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SEPTEMBER 1997

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# radio control MODELER

THE WORLD'S LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

CONSTRUCTION:

## JAEGER JAVELIN

## FEATURES:

- Brains for your Airplane
- P-51 Retract Modification
- Piper Skycycle
- No. 11 Blade
- Pulling Out the Hidden Channels

## REVIEWS:

- Stik Stang
- CAP 232
- Bucker Jungmann
- P-47D-23 Razorback  
"Thunderbolt"





# First came the wheel.



*Our first wheel transmitter, the 2F, controlled the first R/C car World Champion in 1977. Our Magnum 2PC is the big winner for most comfortable grip.*

## Magnum Junior 2PCKA

*Both the Magnum Sport 2PC and Magnum Junior 2PCKA use our new ergonomically designed transmitter and offer a choice of 2 servos or servo/mc combination. 27 and 75MHz.*

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*The MC210CB electronic speed control has fuse protection, reverse and comes wired ready to plug into Tamiya and other popular R/C models.*

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**SEPTEMBER 1997**

**VOLUME 34 NUMBER 9**



**This Month's Cover** — features Pat Kinney and his beautiful Top Flite P-47 Thunderbolt. The Kodachrome slide was taken by Marty Vagts at the Canyon Crosswinds Field in Castaic, California. The review of the P-47 starts on page 170.

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**VOLUME 34 NUMBER 9**

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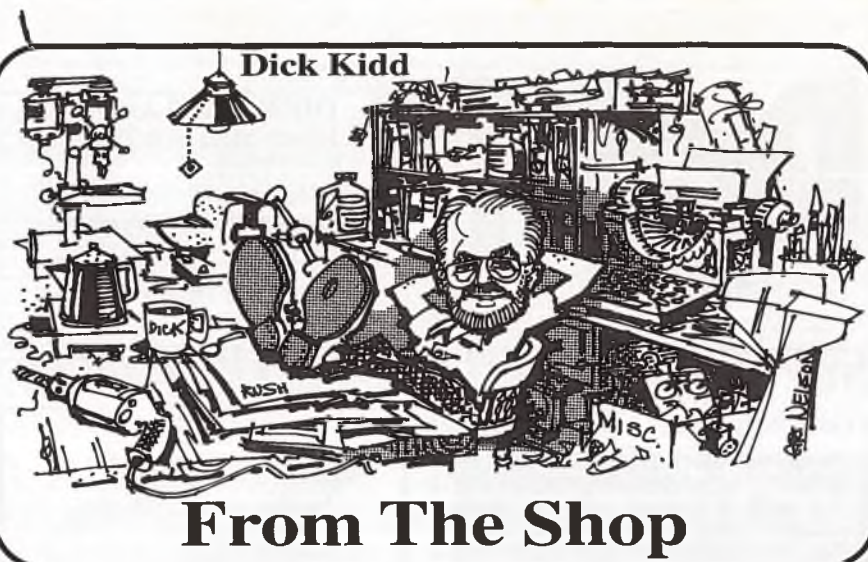
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**Ray Rusan (standing) and friend at their flying site in Juneau, Alaska. What a flying field, but as Ray put it, this is low tide.**

**J**ust recently, I received a package from Kathleen Racine, Executive Director of RCHTA. This package contained entry ideas submitted to the Partners for Progress Program for the second quarter. The following is a reprint of Kathleen's letter.

April 21, 1997

Mr. Kidd,

*It is with great pleasure that the Radio Control Hobby Trade Association announces that Joe Shilling is the second quarter winner of the Partners for Progress Program. He will be awarded \$500.00 for his Young Generation R/C Radio idea. The judges found his idea to be very interesting, with the potential to get younger kids involved in the industry.*

*Mr. Shilling's entry, along with all the second quarter submissions, are enclosed for your use. You will note in the official rules, we advise participants that all entries will be submitted to supporting model magazines for possible publication and that all entries become the property of public domain. It is RCHTA's hope that you will further promote the Partners for Progress Program by printing some or all of the ideas. We could certainly use the visibility for the remainder of the contest. The third quarter deadline will be May 30; and the fourth quarter deadline will be August 30. We are pleased so many modelers took the time and effort to help the R/C industry with their ideas.*

*We thank you in advance for your continued support.*

Warm regards,  
 Kathleen Racine  
 Executive Director



For additional information on the contest, contact RCHTA at: phone (847) 526-1222 or fax (847) 526-9987. By mail, the address is: 560 Bonner Rd., Wauconda, IL 60084.

The following is Joe Shilling's first place entry:

*My idea is to have a radio that will fit the hands of young children so they can hold the radio easily and be able to steer. The handle needs to be small enough for a child of six, to be able to put his or her hand around it, and also to move the throttle trigger closer to the handle so it can be reached with their fingers. (Suggestion is for car/boat radios.)*

Joe's words on how his idea will help advance the R/C hobby is as follows:

*By getting the younger kids involved more with this radio, they will be able to have more control and not worry about dropping it. By getting young kids involved earlier, they will stay with R/C for a long time.*

\*

### **Radio Control Exposure Can Result in \$Cash\$**

The Radio Control Hobby Trade Association (RCHTA), located in Wauconda, IL, has approved a \$25,000 budget for a new publicity program which will award cash to consumer clubs for verified media coverage of R/C related events: \$100.00 if it's printed in general public newspapers or magazines, \$150.00 if it's heard on radio, and \$200.00 if it's seen on TV/cable. With the participation of retailers and R/C clubs across the nation, RCHTA hopes this program will expose the fun and excitement of radio control to new people.

There is a \$500.00 cap per event, but multiple events' coverage may be submitted throughout the year until the funds are exhausted. To qualify, the publicity must:

- be positive in nature.

- be verified with proof of coverage. For example, if the event received newspaper exposure, RCHTA needs the newspaper page on which the article appeared and includes newspaper name, and date it appeared. A video recording of the TV coverage, or an audio cassette recording of radio coverage is required for verification. The RCHTA Board reserves the right to make a determination on questionable submissions.

- be for an event held between June 1, 1997 and December 31, 1997.

- exclude paid advertising.

- be received while funding is available. Monies will be awarded on a first-come, first-served basis.

Interested clubs are encouraged to call the RCHTA office at (847) 526-1222 for a complete set of rules and an application.

\*

Just about a year ago, I had some correspondence with a modeler from Umatilla, Florida, named Bruce Hutton. Bruce turned 77 last year around July, and wrote me some very interesting facts about his life in the Air Corps before WWII. This is the letter from Bruce:

*I was Charles Lindbergh's mechanic at Bolling Air Corp Base in Washington, D.C. It was an excellent job. When he flew, it was always on Sunday, so my week was free. He would always arrive in civilian clothes; the military police had a picture at the main gate of the "green" cab; they were instructed not to stop it, and the cab would come right to the flight line. I would have his P-12E gassed up, preflight checked, and engine warmed up and ready to fly. He was a quiet person, private, very private person. In the first year, 1939, I doubt if we spoke 15 words. He would fly from about noon to evening. Where he went, I never knew, as he never filled out the form 1A telling of his destination or stops in-between. I always assumed he went up around Trenton, NJ, his old home place. So, I would just put local flight in his form 1A military flight record. The only time I ever saw him laugh, he motioned for me to clean off the P-12 cockpit windshield. I jumped up on the lower wing, pulled my mechanic's rag out of my hip pocket. Alas, no squirt bottle, so I just spit on the dirt and started shining the shield like a pair of polished boots. When I did that, his face was just a few inches from the Plexiglas. He jumped back and started laughing. I was young and embarrassed. He had a big blue eagle on each side of the fuselage and I made sure, with a small touch up brush, that none of the feathers chipped off. Another incident I recall — one Saturday, I spray painted the cowling (in the air it gets chipped and worn first). Sunday, I figured it would be well cured (it was not). Some character at the paint hangar had mixed the paint and he must have used turpentine instead of thinner. When Charles came back, the entire fuselage had streaks of paint like tears on a modern day hot rod car. Some of your membership might remember Charles, and they would get a kick out of this, so feel free to print it if you wish.*

*Flying friend,  
Bruce Hutton*

Bruce spent 21 years in the U.S.A.C., U.S.A.F., and had three years of combat in Europe. He has flown B-24's, C-47's, a C.G. 4A Glider, and the British 35 place Hossa Glider.

\*

In reading one of the latest issues of the *K-Factor* newsletter from Pattern Fliers, there was a letter printed from K&B regarding their Super Pox. I checked with Don Weitz at K&B and he sent me a copy of the last input to Erick Hawkinson, Editor of *K-Factor*. The letter follows:

March 12, 1997

Dear Mr. Hawkinson:

*We have read some of the recent K-Factor articles discussing our paint products. All the articles seem supportive of the trouble K&B has had with the government regulation on Super Pox. But, we would like the opportunity to clarify some of the questions raised. We are hoping you will publish the comments listed below to help clarify these issues. The new K&B manage-*

*ment is working to improve the quality and delivery of all our engines, we are also introducing a new .61 with some innovative features. Later in the year, we will introduce a new line of performance engine. In an effort to continue our changes, we would like the information published about our products to be as accurate as possible. We really want to keep the modeling public informed and looking at our products.*

K&B Manufacturing would like to clarify the status of Super Pox. We regret the loss of this very popular paint product, but the EPA has determined some of the components of the current formula of Super Pox are too "volatile." Under this ruling, the company that mixes our paint would be forced to construct a new facility to continue to produce Super Pox. They have determined the cost to build a facility that will conform to the regulation is far too expensive, and they simply will not produce the product any longer. However, the catalyst and thinner is not included in this ruling (yet), so we will continue to ship catalyst and thinner as long as possible. We also have some orange and blue Super Pox still in stock while supplies last. This, along with the catalyst and thinner, are available from your local hobby shop (they should contact their distributor). With regards to locating more products, we have been referring anyone who asks, to any hobby shop we know that has stock.

For the past year, K&B has been working with our chemists to develop a new paint that can be produced under the current regulations. Although this effort has confirmed what many have known for a long time, Super Pox was an outstanding product for its price. We have finally found a suitable replacement. After exhaustive testing, we are completing the final tests of the most recent formula. From all the reports so far, our new Ultra Pox, covers, flows, and glosses as good, or better, than the old formula. In fact, many have said "they like it better and it's tougher," some report "the gloss is so good, they don't need a clear coat any more."

Also, since our old or original catalyst is available, we do not recommend using other brands of catalyst with our products, we cannot be sure of the results. We certainly hope, as has been suggested, you don't go out and find a replacement until you've tried the new Ultra Pox. We think it will certainly match the performance of Super Pox.

We are not ready to officially announce a shipping date or price, as of this writing, but we plan to have it ready by August.

In closing Mr. Hawkinson, thank you and your readers for your patience and support during this period. If you have any further questions on this, or any other K&B product, please feel free to contact K&B.

Sincerely,  
K&B Manufacturing

\*

That's all for now!



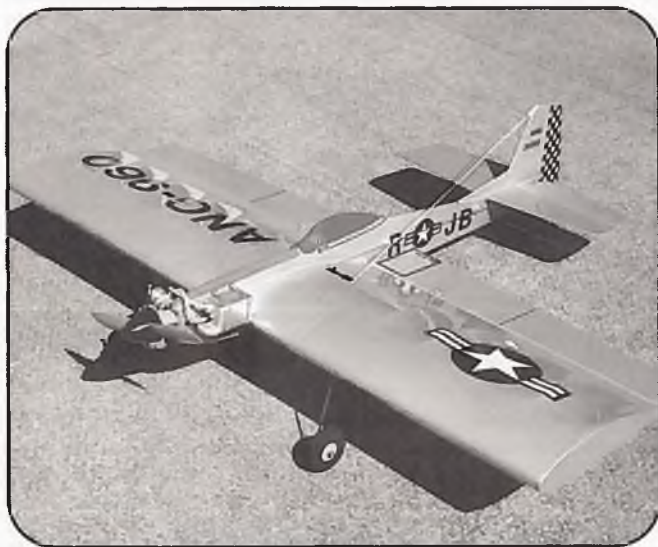




# PRODUCT REVIEW

## STIK-STANG (P-51 PROFILE)

**Air Flair**  
**Dick Barbosa**



The Stik-Stang is the second Caricature Scale model kit from Air Flair, the first being the Stik-Munk (DeHavilland Chipmunk profile). These designs were derived from the "Stickit" series of Competition Fun-Fly (CFF) airplanes, also from Air-Flair.

This model achieves near competition performance in loops and rolls, but it has several advantages for the sport flier over the CFF designs. The one-piece, strong, thick, semi-symmetrical wing is easy to build warp-free on a suitable flat surface. The airfoil was chosen for its gentle stall and good inverted flight characteristics. The balsa fuselage makes the tail assembly more rigid and allows knife-edge flight. The wide-stance wing mounted landing gear and steerable tail wheel provide easy ground handling. The increase in weight over a CFF airplane also improves handling in a strong wind.

The 37" x 5-1/2" x 2-1/2" box was neatly packed and padded, and the hardware was contained in a plastic bag.

### Construction:

One full-size 36" x 53" plan sheet was accompanied by a 7-page



## SPECIFICATIONS

Name .....	STIK-STANG
Aircraft Type .....	P-51 Profile Sport/Fun-Fly
Mfg. By .....	Air Flair
	9351 E. Rawles Ave.
	Indianapolis, Indiana 46229
Mfg. Sug. Retail Price .....	\$89.95
Available From .....	Direct From Mfg.
Wingspan .....	48 Inches
Wing Chord .....	16 Inches
Total Wing Area .....	768 Sq. In.
Fuselage Length .....	41 Inches
Stabilizer Span .....	19 Inches
Total Stab Area .....	105 Sq. In. (Approx.)
Mfg. Rec. Engine Range .....	.32-.40, 2-Stroke
	.40-.53, 4-Stroke
Rec. Fuel Tank Size .....	4 Oz.
Rec. No. of Channels ..	4 (2 Ail. Servos)/Suggest 6-Ch
	w/Flaperon and Elevator Mixing
Rec. Control Functions .....	Rud., Elev., Throt.,
	Ail., Coupled Flaps
<b>Basic Materials Used In Construction</b>	
Fuselage .....	Balsa & Ply
Wing .....	Balsa
Tail Surfaces .....	Sheet Balsa
Building Instructions on Plan Sheets .....	No
Instruction Manual .....	Yes, 7 Pages
	(One Page Parts List)
Construction Photos .....	No

## RCM PROTOTYPE

Radio Used .....	Futaba 7UAF
Engine Make & Disp. ....	K&B .40 (#4011)
Tank Size Used .....	4 Oz.
Weight, Ready to Fly .....	64 Oz. (4 Lbs.)
Wing Loading .....	12.1 Oz./Sq. Ft.

## SUMMARY

### WE LIKED THE:

Simple construction and flight performance.

### WE DIDN'T LIKE THE:

Landing gear wire didn't fit hardwood blocks (Mfg. notified).





booklet of instructions and a 1-page parts list. An addendum sheet was included showing a modification to the elevator, so it would clear the rudder pushrod.

The machined parts (no die-cutting) were accurately cut from good quality balsa and plywood. The spar cutouts in the wing ribs had radiused in the corners which were cut away with a hobby knife, per the instructions. The 3/8" ply landing gear blocks had a 1/8" groove, though the pre-bent main gear wire was 5/32" diameter (mfg. was notified).

In preparation for building the wing, the landing gear blocks and torsion blocks were epoxied together and drilled for the gear wire. The two 3/16" (No. 1) ribs were epoxied together and the doublers for the gear blocks were epoxied to the No. 2 and 3 ribs. Eight 3/32" x 3" balsa sheets were edge-glued together in pairs and the leading and trailing edge sheets cut to width from these. The 1/4" sq. spruce spar and joiner stock was epoxied together to make two 48" spars.

After pinning the lower trailing edge sheeting to the work surface, the aft wing spars, the main wing spar, and all the ribs were added. Next came the top spar and the top leading and trailing edge sheeting. The sheeting was added to the two center sections leaving openings for access to the radio equipment. These openings were later covered with hatches.

The wing was now removed from the board, landing gear blocks and servo rails added, and bottom sheeting completed. Adding the 3/16" sheet balsa tips completed the wing construction.

The ailerons were built-up over the plans from 1/4" x 3/8" sticks, with diagonal braces.

The sheet balsa tail surfaces were glued together over the plans from pre-cut pieces and the 1/32" ply control horn plates added. The tail wheel wire was bent to shape and glued in place on the rudder. The elevators were joined together with the prebent 1/8" dia. wire joiner.

After sanding the wing, the top and bottom fuselage halves were checked for a proper fit to the wing before gluing them together. We also checked to make sure the engine fit properly on the hardwood mounts before epoxying them in place. After sanding a taper on the rear edges of the ply fuselage doublers, we epoxied them in place. Trimming and sanding the doublers completed the fuselage.

Hot Stuff UFO from Satellite City was used for construction except where epoxy was recommended.

#### Covering:

The wing, ailerons, and all tail surfaces were covered with "aluminum" colored film, with "neon orange" on the bottom of the wing and stabilizer for contrast. The fuselage and fuel tank were primed with "white primer" and painted with "aluminum" spray paint. The film and paint were Coverite's "21st Century" products from Great Planes. Great Stuff! Coverite's

21st Century Iron, with its unique shape, made the covering job easy. The military "stars and bars" were from Sig Mfg., while the letters and numbers were from an art supply store. A red 2-1/2" Du-Bro spinner added the finishing touch.

#### Engine:

I used a K&B #4011 ball bearing .40 with standard muffler on the 'Stang. I have used these engines with complete satisfaction for many years. They are smooth, powerful, and reliable, as well as inexpensive; what more could you ask for?

The Hayes 4 oz. tank proved to be ideal for this type airplane because of its narrow profile.

#### Radio:

A Futaba F7-UAFS system was used with the standard S-148 servos, since it incorporated all the features I needed to use on this airplane.

It should be mentioned that a standard 4-channel system is all that is really necessary, and control throws are included in the instructions for these systems also.

The aileron servos were mounted on the bottom of the wing, while the remainder of the radio equipment was in the wing on both sides of the fuselage, with hatches for easy access.

#### Flying:

The C.G. on my model was located just slightly ahead of the desired range and the control throws were set at the low end of the recommended range for the first few flights.

With these settings, the airplane was quick to respond to the sticks, yet not overly sensitive. A full throttle take-off required only a few feet of runway, and the climb-out was nearly vertical. With the control throws set at the high recommended settings, the performance of the 'Stang was outstanding; very quick rolls and tight loops. It's really been a lot of fun exploring all the many unusual aerobatic capabilities of a plane like this.

Since the airspeed drops quickly with a power reduction, due to the high drag of the wing, you'll need to keep the nose down slightly on the approach until you're ready for touchdown.

#### Conclusion:

The Stik-Stang could be just what you're looking for if you want an economical, high performance "fun-fly," that doesn't require an expensive "hot" engine.

The wide-tread main gear and steerable tail wheel provide excellent ground handling, even when it's windy.

This airplane has a very wide performance envelope, so it can be enjoyed by just about anyone who is past the "beginner" stage. You'll have fun whether you're just out "Sunday flying" doing lazy aerobatics or using the increased control throws for some quick, dazzling stunts.

We've been completely satisfied with the value and performance of this model and are looking forward to a lot more fun-filled days flying it.



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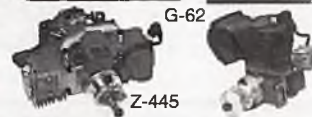


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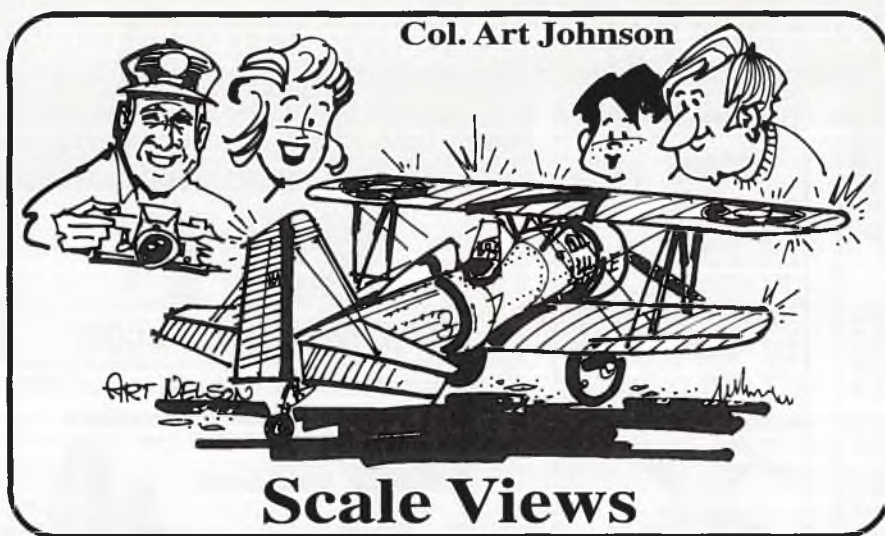
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### AMA Scale Rules

**B**y the time you read this, the AMA Scale Board will have decided the fate of some of the numerous rule change proposals that appeared in the March issue of Model Aviation. Others will go through further scrutiny before becoming a part of the next AMA Rule Book. Changes approved will appear in the rules in the year 2000.

Claude McCullough's proposed new Team Scale event looks good to me. The event has been run for years in many of the larger contests, although not as a rule book

event. The new rules would be simple — same as Expert Sport Scale with the team being the builder of the model and a pilot-flier. The event should give the expert builder (but not so expert flier) a chance to show what his model can do in competition, with less risk to the model.

John Guenther's proposal to separate Fun Scale into an entry level division for Novice fliers, and a second division for those with previous competition experience, is also needed. This is another rule change that has been well tested in local competitions and seems to work well. Beginners are

much more likely to enter Fun Scale if they know that the experts are not competing with them.

In a more controversial area, Dave Platt's proposed expansion of the "Realism In Flight" statement is by far the simplest and most accurate of those proposed. Everyone wants to see a model flying like its big brother. Unfortunately, this proposal did not go beyond the first screening, which would be fine if all proposals to change the realism definition received the same treatment. I hope we never get to the point where a proposal (no matter how bad) becomes a rule simply because it has been submitted often enough.

In this respect, there is nothing wrong with the Realism In Flight paragraph in the AMA Rules as currently written. It is simple and to the point. Flight judges now do a pretty good job deciding if one model looks more like the real thing in flight (realism) than another model, particularly when there is more than one model of the same aircraft entered. One would expect the model that flies like the real thing to get a better score than one that bombs around the sky looking more like a model airplane than a miniature of a full-scale aircraft. Certainly we would not want to approve a change to the rules that would encourage models to fly in an unrealistic manner. Unfortunately, there have been persistent efforts to push this type of change over the last few years.

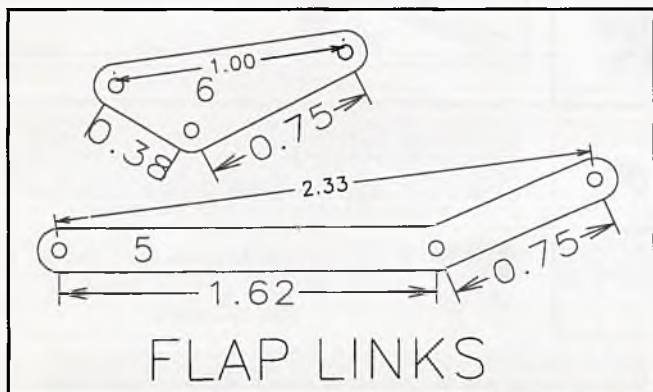
The Scale Board in the past has seen



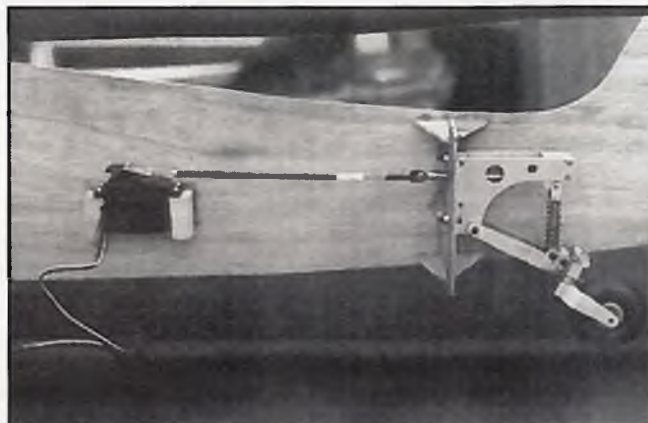
**Most proposed changes to the AMA Scale Rules involve the flight part of the score. However, Scale Judges do not seem to have had a problem awarding top-flight scores to Graham Mears' Tiger Moth under the current rules, realistic flier. It looks good to other contestants too!**



**The DeHavilland DH-1 was in the 100 mph tops class in World War I, and John Cole's model looks close enough to flight judges to receive excellent flight scores. Realism is in the eyes of the beholder and not something that can be readily measured.**



**The missing dimensions on the Fowler flap link drawings are shown here. Original drawings were in Scale Views, RCM, March 1997. Dimensions in inches.**



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7 X 6	1.83	9 X 10	2.29	12 X 6	3.97	13.5 X 9	7.1295	16 X 8	12.95	24 X 12	38.00
7 X 7	1.83	9.5 X 6.5N	5.395	12 X 7	3.97	13.5 X 10	7.1295	16 X 10	12.95	24 X 14	38.00
7 X 8	1.83	9.5 X 7.0N	5.395	12 X 8	3.97	13.5 X 11.5N	7.1295	16 X 12	12.95	24 X 16	38.00
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7.8 X 7	6.395	9 X 8.5	5.395	12 X 14	7.95	14 X 7	12.95	10 X 7P	Pusher 3.95		
8 X 4	14.206	9.5 X 4.5	11.263	12 X 15	7.95	14 X 8	12.95	10 X 8P	Pusher 3.95		
8 X 5	2.06	10 X 3	2.63	12 X 16	7.95	14 X 9	12.95	11 X 6P	Pusher 3.95		
8 X 6	2.06	10 X 4	2.63	12 X 17	7.95	14 X 10	12.95	11 X 7P	Pusher 3.95		
8 X 7	2.06	10 X 5	2.63	12 X 18	7.95	14 X 11	17.1295	14 X 6P	Pusher 12.95		
8 X 8	2.06	10 X 6	2.63	12 X 19	7.95	14 X 12	10.1295				
8 X 9	2.06	10 X 7	2.63	12 X 20	7.95	14 X 13	10.1295				
8 X 10	2.06	10 X 8	2.63	12 X 21	7.95	14 X 14	10.1295				
8.5 X 5	4.395	10 X 9	2.63	12.25 X 3.75	8.397						
8.5 X 5.5	4.395	10 X 10	2.63	12.5 X 9	7.95						
8.5 X 6.5	5.395	10.5 X 4.5	11.395	12.5 X 10	7.95						
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### CURRENT USAGES

1	.....049 Free Flight
2	..... 15 Combat
3	..... 10-15 Pylon
4	..... 25 Pylon
5	..... 40 Pylon
6	..... 36 Combat
7	..... 80 Pattern
8	..... CL Stunt
9	..... 120 Warbird
10	..... 120 Pattern
11	..... 40 Free Flight
12	..... 35 CC
13	..... 70 CC
14	21-25 Free Flight
15	..... 15 Free Flight
16	..... 29 Free Flight
17	..... YS 91

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through wordy proposals that contradict the laws of physics and math and that serve no useful purpose. Let's hope they keep up the good work.

A few other proposals may not prove too popular. Allowing a back up model at a scale contest, sounds nice at first glance. Boy! Could I have used one a few times. The only problem is that most scale models are far too complicated for the builders to turn them out in pairs. You would not want to see competition favor those with enough money and time to duplicate their efforts.

Proposals to change wheels, wing skids, or other parts of the model after static judging, fly in the face of the fact that we want our models to look in flight exactly as the original. We allow changing to a flight prop only because the difference between our model engine performance and the big ones is so great that a scale-size prop is impossible for many aircraft types. We allow sharp protrusions (pitot tubes, etc.) to be removed for safety reasons. Beyond that we would need a good reason to change anything that makes the model look different (a choice of external stores should be okay; after all, they change them between flights on the big planes and we should be able to do as they do in real life).

Al Kretz's proposal to start a new event for scale models with small engine limitations would have looked good to me a number of years ago. This was back when they had similar limitations in FAI Scale and we needed to field models that could

lead into that type of competition. This is no longer the case. Engine limitations are no longer a factor and about any size is okay for all events. A case for this limitation now has to be based on cost of models or impression points for the larger models. Both are valid to a point. The fact is that smaller models can be entered in any competition without a rule change. I have seen some that were pretty competitive, although many will say that the small model flits rather than flies. This is the real reason for the impression point factor.

Overall, the Scale Board must be extra careful about changes this year. Anything approved will be on the books until the year 2003! That is a long time to suffer with a bad rule.

### New Retracting Tail Wheel

Lee Robinson of Robinaire, P.O. Box 6766, Lake Worth, FL 33466-6766, has a new retracting tail wheel for scale models that looks good. It actuates with a pushrod that can easily be handled by an S-148 type servo. The mechanism is compact and suited for many of the scale plans and kits on the market.

### Fowler Flap Correction

We were sorry to have left out a couple of needed dimensions in the drawings of the Fowler flap mechanism (March '97, Scale Views). For those readers who have not already contacted us, the outer holes in link #5 are 2.33" apart; the outer holes in part #6

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are 1" apart. It would be pretty difficult to draw the links without either these dimensions or the angle of offset.

#### Model Warplanes Books

We have mentioned John Fredericksen's books listing model plans before. The lists are now up to date with publication of Volume 4 and 5. The last is on the Jet Age from 1946 to 1996. If John has missed any of the plans that have been published, I am not aware of them. He even has addresses in Volume 5 of companies that deal in the latest turbine engines. The books are available from John C. Fredericksen, 461 Loring Avenue, Salem, MA 01970, (508) 745-9849.



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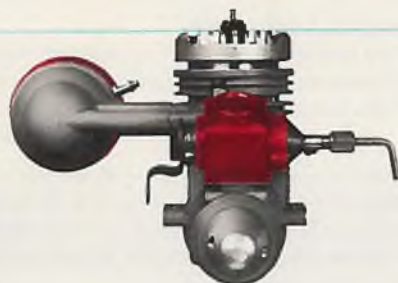
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76	12X6	14,200	24.9	\$300.00
90 LITE	12X6	15,000	25.1	\$325.00
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# BRAINS FOR YOUR AIRPLANE

By Richard McGrath

## ABOUT THE AUTHOR

Richard owns and operates Studio 7 Technical Documentation, a writing, graphics and consulting business. He has been flying model airplanes since he was 12. He is also an instrument rated private pilot and has written technical articles for RCM and other magazines.

A number of companies produce small, lightweight computers that easily fit into model airplanes. I looked at the specifications for several of these computers and finally settled on the Tattletale Model 5F, produced by Onset Computer Corp., 536 MacArthur Blvd., P.O. Box 3450, Pocasset, MA 02559-3450, Tel: (508) 563-9000. The 5F is tiny, measuring 2" x 1-3/16" x 1/2" and weighing in at slightly less than 1 oz. It comes with a breadboard/socket, RS-232 interface cables for either Mac or PC-based systems, and a battery connector and strap for a 9 volt battery.

This package is entirely self contained, including its own operating system, a built-in version of the BASIC programming language and enough solid state memory to hold a user's program and several hours of stored data. In order to illustrate its usefulness, a pair of Motorola pressure sensors have been interfaced to the 5F so it can measure and record altitude and airspeed. The computer's onboard clock provides running time in minutes while a thermistor measures temperature during the flight. Refer to Photo #1.

If you want instant gratification, for example, how fast am I going or how high is the airplane right now, things can get complicated and expensive in a hurry. You'll need a telemetry system. For example, Aero Telemetry, 947 W. 30th St., Ste.-24, Los Angeles, CA 90007, Tel: (800) 746-9380, advertises complete air-ground telemetry systems starting at \$1,195. However, if you want to collect data and then download it to your computer, analyze or plot it on the screen, transfer it to a statistical program, or use it in a graphing application, things are much less complicated and much less expensive. If you have a laptop computer you can use it at your flying site. If you have a home-based computer you can work on the data in the comfort of your own space. The Tattletale 5F, complete



**Photo #1:** Close-up of computer and breadboard/socket. There are chips mounted on both sides of the computer board. In the background you can see the pressure sensors, mounted with white nylon nuts and a piece of tubing that goes to the pitot tube.

with socket/breadboard, battery connector, interface cable, and all the hardware and software manuals you'll need to get started costs \$490.00. There are many other applications for a stand-alone controller/data logger.

Photo #2 shows the package used for testing. It weighs about 5 oz. and consists of the 5F computer, socket/breadboard and battery, together with two pressure sensors (for measuring altitude and airspeed) all contained in a plastic box with a screw-on cover. The box measures 4-5/8" x 2-3/8" x 1-3/8". The 1/4" tubing connects to a homemade pitot tube. Stuff some foam around the components in the plastic box to keep them from moving around. If you plan to fly anywhere near water, it is wise to wrap the box in a plastic bag and tape the bag to the connecting tubes so you'll have a watertight package.

## The Tattletale 5F Computer, An Overview

Logger/controllers are engineering tools for recording temperature at a remote site, measuring pressure, or controlling robotic devices and machine tools. They are also found in automobiles, air-

*Continued on page 14*

*The following is from a press release on the Pathfinder solar powered aircraft:*

## Pioneering Solar Powered Plane Reaches The Stratosphere

Edwards AFB, CA -- On 11 September 1995, AeroVironment, Inc., began a whole new era in powered flight. Like the first supersonic flight of the X-1, which opened up the supersonic flight era, it wasn't publicized very much and it only involved a small group of dedicated contractor and government engineers and technicians. On this day, NASA's remotely piloted "Pathfinder" aircraft reached an altitude of 50,500 feet during an 11-hour flight — powered only by solar energy — miles higher than had any previous solar flight. This remarkable flight high into the stratosphere (at an altitude where military pilots are required to wear pressure suits) demonstrates that solar powered flight is now a practical reality. AeroVironment, the world leader in solar powered flight, envisions future planes that fly for months at a time in the stratosphere serving many of the functions of a satellite but at significantly reduced costs and about 2000 times closer to earth than a satellite in synchronous Orbit.

This high altitude test flight, which proved the feasibility of long duration flights using sunlight as the sole energy source, was conducted at the NASA Dryden Flight Research Center (DFRC) in California.

*Editor's Note: The flight control computer for this remarkable aircraft was based on a Tattletale Microcontroller. If you are interested in knowing specific flight information about your R/C model, we think you will find this article very interesting.*



*Photo courtesy NASA Dryden Flight Research Center.*



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RCM September 1997

13





**Photo #2: Photo of computer/sensors, battery and plastic box. The 9V battery easily fits inside the box, together with several chunks of foam to keep things from moving around. A screw-on cover provides additional protection for the contents.**

*Continued from page 12*

craft, satellites, and hundreds of other applications. Because of its small size and light weight, the 5F provides an incredible amount of computing power inside a model airplane. It is really a solid state brain. Technical specifications for the 5F are shown in Table 1.

#### Sensors

For demonstration purposes, three different sensors were connected to the A/D converter. The five remaining A/D channels and all 14 of the digital I/O lines were/still available for other applications. To measure temperature a 10K ohm, 1% thermistor (Radio Shack p/n 271-110) and a 10K, 0.1% resistor were connected to channel 0 (the A/D converter's eight channels are numbered 0 to 7). A wiring diagram and instructions for installing the temperature sensor are included in the 5F hardware manual. To measure airspeed and altitude, two Motorola silicon pressure sensors were connected to A/D channels 1 and 2. Both pressure sensors have built-in temperature compensation and signal amplification. They can be connected directly to the A/D converter and provide signals in the 0 to 5V range. Motorola recommends a filter, consisting of a 50 picoFarad and a 51K ohm resistor in parallel, between the signal lines and ground, but those are the only external parts required. The circuit is shown in the data sheet that comes with the pressure sensors. I soldered the terminals of the sensors and the filter components to a scrap of printed circuit breadboard then mounted this sub-assembly inside the plastic box with nylon bolts and nuts. Photos #1 and #2 show this, together with the wires running to the computer and its socket/breadboard. So, with the 5F and a 9V battery, three resistors, two capacitors, a thermistor, two pressure sensors, and a small box to hold all the pieces -- you're in business.

#### Pitot Tube

To measure airspeed, you'll need a pitot tube to sample the air pressure outside your airplane. You'll need to mount the pitot tube outboard of the propwash. A piece of 1/4" O.D. aluminum tubing about 3" long works nicely. Stuff a length of 3/16" fuel tubing into the end of the aluminum tube and run the other end of the fuel tubing back into the fuselage at a location where you expect to install your computer and sensors package. You can make an internal installation through the wing if you choose. If you want to try this out before you make an internal installation, you can jury rig the pitot tube onto a balsa dowel and tape or rubber band the dowel in position like a pseudo-strut. For testing I placed the pitot tube under one wing of a Hangar 9 Easy Fly 40, 16" from the wing centerline. Refer to Photo #3.

#### Pressure Sensors

For airspeed measurements, Motorola's MPX5010DP differential silicon pressure sensor was used. It is a low pressure device that measures 0 to 10 kPa (0 to 1.45 PSI). The sensor features on-chip signal conditioning, 0.2 to 4.7V output and requires a supply voltage of 5V @ 7 mA. Analog 5V and analog ground pins are available directly on the 5F. Several case styles are available for all Motorola pressure sensors. For the airspeed sensor, you'll want the case with two tubing connectors. One tube (the pressure side) attaches to the pitot tube and the other (static side) is normally open

**TABLE 1:  
Technical Specifications, Tattletale Model 5F**

Price (computer only)	\$ 395
(development kit)*	\$95
Size (inches)	1.2 x 2 x 0.5
Weight (oz)	<1
Processor	Hitachi 6303
Data capacity (RAM)	480 Kbytes
A/D converter resolution	12 bits
Analog channels	8
Maximum sampling rate	3,200 Hz
Digital I/O lines	14
Count channels	1
Current min/max (mA)	3.1 / 30
Hardware UART Baud rates	600 2,400 19,200 (RS-232) 153,600
Software UART Baud rates	up to 9,600 (standard rates)
Serial EEPROM	128 bytes
Voltage input	6 to 15 V
Real time clock	Software
Programming language	TXBASIC
Operating temp range	0 to 70° C
Relative Humidity	0 to 95% non-condensing

\* The development kit contains the socket/breadboard, RS-232 cable for Mac or PC, software and manuals. You may want several computers, but you only need one development kit. Extra socket/breadboards are available.



**Photo #3: Easy Fly 40 with pitot tube attached. The plastic box containing the computer, battery, and sensors is inside the fuselage at about the Center of Gravity.**

to the free air inside your airplane. If you plan a tape or rubber band mounting of the box containing the computer and sensors outside the airframe, for example on the struts of a biplane, you'll need to run a static line back inside the airframe to get accurate readings. Otherwise, the air rushing around the computer/sensors box introduces a lot of error in the data. The differential pressure sensor and the altimeter/barometer cost a few dollars apiece and are available from Motorola pressure sensor distributors. If you need more information, specification sheets, data books, or the phone number for

*Continued on page 21*



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Wing Area sq.in: 909 1023  
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Length: 55.5 57"  
Engines: 60(2C) 60(2C) 80(2C)  
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KL200 Pure syntheloid/Techniplane racing lubricant (best for methanol, gas Sport) **7.70**

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MIP63610 MIP Engine Head Onboard Temp Gauge

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## MUFFLER, PIPE, HEADER

CN3000B Shuttle mini tune pipe(32-36)WOOV **54.95**

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CN3005 Speed Torpedo/Law, Ninja, Shu, X30 **32.95**

CN3006 Black Torpedo Concept muffler (front port)New **64.95**

CN3007 Black Torpedo/Enforcer muffler **32.95**

CN3030A Scale rear exhaust muffler (eng-back) **79.95**

CN3032 Nitro tune muffler **69.95**

CN3033 32 tune muffler(Shu/Ergo/X30/Hawk) **39.95**



# FLY, don't build - almost everything here is Ready Built!

Sale Prices are in effect until September 30, 1997

**READY BUILT, covered, BIG! VERY easy to fly and launch!**



GR4291 Graupner Elektro-Junior "Sport" reg. price \$189.00  
**SALE! ..... \$177.00**

Capable of soaring for hours -- not minutes! Elektro-Junior "Sport" is big -- 83" wingspan with a two-piece handmade and covered balsa wing that is ready to fly after you simply glue the outer panels on. Fuselage is ready. Elektro-Junior "Sport" is so easy to fly that some of Hobby Lobby's employees who've never flown RC have learned to fly it. Recommended: GR6066 Motor/Prop, B071400R Nicad Pack, HLJE20B Motor Controller, 4 channel radio with 2 servos.

**Only 2 hours from box open to high performance thermal SOARING!**

GR4505 Graupner "Bussard" ARF Electric Glider reg. price \$249.00

**SALE! ..... \$229.00**

Capable of soaring for hours! Pre-built and covered 2-piece geodetic handmade balsa and spruce wing will not twist. Tail parts are ready-built and covered. Has "Perfekt-Fertigrumpf" fuselage that's so ready-to-use that it even has pushrod cutouts, air intakes, switch cutouts done. Even the canopy is painted. Bussard can literally be flying, maybe even winning a contest, 2 hours after you get it! Wingspan: 78". Recommended: GR1717 Speed Gear Motor, GPE12010 12x10 prop, B071000R Nicad Pack, HLJE30B Motor Controller, 4 channel radio with 2 servos.



**For expert or beginner -- your best choice in electric helicopters!**



IK001 Ikarus ECO Electric Helicopter kit ..... \$299.00  
ECO out-performs most glow powered helicopters! And, it's electric so you can fly anywhere, anytime. ECO is the best choice for a helicopter beginner:

It flies better than other electric's, has longer flight times on a battery charge, is extremely durable, and it includes a mechanical mixing system that lets you use inexpensive RC airplane radios. Rotor diameter: 41.75". Recommended: IK0153 Ikarus Sport Motor, B081700R Nicad Pack, HLJE30HE Motor Controller, 4 channel radio with 4 Mini or Micro servos.

**This electric SEAPLANE may be the BEST FLYING RC airplane we've seen!**

HLOB004 HL/Obag Donald 4 Electric Seaplane \$199.00  
Very high quality kit that's already built - fiberglass fuselage, balsa



rib/spar ready-built wing! You just cover the wing and tail and install your equipment. Water takeoffs, taxiing, and landings are perfection with Donald! Specifications: Wingspan: 55". Wing area: 428 sq. in. Flight weight: 49-53 oz. Recommended: GR3301 Motor, GPS08040 8x4 Prop, GR1304/3 Spinner adapter, HLJE30B Motor Controller, B081400R 8 cell nicad pack, 4 Channel Radio with 2 servos (rudder and elevator control.)

**NEW! The MOST Ready-to-Fly model airplane we've ever seen! The manufacturer thinks you can have the fully covered version in the air 90 minutes after you open the box!**

PR201 Precedent "SuperNova" RTF (Fully covered, Ready to Fly) \$199.00

PR202 Precedent "SuperNova" (not covered) ... \$159.00

BIG 72" wingspan (BIG airplanes fly better than little ones) RC sport trainer. SuperNova is a sporty flier with enough wing area to slow down nicely for landings. 2-piece wing for easy transport. What makes SuperNova more "ready-to-fly" are these: the tail slides into slots and you glue it; glue the pre-installed rudder hinges; all control pushrods are in place; fuel tank and all fuel and vent lines are in place; aileron servo boxes are in place with pushrods; wing connector rods are in place. Even prop and wheels are included. Structure is Liteply and balsa and beautifully made (in England). Specifications: 72" wingspan, 792 sq. in. wing area, semi symmetrical airfoil. Recommended: 4 channel radio with 5 servos (2 aileron servos required), .46 Engine PAN1019.



**NEW! Hobby Lobby's Catalog 30 is READY NOW!**

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# FLY, don't build - almost everything here is Ready Built!

Sale Prices are in effect until September 30, 1997

**ALL built, covered, ready for you to install your equipment and go FLY!**

HCZ104 "Helio Courier"  
Electric Almost-Ready-Fly ..... \$112.00  
50" wingspan balsa, fully built, for rudder, elevator, motor control. Recommended: GR1162 Motor/Prop, HLJE30B Motor Controller, B071400R 7 cell Nicad pack, 4 channel radio (use 2 servos).



**Ready-Built and Covered: great RC trainer as nearly ready to take FLYING as it can be!**

BALD40 Baldwin's Ready-Built "Sport40" reg. \$169.00  
**SALE! ..... \$149.00**  
59" wingspan. A great RC trainer that you can learn to fly RC with. All balsa wood and plywood airplane.

There are clear and simple instructions for the assembly of the airplane and the installation of your RC equipment. Just glue together the wing halves (they're precovered with ailerons hinged in place and the control horns are ready to use!) Install your radio equipment and the included hardware (tank, fuel tubing, wheels, control horns, pushrods and connectors, steerable nose gear) and GO FLY IT! Use a .40 to .46 engine, and 4 channel radio (ailerons, elevator, rudder, throttle).



**The "kit" is built -- you assemble the Ready-Built main parts and cover it!**

HLA106 Telemaster 2000 with prebuilt structure reg. price \$219.00  
**SALE! ..... \$177.00**  
79" span, perfectly built structure, GREAT trainer but more aerobatic than most Telemasters. For .46 engine and 4 or 5 channels (Flaps are optional).



**NEW! Scale! Ready to cover, fiberglass with sheeted wing -- unusually GREAT flyer on Speed 400's!**

HVPDC3 Hobby Lobby/HVP DC-3 for Speed 400's ..... \$318.00

59.8" span fully sheeted and shaped one-piece foam wing with ailerons cut, perfectly formed fiberglass fuselage. GREAT flight duration with two Speed 400 motors on direct drive. Specifications: 59.8" wingspan, 405 sq. in. wing area, Clark Y airfoil, 37" length, flying weight about 52 oz., 18.5 oz./sq.ft. wing loading, for 4 channels, ailerons, elevator, rudder, motor control.

Recommended equipment: 2 - GR1794 Speed 400 motors, 2 - GR6070P Scale 6-1/2x4 props, 2 - GR1328 Prop shaft adapters, HLJE30B Motor Controller, B081700R 8-cell pack, and 4 channel radio such as HTR5172 Hitec Flash 4 with 2 mini aileron servos.



**All balsa Ready-Built for almost endless soaring with SPEED 400 motors!**

HCZ203 Hacker Timothy 400 Electric Sailplane Reg. Price \$112.00  
**SALE! \$88.00**  
59" span, 25"

long ready built balsa sailplane comes ready covered! Timothy's 2-piece wing lets you take Timothy anywhere -- even in a small car. For 3 RC channels; rudder, elevator, and motor control. You will have nearly 10 minutes of motor run and you will probably stay aloft for 30 minutes -- longer in thermals! Recommended: GR6065 Motor/Prop, HLJE10B Motor Controller, B060800 Nicad Pack, 4 Channel Radio with 2 mini servos.



**The airplane that revolutionized electric powered sailplanes!**



GR4207 Graupner Elektro-UHU reg. \$126.00 **SALE! ..... \$88.00 !!**  
75" wingspan. Short motor runs of 30 seconds pull UHU to thermalling altitude. The power-off GLIDING is almost unbelievably good! Thermal soaring is excellent and UHU can "dash" to the next thermal if you lower the nose and let it hit its top airspeed. 75" wingspan. Ready-built fuselage, balsa/hardwood wing kit. Recommended: GR1162 Motor/Prop, B071400R Nicad, HLJE30B Motor Controller, 4 channel radio w/2 servos.

**Ready-built and covered -- just install your Speed 400 equipment and radio and go FLY!**

HLCO6210 Fokker ARF for Speed 400 \$128.00

38" span. All balsa structure completely covered with Oracover and ready for your RC and electric equipment. Taxi around, take off, shoot touch and goes in confined spaces like parking lots. It's an excellent RC trainer -- easy to fly, durable, and is repairable with regular wood glue. 38" wingspan. For rudder, elevator, motor control. Recommended equipment: GR6065 Motor/Prop, HLJE10C Motor Controller, B070600C Nicad Pack, 4 channel radio with 2 Mini Servos.



**The electric sailplane that soars like the \$300 German fiberglass sailplanes! Already built -- cover it and FLY!**

HLDS002B "Framed up" Skimmer, reg. \$99.00 **SALE to Sept. 30, 97 \$67.97**

70" wingspan Skimmer climbs so high on an inexpensive electric power system that you can not avoid thermal updrafts! Your problem won't be how to keep Skimmer in the air -- your problem will be how to get it back down! For rudder, elevator, motor control. Wingspan 70". Recommended: GR1162 Motor/Prop, B071400R Nicad Pack, HLJE30B Motor Controller, 4 channel radio with 2 servos.



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by Duncan Hutson

In this book the author takes you through some of the intricacies of ensuring that your scale creation is as accurate to the full size prototype as possible. Subjects covered include airframes, wings, control surfaces, cowls and engine compartments, wing fillets, scale servo installations and scale controlsystems.

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By Sean Brown

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By Jonas Kestler

Jonas Kestler has been active in this area of modelling for more than 20 years, within this book he shows how to implement successful electric power systems for semi-scale models, and covers all aspects of building, from fuselage and wing construction, undercarriages, cabin glazing, right through to the most appropriate finishing techniques.

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**\$24.00** plus s&h



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By Chris Jackson

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### Continued from page 18

your local distributor, call Motorola at (800) 521-6274.

Motorola's MPX4115AP silicon pressure sensor is designed as an electronic altimeter/barometer and measures 15 to 115 kPa. It also features on-chip signal conditioning and temperature compensation and requires a supply voltage of 5V @ 7 mA. When you connect this sensor, you'll find its output voltage to be 4.5V or more at sea level. As elevation increases, voltage output drops. You'll want the case style with one tubing connector (pressure side). The other side of the sensor is referenced to a built-in vacuum chamber. If there is a lot of air rushing around the sensor you won't get accurate readings, so if you're anticipating an outside tape-on mounting for the computer and sensors package, be sure to connect the altimeter to the same static-side tubing you use for the airspeed indicator. If you're planning on mounting the computer/sensors box inside the airframe, the altimeter/barometer will work fine without any additional tubes.

### Programming

Programming in TXBASIC is not difficult, even if you're a beginner without any or much programming experience. The software manual provided with the 5F is a very thorough tutorial and takes you through the steps you'll need to write simple and even moderately complex programs. The 5F is quite sophisticated. You can mix assembly language commands with TXBASIC commands. You can even run a program in background mode and run another in foreground mode. However, for the application we're dealing with here, you don't have to be concerned with assembly language, nor with the foreground/background modes. If you work your way through the examples in the 5F software manual, you'll learn enough about program-

ming in TXBASIC to be able to use the computer and modify the program provided in this article. If you practice a bit more, you'll find yourself writing short subroutines and trying them out. From there on, you can go as far as you would like.

TXTOOLS is a utility program, a terminal emulator, provided on the 3-1/2" disk that comes with your 5F. It is the software link between the 5F and your Mac or PC. TXTOOLS displays a working screen on your home-based computer or laptop that enables you to open files, write and edit programming sequences, load and run the programs you've written, and offload data collected by the 5F onto your Mac or PC's hard disk.

### Program Example

Shown is a TXBASIC program that runs on a DOS-based PC. It measures and records four variables simultaneously. TASALT is an abbreviation for Time, AirSpeed, ALtitude and Temperature; -9 is the version number. Type the boldfaced words on your TXTOOLS screen (You don't have to type the // or anything after the // on that line):

The data is stored in four columns with a space between each column. You can alter the storage format to suit your own needs. If you don't have a graphing program, you can plot the data by hand on graph paper. For processing any amount of data, this is very time consuming and a technical graphing program is a worthwhile investment. For out-of-date graphing software, try Surplus Direct at (800) 753-7877. If you want a current version of technical graphing software, try PC & Mac Connection at (800) 800-1111.

### Testing And Experiments

To calibrate the altimeter I first noted the barometric pressure on my home barometer. Then I connected the battery, loaded a TXBASIC program into the 5F's memory



# TASALT-9 PROGRAM IN TXBASIC

```

start: onerr exit           //Exits program when any error occurs.
sleep 200                  //2 sec low power state.

let t = temp(chan(0))*9/5+3200 //Number t= degrees F.

if t>3200 let g=(chan(1))-300 //Corrects diff pressure
if t>4700 let g=(.023*t+(chan(1)))-400 //sensor and/or thermistor
if t>5700 let g=(.216*t+(chan(1)))-1461 //and/or A-D converter chan(1)
if t>8500 let g=(.053*t+(chan(1)))-114 //for temp-related baseline
if t>10200 let g=(chan(1))+426 //shifting.

dim k(25)                  //Make a 25 element array, fill it with 25
for i = 0 to 24            //airspeed samples and average them.
let k(i) = (g-1925)*.02

let sum = k(0)+k(1)+k(2)+k(3)+k(4)+k(5)+k(6)+k(7)+k(8)+k(9)+k
(10)+k(11)+k(12)+k(13)+k(14)+k(15)+k(16)+k(17)+k(18)+k(19)
+k(20)+k(21)+k(22)+k(23)+k(24) //This is all on one line

print #03,k(i)             //Print the 25 airspeed samples.
next i
let z = (sum/25)           //z= AS(av)= average airspeed during
                           //the sampling period.

if z<1 let y=1             //Lookup table for low airspeed. Table
if z=1 let y=6             //compensates for data errors at
if z=2 let y=9             //low end of differential pressure
if z=3 let y=16            //sensor's range.
if z=4 let y=16
if z=5 let y=18
if z=6 let y=18
if z=7 let y=20
if z=8 let y=20
if z=9 let y=22
if z=10 let y=22
if z=11 let y=24
if z=12 let y=24
if z=13 let y=26
if z=14 let y=26
if z=15 let y=28
if z=16 let y=28
if z=17 let y=30

if z=18 let y= z+(250/z)
if z=30 let y= z+(225/z)    //Equations define AS(adj) from 18mph
if z=60 let y= z+(180/z)   //and higher. At 180 mph y = z - 1.
if z=65 let y= z+(180/z)-1
if z=70 let y= z+(180/z)-2

print 'CHAN(1)= 'chan(1)   //Prints chan(1).
print 'AS(av)= '#03,z, 'AS(adj)= '#03,y //Prints z and y.

dim q(10)                  //Make a 10 element array. Fill
for j = 0 to 9             //fit with altitude samples and
let q(j) = 564-((chan(2))-53250) //average them.
let summ = q(0)+q(1)+q(2)+q(3)+q(4)+q(5)+q(6)+q(7)+q(8)+q(9)
print #04,q(j)
next j

print 'CHAN(2)= 'chan(2)   //Prints chan(2)
print 'ALT(av)= '#04,summ/10 //Prints ALT(av)

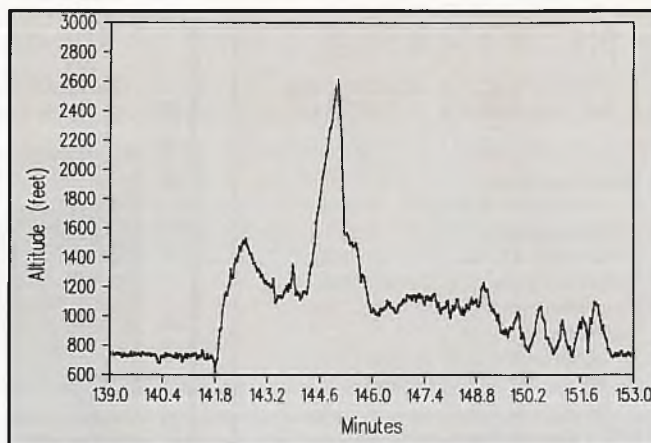
rtime                      //Use onboard clock, print and store
                           //results.

print #03,?,/6000, ' ',#02,(? %6000-18)/60, 'AS(av)= '#03,z,
'Alt(av)= '#04,summ/10, 'Temp= '#02,t/100, ' ',#02,t%100,
Time= ',(2),',',(1),',(0) //This is all on one line. It prints
                           //a summary on the screen

store x, '#03,?,/6000, ' ',#02,(? %6000-18)/60, ' ',#03,y, ' ',#04,
summ/10, ' ',#02,t/100, ' ',#02,t%100 //This is all on one line. It
//formats and stores the data

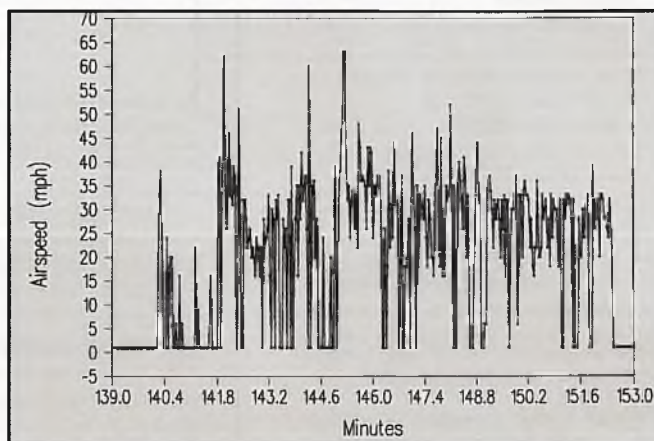
goto start                 //Do another loop through the
                           //program.

exit: print 'Logger Full'   //Stops the program. You may
stop                       //be able to recover the stored
                           //data--sometimes you cannot
    
```



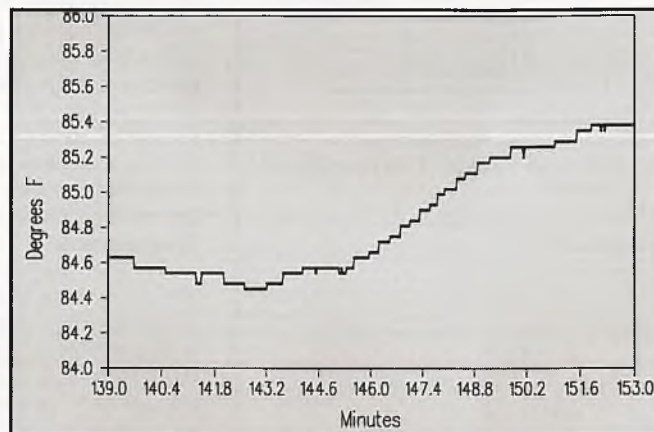
**FIGURE 1:**  
**ALTITUDE, ENTIRE FLIGHT**

In this and the following graphs, minutes represent time since the computer was started. The zig-zags at minutes 150 to 152 show several low altitude passes over the runway. Altitude is relative, since data have not been corrected for field elevation.



**FIGURE 2:**  
**AIRSPD, ENTIRE FLIGHT**

The data is very compressed and scatters above and below the average airspeed. Compare this graph with the previous one (altitude) to get a better idea of what's going on.



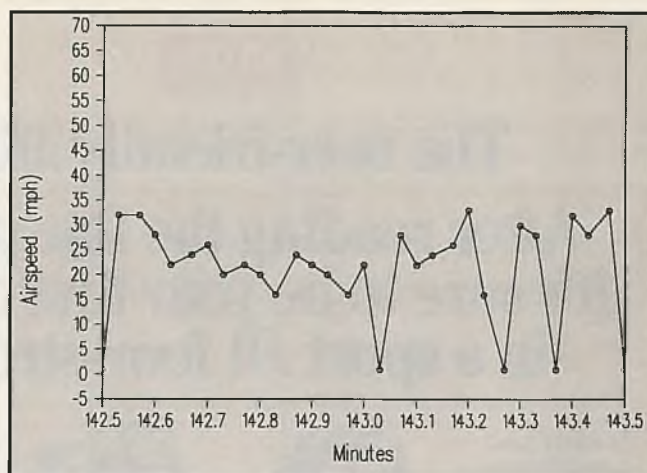
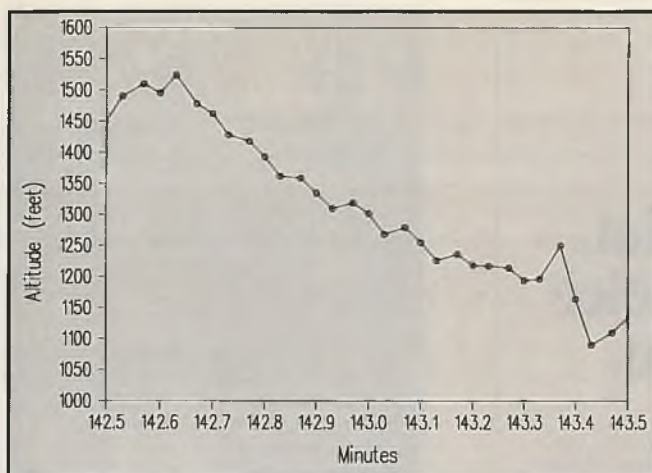
**FIGURE 3:**  
**TEMPERATURE, ENTIRE FLIGHT**

Temperature is measured inside the plastic box containing the computer and sensors. An additional sensor could easily be connected to measure outside air temperature.

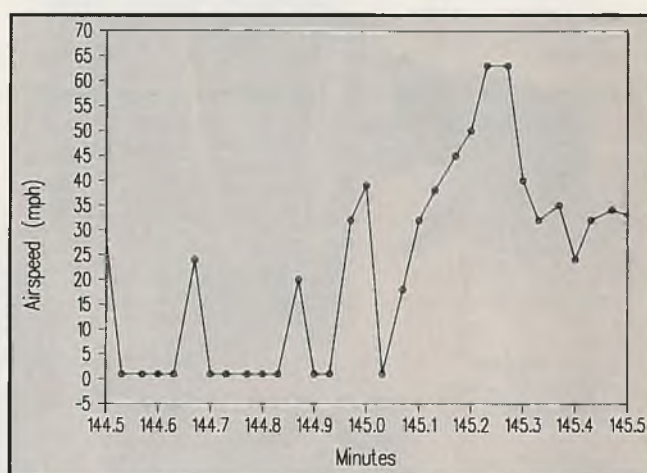
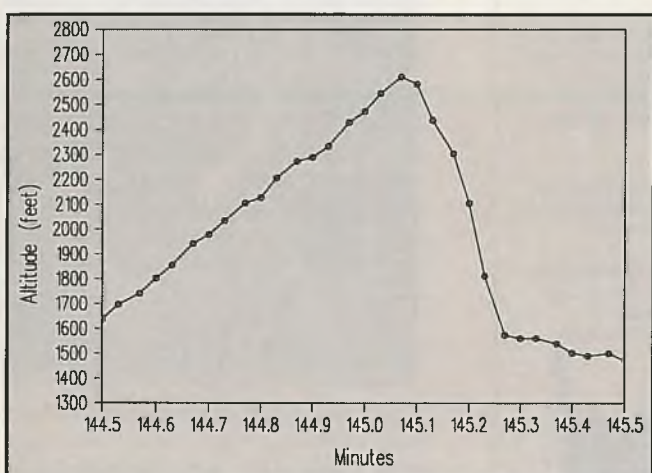
and drove to the Manchester, NH airport which, according to FAA charts, is at 233 ft. Then I drove to Mt. Kearsarge, which is about an hour's drive. The mountain is in a New Hampshire state park and the park guide contains a topographic map which allowed me to establish, with reasonable accuracy, elevations of 1600 ft. at the toll booth and 1800 ft. at the parking lot. I then drove back to the

Manchester, airport. When I returned home, I noted the barometric pressure again and by a phone call to FAA at the airport, was able to establish that my home barometer was right on the money. I downloaded the stored data in the 5F to a file on my PC and loaded the file into my graphing program so I could see all the data at once. With the known altitudes at the airport and Mt. Kearsarge, I was

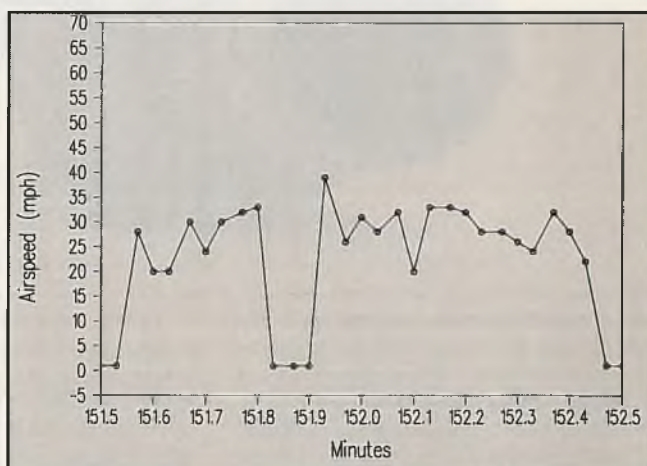
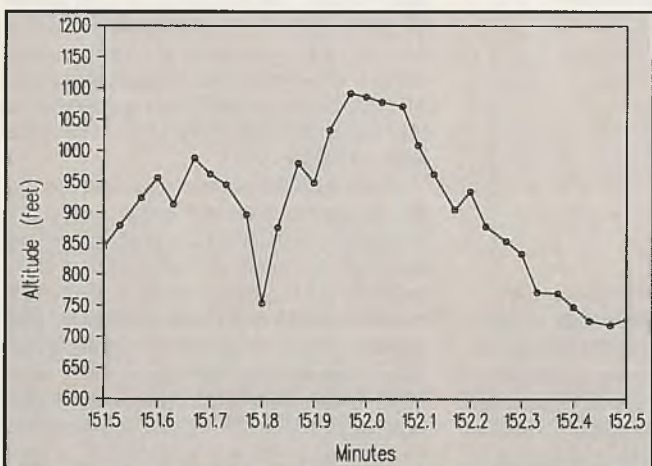




**FIGURE 4-5: (MINUTE 142.5 TO 143.5)**  
Altitude and airspeed during slow flight showing stalls and near stalls, together with a loss of altitude (see text). All samples were taken at 2-second intervals.



**FIGURES 6-7: (MINUTE 144.5 TO 145.5)**  
High angle of attack climb, stall at time = 145.03, and dive from altitude. This shows the high angle of attack limitations on airspeed measurement. All samples were taken at 2-second intervals.



**FIGURES 8-9: (MINUTE 151.5 TO 152.5)**  
Full stall (near mishap) on approach at time = 151.8, followed by recovery and normal landing. An approach speed of 25 to 30 mph looks good for this aircraft. All samples were taken at 2-second intervals.

able to calibrate the altimeter, at least up to 1800 ft.

Airspeed calibration was not quite as simple. According to the data sheets accompanying the Motorola pressure sensors, there should be a straight line relationship between pressure and output voltage. This was not what I found, and the main reason is that the pressure sensor is operating right at the bottom of its voltage range. That is, from 0.2V at rest to less than 0.5V at 70 mph. I tested this extensively with the pitot tube taped onto a stick which I held

outside my car window (about 4 ft. from the car) as I drove along at various speeds. To increase the voltage output would require more pressure, perhaps in the form of a much larger pitot tube or a funnel at the air inlet -- neither of which seemed like a very good idea. This sort of difficulty is not at all unusual in the world of measurements. Data inaccuracies were handled with a correction table in software. A correction table was constructed for airspeed, and required additional corrections for changes in temperature. No correction table



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was needed for altitude measurements. The corrections work very well for highway speeds, but even on still days there is a lot of turbulence from passing cars and trucks, so the scatter of data is appreciable, especially at the higher speeds. The correction table is further described in the notations following the // symbols in the TASALT-9 program.

#### Results

So, what does the data look like? The following graphs were made from data recordings taken during a 12 to 13 minute flight of a Hangar 9 Easy Fly 40 ARF trainer with an O.S. .46 engine. Rick Mastalerz, president of the N.H. Flying Tigers R/C Club flew the craft while I made notes on a kneepad. Figures 1-3 show the entire flight data.

In this form the airspeed data is quite compressed, looks erratic and is not easy to interpret. By observing one minute data frames of altitude and airspeed, it was a lot easier to see what was going on. Here is what I found: The pitot tube, which was mounted parallel to the bottom of the wing, worked just fine in level flight. During climbs and stalls, however, the angle of attack changes enough to make this airspeed indicator unreliable at speeds below 15 mph. What happens is this: in low throttle slow flight, as you pull back on the elevator, the nose goes up, the angle of attack changes and the plane stalls. Then the nose drops, speed builds up and the plane flies again. In steep climbs, the airplane may be fully stalled, hanging on the engine at times

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-- and climbing aerodynamically at a high angle of attack at other times. What is seen on the graphs is a virtual absence of data in the 5 to 15 mph range. The airspeed drops from 15 or 20 mph to 0 and then returns to 15 or 20 mph without showing the intermediate values. The pitot tube, at high angles of attack, is not pointing directly into the oncoming air so it spills air, the pressure drops and the measured airspeed falls to 0. The aircraft is probably not stalled out at this point, but it may be close to a stall. Refer to Figures 4-9.

Even with this aberration at low speeds, the airspeed data are still useful, especially at higher speeds. It is clear that the stalling speed of this particular aircraft is a little under the 15 to 20 mph range. An approach to landing at 25 to 30 mph is effective, and speeds of 60 to 65 mph are easily achieved. The altimeter is effective at more than 2000 ft. and can resolve differences in altitude of less than 25 ft. The temperature measurements show a resolution of at least 0.05° F.

#### Other Applications

What has been described here only scratches the surface of possible applications for controller/data loggers in model airplanes. If there is interest in this sort of thing, let the RCM editors know your feelings. There can certainly be additional articles devoted to computer controller and data logging applications.







## Radio Spectrum

This month I thought I would take another look at Giant Scale Air Racing. Specifically, the "World Championship Series of Giant Scale Air Racing."

Giant Scale pylon racing can consist of up to six classes of Reno style pylon racing, which are Unlimited Warbird, Unlimited Civilian, Formula I, AT-6, Biplane, and

Thompson Trophy. These are all classes of aircraft that are flown at Reno, Nevada, each year; however, in our case, Giant Scale refers to large models with wingspans typically around 100 inches.

Giant Scale pylon racing "Reno Style" was started by Cliff Adams and Tom Easterday and the first race was held in Madera, California, in October 1991. Since

its inception, Giant Scale racing has offered large cash awards, provided a very competitive environment for modelers to participate in, and has attracted many spectators. But, more importantly, Giant Scale racing has been responsible for significant advances in model aviation.

From 1992-1995, there were several Giant Scale races that had no tie to each other. In other words, the rules were different from race to race, not only for aircraft requirements, but also how the race was run. This resulted in confusion and frustration with many of the participants.

In 1996, we began to see an effort to tie the races and the promoters together in an event that was called the Triple Crown. The Triple Crown series of racing started by Ron Eisner was three separate races throughout the course of the year where each event was a race unto itself. Each of the three races had identical aircraft requirements and was run the same. Each race also had a purse established at 50% of the entry fees. In addition to the unity seen at the Triple Crown, the Triple Crown also allowed the participants to combine point totals obtained during each of the three races and put them toward a Championship Race which was held at the end of the third event.

Photos by Eugene Anastasi of Ampliflow Co.

