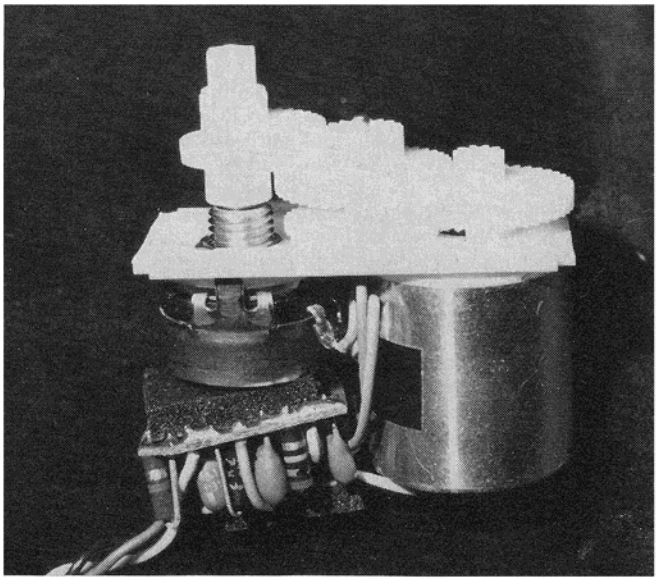
S-12C Servo

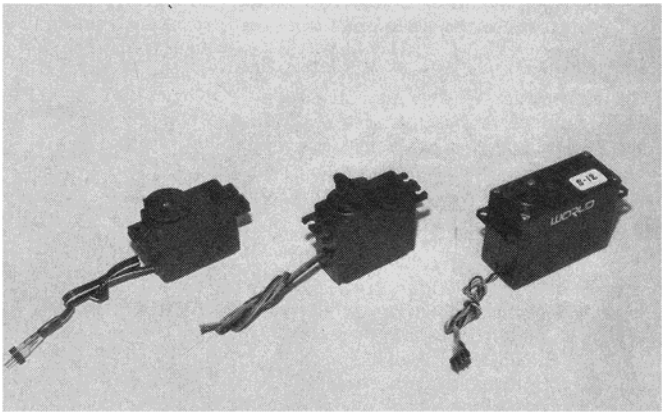
The S-12C servo has been on the market now for roughly two years. It is the servo used by Dave Brown for all of his competition flying. In fact, I suspect Dave had a hand in the design and production of the S-12C. It is classified as a "precision" servo for the discriminating modeler. However, the new list price of $44.95 would not preclude anybody from buying these servos whether they be beginner or expert. Unlike the S-16 and S-11 servos, the S-12C is molded in a black color. The case measures 2¼ inches long × 1⅝ inches high × 1 inch thick (excluding the output arm and mounting flanges). Weight with the cable and connector is 2.6 ounces. This servo also has a ball bearing on the output shaft (it is not waterproof).

Inside the case you will find a NE-544N I.C. chip in the amplifier, along with two external driver transistors and four additional transistors connected in an output bridge circuit. World Engines claims this amplifier allows the S-12C to be built with less than 2.0 micro-seconds deadband. The motor in this application is a Mitsumi brand (Japanese) measuring 20 MM in diameter, with a nominal resistance of eight ohms (although World Engines tells me that the actual measured resistance can be as high 9.5 ohms). The feedback pot is again the Clarostat sealed carbon variety (identical to the pot used on the S-16). Centering can be accomplished by inserting a small jewelers type screwdriver down through the center of the output shaft. Although World Engines originally intended to use a special precision Waters drum type feedback pot, they decided to drop this plan. The reason for this is primarily cost (the servo would have had to list at approximately $75.00) and availability. Quite honestly I found the S-12C to have very excellent resolution and centering accuracy while using the regular Clarostat feedback pot. Basically the S-12C is a very quiet, smooth performer.

World Engines claims the output of the S-12C to be 48 inch ounce of torque. Honestly I feel this rating is a little on the high side. Servo output testing can have many variables. Let's just say that there is plenty of power available here to handle any .60 powered pattern model (never heard Dave Brown complain and he is using this very servo). In my testing I measured the current drain while pulsing the servo in continuous motion at 200 MA. Stall current is in the order of 450 MA and the idle current is seven MA. Transit time is a fast 0.4 seconds for a full 90 degree rotation. Both the speed and the precision are what the pattern flyer is looking for in a good servo.

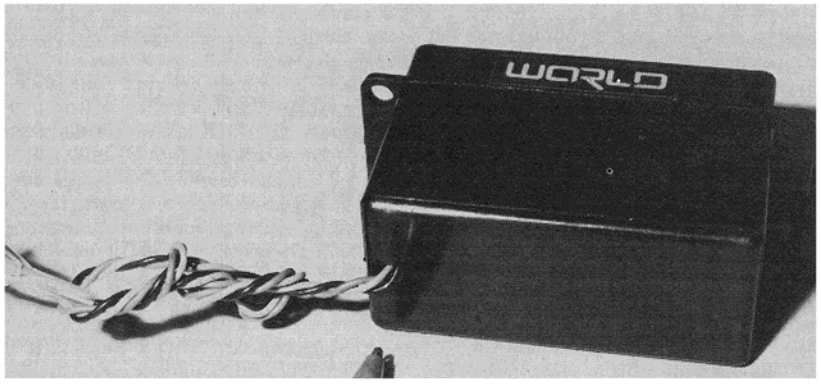
One additional comment I have to make (and I don't get this chance too often). The S-12C and the S-11 servos (to be discussed next) both have their cables exit out the bot-



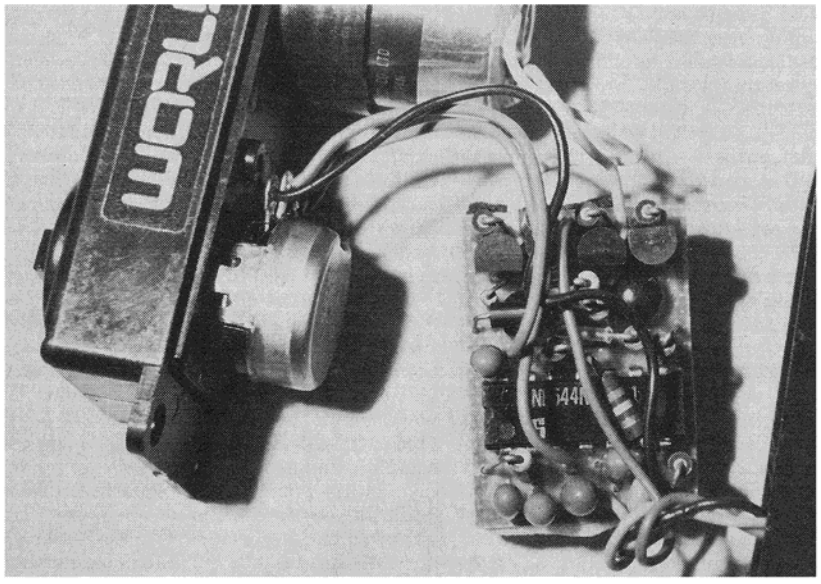


Here is a close-up view of the World Engines S-11B servo gear train, motor, amplifier and feedback pot (**left**). This servo is very easy to maintain. The Clarostat sealed carbon pot can be purchased for $3.00 from World Engines. It can be easily replaced by the modeler should it ever become necessary. These are the black case World Engine servos (**above**). The S-12C precision servo is at right. S-19 and S14 center and left.

World Engine Servos



The S-12C (shown here) and the S-11 servos have their cable exit out the bottom of the case. Bob likes this feature because it doesn't let the cable get in the way of the tray or beam mounting.



In this close-up view of the S-12C amplifier the Signetics NE-544N I.C. with two outboard driver transistors and an additional four transistors in an output bridge circuit can be seen on the PC board.

tom of the case. I have always liked this idea since it permits easy beam or tray mounting of the servo without the need to "gouge" out a clearance slot for the passage of the cable. I wish more manufacturers would use this approach. But please World Engines make me really happy by installing a rubber grommet at the point where the cable exits from the case.

S-11 Servo

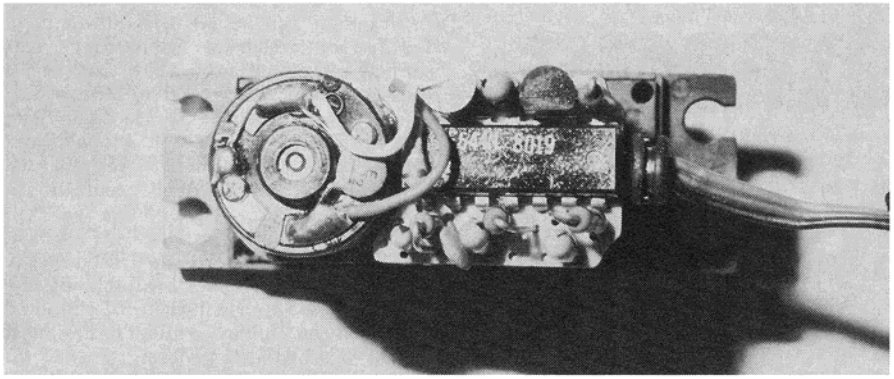
The standard or "mainline" World Engines servo is their S-11 series which has been produced for the last five years or so. It is available is two versions. A standard version which lists for $29.95 and a ball bearing version with a list price of $37.50 (note - these are special new reduced list prices effective December, 1980). Both S-11 servos measure $1\frac{11}{16}$ inches long $\times 1\frac{1}{2}$ inches high $\times \frac{7}{8}$ inch thick (exclusive of the output arm and the mounting flanges). The ball bearing version has an extra lip at the top of the case to house the ball bearing. Weight is 2.0 ounces in either case. I have previously reported on this S-11 servo while reviewing the World Engines Expert radio system (FLYING MODELS, October 1977) and the World Engines "Four" R/C system (FLYING MODELS, November 1978). It is still the same servo although this current version now has the Signetics NE-544N I.C. in the amplifier instead of the EXAR 2262 (which was used at the time). This amplifier does not employ any outboard driver transistors. Motor is the same Mitsumi 20 MM diameter, 8 ohm resistance type, as used in the S-12C servo. My 1978 review of this servo claimed a four ohm resistance motor which I now feel is an error on my part. The same Clarostat feedback pot, as used on the S-16 and S-12C servos, is employed here. Centering is possible by inserting a small jewelers screwdriver down through the center of the output shaft.

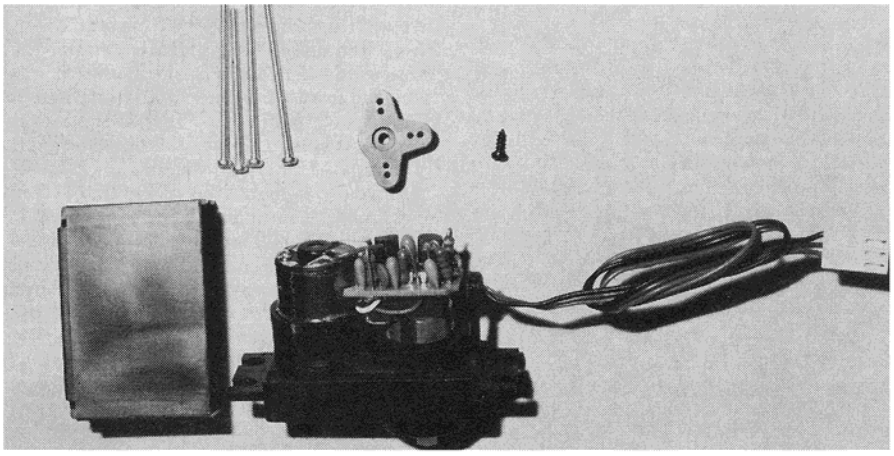
Pulsing one S-11 servo in continuous motion gave an average current reading of 175-200 MA. Idle current is five MA and the stall current is approximately 400 MA. Output torque is claimed to be around 40 in. oz. Again this may be a little on the high side but I will simply take World Engines word for it. Transit time is approximately 0.5 seconds for full 90 degree rotation. My tests showed this servo to have good resolution and centering characteristics. A World Engine/Mitsumi connector is supplied which mates with most World Engines R/C systems.

S-19 Servo

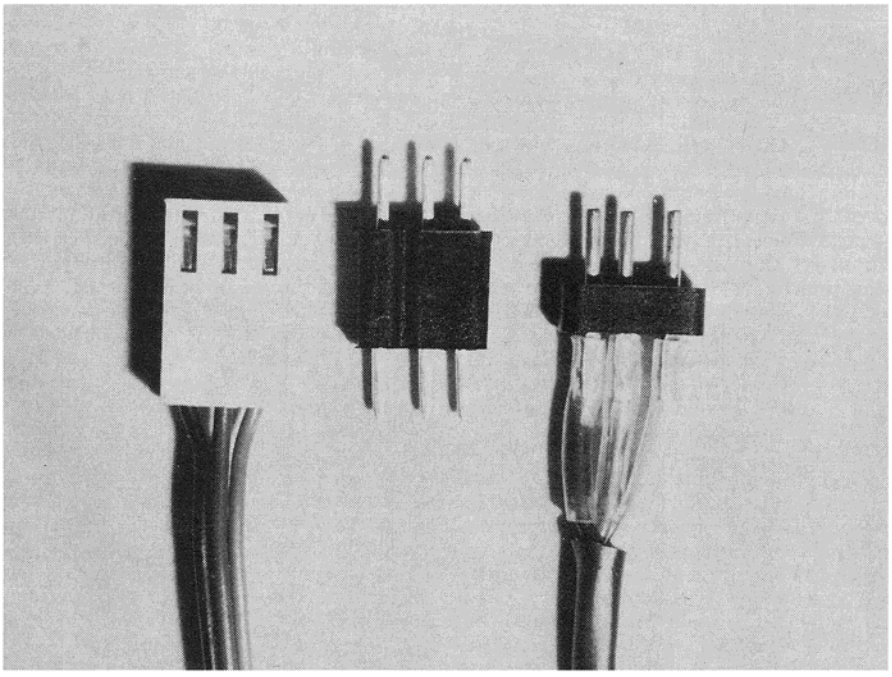
The servos described above are manufactured by World Engines in the U.S. The remaining two servos (S-19 and S-14) are both imported from Japan. Lets first talk briefly about the S-19 servo. It is housed in a black molded (filled) nylon case measuring $1\frac{5}{8}$ inches long $\times$ $1\frac{5}{8}$ inches high $\times$ $\frac{11}{16}$ inch thick (less output arm and mounting flanges). Weight is 1.8 ounces including a flat cable which terminates in a Molex (Sanwa) type connector. Internal layout is exceptionally neat. Motor is a 16 MM in diameter variety with a resistance of 8 ohms (nominal). The amplifier again employs the Signetics NE-544N I.C. chip and in this case includes two outboard driver transistors. Feedback pot is an enclosed carbon element variety (I'm not sure of the source in this case). Servo output is claimed to be 32 inch ounces. Idle current is five MA. Pulsing the servo in continuous motion gives an average current indication of 175-200 MA. Stall current is in the order of 450 MA. Transit time is a rather fast 0.4 seconds for a full 90 degree rotation. Best of all, this servo is presently listing for $22.95 (that's not a mistake!). With a nominal 1.5 M.S. neutral spacing this servo could easily be adapted to other R/C systems simply by substituting the appropriate connector. Resolution and centering, in my testing, appeared to be adequate for normal R/C applications.

S-14 Servo





Here is a close-up view of the S-19 amplifier and motor connections (**top**). Signetics NE-544N I.C. and two outboard driver transistors are used here (no bridge circuit). List price is only $22.95. Inside the S-19 World Engines imported servo is very compact, well thought out packaging (**above**). Note the use of the flat cable and the Molex (Sanwa) type connector. Bob was impressed with the line.



In the center is a typical Deans connector. At the right is the Molex (Sanwa) type. At left is the World Engines/Mitsumi three pin connector. You can easily solder the Mitsumi and Deans type.

Our last servo to be described in this review is the World Engines S-14 sub-compact. This servo again is the product of Japan. It is actually manufactured for World Engines by the O.S. company. The S-14 measures 1½ inches long × 1¼ inches high × 11/16 inch thick (less output arm and the mounting flanges). Weight is 1.2 ounces. This servo again employs the flat type cable (seven inches long), but in this case it is terminated in a World Engines/Mitsumi connector. Mounting flanges at each end of the servo have the *molded* rubber grommets which is common to several Japanese manufacturers. I quite honestly wish that U.S. R/C manufacturers would use this type of servo mounting instead of the more usual individual rubber grommets. Rated output is claimed to be 36 inch ounces. Again I believe this to be a little overstated but I don't wish to get into a debate on servo testing procedures. Surfice to say the little S-14 servo has plenty of available power. Idle current is six MA. Pulsing the servo in continuous motion gives an indicated average current reading of 150 MA. Stall current is approximately 450 MA. Transit time is 0.5 seconds for full 90 degree rotation. The output shaft, by the way, has a spline gear arrangement which will permit easy neutral position adjustments. This is similar to the scheme used by the Sanwa company for many years. Again this servo is adaptable to many R/C systems provided that you hook up the appropriate connector. List price of the S-14 is $22.95. A very good buy considering what you get.

Summary

That pretty much gives you an overview of five different types of currently available World Engines' servos. They do, in fact, have even more servos to offer. I would strongly suggest that you write to Mr. John Gerhardt at World Engines (8960 Rossash Ave., Cincinnati Ohio 45236) and request a complete catalog and list price schedule. I'd like you to also take note of the Mitsumi connector that World Engines employs on most of their servos and R/C systems. Remember, you can solder this connector yourself. They can be purchased separately in mating halves for $3.05. I recommend them for all kinds of general R/C applications.

The "powerhouse" S-16 servo should be given special consideration for application in large R/C model aircraft and for R/C boating (steering function). Another excellent servo for the discriminating pattern flyer is the very precise and smooth S-12C servo. All of these World Engines servos are now being offered at special reduced list prices (effective December 1980).

The various servos described in this review can be adapted to most other R/C systems now available on the market. You can therefore consider buying a World Engines servo as a component for use with your existing R/C equipment. These servos are not limited to use only with World Engines receivers. In the near future I hope to get a chance to review the new World Engines Expert Three radio system. During that review I will give you an update on World Engines servo operations, when considering the entire system. Until then . . .

Flyin' things for fledglings

More news from the gang. **by Earl VanGorder**

Hi gang . . . Well, I know the date on this issue says April - but, would you believe . . . I'm writing it just a short time after the Christmas Holiday? I think you'll agree it's hard to get into a Springtime mood when I look out my window and see five inches of snow on the ground. We always have a lot of good things to talk about regardless of the time of year. And, this month is no exception. I've got a lot to talk over with you, a few good photos to pass on, as well as one of those special unadvertised deals that I'm always looking for.

Let's start by taking a look in the old mail bag and see what we have and who we've heard from .....

Well, we got a couple of letters from different members of the gang, thanking us for continuing to locate those rare, unadvertised items. Thanks, fellas, I appreciate that - cause it gets tougher and tougher to keep finding these rare items for you. Glad you appreciate it. Got a letter from Tom Singleton in Kings Mountain, Kentucky, who had a question. . . . Yeah, he wanted me to tell him how a CO_2 motor works. Wow! I could write a book on that one. Well, I answered his letter and gave him the dope to the best of my ability. Hope it was of some help, Tom.

Another letter from Don Wilson, of St. Augustine, Florida, is very complimentary of our efforts. Don said he's been a modeler for some time but has been away from the hobby for about 35 years. He likes our column and is getting back into it. Great stuff, Don - I know all the gang is happy to have you join us. It's really neat when we get that terrific mix of new modelers and old timers coming back. That's what it's all about.

Oh, by the way, maybe some of you remember that a couple of months ago I told you about that great U-control project that the National Correctional Recreation Association is getting into. Remember, I said we might get our editor to do a feature on it? Well, good news, gang, he likes the idea and we'll have full coverage with drawings in an upcoming issue of FLYING MODELS, I'm told.

We also got a nice letter from Bill Mathews, who is the Vice President of District V of the AMA. Bill sent a photo that I want to pass on to you of Cliff Upshaw, Birmingham, Alabama. Cliff's quite a guy. He only got interested in models about a year ago and has already won a few trophies at contests. That's really terrific. Most of his wins have been with the Square Eagle P-30 from Blue Ridge Models. You probably remember that I told you about those great kits from Blue Ridge. . . . No? Well, c'mon, drop a self-addressed stamped envelope to Phil Hartman at Blue Ridge Models, P.O. Box 429, Skyland, NC 28776. He'll send you a complete catalog of what's available. By the way, the photo I'm showing you of Cliff shows him with a hand-launched glider he designed himself. Not bad for a fledgling.

I received another picture I've got to pass on to you . . . mainly because we've all gone through this problem at one time or another. Frank Renaut of Pikesville, MD, sent me the photo of his semi-scale Rearwin *after* it was retrieved from a tree by a "would-be" helpful child. Wow! Would you ever believe that Frank was able to repair that mess and get it flying again? No? Well, he did. . . . Honest.

Oh yeah, a short time back, I told you about those great indoor beginners kits that Lew Gitlow is putting out at Indoor Model Supply. Well, now I have a photo to show you. It's a good photo, too, because it also shows that neat little propeller jig that lets you make a perfect indoor prop every time. Did you get Lew's catalog like I suggested? C'mon, now, gang. Get on the ball . . . send two 15¢ stamps to Indoor Model Supply, Box C Garberville, CA 95440. Indoor is fun, and Lew makes it easy for the beginner.

Now, before we go any farther . . . I promised, in the last issue, that I'd give you Bill Baker's formula for making one of those old time Jim Walker Ceiling Walkers.

Well, I didn't forget. . . . Bill sent a photo, which I'm showing to you and it pretty much explains the whole deal. Bill says there's just one or two points that are important. . . . The top prop should *not* be glued to the motor stick. Using a flexible joint (rubber band) prevents damage. Make your props using the same method that Lou Roberts gave you in a previous column. Bill says you should remember that the prop should have no down or side thrust. That means that the commercial plastic thrust bearings won't work. Bill uses a piece of $^1/_{16}$" tubing (either aluminum or brass will do). Bind it on to the stick with thread and smear it with glue. Bill says that the hardest thing is making one left hand and one right hand prop. Then, he says, that the next hardest thing is figuring out how to wind the little devil!

It shouldn't give any trouble if you build like the photo, but if it doesn't climb well - just add more power (more rubber) . . . and, don't worry about the helical climb . . . that's because the model is slightly asymetrical due to the offset of the thrust bearing. Take a look at the photo gang . . . these are real easy to build and fly like demons.

Now, I want to tell you about a few new items that are available. Two of them come from Bob Peck at Peck Polymers, P.O. Box 2498, La Mesa, CA 92041. First, there's Bob newest kit . . . The Lacey M-10 in peanut scale. This is really great for you newer modelers who like scale aircraft. With this one, you can get a good scale model and still

have comparatively simple construction. What's more, it really flies great and, if built carefully, could well be a real contest winner. It is designed by Butch Hadland of England and won the English peanut scale championship. You can get it at your local hobby shop or direct from Peck Polymers for $4.95 . . . and, believe me, it's a good buy. Bob Peck has also come up with another great item that we all use . . . a winder for rubber models. So - you say, what's new about a winder? Well, I'll tell you. This is a great, durable, five to one winder that's plenty rugged. Okay, so that's not a big deal . . . but, the price is. Only $3.95 for this one, and that makes it one of the best winder buys on the market today. If you've always wanted a winder but never felt you could afford one - well, this is it. Here's your chance to get those extra turns that win contests . . . and, at a price that won't break you.

Now, I've got something else to tell you about. I'll bet none of you have ever heard of this deal. I was so happy when I heard about it that I couldn't wait to pass it on to you. Here's the deal: a very enterprising guy has taken some of the greatest model airplane plans of all time and reduced them to peanut scale. His printing job is nothing short of superb. And, as for the plans he offers - all I can say is. . . . Wow!!! There are currently five plans available and here's what is being offered: the Curtiss XP-55 Ascender, designed by Earl Stahl (one of the all-time greats). This is a pusher canard fighter from late World War II. Then, there's a Howard DGA-9 reduced from a 25" span kit plan. This is a gorgeous high wing monoplane of the mid-thirties. And, there's the Keane Ace, a nice model of a homebuilt. The plans were originally published in the old FLYING ACES magazine in June 1937. Did you know that FLYING MODELS used to be FLYING ACES? There's a plan for the Aeronca Low Wing, from the Peerless Model Airplane Co.'s kit manufactured in 1937. And, if you think that's an antique, how about these? The Douglas YO-43 Army Observation from a Scientific kit produced in 1934 and a Bellanca Aircruiser designed and drawn by Paul Lindberg and published in POPULAR AVIATION in May 1934. These were all larger models originally, but have been carefully reduced to peanut scale for all you peanut scale nuts . . . and, these could be real contest winners! Here's the best part of the whole thing. You get *all* six of these plans for five bucks. That's right - less than a buck a plan . . . and no additional charge for postage and handling. How about that for a deal. Heck, if you don't even want to build the models, you can grab a real hunk of modeling history for yourself at a bargain basement price. I'll tell you, it's a whole lot of fun just relaxing in your favorite chair and looking over these great drawings from modeling's earlier years. Personally, I've enjoyed looking over all the plans in my package, but I'm pretty sure I'm gonna build the Bellanca Aircruiser from 1934. . . . What a beauty.

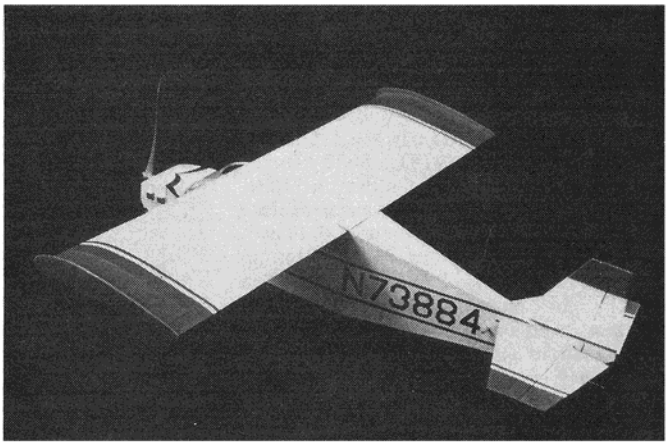
Oh yeah, I almost forgot . . . you want to know how to get these little gems. Well, it's really easy. Just put a fiver into an envelope and send it to the following address telling him that you want the six peanut plans: Edward Baltera, 133 Davis Ave., Absecon, New Jersey, 08201. You won't want to miss this deal.

Well, gang, it looks like it's that time again. Time to adjourn this session and close the old hangar doors until next month. It's been great getting together with all of you again and I look forward to seeing you all again next month. I'll try to come up with more goodies and maybe some building hints. Until then, don't forget to send any good photos of your models to your old modeling buddy here at 10 Brothers Rd. in Wappingers Falls, NY 12590. So long for now and Happy Modeling.

PHOTO: BOB PECK

Peck-Polymers is now offering a 5 to 1 winder for rubber models (**above**). This is one of the great indoor models from Indoor Model Supply (**below**). Note the special prop building jig that is included with the kit.

PHOTO: BOB PECK



The latest in a long line of peanut scale models from Peck-Polymers is this Lacey M-10 (**above**). This model features 47 square inches of wing area. Cliff Upshaw holds his own design hand-launched glider (**below**).

