

# RcM



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# radio control MODELER

THE WORLD'S LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST



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# MODELER



## FEATURE ARTICLES

From The Shop — Toledo '84	4
Fairey Junior	78
The Winger	104
Over The Hill Gang	126
Fly It Again	164
O.S. FS-120 Four Stroke	168
RCM Subscription Contest	186
Contest Announcements	215

## DEPARTMENTS

Radio Spectrum	30
Scale Views	36
Sunday Flier	45
Silent Power	49
Soaring	54
Flying Lowe	58
Engine Clinic	62
Cunningham On R/C	94
For What It's Worth	116
Pit Stop	129
Give It A Whirl	144
Power Boating	154

## PRODUCT TESTS

Tower Hobbies: Land Jump 4D	195
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## MERCHANDISING SERVICES

Showcase '84	198
Readers Exchange	220
Advertisers Index	221

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**This Month's Cover** salutes Super Bowl XVIII winners, the L.A. Raiders. Raiderette Jackie Thorpe shows off long time Raider fan Capt. C.G. Strange's Goldberg Skylark on the beach at Carlsbad, California. The Skylark is powered by a Webra Speed 40. Photograph by Jerry Bryan.

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## Toledo's Thirtieth Annual Radio Control Exposition

**W**hat would it be like without the Toledo Exposition? Don't really know. As long as I can remember there has been one. This year the Toledo Weak Signals R/C Club hosted their 30th Exposition. Can you imagine, 30 years of putting on the

show. And, without question, they have become experts at it. How and when did it all start? Thirty years has created some history. Let's start from the beginning.

In February 1955, a group of R/C enthusiasts from the Detroit area got together at a cemetery accessory sales office (of all places) to talk shop. They enjoyed the session so much that they decided to make it an annual get-together. In 1956, it was held in the same place only the event was



# TOLEDO '84



Eager for the doors to Toledo '84 to open, the crowds were anxiously lining up to get inside.

Larry Gordon of Fenton, Michigan, picked a very unusual aircraft to model. The time and effort he spent on this Polish P.Z.L. P-23A Karas Recon and Light Bomber paid off with Larry winning First Place in "Precision Scale" and also "Best of Show" award. He is a master craftsman as can be seen in the photos. This aircraft was operational in the middle to late thirties and carried a crew of three. The pilot was seated in a fully enclosed heated and air conditioned cockpit while the observer, seated behind, was provided with detachable dual controls. The observer was also bomb-aimer and gunner by folding his seat and descending into the ventral gondola. The permanently open dorsal gun position was manned by a gunner, the third man in the crew.



text continued on page 29



*Aero Composites EU-1A, by Bruce Rebechini, Mokena, Illinois, 1st in Pattern.*



*USS New Jersey as of 1944, 1/8 scale, Bill Brown, Collingdale, Pennsylvania, 1st in Military Scale boat.*



*Custom Cavalier by Dave Gierke, Lancaster, New York, 1st Old Timer.*

*XFS-F1 Skyrocket by Delbert McGehe, Urbana, Illinois, 1st in Military Stand-Off Scale.*



*CAP 20L, Owen Wysong, South Bend, Indiana, 1st Best Finish.*

*Sprint car (Scale) by Len Coppler Jr., Fostoria, Ohio, 1st R/C Car.*





*Southern Eagle designed and built by Kent Landefeld.*



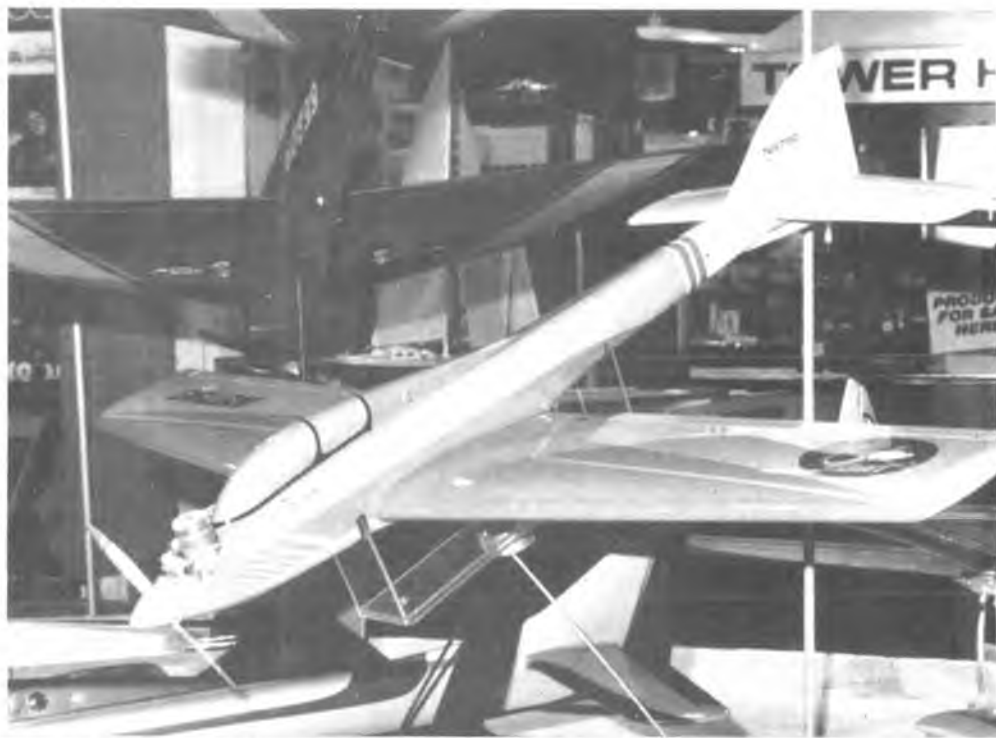
*Ziroll P-40 by Al Betkey, Temp., Michigan.*



*Fock-Wulf 190A by Melvin Nypiuk, Canton, Michigan.*



*DHC-3 Otter by Joe Murray, Markham, Ontario, Canada.*



*U.F.O. by Kent Landefeld —  
Pattern, Somerset,  
Pennsylvania, 2nd in Pattern.*



*Fairchild PT-19 by  
David Swanger,  
Fremont, Ohio.*



*Clipped Wing Cub  
by Cliff Tacie, Mt.  
Clemens, Michigan,  
2nd Non-Military  
Stand-Off Scale.*





1/4 Scale Stinson by Larry Riggen, Waukeegan, Illinois.



Buccaneer on floats by Dennis Lamont, South Bend, Indiana, 3rd Old Timer.



Piper Seneca 2 by Mike Smith, Savoy, Illinois.



Monocoupe 110 Special by A.L. Lockrow, Indiana, Pennsylvania, 3rd Non-Military Stand-Off Scale.



Sea Dream by Charles Kelley, Pittsford, New York.



Super Decathlon by Mark Gilmore, Muncie, Indiana.



"Hayseed C" by Walt Moucha Sr., Menominee, Michigan.



Chiper Bipe 1/3 Scale, Ken Barnes, Battle Creek, Michigan, 1st Sport Biplane.



P82-B Twin Mustang by Larry Horbacz, Brunswick, Georgia.



Buccaneer by Bruce Perry, Matteson, Illinois.



Travel Air D-40, by Doral Drew, Piqua, Ohio.

*Lear Jet by John Kintz, Bayshore, Michigan.*



*Aeronca C-3 by Rick Quinlan, owned by Dwight Hartman, Argenta, Illinois.*

*Giant J Bipe by Joe David, Columbus, Ohio, 3rd Sport Biplane.*



*DH Moth by Merritt Zimmerman, Cleveland, Ohio, 2nd in Precision Scale.*



*New Ruler by William Kaylor, Cumberland, Maryland.*



*TOP: Ryan STA by Robert Wright, Harrodsburg, Kentucky, 3rd Precision Scale. ABOVE: B17-G Fortress by Lawrence Durst, Owen Sound, Ontario, Canada. RIGHT: Bonanza V35A by Michael Beckman, Howell, Michigan.*



*1951 Hawker MkII Sea Fury by Dennis Wann, Bryan, Ohio, 2nd in Military Stand-Off Scale.*



*TOP: Nieuport Triplane by Frank Hoffer, Cleveland, Ohio. ABOVE: U.F.O. by Jeff Troy, Valley Forge Signal Seekers. LEFT: SBD-5 Douglas Dauntless by Ken Ames, Jackson, Michigan.*



*Miss Los Angeles by Walt Moucha Jr., Menominee, Michigan.*



*FG2-1 Corsair by Ben McKillans 1949 air races version.*



*Close-up of Custom Cavalier by Dave Glerke, 1st in Old Timer R/C plane.*



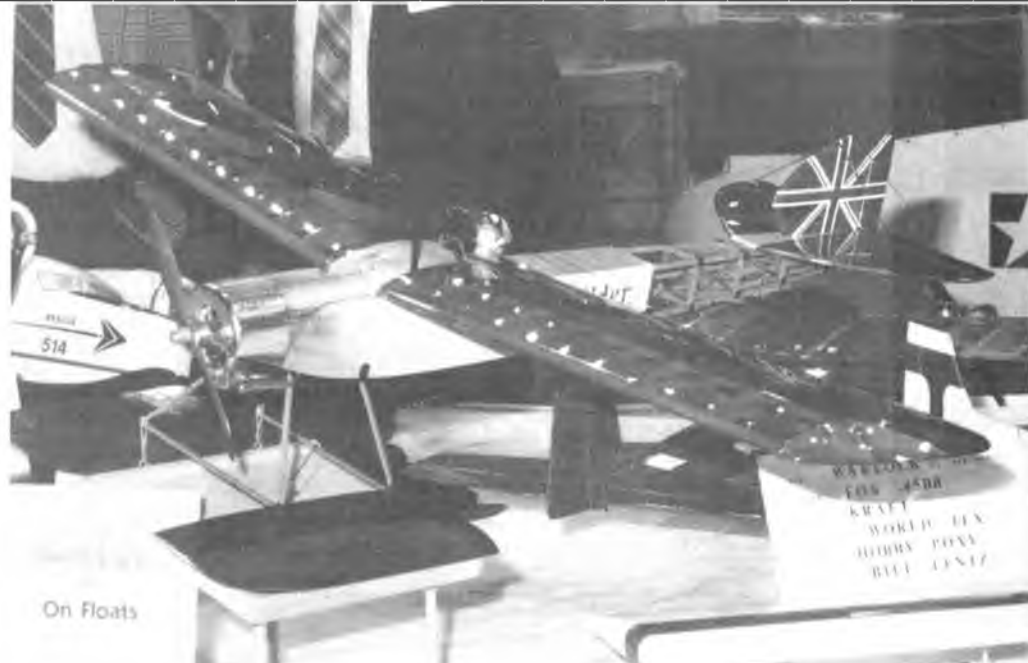
*1914 Bleriot XJ-2 by Jeff Troy, King of Prussia, Pennsylvania, 3rd in Military Stand-Off Scale.*



*F-4J Phantom "Black Bunny" by Bob Florence.*



*Sun Ray 2 .40 Jack Van Hee, Temperance, Michigan.*



*Elder-On-Floats by Scott Christensen, Buffalo Grove, Illinois, 2nd in Sport Plane.*



*R/C Kits Acro-Master by Ron Price, Kewanee, Illinois.*

*Beautiful unfinished Emraude by Dario Brisighella, Oak Creek, Wisconsin.*



*Douglas Skyraider AD6 by Phil Nigg, Urbana, Illinois.*



*Shelley Foss tug, Denny Lyman, Toledo, Ohio.*



*Clayton F. Thoms tug, Dwight Hartman, Argenta, Illinois.*

**TOLEDO '84**



*Lincoln Thrift, Wallace Stangway, Lake Oregon, Michigan.*



*Scarab 377 Special Edition, Mike Barrett, McComb, Ohio.*





*Atlas Van Lines by William Overton, Springfield Garden, New York.*



*Atlas Van Lines, Jerry Badgero, Oxford, Michigan.*

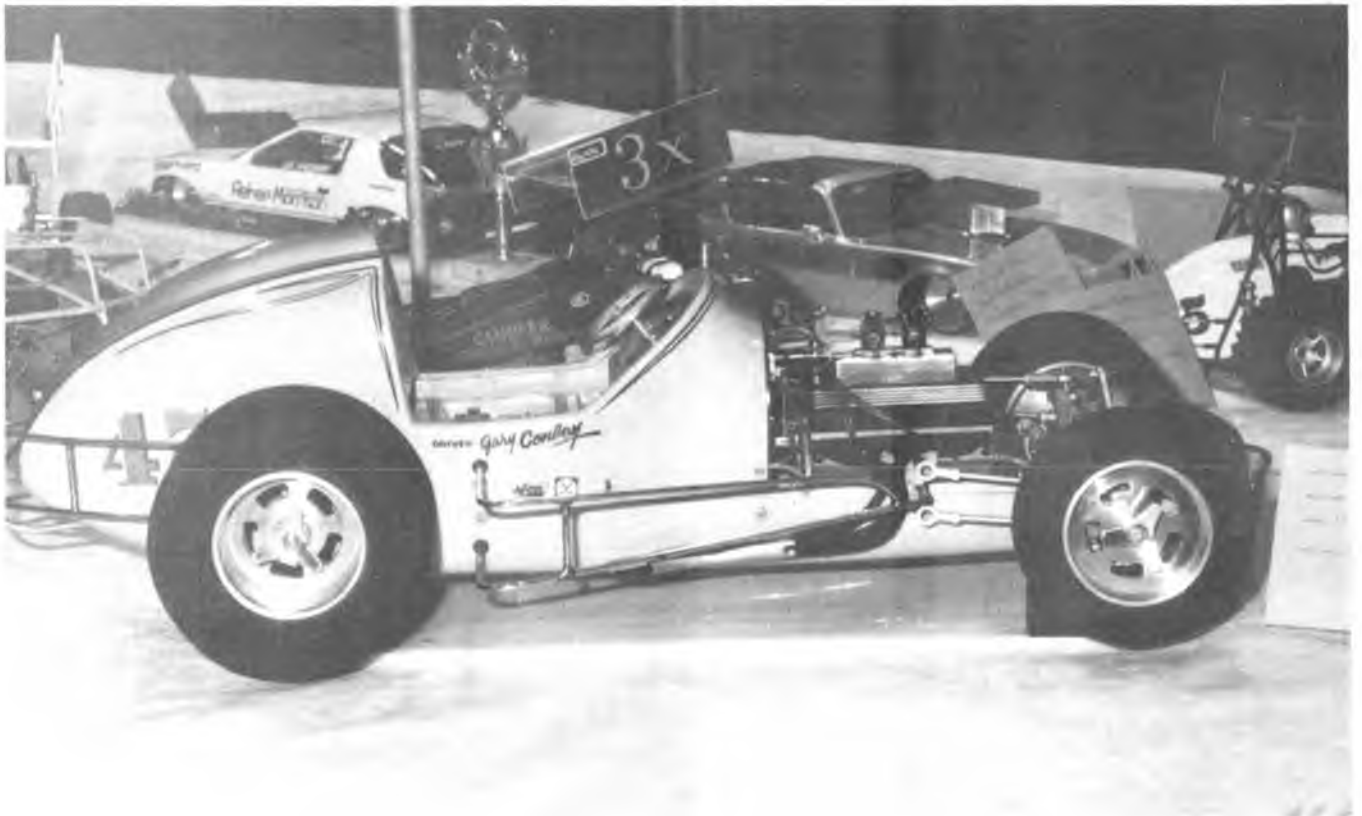
*Jennifer Lynn (row boat), Douglas Cass, Rochester, Michigan.*

*"Bear" Richard L. Peyton, Graytown, Ohio.*





**ABOVE:** Windbourne Sail, Denny Lyman, Toledo, Ohio, 2nd in Pleasure Boat class. **RIGHT:** West Coast 12 Meter by Ken Cristensen, Berkley, Michigan. **BELOW:** 1/4 Scale Sprint Car, V8 powered, by Gary Conley, Glenelyn, Illinois.





*Thunder Tiger dune buggy by Gary Conley, Glenelyn, Illinois.*



*Toyota 4 x 4's by Tim De Selms, Toledo, Ohio.*



*Bell 222A by Mark Barbee.*



*Hughes 500 by Mike Robins, Woodbridge, Virginia.*



co-hosted by the Detroit R/C Club and the Toledo Weak Signals. This is the very first time the Toledo Weak Signals became involved.

In 1957, the conference was completely taken over by the Toledo Weak Signals & moved to the Toledo area primarily because of the expressway and Ohio Turnpike connections providing better access to the show. The 1957 and 1958 conference was held at the Trilby Log Cabin. In 1959 the conference was moved to the Miracle Mile Ballroom and remained there through 1961.

More space was needed and in 1962 the conference was again moved to the Sunndale Country Club. That year twelve manufacturers and about 1,000 visitors attended. Again, the facility proved to be too small and in 1963 and 1964 the conference was held at the Champion Spark Plug Company hangar at the Toledo Express Airport. By then the show was attracting participants from many parts of the country. It was in 1964 that RCM began sponsoring a trophy for best finish. In 1965 the conference was moved to the Lucas County Recreation Center and remained there through 1974. During those years the R/C hobby experienced a tremendous growth and the Toledo Weak Signals soon outgrew the Recreation Center.

The Toledo Sports Arena became the home of the conference in 1975. It was also in 1975 that the official name was changed to the Toledo Radio Control Exposition.

What will happen to the Exposition in the near future? According to Co-Director Bob Hisey and Wayne Yeager, soon to be Co-Director, the Exposition will remain at the Sports Arena until a larger facility becomes available.

They have no place to move right now. Future planning in the area will open up more possibilities so we will have to wait and see what happens.

The Toledo Exposition doesn't just happen every year. It is the result of year-long planning on the part of the Co-Chairmen Don Belote and Bob Hisey, the Weak Signals Exposition Committee, and the entire club membership. The 30th Annual Exposition was no exception. It keeps on getting better and better. The Weak Signals Club has it well in hand.

Primarily, the Toledo Exposition is aimed at you, the R/C modeler. It provides you with a common meeting ground with modelers from all over the country. It allows you to see and talk with the various R/C manufacturers, magazine personalities, display your models in competition with others, and even swap your used equipment. For the R/C manufacturers it provides space to show and sell products with an audience of over 35,000 modelers interested in R/C products. Nowhere can you ever expect to see a more comprehensive R/C show with benefits for all.

I will not comment on any new items seen at the show, the various columnists throughout the magazine will cover that aspect. The show was well-attended by RCM staff members, Editor Pat Crews, Dick Kidd, Ken Willard, Bob Wallace, Dick Phillips, Jim Oddino, Art Johnson, Don Lowe, John Gorham, John deVries, Jim Zarembski and Al Doig. From the entire staff we hope you enjoy our Toledo coverage. And, thank you Weak Signals of Toledo, for hosting another fantastic Exposition. You have made it happen for thirty years! □

Toledo 1984

Generally when I think of my trips to Toledo, I think about all the new products and the beautiful models and start dreaming about the ultimate radio controlled model. And while there is a lot of hardware to talk about this year, I think the thing I enjoyed the most was the conversations with the other modelers who I only see once or twice a year. In fact, it started at the airport in Los Angeles where I met Pat Crews, Dick Kidd and Al Doig. Now you may think I see the RCM staff quite often but the truth is we do most of our communication through the mail. In fact, I hadn't seen Al Doig in about 25 years. He was one of my heroes when he published the first multi channel feedback proportional system called Ulti-Multi, back in the late fifties. He had me winding toroids and burning up transistors but I sure learned a lot in the process. It was nice to reminisce about the early days.

Of course, the big topic of discussion at Toledo this year among the pattern fliers was concerning what kind of equipment would it take to fly the turnaround pattern. Amongst the master fliers who have been around awhile there is a unanimous feeling that all master fliers should fly turnaround. Not like the West Coast where a bunch of animals are resisting

the change.

However, there seem to be two schools of thought on the airplane design. Many guys think the scale type airplanes like the Laser and CAP 21 are the way to go, while others think that sticking closer to our existing pattern designs is better. All agree you need to fly slower and, therefore, you need to be lighter and maybe bigger to stay in the air. Don Lowe seemed to think that you could be competitive with a Phoenix 8 or a Laser but you ought to be under 8 lbs. Steve Helms was happy flying his Cosmos with an Enya 120 4-cycle but indicated it would be better if it was a little lighter. I had previously decided on a Super Sceptor by R & L Performance Products, 20115 Nordhoff St., Chatsworth, California 91311, (818) 882-3360, but decided I ought to try a Laser too, just in case. Mallory Models and Bob Godfrey's Precision Built Models & Kits, 1818 6th Ave. W., Bradenton, Florida 33505, (813) 747-7006, have Lasers that appear to be the ideal size. However, Hanno Prettnner says he has a 1.8 kg Super-Fli powered by a 4-cycle .45 that does the whole Las Vegas TOC pattern. When I asked him if he was going to use it in competition he just smiled.

What about radios? Most of the pattern fliers were more interested in having the functions they wanted and



would rather have the rest of the bells and whistles left off. Dean Koger was interested in having a good basic system with the ability to set up the way he wanted, and "leave off the garbage." The problem for the manufacturer is to keep everyone happy. Simprop, a German system, seemed to do the best at making the transmitter "user friendly." You can plug in various modules and interconnect the various switches to your own liking. More on that later.

Don Lowe and Dave Brown are convinced, like I am, that you want the ability to mix rudder into roll and pitch and maybe pitch into roll and yaw, as I suggested in a previous column. Don says one of the full size aerobatic planes has mechanical mixing from the rudder into pitch and roll. It would be interesting to know who thought of it first.

Many guys are convinced that the automatic dual rate or exponential will replace rate switches in the turnaround. Most think roll, snap, and spin buttons are unnecessary.

One of the most interesting conversations was with Hanno Prettnner on Mode I versus Mode II. He said he started out as a Mode II flier but switched to Mode I to separate the roll and pitch functions. That way he can hold a fixed amount of roll while making pitch corrections in a roll. I've

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always argued that I want two functions on my right (and hopefully more coordinated) hand and one on my left. So I have flown Mode II. The way I solved the roll problem was to use a roll switch (a center off, momentary toggle, left and right) which I activate with my left hand. So I, too, was separating roll and pitch but I must admit I have had a hard time finding that switch in the turnaround pattern. So I started thinking, could I learn to fly Mode I? Probably not well. But I bet I could put ailerons on the left stick and rudder and elevator on the right and pick that up real fast. That could be the best of all worlds. I hope to give it a try but I'd appreciate some feedback from you readers. Most of you can get a lot more flight time than I can. So if you think it has merit, try it and let us know the results.

Of course a lot of people asked me if I thought PCM was the way to go and of course I said yes. I don't think we've seen the ultimate PCM system yet but I think the present systems are superior to the PPM systems. However, Butch Lanterman of World Engines is working on a PPM system that could accomplish the same thing as the PCM system, namely reject bad data in the receiver. So don't close the patent office.

Cliff Weirick of Airtronics feels the dual conversion receiver is important for a good RF link while World Engines is working on a single conversion receiver with a 10.7 MHz IF. Cliff and I discussed the possibility of a tuned RF receiver with a narrow band pass filter at the RF frequency. The problem there is that there are so many different frequencies that you'd have to stock a bunch of filters. Which brings us to the frequency synthesizers. Apparently Kraft Systems is taking some heat. However, there is no question this is

the way to go and other manufacturers will follow. We'll talk more about that later also.

Dave Platt complained that no one was considering the scale flier when they designed radios. Once again I think Simprop may be the one doing the most. For instance they will have switches on top of the sticks which could be used for bomb drops, etc. Dave and I agree that the less you have to let go of the sticks the better.

Dario Brisighella, the man behind U.S. Quadra, 1032 E. Manitowoc Ave., Oak Creek, Wisconsin 53154, (414) 762-7155, was interested in redundancy. He is willing to spend big bucks for a radio if it will help keep his plane in one piece and I can see why. The cost of the radio is small compared to the time and effort he puts in his models. He was thinking about putting two receivers in the plane with one controlling the right aileron and elevator and the other the left. I pointed out that that didn't take care of a transmitter failure or interference such as someone turning on, on your frequency. I suggested the possibility of two receivers on two different bands. Have a primary, but have your buddy stand by with the back-up. We'll be thinking about the optimum set-up. You guys think too please and send your suggestions.

The boat guys, John Brodbeck and Bobby Tom of K & B, in particular, said their biggest problem was breaking rudder servos. I started thinking about pneumatic and hydraulic servos but then got to thinking about what I remembered about boat rudders. It seems they always hinge them on the leading edge. It would seem logical that moving the hinge line back would lower the force requirements on the servo. Something to think about on big airplanes too. You want some positive

stability (hinge line ahead of the center of pressure) but not too much. I also wonder if the boat guys have too much yaw stability in their boats which would increase the amount of rudder required to make a turn. I guess that's a problem for Howard Power. (I called Howard when I got back and he said he does balance his rudders. He did say there was still a problem but indicated it was more probably vibration induced because it was usually the motors and pots that went and not the gear trains. However, he said they also lost a lot of integrated circuits which indicates they probably have high current drain.) So, anyway, it sounds like the world needs a better servo for power boats.

Well, let's take a look at what the various manufacturers are doing.

**Kraft Systems Inc.**  
450 W. California Ave.  
Vista, California 92083  
(714) 724-7146

We'll start with Kraft because they called a press conference for first thing in the morning on the opening day of the show. As I mentioned, they have been getting complaints about their new frequency synthesizer which allows the modeler to select 49 of the 50 channels that will be available in 1991. In fact, it has been rumored that some clubs were going to ban their use.

The problem arises because, according to the AMA phase-in plan, only 11 of the 50 channels should be used now, in order to allow continued use of older equipment. The Kraft folks could have built the equipment so that only eleven channels worked now and then charged the modelers to update it as the additional channels were phased-in. They elected to save the modelers some money — unusual in this day and age. Their thanks is a

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lot of complaints.

The only legitimate complaint was that Kraft Systems didn't publish the fact that operating on some of the new frequencies that have not been phased-in could cause problems in older equipment (or new equipment that doesn't have a "1991" design).

The Kraft people pointed out that right on the transmitter module itself was a warning: Operation on unauthorized channels may result in accidents causing serious physical injury as well as serious property damage.

The label also lists the eleven authorized channels along with the center frequency of each.

As I see it, frequency synthesizers are here and we need to start getting accustomed to them. We need to police ourselves more than ever because it will be a little easier to screw-up. It has been suggested that on a given day you don't let a guy switch once he has made his choice. This seems unnecessary if you use the system we use at Sepulveda Basin or at the Conejo Valley field. The idea is that the modeler puts his marker (a flag at Sepulveda, his club badge at Conejo) in/on the stand for the channel he is using. So if you look at the stand for channel 12 and there is no flag in it, it should be okay to use it. However, there is no substitute for communication. Talk to everyone in the pits and find out who might want to use channel 12 and arrange to take turns. Being polite could save everyone a lot of pain.

So once again, don't be afraid of something because it is new and different. Learn to use it the way it was intended and I'm convinced that you'll agree it is the way to go. Believe it or not I hope they do the same for the six meter band.

RCM did receive a frequency

synthesizer transmitter module and receiver so we'll give you some field test data in a future article.

Kraft was also showing their new KP7KB which appears to be an import with many of the features found on the high price sets but at a low cost. The Kraft ads tell you about the features so I won't go into that.

**Circus Hobbies**

3132 S. Highland Dr.  
Las Vegas, Nevada 89109  
(702) 732-0022

The Circus Hobbies booth always had a big crowd around it so it was kind of hard to see what they had. Finally, Don Lowe and I simply got inside the booth so we could look over their new 9 channel PCM system. By the way, they also had a single stick transmitter. The two stick version is expected to sell in the vicinity of \$600.00 and features a very compact receiver. The guys had just received the PCMs and weren't totally familiar with its capabilities but they did indicate that they had eight bit resolution (256 steps) and a fairly high frame rate. The operating system had a variety of servos plugged in and the channel with the good servo looked very smooth. Better than I would have expected from an eight bit system. The JR fail-safe system makes much more sense than the Futaba. You can set the fail-safe positions by pushing buttons on the **outside** of the transmitter. The Futaba system where you set each channel, one at a time (on the inside) is not too practical. An adjustable snap roll switch is another desirable feature on the JR. The single stick transmitter was an all aluminum box that looked nice but probably will get real hot and real cold.

We'll have to wait until the JR PCMs get into the field before we can comment on how well they work. However, I suspect they will give

Futaba a run for their money and should result in prices coming down.

**Altech Marketing/Simprop**

P.O. Box 286  
Fords, New Jersey 08863  
(201) 572-5792

Altech Marketing, who brings us Enya engines, has decided to import the Simprop PCM system from West Germany. As many of you know, Simprop is the system flown by World Champ Hanno Prettner. Hanno and his teammate and father, Hans, were at Toledo to promote the Simprop and answer questions. Hanno conducted a press conference where he described the system (in English), that was done in a most professional way. He obviously was very familiar with the equipment and was able to demonstrate its capabilities without any of the usual fumbling around and guessing that goes on with today's complex transmitters.

The Simprop is really well thought out from a user standpoint. Just about everything inside is plugged in with connectors so you can move functions from one stick assembly or switch to another. Changing modes takes just a few minutes. The transmitter also features plug-in modules that contain all of the adjustments you might want for a given airplane including servo direction and rate. The idea then is to set up your number one plane and then set up a second module for number two. You can then switch back and forth without the expense of two transmitters or the time consuming readjustment of all the variable functions. And, on top of that, the two (or more) models don't have to be the same type. Simprop has glider, pattern, and all around modules now and a helicopter version coming. I already mentioned the switches on top of the sticks which I think the scale guys will like. The packaging is very

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well-done and Hanno says the range is better than any previous system he has flown. The system is an eight bit system and has the same frame rate on all channels, unlike most of the other European PCM systems. My visual calibration of the smoothness of the servos says they're not quite as smooth as the Japanese seem to be but they don't seem to hurt Hanno's flying. Altech will provide service in this country and appears dedicated to making Simprop a success.

**Miniature Aircraft  
Supply/Multiplex**

2594 N. Orange Blossom Trail  
Orlando, Florida 32804  
(305) 422-1531

Multiplex is another German system which will be imported. It is interesting to find out that the Multiplex transmitter can be switched to transmit either PPM or PCM. I guess the idea is to make it compatible with your old airborne equipment. It also had two battery packs in the transmitter so that when one gets low you can switch over to the back-up. The Multiplex approach to versatility is to use a "soft module" which

programs the various switches and pots to perform different functions. When you change the soft module you also change a face plate which tells you the new function of the switch or pot. Unfortunately, each time you switch you would have to go through a lengthy adjustment procedure. Again, the German systems don't seem to be as smooth as the Futaba and JR but that may be my uncalibrated eyeball.

### World Engines

8960 Rossash Ave.  
Cincinnati, Ohio 45236  
(513) 793-5900

World Engines is building a radio for Dave Brown which he hopes will straighten out his Las Vegas biplane. From the standpoint of allowing the pilot to decide how he wants to mix channels, it sounds like the most versatile approach yet. Whether they can get it all in the transmitter case remains to be seen. They do plan to market the new system but no release date is scheduled. A frequency synthesizer has been put on the back burner until the new encoder is finished. World also has a new gimbal assembly that features top grade pots and a very ingenious centering mechanism which combines the best qualities of the single and double scissor arrangements. The other manufacturers ought to take a hard look at that. I'm not sure where the single conversion 10.7 MHz IF receiver fits into their plans but it sounds like it could be a winner.

### Novak Electronics

2709-C Orange Ave.  
Santa Ana, California 92707  
(714) 549-3741

Bob Novak didn't have his new FM dual conversion receiver at Toledo but he did have a new electronic throttle with exceptional performance. The secret is the use of parallel Hex Fets in the output which can control up to 150 amps with essentially no drive current. Three adjustments are provided which allow setting the high end, neutral and brake setting for any radio. All Bob's products are first class and this one is no exception. However, I'll let him tell you what you must pay for a first class throttle.

### Dave Brown Products

4560 Layhigh Rd.  
Hamilton, Ohio 45013  
(513) 738-1576

Dave was showing a flight simulator that is designed to work with an Apple II computer. It consists of a control box that looks like a two stick transmitter and the software.

## Precision Tools



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Two versions were on display, namely pattern and helicopters. I tried the pattern simulator and found it to be quite realistic, but more like an underpowered trainer than a hot pattern plane. The response just seemed a little slow. Dave said it could be cranked up so it responds faster, so I imagine they are still optimizing the system. I managed to crash and was given an estimate of \$254.00 worth of damage. I didn't feel so bad when I heard Hanno's bill was much higher.

**SR Batteries Inc.**

Box 287  
Bellport, New York 11713

SR was showing some new small batteries which should be popular with the racers and anyone else interested in saving weight. The 175 mah pack weighs 1.2 oz. and the 325 mah pack weighs 2 oz. They also were showing both 8 cell and 10 cell starter packs that attach directly to a Sullivan starter.

They also had an exclusive Ace Digipace which was designed to discharge at 300 ma or 500 ma and is capable of charging at 50 ma or 120 ma. Their solution to the high transmitter current drain is to offer an external pack made up of 900 mah cells.

**Ace R/C Inc.**

P.O. Box 511  
Higginsville, Missouri 64037  
(816) 584-7121

Ace is thinking about a new digital encoder and an FM system. They have not totally committed to the digital encoder because it looks like the costs might be too high. They were showing a new ultra simple, low cost system called the Olympic V which looks pretty attractive at \$149.95.

**Condor Hobbies**

17971 Skypark Circle, Suite D  
Irvine, California 92714  
(714) 250-1425

Condor has a new CD ignition system that uses a photo diode to sense shaft position. Unfortunately, I've misplaced the fact sheet on this item but as I recall it claimed a weight of one ounce. I'm not sure if this included the coil but the coil couldn't add much more than another ounce. I suspect you would want to run a separate battery pack on the ignition so you have to decide if the total weight penalty is worth it. I'm sure in the big scale planes three or four ounces is insignificant but the potential savings in fuel costs are.

**Master Line Products**

1836 Alabama Ave.

Fort Wayne, Indiana 46805

Master Line had a couple of tachs that looked real good. Both had large analog meters. The Master-Tach 2 has just two ranges 0-10K rpm and 0-25K rpm. The Master-Tach has five expanded scales 0-6, 4-10, 9-15, 14-20, and 19-25K rpm. They also had a pocket-size glo plug battery with a head lock output with a meter to monitor battery and/or glo plug condition. Good idea.