**FIGURE 1  
WINNERS OF EACH CLASS AND THEIR EQUIPMENT**

Name	Kit	Engine	Radio
<b>BIPLANE</b>			
1. Kent McKenna	KT Aviation	Aerrow 75	Futaba
2. Rob Pastor			Futaba
3. Holly Hollingworth	Knight Twister	Zenoah 445	Hitec
4. John Creagh	Mong	3W - 4.2	Futaba
5. Tim Cardin	Scratch Pitts	Quadra	Airtronics
<b>AT-6</b>			
1. Gene Barton	Zirol	G-62	Futaba
2. Joe Marine	Race Pro	G-62	JR
3. Shawn Everson	Race Pro	G-62	JR
4. Tim Cardin	Saxton	G-62	Hitec
5. Dave Cowan	Race Pro	G-62	JR
<b>FORMULA I - 4.6</b>			
1. Diego Lopez	Kelly	3W - 4.2	Futaba
2. Mick Crawley	RnR GR-7	A3 4.4	JR
3. Mike Adams	Race Pro GR-7	Husky 4.6	JR
4. Ken Thornton	Race Pro GR-7	Zenoah 445	Airtronics
5. Babe Caltabian	Cosmic Wind	Aerrow 4.4	JR
<b>FORMULA I - 6.0</b>			
1. Mick Crawley	RnR GR-7	A3	JR
2. Jeff Powell	D & W Polecat	Quadra 100	JR
3. Charlie Powell	Rankin Polecat	Air Hobbies 6.0	Futaba
4. Dan Egelhoff	Ole Tiger	Aerrow 100	Airtronics
5. Rick Schrameck	RnR GR-7	Quadra 4.6	Futaba
<b>WARBIRD UNLIMITED</b>			
1. Scott Manning	Super Corsair	Herbranson	Futaba
2. Ken Thornton	Race Pro NA-50	Aerrow 200	Airtronics
3. Don Rice	Fiat G-59	Aerrow 200	Futaba
4. Rob Pastor	RnR Rare Bear	Herbranson	JR
5. Bruce Brown	Scratch Stilleto	A3 8.8	Futaba
<b>SUPER UNLIMITED</b>			
1. Archie Snider	RnR Lancair	A3 8.8	JR
2. Daniel Goldberg	RnR Lancair	A3 8.8	Futaba
3. John Creagh	Race Pro Lancair	Aerrow 200	Futaba
4. Bob Smith	RnR Lancair	A3 8.8	Futaba
5. Richard Verano	RnR Lancair	Aerrow 200	Futaba



**Team Extra with eight of their aircraft. Five of them are Bel Custom Aircraft Kellys flown in the Formula I class.**



**Close Formula I heat race between McBride Racing and Aerosport.**



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In 1997, Giant Scale air racing took many of the ideas started at the Triple Crown series, and introduced the "World Championship Series of Giant Scale Air Racing." We now have four races across the country operating with the same format. Aircraft flown at the "World Championship Series" must follow specifications set forth by USRA (Unlimited Scale Racing Association). USRA, with the help of Vice-President Dennis Crooks, has spent a lot of time with aircraft requirements taking into account pilots' comments, and evaluating aircraft currently flown in Giant Scale air races. (For those interested in a complete set of aircraft specifications for each of the six classes of aircraft, contact the USRA secretary, Mike Wise, 703 Kahlden Court, Houston, TX 77079, 281-558-4191 Tel/Fax.)

Each of the four races of the World Championship Series is an event unto itself where each participant will race in at least five heat races that consist of six laps around a 1600 foot pylon course. Unlike other forms of model aircraft pylon racing, in Giant Scale racing the pilots stand outside the course as do all the workers, pylon one is 800 feet to the pilot's right and pylon two is 800 feet to the pilot's left. The first place winner of each of the heat races will be awarded five points. Second place is four points, etc. The participants with the highest point totals obtained during heat racing will move on to the trophy race for their particular class. Since this is a series of four races across the country, the participants with the

highest points obtained during three of the four series races will be named the champion for their particular class.

The "World Championship Series of Giant Scale Racing" started off with the first race in Rialto, California, held April 17-20, 1997. The second race in this series was held in Gainesville, Texas, June 4-8, 1997. The third race in this series will be held in Oshkosh, Wisconsin, home of the EAA Convention, immediately following the convention, August 7-10, 1997. The final race in the series and the championship winners will be determined at Rialto, California, September 18-21, 1997.

The first race in the series, "Golden State Unlimited," was held at Rialto, April 1997, and was promoted by the World Championship Series. Many thanks go out to Archie Snider, Rick Schrameck, Tom Easterday, and Lorraine Hartranft/Easterday. The major sponsor for the Rialto race and the World Championship Series is "ZAP" Pacer Technologies.

The Rialto race gave us a real good start to the "World Championship Series." Approximately 100 participants showed up, some who participated in the Unlimited classes and reached speeds close to 240 mph (actual speed from radar guns). The largest class at Rialto was the Formula I class, with speeds reaching in excess of 180 mph. The AT-6 class, once thought of as an entry level class, is becoming very popular and competitive. The smallest class was the Biplanes; however, they are showing lots of promise.

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**USRA President, Joe Nelson, fuels Marvin Qualls' AT-6. In the AT-6 class, props and fuel are provided by the race promoter.**



**The aircraft to beat! A Fiat G-59 built by Paul Ross and flown by Don Rice. This entry in the Unlimited Warbird class won all of their heat races and took third in the trophy race.**



**The fast of the fast, Archie Snider (center) accepts first place in the Unlimited Civilian class.**



**Five Formula 1 aircraft in the ready area. "Gentlemen Start Your Engines!"**



**Unlimited Warbird class. One lap to go, the Fiat pulls ahead of the Bearcat.**

## FIGURE 2 GOLDEN STATE UNLIMITED KEY WORKERS

Lorraine Hartranft/Easterday	Team Leader
Cal Orr	Contest Director
Alan Pounds	Asst. Contest Director
Steve Parola	Flight Line Boss
Sam Wright	Announcer
Kelly Hartranft	Matrix/Scorekeeper
Terri Parola	Lap Counter
Debbie Lopez	Lap Counter
Tracey Zeidman	Lap Counter
Mike Lance	Lap Counter
Jim Oreskovich	Lap Counter
Julie Ramos	Pylon 1 Boss
Tom Ruleman	Pylon 2 Boss
Joe Nelson	Tech. Inspection
Mike Wise	Tech. Inspection
Dennis Crooks	Tech. Inspection

Participants showed up for Rialto on Wednesday, April 16, 1997, for check-in, where they were greeted by Lorraine and given their pilot's package. Each participant's aircraft had to then pass tech inspection, where a USRA representative came to the participant's pit area and the aircraft was checked for safety and to ensure that the aircraft conformed to USRA specifications.

Thursday, the 17th, tech inspection continued until approximately noon and then the field was open for practice flying. The practice session allows the participants to become familiar with the course, and the workers to become familiar with their duties, prior to actual racing. Thursday afternoon heat racing began, flying almost one round.

Friday morning, the 18th, we continued with heat racing; our goal was to fly every-one two rounds on Friday. We had a little bit of full-scale traffic even though Rialto airport was Notam, "limited use." It seemed that all the full-scale pilots wanted to come over and see what we were doing. The airport manager, Richard Scanlan, and his crew did a great job being air traffic controllers for both full-scale traffic and model traffic.

Saturday, the 19th, turned out to be an

overcast day, perfect for flying models but not so good for full-scale aircraft which was okay. Saturday was also heat money day. On two of the rounds we ran Saturday, heat money was paid out in cash to the first and second place winners of each heat. Saturday we ran a lot of races. I'm told we wore out soles of tennis shoes of participants from running back and forth between the pit area and the flight line.

Sunday, the 20th, we finished up heat racing and had flown six rounds. Sunday afternoon, the five participants with the highest point totals in each class earned during the heat races, went on to the trophy race. In the trophy race everything starts over. You spent the last four days just trying to get to the trophy race; yes, you might have earned some money in heat racing but, once you have made it to the trophy race, you have a chance to win your share of \$12,000 paid out in cash Sunday afternoon.

The Rialto air race, the first in the World Championship series of racing for 1997, ran very well and very smooth. The promoters did an excellent job making sure that every detail was covered; every position had a competent worker.

New for 1997 will be the first annual Giant Scale Race held in Oshkosh,

Wisconsin, August 7-10, 1997. The Oshkosh race is promoted by the EAA (Experimental Aircraft Association) and is being held immediately following the famous EAA Convention at Wittman Regional Airport, Oshkosh, Wisconsin. The Oshkosh race is also introducing a seventh class into Giant Scale air racing known as the Byron AT-6 class. This class of AT-6 racers is intended for entry level participants where everyone in the class will be flying the same kit — a 1/5 scale stock Byron AT-6 powered with a G-62 engine. The EAA Oshkosh race is also a part of the World Championship Series of Racing and points earned in the original six classes of racing will count towards the Championship Final. For more information, call the EAA at (414) 426-6524.

The final race in the series and the "Championship Final" is back at Rialto, California, the third weekend of September. For more information, call Lorraine Hartranft (714) 255-0202.

1997 promises to be a great year of racing.

See you at the races!





# RETRACT MODIFICATION FOR THE TOP FLIGHT GOLD EDITION P-51

By Jerry McGhee

## ABOUT THE AUTHOR

Jerry McGhee has been designing, building, and flying R/C airplanes for the last 16 years. He is a Captain in the U.S. Air Force, currently stationed at Eglin Air Force Base, Florida. He is married and has two children.

**D**o you love to fly your Top Flite (TF) Gold Edition P-51 Mustang but are hampered by gear problems? If this sounds familiar, I have the solution. I have designed a lightweight and very strong method to attach those retracts to your TF P-51.

I thoroughly enjoyed building my TF P-51. The kit was an absolute dream to build. All of the parts fit extremely well and the instructions were very thorough. I actually found myself wanting to build! I used to think of building a kit as absolute drudgery and a necessary means to an end; not so with the new TF P-51. It is a very enjoyable project to build. I liked building it so much, that I bought a second kit.

After the completion of the kit, I was ready to fly. The first flight was relatively uneventful. The plane flies very well. The problems started on the second flight. I entered the pattern for landing and upon a very gentle touchdown, the landing gear collapsed.

The next day, I began repairing the retractable landing gear mounts in the plane, according to the specifications in the plans, and headed back to the flying field. The first flight of the day went splendidly; I felt like a WWII fighter pilot! On the second flight of the day, again on landing after a gentle touchdown, the gear collapsed. At first, I thought I might have taken on some battle damage from the dogfight I had been in — no bullet holes, so I went back to the drawing board.

This time, I decided to abandon the specifications in the plans and go it alone. With a little time on the Model Cad and some time on the band saw, I installed my new and improved gear mounts to the Mustang.

This new modification is quite rugged! I have tested it on grass and asphalt. I have even gone as far in testing to land short of the asphalt runway in the grass, power up with the mains on the ground, and cross the threshold of the asphalt runway! The gear held! It was probably one of my best touch and go's ever.

I have the unique opportunity to travel a lot. Whenever I fly my

TF P-51, I have people come up to me and say, "I have one of those, did you have any gear trouble?" After visiting clubs in Colorado, Texas, and Virginia, I realized that I wasn't alone with my gear troubles, but that many of my fellow modelers were having problems, too. Thus came the premise for this article. So, if you are a frustrated TF P-51 pilot, try my retract gear modification.

First you will need three things: (1) 1/2" hardwood, (2) 3/8" plywood, and (3) 1/2" balsa triangle stock.

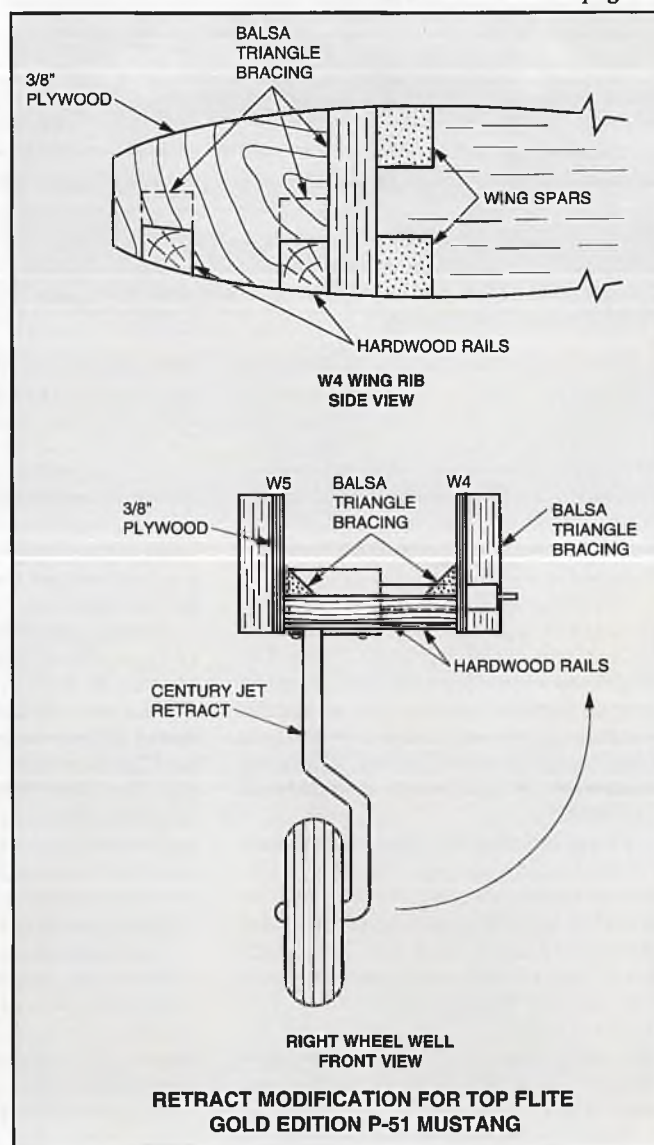
**Step 1:** If your Mustang is already built, you will need to cut wing ribs W4 and W5 out from the leading edge to the wing spar. If you are building your Mustang, you can decrease the thickness of the 3/8" plywood, and simply reinforce the wing ribs with plywood so that the total wing rib thickness is 3/8".

**Step 2:** Cut the shape of the plywood to match ribs W4 and W5 from the front of the wing spars to the leading edge.

**Step 3:** Glue the new 3/8" plywood W4 and W5 ribs in place using thick CA.

**Step 4:** Glue 1/2" balsa triangle stock to the wing ribs and wing

*Continued on page 34*



Jerry McGhee, and his son, Collin, with their Top Flite P-51 Mustang.



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We now have a newsletter. The first issue contains among other things a detailed description of how to do the rolling 360 turn. The second issue will deal with the finer points of hovering. Send me an e-mail for free copies – [walter@morrishobbies.com](mailto:walter@morrishobbies.com). A year's subscription by regular mail is \$13.95.

Here is an excerpt from the first newsletter:

*"Keep in mind that turn is made with the elevator. Start the plan in a slow roll. When the top of the plane is facing the center of the circle give it up elevator. When the bottom of the plane faces the center of the circle give it down elevator. After you get the timing down you can begin to use rudder. If you do not use rudder the nose will bob up and down. A little rudder will prevent this. (What I am saying here is use top rudder when in knife edge.). Also you can use a bit of rudder to help when the wings are horizontal."* There is more detail in the newsletter.

**THE MORRIS GIANT SU-DO-KHOI** is big (see picture in this ad). That's Tony Ayer hiding behind the wing. But it's more that big. It is the

easiest of all to hover. With the Moki 1.80 it will do climbing inverted flat spins. Picture this plane right on the deck, right in front of you doing consecutive loops with a radius no longer than the plane. Back and forth knife edge with half knife edge loops are a snap. It does most everything the 40 size Su-Do-Khoi does.

**THE Balsa NOVA** is becoming a classic. It is the best flying sport plane I have ever flown. We are getting raves from the fellows who are flying it. Some are practicing pattern with it. Besides that it's good looking! Team it with the Morris Powerhouse 45 and get astonishing vertical with unlimited fast rolls.

Now we have the 1.20 size BalsaNova. Just as good looking and flies just as well as the 40 size. Coming soon is a 60 size **Su-Do-Khoi** and the **Morris Hawk**. We've flown prototypes of both. The 60 **Su-Do-Khoi** hovers better than the 40 with the Power House 60 P. and it does everything else the 40 does. The Hawk is a fast, fast good looking, slick war bird.

**WHICH HOVERING PLANE?** If it is your first hovering plane get the **Su-Do-Khoi** or **Knife**. They are the best all around. You will soon fly them in close and low and slow and this will improve your flying skills. The best hoverer of all is the **Giant Su-Do-Khoi**.

**FRAMED AND COVERED.** We have a few of our plans framed only or framed and covered. Call for details.

**Glow Plugs.** We now have extended our line of glow plugs. They range from #1-#9. The hottest plug is #1, the coldest #9. For most applications use #4. The price is \$2.45 for #1-#4, \$3.45 for #5-#9. They are packaged in sets of five.

Download our catalog from [www.morrishobbies.com](http://www.morrishobbies.com)

E-mail address is [walter@morrishobbies.com](mailto:walter@morrishobbies.com)

Check out our prices. We always have the most low prices.

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Stylus 8 channel computer	599.95
Radiant 6 channel	199.99
VG4R 4 channel FM	129.95
VG4R 4 channel FM 2-mini servos	187.95
VG6DR 6 channel FM 4-102 servos	156.95
Mini BB servo	29.90
IN600A 6 channel FM 4 servos	328.95
IN600A 6 channel PCM 4 servos	368.95
IN600A 6 ch. computer 4 servos FM	398.95
IN600A 6 ch. computer PCM 4 servos FM	389.45
102 std. servo	13.95
94322 Heavy Duty B.B. servo	24.90

## ► HITEC RADIOS

Prism 7X FM computer	234.98
Prism 7 FM computer	217.95
Flash 5	189.95
Flash 4	155.95
Focus 4 channel FM	128.95
Focus 6 ch. FM	149.95
Supreme 8 channel FM receiver	62.95

## ► HITEC SERVOS

HS-60	36.95
HS-80 sub micro	24.95
HS-80 MG metal gear	34.95

HS-101 mini servo	21.45
HS-101 MG metal gear	29.95
HS-205 BB super mini servo	29.95
HS-205 MG metal gear	37.95
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HS-425 BB w/ dual ball bearings	18.95
HS-605 BB ultra torque servo	36.95
HS-605 BB MG metal gear	45.45
HS-615 MG super metal gear	45.45
HS-700 BB giant scale servo	28.75
HS-705 BB super torque giant	42.45

## ► FOX ENGINES

	w/o muffler	w/ muffler
FOX 25 RCBB	65.45	72.95
FOX 40 Deluxe	72.95	89.95
FOX 45 BB	89.95	96.45
FOX 46	98.95	104.95
FOX Quickie 500 Sport	119.95	125.95
FOX-60 ABC	122.95	129.95
FOX 74 Eagle Ring	127.95	134.95
FOX 74 ABC	131.95	137.95
FOX 15	52.95	63.95
FOX 35 stunt	*	59.95
Fox-Super-Quiet-Muffler 40 sz		28.95
FOX-RC-LONG-PLUGS (card of 12) per plug		1.85

## ► THUNDER TIGER

GP 10	45.95
GP 25	51.99
GP 42	49.99
GP 61	91.95
PRO 120	219.95
F 54S 4 Stroke	159.95
F 91S 4 Stroke	194.95
KITS	
World Trainer 40 T A.R.F.	103.99
World Trainer 40 H A.R.F.	104.99
Tiger Trainer 40 A.R.F.	94.95
Champion 45 L A.R.F.	143.95

## ► MVVS (CZECH) ENGINES

.09 Diesel	53.48
.12 Glow-ABC	59.95
.15 Diesel DBBRC	69.99
.15 ABC RC DBB	64.99
.15 Glow ABC DBB w/ Venturi	59.95
.21 ABC RC DBB	79.99
.21 Car-Engine DBB	124.95
.40 Pylon DBB	149.95
.40 ABC RC DBB	98.95

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**Morris the Knife 82.95**  
**Combo . . . . . 231.85**



.40 Q500 Side-Exhaust w/ muffler	169.94
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.61 Diesel DBB w/ glow head	177.99
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1.20 Single Cylinder	229.99

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Moki Marine 90 ABC	375.00
Webra 120	239.99

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40 SS R/C w/ muffler	82.96
40 SS BB R/C w/ muffler	108.95
40 CX BB R/C w/ muffler	134.95
45 CX BB R/C w/ muffler	154.95
60 XF-4 Ring RC w/ muffler	179.96
60 XF-4 ABC RC w/ muffler	219.96
80 4-cycle w/ muffler	229.99

#### Morris GIANT

Su-Do-Khoi

**249.95**

Combo\* . . . 664.85



**82-inch wing span!**  
 \*Combo includes: kit,  
 Moki 1.8, Mac Long,  
 Quiet pipe and header

**Morris Su-Do-Khoi 79.95**  
**Combo . . . . . 228.85**

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5% Nitro, 17% Lubricant, each	\$12.95
10% Nitro, 17% Lubricant, each	\$14.95

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 4200 Leghorn Drive • Louisville KY 40218  
 RCM September 1997



M O R R I S

# PowerHouse

**"The First Engine I love so much I gave it my name"**

*Walter R Morris*

The Morris PowerHouse is a double ball bearing ABC engine. The C is for chrome. Most engines sold use nickel since it is much cheaper. And they do not tell you. Whats worse they often do not tell you whether or not they are sleeve bearing. I bought an OS engine when I first started flying thinking I was buying a first class engine. Turned out it was sleeve bearing. Probably the best way to avoid this is - If they do not tell you assume it is sleeve bearing.

I feel the same way about fuel. If they do not say on the label how much lubricant assume it has a minimal amount. For the PowerHouse engines you need 17% lubricant. Our Powerhouse fuel has it and 20% of the lubricant is degummed castor.

When I look at an engine I do it from the point of view of the modeler. I want my engines to start easily - The PowerHouse engines start easily. I want them to be reliable.

You should not get dead sticks with the PowerHouse engines. I want high power to weight ratio. The PowerHouse 45 pulls a 10 x 5 prop 16,000 and the PowerHouse 45P pulls it 16,600 with the long quiet pipe. I want a linear power curve and my engines have it.

Most model engines leak fuel because the front bearing is not sealed. I don't want mine to do this and they don't. We were disassembling one for taping and we found out why, there is a tiny hole in the crankcase that opens behind the bearing where excess fuel accumulates. The other end opens into the powerful vacuum formed when the engine is running. It draws excess fuel back into the crankcase where it is used as

fuel. This means distinctly more flying time per tank, also a cleaner plane. If you had a cadillac you would not want it sprayed with oil. This engine is the cadillac of its class.

Another example of quality, every piston sleeve is measured for size. Then the same machine makes the piston assuring a perfect fit every time.

I know the Rossi reputation for quality - Model Airplane News air scoop calls it "Rossi - legendary quality." I did not know why when I visited Italy; the why is Mr. Rossi.

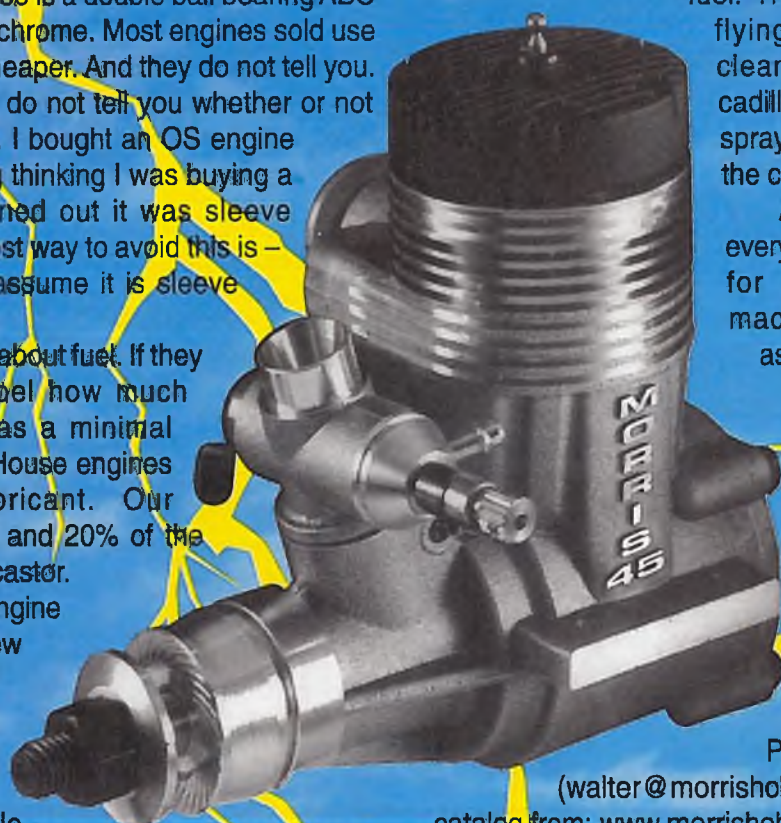
P.S I like to receive e-mail:

(walter@morrishobbies.com) Download my catalog from: [www.morrishobbies.com](http://www.morrishobbies.com).

The Morris PowerHouse 45 is \$115.95. The 45P is \$139.95. The tuned silencer is \$37.95 and the long telescoping quiet pipe with header is \$54.95.

The Powerhouse 60P is now available. It is a powerful engine with all the qualities of the Powerhouse 45 and 45P. You can not buy a better .60 size engine. And the quiet pipe is telescoping, making it a snap to tune. If your field has a noise problem, this pipe will solve it. And no sacrifice in power. The Morris PowerHouse 60 is \$164.95. The Quiet pipe and header are \$54.95. Shipping and handling is \$6.25.

*The PowerHouse 50 is coming soon.*



**Morris Hobbies 1-800-826-6054**

1-502-451-0901 • fax 1-502-451-8793 • <http://www.morrishobbies.com> • 4200 Leghorn Drive • Louisville KY 40218



# MORRIS JERRY'S BIG BOY



The following is excerpted from an review by Dave Baron in the December 1996 Model Airplane News:

Jerry L. Smith has designed some of the most successful aircraft in fun-fly competition, and the Big Boy is his first design for the sport and hot dog market. Morris Hobbies is the perfect outlet for his design; with its stable of fine models, it has set new standards for aerodynamics and performance.

This is a beautiful, complete kit, and it contains hardware that includes clevises for elevator halves and the rudder. This means that there are six cables going to the tail! The light weight aluminum landing gear has tremendous strength and good flex, and it's really good looking. The plans and instructions are simple and clear. Any modeler with kit building experience will enjoy the construction. The plane builds very quickly.

The aircraft requires a radio that you have total faith in. Due to its superb reliability and all the great fun-fly features the programming system offers, I chose the Airtronics Stylus. For control redundancy, power and minimum slop, the servos were mounted in configurations in which I could have one servo for each control surface on the tail. Later I tried Airtronics new *Extended Feature* card system and took advantage of features in the IAERO card, such as *aillevator* (sometimes referred to as *taileron*). With this activated, you have mixed the aileron commands into each half of the elevator.

The wing has an even more intriguing system, the cou-

pling of servos to the same control surface, two servos for each aileron: one at the root, and one on the tip. The servos must be coupled with a Y-harness; use great care to ensure that the throws and geometry are identical on each connected-together servo in the Y-harness.

This plane is for fliers: sport fliers, pattern fliers, scale fliers & especially big-bird fliers. The Big Boy effortlessly performs all maneuvers in *the book* (& so much more that we'll probably need a sequel to *the book*!) It is smooth, agile and it tracks like a train. Its great attribute is that its stability is apparent throughout its wide speed range. Whether you're at idle or full throttle, this is one plane that goes only where it's pointed until it stalls (at an incredibly slow speed). Often, I have taken off with the throttle at only high trim.

This plane literally leaps into the air in a conventional, full throttle take off. I think that any engine from a .60 up should cause a reaction similar to a rapid reversal of Newton's gravitational laws. If, when you start the takeoff run, you don't have to clear a 50-foot obstacle 10 feet in front of you, you may be inclined to take off at a reduced throttle setting.

When you have the control throws at a reasonable level, the Big Boy flies like a trainer and it will land itself if given half a chance. It has such a wide spread range that you can draw out your flare until you achieve just the right nose-up descent angle & drop into a perfect three-point stance. Wheel landings are a bit more of a challenge only because of the plane's eagerness to fly. Either

way it's pure pleasure. And this plane can hover until it runs out of fuel. Hovering is not difficult.

**Loops.** Jerry L. Smith incorporated into this plane the same airfoil that he uses in his competition fun-fly designs. The result is a loop that is fast and tight at full throttle. Consecutive loops are fun because of how little altitude is lost with each revolution!

**Lollipops.** I have enjoyed this maneuver since I started enjoying fun-fly airplanes. You need to have enough power to accelerate vertically. For this, you must first hover; then you hit the throttle and immediately continue straight up. At the moment of your plane's peak vertical acceleration (not speed), kick in full rudder and keep the plane flat with the ailerons and elevator as it rotates. Done correctly, this part of the maneuver will look like the tightest knife-edge loop you have ever seen! As the plane comes back around to the vertical, throttle back to hover and neutralize the rudder to finish the maneuver.

Perhaps the greatest pleasure in a plane such as this is that it tempts you to explore its outrageous maneuverability. You'll come up with maneuvers that have yet to be explained. Sometimes, the hardest part is figuring out what you did so that you can do it again!

Without a doubt, this aircraft is the most fun I have ever had with a giant model. I recently took it to a giant rally, where no one expects to see ho-dogging. Needless to say, everyone who saw it wanted to know what it was and where to get one! Hats off to Morris Hobbies and Jerry L. Smith for producing this outstanding plane.

Morris Hobbies • 4200-A Leghorn Drive • Louisville KY 40218 • 1-800-826-6054 • (502) 451-0901 • fax 1-502-451-8793 • walter@morris hobbies.com

Tapes are available of these planes in flight being put through their paces. Tapes are \$10.00 for the first and \$8.50 for each additional one. Send them back on your next order for credit. Call for other items. Prices in this ad are good thru May 1996. Prices, availability and specifications are subject to change. Morris Hobbies is not responsible for errors in this ad.



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Lite 19 ch version has 7 regular servo channels + 8 2/3 position servo outputs + 4 on-off's for lights, ignition & starter. KH812: \$829.95. Mfg of R/C over 20 years.

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spars using epoxy. Refer to drawing for placement.

**Step 5: Do not glue in this step.** Cut hardwood rails to length, set the rails in the ribs, and test for proper fit. Also, test-fit your retracts with the rails in the ribs.

**Step 6:** Glue in the hardwood rails with epoxy. Install balsa triangle bracing to the hardwood rails and wing ribs. Refer to drawing for placement.

**Step 7:** Install retracts.

Voila! You now have a dependable gear mount for your Mustang. The secret is to use the hardwood rails, triangle stock, and beef up the wing ribs.

I really do enjoy flying my Mustang. Top Flite really hit the mark on this kit (with only one obvious disappointment)! I

# SR

**Longer flight times...  
...are just a phone  
call away!**

Just because your radio system came with a 500mah battery pack, it doesn't mean you have to fly with a 500mah pack!

Today's transmitters and servos draw more current than ever before. However, most radio systems still come with only 500mah or 600mah battery packs. Although the electronics in today's transmitters have changed dramatically, the battery packs they come with haven't changed much in the last 15 years! As we have always said, "The best radio gear... is no better than its battery pack."

SR 850 Series transmitter packs are the same size and weight as a standard 500mah pack but they will give you a full 900mah in capacity. That means you'll get almost twice the flying time from an SR 850 Series transmitter pack than you did with the pack that came with your transmitter! And, they'll fit in any Airtronics, Futaba, or JR transmitter ever made!

When it comes to receiver packs, we can give you a pack with 900mah, 1100mah or 1400mah that's only slightly larger and heavier than your original 500mah pack. If you only need a 500mah pack, our 500 Series pack is almost *half the size* of an ordinary 500mah pack yet it has a capacity of 575mah!

If you'd like more information or have a question, drop us a note at SR Batteries, Inc., Box 287, Bellport, NY 11713, Fax: 516-286-0901, Email: 74167.751@compuserve.com or call 516-286-0079 between 9am and 5pm, EST.

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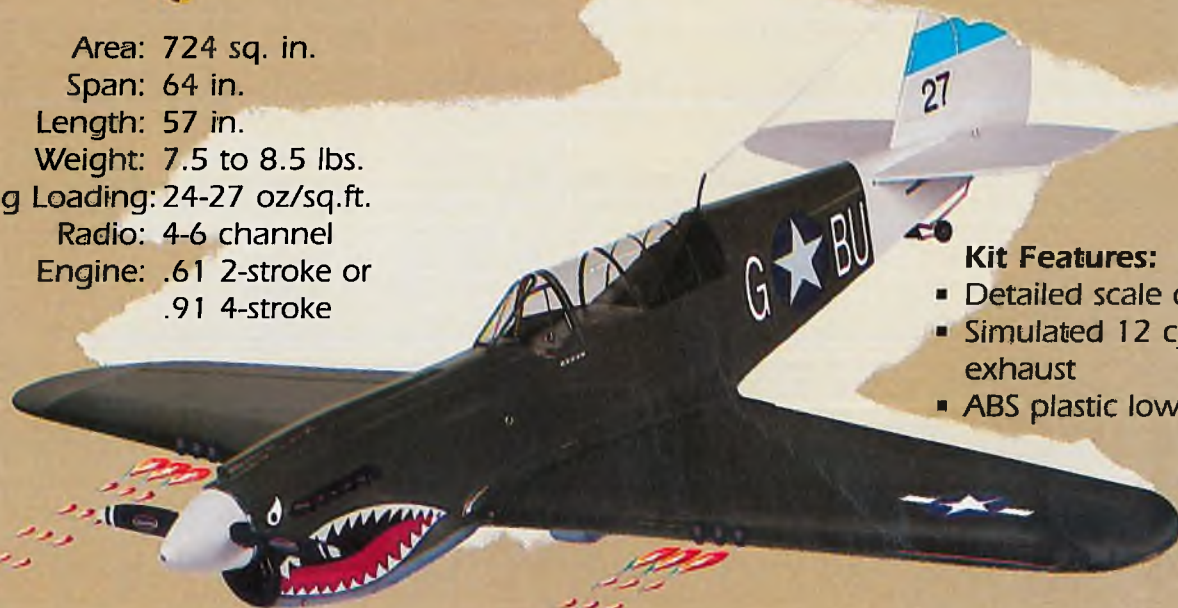
# P-40N WARHAWK



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Engine: .61 2-stroke or  
.91 4-stroke



### Kit Features:

- Detailed scale canopy
- Simulated 12 cylinder exhaust
- ABS plastic lower cowl

### Profile of the P-40N

The N version was the most numerous of the series with 5,219 built, and it was the best all-around aircraft. The N series boasted the following improvements over earlier versions:

- Increased tail moment
- Increased flying stability
- Increased cockpit visibility
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4-pin "CEU" connectors fit Aeromax, Futaba "J", JR, Hitec "S" and DAD servo plugs
- **HIGHEST SERVO SIGNAL OUTPUT**  
Digital processor "sends" 150-200% stronger servo signal than other receivers
- **"SAFETY-LOCKED" CONTROL FRAMING**  
Digital processor "locks" Tx control frames for faultless servo positioning, "glitch" resistant!

\* "CEU" is a product of Custom Electronics, Higgensville, MD



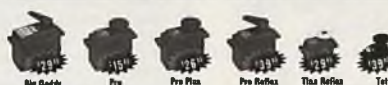
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- 3" L x 1.25" W x .825" H - 2.8 Oz. Wt.
- High Impact "Nylon 66" Case
- Sensitivity: 4 micro-volts (> 2 miles free air range)
- Max Voltage: 16Vdc
- Current Drain: < 25 milliwatts
- 1990 + FCC approved
- Limited Lifetime Warranty
- Crystal Interchangeable



Diagrams on the side labels illustrate how to properly plug in each brand of compatible battery and servo connectors.

### Sport & Hi-Performance Servos



	Bearings	Torque @4.5v	1 x 80° @4.5v	L x W x H	Weight
<b>Big Daddy</b> \$29.95	Iron/011ite*	140"/Oz.	.24 Sec.	2.3 x 1.1 x 2	3.6 Oz.
<b>Pro</b> \$15.95	Iron/011ite*	44"/Oz.	.24 Sec.	1.8 x .79 x 1.4	1.7 Oz.
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<b>Pro Reflex</b> \$39.95	Iron/011ite*	130"/Oz.	.24 Sec.	1.8 x .79 x 1.4	2.1 Oz.
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<b>Tot</b> \$35.95	Iron/011ite*	19"/Oz.	.20 Sec.	1.0 x .53 x 1.0	.56 Oz.

\* Futaba Race Compatible \* Shock-proof, Self-lubricating Mechanical/Oilite, 2000° Metal Gearhouse Bearings.  
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field kit battery performance!**

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one obvious disappointment!) I equipped my award-winning TF Mustang with a Saito 1.50 engine, Century Jet Retracts, and a JR 622 radio. I also installed the Vortac tank drop mechanism and, to slow the gear down while retracting, I installed restrictors in the air lines. The latter effect is quite dramatic, as the gear cycles one at a time when retracted or extended.

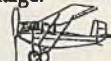
I really do hope you try this modification to your project, if you are besieged by gear problems. With minimal work, you could even modify it to fit any plane with gear problems. Good luck, and I hope you enjoy your Top Flite Gold Edition P-51 Mustang as much as I enjoy mine.



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**NEW!**  
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**NEW!**  
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GPMA1030	Big Stik 40 ARF-Modern 40-50.57 5"	109.99
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GPMA1035	Easy Sport 40 ARF 35-46.59 2"	129.99

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GPMA1040	Super Sportster 40 ARF 40-50.55 5"	149.99
GPMA1500	Spitfire ARF 40 40-46.54"	199.99
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GPMA1530	F4U Corsair ARF 40	249.99
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GPMD0805	Power Pod Unpowered	9.99
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GPMD3871	Screw-Lock Connector-Bulk (12)	5.99
GPMD4131	Standard Silicone Fuel Tubing 3'	2.15
GPMD4150	Ultra Precision Fuel Filter	2.75
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GPMD4230	3 3/8" Piper Cub Wheels (2)	19.99
GPMD5005	4-Step Standard Prop Shaft Reamer	9.49
GPMD2300	Wing Jig Kit	17.99
GPMD2400	C.G. Machine	24.99
GPMD6003	Pro CA Glue 2oz Thin	6.49
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GPMD6015	Pro CA- Glue 2oz Thick	6.49
GPMD6035	Pro CA Activator 2oz w/Pump	3.99
GPMD6036	Pro CA Activator 8oz Refill	8.99
GPMD6039	Pro CA Debonder 1oz	2.99
GPMD6041	Glue-B-Gone	5.99
GPMD6045	Pro Epoxy 6 Minute Formula 9oz	8.49
GPMD6047	Pro Epoxy 30 Minute Formula 9oz	8.99
GPMD6060	Pro Thread Locking Compound	2.79
GPMD6161	Pro Wood Glue 4oz	1.89
GPMD6165	Milled Fiberglass	4.99
GPMD6167	Plan Protector 25" Roll	5.69
GPMD6169	Easy Touch Hand Sander 5 1/2"	3.99
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GPMD6180	Bar Sander Sand Paper 80 Grit	4.99
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GQKA2130	de Havilland Beaver 40	79.99
GQKA2225	Wacky Waco Profile 60	89.99
GQKA2310	Skylane 45-61.72"	89.99
GQKA2320	Raven 60-65.62"	119.99
GQKA2325	Raven Profile Fuselage 40	59.99
GQKA2327	Beacraft Profile 40	69.99
GQKA2330	IMAA Legal Giant Raven	209.99
GQKA2340	Easy Answer 78"	24.99
GQKA2345	Tecate Biplane 40-53.50"	99.99
GQKA2348	Gigolo Glider ARC	59.99
GQKA2485	Avenger 45 ARF	169.99
GQKA2490	Raven 40 ARF	179.99
GQKA5600	Kwik Fly 40 ARF 40-45.56"	95.99
GQKA6250	Er Skylane 60 ARF 60-65.72"	209.99
GQKA6525	Spitfire 36 ARF	139.99
GQKA6570	Tomato A.T. ARF	149.99
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HCAA2058	SuperStar 60 AWAARF 46-61.69"	139.99
HCAA2060	Starfire 40 AWAARF 40-46.56"	129.99
HCAA2080	EXTRA 300S 60-SIZE AWAARF PLUS	189.99
HCAA2100	HobbiStar 60 AWAARF 60.71"	139.99
HCAA2600	ASAP Extra 300 40-46.55 3/4"	189.99
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HCAAM1000	CS 51J Command Servo Futaba J Standard	12.99
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HCAAM1040	CS-11J Command Servo Futaba J Micro	28.99
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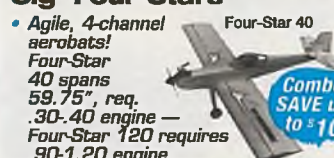
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- Build the plane that got R/C aerobatics off the ground! Spans 71", requires .40-.60 engine, 4-channel radio, 3 rolls MonoKote.

CM3307	Kir/O.S. 46FX	SAVE \$5 \$172.98
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SIGA5116	Four-Star 40	\$57.99
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CM3309	Kir/O.S. 15FP	SAVE \$5 \$73.98
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- Fly the IMAA-legal version of Hazel Sig's own personal aerobat! Spans 86", requires a 4-channel radio, .60-.90 engine, 24-30 Feet MonoKote.

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CM3314 Kit/O.S. 1.08FSR .....SAVE\$20 \$369.98

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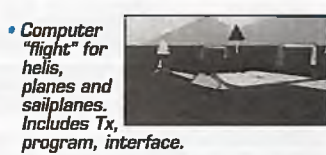


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- Requires no guesswork—accurately balances any plane up to 40 lbs.

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- Requires 4-channel radio, .60-.75 engine, 4+ rolls MonoKote.

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MIDA0184

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HCA2550	4-Way Wrench with Plug Storage	3.99
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HCA3010	Hand Operated Fuel Pump	8.99
HCA3100	Top Fueler 6/12V Pump	13.99
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HCA3650	Bullet CA+ Glue Zox	4.99
HCA3670	Bullet CA- Glue Zox	4.99
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HCA3750	Bullet Activator Spray Zox	3.99
HCA3755	Bullet Activator (Refill) Box	6.49
HCA3780	CA Applicator Tips (6)	8.99
HCA7000	Deluxe Heat Gun	15.99
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KYOA1020	Extra 300 ARF Red/Yellow .32-.40,52"	249.99
KYOA1021	Extra 300 ARF Blue/Red .32-.40,52"	249.99
KYOA1030	Space Walker ARF .32-.40,62.4"	249.99
KYOA1035	Fairchild PT-19 ARF	NEW! 289.99
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KYOA1255	Sports Trainer 20	189.99
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KYOE0247	Nexus Legato w/OS FS52 Surpass	649.99
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LANA1208	Laser 200 1/3 Scale 3.2-4.2,95"	179.99
LANA1209	1/3 Scale Extra 300-S	328.99
LANA1210	Sea Ring ARF	109.99
LANA1216	Fun Fly ARF 19-46.48"	49.99
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LANA1340	Slinger 40.32-46.48"	54.99
LANA1360	Slinger 60.51-75.60"	79.99
LANA1400	Slinger 1.20 41-2.2,84"	129.99
LANA1500	Slinger Giant Scale Kit 1.2-4.2,84"	149.99
LANA1600	1/4 Scale Extra 300S	199.99
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MCDM3936	836 6 Channel Buffered Amplifier	27.99
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MCDP2001	101 Ni-Starter w/Charger	18.99
MCDP2002	201 Ni-Starter w/Meter & Charger	21.99
MCDP2007	205 Ni-Starter w/Meter-No Ch	18.99
MCDP2170	On-Board Ignition System	13.99
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MCDP2231	12 Volt Fast Charger	16.99
MCDP2472	Onboard Glow Driver Twin	74.99

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MDHA1170	Great Lakes Biplane 40 BHP .46-53.47"	149.99
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MGMG2810	XL-91 Magnum Engine	139.99
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MIDA0181	Star Duster 40 32-45.60"	85.99
MIDA0182	Super Stinker Bk-Plane 1.08-1.8,60"	234.99
MIDA0183	Citabria Airplane 60 3/4"	163.99
MIDA0184	1/6 Super Stearman Airplane 60-75.65"	187.99
MIDA0185	Essence Airplane Kit	37.99
MIDA0186	G-202 Airplane Kit 1.08-1.50,72"	204.99
MIDA0187	Cap 232	233.99
MIDA0189	Aero-Star 40 30-40,62"	74.99
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OSMG0115	15 FP w/Muffler	49.99
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OSMG0125	25 FP w/Muffler	52.99
OSMG0140	40 FP w/Muffler	54.99
OSMG0160	60 FP w/Muffler	89.99
OSMG0308	1.08 FSR RC w/Muffler	249.99
OSMG0350	BGX 1 3500 2.3 Cubic Inch	279.99
OSMG0525	25 FX w/Muffler	84.99
OSMG0532	32 SX Non-Ringed w/Muffler	124.99
OSMG0540	40 FX w/Muffler	94.99
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OSMG0852	FS-52 Surpass Ringed 4-Stroke w/Muffler	189.99
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OSMG1320	FF-320 4 Cylinder Ringed 4-Stroke Pegasus	1299.99
OSMG1400	30 Wankel Rotary w/Muffler	199.99
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Mike Lee



## Pit Stop

**W**e have a great new radio system to look at this month and it has the features you need to make the car handle. This is the KO Propo EX-11 Presto system, available from Tower Hobbies. I'm going to jump right into the radio so that we don't waste any time.

The heart of the Presto is its computer

system transmitter. Personally, I have always liked the feel of the KO transmitters, as they have been very well balanced, ergonomically designed, and had a nice spring rate on both throttle and steering controls. The new Presto has most of this, save for the new steering wheel cover, which is a solid rubber piece. Previous covers were

lightweight foam that allowed a nice grip and could soak up the sweat from nervous fingers. Our new transmitter features up to four channels of control, 3-model memory, Anti-Lock brake system, traction control system, electronics trims, dual rates, exponential, and an LCD display panel. This seems like a lot and it is!

Beginning with the number of channels, this is a full-fledged 4-channel system, although the receiver has only two channels available. Nonetheless, this makes for a very versatile system, suitable for gas and electric powered cars, plus some specialty vehicles that previously used an aircraft type transmitter. The transmitter will accept dry cells or NiCds, having a charge jack on the back side of the unit.

Trims are electronic, meaning that they use a single click stop for trim changes in either direction, and then self center. These are worth the cost of the system, as there is no longer the danger of having the trims bumped while the radio is in impound at a



A shot of the head of the EX-11 Presto transmitter shows the layout of all controls and programming switches. Under the steering wheel are the two dual-rate switches.



Here are the four programming switches that makes it all possible. Simple programming makes set up easy. Main power switch lies just below the program switch panel.

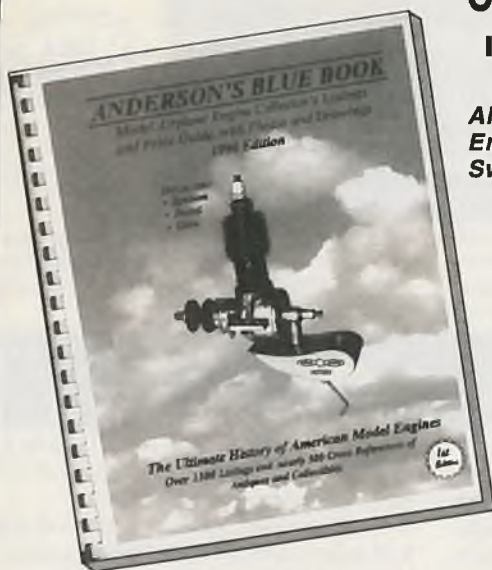


Even the bright lights used to take this photo did not dim the LCD display. Here we see model No. 1, the name of the model, and the current transmitter voltage.



Included with the Presto system is the KR-297FZ microreceiver, standing next to a quarter. It is indeed small!

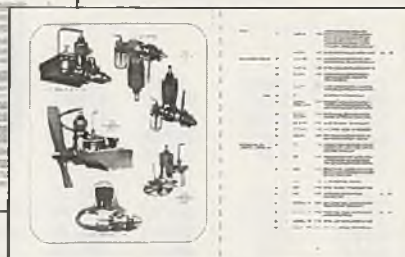
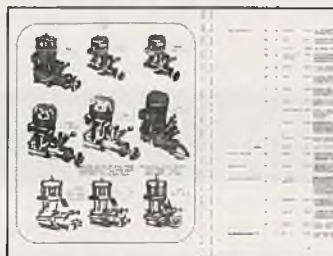




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race. These trims are active only when the main power switch is on. Additional warning is given on the LCD display, as it will show the trim change setting whenever a trim button is moved.

For once, someone actually thought about the placement of the trim buttons. In this case, the steering trimmer is above the steering wheel where your index or middle finger can make the adjustment. The throttle trimmer is located to the left of the steering wheel, where your thumb can make the change. With this arrangement, you can make the trim change without stopping the car to take your hand from the wheel. Hooray for KO!

At the top edge of the pistol grip, we find two adjustment buttons, called GD Lever A and GD Lever B. The top one is the steering dual rate, while the lower one is the brake dual rate. Both are operated by the thumb of your throttle hand. You can make one "click" adjustment to the dual rates, or simply hold back, and the rates will ratchet right on through. An audible signal from the transmitter will signal the progress of your adjustment, as will the LCD display with a visual cue. I like being able to adjust the brakes this way, as I find this even easier than using the trimmer switch.

To the right of the steering wheel, another trimmer switch is found, and this controls the third or fourth channel, at your discretion. It is programmable for use as an "ON/OFF" type switch, or 2, 3, and 4-position motion, as well as a linear-motion

switch. What immediately comes to mind is the throttle mixture adjustment for a gas car. One or two clicks at a time is all you need to make adjustments on these rascals.

Farther to the right is the program key panel, where all programming is carried out. Only four membrane switches are used to perform all program functions, and each command function is easily seen on the LCD display panel, on the opposite side of the face. The main power switch is right below the key panel. Frequency crystals are found on the back side of the transmitter and a standard telescoping antenna is on top.

Now, we start the fun part, this being the programming functions the Presto has for you. We start with the LCD display, which has an adjustable contrast which is handy for those times when the lighting is basically poor, and you strain to see the display. Adjust the contrast for easier viewing. The display will also provide a visual low-battery warning combined with an audible alarm when the minimum voltage of 8.7 volts is reached. I would have to say that when you get this low, it's time to bring the car into the pits, as your rechargeable will eat the dust momentarily.

Programming of the functions is performed through two menus on the radio: the Function mode and the System mode. Under the Function mode, you will select the travel rates of steering and throttle, model selection, and the response curve for steering and throttle. We begin with Model selection.

Under Model selection, you may select

from one of three models held in memory. Names for each can be assigned from the System mode menu, up to six characters. That was easy. Now, the travel rates. This is a real treat, as you can make travel rate adjustments using the Function menu, the trimmer switch, or the dual rate switch. With the Function menu, values are assigned in terms of percentage, going from zero movement to 130% of normal. Normal is assumed to be 60° of motion. To adjust steering with the trimmer switch, turn the radio ON, let's say to the left, and then hit the trimmer switch left to increase throw, or right to decrease. With the dual rate switch, simply click one direction or the other to increase or decrease the throw. Using any of the methods will cause the LCD display to show what the setting is, as you change it. I like this! Throttle adjustment is done in a similar fashion, using the throttle trigger instead.

The steering and throttle response command is actually like setting exponential rates, allowing you to make servo motion around center either more or less rapid to your control input. For example, a 1/12 road car is very sensitive and, by decreasing the response time around center, makes the car much easier to handle, yet does not decrease the overall turning radius. With throttle, this is especially useful for tracks that have little bite. A softer response at low throttle will help keep the rear end in control under power. You can actually feather the throttle, instead of getting an





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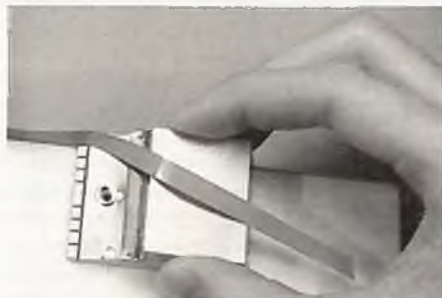
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"ON/OFF" switch effect.

Now, we move to the System mode menu. This begins with the servo reversing menu for all channels. That's easy enough, and we head to Auxiliary select for channels 3 and 4. This menu allows you to determine whether channels 3 and 4 act as a 2-position, a 3-position, or 4-position motion command. It can also provide linear movement at the servo, although it requires the driver to hold the channel 3 trimmer switch in the desired direction for as long as required to reach the position you want. You can do this in one step "clicks," or just let it ratchet through until you get there.

The next menu is the GD Select menu. In this menu, you can assign the GD switches whatever function you wish. I mentioned earlier that these were also known as the dual-rate switches, plus the third trimmer to the right of the steering wheel. If you wish, you can assign a dual-rate function to the trimmer switch instead of the thumb switch. This is your choice, allowing you to custom-design the transmitter. I have no idea what "GD" stands for, but, take my word for it, you'll call it the dual-rate switches.

Following GD Select is the ABS (anti-lock brake system) cycle menu. This system actually pulses the brakes to prevent brake lock up when slowing hard. We all know that to lock up the brakes is to cause a skid and loss of control. With ABS, you can pulse the brakes to help prevent locking, only this is done automatically by the transmitter. You may select a fast or slow rate of pulsing with the menu. First rate is recommended for electric cars, and slow rate for gassers. Fast rate is around five pulses per second, and slow is around three pulses.

From here, we move to the final menu, which is the Model Name menu. You may select up to six characters (alpha, numeric, or symbol), for each model in memory. To do this, you must select which model to name first, then add the characters — pretty simple.

Now that we have run through all of the screen functions and menus, remember that, because this is a digital system, you can make very minute changes to each setting. This allows very accurate set up of the model for fine control. Most everything is set in percentages, as it relates to 60° being

100%. You can exceed the 100% mark by up to 30% in some cases, allowing gobs of servo travel if you really need it.

In application, I find the Presto to be a well-balanced, ergonomically fitting radio. I have said before in this column that you must be comfortable enough with the radio that you never think about it when driving. It is an extension of your mind and, anything that detracts from the job of driving, certainly prevents you from driving your best. Setting up different cars with the Presto has come easily, no matter whether it is a road car or off-road gasser. It's what I want in a radio system. I recommend this system to anyone looking for a versatile radio that will carry you into the heart of competition racing.

My tech tip this month deals with radio care. In the world of off-road racing, it's not uncommon to find we have placed our muddy hands all over the radio and that's not good. Grit that enters into the steering wheel joint or throttle trigger can cause them to stick in one place, usually at the wrong time. I normally use a damp cloth and wipe down the case to my transmitter to get that stuff off. An old toothbrush can be used to remove the dirt imbedded in the grips of the transmitter body, as well as the corners by the steering wheel. An air compressor helps to blow dirt and stuff out of the corners and small openings of the case. You have to take care of the equipment if you expect it to take care of you. Do this often and the radio will serve you faithfully and last a long time. (You airplane pilots can do the same thing, too).

Next month — the awesome new Associated RC-10L2 road car. This is radically changed over the past roadster and well worth looking at. Stay tuned for that little bugger. Meanwhile, the race season is hot and heavy, and we're having fun out there. I hope you are, too. I also happen to work at a place where there used to be a real two mile long road course and they set it up once a year to hold vintage car racing. My plan is to hop on the track and have some fun in the real thing. If I get the chance, I'll show you the pictures. Now we can really blow the speed limit. See ya!





# Leader in Small Airfoil Technology MASTER AIRSCREW



## Now! Improved Performance and Design!

The GF Series has 13 new sizes and an updated design using the latest in engineering technology: NASA Airfoil sections, true pitch, hub fillets, higher thrust and lower noise. Made of glass-filled nylon for strength and durability. In 30 sizes from 7x3 through 11x10.



**K Series** In sizes 12x6 -16x8, the K Series has efficient wide blades for slower turning 4-strokes, but performs great on 2-strokes. In glass-filled nylon.



**Classic Series** For giant scale and WWII planes in 9 sizes from 16" - 20". In glass-filled nylon.



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## For Summer '97 3-Blade Series

**\$8.95 - \$10.95**  
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Now in sizes 11x8, 12x6 and 13x8, the 3-Blade Series has a great scale look, NASA Airfoils and superior performance. In black glass-filled nylon. More sizes to come!



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## Electric Flight Accessories

### Electric Flight Pack

- kit contains gearbox, 7.2 volt 05 motor, folding prop with spinner, and motor mount
- greater efficiency over direct drive
- gearbox in 2.5, 3.0, or 3.5:1 ratio
- a super value at \$41.95 sug. retail



### 7.2 Volt Motor

- 8019, 05 motor
- Built-in capacitors
- Recommended for 6 or 7 cells.
- A Great value at \$15.95 sug. retail



### Gearboxes

- longer flight times
- greater climb
- compact, lightweight design
- \$18.95 sug. retail
- In ratios 2.5, 3.0, and 3.5:1



### Folding Propellers

Folding props offer the advantage of a large blade area without the drag of fixed blade props. Thin, undercambered blades deliver superior thrust and performance. In sizes 12x8 and 15x12. Replacement blades are available. \$8.95 and \$9.95 suggested retail.



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3802	SIMPLE ULTIMATE BIPE	45.96

## CLOUD DANCERS

**SPECS:** 40 / 60  
SPAN: 60 / 72in  
AREA: 625 / 840 sq  
RADIO: 4 ch  
WT: 4 / 6-7lbs  
ENG.: 40 - 46 / 40 - 60 2C  
40 - 53 / 60 - 80 4C

40 #3803 ... \$71.99  
60 #3897 ... \$98.96

## SMARTEST



- Analyze RX & TX Packs
  - 4 or 5 Cell RX Packs
  - 8 Cell TX Pack
  - Digital Capacity Display
- #ACE 34640  
... \$59.96

## SMART CHARGE

The Smart Charge from ACE R/C is a fully automatic fast charger for receiver and transmitter nicads. This charger has a microprocessor that monitors and calculates the fast rate charge termination when the pack is at 100% capacity.



## AT-6



SPAN: 35 in  
AREA: 188 sq in  
RADIO: 2-3 ch  
WT: 20 oz.  
ENGINE: .049

#3936 AT-6  
... \$33.96



**DIGIPACE 3**

- Checks RX & TX Packs
- Auto Trickle Mode
- Microprocessor-Based
- 4 or 5 Cell RX Pack
- 8 Cell TX Pack
- UL Approved Power Supply
- HiVis LED Display & Status

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... \$99.96

## Altech Models

### F-14 TAMECAT TRAINER



SPAN: 72-1/4 in  
ENGINE: 40-46 2C 53 4C  
RADIO: 4 ch

ALT800 F-14 TAMECAT TRAINER RTE..... 139.96  
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- Light Wing Loading
- Molded Cockpit Deck & Cowling
- Stable, Wide Stance Gear
- Factory Built Ready to Fly
- Factory Finished Ready to Fly

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## ASP Engines



- DUAL B. BEARINGS
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- QUIET MUFFLER
- 90 DAY WARRANTY
- EASY STARTING

### ASP 40 R/C

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2165	ASP 61 FSR ABC R/C W/MUFF	99.96
2166	ASP 61 FSR RING R/C W/MUFF	92.96
2167	ASP 75 FSR ABC R/C W/MUFF	98.96
2168	ASP 91 FSR ABC R/C W/MUFF	115.99
2169	ASP 108 FSR ABC R/C W/MUF	139.99
3045	ASP 65 4-CYCLE W/MUFF	176.96
2773	ASP 80 4-CYCLE W/MUFF	183.99

## American Aero

### RC120 SPORT



A deluxe all balsa kit for those pilots that want an easy to fly yet very aerobatic sport airplane.

SPAN: 68 in  
AREA: 952 sq in  
ENGINE: 60-108 2C RADIO: 4 ch  
90-120 4C WT: 7-71/2 lbs

#AAS150  
... \$109.96

## Bridi Models

### UTTER CHAOS 60



SPAN: 63.50 in  
RADIO: 4-5 CH  
ENGINE: 50-61

#2172 ... \$61.96

The **UTTER CHAOS 60** from BRIDI is a fine first low-wing trainer and a great sport airplane for the seasoned pro.

## Cox Hobbies

2178	TEE DEE 020 ENGINE	28.96
2179	TEE DEE 049 ENGINE	28.96
2182	BLACK WIDOW 049 ENGINE	19.96
2183	QRC 049 ENGINE W/MUFF	21.96
2186	EZ BEE II W/ENGINE	74.96
2187	EZ BEE II W/RADIO SYSTEM	164.96



The Cox **Lazy Bee** RTF is a prefabricated mold foam trainer that even comes with a Cox .049.

COX0450	LAZY BEE W/2CH RADIO	169.96
COX0451	LAZY BEE	89.96

## Clancy Aviation

### LAZY BEE KITS



CLA100	LAZY BEE KIT	44.96
CLA150	LAZY BEE EXTENDED KIT	49.96
CLA200	BIG LAZY BEE KIT	92.96
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Prices subject to change without notice  
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## Airtronic's Radios

### RADIANT 6



Designed for the beginner or advanced sport flyer want the advantages and benefits of a computer but as easy to operate as a non-computer system. The Radiant incorporates a custom microprocessor and the easiest to use software available on the market.

AIR0210FM	Radiant 6CH AIR W/4-102	203.99
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### VANGUARD 6CH FM

- 4 HD 102 Servos
- DC Narrow RX
- All Nicad System
- Trainer System
- Reliable
- Dual Rates

#2135  
... \$164.99

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2134	Vanguard 4CH FM W/2-501	189.96
2135	Vanguard 6CH FM SYS W/4 102	164.99
2136	Vanguard 7CH FM SYS W/4 102	239.96



2170	XLT PATTERN	99.96
2171	ESCAPE PATTERN	99.96
2172	UTTER CHAOS 60	71.96
2173	VAGABOND 40 SPORT	63.96
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3441	GREAT ESCAPE PATTERN	119.96

## Dremel Mfg



### MultiPro

- Vari-Speed BB
- 72 Piece Accessories
- Storage Case
- 175+ Guide Book

#DRE5900  
... \$79.99

2206	2750 W/ACCES	43.96
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2208	5950 BB/VAR SPD W/ACCES	64.96
2209	1571 SCROLL SAW 15in.	89.96

## Enya Engines

### SS15 R/CW/MUFFLER

Features include an ABC piston/sleeve set, schneurle porting, and a quiet muffler.

#EMP151 ... \$84.96

2242	09 R/C W/MUFF	59.96
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2245	25 SS R/C W/MUFF	69.96
2246	25 SS BB R/C W/MUFF	94.96
2249	35 H BB HELO R/C W/MUFF	129.96
2250	40 SS R/C W/MUFF	82.96
2251	40 SS BB R/C W/MUFF	109.96
2256	60 XF SE RING BB R/C W/MUFF	179.96
2257	60 XF SE ABC BB R/C W/MUFF	219.96
2258	60 XL RE ABC BB R/C W/M	198.96
3834	41 4-CYCLE W/MUFF	224.96
2259	53 4-CYCLE W/MUFF	214.96
2260	80 4-CYCLE W/MUFF	264.96
2261	90 4-CYCLE W/MUFF	314.96
2262	120 4-CYCLE W/MUFF	339.96
2263	R120 4-CYCLE W/MUFF	339.96
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- COMMON FEATURES:**
- End Point Adj - All Ch's
  - 3 Model Memory
  - Sub Trim on Prop Ch's
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  - Servo Reversing
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  - ESV Meter
  - Adj Precision Gimbals
  - DC FM Receiver

### AIRCRAFT VERSION

- Dual Rate All-Elevator
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- Revolution Mix
- Idle Up
- Throttle Hold
- Hovering Pitch Adj
- Hovering Throttle Adj
- 1000 Mah RX Battery



### STYLUS 8 FM & PCM

- Dual Rates
- Four Model Memory
- ESV Meter
- Precision Gimbals
- Switch Assignability
- Servo Reversing
- Many Mixing Options
- Voltage Display
- Precision Gimbals
- Memory Card System

3739	Stylus AIR 8CH FM W/4-322	599.96
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2150	161 PRO QS SERVO 135oz	69.96

## Direct R/C



WING SPAN: 47in RADIO: 4ch  
WING AREA: 535 sq in WT: 5-1/2 lb  
ENGINE: 40-46 2C

#3405  
... \$89.96

## F/A F-18 HORNET



SPAN: 53 in RADIO: 4ch  
AREA: 642 sq in WT: 7-1/2 lb  
ENGINE: 60-91

#DCR608  
... \$129.96

2194	YARD DART FUN FLY 25-40	89.96
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## Astro Flight

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2517	WACO F3 BIPE 1/5 SCALE	189.99
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2519	T-28B 1/5 SCALE	189.99
2520	SPITFIRE 1/5 SCALE	198.99
2521	P-51 MUSTANG 1/5 SCALE	239.99
2522	RETRACTS SPITFIRE 1/6 SC	163.96
2523	RETRACTS T-28 1/6 SC	199.96
2524	RETRACTS FW-190D 1/6 SC	172.96
2525	RETRACTS DUELLIST	199.96
2526	RETRACTS T-28 1/5 SC	199.96
2527	RETRACTS SPITFIRE 1/5 SC	229.96
2528	RETRACTS MUSTANG 1/5 SC	289.96

## Midwest Products



SPAN: 72 in  
AREA: 960 sq in  
FUSE. LENGTH: 64.5 in  
ENGINE: 1.08-1.50 2C  
1.20-1.82 4C  
RADIO: 4CH/6-SERVOs  
SCALE: 27%

**#MID186**  
... \$209.99

- Precision Cut Parts
- Full Sized Plans
- Jig-Lock Construction
- ABS Cowl & Wheelpants



WING SPAN: 83 in  
WING AREA: 1000sq in  
ENGINE: 90-120 2C  
RADIO: 4ch - 5 servo  
120 - 160 4C WT: 10-15 lb

**#3670** .. \$229.96

**RBT620 AT-6 RETRACTS** ..... \$149.96



● Jig-Lock Construction  
● Precision Cut Parts  
● Full hardware package  
● ABS Cowl & Pants

● High Quality Parts  
● Pre bent Aluminum Gear  
● Full Sized Plans  
● Complete Building Manual

SPAN: 80 in  
AREA: 1162 sq in  
ENGINE: 1.5 - 2.2 2C  
1.8 - 3.0 4C  
2.2 - 2.8 Gas

RADIO: 4 ch  
WT: 14 to 17 lbs

**#3671**  
... \$232.99



● Jig-Lock Construction  
● Precision Cut Parts  
● Full hardware package

● High Quality Parts  
● Pre bent Aluminum Gear  
● Full Sized Plans  
● Complete Building Manual

SPAN: 60 in  
AREA: 665 sq in  
ENGINE: .32-46 2C  
40-53 4C

RADIO: 4 ch  
WT: 4-1/5 - 6 lbs

**#3673** ... \$89.96



**#MID183** ... \$169.96

## Lanier Models

### ALMOST READY TO FLY KITS

LAN104	DART 40-60	64.96
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LAN124	JESTER 60 RTF	69.96
LAN132	P-51 SPORT ARF	64.96
LAN204	JAVELIN	54.96
LAN205	LASER .45-.61 RTF	94.96
LAN217	LASER 1/4 SCALE	159.96
LAN219	LASER 1/3 SCALE	219.96
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LAN209	FUN FLY 40	49.96
LAN210	TR-260 AEROBATIC	99.96
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LAN3216	STINGER 10	38.96
LAN218	STINGER 40	69.96
LAN220	STINGER 60	94.96
LAN215	STINGER 120	139.96
LAN208	STINGER GIANT SCALE	159.96

## Moki Engines

- RPM: 2,000 - 12,000
- Ringed Piston
- 4.1 HP
- 41.3 oz
- 10% STD Fuel
- 18 x 8 - 18 x 10

### MOKI 180

**#MOK180**  
... \$309.96

## SUPER STEARMAN



WING SPAN: 100 in  
WING AREA: 1100 sq in  
WEIGHT: 10-12 lbs  
ENGINE: 60-120 2C  
110-140 4C  
RADIO: 4 CH W/6-SERVOs

**#MID184**  
... \$188.96



**#MID187**  
... \$234.99

The new CAP 232 excels at aerobatics - spectacular tumbling maneuvers and will knife edge with incredible ease. Some of its feature include an aluminum landing gear, pre-trimmed ABS wheel pants and cowl, a thick crystal clear canopy, full sized plans with Midwest's famous illustrated Success Series construction manual.

WING SPAN: 80 in  
WING AREA: 1162 sq in  
RADIO: 4ch w/6-servos

WT: 14 - 17 lbs  
ENGINE: 2-cycle Glow 1.5-2.2  
4-cycle 1.8-3.0, 2.2 - 2.8 Gas

## MIDWEST CHEROKEE



SPAN: 61 in  
ENGINE: 40 - 46 2C

**#MID176**  
... \$79.96



SPAN: 54 in  
ENGINE: .45 - .61 2C

**#MID157** ... \$84.96



SPAN: 74 1/2 in  
ENGINE: 60 2C

**#MID178** ... \$84.96

LAN221	EXTRA 300S 1/3 SCALE	329.96
LAN222	EXTRA 300S 1/4 SCALE	199.96
<b>ALL NEW LASER CUT ALL WOOD KITS</b>		
LAN223	SHRIKE 10-15	34.96
LAN224	INDICATOR TRAINER	34.96
LAN225	SUPER TRAINER ST-40	59.96
LAN226	EXTRA 3.25	64.96
LAN228	PRO CUB	64.96
LAN229	PRO TWISTER	59.96

### INDICATOR



SPAN: 45-1/4 in  
AREA: 316 sq in  
RADIO: 2ch  
ENGINE: .049-.051 2c

### PRO TWISTER

SPAN: 41 - 1/2 in  
AREA: 664 sq in  
RADIO: 4ch  
ENGINE: .32 - 46 2c

## Saito Engines

### FA-91S

RPM: 2000 - 11500  
WEIGHT: 18.25OZ  
HP: 1.7  
PROP: 12X8 - 14X8

**#2982** .. \$249.96

### FA-150

RPM: 2,200-10,000  
WEIGHT: 30.5OZ  
HP: 2.50  
PROP: 14X10 - 18X4

**#3690** .. \$374.96



### FA-450RD

RPM: 1600 - 8000  
Weight: 6.39 Lbs  
HP: 7.0  
Prop: 22 x 10 - 24 x 10  
Total Diameter: 7.87in

**#3894**  
... \$1089.96

2552	FA-50 W/MUFF	184.96
3891	FA-56 W/MUFF	189.96
2554	FA-65 W/MUFF	194.96
2556	FA-80 W/MUFF	214.96
2982	FA-91S W/MUFF	249.96
2559	FA-120S W/MUFF	349.96
3690	FA-150 W/MUFF	374.96
2561	FA-60T TWIN W/MUFF	594.96
3691	FA-100T TWIN W/MUFF	499.96
3893	FA-182T TWIN W/MUFF	689.96
<b>GOLDEN KNIGHT SERIES</b>		
2553	FA-50G GOLD W/MUFF	199.96
3892	FA-56G GOLD W/MUFF	209.96
2555	FA-65G GOLD W/MUFF	219.96
2556	FA-80G GOLD W/MUFF	239.96
3710	FA-91G GOLD W/MUFF	274.96
3711	FA-120G GOLD W/MUFF	389.96
3712	FA-150G GOLD W/MUFF	399.96

## Magnum Engines



Unbelievable value in these new high performance ball bearing engines. And at plain bearing prices.

MAGXL80RFS	80 4-Cycle w/Muff	174.96
MAGXL91RFS	91 4-Cycle w/Muff	184.96
3768	XL 15FSR BB R/C W/MUFF	47.96
3769	XL 25FSR BB R/C W/MUFF	49.96
3770	XL 28FSR BB R/C W/MUFF	49.96
3877	XL 32FSR ABC BB R/C W/MUFF	49.96
3878	XL 36FSR ABC BB R/C W/MUFF	49.96
3879	XL 36HR FSR BB HELI R/C	79.96
3550	XL 40FSR BB R/C W/MUFF	49.96
3551	XL 46FSR BB R/C W/MUFF	69.96
3552	XL 53FSR BB R/C W/MUFF	79.96
3880	XL 61FSR ABC BB R/C W/MUFF	94.96
3881	XL 61FSR RING BB R/C W/MUFF	89.96
3882	XL 75FSR ABC BB R/C W/MUFF	117.96
3771	XL 91FSR BB R/C W/MUFF	139.96
3772	XL 108FSR BB R/C W/MUFF	159.96
3883	XL 120FSR RING BB R/C W/MUFF	189.96
3766	GPA BUSHING 40 R/C W/MUFF	39.99
3767	GPA BUSHING 46 R/C W/MUFF	54.99

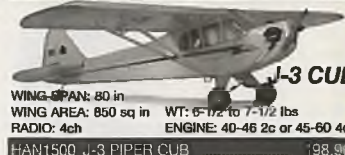
Check out our Internet Site  
<http://www.btown.com>  
for more Super Specials

## Hangar Nine



WING SPAN: 63-3/4 in  
WING AREA: 712 sq in  
RADIO: 4ch

**HAN1400 EZ FLY 40 TRAINER** 109.96



WING SPAN: 80 in  
WING AREA: 850 sq in  
RADIO: 4ch

WT: 6-1/2 to 7-1/2 lbs  
ENGINE: 40-46 2c or 45-60 4c

**HAN1500 J-3 PIPER CUB** 198.96



WING SPAN: 61-1/2 in  
WING AREA: 720 sq in  
RADIO: 4ch

WT: 5-1/4 to 6 lbs  
ENGINE: 40-46 2c 45-60 4c

**HAN1600 CESSNA 40** 109.96



2453 DAS UGLY STICK RTF 40 109.96

2454 DAS UGLY STICK RTF 60 129.96

## RJL Engines

### 61R/C W/Muff

### #2783

... \$109.96

RPM: 2,000 - 13,000  
WEIGHT: 19OZ  
HP: 1.8  
PROP: 11X7 - 12X6

## Prather Products

### Fun Cruiser Ready to Go

MADE IN THE USA

● Factory Assembled

● 25cc Gas Engine

● Epoxy Hull

● 46in Length-14in Beam

● 1/4in Flex Cable Drive Sys.