PHOTO: LEA GITLOA

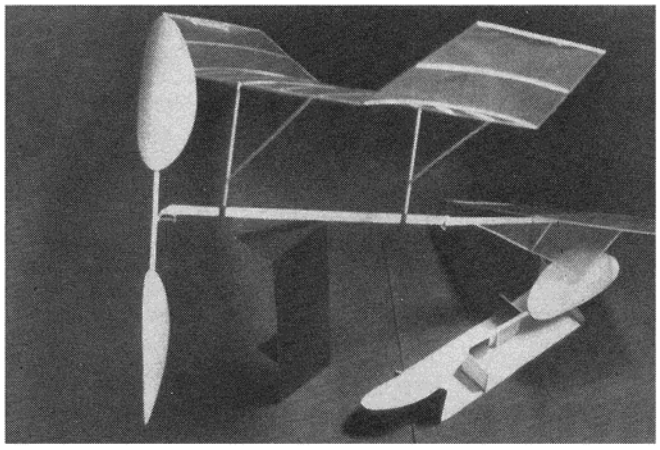


PHOTO: BILL MATHEWS

Vantec's Maximixer

by Ron Farkas

Mixing control functions on a model airplane is made easy with this electronic unit.

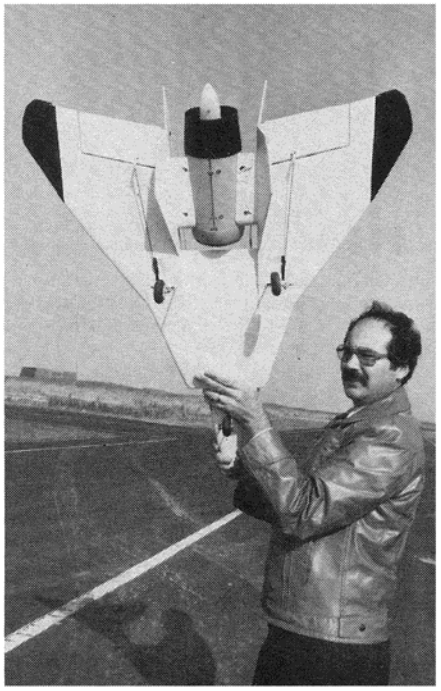
The VANTEC Maximixer (designated MXB) is an electronic control mixer for V-tail or elevon equipped aircraft. It also has an application in twin-screw boats in which varying the left and right engine speeds aid in steering. The MXB is a separate unit that is adaptable to the airborne pack of most existing R/C systems. It plugs into both turn (or bank) and pitch control receiver outputs and mixes the functions of two individual servos, each connected to a left or right control surface. Since this eliminates mechanical linkage mixers and sliding servo trays there is a minimum of friction or looseness in the system. I believe that the MXB Maximixer is the only device of this kind that is currently available. It is manufactured by VANTEC, 8832 Shirley Ave. Suite 4, Northridge, California 91324.

Before going any further, I want to explain what I mean by mixing (as opposed to coupling) of functions. Mixing is the combining of *two* separate control functions in such a way that one command moves both servos in the same direction while the other command moves them in opposite directions. Typically the elevator command causes both left and right control surfaces to move up and down together while the aileron command causes one side to go up as the other side goes down. It follows that any proportional combination of the two control inputs produces a *mix* of servo outputs, some together movement and some opposite movement at the same time. On the other, coupling is the use of a *single* control input which causes two servos to move simultaneously. Coupling is generally used for flap-elevator or rudder-aileron coordination. My description of mixing is more easily understood when you realize that, in a V-tail or elevon configuration, one set of flight control surfaces must do the job that takes two sets of surfaces to do in a conventional aircraft.

Before electronic mixing became practical there were several ways of installing mechanical linkages or sliding servo trays to get the job done. For the most part these were light duty applications but the cost was low. The inherent disadvantage was the potential for looseness or binding. When power and smoothness were critical there was just no substitute for a direct pushrod connection between the servo and its control surface. With electronic mixing the left and right side surface can each be controlled by its own servo. The Vantec MXB Maximixer provided this capability when it was connected between the receiver and the servos. (See block diagram.)

Without going into the electronics I will describe the Vantec MXB Maximixer, how it is installed, and how well it performs. The test aircraft for this review is my ducted fan, delta wing Tommycat (FM March 1980). During its development this aircraft was originally flown with a mechanical mixer and then converted to electronic mixing using a Christy Mixer in the airborne pack. This unit is no longer available commercially. The Tommycat is now being flown with the Vantec unit.

PHOTOGRAPHY: RON FARKAS



The underside of the author's Tommycat (FLYING MODELS, March 1980) clearly shows that individual pushrods go to separate servos in each wing. This arrangement provided best control.

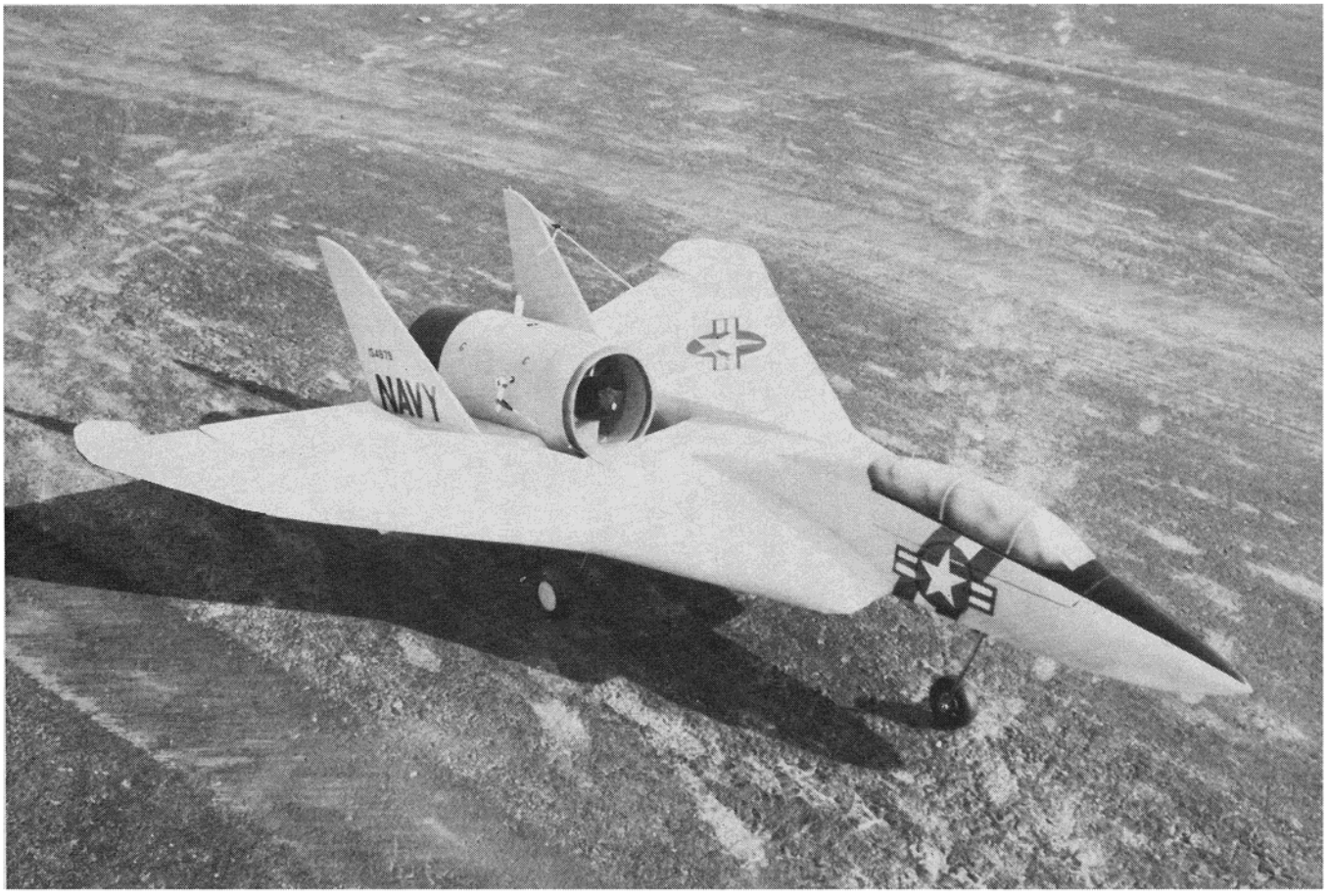
The Maximixer costs $28.95 and must be ordered directly from Vantec. This price includes connectors for the radio system that you specify when ordering. The unit arrives completely assembled and ready to use. All components are on one side of a printed circuit board 1⅝" by 2¼" in size. Four 5" long 3-wire leads are soldered to the foil side. Two have male connectors that plug into the receiver aileron (or rudder) and elevator channels. The other two leads have female connectors for the left and right servos. The unit does not come in a case. The weight is 1¼ ounce. Current drain is claimed to be only 3½ milliamps above what your system draws. A simple set of instructions is included for installation and adjustment.

After plugging in the unit the only adjustments are for setting servo neutral. There are two trim pots on the Maximixer that are to be set initially and should not need any further adjustment. One pot is for master centering and the other is for synchronizing the two servos. The pots and servo connectors are color coded with a dab of paint to make the job almost foolproof. In fact, the unit works perfectly on the bench within minutes after opening the box.

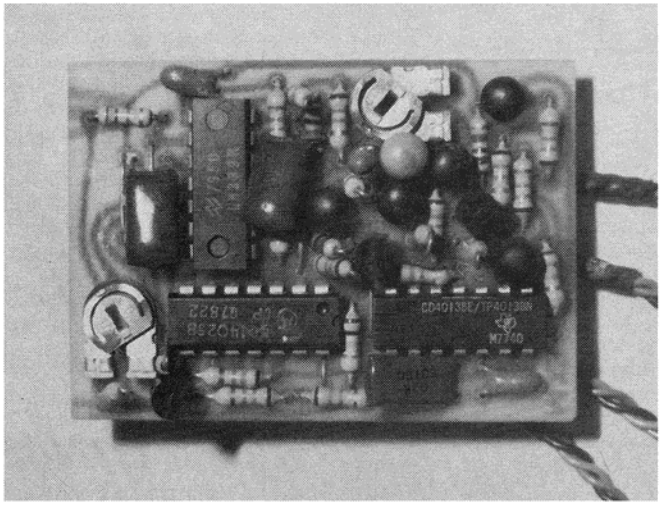
One thing you will notice right away is that either a full elevator or full aileron command by itself produces half of the normal full servo travel. However the combination of both full elevator and full aileron will hold one servo at neutral and drive the other to its normal full travel. (Actually the MXB provides a bit of additional gain so that your servo will go a little past its usual endpoint.) This is the way electronic mixing works and insures that the sum of both full commands will not drive the servo past its mechanical limit. As stated before, any combination of proportional inputs will move both servos to their respective intermediate positions to give the control that you desire. The actual amount of surface deflection that you obtain is determined by the length of servo arms and control horns that you choose.

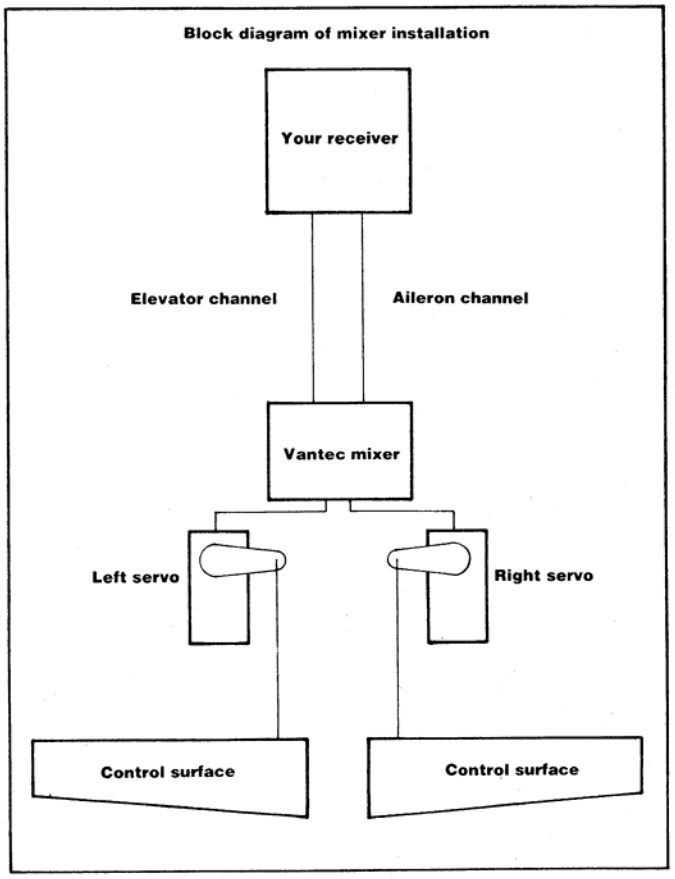
The ratio of pitch control to bank control is 50:50 and is not adjustable. This means that you must live with an equal amount of elevator and aileron throw. If this is not acceptable then a transmitter with dual rate capability would be a big help. This is about the only disadvantage of the MXB. For example, my Tommycat is much more sensitive in roll than in pitch so it would be advantageous to be able to reduce the amount of aileron throw with respect to elevator. As it turns out, the Tommycat flew quite well with the 50:50 ratio since I am already accustomed to its behavior. As of this writing, I have flown with the Maximixer for about a dozen flights and have had no problems whatsoever.

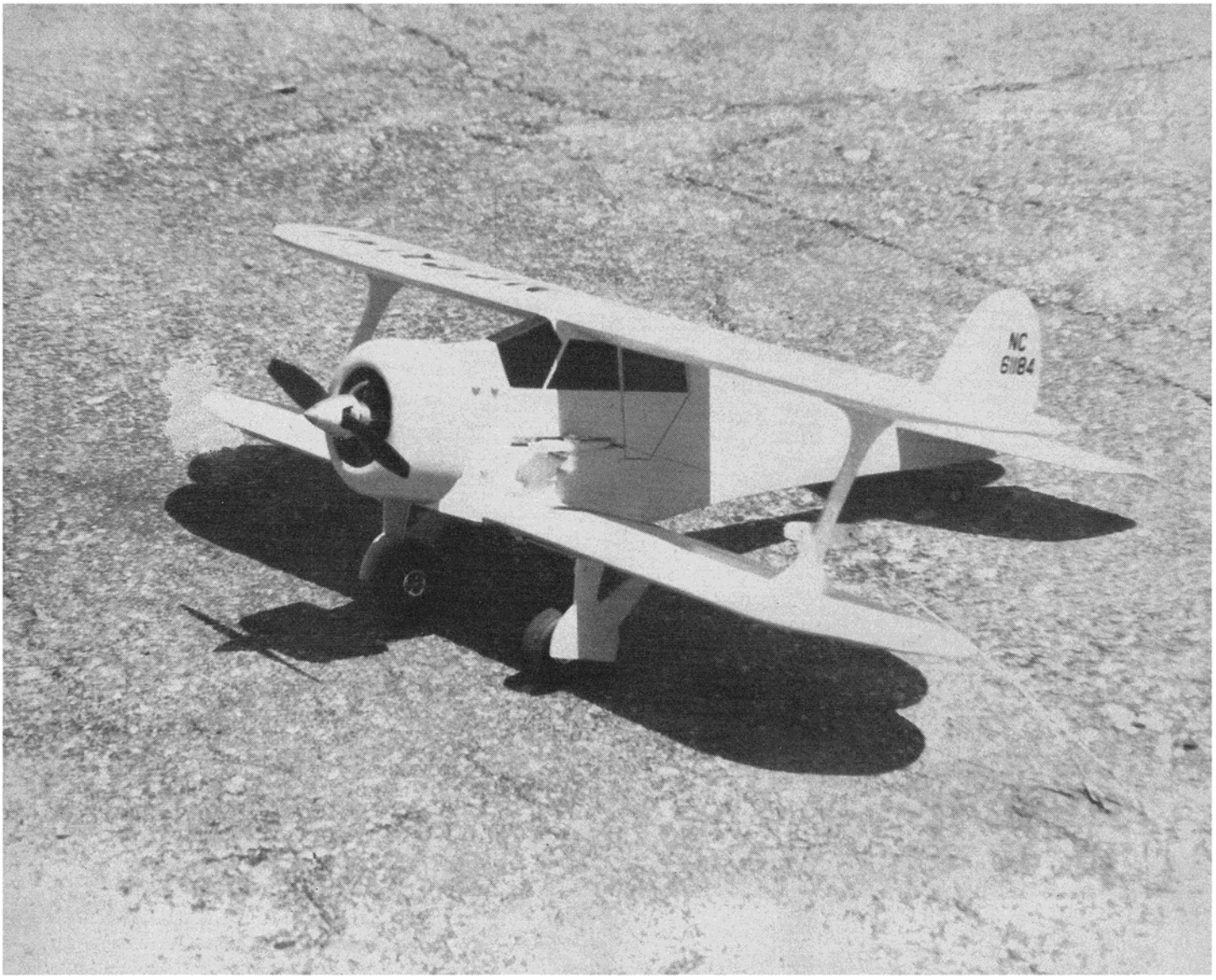
Any modeler who has a need for this kind of control mixing should consider the Vantec MXB Maximixer. The price seems right and it works exactly as advertised. Some of the exotic transmitters can be obtained with built-in mixing circuits but they are very expensive. Adding the mixer to the airborne pack is still the most economical way to go and is simple with the Vantec unit.



Delta winged aircraft, like the Tommycat, normally require elevon control (**above**). The Vantec mixer is mounted in the fuselage along with the receiver. This is the component side of the Vantec mixer (**below**). The two potientiometers are for adjusting servo neutral. The unit comes assembled with your choice of connectors installed. Spacing is generous.







PHOTOGRAPHY: DOC MATHEWS

A C/L Beechcraft Staggerwing

by Doc Mathews

This 1930's biplane became a classic. Now you can build your own profile replica.

For many years Sig's "Beechcraft Bipe" has been my favorite ½A U.C. kit. Often I've thought what a delightful model it would make in 15-19 cubic inch size but several engineering problems always cropped up. I even went as far as to draw the outlines on brown paper several years ago before the seemingly insurmountable cowl, landing gear, bell crank mount, and cabane problems turned me off again.

Not long ago while installing the nose gear in an R/C model, inspiration struck. Why not cut a nylon nose gear bracket in half and mount it on one side of a profile fuselage as a bell crank mount? Certainly the bracket would be much stronger and distortion free than the aluminum brackets I'd seen used. A quick trip to the jig saw and a dive into the U.C. hardware box produced a promising gadget. Now what to try it on?

The "Staggerwing" drawings were dusted off and redrawn to fit a Sig "Relic" plastic cowl. (A catalog item). Tatone's new metal cowl would fit. I'd use double ribs to hold cabanes on an R/C bipe successfully. So this technique was drawn in using 1/8 lite plywood for quick fabrication.

Three problems were solved leaving only the landing gear. Why not epoxy a spruce strip into the bottom wing as a mount and hold the wire to it with nylon brackets? Then, I made a torque bar by running the inside leg through the wing and onto the fuselage held with brackets—just like a R/C low wing.

I detail this thought process to illustrate how feeble minds stagger around seeking simple solutions to simple problems. Were I half bright, these answers would have occurred to me many years ago. Necessity may well be the mother of invention but *only* when a mind is out of the *hold* position. I make no claims that this model contains brilliant and inspiring innovations, only that it does show some pragmatic solutions to vexing problems.

Inspired or pragmatic, let's start building. The model is undeniably attractive, flyable, and out of the profile rut.

As the fuselage is the key to the construction it should be built first. Besides, if you have a fuselage you'll feel more inclined to build two wings. The outline is traced using carbon paper under the plan and over the 3/8" balsa, the same method is used with the 3/32"

ply doublers. A jig or copeing saw is used to cut out the pieces. The motor cut out shown is for a S.T. G-15, check for your particular motor. Maple motor bearers and ply doublers are epoxied together using weights or clamps to hold them in position.

The bearers are drilled 9/64" for 4x40 bolts and T-nuts. The sides are marked and drilled for the long Goldberg J-Bolts that hold the Fox 1½" medium profile tank, and the preassembled, nose gear, block-control horn assembly. Remove, sand, and finish after installing tail wheel.

The stabilizer, elevator, and rudder are all cut from 3/16" balsa. The elevator halves are joined with a 3/16" spruce or dowel stub, and the small Klett hinges are temporarily installed using a hinge slotting tool. Disassemble and block-sand these to a pleasing contour. Then apply finish.

The wing ribs are stack cut using a master pattern developed by tracing, spraymenting, cutting, and peeling off. The W-3, W-2, and W-2 bis ribs are identical except for the notches. Notch the leading and trailing edge stock as shown using three hack saw blades or whatever.

Pin the trailing edge to the plans, block up the leading edge using ribs as a guide, then glue ribs to the leading and trailing edges. Shim the center section ribs 3/32" at the trailing edge. When cured, remove the panels, add pre-cut tips (developed with carbon paper tracing), epoxy ¾"x3/16" spruce glider stock and doublers into notches, plank center sections, sand leading edges to contour, smooth and contour tips, and cover with silk, polyester or iron ons.

Cut the covering out of slots to clear cabanes and wheel doors and trial fit wings to fuselage. Mark and cut away the covering at the wing fuselage joint and epoxy. Use a flat surface and a ruler to adjust cabanes for wing parallelism in the front view and the top view. Pin and tape to hold the fuselage while the epoxy cures. Repeat with the stabilizer in the slot and the rudder pinned to the fuselage top. Check with right angle triangle.

Bend the landing gear wire to the pattern. Drill up through spruce, doubler, wing planking, and as close to the fuselage side as possible. Push the wire up through the hole. Hold to the spruce with two nylon brackets and screws as well as one bracket on either side of the fuselage.

Install leadout bracket, control horn and bell crank-push rod. Adjust for neutral then solder the push rod halves. Epoxy prefinished wheel well doors into the slots, position wheels with the 3/32" wheel collars.

Install the engine and tank. Check C.G. adding lead as needed to obtain level fore and aft with fingers placed under upper wing at point drawn. Position pre-finished cowl and drill through it for the number 2 sheet metal screws into fuselage top and bottom.

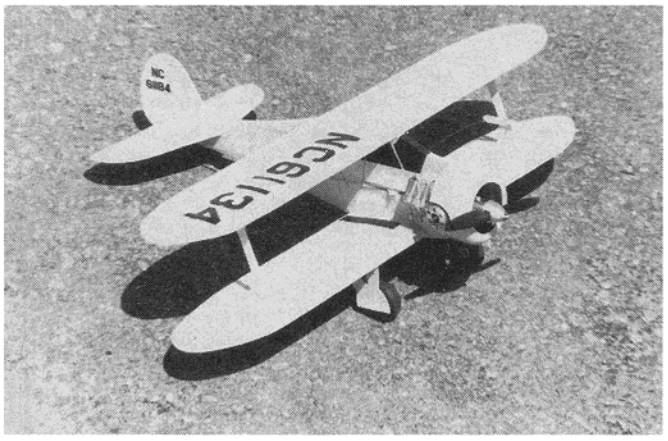
You will note I suggest pre-finished pieces prior to final assembly. This is a much simpler route than waiting until the whole thing is in one chunk. I used polyester sheeting on the wings; filled with three coats of *nitrate* clear dope then sprayed with Perfect urethane paint. The wood parts were sanded down to number 380 then given two coats of K&B primer, sanded down to barewood between coats. The wood parts also have two coats of Perfect Paint.

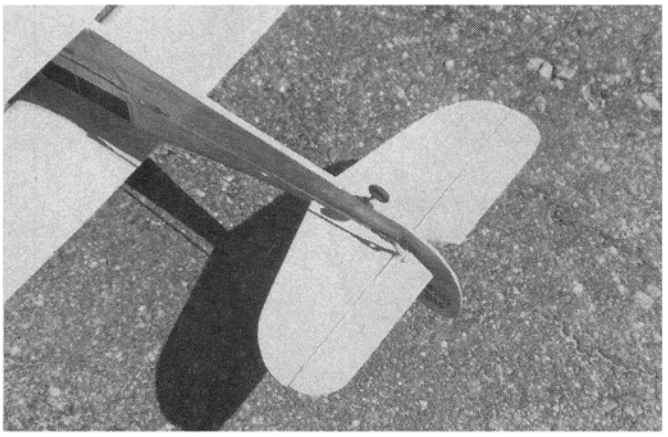
For fun, I outlined the stringers and panels, after sanding the K&B primer using J.Z. (Ziner Props) .020 Paneling tape (stock number 1513). It stuck well and held the paint with no problem. Use of a straight edge as a guide is useful as the tape is so thin a straight line is difficult to free hand. Aileron and door outlines are done with J.Z.'s black tape.

Pre-run the engine before leaving for the flight circle, it's much less frustrating. I found it possible to adjust the needle valve by reaching into the cowl. Your particular power plant might need an extension or a long screw driver pressing into a slot in the needle valve. With a S.T. .19 and an 8-6 Rev Up my Staggerwing does *not* stagger, as a matter of fact the thing moves out like a Goodyear racer. Landings are fast but clean. Don't linger after the motor cuts, this is *not* a Jr. Ringmaster.

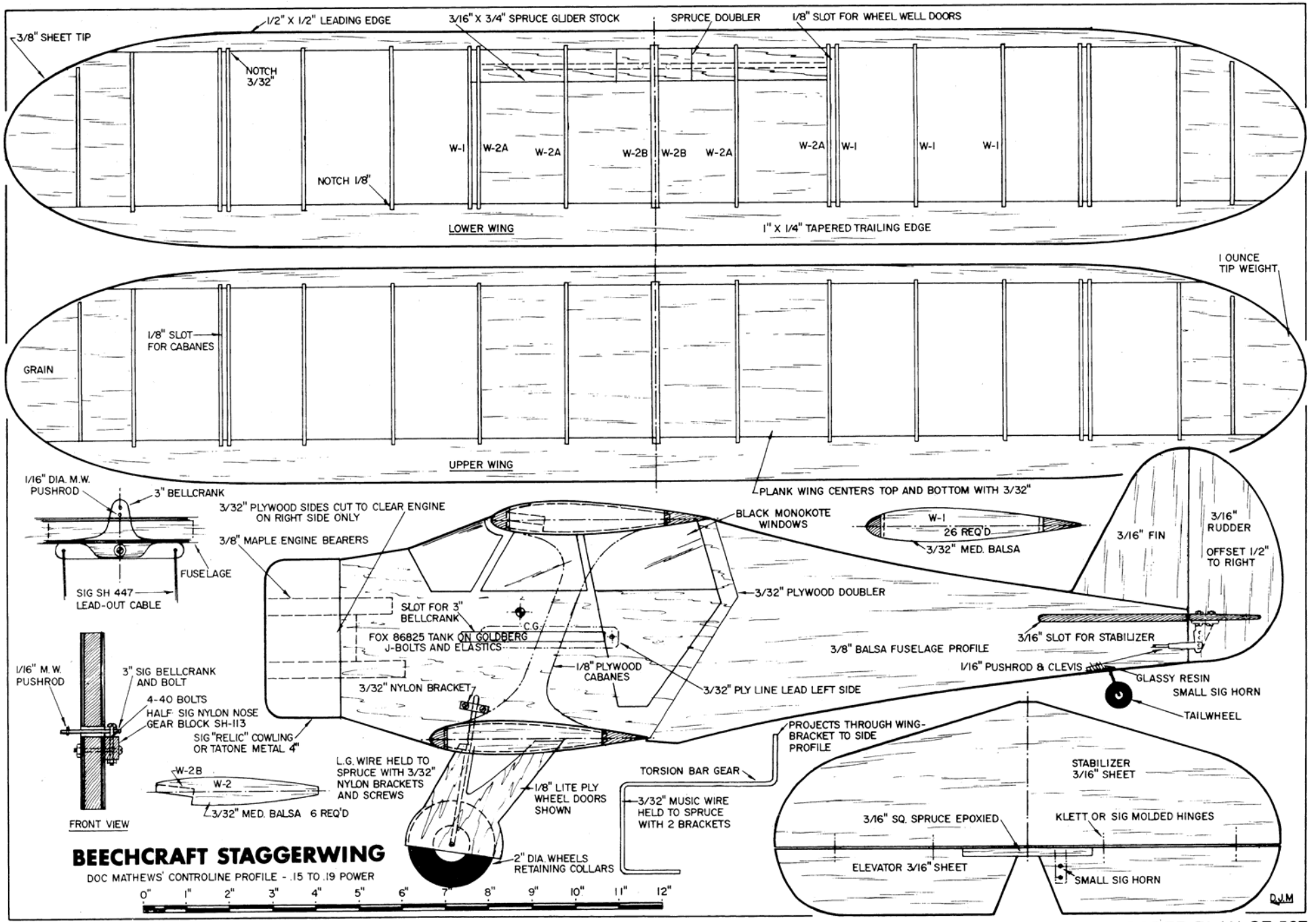
This Beechcraft Staggerwing builds into a highly attractive profile sport-scale model. Build yours carefully, fly it lovingly and you'll be rewarded with many hours of great fun.