**Futaba**

555 West Victoria St.  
Compton, California 90220  
(213) 537-9610

Steve Helms was pitching the Futaba systems and seemed to have a crowd of the "pro" pattern fliers around him most of the time. All seemed pretty happy with the PCM although there was some complaining about too many switches. As I said, you can't please everyone.

Futaba also showed a custom single stick transmitter that used Ron Chidgey's new gimbal assembly. Production plans were uncertain.

**B & B Specialties, Inc.**

14234 Cleveland Road  
Granger, Indiana 46530  
(219) 277-0499

For those of you flying big airplanes or have boats that require lots of servo power, take a look at B & B's servo doubler. The unit they were showing used two Airtronics servos but any rotary servos should work. The workmanship in the doubler is really first class. Their system of aluminum arrow shaft inserts which fit standard aluminum arrow shafts will make a really heavy duty pushrod.

Some other products that I thought were significant to report on even though they probably don't belong in this column include a product called See Temp for making templates. It is a plastic sheet that you can lay on your plans, score with a knife, and break out a perfect template without destroying your plans. Contact See Temp, P.O. Box 105, Sussex, Wisconsin 53089.

Bob Violett Models, 1373 Citrus Rd., Winter Springs, Florida 32708, (305) 365-5869, has a variety of composites that will play a big part in reducing model weight in future designs.

Golden Gate Hobbies, P.O. Box 4412, Burlingame, California 94010, (415) 467-3170, has some beautiful Japanese pattern airplane kits and a whole host of accessories. A universal servo tray that allows you to lay the

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We have listings of used radio equipment for sale. Send SASE for details. Minimum fees, escrows available.

servo down or stand it up looks good.

Have trouble making uniform leading edges like I do? Buy a duplicator from Eldon J. Lind, Co., 2912 Walker Lee, Los Alamitos, California 90720, (213) 439-0231, like I did. I could go on and on but, hopefully, some of the other guys will cover the stuff I haven't mentioned.

Once again, the hardware is impressive, but just the enjoyment of hangar flying with the guys from all over the country makes the trip to Toledo worth it. It was great to talk to Bob Hunt who I'm sure will bring the same competitive nature that made him a control-line winner into the winner's circle in R/C. Bob's doing a column on R/C pattern in Flying Models. So if you have never visited the Toledo Radio Control Exposition start planning for next year.

**Attention**

I got a call from Bob Novak today concerning my comments regarding narrow band AM operation in the May 1984 column. I said I wondered if some of the existing AM transmitters might cause some troubles. I didn't mean to imply that the Novak narrow band receiver wouldn't work with any existing AM transmitter because it will. What I was worried about is that someone else's receiver might be bothered if the AM transmitter has excessive side bands. As I said in May, if the transmitters originally met the FCC specs they should cause no problems. I seem to recall Bob Aberle reporting that he tested some large number of transmitters and they were all well-within spec. I'm sorry I made the comment now that I think about it. The specs on our transmitters for "narrow band" operation are no different than they ever were. The differences are in the receiver and Novak has a true "narrow band" (by R/C definitions) receiver. Just to be sure, Novak Electronics has decided not to sell dual conversion AM receivers on the old frequencies.

By the way, I talked to Bob Aberle at Toledo and he said he would try to let me look over the AMA's 900 MHz R/C system. We'll pass on any news from that area.

Till next month, stayed tuned.

# SCALE VIEWS

**Col. Art Johnson**

Scale At Toledo '84:

**A**s soon as you walk into the Toledo Sports Arena, where the annual "Weak Signals" trade show is held, you cannot help but see that scale modeling is alive, well and more popular than ever. In any direction you look, there are scale models on tables, hanging from the ceiling or from display stands at the manufacturer's booths. There was an interesting variety of scale models entered in the annual static-scale



*Claude McCullough's latest design for Sig. Model is of home-built "Morrisey Bravo" and sized for the larger engines. Display model had Tartan Twin. Looks like an easy flier.*

Sig Mfg. Co. Inc., Montezuma, Iowa 50171, moved into the production of kits for large scale models with their Giant Scale Cub. Their latest proposed

kit is an 84" span model of the "Morrisey Bravo" designed by Claude McCullough. The model on display had a Tartan Twin for power and this model of a low wing home-built has easy flying written all over it. This latest from Sig may be available some time in the fall. I have an idea that it will be as popular as the Sig Cub.

This was my first good look at the new P-47 by Byron Originals, P.O. Box 279, Ida Grove, Iowa 51445, (712) 364-3165, and there is no question in my mind that the model should fly well. I expect that some builders will have a tough time deciding whether to go with the simplicity of a direct drive engine or go for the speed reducing belt drive that can handle the more realistic appearance of the big four blade prop. Either way the P-47 is an impressive model and I expect to see a number of these at the flying sites this summer. Byron Originals is also heavy into models of Beechcraft airplanes. Several years ago I had a chance to fly Bud Caddel's super



*"Jet Model Products" booth with Tom Cook's new F-14 Swing Wing fighter on display. Wing positionable in air, 22 pounds with O.S. Max 65's. Super kit available for Tom's F-4 in foreground.*

competition by modelers showing off their individual efforts. At least as many models were displayed by exhibitors who were competing for the attention and interest of those modelers who can't wait to go home and duplicate the model with help from the manufacturer in the form of kits, plans, parts, etc.

The exhibitors at the Toledo show are the people dedicated towards making life easier for the average scale modeler and every year they seem to come up with ideas on how to do it better. Many of these ideas show up in the accessories that we use in the construction of scale models, but there were also some new full kits or planned future kits that were interesting.



*Byron's new, just under 1/6 scale, P-47 kit. A large model and set-up for either direct drive or belt drive Quadra engine. Wide gear should make easy flying taildragger.*



**"Bob Violett Models"** had great display of carbon fiber applications. This shows Magnalite angle mounts for retracts in foam wing. Lightest and strongest system I have seen.

Balsa U.S.A. has come up with another big WW I vintage model. The Moraine Saulnier Parasol spans 103 inches. In the 2 c.l. and up engine class.

detailed model of the Beech Baron twin. The model was a joy to fly and I expect that builders of the 1/6 scale Byron Beech Baron 58 will like this one too. My experience with the Staggerwing Beech has been a little different. About five years ago I got my hands on a .60 powered model of the Beech Staggerwing. Although it flew, it had all the realism of a Formula I racer. By going to a 1/5 scale with 1600 sq. in. area, Byron's version of the Staggerwing should be a pussycat by comparison. Nothing like reducing the wing loading to get a more realistic flying model.

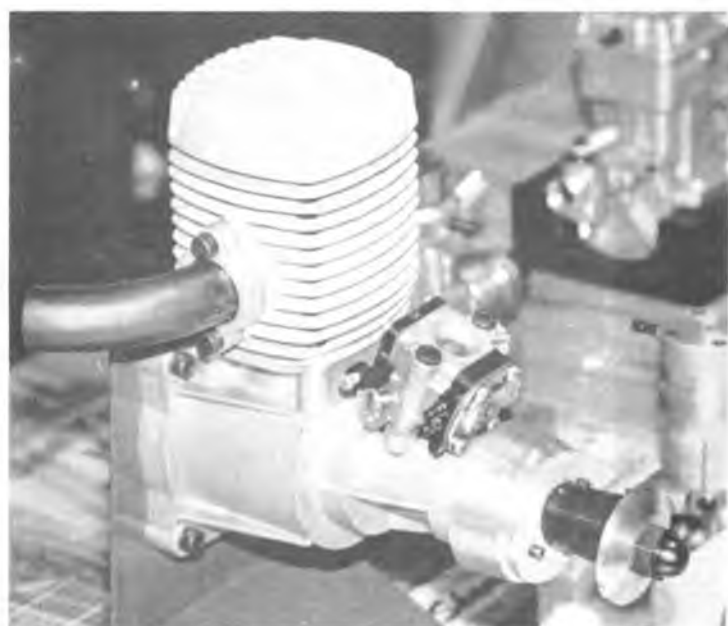
Dave Platt, 6940 N.W. 15th St., Plantation, Florida 33313, (305) 587-4861, was back this year featuring his new 1 to 5.5 scale Zero as presented in the May '84 issue of RCM. Parts available now with a complete



**"Dave Platt Models"** new 1/5.5 scale Zero will be available by the piece or in complete kit. New all-metal machined retracts are available with improved load capacity.



Just forward of the flap is spoiler that opens only on up alleron. Kit for this A-7 attack aircraft is coming from "Jet Hangar Hobbies."



Latest entry into the large engine field is OPS with this 1.8 cubic inch long stroke engine. OPS says 2.45 hp swinging a 22" prop.



*Ed and Louise Izzo take a close look at the meticulously detailed model of a Polish military aircraft. It is the Polish PZL P23A light bomber built by Larry Gordon that captured 1st Place in Precision Scale and the Best of Show Award.*

kit coming later on. Also available is a new all metal version of the Platt retracts which should handle heavier loads than the original molded version. I know they have worked well in the Zero which is now flying with the Super Tigre 2500 1.5 c.i. engine.

For those interested in jets, Tom Cook's "Jet Model Products," 3045 Silvertop, Raymore, Missouri 64083 (816) 331-0356, is in full production on the F-4 Phantom II kit. Tom really tweaked everyone's interest when he hid his latest model of the F-14 Tomcat up behind a couple of versions of the F-4 at his display booth. Tom now has the new model flying well with the swing-wing system working and says it is no problem to fly. Someday I expect there will be a kit available but don't look for it this year. There is a lot involved in going from prototype to production on a model as complex as



*Another unusual and nicely done model is the XFSF-1 Sky Rocket by Delbert McGehe. Looks like a couple of engines waiting for the fuselage to catch up. Not Delbert's fault — I guess Grumman wanted it that way. It won 1st Place in Military Stand-off Scale.*

the F-14. In fact, the A-7 kit from Larry Wolf's "Jet Hangar Hobbies," 12554 Centralia Rd., Lakewood, California 90715, (213) 860-7692, is

many uses. In fact, his illustrated brochure for a buck is a regular handbook of applications for the material. Bob's latest idea is to use

*Merritt Zimmerman's masterpiece is a D.H. Moth with his own four cylinder, four cycle engine. This outstanding example of scale modeling artistry took 2nd Place in Precision Scale.*



*The Nieuport Triplane was not one of WW I's better known fighters. Well-done by Frank Hoffer.*



You can model a number of Beechcraft airplanes from Byron kits. The Baron 58 should fly well as Byrons first kit for a multi engined model.



TOLEDO '84

If you are in a hurry to fly a scale looking model, this Chipmunk comes out of the box painted as you see it here. Hobby Shack's latest kit requires assembly only and is available with retracts.

angle strips of carbon fiber as retract mounts in a foam wing. He had a demonstration gear mounted this way in a foam wing and defied anyone to break the gear out without breaking the wing. It impressed me because I had just managed to pull the retracts out of a new model by going off the end of the runway into the grass. The material is not cheap but for many applications it is worth the price.

Scale pilots are a must if you are going to fly your model in competition and there was a bigger choice on display this year than ever before. The



Melvin Nypiuk's scratch-built FW-190A is big. 44 pounds, 108 inch span, Anco retracts and a Chrysler West Bend 5 c.i. engine.



AD Skyraider by Phil Nigg. Variety of underwing stores reflects load capacity of the original. One of a wide variety of models entered in the static scale competition at Toledo.

new additions to the line of "Knights of the Air" were very realistic, particularly the 1/5 scale U.S. Navy pilot. I have to wait a little longer for the WW II Army Air Force version ---

the Navy guy would not look right in my P-40. I have never flown a jet fighter without wearing an oxygen mask so it was nice to find that "Jet Hangar Hobbies" had some I.M. pilots

on hand, complete with the mask in place. Although pilots are not considered in static judging, your model just has to look better with a realistic looking jock at the controls.



*Byron Originals continue to improve features of their existing kit models. In this case it is a scale improvement for retract nose gears.*

Contact Wm. M. Hawke, 7148 Lasting Light Way, Columbia, Maryland 21045.

It was engine availability that sparked the development of ever larger and faster full size aircraft and the same principle applies to models of these aircraft. When it comes to engines, scale modelers are now living in the best of times. It was only a few years ago that you had to use one of the converted chain saw engines if you wanted to fly a scale model weighing much over 15 pounds. At the Toledo show there were actually dozens of different engines large enough to fly models to any size within reason. For example, AMT U.S.A., 5068 Greenboro Ct., Columbus, Ohio

43220, (614) 457-0065 (Aero Model Technik of West Germany) had a complete line of King engines ranging up to a 6 cubic inch twin of eight horsepower and a weight of only 7.7 pounds. The AMT engines were ignition types developed for model use, but other manufacturers have new glow types for our Giant Scale models. The King engines look much like the Webra Bully which has been out in a glow version for some time. The Super Tigre 2000 and 2500 are pure model engines designed for efficient use of glow fuel. Now these engines are followed by OPS who had a new long stroke large engine on display that is a natural for the big scale birds. If the new 2-cycle engines are too noisy for you, there is a wide range of four strokers from O.S. Max, Saito and Enya. Of the 4-cycle engines on display, the O.S. Max 4 and 6

*Working leading edge slats and dive brakes were shown on a Jet Hangar Hobbies model of the A-4 Skyhawk. Only at the Toledo show can you see such a variety of neat scale features that are in the works by model exhibitors.*



*A very nicely finished Super Decathlon by Mark Gilmore.*

cylinders were the engines to drool over this year. These engines would look good in just about anything, and can you imagine the sound? Of course, like the Kavan twin of last year, there is a price to pay, but then perfection has never come cheap.

I do not have a burning interest in helicopters but I ran into a really neat gadget at the booth for American R/C Helicopter, Inc., 594 Airport Road, Oceanside, California 92054, (619) 439-5454. It is called "Lok-n-Start" and it consists of a no-slip adapter for



*Walt Moucha Jr's model of Miss Los Angeles just within the Sportscale weight limit at 14 3/4 pounds. 76 inch span model is of racer flown by Bill Turner.*



*Larry Horbaez' fun-scale P-82 is loaded for bear with Estes rockets that can be fired in air. Not for AMA sanctioned events, the 60 pound model flies with two Kawasaki 3.15 c.i. engines. If you think the Nosen P-51D is big, just hook a couple of them together.*

the Sullivan starter which provides a one way clutch type engagement of the prop shaft for starting the engine. The application that interested me was the



*The only ducted fan model in the static competition this year was this Lear Jet with two Kress fan units.*

special unit made for starting the Byron type ducted fan. Anyone who has had the starter cone slip off and jam into the fan blades while starting one of these units can appreciate the advantage of a positive engagement, no slip on the prop hub, starter adapter. This is the kind of thing that actually looking at it in a trade show is worth more to your understanding than a thousand words in an ad. I am sure that the starter adapter works well for helicopters and planes but there is a crying need for it in the ducted fan area of this hobby.

Thinking back over the new kits that I saw at the show, I think that the majority were in the Giant Scale Class. With a 103" wingspan, the kit for the Morane Saulnier Parasol from Balsa U.S.A., P.O. Box 164, Marinette, Wisconsin 54143, (906) 863-6421, is certainly one of the larger

models and about the only new kit for a WW I model. I expect that this model will be as popular as Balsa U.S.A.'s large WW I biplane of the same vintage.

R/C Kits, 706 Easton Northeast, North Canton, Ohio 44721, (216) 499-5323, had a number of scale kits on display. The 1/5 scale kit for the Sea Fury in balsa and foam looked good in the display model. This one needs a 2 c.i. or better engine as even at 1/5 scale the Sea Fury comes out pretty big.

At the other end of the size scale, Hobby Shack, 18480 Bandilier Circle, Fountain Valley, California 92728, (714) 963-9881, has a new EZ build kit for a Super Chipmunk complete with retracts. These kits are for those who want to fly a model that looks like an aircraft but who have no time to build. The models come painted ready for final assembly which I think makes

them ineligible for scale competition but great for air shows or Sunday flying.

One thing about the Toledo show that never changes is the enthusiastic crowd that attends. Saturday was as big a crowd as is physically possible to squeeze into the arena. They were not all from the populous Northern area

TOLEDO '84

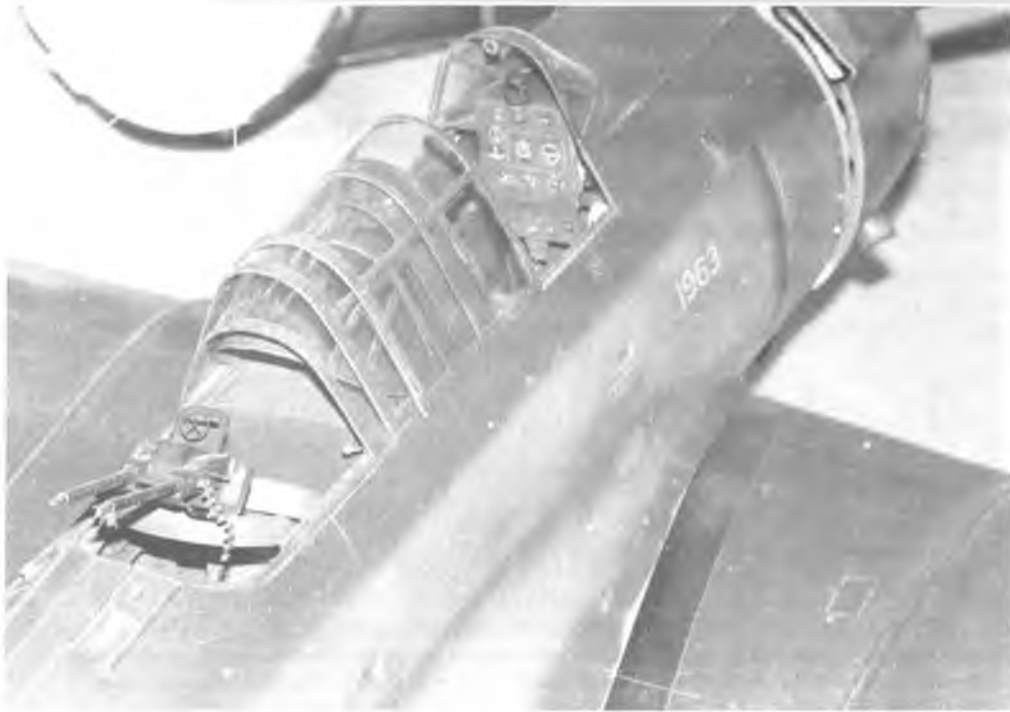


## **Tony & Addie Naccarato switched to Micafilm**

Tony & Addie told us they covered Carl Goldberg's Junior Clipper with Micafilm, flew it over 70 times, and never got a single sag. Think of that next time you have to tighten up your film covered ship. P.S. Yes, that's the master himself, Carl Goldberg.

**COVERITE**

420 Babylon Road, Horsham, PA 19044 USA



*Model of the SBD dive bomber entered in the Toledo Precision Scale category. A 90 O.S. powers Ken Almes 11¼ pound Dauntless.*

publication that I had been searching for for a number of years. This particular Vol. 7 of the AIRCAM collection had been listed as out of print or unavailable in all of the catalogs I had checked. Mike promised to check and he certainly did. Claude did not have a copy of the book but he put me onto an outfit that did. The 1984 free catalog of "Zenith Aviation Books," P.O. Box 1, Osceola, Wisconsin 54020, listed 13 of the 23 AIRCAM volumes including the issue I wanted. A toll free phone call and the copy is on its way. Nice that scale modelers are so great about helping out. Good thing because scale modelers need more help than those in less complex facets of model aviation. □

**TOLEDO '84**

either. For example, there were thirteen members from my local club in Florida (all complaining about what is probably the normal April weather in Ohio). I ran into Al Tuttle who came all the way from Maui, Hawaii, and of course our RCM Editors and staff from California. A great chance to renew acquaintances from last year's scale activities and to talk about what's happening.

Claude McCullough, who authored RCM's "Scale Views" column for many years, was not at the Toledo show but in a conversation with Mike Gretz at the Sig booth, the subject of Claude's extensive collection of aviation background material came up. The thought struck me that perhaps Claude had a copy of an AIRCAM



*ABOVE: Dennis Wann took 2nd Place in Military Stand-Off Scale with this 1/6 scale model of the Hawker Sea Fury MK II. Well-done to come out at only 15 pounds.*



*LEFT: One of the O.S. four stroke engine displays shown by World Engines. The continuing increase to the O.S. line of superb engines is amazing.*



## Ken Willard

Once again the rites of spring are over, and the Toledo 1984 R/C Exposition is history. So is my annual pilgrimage. I enjoyed the show, but when people asked me what was the best thing I saw, I had to reply, "San Jose Airport on the return trip to California." The Toledo Weak Signals Exposition gives you a great sense of appreciation for the finest models in the world, along with an equally great



1



2

sense of appreciation for living in California.

You'll be reading elsewhere about all the great things that were on display in Toledo and, believe me, there were a lot of them. Most of them, however, had been announced previously, so there wasn't any really new item which was so outstanding that friends would come up to you and say, "Hey! Have you seen such and such? Y'gotta see it!" That happened in 1983 when the Conley V-8 water cooled engine was displayed, for example. The Conley engines were there again this year, but the thrill just wasn't the same.

Dave Brown had an interesting exhibit, but you couldn't get near it for the kids. It's a video display R/C flight trainer simulator. I watched it briefly over the heads of the crowd. It looks promising. Tony Dowdeswell, honcho of the English magazine "R/C Models and Electronics," was at the airport after the show, and we talked briefly. He did get a "hands on" demonstration, and his impression is that the idea has merit, but needs further refinement before it will have the degree of usefulness that flight

simulators for full scale flying have developed. Of course, there is a difference in the level of sophistication --- and price. But it could be a step forward if and when the response time is shortened. Be that as it may, it is a new idea.

World Engines had one of the most unusual items in the entire show. It will never fly, but it will intrigue the model railroad buffs. Take a look at Photo #1. That's a real, live steam locomotive; scale is approximately one

inch to the foot, and it measures about five and one half feet long. It runs on a five inch track, weighs two hundred and twenty pounds and, as you can see, there's a seat and pedals for your feet so you can ride it. I don't know whether they will have flat cars that it can pull, but wouldn't that be a real attraction for the kids --- from six to ninety?

The new Kraft synthesizer system was on display. Sure, the ads are out, and one of the big questions was, "If you have one, do you have to carry sixty flags with you to cover all the channels?" Gordon Boudewyn, Kraft's Hobby Sales Manager, told me what the proposed solution is, as suggested by George Myers. You get a single red flag, big enough to be very noticeable, and attach a plastic container to the wide end which will display two numbers. Put in the two numbers appropriate to the numbered frequency you will be flying on, and fly from that assigned frequency pit. Simple, eh? An interesting sidelight is that Kraft has found that channel 40 is potentially subject to some kind of



3





invited to the IMAA birthday banquet, and enjoyed bantering with Don Godfrey and all the biggie enthusiasts. Told them I'd flown the Skybaby, and as soon as I repair it I'll fly it again. Some time next fall, at the rate I'm going.

For me, in the final analysis, two items combined to really whet my interest. The first was that there in the Cox Hobbies booth I saw Bill Selzer, once again in charge and with great plans for the future. All you 1/2A fans can rejoice. Bill insists on first quality production, distribution and marketing. That's Bill in Photo #3, holding the newest ARF by Cox. It's a Stand-Off Scale ultralight called the "SkyRally." Big John Elliott has flown it and tells me it flies great, and just looking at it, I can tell that it would.

As I talked with Bill, I told him I had some .010 Tee Dees. "They're valuable," he said.

"I know," I replied. "Do you have any plans to reduce their value as a collector's item?"

"Could be. A lot of people here at the show have asked about it, and if the interest is high enough, we could start up the line again. But not before 1985 at the earliest."

Just the prospect was enough, though. Especially after I went over to the booth where the Velectro Company (P.O. Box 50118, Phoenix, Arizona 85076) had their Great American Foam Machine on display. Frank Milo, formerly with Pacer Industries (Zap), had taken on the job of world wide distribution. He loaned me one, along with a supply of True Blue Foam.

There just was no way I could resist it. I cut out a couple of templates from cardboard and made a small flying

boat hull out of the foam. Then, using the table machine, I cut out a couple of wing panels from Ace foam wings to make a flat bottomed section. Then I cut out some tail feathers from Aerolite foamboard, some tip floats from a half inch thick piece of the True Blue foam, and stuck it all together. Viola! A twenty eight inch span flying boat. At eight ounces all up weight, with Cannon Super Micro servos, it should fly up a storm with one of my Cox .010 Tee Dees mounted as shown in Photos #4 and #5.

Cutting the wing on the flying boat was a bit tricky, but even that will be easy as soon as the new 40" bow hot wire cutter is available from Firecat Technology, 707 Continental Circle, Suite 1930, Mt. View, California 94040, (415) 969-2743, which is Frank Milo's new company to distribute Valectro's Foam Shop. Photo #6 shows a prototype, and the table unit is in Photo #7.

So, with a small foam cutter, small servos, and the possibility of a supply of small engines, those of us who enjoy small models have a lot to look forward to. And I found out about all this at Toledo, so the trip was a success for me.

★

To wind up this column, I want to try to help some friends of mine at Lockheed.

Sol London, who works in Public Relations for Lockheed in Burbank, called me the other day to see if I knew of anyone who had a good model of the Lockheed Vega that they would be willing to donate to the Burbank Air Museum. It's a city owned museum, non-profit, and the donation would be tax deductible. I told Sol I couldn't think of anyone right off, but there

must be a modeler out there somewhere who had one. I remembered seeing a real beauty at Morgan Hill five years ago --- see Photo #8 --- but I didn't get the name of the modeler. And I'm sure there are others. Now it doesn't necessarily have to be giant scale, just a good sized model will do. Also, if it's done up like Wiley Post's "Winnie Mae," so much the better. And if it isn't, Lockheed will have their model shop do it up that way before it goes into the museum.

If you have one, and would like to participate, get in touch with Jim Ragsdale, Director of Public Relations for the Lockheed California Company, P.O. Box 551, Burbank, California 91520. Telephone (213) 847-6866. He'll be most appreciative. So will Ross Hopkins, Community Affairs Director.

You'll get full credit, and I'll get credit for an assist.

So let's show 'em that we Sunday fliers are public spirited.

We're the good guys, guys.

□

### Flying Near Airports? Be Careful!

Free Flight or Radio Control flying near airports, or in any situation which might involve the possibility of models being in the vicinity of full-scale aircraft operations, must be avoided—or conducted so as to eliminate any dangerous situations. Models should not be flown in the proximity of full-scale aircraft operations unless the flyer has someone else with him for the sole purpose of watching for full-scale aircraft and supervising the flying so as to prevent accident possibilities.

PROTECT YOUR RIGHT TO FLY!

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No Accident!**

# SILENT POWER

**Jim Zarembski**

**T**his year's Weak Signals Toledo R/C Exposition was held April 6, 7 and 8, 1984, at the Sports Arena in downtown Toledo. As a member of the Toledo Weak Signals, the show actually began for me on Wednesday night when all of the 90 members of the Club participated in a "work night" to set up the model display areas, the swap shop, etc. As a columnist for RCM, the fun began early Friday morning as Pat Crews, Dick Kidd, and most of the associate editors spent countless hours talking to readers and distributing 8,000 of the latest edition of RCM.



*Keith Shaw with Stand-Off Scale Spitfire which utilizes Pilot retracts and Astro 25 geared motor with 16 cells. Bottom side of nose has adequate cooling air intake.*

TOLEDO '84



In the area of Silent Power, Toledo is always full of surprises! There was evidence this year that the electric power manufacturers are concentrating on perfecting flight systems, and supporting equipment introduced in the past two years.

There was no separate category for electric powered models at Toledo, but there were electric models scattered all over the place and entered in the various competitive categories.

Located prominently in the Military Stand-Off Scale area was Keith Shaw's striking Supermarine Spitfire MK 1 A. Keith is a research associate

*B2RD by K. Urs Grutter of Switzerland. Entire model fits in a briefcase and is Leisure 05 powered. Sailplane fuselage is disassembled for travel.*

*Suzanne and Bob Boucher of Astro Flight display a wide array of super ferrite and cobalt motors.*

*Nancy and Roland Boucher of Leisure. Model on tripod is the Keller 25 powered Coulombia.*





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- 4) Coat entire surface with polyester finishing resin, dry and sand.
- 5) Finally finish with urethane, epoxy or dope.

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at the University of Michigan in nearby Ann Arbor, Michigan. His Spitfire has a wingspan of 61" with 670 square inches of wing area. The full scale outlines for the wing, fin, stabilizer, and fuselage cross sections were used. The entire model weighs in at 25 ounces, less radio, and flight system. This includes retractable landing gear, which is operated by a fifth servo. Keith used the new small size Pilot retractable landing gear for the Spitfire. For power, an Astro 25 geared 2½ to 1 was chosen, with a Jomar SC-2 speed controller. The total ready to fly weight of the Spitfire is 80 ounces. This model is designed to be fully aerobatic, and will fly in early spring. Keith has promised a full report on performance with inflight photos.

Ann Arbor seems to be a hot bed for midwestern Silent Powered activity. The builder of a fantastically engineered sailplane / powered sailplane is K. Urs Grutter from Switzerland, who is currently a law student at the University of Michigan.

The B2RD is designed to break down into pieces no larger than 20" so the entire model can be transported in carry-on luggage on an airline. The B2RD uses the Eppler 193 airfoil with a 60" wingspan. The wing breaks down into three pieces for transporting. The fuselage is in two pieces, with the front portion containing the flight system, radio battery and receiver. The rear fuselage section contains the rudder

and elevator servos. The rear of the fuselage fits into the forward section with a clever slip-in tongue system. The wing is bolted to the fuselage at the leading edge and trailing edge to hold the two fuselage halves together. Incidentally, the B2RD has two separate fuselages; one for electric power and one for straight gliding. The electric powered version uses a Leisure 05 and five cells, with an 8/4 propeller. This B2RD flies great at 23 ounces.

**Astro Flight**

Bob and Suzanne Boucher of Astro

Flight, 13311 Beach Avenue, Marina Del Rey, California 90292, visited Toledo this year with a fully redesigned group of ferrite and cobalt flight systems. The Super Ferrite motors are available in 05, 075, 10, 15, 25, and 40 sizes.

These new high performance motors have been redesigned to incorporate M-8 ferrite magnets, and silver graphite brushes as introduced in the cobalt motors.

The Astro Challenge Cobalt motors are available in 05, 15, 25, and 40 sizes, and feature newly designed brush holders and brush springs able to withstand the tremendous load placed on them in events like F3E competition or pylon racing.

One new item in the Astro Flight stable is a switch to gold plated connectors in all flight systems. There was a danger of overheating with previous connectors, especially when a system is drawing very high current. The new connectors solve this problem.

**Leisure Electronics**

Roland Boucher of Leisure Electronics, 11 Deerspring, Irvine, California 92714, has introduced a new kit at Toledo, the Leisure Wasp. The Wasp was designed by the writer, and has been an exciting sport aerobatic model for scores of electric power advocates since it appeared as a construction article in the April 1983 RCM. The Leisure kit retails at \$34.95, and contains precision cut and sanded parts from balsa, plywood and



Larry Sribnick of SR Batteries introduced new 900 and 1200 series electric powered "Max" Packs.



*Charlie Hampton of Polks with the model Flight Islander twin electric. Aero Naut BD-5 box seen in rear.*

spruce, carefully selected for this model. With an 05 system and six 1.2 ah cells, the model is a nice sport trainer. With 7 cells, the flight performance is spectacular.

A sport pattern aircraft was prominently displayed in the Leisure booth. This was the prototype Coulombia by Keith Shaw, and features the Keller 25 motor. This model may not be available as a kit for some time, but Roland feels that if the demand is there for a high performance aerobatic model, the Coulombia would be his first selection.

A nice Cabin Playboy was also seen in the Leisure booth. It makes a nice contrast to the Pylon Playboy that Leisure has been kitting for the past few years. The plans for the Cabin version are drawn on the Leisure Playboy plan.

Roland intends to add several kits to the currently available models. Included will be a powered sailplane and a scale ship, as well as a trainer.

**SR Batteries**

SR Batteries, Inc., Box 287, Bellport, New York 11713, has

introduced two new lightweight receiver packs suitable for small aircraft where weight is important. The 150 series battery has a capacity of 175 mah, and weighs in at 1.2 ounces. The 300 series receiver pack weighs 2.0 ounces, and has a 325 mah capacity. Both the 150 series and 300 series sell for \$19.95 plus \$3.00 for your favorite connector.

SR now has new Electric Flight Max Packs available in 900 mah and 1500 mah capacity. These are stocked in 6, 7, or 8 cell packs, and can be ordered in flat, stick, or rectangular configurations.

SR is also introducing specially manufactured Super Flexible 16-gauge wire. This is multi-strand wire (over 100 strands) and makes

electric flight system installation a snap, compared to the stiff wire used in the past. This wire is available for \$3.00 per 10 feet (5 feet of yellow, and 5 feet of black).

As a special service for electric powered advocates, SR is stocking 1" 6-40 socket head screws for Astro and Leisure motors at three for \$1.00.

For a full description, write SR at the address listed above.

**Polks Model Craft Hobbies**

Polks Hobbies, 346 Bergen Avenue, Jersey City, New Jersey 07304, has entered the mail order business, as evidenced by their recent ads in RCM and other modeling publications. They offer a series of electric powered kits and accessories by various European manufacturers.

This includes a nice rendition of the Britten Norman Islander by Model Flight of England. The Islander has a 50" wingspan and uses fully sheeted foam wings ready for your favorite finish after assembly of the wing tips and dihedral joint. The Hummingbird is a 44" sport model with ready covered foam wings. Both the Hummingbird and Norman Islander were originally designed for the Mabuchi 550 systems in the late 1970's. Today, these fine kits would do well with a pair of 05's by Leisure or Astro. The Hummingbird is available direct from Polks for \$39.95, while the Islander is selling for \$79.95. There is a third model called the Magicfly, which sells for \$49.95. No details are available.