● Prather Metal Prop

● Complete Instructions

● Pull Starter

PRA0811 FUN CRUISER with Engine RTF..... 599.96

PRA0711 EMPRESS with Engine RTF..... 714.96

## Sig Models

2571	SKYBOLT BIPE	89.96
2572	KOUGAR MKII	62.96
2573	SMITH MINIPLANE BIPE	72.96
2574	KAVALIER	64.96
2575	DOUBLER II	39.96
2576	KIWI	57.96
2577	HUMMER 1/2A	22.96
2578	P-51 MUSTANG	98.96
2579	KOBRA 20	46.96

## FOUR STAR 60



**#SIG 757**  
... \$89.96

SPAN: 71 in  
AREA: 920 sq in  
RADIO: 4 CH  
WEIGHT: 7 - 8 LBS  
ENGINE: 60-75 2C  
65-91 4C

CALL 1-800 228-3237 or <http://www.btown.com> FOR OUR LATEST FREE SALE CATALOG



## Futaba Corp



### 6VA SKY SPORT

- ERGONOMICAL TX
- 4-148 SERVOS
- SERVO REVERSING
- MIXING
- DUAL RATES
- ALL NICAD W/CHGR
- R127DF RECEIVER
- TRAINER SYSTEM

#2311 ... \$198.96

### SKYSPORT 4V SPORT

A new 4 channel from Futaba for the new corner into Radio Control. This system features a comfortable designed transmitter case and Futaba's high level of reliability.

Comes with a one year warranty.

#FUT040 ... \$149.99

- Ergonomic Design
- Servo Reversing
- Trainer System
- 127DF Dual Conv Rx
- 3-3003 Servos
- Full Nicads w/Chgr
- Neck Strap
- Adj. Transmitter Sticks

### SKYSPORT 6X COMPUTER



The new 6XA and 6XH systems from Futaba features a new simplified programming system so even the novice modeller can take advantage of modern R/C technology. Comes with a one year warranty.

#### Air Features:

- Flapover Mixing
- V-Tail Mixing
- Elevon Mixing
- Airbrake
- Elevator to Flap Mix
- Flap to Elevator Mix
- 4-3003 Servos

#### Heli Features:

- Hover Pitch
- Revolution Mixing
- Delay
- Rudder Offset
- 4-148 Servos

FUT064 6XA COMPUTER W/4-3003 ... 229.96  
FUT065 6XH COMPUTER W/4-148 ... 249.96

### 8UA SYSTEMS

- Ergonomical TX
- 4/5 Servos
- Servo Reversing
- 5 Mix Circuits
- Dual Rates
- All Nicad W/Chgr
- DC Receiver
- 8 Model Memory
- Stop Watch
- Digital Trims
- Trainer System
- + lots more new features



3730 8UAF FM AIRCRAFT W/4-148 ... 408.99  
3731 8UAF PCM AIRCRAFT W/4-3001 ... 498.99  
3732 8UAF FM HELI W/5-3001 ... 549.96  
3733 8UAF PCM HELI W/5-9502 ... 779.96

2313 148 STANDARD SERVO 42oz ... 16.25  
2314 3101 MICRO BB SERVO 34.7oz ... 34.96  
2315 3002 MINI W/ METAL GEAR 44oz ... 55.96  
2316 3302 HD QS SERVO 110oz ... 55.96  
2317 5101 STD BB SERVO 55.6oz ... 41.96  
2318 5102 MICRO BB W/MET GR 55.6 ... 59.96  
2319 9101 BB CORELESS 41.7oz ... 59.96  
2320 9102 MICRO BB CORELESS ... 79.96  
2321 9202 BB HT AIRCRAFT 69.5oz ... 52.99  
2322 9304 BB HT CORELESS 69.5oz ... 55.96  
2323 9403 BB MINI CORELESS 44.5oz ... 55.96  
2324 9303 BB HT CORELESS 99oz ... 64.96  
2325 9601 MINI BB CORELESS 36oz ... 55.96

### FUTS133

S-133 Micro Servo ... \$26.99

- Custom Hybrid IC
- 51 x 1.10 x 1.14in
- 30.5 oz Torque
- Only .67oz.

**SHIPPING & HANDLING:** Ground Continental USA: \$5.95, TWO DAY & OVERNIGHT Air available. Overseas charges additional on some shipments. Foreign orders are welcome.

C.O.D. Ok, add \$5.50 for COD fee. Handling fees may be applicable on returns.

**HOURS:** Mon - Fri 9:30 - 5:30, Thur 9:30 - 9:00, Sat 9:30 - 6:00 & Sun 10:30 - 5:00

## Goldberg Models



#3402 ... \$149.99  
SPAN: 72-1/2 in  
AREA: 948 sq in  
RADIO: 4 CH  
WEIGHT: 8.75 - 9.5 lbs  
ENGINE: 90 2C  
120 4C

2330 ELECTRA ELECTRIC DELUXE ... 56.96  
2331 MIRAGE 550 ELECTRIC ... 61.99  
2332 FALCON 56 MK III ... 61.99  
2334 EAGLE II TRAINER ... 56.99  
2335 FREEDOM 20 TRAINER ... 59.96  
2336 EAGLE 50 ... 43.96  
2337 GENTLE LADY SAILPLANE ... 31.99  
2338 SUPER CHIPMUNK ... 108.99  
2339 ULTIMATE BIPE ... 131.99  
2340 EXTRA 300 ... 126.99  
2341 ANNIVERSARY J-3 PIPER CUB ... 75.99  
3590 TIGER 60 ... 94.99

## Global Models



SPAN: 53 in  
AREA: 800 sq in  
WT: 4-1/2 lbs  
ENG: 40-53 2-C  
RADIO: 4 CH  
#GLO325 ... \$57.96



SPAN: 62 in  
AREA: 638 sq in  
ENGINE: 80-85 2C  
91 4C  
RADIO: 4 ch  
#3692 ... \$129.96

3937 EXPLORER RTF 2M SAILPLANE ... 74.99  
3938 TECATE BIPLANE 40-53 ... 99.99  
3188 SKYRAIDER 60 ... 109.96  
3939 WHIPIT HGL ... 109.96  
2354 SKYLANE 45-60 ... 79.96  
3940 EASY ANSWER 2M GLIDER KIT ... 24.96  
3941 GIGOLO RTC SLOPE SAILPLANE ... 79.96  
3942 TORNADO AT RTF 40 TRAINER ... 149.96  
3943 KWIK FLY 40 ARF ... 99.99  
3944 AMERICAN FLYER RTF ... 89.99  
3945 AMERICAN FLYER W/40GP RTF ... 134.99  
3946 RIGHT FLYER 40T RTF ... 98.96  
3947 RIGHT FLYER 40T W/40GP RTF ... 139.99  
3948 RIGHT FLYER 60H ... 149.96

## Hirobo



**Super Shuttle Z Sale**  
3861 SHUTTLE Z KIT ... 209.99  
3862 SHUTTLE Z ASSEM W/ENYA 35H ... 349.99  
3463 SHUTTLE ZXX KIT ... 494.96  
3464 SHUTTLE ZXX ASSEM W/35HBB ... 669.96

### PARAPLANE RTF

- Assembled
- 2ch Radio Included
- Motor Installed
- Battery Included
- Fast Charger
- Electronic Speed Ctrl.

### #HIR3903

... \$249.99



#3102 ... \$71.99  
SPAN: 54 in  
AREA: 680 sq in  
RADIO: 4CH  
ENGINE: 35-45 2C / 40-50 4C

2342 JET GLUE 2oz ... 6.49  
2343 SUPER JET GLUE 2oz ... 6.49  
ULTRACOTE ... 10.96  
ULTRACOTE FLUORESCENT ... 14.96  
2344 SUPER TOTE FLIGHT BOX ... 24.96  
2345 PRO TOTE FLIGHT BOX ... 34.96

## House of Balsa



WING SPAN: 56 in  
WING AREA: 550 sq in  
ENG: 40-46 2c, 50-60 4c  
RADIO: 4ch  
WT: 5 lb

2383 P-51 MUSTANG 20 ... 37.99  
2384 T-6 TEXAN 20 ... 37.99  
2385 2 X 4 SAILPLANE ... 21.96  
2386 2 X 6 SAILPLANE ... 26.96  
2387 2T SAILPLANE ... 26.96  
2388 P-51 MUSTANG 1/2A - .10 ... 31.96  
2389 ME-109E 1/2A - .10 ... 31.96

A7 CORSAIR II #HOB035 ... \$54.99



#HOB030 ... \$41.96  
Span: 62 in  
Area: 480 sq in  
Wgt: 30 oz.  
Radio: 2ch w/Std Servos

**XP783 7ch Computer Systems**  
● 7 Channels  
● 8 Model Memory  
● FM or SPCM (1024)  
● LCD Display  
● 3 Dual Rates  
● Nicads & Charger

3839 XP 783 FM AIR W/4-507 ... 399.96  
3840 XP 783 FM HELI W/5-517 ... 449.96  
3841 XP 783 PCM AIR W/517 ... 499.96  
3842 XP 783 PCM HELI W/5-531 ... 569.96

## Hitec - RCD



The **FOCUS** series of radio systems from HITEC feature full nicad sets, charger, a RCD DC receiver, servo reversing and adjustable length transmitter sticks.

### Prism 7



- Computer Programming
- Servo Reversing
- Narrow Band RCD Rx
- End point All Channels
- 3 Model Memory
- Delta, V-Tail, & Flaperon Mix
- Dual Rate & Exponential
- Snap Roll Button
- Nicads & Charger Set

### PRISM SYSTEMS

3368 7 FM W/4-300 ... 219.96  
3726 7 SPECTRA FM SYN W/4-422 ... 309.96  
3863 7X FM W/4-422 ... 239.96  
3864 7X SPECTRA FM W/4-422 ... 329.96  
3865 7X SPECTRA PCM W/4-422 ... 369.96  
3729 SPECTRA SYNTH TX MOD ... 119.96

### FOCUS FM R/C SYSTEMS

3189 4 CH SYS W/4-300 ... 128.96  
3190 4 CH SYS W/3-101 MINI ... 169.96  
3192 6 CH SYS W/4-300 ... 149.96

### SERVO

3193 080 SUB MICRO 30oz ... 24.96  
3194 080MG SUB MICRO MET-GR 24oz ... 34.96  
3195 101 MINI SERVO 24oz ... 21.96  
3196 101MG MINI METAL GEAR 24oz ... 29.96  
3197 300 STANDARD SPORT 42oz ... 11.96  
3695 205 SUPER MINI BB .20-42oz ... 39.96  
3696 205 SUPER MINI BB MET GR .20-42 ... 46.96  
3198 422 PRO SERVO 43oz ... 15.96  
3199 425 PRO SERVO BB 43oz ... 18.96  
3697 525BB HIGH SPD BB .16-46oz ... 34.96  
3698 545BB HIGH TORQUE BB .21-61oz ... 34.96

### RCD SUPREME 8CH DC RECEIVERS w/o X-tal

3200 MICRO 5CH FM FUT-J ... 59.99  
3201 MICRO 5CH FM AIR ... 59.99  
3202 MICRO 5CH FM JR ... 59.99  
3721 SUPREME 8CH FM FUT-J ... 59.99  
3722 SUPREME 8CH FM AIR ... 59.99  
3723 SUPREME 8CH FM JR ... 59.99  
3724 SUPREME 8CH FM HITEC ... 59.99

## JR Radios

When you're ready to move up to a computer radio system, the XF622 is the logical choice. With its easy to program and read LCD screen, adjustable gimble assemblies and you have a truly customized, state of the art computer radio system.



### XF-622 6 FM

3546 XF-622 6CH FM AIR W/4-507 ... 274.96  
3547 XF-622 6CH FM HELI W/5-507 ... 298.96

### XP-8103 8ch Systems



- 8 ch
  - Model Reset
  - 10 Model Memory
  - Reversing on all 8 Channels
  - Sub-Trim on all 8 Channels
  - Model Name Input-8 Characters
  - Modulation - PPM, S-PCM (1024) & Z-PCM (512)
  - Data Transfer between 8103 Transmitters
  - Dual rate on Aileron, Elevator, and Rudder
  - Exponential rate on Aileron, Elevator, and Rudder
  - Travel Adjust on all 8 Channels
  - Fail - Safe on PCM Versions
  - Trainer System Function Assignable
  - Timer Function - Up-Down or Integrated
  - Graphic Servo Positions
- Plus lots of Fixed wing, Helicopter, and Sailplane Specific Functions.

JRS8412 8103 FM AIR W/4-517 ... 469.96  
JRS8422 8103 FM HELI W/5-517 ... 529.96  
JRS8442 8103 PCM AIR W/4-517 ... 529.96  
JRS8453 8103 PCM HELI W/5-531 ... 649.96



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2580	KING KOBRA 60	81.96
2581	ASTRO HOG	77.99
2767	CLIPPED WING CUB 1/4 SC	184.96
2768	PIPER CUB J-3 1/4 SCALE	148.99
2589	MORRISSEY BRAVO 1/4 SCALE	214.96
2590	SPACEWALKER	244.96
2591	RISER 78in SAILPLANE	31.96
2592	RISER 100in SAILPLANE	50.99
2593	NINJA SLOPE SAILPLANE	44.96
2594	SAMURAI SLOPE SAILPLANE	99.96

### SIG KADET LT-40



#SIG754  
\$72.99

SPAN: 70 in  
AREA: 900 sq in  
ENGINE: 30-40 2C  
40-50 4C  
RADIO: 4 ch  
WT: 5-1/2 to 6 lbs

The **LT-40 Trainer** from SIG was designed for the first time modeler looking for a gentle flying and easy to build trainer.

### ULTIMATE BIPE



#SIG756 ... \$62.96



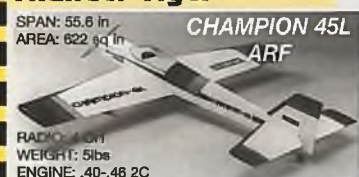
#2588 ... \$44.96 **KADET SENIORITA**

WING AREA: 746 sq in  
WING SPAN: 63 in  
ENGINE: 15-25 2-C  
21-35 4-C  
RADIO: 3CH

Very docile and forgiving, great for the new student pilot. Easy to build.

2582	CITRABRIA 1/6sc	84.96
2583	FOUR STAR 40	57.96
2584	MID STAR 40	62.96
2585	KADET JUNIOR	39.96
2586	KADET MK II TRAINER	53.99
2587	KADET SENIOR	61.99
2588	KADET SENIORITA	44.96
3008	FOUR STAR 120	139.96
2566	PIPER J-3 CUB	54.96
2567	RYAN STA	119.96
2569	KOMMANDER	67.96
2570	LIBERTY SPORT BIPE	83.99

### Thunder Tiger



**CHAMPION 45L RTF**

SPAN: 55.6 in  
AREA: 622 sq in  
ENGINE: 40-48 2C

2602	CHAMPION 45L RTF	149.96
2599	HAWK 78in RTF SAILPLANE	73.96
2600	20T OLYMPIC RTF TRAINER	89.96
2601	40T SKYLARK RTF TRAINER	108.96

### F-91 4-CYCLE

- Muffler
- 1.6HP at 11,000rpm
- 1,800 - 12,000rpm
- 25.3 oz.

#THU9801  
... \$219.96



**TIGER TRAINER 40 ARF**

SPAN: 61 in  
AREA: 675 sq in

THU4504	TIGER TRAINER 40	104.96
THU4504A	TIGER TRAINER 40 W/40R/C	159.96

The ready to fly **THUNDER TIGER TRAINER 40** was designed for the newcomer to radio control. Thanks to its large, flat bottom wing this airplane provides the "Hand-Off" stability that all new pilots need.



#2581  
... \$77.99

WING SPAN: 71 in  
ENGINE: 45-60 2C  
60-75 4C

One of the easiest and slowest flying low wing airplanes around. Perfect first low wing trainer. Easy to build with its complete instructions and plans.



#SIG752 ... \$46.99

### YS Engines



The new **YS140FZ** is probably the most powerful 120 sized four cycle ever made. Its new head design has larger intake valve and uses an improved piston design for even more power and superior throttle response.

#3895 ... \$599.96

2627	45BB ABC R/C S.E. WO/MUFF	154.96
2634	45 MUFFLER FOR SIDE EXH	22.96
2628	45BB ABC R/C R.E. WO/MUFF	154.96
2629	61BB ABC R/C S.E. WO/MUFF	229.96
2630	61BB ABC R/C R.E. WO/MUFF	259.96
2631	61BB ABC R/C R.E. AR WO/MUF	259.96
3554	91 4C SUPERCHRG W/MUFF	269.96
2632	120 4C NC W/PUMP	398.99
3895	140 4C FZ WSUPRCHG	599.96

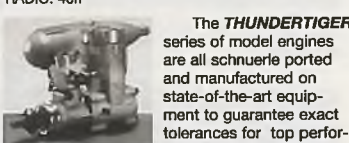
### Zenoah Engines

2398	ZENOAH G-23	289.96
2399	ZENOAH G-38	309.96
3440	ZENOAH G-45	419.96
2400	ZENOAH G-62	449.96



The new **TIGER STICK 40** Ready to Fly Tiger Stick from Thunder Tiger has been totally redesigned. The new airfoil incorporated on

the airplane was selected to allow for less dihedral to eliminate roll-coupling tendencies.



The **THUNDER TIGER** series of model engines are all schruerle ported and manufactured on state-of-the-art equipment to guarantee exact tolerances for top performance and long life. The

**GP** series have bronze bearings and the **PRO SERIES** all have two (2) ball bearings. And a 3 year warranty.

R/C GP ABC MODEL ENGINES		
3572	GP 10 R/C W/MUFFLER	46.96
3573	GP 15 R/C W/MUFFLER	49.96
3574	GP 25 R/C W/MUFFLER	56.96
3575	GP 40 R/C W/MUFFLER	59.96
3576	GP 61 R/C W/MUFFLER	94.96

R/C PRO ABC BB MODEL ENGINES		
3577	PRO 25 FSR R/C W/MUFF	84.96
3578	PRO 36 FSR R/C W/MUFF	89.96
3579	PRO 40 FSR R/C W/MUFF	94.96
3580	PRO 46 FSR R/C W/MUFF	99.96
3581	PRO 61 FSR R/C W/MUFF	149.96
3582	PRO 36 FSR HELI WO/MUFF	100.96

### WORLD CLASS ACCESSORIES

3583	FUEL PUMP - HAND CRANK	10.96
3584	FUEL PUMP - 12V ELECTRIC	14.96
3585	MINI LCD TACHOMETER	34.96
3586	POWER PANEL - 12V MOSFET	20.96
3587	ESV 4.8V - 9.6V	13.49
3588	DELUXE 12V STARTER	34.96

### Webra Engines

3460	32GT ABC R/C W/MUFF	129.96
3461	40GT ABC R/C W/MUFF	134.96
3462	50GT ABC R/C W/MUFF	159.96
3148	61 BB SILVERLINE R/C W/MUFF	99.96
2603	32 BB RING SPEED W/MUFF	129.96
2612	61 BB RE RACE ABC W/PUMP	349.96
2820	1.20 BB SPEED TN WO/MUFF	259.96

### Accessories

● APC PROPELLERS		
2640	9 X 6 COMPOSITE PROP	1.99
2641	9 X 7 COMPOSITE PROP	1.99
2642	10 X 6 COMPOSITE PROP	2.29
2643	10 X 7 COMPOSITE PROP	2.29
2644	11 X 6 COMPOSITE PROP	2.49
2645	11 X 7 COMPOSITE PROP	2.49
2646	11 X 8 COMPOSITE PROP	2.49
2647	11 X 9 COMPOSITE PROP	2.49
2648	12 X 6 COMPOSITE PROP	2.89
● AEROTREND PRODUCTS		
2649	BLUE LINE MED FUEL TUBING 3FT	1.79
2650	BLUE LINE LRG FUEL TUBING 3FT	1.79
● AMERICAN RUBBER BAND CO.		
2651	#64 RUBBER BANDS #1/4LB	1.49
● BADGER		
2652	DETAIL TOUCH-UP SPRAY GUN	79.96
● BRU-LINE PRODUCTS		
2653	ENGINE AIR CLEANER FINE	2.69
2654	ENGINE AIR FILTER COARSE	2.69
● DAVE BROWN MODEL PRODUCTS		
2657	SIX-SHOOTER GLO FUEL PUMP	8.96
2658	SIX-SHOOTER GAS FUEL PUMP	8.96
● DUBRO PRODUCTS		
2660	TRU-SPIN PROP BALANCER	17.96
2661	4-WAY WRENCH	3.83
2662	KWIK-FILL FUEL VALVE GLOW	9.96
2663	KWIK-FILL FUEL VALVE GAS	9.96
● FOX MFG		
2664	R/C LONG GLOW PLUG	1.79
2665	R/C SHORT GLOW PLUG	1.79
2666	MIRACLE GLOW PLUG 2 & 4CY	2.09
● HAYES PRODUCTS		
2667	KM-40 MOTOR MOUNT	4.00
2668	KM-60B MOTOR MOUNT	4.75
2669	KM-70 MOTOR MOUNT	5.00
2670	FUEL TANK 8oz	6.00
2671	FUEL TANK 11oz	6.25
2672	FUEL TANK 13oz	6.50
2673	KRAFT POLY HINGES (20)	1.89
● HOT STUFF		
2674	HOT STUFF 2oz	6.96
2675	SUPER T 2oz	6.96
2676	SPECIAL T 2oz	6.96
2677	UFO THIN 7-15 SEC 2oz	14.96
2678	UFO THICK 50-60SEC 2oz	14.96
2679	HOT SHOT ACCELERATOR 3oz	4.96
● MCDANIEL R/C		
2684	NI-STARTER W/CHARGER	24.96
2685	NI-STARTER W/MTR & CHGR	28.96
● PRATHER PRODUCTS		
2693	PROP PITCH GAUGE	46.96
2694	AFTER RUN ENGINE OIL	1.96
2695	FUEL TUBING MED 3ft	2.09
2696	FUEL TUBING LARGE 3ft	2.59
● ROBERT MFG.		
2697	DELUXE INCIDENCE METER	24.96
2698	SUPER STAND	6.49
2699	DREMEL 90° BB DRIVE	24.96
2700	AIR PUMP W/GA FOR RETRACTS	24.96
● SONIC-TRONICS MFG.		
2709	SUPER X ELECTRIC FUEL PUMP	21.96
2710	MARK X ELECTRIC FUEL PUMP	18.96
● SPRING AIR MFG		
2711	RETRACTS TRI/FW	99.96
2712	RETRACTS MAINS 2-GEAR	79.96
● SULLIVAN MODEL PRODUCTS		
2713	HD STD ELECTRIC STARTER 12V	28.96
2714	HD DELUXE STARTER 12V	31.96
2715	DYNATRON STARTER 12-24V	54.96
2716	SS-8 8oz SLANT FUEL TANK	2.74
2717	SS-12 12oz SLANT FUEL TANK	3.01

NorthEast Aero		
NEA020	TRAIN-AIR 20	54.96
NEA050	TRAIN-AIR 40	69.96
NEA100	SPORT-AIR 40	74.96
NEA075	BEL-AIR 40 BIPE	94.96
NEA080	BEL-AIR 60 BIPE	99.96
PROFILE SERIES		
NEAP501	ME109 MESSERSCHMITT	54.96
NEAP502	F6F HELLCAT	54.96
NEAP503	FOCKE WULF 190	54.96
NEAP504	RUSSIAN MIG 3	54.96
NEAP505	JAPANESE ZERO	54.96
NEAP506	HAWKER HURRICANE	54.96
NEAP507	P-40 WARHAWK	54.96
NEAP508	P-51 MUSTANG	54.96

### Quadra Aero



Q52S 3.2cu - 4.5hp		Q75S 4.4cu - 8.0hp	
QUA052S	Q52S - 3.2cu in .....	379.96	
QUA065S	Q65S - 4.0cu in .....	489.96	
QUA075S	Q75S - 4.4cu in .....	544.96	
QUA100S	Q100S - 6.0cu in .....	659.96	

2718	SS-24 24oz SLANT FUEL TANK	4.21
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### ● MASTER AIRSCREW PROPELLER CO

2719	9 X 4 GLASS-FILLED PROP	1.09
2720	9 X 6 GLASS-FILLED PROP	1.09
2721	10 X 6 GLASS-FILLED PROP	1.29
2722	10 X 7 GLASS-FILLED PROP	1.29
2723	11 X 6 GLASS-FILLED PROP	1.49
2724	11 X 7 GLASS-FILLED PROP	1.49
2725	12 X 6 GLASS-FILLED PROP	2.29
2726	14 X 6 GLASS-FILLED PROP	3.49
2727	18 X 6 CLASSIC PROPELLER	11.96
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2729	18 X 10 CLASSIC PROPELLER	11.96

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## MODEL BUILDING TECHNIQUES

BY DICK TICHENOR

### A Few Suggestions for Scratch-Builders

A trend of model airplane activity has increased in the area of designing and scratch-building model airplanes. Specifically, models that are not available as kits or even in plans form. This activity is especially prominent among us senior citizens who now have time available for projects in the "just gotta do it" category.

This article is intended to share some of the problem-solving techniques applicable to a particular obscure airplane. **This is not a construction article and there are no R/C model plans available for this Piper**

**Skycycle.** We used a 1945 Wylam drawing (Model Airplane News) for the full-size aircraft configuration. R.W. Friestad, RR #1, Box 163, Cameron, IL 61423, enlarged the

Wylam drawing to the two inch = one foot scale that I desired.

None of the construction methods shown are new; some of these were used back in the 1930's. Bev Smith introduced the use of rubber balloons for the fiberglass/epoxy cowl lay up in the 1960's. The use of holding fixtures to assure correct alignment is undoubtedly a fallout of my years in aircraft/aerospace. I didn't know how else to assemble all of those compound curves.

We hope that some of the methods presented might be applicable to some of your projects.



**Holding fixture for building forward fuselage. Four removable tooling pins (1/16" dia. wire) permits rotation of structure in 90° increments.**



**Fillets were fitted to wing and attached to the fuselage with the two U-shaped locators removed. Canopy and pilot were not installed at this time.**



**Wing location and seating used fixture base as a horizontal reference.**



**Tail boom was assembled to forward fuselage using the two removable U-shaped locators to assure correct alignment.**



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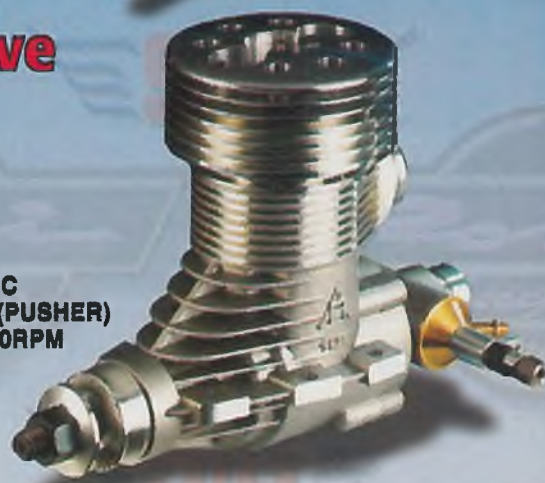
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**October 24** Unknown compulsory program, known compulsory program and free program 8:00 a.m. Model aircraft demonstration.  
**October 25** Unknown, known and programs free starting at 8:00 a.m. Model aircraft demonstration and full scale air show.  
**October 26** Final round 9:00 a.m. to 2:30 p.m. Model aircraft demonstration and full scale air show. Awards presentation approximately 3:30 p.m.

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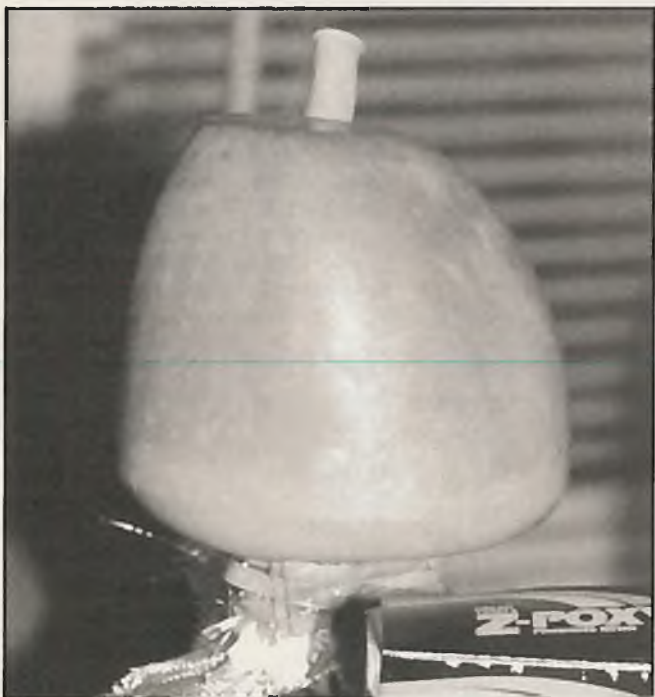




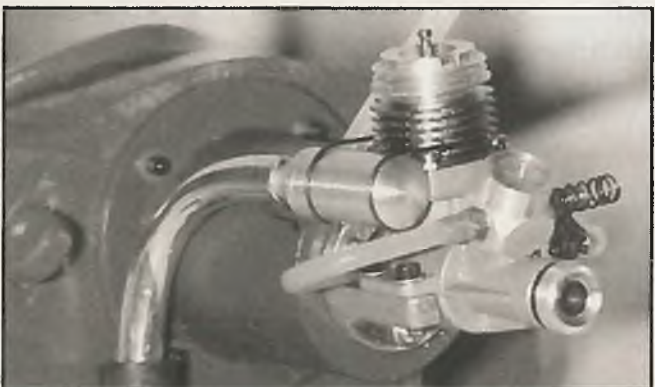
*Tail surfaces were assembled to tail boom using the locator, foreground, for correct horizontal alignment. Rubber bands held components in position.*



*Landing gear installation used normal R/C techniques.*



*Nose cowling was made of fiberglass cloth and epoxy. An old technique utilizing rubber balloons simplified the lay-up.*



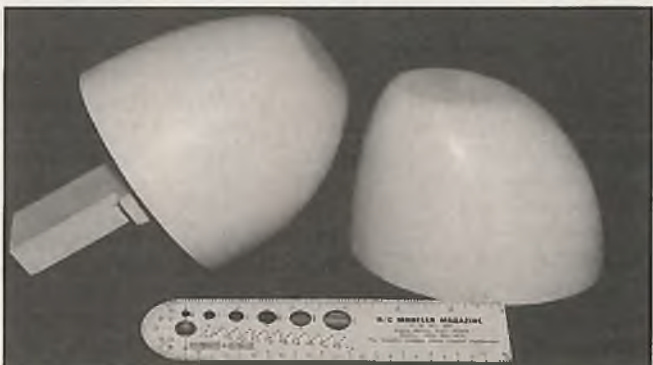
*The power pod installed with exhaust extension secured.*



*Radio components were positioned between cockpit floor and wing top surface.*



*Removable power pod contains a fuel tank with a three-line fuel system. Pod is shown mounted on a new engine run-in fixture. Top tube is filler line and bottom tube is for overflow.*



*Shown on left is the carved (balsa) plug with holding block screwed to bottom. On right is the fiberglass cowling with a coat of primer.*



*Front end of Skycycle with nose cowling removed.*



*Front end of finished Skycycle.*







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## Sunday Fun

### Toledo And The RCM Sweathogs

**T**he Toledo Weak Signals R/C Expo seems to really be America's gathering spot for R/C modelers. There's always a lot of new stuff and old friends there, and if you've never

been, ya really ought to start saving up some dollars and mark your calendar to attend on April 3, 4, 5, 1998. Most of the smaller manufacturers have "show specials" and they'll sell to you at special prices right across their counter and, if you don't spend all your hobby dollars on the main floor, there are plenty of bargains in the upstairs swap shop. This year there seemed to be more of the RCM associated people in Toledo than most years ... I counted about a dozen, and if you check the staffing page of this issue (usually around page 5), you can see that it takes quite a gang of people to write, edit, and bring you each copy of RCM.

Most of us seem to be comfortable in old flying clothes (we kinda look a bit like sweatshirts!), and that's how many of us were casually dressed at Toledo this year. But four of the guys were nicely cleaned up with dark jackets and starched shirts, and were even wearing neckties, and I thought you might like to meet them as seen in our opening photo this month. These are *real* R/C modelers who have special talents and who work plenty hard to make sure

each and every issue of RCM you buy is well-worth the cover price of \$3.95 (the 1 year and 2 year subscriptions at \$25.00 and \$49.00 are still better values).

On the left is Don Edberg who writes the "Soaring" column, and



**Photo #1:** Here are some of the R/C modelers who sweat deadlines to bring you R/C Modeler each month.



**Photo #3:** These two Sunday fun caliber models weren't for sale at Toledo. F-15 and F-16 use a propped .25 2-stroke up front ... lotsa realism, and kits are available as you read this.



**Photo #4:** My panel of R/C experts will choose a winner from these three ingenious devices in December '97. Watch for the winner here in RCM.



**Photo #2:** This Toledo display model was admired by practically everyone ... including Connie. Details in text.

his "About Thermals" that started in our 4/97 issue is a "must read" that's easily understood. Next is Bob Wallace who's a master plans draftsman and who also does some construction articles himself, as well as occasional feature articles. Bob's name is often seen in the lower right of the RCM plans. Unless he, too, was an active R/C modeler and understood what's needed to scratch-build, guys would have troubles building from our plans ... but they don't. Next is Red Scholefield who's spent a lifetime around batteries and is "computer literate," too. Red writes "On The Net," and you can email to him at:

[redscho@gnv.fdt.net](mailto:redscho@gnv.fdt.net)

for a pretty quick reply. On the right is Jim Pearson who's the Assistant Editor answering to our Technical Editor, Dick Kidd, as well as to all you loyal readers. Dick and Jim are the guys with red pencils and sharp scissors, who make sure only the best gets into print. The model above their heads is Wendell Hostetler's 125" span 1/4th scale Stinson Reliant SR-10 that's a beauty and, if you'll stop



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PST - CA TIME  
Monday - Saturday  
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5/97

BALSA STICKS			SPRUCE/BASS STICKS DOUBLE BALSA PRICES		
1/16 INCH	36"	48"	1/4 INCH	36"	48"
1/16 x 1/16	.10	—	1/4 x 1/4	.22	.30
1/16 x 3/32	.10	—	1/4 x 3/8	.27	.33
1/16 x 1/8	.10	.14	1/4 x 1/2	.29	.41
1/16 x 3/16	.11	.15	1/4 x 5/8	.37	.50
1/16 x 1/4	.12	.15	1/4 x 3/4	.42	.58
1/16 x 3/8	.13	.16			
1/16 x 1/2	.17	.21	5/16 INCH	36"	48"
1/16 x 3/4	.22	.28	5/16 x 5/16	.27	.35
			5/16 x 3/8	.31	.39
3/32 INCH	36"	48"	5/16 x 1/2	.38	.48
3/32 x 3/32	.11	.12	5/16 x 3/4	.48	.62
3/32 x 1/8	.12	.14			
3/32 x 3/16	.13	.16	3/8 INCH	36"	48"
3/32 x 1/4	.14	.18	3/8 x 3/8	.36	.45
3/32 x 3/8	.15	.19	3/8 x 1/2	.40	.57
3/32 x 1/2	.18	.24	3/8 x 5/8	.47	.59
3/32 x 3/4	.26	.32	3/8 x 3/4	.53	.68
1/8 INCH	36"	48"	1/2 INCH	36"	48"
1/8 x 1/8	.11	.13	1/2 x 1/2	.49	.64
1/8 x 3/16	.13	.18	1/2 x 5/8	.57	.78
1/8 x 1/4	.14	.21	1/2 x 3/4	.60	.82
1/8 x 3/8	.15	.23			
1/8 x 1/2	.21	.27	5/8 INCH	36"	48"
1/8 x 3/4	.28	.36	5/8 x 5/8	.60	.86
			5/8 x 1	.93	1.14
3/16 INCH	36"	48"			
3/16 x 3/16	.14	.23	Other Fine Products NHP, West Systems & Bob Smith, Epoxy, Tools, Supplies, Composites, Hardware		
3/16 x 1/4	.18	.27			
3/16 x 3/8	.21	.29			
3/16 x 1/2	.24	.36			
3/16 x 3/4	.30	.45			
BALSA SHEETS			TRAILING EDGES		
1 INCH	36"	48"	1/8 x 1/2	.29	.37
1/16 x 1	.29	.45	3/16 x 3/4	.35	.47
3/32 x 1	.31	.42	1/4 x 1	.39	.54
1/8 x 1	.35	.48	5/16 x 1-1/4	.48	.71
3/16 x 1	.38	.59	3/8 x 1-1/2	.58	.85
1/4 x 1	.52	.78	1/2 x 2	.90	—
3/8 x 1	.67	.86	3/4 x 3	1.80	—
1/2 x 1	.78	1.04			
2 INCH	36"	48"	36" AILERONS		
1/32 x 2	.37	.50	1/4 x 1	.57	
1/16 x 2	.38	.50	1/4 x 1-1/4	.85	
3/32 x 2	.46	.61	1/4 x 1-1/2	.74	
1/8 x 2	.49	.65	1/4 x 2	.80	
3/16 x 2	.60	.74	5/16 x 1-1/4	.74	
1/4 x 2	.68	.90	5/16 x 1-1/2	.75	
3/8 x 2	.88	1.19	5/16 x 2	.85	
1/2 x 2	1.10	1.43	3/8 x 1-1/2	.83	
3 INCH	36"	48"	3/8 x 2	.95	
1/32 x 3	.43	.60	3/8 x 2-1/2	1.08	
1/16 x 3	.44	.60	1/2 x 1-1/2	.95	
3/32 x 3	.52	.67	1/2 x 2	1.08	
1/8 x 3	.53	.64			
3/16 x 3	.78	1.03	36" TRIANGLES		
1/4 x 3	.94	1.30	1/4 x 1/4	.29	
5/16 x 3	1.08	1.52	3/8 x 3/8	.33	
3/8 x 3	1.15	1.70	1/2 x 1/2	.40	
1/2 x 3	1.50	2.05	3/4 x 3/4	.54	
4 INCH	36"	48"	1 x 1	.68	
1/32 x 4	.66	.92	36" DOWELS		
3/32 x 4	.68	.92	1/8	.16	5/16 .27
1/16 x 4	.82	1.14	3/16	.17	3/8 .37
1/8 x 4	.93	1.34	1/4	.20	1/2 .84
3/16 x 4	1.09	1.59			
1/4 x 4	1.52	1.79			
3/8 x 4	2.10	2.85			
1/2 x 4	2.85	3.36			
36" LEADING EDGES			WIDE BALSA SHEETS		
Conventional			1/16	5x35	5x48
Symmetrical			3/32	1.41	2.25
			1/8	1.79	2.79
			3/16	2.06	3.14
			1/4	2.25	3.80
			3/8	3.00	4.77
			1/2	5.10	5.95
			BALSA BLOCKS		
			1x1	0.65	0.75
			1x2	0.90	1.05
			1x3	1.20	1.35
			1x4	1.57	1.72
			2x2	1.75	2.45
			2x3	1.80	2.50
			2x4	2.85	4.50
			3x3	3.30	5.55
			3x4	4.80	7.70
			4x4	6.50	9.80
Aircraft Grade Birch Plywood			OBECHI - 1/32" x 14" x 105" - \$14.75		
	6x12	12x12	Blue 2 x 12 x 24	3.65	
1/64	1.40	2.79	Blue 2 x 24 x 48	13.28	
3 Ply	.95	1.80	White 2 x 24 x 48	8.30	
1/32	.95	1.80	EPP 2 x 12 x 24	5.50	
3 Ply	.95	1.80	White 4 x 12 x 24	3.50	
1/16	.95	1.80	EPP 2 x 18 x 48	15.60	
3 Ply	.95	1.80	White 4 x 24 x 48	12.75	
3/32	1.35	2.63	EPP 2 x 36 x 48	30.00	
5 Ply	1.35	2.63			
1/8	1.45	2.80			
5 Ply	1.45	2.80			
3/16	.99	1.85			
4 Ply	.99	1.85			
1/4	1.25	2.30			
5 Ply	1.25	2.30			
3/8	1.50	2.85			
7 Ply	1.50	2.85			
1/2	2.00	3.50			
9 Ply	2.00	3.50			
1/8 Balsa Ply	.75	1.25			
1/8 Lite Poplar	.75	1.25			
1/4 Lite Poplar	.90	1.75			
CA'S			36" Bargain Balsa Bundles - \$2.95 ea *		
Thin, 1/2 oz	2.10	1.85	1/32 x 3 (9)	1/32 x 4 (6)	1/8 x 1/8 (36)
Gap, or 1 oz	3.49	3.00	1/16 x 3 (9)	1/16 x 4 (6)	3/16 x 3/16 (30)
Thick 2 oz	5.95	5.00	3/32 x 3 (8)	3/32 x 4 (5)	1/4 x 1/4 (18)
AS Thick is higher in price	8 oz	17.95	1/8 x 3 (6)	1/8 x 4 (4)	3/8 x 3/8 (12)
	16 oz	30.00	3/16 x 3 (5)	3/16 x 4 (3)	1/2 x 1/2 (6)
	2 oz thin gap filling - 1 sec cure	5.50	1/4 x 3 (4)	1/4 x 4 (3)	1/2 x 3/4 (6)
Odorless	1/2 oz	4.55	3/8 x 3 (3)	3/8 x 4 (2)	
Thin, 1 oz	8.45	6.85	1/2 x 3 (2)	1/2 x 4 (2)	
Gap, or Thick 2 oz	14.95	12.00			

by the RCM booth at Toledo next year, these guys will give you a free RCM issue for a buddy at home ... and they'll happily sign you up for a renewal subscription, too. Please remember, April 3, 4, 5, 1998!

The Toledo show draws a lot of outstanding models that are judged, and receive pretty significant awards. Photo #2 shows a model that was first covered in black MonoKote, then it had a zillion colored MonoKote squares added, and it was a real eye-catcher. I wish you could see it in color. I had to leave about 1:30 on Sunday, so I don't know if it won an award, but if you study the photo a bit, you can probably see how it's done and you (with tremendous patience) can probably do the same — real nice!

It's very awkward to show you one exhibitor's booth without showing the booths of all 250+ exhibitors, since this is a selling show and nobody should be slighted. Before the show, I'd heard of a neat new .25 powered F-16 jet that was being test-flown on Florida's east coast, and the test model was at Toledo, but kits were not for sale across the counter. On that basis, Photo #3 shows Aurora and Bob Parkinson holding the F-16 and a nonfinished F-15 model. These models, when viewed from the top and from the side, are scale models, but their cross section is "+" shaped; a profile top added to a profile side. All the radio gear is slung below, almost out of sight. These models are the essence of flying a jet model, with a Sunday fun atti-

tude and cost. I really think the Parkinson's just brought the models to get comments from the R/C modelers, but the guys heaped a bunch of orders on them right then and there. I saw the stack of orders and it's clear that the F-15 and F-16 are gonna be popular! Yes, the .25 2-stroke side mounts up front out in the breeze with the fuel tank behind it. An S.A.S.E. to Bob Parkinson Models, P.O. Box 60308, Palm Bay, Florida 32906, will get you more information. But don't expect an instant answer because I'm sure the Parkinsons are plenty busy cutting balsa and packing kits morning, noon, and night. It appears they have a pair of winners.

And speaking of winners, my panel of R/C experts have finally selected three extremely ingenious devices, and one of them will win the title of "R/C Ingenious Device Of 1997." We showed and told you about the GloBee quick charger for NiCd Ni-Starters and/or Glo Starters last month, and it's on the left in Photo #4. I spoke with Neal Cloud at Toledo, he's the electronic's whiz involved in this one, and he confirmed that when the charger times-out after about 20 minutes on a 12-volt supply, that there's enough energy pumped in to probably start/fly all day. This charges at about a 1200 mA rate; my McDaniel charger charges at 120 mA and is not okay for field use. This charger is just now in the hobby shops and sells for approximately \$25.00, and we think it's worth every penny. The middle item was pictured on the bottom/left last month, too, it's K&B's new

#9225 remote needle valve assembly priced at \$12.95, and if your hobby shop doesn't have it (or can't/won't get it for you), you can get it straight from K&B with a \$6.00 shipping surcharge. If you properly adjust your needle valve from behind the prop, this ingenious device adds a great degree of safety that's worth its cost. The third candidate is shown on the far right, and it's a very ingenious settable voltage reader that mounts in and rides with your model, it's called the Voltage Proof and it's being sold at most of the bigger R/C shows by Rod Johnson of i4C Products, pronounced "I foresee." i4C is the one who's done the Air Screamer that was a sell-out at Toledo this year. You set the Voltage Proof for the number of cells in your battery pack, cut a small window in your model, mount the Voltage Proof so the LCD is in the window, plug in the cable to an unused channel at your receiver, and it gives you a true voltage readout from your actual conditions. It costs \$39.95 and allows you the safety of knowing how your airborne rx battery is doing. Add \$3.75 shipping if you order from i4C at: 6924 E. 92nd St., Tulsa, Oklahoma 74133-5318. This unit weighs only a half ounce and has two clever additional features that make it well worth its price. The panel of R/C experts will vote in December 1997, and you'll read which one is the overall winner here in RCM shortly thereafter.







# PRODUCT REVIEW

## CAP 232

### Midwest Products

By Cliff Weirick



Some months back I was talking with Dick Kidd and asked him about the product reviews that are featured in RCM. When he asked if I would like to do one, I said yes, but it would have to be a fairly large model. Little did I know what was in store for me.

Sometime later, I received a package via UPS. This package measured 7" x 19" x 43" and my first thought was that I was going to build a B-29 but it turned out to be the new Midwest Products' model of the CAP 232. The packaging was extremely well done, all wood was in plastic bags as were the large cowl, wheel pants, and canopy. (I would like to have seen the wood for the fuselage, wing, etc., packaged in individual bags — sure would save a lot of time.) The landing gear strut is preshaped and drilled. Two very large sheets of rolled plans were included and, I might add, they were very well done.

#### Construction:

The plans consist of top and side view of the fuselage on one sheet and wing and horizontal stab on the other. Both sheets are very large and I cut them where necessary to facilitate ease of building this large model in a fairly small area.

The instruction manual is very well done; it includes a complete parts list by part number, quantity, and dimensions in both inches and millimeters. I recommend checking all parts against this list as I was missing a couple of wing ribs. A quick call to the nice people at Midwest took care of the problem. I had the ribs before I finished the fuselage. There are also drawings of all the die-cut sheets which is a great help in identifying those parts.

I built the fuselage first and it was a piece of cake. All the parts fit well and the drawings in the instruction manual made it extremely simple. In fact, the entire plane was a joy to build due to this excellent instruction book.



## SPECIFICATIONS

Name ..... CAP 232  
Aircraft Type ..... Aerobatic Stand-Off Scale  
Mfg. By ..... Midwest Products, Inc.  
400 S. Indiana St.  
Hobart, Indiana 46342  
Mfg. Sug. Retail Price ..... \$364.95  
Available From ..... Retail Outlets  
Wingspan ..... 80 Inches  
Wing Chord ..... 14-1/2 Inches (Avg.)  
Total Wing Area ..... 1162 Sq. In.  
Fuselage Length ..... 74 Inches  
Stabilizer Span ..... 25 Inches  
Total Stab Area ..... 150 Sq. In. (Approx.)  
Mfg. Rec. Engine Range ..... 1.5-3.0  
Rec. Fuel Tank Size ..... 24 Oz.  
Rec. No. of Channels ..... 4-Ch. Minimum  
(Dual Rate On Elev. and Ail.)  
Rec. Control Functions ..... Rud., Elev., Throt., Ail.  
Basic Materials Used In Construction  
Fuselage ..... Balsa, Ply & Lite Ply  
Wing ..... Balsa & Lite Ply  
Tail Surfaces ..... Balsa  
Building Instructions on Plan Sheets ..... No  
Instruction Manual ..... Yes (47 pages)  
Construction Photos ..... Yes

## RCM PROTOTYPE

Radio Used ..... Airtronics "Vision"  
Engine Make & Disp. .... ST3000 Converted To Gas  
By CH Electronics  
Tank Size Used ..... 24 Oz. (Du-Bro)  
Weight, Ready to Fly ..... 256 Oz. (16 Lbs)  
Wing Loading ..... 32 Oz./Sq. Ft.

## SUMMARY

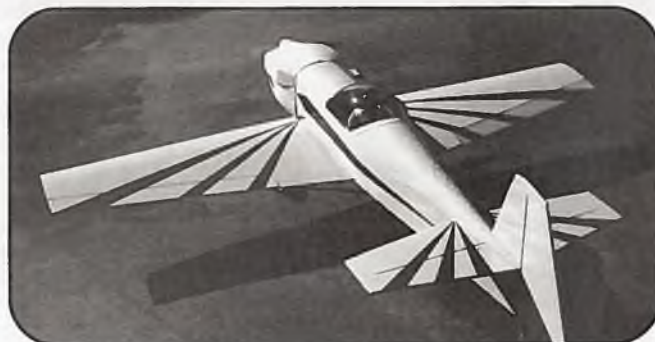
#### WE LIKED THE:

Die-cutting of the fuselage parts, parts fit, overall instructions, and packaging was excellent.

#### WE DIDN'T LIKE THE:

Use of lite ply for the fire wall, some of the balsa die-cutting was poor (generally, this applied to the softer sheets), fiberglass tape for wing center was too short, and two wing ribs not in kit — phone call to factory got them.

There are a few changes I would make were I to build another CAP 232; first, I would use 1/4" birch ply for the fire wall. In the kit, the fire wall is made up of two "F1" pieces of 1/8" lite ply glued together. The 8-32 blind nuts for holding the engine mount keep squeezing the wood, and as a result, the engine loosens after a few flights and requires tightening. This would hold true for any model using lite ply for the fire wall. I recommend use of a hard plywood for a fire wall even if you do have to make it yourself. Next, I added two 1/2" dia. tubes (made from paper) from the wing saddle to the two elevator servos. Two 24" servo extensions are required and I sure didn't want them flopping around inside. These tubes are similar to





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# LONE STAR BALSA

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LARGEST SELECTION AAA GRADE CONTEST BALSA — SATISFACTION GUARANTEED — SHIPPED

BALSA SHEETS			36"	48"	WING SKINS			30"	36"	TAPERED AILERON & ELEVATOR STOCK			36"	48"	5 PLY BIRCH			12"	24"	48"	GROOVED L.G. MOUNTS			12"	GLUE			4-1/2 OZ.	9 OZ.		
1/32 x 2			.37	.50	1/32 x 12			4.79	5.35	1/4 x 1		.57	.82	3/32 x 6		1.35	2.80	4.90	3/8 x 3/4		(1/8)	5 Minute	4.25	6.69	15 Minute	4.25	6.69	30 Minute	4.25	6.69	
1/16 x 2			.38	.50	1/20 x 12			4.79	5.35	1/4 x 1-1/4		.65	.90	1/8 x 6		1.45	2.80	5.25	.50												
3/32 x 2			.46	.61	1/16 x 12			4.79	5.35	1/4 x 1-1/2		.74	1.05	1/8 x 12		2.80	5.50	9.50	3/8 x 3/4		(5/32)	.50									
1/8 x 2			.49	.65	3/32 x 12			5.79	6.45	1/4 x 2		.80	1.15	1/4 x 6		1.25	2.50	3.80	1/2 x 3/4		(3/16)	.55									
3/16 x 2			.60	.74	MATCHED SHEETS 42"			48"			5/16 x 1-1/4		.74	1.05	7 PLY BIRCH			12"	24"	48"	SPRUCE STICKS 36"			48"	20 Minute			4-1/2 OZ.	13 OZ.		
1/4 x 2			.68	.90	3/32 x 4			1.25	1.42	5/16 x 1-1/2		.75	1.08	3/8 x 6		1.50	2.85	5.25	1/16 x 1/4		.24	.30				Finish Cure	4.29	8.40			
3/8 x 2			.86	1.19	1/8 x 4			1.50	1.69	3/8 x 1-1/2		.88	1.20	3/8 x 12		2.85	5.50	10.00	3/32 x 1/4		.25	.39				Epoxy Brushes (6)		.95			
1/2 x 2			1.10	1.43	1/4 x 4			1.64	1.89	3/8 x 2		.83	1.16	1/2 x 1-1/2		.95	1.40		1/8 SQ.		.21	.29				Epoxy Spreader		.85			
1/32 x 3			.43	.60	1/4 x 4			1.76	2.05	1/2 x 2		1.06	1.50	ADD FOR SHAPED LEADING EDGE			.25	.30	BASSWOOD SHEETS			24"	36"	48"	1/2 oz. Thin				1.85		
1/20 x 3			.43	.60	BALSA BLOCKS			6"	12"					1/32 x 3		.73	1.09	1.55	3/16 SQ.		.28	.38				1 oz. Thin		3.00			
1/16 x 3			.44	.60	1/2 x 3			.35	.55	1/16 SQ.		.10	*	1/16 x 3		.81	1.22	1.71	3/16 x 3/8		.40	.53				2 oz. Thin		5.50			
3/32 x 3			.52	.67	3/4 x 3			.42	.64	1/16 x 1/8		.10	*	3/32 x 3		.91	1.36	1.95	3/16 x 1/2		.48	.64				8 oz. Thin		16.50			
1/8 x 3			.63	.84	1 x 2			.42	.69	1/16 x 1/4		.12	*	1/8 x 3		1.04	1.56	2.20	3/16 x 3/4		.65	.88				1/2 oz. Gap Filling		1.85			
3/16 x 3			.76	1.01	1 x 3			.54	.95	1/16 x 3/8		.13	*	5/32 x 3		1.08	1.63	2.29	1/4 SQ.		.45	.67				2 oz. Gap Filling		5.50			
1/4 x 3			.94	1.30	1 x 4			.68	1.28	1/16 x 1/2		.17	*	3/16 x 3		1.22	1.84	2.58	1/4 x 3/8		.53	.69				8 oz. Gap Filling		16.50			
5/16 x 3			1.09	1.52	1-1/2 x 3			.72	1.37	3/32 SQ.		.11	*	5/16 x 3		1.56	2.35	3.40	1/4 x 1/2		.61	.81				1/2 oz. Extra Thick		2.00			
3/8 x 3			1.15	1.70	1-1/2 x 4			.88	1.26	1/8 x 1		.35	.45	3/8 x 3		1.62	2.45	3.50	1/4 x 3/4		.83	1.10				1 oz. Extra Thick		3.30			
1/2 x 3			1.50	2.05	2 x 3			.88	1.47	3/16 SQ.		.14	.23	1/2 x 3		2.00	3.00	4.25	3/8 x 1/2		.75	.91				2 oz. Extra Thick		6.00			
3/4 x 3			2.25	3.10	2 x 4			1.07	2.13	3/32 x 3/8		.15	*	3/4 x 3		2.94	4.40	6.20	1/2 SQ.		.85	1.05				8 oz. Extra Thick		18.00			
1/32 x 4			.66	.92	3 x 3			1.15	2.33	3/32 x 1/2		.19	*	1 x 3		3.47	5.25	7.35	1/2 x 3/4		.94	1.25				QDORLESS FOAM					
1/20 x 4			.66	.92	3 x 4			1.60	3.21	1/8 SQ.		.11	*	2 x 3		4.75	7.15	10.00	3/8 x 3/8		.54					1 oz. Thin		4.25			
3/32 x 4			.82	1.14	BALSA PLANKS			36"			1/8 x 3/16		.13	*	BASSWOOD			36"	48"	SPRUCE TRIANGLES			36"	3/8 x 3/8				.54		1 oz. Thin	7.85
1/8 x 4			.93	1.34	1 x 1			1.10		1/8 x 1/4		.14	.21	1/16 x 1/4		.28	.36		1/2 x 1/2		.75				2 oz. Thin		13.85	1/2 oz. Gap Filling	4.25		
3/16 x 4			1.09	1.56	1 x 2			1.90		1/8 x 1/2		.15	.23	3/16 x 3/8		.21	.29		3/4 x 3/4		.95				1 oz. Gap Filling		4.25	1/2 oz. Gap Filling	7.85		
1/4 x 4			1.52	1.79	1 x 3			2.85		1/8 x 3/8		.21	.27	3/16 x 1/2		.24	.36		1/2 x 3/4						2 oz. Gap Filling		13.85	2 oz. Gap Filling	13.85		
5/16 x 4			1.82	2.34	1 x 4			3.75		1/8 x 1		.35	.45	3/16 x 3/4		.30	.45		3/4 x 1						2 oz. Accelerator		3.15	1/2 oz. Gap Filling	4.25		
3/8 x 4			2.10	2.85	1-1/2 x 3			4.05		3/16 SQ.		.14	.23	3/16 x 1		.38	.59		1/2 x 1						8 oz. Acc. Refill		6.95	1/2 oz. Gap Filling	7.85		
1/2 x 4			2.85	3.36	1-1/2 x 4			5.30		1/4 SQ.		.22	.30	3/16 x 3/8		.21	.29		1/2 x 3/8						6 Extender Tips		1.49	2 oz. Gap Filling	13.85		
3/4 x 4			3.50	4.71	2 x 2			4.20		1/4 x 3/8		.27	.33	3/16 x 1/2		.24	.36		3/4 x 3/8						2 ft. Teflon Tubing		1.49	1/2 oz. Gap Filling	13.85		
BALSA SHEETS			30"	42"	2 x 4			6.30		1/4 x 3/4		.42	.58	3/16 x 3/4		.30	.45		1/8 x 1/4		.28	.36				Overcap		.20	1 Extra CA TOP	.49	
1/32 x 3			.36	.50	3 x 3			6.85		5/16 SQ.		.27	.35	3/16 x 1		.38	.59		1/8 x 1/2		.41	.55				1 Applicator		.49	1 Applicator Fine	.49	
1/16 x 3			.36	.50	3 x 4			8.88		3/8 SQ.		.35	.45	3/8 x 1/2		.47	.66		1/8 x 3/4		.65	.88				1 oz. Empty Bottle		.95	2 oz. Empty Bottle	1.25	
3/32 x 3			.43	.61	ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE						1/2 x 3/4		.60	.82	3/16 x 1		.72	.95		1/4 SQ.		.45	.57				2 oz. Empty Spray		1.80		
1/8 x 3			.52	.73	(20) 1/16 x 3			7.99		5/8 SQ.		.60	.86	1/2 x 1		.76	1.04		1/4 x 3/8		.53	.69				Balsa Stripper	4.20		MODEL CEMENT		
3/16 x 3			.62	.84	(20) 1/16 x 4			12.35		3/4 SQ.		.81	1.11	3/4 x 1/2		.81	1.11		1/4 x 1/2		.61	.81				Razor Plane	4.20		2 oz. Tube	1.79	
1/4 x 3			.78	1.13	(20) 3/32 x 3			9.70		3/4 x 1		.99	1.32	1/4 x 3/4		.83	1.10		1/4 x 3/8		.83	1.10				Razor Plane Blades		1.59	4 oz. Tube	2.79	
3/8 x 3			1.05	1.48	(15) 3/32 x 4			11.50		*NOT AVAILABLE					1/4 x 1		.96	1.24		1/4 x 1/2		.61	.81				3 Razor Plane Blades		1.59	R/C 56 Glue	3.25
1/2 x 3			1.35	1.75	(15) 1/8 x 3			8.75		PLYWOOD SUPERIOR LITE	24"	48"	5/16 SQ.		.59	.80		5/16 SQ.		.64	.85					ABS FOR COWLS, ETC.					
1/32 x 4			.56	.79	(10) 1/8 x 4			8.75		1/8 x 6		2.50	3.85	3/8 x 1/2		.75	.91		3/8 x 1/2		.75	.91				.040 x 6 x 26	1.95		FIBERGLASS		
1/16 x 4			.56	.79	(15) 1/8 x 3			8.75		1/8 x 12		3.95	7.50	3/8 x 3/4		.85	1.06		3/8 x 3/4		.85	1.06				.040 x 12 x 26	4.50		.55 oz. Glass Cloth (26" w)	2.50	
3/32 x 4			.66	1.06	(15) 3/16 x 3			10.50		1/4 x 12		4.95	9.50	1/2 x 1/2		.85	1.05		1/2 x 3/4		.85	1.05				.040 x 26 x 39	12.50		.75 oz. Glass Cloth (38" w)	3.75	
1/8 x 4			.76	1.12	(10) 1/4 x 3			14.00		LITE PLY			12"	24"	48"	1/2 SQ.		.85	1.05		1/2 x 1		1.15	1.54		CLEAR PLASTIC					
3/16 x 4			.87	1.40	(10) 1/4 x 4			14.00		1/8 x 6		1.00	1.25	3/8 x 1		1.04	1.25		3/4 x 1		1.30	1.75				.020 x 12 x 24	2.49		4" Fiberglass Tape	.85	
1/4 x 4			1.06	1.62	(10) 3/8 x 3			10.50		1/8 x 12		1.25	2.35	1/2 x 3/4		.85	1.05		1/4 x 1		1.45	1.95				.030 x 12 x 24	2.95		6" Fiberglass Tape	1.30	
3/8 x 4			1.65	2.39	(5) 3/8 x 4			9.50		1/4 x 12		1.75	3.40	3/4 x 1/2		.85	1.05		1/4 x 1/2		.85	1.05				.040 x 12 x 24	3.89		2 oz. Carbon Mat (35" w)	3.00 Ft.	
1/2 x 4			2.49	3.15	(5) 1/2 x 3			6.95		1/4 x 12		1.75	3.45	1 x 1		1.79	2.40		1/2 x 1/2		.75	.91				CF COMPOSITE TUBES					
BALSA SHEETS			36"	48"	2 x 2			2.25		2mm & 2.5mm same prices as 1/8"					HARD MAPLE			18"		298 x 32.5 (024 WALL)			2.50	.004 x 2 x 24				3.00			
1/32 x 3			.36	.50	BUNDLE DEALS			48"		3 PLY BIRCH 12"	24"	48"	1/4 x 1/4		.45			317 x 39.4 (026 WALL)	3.25		.350 x 32.5 (026 WALL)			2.70	.004 x 2 x 48				5.00		
1/16 x 3			.36	.50	(10) 1/16 x 4			9.00		1/8 x 6		2.50	3.85	1/4 x 3/8		.50			350 x 32.5 (026 WALL)	2.70		.414 x 54.5 (039 WALL)			5.75	.004 x 4 x 24				9.00	
3/32 x 3			.43	.61	(10) 3/32 x 4			10.75		1/8 x 12		3.95	7.50	1/4 x 1/2		.56			.505 x 32 (044 WALL)	4.00		.505 x 64 (044 WALL)			7.95	.007 x 2 x 24				3.50	
1/8 x 3			.52	.73	(5) 1/8 x 4			6.25		1/4 x 12		4.95	9.50	1/2 x 1/2		.56			.505 x 64 (044 WALL)	7.95						.007 x 2 x 36				5.50	
3/16 x 3			.62	.84	(5) 3/16 x 4			7.35		LITE PLY			12"	24"	48"	3/8 x 3/4		.65					<								



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the tubes required in the wing for the aileron servo extensions. One other change I made was to use a Sullivan pull-pull Kevlar set-up for the rudder cables. Having been in the radio business for more years than I can remember, I have found that the least amount of metal of any kind near the receiver antenna is a real good idea. Building the wing was very straightforward. One thing to keep in mind is that the two panels are built upside down to maintain proper alignment. Again, the construction overall was very easy. Just don't forget that they are upside down. Tail feathers are just like on any other aircraft. Note that the elevators are counterbalanced. I used Satellite City adhesives throughout for construction of the entire airplane. I have been using their products for many years and I've been most pleased with them.

The cowl consists of two pieces and are joined at the sides just where the cowl would separate on the full-size airplane. The wheel pants were made in two pieces, joined at the outer edges; all the joints were backed up by 1" fiberglass tape using thin CA, which makes things very strong.

#### **Covering:**

I covered the CAP 232 with Goldberg UltraCoat, and trim was done with UltraCoat Plus — no tricks anywhere here.

#### **Installing Engine and Radio:**

I used my old faithful ST 3000 engine for power. It has been in a number of planes in the past few years and has never let me down. It was converted to gasoline by using a CH Electronics Ignition system with the new auto advance and also the new needle bearing con rod. I can't say enough good about CH and their excellent customer service. I used the 24 oz. tank as recommended on the plans. Great Scott, you can fly forever on 24 oz. of gasoline.

For control, I installed my trusty Airtronics Vision 8-channel radio along with 94732 servos in the CAP. I have been using these for years and they've never let me down. My only comment here would be

that there is so much room inside these big airplanes that it required a lot of work just to support the battery, receiver, etc. I finally just used big blocks of the softest foam I could find, adding about 2 oz. of weight overall.

#### **Flying:**

I set up the control surface throws as called out in the manual and was very skeptical about the total travel spelled out in the instructions, which seemed excessive to me. To be on the safe side, I set the dual rates at 50% of the total and I'm sure glad I did. On take-off it went nice and straight until lift-off and then all h\*\*\* broke loose. Ailerons were super sensitive and I couldn't wait to get both aileron and elevator dual rates switched on which settled her right down. I flew around on low rates for about 20 minutes or so and then turned dual rates off; 5 minutes later when I finally got partially settled down, I again went back to dual rates on and set up for the first landing which went smooth as silk even in the crosswind we had at the field. I know this airplane is designed for the new high-energy maneuvers such as used at TOC, but that is not my bag and I'm too darn old to learn all over again.

Now that the test flight was out of the way, I decided to try out the pattern maneuvers that I was familiar with and, at the same time, adjust the surface travels to what I was used to. Loops, rolls, Cuban 8's, slow rolls, anything I could think of; she did them all as well as I've ever seen, even knife-edge which is something I've never had much success at. I finally gave up on the rolling circle because I just couldn't get my thumbs in sync — too old to learn new tricks, I guess. I sure would have liked to have had this airplane back in 1964 and '65. Wow, it would have blown the competition's minds. I'm sorry that I'm not more familiar with all the new maneuvers but that is really not my bag any longer. I shot a number of touch and go's just to get the feel of how slow I could get for landing. I estimate the touchdown at

approximately 10 mph which is pretty slow for a big airplane. I flew four long flights the first day; 24 oz. of gasoline keeps you in the air for quite a long time.

I asked a friend of mine who is just a few years younger and likes to fly big airplanes too, if he'd give it a try and here's what he had to say about the CAP 232. "I was really excited when Cliff called and asked if I'd like to meet him at the field for the test flight on the Midwest CAP 232. I always get a chance to fly Cliffie's airplanes (still sorry about losing the canopy off the Chipmunk though), and I knew I'd get a chance to fly the CAP. His airplanes are always the cleanest, straightest ships at any flying field so they're a pleasure to fly. The CAP on take-off rolls straight with just a touch of right rudder. I then pulled straight up into vertical, and into a stall turn at the top (at least I think it was a stall turn, the plane was so high it was hard to tell). I tried snap rolls, tail slides, flat spins, and even a few loops and rolls. The CAP 232 is a very honest flier and will do anything the pilot is capable of making it do; snap rolls are crisp and stop when controls are neutralized. Spins are fun to do with this airplane; after the spin is established (about two rotations), slowly feed in opposite aileron, then down elevator, and the CAP will do a very pretty flat spin that looks like it's not losing any altitude at all; then neutralize controls and the CAP starts flying again in less than one full rotation. Landing is easy, downwind with a couple of clicks of power just to hold altitude, then turn final and chop the power. The CAP floats over the fence and touches down light and easy. The Super Tigre 3000 is a good choice of engine and made it fly in a very scale-like manner; it seems to be the perfect engine for this airplane."

In closing, I will say the CAP 232 is a darn good airplane, light on her feet and very responsive, an excellent aircraft in both the construction and flying arenas.







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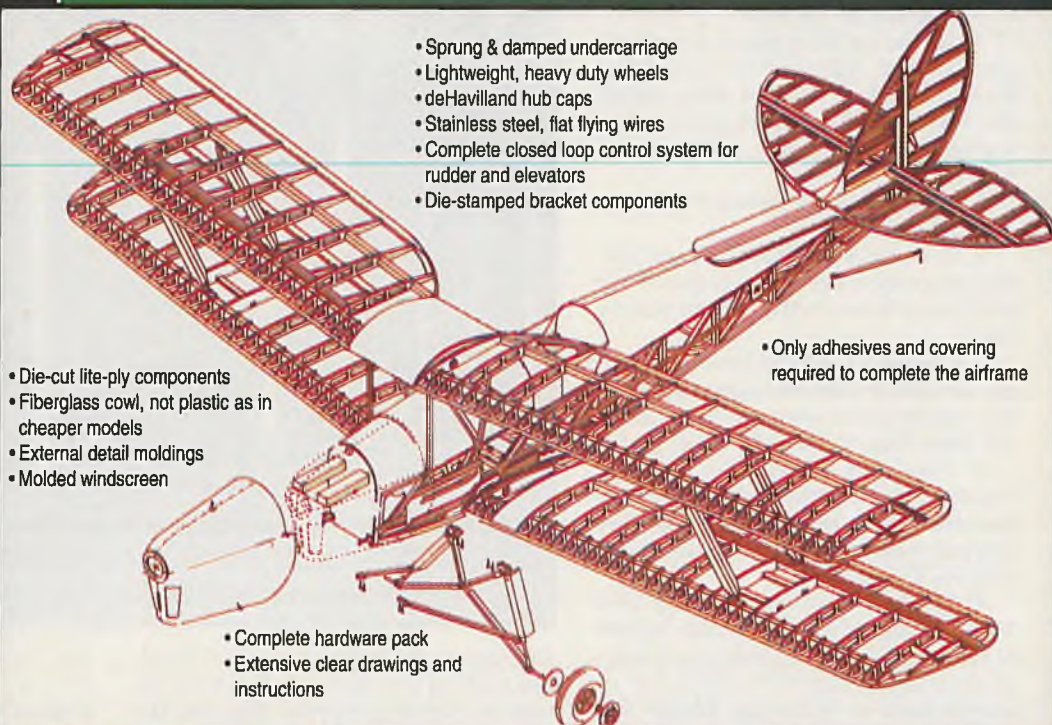
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# JAEGER

By Mike Hollison

## A Simple Quick Building Aileron/Elevator Design For Slope Or Thermal Soaring

**J**aeger is a slope/thermal design for those who want a snappy looking, easy-to-build fun flier. It is also suitable for the modeler looking for his/her first aileron ship — the construction is lo-tech with a lot of balsa and ply; it uses two channels only (elevator and ailerons) and is a very docile performer, despite its racy lines. So, hang up your current polyhedral, rudder-elevator floater for the season and try your hand at this lean, but not so mean, flying machine!

### CONSTRUCTION

1. Start with the wings by cutting the leading edge and lower wing spars to length and laying them on the plan.

2. Cut out all wing ribs, and epoxy ribs W-3 to W-6 in position.

3. Taper and sand the aileron spar, notch for ribs W-7 to W-10. Lay in place over the plan, glue W-10 in position and epoxy the spar between ribs W-6 and W-10. Add ribs W-7 to W-9.

4. Cut the top wing spar to length and glue in place. Add the 1/4" balsa filler between ribs W-3 and W-4, then cement the 1/16" balsa vertical grain shear webbing between each rib, as indicated on the plan.

5. Repeat steps 1 through 4 for the second wing panel.

6. Next, cut wing joiner J-1 from 1/4" ply and epoxy to the center section of one wing panel between the top and bottom spars.

7. Cut two J-2 wing joiners from 1/16" ply and epoxy the front joiner between W-3 and the center section. Add a piece of 1/4" balsa filler between rib W-3 and J-1.

8. Now, join the two wing panels together and epoxy the rear joiner (J-2) in position, making sure that there are 2" of dihedral at each wingtip under ribs W-10. Add ribs W-1 and W-2.

9. Cut the bottom wing sheeting from 1/16" light balsa and cement to the bottom of each wing panel, remembering to shim up the trailing edge of W-10 by 1/4" to provide wash-out at the tips. Add the rear 1/16" balsa strip spacers between each rib immediately behind the aileron torque rod position, and the scrap-tapered balsa on either side of ribs W-1 for the wing mounting bolt.