P.S.—Wouldn't a profile sport scale contest attract a lot of entrants who normally wouldn't compete in U.C. scale? Wish some club would try it.





The Beechcraft Staggerwing has been modeled often. Its pleasing lines and generous areas make for a good flying model. In the photo **above** the mounting of the bellcrank, tank and engine can be seen. Note the use of a ring cowl on a profile model for a scale-like look to the front end. The landing gear is mounted into torsion blocks that are installed in the wing (**above right**). An adjustable link is used on the elevator control horn (**right**). The details add much to the effect of the finished plane.



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A CO_2 Replica Scrappy

by Al Lidberg

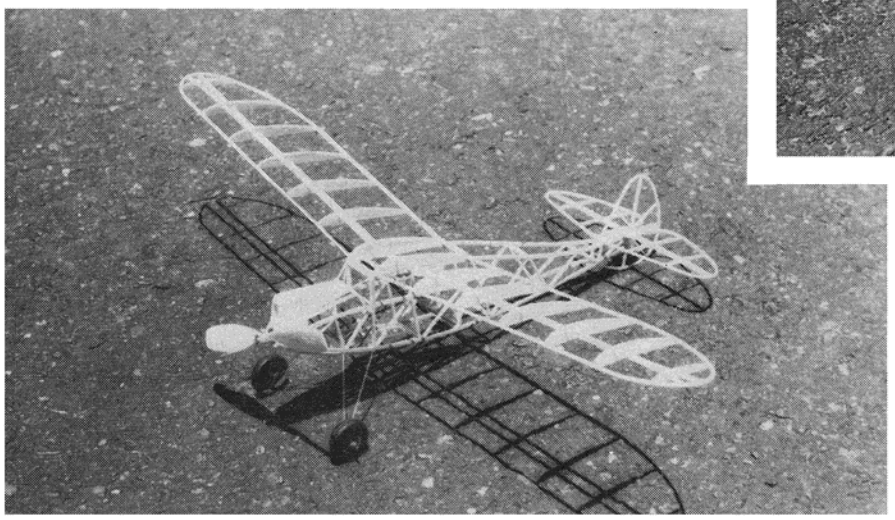
Ray Heit's 1939 FLYING ACES original is the subject of this fine flying CO_2 replica.

Scrappy was published in the May, 1939 issue of FLYING ACES and again during FLYING MODEL's 50th Anniversary year in the January, 1978 issue. It was described as a "nifty five foot ship" and as "a gas buggy that's really a honey". Scrappy was a very realistic looking model due to the "V" dihedral and the cowling, which looked quite like one from an antique plane with an in-line engine.

I enjoy the Old Timer designs and this one really caught my eye. I can't afford the space in my workshop (or the costs, either) for all of the neat models that I would like to build. So that problem led to the idea of CO_2 powered replicas of favorite models. Scrappy was the third model in this CO_2 replica series, with the first being Sal Taibi's Powerhouse (in M A N, Sep. '78), and the second Leon Shulman's Super Skyrocket "B" (in FLYING MODELS Jan. '80). If you haven't tried CO_2 yet, it's a form of power that lends itself to a more relaxed form of fun flying with no fuel/oil mess, little noise, and instant starting. My models have used the Telco and Shark motors; other motors of the same size would work about as well. With only a little bit of special care the weight of Scrappy can be kept down to about 35 grams (28 grams = 1 ounce) or less, ready to fly with motor and prop. At that weight you can expect some very respectable flights. Building a bit heavier, you can fly safely in a ball park without gaining too much altitude.

You should find Scrappy to be fairly easy to build because it is quite like a classic "stick" model. Material sizes are selected to ensure a light yet durable model. You might note that the body sticks appear a little on the large or heavy side. The body of any model gets a lot of handling and it is felt that $^3/_{32}$ inch square stays together best. However, there are at least a few grams that could be saved here, so if you'd like to use $^1/_{16}$ inch square go ahead and try it. We'll come back to the body later.

The wing tips, stabilizer and rudder outlines are all laminated from thin bass wood strips to produce light, but extremely strong pieces. I'd suggest making the templates first and forming all of the pieces ahead of time. Use poster board at least $^1/_{16}$" thick for the templates and make them to the shape of the inside edge of each piece. After the templates are cut out, use a sanding block to smooth the edges and get rid of bumps. Rub the edges with an old candle so the glue won't stick. Each curved piece is made from three layers



Love that cowling (**above**). It looks like it could house a Menasco racing engine or at least one from a model A Ford. In the two photos, **top** and **above left**, the author is seen launching the Scrappy. The bare bones show the rugged but light construction (**left**). CO_2 is becoming very popular.

of .020" x 1/16" basswood from the hobby shop's model railroad counter. Basswood is really the best choice here but if you can't find any, three layers of 1/32" x 1/16" balsa could be substituted. Each piece should be dampened with water for a few minutes. Then, very thin Titebond glue (half glue, half water mix) is applied to the mating edges. Attach the strip stack to the template with tape and form the stack around the shape using tape where ever needed. If possible, let the glue dry for 24 hours before removing the piece from the template, but if you're in a hurry, the glue can be dried quicker with the heat from an ordinary lamp. When this set is dry, make up another wing tip and stab half outline.

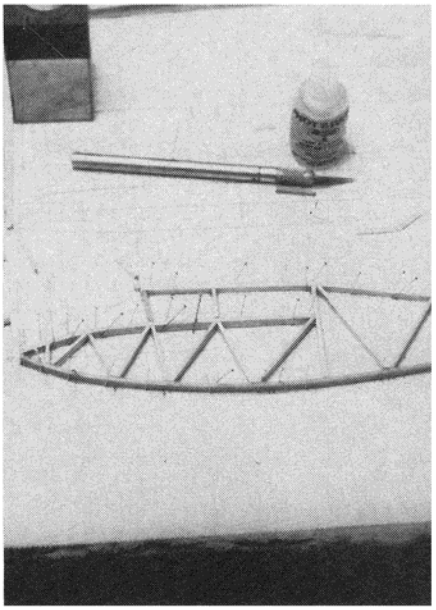
Cover the plan with waxed paper or plastic wrap and start the actual wing construction by pinning down the trailing edge (TE). Join the wing tip pieces to the TE with long splices. Hot Stuff Super "T" is used in the construction of my model. The leading edge (LE) is a square piece set up on one corner and blocked up from the work table to align with the rib notches. Block up the front of the tip pieces to match and join them to the LE with long splices. Make up a cardboard or plywood rib template and cut out all the ribs without any notches. As the wing is assembled, the tip ribs will be sanded to shape from full sized ribs. Stack up all the ribs and pin them together so they can be sanded to the same size and shape. Spar notches and the LE notch can now be cut using a file or hack saw blade applied to the stacked ribs. Fit the ribs in place, trimming at the TE if necessary, and glue them. When dry, cut the wing apart at the center section breaks; sand in the appropriate joining angles and block up the tips and glue the wing panels to the center section. When dry, remove from the board and shape the tip ribs, deepening the upper spar notches as needed to allow curving of the spar down to the tip. The upper and lower spars can now be added, making sure the wing is not allowed to warp while they are put in. Sand the TE to shape and round off the LE and tips.

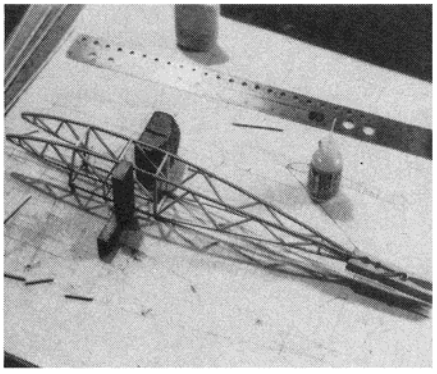
Start the stab by pinning down the spar. Shim up the laminated outline all around with scraps of 1/32" sheet. Join the outline halves with a piece of 1/16 inch square at the front. Add the ribs and some gussets which will prevent warps later on. After drying, remove from the board for shaping. The stab should have a symmetrical airfoil, although in this size it will look more like a flat plate than a recognizable airfoil. The rudder is a bit easier because the outline is just pinned to the board and all parts are 1/16" thick.

Begin the body by building one side on the plan. When this is dry, leave it in place and make the second side right on top of it. This ensures that the two sides will be almost exactly alike, and simplifies getting the body squared up during assembly. When the second side is dry, remove from the board and use a sanding block to smooth up both sides. Carefully split the sides apart and sand the bumps from the split apart surfaces. Pin the sides over the top view upside down and begin joining them at the widest part. Use some triangles to help keep the sides vertical. Join the tail posts together and fill in the remaining cross members. The firewall (I guess "motormount" would be a better term, but gas model habits are hard to break!) should now be cut out from 1/16" plywood and glued in place. Bend the landing gear (LG) parts from 1/32" wire. Glue the main LG wire in place and adjust the bends of the rear brace so they will join up properly with the main LG. This joint can be wrapped with fine copper wire and soldered, or wrapped with thread and glued with Hot Stuff (regular Hot Stuff - the Super "T" variety doesn't soak into the thread very well). Reenforce the LG joints to the body with some epoxy and while you're there put some epoxy on the firewall joints. Small glue or epoxy fillets where the LG wires leave the body will support the covering tissue later on. The front end of Scrappy now begins to take shape with the addition of formers and stringers. Add the bottom ones first, followed by a scrap of 1/4" sheet for the fill in block below the motor.

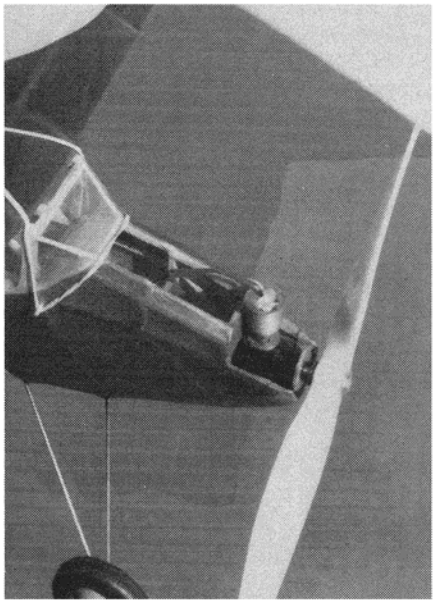
Now would be a good time to mount the motor with small wood screws so you'll be able to shape the cowl parts correctly. Just feed the tank and lines back into the body through the opening behind the firewall. You'll be able to move the motor/tank from this model to another with out major surgery, if desired. Put some tape on the motor's exhaust ports to keep out sanding dust, and add the cowl front piece. Small scraps of 1/4" sheet are needed between the cowl front and the firewall along each side. Glue these to the cowl front piece only, to make it easier to remove the cowl later on. Now add the windshield base former and the two partial formers. Cut two stringers which form the borders of the body opening and glue them in place. Add the 2-1/16 inch square side stringers and a couple of bamboo or very hard balsa windshield braces. Cut out the cowl sides and top and glue them together. The resulting "U" shaped piece is glued only to the cowl front. Sand the body and cowl and carefully cut the cowl where shown to separate it from the body. Remove the motor for now.

Covering Scrappy is fairly easy, although the underchambered wing might cause you some problems if you haven't done one before. The major point to remember is that the tissue must be adhered to all rib and spar edges on the bottom. The best way I know of to make this happen is to put a couple of coats of thick dope on all those edges first and let it dry thoroughly. The dope will raise some of the wood grain so smooth things off again with fine sandpaper. Those primer coats of dope will allow you to put on another coat and have it remain tacky long enough to allow covering a whole panel, from the center section to the tip. Then, with a very small brush, put a thin line of dope on the tissue over each rib and spar, rubbing it in as you go along. The top of the wing can be covered without wrinkles and puckers by using separate pieces of tissue for each of the three outer rib bays at each tip. The body needs quite a few separate pieces around the front end, but with a little care and a wet finger to help persuade the tissue to fit compound curves, you should be able to cover the whole cowl, too. The side window shape, usually accomplished on models with sheet balsa filler pieces, can be nicely done with tissue. Cover the whole window opening with thin plastic sheet. Carefully cut out the window

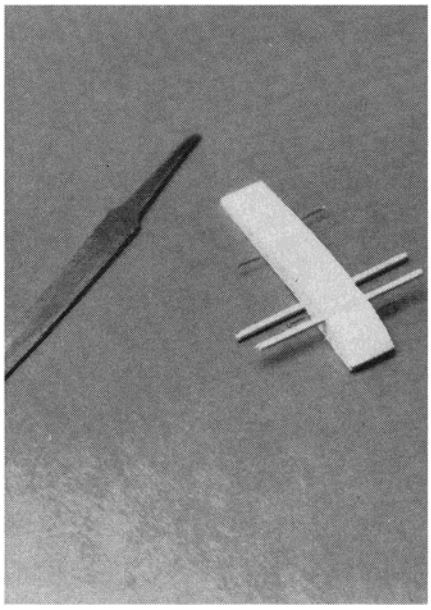


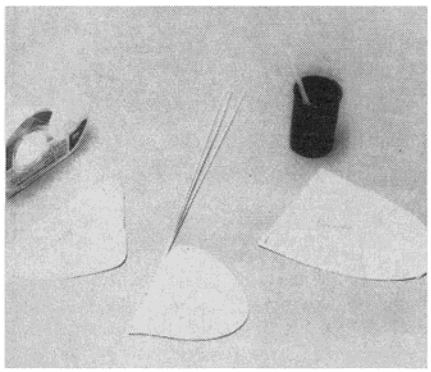


The body construction is very conventional for a model of this type. Make the second fuse side over the first (**top**). Use triangles to keep the sides parallel and square (**above**).

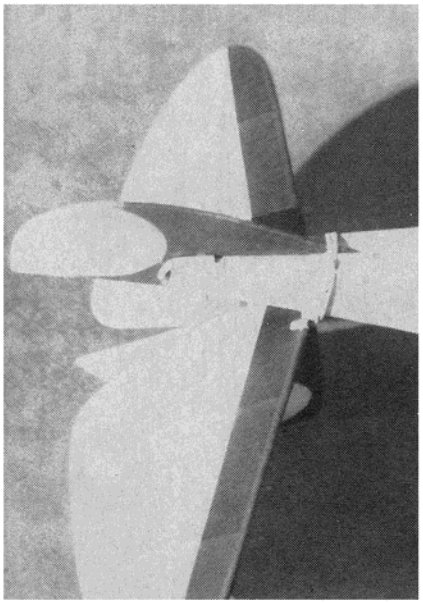


This is a view of the motor mounting. The charging jack exits from back of wing saddle.





After the ribs are cut-out, stack and pin them together for sanding (**top**). Cut spar notches with a file. Three layers of thin bass wood strips form each curved outline (**above**).



This photo shows the original DT set up. A more convenient set up is shown on the plans.

shapes from a rectangle of tissue and adhere the tissue to the plastic. I use movie film cement for this task, applied with its own brush. Paint the watery thin cement all over the tissue and it will soften the plastic just enough to hold the tissue. One other benefit of this method is that it adds a tremendous amount of strength and rigidity to the cabin.

My Scrappy is covered with pale yellow light weight tissue, water shrunk, and given two coats of plasticized dope (nitrate dope with castor oil added or Sig Litecote). That old standby, nitrate dope, is now available by mail (Hobby Horn and other suppliers) and it's really worth any extra trouble to get it. Thin the nitrate 50 to 100% with thinner and add about ten drops of castor oil per ounce of dope to minimize dope shrinkage induced warps.

For the trim on my model, Cardinal red Rit dye powder was dissolved in thinner, poured off (because some of the dye powder won't dissolve in thinner) and mixed with already thinned dope about half and half. After masking off the trim lines, the resulting mixture was airbrushed on. Four or five coats were necessary to get a bright, deep red. The lettering was cut from black tissue and stuck on with thin dope. Make up a rough paper pattern for the windshield, trim as needed. When it fits to your satisfaction, transfer the shape to thin plastic and glue it on.

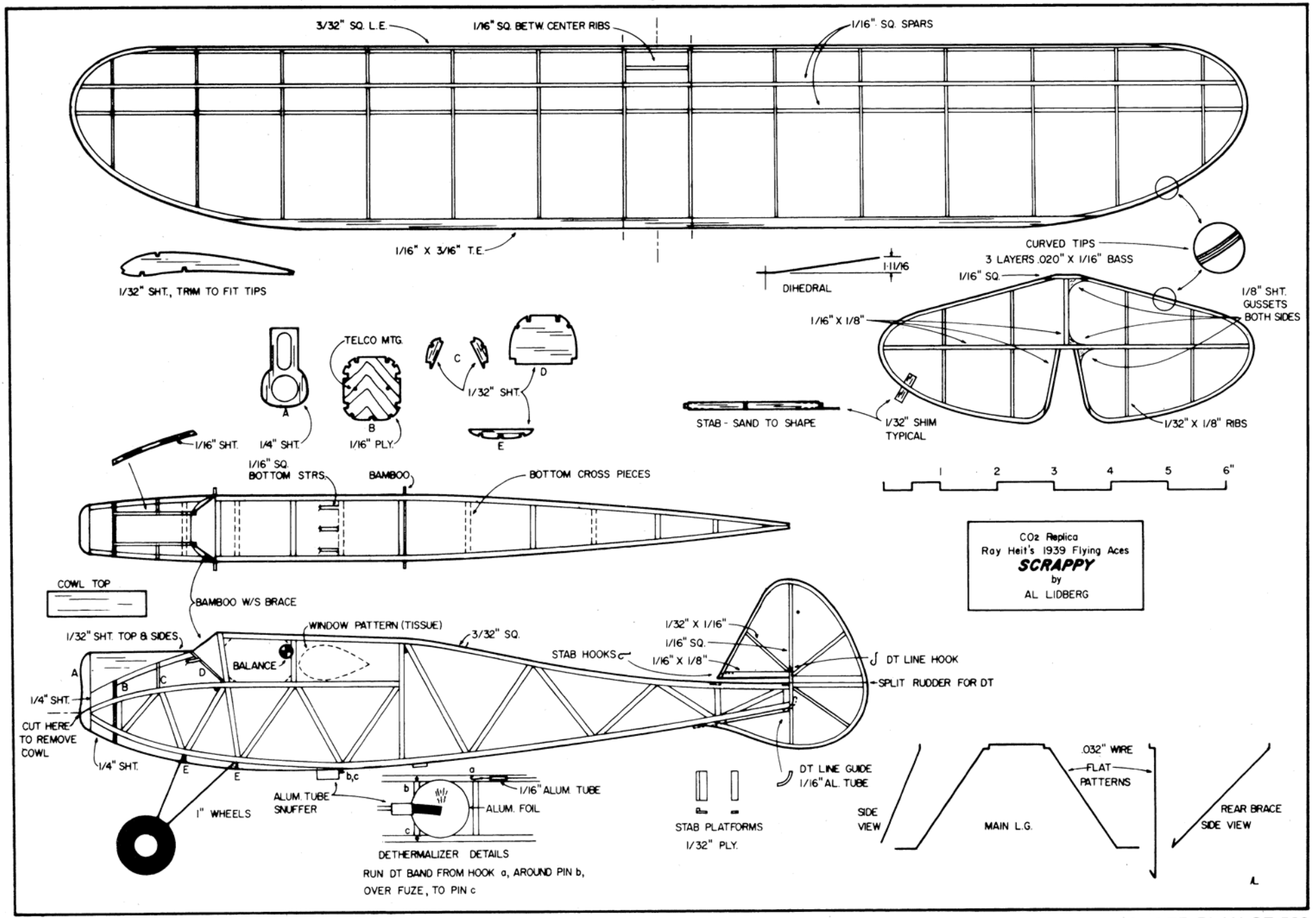
It's about time for final assembly so it's also time to decide about the dethermalizer (DT). I hate to lose models so I think it's worth the trouble. A DT can also come in handy for keeping a model within the confines of a small field, so perhaps that will help in your decision. If you choose not to install the DT just glue the stab to the body and add the rudder. If the DT is desired, make up the various small bits of tubing and wire as shown on the plan. Note that the DT on the plan differs from that shown in the photos. Using the vertical snuffer tube shown in the photos requires that the burnt out fuse be pushed into the body when a new one is installed. The plan version allows considerably easier fuze changing and a bit less drag due to the fuze. Choose the snuffer tube size to match the fuze you'll be using - either Sig or the smaller fuze sold by Peck. Epoxy or Hot Stuff the curved tube line guide and snuffer tube in place. Make up the stab platforms and glue them into the notches shown. Add the bottom half of the rudder. Glue the top half of the rudder to the stab and add the stab hold-down hooks (2 at the front and one on the left side of the rudder at the spar). The DT line is made from very small fish line and should be added now. Thread the 2 straight pieces of tubing onto the line before adding the hook, labeled "a" on the plan. Here's where you'll have to do some experimenting. Refering to the plan, the distance from hook "a" to the short tube line guide determines the stab pop-up angle, which should be about 40-45°. Make up the line to about the length shown and then glue the line guide in place once you have found the proper location. Be sure to key the stabilizer to its platforms. These little keys need to be only about 1/16 square x 1/8" long, but they keep the rudder pointed in a consistent direction so that meaningful adjustments can be made. Without keys, the rudder may move between flights and destroying your trim settings and maybe your model.

Add the wheels and the wing hold-down bamboo strips and you're almost ready for balancing. Wheels can be the very light open backed plastic ones that come with kits and ready to fly rubber models or you could make up some laminated balsa wheels. A smooth, solid wheel has far less drag in flight so it's probably worth the work.

Feed the tank and lines into the body through the cowl opening and just set the motor in place for now. Attach the wing and check for balance. Move the tank as needed, remembering that the tank outlet must be above the horizontal to prevent line freeze ups, which will shut down the motor. If the tank line won't allow enough tank movement, some clay or lead ballast will be needed to establish the proper balance point. Once the model balances properly, use some scrap balsa sheet to brace the tank in place. The tank on my model is about as far back as the line will allow and is entirely behind the wing. As for what to do with the charger fitting, I will readily admit that leaving it just hanging out there looks terrible, but this is done for a good reason. Charging the tank requires about a four pound force with the Telco. If the charger fitting is built in or bolted onto the model, the supporting structure has to be able to withstand that force, which translates to extra wood and glue. Remember extra wood should be avoided.

Check the wing and tail surfaces for warps and correct if necessary with steam. The cowl should be left off for now to simplify thrust line and throttle adjustments. After these settings are fixed, the cowl can be held in place with a couple of tiny droplets of glue. Try some test glides - please, not over concrete - look for some of that mysterious stuff called tall grass. If the model stalls, put some thin shims under the wing TE. If it seems to glide too fast, put shims under the LE. Beware of very tight turns because they will probably get worse under power. Warp the rear half of the rudder, or move the stab keys for drastic changes, to obtain a 50-75 foot diameter glide circle to the right. Now try some low power flights using a gas charge (charger pointed up) and low throttle setting. If the model won't climb, open the throttle a bit until you can see what it's going to do. After some altitude is gained you'll get a better idea of the glide trim and may need to do some adjusting there. Some down thrust and right thrust may be needed (by putting shims between the motor and mount) for power adjustments as power is increased.

As you get the trim set up to your liking, switch to a liquid charge (charger pointed down), which will give a longer run. Experiment with the throttle settings to achieve the best climb. My CO_2 models all seem to fly best, meaning longest, with a fairly slow setting. The ideal setting appears to be one which is not quite strong enough to allow the plane to ROG. ROGs are fun though, so you should try some. For a small field the extra power required to ROG will shorten the run and limit the flight a bit. At the slow setting, the motor runs for 30-50 seconds and the plane can fly for about a minute or so without thermal help. Be sure to put your name and phone number on Scrappy - happy flying.



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R/C giant Scale

by Nick Ziroli

Well it seems unanimous, with all our model magazines, that "Giant Models" should become popular enough to deserve a column of their own. This will be the first edition of a regular column in FLYING MODELS featuring information and activities pertaining to these larger than average airplanes. It will be published as often as material, photos, space and the editor permits.

Before I go further let me say that I have been building models non-stop for almost 40 of my 46 years. Models have been my full time occupation for the past 12 years. A good share of my work has involved R/C feasibility study models and RPV's to carry research equipment. I have developed, built and flown some quite large RPV's, 13 foot wing, ten horsepower planes weighing about 100 pounds. Big models are not new to me.

However there are big models and there are big models.. I have recently completed a couple of deltas to test some special equipment. These have a wing span of about six feet. Not a super big model. But when this six foot model weighs 90 pounds and is powered by a 10 hp engine, it becomes a very big model. Big also is the potential damage that a model this size can do.

I'll probably be drummed out of the International Miniature Aircraft Association (IMAA) but the direction I see some modelers taking, I believe, is courting disaster. This is not a negative attitude but rather a feeling that we will have a more enjoyable, non-government regulated, hobby if models are kept to a size that can still be considered a model. If all the flying is only done at Vegas or other large open areas it probably won't matter. However I am sure that the 60 to 100 pound models I see photos of are being flown in other than ideal surroundings creating a potential hazard far beyond that of lesser sized models. I don't know what can be agreed upon as a maximum size, but a 40 pound, four cubic inch model can be satisfactory. These are my personal opinions formed from my experiences flying and crashing some big ones. I invite other opinions both pro and con.

Nobody has enjoyed the big models any more than I have, since I built my 84" wing span "Taube" back in 1973. This was published in FLYING MODELS in January 1974. It was flown with both an O&R "Compact" 1.25 cubic inch magneto ignition engine and a glow .60. No problem was ever encountered with the radio due to ignition interference.

The "Quadra" engine really got the Giant Scale ball rolling. It is very reliable and inexpensive to buy and operate. Since then an increasing number of converted chain saw and other utility engines adapted for model use have become available. These engines are tough work horses. Unless one is structurally broken it should, with proper care, last for many seasons of flying.

A wide range of large size props have become available that where unheard of just a few years ago. This also goes for wheels, accessories, servos, right down to pilots. A variety of Giant Scale kits are available and each month seems to bring more. Scratch builders can take advantage of a wide selection of full size plans.

So often I hear the comment, "I'd like to build a giant model but they're so expensive". This can depend on the type of airplane chosen. Pick a plane that is mostly fabric covered and can be built for little more than a good .60 size pattern ship. The local lumber yard can supply most of the frame work materials.

Two items can be acquired there that will cut the cost of your model considerably. One is a ¼" thick pine called latice. This comes in different widths up to about five inches. I check through the supply each time I go to the lumber yard and pick out the best looking and lightest stock. Some of it is very heavy while other pieces are clear grained and light. This material is ripped up in a table saw to ¼" by any width desired. A Dremel table saw will handle this job easily.

I use this for all strip stock from ⅛" × ¼" stringers to ¼" × ¼", ⅜" or ½" spars. Any size and length is there for the cutting. This wood glues well with Wilhold or Glue it.

The second material to look for is 3mm, ⅛", poplar plywood. This is not always available but many lumber yards do stock it. A mahogany plywood is usually more readily available and although it will do for formers and ribs is not as desirable as the poplar. The poplar is similar to Sig "Lite Ply". There are lumber yards that specialize in plywoods. Check your telephone directory.