Polks is also carrying a Stand-Off Scale version of the Bede BD-5 by Aero Naut of West Germany. This model is designed for glow 09 to 15 systems or the Graupner motor and folding prop



*David Verhaeghe of JM Glascraft holds prototype Hummin-Bird. This particular model is glow powered, but the ship is designed for 05 electric systems. Fuselage plug at left shows cooling air inlet for Silent Power.*

**TABLE 1  
ELECTRIC POWER  
LARGE COBALT FLIGHT SYSTEMS  
Spring 1984**

Mfg.	No.	Motor	Drive	Number of Cells 1200 MA	Prop	RPM	Motor Wgt.	Battery Wgt.	Power Duration (minutes)	Max. Flying Wgt.	Wing Area
Astro Flight	6615	15 Cobalt	Direct	12	7x4	1600	7 oz.	22 oz.	7-9	64 oz.	350-750 sq. in.
Astro Flight	6615 with 4033 gear box	15 Cobalt	Geared	12	11x7	7500	9 oz.	22 oz.	5-7	64 oz.	600-800 sq. in.
Astro Flight	6625	25 Cobalt	Direct	14	9x5	12000	11 oz.	26 oz.	7-9	80 oz.	450-900 sq. in.
Astro Flight	6625-10	25 Cobalt (10 turns)	Direct	12	13x7 Geist (or wood)	5000	11 oz.	22 oz.	5-7	75 oz.	700-1000 sq. in.
Astro Flight	6625 with 4041 gear box	25 Cobalt	Geared	14	13x7 Geist (or wood)	6000	13 oz.	26 oz.	5-7	80 oz.	700-1000 sq. in.
Astro Flight	6640	40 Cobalt	Direct	18	9x5	13000	13 oz.	33 oz.	7-9	100 oz.	500-900 sq. in.
Astro Flight	6640-10	40 Cobalt (10 turns)	Direct	14	13x7 Geist (or wood)	6000	13 oz.	26 oz.	5-7	80 oz.	700-1000 sq. in.
Astro Flight	6640 with 4041 gear box	40 Cobalt	Geared	18	13x7 Geist (or wood)	7000	15 oz.	33 oz.	5-7	90 oz.	900-1200 sq. in.
Leisure Elect.	6025	Keller 25	Direct	12	9x6	10000	8.5 oz.	22 oz.	6-7	80 oz.	600-800 sq. in.
Leisure Elect.	6025	Keller 25	Direct	14 @ 800ma	11x6	8000	8.5 oz.	16 oz.	2-3	40-64 oz.	600-200 Sailplane
Leisure Elect.	6050	Keller 50/24	Direct	18	10x6	10000	14 oz.	33 oz.	8-10	70 oz.	600
Leisure Elect.	6050	Keller 50/24	Direct	18	13x6	2500	14 oz.	33 oz.	5	80 oz.	1000
Leisure Elect.	6050	Keller 50/24	Direct	24	10x6	12000	14 oz.	44 oz.	5	90 oz.	600-700

with 6 or 7 cells. The BD-5 sells for \$85.00.

#### JMGlascraft

The makers of the Barbarian have added a low wing version of this popular electric sport ship. The JMGlascraft Hummin-Bird has a wingspan of 50" and 300 square inches of area. The wing is identical to the Barbarian. Designed by John Fotui and Dave Verhaeghe, the Hummin-Bird flies well on an 05 electric with 6 or 7 cells, or an O.S.-10 FSR glow engine. The Hummin-Bird is available for \$45.00 direct from JMGlascraft, 30820 Mayflower, Roseville, Michigan 48066.

★

I have received a lot of mail in the past few months and would like to share some of these letters with you.

Dear Jim,

*I have been struggling with electrics for several years, with varying amounts of success.*

*I have flown the electric Chipmunk, Fibrini, Kraft Cardinal, Airtronics Kitty, and the Gentle Lady.*

*The Kraft Cardinal seemed to fly the best for a powered stunt/sport plane. The motor in the Fibrini seemed to be*

*the most powerful of the ARF's. It is a Mabuchi.*

*The Gentle Lady was great with any motor, but seemed to like a geared Leisure 05 the best.*

*I finally got a Wasp with an Astro 05 Cobalt in the air and the performance was sensational! I was quickly gathering a crowd with the best flying electric they had ever seen . . . then it happened. The dowel pulled out of the wing. It was totally disastrous!*

*I am now building my second Wasp with an epoxied and fiberglass wing dowel. I wish someone would kit your Wasp. I am considering blowing up the Wasp to 15, 25, and 40 size.*

*I have heard rumors of Goldberg Senior Falcons flying well with a Cobalt 40, but can find no information on this. Would a Falcon 56 do well with a 25 Cobalt?*

*Is the 15 Cobalt about the same size as the Cobalt 05 or normal 05? What battery pack does it like? Prop?*

*I have a million questions to ask and realize you don't have time to answer them. Your column is the most enlightening thing ever to electric fliers. Keep up the good work.*

*William B. Hedge*

Bill started out the way many electric enthusiasts get into the hobby, ARF foam ships. They work reasonably well, but cannot at this time compare with a well-built, lightweight balsa model. Regarding the Wasp kit, it has been released by Leisure (as mentioned in the Toledo Report portion of this column).

The new highly efficient Astro Cobalt 15, 25, and 40, as well as the Keller 25 and 50/24 produced for Leisure by Keller Motors of West Germany, now give the modeler of large size electric models some options not available a year or two ago.

In order to explore the potential of the motors, I have collected the data in Table 1 to compare the vital statistics for these systems.

Now with this listing of fine motor systems with ample power and duration, the question remains: Which aircraft and which plane?

The Old Timers and sailplanes have been fairly well documented. For aircraft with thick cambered wings, choose a geared system to push a large prop at relatively low rpm. For thin airfoiled sailplanes or Old Timers, use direct drive.

For sport ships, look through your old magazines for designs or kits that roughly fit the criteria shown in Table 1. For example, the old standby, Goldberg Falcon 56, has 558 square inches and a recommended glow engine flying weight of 56 ounces. Try an Astro Cobalt 15 or a Keller 25 with 12 cells @ 1200 ma. For a Senior Falcon with 810 square inches and a design weight of 100 ounces, try Astro 25 or 40, or a Leisure Keller 50/24.

More on large systems next time when we get a report on Keith Shaw's scale Astro Cobalt 25 geared Spitfire with retracts.

Dear Jim,

*I'm really glad to see another advocate of electric R/C! I have yet to see someone in New York who takes electric R/C seriously. I fly a Sky Lark EH-1 electric helicopter. It's a very interesting model, in that it is electric powered and, to my knowledge, the only one. When I tell people that I fly a helicopter, and, furthermore, an electric one, they can't help but fall over laughing.*

*In regard to the letters in your January column, the problem of flying time is very important in electric models. I find that I get only about four or five minutes from a 9.6 volt 1200 mah Sanyo battery pack. Frankly, that just isn't enough time to get into it. Once you reach a reasonable altitude or perform a stunt, the battery kicks out. Even if you do have a few of these \$36.00(!) battery packs charged and on hand, it gets to be a real pain to change them every five minutes. The only way that you can get any reasonable flight time from an electric airplane is to lighten it. Hence, foam ships. Foam just makes me sick, and gets tossed about in the wind quite a bit, making it impossible to fly in any level of adverse condition. Converting balsa models originally designed for gas to electric is even more painful, because when you tamper with the engine, you wreak havoc on the airplane's feel.*

*In regard to Bob Boucher's comment on younger fliers, I'm one of the very few. It's hard to get your hands on expensive equipment like a good radio, a decent helicopter or aeroplane and, much harder, a safe place to fly. I never could afford to buy R/C until I got a job, and most people have enough problems with that. At least we're trying!*

Best regards,  
Jim Chu

New York City

I have heard great reports on the

special 120 volt Astro Cobalt 40 motor (No. 640-48) for 25 to 40 sized helicopters. This motor works with a tether cord and ground power. No batteries are used in the model.

★

**CLUB NEWS**

**New National Electric Flight Organization Formed:**

The Electric Aeromodeling Association (EAA) was formed by a national group of active electric competition fliers. The petition to the AMA for special interest recognition was sent to the AMA and officers were elected for 1984. A newsletter is scheduled for March 30 release. Officers are: President, John Brown; VP Sailplanes, Larry Jolly; VP Old Timer, Bob Sliff; VP Free Flight, Bill Stroman; VP Control Line, Tony Naccarato; VP Aerobatics, Rick Schramek; VP World Records, Bob Boucher; VP Scale, Harry Apoian; Secretary, Roger Roth; Treasurer, John Szary; VP District 1, Nelson Whitman; VP District 2, John Grigg; VP District 3, Jim Zarembski; VP District 6, Cal Ettel; VP District 7, Keith Shaw; VP District 10, Steve Neu; VP District 11, Dave Katagari. All of the above are leader members of the AMA and have been actively involved in electric flight. Registration forms will be available shortly. They plan to hold at least six contests this year in California, and will hold electric sailplane events and electric indoor events at Reno.

**Houston Sparks Form:**

In March 1984 a group of electric power advocates formed the Houston Sparks (Silent, Propelled Aircraft Kontrol Society). Ken Martin at 13106 Newbrook in Houston, Texas 27072, is the President. Prospective members can call Dr. Jean Duke at (713) 498-2801 or check with Rick Irwin at Mall Hobbies in Houston for further information.

**KRC Electric Fly September 22-23, 1984**

The Keystone Radio Control Club will sponsor their fifth Electric Fly this September at their flying site north of Philadelphia. As usual, this is designed to be a low-key, fun weekend of flying and talking about electric powered model aircraft. Plan on attending if you're anywhere near Lansdale, Pennsylvania. For information, write Bob Kopski, 25 West End Drive, Lansdale, Pennsylvania 19446.

Good Flying. □

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## SOARING

Al Doig

I just returned from Fantasyland, the 30th Annual Weak Signals Radio Control Exposition, Toledo, Ohio. It's like being in a great big candy store and I had my nose pressed against the glass for all three days. I found that a lot of people really do read this column and you're a bunch of nice guys. It's quite a change to be called Sir instead of Stinky; but now I'm back from Fantasyland into the real world.

Anyway — I found only a few new items in the field of soaring. I was talking with Ted Davey, (Davey Systems, One Wood Ln., Malvern, Pennsylvania 19355) and he is coming out with a neat little product; a very simple but useful one. They are 1/2" x 4" strips having a rough sandpaper-like texture. The backing peels off exposing a very tenacious adhesive. These are applied to the sides of the fuselage, under the wing to provide a gripping surface for launching. Many sailplanes do not have much area to hold on to and this product provides a positive grip, especially in wet weather or if the hand is wet with perspiration. Works very well; I've tried them. I wonder why I didn't think of that?

From long time sailplaner, Taylor Collins, comes a new adjustable tow hook called "The Hooker," and a Ballast Lock. The tow hook bolts to the bottom of the fuselage and has a full 1" adjustment. The Ballast Lock bolts into the ballast compartment and secures a stack of sheet lead ballast (not supplied). A hole is drilled in the ballast sheets and they are held in place with a wing nut. (See photo.) I've not tried these but they are available

from Taylorcraft, 10221 Slater Avenue, Suite 103, Fountain Valley, California 92708.

From Mark's Models, 1578 Osage, San Marcos, California 92069, we have the "Sensor 117" kit. This ship has a wingspan of 117", a wing area of 960 sq. in. and a wing loading of 8.5 oz./sq. ft. It has a polyhedral built-up wing with large flaps and slick slot spoilers that pop up. The fuselage is fiberglass. The wing rod is 5/16" steel rod and an optional carbon fiber spar is offered but not included in the kit. It is claimed that with the flaps and spoilers fully deployed, the Sensor can be put into a vertical dive without exceeding the speed where the structure will fail. To prove this claim, designer Mark Smith has offered to dive your Sensor straight down from great height. Anyway — I believe Mark, he's a straight arrow. The list price is \$129.95 and Sensor should be on your dealer's shelf by the time you read this.

JMGlascraft, 30820 Mayflower, Roseville, Michigan 48066, has a new 2-Meter thermal duration sailplane, the "Songbird." Designed by Matt Spisak and John Fotil, the Songbird is a neat looking low winger with coupled aileron/rudder, and elevator. It has a glass fuselage and foam core wings (no spars) and a respectable weight of 9 oz./sq. ft. Although stated as a candidate for F3B and F3E electric, I don't think it would be a serious candidate for international F3B but it might certainly hold its own in local multi task contests. The kit is a basic one and includes only the 3.7 oz. epoxy glass fuselage, foam wing cores, and a full size set of plans. The

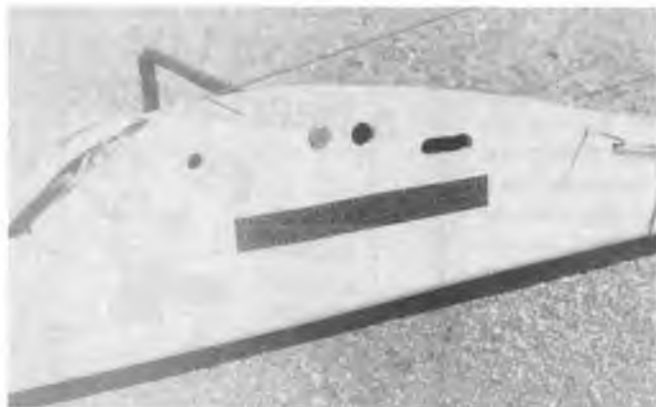


**Happy Al found his niche handing out magazines at Toledo. (Thanks Al! — ed.)**

price is \$50.00 and is available by direct order only. A 100" version, the Songbird-100, is also available at \$62.00. If you want to be the only kid on the block with a low wing thermal ship, these might bear looking into.

The last new sailplane seen was the "Harlequin," designed by John Lupperger and soon to be kitted by Pilot. This is another 2-Meter sailplane (they are getting popular) with a 608 sq. in. wing and a wing loading of 8.5 oz./sq. ft. The airfoil is a modified Eppler 205. Control is by rudder/elevator. I forgot to ask the price and by the time I waited in line at the telephone booth and changed from my Superman suit back to my Clark Kent costume, the show was over. So, I guess you will have to read the advertisements.

Anyway — the show was awesome — wall to wall people. The models on display were beyond anything I could ever build. In the sailplane category, Jeff Troy from King of Prussia, Pennsylvania, won top honors with his Grand Esprit. Second was Bob Coury from Tecumseh, Michigan



**Davey Systems' Adhesive Grip. Provides non-slip grip area.**



**Taylorcraft Ballast Lock and Tow Hook.**

**Mark Smith and his new friend  
"Sensor 117." Kitted by Mark's  
Models.**

with his ASW 22. Third was Ed White from Michigan, with Great Gull.

It was a great show. RCM ported quite a bunch of the Editors to Toledo, just to prove they really exist. Even after the show there was some discussion as to whether Ken Willard really existed, although a reasonably accurate replica was on display. Anyway — a good time was had by all, and we'll be back next year.

★

Hey guys! Let me appeal to your generosity. To those of you who have been following my comments on the U.S. Soaring Team and their finance problems, here's how you can help out for 1985. Helen Olsen, a premier soaring flier in her own right, has taken on the big responsibility of

Said defines the deep stall as "both wings fully stalled, with a pitch angle sufficient to bury the primary pitch control surface in the turbulent air of

from the stalled wing, the fuselage, spoilers, and flaps all contribute to the disaster. When the fuselage is pitched up at 20 or 30 degrees, it acts like a wing, creating lift and vortices that act on the inboard section of the horizontal stab, pushing it down. Mr. Said concludes: "Under the worst of circumstances, the dynamics of the deep stall are such as to 'lock' the sailplane into a no-win situation. The air below the disturbed wake area still has free-stream velocity and pressure, and should the pitch attitude of the sailplane drive the tail plane down out

**New 2-Meter low wing  
"Songbird." For thermal  
soaring.**

collecting monies to send our 1985 U.S. Soaring Team to Australia in 1985. She is selling very attractive cloth patches for \$3.50; net proceeds going to the 1985 U.S. Soaring Team Fund. How about every soaring club in the U.S. ordering 20 or more patches and selling them to the members? Send your money to Helen Olsen, 8875 Ovieda Plaza, Westminster, California 92683, (714) 897-7569. Tell her Big Al sent ya, and include a bit for postage.

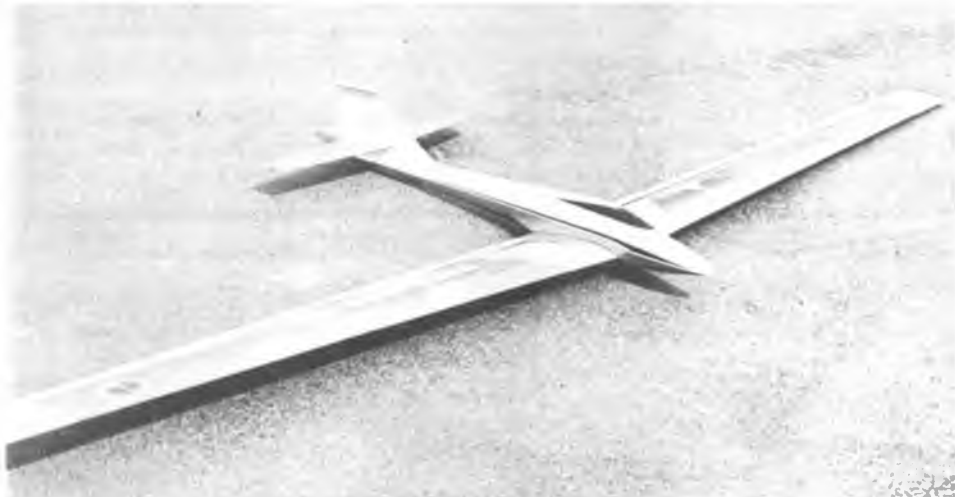
★

Walt Good sent me a very interesting article from *Soaring*, the full scale sailplane publication. It was written by Bob Said and was titled "Stalls — the Deeper the Worse." Mr.

the aircraft's own wake." As he says; "Deep stalls are very bad news, and T-tails are located in exactly the right place to suffer most from them." Aside

of the wake, it is promptly pushed right back up into it again, and again, and again, ad infinitum. This is the dreaded lock-up, and under no

**"Harlequin" new 2-Meter kit by  
Pilot.**



circumstances do you want to explore it in real life."

The sequence of procedures for "unlocking" the sailplane from this uncomfortable situation is interesting. First, if you have a tail chute, deploy it. Work every control and combination of controls rhythmically, including landing gear. Release the canopy (it costs less than the sailplane). If you are running out of altitude and ideas, use your chute. His last remark is a classic: "And if you elected to make this flight without any nylon, I believe you will now agree

that that decision was not one of your best."

In looking back at the pictures of Walt Good's classic launch crash in the August 1983 *RCM* (see page 73), it sure looks as though his Samun was locked into a deep stall. The tail began to drop and the ship began a yaw to the left. In reacting to the left yaw, I'm sure Walt gave right aileron/rudder. This means the left aileron was down, increasing the effective angle of attack of the left wing, worsening the stall on the left wing.

Anyway — there's a lesson for us

guys who fly T-tails.

★

I was reading the April, 1984 issue of the English publication "Radio Control Models and Electronics," and in Charles Gardiner's "Slope Special" column I found that Adrian Lawson Wood of the East Sussex Soaring Association has generated a way of computing existing Beauford scale wind force readings on the slope without a wind meter. You just observe the modelers so:

**Force Features**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>0 Glum faces. All models on ground. Biggest turnout of fliers for months. Sunny.</li> <li>1 Modelers talk a lot. Some lightweight models stay up. New aerobatic models brought out to test fly.</li> <li>2 Air of indecision. All pegs taken just in case lift comes good. Very few models in air. Often foggy.</li> <li>3 Joe Average is flying his heap. Only one broken model in evidence. This wind speed is both too much and too little. Everyone has the wrong model.</li> <li>4 Perfect conditions. Almost invariably encountered on a weekday following a lousy weekend. No modelers in sight.</li> <li>5 Array of broken models. Two in air only. Likely to be mid-air. All other models find it too much. Coffee</li> </ul> | <ul style="list-style-type: none"> <li>6 consumed in large quantities. Gloves and hats worn. Extreme difficulty experienced in launching. Hats no longer kept on. Thermal soarers will fly upside down and gain height.</li> <li>7 Difficult to get out of car. No models in air. Some wings broken in transit up the hill. Planned competition is cancelled due to lack of support. Wind in south.</li> <li>8 Rarely experienced. SMAE signboards get ripped down. All modelers stay in cars. All food and drink consumed before 10:30 a.m. Sane people stay home in the first place.</li> <li>9 Landscape deserted. Profuse modeling activity all over country. Anticipation of better things to come.</li> <li>10 No data yet recorded.</li> </ul> |
|---|---|



*There were only about eight sailplanes entered at Toledo show.*

Just to set the record straight, here's the real Beauford Force scale.

Well, I've got all the black spaces and all the white spaces filled up, so,

catch you next month, all being well. Howzat!

Description	Range-Knots	Average Knots	Force	Forecast Term
Calm	Under 1	0	0	Calm
Light Air	1-3	2	1	
Light Breeze	4-6	5	2	Light
Gentle Breeze	7-10	9	3	
Moderate Breeze	11-16	13	4	Moderate
Fresh Breeze	17-21	19	5	Fresh
Strong Breeze	22-27	24	6	
Moderate Gale	28-33	30	7	Strong
Fresh Gale	34-40	37	8	Gale
Strong Gale	41-47	44	9	
Whole Gale	48-55	52	10	
Storm	56-63	60	11	Severe Gale
Hurricane	64-71	68	12	

Note: 1 knot = 1.152 miles per hour, i.e., 10 knots = 11.5 mph.

*1/5 Scale SZD Jantor 1 by Dan Waybrant, Kentwood, Michigan. (Jerry Smith photo.)*



*Sailplane First Place Winner was Jeff Troy's Grand Esprit.*

*ASW 22 by Bob Coury, Unlimited Class sailplane, 2nd in Sailplane. (Jerry Smith photo.)*



# FLYING LOWE

Don Lowe

## Props

previously reported on the use of high pitch props on my pattern ships. The props I have been using are made by DW Products. It seems that they weren't available in hobby shops, so in answer to many inquiries the DW address is: DW Products, 5634 Crystal Court, Santa Rosa, California 95404, phone (707) 528-9654. They make many prop sizes from 8 $\frac{5}{8}$ " D to 24". Many pitches are available including the higher pitches which I prefer. The props work very well and are reasonably priced. All prop manufacturers are adding to their lines as a result of the added demands of lower rpms and 4-cycle engines. For those who haven't experimented with props, you will be impressed with performance changes as you vary diameter and pitch. There is no really easy way to pick the best prop since requirements vary with your engine's torque curve and airplane airspeed needs. It's easy, for example, to pick the pitch you need if engine rpm and airspeed were constants, but they are not. For the uninitiated, pitch can be computed for a given rpm and airspeed requirement as follows: The pitch of a propeller is the theoretical advance of the prop (or model) per revolution of the propeller (in inches). So we find the theoretical advance of the model by multiplying the rpm times the pitch and



*Your's truly and .60 Laser. Won turnaround event in Jacksonville in March. Note short pants — eat your hearts out Yankees. Ship is 800 sq. in./8 lbs. w/O.S. .60 engine.*

converting to miles per hour, throwing in an efficiency factor for slippage. A useful equation is:

$$\text{Pitch Required (in inches)} = \frac{\text{mph}}{\text{rpm}} \times 1230$$

From this equation one would find that in order to fly at 100 mph, one would need about a 12.3" pitch prop with the engine turning 10,000 rpm. A typical pattern ship with the engine turning 16,000 rpm in the air would need a 10" prop to fly at 130 mph; which is not an uncommon speed for a pattern ship. Another example of a turnaround design flying at 70 mph with a four stroker turning 10,000 in the air would require an 8.6" pitch prop.

All that this really says is that the slower you turn the propeller, the

more pitch you need for a given airspeed. From a noise point of view, sound produced is very responsive to the propeller tip velocity which, of course, varies as to the rpm and prop diameter. Using a larger diameter prop is not a noise panacea as some suppose unless the rpm is reduced. Reducing rpm does reduce the "perceived" noise since frequency is lowered. As examples of noise / rpm / diameter interaction, my four stroke Enya turning 9000 rpm with a 14" propeller produces 104 db as measured by my Izzo calibrated realistic sound meter. Interestingly, my 2-cycle .60 powered Laser with a 13" propeller turning 11,000 rpm produces the same **measured** sound level, however, the perceived noise is louder.

In regard to the latter, yes, I am running very large diameter propellers on my O.S. .61 powered turnaround Laser model. In fact, yesterday I flew it with a 14/6 pitch prop which static tached 10,000 rpm and flew the airplane beautifully. So don't be afraid to experiment — the old adage of matching the engine, prop, and airplane is a powerful one. Remember that the slower aircraft want larger diameters to provide good, slow speed thrust and good acceleration. Be prepared, however, for increased torque and P factor effects — just offset the engine a little — 2°-3°.

## Toledo

I recently returned from the Toledo trade show — which I have attended for many years. It was a real joy to see

*Mallory Models' Laser. Note cut-away wing to save weight. Most of our models are overbuilt.*





Great Planes' CAP 21 — suitable for turnaround pattern.

many of my old and new friends and to fondle all the new modeling goodies. For you who have never attended one of these shows, you really owe yourselves a treat. There is nothing like seeing all the new stuff in one place and to mingle with those of like interests. I don't know what the attendance at Toledo was, but it was elbow to elbow for three days. RCM gave away 8,000 magazines at the show and could have easily given away that many more!

The most asked question (to me) there, was, "What's happening in the 'turnaround' event?" I looked particularly in Toledo for designs and/or kits available that would be suitable — there wasn't much to pick from. Looks like it's mostly a wait and see attitude which I'm sure is abetted by the AMA Contest Board action to make it an added event. I, and a few



Precision Bullt Models' covey of Lasers — seen at Toledo.



others who I know of, have been working on the problem and there are reports of events being held in California, Florida, and elsewhere. Most contests in Florida are adding it to the schedule. At Jacksonville, for example, we had twelve entries out of 48 total pattern fliers. I see in the AMA contest calendar that the event will be held at several listed contests around the country. All reports from the rest of the world (including discussions with Hanno Prettner at Toledo) indicates the FAI F3A turnaround event is the norm for masters fliers. I have a sinking feeling that this country will be poorly prepared to compete in the 1985 World Championships unless the serious U.S. contenders take exceptional personal action to develop ships and strongly encourage the competition

in all U.S. pattern events.

As I have previously reported, the magic numbers for a good design is about 800-850 sq. in. wing area and not over 8 pounds weight. I and others have found that either a properly set up straight .60 2-cycle or a 1.2 cu. in. four stroker will do the job. While in Ohio I had the good fortune to see and fly Tony Frackowiak's new "Challenge II" turnaround design. This ship is powered by an O.S. 120 four stroker, weighs 7.75 pounds and has 850 sq. inches of wing area. It has

*Tony Frackowiak's "Challenge II" turnaround design. 850 sq. in., 7¾ lbs. and O.S. 120 four cycle. Flies extremely well, will be featured in FM magazine.*

two wheel retracts and flies extremely well at slow constant speed.

Reports from Zimbabwe and South Africa tell of great success with the Dalotel design with 830 sq. inch wing at 8 pounds powered by both the O.S. geared .60 and the 1.20 four stroke. I have also reported to you on my .60 Laser at 800 sq. inches and 8 pounds which flies very well. Tony's design will be featured in a future "Flying Models" issue.

The .60 Laser is available as a kit from Precision Built Models, 1818 6th Ave. W., Bradenton, Florida 33505. The Dalotel, being produced by my friend Dennis Hunt, should be available in this country some time



Gerry Graham's "Akrobat II" modification of Laser configuration at 1000 sq. in. It performs well with his 3:1 reduction .60 2 cycle power plant. It is being marketed by Aerobatic Specialties.



Dario shows the latest in prop design at Toledo — for those engines that like to oscillate back and forth.

imports plus the Japanese Futaba and JR (Circus Hobbies, 3132 S. Highland Dr., Las Vegas, Nevada 89109) designs. Futaba, 555 W. Victoria St., Compton, California 90220, of course has had their PCM design available for over a year. Reports indicate very good success. The others were not available for purchase at Toledo time, but will be sometime this year. I'm sure that Jim will report on this equipment in some detail in his RCM column, so I won't belabor it here. It's apparent to me, however, that no one should stampede to switch to PCM since what we have in good pulse modulation designs, particularly as now offered in FM, is very good equipment and will certainly suffice for most needs. PCM does offer increased immunity to interference and a measure of improved system resolution or centering if properly designed. Of course, they can much more easily provide various kinds of

this year. Great Planes Model Mfg. Co., P.O. Box 721, Urbana, Illinois 61801, has a CAP 21 which should also do well and Dick Hansen Models, 5269 Lucky Clover Lane, Murray, Utah 84107, produces a Dalotel model of similar size.

I really enjoyed reviewing some of the radio control equipment at Toledo with friend Jim Oddino — I'm happy to say that Jim has rejoined the flying ranks and is busy getting a turnaround design together. We looked particularly at the new "PCM" offerings and noted two German

Want to fly indoors? Dave Brown is offering a simulator program for aerobatic training — what next?



*Don Weltz tries his hand at Dave Brown's flight simulator fun!*



*Gerry Graham and his Akrobat II. Should be an excellent flying machine.*



*Ed Izzo's new turnaround design — seen at Jacksonville. Salto 1.2 four stroke power. Simple but nice.*

control mixing and programming if that's your bag. So you kind of pays your money and takes your choice. In any event, modelers these days have a fantastic choice in radios which are the best bargain in modeling. These days it's very easy to pay more for a good engine with tuned pipe. Did you ever consider the investment in the propulsion system of a modern pattern ship with pipe, mixture control and --- variable pitch prop? --- on the order of \$500 including the extra servos required for mixture control and prop control!

Toledo also helped unveil the addition of the "carbon fibre age." For those who may not be aware, carbon fibre materials are super strong and light — much better than glass fibres which are now a well-accepted structural material. We used carbon fibres in my RPV Military Project in RPV Designs to reinforce certain critical areas to provide increased strength at reduced weight. We also fabricated complete wings where we cast fibre reinforced polyurethane wings and control surfaces. For the modeler who is looking for a way to provide increased strength and reduced weight, carbon fibre is your answer. We are seeing increased evidence of its use in wing spar reinforcement, landing gear fabrication, firewall and other high stress applications. An excellent application in pattern airplanes is to use fibre strips or tape top and bottom of the wing (over the foam) and then sheet over with very light balsa. The lightest possible wing of solid foam construction would be fabled this way — and it would never break. Carbon fibre has the strength to weight better than steel — and that's the name of the game in model construction — strong but light. At Toledo I noted materials availability from Dave Brown Products, 4560 Layhigh Rd., Hamilton, Ohio 45013; Kitty Hawk Models, R.R. 2, Paoli, Indiana 47454; and Bob Violett Models, 1373 Citrus Rd., Winter Springs, Florida 32708. Brown and Kitty Hawk offered fibre tape suitable for wing and fuse reinforcement. Violett offers a rather complete range of basic materials and composite lay-ups suitable for many applications.

I love it! I really thrive on the technological advancements being made in modeling — and it's great to see the efforts that some individuals and companies are putting forth in this direction. □



# ENGINE CLINIC

Clarence Lee

**T**his past month my good friend of many years, Cliff Rausin, who operates Condor Hobbies, sent me a neat little item for review that I am sure many fellows flying the giant scale type aircraft, or any engine using spark plug ignition, will be interested in. Cliff has been in the import/export business for many years now and has always been the first to import new products from other countries into the U.S. The Magic Muffler and Peak Power Pipe are two products we have reviewed previously in the Engine Clinic column. The latest item — a small digital engine tachometer, although not of as "heavy" a nature as the Magic Muffler or Peak Power Pipe, is still a product worth bringing to your attention. So many times small products such as this will be available for a short time without modelers being aware of their existence and, due to lack of sales, will shortly be taken out of production. Naturally, this is not one of those things you have to have to fly R/C or could not get along without but, as mentioned previously,



*The DET-301 digital engine tachometer is described in text.*

a neat little item to have if interested in this type of thing.

Naturally, there are quite a few mechanical and light sensing type tachometers available, but what makes this tachometer different is its small size and how it is used. The only bad feature being that it can only be used with spark plug ignition engines as it works by counting the firing impulses of the spark plug.

This mini-tachometer is known as the DET-301 and is manufactured by the Oppama Industry Co., in Yokosuka, Japan. The overall size of

the unit is 2 1/8" long by 1-1/16" wide by 1/2" thick. The digital readout display numbers are 3/8" high and easily read in daylight. In operation, you connect the pick-up wire (that the manufacturer calls the antenna) to the spark plug lead of the engine. A clip is supplied for this but a reading can be taken by simply twisting the pick-up wire around the high tension plug lead. The unit automatically turns itself on and starts indicating engine rpm when the engine is started. When the engine is shut off, the tachometer function stops but for an additional one minute the accumulative running hours of the engine are displayed. Ever wonder how much time you actually have on your engine? Well, you can find out with this unit. It is similar to the Hobbs meters used in full size aircraft for keeping track of engine time and, in the case of rental aircraft, flight time.

Although the intent of the DET-301 tachometer is to be permanently mounted in the aircraft, it can be used remotely to check the engine rpm as well. The accumulative time keeps adding up and the only way to zero this is by unsoldering one of the battery leads. The unit is powered by two 3 volt Lithium batteries with a life expectancy of over 2,000 hours. The instructions that accompany the tachometer make no mention of battery change, but I should imagine this could be done without much of a problem. Resoldering of the battery wires and resetting in silicone adhesive would be required.

The tachometer reads up to 20,000 rpm but at 11,000 rpm the digital readout numbers start flashing to warn of over speed. The accompanying



*Old time engine for this month is the 1948 "Series 20" McCoy 60 "Red Head."*





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oil can be used in ratios as low as 40:1 (2 1/2%) with the manufacturer's recommendation of no higher than 10% being required. John Shannon has personally been running the oil for the last six months at 2 1/2% in a variety of engines ranging from a Cox .051 through .40-.60 size two stroke engines, as well as all of the O.S. and Enya four stroke engines including the O.S. Gemini twin. Results have been cooler running, better power, and overall better performance.