10. Slot the top of the aileron spar as indicated for the Kraft "live" hinges and epoxy in place.

11. Next, cut the 22-1/4" long aileron torque rods from 3/32" dia. piano wire and



slide three 1/4" long pieces of 3/32" i.d. brass tubing over each rod, then bend the rods as shown on the plan. Slip into the notches of ribs W-2 through W-6, smear a little Vaseline onto the rod to prevent the wire from sticking, and epoxy the brass tubing to ribs W-2, W-4, and W-6.

12. Sheet the top of the wing with 1/16" light balsa.

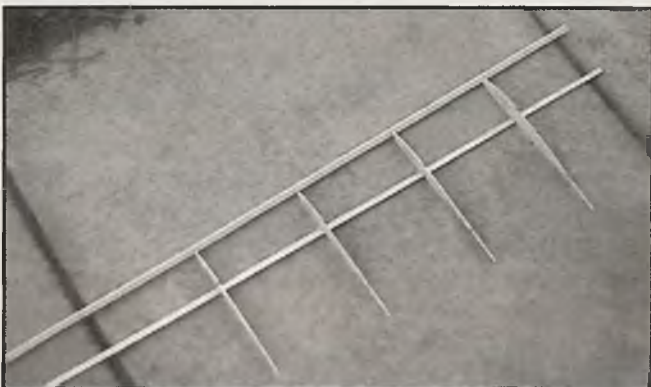
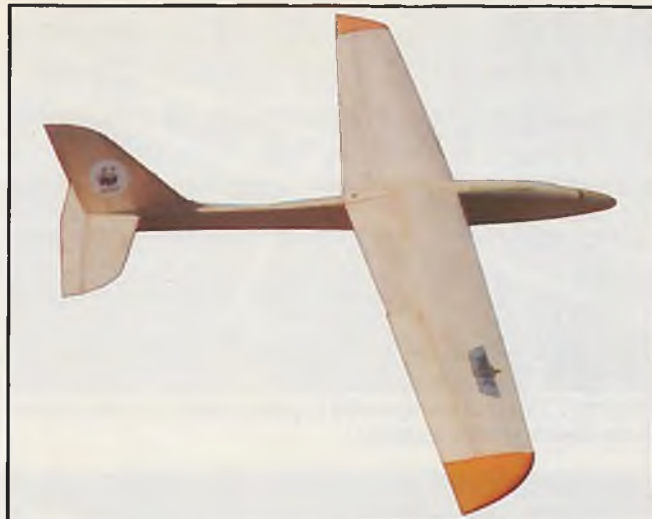
13. Cut the ailerons from 1/2" x 2" x 20" light balsa sheet and carve to the airfoil indicated on the plan. Chamfer the leading edge of the ailerons underneath by

1/8" to allow for deflection when the aileron is hinged at the top. Slot the ailerons for the hinges and the torque rods, then epoxy in place and sand smooth to continue the overall airfoil of the wing.

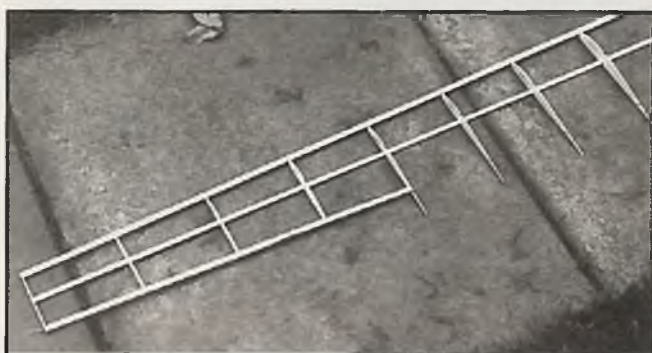
14. Carve the wingtips from soft balsa, cement in place, and smear a bead of epoxy to the tip and trailing edge of each to help protect the thin surfaces at these points.

15. Finally, epoxy a 2" wide strip of fiberglass tape to the center section, top, and bottom. This completes the basic wing

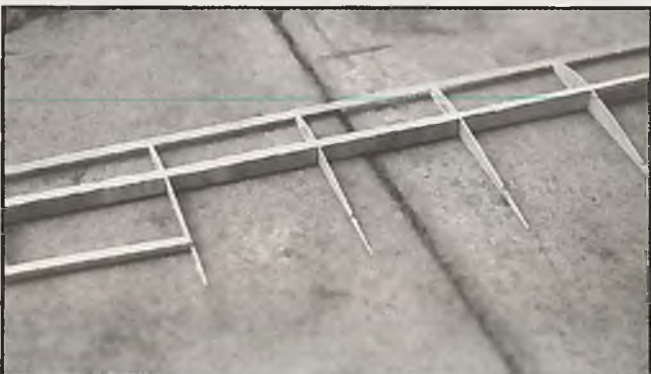




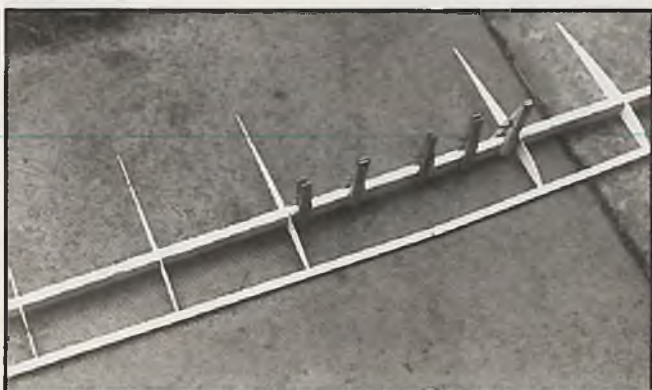
*Wing is simple built-up balsa with spruce spars*



*Aileron spar is added to the basic frame.*



*The top spar is glued in place and the vertical grain shear webbing is added between ribs.*



*The two wing halves are joined together at this time using the plywood dihedral braces and epoxy. Clothespins used to hold everything in place until epoxy is cured.*

construction.

#### **Fuselage:**

1. Cut two fuselage sides from Sig 1/8" lite ply. Cut formers F-1 to F-3, drilling and slotting them as shown on the plan.

2. Cement the 1/4" triangular stock balsa to the insides of the fuselage, and epoxy the formers in place. Pull the rear of the fuselage together, trimming the balsa stock to fit, and allow a 1/8" gap at the end for the elevator pushrod.

3. Sheet the bottom of the fuselage with 1/8" ply and 1/8" balsa, laid cross-grained as shown on the plan.

4. Add the balsa block top decking aft of F-3, slot the rear as indicated for the 1/4" fin, and carve the fuselage to that of section A as illustrated.

5. Likewise, carve and sand the hardwood nose block to shape and epoxy to F-1.

6. Carve the balsa canopy using the profiles of the nose block and F-2 as patterns, and drill for the wing retaining dowel.

7. Epoxy the male and female parts of a dress snapper to the canopy and canopy mount respectively, and glue the latter in place immediately behind F-1. Epoxy the 3/16" blind nut into the wing mounting bolt plate, and epoxy this ahead of F-3.

8. Now, position the wing between F-2 and F-3, add the balsa block wing fairings and rough carve to shape.

9. Epoxy the 3/16" dia. wing locating dowel into the leading edge of the wing,

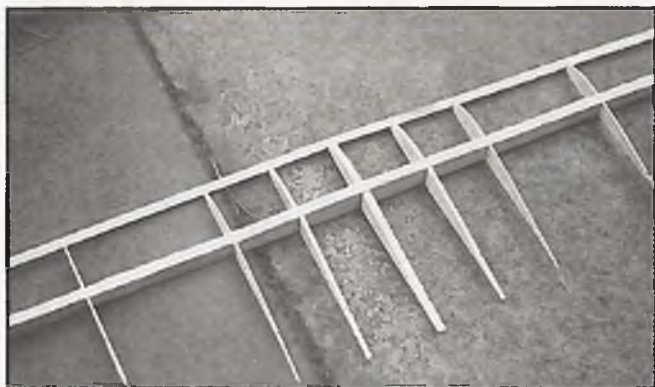
then drill the wing for the 3/16" dia. mounting bolt, and bolt the wing to the fuselage. Now carve and sand the wing fairings to conform to the cross section of the fuselage so as to provide a smooth, continuous flow through canopy, wing, and fuselage.

10. Remove the wing and cut the fin, stabilizer, and elevator from hard balsa sheet. Sand to the airfoils indicated on the plan, and epoxy the fin and stab to the fuselage. A bead of epoxy on the thin edges of both the fin and stab will help protect them from rough handling.

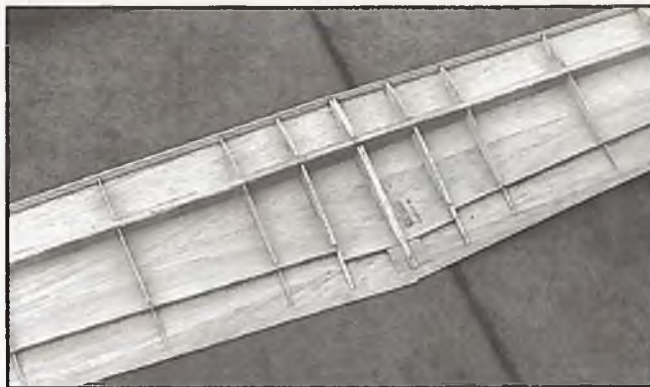
#### **Finishing:**

1. Paint or cover the model to your taste, hinging the elevator with a suitable iron-on film and closing the aileron gap

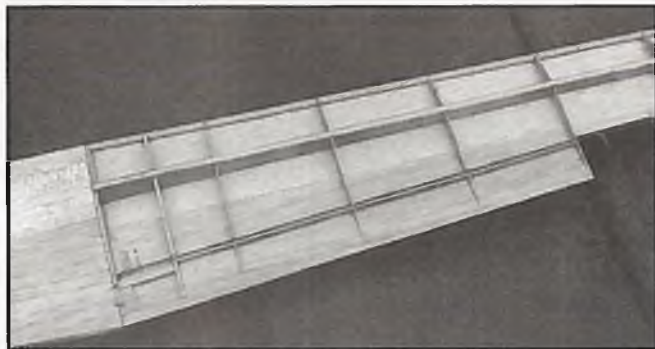




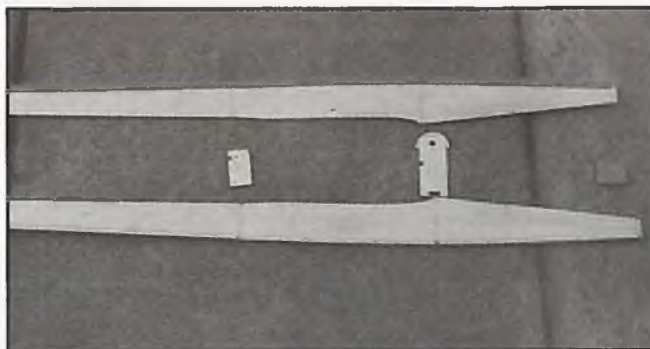
**Ribs W-1 and W-2 are epoxied in place, ready for the bottom balsa sheeting to be installed.**



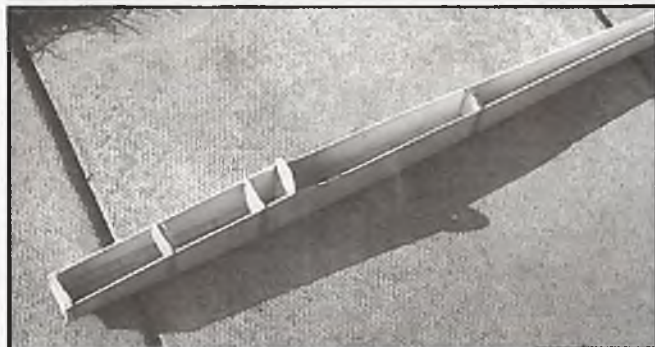
**Bottom wing sheeting glued in place with rear spars and wing bolt blocks also installed at this time.**



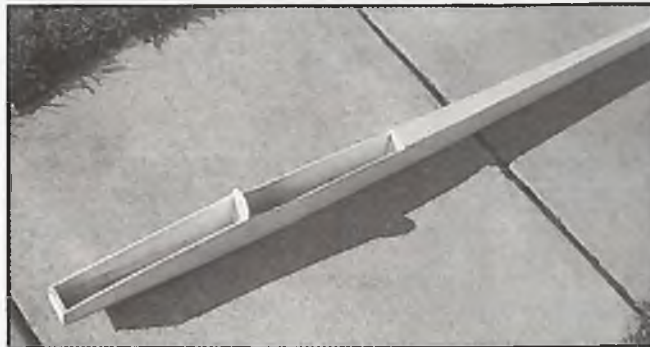
**Left wing panel already sheeted, and right panel ready for sheeting. Note the aileron torque rod and hinges already glued in place.**



**Fuselage sides and formers with triangle stock glued in place, ready to begin assembly.**



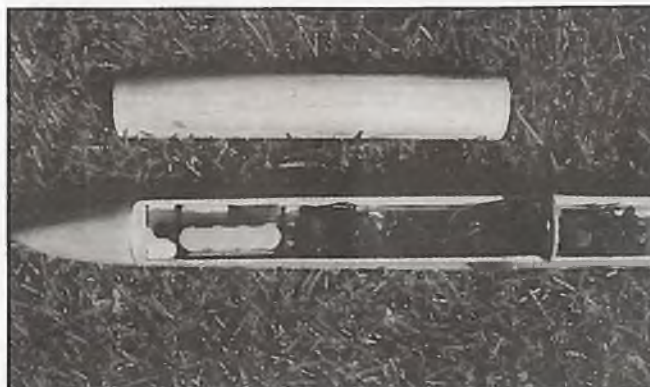
**Fuselage sides are held in place with rubber bands while epoxy cures. Bottom sheeting is already installed.**



**Top rear balsa block glued in place, ready to be shaped.**



**Rear of fuselage shaped and sanded, then slotted for the vertical fin and stabilizer.**



**Finished fuselage showing the basic layout of the radio gear.**

with a similar material.

2. Epoxy the ply tow hook mount to the bottom of the fuselage and add the radio. If you are using standard servos, I recommend mounting the aileron servo in the fuselage immediately behind F-2, cutting the aileron pushrods to length and bending

the servo ends down by 90°, then slipping them into the servo arm as you attach the wing to the fuselage prior to flying. Position the servo so that the bottom of the wing is almost touching the pushrods; this will ensure that the pushrods don't fall out of the servo arm when the model is

inverted! Alternatively, if you intend to fit mini-servos as in the plan, you may choose to install the aileron servo in the wing.

3. Bend and install the elevator pushrod, add a suitable tow hook, balance the model as shown on the plan, and Jaeger is ready to fly.





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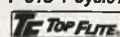
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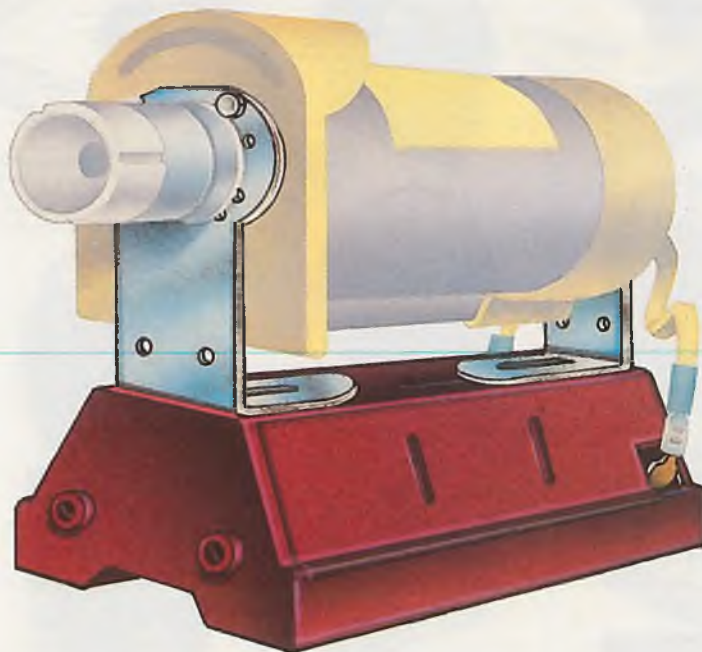
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RCM September 1997 71



## JAEGER

Designed by:  
Mike Hollison

### TYPE AIRCRAFT

Slope/Thermal Sailplane

### WINGSPAN

92 Inches

### WING CHORD

7 Inches (Avg.)

### TOTAL WING AREA

600 Sq. In. (Approx.)

### WING LOCATION

Shoulder Wing

### AIRFOIL

Flat Bottom

### WING PLANFORM

Double Taper

### DIHEDRAL, EACH TIP

2 Inches

### OVERALL FUSELAGE LENGTH

39-3/4 Inches

### RADIO COMPARTMENT SIZE

(L) 13" (W) 2-1/4" (H) 1-1/2"

### STABILIZER SPAN

24 Inches

### STABILIZER CHORD (inc. elev.)

4-1/2 Inches (Avg.)

### STABILIZER AREA

100 Sq. In. (Approx.)

### STAB AIRFOIL SECTION

Flat Bottom

### STABILIZER LOCATION

Top Of Fuselage

### VERTICAL FIN HEIGHT

7-1/2 Inches

### VERTICAL FIN WIDTH (inc. rud.)

5-1/2 Inches (Avg.)

### REC. NO. OF CHANNELS

2

### CONTROL FUNCTIONS

Elev., Ail.

### C.G. (from L.E.)

2-3/4 Inches (At Fuselage)

### ELEVATOR THROWS

1/2" Up — 1/2" Down

### AILERON THROWS

1/2" Up — 1/4" Down

### BASIC MATERIALS USED IN CONSTRUCTION

Fuselage ..... Balsa & Ply

Wing ..... Balsa & Spruce

Empennage ..... Balsa

Wt. Ready To Fly ... 56 Oz. (3 Lbs., 8 Oz.)

Wing Loading ..... 13.4 Oz./Sq. Ft.

Continued from page 69

standard glider has, therefore, staying in and climbing with a thermal takes a little extra eye and hand coordination. Also, getting your model to fly at its optimum

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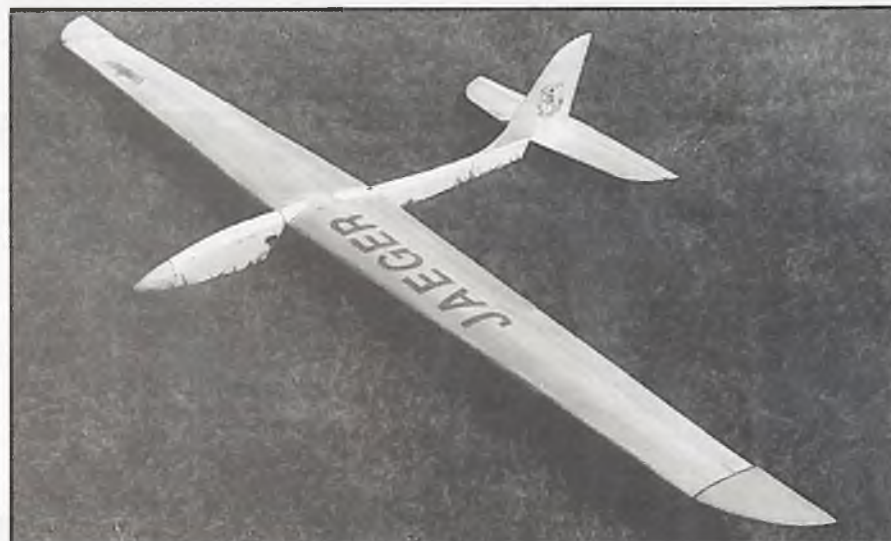
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Completed model with empennage, wingtips, and carved balsa canopy, and wing fairings.

performance level may involve experimenting with weight and trim settings, depending on the weather conditions, thus preparing the pilot for more advanced F3B-type designs.

So, make Jaeger your first (or next) aileron ship and test yourself while you have some fun!



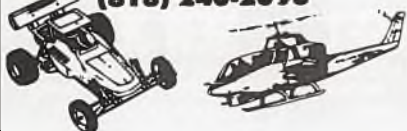
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## John Benario



## Hover

### New Schluter Importer

By the time this column is in print, this news will be old, but the new importer for Schluter helicopters is Paul Gold at Helicopters Unlimited in Connecticut. Paul is a long-time Schluter devotee and is serious about providing support for Schluter helicopters. This news was especially good for me because, even though my Futura has yet to need a replacement part, I know that Paul will have whatever I need if and when I need it. Paul tells me that, as of this writing (April), he has all parts for all Schluter helicopters from the Champion to the Futura and, within two

weeks, he will have all the parts for the Futura SE.

### Century Helicopters Hawk

I thought that after building my Ergo, it would be a while before I got another new helicopter, but then what comes along but another new helicopter to go with my Futura, Ergo, and Nexus.

Peter Caio at Helicopter World called me a short time ago and asked if I would be willing to look at his new Hawk helicopter. I had seen the ad for the Hawk and I have to admit that I was not overly intrigued. It sells for only \$200.00, which is less than I paid for my Heli-Baby in 1977. My thought was

that, since it was priced at only \$200.00, it was not going to be worth spending the time on. I could not have been more wrong. For \$200.00, the Hawk comes with dual bronze bushings on all pivots, a fully aerobatic solid axle head, high-quality autorotation clutch, shaft-drive tail rotor, very good prebuilt main rotor blades and, most astonishing of all, a lot of really good ideas.

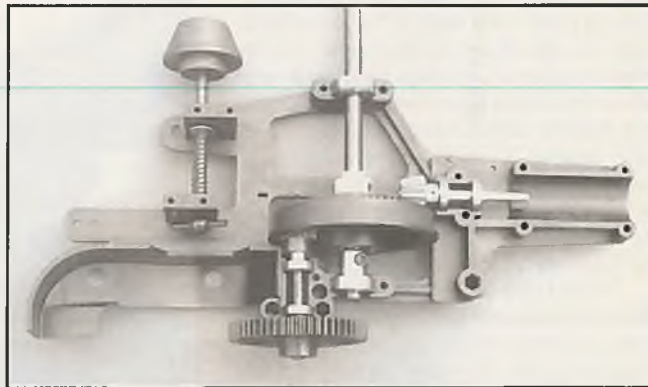
I had not looked closely at the picture of the Hawk in RCM, so I was not prepared for all the features that are incorporated in the design. Most significant is the two-stage gear reduction main frame layout which allows the clutch to be placed next to the engine bearing, while still allowing the engine to be started from above. Since there is no clutch shaft, Peter incorporated a start shaft that keys into the fan and then disengages, so that the start shaft is not turning in flight and cannot cause any vibration.

The overall construction is similar to the Kalt Enforcer in that the mechanics are enclosed in essentially unbreakable case halves with a separate radio tray assembly and a lower frame assembly that connects everything. The engine and landing gear are attached to the lower frame, which uses identical parts for the left and right sides so one does not end up with a number of one of the sides after a few mishaps, while having to buy the other. The radio tray assembly can be removed as a unit, by loosening only a few screws and bolts.

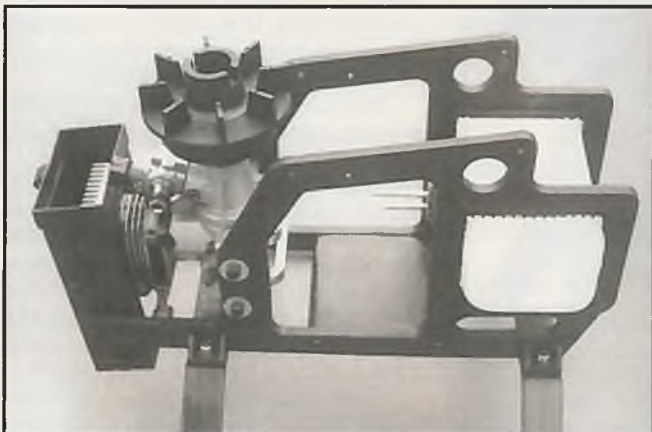
The shafts run in ball bearings and the bellcranks and levers run in dual bronze bushings. While bronze bushings are not



My new Hawk.



The main frame (main molding?) assembly. Note the retractable start shaft and the two stage gear reduction.



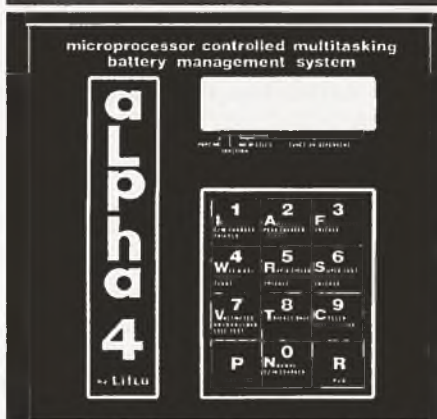
The lower frame assembly with the engine installed.



The left side view of the completed mechanics.



# alpha 4 microprocessor controlled multitasking battery management system



Alpha-4 replaces and obsoletes other cyclers, ESV'S, CVC'S, C/10, fast, trickle and variable chargers. With 4 battery ports and 10 devices it is like having 40 of these units but with far more flexibility, sophistication and far lower total cost. The size is only 6.25"x6.25"x1.35". Maintains batteries for Tx's, Rx's, camcorders, cell phones, lap top's, cameras, flashes, etc. Voltage boost allows charging up to 12 cell nicad's, nimh's or 18V wet/gel's from 12V source. Why waste funds on units that offer only partial solutions and are light years behind.

## ALPHA-4 INCLUDES THESE 10 DEVICES:

Any of the 4 battery ports can be programmed with any of the 10 devices below.

- Cycler, C/10 Charger, trickle. Direct mAh readout
- Super fast cycler. Up to 1000ma discharge & 1000ma 100% charge, trickle. mAh readout.
- Rapid cycler. Up to 1000ma discharge & 1000ma 80% charge. Slow charge to 100%, then trickle.
- Fast charger. Up to 1000ma, 80% charge, then slow charge to 100%, trickle. 4 digit DVM.
- Advanced peak charger. Up to 1000ma 100% charge, trickle. 4 digit Digital Voltmeter (DVM).
- Indefinite C/10 charger, trickle. 996 ranges.
- Normal C/10 charger for new battery priming.
- Trickle only charger. Up to 48 nicad or nimh cells.
- Wet & gel cell charger. Up to 1000ma 100% charge, then float. 4 digit DVM included.
- Dual voltmeter. 4 digit no load & 4 digit auto load. Cell test with diagnostics. Quick charge.

## ALPHA-4 HAS THESE FEATURES:

- Power: 115VAC or 12VDC of either polarity.
- Simultaneous operation of up to 4 ports.
- Ni-cads & nimh's from 1 to 12 cells & 10mAh to 9999mAh. Wet & gel cells 2V to 18V & capacity from 10mAh to 1000mAh.
- C/10 currents 4 to 1000ma in 1ma increments.
- Fast charge and discharge currents: 250, 330, 500 & 1000ma depending on # of ports active.
- Trickle switchover based on battery charge.
- NO 16 HOUR TIMERS TO RUIN BATTERIES!!!
- Very simple programming of custom setups.
- 10 standard setups at a keypress.

- Sealed keypad & alphanumeric display.
- Text error reporting on 4 ports: open, short, reverse polarity, voltage high, voltage low. Power not turned on if above errors present.
- Full protection against reversed polarity.
- Auto power outage protection using battery on port 1 (less than 1ma drain during outage).
- NO FAULTY OPERATION AS WITH OTHERS!!!
- Dual microprocessor multitasking, interactive user friendly operation. Extensive diagnostic text messages. All errors explained immediately.
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- Port displays (4 ports): port #, device type, # of cells, user specified capacity (mAh), measured capacity (mAh), 4 digit no load DVM, 4 digit load DVM, discharge, fast, slow, C/10 and trickle. Unit has 5 standard 2.5mm jacks: One for 12VDC or AC wall transformer (supplied) & 4 for batteries. Adapter cables for 2.5mm jacks (NOT SUPPLIED) must be made by user or purchased (see below).

## PRICES:

- Alpha-4 (includes 115VAC wall power transformer with 2.5mm plug).....199.00
- C1- 2.5mm adapter cable stripped & tinned. Connects port to battery connector.....4.50
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# Litco Systems

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quite as good as miniature ball bearings, they are much better than plastic bushings. I have to admit I was leery of the bronze bushings but, after flying my Ergo quite a bit (the Ergo uses bronze bushings on all its levers), there is no indication of wear and Peter tells me that the bronze bushings have proved very durable. The fuel tank is located in the rear in rubber vibration dampers. Because of its rearward location, the fuel level can be seen at all times, which is good. For \$200.00 the Hawk provides a good value.

When I built all my previous helicopters, including beginner ones such as the Nexus, I used all the building skills that I have accumulated in the 20 years I have flown R/C helicopters, so it is not surprising that my models were always smooth and flew well. However, after talking with Peter, I decided to try a different approach with the Hawk to give it a real test. Since Peter's goal is to have the best beginner helicopter, I built the Hawk as if I were a beginner with no experience and with no helicopter specific tools. I followed the instructions that came with the kit to the letter. I did not balance this, or special fit that, or add the other, which is my normal practice when building a helicopter. By building the kit precisely as the instructions direct, I could form a true opinion of how suitable the Hawk would be for a beginner.

I did not balance the tail rotor, but simply bolted the pieces together. I balanced the flybar and main blades by unbolting the main shaft from the main gear and simply



The rotor head, washout, and swashplate.

resting the helicopter on its side with the rotor head over the edge of my workbench, and letting the head and shaft rotate on the bearings in the main frame. The flybar is balanced by moving the weights and the blades are balanced by adding tracking tape to the light blade.

Because I followed the instructions to the letter, I don't have any comments on the construction of the kit as I have had on previous helicopters. However, I do recommend that a helicopter radio be used. The instructions provide for the use of either a 4-channel nonhelicopter specific radio or a helicopter radio; but, with a nonhelicopter radio, there will be no tail rotor mix nor any of the other adjustments that are so important to helicopter set up and ease of learning. However, if one is determined to use a 4-channel radio, it would be best to use separate servos for throttle and collective with a "Y" connector to the throttle channel.

Producing a complete set of isometric drawing instructions is a huge task and, like every other kit's instructions, there were a few errors in the Hawk instructions which I have brought to Peter's attention so that he can make the necessary changes. The instructions are very complete, but, if there is something that is not clear, call Peter for clarification, rather than potentially assembling a part wrong or with an incorrect mating part.

So how does a \$200 helicopter fly? Very, very well! I was unsure how well the Hawk was going to fly after my assembly method





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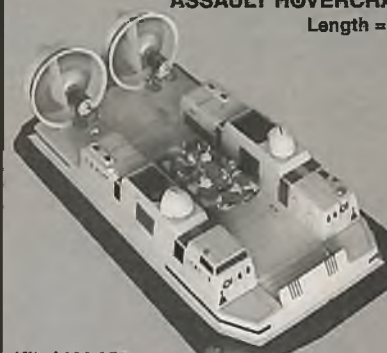
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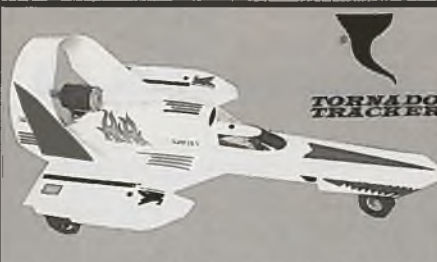


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of simply bolting everything together; however, the Hawk flew very well, with the normal precise characteristics of a solid axle head. Amazingly, there was no vibration from the main and tail rotor even though the tail rotor was not balanced and the main rotor was balanced in only the most rudimentary fashion. I had a small amount of fuel foaming which I attribute to not balancing the fan, clutch bell, or gears. If I had balanced these rotating components on the High Point, there would not have been any foaming. The Hawk has a 49" rotor diameter, an inch larger than other 30's, which makes it very smooth in hover. The larger diameter rotor may slow the aerobatic response down slightly, but any effect would probably be imperceptible.

I wanted to fly the Hawk directly out of the box, and it flew very well, but there is one slight modification that I would recommend. The ball links, as is, are very tight on the balls and should be freed up. I did not do this initially on purpose, and while the helicopter flew, it was obvious that the links were sticking. The links that are on plastic balls can be freed by sanding the balls carefully with 400 grit paper, and the links that are on metal balls can be freed by squeezing the links carefully (very carefully) with pliers while the link is on the ball. Additionally, for a beginner, I would recommend setting the canopy aside and learning without the canopy. Leaving the canopy off eases access to the glow plug, keeps everything out in the open, and keeps the canopy

from suffering the abuse that all beginner machines seem to go through.

I am amazed that a \$200.00 helicopter can be constructed as well and fly as well as the Hawk. At only \$200.00, even with the addition of \$100.00 worth of bearings and a few other upgrades, the Hawk would be a very good advanced model for only \$300.00. Even building the kit with no special tools and following the instructions to the letter, produced a model that is satisfactory for learning purposes. Is building a helicopter without balancing anything a good method? No. Would I recommend this method of construction? No. Will it work for a beginner for a short period of time who does not have any helicopter tools yet? Yes, amazingly enough. Peter assures me that his part's availability is 100% and, since he manufactures everything in the U.S. himself, he can ensure that all parts will always be available.

Based on my experience building my Hawk and the availability of parts, I am going to be recommending the Hawk as the helicopter to learn on, and, with a couple of upgrades, as a very good sport helicopter.

If you're not flying, you're not trying. I can be reached at my (new) email address of:

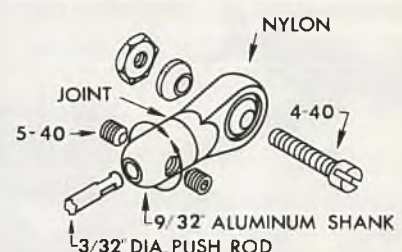
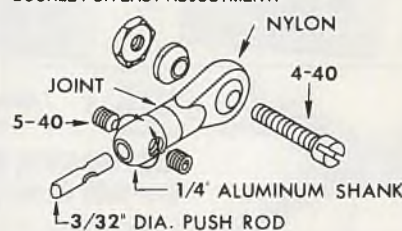
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or through RCM. For my Shuttle parameters for the Ambrosia or Skylark, email me and I will send them out.



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**System Includes:**

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**The Most Requested ARF We've Ever Made! Ultracote covered! 95% RTF!**

Wayne Handley's famous airshow thriller is now available in an Ultracote covered ARF! Built under exclusive license from Handley, our beautiful Raven is truly authentic and performs the same style exhilarating aerobatics! Our model is so complete, even the cowl is factory painted for you. Includes: complete hardware, custom molded wheel pants, clear scale canopy, detailed Raven decals. SPECS: Span: 50" • Length: 42" • Area: 362 sq. • .45-.53 two-stroke req'd • 4 ch. req'd. (R/E/A/T). NO.232490, List \$275.00

**179<sup>99</sup>  
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## AIR MASTER 40T

**THE BEST ARF TRAINER AT THE  
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**When you buy direct from Hobby Shack, you eliminate a 'middle man' and really save money!**

Trainers of the same high quality and high level of prefabrication normally cost \$110.00! At our special introductory price of only **\$89.99**, the Air Master saves you \$20.00! Why pay more?

**Now learning to fly is as easy as 1-2-3!**

You can master the air with the Air Master 40T. It's easy! We've engineered this trainer with a flat-bottom wing and big stabilizers to give you the smoothest, steadiest ride across the sky. Tricycle landing gear puts you at ease on the taxiway and runway.

**Air Master simply looks better!**

That's because it's not your usual "box" fuselage trainer! Air Master 40T comes with a sexy, molded red plastic engine cowl with cheeks, and a molded cabin and turtledeck top. Bright black, red, white, and two-tone blue graphics give the Air Master beauty and high visibility...at no extra work or cost to you!

**Air Master builds more easily!**

It's 90% RTF from the box. More than this, because of the one-piece turtledeck/cabin, the radio compartment is **WIDE OPEN**. Guys with big hands can reach inside! It's the easiest to set up!



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Add a MAGNUM GPA-40—You save \$30.00 on the deal!!!

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• Right designs! • Right price! • Bright colors! • ARF!

The absolute lowest prices & best values in almost ready to fly trainers! Fast & easy assembly from factory built & covered parts—90% RTF. Easy to fly & stable!

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**Right Flyer 25T  
74<sup>99</sup>  
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99<sup>99</sup>  
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**ARF Right Flyer 40T** Our No. 1 best seller! Many 1,000's have learned to fly with this trainer! Super stable design. Flat bottom wing. Bright graphics. Trike gear. • Span: 64" • Area: 736 sq. • .40-.53 2-stk • 4-ch. (R/E/A/T) No. 125760

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**ARF Right Flyer 60H** Bigger is better...and it is BIG! Extra stable & very easy to see. Semi-symmetrical wing is great for training, yet lets you to learn aerobatics too! • Span: 71" • Area: 875 sq. • .60-.75 2-stroke req'd • 4-ch. req'd. (R/E/A/T) No. 125813



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**Better aerobatics.  
Super light. Ultracote covered!**

Pattern flying is more fun with a 90% RTF Avenger! All balsa construction means it's lighter and more responsive. Ultracote covering won't sag or bubble. Painted fiberglass cowling! A proven, classic Pattern design, in the air it blows the doors off other Pattern planes. It even costs less too—you just can't beat this value! Ready to accept your optional retracts! SPECS—Span: 59" • Area: 620 sq. • .45-.53 two-stroke req'd • 4-5 ch. RC req'd. (R/E/A/T, opt.retracts). NO.232485, List \$260.00

**169<sup>99</sup>  
BEST BUY!**



## Tornado A.T. ARF

**For advanced training and unbeatable aerobatic performance. Covered in 4 Ultracote colors!**

Pilots with intermediate flying experience are ready to take control of this 95% RTF advanced trainer! It tracks and handles like a Pattern ship! The Tornado is so completely pre-built and covered, the wings are factory pre-joined for you! Painted glass cowling! SPECS—Span: 56" • Area: 602 sq. • .40-.53 two-stroke req'd • 4-ch. req'd. NO. 126520, List \$230.00

**149<sup>99</sup>  
Great value!**



## Spitfire 36 ARF

**World War II's most effective fighter! Ultracote covered!**

Reinact the Battle of Britain with your own personal "Spit"! It's fast, agile, aerobatic, great looking, and maneuverable—it's really fun to fly! Spitfire is so beautifully pre-fabricated that even the wings are joined for you! Covered in Ultracote in a camouflage pattern so real you'll be proud to show it off! Pre-painted fiberglass cowling. SPECS—Span: 48" • Length: 39" • Area: 380 sq. • .32-.36 two-stroke req'd. • 4-channel R/C system required (R/E/A/T) NO. 126525, List \$215.00

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## Cessna 182 ARF

**EZ-type ARF is pre-painted 90% RTF! This "Skylane 60" is BIG and is a great trainer!**

This model looks so real—with details like panel lines, rivets, & flaps—you'll swear it's a shrunken Cessna! Its color scheme is a real-life Skylane! Inside you'll find 4 seats ready for your pilot & passengers! SPECS—Span: 72" • Area: 724 sq. • .60-.65 two-stroke req'd • 5-ch. R/C req'd. (R/E/A/T/Flaps). NO. 126250, List \$230.00, Regularly \$219.99

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## Global American Flyer ARF

Spectacular flier & trainer!  
• Pre-built, sanded and covered!  
• 40-.53 Size shoulder wing design  
• Balsa built  
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List \$150.00

**92<sup>67</sup>  
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## Global Explorer 2M ARF

Super easy to fly trainer-glider!  
• Pre-built and covered! 90% RTF!  
• Multi-panel, flat-bottom wing  
• Balsa built  
• 78" Span  
No. 127030  
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Price Cut \$10!**



## Global Super Fly 15 ARF

Train-to-fly on small fields too!  
• Pre-built, sanded and covered!  
• 15-.20 Size • Stable high wing  
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Fast, aerobatic, and very fun!  
• Pre-built and covered, 90% RTF!  
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• Balsa built  
• 56" Span  
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## Hobby Shack Firebird ARF

Slope flying at its best! 99% RTF  
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• Wings are pre-joined • Just glue on tail surfaces  
• 58" Span  
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Take this famous Canadian bush plane for a spin & experience the spirit of high flying adventure!

The Beaver 40 not only makes a great sport scale subject, but also an excellent high wing trainer! High aspect ratio (scale) wings with a high lift airfoil and slightly enlarged tail surfaces make the "Beav" a real pussycat to fly. Take off and land with a little flap deflection and you'll be surprised how well it handles slow speeds or extra weight! Includes: fiberglass

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**COMBO** the Beaver with a GPA-40 You'll save \$10.00! **119<sup>99</sup>**

### Raven 40

Incredible performer!

- Clear molded canopy
- Pre-shaped main gear
- Raven decal set

Raven, NO. 232325 List \$89.95



You get: every balsa part pre-cut for you, molded parts, full instructions & CAD plans—you just get MORE with a Global Fun Fly!

### Bearcat 40

Wild aerobatics and a 3-D look! 1946 Blue Angels style!

- Molded 3-D cow! • Clear molded canopy • Pre-shaped gear • NAVY decals

Bearcat, NO. 232327, List \$89.95



### RAVEN

QUALITY KITS

The original, the awesome, the only authorized Raven 60 kit—New lower price makes it a steal!

This model looks so good in the air doing "Who-wee Tumbles," "Flea-Flickers," and flat spins that you may have a hard time staying away from the flying field! But who'd want to anyway? On the ground, the Raven 60 is a true beauty! We've included complete, authentic Raven decals, custom molded spinner, cowl and canopy, and molded wheelpans. Exclusively licensed from Wayne Handley. NO.232320, List \$184.95

**RAVEN COMBO—**

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**99<sup>99</sup> Price Cut \$30 More!**

### Hobby Shack 1/2A-SST While they last!

Fully aerobatic. Simple construction. 4-Hour build. Foam core wings.

Easy to fly! Small for EZ-transport! Span: 33" • Area: 242sq. • .049-.051 2s • Radio: 2-ch required (R/A) NO.123140, List \$32.95



**14<sup>99</sup> slashed \$10!**

A trainer that looks real!



### Skylane 60

Sport scale Cessna: EZ-to-fly & a beautiful plane!

Big model. Small cost. Super stable, like a trainer, yet aerobatic! Curved fuselage. Span: 72" • Area: 700 sq. • 5-ch. req. NO.232310, List \$119.95

**89<sup>99</sup> Best value!**

It's the best biplane you'll ever build and fly!



QUALITY KITS

### TECATE Biplane

The fully aerobatic, easy-to-set-up biplane with no bad habits or building hassles! Impressive kit engineering!

"We call it the biplane for guys who hate biplanes!" It took 1½ years of R&D, but we did it! We designed a highly aerobatic, fast and snappy biplane that's a pleasure to build & a joy to assemble. There's no soldering of wires, bending metals, tricky aligning of wings...none of it! Wings are self-aligning on factory pre-shaped, aluminum cabane struts! Everything builds on a flat board—no jigs needed! Transitioning airfoil snap rolls beautifully, but lands at a crawl for 3-pointers! SPECS—Span: up=50"/low=44" • Area: 620 sq. • 40-53 2-stroke req'd • 4 ch.req'd (R/E/A/T) NO.232185, List \$185.00

**TECATE COMBO—Tecate + Magnum XL-46A engine**

**169<sup>99</sup> You Save \$10**

**99<sup>99</sup> Price was \$120**



### Hobby Shack Lucky Stik ARC

The classic sport 40 you don't need to build!

Fully aerobatic. Almost ready to cover. Span: 52" • Area: 589 sq. • .35-.46 2s NO.123620, List \$114.95

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GLOBAL

### Gigolo ARC

Almost ready to cover slope glider!

A slick, low drag, aerobatic performer. A decade in R&D, the Gigolo ARC does every stunt! Proprietary airfoil. Built and sanded, balsa/foam core. SPECS—Span: 56" • Area: 506 sq. • 2-ch. sys. req. (R/A) NO.232480, List \$132.95

**59<sup>83</sup> Cut \$10 more!**



### Global-Cutlass 45

Awesome scale flying wing!

• Foam core wing • Normal engine • S=52" A=625sq" E=40-.53, R=4ch No.232120 List \$124.95

**49<sup>76</sup> Slashed \$30+!**



### H.O.B.—Extra 300L

New! Scale aerobatic 45!

• Balsa/ply kit • Includes scale doc's • S=56" A=550sq" E=40-.53, R=4ch. No.516645 List \$139.95

**99<sup>99</sup> \$40 Off list!**



### Hobby Shack—Ridge Hunt

Aileron slope glider/trainer

• Balsa/ply kit • Aerobatic • Light • S=50" A=265sq" R=2ch. req'd. No.123160 List \$38.95

**19<sup>99</sup> Cut \$5 more!**



### Midwest-G-202

Giant scale aerobatic!

• Quick build balsa kit • CAD plans • S=72" E=1.08-1.50 2s, R=4 ch. No.569186 List \$314.95

**209<sup>99</sup> Cut \$20 more!**



### Goldberg—J3 Cub

Fun! Sport scale trainer!

• Formed cowl • Dummy cylinders • S=78" E=45 2s .40-.90 4s, R=4 ch. No.579938 List \$129.95

**74<sup>99</sup> Cut \$10 more!**



### Goldberg—Gentle Lady

78-Inches of pure floater!

• Thermal/slope • Flat bottom wing • S=78" A=625sq" R=2ch. (R/E) No.579904 List \$54.99

**29<sup>99</sup> Trimmed \$2!**

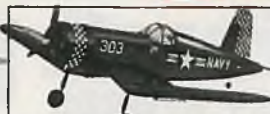


### SIG—Kadet LT-40

Hands-off stable trainer kit!

• Fast building • Flat bottom wing • S=70" E=30 .53 2s, R=4ch. No.258576 List \$110.95

**73<sup>99</sup> why pay list!**



### Great Planes—Corsair

.40-Size fun-sport F-4U kit!

• Easy-building inverted gull wing • S=56" E=40-.46 A=573sq" R=4ch. No.700166 List \$179.95

**97<sup>88</sup> Cut \$12 more!**



### Great Planes—P-51D ARF

.40-Size ready-built warbird!

• Uses Ultra Sport airfoil for agility • S=57" E=40-.50 R=4ch. req'd. No.700016 List \$299.95

**198<sup>47</sup> Cut \$11 more!**



### Global—Easy Answer

Fun, 2-meter sailplane kit

• Easy-building • Strong I-beam spar • S=78" A=580sq" 24-30oz, R=2ch. No.232340 List \$38.95

**19<sup>99</sup> We sell 1000s!**



## NEW! CIRRUS

### CS-20 Ball Bearing Sub-Micro Servo

It's the smallest, lightest, and best micro servo ever!

- Perfect for lightweight hand launch gliders
- Fantastic for use in 1/2A power planes
- Use it wherever you need the smallest, lightest, most compact micro available
- CS-20 BB Sub-Micro opens up a world of small application possibilities!

#### SPECIFICATIONS

Size ..... 0.86 x 0.43 x 0.83 inches  
Weight ..... 0.32 ounces  
Speed @ 4.8 volts ..... 0.11 sec/60°  
Torque @ 4.8 volts ..... 11.11 oz-in.



World's Smallest Micro!

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CS-20 BB Sub-Micro Fut-J. NO. 444230  
CS-20 BB Sub-Micro Airtronics/Sanwa NO. 444231  
CS-20 BB Sub-Micro JR/Hitec NO. 444232

List \$39.95 each  
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## NEW! CIRRUS Car & Heli Servos!

### CS-60BB CAR/HELI

### CS-60MGBB CAR/HELI

With or without metal gears, this 1/10-scale car or helicopter servo can't be beaten: not in price, not in performance! Guaranteed!



**60 SERVO 2BB 2BBMG**  
SIZE (BOTH) ..... 1.60 x 1.49 x 0.79 in.  
WEIGHT ..... 1.58 1.94 oz.  
6v SPEED ..... 0.14 sec/60° 0.17 sec/60°  
TORQUE ..... 56.38 oz-in. 65.00 oz-in.

#### CS-60BB High Torque

J-conn. NO.444125  
A-conn. NO.444126  
JR/Hitec NO.444127

List \$26.75

**16<sup>99</sup>**

#### CS-60MGBB High Torque

J-conn. NO.444130  
A-conn. NO.444131  
JR/Hitec NO.444132

List \$38.95

**21<sup>99</sup>**

## NEW!

It's...  
...like a HS-300.  
...like a JR-505.  
Like our price  
better?

### CIRRUS CS-50 Standard Sport

The budget-priced standard servo that's perfect for sport planes and RC sailplanes!

Size: ..... 1.52 x 1.26 x 0.74 in.  
Weight: ..... 1.48 oz (42 g)  
Speed: ..... 0.16 sec/60 degrees  
Torque: ..... 42.3 oz-in. (3.8 Kg-cm)

J-type connector No.444100  
Airtronics conn. No.444101  
JR/Hitec: S-conn. No.444102

**9<sup>99</sup> each**  
Buy 4: **33<sup>96</sup>**  
(8.49 ea.)

### CS-80MGBB 1/8-Car/Heli

**Super Torque Big MG Servo**  
With metal gears and a super torque motor, this 1/8-scale car or big helicopter servo is a real workhorse.



List \$38.95  
**22<sup>99</sup>**

J-conn. NO.444170  
Air-San NO. 444171  
JR/Hitec NO.444172

**SPECIFICATIONS**  
SIZE ..... 1.60 x 1.69 x 0.79 in.  
WEIGHT ..... 2.01 oz.  
6v SPEED ..... 0.25 sec/60°  
6v TORQUE ..... 129.86oz-in.

### CS-600 BB FET JUMBO

**Super strong!**

FET power amp's do the job of boosting output sky high! But, power comes from energy, so the use of a high capacity battery or secondary battery is recommended.



List \$74.95  
**Wow 44<sup>99</sup>**

**CS-600 FET Specs:**  
SIZE ..... 2.48x2.22x1.27in.  
WEIGHT ..... 5.22 oz.  
SPEED ..... 0.28 sec/60°  
TORQUE ..... 249.97 oz-in.  
J-conn. NO.444280  
A-conn. NO.444281  
JR/Hitec NO.444282

### CS-400 BB GIANT PRO Big servo for 1/4-scale!



It's BIG and powerful with ball bearings and extra thick gears. Great for 1/8 gas cars too! Finally, now there's a giant servo that works as advertised and that you can afford!

**Specifications:**  
SIZE ..... 2.15 x 2.03 x 1.04in.  
WEIGHT ..... 4.0 oz.  
SPEED ..... 0.25sec/60°  
TORQUE ..... 138.9oz-in.  
J-conn. NO.444260  
A-conn. NO.444261  
JR/Hitec NO.444262

List \$38.95  
**Wow! 21<sup>99</sup>**



### CS-30 2BB MINI

"3002" TYPE SERVO  
SIZE ..... 1.22 x 1.21 x 0.63 in  
WEIGHT ..... 0.85 oz  
SPEED ..... 0.23 sec/60°  
TORQUE ..... 44.44 oz-in.

J-conn. NO.444240  
A-conn. NO.444241  
JR/Hitec NO.444242  
List \$34.95



### CS-70 2BB STD. PRO

BALL BEARING "148"  
SIZE ..... 1.59 x 1.50 x 0.79 in  
WEIGHT ..... 1.55 oz  
SPEED ..... 0.15 sec/60°  
TORQUE ..... 43.66 oz-in.

J-conn. NO.444160  
A-conn. NO.444161  
JR/Hitec NO.444162  
List \$24.95



### CS-100 2BB RETRACT

"136" TYPE SERVO  
SIZE ..... 1.78 x 0.97 x 0.89 in  
WEIGHT ..... 1.20 oz  
SPEED ..... 0.50 sec/60°  
TORQUE ..... 102.7 oz-in.

J-conn. NO.444220  
A-conn. NO.444221  
JR/Hitec NO.444222  
List \$41.95



The budget-priced standard servo that's perfect for sport planes and RC sailplanes!

Size: ..... 1.52 x 1.26 x 0.74 in.  
Weight: ..... 1.48 oz (42 g)  
Speed: ..... 0.16 sec/60 degrees  
Torque: ..... 42.3 oz-in. (3.8 Kg-cm)

J-type connector No.444100  
Airtronics conn. No.444101  
JR/Hitec: S-conn. No.444102

**9<sup>99</sup> each**  
Buy 4: **33<sup>96</sup>**  
(8.49 ea.)

! Warranty: 1 yr. against factory defects  
! Performance to meet or exceed any comparable servos on the market



### CS-90 STD. LOW PROFILE

"9102" TYPE, NO BB  
SIZE ..... 1.75 x 1.13 x 0.88 in  
WEIGHT ..... 1.48 oz  
SPEED ..... 0.14 sec/60°  
TORQUE ..... 38.80 oz-in.

J-conn. NO.444180  
A-conn. NO.444181  
JR/Hitec NO.444182  
List \$21.95



### CS-90 BB LOW PROF. FAST

FASTER THAN "9102"  
SIZE ..... 1.75 x 1.13 x 0.88 in  
WEIGHT ..... 1.13 oz  
SPEED ..... 0.09 sec/60°  
TORQUE ..... 31.75 oz-in.

J-conn. NO.444200  
A-conn. NO.444201  
JR/Hitec NO.444202  
List \$29.95



148 Type at a ROCK BOTTOM price!

### CIRRUS CS-70 Standard Pro

Standard "148" type servo. If you need a lot more standard servos, here they are! Our price is the lowest you'll find. We guarantee it! Buy 4 and save more!

Size: ..... 1.59 x 1.50 x 0.79 in.  
Weight: ..... 1.55 oz (44 g)  
Speed: ..... 0.15 sec/60 degrees  
Torque: ..... 43.66 oz-in. (4.0 Kg-cm)

J-type connector No.444140  
Airtronics conn. No.444141  
JR/Hitec: S-conn. No.444142

**10<sup>99</sup> each**  
Buy 4: **38<sup>68</sup>**  
(9.67 ea.)

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#### O.S. 1.40 RX

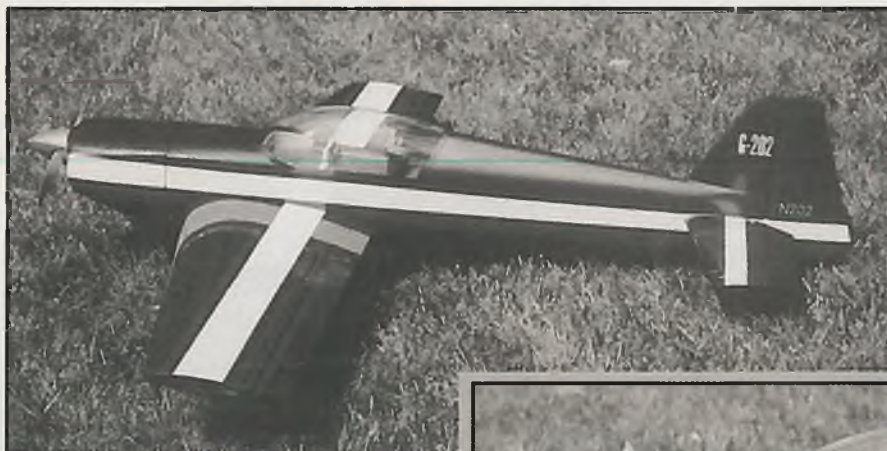
- It Will Fit In Our Current Pattern Airplanes • It Will Run On A Muffler
- It Will Be More Than Competitive With The 4-Stroke

I mentioned last month that my trusty YS 1.20AC lost its cam gear and had to go to the hospital. I put in my backup, which had not been broken in, and began the process. After about three flying sessions, I was getting bored, and I said to myself, "Time to install the 2-stroke." Now the word was that the O.S. had the same mounting holes and would drop right in where the YS had been. I knew the pipe was out of the question in the Ariel, which was designed around the YS 1.20 and its

back 3/8", the header would not clear the Hyde mount. After a lot of thinking, I decided to start cutting away the cowling for the carb and use the existing mounting holes for the engine, and skip the spacer. In the end, the installation came out pretty nice, with minimal new holes in the airframe. I did need to open the hole for the needle valve, and I decided to put a new hole in for access to the glow plug, even though I use a remote connector on the plug. I know there will come a time when I want to change plugs without removing the cowling. All in all, it was a week from when I decided to make the switch, until I was flying, so it wasn't a drop-in deal as some folks might lead you to believe. My

Both were very straightforward with no complications. I drilled and tapped the header adapter for a pressure tap and put the thermocouple in it about 1/2" from the back of the engine.

We had run the engine on the bench with an AAP 1.20 4-stroke muffler and a 6" extension between it and the O.S. header. It seemed to work very well; easy starting, good response to the needle, and steady running. Break-in was with 15% nitro and a 15 x 12 APC prop. After thirty minutes, we pronounced it ready to fly. The first day out with it installed in the plane was a total loss. First of all, the starter wouldn't turn the engine over. This engine has big-time compression. We borrowed a starter, and then the glow driver wouldn't work. When we got the engine to fire, it acted entirely different than the bench tests, so we packed up and went home. That night friend Pete Callas took his AAP muffler over to a friend's and they opened it up and drilled some holes and welded it back together. Next time out, the engine was back to its good behavior. This time we did not install the extension between the header and the muffler. We only flew one flight that day because it was late and very windy, but we could tell immediately that this thing was going to work. I'm really not sure the muffler mod or removal of the extension had anything to do with it, but I plan to try the original unmodified muffler after I get a few gallons of fuel through the engine to find out. I'm still running the engine rich with the 15 x 12 prop, and it turns about 8000 rpm on the ground, although we've leaned it a little and seen 8800 rpm. With the rich setting, it peaks out at about 9700 rpm in the air. The first thing I noticed in the air was that, when I pulled the nose up, the plane did not lose as much speed through the quarter loop, and didn't have any tendency to yaw. In the past, the plane would slow and I would have to start feeding in right rudder. I could also feel the difference in maneuvers like the double



Gerry Dale's G202. Text at end of column.

muffler, but I figured the O.S. 1.40 would have enough power with a muffler, especially because I would cut about a half pound off the gross weight. The engine is about 5 oz. lighter, and I reasoned that I would be able to remove the 3 oz. of lead which I had on the tail.

The first obvious problem was that the O.S. had the carburetor in the front and it would interfere with the cowling. No problem, just put a spacer between the prop driver and the spinner backplate and move the whole engine back 3/8". Friend, Darryl Bergstrom, built me a neat spacer that has pins that end up pinning the spinner, spacer, and drive washer together. When I went to install the engine and exhaust header, I ran into the next problem: If I moved the engine



job was more complicated because I had to install the sensors for the tach and EGT for the AeroSport Engine Data Logger that I'm using to evaluate engines and props, etc.

Immelmann with full rolls. With the 4-stroke, the plane would slow during the climbing half loop, and the roll rate would be quite slow as a result. It was then very





### BRISTOL M-1

Construction is simple, quick and easy. The wing features a scale undercambered airfoil with ailerons. The round type fuselage is built using formers and stringers over a rectangular crutch which is simple to build, yet gives the illusion of complex scale construction. The flying qualities are superb.

Wing Span: 60" Weight: 6 to 6-3/4 Lbs  
Fuse Length: 44-1/2" Engine: .40-.60 2-Stroke  
Wing Area: 650 Sq. In. .46-.90 4-Stroke  
Kit No. 436 ..... **57.95**



### 1/4 Scale Piper J-3 Cub

Our 1/4 scale J-3 Cub is legendary in both flight performance and value. Complete hardware package, step-by step photo illustrated instructions, detailed rolled plans, as well as top quality balsa, spruce, and plywood are included. Two piece wing design. Just like the full scale Cub, the flying characteristics are absolutely outstanding.

Wing Span: 108" Weight: 12-14 lbs.  
Wing Area: 1610 Sq. In. Engine: .60 - 108 2-stroke  
Fuse Length: 68 .90 - 1.2 4-stroke

Kit No.437 ..... **\$134.95**  
A469 Fiberglass Cowl W/Engine Detail ..... **\$34.95**  
469 Fiberglass Cowl W/out Engine Detail ..... **25.95**



### STEARMAN PT-17

Our 30% scale Stearman *Ultimate Series*™ kit re-defines the concept of a complete kit. All hardware items are included, absolutely everything - socket head bolts, aircraft lock nuts, Kwik-Links, threaded rods, scale fittings, Ny-Rods, etc. A separate plan details all the scale pinking tape and rib stitching to make your model a masterpiece. The complete step-by-step photo illustrated 41 page instruction book covers all facets of the construction. The landing gear is not only scale in detail, but function as well with working oleo struts. Scale tail and main wheels are also included. A truly magnificent scale kit.

Wing Span: 116" Weight: 40 - 50 Lbs.  
Wing Area: 3617 Sq. In. Fuse Length: 92"  
Power: 4.2 Cu. In. & Up  
Kit No. 460 ..... **849.95**

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### 1913 ETRICH TAUBE

#### The Perfect Sport Scale Model For Every Sunday Flyer

Our new Taube captures all the excitement of this early era with its slow and graceful flight. Incredibly stable, the Taube features a semi-symmetrical airfoil and very low wing loading so slow flight is without worry. Unlike most other WW I models, our Taube is very easy to build. The construction is as simple as it is to fly. So, if you like the flavor of a WW I aeroplane, but were put off by the complexity of building it, the Taube is for you!

LENGTH: 63-1/2" WEIGHT: 8 to 8-1/2 LBS.  
WING SPAN: 83-1/2" POWER: .70 - .91 4-STROKE  
WING AREA: 1250 SQ. IN. .60 - .80 2-STROKE  
Kit No. 394 ..... **\$129.95**  
485 5" Wms. Bros. Vintage Wheels .. **\$19.00**



### THUNDERBUG 40 & 120

The Thunderbug is a perfect sport aerobatic model for any modeler. The low wing, tricycle gear design combined with the efficient wing tip end plates make the Thunderbug a superb performer, yet it can be slowed down to a walk for landing. The Thunderbug can do it all! You can't find a better sport model at a better price anywhere. Both Thunderbug's are ultra-fast building and feature a one piece wing with spruce spars, rolled plans, top grade balsa and plywood, hardware package and photo illustrated instructions. You will love the fast building and the great performance.

Wing Span: 58" Power: .40-.60 2-stroke  
Length: 43" .50-.65 4-stroke  
Wing Area: 623 Sq. In. Weight: 5 lbs.  
Kit No. 393 Thunderbug 40 ..... **\$54.95**  
Wing Span: 83" Power: .90-1.20 4-stroke  
Length: 60" .80-.90 2-stroke  
Wing Area: 1276 Sq. In. Weight: 8-1/2-9 lbs.  
Kit No. 392 Thunderbug 120 ..... **\$109.95**

### 1/4 & 1/3 SCALE EDO FLOATS

Super scale, complete float kits of Edo's 1400 Series floats. Complete with scale metal fittings, scale metal water rudder, angle shaped toe rails and chine strips. Includes scale rivet details, shaped spreader bars and struts, highest quality "X" bracing with steel fork fittings. Perfect for our Cub kits or can be adapted for use on many 1/4 and 1/3 scale models. The best float kit available anywhere.

Kit No. 464 1/4 Scale 44-1/4" ..... **\$124.95**  
Kit No. 463 1/3 Scale 59" ..... **\$154.95**

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### TAUBE 40

Our smaller Taube kit has probably introduced more builders into WW I aeromodeling than any other single kit. The Taube is a gentle flyer that anyone who has successfully flown an R/C trainer can handle easily. The Perfect 3 channel Sunday Flyer.

Wing Span: 62" Weight: 5 Lbs.  
Fuse Length: 44" Engine: .30-.46 2-Stroke  
Wing Area: 680 Sq. In. .40-.50 4-Stroke  
Kit No. 439 ..... **51.95**



### Sopwith Pup

Our 1/3 scale model is a faithful reproduction of this early aircraft. Our model is exact scale in every detail. Rib spacing, tail size, shape, and everything about the model is as accurate as can be made. To help speed up the construction, there are 20 different die-cut sheets, several jig-cut and shaped parts.

Wing Span: 108" Wing Area: 4428 Sq. In.  
Fuse Length: 77" Weight: 29 Lbs.  
Fuse Height: 36" Engine: 2.7 Cu. In. & up  
Kit No. 461 ..... **249.95**  
Scale Spoked Wheel Kit No. 487 ..... **19.99**



### 1/3 Scale Piper Super Cub

Our new *Ultimate Series*™ 1/3 Scale Super Cub kit stands alone as the best giant scale kit on the market today. The complete 38 page instruction manual contains over 200 photos and covers every step of the construction in complete detail. The landing gear is exact scale in detail right down to the functioning bungee cords and scale bungee covers. Absolutely everything is included; fuel tank, scale Du-Bro Cub wheels, CB steel tailwheel leaf spring assembly, tailwheel, pinking tape, and much more! The flight performance is just fantastic, because nothing flies like a big Cub! Balsa USA's 1/3 Scale Super Cub is the most accurate, detailed scale kit available anywhere.

Wing Area: 3051 Sq. In. Wing Span: 140-3/4"  
Fuse Length: 88.75" Engine: 2 - 4 cu. in.  
Weight: 30 - 35 lbs.  
Kit No. 415 ..... **\$597.95**





### CITABRIA PRO

The Citabria Pro was developed from Bellanca's famous two place tandem sport aerobatic Citabria. Although the model is capable of practically any kind of aerobatics, most modelers we talk to found that they really enjoyed the easy handling characteristics the best. A good first scale model - builds quickly.

SPAN: 80" WING AREA: 1120 SQ. IN.  
LENGTH: 54-1/2" WEIGHT: 11 1/4 LBS.  
POWER: .90-1.2 4-STROKE .60-1.08 2-STROKE  
Kit No. 451 ..... 108.95



### Laddie Mikulasko's LAKER

Fly it off the land then fly it off the water, the Laker is one model you won't get tired of! Easy to handle on the water as it is on the land, the Laker could just become one of your favorite airplanes.

SPAN: 70" AREA: 813 SQ. IN. WT: 6 1/2 LBS.  
LENGTH: 59" POWER: .40-46 2-STROKE  
Kit No. 445 ..... 89.95



### PHAETON II

The Phaeton II is fast and easy to build and its flight performance is second to none in a small biplane. Complex aerobatics are effortless. Its light wing loading and semi-symmetrical wing provides tremendous slow flight. If you are looking for a biplane that really performs with any .40 sized engine, the Phaeton II is for you.

SPAN: 52" AREA: 900 SQ. IN. WEIGHT: 6-6 1/2 LBS.  
POWER: .45-.60 2-STROKE .60-.91 4-STROKE  
Kit No. 448 ..... 64.95

### PHAETON 90

The Phaeton 90 kit builds very quickly and the flight performance is absolutely outstanding. The lightly loaded, semi-symmetrical airfoil is slow and docile when you need it to be, but open up the throttle and watch out! The Phaeton 90 will immediately respond with all kinds of complicated aerobatics any time you want it to. A great model at a even greater price! You will love it.

SPAN: 70" LENGTH: 55" AREA: 1576 SQ. IN.  
POWER: .90 - 1.2 4 CYCLE  
Kit No. 450 ..... 99.95



### Laddie Mikulasko's ENFORCER

With a good hot .80 or .90 4-stroke the Enforcer will really move! Vertical performance at the 6 lb. flying weight is phenomenal and will perform all the basic aerobatic maneuvers with ease. Even though it is fast an maneuverable, with over 1000 sq. in. of wing area it can be flown so slowly that any modeler who can handle a trainer can fly it easily.

SPAN: 48 1/2" AREA: 1080 SQ. IN. WT: 6 LBS.  
POWER: .60-.65 2-STROKE .90-1.2 4-STROKE  
Kit No. 458 ..... 80.95



### Laddie Mikulasko's FORCE ONE

The Force One is very fast and maneuverable at high throttle, but it can also fly so slowly that it almost hovers without stalling. Construction is straight forward without anything complex or unusual methods used that would make the kit difficult. If you are looking for an unusual looking model that is easy to build and flies great, the Force One is for you.

Wing Span: 36-1/2" Weight: 4-1/2 Lbs.  
Fuselage Length: 34" Engine: .40-.46 2 Stroke  
Wing Area: 611 Sq. In. .45-.50 4 Stroke  
Kit No. 457 ..... 55.95



### STICK 40 TRAINER™

The Stick 40™ has been designed especially for the novice and has been the club trainer of choice since 1977. Simple to build, tough, and great flying characteristics made the Stick 40™ an all time favorite. The instruction book contains over 80 photos to guide you through every step of the construction. Nothing is left to chance, making the Stick 40™ or the Stick 40 Plus™ your perfect first R/C model.

SPAN: 60" POWER: .30 - .45  
AREA: 600 SQ. IN. 3 CHANNEL  
Kit No. 441 ..... 39.95

### STICK 40 PLUS™

The Stick 40 Plus™ was designed with ailerons and is the deluxe version of the Stick 40. This is one of the best "Fun Flyers" you can buy.

SPAN: 58" WEIGHT: 5-5 1/2 LBS.  
POWER: .30 - .40 4 CHANNEL  
Kit No. 434 ..... 44.95



### NORTH STAR

Looking for something a little different, perhaps a model with a bit of an attitude? Get ready for some excitement. As a float plane the North Star will handle rough water better than any other model. Attach the included landing gear and fly it off the land as well. In fact, you can fly it right off the snow if you are so inclined! Designed by Laddie Mikulasko.

SPAN: 44" LENGTH: 54" WING AREA: 750 SQ. IN.  
WEIGHT: 6 1/2 LBS. POWER: .40 - 46 2-STROKE  
Kit No. 455 ..... 74.95



### EAA BIPLANE

The EAA Biplane is fully aerobatic and uses the same semi-symmetrical airfoil used on the full scale aircraft. With over 1000 sq. inches of wing area with an all up weight of only 8 pounds, our EAA Biplane a real pussycat in the air. Simple as well as complex aerobatics are easily done, yet the model will slow down to a walk on landing without any tendency to tip stall.

Wing Span: 60" Weight: 8 lbs.  
Wing Area: 1018 Sq. In. Engine: .50 to .80 2-stroke  
Fuselage Length: 52-1/2" .65 to 1.2 4-stroke  
Kit No. 449 ..... 99.95



### STINGRAY 40 & 120

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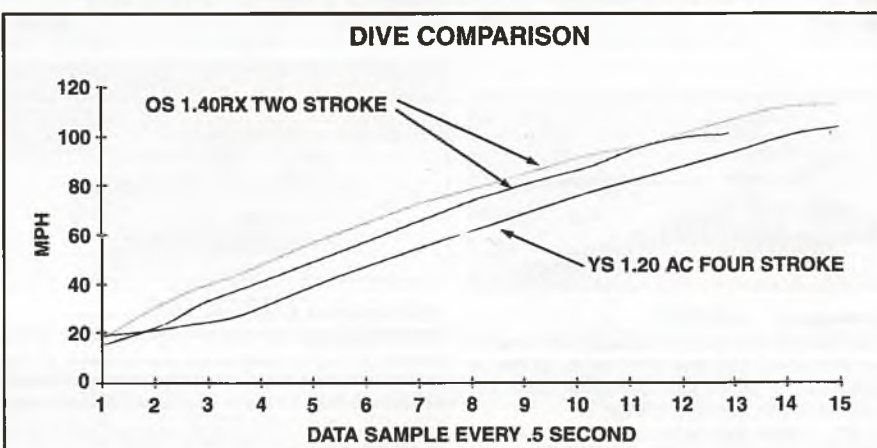


FIGURE 1

hard to match that rate on the final roll. One observation was that the plane appeared lighter on its feet, and I think that says it very well. Of course, it was lighter, but the engine was doing its part, too.

In the May issue of *MAN*, Mike Billinton reviewed the O.S. 1.40RX and, in a carefully worded opening, discussed why 2-strokes were not used by the top pattern fliers in 1996 when the new rules became effective. I say it was carefully worded because you might have concluded that they were Mike's opinions, whereas I believe he was reciting things he had heard in the pattern community. He listed seven reasons why the 4-stroke continued to dominate in 1996, but they kind of boil down to two reasons:

The first has to do with staying with a winning combination. Most of the top guys are happy with the power they have, and they know it takes a lot of experimental work to change over. It was the same in the early 1980s when the 1.20 4-strokes became legal. It took quite a few years for many of the top guys to give up their .60 2-strokes. The engines got better every year and new planes had to be developed to get the full benefits, but after a few showed the way, virtually everyone got in line.

The other reasons can be summarized by what has been called the "winding-up" effect. There is a belief that the throttle response is slow on the 2-stroke with a tuned pipe, and that there is less capability

to slow the plane on downlines.