An all sheet, balsa, covered model can also be finished with fabric and dope. A more durable finish can be had with light glass cloth and surfacing resin. One coat of resin is used to apply the cloth. This is sanded and a second coat of resin applied. A thorough sanding should prepare the surface for paint. It is easier to see scratches and imperfections if there is some color on the surface. A coat of light gray lacquer primer will serve the purpose of adding the color and filling any small imperfections.

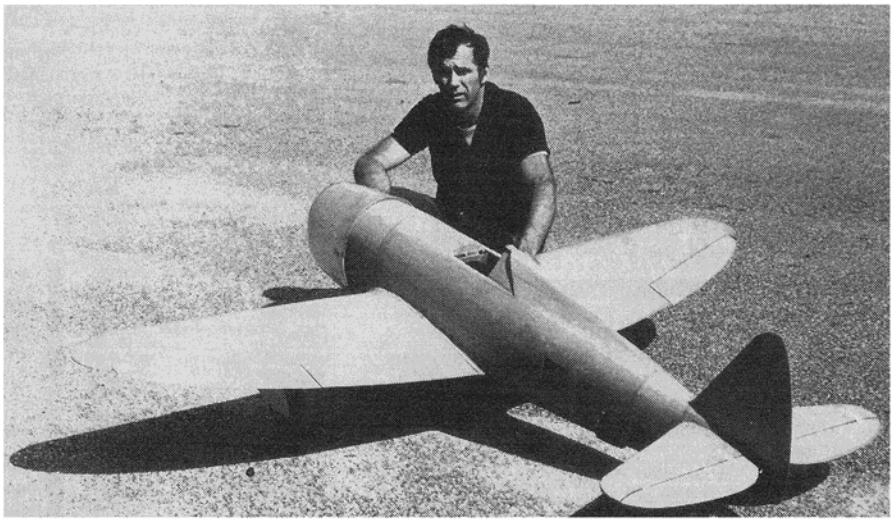
Balsa wood is still the best material to sheet cover a model with. It is expensive but nothing I have ever tried can replace it. I am presently trying a foam, epoxy and glass cloth combination to cover a "Bearcat" fuselage. It is a little cheaper and a good deal stronger. If it shows promise I'll describe it in detail next time.

Fabric covering can be obtained from department or fabric stores. Acetate works well but I have found it difficult to obtain lately. Some Dacron and Polyester materials are usable. Obtain a yard or so of any new untried material and note exactly what it is. Try a piece on an old framework or part of the new model such as the rudder. If it works you'll know what to obtain more of.

Super Coverite or Silk is a good choice though more expensive. Most modelers are familiar with these materials and feel confident of success when using them.

There are a number of materials that can be used for finishing. On a fabric covered model such as a Cub or Fleet I prefer a clear nitrate dope base. Two to four coats, depending on the fabric, will generally seal the surface. Color can be dope, epoxy, urethane or automobile enamel.

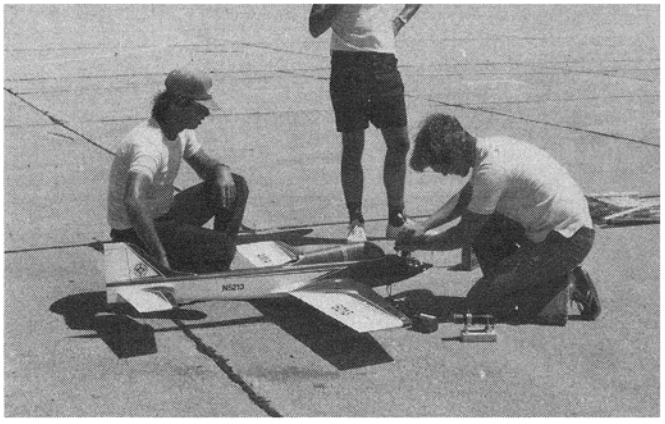
PHOTOGRAPHY: NICK ZIROLI



Shown is Frank Strobel and his nearly completed 2¼" = 1', 93" wing span P-47 that was designed by Nick Ziroli. The ship is quadra powered and weighs 26 pounds. Plans will be made available.

R/C sport & pattern

by Dennis Donahue



PHOTOGRAPHY: BOB HUNT

Pattern flying requires dedication, hard work and patience. Don Weitz (left) and Marty Whittenberg are two of the new breed of pattern competitors.

One of the great pleasures of being a modeler in the Northeast is the long winter nights spent in the workshop. Here we build new objects of creative expression to be used the following flying season to impress our fellow flying buddies, and possibly the judges, if we're lucky. It was on one such an evening recently that I was disrupted by a phone call from an old friend, Bob Hunt, who had just taken over the reins of FLYING MODELS. By the time I hung up, I found myself committed to writing this column four times a year. Just what I need, another project to add to my already endless list, but an exciting one nevertheless.

Just so you know who is responsible for these ramblings, a little background on who Denis Donohue is in order. Born and raised in Brooklyn, New York, I currently live in a northern New Jersey suburb of New York City. I work in the New York-New Jersey metropolitan area as an Electronic Technician servicing computer systems. I cannot ever remember not being interested in model and real aircraft. Starting with stick and tissue, I progressed through control line, single channel R/C, Multi Channel Reeds, a home-built digital proportional set and finally bought a new Kraft proportional in 1970, when I started my pattern career. My first novice contest was in 1970, and I worked my way up to Master Class two years later, when I qualified for my first Masters Tournament. I have competed in every Masters Tournament since then and have thoroughly enjoyed every year of competition.

STICK-TO-IT-IVENESS

Enough about me, let's talk about you. So you think you want to be a successful pattern flyer? Sure, you're the hot shot pilot in your club and can fly square loops around anyone else in your area. But do you really have what it takes? You say you're flying the hottest pattern ship going with a super snarling tuned pipe .60 and the latest custom built full featured programmable radio. Anybody with enough money can have those. What I'm talking about is the proper physchological attitude, also known as "Stick-to-it-iveness."

More than any other ingredient required, and there are many, this one is the most important. Serious pattern flying requires total dedication and a very firm mental discipline. Forget about going out on a nice Sunday morning and boring holes in the sky; flying every which way but level. You are going to have to learn to strictly regiment your flying sessions for the purpose of accomplishing a specific objective which you plan in advance. This must be the case every time you go flying, not just when the mood strikes.

A good constructive practice session starts with a flight of the complete pattern. Successive flights should consist of specific upwind, downwind maneuvers performed repeatedly. The total pattern should then be flown again as the final flight. The desire to "goof-off" in the middle of a flight must be resisted as it not only ruins your concentration, but also creates flying habits that are contrary to proper pattern flying.

After establishing a practice routine, careful consideration must be given to how often you are going to fly. Chances are that unless you are placing very high in all the contests you enter, you are still on a learning curve. This means you should be practicing as many weeknights as possible, besides weekends. If you are like me and have to work a normal eight hour workday, this is going to mean making some sacrifices, like rushing home and leaving for the practice field immediately without dinner so you can get a few hours of practice before dark. It's going to mean resisting the temptation of sinking into your easychair with a cold beer to watch the ballgame after a hard day's work. It will even, on occasion, mean neglecting your house, lawn, wife, etc. just for a few more hours of practice. "Stick-to-it-iveness".

Now comes the contest itself. You must get up very early to arrive on time, and very often you must drive long distances. You have butterflies in your stomach and probably have difficulty trying to eat. Finally, you get to the flight line and perform what you think is a real "Barn Burner" flight, only to find that your scores aren't even in the top five. You are learning the most difficult fact of life in "pattern competition".

Here, as in other competitions which involve human objectivity in judging, you will find it to be, at times, inconsistent, and other times not reflective of the flying. Frequently, the local pilots will win even though they are not flying the best. This may be because they and their flying styles are what the judges are used to seeing, and not necessarily intentional biasing. There are other times, however few, when judges will be inexperienced and the results of the contest will reflect this. The outcome in these cases will be a result of the judges' subconscious preference for flying styles, aircraft design or color scheme, flying speeds, maneuver positioning, etc., rather than their knowledge of the rules. Although this is prevalent mostly in local contests, not National events, it is not unheard of.

If and when you reach Master Class competition, you will find as in other sports, a leniency towards "big name" competitors. When a person establishes himself as a top Masters competitor, he is almost certain to garner an extra couple of points per maneuver over other lesser known competitors. What this means to you is that you will have to consistently outfly these competitors before you will have a chance of winning over them. This is known as "paying your dues", and while it is undeniably wrong, it is a fact of life in sports involving human judging. If you wish to be a successful competitor, you must be willing to accept these situations as facts. You must also be willing to accept the fact that you may not really be flying as well as you think. It could be that you are just not advanced enough to see the small flaws that separate you from the accomplished pilot. Overcoming these situations will be the most difficult test of your psychological preparedness. "Stick-to-it-iveness".

Our sport is not unlike many others such as golf, tennis, auto racing, etc. in that it takes much skill, dedication, perseverance and a very strong will to win. However, it also requires many additional skills that other sports don't. A successful pattern pilot is also a master craftsman, an artist, an engine tuner and an expert in repairs both small and large. How many successful sports figures do you know who go home after a practice session and build themselves a new tennis racket, or tune and adjust their golf clubs, and how many race car drivers build their own cars, tune and maintain them?

There is no doubt that our sport demands a lot more of a person than most others, and yet when the final results are compared, the others walk away substantially richer while we merely gain another trophy to add to our collection. So why do we do it? Why do we put so much of ourselves into a sport which provides no personal gains? For me, the answer lies in the incomparable pride and satisfaction gained when I have proven myself deserving of the winner's circle using an object of my own design and creation. For you, the answer will lie in your own mind and all factors will have to be considered as you develop your own psychological attitude and determination.

R/C Soaring

by Dave Elias

This column will be for all Radio Control Sailplane flyers with a strong emphasis on competition flying. All of the topics that will be discussed will both inform and instruct the flyer about improving their skills.

Because sport flying is fun, the improvement of flying skills is fun, and competition flying is fun. *Fun* is the reason why we are involved in this sport of R/C Soaring. Also, it is my opinion that competition with its motivation for personal skill improvement and its camaraderie will keep a soaring enthusiast involved and rewarded for many years after the sport flyer has turned to either powered models (cough, cough) or golf. Through competition, whether it is on a club, regional, or national level, the all too often cycle of learning to fly; becoming proficient; becoming bored and quitting can be altered to include increased enjoyment thereby preventing the boredom and subsequent quitting.

This reporter has been involved with model airplanes for over 23 years. Originally I flew controline events including the speed events and teamrace. Then after a lapse of eight years from active modelling a friend introduced me to the sport of R/C soaring. It had all of the modeling benefits of graceful flight without the noise or the mess of powered models. After soloing some four years ago with a now well used *Hobie Hawk,* it became quite obvious that the quickest way to improvement was through competition.

Following only four months of flying, I entered my first contest in Miami, Florida. It was a club contest with fifteen entries. But after seeing the variety of models from a small 64 inch Airtronics *Questor* to a 150 inch Craftair *Sailaire* and becoming aware of the various skills necessary to be competitive, my learning process had started. The real surprise came when I placed third. Just think, my first contest and third place with my *Hobie Hawk.* Now that's a rush!

One month later (since my wife and I had planned a vacation to the Northeast) we were able to attend the slope soaring contest at Harris Hill, New York. This was a two day contest with a ten minute duration task. Nothing too scary except for the fact that I had to throw my model off an eight hundred foot hill and hope that it would stay up. This was something I had not tried before. Imagine, I watched my plane just clear the crest of the hill then continue out barely six feet above the treetops and then out into the open air. It had lost one hundred feet of altitude while pushing out three hundred feet, then it levelled off and finally at a distance of five hundred feet it met the rising pressure wave and I watched the *Hobie* rise several hundred feet above me. Whew, that took some brass!

With ninety six entries and ten planes being thrown off of the hill at the same time it was quite exciting. This excitement was heightened because this flyer was able to observe the flying and meet people such as Dr. Walt Good, Don Clark, Dick Pike, Bob Baugher, Bob Curry, Dan Pruss and others.

These early contest experiences combined events both locally and nationally in scope were dramatic indicators of the skills that were to be learned and the friendships that were gained. The past four years were filled with numerous competitions and similar experiences. These were encounters that were shared and felt by all flyers and through this column I hope to share them with you.

The format to be used in my reporting will consist of three forms: interviews with eminent competition flyers, news of major contests, interesting new products and a question and answer column. By varying these styles it is hoped that the result will be a diverse forum that both informs and instructs.

The first interview will be with Mark Smith in the June, 1980 column. In this and subsequent interviews perspectives about building and flying will be expressed to help those not able to observe and learn from these fliers first-hand at contests. Although the topics to be discussed have been reported by others before, these interviews will present differing perspectives thus providing new insight into these topics.

Areas to be discussed will include trimming techniques (launching and flying), practice flying, 'reading the air', timers, landings, devices and accessories, launch equipment, ballasting, multi-channel vs. 2-channel competition designs, soaring classes, FAI competition, sport scale, new events, future trends, etc. Whenever possible the discussions will avoid design theory and concentrate on building and flying techniques.

The two major contests to be reviewed this year will be the Nats to be held in Seguin, Texas, in early August and the yet to be finalized National League of Silent Flight (LSF) Tournament. Coverage of each of these competitions will consider design trends for specific events and innovative strategies used by the winners. A review of the Sport Scale rules with distinct flight task suggestions will be planned for an upcoming issue.

All club and state soaring organizations are sincerely requested to send copies of their newsletters to me at the address listed below. These newsletters provide a wealth of information that should be shared with the larger readership provided by FLYING MODELS. In addition the questions from flyers that are sent to me will be answered not only by myself but by some of our top flyers.

The following are a list of national organizations that should be supported through membership by all R/C Soaring flyers. These organizations through your membership are the voice of R/C Soaring that help with the evolution and perpetuation of our sport.

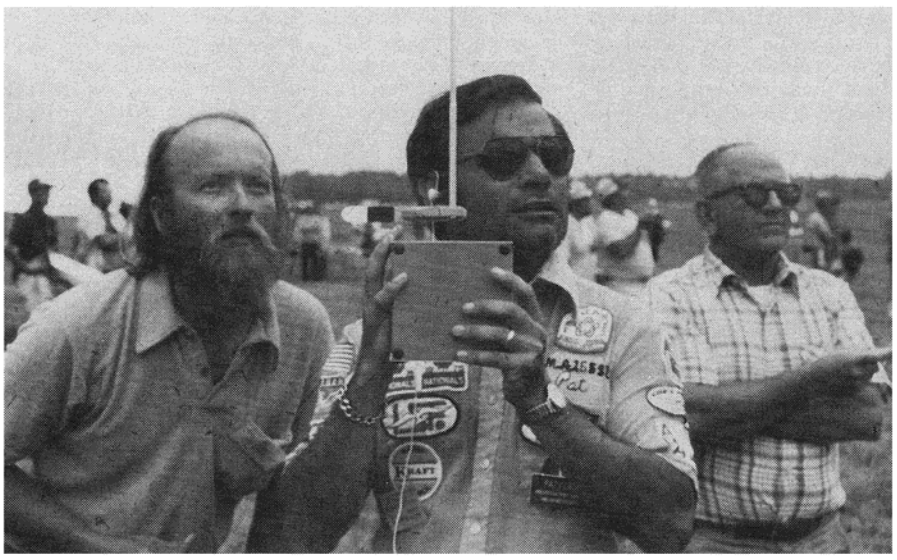
National Soaring Society
Box 1530
Denver, Colorado 80201

League of Silent Flight
P.O. Box 39068
Chicago, Illinois 60639

See you next time with an interesting interview with Mark Smith.

David Elias
#3 Country Club Cr.
Tequesta, Florida 33458

PHOTOGRAPHY: DAVE ELIAS



Shown here from, left to right, are Ken Bates, Pat Flynn and Walt Hill. The scene is the 1980 Nats. Flynn, a recent LSF level V recipient, demonstrates the use of a Thermic Sniffler. Ken spots and Walt times.

on engines

by Henry Nelson

One problem associated with writing a monthly column is that deadlines seem to arrive about every two weeks. I've asked Hunt to work on the problem but he hasn't been successful.

If you're interested in engines to the extent of buying the measuring instruments listed last month, you'll be able to measure certain features of your engines which influence its performance. That's the good news. The bad news is you need some tools to improve the things you've measured. I'm probably going to lose whatever audience I have if I suggest a further expenditure of about $5000.

In November, a new labor saving device in the form of an NC Chucker was added to the Nelson machinery collection. The decision to purchase this latest metal monster was influenced by the decision to proceed with a new front valve glow 15 engine and for the last month I have been alternating between language disputes with the chucker (computers are honest but you have to ask the right questions) and mold making for the new crankcase. I don't have pictures of the new mold, but I do of the mold for the team racing engine.

Except for the prototype engines pictured back in the August 1980 issue, the Nelson engines use an aluminum casting for the crankcase. Most large-scale-production engines use die castings. In this process molten aluminum is injected under high pressure into a cavity machined into blocks of steel. Very little time is taken for each casting so they are quite inexpensive but the die itself is quite expensive and the cost cannot be justified for fewer than several thousand parts.

Other casting methods used are sand casting, where the cavity is formed in a special sand and low pressure permanent mold where the metal is poured by gravity into a metal cavity. Sand casting uses the least expensive tooling (the patterns can be made of wood) but is the least accurate. The permanent mold process is of intermediate cost.

All casting methods have the problem of what to do about the inside of the engine. Due to the shape of the bypass cavities, it is not possible to simply pull a "core" out of the cylinder casting. A die casting may use a complex mechanical core which collapses to a shape which can be withdrawn. The reason some Fox engines have their distinctive large rear cover is that it allows the bypasses to be cast with a relatively simple core. The same is true of the Cox Conquest 15 which has the crankcase split below the exhaust stack. Some Supertigre and K&B crankcases have some additional metal removed from the bypasses by machining. It is easier to do this secondary operation than to further complicate the core.

On a per-casting basis the Nelson engines use the most expensive casting process called investment (or lost wax) casting. This is an ancient process sometimes used for jewelry, and consists of taking a wax pattern of the part and submerging it in a ceramic material similar to plaster. When the ceramic is hard, the whole mess is put into an oven and the ceramic is fired thereby also burning out the wax. What is left is a very precise cavity which can have any shape because the ceramic can flow into any sort of glind hole. With a vacuum assist, metal is then poured into the cavity.

If you want to make only a single part it is possible to take a block of wax and carve it to the desired shape. Then you hand it to the foundry and get back a duplicate in metal. Custom jewelry makers use such a wax-carving procedure.

Since I want more than one crankcase, it is necessary to mass produce the wax patterns by casting them in a mold. This same process is used by Roger Theobald for the Kraft 61 and I believe the Ross twin crankcase was also an investment casting.

For the mold, aluminum is the standard material. It machines easily and is lightweight. There is still the problem of how to put in the bypass cavities. This can be handled in two ways. The Kraft engine uses a mechanical core. The "cheeks" for the bypasses are attached to a central support and after the wax is hard, the central support is removed leaving the cheeks in the wax. These are then picked out by hand.

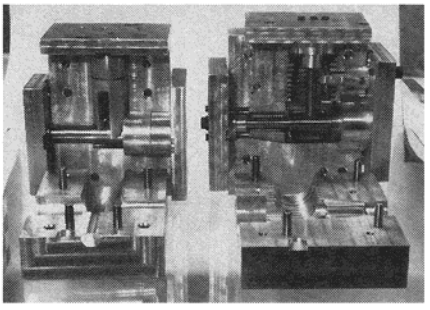
The system used on my engines uses a "soluble core." This is the purpose of the mold on the left in fig. 2. The wax injected in this mold forms the inside shape of the crankcase and has the bypass cheeks. This "core" is then located on the rods in the mold on the right and a different type of wax is injected around it.

When removed from the mold, the wax "crankcase" is put in a slightly acid water solution. This dissolves the wax which forms the (appropriately named) soluble core. Now the wax pattern is put into the ceramic and the casting is made as described above.

Depending on the shape to be cast, the mold doesn't even have to be solid aluminum. The mold for my magnesium T/R engine mounts (shown in August 1980) is made by casting "plastic steel" around a master model of the mount. I chose this method because it is easier to machine a pattern of the part than a mold cavity. For a crankcase, it's actually easier to machine a cavity. Also, I worry about cracking the fins if the mold is of plastic.

The investment casting process is adaptable to virtually any geometry. Although, previously used only for very small parts, the industry is now making castings which measure several feet in each direction and are so complex the mold may take eight hours to assemble, inject the wax and then disassemble.

From the model engine standpoint, it is a good process because of the fine detail which

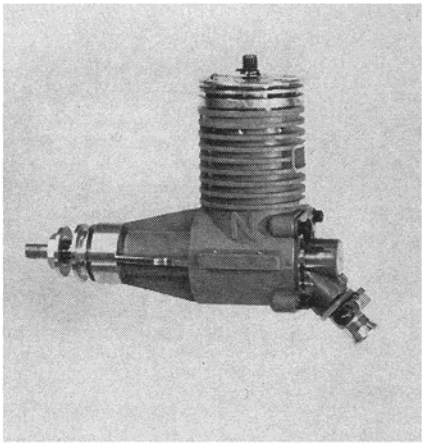


can be cast into the parts and the wide choice of alloys which can be cast. These castings can be heat treated to improve their strength. This is not usually possible with die castings because turbulence associated with the high pressure injection of metal causes porosity throughout the casting which may produce blisters on the casting surface at the heat treating temperature. The relatively high cost per part is not a major problem for the limited-market high performance Nelson engines.

In England, Irvine Engines uses aluminum investment castings for their .21 and .40 engines. They also use steel investment castings for the cylinder liners. Casting accuracy is sufficient to allow the ports to be cast in without later machining.

In Canada, Brian Fairey has, over the past eight years, made a series of T/R engines using investment cast crankcases. Some of his RAM (Racing Aero Motor) cases and molds are shown in figs. 3 and 4. Brian uses mechanical cores and injects his own wax patterns with a home built injector which he puts into the kitchen oven to melt the wax.

PHOTOGRAPHY: HENRY NELSON



These are the molds for casting the wax patterns of the Nelson 15 diesel (**top**). The mold at left is for water soluble wax which shapes the inside of the engine. The Nelson N15D uses investment cast crankcase and rear cover (**above**).

F/F rubber

by Dave Rees

For my first venture into the writing of a column, I will be sharing with you ideas, news, tips and whatever comes along, primarily aimed at the more competition minded free flight scale flyer, rather than the beginner or sport flyer. These topics will be ably covered by my compatriots. But ideas and tips for competition airplanes are almost always applicable in some form for everyone, so stick with me.

Book Review - Peanut Power

By Bill Hannan, published by Historical Aviation Album.

I must confess that when this book was handed to me by FLYING MODELS editor, Bob Hunt, I felt a little like the shepherd who had just been handed a copy of the Bible and was asked to review it. Bill Hannan has long been one of the guiding lights in my career in scale modeling through his many plans and articles, and I hope to some day have the pleasure of meeting him in person. A number of times, after finally working out some particularly tricky scale building technique, I have come across the very same thing in one of Bill's plans, and realized he had done it, too - only ten years ago.

"Peanut Power", which was introduced in mid 1980, has rapidly become the definitive publication on the whole Peanut Scale movement in this country and abroad. I know of no other publication which even comes close. The book is pertinent, current, and complete in every respect. I am not aware of Mr. Hannan's occupation, but it must be related to the advertising or graphic arts field, judging from the snappy, upbeat style of his presentation. The publishing, too, is first rate, as we have come to expect from Paul Matt's Historical Aviation Albums on full scale aircraft. (I'm still looking for some of his earlier ones for my collection.) With a writer - publisher team like this, the book is bound to be a success. Every scale modeler, should own a copy.

Peanut Scale as a formula is, I believe, responsible for the resurgence of interest in Free Flight scale which has occurred in recent years. They may be flying in other scale events now, such as AMA Rubber and FAC Scale, but most modelers built a peanut as their first scale airplane. A peanut was successful in wooing me away from Control Line Precision Aerobatics in the mid seventies with its congenial, uncomplicated, low pressure appeal. And, like any successful movement, whether political, religious or social, Peanut Scale had its progenitors to conceive the idea in Dave Stott and Bob Thompson, as well as its disciples who kept things going after the initial start had been made. This book definitely supplies the latter sustaining force. The first section of "Peanut Power" explains clearly how it all began and who deserves the credit for the early growth of peanut scale.

Bill then takes the reader into a detailed discussion of each phase of the craft of peanuting from "Selecting a Subject" to "Detailing". He also discusses those often glossed over topics as "Model Transportation", "Ground Support Equipment", and photographing a peanut. I particularly enjoyed the chapter on "Designing your Own", as this is the stage one must reach to be a successful competition scale modeler. In this section, which is one of the longer ones in the book, Bill examines each part of the subtle art of design with a very intuitive approach. All the intricacies involved in selecting a subject emotionally and philosophically are explored, such as personal appeal to the modeler, winning potential and distinction in originality. I noticed his comments lamenting the fact that present competition is being dominated by a very few types of aircraft. This is often the complaint of very good scale modelers. Cheer up Bill, I think things are changing for the better. He covers all the angles that I could think of plus more besides with sub-headings or "aerodynamics", "structural considerations", "scratch building" and "changes from scale". Each one is explored in detail with lots of drawings showing ways to make a nose block or designs for ribs in wings. His discussion of wing incidence arrangements for the various wing types is surprising to me in that he shows the opposite biplane setup from what I have used. Who knows, maybe they both work.

Excellent pictures and graphics abound with a few on almost every page. Mr. Hannan shows great restraint in the use of shots of his own creations, which are impeccably built and could have easily filled up a book of this size. Instead, he presents a collection of pictures from each of the best scale builders in both this country and abroad. I especially enjoyed the pictures from the European peanuters, as I have not had much opportunity to see the work of any but American flyers. The acknowledgements fill a whole page, and could be used as a "who's who" in scale modeling today.

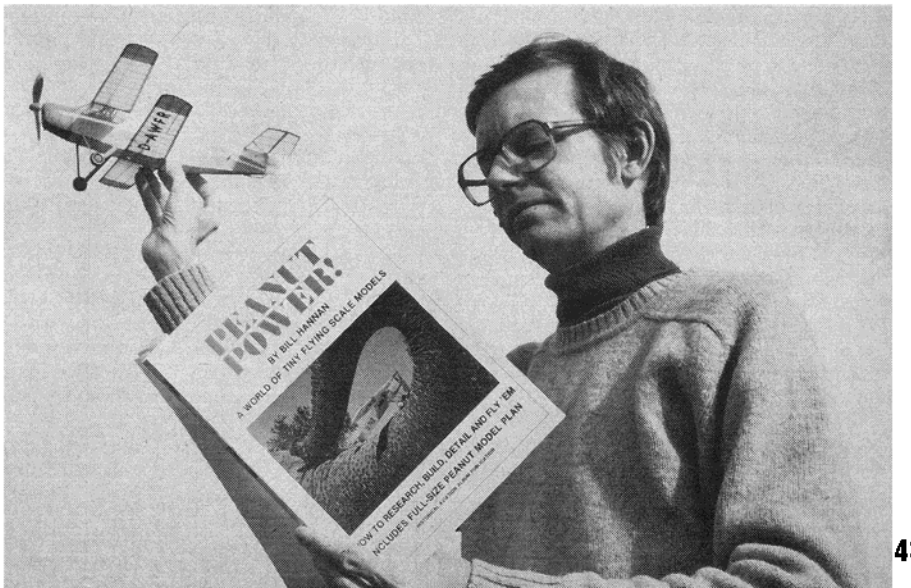
When I first finished reading the book, I was left with the feeling of wanting more. Why stop with peanut scale, there is AMA rubber, AMA gas scale, all those mass launch FAC events, etc., etc? But when I thought about it awhile, adding chapters on all of these topics would have perhaps diluted the focus, and overwhelmed a person just getting started. Better to leave those subjects to be explored on their own after a newcomer has been bitten by the bug. Most of the subjects presented such as covering, painting, detailing, etc. are directly transferable to the larger sizes of scale models anyway. As for flying, once you have coaxed a two minute flight from a peanut either indoors or outdoors, believe me, you will find the big ones easier. Perhaps, after the success of this book, Bill will be persuaded to write another on some other facet of scale modeling.