"Glo Glide" will mix with either alcohol or gasoline and any percentage of nitromethane. The oil was formulated expressly to combat rust and corrosion. In fact, the manufacturer recommends priming the cylinder and carburetor of the engine (after it has cooled) with fuel prior to storing to protect from rust and corrosion. The oil contains additives that alter the combustion process that the manufacturer calls FFA (Flame Front Accelerator). This is supposed to promote better combustion and overall power. Other claims are made for the oil such as improving compression, and little or no oil residue on the aircraft due to the oil burning in the combustion chamber. I naturally question how an oil can burn in the combustion chamber and still provide adequate lubrication. I also wonder how compression can be increased unless a coating or glaze is being deposited on the cylinder wall. A letter sent to John Shannon regarding these questions has gone unanswered as of this writing. John did phone and say a gentleman involved with the manufacture of the oil would be in the Los Angeles area and give me a call to answer my questions. The man did visit K & B but did not contact me.

I have performed some initial bench tests of this new oil and so far everything looks favorable. I have checked the oil in both two and four stroke engines. However, the real test will be under actual operating conditions. Samples of the oil have been sent to Gene Husting for testing in the R/C cars, John Brodbeck will be running it in his boats, and I will be checking it in aircraft. When the results are in we will let you know. At present the oil is not available in this country. If the oil does prove to be all that testing in Australia have claimed, there is a good possibility that K & B will be importing the oil as well as using it in their fuels. So stay tuned to Engine Clinic.

Dear Mr. Lee:

I was looking through the April 1983 issue of *R/C Modeler* recently and reread your review of the Fox 1.20 opposed twin. Very neat and simple way to alleviate the problem of one of the cylinders dying. Would you please tell me where I might obtain those twin matched mufflers for this particular engine?

I would like to ask another couple of questions. (1) Is the Don Harris onboard charging system really efficient and dependable? How about the durability of this little unit? (2) I've seen devices advertised for cycling or discharging your battery pack. Once you get them charged, why in the world would you want to discharge them? I know I am showing ignorance, but you see I entered airplane modeling in the last of the Forties — I stayed with it just a few years. Now I am really interested in R/C.

Thanks a lot for your time.

Pete Harrell

Elizabeth City, North Carolina

Several fellows have written in since that Fox twin article and asked the same question, Pete. The mufflers pictured were just the regular Fox mufflers that Duke offers as optional equipment for the engine. They are the same muffler as used on the Fox Eagle III and are available in either upswept or downswept models. The upswept model is pictured on the Fox twin.

Although I do have one of the Don Harris onboard charging systems, I have not put it to use in an aircraft. Fellows who I have talked to who have, have nothing but the best to say about it and would not fly without it. I have not received any feedback regarding any problems with the system. It is a shame that Don had to discontinue production. There is a similar unit available in England for fellows who cannot get one of the Don Harris units.

Your question regarding battery cyclers is getting out of my field, but it is something that I do have experience with. The main purpose of the battery cyclers is to keep your nickle cadmium batteries from developing a memory. If you go out and put in five flights every time you fly — come home and recharge the batteries — your batteries will soon be good for only five flights and go dead on the sixth or seventh. There is a little story involved here regarding my own personal experiences along this line. Many years ago when the nicad type

66



Salto FA-270 four stroke twin alongside Salto FA-120 for size comparison. To be subject of future review.

batteries first came out there was only one commercially available rechargeable pack known as the "Ritchie Pack" made by Zel Ritchie. These were a little expensive so many of us made up our own battery pack using Gould batteries. Gould was one of the first to offer rechargeable nickle cadmium batteries. It was my normal practice to put in five or six flights at least twice a week, recharging the battery pack after each flying session. I soon began to notice that by the sixth flight my battery pack would hardly drive the servos. So a Bonner servo motor was connected up to discharge the pack and see how much life it had. Remember, guys, we did not have the fancy cycling units in those days. Sure enough, battery life was far short of the battery's rated capacity. So the batteries were junked and a new pack made. This went on for quite some time before I came to the conclusion that the batteries were developing some sort of memory. Other fellows were experiencing the same thing. It is one of the reasons nickle cadmium batteries got a bad reputation in those days and most radio manufacturers recommended using only dry cells. I talked to several knowledgeable people in the electronics field about this and was told "no way." I wrote an article for our local Valley Flyers newsletter regarding this so-called memory that was picked up by several of the model magazines. I heard from quite a few disbelievers. Well, needless to say, battery memory is now a proven fact with the various manufacturers publishing literature on this phenomenon.

Dear Clarence,

I'm an owner of a McCoy Red Head "60" series 20 racing engine. The engine is brand new and runs very well with little difficulty in starting it. The information I need is some reference as to names and places of people who could possibly lead me to some spare parts for my engine. My intention is to use my engine along with a muffler in a Tyro Playboy Sr. 80" span by Tyro Model and Supply. The model airplane Kit is both used as old timer R/C or F/F.

I would appreciate both positive and negative feedback along with the following test results I'm giving you.

Four minutes running time on 6 oz. of 10% nitro fuel, using 11/7 Zinger prop. Temperature  $\approx 41^{\circ}\text{F}$ ., engine run was part rich. Test results were made without use of muffler and tachometer. I noticed a slight vibration at a rich mixture. I leaned the mixture out and rpm went up, but the engine was still rich and away went the vibration. I didn't balance the prop. I talked to a friend, and his comment was such that, "He remembered that the engine had some vibration problem due to an engineering difficulty."

The parts I need most are the piston rings, and ball bearings. Inboard (MRC-R8). Outboard (MRC-38). The piston rings Part No. is 1808 (two required). I would appreciate your help very much.

Sincerely,  
Robert Schneider  
Mt. Holly, New Jersey

First off, propellers should always be balanced before installing on an engine and then the tips checked for

continued on page 74

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tracking — something few fellows bother to do. Even though a propeller can be in static balance, tips with a lot of run out can create a dynamic imbalance and vibration.

Any single cylinder two stroke model engine is going to pass through vibration periods. It is impossible to balance a single cylinder engine at all rpm levels. The McCoy .60 would hit rough spots at about 7,000 and 13,000 rpm. This has nothing to do with any design deficiency or engineering difficulty. The engine was designed initially for tethered race car use and later adapted to U-control speed, turning in excess of 16,000 (high rpm in those days). With a balanced 11/7 prop you should not have any excessive vibration problems.

As far as replacement parts, as we have mentioned several times in past columns, rings for the K & B .61 will fit the McCoy .60. The front bearing for the K & B .61 will also fit and the rear bearing for the K & B .40 will replace the rear McCoy bearing.

Dick McCoy still has some parts left and has been advertising in the Model Engine Collectors Assn. (MECA) Swap Sheet recently. Contact Dick at C & H, 10767 Monte Vista Ave., Ontario, California 91761.

Incidentally, Dick McCoy has a special low ratio racing oil available that I have been hearing good things about. Dick sent me a sample some time back but I haven't had a chance to do any extensive testing — time being in somewhat of a short quantity around here. I understand the oil is castor based which should make it an excellent oil for the four stroke engines. Many of the four stroke engine manufacturers are recommending the use of only castor oil in their engines to hold down rust and corrosion.

Mr. Lee,

*After reading several articles concerning H.P.'s new four stroke 21, I finally purchased one. However, I find it nearly impossible to start or keep running.*

*My testing has been done at room temperature on a test stand. A new Sullivan 4 oz. tank hooked up as per H.P.'s instructions was used. The few instructions given by H.P. have been followed. I tried different fuels — K & B 500 and Red Max 4-cycle 10% nitro. Plugs tried were K & B standard long and short as well as the O.S. type F. Carb settings were made as per H.P.'s instructions plus others.*

*Starting battery was new and tested. Props tried were 9/4, 9/6, and 10/4.*

*Starting procedures used were H.P.'s as well as other known four stroke styles.*

*I haven't tried an electric starter, but have found that it doesn't want to start by hand. I have a couple year's experience with 2-cycles without much in the way of problems. The 4-cycle backfires but fails to start.*

*Are 4-cycles really that difficult to start? Could you please offer any suggestions?*

*Thank you,  
Karl Graebner  
Fraser, Michigan*

*P.S. Congratulations on your Modeling Hall of Fame Award!*

Four stroke engines can be pretty difficult to get started until you become familiar with their operation. Even then, they can be pretty balky at times unless everything is just right. The H.P. .21 is probably one of the easiest starting of the four stroke engines. At least the one I tested for the review in RCM was. It was one of the few four stroke engines that would start by flipping in the conventional direction. Normal starting procedure for four strokes is to bring them up to compression backwards and flip. They kick and take off running in the proper direction. If your engine is kicking then try flipping it backwards. Four strokes like to start wet. Choke the engine until you have fuel running out of the carburetor and you can hear a slushing sound as fuel is drawn past the intake valve. It is a sound that is a little hard to describe but one you will become familiar with, with experience. Flip the engine a few more times to distribute the fuel. As mentioned previously, bring it up to compression backwards and connect the starting battery. One hard flip and it should take off running. The use of a chicken stick or leather glove is a good idea as the kick can catch you by surprise sometimes. If the engine starts, runs for a few seconds, and dies, it is not getting enough fuel so open the needle valve another turn. If it fires a few times, runs rough, pops and dies, it is too rich. The needle adjustment may be okay but you just choked it too much. Pull or pinch the fuel line and keep flipping until it fires and runs out the excess fuel. Then start the procedure again.

If you still cannot get the engine running, then an electric starter is the only solution until you do get a little running time on the engine and have

found the correct needle valve adjustment.

I would stick with the 10/4 prop for the extra flywheel action, the O.S. four stroke plug, and Red Max four stroke fuel. If it will not run with this combination it is not going to run better with any other.

Dear Mr. Lee:

I have a Heli Boy with a H.B. .61 PDP and a Max's header and tuned muffler.

I have never had any experience with tuned pipes. I know it would be hard to run the engine to maximum power without cutting the header to its proper length. What is a general length to cut the header?

Also, I drilled a hole for a drain if it flooded. Is this a good idea?

Your response would be appreciated.

Sincerely,

Harry Ford, III  
Syracuse, Kansas

You are going to have nothing but problems if you try to use a tuned pipe on a helicopter. A tuned pipe is only in tune through a narrow rpm range. Tuned pipes used on model engines are designed for maximum rpm operation. Most helicopters fly at partial throttle where the tuned pipe is not working. To try and tune the pipe for mid-range operation would mean that it is out of tune below and above this range. A pipe tuned for mid-range rpm would seriously affect the high rpm operation. Some pipes have a broader range than others but there is no way you can have the pipe in tune throughout the whole rpm range. Also, when the engine "comes on the pipe," there is a noticeable increase in rpm — something you would not want in a helicopter. You would be a lot better off to use a conventional muffler if you expect linear throttle control.

You do not want to drill a hole in a tuned pipe for a drain. Tuned pipes work on the principle of pressure waves. How is the pipe going to create a positive pressure for supercharging the engine with a hole in it? This is the reason the tail pipe is always of very small diameter — to hold pressure loss to a minimum. A very small hole probably would not hurt but don't get carried away.

Dear Mr. Lee,

I have been looking for information concerning the relationships between a

continued on page 219



## Hughes 300 (GLO)

**\$279<sup>95</sup>**  
Kit

**\$379<sup>95</sup>**  
Built-Up

Proven by modelers worldwide to be the best trainer. All have had success with this model, many having failed with other smaller so called trainers. This is the choice for your first model helicopter. — Available in kit form or built up with an OS 50 FSR-H installed.

**Features Include:** Semi knock down kit, collective Bell/Hiller head (assembled), no wood parts, shaft starting, unique new blade covering, shaft driven tail rotor, smooth scale-like performance and rugged construction.

### SPECIFICATIONS

Rotor Span: 54"  
Length: 45"  
Tail Rotor Span: 12"  
Height: 21"  
Weight: 9 lbs., 4 oz.  
Engine: 45/50 FSR  
or equivalent  
Trainer/Sport Scale



## Hughes 300 (GAS)

**\$489<sup>95</sup>**

Sport scale realism at its best. This is the first successful design for a gasoline ignition engine. **Features Include:** recoil (pull) starting, rugged rotor system and drive train, unbreakable main drive gear, new rotor blade profile and covering shaft driven tail rotor and pre-assembled, polished alloy collective Bell/Hiller head.

### SPECIFICATIONS

Rotor Span: 56.3"  
Length: 47.2"  
Tail Rotor Span: 11.8"  
Weight: 13 lbs.  
Engine: 21.2cc Kioritz  
Echo 20/Ignition  
Output: 1.2 H.P.  
Carburetion: diaphragm  
Fuel Capacity: 16.7 oz. (.5 liter)

## ROBINSON R22<sup>HP</sup>

**\$475**

FOR  
OS 50 FSR-H

**\$495**

FOR  
Echo 20 GP-R

Already a successful international contest winner in scale and aerobatic competition. This is the first truly new design for model helicopter mechanics and rotor system in many years. Available in both gas and glo versions.

**Features Include:** Fully articulated flybarless rotor head, washed out/tapered rotor blades, auto-rotation clutch, new "MCS" control system (patent applied), simple construction.

### SPECIFICATIONS

Rotor Span: 59"  
Length: 47"  
Height: 19 1/4"  
Weight: 8.5 lbs.  
Engine: 50/61  
Gear Ratio: 9.6 to 1 to 4.5  
Radio: 4 Channel, 5 Servo

CALIFORNIA  
MODEL IMPORTS

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R/C HELICOPTER HOT LINE  
(714) 991-1720

Kobé Kiko



# FAIREY JR.



Following WWII, Fairey Aircraft Co. was going to make available a small aircraft for inexpensive flying. This is our model presented in 3½" = 1' scale and perfect for the .90 to 1.20 four strokes — especially the O.S. 1.2 Twin.

**W**hen I became the proud owner of an O.S. Gemini twin, I felt that it would be a shame to hide it under a cowling! So I began to look for a suitable subject to model. It needed to be a fairly simple machine (not too much detail) powered by a flat twin engine, and reasonably attractive. These requirements, of course, did narrow the field of choice very considerably; however, after a fair amount of research, the Junior was decided upon.

There were two prototypes. One was registered 00-TIT (there would appear to be some flexibility in the registration of Belgian aircraft at that time, 1948!). It was powered by a Walter Micron inline air cooled engine of 60 h.p.

The second aircraft was registered 00-ULA, and was a tribute to the Ultra Light Association of the time, and was powered by a flat twin J.A.P. engine of 37 h.p. and is the one that I chose to model. It was presented to the designer, M. Tips, by the association. A scale of 3½" to the foot was about right, since it produced a wing area of ten square feet. Assuming an all-up weight of around 15 pounds, the result would be a very acceptable wing loading of about 25 ounces to the square foot and, in turn, a very scale-like speed. As luck and planning would have it, things turned out just right, and the model is very easy to fly, stable, having a fast rate of descent when slowed down, making it a good small field machine.

If your appetite has been whetted, we can start construction. I do not think that a blow by blow instruction sheet is necessary, or wanted; the model is easy to build and I will start with the wing.

### CONSTRUCTION

#### Wing:

Cut all the ribs from the materials indicated, thread the ribs onto the rear spar, pin the lower front spar on the plan, and continue to build the wing

up in the usual way. When the leading edge and the spars are glued and set, remove the pins from the lower front spar, pin the lower trailing edge to the plan and roll the wing back onto the trailing edge. Glue the ribs in place and add the top trailing edge.

It is now straightforward completion to drawing. Note that the ailerons are built in with the wing and separated after completion. Do use one servo for each aileron, as they are so large. I would suggest that you have a word with the technician who is familiar with your radio, to make sure that it will tolerate the extra length of servo lead necessary. Most modern sets, like my Fleet, are okay, but better safe than sorry!

Do take care not to build a warp into the wing. The "D" box L.E. makes a very stiff structure and it will be difficult to rectify! When you have built both wings, join the two together (be sure they are true). I find that a careful look at the rear of the wing from a few feet away tells me more than all the measurements. Sheet the center section and apply the finishing touches.

#### Fuselage:

Cut the 1/32" ply and the balsa sides to shape (do not glue together until they have been bent to shape) and cut out all the formers. Wet the ply and balsa sides at the point where they are bent. Lay them on a flat surface and, with either weights or clamps, hold each one down, and ease the end up carefully so that the bend occurs where shown on the plan. When they are dry, they can be glued together using a contact cement. Believe me, this is the only satisfactory way to do it! Use slow epoxy to join the sides using the firewall and formers F1A and F2. Add the angle gussets and allow to set. Install the fuel tank box and complete the rest of the fuselage.

A few points to watch for are: Do not forget the fin post fits **between** the sides at the rear; make sure all the stringers run straight (nothing looks worse than wavy lines under the



### FAIREY JUNIOR

Designed By:

Dennis Tapsfield

TYPE AIRCRAFT

3½" = 1' Scale

WINGSPAN

80 Inches

WING CHORD

18¾ Inches

TOTAL WING AREA

1420 Sq. In.

WING LOCATION

Low Wing

AIRFOIL

NACA 2415

WING PLANFORM

Constant Chord

DIHEDRAL EACH TIP

1-5/16" (2°)

O.A. FUSELAGE LENGTH

62 Inches

RADIO COMPARTMENT SIZE

Ample

STABILIZER SPAN

29 Inches

STABILIZER CHORD (incl. elev.)

10 Inches

STABILIZER AREA

275 Sq. In.

STAB AIRFOIL SECTION

Symmetrical

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

9 Inches

VERTICAL FIN WIDTH (incl. rud.)

10½" Avg.

REC. ENGINE SIZE

.90-1.20 4-cycle

or good .60 2-cycle

FUEL TANK SIZE

13 Oz.

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage..... Balsa & Ply

Wing..... Balsa, Ply, & Hardwood

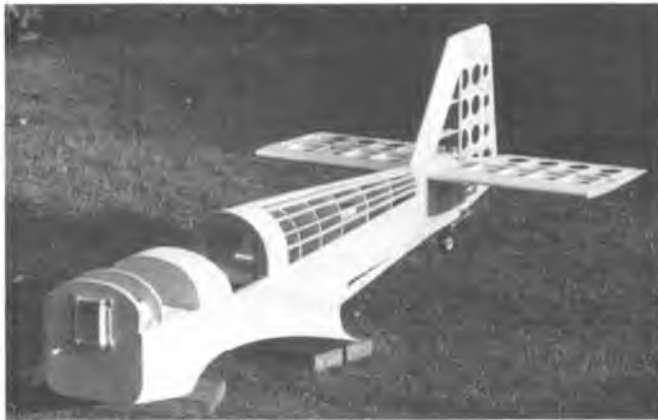
Empennage..... Balsa & Hardwood

Wt. Ready To Fly..... 232 Oz.

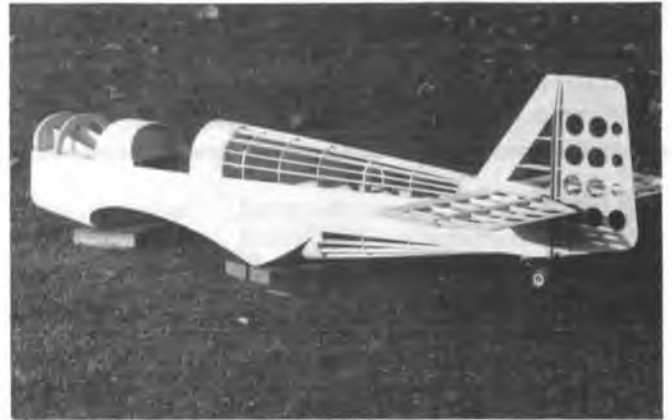
Wing Loading..... 24 Oz./Sq. Ft.

By Dennis Tapsfield





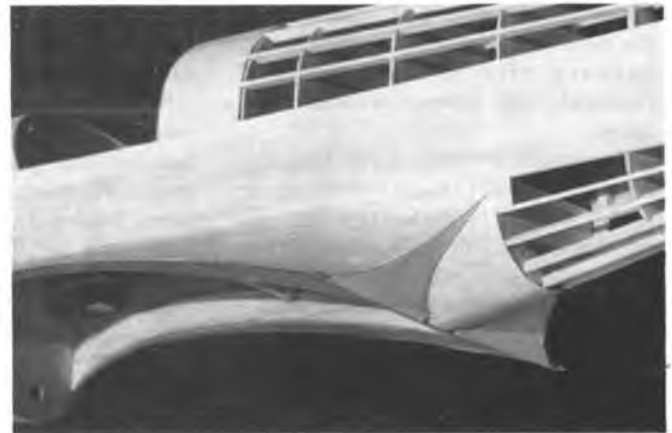
*3/4 front view of completed fuselage.*



*3/4 rear view of completed fuselage.*



*Looking at underside of wing fillet.*



*Close-up showing how fillet is closed off at rear.*



*Close-up of tail wheel and linkage detail.*



*Top front of fuselage with hatch and cowl removed.*

covering!).

I suggest that you leave the stringers until last so that you can get in to install the pushrods and a nylon tube for the radio antenna, and any other bits and bobs.

#### **Tailfeathers:**

These are built using the well-known method of profile and rib. The large lightening holes are cut using the sharpened end of a tube or tin can; do not chicken out on the trailing edges or you will find that the covering will adhere to the flat profile between the ribs and spoil the effect completely. Cut out the horns from old

fiberglass printed circuit boards. I find it is wonderful material for this job and, providing it is roughed up, epoxy bonds it well, and I have never had a breakage. Be sure that you inset the 3/8" balsa on the top and bottom of the stab where shown, as this is the area to be glued to the blocks later after covering. You can cut these blocks to shape now so that the stab sits in correctly.

#### **General:**

The telescopic landing gear can be made to drawing, or purchased from: Airtract (UK) Ltd., 5 Burnside, Rolleston on Dove, Burton on Trent,

England D. E 13 9D.W. If you propose using a single cylinder engine, consider making a dummy cylinder for the opposite side, with alternate laminations of ply for the fins, spaced with balsa. A very convincing replica can be made in this way. By this time you will have assembled the model, and surveyed your handiwork. Carefully check over the airframe, to ensure that there are no lumps or bumps that will show through the covering. I normally install the radio while building the model to avoid the otherwise inevitable dings that occur if you do it when the model is



*Inside view of lower cowl piece.*



*Front view of lower cowl with hatch in rear.*



*Top cowl half showing locking mechanism.*



*All the pieces in place at the nose section.*



*Looking into the wing saddle with ample room for any electronics.*



*Photo of the original full size aircraft which was the inspiration for Dennis and his prototype.*

complete.

Check that the control surface movements are correct to drawing, ailerons 1½" up 1" down; elevator 1" up and down; rudder 2" each way. If you are satisfied, the model can be covered.

I used opaque white Solartex for mine as it's very easy to use and does not need any preparation of the airframe. I gave mine one thinned coat of car cellulose (pale primrose), the registration letters were cut from mid-blue Solarfilm, and the cowl design was matching enamel. Be very careful to position the Solarfilm

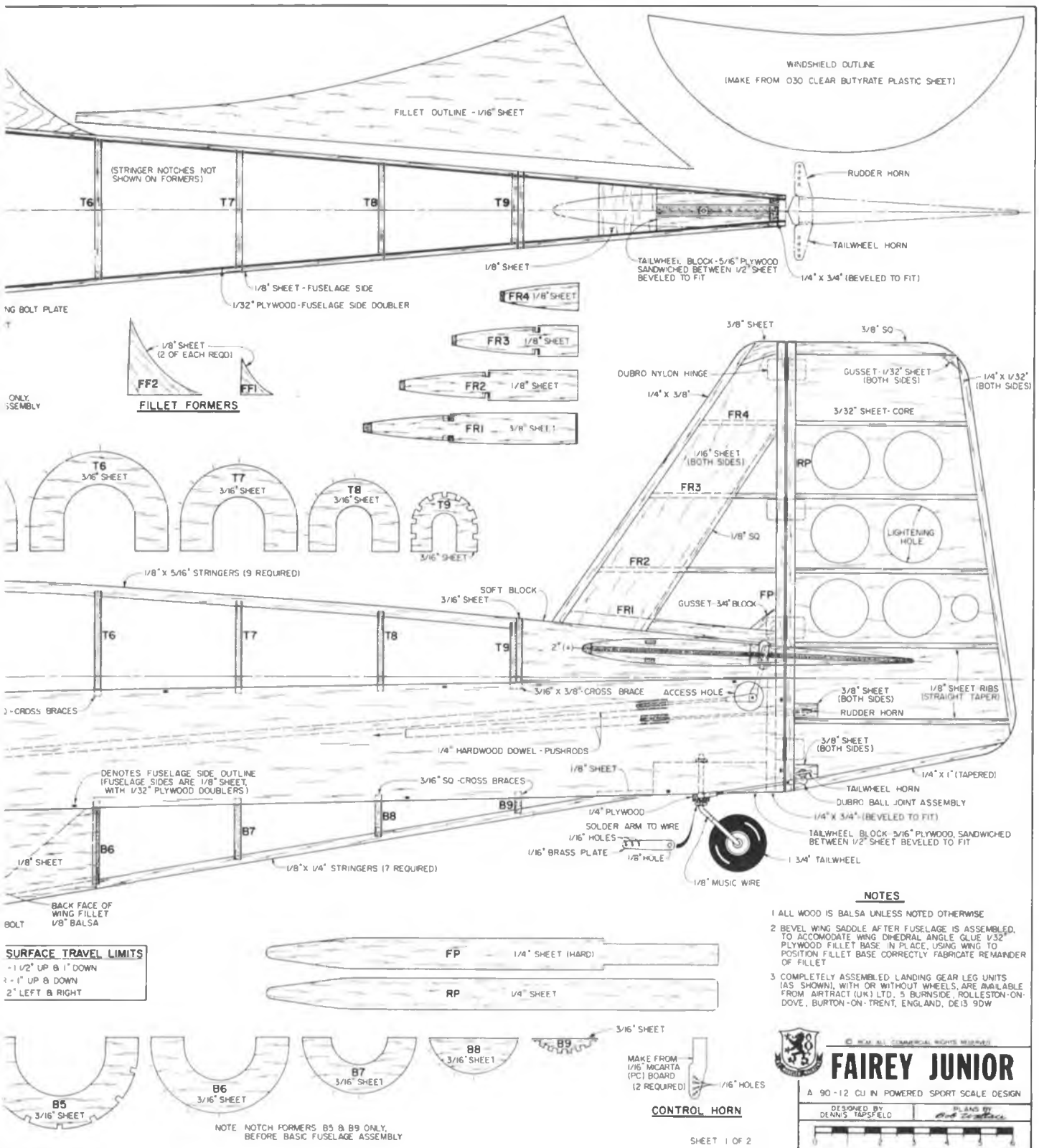
letters accurately, since once they are even touched with the iron, removing it (should it be wrong) will surely leave the pigment on the fabric! The finished model was then given two thin coats of one pot polyurethane clear varnish and the result is very pleasing. Whatever you do, the finish must be fabric to be authentic. The words "Fairey Junior" were letterset.

The instrument panel is cut from scraper board, available from your local art shop, and the dials carefully scratched on it. The bezels are pieces of tube about 1/32" long epoxied on, or you can go the easy way and buy some!

The pilot I made (it's surprising!) looks just like the guy who flies my B.D.8.!

Now **check the balance point!** You will probably need some weight in the nose. I used a 1.8 AH nicad for the radio, mounted just behind the firewall, plus a single 7 AH nicad for on board glow ignition. A master switch and a micro switch, triggered by a notch cut in the periphery of the throttle servo output disk, were so arranged to switch on at fast idle and below. This allows engine starts to be made without external batteries and ensures a reliable idle. *(Editors Note: Great Planes Model Mfg., P.O. Box*





- NOTES**
- 1 ALL WOOD IS BALSA UNLESS NOTED OTHERWISE
  - 2 BEVEL WING SADDLE AFTER FUSELAGE IS ASSEMBLED. TO ACCOMMODATE WING DIHEDRAL ANGLE GLUE 1/32" PLYWOOD FILLET BASE IN PLACE, USING WING TO POSITION FILLET BASE CORRECTLY. FABRICATE REMAINDER OF FILLET
  - 3 COMPLETELY ASSEMBLED LANDING GEAR LEG UNITS (AS SHOWN), WITH OR WITHOUT WHEELS, ARE AVAILABLE FROM AIRTRACT (UK) LTD, 5 BURNISIDE, ROLLESTON-ON-DOVE, BURTON-ON-TRENT, ENGLAND, DE13 9DW

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## FAIREY JUNIOR

A 90-12 CU IN POWERED SPORT SCALE DESIGN

DESIGNED BY DENNIS TAPSFIELD

PLANS BY *Mark S. Tapfield*

inverted flight, spins, loops, rolls, stall turns, etc.

When you are ready to land, set up the approach and keep some power on. If you don't, you will be caught out by the fairly rapid, though safe, rate of descent that develops, and you will undershoot the runway. The landings are good and easy, with little tendency

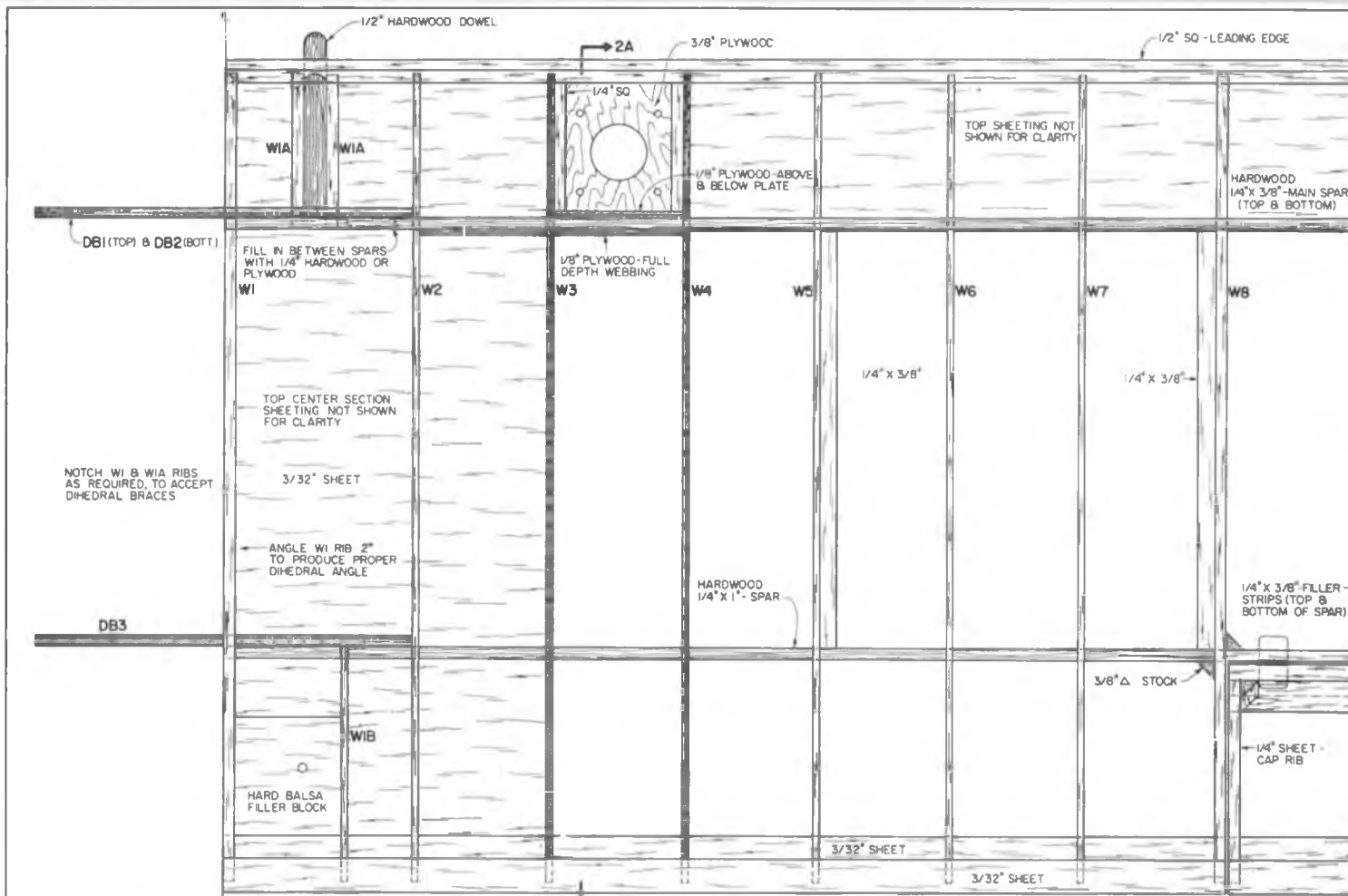
to nose-over, and with the steerable tail wheel, the ground handling is really something. I have the reputation of being lazy enough to start the model by my box, taxi out, take-off, fly, land, and taxi back to the box! I guess it's because I've done all the work building the model!

If you decide to build the Junior, I

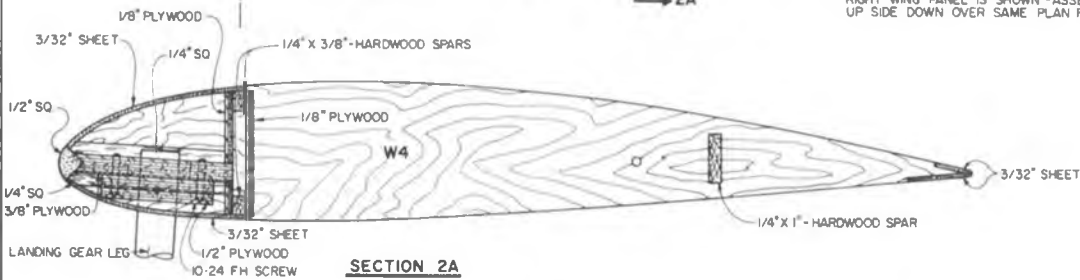
hope that she performs as well for you as she does for me.

The "Junior" took First Place for "Best Scratch-Built" at the Large Model Association two day meet at R.A.F. Watten in Norfolk, 11th-12th June '83.

Happy three pointers!