I totally agree with the thought that it takes a lot of work to change to a 2-stroke, but I decided that I did not have a winning combination and that I needed something better. Either I needed a new YS 1.4, or I would try a 2-stroke. On paper, the 2-stroke should provide more power to weight, so that is why I'm trying it first. I'm sure I could have just dropped the YS 1.4 4-stroke in and been competitive sooner, but someone must be a pioneer. The jury is still out on the "winding-up" effect, but we'll be collecting more data as we get the engine broken in. Right now, I'd say slow throttle response is not a problem, nor is there a problem on the downlines. Figure 1 is a comparison of three long dives of about seven seconds from near stall speed until the ground was getting close. I repeated the dive with the 2-stroke because I didn't understand the greater initial acceleration. However, notice that once you get over 40 mph, the acceleration (increase in speed per second) is essentially the same. With the exception of a few maneuvers like stall turns and spins, we want to keep the speed above 60 mph, so I don't think we have a problem. One could also argue that it is good to get up to speed faster after a stall turn, so the higher initial acceleration is not a problem either, if it turns out to be real. Once we settle on the muffler arrangement, glow plugs, fuel, props, etc., we'll get some hard data with the AeroSport Data Logger



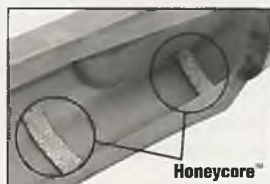
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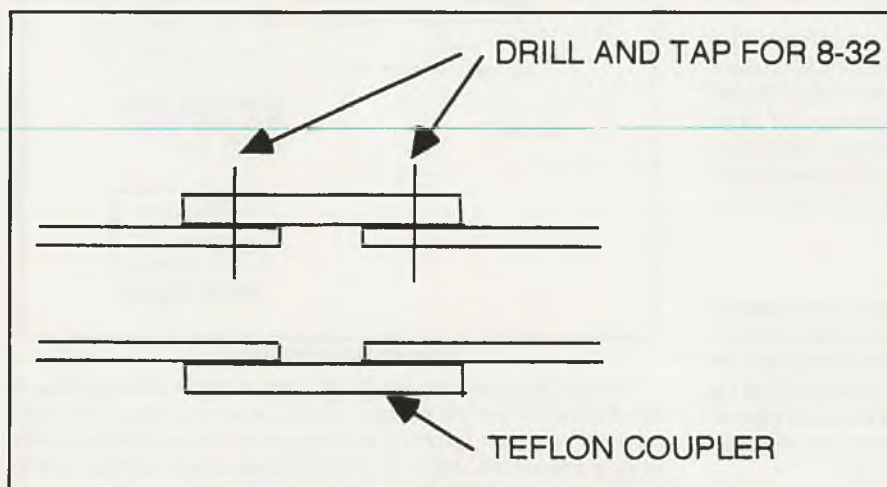
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**FIGURE 2**

Just a closing tip if you do use Teflon couplers. Instead of using those big heavy hose clamps on them, try drilling and tapping a hole right through the coupler and the header and muffler. I use 8-32 capscrews to hold everything together.

that will answer these questions.

### Battery Fail-Safe

A few months ago, we warned about setting the throttle fail-safe to low speed on your Futaba systems to prevent the airplane from running away in the pits if you get a battery fail-safe condition. As I mention, you can activate battery fail-safe even though you have a good battery. Reader, Gerry Dale, describes what caused him to experience a battery fail-safe.

Dear Jim,

I always read you column first (after

Don Low's) when I receive my RCM. This is in response to your experience with battery fail-safe and addresses one of the causes of intermittent triggering of BFS. I had just completed this year's new Sequel and was doing first engine run-up when the throttle went to (you guessed it) 44% and held. After determining it was not an engine problem but a radio problem, I realized I had committed the cardinal sin of not soft-mounting the tuned pipe coupler which, in this case, was aluminum. Second, the header and the front end of the pipe were

butting one another, as indicated by peening on the front end of the pipe. I created a soft mount for both the coupler and the pipe and switched the coupler to a Teflon one. The problem disappeared. This coupler comes with collars to prevent butting, but they have their own set of problems. In my opinion, the best solution is to soft-mount the exhaust system and use Teflon couplers.

I'm enclosing a couple of shots of my G202. It was completed in January and now has about 30 flights. It is a scratch-built using a structure similar to the Carden Extra's with the R/C City glass cowl and pants, and the Midwest canopy and gear. Deviation from scale is a 6" stretch and lowering of the stab. It is a fine IMAC craft, but we won't see many on the pattern circuit due to weather vaning in crosswind conditions and adverse roll coupling from that big rudder area ahead of the hinge line. It weighs 10-3/4 lbs. and has great vertical with any good YS 1.20.

Yours truly,  
Gerry Dale  
Apex, NC



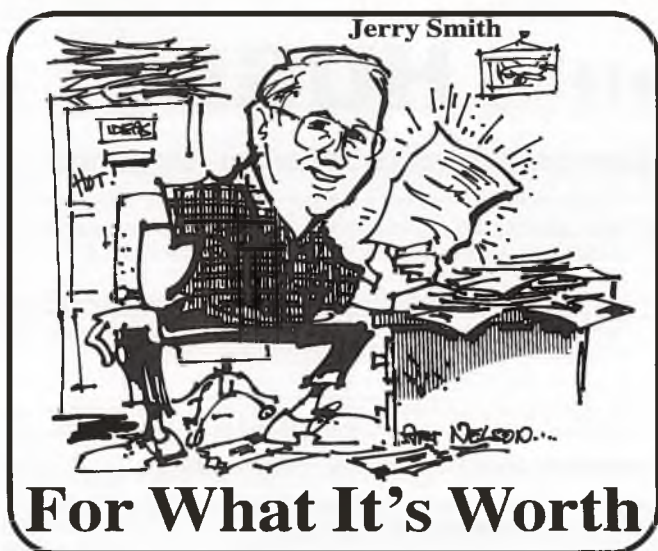
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#### A NOTE FROM JERRY

Many readers have been sending me suggestions by e-mail. They are good, usable ideas that could be published; however, I cannot use them if you do not include your address. Your e-mail address is not enough. I need your complete home address in order to get back to you when, and if, your suggestion is published. So please include it. And, while I have your attention, please submit an SASE when asking for information if you want to receive an answer ... Jerry.

#### CA STICKING TO THE PLANS

Before starting to build, you generally cover the plans with a plastic or wax paper material and then start construction. If you then put CA on the wood joints, it runs onto the protective material and sticks. To prevent this, slide a small piece of greaseproof paper between the wood and plans and press down at the joint. Then apply the CA and slowly slide out the paper. It wipes the wood and protection material and prevents adhesion of the wood. Submitted by Les Childs, Blackpool, Lancashire, England.

#### LOSING WHEELS

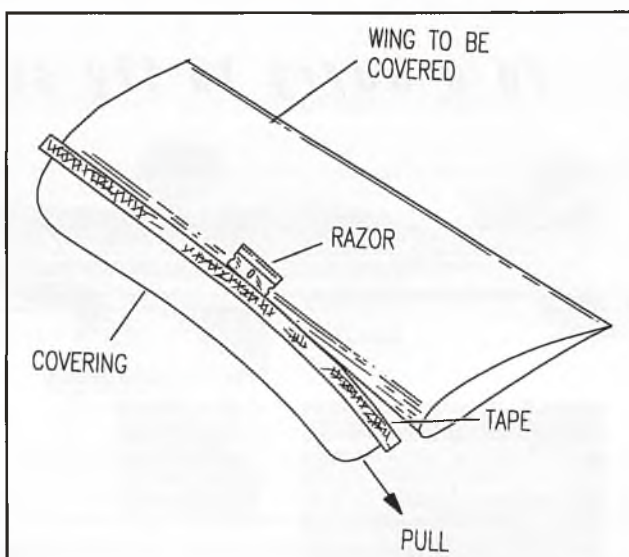
To prevent losing your wheel and wheel collar if the setscrews works loose, force a small length of fuel tubing over the axle outboard of the wheel collar. It is a good idea to check the tightness of the setscrews from time to time. Better yet, grind a small slot in the axle for the setscrew to go into. This, coupled with the small piece of fuel tubing outboard of the wheel collar, will give you an additional safety factor. Submitted by Scott Hamilton, Waco, TX.

#### CLEANING CANOPIES

Frequently, the plastic canopy or windshields become dirty and scratched and look quite poorly after a few mishaps. They clean up with a light brushing, water, and then the use of K-1 (water white kerosene) to bring the plastic to a bright shine. Do not use an abrasive cloth to clean with. An application of Pledge spray wax will all but eliminate the scratches. Submitted by Herb Jacobs, Lighthouse Pt., FL.

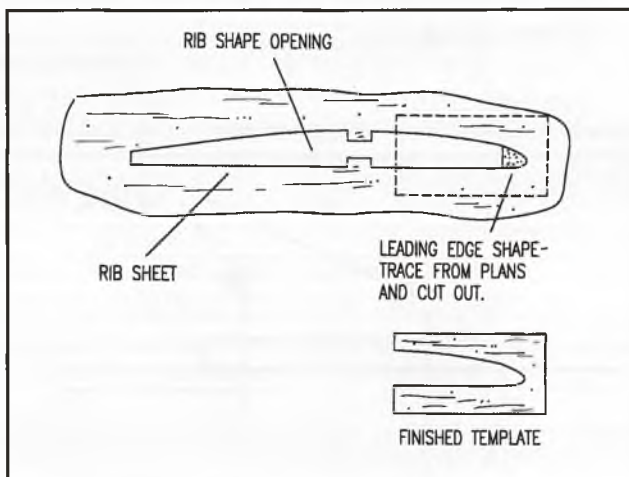
#### IN A PINCH

Two clothespins can be used as "helping hands" to hold small items or wires to be soldered together. Glue the pins together about 2" apart at the handle end with a 1" wide strip of wood. You can lay your "helping hand" flat or stand it up on the handle end to support your soldering job or whatever. What could be easier and simpler to make? Submitted by Andre Landrum, Madison MS.



#### TRIMMING COVERING

To make a nice neat cut when trimming off covering, lay down masking tape along the line to be cut. Locate the tape on the portion to be trimmed off. While pulling on the covering, guide a sharp razor blade along the edge of the masking tape at a slight angle as shown in sketch. This will make a smooth cut with a straight line. You can also do curves. Practice the angle of razor and direction of pull for the best results. Submitted by Don Leaf, Arlington, TX.



#### SHAPING AIRFOILS

In order for an airplane to fly well, one of the important things is the shape of the airfoil. In many of the kits we purchase, the manufacturer supplies square or rectangular sticks to be used on the leading edge of the airfoil. For the resultant model to fly as well as the designer intended, it is necessary to shape the leading edge as designed. This is usually approximated or sometimes even ignored by many of the builders, who simply pay little attention and round off the leading edge with no regard to what is shown on the plans.

Here is a method to ensure a close match to the airfoil to shape. Use a left-over piece of the die-cut or laser-cut rib sheet after removing the ribs. The cross section of the leading edge is then copied from the plans and traced on the front of the open section and cut out as per the sketch. This now gives an exact template of the correct airfoil. By using this to check the airfoil, as the leading edge is shaped, you can get the airfoil much closer to the way the designer intended. Submitted by Harold Marenburg, Orlando, FL.

#### WIRE STORAGE

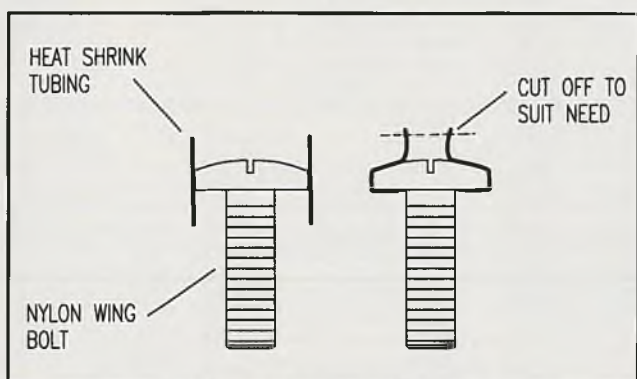
Don Petersen, Bridgewater, NJ, has found a way to store the long wires on his charger. Glue an old 50' 8mm film spool onto the front of the charger. By enlarging the center hole on the spool, you will be able to see the charge light when it is placed properly. Now, wind up



the wires and the next time you use the charger — no tangled up leads.

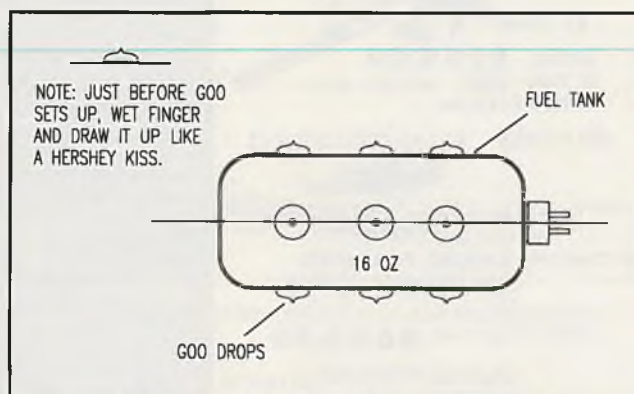
### ANTENNA DECEPTION

How many times have you seen a beautiful model (airplane that is) with the external antenna that looks like a hanging wet noodle? Here is a good way to remedy the problem. Run the antenna back to the vertical fin as usual and then down to the end of the horizontal stab. This is generally enough to use all of the antenna. Now run some thread, the same color as the antenna wire, from the vertical fin tip down to the horizontal stab tip on the other side. This will give the appearance of tail struts and will also help to stabilize the vertical fin to some degree. Submitted by Don Phillips, Winterhaven, CA.



### SLIPPING SCREWDRIVER

Here is a suggestion to help keep the screwdriver from slipping out of the bolt head slot. This suggestion works best with bolts that have a slight shoulder but will work on any type of slotted head bolt. Place the heat shrink tubing over the head of the bolt. Be sure to allow excess material beneath the head as well as above the head. Heat the tubing until it covers the bottom of the head and part of the top. Cut off excess from top of bolt. Submitted by Donald Shoefelt, Laramie, WY.



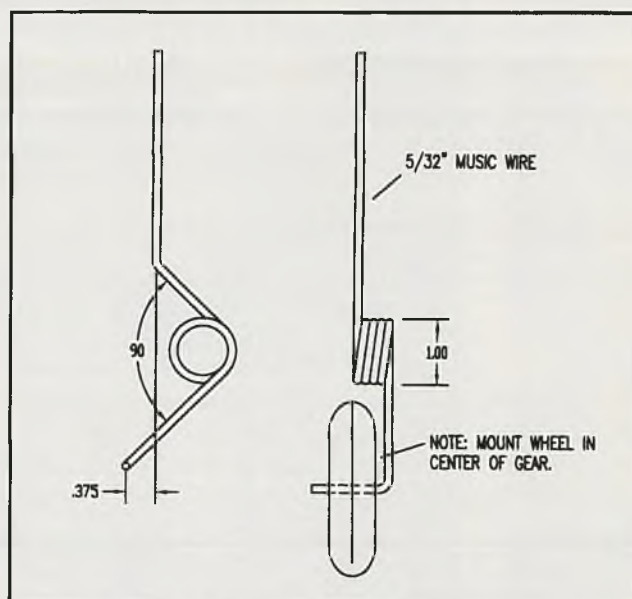
### STABILIZING ROUND FUEL TANKS

Many of us hate to use round fuel tanks because they sometimes rotate with vibration. Park Swan, Murrells Inlet, SC, had this very problem and solved it with Shoe Goo, a glue that sticks to just about anything. Put dabs along each side of the tank and some along the top and bottom. Just before the Goo sets up, wet your finger and draw it up like a Hershey Kiss (see sketch). Install the tank in loosely packed foam. The little glue tips dig into the rubber and hold the tank in position. If the fuel tank is located in an inaccessible place and needs to be slid out, you may find it difficult to slide. Make provisions in the form of a strong handle at the back end if this is necessary.

### WEAVE AND PIN HOLE FILLER

For weave and pin hole filler on glassed surfaces, use a thinned mixture of Lite Spackle, cut with water, to a creamy consistency and brush on with a 2" or so brush. It dries quickly and can be sanded almost completely off with 220 grit paper used dry. On wing and tail

fillets, use the Lite Spackle uncut. The weight gain is negligible, the bond is good, and it will accept any type of primer and finish. Submitted by Mitch Epstein, Leominster, MA.



### BETTER SHOCK ABSORBING NOSE GEAR

Clauss Gramberg, Prov. Buenos Aires, Argentina, has worked out a new nose gear design. The landing gear absorbs shock far better than the conventional spring strut we have seen in the past. Furthermore, the displacement of the wheel center to the rear, called caster, facilitates for smoother running and further protects the servo from shocks. Clauss has been using this nose gear with great success and wanted to pass it on to our readers. My only suggestion is that it doesn't need as many spring coils. The amount shown makes it look bulky and adds much aerodynamic drag. This suggestion could also be used on the main gear as well. Why not? (See sketch.)

### LOSING WHEEL COLLARS

After losing wheel collars and wheels for years, Wally Kranz, Bethpage, NY, has an answer to prevent this annoyance. He now anneals, with a butane torch, approximately 1/2" of the wire axle by bringing it to cherry red color and allowing it to air cool. He then files a slight taper all around the end of the wire. This allows the die to properly engage and cut threads. Use tapping oil. Install the wheel and screw on the lock nut. Your wheel attachment problem is now solved forever.

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- 1/4" — 1/4-28

### GLUE ACTIVATOR SPRAY BOTTLE

Have you found the little finger pump CA activator bottle frustrating? Each time you need a little kick to a glue joint, the pump has lost its prime. So you pump and pump and finally it primes, only to happen again the next time you use it. The answer to this frustration can be found in a refillable spray can which you charge with air. Just pour in 8 oz. of activator refill (the can holds 16 oz.), pump up the can with air to 60 psi, and you have instant spray when you need it. The activator does not evaporate, the can will hold pressure indefinitely, and you will find it more economical than buying the little 2 oz. bottles. The refillable spray can was purchased mail order from Harbor Freight Tools, 3491 Mission Oaks Blvd., P.O. Box 610, Camarillo, CA 93011. You will find this pressurized can excellent for painting as well. Submitted by H.C. Thorman, Blue Ridge, TX.







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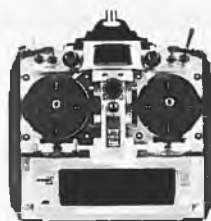
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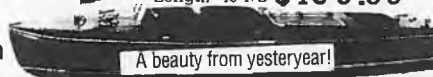
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Clarence Lee



## Engine Clinic

This past month the RCM office received a nifty new product we would like to bring to your attention; it is being marketed by Albert Tejera who heads Tejera Microsystems Engineering (TME). TME has been marketing the "Simple Smoke Pump" utilized by many of the top Tournament Of Champion fliers for several years now as well as other hobby-related products. The new product now being marketed is called "The Timing Stick" and provides a means of automatically advancing the timing on the larger displacement size engines intended mainly for the Giant Scale type aircraft utilizing a capacitive discharge spark ignition system. Many of your capacitive discharge systems either use a mechanical advance, coupled with the carburetor, or have fixed timing. With fixed timing, a compromise timing has to be used in order to have a reliable

idle and permit hand-starting, if desired. As a result, some top end power has to be sacrificed. With The Timing Stick, the advance becomes automatic with engine rpm.

Installation is utter simplicity itself. All that is required is to install The Timing Stick between the magnetic pickup and the control box. The Timing Stick comes with Deans plugs as do the majority of the after-market capacitive discharge systems so installation is simply a matter of plugging in the device. The timing is then set to fire 4° before top dead center which is explained in full in the comprehensive operating instructions that accompany The Timing Stick. With the engine running, the timing will then automatically start to advance at 2,500 rpm and reach a full advance of 28° at 5,000 rpm with precise linearity throughout the advance range.

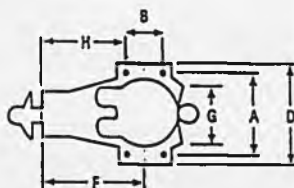
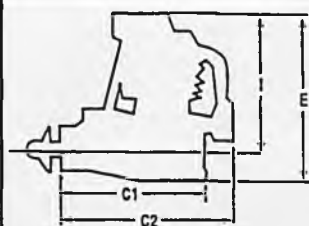
Being curious as to whether The Timing

Stick lived up to its claims, we installed it along with one of Bill Carpenter's older C.H. Electronics capacitive discharge systems on the new O.S. 140RX 2-stroke engine which we will be reviewing in an upcoming issue. With the aid of our automotive dial back-timing light, we found the spark advance to be exactly as stated. We did experiment with the initial 4° advance in order to get higher total advance and found that by advancing the initial timing to 8° for a total timing of 32°, we could pick up another 200 rpm. However, this also made the engine more susceptible to kicking back during starting and, if the engine were set slightly lean, could lead to preignition and overheating. The stock 28° advance proved to be the best compromise timing for the engine and, with the 28° advance, the engine turned a 16 x 14 prop the same rpm (8,100) as with glow ignition. An added feature of The Timing Stick is its



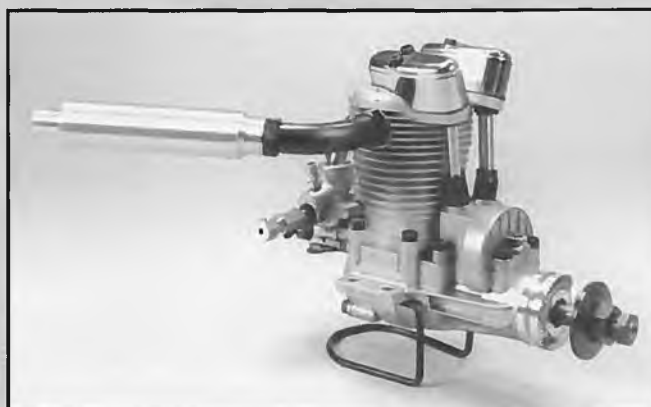
automatic cut-off of the engine, should it over-rev due to losing the prop or throwing a prop blade which could, in turn, shake the aircraft to pieces before you could shut the

## SAITO FA-56 REVIEW

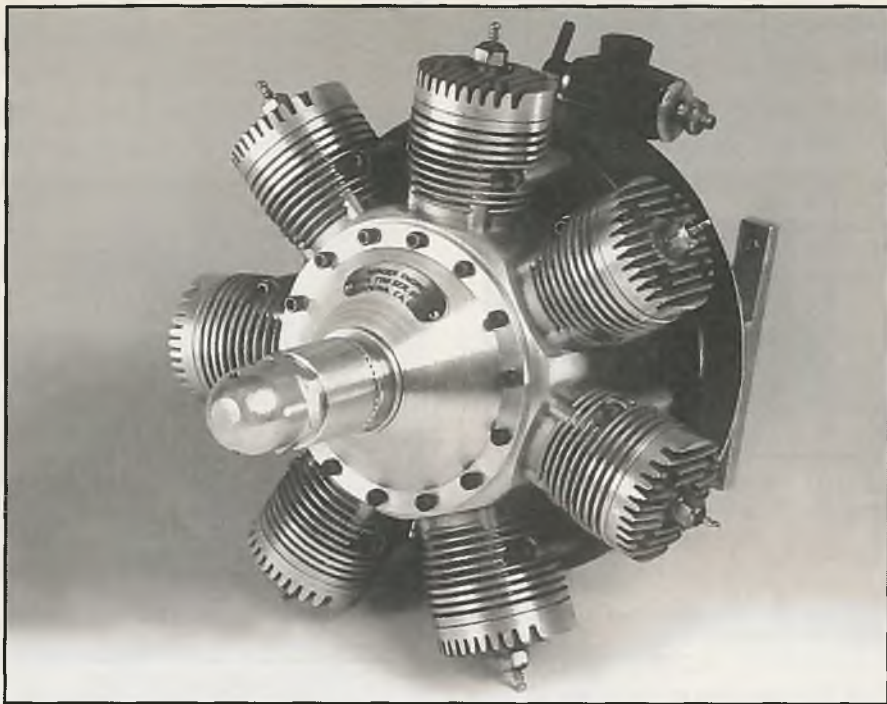


DIMENSIONS (MM)	
A	46
B	15
C1	76.5
C2	104
D	54
E	104
F	59
G	32
H	51
I	86.5

It's strange how modelers never seem to have enough power to satisfy their needs. It is becoming quite common to power an aircraft intended for a .40 displacement size engine with a .50 displacement size, especially if using a 4-stroke engine. Even then fellows still want more power, but a .60 is bordering on too large for a .40 size aircraft. Earlier this year, Saito introduced a new .56 displacement size engine for the power-hungry crowd. The new FA-56 is basically an increased bore







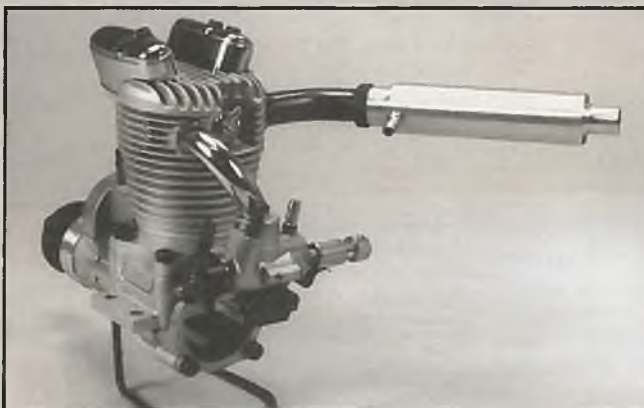
**Revolutionary new 1.96 cu. in. 7 cylinder 2-stroke radial engine being produced by Lee Berger who heads Machine Specialties in Hesperia, California. That's right, the engine is a 2-stroke, not a 4-stroke. Lee Berger has solved the problem inherent to all 2-stroke radials where the cylinders share a common crankcase, i.e., lack of base or crankcase pumping pressure by utilizing a patented supercharging system. Flight testing has been completed and the engine is now in production. The engine features AAC piston/sleeve metallurgy, Schnuerle scavenging, measures 6-1/4" in dia., weighs 58 oz. with muffler, and will turn an 18 x 8 prop 8,000 rpm. The introductory price is \$1,199.00. Lee has promised us one of the first 10 production engines and we will be reviewing the engine in a future issue. For further information, contact: Lee at Machine Specialties, 17459 Lilac, Unit G, Hesperia, CA 92345. Phone: (619) 949-7969.**

version of the already popular Saito FA-50. By increasing the Saito 50's bore from 23.4mm to 24.8mm or a bore increase of 1.4mm, while still retaining the 50's 19.0mm stroke, the engine now displaces .5612 cubic inches, with the weight remaining nearly identical at 15.5 ounces. The result is an engine with considerably more power with no gain in weight or physical size. We have not reviewed the Saito FA-50 so do not have a basis for power comparison, but Saito claims the new FA-56 will turn a 12 x 7 APC prop 1,000 rpm faster than the 50. Horsepower-wise the FA-50 was rated at .85 horsepower and the FA-56 at .93 with the rpm not specified, and that, my friends, is a significant power gain!

Whereas the FA-50 utilized ABC piston/cylinder construction, the FA-56 features AAC construction, i.e., an aluminum piston running directly in the hard chromeplated die-cast aluminum cylinder with all other components remaining the same as the FA-50. Elimination of the brass liner allowed for the bore increase without any increase in the cylinder's overall diameter.

For those interested in timing

specifics, the intake valve opens 55° before TDC and closes 60° after BDC. The exhaust valve opens 75° before BDC and closes 35° after TDC with an overlap period, when both valves are off their seats, of 90°. We measured the combustion chamber volume at 1.40cc, which computes to a compression ratio of 7.56:1.



Following a brief 15-minute break-in period, we recorded the following power figures using 10% Omega fuel and Rev-Up propellers.

11 x 7 — 11,000  
11 x 8 — 10,200  
12 x 6 — 10,400  
12 x 7 — 9,300

engine down. Two different models of The Timing Stick are available depending on the operating range of the intended engine. Model TTS-D09 will kill the engine, if operated above 9,000 rpm, and model TTS-D11 above 11,000 rpm. Other engine shut-off units are available without the automatic spark advance feature for racing applications to save the aircraft if it should throw the prop or a prop blade. We received the TTS-D09 9,000 rpm cut-off model and checked the cut-off function by installing a 15 x 12 prop which the engine could turn in excess of 9,000 rpm. By running the engine rich and gradually leaning in, we found the cut-off to shut the engine down right at 9,000 rpm. Actually, the TTS-D11 11,000 rpm cut-off model would be a better choice for this engine because, when propped for 8,000 plus on the ground, the engine could easily exceed 9,000 rpm in the air. Once the cut-off has killed the engine, shutting off the ignition switch and turning back on, re-arms the system. I would also like to see a model with even higher rpm cut-off capability so that device could be used on some of the smaller displacement size 4-stroke engines that fellows are running on spark ignition.

The Timing Stick only measures 1-5/8" long by a little under 5/8" wide by 5/16" thick and weighs 9 grams or .3 ounces. It can be attached to any convenient location with servo tape or Velcro after being wrapped with foam rubber. The retail price is \$39.95 and can be ordered direct from Tejera Microsystems Engineering, Inc.,

12 x 8 — 8,900

13 x 6 — 8,700

As can be seen by the preceding figures, the Saito FA-56 is one strong running engine, equaling or surpassing some of the .60 displacement size 4-strokes of only a few years ago. The overall handling was beautiful with no particular problems encountered. We had the engine ticking over at a 2,200 rpm idle with the 12" props and 2,000 rpm with the 13 x 6 with almost instant acceleration. Hand starts were a breeze hot or cold. In short — a very impressive engine.

The standard version carries a suggested list price of \$319.95 and the Golden Knight version with the black baked enamel crankcase and polished gold rocker arm sells for \$349.95. However, the mail order houses and discount hobby shops are selling the standard engine in the \$180.00 to \$190.00 range and the Golden Knight version for about \$20.00 more. For the money, you are getting a top-quality product with above average power, aimed specifically at the "Power-Hungry" crowd. It also carries a 3-year warranty.





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This month I received a letter from Charlie Fitzpatrick who, in conjunction with his late brother, Mike, designed the Fitzpatrick 61. After a couple of false starts production-wise, the Fitzpatrick Brothers thought they had found a Canadian aerospace manufacturer who could produce the engine; however, this arrangement just didn't work out.

Charlie Fitzpatrick is looking for a new manufacturer to produce the engine. If any of our readers would like to get involved with model engine manufacturing or know of someone who would, the design and production rights to the Fitzpatrick engines are up for sale. Charlie's telephone number is (310) 559-3520, California time. (Please persist.)

Our first letter contains questions that we have answered several times in past columns but realize we are picking up new readers all the time. Readers of the column who have been with us for a few years, will have to bear with us if some of the questions are repeated. After 28 years of writing the column, we can't always have questions not previously run.

Dear Clarence,

A few questions: (1) I want to convert a new .90 engine to diesel, do I break it in as a glow engine or diesel? (2) Do you have a home brew after-run oil and how is it used?

(3) Is it worth the effort to home brew diesel fuel? Do you have a recipe?

Thanks,  
Don Waterhouse  
Sheboygan, WI

Taking your questions in order, Don — if you intend to run an engine as a diesel, it would be best to also break it in with diesel fuel. The operating temperatures between glow fuel and diesel fuel are quite different due to diesels running considerably colder. If the engine were to be broken in on glow fuel operating at higher temperature, the piston fit might end up too loose for proper diesel operation.

There are any number of excellent after-run oils on the market but you can't beat Marvel Mystery Oil or even better — Marvel Air Tool Oil that contains additional rust preventatives. Any good gun oil, sewing machine oil, etc., can also be used. Most after-run oils are a little light to use for engine assembly and, for this purpose, I recommend automotive automatic transmission oil. A 50/50 mix of Marvel Mystery Oil and automatic transmission oil also makes an excellent after-run oil. To use, you just inject five or six drops in the exhaust and down the intake, and then flip the engine half a dozen times to distribute the oil. With a diesel, you have to be careful not to inject too much oil since, due to the high compression required for diesel operation, you could get a hydraulic lock. Don't force the engine through top center if it doesn't want to go. This being the case, open the exhaust port and let a little of the excess oil drain out.

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OLD TIMERS S.A.M. CHAPTER 89

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Diesel fuel is easy enough to mix but finding the ingredients can be a problem, especially ether. Any individual attempting to purchase ether nowadays is suspect of running a drug lab. Motor-starting ether available in most auto parts stores can be used but usually contains a small percentage of oil also. Another ingredient that improves combustion in a diesel engine is Amyl nitrate. This is a heart stimulant and only available normally with a doctor's prescription. Fred Wilson who heads Red Max fuels will sell the individual ingredients but only in one-gallon size cans. Due to the difficulty in obtaining the ingredients, it is just as easy to purchase the fuel ready-mixed. You will not save that much money by mixing your own fuel. If you do decide to try mixing your own fuel, try this: 22%-25%

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lubrication, preferably castor oil or castor/synthetic mix, 30% ether, 2% Amyl nitrate, and the balance kerosene or lamp oil will work well in just about any diesel. Some fellows prefer to use a little less oil, in which case substitute the oil removed with kerosene.

Dear Clarence,

Thank you for your past assistance with my R/C engine-related questions. I have recently started spraying one small squirt of Armor All in a full-gallon of fuel to prevent foaming. While I have never experienced any foaming problems which I attribute to careful mounting of fuel tanks by surrounding them with foam, etc., I saw this product used by another modeler and, when the

gallon of fuel was shaken after the squirt of Armor All, there was no foam. Do you think it is the silicone in the Armor All? Is there any possible detrimental effect you can think of?

As always, thanks for your time and consideration.

Sincerely,  
 Wayne Boots  
 Waterloo, IA

Wayne, I have heard that a shot of Armor All into a container of fuel will stop fuel foaming but haven't personally given it a try. A bit, I read in one of the other model magazines some time back, credited the silicone in Armor All as being responsible for stopping the fuel foaming. Whether this will cause any significant damage to an engine

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or not I cannot say. Some years back, when the silicone oils first came on the market, I (and others) gave them a try as lubricant in model engine fuel. We found that, when burned, the silicone oils will form a hard glass-like deposit on the glow plug element affecting the top end and practically eliminating any idle possibilities. A close friend tried one of the silicone oils in his motorcycle and had the performance gradually deteriorate. When we pulled the engine apart, we found a hard glass-like coating on the top of the piston, valves, etc., that took a cold chisel and hammer to remove. I have been very leery of using silicone oils ever since. Whether the amount of silicone in Armor All (when it is, in turn, diluted in fuel) would have any effect or not, is hard to

say. If you do use Armor All and begin to have idle problems, you will know the cause. One thing else to keep in mind — some of your model engine fuels already have anti-foaming agents in them. This is easy enough to detect, just shake the container and see if the bubbles (or foam) disperse right away.



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• Spans 50.5", requires 4-channel radio, 2-stroke .61-.75 engine, 3+ rolls MonoKote.

RZ0710 Kit/O.S..61 FX Eng Cmb .SAVE \$10 **\$299.98**

## Top Flite® Warbirds Gold Edition™

WWII transformed "Average Joes" into aerial aces—Gold Edition engineering makes warbird pilots out of average builders! Die-cut wood parts ensure the fit; molded ABS parts and authentic, decals help capture the fighting spirit of WWII's "Famous Five!". All require 4-7 channel radio (4-6 for AT-6 Texan), 2-stroke .61-.80 or 4-stroke .91-1.20 engine and MonoKote.

RZ0716 F4U Corsair 60/SuperTigre G75/Muffler/Exhaust Header Combo .SAVE \$50 **\$288.96**  
RG1413 F4U Corsair 60 .60-.80, 62" .149.99  
RZ0717 P-51D Mustang .60 /Sup G75/Muffler/Header Combo .SAVE \$50 **\$288.96**  
RG1414 P-51D Mustang .60-.90, 65" .149.99  
RZ0718 P-40E Warhawk .60/Sup G75/Muffler/Header Combo .SAVE \$50 **\$288.96**

F4U Corsair 60



**BEST DEAL**  
SAVE \$50 on combos

RG1415 P-40E Warhawk 60 .61-.91, 64" .149.99  
RZ0719 AT-6 Texan/SuperTigre G75/Muffler/Header Combo .SAVE \$50 **\$288.96**  
RG1416 AT-6 Texan .61-.90, 69.4" .149.99  
RZ0720 P-47 Thunderbolt/SuperTigre G75/Muffler/Header Combo .SAVE \$50 **\$288.96**  
RG1417 P-47 Thunderbolt .61-.90, 63" .149.99

## Great Planes® Learjet

**\$99<sup>99</sup>** RG1418



Learjet is a registered trademark of Learjet, Inc.

• Aerobatic thrills and jet-set looks at economy-class prices!  
• Spans 55.5", requires a 4-5 channel radio and a 2-stroke .40-.50 engine.

RZ0709 Kit/O.S. .46 FX Eng Cmb .SAVE \$10 **\$189.98**

## Top Flite® 1/5 Scale Gold Edition™ Beechcraft Bonanza

**\$199<sup>99</sup>** RG1419

Like the original, it's designed to offer the best and to last "forever." The 1/5 scale size is IMAA-legal, the depth of detail is luxurious—and the list of "options" impressive. The tail cone pulls off for easy access to control linkages, whether built as a conventional Model F33A, or as a V-tailed Model V35B—and realistic looks can be enhanced with retracts, a full cabin kit and a custom-fit nav/landing light kit. Spans 81", requires a 4-6 channel radio w/6-9 servos, .61-.90 engine and 6 rolls MonoKote.



**BEST DEAL**  
on G-75 combo

RZ0721 Beechcraft Bonanza/O.S..61 FX Engine Combo .SAVE \$10 **\$349.98**  
RZ0722 Beechcraft Bonanza/SuperTigre G75/Muffler/Header Cmb .SAVE \$46 **\$338.96**

## Great Planes® Ultimate Bipe

Stunts like there's no tomorrow—and spans less than 4 feet for easier transporting and carrying. There's stability to fall back on—and amazing versatility to exploit when you've just gotta cut loose! Interlocking parts, an all-balsa exterior and precision-formed ABS cowl and wheel pants meet the need for strength and speed; simple pushrods linking top and bottom ailerons put more snap in your snaps, and more lift in your loops! Spans 43-3/8", requires a 4-channel radio w/4 servos, .40-.46 engine and 4 rolls MonoKote.



**\$119<sup>99</sup>**  
RG1420

RZ0707 Ultimate Bipe .40/O.S..46FX Engine Combo .SAVE \$10 **\$209.98**  
RZ0708\*\* Ultimate Bipe .40/O.S..46FX/Tower 4FM-4 Servos .SAVE \$18 **\$349.93**

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2



## Tower Hobbies® .40 ABC

- CNC-machined sport engine makes ABC performance and an angled needle valve affordable.
- Muffler, 2-year warranty included; Tower Glow Plug required.



**\$59.99**  
RG1421

RM0701 Tower 40 ABC Engine ..... \* 2 for \$109.98

## Tower Hobbies® Glow Plugs (6)

**\$10.99**

RG1422

- A bargain price on a 6-pack of clean-burning, long-lasting glow plugs!
- Precision-machined for perfect fits, with a platinum element for best combustion.

## Super Tigre™ Engines

Ball bearings, Schnuerle porting, light-weight cast heads, full, 2-year warranty protection—you enjoy all of these features and the legendary performance they create with every Super Tigre engine. Engines up to the GS-90 include muffler; the giant-scale G-3250 and G4500 include a radial mount for installation ease. All include glow plug.



RG1441	GS-40 Ring w/Silent Muffl.....	\$79.99
RG1439	GS-40 Ring w/Economy Muffl.....	74.99
RG1440	GS-45 ABC RC w/Muffler.....	94.99
RG1442	G-61 ABC w/Muffler.....	149.99
RG1443	G-75 Ring w/Muffler.....	159.99

RG1444	G-90 Ring w/Muffler.....	\$169.99
RG1445	S-2500 1.5 Cu In RC w/Mnt.....	199.99
RG1446	G-3250.....	219.99
RG1447	G-4500 2.8 Cu In RC w/Mnt.....	279.99

## Tower Hobbies® System 3000™ 4FM 4-Channel FM Radio

Cost-cutting economy and cutting-edge features make the Tower 4FM just right for flight. Robotically assembled, it features today's best, narrow-band FM tech, and a transmitter that broadcasts at maximum legal power. Trainer system, proportional trims, all-channel servo reversing, full NiCd's—the 4FM has it all. Buy it in six servo configurations—or buy it without servos so you can savings with Tower's special price on the TS-53) standard servo. 1-year warranty (2 years for Super Saver Club Members.)

RZ0726**	w/3 Standard Servos	
plus 4th Servo FREE.....	129.96	
RZ0728**	w/3 Standard BB Servos.SAVE \$6	144.96

RZ0728**	w/3 Stand BB Servos.....SAVE \$6	144.96
RZ0729**	w/4 Stand BB Servos.....SAVE \$10	157.95
RZ0730**	w/2 Micro Servos.....SAVE \$5	154.97



## Futaba® Radios

Tower has narrow-band radios for surface and sky, and all feature servo reversing and vibration-resistant SMT parts. Surface radios include the low-cost 2-channel 2PCKA Magnum Junior AM, plus the 3-channel 3PJ FM computer radio with 8-model memory, ABS Braking and digital dual rates. Economical SkySport™ 4VF FM systems include trainer system, full NiCd's and charger, features also found on 6-channel SkySport 6VA/6VH FM systems. Both 6-channels include mixing functions: Air version adds flaperon and aileron diff and rotary flap knob; Heli version offers digital programming of pitch curve, throttle hold and more. Created for competition, 6-channel 6XA/6XH PCM computer radios add 3-model memory, programmable mixing and electronic trim memory! Advanced 8UAF FM and 8UAP PCM sport radios include 8-model memory; 8UHF FM and 8UHP PCM add heli-only features such as 3-circuit revolution mixing. 9ZAP PCM plane and 9ZHP PCM heli radios offer maximum versatility, with 10-model memory; memory download; data transfer; mixing/mutual mixing; plus F3A/F3B/F3C software. All include 1-year warranty.



RG1452**	2PCKA 2 Channel/2 S3003 Servos.....	\$81.99
RG1453**	2PCKA 2Ch/1 3003 Servo/MC210CB.....	114.99
RG1454**	2PCKA 2 Channel/1 S3003 Servo.....	72.99
RG1455**	3PJF FM 3 Channel.....	299.99
RG1456**	4VF 4Ch FM/3 S3003 Servos.....	144.99
RG1457**	4VF 4Ch FM/4 S3003 Servos.....	154.99
RG1458**	2VR 2Ch/2 S3003 Servos.....	52.99

RG1459**	6XA 6Ch/4 S3003 Servos.....	\$229.99
RG1460**	6XH 6Ch/4 S148 Servos.....	249.99
RG1461**	8UHF 8Ch FM/5 S3001 Servos.....	429.99
RG1462**	8UHP 8Ch PCM/5 S9202 Servos.....	609.99
RG1463**	9ZAP 9Ch/4 S9101 Servos.....	1039.99
RG1464**	9ZHP 9Ch/5 S9202 Servos.....	1139.99

## O.S.® Engines



Recently, 90% of modelers surveyed ranked O.S. #1 in craftsmanship—an achievement no doubt due to the 2 years of design and testing that O.S. invests in each O.S. Engine. That tradition of quality includes the FP Series of beginner and sport engines, as well as the SX and FX Series engines, which were shaped by modeler wishes and made realities by O.S. All include reinforced, backplate-mounted needle valves, O-ring seals and coarse threads to keep settings true, semi-square heads, dual bearings (including larger front bearings) and more thread on the crankshaft. O.S.'s line of 4-stroke Surpass™ Series now includes the Surpass 120 III w/Pump, a giant-scale power plant capable of consistent excellence at any attitude. All include 2-year warranty; All (except giant-scale 1.08 FSR and BGX-1 3500) include muffler; all (except Surpass engines) require glow plug.

RG1423	.10 FP w/Muffler.....	\$47.99
RG1424	.15 FP w/Muffler.....	49.99
RG1425	.25 FP w/Muffler.....	52.99
RG1426	.35 FP w/Muffler.....	53.99
RG1427	.40 FP w/Muffler.....	54.99
RG1428	.60 FP w/Muffler.....	89.99
RG1429	1.08 FSR RC w/Muffler.....	249.99
RG1430	BGX-1 3500 2.3 Cubic Inch.....	279.99
RG1431	.25 FX w/Muffler.....	\$89.99
RG1432	.32 SX Non-Ringed w/Muffler.....	124.99
RG1433	.40 FX w/Muffler.....	109.99
RG1434	.46 FX w/Muffler.....	114.99
RG1435	.61 FX Non-Ringed w/Muffler.....	159.99
RG1436	FS-52 Surpass Ringed 4-Strk w/Mfllr.....	199.99
RG1437	FS-70 Surpass Ringed 4-Strk w/Mfllr.....	209.99
RG1438	FS-91 Surpass Ringed 4-Strk w/Mfllr.....	239.99

## Great Planes® Legendary Warbirds ARF Series

The proven Ultra Sport airfoil supplies the dogfight agility; hand-painted parts color-matched to the authentic details preprinted into the lightweight, fuel-resistant composite coverings supply the looks of WWII's most aggressive aces. Choose from Germany's "Butcher Bird", the 58.6" span Focke Wulf FW-190, England's heroic Spitfire (54" span) and America's "Boss Hoss", the 57" span P-51D Mustang. All require 4-5 channel radio: Spitfire requires a .40-.46 engine; Mustang and FW-190 require a .40-.50 engine.



RZ0723	Spitfire ARF/O.S. .40 FX Engine	
Combo.....	SAVE \$10 \$284.98	
RG1449	Spitfire ARF 40 .40-.46,54".....	199.99
RZ0724	P-51D Mustang ARF 40/O.S. .48FX	
Combo.....	SAVE \$10 289.98	
RG1450	P-51D Mustang ARF 40 .40-.50,57".....	\$199.99
RZ0725	Focke Wulf FW-190 ARF/O.S. .46 FX	
Engine Combo.....	SAVE \$10 289.98	
RG1451	Focke Wulf FW-190 ARF 40 .40-.50,58".....	\$199.99

## Tower Hobbies® System 3000™ Servos

Surface Mount Technology gives each servo dependability in the face of stress and vibration; tough, fuelproof cases protect them against impact and damage. Models include 0.6 oz. TS-10 micro for sailplanes and small aircraft; TS-53 for general use; and the ball bearing TS-69 for general uses and TS-75 for 1/4 scale planes. All include complete mounting hardware and 1-year warranty.



RG1465	TS-10J Micro Servo Futaba J.....	\$29.99
RM0702	TS-10J Micro Servo Futaba-J * 3 for 84.97	
RG1466	TS-10A Micro Servo Airtronics.....	29.99
RM0703	TS-10A Micro Servo Air.....* 3 for 84.97	
RG1467	TS-53J Standard Servo Futaba J.....	11.99
RM0704	TS-53J Std Servo Fut J.....* 3 for 32.97	
RG1468	TS-53A Standard Servo Airtronics.....	11.99
RM0705	TS-53A Std Servo Airtronics.....* 3 for 32.97	
RG1469	TS-69J Standard BB Servo Futaba J.....	\$16.99
RM0706	TS-69J Std BB Servo Fut J.....* 3 for 46.97	
RG1470	TS-69A Standard BB Servo Airtronics.....	16.99
RM0707	TS-69A Std Servo Airtronics.....* 3 for 46.97	
RG1471	TS-75J 1/4 Scale Servo Futaba J.....	39.99
RM0708	TS-75J 1/4 Scale Futaba J.....* 3 for 114.97	
RG1472	TS-75A 1/4 Scale Servo Airtronics.....	39.99
RM0709	TS-75A 1/4 Scale Airtronics.....* 3 for 114.97	

## Airtronics® Radios

Designed for performance and price, Vanguard 4-channel VG4R sport and 6-channel VG6DR competition radios feature narrow-band design, servo reversing, battery meters, adjustable sticks, precision gymbals, trims. FM versions include trainer system; trainer cord required. 6-channel Radiants add computer precision without complexity, plus 3-model memory, mixing functions and much, much more. 72 MHz. 1-year manufacturer warranty.



RG1473**	VG4R FM 4Ch/3 102 Servos/2 Stick..	\$144.99
RG1474**	VG4R FM 4Ch/4 102 Servos/2 Stick..	154.99
RG1475**	Radiant 6P 6 Channel FM/4 102 Servos/2 Stick	\$219.99
RG1476**	Radiant RD6P FM 6Ch 4 322 Servos.....	\$279.99
RG1477**	VG6DR FM 6Ch/4 102 Servos/2 Stick	164.99



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- Top-notch covering tools ensure even shrink and better bonding. Both include 2-year warranty.

RZ0732 Heatgun/Sealing Iron Combo..... \$23.98  
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### Top Flite® MonoKote® Covering

Strong, lustrous and easy to apply—no wonder MonoKote has been the modeler's choice for over 20 years! Its totally dry adhesive shrinks (and stays) drum-tight with just an iron or heat gun—and holds tight against fuel and the test of time! With its contest-winning looks and wide color selection, it's no wonder more top modelers say, "Make Mine MonoKote!"

RG1480 Red-6"	RG1486 Olive-6"
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5 ft. Opaque  
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RG1610

RG1492 Dark Red-6"	RG1496 Light Purple-6"
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RG1494 Royal Blue-6"	RG1498 Sapphire Blue-6"
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### Hobbico® Accu-Cycle™



**\$99.99**  
RG1499

- Maximizes the capacity and lifespan of 6-8 cell Tx and 1-, 4- and 5-cell Rx NiCd or NiMH cells with push-button ease.
- Includes 15-hour timer, auto trickle, color-coded jacks and 2-year warranty.

### Secrets of Great Covering with Top Flite® MonoKote® Video



- Covers everything from basics to advanced techniques, plus how to use many MonoKote tools. 60 minutes.

### Tower Hobbies® Deluxe Power Panel



**\$16.99**  
RG1511  
**BEST DEAL**

- Power a starter, 12/6V fuel pump and glow plug from a single 12V source! Includes meter, amp control knob, 6 banana plugs and 2 alligator clips. 1-year warranty.

RM0710 Deluxe Power Panel..... ★ 2 for \$31.98

### Tower Hobbies® TowerKote™

- So versatile, it's perfect for foam and most plastics, too.

Even when your budget is limited, your trim scheme options needn't be: all you need is TowerKote and imagination. Light and bright, TowerKote is priced to make multi-color trim schemes a reality—and good results a breeze. Its low heat requirements make it ideal for use on foam and most plastics—and its built-in pliability makes it easy to "flow" around corners and conform to curves. For lasting colors and drumtight bonds, it's TowerKote.

**\$6.99**  
RG1501 Red-6"  
RG1502 White-6"  
RG1503 Yellow-6"  
RG1504 Dark Blue-6"  
RG1505 Medium Blue-6"  
RG1506 Light Blue-6"  
RG1507 Black-6"  
RG1508 Orange-6"  
RG1509 Cub Yellow 6"

### Coverite™ 21st Century™ Sealing Iron



**BEST DEAL**

- Keeps temps within 3° of setting—hand-mounted dial keeps hands and hot shoe apart. Includes sock and stand.

### Tower Hobbies® 12V Battery & Charger



**BEST DEAL**  
12V Battery

- Portable, lead/acid 12V Battery has 5Ah capacity and recharges overnight with U.L.-approved 12V AC Charger.

RG1513 12 Volt Charger..... \$10.99  
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RM0713 12 Volt 5Ah Starter Battery...★ 2 for 24.98

### Tower Hobbies® Expanded Scale Voltmeter (ESV)

**\$11.99** **BEST DEAL**  
RG1514  
• Tests radio packs against simulated servo loads for real life readings of power and capacity. 1-year warranty.

RM0711 Expanded Scale Voltmeter...★ 2 for \$22.98

### Tower Hobbies® Mini-Tach



**BEST DEAL**

**\$32.99**  
RG1515

**SAVE \$5**

- Reads rpm of 2- & 3-blade props with "point-n'-press" ease, and displays on big LCD! Battery included. 1-year warranty.

RM0712 MiniTach.....★ 2 for \$61.98

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4





## Altech F-14 Tamecat Trainer

**\$139<sup>99</sup>**  
RG1516



- Factory-built F-14 looks like a tiger—but flies gentle as a kitten.
- Spans 68", requires 4-channel radio, .40 engine, 2 rolls MonoKote™.

## Tower Hobbies® Tower Power™ Starters

**\$18<sup>99</sup>**  
**\$26<sup>99</sup>**  
RG1517  
Heavy Duty  
RG1518  
12V Dlx



- Easy-press, fatigue-free starting power for engines up to 1.2 cu. in. and 1.8 cu. in.
- V-grooved aluminum starter cone and rubber insert for starting versatility. 2-year warranty.

## Great Planes® Signature Series Super Sportster™

90/120 **\$99<sup>99</sup>**  
**BEST DEAL**  
Kit  
RG1519



- Spans 72", requires 4-channel radio, .61-.90 engine, 3 rolls MonoKote™.

RZ0734 Kit/SuperTigre G90 Engine .....\$269.98

## Great Planes® Easy Sport™ 60

**\$69<sup>99</sup>**

RG1520



**SAVE \$5**

- Builds fast, straight and strong—and flies easily for second-timers and seasoned sport fliers alike!
- Spans 66.5", requires 4-channel radio, .60-.90 engine, 3 rolls MonoKote.

RZ0733 Kit/O.S..60FP Engine Combo **SAVE \$65** \$151.98

## Tower Hobbies® Epoxies

**BEST DEAL**

- Ideal for fast, fuel-proof bonds with wood, fiberglass or porous plastics.
- Both cure clear, strong and sandable—won't turn brittle with age.



RG1521 6-Minute Epoxy 9oz. ....\$6.99  
RM0715 6-Minute Epoxy 9oz. ....★ 3 for 19.97  
RG1522 30-Minute Epoxy 9oz. ....6.99  
RM0716 30-Minute Epoxy 9oz. ....★ 3 for 19.97

## E.J. Lind Master Building Board

**\$119<sup>99</sup>**  
RG1523



- Lets you align for accuracy and lock parts in place with magnetic power—not pins!
- Includes 16" x 48" plate, 60 magnets, 40 nut/bolt sets and more.

## Robart® Incidence Meter

**BEST DEAL**

**\$19<sup>99</sup>**  
RG1524



- Sets proper thrust, wing and stabilizer so new models fly right and old models track better.
- Features anti-parallel meter scale, magnifying window, bubble level & counterweight.

**SAVE \$5**

## Ram Simple Cycler

**BEST DEAL**

- Inexpensive discharger starts work at pack hook-up, and sounds an alarm when its work is done!
- Works with 70-550 mAh Tx and Rx NiCds. Connectors required.



**\$13<sup>99</sup>**  
RG1525

## Hobbico® DC Quick Charger

**\$49<sup>99</sup>**  
RG1526



- Peak charges Tx and Rx packs singly or simultaneously, from any 12V DC source.
- Push-button unit includes, cord, clips and 2-year warranty. Charge plugs required.

## Hobbico® Starfire 40™ AWARF™

**\$129<sup>99</sup>**  
RG1527



- Hot, precovered ARF aerobat tracks like radar, flies like a star!
- Spans 56", requires 4-channel radio and a .40-.46 engine.

RZ0735 Kit/O.S..46 FX Engine **SAVE \$10** \$219.98

## Tower Hobbies® Handcrank Fuel Pump

**\$9<sup>99</sup>**  
RG1528



- Mounts easily on fuel can or field box—and fills/drains at a rate of 1/4 oz. of fuel per turn.
- Durable, glass-filled nylon case includes tubing jacks and mounting flanges.

RM0714 Handcrank Fuel Pump .....★ 2 for \$17.98

## U.S. AirCore® 40 Trainer™

**\$59<sup>99</sup>**  
RG1529



- Made with durable AirCore material that's stronger than balsa and fuelproof.
- Spans 64", requires 4-channel radio and .40-.46 engine.

RZ0740 Kit/SuperTigre GS40 Eng **SAVE \$12** \$137.98

## LDM Ball Bearing Conversion Kit

**BEST DEAL**

- Eliminates wobbling, for longer life and more precise control.
- Converts 4 standard servos to ball bearing operation for the cost of a single new ball bearing servo!

RG1530 Futaba (4) .....\$21.99  
RG1531 Airtronics (4) .....21.99  
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## AstroFlight 112D DC Digital Peak Charger

**\$159<sup>99</sup>**  
RG1533



- Advanced, 3-36 cell peak charger offers 0.2-1A slow charging, 1-5A fast charging, and 400 mAh trickle charge.
- 2-line LCD shows volts, amps, charge time and mAh delivered—built-in fan keeps cooling at peak!

## Kyosho® Nexus™ Helicopters

**SAVE \$15  
on combos**



Nexus 30  
Standard Kit



Nexus  
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Designed for durability, convenience and straight-from-the-box performance, Nexus features numerous one-piece molded parts for assembly ease, and an angled engine mount for easier starts. The Nexus is available as a kit, or factory-assembled with an O.S. .32 F-H already installed—choices also available with the Nexus Deluxe. Two short axles in the main rotor head give the Deluxe exceptional aerobatic capabilities. Nexus 46 includes an installed O.S. .46 FX-H engine for competition and stunt flying, while Nexus Legato offers 4-stroke torque and sound with an installed FS52 Surpass Engine. Both a new cooling fan, clutch shoe, 86T main gear, engine mount and muffler. All require 5-channel heli radio with 5 servos & gyro, glow fuel and starting equipment; helis without engine require .32-.36 engine.

RZ0737**Nexus 30 Kit/O.S..32SX-H/G154 Gyro/Futaba 6VH Radio Combo.....	<b>SAVE \$15</b>	<b>\$709.95</b>
RG1534 Nexus 30 Standard Kit.....		279.99
RZ0738**Nexus 30 Assembled w/O.S.32/Gyro/Futaba 6VH Radio Combo.....	<b>SAVE \$15</b>	699.96
RG1535 Nexus 30 S Assembled w/O.S.32 Engine.....		399.99
RG1536 Nexus 30 Deluxe Kit.....		479.99
RG1537 Nexus Legato w/O.S. FS52 Surpass.....		599.99
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RG1539 Learn To Hover: Nexus 30.....	<b>NEW!</b>	22.99

## Hobbico® Extra 300 .60 ASAP™

**\$229<sup>99</sup>**  
RG1540



**SAVE \$20**

- The expert's aerobat that's over the top in performance and assembly ease!
- Spans 63", requires 4-5 channel radio, .60-.75 engine.

RZ0736 Kit/O.S..61 FX Engine **SAVE \$20** \$369.98

## U.S. AirCore® KnightHawk™

**\$84<sup>99</sup>**  
RG1541



- Unique trainer/multi-mission craft builds with "Fold 'n Fly" ease!
- Spans 64", requires 4+ channel radio, .40-.50 engine.

RZ0739 Kit/SuperTigre GS40 Eng **SAVE \$15** \$164.98



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Limit one Super Bonus per order please!



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**\$254<sup>99</sup>**  
RG1542

**NEW!**

Docile for first-timers, fun for the pro, gigantic Mud Duck offers FoamCor lightness and no-covering convenience. Spans 108", requires a 4-channel radio and a 2-stroke .60 or 4-stroke .91 engine.



### Kyosho® Aurum 30 Sports ARF

**\$339<sup>99</sup>**  
RG1543

**NEW!**

Designed by 1996 F3A world Champion G. Naruke, this all-balsa aerobat combines competition-quality performance with ARF ease. 52" span.



### Altech Pilatus Porter ARC

**\$179<sup>99</sup>**

RG1544

Swiss, STOL utility plane comes prebuilt for ease, ready for your own custom trim scheme! Spans 72".

RZ0741 KR/O.S. .80 FP .....SAVE \$15 **\$254.98**



### Kyosho Cap 232 ARF

**\$189<sup>99</sup>**  
RG1545

Start flying in just a few hours.

Wingspan: 55 in  
Wing Area: 558 sq in  
Weight: 5.3 lb  
Fuselage Length: 49 in

This .40-size ARF version of the famous aerobat comes with hand-crafted quality! Lightweight, durable all-balsa assemblies are precovered with a high-quality, repairable heat-shrink film. The wheel pants and one-piece ABS cowl have even been hand-painted to match the trim scheme. The striking scale looks perfectly complement the CAP 232's tremendous aerobatic potential. Requires a 2-stroke .32-.40 or 4-stroke .48-.52 engine, 4-channel radio with 4 servos, prop, spinner, fuel tank and tires.



### Clancy Aviation Lazy, Big Lazy & Speedy Bees

Lazy Bee 40"

"Lazy," floating flight speeds disguise incredible aerobatic power provided by these kits' oversized control surfaces. Use a 2-3 channel radio (required) to pilot the 40" span Lazy Bee or 48" span Extended Wing Lazy Bee. For even larger thrills, fly the 72" span Extended Wing Big Lazy Bee with a 3-channel radio (required). The 40" span, shoulder-wing Speedy Bee offers the same "oh-so-slo-mo" flight and outrageous aerobatic agility (4-channel radio required). Bees can be flown with gas, diesel or electric power—call Order Assistance Line for details.

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### Direct Connection P-40N Warhawk

**\$119<sup>99</sup>**  
RG1550

All-wood single-seater features a detailed scale canopy and bullet-dodging agility. 64" span.



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IMAA-legal kit is 27% scale, but 100% aerobatic with light wing loadings and fully symmetrical wing! 80" span.

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**NEW!**

Over 90% prebuilt, with ABS cowl and wheel pants handpainted to match the fancy, 5-color finish! Spans 62".



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## PRODUCT REVIEW

# BUCKER JUNGSMANN

Carl Goldberg Models  
By Mike Lee



Biplanes have always held a special place in the hearts of pilots and spectators when it comes to flying aerobatics. Beginning with the barnstorming bipes of the 1920's to the modern Pitts, Eagles, and now the Bucker Jungmann. The Jungmann began life as a German military trainer for most, turning into a strong, aerobatic stunt biplane well after World War II. Today, modern examples of this classic design still fly, and the subject of this review is a modernized version of the Jungmann by Carl Goldberg Models.

The Bucker Jungmann model is a smaller version of Dave Patrick's Tournament of Champions design, yet it retains the outstanding aerobatic capabilities the larger version possessed. All primary building materials are lite ply, balsa, and a few vacuum formed plastic parts. These parts are all packed into a colorful box that measures 48" x 15" x 10", making it shippable by UPS. All parts are well packed and protected from damage by rough handling, and you can tell by the box that this is going to be a big biplane.

General design parameters of the Bucker Jungmann has a symmetrical airfoil section on both wings, and both are a modified "D" tube design. The fuselage is a cleverly designed box style, using almost all plywood in the construction, yet is quite light and strong. Tail feathers are built-up and sheeted for strength and lightness. Plastic parts include the canopy/cover, cowling, and the wheel pants. The plans are in two large sheets, full-sized, and accompanied by a detailed instruction manual with photos to assist.

The kit hardware package is quite complete, providing the modeler with darn near everything required to outfit the aircraft. It misses only 3" tires and a 3" spinner.



## SPECIFICATIONS

Name ..... BUCKER JUNGSMANN  
Aircraft Type ..... Sport Scale Aerobatic Biplane  
Mfg. By ..... Carl Goldberg Models, Inc.  
4734 W. Chicago Ave.  
Chicago, Illinois 60651

Mfg. Sug. Retail Price ..... \$229.00  
Available From ..... Retail Outlets  
Wingspan ..... 64.5 Inches (top and bottom wing)  
Wing Chord ..... 9 Inches  
Total Wing Area ..... 1225 Sq. In.  
Fuselage Length .. 59 Inches (w/Saito 150GK engine)  
Stabilizer Span ..... 25 Inches  
Total Stab Area ..... 250 Sq. In.  
Mfg. Rec. Engine Range ..... .61-1.20, 2-Stroke  
..... .90-1.50, 4-Stroke

Rec. Fuel Tank Size ..... 14 Oz.  
Rec. No. of Channels ..... 4  
Rec. Control Functions ..... Rud., Elev., Throt., Ail.  
Basic Materials Used In Construction  
Fuselage ..... Lite Ply & Plastic  
Wing ..... Balsa, Spruce & Ply  
Tail Surfaces ..... Balsa  
Building Instructions on Plan Sheets ..... No  
Instruction Manual ..... Yes (54 pages)  
Construction Photos ..... Yes

## RCM PROTOTYPE

Radio Used .. Futaba 8UAP w/Hitec RCD Flight Pack  
Engine Make & Disp. .... Saito 150GK Golden Knight  
4-Stroke

Tank Size Used ..... Sullivan 16 Oz.  
Weight, Ready to Fly ..... 146 Oz. (9.2 Lbs.)  
Wing Loading ..... 17 Oz./Sq. Ft.

## SUMMARY

### WE LIKED THE:

High quality die-cutting, good instructions, overall looks, and outstanding performance.

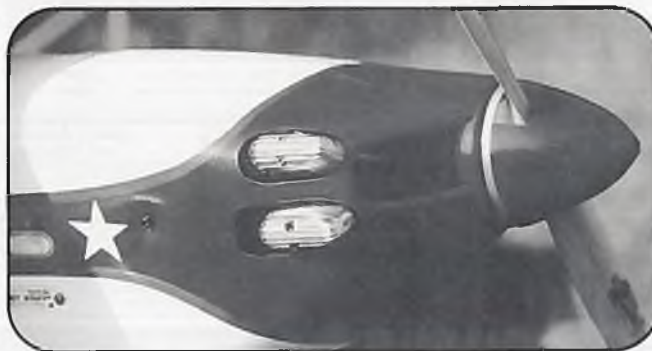
### WE DIDN'T LIKE THE:

Wing rib tabs falling off (although they're supposed to come off easily).

### Construction:

Assembly begins with the wings. Most parts are die-cut from balsa and ply. The balsa ribs are cleanly cut and separate easily from the sheeting. To assist in the wing assembly, alignment tabs are made a part of selected ribs, but I found they tend to fall off easily. Yes, they are supposed to fall off, but only after the wing is completed. I used a bit of masking tape to hold them in place until I was ready to remove them.

The wings assemble flat on the building board, making life very easy for the modeler. Using the instruction manual, you can assemble the wings in a step by step fashion, checking off each point on the





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instructions with the printed check box. This is especially handy considering that both top and bottom wings are almost identical. Each wing is assembled in three distinct portions, and if you assemble the wing portions to the plans, which are excellent, then each portion will fit like gloves to each other.

Pay attention to the placement of the plywood pieces and how you glue them in place. Most of these are stress bearing parts, and a little attention here will go a long way towards the life of the aircraft. Servos are mounted to the inside of the lower wings, and the ribs are cut to allow a servo cable to easily thread through. Span-wise strength of the wing is enhanced with sheer webs at the spars. Stress bearing areas are all plywood reinforced. Sheeting of the wings along with capstrips finishes the wing assembly.

At the tail, we find a flat airfoil, horizontal stab, and elevator structure, constructed with geometric ribbing and then sheeted over. Once the sheeting is in place, the structure is quite strong. Make sure you do not warp these sections, as getting the warp removed later will be near impossible. The vertical fin and rudder are built the same way. Note that both the elevators and rudder are very large, indeed. This should be a hint at the effectiveness of these surfaces later on.

Once the tail sections are completed, the fuselage construction begins. This item is a basic box type fuselage using die-cut lite ply almost exclusively. The die-cutting is very good here, and I found that I had to be careful to prevent parts from falling away from the die-cut sheets, or they would get mixed up. Thankfully, the instructions provide a die-cut sheet diagram, showing where the parts are located within each die-cut sheet.

At the fire wall, we find a double laminated former, with all other formers being single layer. It goes together alarmingly fast, leaving the impression that there has got to be something missing in the assembly. Not so, as the kit features a large, vacuum formed canopy and top nose section, spanning from the nose to the headrest of the cockpit. About the only difficult part of the fuselage assembly is installing the rear turtledeck, this being a single sheet of 1/32" plywood. The application of water to the plywood, allows you to make the bend

without splitting the wood.

At this point, the fuselage looks like a plywood skeleton, to which we begin mounting the wings for alignment. I was amazed to find that the lower wing is held to the fuselage with only two 6-32 screws. The top wing is held to the main cabane struts with four 4-40 screws. Both wings are held in place outboard by 2-56 threaded rods with clevises at the tips. For such a large aircraft, this seems like pretty small hardware. However, when you consider where the actual load bearing will occur, it makes sense that this is all the hardware you need to keep the plane in one piece.

Once the wings are aligned, the tail feathers are mounted and the canopy/forward cover is placed. The instructions say to paint the canopy/cover from the inside prior to mounting. My own common sense says that glue won't adhere to a painted surface very well. Also, the resulting finish of the canopy/cover will be a very high gloss, compared to the covering. So, I opted to paint the outside of the canopy/cover, allowing the glue to bite into the plastic directly. This worked very well for me, and the painted finish looked like a dead match for the film finish of the rest of the fuselage. In this case, I used 21st Century paints to make the match.

### Covering/Finishing:

All of the basic construction work was accomplished using Satellite City Hot Stuff Super T. This has been my adhesive of choice for over a decade because of the consistency of quality. I used some epoxy to paint the fire wall and to place reinforcement fiberglass cloth over the wing joints. From here, we applied the finishes to the airframe. 21st Century film covering was used over the entire airframe, except where we painted the canopy/cover. We found good results with the film, including being used as a color trim. The cowl and wheel pants we painted with 21st Century paints, which provided an exact match in color to the film covering. Inside the kit box, we found a can of Carl Goldberg Cowl Bond adhesive. This stuff is used to glue the vacuum formed cowl and wheel pants together at the seams for a strong, permanent bond. Like any other glue, be sure you don't overdo this, as the Cowl Bond will eat into the plastic

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when excess glue is used.

#### Radio:

The radio I installed was the Futaba 8UAP system, which I consider a superb radio system for this application. On board the Jungmann, RCD Hitec servos and receiver provide the command and control functions. At the elevator, a single HS-705BB servo handles both elevator halves. With 133 oz. of power to drive the pushrod, it will be hard to imagine a servo stall here. At the ailerons, an HS-605BB servo resides in each side of the lower wing, providing fast and accurate aileron response. The rudder also sports an HS-605BB, and the throttle has an HS-425 moving it. An RCD Hitec Supreme receiver does the decoder work, served by a 900 mAh battery.

There is a canyon of room inside the Buckler, making installation of the radio a snap.

#### Engine:

Powering the Buckler biplane is a Saito 150GK Golden Knight 4-stroke engine, mated to a Du-Bro isolated engine mount. This engine has gobs of power, and is listed as the upper engine requirement for this model. It is such a good looking engine that it's hard to have the cowling cover it up. Only the gold color valve covers poke through the cowl cheek. The use of this engine also forced me to place the cowling well beyond the recommended placement, due to the length of the engine. It still makes a good fit, just don't drill out the recommended mounting holes in the cowl. A McDaniel Model 403 remote plug adapter is

used on the glow plug to prevent the necessity of putting a big hole in the cowl for the glow plug connector. Du-Bro super low bounce wheels round out the aircraft. Finished weight is just over nine pounds, with four ounces of lead in the tail to balance.


#### Flying:

Our first day out was partly sunny with 5 mph winds and only 68°. Our Saito 150 fired right up and a quick check confirmed that she was ready to go. With the application of throttle, the Buckler Jungmann needed hardly a bump on the rudder to hold her straight, and went airborne in about 80'. Only a tad of trim was required to get her inline, and then we put her through the paces.