The book closes (just before the elephant backside picture) with one of Bill Hannan's plans of a Bede IV in the taildragger variety. I prefer this one to the tricycle gear version because the landing gear can be lengthened slightly to get clearance for a larger prop without appearing too much out of scale. I have always liked these high winged monoplanes such as Cougars, Lacys, Tailwinds and Fikes, because they fly so well and are so straight-forward to build. For those of you thinking of starting in competition, the peanut scale event is one of the few events where a highwinger can still be competitive. The handicaps for unorthodox types are not so out of proportion.

So by all means add this book to your collection—it's not nearly as expensive as one of those "coffee table" type books on "The Wonderful World of Airplanes" like you can find in bookstores nowadays. And contest directors take note; it makes an excellent award for peanut scale contests.

Bill Hannan's Peanut Power is available through FLYING MODELS Book Hangar—Ed.

PHOTOGRAPHY: DAVE REES



C/L stunt

by Bob Hunt

Last month we discussed the advantages of the .40 size engine for use in a competition stunter. This month's column and perhaps the next few will deal with setting-up a .40 Schnuerle ported motor for an acceptable Stunt-type run.

The OS.40 FSR will be the subject of this series, but most of the set-up procedures will be the same for the stock HP.40 Silver Star as well.

Perhaps some history behind the use of the OS.40 FSR in the Stunt event is in order. Around the year 1974 a good friend, U.S. Air Force Colonel Frank McMillan, sent one of these, then new, R/C super-motors to me and suggested that it just might be adaptable to the Stunt event. I was sure that he had been out in the Nebraska sun too long and put the engine into a drawer where it spent the next two and a half years. During that time I met and became friends with a fellow named Rich Tower. Rich was an engine man supreme. His background in motor work included the building of several automotive racing engines, some of which were used to propel his own record holding, B/Modified Production, Drag Camaro and a bevy of east coast flat trackers, that had a habit of showing up in the winners circle.

Rich quit the dog-eat-dog world of Drag Racing and returned to his earlier love of model airplanes, and he joined the famous eastern C/L Stunt and Scale group, the Garden State Circle Burners. Rich quickly learned the fine points of two-cycle model airplane motors and was in constant demand to rework the popular ST.46 for the local troupes.

Rich visited my shop on a regular basis and the one thing that caught his eye was that OS.40 FSR. He too was sure that it could be set-up for stunt and I was sure that the sun had scored another victim. Rich kept the pressure on until I gave him the motor to try.

Some days later Rich called and told me to meet him at my practice field. When he arrived he produced from the rear of his station wagon a familiar sight. He had brought along Lou Dudka's 69 ounce Genesis 46. This ship was Lou's first full-stunter, built a year and a half before. I had flown that ship and knew full well why it was nicknamed "Bowser". With a healthy ST.46 in the nose Bowser had a hard time even doing the pattern at a 4.9 second lap time. It was truly "a dog". Something was different about it that day though, and the difference was the installation of that OS.40 FSR. The first thing that caught my eye was the 13-6 prop. Was Rich trying to pull some kind of a practical joke? I was told to shut-up, run the lines out (.018 cables) and just fly the thing. Rich started the .40 and launched the winged anvil.

The ship lifted quickly and settled into a 5.8 second lap with line tension the likes of which I had never felt with the Tigre. Had I not flown the ship before, what was to follow might not have been so dramatic to me. At that lap time the Tigre would have been hard pressed just to fly Bowser level, but the FSR could easily have flown another ten ounces on the same wing at a sub 5.5 second lap. The most impressive part of that flight was the positiveness through maneuvers and the fact that there was no tendency to drop out of hard corners. That combination, with some trimming, would be better than my competition ship of that year.

Several more flights with Bowser that day convinced me to go the Schnuerle route for the season. Rich kept the OS.40 and I bolted an HP.40 old style into my current ship that same day. In order to get equal lap times upright and inverted, the tank had to be shimmed off of the mounts (down) ⅛". This held true for the OS.40 FSR too. Rich had used a 13-6 prop to prevent the OS from "running away" through maneuvers, a trait of this engine (see Henry Nelson's On Engines column in the February 1981 FLYING MODELS). I chose to "load" the HP with one of my experimental three-bladed props. I chose an 11-5 EW (extra wide blade). By that evening Rich and I had my HP powered Genesis "77" doing 5.9-6.0 second laps. Several venturis were tried and we settled on a .295 ID in the HP and a .300 ID in the OS. My Genesis was some 12 ounces lighter and in trim so I did have an advantage. This factor made direct comparisons difficult and we were both having too much fun flying to stop and switch motors.

I spent the following few weeks getting ready to leave for England to compete in the 1978 World Championships. As the departure date neared, I began to have motor problems. The weather had been unusually hot during this time and the HP was "eating" rings at the rate of one a day. I later surmised that I was loading this motor too much and burning the rings. I switched to a brand new plane for the worlds, and it was set-up for the HP. Rich and I continued to fight with this combination, with no luck, until the week that I was due to leave. The decision was made to install the OS.40 FSR at the last minute. Several practice flights were made and the OS performed flawlessly in the heat. The rest is history, the OS.40 is responsible for the successes of that year for me.

The final numbers on that set-up were as follows: a box-stock (except for venturi) OS.40 FSR, a .318 ID venturi from CSC, a CSC muffler, an Aldrich wide idlebar glow plug, a six ounce, home made, uni-flow tank, .015 Pylon brand cables x 61½ feet long, a stock Genesis 46 airframe (FLYING MODELS 8/77, plan CF-447) weighing 59 ounces, KP-725 fuel and a CSC Trujust handle.

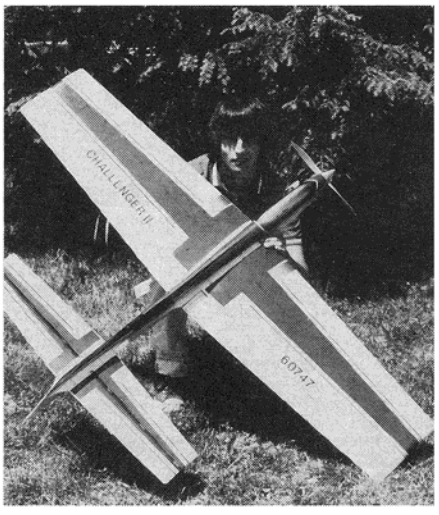
After returning from England, several experiments were tried and the lap times got as low as 6.3 seconds per lap. Longer lines allowed the ship to fly even cleaner, and 67 feet of .015 cable was the last set tried, and provided the best performance of all lengths tested.

From the above you can tell that a simple change of engine resulted in an entire rethink of accepted ideas. Even the weights of subsequent ships, for a given wing area, would change. Slightly more weight was found to help the penetration of the plane without the detrimental effects of power loading that had plagued the Tigre. I will touch more on this subject later on.

Soon OS.40 FSRs were being bolted into stunt ships from coast to coast, and here is where problems started. Reports began to filter in about the OS being unmanagable. Flyers were reporting tremendous overspeeding in outside maneuvers. One noted C/L control system expert described his experience during an outside square as "a race between his hand and the airplane to the ground." It became obvious that someone was missing something somewhere.

That about brings us up to date. Some flyers are deliriously happy with the FSR while others have long since cut them up for use as tip weight. We can now start to do a step-by-step installation of the OS in a new stunter and perhaps find out why these flyers are experiencing problems. The fact that OS is now producing this motor in a C/L Stunt version with a modified crank timing may make the job more difficult. Let's start with the older R/C motor that can be changed over to C/L with the addition of a venturi. There are a number of these out there in stunt land and it would be a shame to let them go to waste. One thought is to purchase a new C/L version crank for the older model FSR as this would solve most of the problems instantly.

PHOTOGRAPHY: BOB HUNT



The Junior division National Champion for the years 1978-79 Andy Harrisiadis, is shown here with his latest original design, the Challenger. The ship is powered by an OS Max .40 FSR and features a 60" wing span. Uses foam wings and tail.

with model builders

by Ed Whalley

Sport Racing Begins On NW Drizzle Circuit

Those Drizzle Circuit Sport Races we told you about a while back got under way in December with a venue at Delta Park in Portland. The meet-a-month series continues with venues in Seattle, Astoria, Yakima and Eugene, so Northwest race pilots can look forward to plenty of action right into the summer season. As reported last time, the two sport races will form the basis for each meet on the circuit, and season winners will receive huge perpetual trophies to hold for a year. In addition to the two primary race events, Northwest Sport Race and Northwest Super Sport Race, each meet will card at least one secondary event. Mouse Race, Slow Combat, Half-A Combat, Stunt and Goodyear will be scheduled. Entry fees have been kept low, and everyone gets a chance to fly in at least three events.

With the focus on flying, each participant in the races will be able to fly in two preliminary heats. The best scorers move on to the feature races. Four ships go to the feature in NWSR; three, in NWSS. In case of ties en route, the best times turned will decide who makes the features. Championship points will be determined as follows: Each entrant who finishes a 70-lap preliminary heat gets one point; if he goes on to the feature, he loses it. But, and this is a *big* but, if he takes first overall for the contest, he gets a number of points equaling the number of entries. The second-place score equals the number of entries minus one. Scores are competed in a descending order through fourth place in NWSR and through third in NWSS. The least a guy can get is one point for each 70-lapper he completes; the most is based on the number of guys he beats. And points will accumulate throughout the season.

Back in November, the Eugene Propspinners sponsored the first, sanctioned tryout for the two new race classes. The weather was against the venue, and attendance was poor. But the results gave some indication of what might be expected on the circuit.

John Thompson won both the NWSR and the NWSS. His preliminary in the former was 5:11; his final 10:08. In the Super, he turned 4:25 and 9:05. But everyone expects things to pick up.

Mike Hazel thinks that times will get down to 4:45 for 70 laps in NWSR and that finals will be in the low 9:00's. This means that the Fox stunt motors will have to move the ships at 75 mph plus. In Super Sport, Mike expects times to push 100 mph. Eventually, he expects finals to be burned in a little over 7:00 or even 7:00 flat.

The changeover to Fox stunt motors in NWSR poses a number of problems. For one thing, the new mill is quite a bit lighter than what the boys have been using. This weight differential makes the changeover something more than merely swapping motors. For another, the fuel consumption of the new mills is also a lot lower. In order to avoid overruns, the guys have to cut down from four-ounce to two or two and one-half-ounce tanks. The fuel requirements themselves are a bit different. The old racers are quite happy on a mix of 30—40 percent nitro; these stunt motors don't need all that hot stuff. Guys are starting with 10 to 15 percent and working their way up to 20 or 25 percent max.

Re-starts are a problem with the stunt motors, too. There is a tendency to overheat on a standard vented tank with an optimum needle setting. Leaning-out occurs toward the end of the race. Mike foresees a trend toward uniflow venting.

Mike and John, by the way, are the chief instigators of all this. They also publish Flying Lines, the best CL bulletin currently crossing our desk. There's a lotta good stuff in it for anybody anywhere. Write 'em at 1411 Bryant Ave., Cottage Grove, Oregon 97424.

Don't Try R/C in Downtown DC

This story is true. It's all about how the August Smithsonian came to stock Columbia Model Crafts', ready-to-fly R/C job, in the prestigious Air and Space Museum's book store. Yeah, you can buy it there, but the whole deal is a bit iffy. The story goes like this.

Mark Weiss who flies with the DC bunch outta Columbia got together with a coupla friends and formed a company to produce the ships in question. The word was that the ship was a gentle, forgiving thing—an excellent Sunday sportster. Anyhow, Mark began lining-up retail outlets. Among others, he contacted the director at the Smithsonian and sounded him out. The man mentioned that he would like to see a demo, and Mark agreed to oblige him. The catch was that the site selected was the Mall near the Museum. Anyhow, they went ahead and arranged for a time and a special permit.

The Mall was probably the worst place in the world you can imagine for such a demo. There're tourists all over the place, trees galore, and the ground was bumpy to boot. Mark was understandably nervous as he cranked-up, and he can be forgiven for getting his tie caught in the prop. But this was just a minor embarrassment.

Mark finally got off OK, but his troubles had only begun. Once in the air, he was hit by about a thousand watts of interference. His flight plan got sketchier and sketchier as he struggled for control. The problem was not too surprising considering that he was next door to NASA, the Mayor's Command Center, Civil Defense, the DC motor pool and Metropolitan Police HQ. Mark's guardian angel must have taken a hand at the controls because he finally got the ship down in one piece. He modestly suggested that another spot might be more appropriate.

The director, a man of discernment, agreed, and they moved down the Mall a couple of blocks. Mark put the ship up again, and this time did all right. The director must have thought so, too, because now you can buy the complete package at the Smithsonian.

Bits 'n Pieces

- Mall shows are going great this time of year. The Illinois Valley boys held another at the South Towne Mall in Ottawa—showed everything from Quarter-Scalers to the tiniest of the tiny (26 in all). Up in Newington, Maine, plans for a Mall show include a 200 x 200 roped-off area for a ukie demonstration. Out in Lodi, the Lodi Model Association had a display at the Weberstown Mall—plan to make it an annual. Shows are a great off-season project.
- The Prop Wash of the Garden State Circle Burners sported a group picture of the gang on the cover page this month. Haven't seen such a shot in ages—one reason being that modern editors are not receptive to "line-up" shots. Such shots, however, make grand mementoes for the members. I still have one of the old Flying Fools (Woonsocket, R.I.) that goes back to the early fifties. Looks like a fun group.
- This is the time of year that club dues are scrutinized and expenses gone over with a fine-tooth comb. The inevitable conclusion in these days of inflation is that the dues gotta go up. Inevitably, one of the chief causes is the cost of newsletter production. Typically, the usual bulletin costs fifteen cents to mail—and that's on top of production costs. Less typically, some of the bulletins we receive cost around twenty-eight cents to mail. Paper for ditto's and mimeo's has gone up over a buck a ream. We sympathize with the flyers who are footing the bills, but we hope that the bulletins keep coming. Newsletters perform many vital functions: they are the glue that holds a club together; they are the best means of supplying direct information; and, they are the single most important PR instrument in the business.
- Clubs and individuals are invited to send news, photos, letters and bulletins to Ed Whalley, 89 Lakeview Ave., Bellingham, Mass. 02019. We operate on a ninety-day basis with the deadline on the first of the month.

MRC/Tamiya Sand Scorcher

by Chris Chan

One of two, new, Off-Road, Baja Buggies for R/C fun on wet or dry terrain.

PHOTOGRAPHY: SKIP deYOUNG

Model: Volkswagen "Sand Scorcher" Baja Buggy
Scale: 1:10
Power: Mabuchi RS540/7.2 v., 6-cell NiCad pack
Channels Required: 2 (speed switch and reverse/steering)
Manufacturer: Tamiya Plastic Model Co.
Imported By: Model Rectifier Corp.

A great deal of the current popularity of electric, radio control off-road racing is a direct result of just one product . . . the Tamiya Sand Scorcher.

The 1:10 scale Sand Scorcher (and its open-wheeled twin, the Rough Rider) is a sophisticated high performance racer and an exceptionally well-detailed model.

Available as an unassembled kit, the Sand Scorcher requires a two channel proportional radio control system and a 6-cell NiCad power supply.

The kit itself is excellent, with well-illustrated, detailed instructions (English/with German subtitles). Materials and hardware are all first rate. Front and rear suspension pieces and the motor/gear enclosure are beautifully cast in alloy and allen head bolts are used throughout.

Despite the awesome array of parts and the complex nature of a four-wheel, independent suspension chassis, assembly was very simple. Continually, I was amazed at how well things seemed to fit and how thoroughly well-engineered the kit was. Tools, and even liquid thread lock and silicone were included.

And then there are those shocks. As you complete the suspension, you build four oil-damped shocks. Tamiya's shock kit includes an aluminum cylinder and brass fittings, all designed for easy assembly. After you top them up with the supplied oil and screw them together, you feel like Mr. Koni.

Total assembly of the chassis, including radio installation, took about five hours. I chose a Futaba 3FG system using S7 servos. Heavy duty servos are a good idea, even with Tamiya's spring-loaded servo saver. Off-road cars take plenty of abuse, so the tougher the servo the better.

The Sand Scorcher is designed for a six-cell, sub-C NiCad pack, the same as most 1:12 electric racers already use. MRC offers the Tamiya, plastic-cased pack with either overnight or 15-minute chargers, but I just slipped in a set of Leisure/GE's. If you use two 3-cell sticks of GE's or Sanyo's, they will just fit in the Scorcher's water resistant radio box.

One variation I made from the manual was to tap the battery pack with a diode for the receiver and servos. A common practice with 1:12 cars to save weight of the additional battery pack, it was of questionable value for off-road.

As much fun as the Sand Scorcher is to build, it is a total gas to drive. For starters, the car is very fast. I selected the lower (20:65) gear ratio, primarily to get the longest possible run time, but the speed is more than enough to generate great rooster tails of dirt and dust broadsliding around.

And the shocks and suspension really work! Flying over bumps, the Sand Scorcher

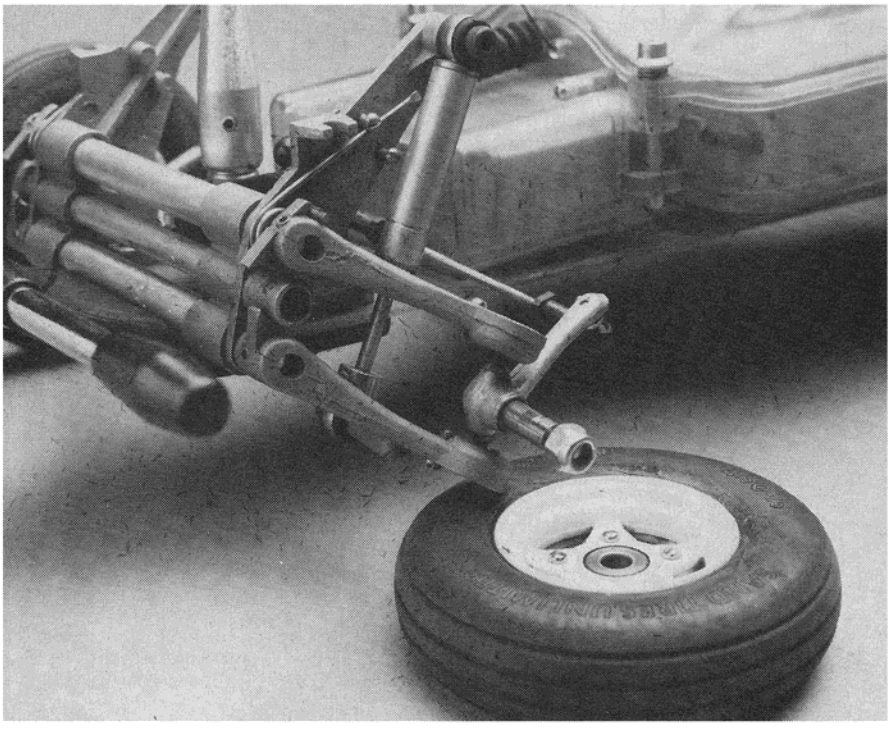
lands cat-like, always capable of generating power to the rear wheels.

The beauty of the Sand Scorcher is that you can run it practically anywhere. Dirt, mud, sand and grass are perfect for racing or just chasing the cat. But the Sand Scorcher isn't at home on asphalt, which can quickly chew up the soft tires and cause flips.

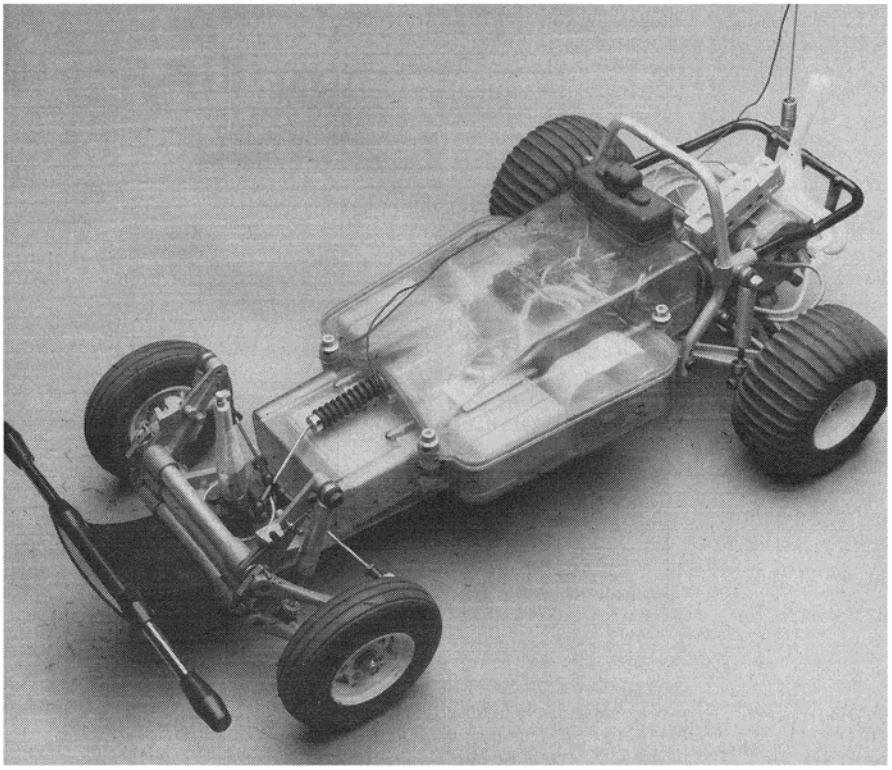
Unfortunately, the Sand Scorcher is not without faults. Weighing in at nearly five pounds (the 1:8 scale/Gas limit) the run time for the Buggy in rough terrain can be as short as four or five minutes. Because the car relies on some of that bulk for its remarkable stability, there isn't much the competitive off-roaders can do but have short races. Local California tracks race for just four or five laps, and that seems to solve the problem.

Speaking of Off-Road R/C racing, both club tracks and rentals are doing well out in California. Availability of essential spares (bumpers and rear half shafts) is getting better and racing accessories are beginning to appear. MRP has just released a pair of vacuum-formed, Lexan bodies that should prove very popular.

If you're looking for an off-road racer with a dynamite combination of performance and scale good looks, build Tamiya's Sand Scorcher, you won't be disappointed.



Realistic and functional, the Sand Scorcher's oil shock-equipped front suspension works to perfection. Excellent craftsmanship throughout. Note the scale tread on the front tires. The kit is very complete and comes with outstanding assembly instructions. Off-Road racing with two Baja Buggies is great fun. Try it!



Battery and radio equipment are housed in a water-tight case, that is shock mounted over the fiberglass chassis. The motor and gears are also enclosed for fun in the wet. Norice the large, soft, rear "knobbys". The Baja Buggies are available in two body styles: The Sand Scorcher, and Rough Rider.

starting line

by Chris Chan

This month's subject is the first annual FUTABA/FLYING MODELS Grand Prix held in Los Angeles.

There were a lot of "firsts" in the First Annual FUTABA/FLYING MODELS Los Angeles R/C Grand Prix (or LARCGP, for short).

The LARCGP, held this Winter on the Crenshaw R/C Club's site, was the first race organized by the Santa Monica R/C Racing Club (SMRCRC). And, the LARCGP marked FLYING MODELS magazine's first sponsorship of a R/C car event, donating the Trophy Dash award.

Another first was use of the Formula body class at a major race. Can-Am and sports car body styles, with increased downforce, have always been popular. SMRCRC reasoned that in terms of creating a unique, yearly event the open-wheelers were the way to go.

The gamble paid off. Despite short notice the race drew nearly seventy entries, including a number of current and past National Champions. Virtually all of the cars were concours quality, making for one of the prettiest racing fields seen in R/C car circles in quite some time.

Judging concours was particularly difficult with dozens of highly-detailed entries. The most humorous entry was definitely Bob Fujioka's "Kamekazi" Lotus, commemorating the December 7 race date. Other strong contenders for the Concours trophy included Butch Berney (Marlboro/McLaren), Andy Jacobson (Lotus) and Darrell Empey (Williams), but the unanimous winner was Mike Quarterman.

Carefully painting and hand-lettering an Associated Brabham body, Mike created a very convincing Formula One Oscella as driven by Eddie Cheever.

The racing program for the LARCGP was pretty standard. Stock motors (Donated by Associated) were handed out to all stock class drivers. Three classes would compete this year; Formula Tamiya (1:10), Formula Stock (1:12), and Formula Modified. All drivers were given assigned numbers and heats by advanced mailing and organized practice was followed by two timed heats.

The Crenshaw Club did a good job setting up a challenging course for the race. A nine-corner layout combined fast sweepers at both ends with a variety fast and slow turns through the infield.

Throughout practice and qualifying, no one was cutting a better line than works Associated driver, Mike Lavacot. Using a chassis virtually identical to the one shown in last month's FLYING MODELS Mike topped all qualifiers with a stunning 30 lap heat (the only 30 lap heat).