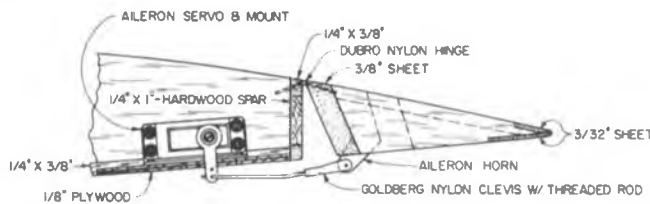
RIGHT WING PANEL IS SHOWN - ASSEMBLE LEFT WING PANEL UP SIDE DOWN OVER SAME PLAN FORM



**SECTION 2A**



**LANDING GEAR LEG BLOCK**



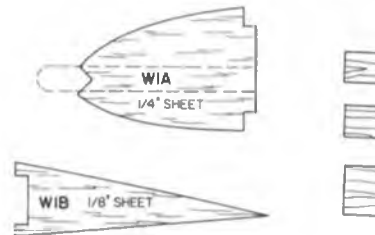
**SECTION 2B**



**AILERON HORN**



**DIHEDRAL DETAIL**  
NO SCALE





# CUNNINGHAM ON R/C Chuck Cunningham

**W**hat do you do with old model magazines? By old, I mean ones that are a couple of months old or older. Do you save them? Do you toss them out after you have looked through them? Do you only buy RCM; or do you buy several, or all, of the model press? Frankly, I'm a saver. I don't file 'em, I pile 'em. I know that someday my long suffering wife is going to pile all of them and me right out the door. When there is something that I want to look at again I start dragging out magazines from under the bed, off the floor of my closet and out of the shelves in my workshop and just about every place where magazines can congregate. Some day --- there's that super word --- some day, I'm going to attack the piles and get them organized. Some day I'm going to file each issue in its special box or binder, and some day I'm going to know where that special box, binder, or file is. But, like *Manana* . . . that some day hasn't made it through the door as yet. Sure hope that you do a better job than I do. Of course, that modeler who tosses the magazines in the trash a couple of months after they have arrived doesn't have a storage problem . . . but it really tears me up to think of all of the terrific information that is lost in that manner. The modeling press, far more than any other thing, is

responsible for bringing to you the enjoyment that you have found in radio control. If it hadn't been for the modeling press all of us would be getting our flying fun out of chucking paper gliders. I'm not beating the drum and shaking the tambourine for the modeling press because I'm involved with it; heck, I've been a reader much longer than a writer. What I'm really trying to say is when you receive a new issue of any of the model mags, take the time to look through all of it. Read all of the articles, even the ones that are out of your field of interest. You never know when or where you're going to find a really good idea. (*Editor's Note: Jim Oddino made a statement to us the other day that he had picked up some good information reading Power Boating column, and he isn't into boats!*) Don't tell your wife that I'm asking you to join "Pilers Anonymous," just don't toss out the wonderful records of man's ability to enjoy the world's greatest hobby/sport.

Rex Johnson sent me one of the latest modifications of his popular Accu-Tach. This new A-T has some features that will make your flying even more enjoyable. Realizing that large aircraft need large battery packs, Rex also realized that to accurately load check the larger battery packs, a heavier load was



**Accu-Tach II by Nor-Cal Avionics, with servo and large battery checkers.**

needed than is now available. This function of the Accu-Tach is in addition to its ability to accurately read the rpms of your engine's propeller at various speeds. The standard Accu-Tach I is able to double as a full scale digital voltmeter, placing a 250 ma load on your battery to see how it responds under simulated flight loads. Now, with the new "Quarter Scale Adapter," a 500 ma load can be applied to those larger battery packs. How about that servo in your system that is stalled at the ends of its travel? Perhaps a pushrod is binding at some point, or perhaps the throttle push wire goes past the stop on the throttle and the servo just keeps on pushing. Do you know what that does to your flight pack? Well, I'll tell you what it does, it sucks the juice right out of the pack. Very possibly many "unexplained" crashes are caused by the drain imposed on the battery by a stalled throttle pushrod. You know the kind of crash . . . suddenly you "ain't got it" and down comes the aircraft, a victim of "interference."

Rex's latest brainchild is a servo load checker adapter to the Accu-Tach. With this little jewel plugged in-between the servo and the receiver and, in turn, plugged into the A-T, you can operate your radio, move the servo to be checked and determine the condition of that servo as it goes about doing its job. This one feature (at a cost of only \$8.95) can save you a lot of money and time if you use it to check each of the servos in your aircraft. It is available with plugs for Futaba, Kraft, and Airtronics, and will probably have plugs for JR by the time that you read this. Of course, if

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Beautiful Sig Skybolt built by Claude E. Reed of No. Adams, Michigan.

you have another brand of radio you can wire on your own plugs to do the checking. The A-T can also be used as a standard  $\pm$  0-20 volt reading for any normal voltmeter work that you want to do. You can purchase a new Accu-Tach II or you can have your older model Accu-Tach I updated by the factory. If you're interested, contact Nor-Cal Avionics, Inc., P.O. Box 70956, Sunnyvale, California 94086.

I also received a sample of the new, larger Klett hinges from Roy Klett. These hinges are for use on the larger aircraft and are, as usual, very well-made, and rugged. The new hinges are 7/8" wide x 1 3/4" long, are about twice as thick as the standard large Klett Hinge, and have fixed pins of a much larger diameter. Roy didn't tell me, but I'm sure that these hinges will be distributed by Goldberg Models along with the standard and small size Klett hinges.

I'm currently building a 68" span, .60 powered flying boat for this year's float flying. After spending a couple of years with float equipped aircraft, I decided to build a flying boat for this year. Naturally, I started a bit late so I am trying to get it finished for the first Thunderbird Float-In of the season. I decided to fiberglass the hull for extra strength and water proofing. I've just about decided that fiberglassing and Cunningham don't mix; I've got a ton of sanding to do to get it back to where it looks half way decent again. If we could ever locate a really good water flying site in our area I would build a big flying boat, but so far we haven't located a site that can be used all year 'round, and one that is a bit protected from the ever blowing Texas wind. We will be bringing you pictures of the year's first Float-In in the next couple of issues. Depends upon the weather.

My pal, Gene Wallock, has been leaning on me to give electric powered

many of you "old guys" remember the old defroster fans that used to clamp on the steering column of the family car? They had rubber fan blades and could be directed at the windshield to try to defrost the window with heated air inside the automobile. Forgotten those fans, right? Anyhow, something small and simple like that would sure be a great addition to the modeler's workbench. Why? To blow away all of the fumes that we create in our building process, that's why. A small fan, perhaps with a twenty five watt lamp in it, that could be directed right



From C.R. Arlon of Kiflissia, Greece, is this combo of RCM Trainer wing and a reduced Square Rigger fuselage powered by O.S. .25 FSR. Files great.

flight a try, and I plan to do this in the near future. It sure is tough to get enough time to try out all of the things that I want to do, and to still take time out to try to make a living. Bet that the rest of you guys have the same problem. Here's a thought for a new product . . . how about a small fan? One with a 4" or smaller blade. One that runs on house current, sits on a small stand, doesn't turn too fast and doesn't make too much noise. How

at the work piece with a gentle breeze to blow away the fumes from the chemicals that we use might really be a "lifesaver."

For example, when I am soldering something, the fumes from the soldering flux always rise straight up into my face. I don't know if it is toxic or not, the industry doesn't know and even OSHA government inspectors are not yet sure if it is toxic or not . . . but, I would just as soon not breathe it.

## SUPER SAILPLANE RADIO SYSTEMS



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List  
\$597





*LEFT: View of C.R. Arion's workshop — he is presently building the "Dream Machine" (RCM #890). ABOVE: A scratch-built Vampire MK III (DH-100) by Dr. Paul S. Grose of Montgomery, Alabama. The young lady holding the aircraft is daughter Elizabeth. Model has 5' span, retracts, flaps and K & B 7.5. Problems occurred on first flight and is being rebuilt with mods.*

I think that using Super T Hot Stuff is great, especially with the new accelerators, but I really would rather not have the fumes coming straight into my face. Doing the fiberglass work out in my garage last night while working on my flying boat, gave me pause once again. The side door was open and the garage is quite large, but no air was moving. As I brushed on the fiberglass resin, the fumes came right into my long suffering nose again. I have a large 24" box fan that I use in the summer to keep some of the Texas heat at bay, and to blow away some of the flying insects at night, but the breeze from this large fan is annoying, and tends to blow everything off of my workbench, so I don't use it except when it is hot. So, how about it, one of you really talented inventors, how about a hobby fan, complete with small light, easily portable that can be used by any type hobbyist to help keep his or her nose from sniffing up all of that less than "good stuff?" Perhaps someone already puts out this type of equipment, if you know about it, let me know, and I'll spread the word.

While on the subject of fiberglassing and such, have you ever broken a hand, or a wrist, or anything that needs a lightweight cast on it? Chances are that if you have broken something, you received a fiberglass

cast. Did you know that this casting material is activated by **water**? Yep. The casting material comes in a small roll, preimpregnated with resin. When the doctor is ready to wrap your broken bone he takes a roll of tape from an individual aluminum foil envelope, sticks it in a bowl of water for twenty seconds, removes the roll, and wraps it around your limb. It gets mildly warm as the resin undergoes its catalytic reaction. In the space of about five minutes the cast is all set. What a fantastic material for fiberglassing the center section of wings. The rolls are about 4" or 5" wide. (Actually, they come in several widths.) The catch is that each roll has about 12' in it, and as soon as it is exposed to the air (or, rather, the moisture in the air), the reaction begins. I contacted several of the manufacturers of this tape (Johnson and Johnson among others) and found that it does not come in small packages. But, perhaps some giant in our industry could prevail upon Johnson and Johnson or one of the others, to package it in 3' rolls. Think about it, a complete fiberglassed center section in about five minutes. No muss, no fuss, no bother. You do need to do what the doctors do, though, and that is to wear a pair of throw away surgical gloves while you're

working with the material.

Another thought has occurred to me with the advent of the new dial-a-channel radio equipment now available from Kraft. How about a frequency monitor with the capabilities of monitoring all of the new frequencies? If you can dial a frequency, can the monitor be far behind for us poor frustrated contest directors?

Watching some video films the other night (taken by Ted White at the first Thunderbird Float-In) reminded me that there are a couple of points about float flying that need to be considered by fliers new to this sport, and now is a pretty good time to mention them. For successful float flying you must learn to make nice, smooth landings. Looking at the films pointed out the differing flying techniques, or rather landing techniques. Generally, those pilots who normally fly trike geared ships make a quick dart at the runway, while those who normally fly tail draggers tend to make a more nose high, gentle touch-down type of landing. The quick dart type of landing was very evident on the films as these resulted in very hard contact with the water, sometimes with very hard results. The nose up, light

**continued on page 219**

# THE WINGER

By James E. McKeown

Several years ago, a foam flying wing called a "Right Angle" appeared in one of the model magazines. I looked at this article very quickly and thought, "another squirrely airplane," and thumbed on to greener pastures. Some months later, while discussing club activities, one of our leading members suggested a "Battle to the Death" using old airplanes which were ready for the scrap heap at the end of the flying season. (In upstate New York, our season of regular flying starts in March and ends in November.) This was an intriguing thought, however, I felt that it would be difficult, with the late autumn weather, to take just any airplane and adapt it to R/C combat. I, therefore, thought again about C/L flying wings which led specifically to the "Right Angle." I did not have the time to send to the plans service and get the plans for this model so I decided to effectively build one to my own design. Several years before this period, I had done some work adapting control line airplanes such as the "King Pin" and the "Ringmaster" to R/C with good success, thus I had no qualms about trying a complete scratch of such a model. After all, what was there to lose?

The fatal day of the "Battle Royale," which had in the meantime been firmed up as the last weekend in October, was fast approaching. Rhinebeck and the WW I Jamboree had come and gone and the chilly mornings were upon us, which meant that it must be late September and time was running out. I secretly built the first such wing in less than a week and stole quietly down to a local park late Saturday afternoon and "touched" it off. To my surprise, after the initial trim had been set, it was an extremely stable, aerobatic and predictable model. I flew the "Thing" (as I then called it) several more times that afternoon and went home a very pleased and happy person.

At this time I decided to let some of my close friends in on the "secret" and offered to help them with models to use at the "Battle Royale." To this end, I kitted three more identical wings and gave them to local buddies. Two of



## ABOUT THE AUTHOR

Jim McKeown is fifty-four years old and has been building and flying R/C models since 1959. His start with this hobby was in England where he lived for 11 years. He is a radio amateur and has directed his attention to both the airframes and control systems used in this hobby. He probably built one of the first solid state, superregen receivers used in England. In 1963, he built a successful three channel analog proportional R/C system to his own design.

Jim is interested in several facets of model aviation which include Giant Scale, R/C Gliders, and any of the Sport types of planes for flying fun.

In 1975, he and his son developed the hardware and co-authored a series of articles for CQ Magazine on Slow Scan Amateur Television.

The author has a Bachelor of Science Degree in Mechanical Engineering and is currently employed in Sidney, N.Y. by the Engine Products Division of Bendix in the Ignition Development Lab. His duties there are directed towards the circuit design, analysis and packaging of sundry engine ignition and control units.

these were completed and test flown before late October. One of my enterprising counterparts was so pleased with the results that he removed the .19 cu. in. engine and replaced it with a .35 cu. in. mill (big mistake!).

The great day of the "First Annual Battle Royale" arrived and the three of us appeared at the field with the new creations. It was a blustery, cold day with winds blowing from 15 to 25 mph. We were extremely fortunate that the flying field was at the end of an airport runway, immediately

adjacent to the inn associated with the airport, since the restaurant provided a place out of the elements to say nothing of the "goodies" which were available.

The flying proceeded through the afternoon and two of these wings flew well in these conditions. The third, with the larger engine, was a disaster. For some reason it was extremely unstable entering into violent snaps and nose tucks at the most unpredictable times. Alas, this one is no more! Had this happened with the first prototype, the Winger project would have been abandoned post-haste. As darkness closed in on us there were two of about ten conventional airplanes still flying, to say nothing of the two remaining wings, which spoke well of the project. This, therefore, was the beginning of the evolution of the "Winger."

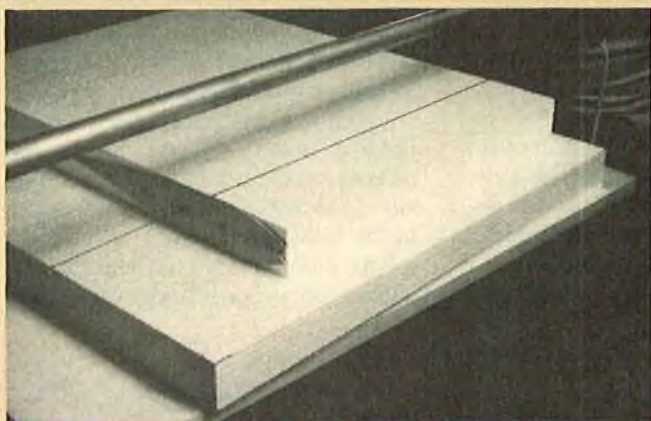
In early November, immediately following the "First Annual Battle Royale," six more of these wings were kitted and sold at the annual club auction. There were, however, several weaknesses and improvements which were pointed out by the flying of the first prototypes. The original versions were covered with "Chromecard" which was a plastic coated cardboard. This was then painted with acrylic lacquer or covered with any of the shrinkable films. Due to the added weight of this construction, these models had the glide rate of a brick when the engine stopped. It was, therefore, decided for future versions to specify any of the low temperature covering materials such as Solarfilm or EconoKote applied directly to the foam. Studies of the unstable model (the pieces of which were recovered from the Battle Royale) indicated that it was somewhat tail heavy. A subsequent model which was tail heavy behaved in a similar manner. Thus, it is inadvisable to try to fly a tail heavy Winger. The results are disastrous! The balance point shown on the plan has been very successful.

The original versions were built with lite ply ribs as "square" wing tips. These are definitely not pleasing to the eye and are difficult to make. The shaped tip now used is quick to build

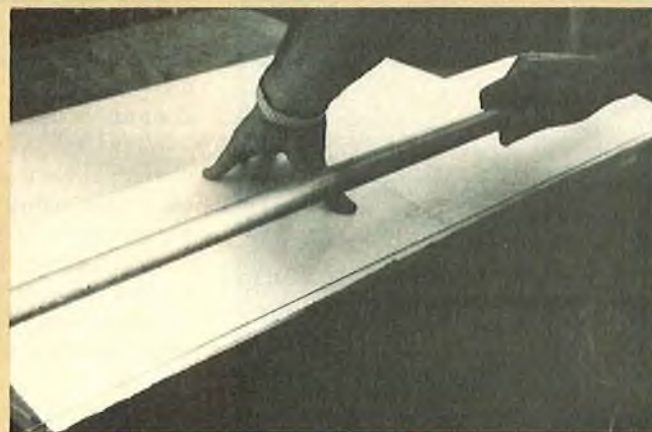


Two versions of the Winger have been built: In the foreground is shown the use of elevons for both pitch and roll control. In the rear is a version using conventional aileron and elevator to control these functions.

From a club discussion, suggesting a "Battle to the Death" with old airplanes, came this flying wing. Designed for R/C combat, this "Winger" makes a perfect model with minimum building time required.



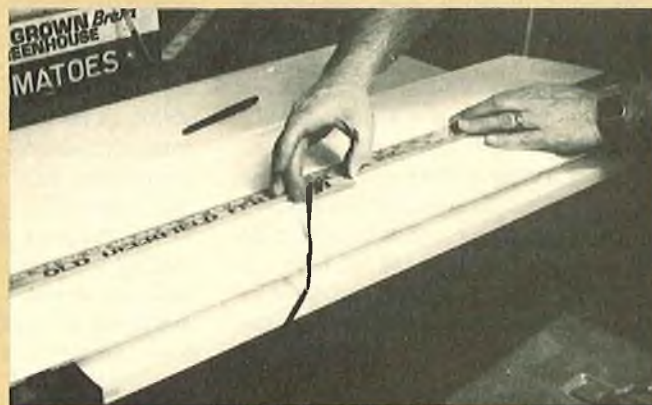
The wing core is cut in two halves from insulation foam. The end templates are like ply held to the foam with 2" nails.



After cutting, the cores are smoothed, joined with masking tape and the trailing edge is cut straight.



Fixtures and templates used to cut detail into the wing cores. Note the two hot wire slot cutters at the extreme left. Adjacent to these cutters are the templates used to cut the motor mount reinforcement slots. The use of the remaining parts is illustrated in subsequent photos.



Use a straightedge and a hot wire slot cutter to cut the spar slots while the cores are still taped together.

## WINGER

Designed By:

James E. McKeown

TYPE AIRCRAFT

Flying Wing (Combat)

WINGSPAN

39 Inches

WING CHORD

13 Inches

TOTAL WING AREA

490 Sq. In.

WING LOCATION

N/A

AIRFOIL

Symmetrical

WING PLANFORM

Tapered T/E

DIHEDRAL EACH TIP

None

O.A. FUSELAGE LENGTH

19½ Inches

RADIO COMPARTMENT SIZE

(L) 2" x (W) 8½" x (H) 1½"

STABILIZER SPAN

NA

STABILIZER CHORD (Incl. elev.)

NA

STABILIZER AREA

NA

STAB. AIRFOIL SECTION

NA

STABILIZER LOCATION

NA

VERTICAL FIN HEIGHT

4¾ Inches

VERTICAL FIN WIDTH

4 Inches

REC. ENGINE SIZE

.15-.25

FUEL TANK SIZE

4 Ounces

LANDING GEAR

None

REC. NO. OF CHANNELS

2-3

CONTROL FUNCTIONS

Ail., Elev., Throt. (opt.)

BASIC MATERIALS USED IN CONSTRUCTION

Birch Ply Engine Pod

Foam Wing

Fome Cor® Control Surfaces

Wt. Ready To Fly ..... 40 Oz.

Wing Loading ..... 12 Oz./Sq. Ft.

and easy to cover with the added advantage of providing an exit for the antenna.

Several more wings were built over the next year, all of which flew well; however, it took about two years to identify a couple more problems. The second "First Annual Battle Royale" came with two more wings to this design giving a total of four. A problem which had exhibited itself to a greater or lesser degree now became more apparent. On hard landings, the power pod tended to loosen and, after several such landings, it was necessary to re-epoxy the assembly in

place. After this was done several times, the epoxy seemed to provide enough reinforcement to prevent further problems. I, therefore, decided to provide an internal wood reinforcement to eliminate this problem. The 1/2" plywood element shown does this job admirably. Nose first landings do not phase this construction! A further minor problem was a bit tough to identify, however, it was easy to solve. One member of our club built a large horizontal "box" protruding from the top of the wing by about one inch to house the radio. This one had no elevator control! We thought at first that it was a radio problem but finally found that the elevator was masked by this box.

The construction materials on the early versions were balsa, plywood, spruce and insulation foam. To provide simpler hinges and to help to reduce the materials cost, the control surfaces, fins and wing tips have subsequently been changed to "Fome Cor®" which is a cardboard coated foam about 3/16" thick. This material can be obtained from most art supply shops. The construction portion of this article demonstrates techniques for working and using this material.

The third "First Annual Battle Royale" has just passed and there were nine flying wings and only two conventional models present which has developed a "One Aircraft Contest."

With the advent of electronic mixing, several of these wings have been built using elevons. These are simpler to build and, with increased control surface area, perform in a manner similar to the conventional control systems. The plans show the configuration used for electronic mixing.

Construction of this model is covered in detail in the photos and drawing, but to eliminate errors it will be further covered step by step.

The foam cores are cut from 2" insulation foam which is obtainable from any building supply firm. A standard 16% symmetrical airfoil was chosen to accommodate the 2" foam. Templates were made from lite ply and marked as shown on the plan. These numbers are essential during cutting to ensure a uniform cut rate between you and your assistant. The templates were affixed to the ends of a piece of foam 18" x 12" which was then cut with a hot wire. Due to the thickness of the wing being close to that of the foam, the wire will "break"

out of the foam in the area of maximum thickness and may leave a rough spot. This can easily be smoothed after cutting with 60 grit aluminum oxide sandpaper affixed with contact adhesive to a piece of fairly thick plywood. The slot for the leading edge is best cut by entering the wire to the vertex of the slot and drawing it out along the template. This is repeated twice for each slot.

When both cores have been cut, smooth them with coarse sandpaper and, using the 3/8" square leading edge taped to join the cores together, cut the trailing edge to provide a chord of 11½". Using a hot wire slot cutter and a straightedge, mark and cut the 1/4"(W) x 1/8"(D) spar slots in the joined wing cores. These slots are positioned so that the rear of the slot is 8/8" from the trailing edge. Separate the halves and cut the radio compartment in each half using templates made from an old fuel can taped to the core. Position the template so that the front edge falls in the middle of the spar slot. Using two fuel can straightedges taped to the core, hot wire cut 1/4" of foam from the inside front face of each wing core to provide clearance for the motor mount. Referring to the photographs of the various templates, make the two templates to cut the motor mount reinforcement slot, tape in place and, in turn, cut the slot in both cores.

Using suitable templates, hot wire cut 3/16" radius slots for the fins and aileron cable in both cores. Finally, cut the antenna tube slot in the bottom of the right core only.

The motor mount is made to the outline shown on the plan from two

## BILL OF MATERIALS

- 2 — 18" x 12" x 2" Insulation Foam.
- 1 — 8¾" x 1¾" x 1/8" Poplar (lite) Ply.
- 1 — 8¾" x 1½" x 1/8" Poplar (lite) Ply.
- 2 — 1½" x 2½" x 1/8" Poplar (lite) Ply.
- 2 — 3" x 3/4" x 1/4" Birch Ply (Servo Bearers).
- 2 — 3" x 6" x 1/4" Birch Ply (Motor Mount).
- 1 — 12¾" x 12½" x 3/16" Fome Cor®.
- 1 — 3/8" x 3/8" x 36" Balsa L.E.
- 2 — 1/8" x 1/4" x 36" Balsa Spars.
- 1 — 8¾" x 2½" x 1/32" Birch Ply (Hatch).
- 1 — 2½" x 3" x 1/2" Fir Ply (M.M. Reinf.).
- 2 — 3" x 3/16" Dia. Birch Dowel.
- 1 — 36" x 1/8" O.D. Antenna Tube.
- 1 — Sig SH-560 Flexible Control Cable.
- 2 — Du-Bro #111 Threaded Couplers.
- 3 — Medium Control Horns.
- 2 — Threaded Pushrods and Clevises.
- 2 — Small Clevises (Use With Aileron Horns).
- 1 — Sullivan RST-4 4 Oz. Fuel Tank.
- 4 — #4-40 x 1" Engine Bolts and Blind Nuts.
- 24 — #2 x 1/2" Sheet Metal Screws.



*The core cutter is used in conjunction with templates to cut the radio compartment hole.*



*A slot cutter with suitable templates is used to cut the fin slots and aileron linkage slots.*



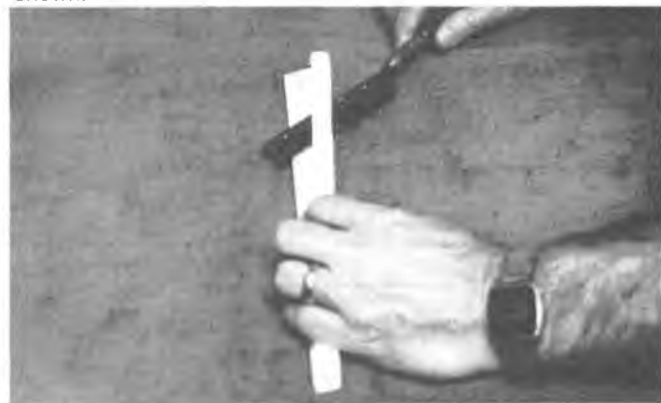
*The wing cores are completed by cutting the motor mount reinforcement slots.*



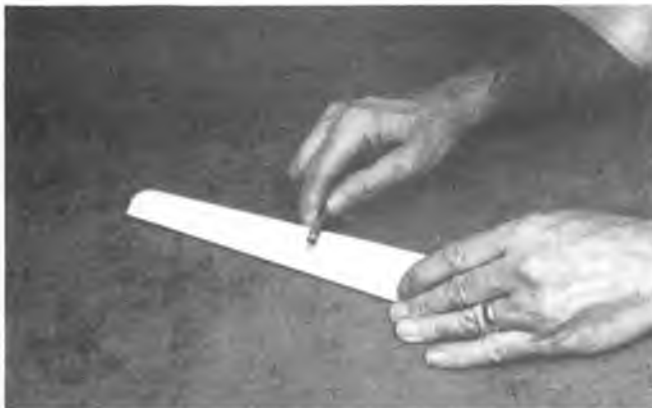
*After cutting the "Fome Cor" parts, to form the hinges, cut through one skin of the control surface with a sharp knife as shown.*



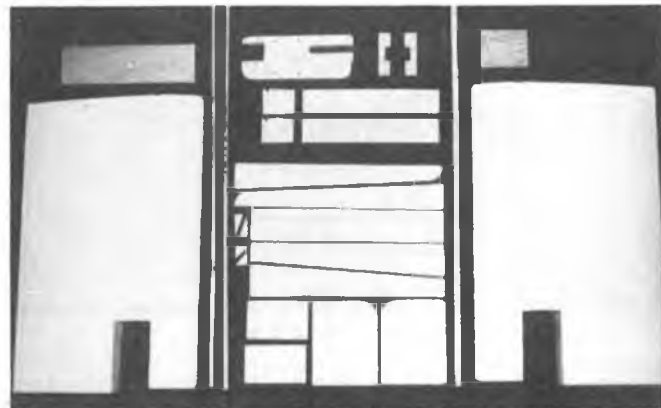
*Having cut through one surface to form hinge, crease this cut into surface with a square corner of wood.*



*After cutting and creasing the hinge, fold the hinge back on the uncut surface and, with a razor saw, remove the foam on the side to be attached.*



*With a round object, roll all exposed "Fome Cor" edges to form a finished radius.*



*Congratulations! After you cut out the plywood parts you have a "Winger" kit. The "Fome Cor" parts are at the top center and can be identified from the plan. Immediately below this group are the lite ply radio compartment liners. At the bottom from left to right are: The motor mount reinforcement, the servo bearers, the motor mount and the radio compartment cover.*



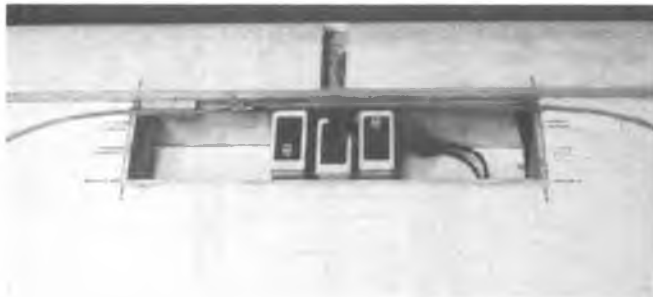
*Temporarily tape the wing cores together and check the fit of the various parts. Where necessary, ease the component fit to provide good glue joints.*



*Tape the control surfaces in place as shown, fold back, apply epoxy and tape the surface in the down position until cured.*



*Slot the bottom and inner edge of the right hand wing tip to accommodate the antenna tubing. Epoxy tube in place and use tape to hold till cured.*



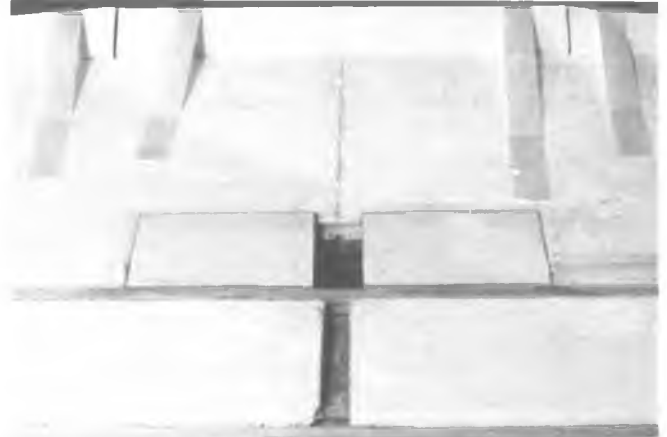
*Install the aileron linkage and servos. Note the music wire link soldered to the cable at the left of the servos.*

pieces of aircraft grade birch plywood. It is important that a hard plywood be used in this application since the softer construction grade plywood will

"crush" in the region of the engine bolts. Epoxy the two pieces together prior to cutting to shape. When cured, cut to the outline shown, making sure



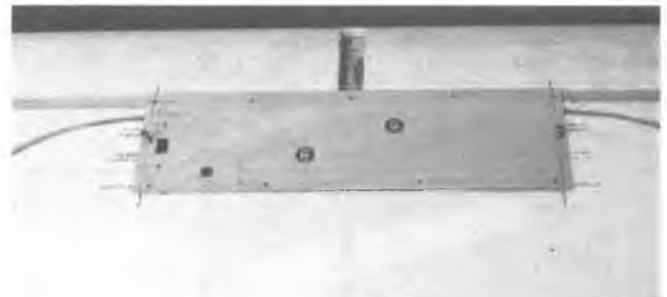
*After checking the fit of the components, epoxy the wing cores, spars, leading edge, radio compartment liners, and servo bearers in place.*



*While the control surfaces are curing, epoxy the radio compartment bottoms in place.*

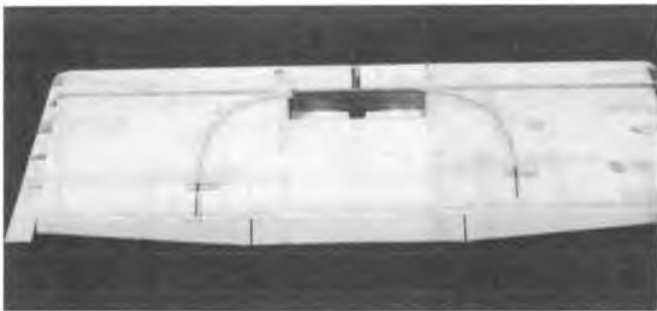


*Epoxy and tape both wing tips to core as shown. Note the slot in the wing for the antenna tube and the "Fome Cor" gussets.*

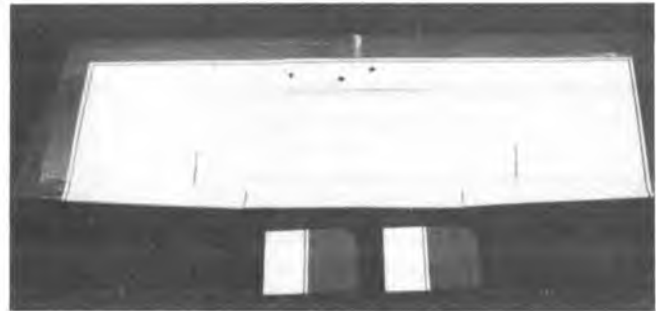


*Mark and drill the holes in the radio compartment cover. The #2 sheet metal screws used to retain the cover go into the compartment liner.*

that the engine of your choice will fit in the space provided. Fit the rear part of this mount to the space between the spars so that you will have a sound



*The completed assembly. Do not install the motor mount until covering is completed. Allow to dry overnight, sand smooth with 100, 150, 220 and 400 grit sandpaper prior to covering.*



*The completed assembly prior to installing the motor mount.*

glue joint when finally installed in the assembled wing. Cut the radio compartment liners from 1/8" lite ply. The end liners are slotted to accommodate the aileron cable if used. The motor mount reinforcement member is cut from either balsa or fir plywood 1/2" thick. I prefer the fir plywood since it is stronger and does not add significantly to the overall weight.

The servo bearers for the aileron version of this model are "stepped" so the aileron servo arm can be mounted at the same level as the aileron cable. To provide clearance for the servo

wires during installation, the bearers are made from two pieces of 1/4" birch ply 3/4"(W) x 3"(L). These are then clamped together in a vise and three 1/4" holes are drilled vertically through the interface between the two parts. This can easily be accomplished by first drilling a 3/32" diameter pilot hole to guide the larger drill. These bearers may then be epoxied to the front and rear radio compartment liners prior to assembly.