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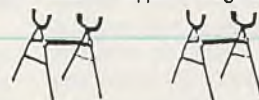
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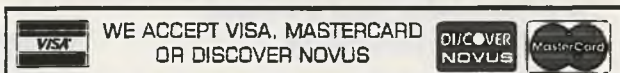
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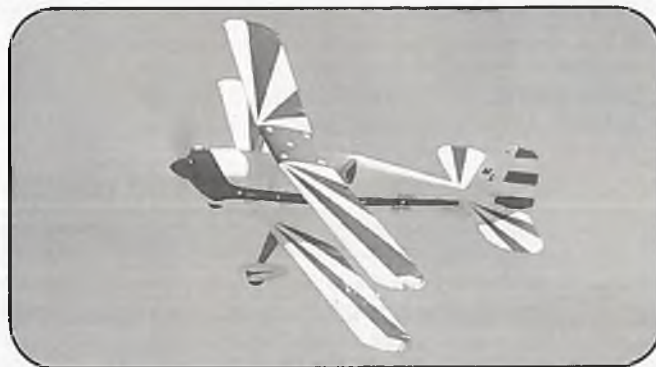
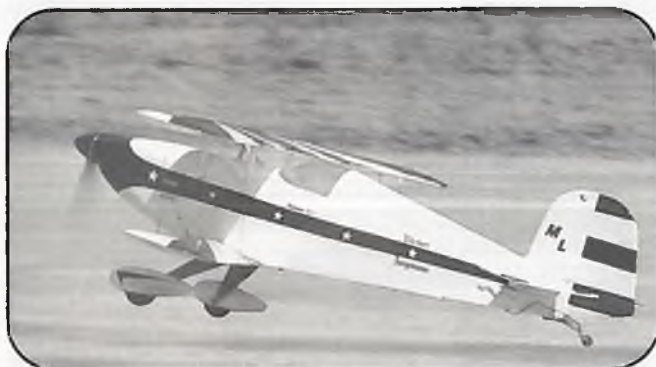
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Elevator response is quite smooth and positive. Although the amount of recommended throw does not appear to be much, it is plenty for what we need to do. Ailerons are solid, leaving the bird right where you want it with crisp response. Rolling maneuvers handle well, and look axial, particularly when you consider this to be a biplane. Rudder response is radical, letting you know each time you apply rudder that you have a positive yaw movement. This is especially nice in the point rolls, knife-edge, and stall turns. As for the claim that the Bucker will perform a knife-edge loop, indeed, it really will perform a knife-edge loop with the Saito 150 up front. There is only a slight hint of

roll coupling through the rudder, which was mixed out in the transmitter.

Snap rolls are positive, yet semi-slow in nature. You definitely know the aircraft is in a snap roll; it just occurs slower than you first anticipate. This makes it easy to get the plane to stop where you want when exiting the snap. Spins are easy, but will take about 1/2 turn to stop upon releasing the controls.

Landing the big Bucker is not hard, as the plane slows down nicely. In fact, it has a very good glide. You will have to practice wheel landings before going to stalled landings, as the Bucker has a nasty bounce on anything but a greased, stall landing. Overall, this is a plane that any sport pilot

can handle and a hot dogger will appreciate. With power like the Saito 150GK, you have an airshow type machine.

In summary, I am very pleased with the Bucker Jungmann biplane, both in the construction and in the flying ability. Although not as crisp flying as a pure pattern aircraft, it is as honest a flying aerobatics bird as there ever was, short of a pure pattern aircraft. Indeed, it will be a real contender in IMAC competition. She handles great and leaves me with a smile every flight. Other pilots who have also flown this plane, agree.

I give it a two thumbs up rating!



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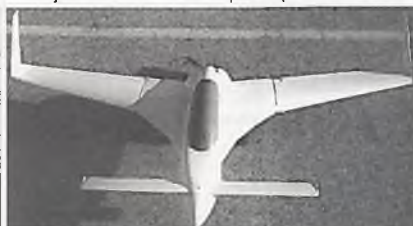
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Mike McConville  
JR Team Manager/  
Field Marketing Manager



# No matter what you're flying, here's the radio that can have you flying better than ever.

The radio Mike's referring to is the airplane version of the new pro-class PCM10SxII.

And the main reason for his confident prediction is its unique feature known as Flight Mode Control—or FMC, for short.

Until now, JR's Flight Mode Control has only been included in helicopter software. But the development of a more inclusive, even easier-to-use edition prompted JR to design a variant for fixed-wing flyers, too.

And once you've got a handle on the tricks FMC can perform for you, we've got a feeling you'll agree with Mike a hundred and ten percent.

## HERE'S WHAT FMC ACCOMPLISHES.

Imagine programming your favorite model in as many as five different setups—each with a combination of rates, mixes, trims, etc.—that are just right for a single operation or groups of maneuvers with similar control requirements.

Then picture flipping a single switch to change from one configuration to another while you're in flight.



These two switches are the key to the 10SxII's Flight Mode Control—and a whole new dimension of RC excitement.

Well, that's what FMC is all about. And if you take a minute to think about it, you'll probably come up with some applications we haven't thought of.

But just to get you started, let's look at a few possibilities.

## SEVERAL WAYS YOU MIGHT USE FMC.

How about a B-25

with a taxi mode: Retracts are inhibited and nosewheel steering is full rate. Separate-channel throttles and brakes are rudder responsive for turn-on-a-dime "power steering." Switch to takeoff/landing mode:

Throttles and brakes normalized, rudder gyro at high gain and nosewheel steering highly dampened. After takeoff, switch to the third mode: The gear retracts, rates are reduced, the gyro's off and you're in cruise configuration.

Or how about a ducted fan with modes to match the wide range of control response



and airspeed-related requirements your model will encounter during a typical flight?

Or maybe an aerobatic model going from a long, smooth axial maneuver setup with reduced top-end throttle to a tumbling configuration to an optimized snap setup. And you activate each unique configuration with the flip of a switch. Like we said, just take a minute to think about it.

## PCM10Sx + FMC = PCM10SxII.

What's all that mean? Simply this.

Flight Mode Control was added to the base software of the PCM10Sx. So until you elect to access the feature, the 10SxII operates with all the buy-it-and-fly-it ease of the user-friendly 10Sx—the favorite pro-class radio of RCers who prefer to spend more time flying than studying manuals.

And when you *do* decide to take advantage of its FMC flexibility you'll discover that the 10SxII also makes flight modes easy to understand and easy to program.

In other words, the PCM10SxII is a JR through and through. Practical, useable and accessible.

## A GREAT NEW RECEIVER AND MORE, JUST TO SWEETEN THE DEAL.

Besides Flight Mode Control and its other unique programmable features, your 10SxII will be equipped with JR's all-new ABC&W 950S receiver for unexcelled precision and unprecedented RF link integrity.

What's more, a 1400mAh JR Extra receiver pack, 90 oz./in. 4131 coreless servos and an aluminum transmitter case are also included as standard equipment.

So head to your dealer's for a 10SxII brochure or phone

(217) 355-9511 to request one by mail. Or if you're online, you can read about it at [www.horizonhobby.com](http://www.horizonhobby.com).

Either way, you'll be on your way to the best RC flying you've ever experienced.



## So what else is new in the PCM10SxII?

**PILOT LINK:** Allows you to transfer basic flight controls to a second flyer's radio while you maintain control of accessory channels, flight modes, mixture control, etc. for low-risk demonstrations.

**DUAL ELEVATOR PROGRAM:** Two channel elevator without using a p-mix.

**3-POSITION FLAPS:** With elevator compensation, all on a single screen.

**SERVO MONITOR:** Bar graph display of commanded position of all 10 channels.

**SERVO SPEEDS:** Assignable to flight modes to enable in-flight changes.

**RUD-TO-AIL/ELE MIXES:** Now pre-programmed on a single screen.

**CUSTOM RESPONSE RATES:** Aileron, elevator and rudder rates may now be tailored with different values on either side of neutral.

## The pro-class radio you can grow into.

Right out of the box—with nothing more complicated than charging and servo reverse programming—you PCM10SxII could literally be used as a basic four channel radio for up to ten models.

Then, as your interest in programming progresses, you can begin to familiarize yourself

with the radio's more sophisticated features "a layer at a time" until you eventually opt to dedicate your planes to Flight Mode Control for the ultimate in flight pro-file flexibility.

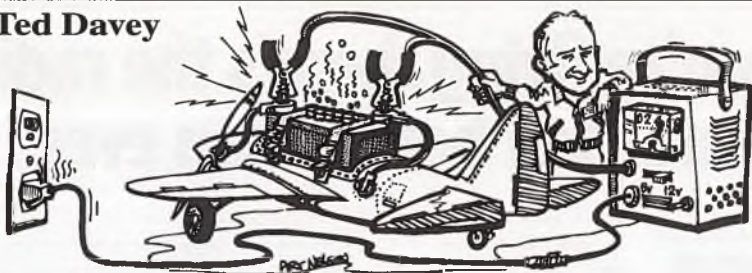
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Ted Davey



## Silent Power

I have received word from Charlie Sylvia that he and his wife are closing down C.S. Flight Systems, due to an intended move to the south in 1998 to be nearer their children. They have decided not to move the business and have put it on the market. C.S. Flight Systems has been an active source of electric components for 15 years and has an excellent electric flight information pack as part of their catalog which has become a bible for the beginner. If anyone wants to become part of the electric flight business, here is an opportunity. Charlie can be reached at (508) 947-2805.

The 11th Annual Dallas Electric Aircraft Fliers (DEAF) Fly-In has been scheduled for October 4-5 at the Dallas R/C Club field in Seagoville, Texas. This fly-in features several different competitive events including LMR Sailplane, and Old-Timer (events #610, 612, and 618). Additionally, there will be 7-cell weight lifting and a "lightest R/C electric to fly 10 minutes" contest as well as some type of endurance contest and, hopefully, some demos of the Speed 400 pylon racers. Contact Greg Judy at (817) 468-0962, or Frank Gorman at (214) 327-8411, for information.

Bob Boucher and crew from Astro Flight were showing extensively revised products at Toledo this year but, I don't have any photos. The motors have newly-machined cases to allow for more airflow and make them a little lighter, and the gear reducers have all new ratios as well as a completely new look. They also have a new brushless 020 motor/controller combo that will retail for \$200.00. The newly-designed reducers have a rectangular box around the spur gear which also has four-point screw-hole mounting onto a front bulkhead.

Astro Flight has a news release prepared that shows differing levels of performance with each motor with different props and power packs. What I found very interesting is the new gear ratios which I feel are much better than the original ones. The 90 now has an available 2.7:1, the 60 a 3:1, the 40 and 25 a 3.1:1, the 15 and 05 a 3.69:1, the 035 a 4.36:1, and the 020 has a gearbox but there is no ratio listed. The 90 is also available with the 3:1, and the 60 with 2.7:1. See their ad for the number to call for more information.

Last month, I discussed cutting out material to make a kit lighter and I want to get back on that subject a little because more should be said about it. I remember a couple of years ago, when I kitted three small 40" span electrics, the Fly Baby, Eindecker, and Citabria, that there were a few that did not like

the sheet tail feathers that were part of the design. In this case, it was a bad rap on the kits as is often the case when using the sheeted tail feathers. Some weight reduction can be obtained by cutting lightening holes in the sheet stock, and the resulting surfaces will still be sturdier than stick construction.

Many kits for 05 motors use 1/8" x 1/4" or 3/8" sticks in the tail to save weight and I feel it's a poor idea. 5/32" sticks would be a little better, but I was the only one using that size and most of it was for sheets anyway. Tail assemblies with 1/8" stick stock tend to be frail, easy-to-warp, and don't have much gluing surface available. Even when using a 1" center section for the stab or the fin base, there is not enough material there to offer decent integrity to the whole assembly. Keep in mind that a small electric sport flier or a two-meter motor glider is going to be a relatively heavy model for its size, that will shock the tail assembly rather hard on all but the smoothest landings and, having another 1/2 oz. back there in the form of more material, is good insurance. Any small undetected crack or parting of the glued surfaces can lead to shedding parts on the next flight when you pick up speed. I am well aware that saving one ounce in the tail will save four in the nose, but the price can be very high.

Cutting back on wing center section sheeting or the ply wing joiners can also lead to a problem. The stress on the wing of a small, heavy electric can be quite severe during aerobatics, planned or not. Wing bracing should extend out through a couple of bays past the fuselage sides on a sport flier, and more with a glider with longer wings. The sheeting should not be cut back either because it's there to strengthen the structure, as well as hold on the wing retaining bands. In general, the bigger and heavier the model, the more relative structural integrity you want in the wing center section. Cutting holes into ribs is also a dubious way to cut out weight. Most modest size kits, or designs, have 1/16" sheet rib stock with about a medium density, partly because it's a good compromise and partly because 75% of a shipment of bulk balsa is of a medium density, and it's a good place to use it anyway. If you have a very good scale, try cutting holes into ribs and then weighing the cut out pieces. I think that you will find that it is not worth the bother.

The easiest way to save weight in wing construction is to avoid block-type tips and to replace wing sheeting with 1/8" or 3/16" square sticks. The square sticks are easier to

build with, a lot easier to repair, and are very strong as long as the wood is not soft. I prefer 1/8" spruce stock but it can be expensive and sometimes straight grained stock is hard to find. Consequently, I used relatively hard 3/16" balsa which is plentiful when you are buying balsa blocks by the ton and cutting your own, and should not be hard to find at your dealer.

The best place to save weight with a model, other than simply using very light wood and hoping for the best, is to look closely at the fuselage. It may be that lighter formers can be used or that holes can be drilled into the heavier ply ones. If there are any carved blocks, cut away more material on the inside and use smaller, thinner braces to support the radio equipment. The use of a Velcro-type material, or self-stick foam tape, along with some dense foam blocks for positioning support, will do the job with less weight. The use of the Velcro is also handy when equipment has to be shifted to obtain a proper balance as well.

There is also the possibility that some weight can be shaved by using a lighter motor mount system or landing gear but this can get tricky. There are many engine mounts of either metal or composite material that can be converted to motor mounts by using straps or clamps to hold the motor in place, and these can be made lighter by drilling away material without a problem. Cutting back on the size of landing gear will be a different matter. The use of formed music wire landing gear on small models is pretty common and satisfactory as long as the overall model weight is modest. If a model weighs two pounds or so, a 3/32" wire gear will carry the load if the gear is not too long. However, if the weight is closer to three pounds and/or you need a longer gear foreground clearance, you will find that 1/8" wire is a minimal requirement.

The difference in weight between wire sizes is not the only consideration when determining which gear to use. The size and weight of the wheels will be important too. If you need larger wheels, say 2-1/2" to 3", because you fly off grass, then larger wire may also be required because the surface won't be smooth and will tend to snag the model in both coming and going. Consequently, using smaller, lighter wire can be foolish economy because of the increased possibility of damage to the model. At the very least, the gear may bend on every flight and this in itself can be a nuisance as well as causing prop breakage. In the long run, I think it might be best to stick with reliable, sturdy gear and accept the small weight penalty.

All of the above does not mean that I advocate building a design as it comes out of the box, particularly when a conversion is planned, because that is not the case. What I am saying is that shaving weight, just for the sake of doing it, does not automatically mean that the model will be improved. For years, I have been telling all to "build to fly, not to crash" and that has not changed.

Until next time, let's do it quietly!







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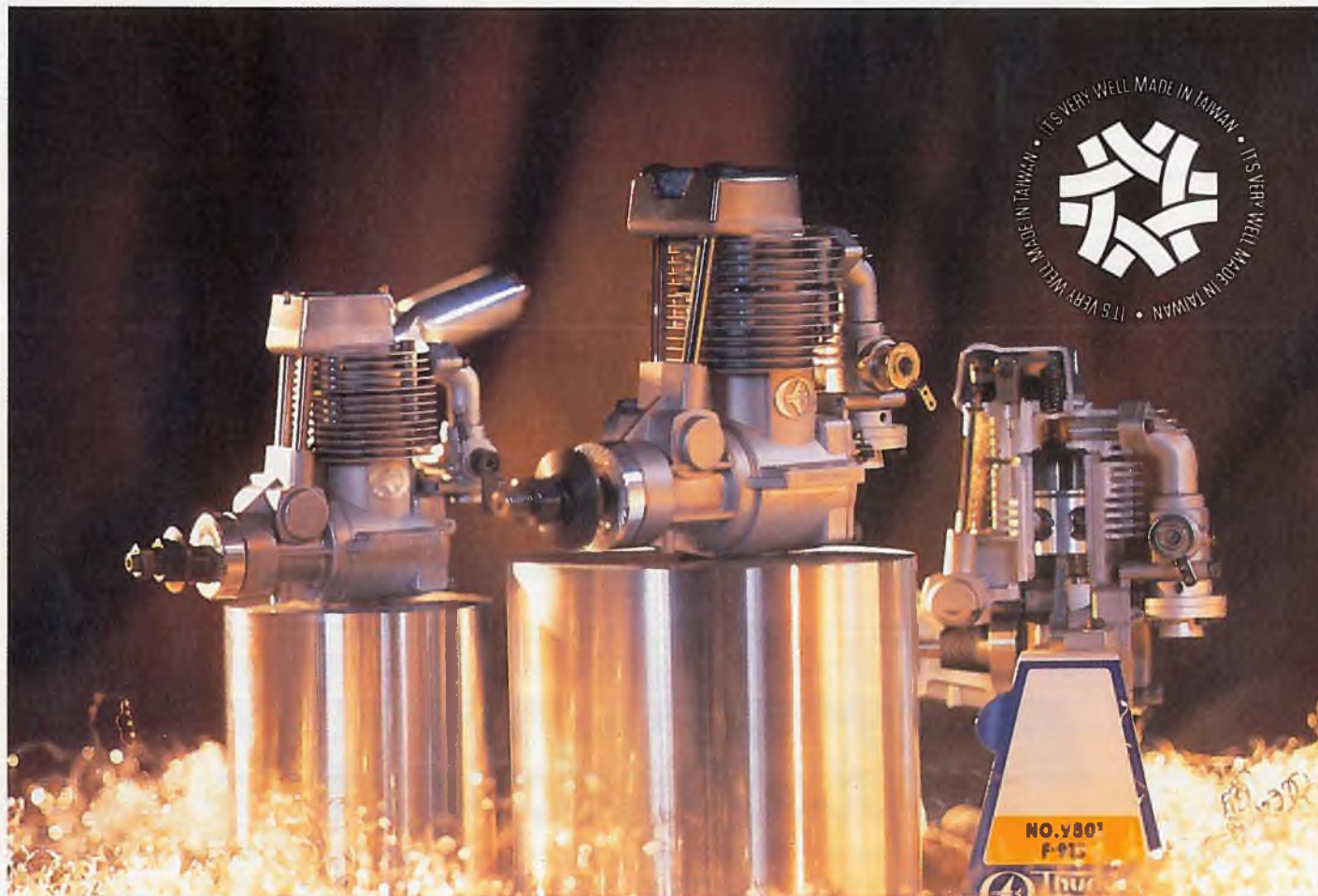


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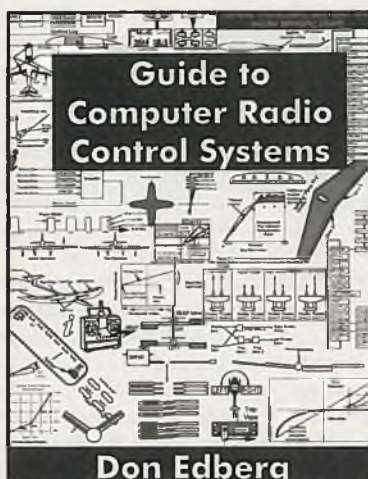


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# RCM Book & Video Review



**GUIDE TO COMPUTER RADIO CONTROL SYSTEMS**  
By Don Edberg

At last, there is a book that comprehensively explains the functions currently available in computer radio systems, "in plain English." The book is very well organized, beginning with an explanation of early model aircraft control systems (escapements, reeds, analog proportional) and clearly describes the differences between AM and FM radio systems, along with the features commonly found in PCM systems, such as the fail-safe mode. However, the main subject of the book is computer radios: **Why** a computer radio might be desirable; **What** a computer radio can do for you; and **How** to perform the step-by-step procedures necessary to properly program a computer radio. A bonus found in this text is a section on the practical testing of a new or used radio system, computer or otherwise.

*Guide to Computer Radio Control Systems* is a soft bound, 184-page book that measures 8-1/2" x 10-3/4". The book may be ordered from Dynamic Modelling, 4922-G Rochelle Avenue, Irvine, CA 92604, (714) 552-1812, for \$17.95. Shipping and handling for U.S. residents is free; foreign orders are subject to an additional charge.

**HALBERSTADT FIGHTERS**  
*Classics of WWI Aviation 1*  
By P.M. Grosz

This is the first in a new series of books



from Albatros Productions, Ltd. The *Classics of WWI Aviation* series is placed between the well-known *Datafile* series of books and the *Datafile Special* series, and is devoted to airplanes and airmen of World War I.

In this book, Mr. Grosz relates the story of the early Halberstadt fighters from the D.I. through the D.V. This series of biplane fighters was of historical significance as they bridged the gap between the Fokker monoplanes and the Albatros D-type aircraft, and were the first German biplane fighter aircraft to enter combat in World War I.

As with other books from Albatros, this 50-page, softbound book contains dozens of rare photographs and some excellent 3-view drawings in both 1/48 and 1/72 scale. If you are considering building one of these aircraft, this book will make an excellent reference for details not usually found in lesser publications.

The book may be ordered from Wise Owl Worldwide Publications, 4314 West 238th Street, Torrance, CA 90505-4509, (310) 375-6258, Fax (310) 375-0548, for \$31.00, postage paid.

**MODEL WARPLANES 1996**  
Volume 4: World War Two  
1939-1945: Allied  
By John C. Fredriksen, Ph.D.

Okay, you've decided to build a scale

## MODEL WARPLANES 1996

Compiled By  
John C. Fredriksen, Ph.D



Volume 4:  
World War Two, 1939-1945: Allied

model of your favorite Warbird, and you have a general idea of the size and degree of detail that you want to build into it; now, how do you find a suitable plan or kit, or the accessories you might need?

This book is the answer. The author has compiled a comprehensive list of sources for over 10,000 plans, scale drawings, photographs, booklets, kits, cowls, canopies, decals, and retracts, for Allied World War Two aircraft, in sizes ranging from peanut to giant scale. The book is organized by country and manufacturer of the aircraft, and also contains an excellent supplier reference section, with company names, addresses, and telephone numbers.

The softbound book measures 6" x 9", and contains 141 pages. It is one in a series of five volumes covering different periods of aviation history. Individual volumes carry a price of \$15.00 (postage paid), or the entire set may be purchased for \$55.00. The books may be ordered from the author at 461 Loring Avenue, Salem, Massachusetts, 01970, (508) 745-9849.



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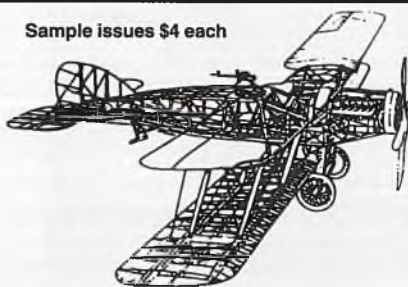
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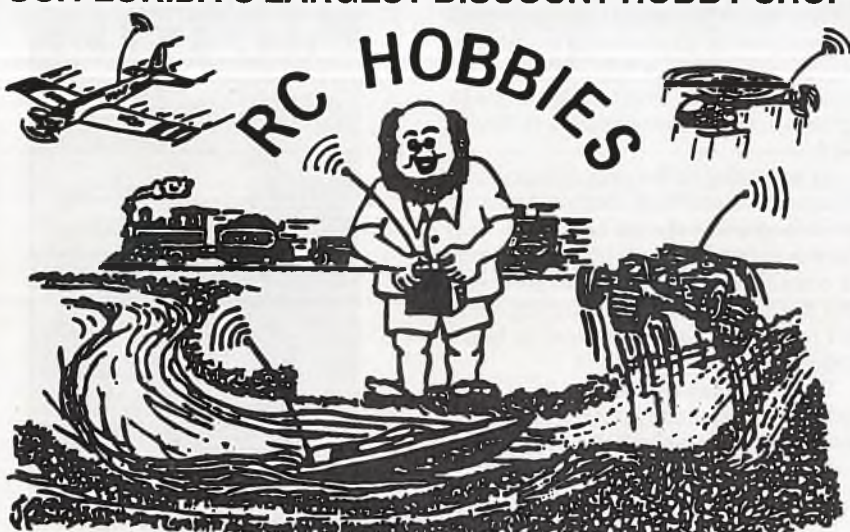
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The VHS format video is professional quality and contains a digitally mastered stereo soundtrack whose music blends perfectly with the flying and scenery. The one hour video sells for \$29.95 and may be ordered from Northeast Sailplanes (802) 658-9482, or C.R. High Performance Sailplanes (the C.R. is Charlie Richardson, a well-known sailplane designer, who produced all of the sailplanes flown by Paul in this video) at (760) 630-8775.



**A GATHERING OF EAGLES  
70TH NATS HIGHLIGHTS 1996**

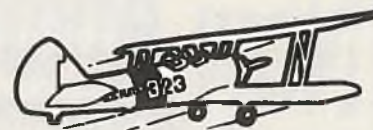
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City; the Yorktown is in Charleston, South Carolina; and an attempt is being made to conserve the Hornet in Alameda, California. (I have had the opportunity to visit the Yorktown and it is truly an awe-inspiring link to the military history of World War II.)

The author has compiled a collection of fascinating photographs, line drawings, and color plates on this class of warships, and does a good job of summarizing the service of these famous ships in this softbound, 50-page book. The book is published by Squadron/Signal Publications and sells for \$7.95. You can find this book at many hobby outlets and bookstores.





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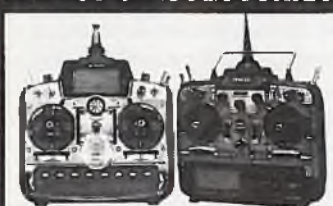
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# THE NO. 11 BLADE

By C. Ron Adams

I freely admit I have never built a model before. What I have done is read all of the model magazines and, most especially, the reviews and construction articles on the newest kits. The common denominator appears to be that you have to cut, trim, shave, clip, "bash," adjust, taper, and otherwise slice pieces of wood and covering material. In almost every case, the item of choice to perform this mayhem is identified as a "No. 11 Blade."

Apparently, knowledge and skill in the use of the No. 11 Blade is essential in everything relating to modeling. So off to my local hobby shop to purchase a pack — the large size.

When I arrive home, I discover the package of 15 blades is sealed against a cardboard backing by a formed clear plastic cover. I try several methods of separating the advertising panel from the plastic sarcophagus. None work except to the extent that I remove a good portion of one fingernail. The obvious solution is to cut through the clear plastic with another No. 11 Blade, but since all of them are inside the packing, I resort to a large serrated kitchen knife of the Ginsu type. Fortunately, my wife is not home to laugh when I cry out, "HiiiiYA" as I slash at the plastic. The Ginsu cuts through anything. Sorry about the counter top.

Once free of the exterior packing, I examine the container of blades in the time-honored tradition of How-To articles. This means the first thing to do is measure the package. It is approximately 1.8 inches long, 0.9 inches wide, and 0.7 inches high (at the highest point). Now that I have measured the container, perhaps someone can explain to me why this is important. Frankly, any model I have ever seen is much larger than the box in which it comes. Therefore, it follows, that if you have room for the model in your workshop, you should automatically have room for the box. Why do you need to know how big the box is? Why should you care? Am I missing something?

Again, following tradition of writing for model magazines wherein the author describes the box and its packing, the container is made of a hard plastic that has allowed each blade to arrive in perfect condition. Embossed into the top of the container is the logo of the manufacturer and a

very attractive image of the blade superimposed with the number eleven and overprinted in silver.

The actual blades live on a teeny-tiny spring-loaded elevator. This is located in the lower right corner of the top and is very easy to locate. Immediately adjacent to the elevator is a small slot. The purpose of this slot is not obvious at first glance, but as we will show later, it is a clever design feature of the package. No instruction sheets are included in the package. Since there are no plans, they are neither rolled nor folded.

Even though each No. 11 blade is presented in sequence at the top of the elevator, removing it from its nest is not easy. The blades appear to stick to each other. This could be caused by a thin, invisible protective coating used to prevent corrosion. More likely, they just feel snuggy in there and don't want to come out. My first attempts to remove a blade resulted in an additional broken fingernail and the use of several words that my wife did not approve of. (Later on, I learned that the old, dull blade could be used to slip into the hole in the basic handle from which point sliding

padding to two fingers and one thumb of the right hand (use the left hand if you are left handed). If this is not done, the highly absorbent balsa wood will bear linear traces of red blood along most of the length of the slice. The two fingers of choice are the index finger (the one you point with even though it used to be considered bad manners to point), and the adjacent finger which is the most often used by one driver to signal to another.

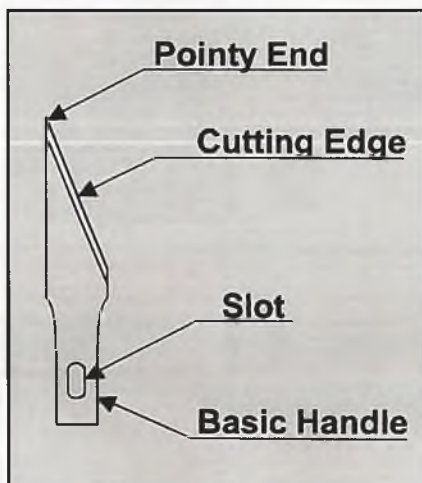
For our purposes, the index finger can be called the pusher, and the thumb and the remaining fingers are referred to as "grippers."

Before making our first cut, I should explain that even though magazines divide balsa wood into various grades such as hard, soft, heavy, light, etc., I have found there are really only two classes that count. They are (1) hard to cut, and (2) easy to cut. I prefer to work with (2).

Once your fingers are prepared and you have grasped the No. 11 Blade properly, make your first cut in a scrap of balsa, grade (2). Ah, you noticed! Where do you get a scrap of balsa when you have not built a balsa model before? Many times the magazine instructions say, "Use a piece of scrap balsa." Wonderful. Where do you get such a thing when you are just getting started? (I hate skipping forward in time, but I later discovered that model making is really the creation of pieces of scrap wood from a neatly organized kit. The initial scrap comes from construction and the final collection of debris comes from making a single mistake close to the ground.) I solved the immediate problem by going back to the hobby shop and buying a whole sheet of 3/32" balsa and classifying it as "scrap."

The first practice cut to make is a long (six inches or more) straight slice parallel to the long edge of the scrap. This allows the blade to move in the same general direction as the grain of the wood. (The grain is the alternating darker and lighter strips built right into the wood by the manufacturer.)

In order to make a straight cut, you need to obtain a straightedge such as a ruler. A metal ruler is best since the No. 11 Blade is quite capable and eager to slice chunks out of a plastic unit. If you are right-handed, place the scrap wood on a slight angle (top to the left) directly in front of you. Place the



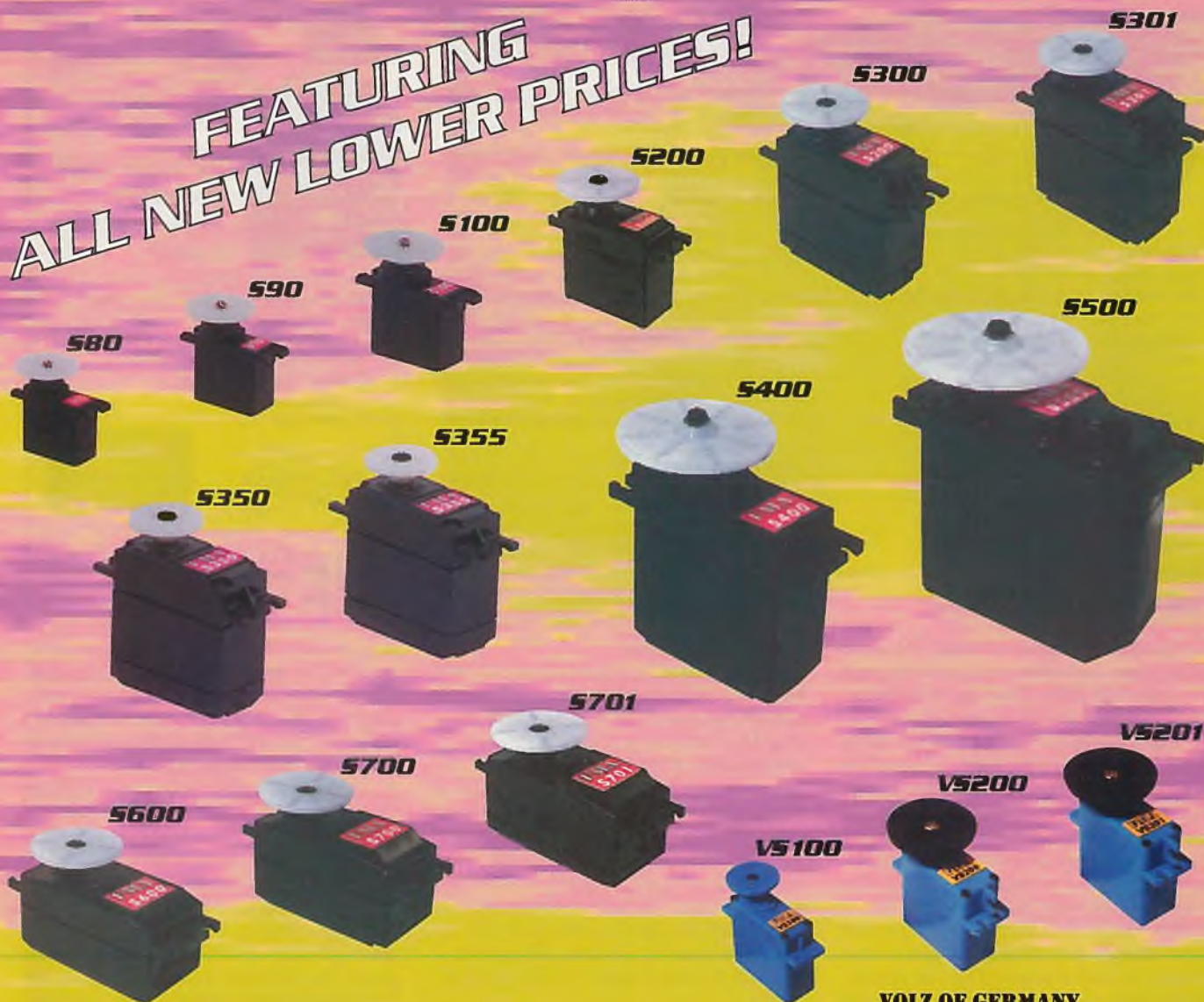
the new blade out was easy.)

Learning to use the blade takes some practice. It also requires the use of an ancillary product called a "self-sticking bandage." There are several of these on the market under various brand names such as Band-Aid and Curads to name just two.

Although not strictly necessary, it is wise to apply the self-adhesive bandages as



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S100	Micro BB	1.06 x 0.97 x 0.5	38.9	0.18	\$ 19.75
S200	Mini Dbl BB	1.22 x 1.21 x 0.63	44.5	0.23	\$ 19.75
S300	Std. Bronze Bush	1.6 x 1.5 x 0.8	41.7	0.14	\$ 10.75
S301	Std. Ball Bearing	1.6 x 1.5 x 0.8	41.7	0.14	\$ 14.75
S350	Metal Gear Dbl BB	1.6 x 1.5 x 0.8	50.0	0.21	\$ 19.75
S355	MG Dbl BB Hi-Out	1.6 x 1.5 x 0.8	114.0	0.31	\$ 19.75
S400	Giant Scale Dbl BB	2.14 x 2.02 x 1.04	180.5 <sup>6v</sup>	0.20	\$ 21.75
S500	Giant Scale Fet Amp	2.48 x 2.22 x 1.27	333.0 <sup>6v</sup>	0.22	\$ 44.75
S600	Low Profile Retract	1.78 x 0.97 x 0.89	100.0	0.50	\$ 24.75
S700	Low Profile BB Hi-Spd	1.76 x 1.13 x 0.89	30.5	0.09	\$ 17.75
S701	Low Profile Standard	1.76 x 1.13 x 0.89	34.7	0.16	\$ 12.75
VS100	Sub Micro	1.10 x 1.18 x 0.45	22	0.16	\$ 34.95
VS200	Micro MG BB	1.16 x 1.20 x 0.52	30	0.17	\$ 44.95
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straightedge parallel to the long dimension of the scrap and about a quarter of an inch from the right edge. Hold the straightedge firmly with the fingers of your left hand.

Use your entire arm to pull the blade along the straightedge. Think of your arm as a boat and the blade as its rudder. Except in this case, the rudder just follows the motion of the boat (the arm). Make sure the blade is angled slightly toward the straightedge so it does not wander off into the wood by following the grain. You do not have to cut all the way through on the first pass. Hard balsa (1) or thick pieces may require several attempts. Did you remember to keep the fingers of your left hand clear of the straightedge? If you didn't, this would be a good time to use an additional

self-sticking bandage.

We now have a piece of scrap balsa 36" long with a thin floppy piece at one end. To remove the piece, we make a cross-grain cut. This is the one that frees the small chunk of wood from the larger. There are two ways to make this cut. They are known as the "innies" and the "outies." The innies start cutting from the previous cut and pull the No. 11 Blade away from the main portion of the scrap. This is not the best way, in my opinion. I have proven (at least to my own satisfaction) that you will, on occasion, cause the wood to split instead of cut, and the way it splits can be quite creative.

The outy technique is to start the cross-grain cut from the outside of the scrap, and



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pull the blade toward the original cut. This squishes the grain of the wood upon itself and stops the splitting action. The main danger of this technique is prolonging the cut across the entire piece of scrap instead of stopping at the target cut.

Curved cuts are made almost exactly like long cuts except you don't use a straightedge.

By this time, you will have discovered the reason for the slot in the blade's handle. It is to allow an unrestricted flow of blood from your fingers. Sword makers learned this trick many centuries ago. By grinding a groove on each side of the sword blade, the loser's blood was allowed to seep out more efficiently through the channel. The No. 11 Blade's hole serves the same purpose.

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4N-350AAC	4.8V/350	58 x 30 x 14	12.00
4N-800AA	4.8V/800	58 x 30 x 14	9.00
4KR-800AAE	4.8V/800	58 x 50 x 14	12.00
4KR-1100AAU	4.8V/1100	58 x 50 x 14	16.00
4N-225AE	4.8V/225	87 x 17 x 17	12.00
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4N-800AR	4.8V/800	87 x 50 x 17	18.00
4KR-1100AE	4.8V/1100	87 x 43 x 17	15.00
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5N-270AA	6.0V/270	70 x 30 x 14	12.00
5N-350AAC	6.0V/350	70 x 30 x 14	14.00
5N-800AA	6.0V/800	70 x 50 x 14	11.00
5KR-800AAE	6.0V/800	70 x 50 x 14	14.50
5KR-1100AAU	6.0V/1100	70 x 50 x 14	18.00
5N-225AE	6.0V/225	83 x 17 x 17	14.00
5KR-600AE	6.0V/600	83 x 28 x 18	14.00
5KR-1100AE	6.0V/1100	83 x 43 x 17	18.50
5KR-1500AUL	6.0V/1500	83 x 43 x 17	22.00
5KR-1400AE	6.0V/1400	83 x 49 x 17	22.00
5KR-1700AUL	6.0V/1700	83 x 49 x 17	24.50
5KR-1300SC	6.0V/1300	110 x 42 x 22	16.00
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7KR-600AE	8.4V/600	118 x 30 x 17	20.50
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7KR-1400AE (hump)	8.4V/1400	68 x 48 x 32	31.00
6N-1000SCR	7.2V/1000	108 x 46 x 23	28.00
7N-1000SCR	8.4V/1000	127 x 46 x 23	32.00
6N-1000SCR	9.6V/1000	138 x 46 x 23	34.00
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6N-800AAE-2	9.6V/800	150 x 44 x 15	23.00
6N-800AAE-3	9.6V/800	112 x 52 x 15	23.00
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6N-1100AAU-2	9.6V/950	150 x 44 x 15	27.00
6N-1100AAU-3	9.6V/950	112 x 52 x 15	27.00
6N-1100AAU-F (Futaba, JR, 9V tip clip)	9.6V/950	112 x 32 x 30	33.00
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N-110AA	110	14.0 x 18.5	8	1.80
N-270AA	270	14.0 x 30.0	14	1.80
N-350AAC	350	14.0 x 30.0	14	2.00
N-600AA	600	14.0 x 49.5	26	1.60
KR-800AAE	800	14.0 x 49.5	28	2.50
KR-1100AAU	1100	14.0 x 49.5	27	3.00
N-225AE	225	18.5 x 16.3	12	3.00
N-500AR	500	16.5 x 27.8	20	4.00
KR-600AE	600	16.5 x 27.8	22	2.25
N-800AR	800	16.5 x 48.5	35	3.50
KR-1100AE	1100	16.5 x 42.0	32	3.30
KR-1500AUL	1500	16.5 x 42.0	33	4.00
KR-1400AE	1400	16.5 x 48.5	38	4.00
KR-1700AU	1700	16.5 x 48.5	37	4.50
KR-1700AE (5/4)	1700	18.5 x 67.0	45	6.00
N-650SC	650	22.0 x 25.8	29	3.20
N-1000SCR	1000	22.0 x 33.0	39	4.20
KR-1300SC	1300	22.0 x 42.0	48	2.80
N-1400SCR	1400	22.0 x 42.0	52	4.20
KR-1800SCE	1800	22.0 x 42.0	54	5.00
N-1700SCRC	1700	22.0 x 42.0	55	5.50
KR-1700	1700	22.0 x 42.0	56	6.25
KR-2000	2000	22.0 x 42.0	58	7.50
N-1500SCR (5/4)	1500	22.0 x 49.0	61	5.00
KR-2300SCE (5/4)	2300	22.0 x 49.0	76	5.50
N-1100CR	1100	25.2 x 29.8	46	5.00
N-1800CR	1800	25.2 x 49.0	80	7.00
KR-2000C	2000	25.2 x 49.0	70	4.80
KR-2800CE	2800	25.2 x 49.0	78	5.50
N-2500DRL	2500	32.3 x 44.0	110	4.50
N-4000DRL	4000	32.3 x 59.0	180	11.00
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HS-80MG	Sub Micro Servo (all metal gear)	36.95
HS-85BB	Mighty Micro w/top BB (38oz)	32.95
HS-101	Mini Servo (24oz)	21.95
HS-101MG	Mini Servo (all metal gear)	29.95
HS-205-BB	Super Mini Low Profile Servo (42oz)	27.55
HS-205MG	Super Mini Servo (all metal gear)	40.55
HS-225BB	Super Mini Servo Ball Bearing (50oz)	32.95
HS-300	Standard Sport Servo (42oz)	10.95
HS-422	Pro Servo (43oz)	12.95
HS-425BB	Pro Servo with Dual Ball Bearing (43oz)	18.95
HS-525BB	High Speed 5-pole, top BB (47oz)	34.95
HS-545BB	High Torq 5-pole, top BB (62oz)	34.95
HS-605BB	Ultra Torque Servo (77oz)	36.95
HS-605MG	Ultra Torq Servo (all metal gear)	46.55
HS-615MG	Super Torq (metal gear - 107oz)	46.55
HS-75BB	Retract Servo (90oz/180deg)	39.95
HS-700BB	Giant Scale Servo (133oz)	29.55
HS-705MG	Super Torq Giant Servo (160oz)	42.85
HS-715BB	Sail Arm Servo (161oz/90deg)	37.38
HS-725BB	Sail Winch Servo (161oz/4 turns)	47.95
HS-815BB	Mega Servo (231oz/180oz)	51.89
RCD2200	5 Ch. Micro 535 Rx "Futaba J" w/o crystal	58.95
RCD2400	5 Ch. Micro 535 Rx "Airtornic" w/o crystal	58.95
RCD2500	5 Ch. Micro 535 Rx "Hi-Tech" w/o crystal	58.95
RCD2600	5 Ch. Micro 535 Rx "JR" w/o crystal	58.95
RCD3200	8 Ch. 72mHz "Futaba J" compl. w/o crystal	55.95
RCD3400	8 Ch. 72mHz "Airtornic" compatible w/o crystal	55.95
RCD3500	8 Ch. 72mHz "Hi-Tech" compatible w/o crystal	55.95
RCD3600	8 Ch. 72mHz "JR" compatible w/o crystal	55.95
RCD72X	Rx Crystal, Ch11-Ch6C	8.50

\* Please specify your connector on the Hi-Tech unit.



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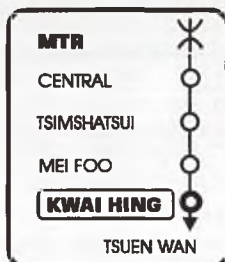


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Speaking of holes, you will remember I mentioned the little one next to the elevator on the plastic blade container. As I was digging a new, sharp blade from its nest, it occurred to me that the old, dull blade could be slipped into the slot. It worked! The manufacturer designed a receptacle for used blades right in the original package — very clever people, these manufacturers.

After chopping, whittling, cutting, and carving away at my scrap wood, I was able to gain proficiency in the basic use of the No. 11 Blade. I felt I was ready to build a model.

Upon arrival at the hobby shop, I was accosted by a young man behind the counter, who asked, "May I help you?"

"Yes," I said. "I am looking for a model to build."

"You came to the right place." He paused, then asked, "What is wrong with your hand?" He was staring at my bandages.

"I was practicing with my No. 11 Blade," I responded.

"Really?" he rejoined with raised eyebrows. "What happened?"

I told him.

He shook his head. "You really should have asked for directions," he said pointedly. With a sharp glance at the display behind him, he thrust his finger in the direction of a long, narrow aluminum object. He edged over to the display and, with a rapier-like lunge, placed the object

on the counter in front of me.

"This is what you need."

"What is it?" I asked.

"It is what we call an OEM handle, Number One."

"An OEM?"

"Yes. That means Original Equipment Manufacturer. In this case, X-Acto."

"Interesting," I looked at the object with interest.

"Notice that it comes with a knurled fixture at one end. That is a sleeve that unscrews and allows the user to insert a No. 11 Blade in a little slot. Once the knurled area is re-tightened, the blade is held securely in place and is easily manipulated for cutting, slicing, and carving with little danger to the hand holding the unit."

"What a wonderful idea," I exclaimed, "Does it really work?"

"Absolutely. You have my word as a model shop employee."

Well, in that case, I thought to myself, what more could I ask?

The clerk raised his eyebrows in surprise when I mentioned I was just getting started in R/C modeling. He definitely smiled with pleasure when I explained I was looking for an entry level kit, engine, and radio system. "I have read that a .40 size was just about right for starters."

This time his expression was that of shock. "Heavens," he exclaimed expansively. "What you really need..." And with this, amid graceful hand gestures, he explained several aerodynamic factors

such as Bernoulli's Theorem, the effects of Reynold's number, the Jutta-Jankowski relationships, and scale effect. In short, I came away with a .60-sized aircraft complete with engine, electric starter, battery, glow plug igniter, fuel pump and matching fuel, wheels, covering material, fuel tank, assorted glues, resins, and a 12-channel super-duper, heavily chromed and multi-switched computerized R/C radio system "that would save me money on the long run." And, of course, my new OEM handle for the Number 11 Blades.

Needless to say, the first thing I did upon getting home was to try my new combination of Number 11 X-Acto blade and OEM handle. It worked wonderfully! Now I could cut, trim, shave, clip, "bash," adjust, taper, and otherwise slice pieces of wood and covering material. I no longer needed the various kinds of self-adhesive bandages. My wood was no longer two-toned tan and red. My life, as a modeler was, at last, off to an excellent start.

We liked the clean, sharp lines of the No. 11 Blade. It is versatile, useful, and performs every maneuver asked of it. Despite the simplicity of the blade itself, we strongly recommend the use of a suitably sized handle.

We didn't like the ease with which the blade sliced through our skin. If it cut hard balsa as easily, it would be the perfect implement.



## R/C → DIRECT

Home of the **HANDY**

**HANDY** is a jig-built sail plane manufactured in the Czech Republic to exacting standards. **HANDY** is covered with \*cote in 2 colors. As the name suggests, this is an excellent hand launch glider which responds to light thermal conditions. We are flying it on small slopes here in San Marcos. Wingspan is 150 cm (59"), profile is Selig3021, weight (without radio) is 7.5-8 oz. Full up wing loading will be considerably less than 6 oz/ft<sup>2</sup>. **HANDY** is also available in electric version ready to mount a **SPEED-400** motor and a 6x3 folding prop. With a 7-cell pack we get 3 or 4 climbs on a charge. **HANDY** or **HANDY-E ARF** \$118.00



## Home of the **TRIFFIK**

The **TRIFFIK** is a 70cm (27.5") span **SPEED-400** pylon racer/acrobatic **ARF** manufactured with glass fiber, carbon fiber and epoxy. The motor and a 7-cell pack help transform this little beauty into a very exciting miniature pattern plane or competitive pylon racer for the experienced pilot. We also carry the complete power package for these airplanes. The **TRIFFIK** is in stock in many hot color combinations. Our special price is \$158.00.



R/C → DIRECT

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## SPORT FLYERS OF AMERICA, INC. NEWS UPDATE – FALL EDITION



SPORT FLYERS OF AMERICA, INC. HAS HAD A MOST SUCCESSFUL YEAR! OUR MEMBERSHIP LIST IS GROWING AT A RATE OF 20% PER YEAR AND WE LOOK FORWARD TO HAVING AN EQUALLY SUCCESSFUL YEAR IN 1998. WE FEEL THAT OUR SUCCESS, IN PART, IS DUE TO THE FACT THAT WE ARE ACTIVE MODELERS OURSELVES AND HAVE LEARNED OVER THE YEARS WHAT IT TAKES TO PROMOTE THE SPORT, WHILE KEEPING IT FUN AND SAFE FOR ALL.

- ✈ **CONTEST** – STARTING NEXT YEAR, SPORT FLYERS OF AMERICA WILL BE INCLUDING DECAL STICKERS FOR YOUR MODEL AIRCRAFT WITH EACH NEW MEMBERSHIP. WE WOULD LOVE TO HAVE OUR MEMBERS HELP US IN THE DESIGN OF THIS LOGO/DECAL. OUR ONLY REQUIREMENT, AT THIS TIME, IS TO HAVE THE NAME OF SPORT FLYERS OF AMERICA REPRESENTED SOMEWHERE ON THE DECAL.

IF YOUR DESIGN IS CHOSEN, YOU WILL RECEIVE ONE FREE YEAR OF MEMBERSHIP INSURANCE BENEFITS, AS WELL AS A FREE ANNUAL SUBSCRIPTION TO R/C MODELER MAGAZINE. YOU CAN SUBMIT YOUR IDEAS TO SPORT FLYERS AT THE ADDRESS PRINTED BELOW, MARKED TO INDICATE (LOGO CONTEST) ON THE ENVELOPE.

- ✈ **ARTICLES** – WE WOULD LIKE TO ENCOURAGE OUR FELLOW MODELERS TO CONTRIBUTE NEWS, SPECIAL-INTEREST ARTICLES, OPINION LETTERS, EVENT ADVERTISEMENTS AND/OR PICTURES TO SPORT FLYERS OF AMERICA, INC. NEWS UPDATE. ANY MATERIAL MUST BE SUBMITTED AT LEAST 8 WEEKS PRIOR TO THE NEXT QUARTERLY ISSUE PUBLICATION OF R/C MODELER MAGAZINE. (THE NEXT ISSUE WILL BE DECEMBER.)

- ✈ **PHONE CHANGED** – AS OF JUNE 1, 1997 THE AREA CODES FOR NORTHERN NEW JERSEY HAVE BEEN CHANGED. OUR NEW AREA CODE WILL BE (973). THE NEW ADDRESS AND PHONE NUMBERS FOR SPORT FLYERS OF AMERICA ARE LOCATED ON THE BOTTOM OF THIS PAGE AND THE APPLICATION PAGE OF THIS NEWS UPDATE. MOST OF OUR PRINTED MATERIALS WILL REFLECT THIS CHANGE; HOWEVER, WE ALREADY HAD PRINTED OUR 1998 MEMBERSHIP CARDS, PRIOR TO BEING NOTIFIED OF THIS CHANGE. WE APOLOGIZE FOR THIS INCONVENIENCE. THE SAFETY CODE CARD WHICH COMES WITH EACH NEW MEMBERSHIP CARD, DOES REFLECT THE NEW NUMBER, SO KEEP THEM HANDY NEXT YEAR!

### MANAGING STAFF

ELLIOTT JANSS, JR., PRESIDENT • KEN THOMPSON, VICE-PRESIDENT • VERONIKA JANSS, OFFICE MANAGER  
E.J. ZMUDA, TECHNICAL SERVICES • AL ARNT, PHOTOGRAPHY & NEWS EDITOR • ED ULRICH, MARKETING DIRECTOR  
SPORT FLYERS OF AMERICA, INC. • P.O. Box 7993 • HALEDON, NJ 07508  
PHONE (973) 305-8599 • FAX (973) 305-6686



## WHERE THERE'S A WILL, THERE'S A WAY !

CLARENCE RAGLAND HAS BEEN IN THE R/C AEROMODELING SPORT FOR OVER 25 YEARS AND HAS SPENT A CONSIDERABLE AMOUNT OF THEM PROMOTING THE HOBBY BY TEACHING OTHERS. IN HIS LETTER HE DESCRIBES A "BREAKTHROUGH" IN FLIGHT INSTRUCTION WHICH IS CONSIDERED TO BE MUCH SAFER THAN THE BUDDY-BOX SYSTEM, WE ARE NOW FAMILIAR WITH.

WITH THE SUPPORT OF THE SCHOOL AT WHICH HE TEACHES HIS FLEDGLINGS AND THE ENTIRE COMMUNITY, HE IS REJUVENATING INTEREST IN THE SPORT AND AT THE SAME TIME HELPING YOUNG ADULTS TAKE ON LEADERSHIP ROLES AND BUILD CONFIDENCE IN THEIR ABILITY TO DO ALMOST ANYTHING. SCOFF IF YOU WILL, BUT MR. RAGLAND HAS PROVEN HIS TECHNIQUES TIME AND TIME AGAIN AND WE AT SPORT FLYERS OF AMERICA WISH HIM MUCH SUCCESS ! IF YOU WISH TO LEARN MORE ABOUT HIS TECHNIQUES, MR. RAGLAND HAS STATED THAT HE WOULD BE MORE THAN HAPPY TO TEACH OR SPEAK WITH ANYONE WHO IS INTERESTED.

### A.C.O.R.N.S. (AEROMODELING CLUB ORGANIZED TO RECRUIT NEWCOMER STUDENTS)

FROM LITTLE ACORNS MIGHTY OAKS GROW. AFTER MANY YEARS OF ATTEMPTING TO HELP HALT THE DECLINE OF RC AVIATION, I FINALLY STRUCK PAY-DIRT WHEN YOUNG CHAD TAYLOR (AGE 17) TOLD ME OF THE HIGH INTEREST THAT MANY OF HIS FELLOW NEWFANE, NY HIGH SCHOOL STUDENTS HAVE IN RC AEROMODELING. CHAD WAS ONE OF MY FLYING STUDENTS, WHO BECAME A SKILLED RC PILOT WITHIN JUST 4 LESSONS. USING MY "BREAKTHROUGH" IN THE ART OF RC FLYING INSTRUCTION, MOST OF MY STUDENT FLIERS WILL EARN THEIR SOLO WINGS ON THE AVERAGE OF 5 LESSONS.

A.C.O.R.N.S. WILL BE OPEN TO ALL, WITH THE UNDERSTANDING THAT OURS IS A CLUB FOR "BEGINNERS & INSTRUCTORS ONLY". MEANING, THE ONLY PURPOSE IN BEING A MEMBER OF OUR CLUB IS TO LEARN TO FLY AND THEN BECOME A FLIGHT INSTRUCTOR. "NO HOT-DOGS ALLOWED". ONCE A STUDENT LEARNS TO FLY, HE OR SHE IS WELCOME TO BECOME AN INSTRUCTOR. IF THEY CHOOSE NOT TO TEACH, THEY ARE FREE TO FLY ELSEWHERE OR JOIN ANY OTHER CLUB IN THE AREA.

WE DON'T DISCRIMINATE AGAINST AMA FLIERS OR VETERAN RC PILOTS, JUST SO LONG AS THEY UNDERSTAND THAT THE ONLY PURPOSE FOR OUR CLUB IS, IN ESSENCE, TO MASS PRODUCE NEW RC FLIERS.

CHAD AND I ARE THE ONLY INSTRUCTORS TO-DATE, BUT EVERYONE WE TEACH IS ALSO LEARNING TO BE AN INSTRUCTOR AT THE SAME TIME. THIS IS THE ONLY WAY, AS I SEE IT, TO REALLY CONTRIBUTE TO RC AEROMODELING GROWTH.

WHEN SOMEONE WANTS TO LEARN HOW TO FLY ALL HE OR SHE HAS TO DO IS SIMPLY CALL OR JUST SHOW UP AT THE FIELD AND THEY WILL IMMEDIATELY RECEIVE A MINIMUM OF 30 MINUTES OF HIGH QUALITY FLIGHT INSTRUCTION. THIS IS A GUARANTEE, BY THE WAY. THE FIRST TIME STUDENT WILL MOST LIKELY GET IN AT LEAST ONE TAKE OFF AND LANDING (ASSISTED) ON HIS OR HER FIRST OR SECOND LESSON.

THE ENTIRE SCHOOL AND COMMUNITY ARE ENTHUSIASTICALLY BEHIND OUR EFFORTS. TEACHER, HENRY KURSTON AND NEWFANE HIGH'S PRINCIPAL, NORM KOPECK, (NOT OPPOSED TO TAKING A FLIGHT HIMSELF) ARE BEHIND US 100 %. SPORT FLYERS OF AMERICA, INC. WAS OUR CHOICE AS AN INSURANCE PROVIDER BECAUSE OF ITS EXCELLENT COVERAGE AND THE OPEN-MINDEDNESS OF ITS LEADERS.

A.C.O.R.N.S. WILL SHOW HOW A RC CLUB SHOULD BE RUN, IF REAL GROWTH IS THE GOAL THEY HAVE IN MIND. I AM CONFIDENT THAT NEWFANE HIGH, THE COMMUNITY AND SPORT FLYERS OF AMERICA WILL BE VERY PROUD OF THE A.C.O.R.N.S.

WITH THE ENTIRE COMMUNITY BEHIND US KIDS, WE CANNOT FAIL ! SINCERELY, CLARENCE  
CLARENCE C. RAGLAND • 546 NIAGARA ST. • LOCKPORT, NY 14094





THE A.C.O.R.N.S. CLUB &  
INSTRUCTOR,  
CLARENCE C. RAGLAND



NINA VOSBURGH (AGE 16)  
TWO 10 MINUTE LESSONS AND  
ONE-LANDING UNDER HER BELT.



# **SPORT FLYERS WEST COAST RALLY**

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**SEPTEMBER 6TH & 7TH, 1997**

- TWO GREAT DAYS OF FLYING, FOOD & FUN !
- SATURDAY EVENING ENTERTAINMENT • SPECIAL GUESTS
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COVERS FLYING FOR BOTH DAYS & PILOT LUNCH FOR ONE DAY
- SPORT FLYERS REPRESENTATIVE, KEN THOMPSON WILL BE IN ATTENDANCE  
TO ADDRESS ISSUES REGARDING SPORT FLYERS OF AMERICA, AS WELL AS, TO  
JOIN IN THE FUN !

THIS RALLY IS DESIGNED WITH FUN IN MIND AND HAS BEEN ESTABLISHED TO HELP  
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**AWARD categories:**

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**AIRCRAFT AWARDS WILL BE  
JUDGED  
BY THE REGISTERED PILOTS  
AND BY  
THE SPECTATORS !**

Map to Condor field in Camarillo,  
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**BRING A FRIEND ! • AMA MEMBERS ARE WELCOME !**

FOR ADDITIONAL INFORMATION AND DIRECTIONS TO THE FIELD, CONTACT:  
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# 21st Annual FUN FLY & Swap Meet

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## WALLA WALLA VALLEY PROP TWISTERS

September 20, 1997 • At the Club Flying field in Ft. Walla Walla Park, WA  
Flying Begins at 10 A.M. • Entry Fee is \$10 • Open to All !  
RAFFLE for a Model Airplane



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## AMERICAN LEGION POST #34 – VETERANS MEMORIAL PARK ALAMOGORDO FIELD UPDATE

WITH THE CONSTRUCTION COMPLETED ON OUR TWO 800 x 40 FT. RUNWAYS, THE AMERICAN LEGION AND HOLLOMAN OTERO MODEL ENTHUSIAST HELD THEIR OPEN HOUSE ON MAY 17TH (ARMED FORCES DAY), AT THE NEW FLYING FIELD.

THE TURNOUT WAS GREAT THAT SATURDAY; OVER 54 AIRCRAFT AND PILOTS OF ALL KINDS SHOWED UP FOR A DAY OF FLYING AND PICNICKING. WE HAD EVERYTHING FROM A WWI SE5A TO A BVM MAVERICK JET.

THERE IS STILL LOTS OF WORK LEFT TO DO AT OUR NEW FLYING FIELD, BUT AT LEAST IT IS OPEN FOR FLYING. FUTURE PLANS CALL FOR THE ADDITION OF R/V HOOK-UPS, AS WELL AS, OUR NEW POST HQ'S.

THE AMERICAN LEGION HOPES TO HOST REGIONAL AND NATIONAL R/C AND MODEL ROCKET EVENTS AT THIS FACILITY. FAA HAS GRANTED THE MODEL ROCKET A 15,000 FT. AGL (ABOVE GROUND LEVEL) CLEARANCE AT THE PARK.

ON JUNE 14 AND 15 THE MODEL ROCKET CLUB IS HOLDING THEIR "THUNDER IN THE DESERT" EVENT. MODELERS THAT ARE PASSING THROUGH ALAMOGORDO, NEW MEXICO AND WISH TO USE THE AMERICAN LEGION FACILITY, PLEASE CONTACT RICHARD LEE, VICE-COMMANDER POST #34 AT (505) 437-7228 EVENINGS, OR BILL UPHOUSE AT FLIGHT DECK HOBBIES (505) 434-6563 DAY TIME. PLEASE CALL IN ADVANCE TO MAKE ARRANGEMENTS. ANYONE WITH A VALID INSURANCE CARD CAN FLY! AERIAL PICTURE OF ALAMOGORDO FIELD BELOW.



### YOU CAN'T FLY HERE!

I ASK YOU, DOES THIS SOUND FAMILIAR? HAVE YOU BEEN TURNED AWAY FROM A MUNICIPAL COUNTY OR STATE PARK, WHICH IS SUPPORTED BY YOUR TAX MONEY? ARE YOU BECOMING OR REMAINING A MEMBER OF AN INFERIOR INSURANCE PROVIDER, SIMPLY BECAUSE YOU HEAR THIS SO OFTEN? WELL, YOU DON'T HAVE TO PUT UP WITH IT ANYMORE!

GO TO YOUR LOCAL, COUNTY OR STATE GOVERNMENT OFFICIALS. MAKE THEM UNDERSTAND THAT IT'S YOUR PUBLIC PARK AS BOTH A CITIZEN AND A TAXPAYER. REMIND THESE PUBLIC SERVANTS WHY THEY HOLD THE POSITIONS THEY'RE IN. LET THEM KNOW THAT REQUIRING ONE SPECIFIC INSURANCE PROVIDER IS BLATANT DISCRIMINATION. IF ALL ELSE FAILS, YOU MAY WANT TO SEEK LEGAL ADVICE AND CONSIDER A CLASS ACTION LAW SUIT AGAINST THE OFFENDING GOVERNING BODY.

JUST REMEMBER, YOU'RE NOT ALONE! SPORT FLYERS OF AMERICA CAN HELP. FEEL FREE TO CALL US ANYTIME TO DISCUSS THIS ISSUE AND FIND OUT WAYS THAT CAN GET YOU BACK IN THE AIR AND FLYING HIGH!



# SPORT FLYERS OF AMERICA, INC.

## Benefits Summary / Application

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| → FREE R/C Modeler<br>Quarterly Issues     | → FREE Student/Instructor Coverage                               |
| → R/C Modeler - 50 % Off<br>Newstand Price | → FCC Liaison  |
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### 1997 INDIVIDUAL MEMBERSHIP APPLICATION

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VISA/MC \_\_\_\_\_ EXP. DATE \_\_\_\_\_

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**DIAL.....JOIN...FLY !**  
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FAX (201) 305 - 6686





## Soaring

### Beginner's Models — An Update

**T**wo months ago, I mentioned that there was a training sailplane available which is made from EPP (expanded polypropylene, I wrote the wrong thing by accident), which is a type of foam that you can squash and it springs back to shape. Well, now I've seen one of these things, and was so impressed that I bought one for my six- and eight-year-old sons to learn to fly on.

The TG-3 Foamie Trainer in Photo #1 is now available from Dave's Aircraft Works. I was getting ready to write about it when I ran across an article in the Harbor Soaring Society newsletter, my home club located in Costa Mesa, CA. Roger Saville had written about his experiences with the plane, so I am going to present a few of his words. Now to Roger:

"As the Training Coordinator for the HSS, I became aggravated by the lack of durability of the gliders that accompanied new fliers. I was determined to do something to help 'new guys' go home happy, rather than with a repair task. Our local hobby shop, Gyro Hobbies, donated to our club the most durable glider, the TG-3. I was amazed when I opened the box: there were only a few parts and pieces, not a stack of balsa. The manual was extremely

well thought-out. All parts are included except for glue, spray adhesive, filament tape, and covering. The instruction manual is the best I have seen. It's also a ground school for flying gliders. The instructions are thorough and fun with some good tips."

It only took Roger about 12 hours to complete the assembly, and the weight came out at about 37 oz. (about 1 kg). Roger continues:

"On its first day at the HSS field, I boldly did a mighty hand-launch of the TG-3. It ballooned up into the wind to an altitude of about 15 ft., then stalled and dived straight down into the ground. Many negative thoughts rushed through my mind as I awaited the usual sounds and debris resulting. To my amazement, the TG-3 bounced up about 6" from the point of impact. The nose covering

was wrinkled and the wing was askew. I adjusted the wing and gave it a level toss and it flew well. I was shocked and amazed, I was an instant believer in the spongy foam called EPP.

"The maneuverability is first rate. In thermals, it will stand on a wingtip and pull tight circles. It has been flown inverted all around the field. I hand-catch it or grab it, even when it is going too fast, since the nose is soft and the wings are strong.

"Durability is absolutely astounding. On at least two occasions, it was winch-launched into the ground, which normally results in instant re-kitting. But, after the tumbling stopped, the wing was slid back and it was relaunched. It is strange to witness



**Photo #1: Sturdy TG-3 Foamie Trainer and 1-26 hand-launch (in rear) from Dave's Aircraft Works. Totally indestructible!**



**Photo #2: The Crescent scratch-built model at the Toledo model show. Interesting platform, does it fly? We dunno!**



**Photo #3: DJ Aerotech produces a number of very competitive and reasonable hand-launch designs, including the Chrysalis at only US\$50. More details in text.**



**Photo #4: Ray Hayes of Sky Bench Aerotech is bringing back some of the more interesting older designs, such as the Challenger, a model which won many contests in the 70s. Modern-day touches include laser-cut parts.**



# BEES ARE EVERYWHERE

## ON LAND



BEES AT CHET'S RC COUNTRY, FUN FLY, SACRAMENTO

## ON SNOW & SEA



NEW BIG FLOATS

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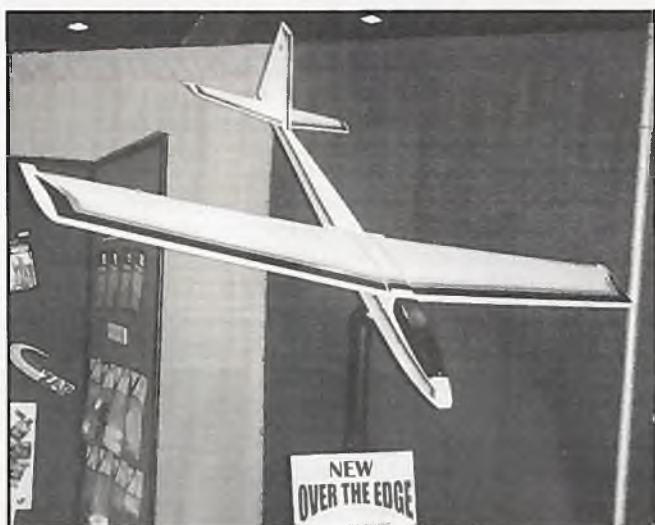


Photo #5: House of Balsa showed this slope trainer, the "Over the Edge." All wood with full hardware, accepts standard-sized R/C gear.

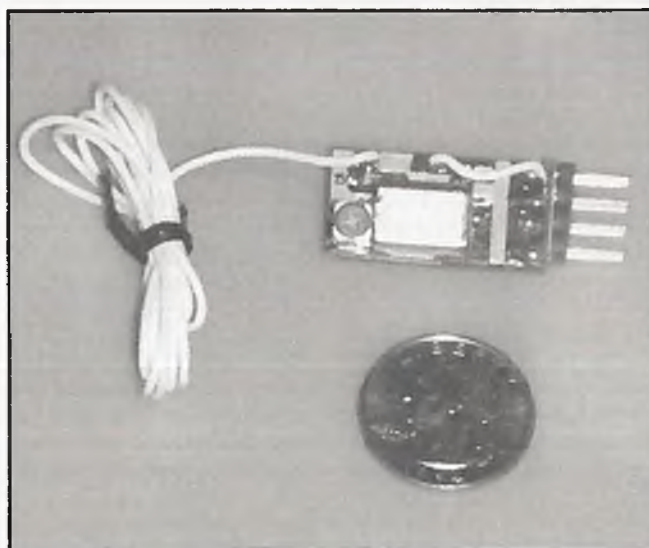


Photo #6: Dave Abbe (of DAD) showed this micro receiver he's working on — 9 grams weight without a case, and 12 g with case!

the amount of crashes and abuse and realize that the plane survives so well. I still enjoy dropping the plane at someone's feet and watch their surprise when it

bounces.

"In the first month, the TG-3 has changed its perception by club fliers from ugly duckling to the best training plane

that has appeared at our site. It is in demand for fun flying and has become the standard teaching glider. The members have become much more active in doing

## Too windy to fly? try R/C Sailboats

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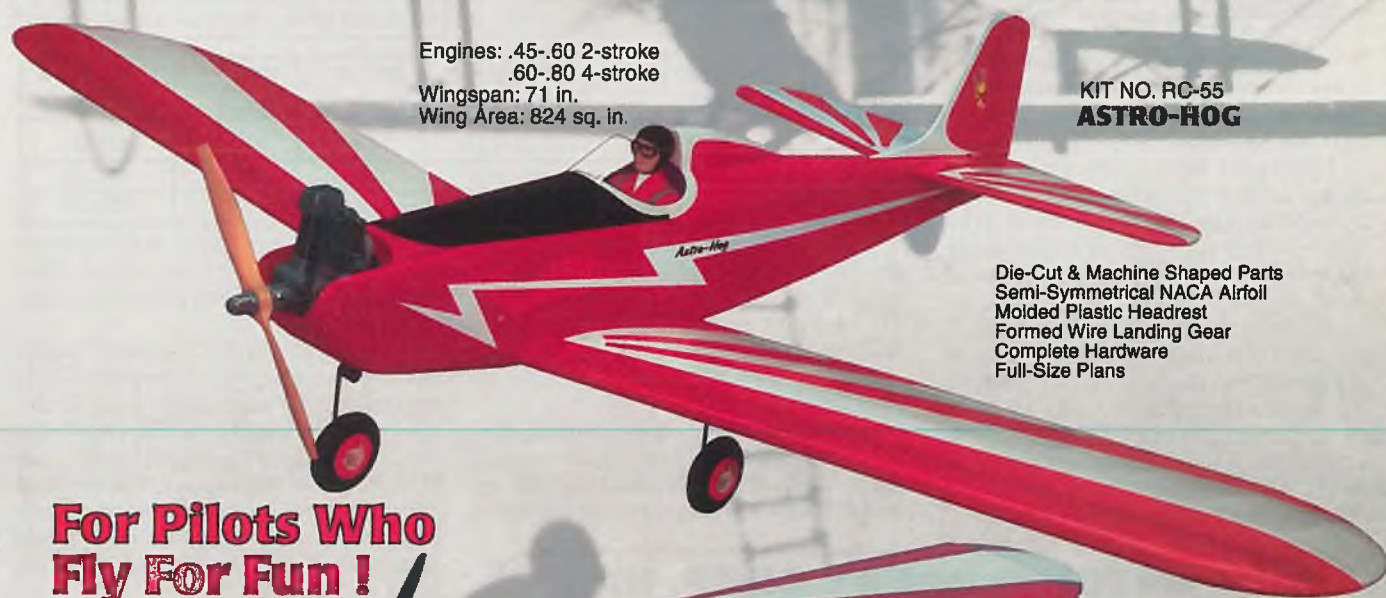


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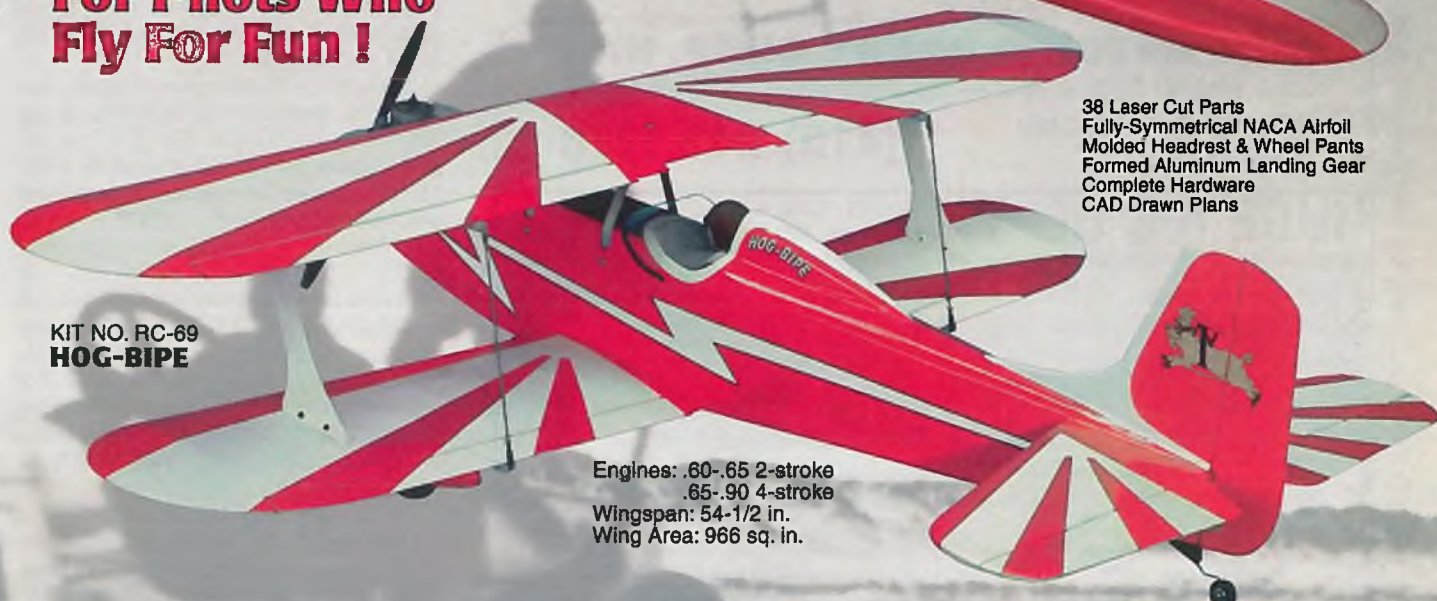


Engines: .45-.60 2-stroke  
.60-.80 4-stroke  
Wingspan: 71 in.  
Wing Area: 824 sq. in.