The Lavacot Brabham, very ominous in Black with blue trim, proceeded into the trophy dash along with Berney, Al Chuck, Clean Gene Husting and Costa Mesa's Tim

FUTABA/FLYING MODELS GRAND PRIX

Results

Formula Tamiya (1:10)
1. William Ormond/Renault (Lotus)
2. Jeff Abrams/Williams FW07
3. Brian Tobin/Lotus 79

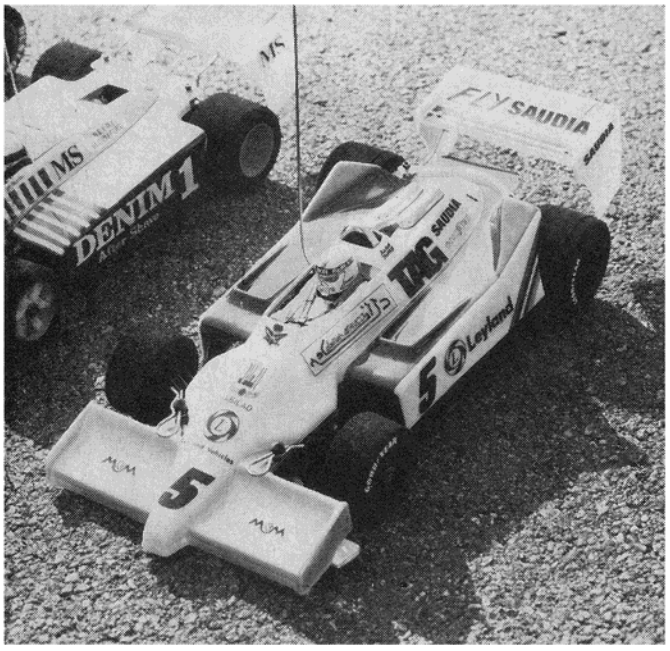
Formula Stock (1:12)
B Main
1. Joe Tentschert/RC12E
2. Andy Jacobson/Thorp
3. Midge Husting/RC12E

Formula Stock
A Main
1. Randy Tentschert/RC12E
2. Chris Chan/RC12E
3. Doug Kott/RC12E

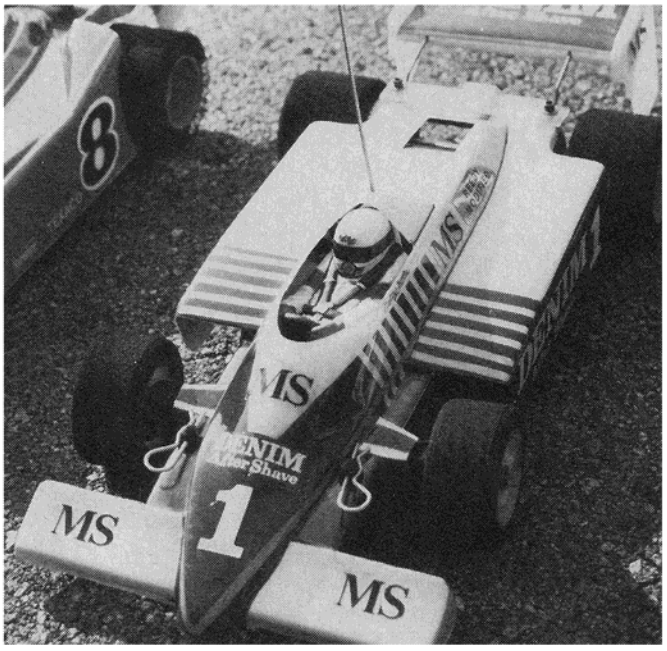
Formula Modified (1:12)
B Main
1. Kent Clausen/RC12E
2. Frank Killam/Leisure
3. Charlie Vehle/RC12E

Formula Modified
A Main
1. Mike Lavacot/RC12E
2. Al Chuck/RC12E
3. Butch Berney/RC12E

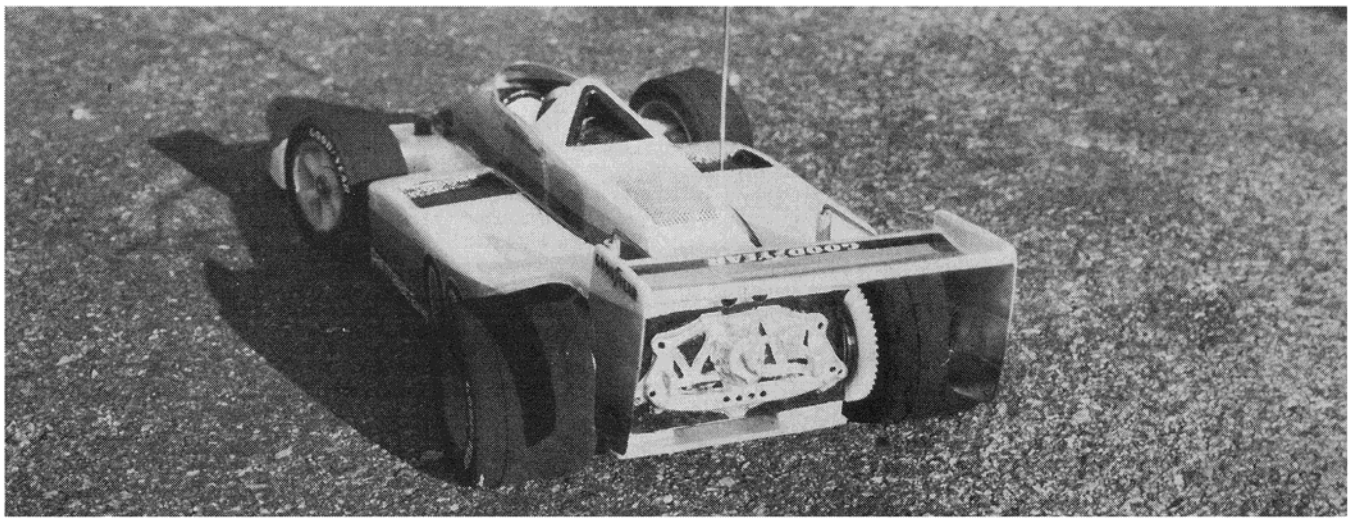
PHOTOGRAPHY: CHRIS CHAN AND FIELDEN LUNDY

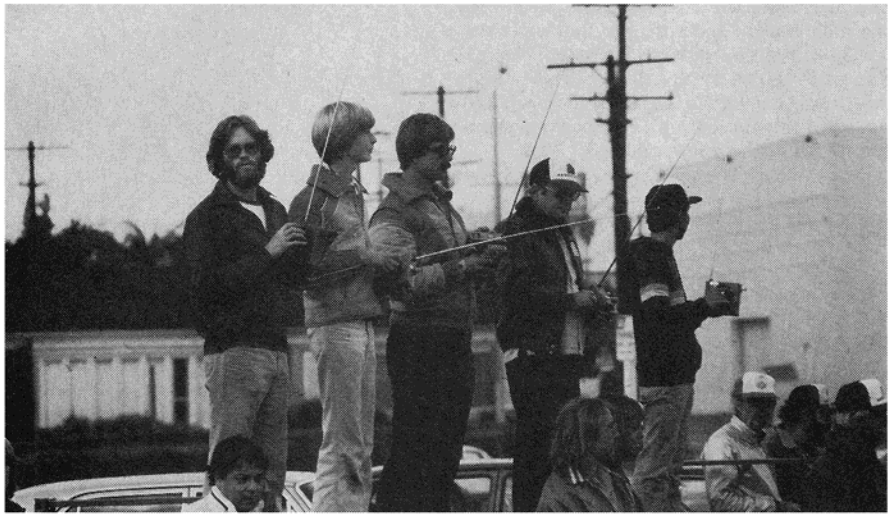


Mike Quarterman's highly original Oscella won Concours. The body is actually Associated's new Brabham, but Mike used a realistic paint scheme and some hand lettering for a beautiful transformation.



Another top concours entry was Darrell Empey's—Williams. Starting with an Associated Lotus, Darrell created a slick copy of the current full-scale Formula I Champion. Beautiful paint and detailing on these cars.





Al Chuck even vac-formed up some great little gearbox rear ends for the Factory's concours entries (**above**). The FLYING MODELS Trophy Dash got together the day's top five qualifiers (**left**). Left to right are Butch Berney, Mike Lavacot, Tim Neja, Gene Husting and Al Chuck.

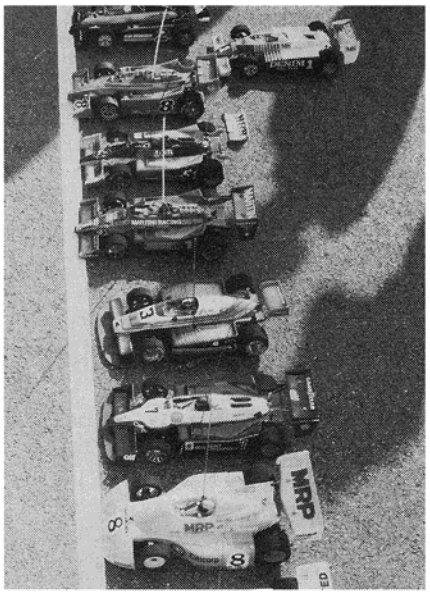
Neja. Mike motored right off and won the five lap FLYING MODELS trophy going away.

The Trophy Dash action was followed by the main events in each class. Drivers qualified for the mains based on the fastest of their two heat races. For Formula Tamiya just one main was held, while both Stock and Modified had 8-car A and B mains.

William Ormond and Jeff Abrams were definitely the class of the Tamiya class and they finished 1-2 in the final, followed by rookie, Brian Tobin. Craig Hilton, with his RC12E radio tray-equipped Tamiya, was a pre-race favorite plagued with interference problems. Ormond, incidentally, has constructed his own track on some business property, a great way to get in some practice.

Joe Tentschert, who edits Team Associated's "Racing with the Team" led the Stock B main from start to finish. Following Joe's RC12E across the line was the Thorp of Andy Jacobsen and Midge Husting's RC12E.

The 8-car Stock A main looked like a one-car race, too. At the start, Doug Kott's Lotus/Leisure grabbed a quick lead which he stretched lap after lap. Behind Kott, Randy Tentschert (Joe's brother) overtook Chan Racing Lotus and things began to settle down. Then, with the eight minute mark expiring, all three cars began their 29th lap. Still comfortably ahead, Kott's car slowed suddenly leaving the infield. First Tentschert, then I flashed by the crippled car. Doug did manage to limp home to take third.



Concours judging turned up a georgeous field of open-wheelers. That's MRP's brand new Penske (#3) body in the middle. Fantastic workmanship.

Next up came the rewind-powered Modified B main. Somehow National Modified Champ, Kent Clausen, didn't make the A main cut, and that was bad news for his B main competition. Despite strong, smooth performances by Frank Killam and Charlie Vehle, Kent simply overpowered everybody and romped to an early win.

If the Modified B main was a rout, then you can imagine how the A main racers felt. Lavacot, current National Stock titleholder, hadn't put a wheel wrong all day. The competition would race for second. Mike made it look easy (as he always does) leading the Factory's Al Chuck and Butch Berney to a 1-2-3 sweep for Associated.

Finally the victors were awarded their custom Formula car trophies donated by Futaba and a drawing was held with prizes donated by Futaba, MRP and Associated.

The First LARCGP was an exciting and memorable event, a fitting finale of the 1980 racing season.

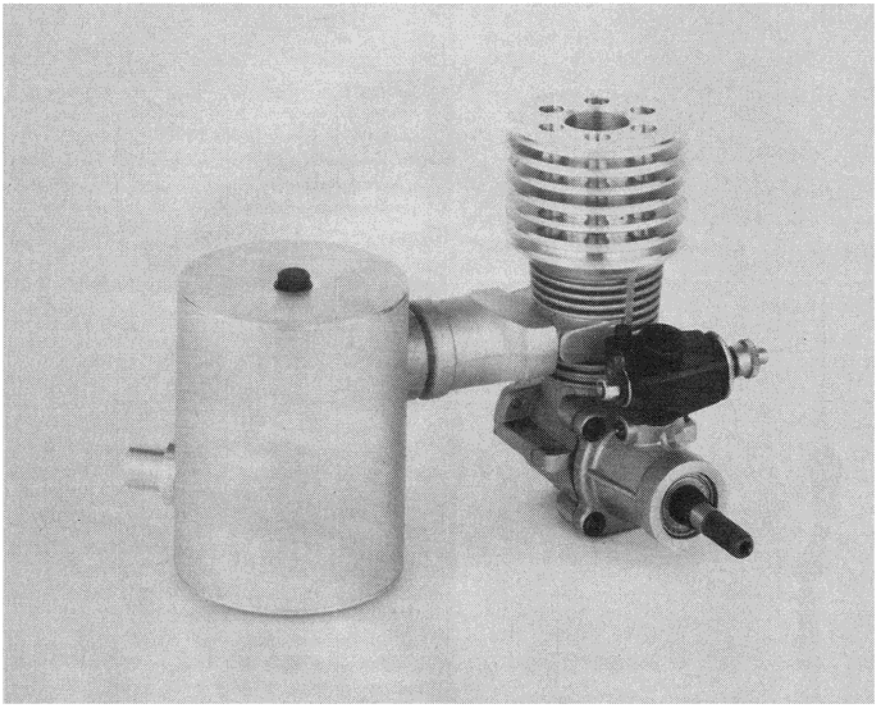
Pit report

TWINN-K INTERNATIONAL, INC., *P.O. Box 31228, Indianapolis, IN 46231,* and Parma International of Cleveland recently exhibited their model racing products at the Tokyo R/C show. This show usually limits all exhibits to Japanese manufacturers; however, an exception was made in 1980 and both Twinn-K and Parma International were allowed to exhibit their product lines. Parma is well known for their Lexon car bodies, controllers, cars and accessories, while Twinn-K is known for performance racing tires, and the GloBee line which includes glow plugs and the Fire Plug ignition system for cars, boats and airplanes. The products from both companies are widely used throughout Japan. For more information on Twinn-K products write to the address above.

TWINN-K, *P.O. Box 31228, Indianpolis, IN 46231,* announces that AJ's division of Twinn-K is now producing Starter Wheels for all of the popular engines starters, including the Sullivan Starter. The wheel is cut from rock hard sponge rubber to ¾" wide. It is silk screened and comes ready to be used on any 1¾" start hub. By adding AJ's Starter Wheel all airplane starters become a starter for radio control cars also. The wheel doesn't interfere with the starters ability to start airplane engines. The Starter Wheel is priced at $2.50 each. For more information write to the above address.

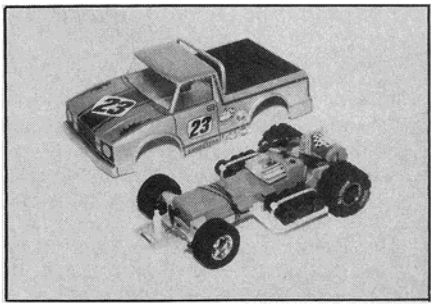
TWINN-K, INC., *P.O. Box 31228, Indianapolis, IN 46231,* has released their new 1/12 scale tires in new dimensions. The direct result of these new dimensions is a lowered center of gravity which actually improves the drivers ability, performance and control. The dimensions of the new front tires are: one inch width (25.4mm), 1⅜" inside diameter (35mm), 1 13/16" outside diameter (46mm). The rear tires spec out at: 1½" width (38.1mm), 1⅜" inside diameter (35mm), 2⅛" outside diameter (54mm). For more information write to the above address.

Product spotlight:



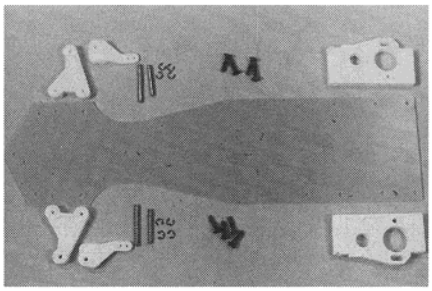
BAVARIAN PRECISION PRODUCTS CO., *22 East Ave., New Canaan, CT 06840,* is now producing a muffler and muffler adapter for their H.B. .21 Race Car Engine. The muffler attaches securely to the engine without the use of hardware of any kind. This unique design features an internal "O" ring which holds the muffler tightly in position. This feature will allow the user to place the muffler in any position, making installation a snap. The large size of the muffler assures adequate cooling of the exhaust gases and eliminates back pressure. The Car Muffler (#7035) and Engine-Muffler Adapter (#7034) are available from the above address.

PARMA INTERNATIONAL, INC., *13927 Progress Parkway, North Royalton, OH 44133,* announces new International decals, the best from Europe and America. For more information write to the above address.

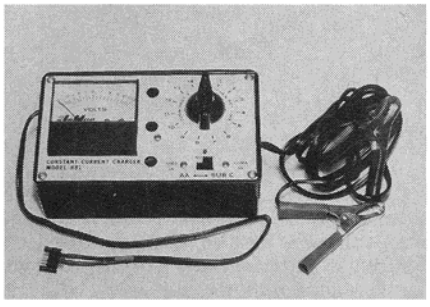


JOMAC PRODUCTS, *12702 N.E. 124th St., Kirkland, WA 98033,* is now producing their All Terrain Vehicle, that is designed for off-road fun in grass, dirt and bark. The complete kit (#111) includes an 05 type electric motor, six (6) Nicad batteries, resistor/wiper arm type motor speed control, charger, radio mounting plate, complete mounting and operating instructions, Lexan Jerobee chassis and knobby tires. Other features include: high current ribbon wound resistor, wired with plugs for easy motor, battery or resistor change. #740 mounting plate for radio, servos, resistor, battery, antenna and switch. Assembled charge cord for 15 minute fast charge (works from a 12 volt source). A ROAR Class D Stock legal .05 race motor that has been balanced and lacquered for reliability. A heavy-duty hex rear axle. Six sealed fast charge G.E. Nicad batteries that have been wired and dip protected. Brass

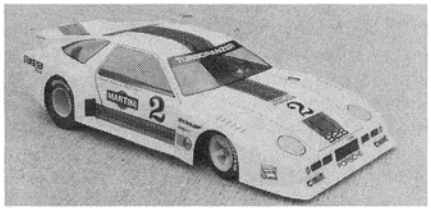
bushed front wheels. Two cells disconnect for four cell operation. Foam knobby rear tires. Chrome cycolac wheels. Ford Courier Lexan body. ¾" ground clearance. The All Terrain Vehicle has a top speed of 20 m.p.h. (33 kph). The wheel base is 7½" with a width of 6¾". For more information write to the above address.



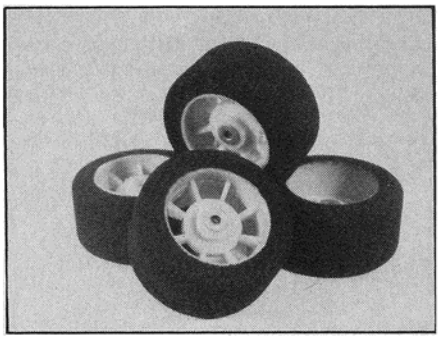
BOLINK/CHAMPION, *420 Hosea Rd., Lawrenceville, GA 30245,* offers their Challenger parts separate for the modeler and serious racer. This service allows the racer to build his own car to meet specific requirements. Bolink/Champion offers a complete catalog of these parts. To receive one or to obtain more information about Bolink/Champion's services; write to the above address.



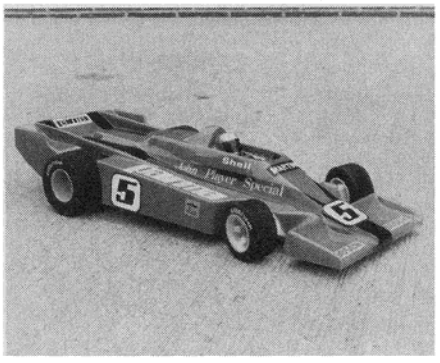
JOMAC PRODUCTS, INC., *12702 N.E. 124th, Kirkland, WA 98033,* is producing the model #801 Electronic Constant Current Charger. Using a 12 volt source (car or motorcycle battery), the #801 automatic charges all AA or sub C nicads cells; fast charging first, then switching to trickle charge for cell equalization. Built-in features of the #801 include a 1-10 volt meter and a 15 minute timer. For more information write to the above address.



PARMA INTERNATIONAL, INC., *13927 Progress Parkway, North Royalton, OH 44133,* has released a ⅛ scale body of a Porsche 928. This is their idea of what the famous Porsche factory would make for group 5 racing. For more information write to the above address.



PARMA INTERNATIONAL, INC., *13927 Progress Parkway, North Royalton, OH 44133,* is producing new front tires and wheels mounted in soft, medium firm and hard compounds for indoor and outdoor racing. For more information write to the above address.



PARMA INTERNATIONAL, INC., *13927 Progress Parkway, North Royalton, OH 44133,* introduces a new body, the ⅛th scale Lotus 80. An original design by PB of England, this body is also being produced by PARMA in both clear and painted versions. For more information write to the above address.

TWINN-K, INC., *P.O. Box 31228, Indianapolis, IN 46231,* offers new 1/12 Scale Traction Cut Tires. These tires are said to offer superior traction on both carpeted indoor tracks and on outside running surfaces. The rear tires are pre-tuned, ground perfectly round and then traction cuts are precisely ground into the running surfaces giving the car greater handling during races and allows the driver to better control his car through difficult maneuvers. These tires are priced at $5.50 per pair. Write to the above address for more information.

TWINN-K, INC. *P.O. Box 31228, Indianapolis, IN 46231,* has a 1/12 Scale R/C Tire Guide available. A leader in the R/C tire field, Twinn-K has on staff a Research Director who is constantly testing all of the rubber compounds that are available to us. As a result of this full-time research and development program Twinn-K is able to publish this helpful tire guide. Twinn-K presently produces tires in seven distinct and different rubber compounds. Their new cutting and finishing equipment allows tolerances of less than .005" from perfect concentricity to be held. The chart allows the R/C racer to match his tire selection to the type of surface that he will be running on. For more information write to the above address.

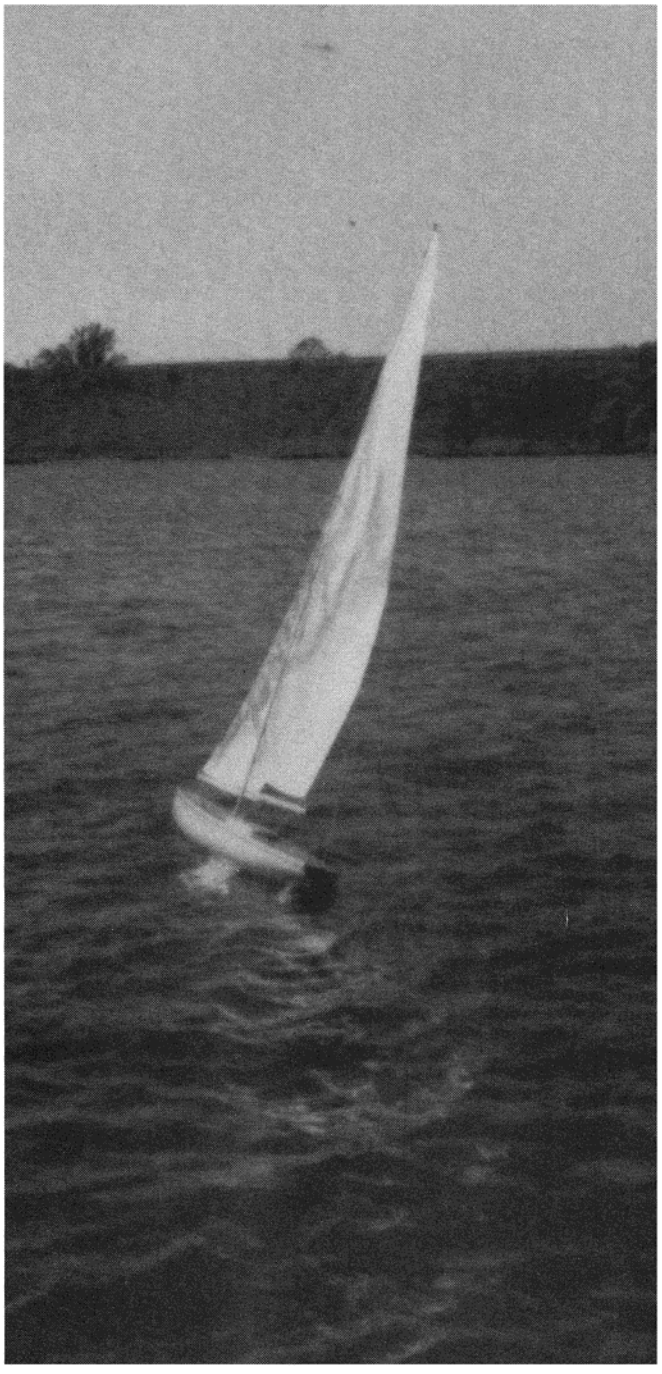
An FM Product Review:

Dumas' Bingo Sailboat

by Don Bilsky

A consistent winner in the 50/800 class, and a fine kit.

PHOTOGRAPHY: DON BILSKY



The summer of 1980 was when I bought lots on a lake in the hills of southern Indiana. The swimming and skiing were really nice, but I also wanted to take advantage of the water with my R/C power boats. What good was being on the water if I couldn't run my boats? Well, one weekend I decided to take the boats down and run them. When I started the engine the noise was shocking. I ran it anyway and then asked the neighbors around the cove if they minded the noise. They were all very nice and said no and thought it was interesting but I thought they wouldn't appreciate it every weekend, so I built an electric boat. That was alright but didn't draw much attention, which was always nice. I decided to build a sail boat. Now all I had to do was decide which kind. After some discussion and thought I decided on the "bingo" 50/800 sail boat made by Dumas Boats, 909 East 17th Street, Tucson, Arizona 85719.

Maybe the first thing you should know about the 50/800 class of boat is its history as taken from the introduction to the instructions from Dumas: The story of the rapid increase in popularity of the 50/800 Class was almost like a dream. In 1930, Roy F. Clough, conceived the idea of a class that would be limited to 50 inches overall and 800 square inches of sail area—just the type of model the average model yachtsmen wanted. It limited the length so that a model could be carried conventiently in an automobile trunk. The sail area was large enough to allow a hull that could obtain good speed. So rapidly did this class become popular that it was not long before it was adopted by many model yacht clubs throughout the country. The class was recognized as a national class in 1932, and as an international class in 1937. Since its adaption to radio control in recent years, the class has taken on new life, and is undoubtedly the most popular class of racing sail models in the world.

The Bingo was designed as a model by Doug Peterson, the renown large sailboat designer. From its beginning the Bingo was a highly successful model yacht. It was obviously a plumb bow model with a full waterline, which proved through the years to be a winner.

The Bingo is fast to windward in all wind conditions. It is an 18 pound model yacht encompassing a compromise of stability, displacement and beam. The underwater hull features a shallow for-and-aft rocker, full bilge curves, and a gentle bustle aft to produce a smooth wake and help longitudinal stability. The design also incorporates a moderately high aspect sail rig and has proven very stable in wind conditions up to 17-18 knots. The Bingo is an exciting 50/800 model yacht for both the novice and serious competitive skipper.

General

There is something exciting about waiting for a sail boat kit to arrive and when it does and you open it you find that all the materials are of the same high quality that marks all of the Dumas kits. The hull is white fibreglass as is the deck and show no flaws whatsoever.

The instructions were the most complete

and indepth that I've ever seen. As I go through the construction of this kit I will comment on just a few of the areas and also draw from the instructions for more precise information.

Construction

Please read the entire assembly manual before starting to build your Bingo. Since all components of the model are inter-related, it is necessary that you have a clear understanding of the overall configuration and general theory behind the design. In addition to the parts provided in the kit you will need to purchase the following:

Small Paint brush
Ten pounds of #9 or #10 Lead shot
One pint of Hobbypoxy polyester resin
One pint of acetone
One roll each of 2" and ¾" masking tape
Selected hand tools
Microballoons (from hobby shop)

Stand

The first project you will find in the instructions is a field stand. Do this first because you will need to use it when you start the hull construction. The stand is easy to make and is described in the instructions fully. It will only cost you $5 or $6 to make it.

Hull, Keel, Rudder

The transom needs to be fibreglassed into the hull. For this I use Hobbypoxy fibreglass resin and added microballoons to form a paste. After locating and taping the transom in place I use the paste to glue it in place. For added strength I used strips of fibreglass cloth to reinforce the inside.

To prevent hull deformation caused by supporting the weight of the keel when the boat is heeled over by the wind, install forward and aft bulkheads. Use a paste of resin and microballoons to cement bulkheads to the hull and to form a generous fillet on both sides of each bulkhead.

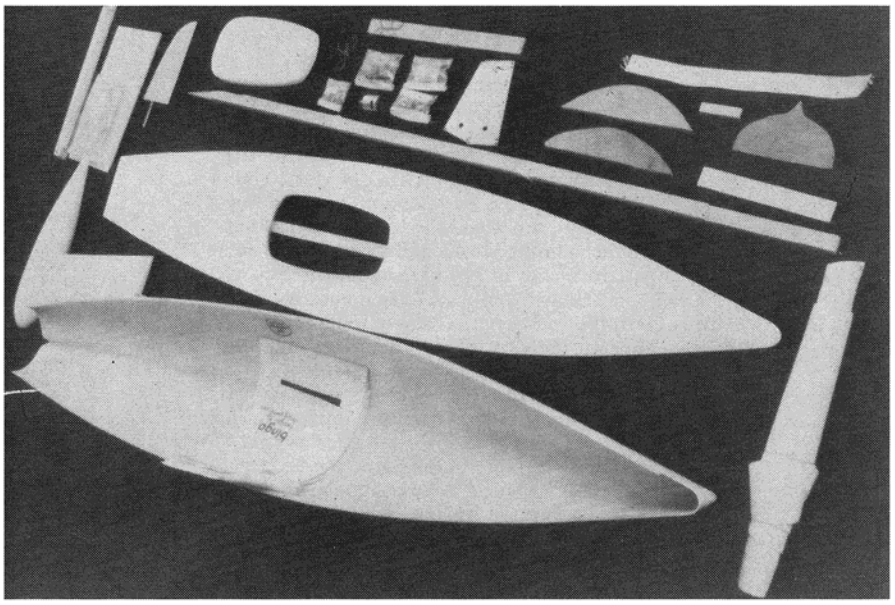
To support the keel studs that come through the bottom of the hull cement a ¾" wide by 1" high by 6" long piece of pine in the bottom of the hull where the studs would come through. Drill two holes according to the instructions in the bottom of the hull and through the pine block and glue brass tubes into them. The keel can be temporarily fitted on the bottom by sliding the studs up into the brass tubes and bolted where they come through the pine block.