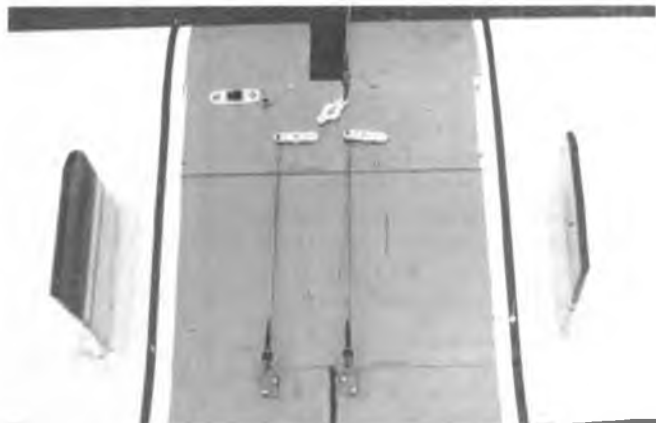
The leading edge and spars can be of balsa, spruce or bass wood. I feel that balsa is easier to shape and lighter, however, I have used all of these woods

with good results. Temporarily join all of the pieces together using masking tape where necessary and check the fit of all the piece parts. Where needed, relieve the fit of any parts which fit too tightly. To check the fit of the motor mount, it will be necessary to round the leading edge in the center to permit it to engage fully into the space between the spars. When satisfied with all fits, disassemble, epoxy and reassemble using clamps and tape to hold the various parts in place during curing.

While this assembly is curing, cut out all of the "Fome Cor<sup>3</sup>" components



*The fabricated wing tip is easily covered with low temperature films.*



*A close-up shot of a typical elevon system.*



*The engine and radio installation in a model using conventional aileron and elevator control.*



*Had to give my age away with this engine shot.*

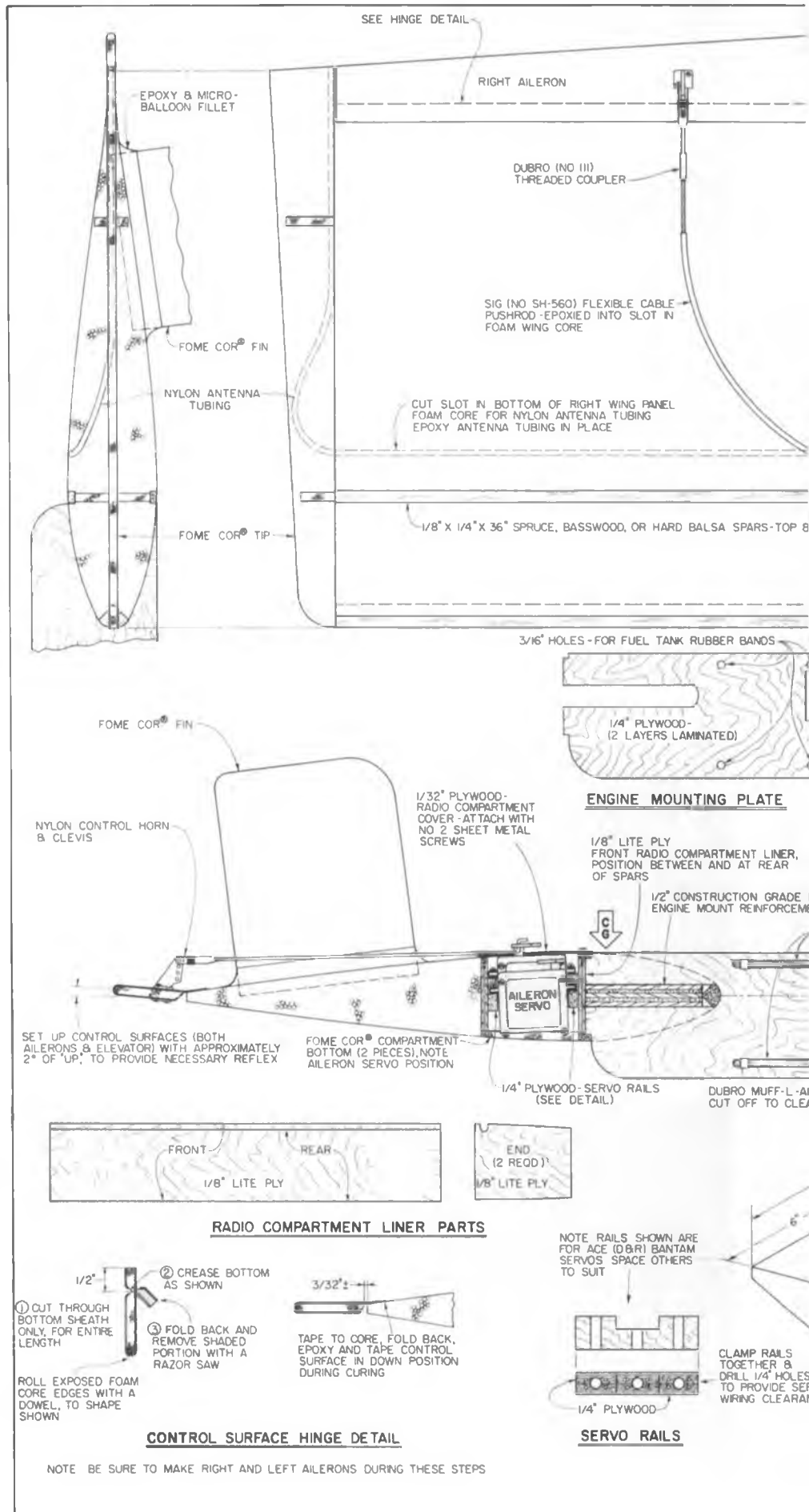
as shown on the plan. Referring to the plan and pictures, form the hinges from one skin of the control surface. In cutting the aileron or elevon hinges, note that there is one left and one right control surface. Cut a slot in the right wing tip as shown to accommodate the antenna tube and epoxy this tube in place prior to securing to the wing. Epoxy the control surfaces to the trailing edge using masking tape as shown. Be sure that the gap between the control surface and the trailing edge is sufficient to permit full down movement of the control surface. After applying the epoxy, tape the control surfaces in their full downward position till cured.

Turn the assembly upside down and epoxy the "Fome Cor" radio compartment bottoms in place. For some servos, the full depth of the wing is required, thus a "slot" is provided in the center to accommodate such servos. This slot presents no problems during landings since it is protected by the motor mount.

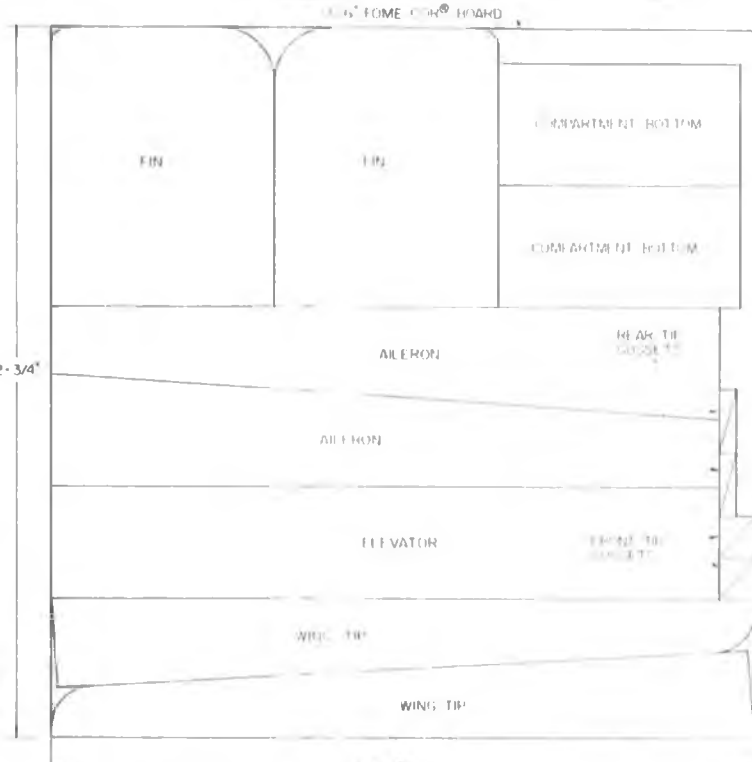
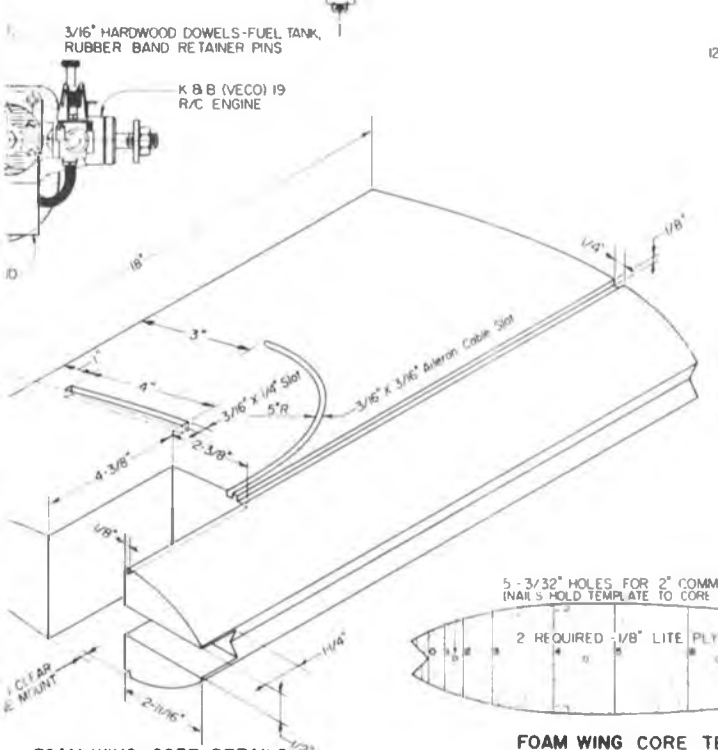
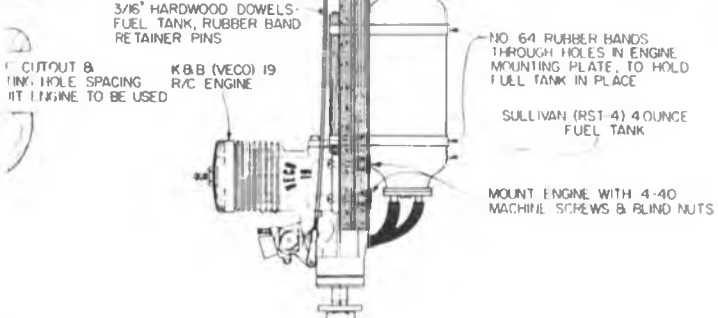
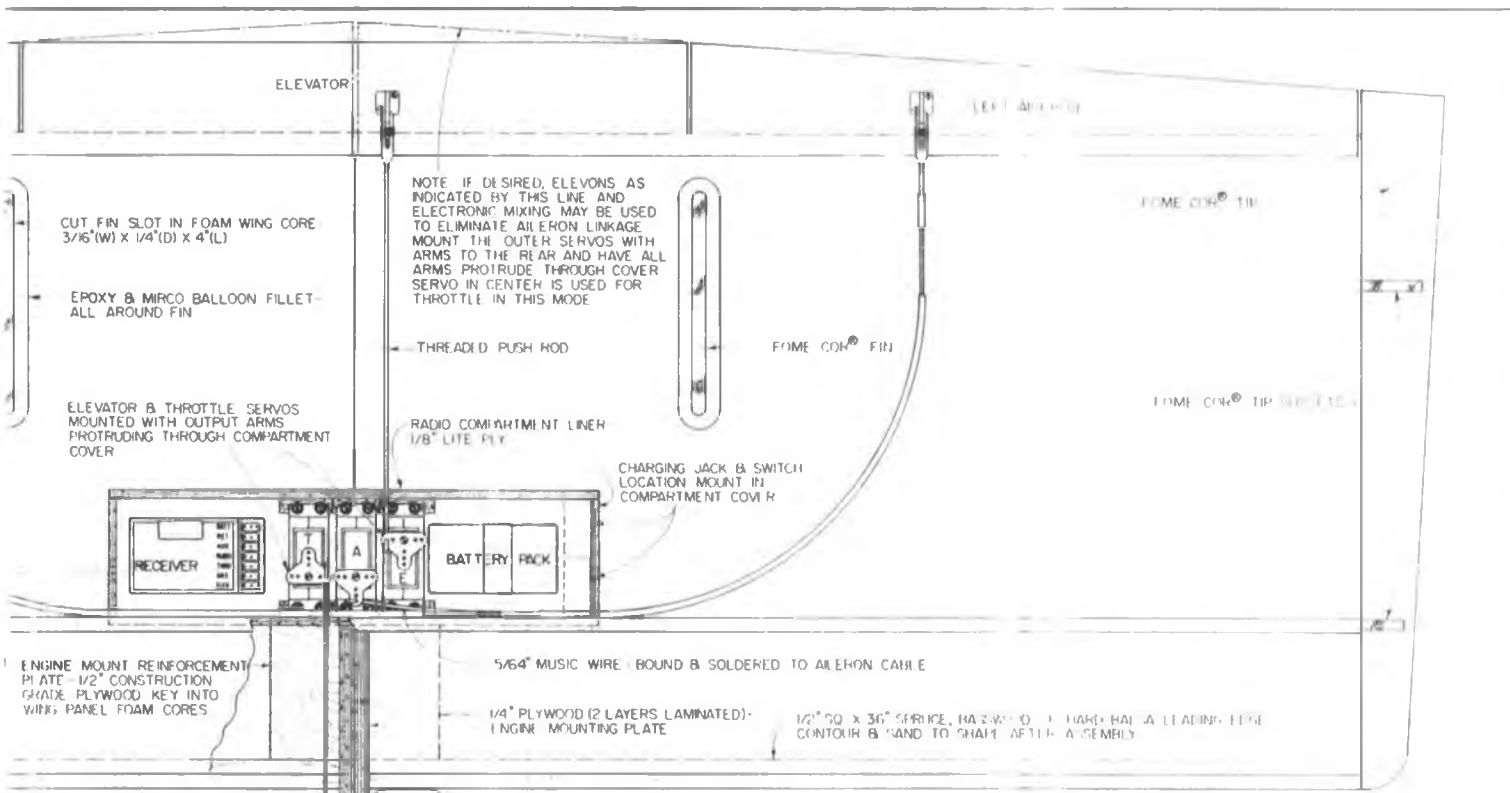
Using the gussets provided, epoxy the wing tips in place. Now epoxy the control cables and antenna tube in place. When cured, sand the entire assembly smooth using 100, 150, 220, 320, and 400 grit wet or dry sandpaper dry. Do not try to sand the "Fome Cor" components with anything but 400 grit as it will rip the surface. The exposed edges of this material can easily be rounded off with a round object such as an X-Acto knife handle. By gently rubbing these edges, a nice smooth edge can be formed which requires no sanding.

Temporarily install the servos and radio. Connect the linkages to the servos and install the control horns. Check the operation of all controls. When satisfied, remove the servo arms and cut the holes in the hatch to clear these arms. Install the switch and charging jack in the cover and carefully drill the holes for the retaining screws. In drilling these holes, be very careful to locate them so the #2 screws will thread into the radio compartment liners. When this portion of work has been completed, remove the radio equipment and proceed with covering the model.

In covering the model, use only enough heat to provide covering adherence and shrink. Excessive heat or the use of high temperature materials will produce a "scalped" or "pocketed" appearance on the finished model. Cut slots in the covering and install the fins and engine mount

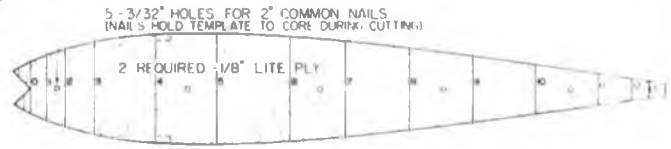






3/16" FOAM COR® BOARD - PARTS LAYOUT

NOTE: THE TERM "LITE PLY" REFERS TO LIGHT WEIGHT POPULARLY KNOWN AS "BIRCH" PLYWOOD. ALL OTHER PLYWOOD, INCLUDING BIRCH REINFORCEMENT PLATE, IS ANCHRA-T GRAD® BIRCH PLYWOOD.



FOAM WING CORE TEMPLATE



# WINGER

A 19" POWERED FLYING WING DESIGN

DESIGNED & DRAWN BY J. E. MCKEOWN



using epoxy. When cured, mix some micro-balloons into some epoxy and, using a flat paddle about 1/4" wide, neatly fillet the joints at the motor mount and fins. When fully cured, paint the motor mount and fillets with a fuel resistant paint such as Testor's Pla or Formula U.

Install the engine, radio and fuel tank. In the radio installation do not try to use a control configuration which would permit the control horns to be on the bottom of the wing. This tends to destroy servo gears during landings! Check all controls for freedom of movement and direction of travel. Be sure the controls, in the neutral position, are around 1 to 2 degrees above center. This ensures that there will be adequate flying reflex. Check the balance of the model. In the event that the balance point falls to the rear of that shown on the plan, add enough nose weight to balance it. In all of the models built to date, nose weight has not been required.

Before flying, fully charge the batteries and pick a reasonable day. For the first flight, to be on the ever ready position, it is advisable to have an experienced friend launch the model. Start the engine, adjust the mixture to provide a slightly rich run, check the idle and, when satisfied, prepare to launch. Open the throttle fully and check the controls for both direction and movement. All being well, give your assistant the nod for a fast slightly nose-up launch. Let the model climb to a couple hundred feet making corrections only as necessary to keep the direction and climb reasonable. Turn the model downwind and try a straight downwind pass adjusting the trims for straight, level flight. Try several more turns adjusting the trims until they are satisfactory. As you become more familiar and comfortable with the model, you will soon be trying any maneuver you can think of. After the first flight, correct any errors in reflex as illustrated by significant off neutral settings of the elevator trim. To accomplish this, adjust both the aileron and elevator neutral until a central trim position is obtained.

I hope that this project will give you as many hours of fun as it has me. Happy flying!

I would like to extend my thanks to Paul Niles for his contribution in the development of this model and to Stacey Barnard for building one of the very first prototypes. □

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Excerpt from RCM Mag — May '84 by Clarence Lee.

"The engine probably accumulated a total running time of about 45 minutes which is not much to judge a fuel by, but in that short time there was no varnish or carbon accumulation in the combustion chamber or on top of the piston. Dissassembly of the engine (for pictures) showed absolutely no wear. In fact, the engine would not appear to have hardly been run --- the rings barely showing any signs of fully seating, the cylinder walls still showing no signs of polish, etc. I have been getting a lot of good reports lately on Red Max fuels. You might want to consider trying them."

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0%	10.50	6.60	5.75	5.35	3.11	135.00
5%	11.50	7.65	6.95	5.85	4.95	219.00
10%	14.00	8.85	8.00	7.10	5.45	299.00
12%	15.00	9.70	8.80	7.75	7.45	340.00
15%	16.00	9.85	8.95	8.70	7.95	350.00
25%	20.00	14.00	12.00	11.00	9.45	497.00
40%	25.00	20.00	18.00	16.00	14.95	696.00
60%	30.00	25.00	23.00	21.00	19.95	923.00

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A Very Good Sport Fuel

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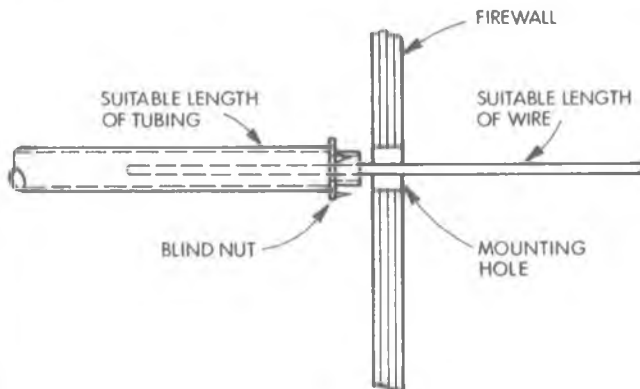
STOCK For 150 and 160cc

# OR WHAT IT'S WORTH

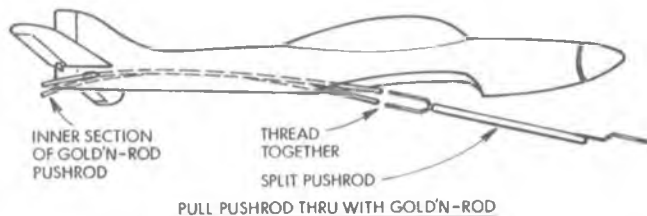


From RCM Readers  
Edited By Jerry Smith

Have you ever had the problem of replacing a blind nut (tee nut) in a very inaccessible place. Maybe the backside of the firewall, for example. A difficult problem for most modelers with short patience. Dick Heil, Eagan, Minnesota, has a neat way of solving this problem. After locating the blind nut in the hole, with a suitable length of music wire, slide a piece of tubing over the wire per sketch. The tubing is then used to retain the blind nut in the hole while the wire is withdrawn. Start the bolt and tighten down until the blind nut is properly seated. Use the length of wire to apply a spot or two of epoxy or slow-cure CA to hold the nut in place. A time saving suggestion.

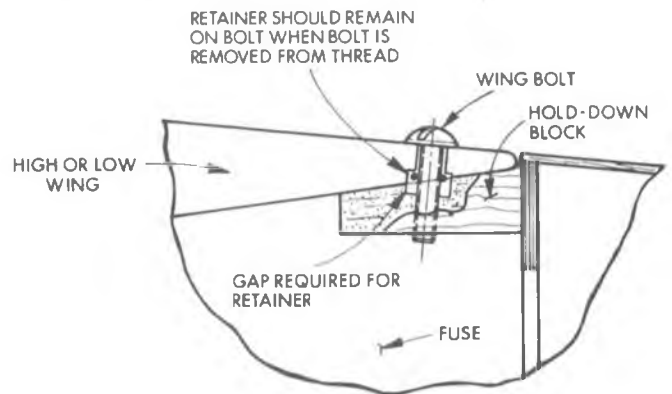


Steve Bygren, Laurel, Montana, discovered while installing the split pushrod in his Dirty Birdy .40, that it was useful to push the inner section of Gold'N-Rod pushrod into the fuselage exit hole, thread onto the pushrod ends, and pull it through. This method as shown in the sketch, allows you to avoid a tedious blind search for the exit holes from the inside of the fuselage.



Wing bolts are more convenient than rubber bands for fastening the wing in place. However, wing bolts tend to fall out of the wing and get lost. They can be retained on the

wing by purchasing suitably sized "O" rings or, alternatively, by using a small rubber band; or why not a 1/16" length of large silicone fuel line. Spread the short section of fuel line open using needle nose pliers, slip it over the bolt and slide it down against the wing. Most modelers carry extra fuel line or have scrap pieces around the workbench. You will find this a convenient and economical method of keeping wing bolts in place. See sketch. From Anthony Pollio, East Meadow, New York.



Larry Green, Whittier, California, has found an excellent alternative to tapes, glues, and greases for sealing radio boxes on R/C boats and cars. The product is a silicone type clear sealant which is remarkable. It has enough adhesion, yet can be pryed apart and easily pulled off in a "string" like piece. The pressurized can retails for approximately \$5.95 and will give up to 50' of 3/16" beading. It will fill gaps up to 3/8". It skims over in 10 minutes and cures in 8 hours. The product name is "Easy Weather Stripper" removable clear sealant made by Scott Page Inc., Box 447, Ridgewood, New Jersey. It has been on the market for approximately two years.

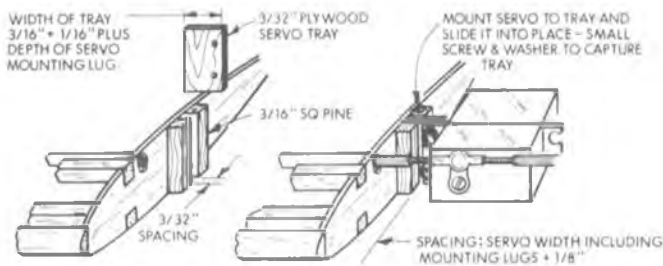


Nothing can be more aggravating than when it's your turn to race and you have difficulty starting your outboard. The starter cone will slip on the flywheel, due to fuel spillage or water, making starting all but impossible. This problem is more prevalent on the 7.5cc engine; however, there is a simple solution. Remove the flywheel and sandblast it. The starter cone will grip the flywheel under wet and slippery conditions. Thanks to Wayne McMillen, Red Top, California, for this suggestion.



Here is an idea for mounting a wing servo when using nyrods to operate the ailerons. It is difficult to mount the servo without using a tray of some sort. When installing the servo in a small model the additional room required causes it to protrude above the wing. This takes up valuable space in the fuselage. If the wing happens to get knocked off, during a rough landing (of course), there is the possibility of considerable damage to the fuselage.

The servo installation shown in the sketch can be accomplished by either adding two additional ribs to the wing center section or by simply adjusting the spacing of the #2 ribs. A small screw and washer captures the mounted servo. Thanks to Frank Weaver, Nanaimo, British Columbia, Canada.

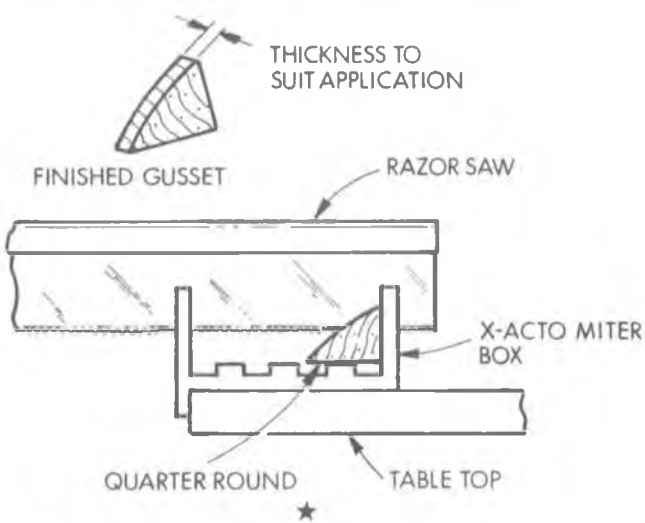


★

Long before accelerators became popular for helping set CA type glues, baking soda was applied to the joint. The messy part was applying the soda. A quick, easy, inexpensive solution is to dissolve the soda in water and use a small pump sprayer to spray the surface. This method is especially useful when treating full sheets of balsa for wing sheeting. Thanks to Gerald Garing, Schenectady, New York.

★

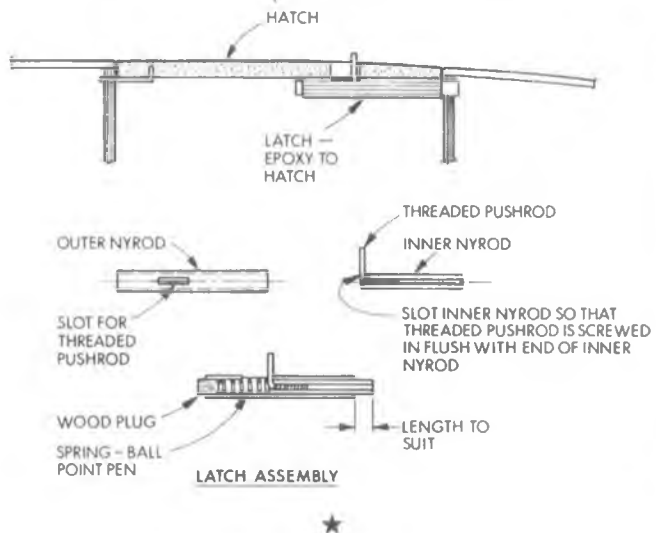
Staff Sergeant Ron Kohler, Fort Fairfield, Maine, has found a convenient way of making gussets, quick and simple. Many hardware stores and lumberyards sell a household finishing item called "Quarter Round." It comes in a host of sizes and is made of various kinds of wood. A five or six foot length costs only a couple of dollars. A razor saw and X-Acto miter box are all the tools required. It is a simple matter to cut the gussets to the desired thickness by placing a stop on the rear fence of the miter box. See sketch. Ron generally makes many gussets, by the sandwich bag full, and has a good supply when the need arises.



Ever had the need for a simple latch to hold down a canopy or hatch cover? Mark Chaffin, Jonesboro, Arkansas, has designed a simple but effective latch. The best part of all is that it can be made with material you, the modeler, generally have on hand. It is made with the inner

and outer sections of NyRod, a small spring, a short piece of threaded wire pushrod, and a wooden plug. See Sketch. To Assemble:

1. Slot outer NyRod for threaded pushrod.
2. Insert right angle piece of threaded wire pushrod into slot. Slide inner piece of NyRod in place and screw into threaded pushrod. Assembly should slide back and forth freely.
3. A small spring is inserted in the opposite end and held in place with a wooden plug. The plug is held in place with CA glue.
4. Epoxy the assembly in place where desired.



Dave Fisher, Bakersfield, California, has found a good way to cut a set of two identical numbers or letters from MonoKote in 10 minutes or less. Here is Dave's time saving method:

1. Draw the letters or numbers on a piece of typing paper. It isn't necessary to space the letters. Butt them up against each other. Trim to 1/2" excess on all sides.
2. Using a piece of glass (or mirror), place a piece of MonoKote (without backing) good side up. Make sure the glass is clean. Place another piece of MonoKote (without backing) good side up over the first. The MonoKote should be about 1/2" larger than the paper.
3. With an iron, gently touch the four corners of the MonoKote sealing them together and, simultaneously, tacking them to the glass.
4. Place the paper over the MonoKote and tape it, and the MonoKote, (with masking tape) along the top and bottom edge.
5. Using a very sharp knife, and small straightedge, cut the letters out. Cutting the top and bottom last makes it much easier.
6. The end result: Nice, neat, clean, characters with time saving effort.

**Send your hints & kinks to R/C Modeler, P.O. Box 487, Sierra Madre, Ca. 91024 — win a free book from RCM's Anthology Library series if your idea is used.**

By Evelyn Odell



## OVER THE HILL GANG

**M**any names have been given to it . . . many comments were made about it . . . many thought it wouldn't fly, but on October 8th, 15 fliers met at what is known to Western Washington as "Hogs Hollow" at the foot of Mt. Rainier, south of Seattle, for a fun-fly surpassed by none to date! It was a first — not for the events nor for the field they flew at, but for one reason alone! All were over 50!

Two months before, while flying at the Kitsap County Fun-Fly across the Sound on the Peninsula, a bunch of fliers, decided they were tired of competing with the kids and their "Butterflies" — the young adults and their hotshot planes — the bouncy, energetic racers — why not have an "over the hill gang" type fun-fly? How many would come? How many over 50 that would want to admit to being over

50? The thought took wing from this small group consisting of Erv Solberg, Seattle Radio Aero Club; Bob Pfeiffer, Mt. Rainier Club; Jerry Odell, also of SCRAC; and their wives to become the: "First Annual Over The Hill Fun-Fly For Flyers Over 50."

Notices were made up and sent to most of the District 10 clubs that were a day's drive from the Mount Rainier Club field. The weekend was a typical Indian summer, fall weekend for Washington. Members of all the clubs started rolling in Friday night, and they "roll in" literally as the Mt. Rainier Club field is a camping field — a popular one to stay the weekend, at the foot of Mt. Rainier overlooking the valley. On Saturday, 14 fliers ranging from "just 50" (ID was required) to the oldest at 72 (Ralph Koutz), registered for the one day event. Not only were the fliers over 50, but some of the

planes were of vintage design. Bob Florence of Bellevue, Washington, flew a beautiful Georgia's Special; Dick Hansen of the Portland Skynights flew his Jenny, one he has flown since 1967. Unbelievable!

Fifteen fliers attended, 14 flew; one crashed on practice flight. One flier walked with a cane, one had to sit down to fly, but they all participated. Some had not flown in competition for 10 years. They came like the flier said, "to use it so they wouldn't lose it!" It was great to see this age group participating in a contest again! By 3:30 all the events had been flown, points tabulated and winners announced by the Master of Ceremonies, Bob Pfeiffer. The First place trophy was an event in itself. Judy Turner, wife of one of the Mt. Rainier club fliers, put together a ceramic masterpiece of an old man sitting on a stool, long overcoat hanging over the back, straw hat, Zee towels in the back pocket, jug of booze sitting by his knee, holding his transmitter with his crashed plane at his feet and "Over 50 Fun-Fly" painted on the base. Everyone, whether they thought they could come in first or not, wanted this trophy. Small ceramic planes were second and third prizes, and the winners were: Dick Hansen, 3rd; Don L. Connell, 2nd; and 1st place, together with the trophy, went to Erv Solberg.

In addition (names have been omitted to protect the innocent!) 4th place got Vitamin E for his wrinkles; 5th was given denture cream to clean his falsies with; 6th received Roloids; 7th, Ben Gay rubbing cream for sore muscles; 8th place — aspirin because he was sure to have a "headache" tonight; and to 9th place went Polygrip so they wouldn't fall out if he got too excited!

The events, including the bomb drop and a 100 second timed flight were geared for the older flier. However, the "over the hill gang" showed they could hit the mark just as easily as the young'uns with scores of 100.3 seconds and inches from the "spot" in the bomb drop.

In the evening, for those who were camping out overnight, a pot luck was put together by the wives and everyone ended up around a large bonfire reminiscing on how it was in the "old days" — and why not! In this age group were the men who flew the planes most WW II scale is copied from. They were the ones who started the hobby with rubber powered "engines" and one channel radios.

Next year they hope to put on the Second Annual OTHFF with new ideas and double the fliers. A lot more will be eligible, and the ones who flew in the first fun-fly hope to be back to join the others next year. □



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# PIT STOP

Gene Husting

## 2nd Annual Budweiser 10 Hour Enduro

**T**he first 24 hour Enduros, for 1/8 gas cars, were held in Miami, Florida, but the big enduro races have now moved to Southern California, with the Ranch Pit Shop hosting the Budweiser 10 Hour Enduro in 1983 and this 10 Hour Enduro in 1984. The Ranch Pit Shop has a new computerized lap counting system which is limited to a 10 hour count, so that is the reason this year's enduro was scheduled as a 10 hour event, rather than like last years 12 hour race. Anyone interested in racing knows Budweiser sponsors many racing machines from cars to boats and we are certainly glad to welcome them as sponsors for this event. I think I should mention that no alcoholic beverages can be used at the track because of the many younger people involved in R/C cars, but this certainly



*The Ranch Pit Shop track in Pomona, California, was the site of the 1984 Budweiser 10 Hour Enduro. Gil Losl Sr. has been continually improving the track with a whole new driver's stand and more lighting.*

didn't stop anyone from trying to win the many cases of Budweiser and Bud Light donated by the Foothill Beverage Co. as prizes.