KIT NO. RC-55  
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Die-Cut & Machine Shaped Parts  
Semi-Symmetrical NACA Airfoil  
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.40 to a .60  
.60 to a .90  
.90 to a 1.20

novice training since they get to fly it too. It has thermalled right up through other planes and has been a tiny speck in the sky on many occasions.

"What can I say in conclusion? I like it. In fact, I like the trainer so much that I am building one just for me — the aileron option configuration. My reason for having my own is not for the primary feature of durability, but because it is a fun plane."

All I can say is that I have witnessed this plane at our field and none of this is an exaggeration! You can get a TG-3 Foamie Trainer kit for US\$69.95 + \$5.00 S&H from Dave's Aircraft Works, 34455 Camino El Molino, Capistrano Beach, CA 92624; Tel: (714) 248-2773; email:

104271.3352@compuserve.com

Servo	Dimensions (in)	Weight in oz. (grams)	Torque (in.-oz.)	Transit (sec.)	Retail Price (US\$)
S80	0.85 x 0.78 x 0.43	0.32 (9.1)	11.1	0.11	\$25.00
S90	0.85 x 0.93 x 0.43	0.42 (11.9)	20.8	0.14	\$20.00
VS100	1.10 x 1.18 x 0.45	0.46 (13.0)	22	0.16	\$35.00

DAW also sells some interesting slope combat warbirds, and an innovative EPP hand-launch model (in the back of the TG-3 in Photo #1) I'll be reporting on in a future column.

## 1997 Toledo Update

The Toledo model show, hosted by the Weak Signals club, is among the largest model shows in the U.S., and I was able to attend this great event on the way to a busi-

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Champion 45L ARF	145.99
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ness trip. It's a good place to see some of the new products being introduced. Here are some of the ones you glider types may be interested in.

Photo #2 shows the "Crescent" model built by John Hoover of Burton, MI. It appears that the name comes from the 2m span model's planform. This model is scratch-built and was finished with MonoKote and Hobbypoxy. The set-up is unconventional in that the entire radio is buried in the wing. The unusual airfoil is said to be a "high lift-to-drag section from McDonnell Douglas."

Photo #3 is the DJ Aerotech booth, featuring an assortment of hand-launch and larger models. There are four different versions of the polyhedral Monarch, a 59" (1.5m) span model for hand-launch and electric, ranging from US\$175 to \$195. The Wizard is a flaperon hand-launch or electric at US\$195, and the Chrysalis is an inexpensive "beginner's" hand-launch model at US\$50. DJ hand-launch models are very competitive, and the Chrysalis looks like a great beginner's plane. For more information on these interesting models, contact DJ Aerotech, 719 Fisk St., Piqua, OH 45356, Tel: (513) 773-6772, or email:

djwerks@bright.net

Photo #4 is Ray Hayes, the proprietor of Sky Bench Aerotech, and his products. This company specializes in wood kits of older models, such as Mini Bird of Time, the Osprey, a new kit of the Challenger, a model used quite successfully by Otto Heithecker in the mid-70s (when this

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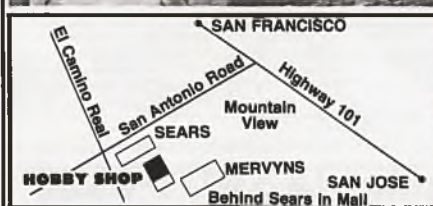
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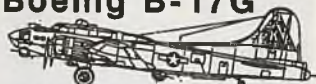


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# PLANS

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Wingspan 138 in. Length 98.4 in.  
Plans 8 sheets w/ SCALE VIEWS \$62.00

## Boeing B-29



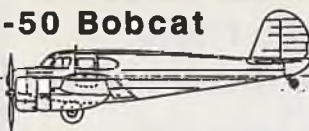
Wingspan 141 in. Length 99 in.  
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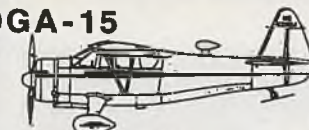
## Cessna T-50 Bobcat

Wingspan 100 in.  
Length 78.6 in.  
Plans 5 sheets  
\$55.00



## Howard DGA-15

Wingspan 95 in.  
Length 62.5 in.  
Plans 4 sheets  
\$47.00

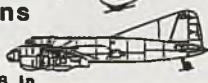


## New Enlarged Plans

Boeing B-29- 169 in.

Henschel 129- 111 in.

Messerschmitt 110- 118 in.



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MESSERSCHMITT 110	118"	58.00
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columnist was just starting out), and a new kit of the Bowlus is scheduled to be available by the time you read this. For more information, contact Sky Bench at POB 316, Washington, MI 48094; Tel: (810) 781-7018.

Photo #5 shows the "Over the Edge" slope trainer from House of Balsa. This is a 62" (1.57m) all-wood model accepting standard radio gear and even flat battery packs. It comes with full hardware and a free 1 oz. bottle of CA. These kits may be found at most hobby shops or retailers.

Photo #6 shows Dave Abbe's (of DAD fame) latest creation, a very small truly digital micro receiver he called the "Imp." By truly digital, it is meant technology similar to that used for garage door openers, where the information is preceded by a custom code, which would be different for each flier. This receiver would operate on 27 MHz but would be impervious to interference since it would only respond to its own code. This receiver is truly small and light — weight is estimated at 9 grams without a case, and 12 g with case! It'll be interesting to try this on a hand-launch model, but Dave told me it would be part of an inexpensive entry-level system, which would include the transmitter as well. We'll keep you posted on the development of this tiny receiver.

FMA Direct showed (sorry, my photo didn't come out) a bunch of servos, of which I felt three TINY ones were very interesting, the S80, S90, and VS100.

Their specifications are shown in the table.

These servos are very lightweight and yet they do not cost an "arm and a leg." Should be very helpful for hand-launch and small stuff. For more info on these and other interesting products, contact FMA Direct at 9607 Dr. Perry Rd. Unit 109, Ijamsville, MD 21754; Tel: (301) 831-8980, Orders (800) 343-2934, or email:

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\*

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(do I see air?)

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**MICRO WING SERVO DXLM 'long'** with unique 40" heavy gauge, drilled connector wire. Drilled wire prevents interference with radio signals. This servo is perfect for installation in wings or remote places. Powerful, high precision metal gear. 1.1x.5x1.1" 34oz torque/0.15sec 0.8 oz DXLM long JR/FUT plug No.14356

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NO annoying noise  
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### YES!

YES! Flying times are comparable to gas powered models  
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YES! Balsa built wings  
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YES! ON/OFF control of motor with the flick of a switch  
YES! They are a lot of fun to fly!

### "Take it Easy" \$99.95

Gentle and slow flying. Lightweight, self-righting with hands off the radio. Clark Y modified airfoil.

Balsa built wings, covered with TUFFSKIN, fuselage indestructible and light PE. Take it Easy :No.60100



**"CRAZEE"**  
Span 66", area 475sq", 39 oz, Ailerons  
Includes: Max 6 motor, propeller, RTF  
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Balsa built wings, covered with TUFFSKIN, assembles in minutes, indestructible PE fuselage, RG 15 airfoil Cessna Bird Dog: No.61100

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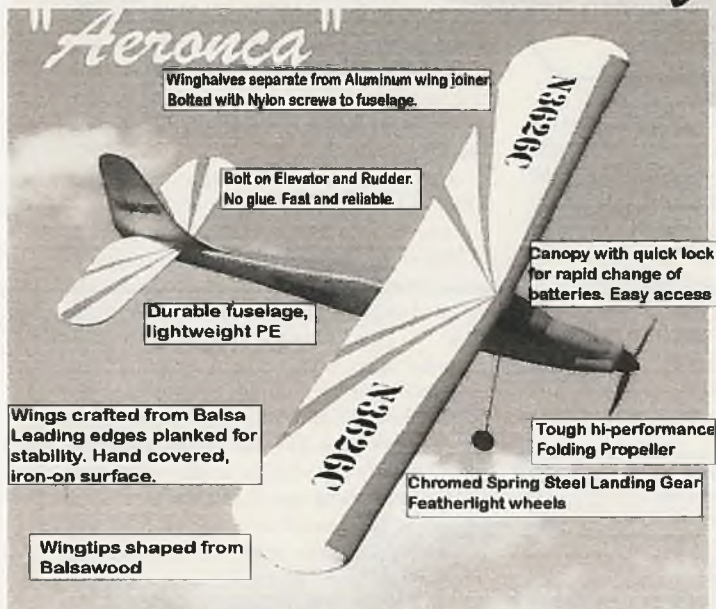
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*Cessna Bird Dog*

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Craze  
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## DCDC Peak Charger



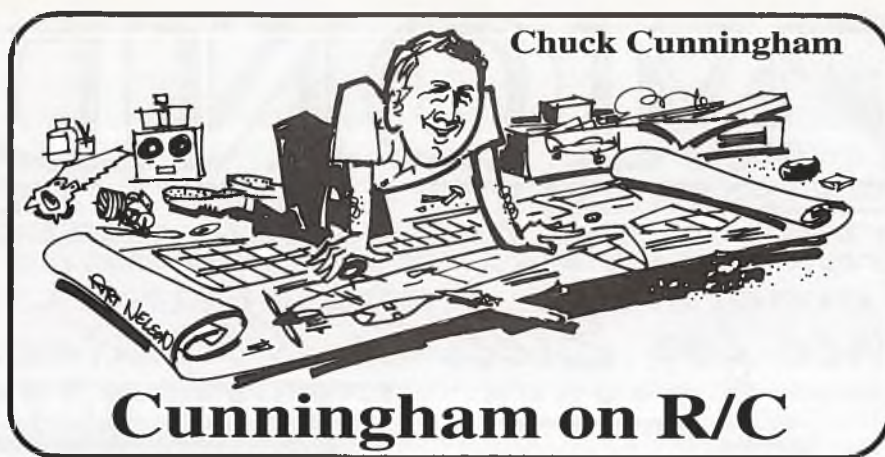
Automatic PeakCharger charges 6-7 cell packs in minutes. Adjustable to most NiCad's.

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**Dealer inquiries welcome.**





## FLOAT FLYING: PART II

Adding floats to a radio controlled model is an easy thing to do. Doing it correctly takes just a bit more time. If you have a set of commercial floats for your aircraft then install them according to the manufacturer's instructions (you did read them, didn't you?). However, if you are starting from scratch — both to build your floats and attach them to your model — read on, this is for you.

If you are considering adding floats to a

the distance from the nose of the float to the step should be approximately 50% of length of the float, depending upon how long the nose of your aircraft might be. It is desirable for the floats to protrude out ahead of the propeller by at least 2", based on the size of the floats used in our example.

If you are designing floats for a much larger or smaller model, then make allowances accordingly for the nose length and other features of your particular aircraft. For example, if you are putting floats

on the fuselage. Then, if it is tail heavy, add weight to the **nose of the floats** to bring it into correct balance. **Don't** add the weight to the fuselage — put it in the floats where it belongs. If you follow this procedure, your aircraft will still balance properly when you convert back to wheels.

Since you have already determined the necessary length for your floats, it is time to complete the design. It is a good idea to sketch it out on your aircraft plans, as it will save quite a bit of time when it comes to cutting and fitting parts. First, draw a line on your plans to represent the step. For most of our models, a 1" step will be sufficient. However, if you are using these ideas to design a small set of floats, then reduce the height of the step accordingly. For much larger models, you would, obviously, increase the height.

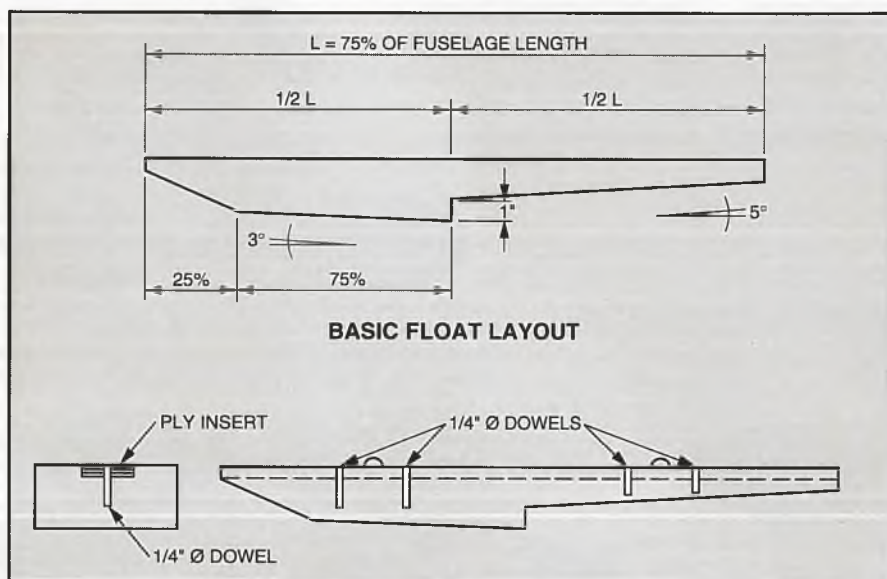
Having added floats to about twelve or more of my aircraft over the years, I began to realize two things that increased the ability of the aircraft to get off any type of water in a hurry. The first is to increase the upward angle of the rear of the floats from 3° to 5°. This keeps the aft end from dragging the water when making a take-off run. The second is to eliminate the curve at the forward end of the float, and make this a flat plane instead. This flat plane comes out of the water much more rapidly than does the curved or boat type forward shape. Take a look at the sketch accompanying this month's column to see what I am talking about with these two modifications. When making a take-off run with a set of floats, the idea is to get the model up on the step as quickly and as easily as possible. I have equipped my 62" Lazy Ace with a set of floats designed this way and it will almost leap off the water even though it may be as smooth as a mirror.

The height and width of the float is, again, a factor of the size of the aircraft. So, for our 36" long floats used in the example, the height should be about 3" and the width of each float should be about 4".

### Construction

Floats can be constructed from balsa and plywood for a built-up, or hollow, type of construction. You can also buy float kits that are molded out of plastic and, again, are hollow inside. These are very attractive floats, but you **must** make sure that all of the plastic seams are tightly sealed, and that there are no leaks. I have witnessed hard landings from aircraft equipped with both built-up balsa floats and hollow plastic floats where they sprang a leak, and almost ruining the aircraft they were designed to support. To prevent the latter from happening, make sure that all your float joints are tightly sealed, and that you practice and learn the technique of landing a float equipped model.

In my opinion, the best material for constructing floats is standard one pound Styrofoam — the same material that is used for hot wired foam wings. Several years ago, I brought you the information on how to figure the weight and size of the foam



simple trainer-type aircraft so that you can learn to fly from water, you really do not need to make them a thing of beauty and joy forever. If, on the other hand, you are building a set of floats for a really good looking model and your plan is to visit a number of float-flies, then you will want to take a bit more time with the finishing touches.

### Design

The first step is to decide how large your floats should be for your particular aircraft. A length of 75-80% of the length of the fuselage — measured from the back of the prop to the elevator hinge line — will give you the required overall length. As an example, let's assume that the fuselage length of your aircraft is 48"; 75% of that gives us 36" as an overall float length. Next,

on a larger model with an overall length of 72", then your float length needs to be 75% of 72", or 54" long, with the nose of the floats extending out ahead of the propeller by about 6% — 6% of 54" = 3.25".

A very important factor when figuring out the size of your floats is determining the balance point of your existing model, as it is when you are flying it with the wheels attached and when it has no fuel on board. Mark this "dry" balance point on your aircraft. Next, fill the fuel tank completely and determine the "wet" balance point and mark it on the aircraft. Now, you have two reference points. Locate the floats so that the step is right under the wet balance point. Later, when you are getting ready to fly, pick up the assembled aircraft and balance it on the dry balance point that you marked



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needed for just about any size model based upon the ability of the foam to support the weight of the model. You can figure this out for yourself if you really need to by assuming that a cubic foot of foam weighs one pound, and a cubic foot of water weighs about 60 lbs. Use a safety factor of two, and assume that a set of floats to support a 30 lb. aircraft will need to displace only one cubic foot of water.

When making floats from Styrofoam, you do not need to use a hot wire. Instead, you can use a band saw with a 15-tooth, or a metal cutting blade. If you don't have a band saw, a hand saw will also work. Whichever method you use, simply draw the float outline on the side of the foam block with a felt marking pen and cut out the float. Make two that are just alike, then sand each float with fine sandpaper. Use a vacuum cleaner to get all of the sanding dust off of the float.

Next, you need to groove the top of each float to accept the plywood stiff back. You can glue the stiff back to the top of the float without making a groove, but to make it aesthetically pleasing, you should recess it into the foam. This can be done with an X-Acto knife and a sand block or, more easily, with router and table. If you do not have the latter, you will find that the router bit will fit into a small drill press. You can make the "upside down" router table by mounting the bit into the drill press, then blocking up the table of the drill press so that the router bit cuts a groove 1/4" deep. If

this is the method you are going to use to cut the groove in the top surface, then do this router operation prior to cutting out the side view of the float.

Once you have cut the slot, make a stiff back out of 1/4" plywood, running the full length of the float. Glue it in place with epoxy. When the epoxy has dried, drill the 1/4" holes as shown in the drawing, filling each hole with epoxy and inserting a 1/4" dowel into each hole. Cut the dowels off flush with the top of the stiff back. Do not eliminate this step, as the dowels transfer the load from the stiff back to the Styrofoam. Without the dowels, the stiff back will tear loose from the Styrofoam as soon as you make your first really rough landing.

From this point on you can make the decision as to the type of finish you want on your floats. You can glue balsa over the foam, then progressively fine sand the wood and, finally, spray paint the floats to match the finish on your aircraft. Make sure you use a paint that will not harm the foam inside should it penetrate the balsa.

The finishing touch is to set the aircraft-to-float connections so that the wing is sitting positive to the top of the float. A 1/2" positive angle relative to the float will do it for a wing with a 12" chord. Remember — you want the wing to help lift the aircraft from the surface adhesion of the water.

See you next month.



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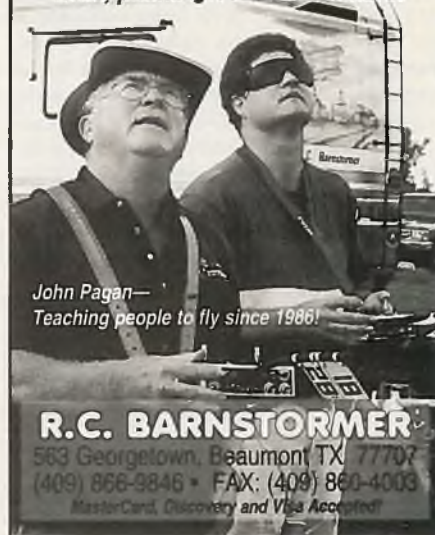
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## Big is Beautiful

### Bagging A Biggie

**Y**ou now have your giant model all framed up and ready to cover, right? How many bed sheets will it take to cover it all? Don't laugh ... that's what it will seem like if you've never covered a giant before. Expense-wise, the extra cost of a gas engine may not be too far from what you are used to, but covering and finishing can be a different story. It just takes so darn much more! But, boy, do we have a lot of choices! Anything that we are used to can work ... as well as curtain fabrics to Stits polyester used to cover full-size gliders. When it comes to finish, it has to be gasolineproof, but you still have many choices ... from polyurethane to house paint!

You will marvel at the ease and convenience of our modeling products when you try to use another fabric that doesn't have the "iron on" features. It harkens back to the days of doping on Japanese tissue. Dope the framework, lay on and stretch wrinkles out of the damp tissue, and again dope down edges. You don't dampen fabrics but the process is similar. "Stits" has a whole line of products used for full-scale covering. Everything from sticking the fabric down to a UV resistant finish and you can top it off with Randolph dopes that are often the exact scale color you seek. I get my materials from aircraft supply and repair businesses and it can be a little expensive. Some outlets sell only in bulk amounts but if you have a buddy who can use the same colors and will split the cost, it can result in a reasonable choice. This one modeler I know builds at least a giant a year, but they are all the same color! He must have had to buy a barrel of that paint or it was a deal he couldn't refuse!

I wasn't kidding about using house paint. It's been used for many years by giant builders. You may have to mix and match to get a desired color but it works. You might compare pricing of fabrics as well as paints before any hard decisions are made. Check out those fabric stores, buy a few samples, and try them out. Make a frame a foot square, dope down edges, and

let dry. Try the heat shrinking capabilities and put a couple of coats of finish on the sample. When done, set that sample out in the hot sun. See if you are going to have sag problems from the heat. I hate that. A pretty, newly finish model, set out into a hot Las Vegas sun soon looks like a wrinkled sock! That can happen with modeling materials just as well. I have tried many coverings and finishes and all have their drawbacks. A covering may be cheaper than Coverite, but then you have to have something to paste it down with and costs



**Author's Piper L-4 is finished with SolarTex and clear dope. Cabin area is lithoplate framed, with scale-like rivets and creases. Note how rib pinking tape stands out by just opposing covering grain.**

may equal out in the long run. For those who are not adventurous enough to strike out on their own, I'll go through my favorite covering and finishing process. Bear in mind that I hate this part of the modeling process and will only devote enough time to allow me some satisfaction with the results.

My favorite trick is to use SolarTex that has the desired color. Stick it on and a clear finish means I only have to do trim painting. I have used MonoKote on 9' models and it worked to my satisfaction except that, with some colors, the covering seemed to get brittle with age. I once was making a vertical descent by holding elevator and yawing my model in a pretty good head wind. It looked pretty neat until the descent got below the treetop level surrounding the site. The bottom fell out.

Made to do cartwheels, my model suffered only bent landing gear but that covering shattered like glass ... one end to the other. But, if covered correctly with MonoKote, that model can be the nicest and fastest covering possible. Take extra pains to have that covering as tight and wrinkle-free as possible **before** all edges are ironed down. This will minimize any sags from the sun's heat.

Any iron on fabric I use is sprayed with numerous coats of Randolph's butyrate dope, bought by the gallon and, used with their thinner, mixed 50-50. Test a dry open area of the covering. Thump it by flicking it with your forefinger. If the sound isn't like drum tight or a little metallic, coat it again. I can often get by with a good fog coat and then a wet coat. This works fine if the finish color is also dope. One of my "clear" finishes will have three or four coats minimum. Many times this dope is applied with a three or four inch fine bristle brush. Trim colors will be from a \$2.00 spray can of Krylon or a "quality" finish will use Formula-U Polyurethane — fast and easy. The big problem here is mixing mediums. A doped fabric with poly-u is almost impossible to patch paint or make repairs. Poly-u on dope is okay but dope on poly-u is a mess.

One other thing comes to mind. I hate seeing sheet plastic stuck on the outside of a plane's finished covering. Yuk! While framing that cabin area, plan for a frame to go around that window. I often install side windows before the painting is done and apply prepainted frame stock to suit. The now inset windows have a wide prepainted frame installed over them. The width is enough to allow the covering fabric to be fixed in place. If this is impossible or framing stock doesn't sound appealing to you, use some lithoplate or very light aluminum to fashion frames. With little effort, this can look very scale-like. A ball point pen and a straightedge allows you to score lines on the reverse side that look exactly like reinforcing bends as well as to adjust thickness change from window surface to the covering. Another little trick is to use a spring-loaded center punch to make "rivets" from the reverse side. Adjust spring tension so it doesn't exaggerate the dimples or punch holes all the way through. You may have to experiment with a "backing" surface when making the rivets. Balsa can work just fine. Make a practice example; it doesn't take any time to do a first class job. It may be easier to draw frame lines on your material and using a ruler as a straightedge, as well as a measuring tool to just pop in a row of rivets in nothing flat. Cut the frames out before adding any scored lines. A bead of silicone can attach the frames to last the lifetime of the model.

A sewed sleeve of covering, slipped

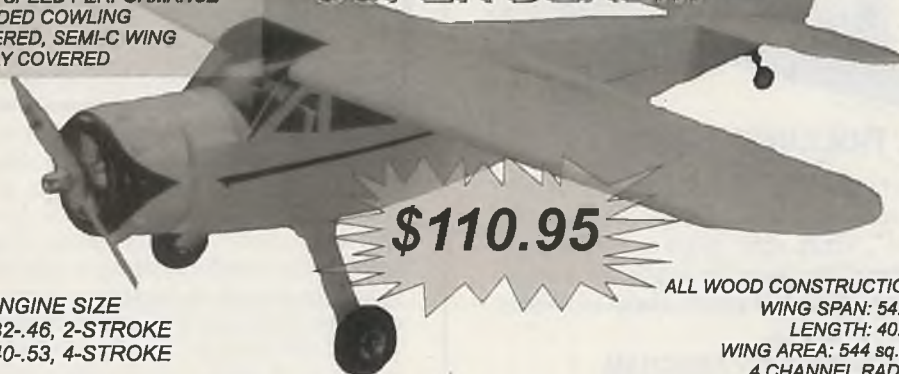


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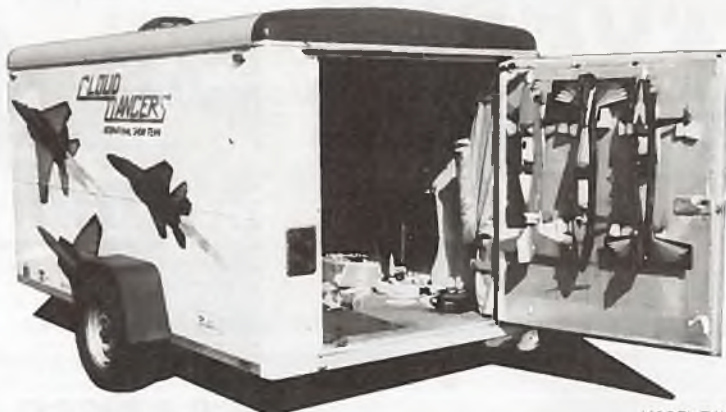
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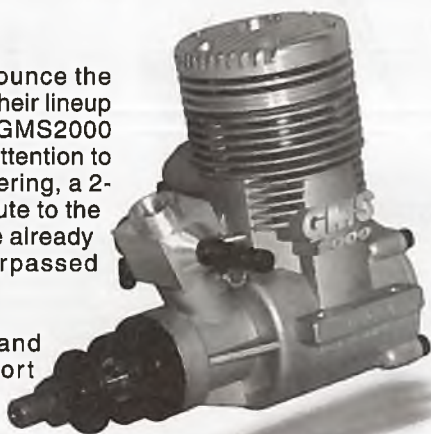
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over framework and then shrunk to fit, is a method used on full-size. Old "BIB" Dick Phillips details this method in his "Building Big Is Beautiful" manual, but I have never tried it. It always seems to me that I have to stretch everything as tight as I can, or the amount of shrinkage is just not enough to keep sags out. I pay attention to a fabric with grain to it, such as SolarTex — that grain always goes span-wise or length-wise. Then, with a clear finish, I can cut pinked tape with appropriate sized pinking shears from a fabric store. Try cutting the tape pieces so that the grain is opposite that in the area where the tape is ironed on. Wing tape will be cut with the grain because it will be ironed on like rib caps, opposite to the span-wise covering. A clear coat finish and opposed grain makes the pinking tape stand out without being obtrusive at all. A subtle but distinct effect is achieved.

When it comes to taping off areas for trim paint, I never have much luck. It seems that I always have to get out a fine tipped paint brush to fix seepage. But, my best luck seems to be with plain old vinyl shelf paper. Make the mask or edging strips, apply them to the model, and put at least two coats of clear down those edges. Be extra careful with stretching those edges out of shape or you will get the seepage under there. Now, I'm gonna get the seepage outa here and see ya again next time!



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All photos shown were taken using Top Flite's 1/5 scale Cessna 182 Skylane model kit.

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# JAVELIN

By **Bill Winter/John Hunton**

Photos By **Bernie Stuecker**

## Introduction

**Y**ou know your airplanes, so run these numbers by: a new piped K&B .40: a span of 42-5/8", a gross of 4 lbs. 15 oz., and a wing loading of 17.67 oz./sq. ft. Doesn't compute? Yes, it does. For starters, the delta wing provides an area of 644 sq. in. The ultra short-coupled canard "tail" adds another 125 sq. in. and, since it is set at a positive angle of incidence, it is a lifting surface, unlike conventional stabilizers which normally provide a down-load for pitch stability. Include the foreplane area, and the loading drops close to 15 oz./sq. ft. For less fiery performance, we found a plain bearing O.S. .40 to be quite satisfactory.

Obviously, with the K&B, it goes like a scalded cat, climbs like a monkey, yet it behaves. It is quite stable due to the nature of the delta and stays where you put it. Roll is anything you crave; let up on the stick and rotation stops like a razor slash. Take-offs are short, landings smooth, though a tad faster. It is safe to fly in any maneuver; there are no X-ship quirks. But ask yourself one question before taking the leap. Do I know myself to be a capable pilot? This plane is on the small side, can be quite fast, and covers a lot of ground quickly, perhaps more so than other airplanes in your log book. Of course, its slotted canard/wing arrangement, with a delta's resistance to



**Bill Winter holding his prototype delta canard design. Model tested with both the O.S. and K&B engines.**



**Javelin is a compact model, transportable fully assembled in a subcompact. Note black nose ring extension, the only thing to be added to adapt from the plain bearing O.S. .40 to the K&B 4050.**

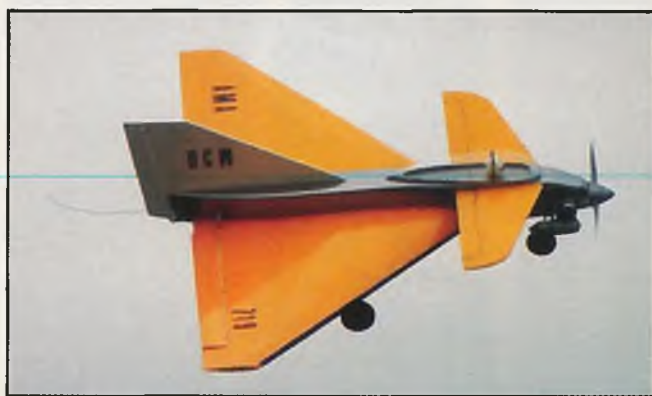


**Javelin has plenty of wing area packed into a small space. Model flies normally in pitch but has reactive roll control because of the low aspect ratio. Note elevons on mainplane as well as elevators on the foreplane. Rear elevons are mechanically mixed for roll control.**





**LEFT:** K&B 4050 is a potent power plant perfectly matched to the Javelin for exciting performance. Racing type engine with tuned muffler. High-end power is very good. **RIGHT:** John Hunton approximates angle of climb at take-off. Model has excellent low velocity controllability and stall characteristics.



**LEFT:** Javelin at point of take-off. Take-off tracking is excellent. Landings are made at a higher angle of attack than normal. Leave plenty of room for your first landings, it will take a while to learn to slow the model down. **RIGHT:** The delta/canard during fly-by. Model has excellent low speed flight characteristics, yet is capable of very fast flight. Can near hover in a light breeze. Get used to unusual configuration slowly, keep model in close until you are used to it.

dropping a tip, and affinity for high angles of attack means that it probably has a greater speed range -- high-to-low ratio -- than anything that you have owned. So you can always throttle down and come off the pipe.

Important, choice of power plants. The lower range is a plain bearing .40; the top, a ball bearing piped .40. The former provides performance beyond any trainer type .40 airplane. So powered, the Javelin is in the performance category. With the piped .40, the Javelin is for qualified pilots.

It will take off and fly without being on the pipe. Then, if you throttle back a bit, it will come off the pipe (if you need a breather). Incidentally, Javelin will climb vertically on the piped engine, and can do four rolls while doing so -- then it comes off the pipe. The instant speed is restored, it goes back on the pipe.

Javelin is not an off-the-top-of-the-head design. It is the third of three progressive, related designs, the first of which was the successful pusher canard Q.E.D. The second was a double delta pusher, that is, a 60°/45° single surface. Solid experience with these two craft pointed the way to the

ultimate of the trio: the Javelin. A few points of interest:

The Javelin is a 4-channel aircraft and has elevators on the foreplane, elevons on the mainplane, rudder/steering, and throttle. That is a lot for your money. Those having more exotic radios can replace the sliding servo tray with two servos for the elevons and, thus, take advantage of various mixing and movements. Be sure not to exceed the specified control surface movements -- notably on aileron -- and don't second-guess the C.G. position. All servos are in the fuselage as well as a mechanical mixer tray to drive the elevons, and by an auxiliary short pushrod, the foreplane elevators.

The delta wing is special. Its geometry, with bottom surface rising to tips, provides effective dihedral. Seen from the back, the dihedral is visible along the trailing edge. The trailing edge rises from the centerline, which also governs the incidence angle of each rib section.

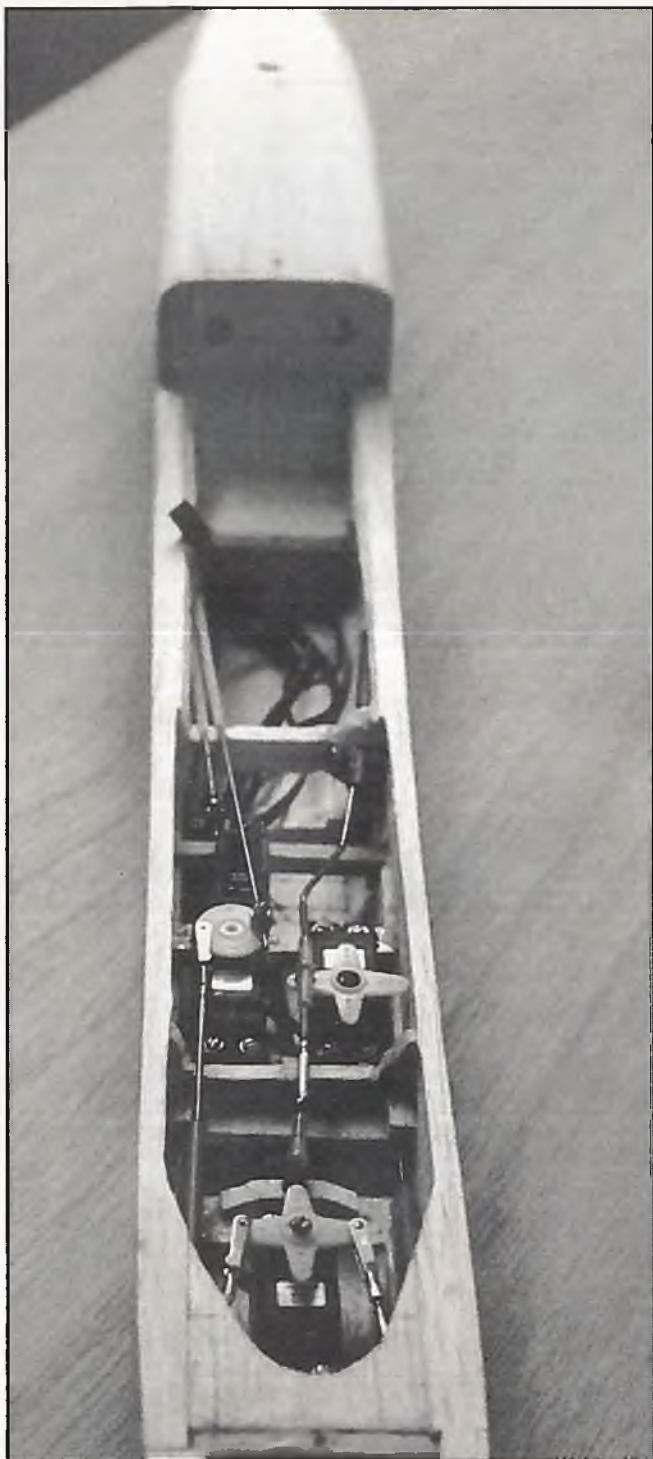
The blending of a canard configuration with a full delta alters the aero-genetic code. It allows delta good stuff, with modified delta traits to allow normal landings, and



**Bill Winter holding his prototype with John Hunton who flight tested the model and drew up the plans.**

so on. This is a well-tested machine. It is a small airplane with big performance. Just fly it like anything else -- but with respect. (Flight test comments appear after construction notes)





**Bottom of fuselage showing partially completed fuselage and servo installation. Mechanically mixed elevon servo is nearest one, sliding tray for elevon function.**

#### CONSTRUCTION

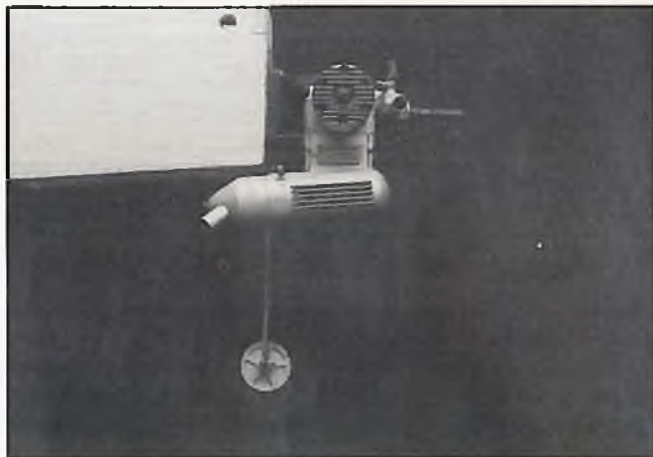
##### General:

Balsa sizes are shown on the plans and are not generally given in the text. When you order your balsa, specify light wood except for the wing skins, which are medium (if you used a cubic foot of 8 lb. balsa, the model would weigh 8 lbs. without anything else). The 1/4" sheet used in the fuselage should be in the 4-6 lb. range. Recommended glues are Titebond (easily sandable and for relatively slow-drying applications) and CA (cyanoacrylate for quick adhesion) in both thin and medium

grades, and 30-minute epoxy.

##### Fuselage:

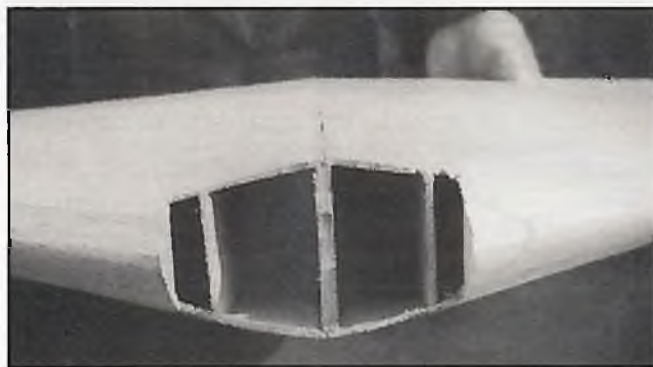
Assemble the two side profile pieces as rectangles 35" x 5". Butt joint as required. Plans show 4" butted to 1". Pin down the wider pieces over wax paper, then run a thin bead of slower CA over the joining edge of the narrower piece and push it against the wide piece, holding it with pins. The rectangle length allows 1/8" waste at both ends for truing up. Remove the pins and sand both sides of the blanks with fine paper on a block. With a square and a soft pencil, mark



**O.S. .40 plain bearing engine installed. The O.S. provides lower power but still snappy performance.**



**Engine compartment. Install nose wheel then fill in triangular fairing. Same mount fits both O.S. .40 and new K&B 4050. For K&B, a nose ring must be added behind spinner.**



**Wing is built to the front point, then the front is partially removed to add dowel hold-down assembly. Low aspect ratio wing is light. Top of wing is flat, bottom tapers up.**

off the rear edges of all bulkhead locations. Carefully note that the fire wall position is to be marked different on each side to produce the correct amount of right thrust. Identify a right and left side. Make a thin cardboard pattern of the wing cutout and accurately scribe with a pencil around the areas to be removed. Draw the straight-line edges of the side profile with a straightedge, allowing for later addition of the top and bottom pieces, etc. When the sides are joined later, the section marks will be the inside surfaces of the sides, so be sure in

*Continued on page 157*



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Continued from page 152

drawing all indicators that one side is marked left and the other right.

Pin the blanks together and true all edges to identical outlines. Place a sheet of sandpaper on the workbench and slide the paired sides back and forth with a milling action. Part the sides, then taper the aft ends for joining later. Cut top rectangles from 1/4" x 3" sheets as follows: 6-1/8", 5-15/16", and 19-3/4" long. These parts comprise the removable canopy section, fixed section immediately aft of it, and the main top sheet to the rudder post. Sand each to exact plan dimensions and mating end slopes (there is additional length allowed for sanding). Scribe the top fuselage outlines on the long aft piece. Cut this piece and the wing cutouts in the sides to the outside of the line with your Dremel jig saw (or available tool). If an X-Acto No. 11 blade knife is used, be sure that the cut is precisely perpendicular to the wood. Make repeated light cuts. Allow extra wood for tolerance, to be trued afterward.

Cut the forward bottom part slightly over length from 1/2" balsa and sand the ends to the required length and angle. Do not install yet. Prepare the plywood foreplane seat outline and remove the unwanted interior area as shown with a jig or coping saw.

Note the materials and details of each

bulkhead and assemble all to the exact required widths (do not install yet). Drill required holes for pushrods, blind nuts, and engine mount. The engine mount used had holes for the nose wheel strut, but because



**Fuselage and wing assembled. Fit wing accurately to fuselage at this point. Add strips of tape to the wing, color with lipstick, fit to fuselage, and remove portions where lipstick shows up. Technique is used by gunsmiths to fit stocks to rifles.**

the mount is turned on its side, similar holes (5/32" dia.) must be drilled sideways through the stock mount.

Coat the front face of the fire wall with epoxy and allow to set. Trial install engine and nose gear (engine will be removed before final nose shaping and will be reinstalled after fuselage has been finished).

Note that the sides of the fuselage run parallel from just behind section 2 to section 5. Also, note that the fire wall is

sloped for down thrust as shown. The typical triangular corner pieces run between formers, not through them. Check section drawings.

Pin down the left side of the fuselage (looking forward) and trial fit, then glue on formers 3, 4, and 5. Use a small triangle to check that each former is at 90° to the side. Repeat the process with the fire wall (former No. 2) at the correct angle for down thrust (following this process properly will create the approximate correct amount of right thrust for the engine when the right side is glued in place).

Lay a straightedge along the exposed edges of the formers, and trim any that need it to prevent gaps when the other side is installed. Coat the mating edges of all formers, except for the fire wall, with Titebond (for time) and install the right side. Use epoxy for the fire wall. After this assembly has cured completely, pin the long aft section of the top sheet to your workbench and glue the assembled sides in place from the front of the top sheet to former 5, without pulling the sides together at the rudder post. After this subassembly has cured, pull the sides together at the rear so that the shaped top piece provides accurate alignment for the sides. Attach the remaining free top parts to the assembled sides with CA for instant capture. Install formers

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6 and 7 which force those stations to their proper rectangular cross sections. During assembly, check frequently with a triangle for trueness.

Coat the free side of the fire wall with epoxy and pull the nose sides in to make good contact with the left side of the fire wall approximately 1/16" forward of the right side for proper side thrust. Next, temporarily install the engine and engine mount to the fire wall.

To install former 1, check the type of spinner you will use and make a temporary centering support for the nose ring former which will provide proper spinner clearance (approximately 1/16"). Pull the sides together using a large clamp and pieces of plywood to spread the load and protect the sides. Things will go easier if you soak the front sides in hot water for 15 minutes. Sturdy pieces of balsa sticks can be used for clamps by placing them vertical to the fuse sides, then rubber band around them across the fuselage top and bottom. True the fronts of the sides with a sanding block, then glue the plywood ring former in place. Trial fit, then glue the foreplane mount in place. Install the 3/4" thick top nose block. Leave the entire bottom of the fuselage open for installation of all servos, pushrods, and R/C equipment.

Check that the servo mounting rails are suitable for your equipment, and cut them out. Glue to the inner faces of the fuselage sides where shown. Be sure that the bottoms of your servos clear the fuselage top sheet; if not, gouge out the sheeting for clearance.

Du-Bro linkage items are shown. A mini-servo is shown for the throttle; substitute, if necessary. To assist in lining up the pushrods, draw routing on the outside of the fuselage, push a pin through to mark hole positions, etc. Drill holes to start the sheath openings through the sides, then work the slots with a thin, round file or piece of music wire, or a drill bit held in the fingers. Don't glue anything until the servo support crosspieces are trial fitted, along with all servos and linkages. Before final assembly, solder the two clevises (shiny type) at the elevator servo arm -- do this outside the air- plane.

Details of the servo tray are given. Movement of the elevator stick moves the tray fore and aft. This allows for simultaneous inputs from the elevator and aileron sticks. Note that a pushrod extends forward from the elevator servo to the foreplane elevators as well as to the sliding tray. If your radio has sufficient channels, you may wish to substitute your own mixed servo arrangements to eliminate the sliding tray, but that requires an additional servo (one for each elevon). Be sure that the controls are rigged so that the elevons go up when the foreplane elevators go down.

**Note:** We do not recommend flying this model with foreplane elevator only. After the prototype was thoroughly tested, we unhooked the elevator function of the coupled elevons. Pitch control became marginal. This model was designed to use both foreplane elevators and coupled elevons (working in opposition).

## JAVELIN

Designed by:

Bill Winter

### TYPE AIRCRAFT

Sport Canard

### WINGSPAN

42-5/8 Inches

### WING CHORD

15-1/4 Inches (Avg.)

### TOTAL WING AREA

650 Sq. In.

### WING LOCATION

Low Wing

### AIRFOIL

Semi-Symmetrical

### WING PLANFORM

Delta

### DIHEDRAL, EACH TIP

0

### OVERALL FUSELAGE LENGTH

41-1/2 Inches

### RADIO COMPARTMENT SIZE

(L) 20" (W) 2-1/2" (H) 2"

### FOREPLANE SPAN

24 Inches

### FOREPLANE CHORD (Inc. elev.)

5-3/4 Inches

### FOREPLANE AREA

138 Sq. In.

### FOREPLANE AIRFOIL SECTION

Flat

### FOREPLANE LOCATION

Shoulder-Front

### VERTICAL FIN HEIGHT

8-1/4 Inches

### VERTICAL FIN WIDTH (Inc. rud.)

12 Inches (Avg.)

### REC. ENGINE SIZE

.40 2-Stroke

### FUEL TANK SIZE

8 Ounces

### LANDING GEAR

Tricycle

### REC. NO. OF CHANNELS

4

### CONTROL FUNCTIONS

Rud., Elev., Throt., Elevons

C.G. (from L.E.)

6-1/8 Inches (At Fuselage)

### ELEVATOR THROWS

1/2" Up — 1/2" Down

### AILERON THROWS

1/2" Up — 1/2" Down

### RUDDER THROWS

1" Left — 1" Right

### SIDETHRUST

1-1/2" (Right)

### DOWNTHRUST/UPTHRUST

2°

### BASIC MATERIALS USED IN CONSTRUCTION

Fuselage ..... Balsa & Ply

Wing ..... Balsa, Ply & Hardwood

Empennage ..... Balsa

Wt. Ready To Fly 79 Oz. (4 Lbs., 15 Oz.)

Wing Loading ..... 15.0 Oz./Sq. Ft.

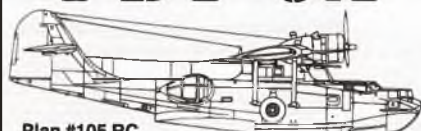
Cut out and glue in place, aft of section 7, the block for the wing hold-down bolt, but do not drill the bolt hole yet.

At this point, set the fuselage aside and make the wing so that it can be trial-fitted for precise dowel location before the fuselage is closed in. After drilling for the wing dowels, continue with the fuselage as follows:

Install the triangular corner reinforcement pieces. Press the curved parts into the side contours where required, or cut slit

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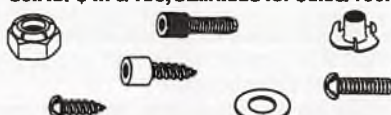
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wedges into the diagonal faces of the triangles to assist placement, if necessary.

Pre-fit the bottom nose sheet and drill to clear the nose gear wire, but do not glue on yet. Install the fuel tank and as much plumbing as can be done at this stage. Remove the engine, tank, and mount, install the remaining triangular parts, then coat the inside of the engine and fuel compartments with epoxy. Drill a drain hole in the engine and tank compartment bottoms. Remove any projecting pushrods or the switch. Round off fuselage corners per section views by rough sanding or with a razor plane. Note foreplane seat and canopy area and avoid over-rounding in these areas.

Mark the centerline of the top rear fuselage sheet and cut holes for fin attachment tabs.

### **Canopy/Foreplane Hatch:**

Cut out the canopy base from 1/4" sheet (match to your particular canopy shape if required). Trial fit the canopy to the base by gently sanding the wood to match the canopy slope around the perimeter. The mount will be glued (later) to the top of the built-up fairing block which is cross sectioned to fit on top of the foreplane between sections 2 and 3. This fairing "block" is assembled as detailed from two 1/4" balsa triangular pieces, a 1/4" sheet plate, and reinforced with two 1/2" triangle corner pieces. The assembly is nominally 6-1/8" long, 3" wide, 3/4" thick at the rear, and 1/4" thick at the front.

To fit and contour the canopy hatch, lay

1/4" thick spacers on the ply foreplane mounting plate to allow clearance for the canard. Place wax paper over the top fuselage opening, mount the canopy assembly in place, then shape to the fuselage with a sanding board. Remove the hatch.

When the foreplane is finished, position it in accurate alignment and carefully mark the outline of the canopy hatch assembly on the fuselage (assembly floats free aft of section 3). Set aside.

### **Foreplane:**

The basic foreplane blank is 21" long with a center chord of 6" and a tip chord of 2". It is butt-jointed from two 3" wide sheets. Selection of proper balsa for the foreplane is very important because of the aerodynamic loads that this surface will take during maneuvers. Use firm, straight grained balsa for the full-span sheet and the leading edge reinforcements. Use medium-to-light balsa elsewhere. Pin down the full-span portion and butt-glue the sheeting joint. Note that the trailing edge is notched out for the elevator joiner dowel so that the elevator joiner is not offset when the elevator is actuated. Note the grain direction of the tip pieces. Butt-glue them on. True the leading edges of the assembly with a straightedge or a sanding block over the edge of your workbench, then install the 1/4" sq. leading edge parts. Round off the leading edges.

Assemble the two elevator blanks and connecting dowel piece snugly against the rear of the main surface with a strip of wax

paper between them and the foreplane. Pin all parts down accurately. Use Titebond on the dowel joint. After it is cured, pick up the work, then taper-sand one side of the elevator assembly with a sanding board. Shape the elevator hinge line as shown on the plans.

Mark locations of the foreplane hold-down screws on the assembly. Pin the foreplane assembly over the plywood foreplane mount. Drill 1/16" dia. guide holes for No. 8 self-tapping sheet metal type mounting screws. There are four such screws to hold down the removable foreplane (for tank access) and two in the canopy assembly. The plastic canopy will be attached to its base frame with six No. 2 sheet metal screws. After installing the screws, remove them and strengthen the holes with CA. Temporarily install the hinges and elevator horn, but remove them until covering is complete. Robart hinge points were used on the prototype, but plastic hinges may be substituted. See detail.

### **Fin and Rudder:**

Noting grain directions, assemble the fin surfaces as you did the foreplane; however, there is no leading edge strip. Dry-fit the rudder hinges and check the fuselage fit. Fin tabs should be snug.

### **Wing:**

The wing is built inverted with the top diagonal spar flush with the workbench. Since the forward cutout which butts against the fuselage is not made until the wing structure is otherwise complete, the leading



edge pieces are extended and taper-joined at the centerline.

Measurements are given with each rib outline for elevation of the trailing edge from the workbench. Note that there are top and bottom auxiliary spars which are interrupted at the intersection of the diagonal main spars. A short 1/4" sq. doubler bridges this cut at the main spars.

Cut out the ribs, trimming the leading edges and edges of the diagonal spar notches at 45°. Remember that there are left and right-handed ribs, so trim ribs and cut notches accordingly. Laminate the two center ribs and cut the lightening holes. Note that there is an "inner" and "outer" leading edge. The 1/4" thick inner one is installed while the frame is on the board. This part provides for easy attachment of the leading edge sheets. The outer leading edges are installed after the frame has been skinned. Both of the leading edge pieces taper span-wise; the inner edge from 1-3/8" to 3/8" at the tips. All leading edge pieces are 30-1/4" long to start. Use a straightedge to mark and cut out the inner leading edge from a single sheet of 2" wide balsa. All leading edge pieces as well as skinning sheets require straight mating edges. To true the edges, clamp each piece down along the bench edge, then trim using a straightedge cut, or sand with a block.

The wing can be built in two halves to be joined later, or if your bench is large enough, build the entire wing at once. Begin assembly by pinning down the top diagonal spars. Lay the auxiliary spars in place and lift these up into place with balsa wedges, where necessary, after the ribs have been placed. Pin the trailing edges in place on the jig pieces. Check for alignment with a straightedge. Locate ribs with a small triangle to set each rib at right angles to the board. If fits are snug, use CA; otherwise, fill with a wood sliver where necessary and then glue.

Install the bottom auxiliary spars and the landing gear blocks. Check trueness of the installed rib leading edges with a straightedge and trim slightly where necessary. Pin the inner leading edge in place. At the center rib, it should be roughly 3/4" off the bench and 3/32" off at the tip. Avoid force fits. If gaps occur, fill with a shaved sliver and glue.

Drill landing gear wire holes in the hardwood blocks. Cut out plywood rib doublers, check fit, then install. Lift the wing assembly from the bench. Join the center section if built in two halves. Slope-sand top and bottoms of the inner leading and trailing edges to match rib contours. True all ribs with a sanding block so that the balsa skin will lay flat. Rub a straightedge over the ribs to read high spots and sand lightly without losing the airfoil shape.

Pin the bottom leading edge 4" width sheet on one wing panel. Apply thin CA through the open side of the panel. Start the sheet at the mid-point of the diagonal spar to allow a land for the remaining sheeting. The sheet should extend slightly beyond the



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inner leading edge part and will be trimmed later. Repeat for the other panel. Add the remaining sheeting, being sure that all butt lines are closely fit and flush with the wing surface.

Trim and block-sand the inner leading edge flat, then install the outer leading edge with Titebond and let dry overnight. The outer leading edge can be laminated from 1/4" sheeting. It tapers from 1-1/2" at the root to 7/16" at the tip. Mark with a pencil and straightedge, then cut outside the lines. Plane or sand carefully to proper shape.

To skin the top of the wing, repeat the process, but use Titebond slow-drying glue as you pin down the skins on all ribs, spars, and edges.

To cut the wing as shown at the apex,

precisely mark cut lines parallel to the centerline with a flexible rule or strip of wood. Make cuts with a No. 11 blade by making light passes. Cut through the leading edges with a razor saw. Leave about 1/16" extra wood around the opening for safety.

Cross sections and assembly details of 3-5/8" wide apex cutout are given. Block-sand the opening to final size. Insert the 1/4" balsa (3" x 3-5/8") block. Scribe its rear face to match wing curvature, cut to shape, and glue with Titebond. Block-sand its top and bottom edges to flow into the wing shape. Repeat the process with the 1/8" ply lamination. Do not drill the dowel holes yet. Face both sides of the open cut with 1/4" sheet.

Add the two-piece trailing edge center

*Continued on page 164*



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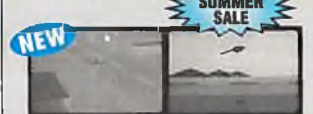
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### Don's Flight Tip

#### Large Aircraft Servo Selection

Many people, when building their first large aircraft, often use .40-.60 size technology & equipment. This mistake will often lead to failures of equipment or structures.

Servo selection is a common area where some modelers tend to use their existing .60 size servos to equip their first large, giant planes. Using smaller servos (torque) will often result in Blowback — a condition where the servo is not strong enough to deflect and hold the surface out into the airstream. Blowback is also sometimes confused with radio failure because the plane does not appear to respond to control input.

Blowback is most noticeable on high speed or high "G" maneuvers such as a split S or the back side of a high speed loop. The pilot pulls back on the stick but the plane does not respond or responds slowly. The plane dives into the ground at full power and

the pilot thinks the radio quit, when in fact, the servo didn't put out enough torque to deflect the surface under high stress.

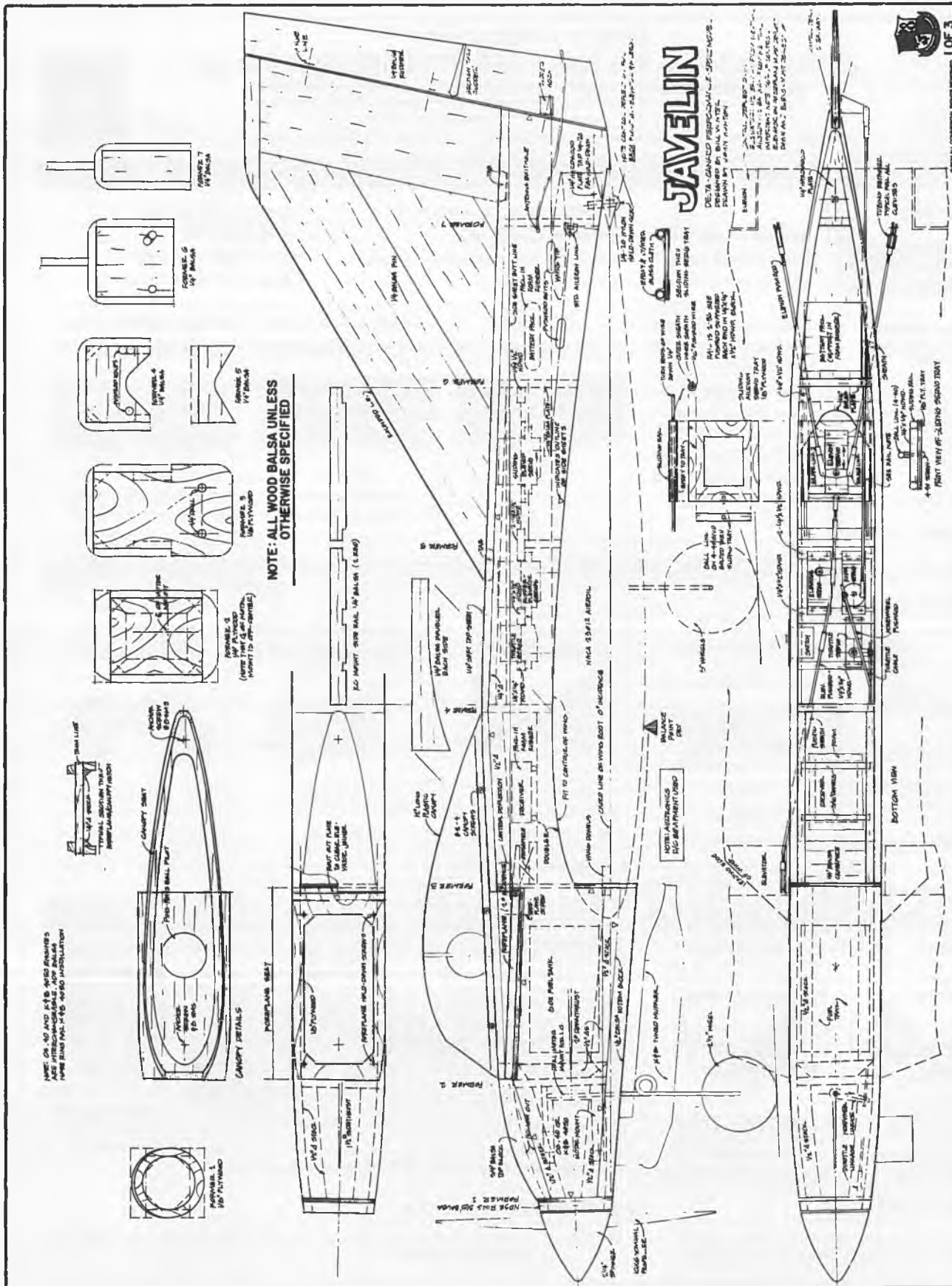
Servo size, torque and speed depend upon the type and how large the plane is. A 9' 1.20 powered J-3 Cub will have different servo demands than a 9' 8HP powered Extra 300.

Servos are the electronic heartbeat of your plane. Therefore, it is advisable to acquire the best ones you can for precise and accurate control of your plane.

Don's Hobby Shop carries a complete line of high quality servos to meet the needs of the most discriminating modeler. Call Don's Hobby Shop on our tech line if you have questions or on our order line to place an order. You'll be glad you did.

Check out Don's Flight Tip. Turn to the checkerboard border.





PLAN NO. 1239

FULL SIZED PLAN AVAILABLE, SEE PAGE 197

PLAN NO. 1239

Continued from page 161

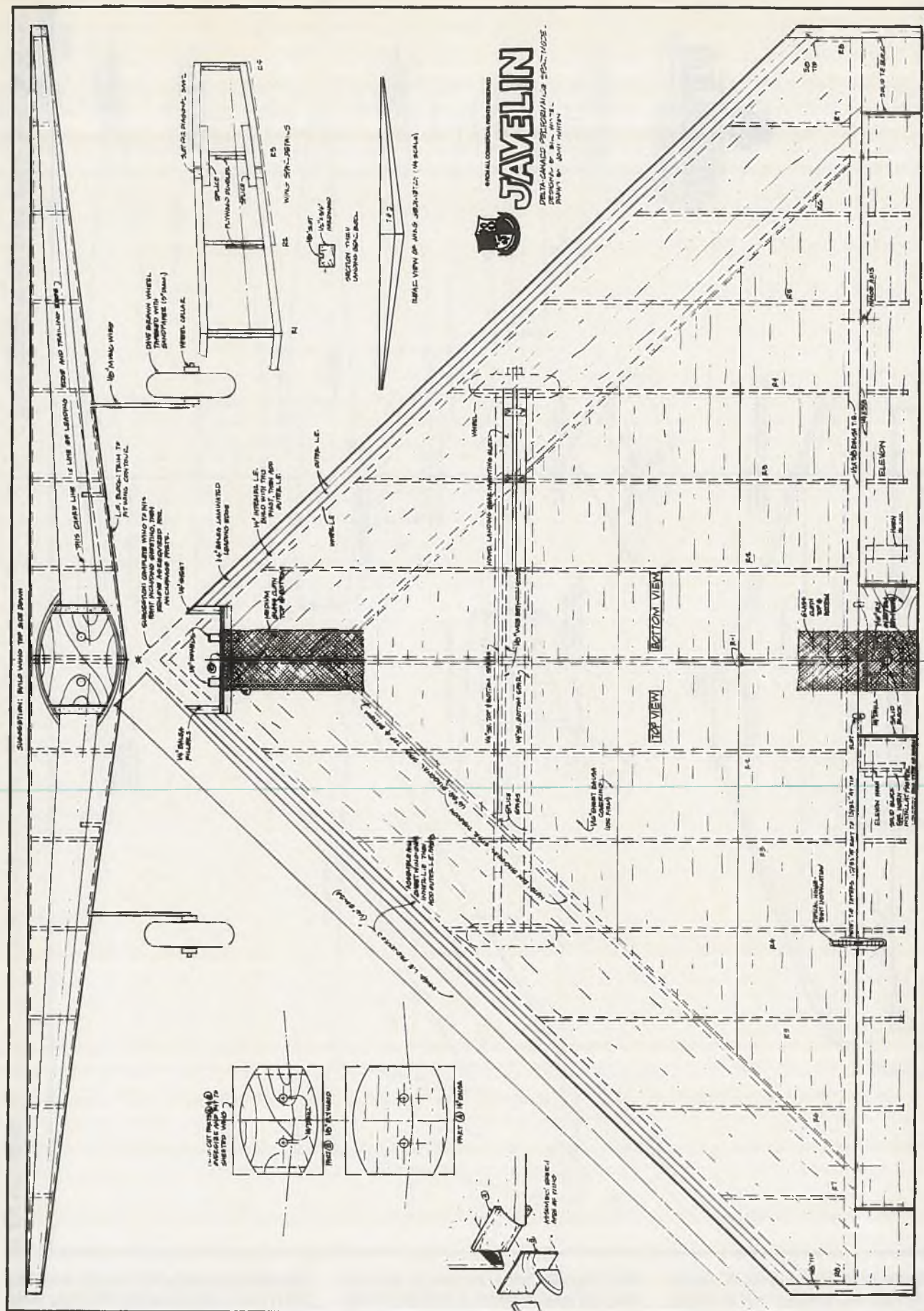
section blocks and sand to conform with the airfoil. Cut recessed grooves for installation of elevon linkage sheaths. Cut notches to allow for full movement of the link arms. Install the linkages with epoxy, being

careful to glue sheath only (a drop of oil on the wires may help prevent adhesion). Install the 1/16" plywood bottom piece at bolt-hole location, crack to match bottom dihedral. Add wingtip trailing edge blocks and tip strips, then sand entire wing to final

shape.

Assemble elevons by first pinning down the bottom sheets at the bench edge, then add the leading edges away from the bench edge. Install ribs and elevon arm blocks (positioned to suit your particular linkage),





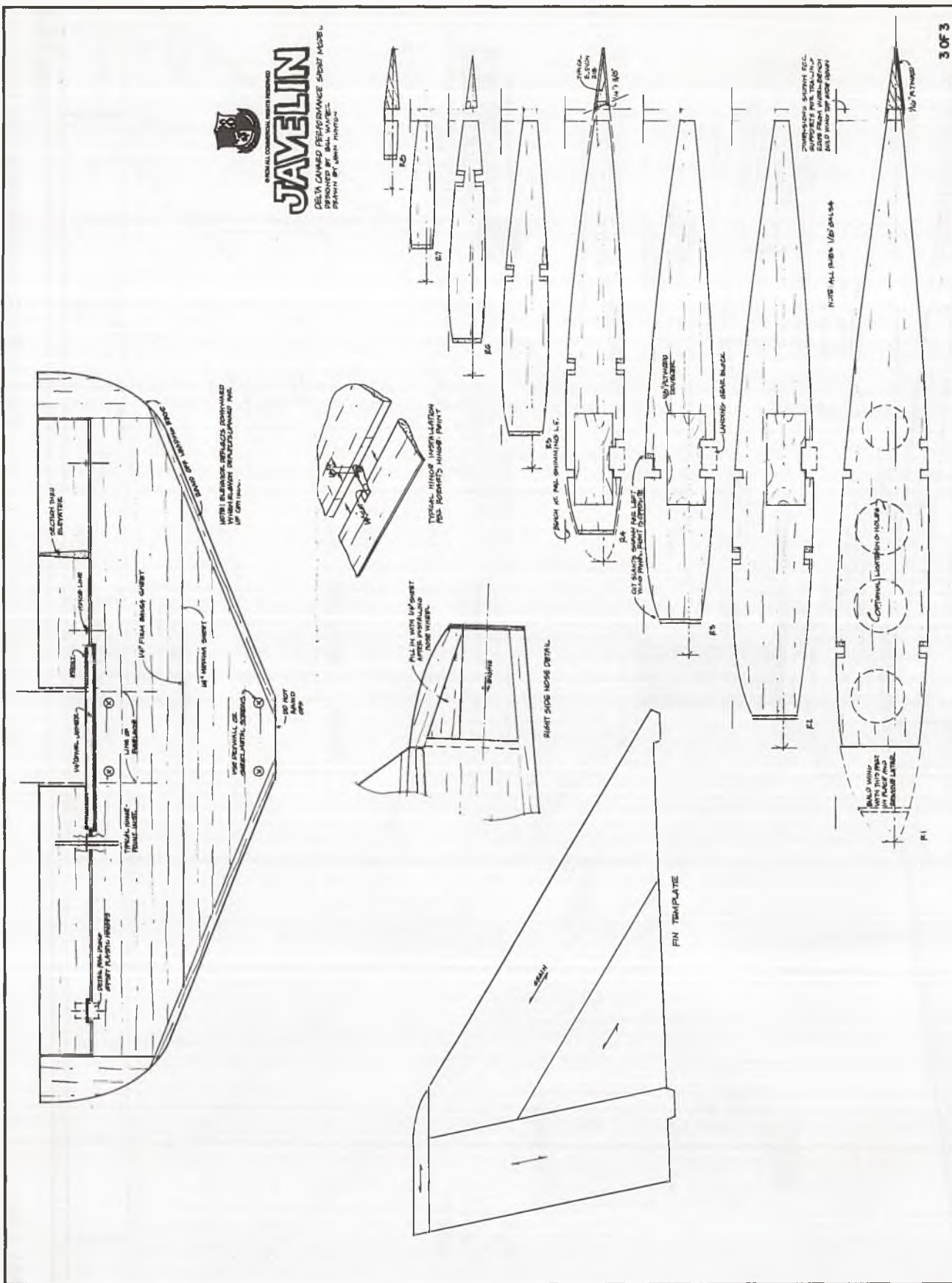
then sand this assembly to tapered shape and install the top sheeting. Groove the elevons to accept the linkage and drill for

the elevon arm. Block-sand the leading edge to proper taper; drill and make cutouts for hinges. Reinforce link holes with CA and

redrill. Trial-fit elevon linkages and hinges, then remove for covering.

Fit the wing to the fuselage before





3 OF 3

PLAN NO. 1239

FULL SIZED PLAN AVAILABLE, SEE PAGE 197

PLAN NO. 1239

installing the hold-down dowels. While the rib profile on the fuselage will be fairly accurate, the inside will have to be tapered and shaped to fit the wing. Run masking tape along the top of the wing where it will meet the fuselage and coat the tape with lip-

stick. Seat the wing, remove it, and trim away the material which is marked with lip-stick. Repeat the same process until the wing is seated and level.

With the wing accurately mated to the fuselage, drill a 3/16" dia. hold-down hole

through the wing and the rear ply mounting plate; remove the wing and drill wing alone with 1/4" dia. clearance bit. Tap the hole in the plywood mounting piece for the 1/4"-20 nylon hold-down screw. Realign the wing on the fuselage and attach with the mount-



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ing bolt.

Drill wing mounting dowel holes from the front, through the already drilled holes in the former and through the ply and balsa pieces of the wing. If the drill angle is awkward, mark the holes, remove the wing, and drill. Temporarily, install the wing dowels and trial-fit the wing. If the fit is not precise, open up the wing holes carefully with a round wood file. When satisfied, fill the wing holes generously with epoxy, place wax paper over the front of the wing, reposition the wing, then insert dowels through the former and wax paper into the wing. Allow to set completely.