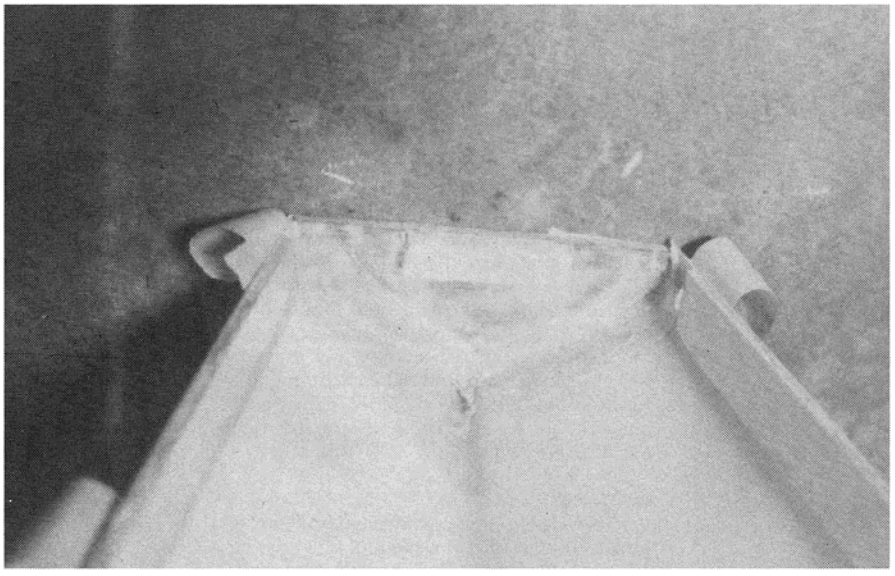
The keel has very little work to be done to it. About the only thing you need to do is fill it through a hole in the top with ten pounds of #9 lead shot.

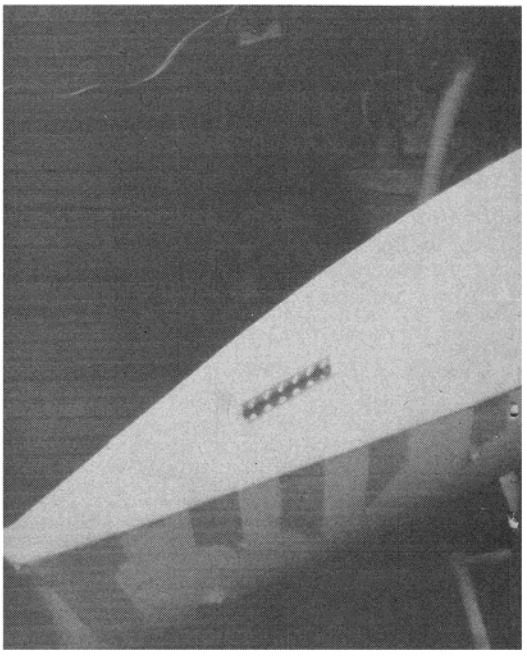
The rudder is supported by a brass tube which is glued through the bottom of the hull and cemented through a piece of pine running to each side of the hull. The top of the brass tube needs to be above the water line. If you don't get this installation right the first time, you'll have trouble later because when the deck is cemented on you can't get into this part of the boat.

R/C equipment and sail control unit

It is recommended that simultaneous sheeting of jib and main sail be used. This system is used by a majority of skippers. Limit switches are set-up to stop the SCU operation at a closehauled and running free positions of the horizontal swinging double-ended arm. This system allows a proper relationship to remain between the jib and main sail at all times. The double purchase







The contents of the kit are shown here (**top**). You'll find the same high quality material in this kit that is found in all of the products from Dumas. The transom needs to be fiberglassed into the hull (**above**). Hobbypoxy Fiberglass Resin was used here. Micro balloons were added for strength. Masking tape is used to secure the deck while the resin cures (**right**). Check deck for proper location.

set up on the extreme ends of the horizontal arm are needed to ensure the jib and main sail sheets are long enough to allow the jib club and main sail boom a 90 degree run from closehauled to the running free positions.

Control of the SCU is by a double pole, double throw, center off switch. A wiring diagram for the sail control unit is included in the SCU kit. The SCU is powered by a separate battery carried in the model hull. Rechargeable NiCad batteries or dry cells will do the job.

The waterborne R/C equipment (receiver, battery pack, On-Off switch and servos) is mounted on a platform. Because there are so many possible arrangements, and so many kinds and sizes of R/C equipment, it is difficult to specify dimensions.

The rudder servo and rudder arm are connected through rigid push rod or ¼″ × ¼″ spruce with adjustable clevis on each end. Full servo throw should produce a 35 degree angle deflection of the rudder from centerline in each direction. Drill another hole in rudder arm if necessary or use a longer arm on the servo. Experience with your own gear and sailing style may dictate changes.

The R/C battery pack and SCU battery pack location are generally a matter of personal preference, but it is recommended that they be separated as much as possible and kept as low in the hull as possible.

The Dumas-Probar SCU is a swing arm motor driven unit to supply power to trim the jib and main together. For the Bingo the length of the arm to be made from the 3/16″ × 1 × 12″ piece of plastic should be 7½″ to swing inside the hull. Locate the center of the arm about 26 inches from the bow.

Deck installation

Except for leading the main sail and jib sheets through the sheet exit guides, all the inside work should now have been completed. Once the deck is mated, everything else must be done through the deck hatch. If you have skipped anything, go back and *Do It Now!!*

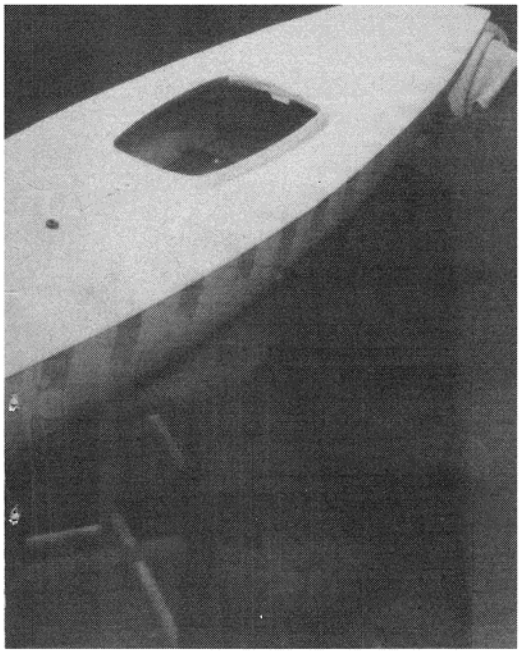
Cut out the wood strong back which goes across hatch opening and bevel the ends of the wood. Lay the deck on the hull to make sure it fits properly. Remove any excess resin or rough spots until it fits.

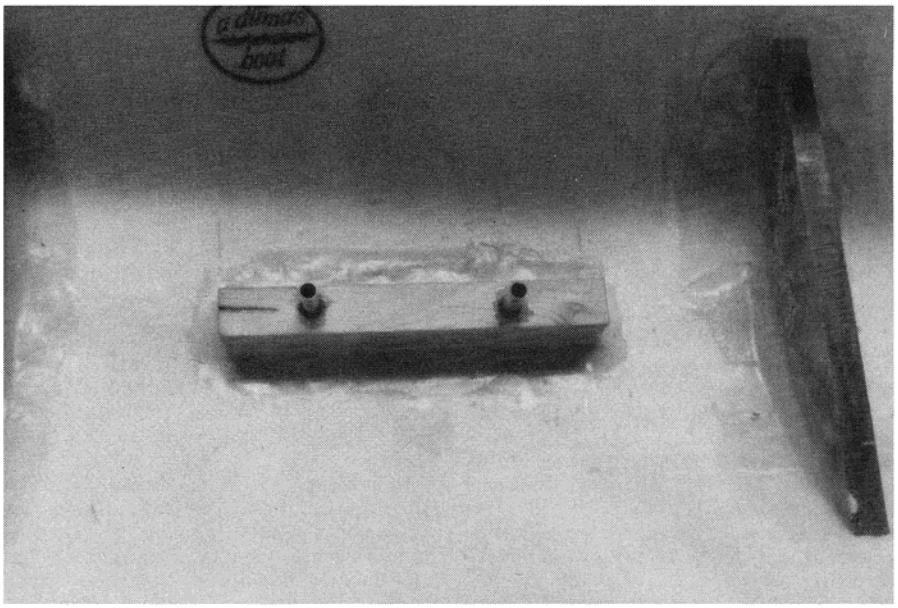
Mix about four ounces of resin and enough microballoons to thicken the resin to a consistency of thick syrup. Before going any further, tear off about 36 five inch pieces of two inch wide masking tape—these pieces of tape will be used to hold the deck in place while the laminating resin cures. For the next operation, it is wise to work with another person. Mix 16 drops of catalyst with the thickened resin and stir thoroughly and coat both the tip of the sheer clamp and the underside of the deck edge. It is recommended that one person do the hull while the other does the deck. Place the deck on the hull carefully making absolutely sure it is properly located. Hold the deck in place with generous amounts of two inch wide masking tape you previously prepared for this purpose. The hull must line up with edge of deck. Space these pieces of masking tape about every two or three inches all the way around the hull.

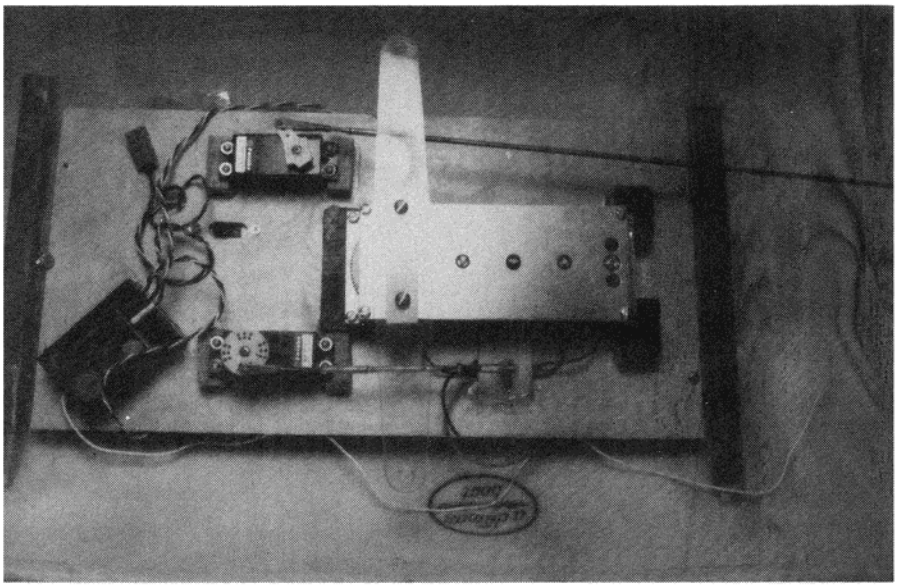
Sand edge of deck flush with the edge of the hull. If you do not plan on painting your hull, run tape along the side of the hull just below the deck to keep from scratching the gel coat.

Mast, mainsail boom and jib club

All three blanks are cut from clear white







The author used a piece of ¾″ × 1″ × 6″ pine to support the keel studs where they come through the hull bottom (**top**). The waterborne R/C equipment (receiver, battery pack, on-off switch and servos) is mounted on a platform (**above**). The rudder servo and rudder arm are connected through a rigid push rod with adjustable clevis on each end. The Dumas Pro-Bar Sail Control Unit is also seen here.

pine. The jib club is approximately 15″ long. The boom is approximately 13½″ long. The mast is 80″ long. To facilitate shipping, the mast is cut into two pieces. Coat the surfaces of the mast, splice with resin after mixing catalyst and join. Ensure the splice is straight, then clamp until the resin cures. Next drill a ⅛″ hole ¾′ deep in the base of the mast and insert the one inch piece of ⅛″ diameter brass rod. After the resin is fully cured remove clamps, shape and sand the three blank spars as desired. Generally, the spars should be shaped to a tear drop or elliptical cross section. The trailing edge of the mast must be straight. Finish sanding with fine sandpaper and apply at least two coats of resin or three coats of spar varnish, sanding between coats.

Rigging

This is a task in which I would recommend having another person around to help. The rigging is done with braided nylon covered wire and 100 pound test Dacron line. The mast needs to be held straight while you attach the wire and line and the extra pair of hands makes it 100 percent easier. The instructions are, to say the least, complete in the rigging section. They are also lengthy enough that you will have to read them when you get the kit.

Tuning and sailing

Now to the fun . . . your model can be sailed in any pond, lake or river which provides 18″ or more of water, and room to maneuver. A word of caution, if you plan to sail in salt water be sure to protect your R/C equipment and SCU from the salt water corrosion that will follow if it gets wet. Also wash the model off after sailing in salt water.

If you transport your model in a station wagon or pickup, you won't have to remove the keel, however, it is advisable to take the keel off if you have only a trunk of a car for transporting the model. Remember, the keel is heavy and kind of fragile. It won't withstand a drop to the ground or heavy impact with a foreign object. It is usually possible to leave the sails rigged on the mast. This will save rigging time at the pond and reduce wear and tear on the sails.

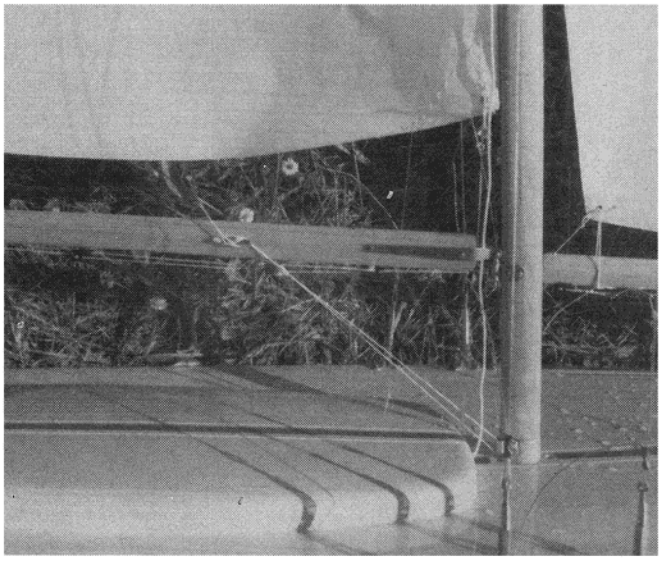
Upon arrival at the pond set the hull up into the wind on the field stand and connect the keel if it isn't already attached to the hull. Next hook the jib swivel hook into the jib rack, step the mast, and thread the lower, middle and upper shrouds to their respective turnbuckles. Tighten the lower shrouds first adjusting to position the mast vertically. Oh yes, connect the backstay and tighten slightly. Adjust the jibstay and backstay to position the mast at the desired rake to the waterline. Adjust the middle and upper shrouds to ensure the mast is straight laterally. The lower shrouds are also used together with the backstay to control the fore and aft curvature of the mast. But until you get to know your model, keep the mast as straight as possible. Later you may want to put some fore and aft curvature in the mast for flatter sails.

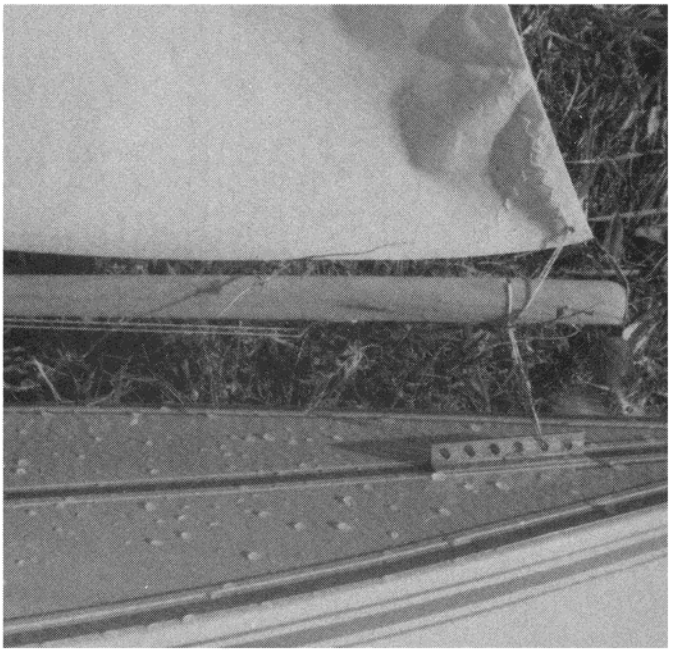
Be sure to secure the R/C receiver antenna to either the backstay or mast, depending on your personal preference. The 27 MHZ band radio can be operated with the antenna in the hull and control of the model maintained at near maximum range. The 72 MHZ band radio antennas should be brought topside and run up either the backstay or mast. The reason for this is that the 72 MHZ band has no water penetration. To prevent the loss of control bring the antenna topside. Do not make electrical connection to the metal stays.

Next be sure the mainsail and jib sheets, all halyards, downhauls and outhouls are connected and properly adjusted. Turn on your transmitter and receiver in that order, and sheet in the sails all the way to a close-haul position. The mainsail should be sheeted in fairly tight, while the jib club position is about half way between the mast and middle shroud. Put a little tension on the luff of the jib and mainsail. Check the rubber and sail control operation. If all checks are satisfactory, launch your model and hope you hooked up the rudder clevis to the rudder servo.

If your batteries are charged, let's go sailing. Set the sails for closehauled and steer the model to an angle of 45 degrees off the wind. Bring the rudder amidships and observe the model's response. A properly balanced model will sail to windward with only the slightest amount of rudder trim carried which would tend to make the model bear away from the wind. This is called weather helm. If the model continually tries to luff up into the wind, rebalancing the rig will be required. Move the entire rig forward to reduce the tendency for the model to head up into the wind. Fine adjustment can be made by moving only the jib, but it is recommended keeping the jib leach close to the mast in order that the jib may have as direct an influence on the mainsail as possible. Final adjustment can be made by slightly raking the mast to bring the model to point where it will balance better with just a small amount of weather rudder trim cranked into the transmitter. When running downwind it is advisable to get the mainsail on one side of the model and jib on the other side in the configuration known as "wing and wing".

It will take some practice to hold the wing and wing configuration. It is easier if you don't try to sail directly downwind, but at some angle off such a course, preferably slightly upwind. For further tips on sailing consult any of the good books written by full size boat skippers. Tips on handling model yachts are most likely to be found in the pages of the quarterly newsletter of the American Model Yachting Association. A membership application is included with your kit and you are urged to join. Hope to see you at the pond.





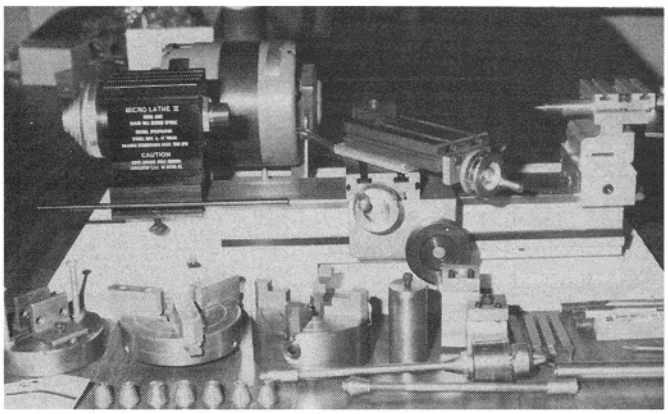
Some of the rigging on the jib club and mainsail is shown here (**above** and **right**). It does take time but it's worth it! The author suggests building the field stand first, to hold the Bingo during construction.

An FM Product Review:

Taig's Micro-Lathe II

by Al Berry

This rugged and inexpensive unit would be a welcome addition to any modelers shop.



PHOTOGRAPHY: AL BERRY

Last year when I bought a lathe I had a hard time getting good information about it. After checking out two or three different models, I decided to try the Taig Micro Lathe. The Taig Lathe was designed for use in schools, small shops, and light industrial applications. It was a very husky and heavy built unit.

You are probably thinking a lathe like this is priced out of range of the every day hobbist. Well its not in fact its cheaper than any we looked at. I'm pleased to say that the price is the only thing I found cheap about the entire unit. It features some of the highest quality parts, materials, and craftsmanship in the world. As you will see in the specifications later, the lathe features things like life time ball bearings on the spindle, 15 inch machined and stabilized steel bed, six speeds ranging from 525 to 5200 rpm, .001 graduations on the cross slide dial, all angle tool post, carriage depth stop and lets not over look a full one year unconditional warranty on parts and labor. As I see it, Forest Bailey, the owner of Taig Tool Co., has bridged the gap for the hobbiest with a low cost precision metal cutting lathe. Lets take a look at some of the specifications on the Micro lathe.

General Specifications

Over all working accuracy .0005 (5/10,000 of an inch)
Maximum bearing run out .0004 (4/10,000 of an inch)
Headstock normality to bed .0004 in maximum error
Cross slide normality to bed .0004 in maximum error
Maximum taper bed dovetail over pins .0001 of an inch
All machined dovetails 45 degrees
Bed width 2 5/16 of an inch
Cross slide dial graduation .001
Cross slide screw ¼-20, adjustment for backlash takeup provided (jam nut arrangement)
Carriage travel .500 in one revolution of hand wheel
Maximum spindle speed recommended 7000
Motor requirement ⅛-¼ (1800 rpm)
Pulley type standard ⅝th inch bore multi-step V belt
Length of head stock on ways 2.875 inches
Length of carriage on ways 3.000 inches
Width of cross slide on carriage 2.000 inches
Tool post may be adjusted for angle cutting (chamfer, boring, etc.)

Spindle Specifications

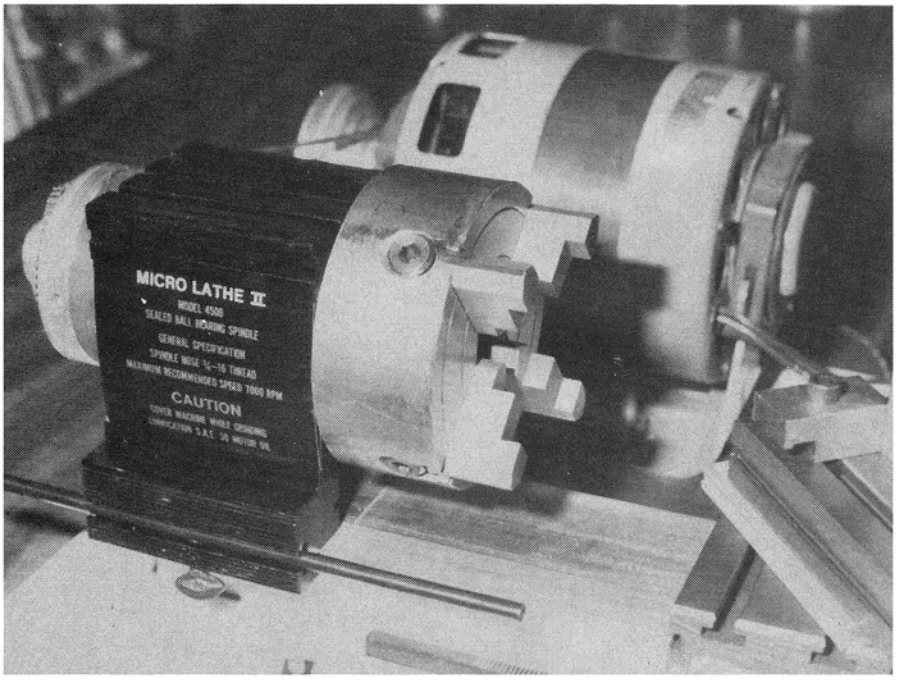
Sealed precision ball bearings 1.5748 O.D.; .6692 I.D.
Spindle nose ¾-16 (¾ SAE)
Spindle hole .343 of an inch
Spindle I.D. taper 15 degrees
Max. collet dia. 9/32th of an inch
Pulley size ⅝th of an inch bore

General Capacity of Model (#L1017)

Swing over bed 4.5 inches (Max. turning dia. 4.5)
Swing over cross slide 2⅝th diameter
Overall length of bed 15 inches
Overall length of lathe 16.5 inches
Tool bit size standard ¼th inch
Drill chuck cap. ¼ of an inch
Distance between centers 9¾ inches (tailstock optional)
Carriage travel nine inches
Cross slide travel 1¾ of an inch

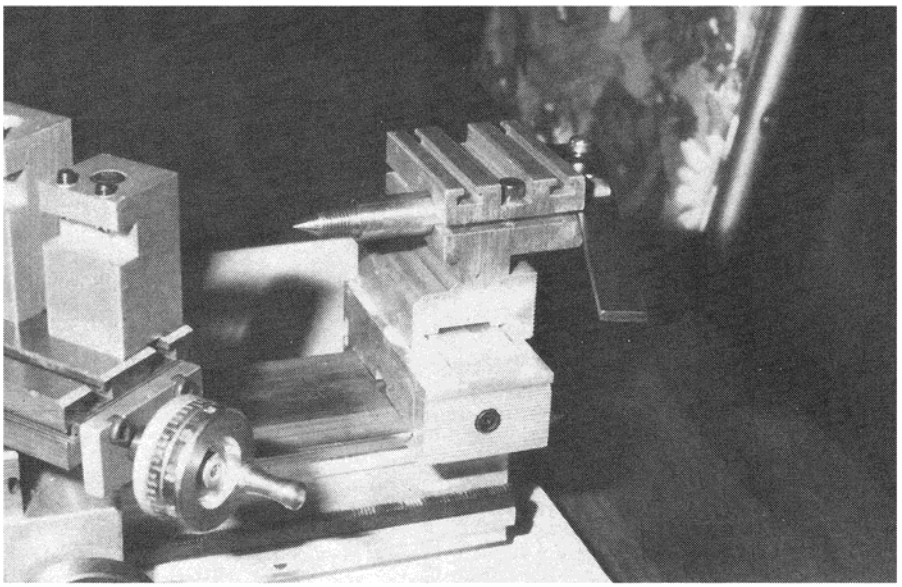
Well what do you think about those specifications for the modelers?

We have literally machined everything a modeler would ever want with ours. It doesn't matter whether you're making model engine parts or watch stems, you'll get a real pleasure with good equipment. We started by making simple things at first, like venturis, prop washers, and the likes. Later I got into making exhaust throttles, heads, flywheels and bar stock front ends. I even designed and built a small exhaust driven turbo-charger for some of our old engines. The turbo worked so well it created quite a stir in the hobby world. The only thing I haven't tried yet, is machining a complete engine. Oh well, give me a few months and I will. I hope you enjoy your lathe as much as I do.

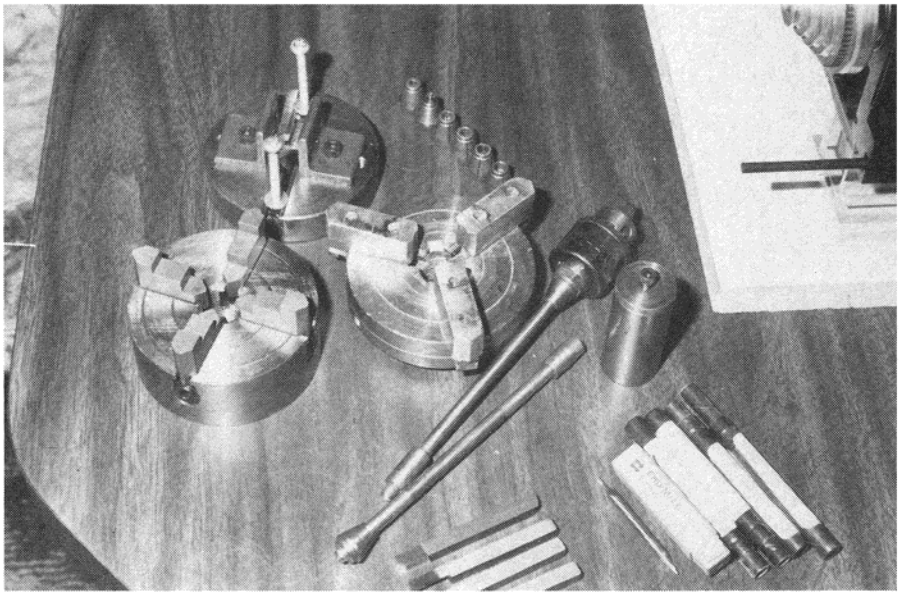


This is the complete Taig Micro Lathe with all of the optional equipment (**top**). This is a photo of the spindle and head stock with the four (4) jaw chuck (**above**). Note the carriage stop.