Four factory teams were entered

with five independent teams entered. I can still remember the first 3 hour enduros we held in Southern California, and now 6 hr., 12 hr. and

**continued on page 132**



*The Outlaw R/C Team is getting ready for their first ever Enduro.*



*John Thorp's Team ran very strong, but fuel problems held them back.*



*Delta Team #4 spent a little more time in the pits than they liked.*



*Associated Team #2 drove a conservative, cautious, race and won the Enduro with no problems. From the left, Gene Husting, Tony Neisinger, Rich Lee, Ralph Burch Jr., Mike Lavacot, and Ralph Burch Sr. who did all the pitting with Rich's new fuel gun.*

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24 hr. enduros make me wonder why anyone would want to try something like this. But the thought of a greater challenge brings out the racer in everyone. Something like climbing the tallest mountain.

Team #1 — Associated had two factory teams entered. Associated Team #1 had Curtis Husting, Bill Jianas and Rick Davis. This team won the last three 24 hour enduros in Miami and last year's 12 hour enduro here. Their record is quite incredible!

Team #2 — Associated Team #2 was headed by Rich Lee. Rich built the car and all the K & B-Lee engines used in both the Associated team cars, in all the enduros. This team, with Rich, Gene Husting, Chuck Phelps and later Bill Jianas, won all four 6 hr. enduros in Southern California. And with Ralph Burch Jr. driving last year, they were leading the 12 hr. enduro at the 11 hr. 45 min. time, when they lost a clutch bearing and dropped to 2nd place. This year Mike Lavacot and Tony Neisinger volunteered to drive. It's interesting to note that all the drivers on this team, except Gene, started in 1/12 scale.

Team #3 — This was the Ranch Pit Shop Team of Gil Losi Sr., Gil Losi Jr., Ron Paris, who builds the very fast Paris-McCoy engines and Robert Cavazos. All very good drivers driving an Associated RC500 car and with as good a chance at winning this race as anyone.

Team #4 — The Delta Team headed by Arturo Carbonell, with Paul Dionne, Chuck Wiggins and Tom Wong driving and Bill Campbell doing the wrenching. Delta won the very first 24 hr. enduro in Miami, so they know what it's all about.

Team #5 — John Thorp's Team with Benney Bullock, Barry Newman, Jim Jones and a new super driver from the off-road racers, Jay Halsey.

Team #6 — The Delta Deamons, with a group that just loves to race, headed by Dean Brown with Doug Campbell, John Pagel and Bob Coughran.

Team #7 — The Outlaw R/C Team is a group of guys who just started racing a short time ago and are going quite fast with their Associated RC500. Rick James, Gus Gustafson, Don Gustafson, Ray Zabritski, Russ Pursley and Greg Pursley are all ready to climb that taller mountain.

Team #8 — From Competition Plus Magazine comes a family of racers who I think must compete in more races, 1/8-1/12 and off-road than



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*The Ranch Pit Shop Team also drove a very conservative race and took a strong 2nd place. Every year they get better. From the left, Ron Paris, Gil Losi Jr., Gil Losi Sr., and Robert Cavazos.*



*Last year's champs, Associated Team #1 battled their way back from last place, after two servo changes, to take 3rd place. On the left, Rick Davls, super pitman Bill Newlin, Curtis Husting and Bill Janas.*

anyone I know of. Leo, Cory and Peter Barana with Kerry Cavazos driving an RC500.

Team #9 — The Ranch Rats are a group of guys running just for the fun of it, which is great! Bill Bills, Bob Bills, Andy Jacobson and Mike Tobey of CRP off-road fame trying the gas

cars, with an RC500.

Friday was a practice day, but this was also the weekend that the CART Indy cars race through the streets of Long Beach. So Friday morning Ralph Burch Sr. and Jr. and I went to Long Beach and watched the Indy cars. In the afternoon we picked up Rich and

went to the track to make sure everything worked. We had no problems. Ralphie got to do some driving. Everything was ready for tomorrow.

Saturday. We arrived at the track at 8, with the race scheduled to start at 9. However, we weren't sure the race



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## BUDWEISER 10 HOUR ENDURO RESULTS

Team	Team	Car	Laps
Team #2	Team Associated	Associated RC500	1618
Team #3	Ranch Pit Shop	Associated RC500	1542
Team #1	Team Associated	Associated RC500	1480
Team #4	Team Delta	Delta Eagle	1456
Team #7	Outlaw R/C	Associated RC500	1364
Team #6	Delta Deamons	Delta Eagle	1227
Team #5	Team Thorp	Thorp	1190
Team #8	Competition Plus	Associated RC500	1166
Team #9	Ranch Rats	Associated RC500	910

could be started. For 2 weeks the weather had been in the 70's. But today it was in the 50's with a solid black cloud layer. It wasn't raining, but it looked like it could pour at any minute.

Nine a.m. starting time. The race started at exactly 9 a.m., with or without you. In our case, it was without us, because it was so cold the motor wouldn't stay lit. Curtis Husting jumped into the lead with the #1 car, closely followed by Arturo Carbonell in the #4 car. After three minutes, Art was sitting right on Curtis' tail so Curtis moved over and let Art take the lead. Curtis has won enough of these Enduro's to know the race isn't won in the first couple of minutes. It's more important to save

the car. Team #2 finally got running, and at the 5 minute mark Ralph Burch Jr. took over the lead, with Curtis in 2nd and Arturo 3rd, and all on the same lap.

At the 30 minute mark, Ralph, Art and Curtis were all still within one lap of each other. At 37 minutes Art pitted for tires. At 38 minutes Ralph pitted for tires, but held onto the lead, with Curtis back in 2nd but within a few minutes Curtis was in the pits with a blown servo which took 9 minutes to replace, dropping them to last place. The Ranch Pit Shop team took over 3rd place with a tough battle from the Thorp team.

At the end of the 1st hour, Ralph had built up a 7 lap lead over Arturo, so Ralph handed the transmitter over to

Mike Lavacot. Arturo handed his transmitter to Chuck Wiggins and Losi Sr. gave his to Losi Jr. Lavacot, being a 1/12 driver, wasn't used to pushing the brakes on at the end of the straightaway, but he still managed to increase the lead to 8 laps at the end of his turn. All the cars were still running very strong.

Rich Lee then took over from Lavacot with Paul Dionne replacing Wiggins and Robert Cavasos replacing Losi Jr. It looked like one of these three cars were the ones with the best chance. Bill Jianas had taken over the driving from Rick Davis in the #1 car and was making up a lot of time, but then they lost another servo dropping them further behind again.

I told the following story before, but not everyone paid attention, so I'm going to tell it again. At the last 24 hour enduro race in Miami, the race was 20 hours old before they'd let me drive. By this time they were over 200 laps ahead and they were all dead tired from driving through the night. I, of course, had slept through the night and felt fine. So it was finally my turn to drive. Curtis handed me the transmitter and said, "There's no power, there's no brakes and the car

understeers. Don't complain — just drive!" He was right. The car sure didn't feel like my own race car. It didn't have any power, it didn't have any brakes and it didn't have enough steering. But for some reason, I was easily able to pass all the other cars on the track. The way the car was, it was certainly easy to drive, so why change it? So I didn't complain, I just drove it and we won.

Now comes the reason for the story. After 3 hours and 15 minutes here, Ralph was leading in the #2 car with Tom Wong now driving the #4 car. This is the car Arturo, Wiggins and Dionne had driven. They had all gone quite fast and were in 2nd place, with a good chance to win. Wong made one lap and pulled in the pits and said he needed more brakes. He then made his 2nd lap and pulled in the pits and asked for more brakes yet. His next lap he punched around the sweeper, started to drift out to the boards, and for some unknown reason he didn't back off the throttle. He brushed the outside walls and promptly tore the left front and rear suspension off the car! Enduro racing is a team event and trying to be an individual star simply doesn't work. All of Art's, Dionne's and Wiggin's fine efforts were wasted.

Before we let Lavacot and Neisinger drive, I told them we didn't want them going 100% — 90% would do just fine. I told them only use 1/2 throttle in the sweepers, even though the car would go punched around. But punching the sweepers also wore out the tires twice as fast. Take your time in passing cars. Telling a couple fast drivers like Lavacot and Neisinger to slow down isn't what they want to hear. I told them don't impress us with your speed, but do impress us with your smooth driving. They're both smart

drivers and they understood what I was trying to tell them. They certainly did a great job.

By the time the #4 Delta team repaired their car and got back on the track, they were within 15 laps of the #1 Associated team. So they had a good race going on. The #7 Outlaw R/C Team and Thorp's team had their own private race, but Thorp's car started having fuel problems and dropped further behind.

The #2 team had a 50 lap lead over the #3 Ranch Pit Shop team at 6 hours. Curtis, in the #1 car, was racing with Art in the #4 car trying to make up laps, then Art blew a motor and Curtis took over 3rd place.

I got to drive about the 8 hour mark. The car felt good. It felt about like a super stock car to me, but we were still gaining laps, so I guess we were okay. I must not have done too bad because they let me drive for 45 minutes. Losi started slowing down, and they later found out one of the suspension pins had worked its way out.

One of the incredible things that happened was that on this cold dark day there was a solid group of spectators who stayed throughout the whole race, thanks to the super announcing job of Frank Killam and Larry Stanclift. They were unreal!

Then at 9 hours and 8 minutes it finally started to rain and the race was called. At this time all nine cars were still on the track running! That in itself is unbelievable! All the teams should be congratulated for a super effort.

#### How To Set Up the New RC12i Front End

This is a true independent front suspension system featuring unequal length arms, fully adjustable castor, camber, toe-in, ride height dampening



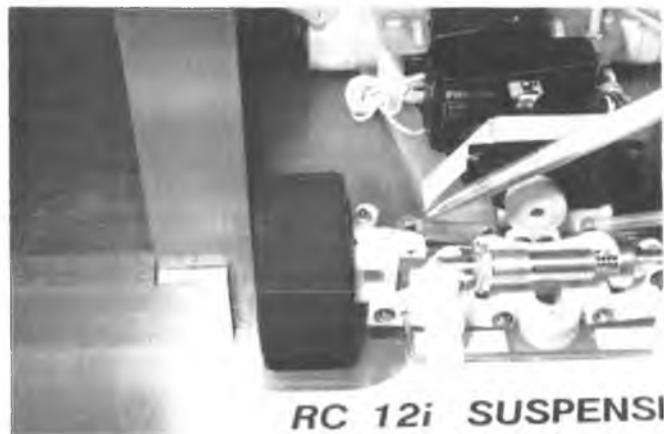
*Tune-up tips on Associated's new fully independent front suspension will be covered here.*

and springing. Similar systems are used on 1/8 gas cars. Various type independent suspensions have been tried on 1/12 cars without too much success before. But Associated's new #4210 front end is already a proven winner having placed 1st, 2nd and 4th at the Indoor Championships in Cleveland on carpet, and winning both classes at the 1984 Florida Winternationals as well as Top Qualifier.

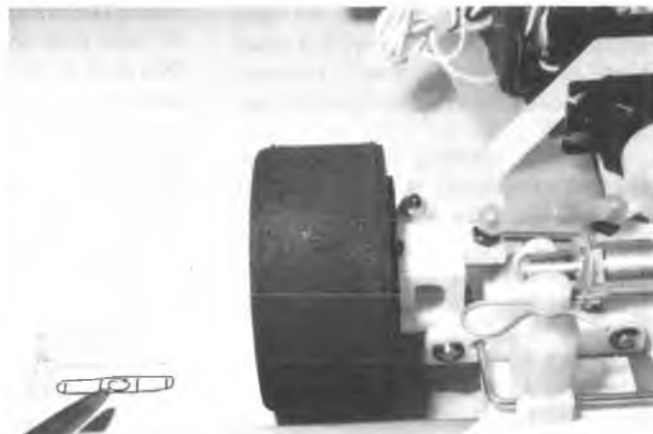
I'm not going to go over all the assembly points here, because these are covered very well in the complete assembly instructions and photos with the kit. What I do want to cover is what we've learned on how to tune this new front end. To begin with, I'd like to impress on you how important it is to follow the instructions exactly. They're written for your benefit. If you think you have some different ideas on set-up, you'll never know if they're an improvement or not, unless you start with the stock set-up first.

Do not try to lower the steering servo by moving the tie rods to the top of the servo. This will induce severe bump steer and make the car difficult to drive.

Do not try to use lock to lock steering. Cut your steering down with



*The camber can be adjusted by changing the length of the upper strut. With the correct camber adjustment, the tires will wear perfectly flat. The tires will also last much longer.*



*The tweak of the car is very important and can be set best with a tweak plate. This should be checked before every race if you want to do your very best.*

your rate trim. You will also probably have to stop running green dot front tires and use super soft or S-K front tires.

The tweak of the car is set best with a tweak plate. If you do not have a tweak plate the next best way to check tweak is to set the car on a flat surface. Lift the front end 2" off the surface and let it drop. Now at the back end of the car, very slowly lift the chassis exactly in the center, between the two rear tires, with the edge of an X-Acto knife. Check to see if both rear tires lift at exactly the same time. If one rear tire lifts before the other one, then the car is tweaked. Check the front anti-roll bar first. If it is still flat, then the tweak condition is probably in the rear of the car. Loosen the rear block screws and radio tray screws and readjust until the car is tweaked flat. You will not be able to go really fast unless the car is tweaked flat.

This front suspension keeps the tires in full contact with the pavement much more than the older type suspensions. It also stops vibrations from being transmitted from the front end of the car to the rear end, thereby helping to improve the efficiency of the rear traction. You'll want one of these.



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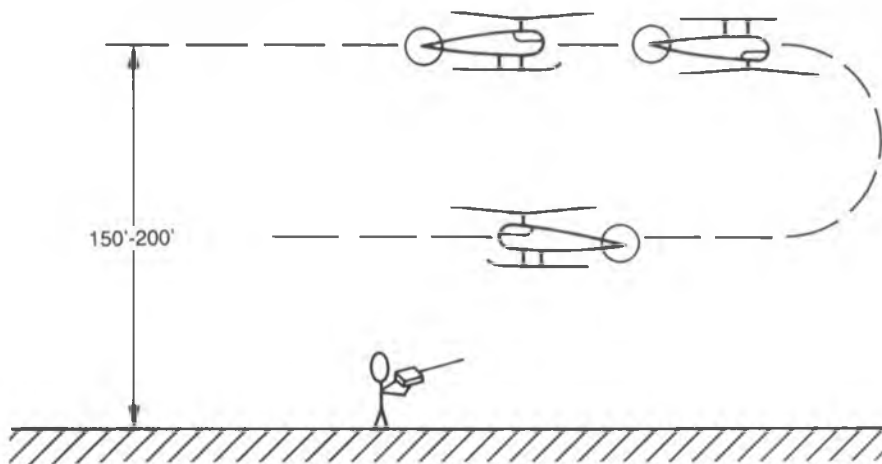
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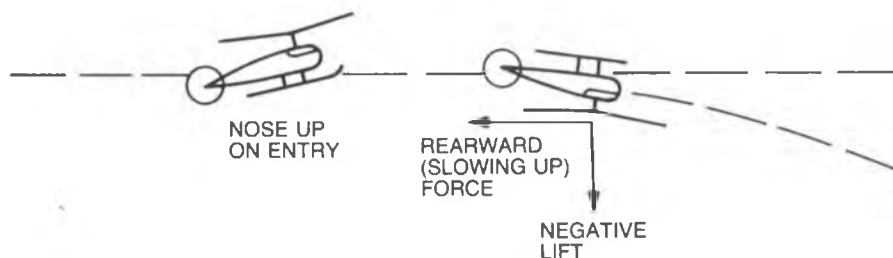
**W**ell, since writing the last column, I have "experienced" Toledo again — it certainly is an experience every year to be surrounded by so many people from all over the world representing or looking at the various products we use in our hobby. To give you an idea of the "strain" of it all, however, this year a badge maker was selling "I survived Toledo 1984" buttons. They sold out! Despite all that, Toledo 1984 was well-worth attending, as usual, and I did enjoy meeting many of you there. 'Till next year!

### 1984 ANNUAL WEST COAST R/C HELICOPTER FLY-IN

Here's another reminder about the 1984 Annual West Coast R/C Helicopter Fly-In. The Merced County Radio Control Club is very determined to make this the best event we've ever had and to top the wonderful organization they had last year. On my part I plan to support this meeting as much as I'm able and certainly plan to attend. So, just to repeat, the date and venue, it's on September 29 and 30, 1984, and the place is Merced, California (just a little southeast of San Francisco). It's very definitely a fun fly encouraging all the country's and even world's best fliers to attend, so do come along and if you have any questions, call Chuck Winter (who is the organizer). His telephone number during the day at his store, The Hobby Castle, is (209) 723-6662. Remember



**FIGURE 1  
SPLIT 'S' ESCAPE ROUTE**

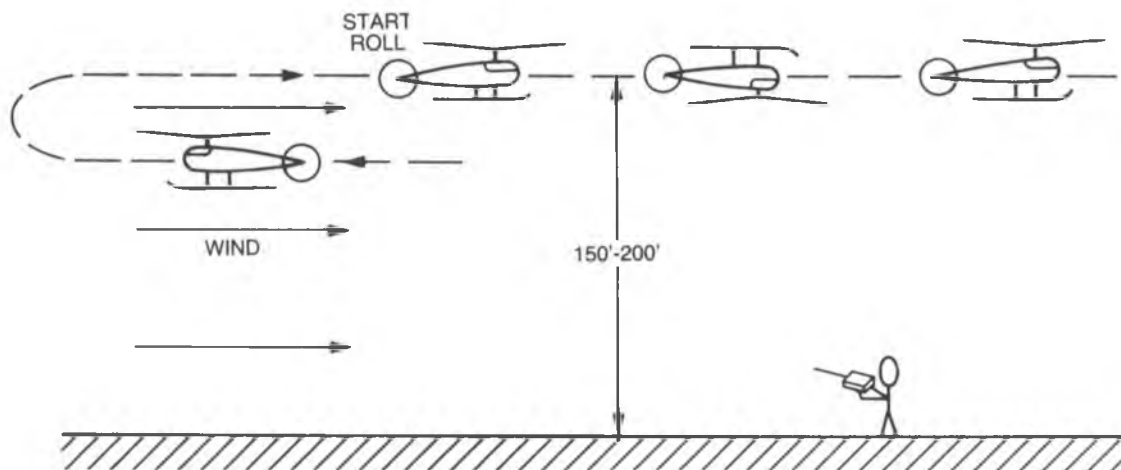


**FIGURE 2  
DON'T 'NOSE-UP' ON ENTRY  
INTO ROLL**

that the meet will cover two days of fun fly and get-together to permit all "heli-nuts" to meet the experts. They can watch some fantastic flying and learn from each other and whoever they can persuade to "give them a hand," or just sit and chat.

### ROLLING A HELICOPTER

Last month we discussed a simple technique for trying your first loop with a helicopter. I've had some feedback that this has worked for quite a number of people and has helped them to overcome the initial



**FIGURE 3  
ROLL DOWNWIND**

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fear of trying their first loop. You may remember that I suggested that you should ease pulling back on cyclic pitch and fly your helicopter into a vertical climb and then a little more over onto its back. At that point, start your loop. It has been pointed out by some fliers that I suggest, as an alternative, that you pretend that you are going to do a stall turn. Then, keep going and exceed the vertical climb to go slightly on your back before really starting to do your loop. I'm sure that either way would work. The main purpose of either of these suggestions

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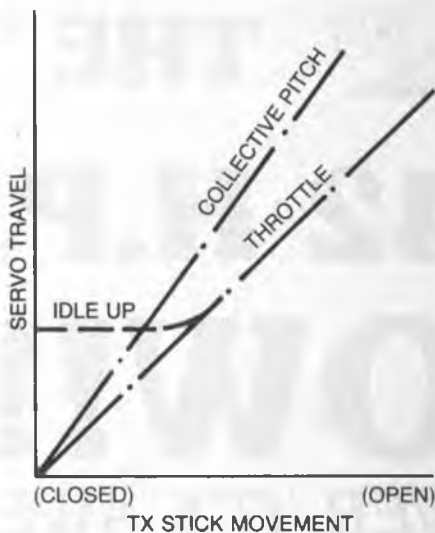
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is to prevent you from putting on too much "nose up" cyclic pitch at the beginning of the maneuvers which can kill much of your airspeed, with the result that you finish up with insufficient speed or control to complete your loop. Now, let's get on to the roll.

**The Preliminaries of a Roll**

First, make sure you own a helicopter that will roll. That is, that you are sure that it has been rolled by average fliers before without any special modifications to the 'chopper. Most of the model helicopters available today, however, will roll and roll well as long as they are set up correctly.

Next, make sure that the set-up of your controls is correct. You should have a swashplate movement in the roll axis of a least 12° to 15° in either direction. Another good check is that your paddles should move plus or minus 20° to 25° when you apply a roll input to the swashplate and the flybar is in the maximum movement position.

**Enough Engine and Control Power**

One very important factor is to be sure that your helicopter has enough power and that the engine is adjusted properly. Please don't try to roll an underpowered helicopter or one which suffers from a low power level because of an incorrectly set needle valve. To roll a helicopter you must have adequate engine power to obtain the forward speed necessary. Remember that your helicopter is not being pulled forward by a prop (like an airplane) and that the inertia of a higher speed at the beginning of a roll will help to insure that you have

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enough control right through the maneuver.

Hover your helicopter and check that when you move your roll stick quickly in either direction, the helicopter gives a positive reaction in roll either way. Also check that there is a good reaction in pitch (that is, fore and aft). You'll see the reason for this later.

**Escape Route**

Now, since if a roll goes wrong you have to have a "way out," clear in your mind, I suggest that you try the **continued on page 150**

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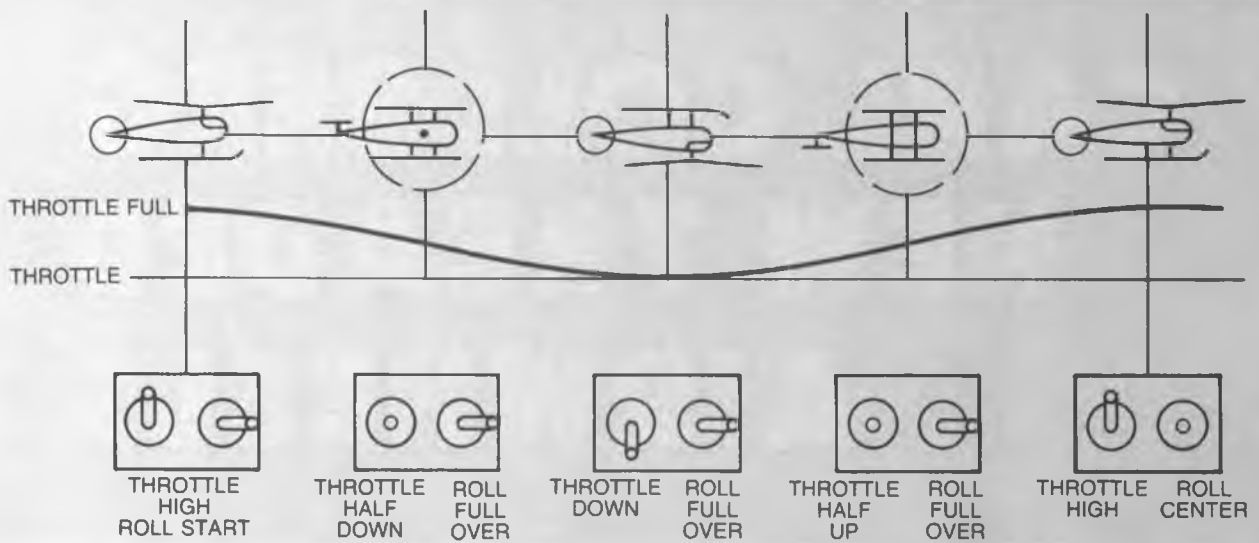


FIGURE 4  
USE OF THROTTLE IN ROLL

following maneuver before you commence rolling your helicopter. Let's get up to about 150' to 200' of altitude, fly upwind for as far as its safe for you to see the helicopter, then turn back and get a good fast forward speed going downwind. By the way, the reason for rolling downwind has really nothing to do with the effect of wind on the helicopter. It's simply that a roll downwind stretches out the length of the roll with respect to the ground so that the roll looks better.

Now, just after the helicopter passes you, pull the nose up *very* slightly and roll the helicopter with the roll cyclic stick (to the right seems easiest and most natural to me). When the helicopter is on its back, release the roll input first and then concentrate on fore and aft cyclic. Pull back on fore and aft cyclic and do the second half of a loop. You will then recover to forward flight flying in the opposite direction (see Figure 1). This maneuver is called a "Split S" and it's useful to know how to do this maneuver since it's the safest way to "chicken" out of a roll which has gone wrong half way through. Practice the "Split S" a few times, until you are sure that if you do get into trouble while upside down, you know how to get out of it.

#### Last "Rites"

Now, before we go into the roll itself we should discuss a feature of the modern radios called "high idle." In my May, 1984, column I described the "high idle" function and we repeat the sketch that was published then for

your reference this month. As you will see, the high idle mode enables you to pull back on the throttle/collective pitch transmitter lever and, while the pitch of your main rotor blades will reduce (or even go to negative), the throttle setting of your engine will never go below about one half power. Because of this, the rotor head speed is maintained at the lower throttle lever settings and this ensures good cyclic control. In actual fact, a high idle setting which is used for normal flying is usually too low for the high idle which is best for rolling. The new Futaba radio has dual setting high idles — high idle 1 and high idle 2. High idle 1 can be set to be optimum for normal flying, and high idle 2 can be set for any special maneuvers such as the roll. The setting on your high idle should be such that your blade speed is just about what it would be on lift off and won't reduce below this when you drop your throttle lever. Another useful check for a correct high idle setting is when you pull back on the power to come in for the approach. The rotor blades should not overspeed any significant amount. Some of the expert fliers switch high idle in and keep it in throughout the whole flight.

Now don't get me wrong, you can certainly roll a helicopter well without high idle. It's just that if you have it, it will improve your rolls even more. If you don't have it, you don't have to go out and buy a new radio. We've been rolling helicopters for many years now without the high idle function.

Now an old flying buddy of mine, Bill Curtis, has suggested that the following be placed in the column concerning doing your first roll. He recommends that before you go out to try, you practice the stick movements and visualize the flight response in your mind. Visualize also what you will do if things go wrong — such as a fast "Split S." Seems a good idea to me. Thanks, Bill, for that tip.

#### Let's Roll

Fly upwind to the point where you can turn and get a good straight run downwind past you at about 150' to 200' altitude. First I must tell you something which, with me at least, "went against the grain" considerably when it was told to me. **Don't** pull the nose of the helicopter up as you enter a roll. You only have to think about this for a moment to realize that as soon as you get upside down your nose-up will become nose-down and will make it much more difficult to complete the roll (see Figure 2). So, however much you feel that it's going to help you, try **not** to pull up the nose any significant amount. The other thing that pulling up the nose tends to do is to kill the helicopter's forward speed, which we certainly do not want to do.

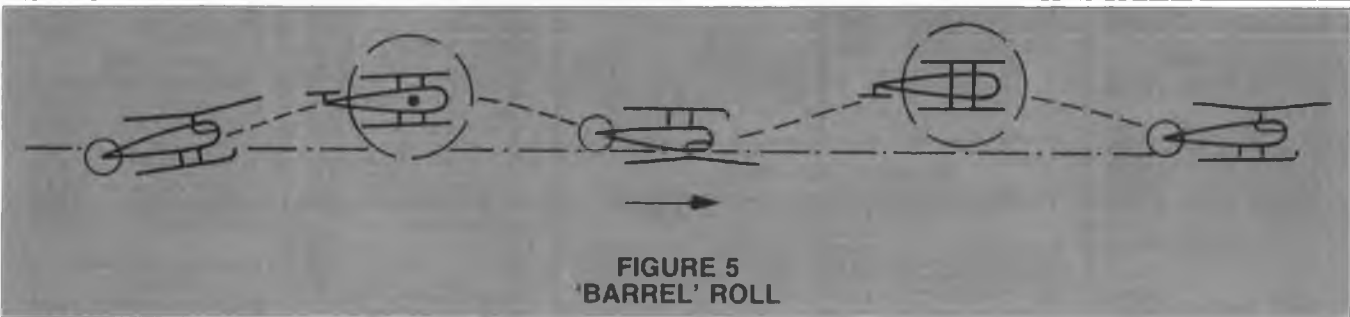
Finally, there is one more thing that we ought at least to consider before we attempt our first roll even though you may not use this technique at the very beginning. This final technique is to move the throttle lever down towards "engine idle" position as you go through your roll and bring it back up to the "full power" position as you

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come out. Figure 4 will show you the sequence in which this should be done. The whole idea is that while you are upside down you want as little negative lift as possible.

Now we'll try the roll. Let's do the same thing as we did for the "Split S." Make sure the engine is running right and we have enough movement in the swashplate. As we fly downwind after our upwind turn, we will commence our maneuver just before reaching the point of flight in front of us. Enter the roll by applying roll cyclic stick and, as we start our roll, try to remember to pull the throttle lever back down to a low (zero or near zero) setting (see Figure 4). As the helicopter is upside down we continue the roll input, leaving the pitch control alone (if we can do it!) and, as the helicopter starts

to come the right way up again, increase power to the level it was when we entered the roll. Of course, if you have the "high idle" facility this provides for very effective rolls since our engine power will be maintained while the blade pitch will be reduced considerably. This means that the roll input becomes more effective because the high blade speed negative lift is reduced considerably. In fact, using high idle properly, the helicopter can actually gain altitude during a roll.

**After the Roll**

Well, as you come out of the roll and take a deep breath and enjoy the congratulations of your friends, please don't forget that you're still flying a helicopter and make sure that you do that turn back into the wind before it goes too far for you to see it. I hope that

you'll now be able to have a go at the roll and not be too scared of it. It is one of the harder maneuvers to do but, at least if you've learned to do a "Split S," you can always "chicken out" half way through.

One last point. Normally rolls are conducted with helicopters having collective pitch and this certainly makes the roll maneuver easier to do. Don't overlook the fact, however, that a well set-up fixed pitch helicopter can, and will, roll and roll quite nicely. The only difference being that it is better to purposely do a slight barrel roll (see Figure 5) with a fixed pitch helicopter in order to allow the rotor speed to be maintained and not lose control power while the helicopter is upside down. Once the rotor blade

**continued on page 219**

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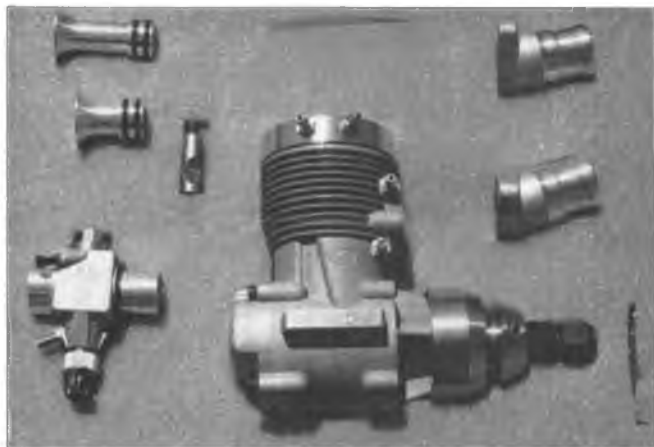
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1. K & B .67 as shipped.



2. Major components disassembled.

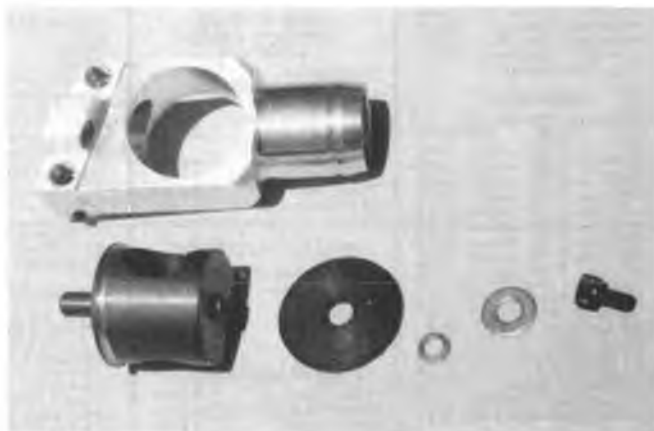
**A**s most of you probably know by now the K & B .67 is on your dealer's shelf. The motor was released early in September, 1983. This offering from K & B (12152 Woodruff Ave., Downey, California 90241) is the most impressive we have seen from them in a long time. Photo 1 shows what you see when you open up the shipping

box. The motor is packed in a foam rubber block for protection. As standard equipment, the motor comes with a carburetor, two exhaust stubs (one at 12° for hydros and another with an angle of 20° for deep vees), and two lengths of draw tubes that insert into the carb. The motor is set up for marine operation having a water cooled head, water passages to cool the

exhaust side of the case, a brass flywheel and a clamping collet flex cable nut. In short, you should not have to buy anything except a pipe and coupler to race this engine. Although it might be hard to tell from the photos, the machine work is the best we have ever seen coming out of the K & B factory. They have purchased the latest computer



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numerical control machining equipment that makes it possible for them to put out a product that matches or exceeds the best engine manufacturers in the world. The fits and finish of this motor are very impressive.

Photo 2 shows the major engine parts disassembled. The motor case should be very strong because it is made from an investment casting and seems to be glass beaded on the outside. Other engines in the K & B line have die-cast cases which are weaker than those made from an investment casting. The bearings are supported in the case without using the normal separate front plate casting. This increases rigidity in this critical area. The K & B is the only production motor of its size with this important feature. The bearings are supplied with plastic retainers that are capable of withstanding rotational speeds approaching 30,000 rpm. The balls in these bearings are smaller than those used in most of the other 65's on the market. This could reduce their life expectancy. Only time will tell. The case has steel inserts mounted in the exhaust flange. This is a really nice feature which will stop the normal thread stripping in this hot area. The case has two water passages on the exhaust flange to keep this part of the case cool and to reduce liner distortion at the exhaust port. The mounting lugs are drilled to accept 6-32 mounting bolts. It is my opinion that this size mounting bolt is too small to harness any racing 11cc motor. I would suggest that the mounting holes be drilled out to accept 8-32 bolts. K & B has picked their own mounting hole pattern so we all will have to change our motor mounts to try the motor in present hulls.