Remove the wing and finish the bottom of the fuselage, gluing on the bottom block, shaping same, etc. Be sure nose wheel strut hole is located properly.

The main landing gear is shaped from 1/8" dia. music wire. Cut long to allow for bending. Make bends using a vice, hammer, etc. (Hint: file a small notch in the vice jaws to provide a small radius to prevent breaking the wire at the bends.) Trial-mount the landing gear and temporarily install the mounting plates. Check alignment and symmetry of the landing gear wire. Remove before covering wing.

#### Covering/Painting:

On the prototype, we used 21st Century films by Coverite for the wings and foreplane, and 21st Century spray paints for the fuselage and fin. Prepare all surfaces by sanding with a block to true up. Touch-up curves with folded sandpaper. Follow film covering instructions accurately, but generally try to pull film tight enough during adhesion to minimize the amount to be shrunk.

The 21st Century spray paints are easy to work with and give excellent results. Apply primer and sand between coats until grain is filled. Apply another coat and wet-sand with fine paper. Apply a thin coat of color and wet-sand again to expose any remaining blemishes, prime out, wet-sand, then apply color coats. The 21st Century finishes are easy to work with and give great results.

#### Final Assembly:

Follow the same alignment steps as in prefinal assembly, only this time, glue the parts in place. Install the R/C gear, linkage,

engine, and engine mount. Hook up fuel tank plumbing. When installing the nose wheel, check incidence against the plans to obtain proper take-off angle. Install the antenna full-length per the plans.

It is critical to make the model balance where indicated. Use ballast, if necessary. Also check side-to-side balance and correct with tip weight, if necessary. Check for free control movements of the indicated amounts.

#### Flying Notes By John Hunton

The Javelin has been designed by Bill Winter to provide a performance type sport model which is easy to build, yet can provide a much wider flight envelope than a typical trainer. With a plain bearing O.S. .40 FP, it flies just fine. With the new K&B 4050, the Javelin is truly exciting. We found that a good match for the K&B's tuned muffler was a 10 x 6 APC on 15% fuel. A 9 x 6 sounds good, but is not a proper match for the plane.

While the Javelin has the speed of a racer, it has excellent stall and low velocity performance, and this provides you with a very wide range of capabilities. Javelin will not bite you if it is yanked off the ground too soon. The only aspects that you must watch carefully are its appearance, its low aspect ratio, and its speed. When flying this model, consider yourself a fighter pilot. You cannot daydream or take your eyes off the ship.

Appearance? Yes. This is a tail-first model (canard) and any unusual planform takes time to get used to in the air. You must color the bottom dark, the top light, and the vertical stabilizer brightly. Stay away from colors that tend to blend with the sky such as light blue or white (blends in on humid, hazy days). Silver on the wings is a challenge. Bright reds, oranges, chrome yellow are typically good. Bill Winter chose a dark, but bright red for the bottom, and this seems to help. These things will help, but mostly keep the model close, until you are used to how it looks in the air. Once up, reduce power as needed and get familiar with the feel of Javelin during simple maneuvers, such as Figure Eights. Use smooth stick "pressures" until you sense that you are checked out.

The low aspect ratio wing inherently has



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more sensitivity to roll than a longer wing. While a snappy roll rate is exciting, it can take some time to get used to. You may want to reduce the motion by one hole to start with.

The Javelin is fast when you are at high throttle, particularly with the K&B 4050. The model can get out of your visual range very quickly, so again ... keep it close. I find myself doing Figure Eights in close, until things settle down and get trimmed out, then I am ready to rock and roll. Javelin can take off and climb out without being on the pipe. Loops are fine and can be made tight. Javelin will fly inverted. It is nice and stable in slow flight, although, when flying slowly, you must depend more on the rudder for control. Stalls are generally just mushes. Javelin has a high enough power-to-weight ratio to fly itself out of a stall.

One basic thing to keep foremost in mind is that with this, or with any fast model, safety becomes a much more important issue. If a model going fast hits something or someone, it will cause much more damage to the object and itself than a slower model because of mass effects. Your preparation and safety procedures must be increased in direct proportion to the speed of the model. Use a checklist. Do your range checks. This fast model will be flying much farther from you than a slower trainer type, and it is smaller.

A word about the K&B 4050. This is a racing-type engine and it is capable of producing 1.8 horsepower when using the proper fuel and propeller combinations. The



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resonant muffler, however, adds some complexities to engine operation. When the engine comes into resonance on the tuned muffler, it requires a richer fuel mixture than at mid-range. This means that, at normal idle mixture settings, the engine will be rich. This problem can be mitigated in two ways. Change the carburetor to a part number 5970 which has a smaller bore than the stock carburetor, or with the stock carburetor, if your engine runs too rich at maximum lean idle, just remove the offset head idle adjustment screw and turn the idle barrel further lean until you get reliable idle.

We also found that the engine will come up to resonance easily when first started cold (be prepared for a quick take-off); otherwise, you will have to take off at a lower power output.

While we recommend a 10 x 6 specifically, it is permissible to make your initial flights with a 9 x 6 APC type prop. With this prop, the engine will come up to resonant rpm on the ground and be easy to set. After getting the engine set up, we went to a 10 x 6 for more disk area and better performance. The 10 x 6 is far superior in aerobatics and vertical maneuvers. The 9 x 6 lowers performance.

If you want performance, you will find Javelin to be fully satisfying and quite capable.



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RCM September 1997 169





# PRODUCT REVIEW

## P-47D-23 RAZORBACK "THUNDERBOLT"

Top Flite  
By Pat Kinney

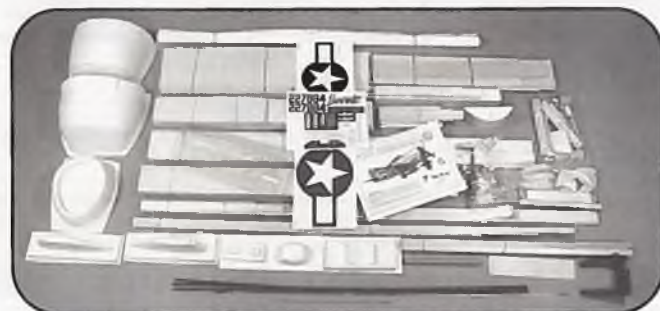


**T**op Flite's P-47 is not new to those of us who have been building scale models for a number of years. The first P-47 kits that Top Flite introduced to the hobby was back in the 70's. A great number of their scale warbird kits were sold, and Top Flite was on their way to becoming a major kit manufacturer.

Twenty years of advanced Computer Aided Design (CAD) technology has eliminated complicated building procedures and made construction super easy and accurate. Interlocking parts throughout the assembly lock together, creating a straight and strong airframe. Top Flite is using state-of-the-art aerodynamic software to create the P-47 airfoil, thus resulting in a slow stall speed with superior handling. We now enjoy Top Flite's computer precise Gold Edition engineering, making the newcomer to scale R/C an immediate perfectionist.

### Construction:

When the kit box arrived, I was pleasantly surprised. The box was 5" x 10-1/2" x 48-1/4" ... very sturdy and extremely attractive. The box top was adorned with a large, full color photo of the completed P-47D-23 T-Bolt Razorback. Upon opening the box, I found that all items were packaged well to prevent damage. Right on top were two sheets of rolled plans measuring 37-1/2" x 57-1/2" and a 56-page manual. The quality of balsa wood in the kit was very good, and the die-cut parts snapped free, or just fell from their sur-



## SPECIFICATIONS

Name ..... P-47D THUNDERBOLT  
Aircraft Type ..... Scale WWII Fighter  
Mfg. By ..... Top Flite/Great Planes Model Dist.  
P.O. Box 721  
Urbana, Illinois 61801  
Mfg. Sug. Retail Price ..... \$189.99  
Available From ..... Retail Outlets  
Wingspan ..... 63 Inches  
Wing Chord ..... 14 Inches  
Total Wing Area ..... 713 Sq. In.  
Fuselage Length ..... 55 Inches  
Stabilizer Span ..... 25 Inches  
Total Stab Area ..... 121 Sq. In.  
Mfg. Rec. Engine Range ..... .60-.90, 2-Stroke  
..... .90-1.20, 4-Stroke  
Rec. Fuel Tank Size ..... 14 Oz.  
Rec. No. of Channels ..... 4-7  
Rec. Control Functions ..... Rud., Elev., Throt., Ail.,  
Flaps, Retract Gear

### Basic Materials Used In Construction

Fuselage ..... Balsa & Lite Ply  
Wing ..... Balsa & Lite Ply  
Tail Surfaces ..... Balsa & Lite Ply  
Building Instructions on Plan Sheets ..... No  
Instruction Manual ..... Yes (56 pages)  
Construction Photos ..... Yes

## RCM PROTOTYPE

Radio Used ..... JR Max 6 PCM/FM computer  
Engine Make & Disp. .... Super Tigre 90K  
Tank Size Used ..... 14 Oz.  
Weight, Ready to Fly ..... 179 Oz. (11 Lbs., 3 Oz.)  
Wing Loading ..... 36.16 Oz./Sq. Ft.

## SUMMARY

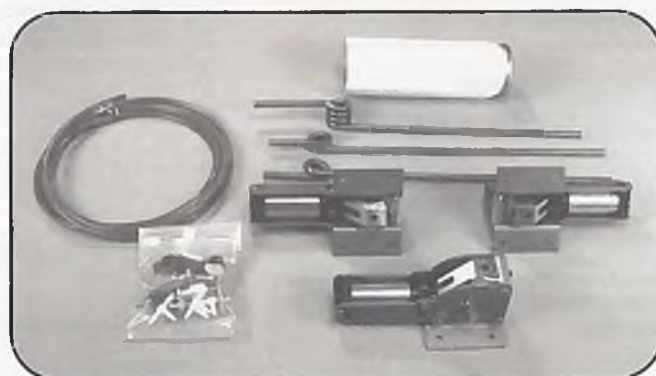
### WE LIKED THE:

Parts fit, completeness of kit, step by step construction manual, quality materials, overall appearance, and flight performance.

### WE DIDN'T LIKE THE:

See text.

roundings when the lite ply sheets were picked up. Shaped parts were in plastic bags, long balsa sticks were neatly rubber banded together, and the clear plastic Razorback canopy was well protected and free of scratches. Prior to construction, I read the 56-page instruction manual from cover to cover. As I did so, I separated all die-cut parts into groups. By doing it this way, I became well acquainted with Top Flite's building technique.



Spring Air 101HD retracts used.



# The Super Quality 40 Series — the ultimate ARFs are here.

**Built the way you  
would build a kit,  
with features like:**

- High-grade heat shrinkable film covering
- Hand-applied trim schemes
- Hand-painted components



Space Walker shown with optional pilot figure.

Space Walker

For all you modelers who want a 40 size ARF that doesn't look like one, your wait is over. Introducing Kyosho's Super Quality Series — a lineup of pre-assembled planes with detail that rivals that of the most intricate hand-built kits. Now you can impress the other fliers at the field with a model that looks professionally put together, but actually took you only a few evenings to finish.

## Kyosho's done all the work... you reap the benefits

As beautiful as these all-wood ARFs look, you'll really appreciate how easy it is to complete them. Each one builds straight and sturdy, with illustrated instructions that guide you through every step of the finishing process. And in the air, their stable flight characteristics and capacity for aerobatics will inspire confidence in your piloting skills.

*"The components were of high quality, and the glued joints were well-bonded and very tight. (In the air)... the Cub was able to perform all the maneuvers in the book."*

— Roger Post, Jr.,  
Model Airplane News

## Choose from several classic designs

Kyosho Super Quality Series ARFs come in 3 distinctive styles, all patterned after actual full-size aircraft. The open cockpit Space Walker is the only preassembled model of this unique design on the market. The airshow favorite Extra 300 features a one-piece cowl that's hand-painted to match the covering, in two different trim schemes. And the popular J-3 Piper Cub

comes in regular and clipped-wing versions, with the regular-wing version covered in Cub Yellow fabric material that adds to the authenticity.

For the location of the Kyosho dealer nearest you, please call **1-800-682-8948**, and mention code #0110K.



Piper J-3 Cub



Clipped Wing  
Cub



Clipped Wing  
Cub



Extra 300



Extra 300

**All planes require 2-stroke .40-.46  
or 4-stroke .48-.52 engine.**



The relatively few number of parts in these kits, combined with their interlocking construction, translates into an enjoyable building project.

## ARFs that feature matchless craftsmanship

Unlike many almost-ready-to-fly planes, these ARFs do not sacrifice quality for assembly ease. Each one is hand built to exacting specifications, and hand covered with high-grade, heat-shrinkable film covering. Trim schemes are also applied by hand, and the vacuum-formed parts accentuate each plane's scale lines. With such painstaking attention to detail, these models are almost works of art.

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The "Turbo 10 GT and Plus" systems weigh 10 oz. and the "Turbo 10/20" Brushless motor package has a 13 oz. weight, EXCLUSIVE of the battery pack. Typical "Sub-C" cells weigh 2 oz. each, therefore battery weight is 2 x the number of cells. It is interesting to note that in many cases our all-up weight is very close to the published weight of the "Glo-Engine" versions.

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The "Turbo 10/20" Brushless motor powers the "Sig 4 Star 40" straight up.

### PERFORMANCE RANGE

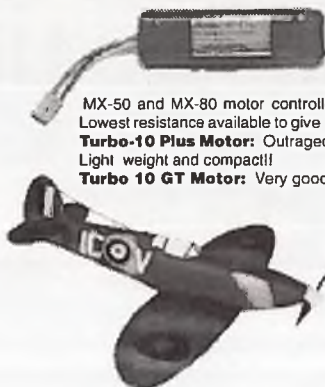
TT-Plus	3-5 lb models	Fantastic to Excellent
TT-GT	3-5 lb models	Excellent to very good w/longer run time
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Battery packs feature "End to End" construction to reduce resistance and allow more power out-put than other commercial packs.

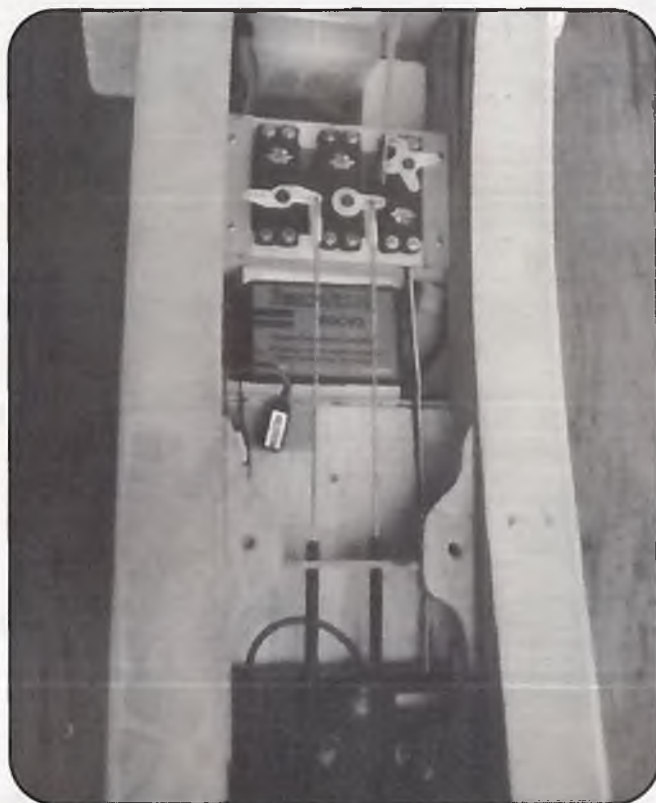
MX-50 and MX-80 motor controllers operate on 8 to 23 cells. Lowest resistance available to give Maximum RPM!! **Water Proof!!**  
**Turbo-10 Plus Motor:** Outrageous power w/excellent run time. Light weight and compact!!  
**Turbo 10 GT Motor:** Very good power, longer run time!!

**Turbo 10/20 Brushless Motor:** Shocking power on 7-20 cells w/excellent run time. Requires slightly larger models.

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## DEALER INQUIRIES WELCOME



Each part of each group was marked and stored in a zip-top bag until needed. By now we had a good size bundle of die-cut sheets with parts removed. They were set aside and came in handy for a number of things that require the use of scrap.

Hot tips are inserted throughout the manual, and the first one was "how to make wing and stabilizer skins." They included a line drawing showing exactly how to lay out a sheet of 1/16" balsa for maximum usage. The stabilizer and elevator are built flat on the worktable as one unit using break-away jig tabs. Both are sheeted before lifting from the worktable. This same procedure applies when building the fin and rudder. I used Great Plane's Pro-CA+ medium gap filler and Pro-CA thin instant. Pro-CA thin wicks quickly and cures in just seconds; both medium thick and thin was used extensively throughout the construction.



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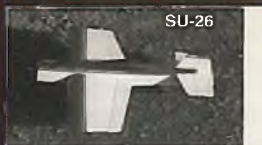
- An onboard monitor to check your receiver battery pack
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## Fuselage:

It is next to impossible to find one WWII warbird with that square boxy look of WWI. They have smooth, round lines

with compound curves that apply to good aerodynamics. Many modelers shy away from building these great scale airplanes thinking they are a pain to build and cover.

Quite the contrary, I found the flowing round lines of Top Flite's P-47D-23 fuselage easy to build and easy to cover.

Two main stringers form the center shape of the fuselage and are pinned to the wax-papered fuselage plan. The lite ply die-cut formers were very accurate and positioned satisfactorily at each station. A 2" piece of 3/16" sq. balsa was used to check each notch in the formers for proper stringer depth and width. Both main stringers are grooved on the outside surface to accept substringers, which provide a stop for the sheeting.

With all the stringers in place and half of the sheeting on, the stabilizer was glued to the stabilizer saddle. The fin, razor spine, and aft-deck top block were glued in place to complete the top sheeting. The fuselage was removed from the building board, turned over and placed into a foam cradle where the bottom half of the fuselage was completed.

Great Planes' 30-minute Pro Epoxy was used to attach the stabilizer and fin to the fuselage. Both the 5-minute and 30-minute Pro Epoxy have good bonding qualities, clean up with alcohol, and are sandable in eight hours when equally mixed.

## Wing:

The backbone of the P-47 wing is the laminated top and bottom spars. They are constructed using hard balsa with spar doublers glued to the inside surface starting at the wing root. The ribs are die-cut from selected medium balsa sheets. Some light sanding of the slots and notches in the wing ribs was needed for an accurate fit of the different rails, supports, spars, and braces. One has the option of retracts or fixed gear, and Top Flite furnishes plywood rails and instructions for both. The wing is built upside down on top of the plans, and both wing halves join together with dihedral braces, wing bolt plates, and dowel plates. The wing bottom is sheeted first, along with sheeting the top and bottom of the flaps and ailerons, while the outer jig tabs and dihedral block are still on the worktable. The wing is then removed from the worktable, turned over and placed on leading edge jigs, trailing edge jig, and tip jigs.

With the wing right side up, the task of completing the inner structure was at hand. Using the backside of the bottom sheeting as a backing to work from, simplified all the construction steps needed for a com-





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pleted structure. Instructions cover these steps number by number in a very clear manner. When shaping a piece for a test fit, such as the flap and aileron hinge blocks, several dry-runs were made before gluing them in place. With the top sheeting completed, both ailerons and flaps are cut free from the wing and completed individually.

### Scale Cockpit:

Scale building is all about detail, and that is exactly what Top Flite has provided in their P-47D scale cockpit interior kit. The scale cockpit is an optional item and can be purchased at your local hobby shop. All parts are vacuum-formed light ABS plastic.

I suggest that you reinforce the back of each part with 3/32" sheet balsa, which is

easy to inlay and glue in place with Pro-CA+ medium. Each rigid panel will now slide in and out of its position until you are ready to permanently glue each one in place.

### Radial Engine:

Top Flite's 1/8 scale radial engine kit is patterned after the Pratt & Whitney radial engine. Although modeled to fit the Top Flite P-47D "Thunderbolt," this engine will fit any cowl with a frontal opening of 5-1/2" to 6-1/4". Not only does the radial engine enhance scale appearance, it serves as an airflow baffle for more efficient engine cooling.

### Drop Tanks:

Another great option when building the P-47D is the two 75-gallon out-board wing

drop tanks and the 108-gallon belly tank kits. With all three tanks hanging from their release mechanism, this warbird has that business-like "loaded down" look and adds even further to the scale realism. The drop tanks and pylons are lightweight ABS plastic and are easy to assemble and finish. I chose to manually release the tanks and use them for static display only.

### Engine:

The P-47 Thunderbolt should fly well with any number of engines ranging from .61 to .90 2-stroke or .90 to 1.20 4-stroke. I chose to power my P-47 with a new Super Tigre 90K 2-stroke. The engine was immediately sent to Paul Thonnard, who headed up TouchStart Inc. at the time, for the purpose of mating his unit to the Super

### THE SNITCH



The **SNITCH** will aid in trouble shooting all glitch problems. A microcontroller counts and records glitches and missed signal frames during flight for playback later on the ground by counting out in audible tones. Great for trouble shooting noisy ignition system glitches or trying out different equipment configurations.

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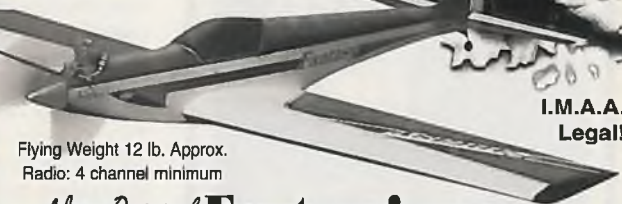
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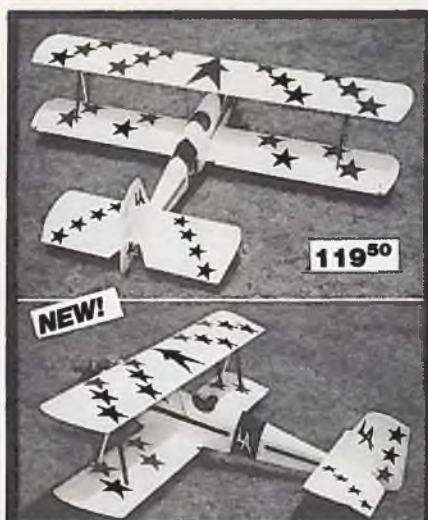
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Tigre 90K. In a few days, I received the complete "AutoStart Glow Engine System," along with a letter stating that it was tested and ready to install. The only change I had to make was transferring the pins from Futaba to the JR input connector housing that came with the electronics. The Engine Operations Controller (EOC) is designed to control the glow plug, starter, and throttle. In fact, everything one needs to know about this system is printed in a 17-page owner's manual. Well ... just about everything except adaptability to your specific aircraft.

In my case, I designed an engine extension block by gluing two pieces of 3/4" plywood with the same outside dimension as the starter mounting flanges. Four holes were drilled in the extension block to accept 8-32 mounting capscrews. One 1-1/2" hole was cut through the center of the extension block and fire wall to allow clearance for the TouchStart electric starter motor. Both starter housing and extension block were bolted to the fire wall. The engine rear drive washer was in the right position for prop/cowl clearance, and the electric starter motor came flush with the inside fire wall. Both EOC and starter battery were neatly tucked away in an area just behind the servo tray.

TouchStart's main shielded starter cable was just the right length to route along one side of the fuselage and plug into the electric motor harness. Our fuel tank was installed and surrounded with foam without any AutoStart wiring interference. Two product reviews on the "AutoStart Glow Engine System" were in the *RCM* magazine, November 1995 issue under "Sunday Fun," and the March 1996 issue under "Engine Clinic." Both columns cover the TouchStart "AutoStart Glow Engine System" in detail.

#### Radio:

During construction, I had a premonition. The servo tray was going to obstruct the radio compartment if I glued it in as instructed. The fuel tank also protrudes into the compartment, blocking even more of the opening. In my mind, there was a fairly simple solution to this dilemma. Two 3/4" x 3/4" x 2-1/2" hardwood servo tray rails were glued to the sides of each crutch on the same plane as the proposed servo tray. The servo tray was then modified and attached to the servo mounting rails with four screws. It was simple and easy to do. To disassemble, back out four screws, make three disconnects, and the servo tray assembly can be lifted up and out of the way, revealing the open 3" x 4" x 4" receiver and battery compartment. Both the foam-covered receiver and receiver battery were easy to pack away, and firmly held in place by replacing the servo tray assembly.

The retract air valve and servo was also moved from this area (covered under retracts). Flap servos are mounted to the inside surface of the flap servo hatch and connected to a "Y" cord. The ailerons are a push-pull installation via bellcranks using

one standard servo.

#### Retracts:

Top Flite thought enough of their P-47 and its ground handling to furnish 3/16" dia. prebent fixed wire landing gear. I also thought enough of the P-47 to pick a heavy duty retractable landing gear with 3/16" dia. wire struts.

The Spring Air 101HD heavy duty retract system fulfilled that requirement. Three unique features about the Spring Air retracts impressed me.

(1) Should you run out of air pressure, the spring inside the retract cylinder forces the gear down and locks into position automatically.

(2) A new type of cam operated air control valve using a standard servo with a large drive wheel.

(3) Only one air line in and out of the control valve to operate both retract cylinders. Simplicity at its best.

Bulkheads 5B and 6B are designed in such a way as to cradle the air supply tank.

Two servo mounting blocks were glued to the inside fuselage crutch just aft of the cockpit floor between formers 4B and 5B. The retract air control valve and servo were mounted to these two blocks.

#### Covering:

Since the P-47 is fully sheeted with 1/16" and 3/32" balsa, one could apply a light covering of fiberglass using K&B resin and the PK method of application. I chose Top Flite's Super MonoKote and spray can LustreKote.

All high spots were sanded to a smooth surface. A light coat of Balsarite was brushed on areas where the MonoKote edges will always be exposed. I used a Woodpecker to perforate the sheeted surfaces. Next, I sanded with 220 sandpaper and vacuumed using our brush attachment. Just before applying the MonoKote, a tack cloth was wiped across the sheeting to pick up any remaining dust. The fuselage was covered in sections, starting at the bottom of the fuselage and covering upward and forward. All ABS plastic parts were sanded, primed, and painted with LustreKote before applying the decals and panel lines.

#### Flying:

For years I have been test flying my new models and helping my friends who had the first flight jitters. Most of these flights were initiated with nerves of steel and an aire of calmness. But sometimes I get more excited than necessary and the adrenalin flows at a faster rate. This was one of those times!

Considerable time was expended building the wing to make sure proper washout was within specs. All controls were set to their recommended surface throws outlined in the instruction manual. To get the proper C.G. as called out on the plans, requires the addition of 3 oz. of weight to be epoxied inside the cowl. I feel the required nose weight would have been much more if it had not been for the additional weight of the AutoStart and engine



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extension block. Strict arming and safety procedures must be followed before turning the engine over. Several test starts were implemented from the transmitter to become familiar with TouchStart's glow system. Before going to the flying field, arrangements were made to set up a photo session with my favorite photographer.

With 713 sq. in. we have a wing loading

of 36.16 oz./sq. ft., which is very reasonable for an overall weight of 11 lbs. 3 oz.

With transmitter and receiver on, throttle stick all the way down, and the throttle trim all the way up, the starter arming switch was then turned on. To start the engine, throttle trim was pulled down until the engine started, then quickly moved to full high trim for idle trim adjusting. Play it

safe by always holding onto the tail feathers until ready to taxi.

By the time we reached the runway, we had completed our check list and I was ready for take-off. The one thing to remember about flying a "taildragger" is that when headed down the runway, forget the elevator and concentrate on steering. When the tail lifts and the airplane begins to get light, it's time to show your skills. The P-47 lift-off was fantastic — very gradual with good solid control. After some trim adjustments, the retract toggle switch was flipped to gear-up position. At this point, it became obvious why retracts were the right choice. One great looking warbird. The P-47 was tracking well and the controls were very responsive as I made my first low fly-by. As the Thunderbolt went by, I initiated a 45° climb-out angle and rolled it over on its back. With controlled elevator and engine reduced to 1/4 throttle, a Split-S maneuver was completed. Three-quarter throttle was a comfortable setting for most scale-like maneuvers.

The Split-S turn-around put the P-47 in a good position for a slow roll across the sky in front of us. Only a touch of down elevator was needed when in the inverted phase to keep it in a slow axial roll. With the power of the Super Tigre 90 up front, loops were a real pleasure, giving ample thrust to pull the P-47 through loops, Cuban Eights, and stall turns. At the top of the next loop, we leveled off inverted, came back over the field, and rolled out.

You can depend on this aircraft to fly as well upside down as it does right side up.

As the "Jug" entered the glide path, the landing gear were lowered along with reduced throttle and 30° flaps. The sink rate was controllable right up to the final flare and touchdown.

The first flight was a real pleasure with no surprises whatsoever. So much for the old story of uncontrollable taildraggers.

### Conclusion:

Top Flight has upheld the tradition of producing quality kits with instruction manuals that are second to none. From plans to decals, the P-47D Razorback "Thunderbolt" is a well done WWII scale model kit. Even if the kit were built right from the box without adding any options, the end result would draw a good crowd. This warbird, whether on the ground or in the air, looks like a real fighter. It has the potential to be a winner at the local scale contest if you pay attention to detail.

Documented history and photos of the "Bonnie" are available in the following books: *P-47 Thunderbolt in Action*, Squadron/Signal; *A Documentary History of The Republic P-47*, By Roger A. Freeman.

Top Flite's P-47D would be an excellent choice for the modeler who is ready for his first real scale radio controlled model kit or the old probuilder who has a hat full of assorted decorative badges.

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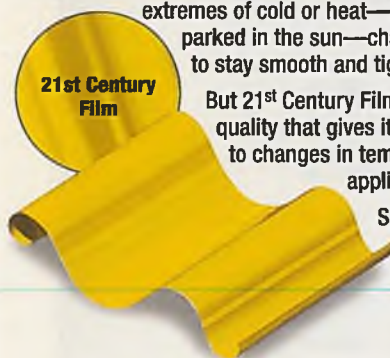


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	Lemon Yellow	•	•	•		Metal Light Blue	•			Stinson Green	•
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# PULLING OUT THE HIDDEN CHANNELS

By George Steiner

*Editor's Note: Several years ago (April '93, page 180), an article by George Steiner was published in RCM on how to extract three additional channels from the Airtronics 4-channel microreceiver #92745/72 FM. There was considerable interest in this article, so George has again*

*shown how you can expand some receivers to take advantage of their real potential. However, take note of George's caution at the end of the article; if your soldering skills are not up to the task, you're better off to leave it to someone with the appropriate skills.*

Most R/C receivers in the marketplace these days have the pin out for 6, 7, or 8 channels. Some small size lightweight receivers come with a restricted servo connector block.

channels were simply not brought out.

With the ever-increasing use of the computer programmed R/C transmitter and the use of multimixed servo functions, requests have been to expand the

that super sailplane. If the mods shown to the battery connector are not what you want, a female servo connector can be wired in place as a pigtail. This would require an access hole being drilled in the

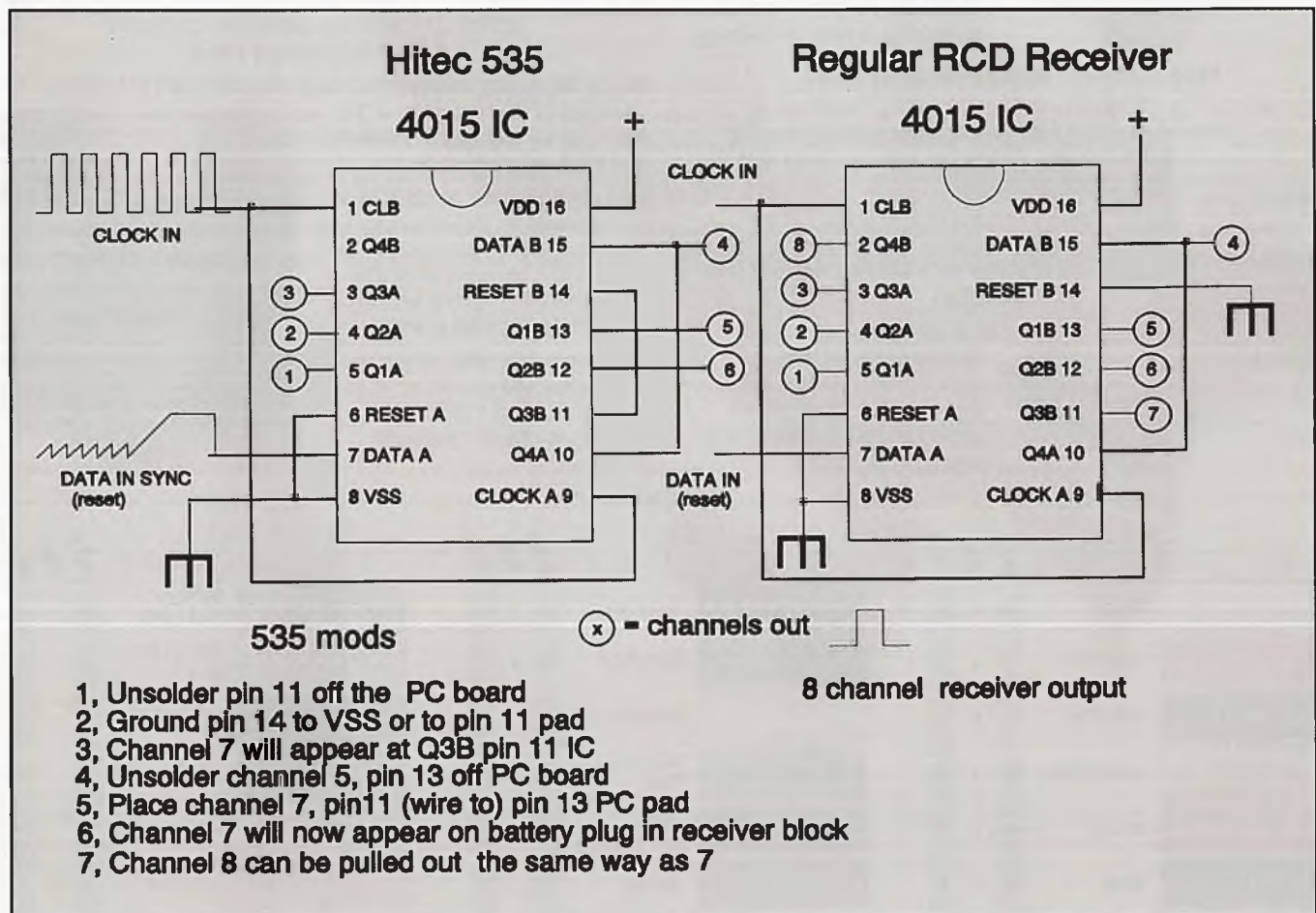


FIGURE 1:

Expanding a receiver with extra channels (Conversion to allow channels 7 and 8 to be used out of the 535 receiver).

One in particular is the small Hitec 535 receiver that ends the servo connection at channel 5, which is shared with the battery input. Note that it is not restricted to decode a 7 or 8-channel transmitter because it is using a dual 4-bit static register, but was designed to save space and weight for lightweight use, and the other

small restricted receivers for other servo channels to be exposed. The Hitec 535 is a good example of one that can be expanded for use with a high-powered multifunction transmitter. Figure 1 gives the required wiring changes that can be made to the Hitec 535 receiver to bring out whatever mix channel you need for

receiver case for the extra channel to be brought out as a pigtail. Warning! The wiring is extremely close, with no room for errors. Only those experienced in soldering techniques should attempt this modification.





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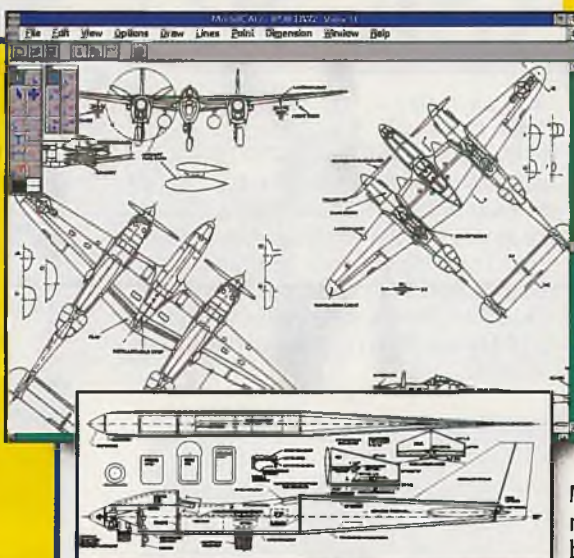
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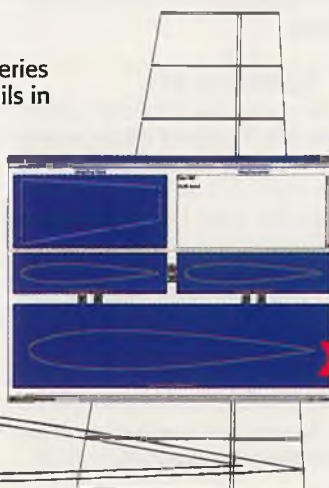
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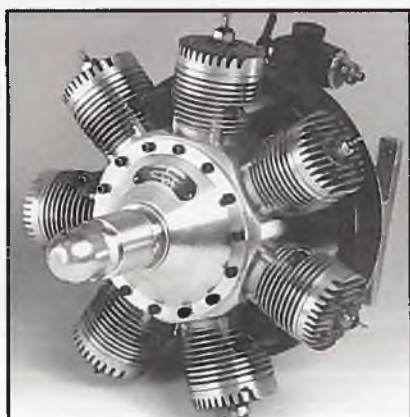
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# SHOWCASE '97



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The Berger Radial Engine was designed with the R/C scale modeler in mind. This powerful seven cylinder engine is of the 2-stroke design (unique for radial engines), eliminating valves and pushrods. An integral blower improves combustion efficiency. The patented oil distribution system virtually eliminates lower cylinder flooding. The engine is 1.96 cu. in. and will swing an 18 x 8 prop at 8000 rpm, with a dependable idle of 1500 rpm. All engines are factory-run before shipping and come with a 1 year parts and labor guarantee. Model #7196, suggested retail price is \$1,199.00. Available direct only. For additional information, contact: Machine Specialties, 17459 Lilac, Unit G, Hesperia, CA 92345.



## 13 NEW MASTER AIRSCREW PROPELLERS

In preparation for the '97 flying season, Windsor Propeller has released 13 new sizes in the G/F Series: 7 x 3, 7 x 5, 8 x 3, 8 x 5,

8 x 7, 9 x 7, 10 x 4, 10 x 5, 10 x 9, 11 x 4, 11 x 5, 11 x 8, and 11 x 10. Designed with Windsor's state-of-the-art CNC tooling, these props have NASA airfoils, true helical pitch, and accurate balance. They are made of durable glass-filled nylon and feature hub fillets for blade strength. Available from hobby dealers. For a free brochure, send an S.A.S.E to: Windsor Propeller Co., Inc., 3219 Monier Circle, Rancho Cordova, CA 95742.



## O.S. .61 FX

For modelers who are into large planes, the .61 FX is the ideal power plant, with all of the innovations that have made the FX line famous. Plus, it also boasts an important extra feature: a remote needle valve that can be positioned horizontally or vertically. This gives builders more flexibility in engine mounting, to better preserve scale lines. PN OSMG0561, .61 FX Non-Ringed — \$269.99 retail. Available from hobby dealers. For more information, contact: Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021, (800) 682-8948.

## HS-85BB SERVO

Hitec's most powerful and durable micro servo yet, the HS-85 mighty micro is a top ball bearing supported servo that offers a whopping torque and quick speed. The perfect choice for hand-launch gliders to high speed slope soarers. If you're looking for a high performance micro servo but don't want to spend a small fortune, the HS-85 is your answer. Specs.: 38 oz./in.; .18 sec.; size 1.0 x 0.5 x 1.1; weight .70 oz. Part No. 31085 (specify connector type — A-Airt., J-Fut., S-Hitec, and JR). Suggested retail price: \$58.95. See your hobby dealer. For more information, contact: Hitec RCD,

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Inc., 10729 Wheatlands Ave., Suite C, Santee, CA 92071. Phone (619) 258-4940, or fax (619) 449-1002.



## 33% LASER 200 A.R.C.

The Aeroworks Laser 200 is 95% pre-built and comes complete with epoxy glass cowl and wheel pants, aluminum landing gear, crystal clear canopy, full-size rolled plans, and detailed instruction manual. Fuselages are built with jigs and hand selected wood. The wings are bayed foam, using spruce and balsa spars and 4 to 6 pound contest grade balsa for the wing sheeting. The tail sections are completely built up and ready to install on the aircraft. Specifications: span 98"; power 3.2 to 4.4 cu. in; price \$695.00 plus S&H. Order direct from: Aeroworks, 1922 S. Hannibal Ct., Unit "G", Aurora, CO 80013, (303) 367-9792.



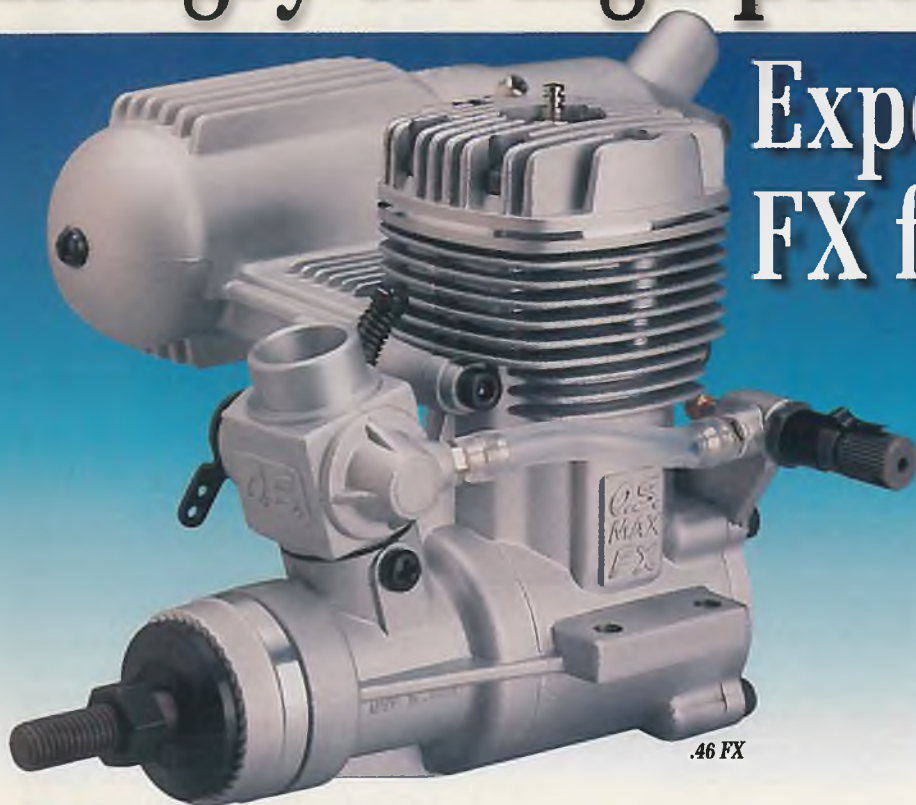
## 1/3 SCALE PITTS "SUPER STINKER"

Like the full-scale counterpart, this 1/3 scale model is an awesome performer! The kit features all fiberglass construction and foam wing cores. Included in the kit are fuselage, wheel pants, cowl, canopy, alu-



# Hungry for high performance?

## Experience the FX from O.S.



### FX Series Engines Features:

- Dual bearings, with enlarged front bearings for lasting smoothness.
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- Crankcase “webbing” to prevent heat distortion and bearing failure
- Lowered crankcase profile
- Taller, semi-squared, heat-sink head for better cooling and stronger operation.



Now that the FX series has grown from a single high-performance engine to a family of five, the question is: what makes these engines so popular?

The answer: *Everything*, from the way they got their start to the way they're built to last.

Like most features, the remote control needle valves were included at modeler request. Customers like the safety and convenience they represent—and love the refinements that O.S. engineers added. The protection added by a heavier needle and a mount integral with a reinforced backplate. Coarser threads on the needle valve to prevent “creep” and vibration-induced wear. An O-ring to seal out air leaks and preserve settings.

And needle valve improvements are just the start. The features at right are

found on every FX engine you see here. But the features you can't see here are just as important. Features such as O.S.'s continuing leadership in metallurgy, CNC-controlled manufacturing and QC standards. The two years of design testing and refinement that precede each engine's introduction. The warranty that lasts for two years after you leave the hobby shop. And the 60 years of accumulated engine expertise that O.S. builds into every engine.

Add it all up, and it shows why the FX Series offers the best in high performance engines today. For the location of the hobby dealer nearest you, please call 1-800-682-8948 and mention code number 0115F.



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# You Won't Believe the NEW K&B ULTRAPOXY Until You've Tried IT!

**W**aiting for the new K&B paint line? It's here! And it is worth the wait. K&B SuperPoxy was the best paint in the industry. We knew it was going to be a challenge to repeat the success of SuperPoxy, but **ULTRAPOXY** has done it and you will see what we mean when you try it. **ULTRAPOXY** exceeds all the expectations we anticipated for a new paint line. **ULTRAPOXY** has the same strong durable fuel proof finish as SuperPoxy, but best of all, it has the clear coat already in it. The finish has a deep high gloss unmatched by any other paint. Better yet, this two part epoxy paint requires no thinner. The coverage is exceptional, spray on one light dust coat followed by a final flow coat, and you're done! The finish looks like you've spent hours wet sanding and painting,



you're sure to get comments from those wondering how you got such a fantastic finish.

**ULTRAPOXY** comes in all the standard base colors that match

the colors of most popular heat shrink coverings. So now its easy to match the painted parts to the rest of the film-covered parts of your model. Additionally, a satin catalyst is available for those wishing a silkier finish.

**ULTRAPOXY** is available at your local hobby dealer. For those who still have some of the SuperPoxy paint left over, K&B hasn't forgotten you. Catalyst and thinner will still be available for a period of time.

**ULTRAPOXY** K&B keeping a promise and providing quality modeling products for the model enthusiast.

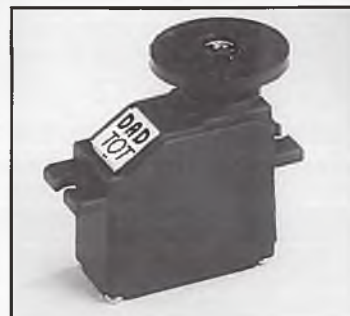


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minum landing gear, rolled plans, and instructions. Span: 72", wing area: 1600 sq. in. Recommended engine size is from 2.0 to 5.0 cu. in. Price: \$389.00 plus shipping. Order direct from Premier Distributing, 620 CR 324, Moulton, AL 35650. For more information, call: (205) 974-1307.



## DAD "TOT" SERVO

Design And Development continues the DAD tradition of producing the highest value, 100% tested in USA quality servos with the all new Sub-Micro "TOT" Servo! TOT is the best way to go small with your next model. At only 1" square and 1/2" thick, this little guy fits anyplace with the highest torque and at the lowest cost possible. Available for only \$39.95, or \$49.95 with metal gears. Available at participating DAD dealers! Dealer inquiries invited. For more information, call DAD at: (800) 669-4548.



## SERIES 380 ROBOSTRUTS

The Series 380 RoboStruts are the best replacements for wire landing gear. They are suitable for most airplanes weighing 4 to 10 lbs. With real functional oleos and torque links, they can be used on grass or paved airfields. No more bent wires! The Series 380 RoboStruts are available in straight, right, or

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# Five Star Performers



Looking for coreless servo performance but can't afford the coreless servo price?

Look no further.

Introducing the 5xx series of precision servos from Hitec RCD.

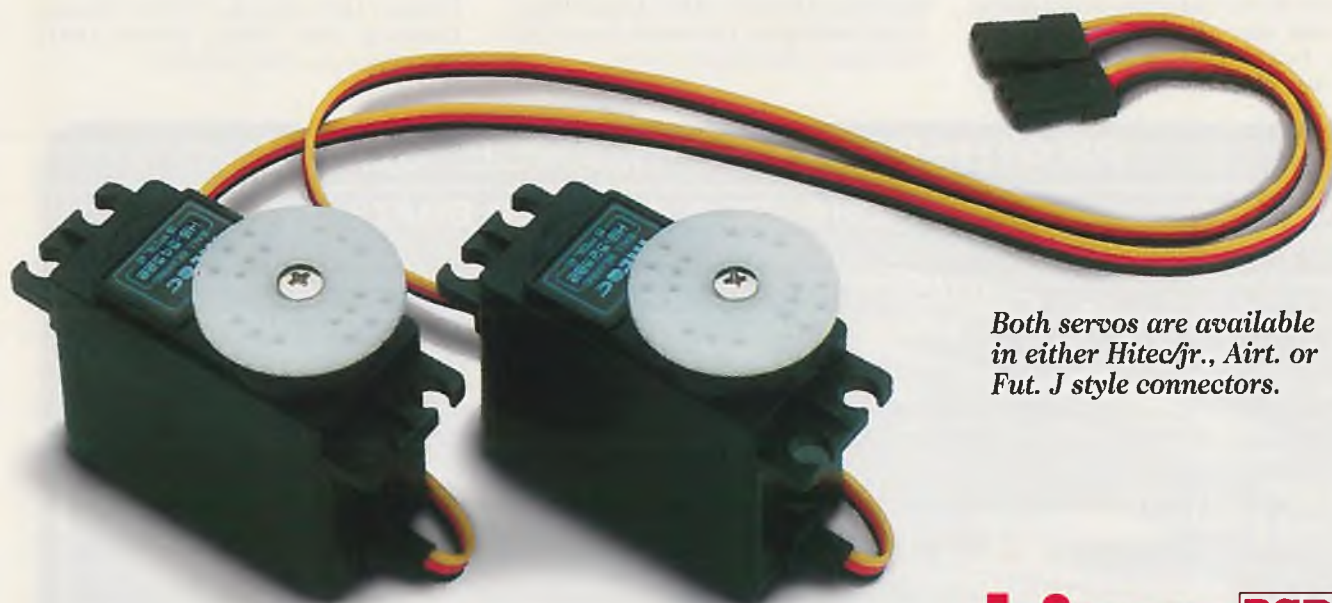
The 5xx series servos utilize a true five pole motor in place of the standard 3 pole.

## The 5 Pole Armature



## The Heart of the 5 Series Servos.

By doing this, Hitec RCD has been able to come extremely close to coreless servo performance, while offering them at a much lower price. All 5xx series servos utilize a nylon gear train with a top ball bearing and bottom iron/oilite bushing on the output shaft.



*Both servos are available in either Hitec/jr., Airt. or Fut. J style connectors.*

### HS-545 HIGH TORQUE

Torque=62 oz/in  
Speed=0.21 second

Size: 1.5"x 0.8"x 1.4"  
Weight: 1.75 oz.

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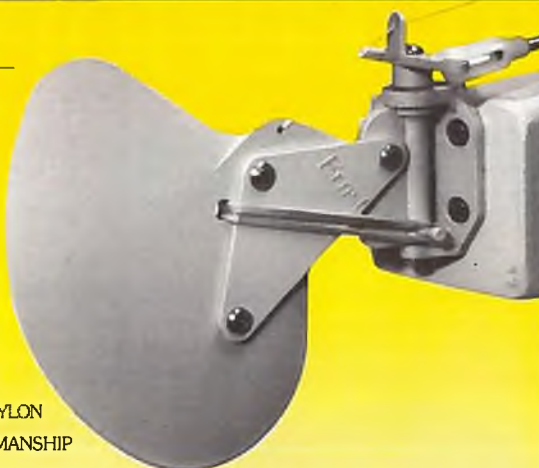
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left offsets (up to a 3-1/4" [82.6mm] diameter wheel), and a fork style oleo. All of the Series 380 RoboStruts come with new, easy to use 5/32" (4mm) and 3/16" (4.8mm) diameter wire adapter bushings. Improve the looks, handling, and performance of your airplane today! Available from both hobby dealers and direct. For more information, contact: Robart Mfg., Inc., 625 N. 12th St., St. Charles, IL 60174-1728, phone (630) 584-7616, or fax (630) 584-3712.

### YF-17 SPORT SCALE JET PUSHER

The YF-17 jet is the first prototype of the F-18. The model features foam wings with balsa slab sides and tail surfaces. All parts are hand-cut and router finished. Kit includes all sheeting wood, hinges, horns, nuts, bolts, and screws required to finish the plane. Vacuformed canopy, turtledeck, nosecone, and tailcone. Full-size plans and



instruction manual. Designed for .40-.45 2-stroke engines. Specifications: wingspan 43"; length 50"; 5 to 6 pounds. Can be built in a weekend. For intermediate to advanced pilots. Model #YF-17, suggested retail price is \$139.95. Available direct only. For additional information, contact: Bill Stevick at Bob Dively Models, 38131 Airport Pkwy., #206, Willoughby, OH 44094, phone (216) 953-9254, or fax (216) 953-9311.



### SUPER TRAINER ST-40

New from Lanier RC is the ST-40, a totally new trainer that has a 64-1/2" span with 774 sq. in. wing area. It features CAD drawn plans, laser-cut parts with interlocking fuselage construction, and tabbed rib construction for fast assembly. For .32-.46 2-stroke/.40-.56 4-stroke engines; 4 channels. Model #96225, suggested retail price: \$109.95. Available direct and from retail outlets. For additional information, contact: Lanier RC, Inc., P.O. Box 458, Oakwood, GA 30566, phone (770) 532-6401, or fax (770) 532-2163.



### SLICK MOUNT

New from JK Aerotech is the Slick Mount, engine/fuel tank mount. Designed for the Cox .049 reed valve engines, it allows you to mount your engine and a large fuel tank with clunk, all in one assembly. (Fuel tank — film canister available separately.) CNC machined, anodized black aluminum. Suggested retail price: \$15.00 plus S&H. Tee Dee Adapter: \$5.00. Available direct only. For additional information, contact: JK Aerotech, 5120 E. Powell, Gresham, OR 97080. Phone (503) 665-3824, or fax (503) 666-7423.

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#### VORTEX BUGGY

MRC's Vortex 1/10th Scale Buggy is high performance off-road at its best. If you want speed and amazing handling, the Vortex is for you. Features include adjustable ball diff, fiber resin chassis, adjustable engine mount, bellcrank steering, light weight, high strength wide track suspension arms, four-wheel independent suspension, oil dampened shocks with adjustable coil over springs, and adjustable toe-in.

The Vortex R/C Buggy also comes with a new slick polycarbonate body and high performance 20 turn motor for top end speeds and off-the-line punch.

Remember all MRC 1/10th scale vehicles are now backed by MRC's 1 year crash damage protection — limited warranty. See your hobby dealer. For more information, contact: Model Rectifier Corp., 80 Newfield Ave., P.O. Box 6312, Edison, NJ 08818-6312. Phone (908) 225-2100, or fax (908) 225-0091.



#### BVM BANDIT

The Bandit is an all new, all composite molded, larger size sport jet that is available now from BVM. Two versions allow you a choice of turbine or ducted fan power.

The "T" version is uniquely designed for the JPX turbine with its BVM By-Pass System, large flaps, and speed brake. The "V" version is designed to be a bit more simple and less expensive for the BVM .91 and Viojett propulsion.

The Bandit has a 64" span, 832 sq. in. wing, and is 72" long. Swept or conventional fins and wingtip tanks are some of the available options.

For further information, contact: Bob Violett Models, 170 State Road 419, Winter Springs, FL 32708. Phone (407) 327-6333, or fax (407) 327-5020. Send \$6.00 U.S. (\$8.00 foreign) for a complete color catalog.



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## HOBBYIST

**WANTED: UNBUILT** Plastic model kits, all types; buying collections, Ohio, Mich., Indiana. Send list, price. Models, Box 863, Wyandotte, Michigan 48192.

**WANTED: IGNITION MODEL ENGINES** 1930s-1950s, especially Elf, Baby Cyclone, Dooling, Hornet, McCoy, Brown Jr., Ohlsson Custom & Gold Seal. Also model Race Cars, any parts, spark plugs, etc. Woody Bartelt, 3706 N. 33rd St., Galesburg, Michigan 49053, (616) 665-9693.

**BACK ISSUES** of model airplane magazines, old time F.F., U.C., R.C., plans. Send SASE for list. R.C. Piccola, 713 Campground Circle, Scottsboro, AL 35768.

**WANTED:** Analogue, pulse, digital proportional radios. Deans, Kline Electronics, Sampey 500, Spar, Min-X Astron, Galloping Ghost, Home-built, American made. Ron Gwara, 21 Circle Dr., Waverly, NY 14892, (607) 565-7486, e-mail: ron.gwara@juno.com

**WANTED: GASELECTRIC** Outboard or Marine engines or parts. Wes Pettinger, 1501 Banbury Ct., Richardson, TX 75082, (972) 907-0930.

**WANTED: OLD COX, WEN-MAC, O&R,** Gas powered cars, airplanes, others. Plastic/metal, complete or parts. Also: old model engines, Dooling 61, McCoy 60. Willie Shuhaibar, P.O. Box 1732, Walnut, CA 91788, (909) 444-1914.

**WANTED: SLOT CARS.** Cox, Monogram, Aurora, others. 1/24th, 1/32nd, HO, Scale, complete or parts. Anything you have. Willie Shuhaibar, P.O. Box 1732, Walnut, CA 91788, (909) 444-1914.

**BUYING ENGINES FOR CASH!** One or an entire estate. Glow, diesel, ignition — new or used. Old and current, all types wanted except .049's. Send description and prices to: Robert Boumstein, 10970 Marcy Plaza, Omaha, NE 68154. Phone (402) 334-0122, Fax (402) 334-4173.

**WANTED:** Built or partially built scale Cessna 150, 152, or 172. Glen Mills, P.O. Box 3393, Mission Viejo, CA 92690, phone (714) 768-0585, fax (714) 458-6455.

**FOR SALE NIB** collectors museum scale Proctor Albatross DVA and Proctor Jenny. Carl Gagliardi, San Antonio, TX (210) 494-3685.

**WANTED:** K&B 3.5 race car engines. Frank Williams, 9861 St. Elmo Dr., Oakland, CA 94603.

**OLDTIMERS:** Playboy, Scientific Mercury, Comet Interceptor, Clipper, Berkeley models, plus 40 models, built up, ready to cover. SASE for list. Dale Myers, 14692 Lowe Rd., Stewartstown, PA 17363, (717) 993-6246

**WANTED:** Hot wheels and Matchbox toy cars. Pay up to \$10.00 each. Stephen Morgan, 909 Post Ave., Alamogordo, NM 88310, (505) 434-1170.

**MONOGRAM SPEEDI-BUILTS:** I pay top dollar for Monogram Speedi-BUILTS and Superkits. Will trade for same kits also. Loren Sisley, 19909 4th SW, Seattle, WA 98166, or call (206) 824-2723 evenings.

**FOR SALE:** Large estate, 900 engines, 300 kits. Send SASE: Greg York, 6326 Corwin Rd., Waynesville, Ohio 45068.

**WANTED:** Toy metal outboard boat motors: Orkin, Gale, Mercury, Johnson, Scott, Oliver, Evinrude, Fuji, Sea-Fury, also old pylon racing boats (wood) and .60 size ignition airplane motors. Richard Gronowski, 140 N. Garfield Ave., Traverse City, MI 49686, ph. (616) 941-2111.

**COX, WEN-MAC, TESTORS:** Comet, O.K., K&B, plastic gas cars/airplanes. Wanted by collector. Please write. Thanks. Dean Barham, 4032 Iowa St., San Diego, CA 92104, (619) 528-1680.

**FOR SALE:** Selling my entire modest engine collection, mostly diesels, some ignition and glows. For list, send a No. 10 SASE to: Richard Komin, 6238 8th Ave. S., Gulfport, FL 33707.

**WANT TO BUY:** Midwest Jetster either kit or built plane. Complete with fan unit. Mark Holly, 310 S. Illinois St., Lake City, IA 51449, (712) 464-1172 eve.

**FOR SALE:** Bob Parkinson Cheetah, all white w/red and yellow stripes. New O.S. .91 with JMP pipe, Dynamix fan unit, Futaba 6 channels with servos, 12 McCoy spark plugs, never flown, looks great \$1,800.00. (903) 825-3094.

**WANTED:** NIB Andrews A-Ray complete kit or completed model. Call Mike Johnston at: (316) 795-4642.

**ALL NIB:** Byron Pitts w/Byro drive \$300.00; VK Cherokee \$135.00; Westcraft 10 ft. B17 \$450.00; 6 K&B 40, Consecutive Serial Numbers \$55.00; Enya VT 240 \$700.00; Back issues of model magazines, SASE for list. John Barron, 118 Griffin Rd., Bangor, ME 04401, fax (207) 942-8377.

**WANTED:** .21 (3.5) car engines, carburetors, mufflers, pipes, etc. Frank Williams, 9861 St. Elmo Dr., Oakland, CA 94603.

**WANTED:** Race car videos: (On Road) 1/8 and 1/12 scale(s) road racing. Frank Williams, 9861 St. Elmo Dr., Oakland, CA 94603.

**WANTED; SLOT CARS:** Cox, Aurora, Tyco, etc. Any scale. Thanks, Dean Barham, 4032 Iowa St., San Diego, CA 92104, (619) 528-1680.

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**WANTED:** EZ and Futaba ARFS. (512) 918-0147.

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**FOR SALE:** Stafford L-19 kit, \$135.00; ASP 80 4 cycle engine, \$155.00; 5" scale 1934 Miss Los Angeles kit \$150.00. All NIB plus shipping. Jim (216) 221-3718, (216) 521-2430, p.m.

**KRAFT:** KP7C MK IV FM (2) Gold stickered transmitters \$150.00 each; KPR8FD (3) dual conversion narrow band receivers \$65.00 each. Numerous Kraft servos and hardware also available. Tony Curatola, 18 East 17th St., #5, New York, NY 10003, days, (212) 243-5478.

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**WANTED:** Super Kaos (60), and a Super Kaos Jr (40), kit or built, and a PA12 kit. David Foster, 106 Bolling Ave., San Antonio, TX 78236, (210) 670-8811.

**WANTED:** Large multi engine kits, Kyosho, Eureka, etc. B-25, B-26, B-36, C-54, P-61 Super Constellation, etc. Peter Pizzorno Jr., (716) 675-2063, 2064 North Creek Rd., Lakeview, NY 14085.

**WANTED:** WWII Righter Target Drone engines, parts and manuals. Ed Fisher, 27 Hurdle Fence Rd., Avon, CT 06001, (860) 675-5676.

**HELICOPTER FOR SALE:** Concept 60 SR, O.S. Max .61 SXH, Hatori pipe, Airtronics 660 PCM, Airtronics SG-X Gyro, Airtronics 94158 servos, 1200 mAh battery, NHP carbon fiber blades. Hovered once, ready to fly, all brand new, must sell. Sacrifice for \$1500.00. Please call (407) 690-0994.

**WANTED:** Byron's T-28 Trojan kit, new in the box or partially built; also interested in custom retracts and power system for same. Cash or trade. Mike McGraw, 5009 Fairdale, Pasadena, TX 77505. Ph. # (281) 998-9046.

**35 READY TO FLY** — Trainer, Sport, Pattern, 1/4 Scale, 1/3 Scale. Bob Dively (216) 292-4493.

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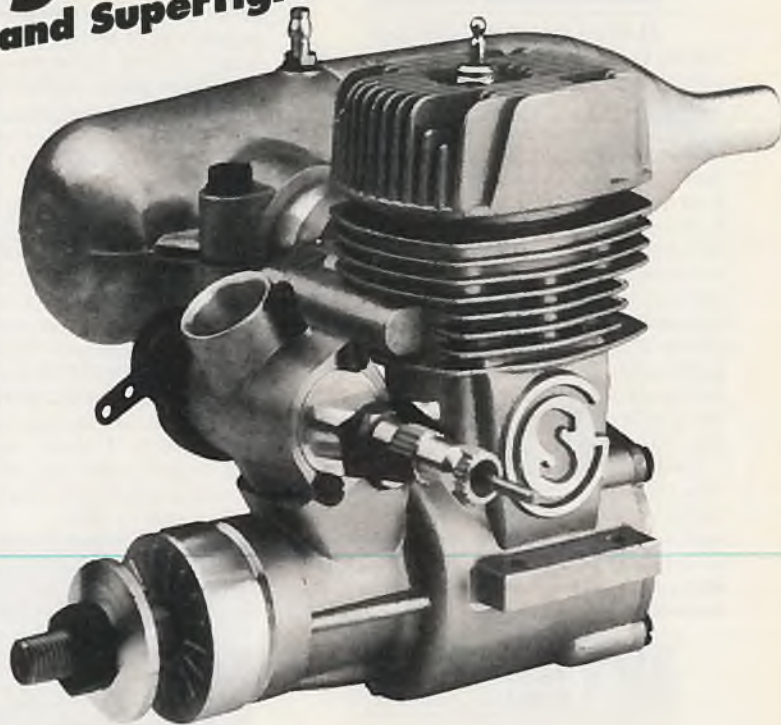
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### June 1997 Winners

The following two people won a prize from RCM and Great Planes.

**Clyde R. Neisner, Oceanside, California**

**Herbert Levin, Boca Raton, Florida**

**Congratulations!**

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RCM currently lists nearly 1000 different plans for R/C models and related items. Each plan is a full-size, individual blue-line print of the highest quality. Along with each plan ordered, you will also receive a reprint of the construction article text to aid in building your next project.

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For your convenience, we have listed the category of each model in its description. Example: Cat. 1 = Sport; Cat. 2 = Scale/Sport Scale; Cat. 3 = Ducted Fan; etc. As you will also note, many models have two or more categories listed such as Cat. 1-8 (Sport-Pattern). You should find this feature helpful in determining the best plans for your modeling needs: (1) Sport, (2) Scale/Sport Scale, (3) Ducted Fan, (4) Electric Powered, (5) Sailplane, (6) Quarter Scale/Giant Scale, (7) Seaplane, (8) Pattern, (9) Power Boat, (10) Sailboat, (11) Miscellaneous.



**#1238 JAEGER:** by Mike Hollison. Cat. 5, 92" span, 600 sq. in., 2-ch.; built-up balsa, plywood, and spruce. One sheet 35-1/4" x 51-1/4", RCM 9-97, \$6.50.



**#1239 JAVELIN:** by Bill Winter/John Hunton. Cat. 2, 42-5/8" span, 650 sq. in., .40, 4-ch.; built-up balsa, plywood, and hardwood. Three sheets 30-3/4" x 42"; 30-3/4" x 44"; 30-3/4" x 42", RCM 9-97, \$15.75.



**#536 BARRACUDA:** by Bob Steele. Cat. 5, 97-1/4" span, 600 sq. in., 2-ch.; built-up balsa, plywood, and spruce. One sheet 34-1/2" x 52", RCM 8-73, \$7.00.



**#537 FOKKER DVII:** by Chuck Cunningham. Cat. 2, 37" span (T) & (B), 444 sq. in., .15, 4-ch.; built-up sheet balsa and plywood. One sheet 27" x 38", RCM 9-73, \$5.00.

## PLANS SERVICE



**#538 MACH VIII:** by Joe Utasi. Cat. 1, 48-1/2" span, 445 sq. in., .40, 4/5-ch.; built-up balsa, plywood, and foam core wing and stab. One sheet 31" x 45", RCM 9-73, \$6.00.



**#539 RCM 15-500:** by Larry Maynard. Cat. 1, 51" span, 504 sq. in., .40, 4-ch.; built-up balsa and plywood. One sheet 30" x 40", RCM 10-73, \$5.00.



**#540 JU-88:** by Jerry L. Holcomb. Cat. 2, 46" span, 280 sq. in., .049, 2-ch.; built-up balsa and plywood. Two sheets (2) 22-1/2" x 35-1/2", RCM 10-73, \$6.00.



**#541 DAS MINI STICK:** by Loren Dietrich. Cat. 1, 36" span, 270 sq. in., .19, 4-ch.; built-up balsa and plywood. One sheet 23" x 33", RCM 10-73, \$5.00.



**#542 RCM SPORTSTER:** by Joe Bridi. Cat. 1, 49-3/4" span, 410 sq. in., .19, 4-ch.; built-up balsa and plywood. One sheet 33" x 50", RCM 11-73, \$6.00.



**#543A KWIK-STICK I & III:** by George Chabot. Cat. 1, use your existing wing, .15 and .60, 4-ch.; sheet balsa, plywood, and pine. One sheet 34" x 50", RCM 11-73, \$6.00.

**#543B KWIK-STICK II & IV:** by George Chabot. Cat. 1, use your existing wing, .049 and .35, 4-ch.; sheet balsa, plywood, and pine. One sheet 34" x 50", RCM 11-73, \$6.00.



**#544 PHANTOM I:** by Bob Klineyoung. Cat. 8, 66" span, 750 sq. in., .60, 5-ch.; built-up balsa, plywood, and foam core wing and stab. One sheet 35" x 56", RCM 11-73, \$7.00.



**#545 DOG HOUSE:** by Nickolas J. Linardos. Cat. 11, 49-1/2" span, 360 sq. in., .29-.40, 4-ch.; built-up balsa, plywood, and spruce. One sheet 34" x 70", RCM 12-73, \$8.00.



**#546 TIPSY NIPPER MK.2:** by Bryce Petersen. Cat. 2, 54" span, 500 sq. in., .29-.45, 4-ch.; built-up balsa, plywood, and foam core wing. One sheet 35" x 41-1/2", RCM 12-73, \$5.50.



**#547 WHIZARD:** by Owen Kampen. Cat. 1, 35" span, 182 sq. in., .049, 1/2-ch.; built-up sheet balsa, plywood, and Ace R/C foam wing. One sheet 23" x 32", RCM 1-74, \$5.00.



**#548 SUPERMARINE S-5:** by G.A. Flandro. Cat. 2, 40" span, 290 sq. in., .15-.25, 4-ch.; built-up balsa and plywood. Two sheets (2) 28" x 41", RCM 2-74, \$6.00.



**A plans catalog, which lists plans from our plans service, is available from RCM. Please see the order page for more information.**



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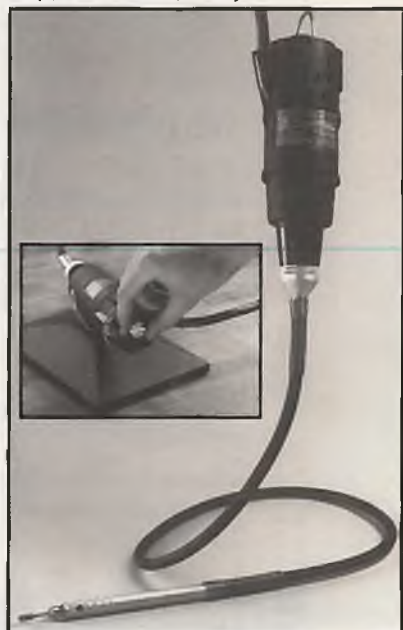
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**"For What It's Worth Contest"**  
**P.O. Box 487**  
**Sierra Madre, CA 91025**

### June 1997 Winner

The following person won a prize  
from RCM and Dremel.

**George N. Poirier**  
**Providence, Rhode Island**  
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## ***They look like a NiCd—but last like two.***

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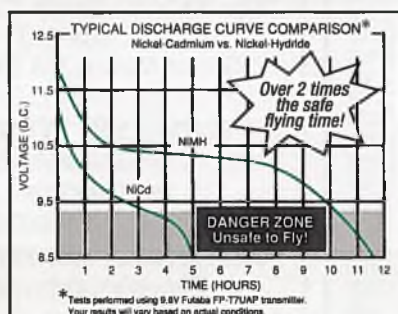
Even after his preflight checks, Steve still approached his HydriMax pack warily. He returned to NiCds for a few flights, but couldn't wait to put the HydriMax NiMH back in. "I could get several more flights without stopping to fast-charge," he says. "And when you're preparing for a competition, it's important to fly as much as possible."

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**A**mong WWII's famous fighters, the F4U Corsair stands alone. Its sturdy, instantly recognizable looks have no equal—and no almost ready-to-fly R/C version has been able to do them justice. Until now.

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BIPE**



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**Pilatus Turbo Porter PC-6**



72" span, Enya .40-.60 2-stroke or .53-.80 4-stroke recommended. One of the most unusual airplanes ever built, this unique, gentle performer makes average fliers and builders look like experts.



**TOP:** Factory-assembled wood field box painted with automotive grade paints and clear acrylic overcoat. Detachable power box. (Fuel container and power panel not included.)

**BOTTOM:** Factory-built, laminated wood fuselage plus many other prebuilt wood parts make these planes extremely strong and easily repairable.

**ALTECH  
MARKETING**

For maximum safety and enjoyment, always follow directions.

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