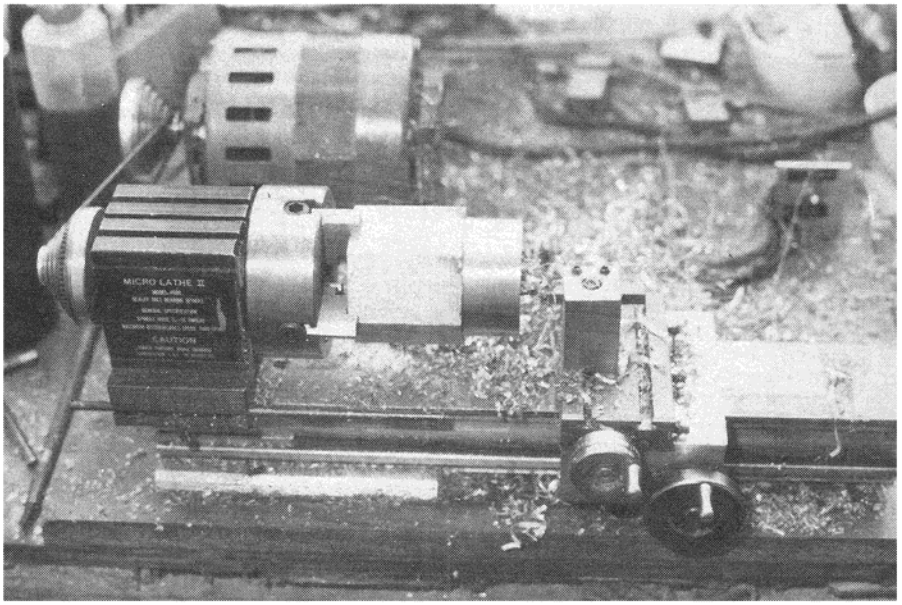
The tail stock comes with an adjustable lever action. This dead center can be removed and replaced with a live center. The live center has needle bearings. This is a rugged unit.



Shown here is the four jaw chuck, three jaw chuck and the universal faceplate. Behind the chucks is a set of collets. In the center is a drill chuck and adapter. On the far right are six end mills and four high speed cutters.



In this photo we can see a large, aluminum, hex bar being machined down into a round cylinder. The Taig Lathe can really cut a heavy load if needed. Note the belt drive from motor.



Exhaust Throttles

by Ed German

Used for many years on model airplanes, this method of controlling an engine is now becoming popular in the boating world.

What's an exhaust throttle? To some, it's that additional piece of "clap-trap" connecting the engine exhaust port to the tuned-pipe with a control arm stuck on it. To many experienced boaters, it's an old airplane device, seeing considerable rebirth controlling the speed of high performance, competition racing hulls by variably constricting exhaust flow.

I've used numerous (four) different manufacturer's exhaust throttles over the past few years; primarily as an alternative to carburetors that either broke, or that I couldn't acquire in time for the next race. But this past year, I started seriously using one on my deep vee with a K&B 7.5 (with stock venturi) and found that the throttle response was seemingly better than the well-known stock K&B 4049 carb that I had been using (with bored out (60/1000") spray bar). I've since tried an exhaust throttle on an OPS .40 with the same results (with the OPS 9mm carb simply wired open).

But are exhaust throttles, with their additional "clap-trap" and expense, really worth the trouble? And, am I really seeing better response? I'm not all that objective about things I do. So, I got in touch with a couple of quite respected model boaters who have no vested interest in exhaust throttles: Marten Davis, well known for his Crapshooters and Don Pinckert, similarly known for his Gators.

Within the "small-stuff", both gave high marks to the use of exhaust throttles. And both suggested that an even better way to go is to use your normal carb linked to the exhaust throttle. The best of both worlds may be obtained then. It's a simple matter to bend a 1/16" push rod to do this job for you ("quick links" and keepers can be used for adjustments and reliability, if desired.)

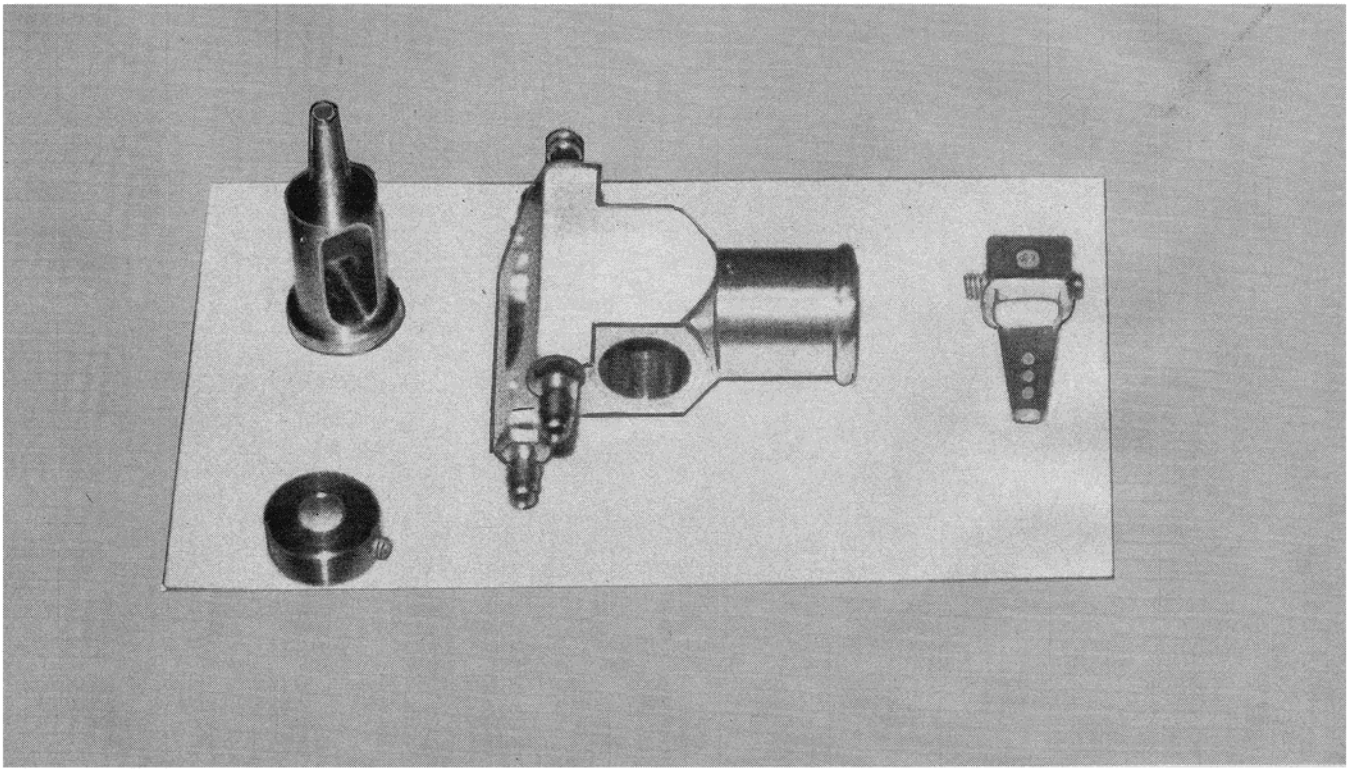
In a nutshell, the positive reasons for using exhaust throttles given were these:

1. Quicker acceleration out of the turns; the engine gets up to revs quicker.
2. Better deceleration, especially on hydros, as the engine doesn't appear to "load up" as much when throttled back; the exhaust throttle acts as a baffle retaining heat in the head and plug.
3. Better idling at launch (for hydros) and for vees on single end milling on small ponds.

On the negative side, the only prominent factor is additional cost ($40-$50 List) for a well designed, water cooled throttle. It is worth pointing out that K&B's 7.5 butterfly exhaust throttle is worth replacing, as the units that I've tried (six) have had such large "blow-by" that effective idling in the water, or on shore, is virtually impossible.

But wait, don't got away! Marten Davis, especially, has pointed out a danger with the exhaust throttles. On .60 engines, and also on .40's, water-cooling becomes a significant factor in the turns for hydros due to engine loading (and probably also for the new vees that can be driven through the turns). He suggests mandatory use of the rudder water

PHOTOGRAPHY: ED GERMAN



The disassembled exhaust throttle is shown here. The pieces include a brass barrel, retaining collar, water cooled aluminum frame and throttle arm.

pick-up with exhaust throttles on .60's and .40's in oval heat racing. .20's (3.5's) may not require them as they need to run a little warmer. Both Davis and Pinckert already use the rudder water pick-up (as do many boaters) for better cooling with carburetors. A simple, inexpensive how-to construct your own rudder pick-up was given in February 1980 FLYING MODELS or you can purchase a ready made one.

Don Pinckert recommends maximum rudder pick-up hole sizes on the order of 50/1000". But Marten Davis suggests as large as 62.5/1000" (1/16") on .60's; he'll sacrifice drag for cooling. You take your pick!

This writer would prefer a simple, single, sturdy, big-throated, easily adjustable carburetor with separate idle and speed jets but few seem to be available considering the spectrum of engines and classes. Maybe it's too tall an order. The exhaust throttle is a viable alternative until then.

A number of water-cooled exhaust throttle manufacturers supply versions for popular .20, .40 and .60 engines (primarily K&B and OPS). Usually, two models are available for each engine type: a 12 (15) degree upward slope from the exhaust port for hydros, and an 18 (20) degree version for the increased slope necessary to get the pipes out of the depths of the deep vees.

Three manufacturers that come to mind for these applications are Steve Muck (whose OPS .40 "Vee" version is used in the illustrations for this article), W-F Products and Prather. Both Muck's and W-F's have fitted barrels to control the exhaust flow. Prather requires replaceable internal silicon "O" rings to seal the barrel and is also somewhat heavier than the other two. I've used both Muck's and Prather's with success. Marten Davis has found W-F's excellent.

Here are addresses and phones for these manufacturers:

Steve Muck's R/C, 6003 Daven Oaks, Dallas, Texas 75248 (214) 661-1572
W-F Products; Box 30089; Los Angeles, CA 90030; (213) 624-1176
Prather Products, 1160 Ravenna Ave.; Wilmington, CA 90744; (213) 835-4764.

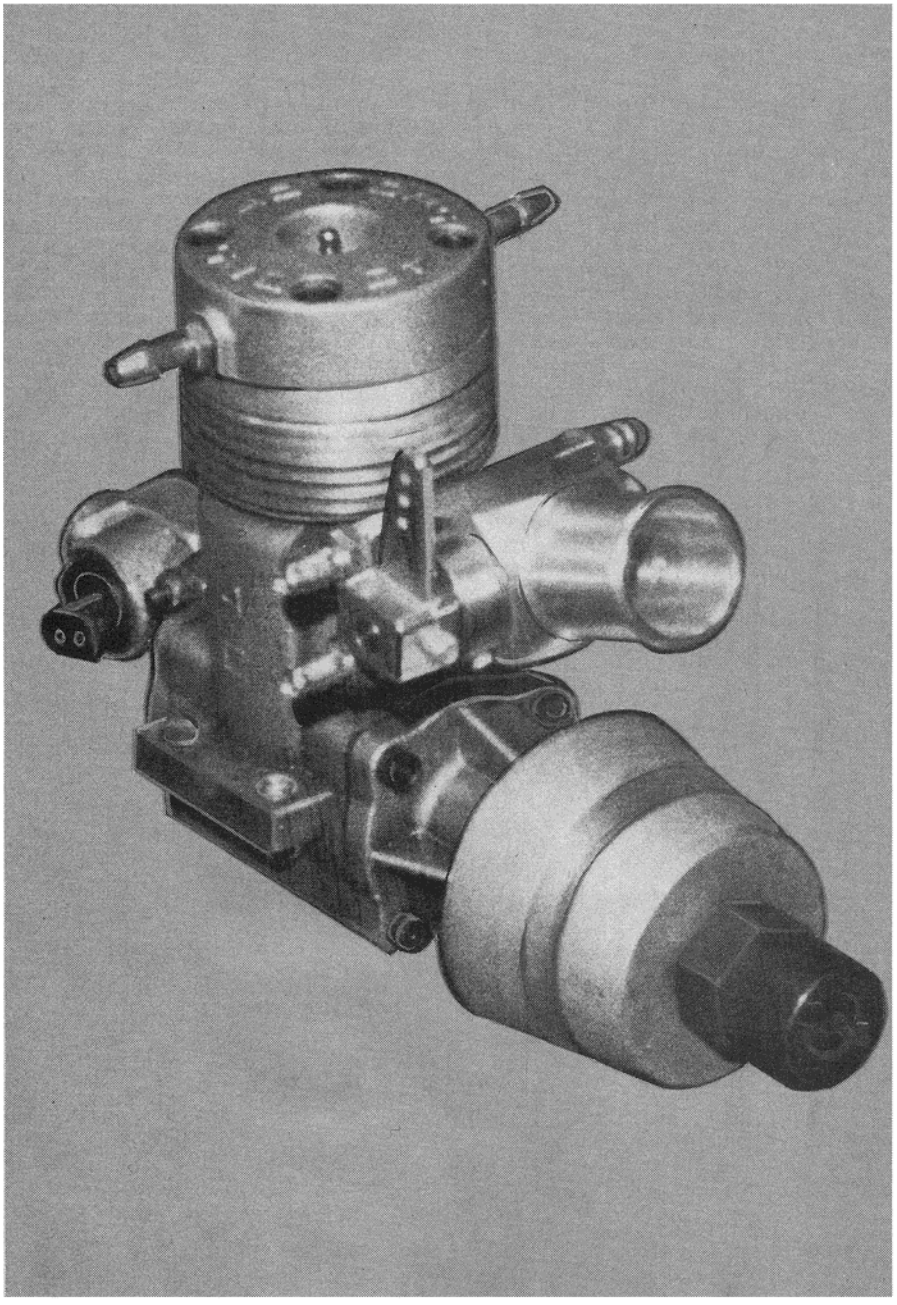
Installation of exhaust throttles is a relatively simple process but some care should be taken to make them perform properly:

1. Put a gasket (using an Xacto knife and gasket paper from your local hobby or auto parts shop) between the engine exhaust port and the throttle to ensure a good fit, good idle and maximum power.
2. Set up the throttle linkage so that it is open completely with the transmitter stick and trim completely up. File a mark on the throttle barrel and case to indicate this position, so that you'll know that things work properly when you check, or replace them. Muck's throttle has a groove to indicate the open setting.
3. Next, check the closure of the throttle mouth with the stick completely down. It should be barely open (use a dentist's mirror and a good light, if necessary). Upon pulling the trim down, the mouth should then completely close. Play with the linkage until both open and closed positions are as described in (2) and (3). Loctite the assembly.

With the set-up described you should be able to start-up with the trim up and the stick down at a low idle. Don't try to start at half throttle as you would with a carburetor or you'll blow the engine rod or piston. Use no more than 1/8th throttle or less, until you're familiar with starting and using exhaust throttles. If too much idle, cut back on the trim. Adjust the venturi, or carburetor, for a very rich four cycle setting at this point. Then advance the stick to half throttle for an instant. (Not maximum throttle and not long, or you'll ruin your engine.) If the engine comes up to r.p.m. reasonably quickly, then try a launch. If too slow, lean a few clicks. If it comes on to a screaming two cycle, you're too lean. In any case, try to run as rich as possible (or you won't run very long).

When you're ready to return you should be able to come to shore with the stick at about ¼ throttle over the last 50 feet or so. When near shore cut the trim and the engine should quit (unless the weather is excessively hot in which case the engine still should be quite slow). Don't try all this with the boat heading directly toward shore, until you've tested the set-up or you'll be fixing your hull. It's good practice, in any case, to bring the boat in parallel to shore until it's nearly stopped.

Good luck and good boating!



Steve Muck's "Vee" Fitted Barrel Exhaust Throttle is shown here mounted on an OPS .40 marine engine.

letter rip

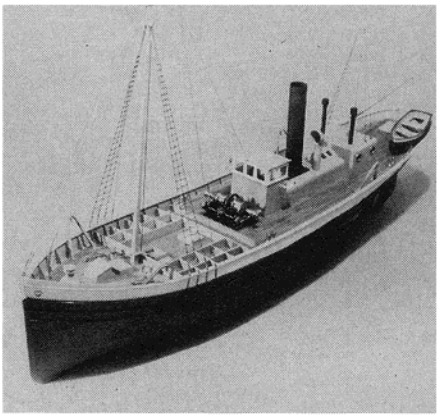
LAUGHING WHALE STUDIO, *Box 191, Wiscasset, ME 04578,* introduces their latest kit, a 1″=1′ scale model of a Swampscot Dory. These fine dories are the aristocrats of their clan and should not be confused with their homelier and more crudely built cousins, the Grand Banks Dory. Full scale Swampscott dories were the most highly developed variant of dory ever built, particularly in reference to speed, ease of handling and seaworthiness. New England Dories came into being when it was possible to acquire clear, wide pine boards cheaply. This model is based on authentic lines for a traditional Swampscott Dory. It has only four strakes to a side. In the full scale vessel this saved labor and permitted rapid construction. Those qualities are carried over into the model as it is both quick and simple to build. The model is built from pre-cut bass wood frames, bottom and planks. The kit also contains brass fittings, wood blocks, stainless steel wire rigging, first quality twisted rigging cord, sail cloth, rolled blue prints and complete instructions including photographs. It is priced at $39.50 and is available at hobby shops or direct. For more information write to the above address.

DYNAMIC MODEL PRODUCTS, INC., *Drawer 'C', Port Jefferson Station, N.Y. 11776,* has a new ⅝″ to a foot scale one piece fiberglass hull of a typical steam trawler of the 1910 to 1940's period. It's not small, being over 67″ in length with a beam of over 15″, molded in fibreglass for a lasting and seaworthy replica. Full size plans are included with each hull! Steam trawlers of this type were not only used for the normal every day business of fishing, but, in time of war were used for convoy patrol duties as well as being used for minesweepers due to their wood construction. This large one piece fibreglass hull, with the rub rails molded in, has all the room you will need to install any type of motive power you desire, be it steam, electric or gas. The hull is molded strong enough so that no interior bulkheads are required, giving the modeler the entire space below decks to use without any obstructions, for installation of his equipment. In addition to the hull, Dynamic Models has available for the modeler the large ventilators molded in fibreglass, a vacuum formed small boat, brass gallows (trawler frames), and other large scale accessories including stanchions, searchlights, chocks, cleats, etc. as shown in their catalog. Introductory price of the hull with full size plans is $165.00. For more information write to the above address.

Product Spotlight:

TAUBMAN PLANS SERVICE, *Box 4G, Dept. FM, 11 College Drive, Jersey City, NJ 07305.*

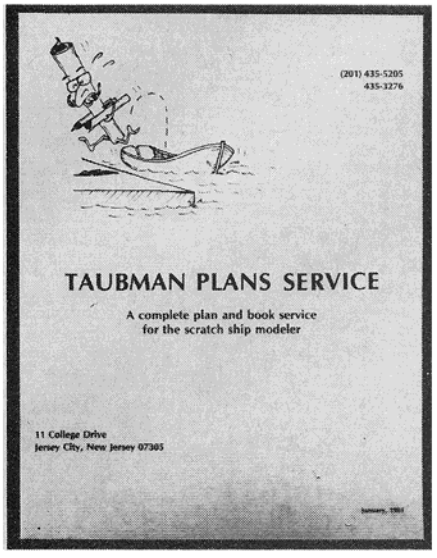
Mr. Abraham Taubman is every bit as good a father image as President Eisenhower or Robert Young. His smiling face is accentuated by a soft billow of white hair and a commodore's mustache to match. He looks for all the world like the kind of man you can bring your troubles to. Best of all, the man matches the image.



But Mr. Taubman, with all his well meaning warmth has posed me quite a problem. I can't figure out if what he does is principally a service or if his main service is a product. Why don't I tell you all about it, and you can be the judge.

On the surface of it, Taubman Plan service offers three catalogs of scale ship and boat plans. For $3.50 you will receive the 1981 Taubman catalog plus the MAP Plans Service catalog from England. Include an extra buck, and Mr. Taubman will include the Wiswesser catalog.

That seems pretty straight forward. Mr. Taubman makes and sells a product, right? Wrong! - Mr. Taubman principally locates, catalogs and sells plans from all over the world, which are researched, drawn and printed by other people. That meets the criteria of a service. For example, the Taubman catalog lists plans from the U.S.A., England, Scotland, France, Germany, Italy, Denmark and Australia. Included among them are plans for about every conceivable type of civil and military vessel you could imagine, from dorys to R.M.S. *Titanic,* from



Viking longships to the U.S.S. Missouri. Pick a category. Would you like to build a tug boat? Fine - Pick a country. How about civilian or military? - World War II vintage?-How about the 1900's-or 1980? There is a plan available for every one of these, and more, and in a variety of scales.

Would you like to build the submarine Thrasher? Well you can, in two versions. You can obtain plans for the ill-fated nuclear powered sub, or for its predecessor of the same name of World War I vintage.

If you liked World War II, you'll love Taubman. His plans include all the big battlewagons, air craft carriers of many nations, the German pocket battleships, the *Prinz Eugen,* many Japanese Imperial vessels (an overlooked subject), and enough destroyers and cruisers to fill an olympic swimming pool.

Many of the drawings offered are illustrated with greatly reduced line art or photos to help you with your selection. Most drawings are offered in the popular ¼", ⅜" or ½" scales depending on the size of the prototypical vessel. HMS *Triumph,* for example, a 74 gun Ship of the Line will build a 52" long overall model from the ¼" = 1' scale drawings. The steamboat *Robert E. Lee* is drawn in ⅛" =1', producing a 41" long model.

Prices vary, but the general range is from $8.00 to $12.00, with plans for very large or complicated vessels going to the $20.00 range. On a per-sheet basis, the cost averages out to between $4.00 and $10.00. That's not bad when you consider the work and the cost involved. Plans are shipped via first class mail (hurrah!) and shipping charges start at $1.00.

Mr. Taubman is very up-front about his business policies. He keeps as many plans in stock as possible, but if he does not have it in his stacks, both he and you will have to wait. The delay can be as little as two or as much as twelve weeks. However, Mr. Taubman will notify you of any delay so you don't have to sit there drumming your fingers.

The catalog states quite clearly that prices are subject to changes without notice. "I hate this clause, but I have no alternative . . . The only time I am aware of new prices is when I re-order - and then they sock it to me.", states Mr. Taubman.

Just pouring over the Taubman catalogs has provided me with hours and hours of fun and down right excitement. But if you are new to building scale model boats, please avoid the obvious pitfall and learn to build using some of the smaller, simpler craft plans. Leave the full rigged clipper ships for another day.

Plans are great for both dreaming and doing. A plan allows you to build a working R/C model of about any ship you desire, to any degree of detail you choose. In offering his product/service, the kindly Mr. Taubman has made our lives richer-WAYNE DANIELS

IMPBA Roostertail

I have prevailed on Bill Le Feber to give us some of his reflections of Model Boatings' early days.

NOSTALGIA TIME

Being one of the oldest active boaters—and there may be some questions about the active bit, but I'll go on anyhow. How many of you boaters remember when IMPBA dues were 25 cents per year and with the dues you received a membership card, rules book and a membership list? Charles Baxman of Detroit was the President of IMPBA. Well, that was the era of this great sport I was introduced to in 1954.

The main activity in model boating was tether boating. The tether boaters ran their boats in a circle on a tether line (a 1/16th inch aircraft cable), the radius was 56'-6" and four laps of this circle gave you a ¼ mile and you were timed for this ¼ mile. The method was as follows: You started your boat in the water with the hull hooked to the running line with a bridle hooked to your hull. After you started your boat within the given port time, you launched it and waited until the engine came on. When the engine was running as fast as it could, then you called time and at that point in the run you were timed for four laps for your ¼ mile time. After calling for our boat to be timed while running most of us would keep our fingers crossed hoping after we called time there was still four laps left so we could get the time.

Some of the boating names back then were these: Kalfus, Parohl, Biderman, Perzentka, Merriville, Demenskey the Jersey City Fireman (he also wore a J.C. Fire Dept. Hardhat) and his helper Ken Franke (these two really made a pair). Other names some of you might remember were Pete Yanczer, Horvath Suhr. This was in the era of model boating before R/C boats were active. But, when R/C boating came on the scene the boaters could see this was the way to go. At first the transmitters were as large as some tool boxes and the wiring of the models was an electrical nightmare—hard tube—and if the boat ran at first you really thought you had done something.

IMPBA's first recorded R/C records were in 1962 and some of the names in the record book then were, Jordan, Foley, Mundt, Toth, Preusse and yes Gary Preusse. Gary set his first record on June 9, 1962, in Class D: ¼ mile Oval. Then between the years of 65-68 the name Whitlach came on the scene and this boater set all kinds of new records. Jim Whitlach broke seven records in '66 and '68. The California boaters were a group to be dealt with. They were very active in R/C boating—both hydro's and mono's—and they set the pace. Along about this time names like Muck, Hughey Pender, Buck, Meelbusch, Mischnick, Bucknell, appeared in the IMPBA record book.

This brought us up to the 70's in R/C boating. The records in the 60's ranged from 17 mph to 60 mph. By this time R/C boating was well on it's way and the tether records were retired in late '65 or early '66. In the 70's there was a new breed of R/C boat introduced, the out-rigger, a go-fast, funny looking boat. This hull made an attack on the records and the records fell like flies. It made such hulls as the Little Hos, Mini-Hos Dragon Fly and the original Hughey foamed hull obsolete. It was catch-up time for the boat manufacturers and designers. In my opinion the first, real, fast out-rigger was Tim Rie's "crapshooter"—a real popular hull and a go-fast from the start (some say Pinckert's boat was first-Ed.) Tim sold the rights to manufacture the "Crapshooter" to Marten Davis who has developed this hull into many winning circles throughout this country and abroad.

Now in the 80's we are starting a new trend in model boating hulls—the canard or backwards boat. This is a boat with the sponsons in the rear of the hull. Ed Fisher has been running this style hull and, in fact, introduced it into model boating. Ed worked with "Circus-Circus" to develop a full size racing unlimited hydro. I am sure when they get the bugs worked out, this will be the hull to beat in the Unlimited racing circuit.

In the past 26 years that I have been involved in model boating there have been many advancements in this hobby we love so well. This came about by dedicated manufacturers coming up with new designs and equipment to make our hobby a more pleasurable one.

Well, by this time you are getting tired of this old boater's goings ons, soooo I'll leave you with this ending comment. Many people are willing to take out of the R/C boating hobby everything they can but never willing to put anything back into it. Remember, if you are not willing to serve, you haven't earned the right to compete.

Only you can keep this hobby competitive sport that it is. So, work with your Club and IMPBA officials. Your involvement is the only way you can do it. The best to all of you in "81".—Bill Le Feber—IMPBA Past President.

I hope to have some further contributions of this nature during the rest of '81. Tom Perzentka has indicated that he would contribute an article and I for one am looking forward to it.

Let me know if you enjoy this kind of contribution—FRED McBROOM.

Savannach VG

Savannach VG

Savannach TM

Savannach TM

Savannach ADV

Savannach ADV

Savannach Bingo

Savannach Bingo