The crankshaft is massive, heavily counterbalanced, and is a full circle type. K & B uses an unhardened crankshaft that is fit tightly to the inside races of the bearings. Most other manufacturers use a hardened crankshaft that has a very light push fit in the bearings. We prefer the light push fit method because the crank can be easily removed for routine inspection of the bearings and crankshaft. The racer should frequently check the crankshaft for scratches which indicate the bearings are getting too sloppy. When the K & B plastic retainer bearings are used, the keepers can be easily removed and the bearing races can be

**continued on page 158**



Our 32-pound SIXTY is a really impressive 12-Meter lookalike with a scale 2100-square-inch rig on an 80-inch aluminum mast. We designed the Sixty for 3-channel radio control, with our SC-3 and SC-4 electric winches trimming the main and jib. The Sixty kit includes a magnificent 60-inch fiberglass hull with deck installed, 19 pounds of ballast castings, finished sails and spars, and lots of stainless steel hardware. Kit price is \$750, and the SC-3 and SC-4 systems add another \$333. To order, get more information, or preview the Sixty plans, give us a call!



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Dear Sig Mfg. Co.,

Enclosed please find pictures of my new Twin Kobra which I made from two of your terrific Sig Kobra kits. Having two good .40's available from a previous ill-fated twin engine and having been inspired by Col. Art Johnson's article (August, 1982 RC Modeler) on his Twin Kougar, I bought two Kobra kits and went to work.

The two H.B. .40 PDP's are large for .40-sized engines, but fit in the Kobra cowlings without any problems. Those H.B.'s are also pretty heavy and having read Col. Johnson's comment that this type of aircraft has a tendency to be nose heavy anyway, I was worried that I was going to have real C.G. problems requiring a lot of ballast. I built my tail feathers heavy and located my radio components as aft as possible and the finished craft balanced only 1/2" forward of the C.G. location shown on the plans. I added no extra weight and it flies superb.

With those two H.B.'s turning 9 x 7's at 14,500 r.p.m.'s, the flight performance of this bird is phenomenal. I'm sure it will keep up with the fastest pattern ship around and maybe even pass it up when going straight up. I was worried about its landing speed because of the high wing loading, but she slows down real nice with no tendency to stall at all. This twin actually lands slower than my .60-powered Kougar.

This project has turned out to be one of the most rewarding experiences of my seven years in R.C. flying. I'm planning on flying this bird in a couple of local pattern contests this year in Sportsman class. She'll do all those aerobatics without a hitch, and of course look and sound very impressive at the same time.

Last weekend I had another successful flying session with the Twin Kobra and really put it through its paces. One of the things I did that really looks impressive was to point her straight up and then do a series of very quick and violent snap rolls. Everyone who has seen it has been quite amazed. I also love to do a high split S on the upwind side of the field, pull it out of a howling dive into a low pass across the field, downwind. The little bird really boogies!

The Sig Kobra is a fantastic kit that is easy to build and very exciting to fly. I'm building another Kobra (single) with a piped O.S. .40 ABC to use in combat flying this season. Last year I used my Kougar with good results. I expect the Kobra may do even better.

Thank you for a quality kit of a well-designed and engineered airplane. You've made me a real Sig fan.

Sincerely, *Terry Miller*

Terry Miller  
Allen, Texas

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*(NOTE FROM SIG B & D: We would think that the Twin Kobra would also do OK with .25 or .30 cu. in. engines. It should be lively enough with the smaller engines and the nose heavy matter would be easier to manage. Kobra fuselage kits, canopies, etc. are listed in the Sig catalog.)*

## SOUTH AFRICA KOUGARARS

Dear SIG,

The enclosed photos, show two Kougars both of which I built, owned by Jack Gregory (No. 1) and myself (No. 2). We are both members of the local club, Benoni Radio Flyers. Jack spent a lot of time as my instructor and I was only too glad to be able to repay this kindness by building a kit which he "never got 'round to".

Both are finished to the SIG team colors with your decal sheets and are fitted with Webra ABC motors, No. 1 with a .60 and No. 2 with a .40. Jack's model is numbered in cognisance of his superior flying abilities and has logged some 100 flights. This is a beautiful plane and a very precise flyer. I found the kits to be of excellent quality and very easy to build. Many thanks for your excellent products.

Yours sincerely, *Steve D. Spratley*

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inspected for damage. If the balls are worn they can be easily replaced with new balls available at any bearing shop. These procedures keep your motor running at peak performance and greatly increase reliability. The tight fitted crankshaft makes this routine maintenance much harder to do properly. If the bearings are improperly positioned on the crankshaft when it is replaced after maintenance, a bind will result when the aluminum front plate gets warm when running and expands along the axis of the crank. The loose fit crankshaft system takes care of this growth automatically because the slip bearing fit adjusts to keep the bearing thrust load to a minimum.

The crankpin is hollow and has a large diameter for strength. The crank has a 1/4-28 stud to accept the cable nut which holds the brass flywheel on the normal split tapered collet. An optional lightweight aluminum flywheel is also available for this motor.

The piston and liner set-up is the normal ABC type. The bore of my motor was 0.958". Its stroke was measured to be 0.917" which results in a calculated displacement of 0.661 cubic inches. The liner has twin exhaust port windows that provide for a 178° total open duration. At the top outside corner of each exhaust port is a notch which effectively widens the exhaust port above the transfer port and helps scavenge the cylinder better. On either side of the exhaust ports are bypass ports which open for a total duration of 122°. Opposite the exhaust ports are twin boost ports which have a total duration of 120°. The liner has a tapered bottom edge to efficiently direct the flow from the bottom of the crankcase to the case passages with as little disturbance as

possible. The very high silicone content piston has a good fit in the liner. The piston material is not like any we have seen used in this area before. It has a heterogeneous texture that shows the silicone particles that are mixed in the aluminum base metal. The hollow wrist pin has its exhaust side end closed. The spring steel wrist pin keepers are easily removable because the piston has a cut in it to allow you to easily pry out the keeper. The rod is very strong and is glass-beaded for strength. Do not polish this rod. The rod has a brass bushing and a single oil hole for lubrication on each end. The head assembly has two pieces. The head button is held in the liner by six screws that pass through the water cooled cap. The combustion chamber has its volume sized for 50% to 60% nitro fuel. The head clearance on my engine was .012". K & B supplies extra head gaskets so that you can adjust the head clearance to fit your needs.

Photo 3 shows the induction system which uses the normal disk rotary valve. The rotor valve is machined



6. Power Products' waterproof pushrod assembly.

from steel and has its face hard chromed. The rotor timing was measured to open at 35° ABDC and closes at 60° ATDC for a total open duration of 205°. Since the photo was taken K & B has added a large O ring to seal the back door assembly to the case. This action was taken after they noticed movement of the backplate with respect to the case after running the motors a few hours. The O ring



7. Typical pushrod seal mounting system for outboards.

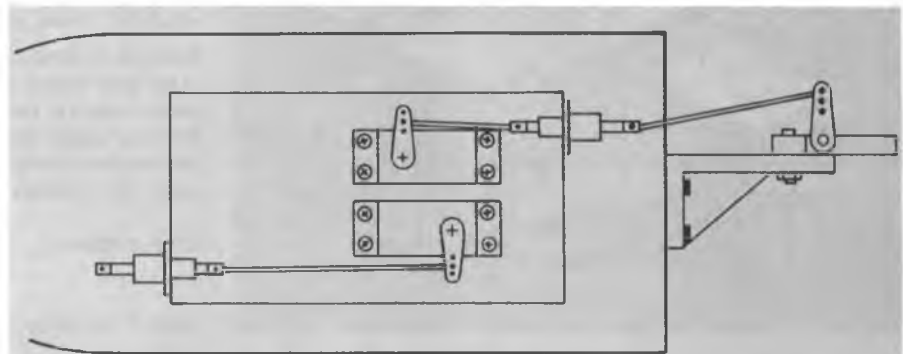


FIGURE 1  
RADIO BOX PUSHROD INSTALLATION  
FOR MONOS AND HYDROS

seals the case pressure and reduces working between these case parts.

A twin needle carb is supplied with the engine. It has a .405" bore and a stem OD of .622". It is unique in that two intake draw tubes are supplied to tune the intake tract. These intake tubes have twin O rings which seal the tube into the carb body. The high speed needle valve is massive enough to take the vibration level of these big motors. The finger tightening needle valve locking system has proven to be very convenient. This carb has all the right stuff! I would, however, change the control arm. I'm sure that this will prove to be too fragile and will, with time, break due to vibration. If this occurs the carb spring will let the barrel open and a run-away might result. I have replaced my arm with one off of the Rossi 80 carb. The Rossi control arm is twice as thick as the K & B arm and we have never had a breakage problem with it. I'm sure that if a breakage problem does prove to exist, K & B will take care of it. In the meantime, I'd rather be safe than sorry.

We were lucky enough to get one of the first few engines off the assembly line. We quickly mounted it in our Marlin outrigger and in our Muck Super Streaker deep vee for testing. Initial tests proved that the motor was capable of making more power than any other similarly sized motor we had used to date. We found after trying many set-ups that the Muck (6003 Daven Oaks Dr., Dallas, Texas 75248) 10cc pipe and the Prather (1600 Ravena Ave., Westminster, California 90744) 11cc pipe work best with this engine. The motor does not respond well to the larger volume pipes we have used on other 11cc motors in the past. We also found that a much shorter than recommended pipe length suited our hulls. We now use the 11cc Prather pipe at a pipe length of 9" (measured from the liner exhaust port opening to the end of the diverging cone) on our monoplane and a length of 9½" for our hydros. This pipe length gave a solid 25,000 revs with an X450 prop on the mono and the same revs with a 1465 prop on the hydro. We sure had a world beater on our hands.

Unfortunately, our enthusiasm was short lived. After about six to ten runs our motors self destructed. It became evident that the pistons were growing as they heated up and were sticking in the liners. This grabbing usually resulted in the wrist pin bosses being

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pulled out of the piston. This tendency was aggravated by the fact that the ends of the wrist pin were directly in line with the inner diameter of the piston skirt. As a result the bosses were too weak to take much piston grabbing and they failed. After trying all types of heat treating we could not keep the piston from growing so we notified K & B of our problems and put the motors on the shelf until they could come up with a solution.

In a few weeks John Brodbeck called with the answer.

The foundry that had made the pistons had used a material with excessive zinc content. New pistons were made of the right material and in a few weeks we were able to test the new pistons. After the change we have had no piston sticking. The motors have had no major mechanical failures since we installed the new

parts.

If you have one of the first run of engines you should contact K & B to see if you have an engine with the old piston. If you do, I'm sure that they will replace it with the new piston.

In all this testing we have had only one other small problem. The carb barrel stop screw is evidently too hard because it shears off due to vibration after some running time. The solution is simple, however. Bruce Kaiser of Aptos, California, suggested the use of an ordinary 4-40 cap head screw as a replacement stop screw. You will have to grind off the threads of the bolt about 1/4" from the end so that it looks like the original part. After this was done no further failures have occurred. We like the motor and feel that this latest offering from K & B should prove to be very popular with competitive boaters. The sport boater



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can also use the motor easily since its total system packaging concept and excellent carburetor speed control makes this a very easily handled power house.

Photo 4 shows a new offering from Freedom Boats Inc., (P.O. Box 1475, Corona, California 91720). This exhaust throttle for the K & B 3.5 inboard marine engine is water cooled for long pipe coupler life. It is machined from aluminum bar stock. The throttle barrel fits perfectly and is made from brass so that it will not stick in the aluminum housing when

it gets hot. The design is simple and the throttle works much better than the stock butterfly valve supplied with the engine. We definitely recommend the use of a barrel-type throttle because of its long lasting seal that results in reliable throttle operation. This throttle retails for \$29.95. Freedom Boats also makes exhaust throttles for all the marine engines made by Rossi, Picco, K & B, O.S. and OPS. If you need a source for exhaust throttles, contact the folks at Freedom Boats.

Photo 5 shows the Freedom Boats clamping control arm. This arm is also machined from bar stock for superior strength. The cap head locking screw threads into one side of the clamp. Tightening this bolt squeezes the sides together and tightly holds the control arm to the rudder or throttle shaft. We have used these arms and find them to work very well.

Also on the new product front, Power Products (766 Broadway, Seaside, California 93955) has released their waterproof radio box pushrods. Photo 6 shows the construction. A glass fiber filled nylon mounting block is used to hold a 3/16"

ID brass tubing housing. Inside the housing a stainless steel pushrod slides to transmit servo motion. The pushrod is 3/16" in diameter and is strong enough for any model boat on the water. The pushrod is machined and drilled on both ends for ease of installation. After the mounting block is silicone glued and screwed to a bulkhead, the pushrod is greased with Sta-Lube waterproof wheel bearing grease to form a waterproof seal. Two complete pushrod assemblies retail for \$10.95. All Power Products are guaranteed and available at your local hobby shop.

Photo 6 shows these pushrod seals installed as they would be used on a typical outboard boat. The servo arm is connected to each of the pushrods using 1/16" piano wire. A Z bend is used at the servo arm end and a simple right angle bend is used on the other end. SuPrLine plastic swing-in keepers are used to lock the piano wire to the pushrod end. The result is a bind-free push-pull system that exits the radio box compartment. Two more 1/16" diameter piano wire linkages (not shown) are connected to a double ended control arm on the outboard

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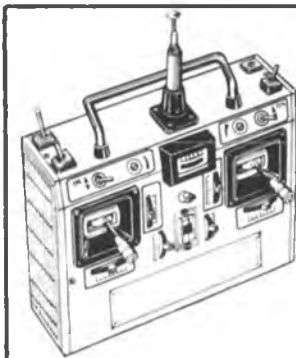
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engine. This system pulls on one side of the engine when turning right or left. The result is precise steering.

The figure shows a typical radio box installation. A single pushrod assembly is used for throttle and another for rudder control. When a single pushrod is used on a rudder, be sure to mount the control arm so that you pull for a right turn. Pushing on the 1/16" wire control linkage can cause buckling if it is very long. This buckling may produce reduced control effectiveness. The linkage does not need to be adjustable. The rudder should be in neutral when the transmitter stick and rudder trim is centered. If the boat does not go in a straight line with this setting you should adjust hull components until it does. The boat should track straight with neutral rudder or you have something that is not correct.

★

I received the following letter from Larry Green who owns a True Value Hardware Store in the Los Angeles area. He is a local boater who has discovered and used with success a removable silicone sealer that may be useful in sealing out water from radio

boxes. He sent a sample and this stuff is great. His letter tells the whole story.

Dear Howard,

*Please find enclosed a sample of a silicone type sealant. I have a hardware lumber supply store and sell this product as a removable sealant where items need to be disassembled. I've found it to be an excellent product for sealing radio boxes. I've tried many types of all kinds, Vaseline, etc., but have found this far superior to anything else. The product is made by Scott-Page Inc. (Box 447, Ridgewood, New Jersey 07451) and sold under the name "Easy" Weather Stripper, Removable Clear Sealant. It's in a pressurized can that will lay 50' of 3/16" bead, fills 3/8" gaps, skins over in 10 minutes and completely cures in 8 hours (although I've used it immediately in water and have had no leaks). It provides enough adhesion so you don't need hold-down screws, but can be easily pried off and removed in a string-like piece.*

*The can retails for approximately \$6.00 and should be available at hardware and paint stores. Its been on the market for two years as close as I*

can remember.

*You might like to mention the product in your column. My friends have also found it to be a better product than tapes and greases, etc. I have used it on R/C car boxes also.*

*If readers can't find it in their area they can call me and I can probably arrange to send them one.*

Larry Green

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★

Well, that about does it for another month. Send your questions, comments etc., to the address at the end of this column. If you desire an answer before magazine publication, enclose a stamped self-addressed envelope. Howard Power, Hobbies Unlimited, 766 Broadway, Seaside, California 93955, (408) 394-1200. □

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# FLY IT AGAIN



By David P. Andersen

"Take-off . . . starting now!" Brian said to the judges.

The shiny red and white Curare waited eagerly at the far end of the runway, its straight wings held out low above its wide but short landing gear, squatting like an eagle about to leap off its nest. Its slender fuselage pointed straight down the runway while the impatient throbbing of its engine told Brian that it wanted to go.

Brian took one last look at the movement of the grass near the other end of the runway. His was the last flight of the round --- and now the wind had rotated to a ninety degree crosswind. He knew that as soon as the plane would lift off the runway it would be blown off course unless he applied just the right amount of left rudder to yaw the plane into the wind.

He had watched most of the other flights of the round. Many of the pilots were unprepared for the wind shear. Too often he had seen an otherwise perfect take-off marred by a turn downwind on lift-off, instinctively corrected with left aileron, and a loss of three points. But Brian had practiced in this kind of crosswind before and he knew how much left rudder to use.

He slowly advanced the throttle, and the Supertigre Bluehead growled to life. A little right rudder compensated for the engine torque as the nosewheel started the plane on a straight heading. Brian decided upon an early lift-off so that the judges would not notice the expected yaw into the wind.

The plane accelerated to flying speed. Brian pulled back on the elevator stick and applied the pre-calculated amount of left rudder. The plane rose and, with only a slight yaw into the wind, proceeded on a straight course, wings steady and

level --- graceful, dignified, and confident.

"Take-off complete," said Brian as he savored the moment. An instant replay flashed through his mind so that he would be sure to remember it later.

Brian flicked the retract switch as he banked into the first turn of a traffic pattern approach. He looked for signs of turbulence in the air and he listened to the sound of the engine. All was ready for the first maneuver.

"First maneuver will be a Figure M with half rolls," announced Brian to the judges seated in lawn chairs immediately to his right.

"Starting now!" he said, concentrating on entering the maneuver with level wings.

The beautiful pattern airplane arched upward. Brian corrected for the wind drift with left rudder again, rolled, then switched to right rudder. He reduced the throttle and rotated through a stall turn with full left rudder. As the plane began its descent, he continued to hold full left rudder in order to offset the crosswind drift, easing off the left rudder as airspeed increased. Rolling through the descending half roll, he switched to right rudder again. The sunburst pattern on the top side of the Curare shown clearly as the plane yawed into the wind. The sunburst changed to a checkboard as the plane recovered inverted and pushed up into the second leg of the M.

Brian thought of his Dad, as his Curare stopped at the top of the M, rotated in place, and dropped with a tiny wiggle of its tail. How proud his Dad would be to see his son fly the Expert pattern, he thought, as the plane did its final roll and recovered to level flight. Too bad Dad never lived to see how far radio control developed and what a proficient flier his son became.

"Next maneuver will be a Cuban 8

--- downwind," Brian proclaimed to the judges as the plane did a Split-S turn-around.

"Starting now."

Brian pulled up as if starting an inside loop, slowly increasing the amount of up elevator as the airspeed slowed in order to form a constant rate of curvature. As the plane came over the top of the loop, he applied the anti-crosswind right rudder again.

Rudder control was the only radio control his Dad ever knew, he thought. How Dad would have enjoyed pattern flying! And what a great team he and his Dad would have been.

Brian hadn't thought of his Dad recently. Why now, of all times, had he been reminded of Dad? Perhaps looking up into the sky at a model airplane and listening to the sound of an engine high overhead brought back the memory --- of the times when Brian was a little boy and he went flying with his Dad.

"Complete" announced Brian as he rounded the bottom of the Cuban 8. He released the up elevator and right rudder to resume level flight. The plane grew smaller as it raced away from its pilot.

"Dad! It's getting awfully far away," he remembered saying to his Dad as they ran to catch up with the free-flight model circling high in the sky.

"When will the motor stop? Will it stop soon, Dad?"

"Pretty soon, I hope . . . I think it's stopped now."

The sun shown through the red and white silkspan as the Buzzard Bombshell ceased its clockwise spiral upward and transitioned into a counter-clockwise glide.

"Next maneuver will be . . ."

Sunlight flashed off the leading edge of the Curare as it turned back toward the center of the field. The plane leveled out above the cornfield far off the end of the runway.

"It's not coming down, son. I think it's in an updraft," Brian recalled his Dad's words --- words and events long forgotten. He remembered how he and his Dad walked through a cornfield, looking for the airplane after a really long flight. He remembered how hungry and sunburned they became, chasing the fly-away airplane.

"There it is. I found it, Dad. It's not broken."

He recalled the odor of banana oil and Comet cement used to repair the wing, and how Mom complained about the smell. He remembered the paper bag in which his Dad kept the rubber bands and the fuel and the starter battery. He remembered a bottle of Lion Brand castor oil on the workbench that was so sticky that balsa dust stuck to it.

"Eight-point roll. Starting now."

The wings ticked across the sky like the hands of a clock, jerking in exact forty-five degree increments. Brian heard the click of a stopwatch as one of the judges timed the roll. Brian counted to eight in a rhythm that he had practiced with his own stopwatch. He had memorized the tempo. The eight-point roll was at count four as the plane passed the center of the runway. Once again Brian heard the click of the judge's stopwatch as he shouted, "Complete."

"How long was that flight, son?," his Dad asked as the Bombshell landed in the hayfield.

Brian looked at his pocket watch.

"Two minutes and twenty seconds," he replied.

He learned from his Dad about lift and drag and pitch and yaw and roll. Dad showed him how the piston compressed the fuel vapor, and how the spark plug ignited it at the top of the stroke. He could hear his Dad's voice explain how the propeller pushed the air backward and the air pushed the propeller forward.

How he missed his Dad! And how he wished that his Dad could share another Buzzard Bombshell flight with his son.

Brian flipped the retract switch as the beautiful Curare banked into the base leg of the landing approach.

"I think we'll get to see it land, Brian," said Dad as he drove the Studebaker along a dusty country road, following the red and white airplane that circled slowly above a pasture. They stopped the car and ran into the field, climbing over a wire fence along the way. They watched the plane's polyhedral wings banking slightly as it descended slowly above the flat green cow pasture. The nose of the plane bobbed gently up and down as it turned slowly in the warm evening sky. Lower and lower it came until it touched the earth and rolled to a stop.

"Landing complete . . . Flight complete. Thank you, gentlemen," said Brian.

"Oh Wow! What a super landing. That was fun. Let's fly it again, Dad," said Brian.

Brian taxied the Curare back to his field box and stopped the engine with the throttle trim lever. He picked up the airplane and carried it back to the spectator area where his flying friends had gathered.

"Pretty good flight, Brian," said one of them. "But I've seen you fly better. You started out well, but the rest of the maneuvers were not your best. How come?"

Brian pulled a handkerchief from his pants pocket and wiped a small tear from the corner of one eye . . .

"I guess I just lost my concentration," he said. □

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# O.S. FS-120 FOUR STROKE

**By Clarence Lee**

Webra, Condor, and Magnum with their single cylinder engines. Knowing that a four stroke model engine develops about two thirds to seventy percent of the power of an equivalent displacement two stroke engine, a .90 size engine would about equal a two stroke .60 in the lower rpm ranges where the four stroke engines are run. When talking power here, we are referring to ounce inches of torque and not necessarily horsepower. Horsepower is a function of torque times rpm and quite often is a deceiving figure. It is torque that turns the propeller, and the rpm at which maximum torque is achieved that is of more importance than the peak horsepower of an engine. So do not be misled by horsepower figures obtained at high rpm — they can be misleading, except in the case of a racing engine operated at high rpm.

By increasing the maximum

**continued on page 172**

*The O.S. FS-120 engine reflects the refinements of years of experience in the four stroke field by O.S.*

**M**r. Shigeo Ogawa of O.S. Engines introduced the world's first quantity produced glow ignition four stroke model engine to the hobby market in 1977. His initial concept was a quiet running engine that could be flown in areas where noise was becoming a serious factor to be contended with. As most of you already know, more and more flying sites are being lost due to the noise factor involved with the conventional two stroke model engine, even when equipped with a muffler. The elimination of noise was Mr. Ogawa's primary concern and the power output secondary. This move took quite a bit of courage at a time when few people saw any need for a four stroke model engine (including myself) and at a time when the other model engine manufacturers were striving to obtain more and more power from their engine designs. I would imagine that even Mr. Ogawa was surprised at the way the four stroke engine movement has taken off with five of the larger model engine manufacturers now producing four stroke engines (O.S., Enya, Saito, Webra, and H.P.), and a considerable number of smaller manufacturers also producing four stroke engines, including Kavan, Condor, and Magnum. The latest word has it that both OPS and Super Tigre will soon be marketing a four stroke engine.

At the December 1982 meeting of the FAI Commission in Paris, the maximum engine size for four stroke model engines was raised to 20cc or

1.22 cubic inches for R/C scale and aerobatic (pattern) aircraft. As of January 1st of this year the AMA followed suit. The FAI decision evidently caught quite a few of the four stroke model engine manufacturers by surprise as many had already marketed, or were in the process of developing, a .80-.90 size engine. This includes Saito with their twin cylinder engines, and O.S., Enya, *The up-draft carburetor has a spring loaded choking device that may be operated from outside the cowling.*





Parts breakdown of the O.S. FS-120. The part in the top center of the photo that looks like a mini-muffler is actually a pressure take-off when attached to the exhaust stack.



The helix gear driven camshaft is supported on each end by husky ball bearings.

allowable engine displacement size to 1.2 cubic inches, four stroke 120 size engines will be developing considerably more power (torque) in their operating range than a .60 size two stroke engine. As an example — the YS-60 reviewed last month developed 118-121 ounce inches of torque in the 9,000-10,000 rpm range. The O.S. FS-120 develops approximately 170-180 ounce inches of torque in the 9,000-10,000 rpm range --- a 50% increase in prop turning torque!

The rule change along with the new "turnaround pattern" opens up a whole new ballgame when it comes to pattern flying and puts new life back into an event that has been running pretty much in a rut for some years now. Many of the top competition fliers are building new aircraft for the 120 size engines and I imagine that there will be a considerable number of new kits for this size aircraft appearing on the model market very shortly. Just as the .60 size two stroke engine has dominated the pattern events for many years now, I would venture a guess that the 120 size four


stroke engines will be the dominant engine in the future. It will be interesting to see at the next Nationals and FAI World Championships how many competitors will be using the 120 size four stroke engine. A considerable number I would be willing to bet — especially at the next World Championships. Rumor has it that Hanno Prettners is working on an aircraft using four stroke engine power.

As in the past with the .60 size two stroke engine, the various four stroke engine manufacturers will be looking for ways to increase the power of their engines, reduce the size and weight, etc., to have an edge over their competition. So the horsepower race is on again getting completely away from Mr. Ogawa's original intention. The 120 size four stroke engines are not exactly quiet but do make a sound far less objectionable than the high pitch whine of a two stroke engine. However, in the quest for power, rpm levels are being raised and, rather than running in the below 10,000 rpm range, many of the newest four stroke engines are turning 10,000-11,000

rpm on the ground and unloading into the 12,000-13,000 rpm range in the air. This is close to what we were running the .60 size two stroke engines only a few years ago.

With the interest in the four stroke engines, and the 120 size in particular, we will be checking out the latest offerings to give you some sort of a comparison. The Saito FA-120 was previously reviewed in the March 1984 issue. As you may have guessed by now, the subject of our review this month will be the O.S. FS-120. If plans go as anticipated, we will be reviewing the Enya 120 in an upcoming issue. As other four stroke engines in this displacement size appear on the market, we will try to review them as well. The Saito, O.S., and Enya are the three more readily available four stroke engines at the time of this writing. Dennis Allen manufactures the Condor 120 in England but the engine is only sold direct and not imported into the U.S. The English Magnum .91, that we reported on in the July 1984 issue, is to be offered in a 120 version using the .91 crankcase and possibly we will be able to review

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this engine in a future issue.

The O.S. FS-120 for our review this month was supplied by John Maloney of World Engines — the U.S. importer. John Maloney should need no introduction to the readers of R/C Modeler as he has been one of the prime advertisers since the magazine's inception. John always presents interesting and informative ads — not just pictures of the product with manufacturer's promo.

I guess I have always been a person who is influenced by first impressions. I have to like the looks or appearance

of a product before I have the desire to investigate it further. Many engine manufacturers do not feel that appearance is as important as how the product performs. If the engine is outstanding in performance it will sell no matter how it looks. This may be true to some extent but many fellows, like myself, rate appearance as pretty important also. The first impression I have when viewing an engine in the O.S. line is that of quality. This is obvious not only in the external appearance but throughout the whole engine as well. O.S. obviously

understands the importance of a good looking as well as a good performing engine and succeeds at both. Machine work, quality of the finishes, and overall workmanship of the O.S. line of engines has been equaled by none in the past few years. O.S. has set machining and tolerance standards that many other model engine manufacturers should strive to achieve. Several have come close, but none have surpassed O.S. in my opinion. I do not know what type of machinery O.S. uses for manufacture

**continued on page 176**

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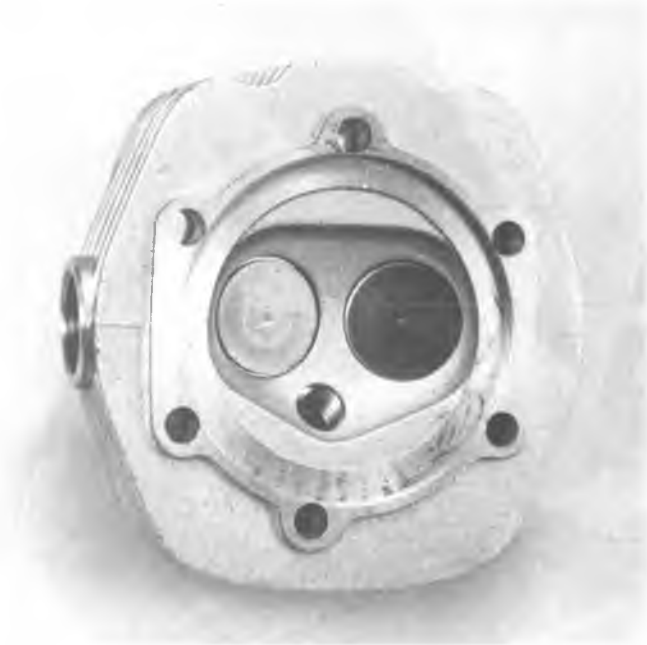
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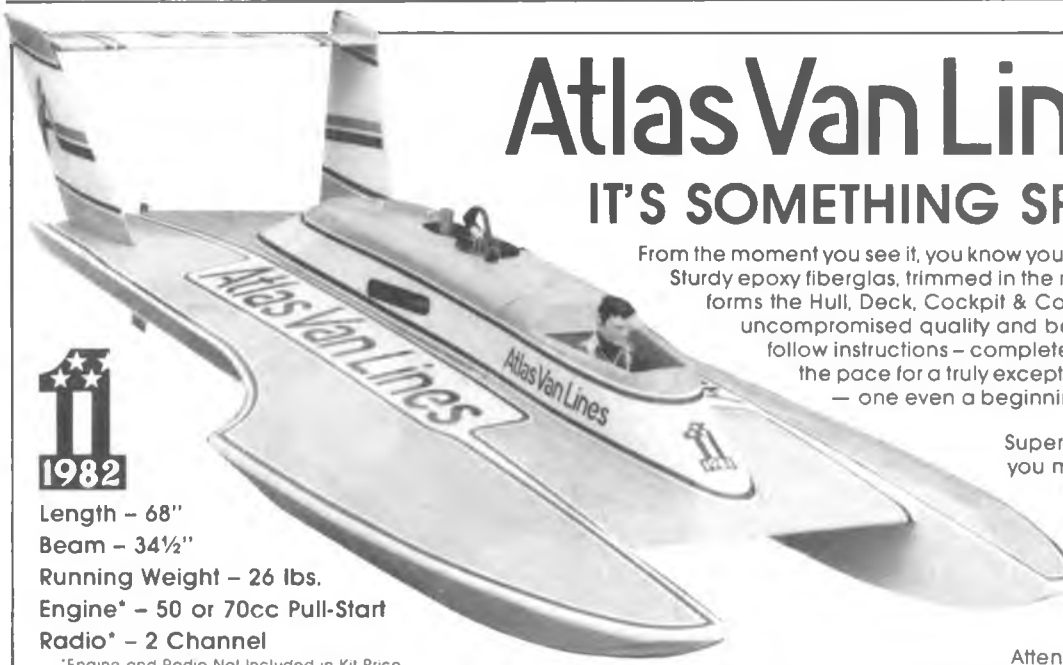
of their line of engines, but would be safe in assuming it is the latest CNC computer controlled type, judging by the surface finishes that can only be achieved with this type of equipment.

With the preliminaries out of the way, let's take a look at the design and construction of the engine.

The manufacturer lists the bore as 30.4mm (1.197") and stroke as 27.5mm (1.083") for a displacement of 19.96cc or 1.218 cu. in. Actual measurements of the engine tested were exactly on these figures. This is quite unusual as many times the manufacturer's listed bore and stroke

will vary several thousandths from the measured engine. Especially the stroke where a variance of .001" in the crankpin location will double the stroke reading. O.S. is obviously using some very precise grinding equipment for finishing their crankpin throws.

The FS-120 uses a one piece



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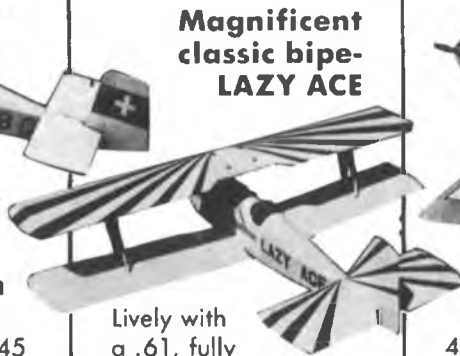


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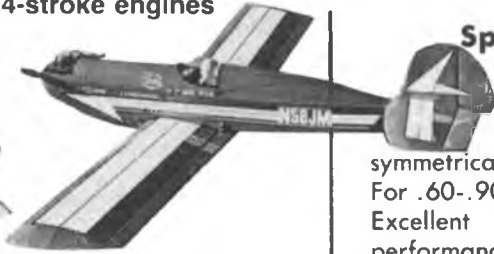
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crankcase design was also required in order to change from the rear driven valve mechanism as used on the FS-90 to the second generation front driven design.

The crankshaft is machined in one piece, hardened, and finish ground. It is double ball bearing supported with a 32mm O.D. x 15mm I.D. shielded rear bearing and 24mm O.D. x 10mm I.D. shielded front bearing. Helical gear teeth that drive the matching camshaft gear are ground as part of the crankshaft. The machining operation involved here being somewhat complex but resulting in the simplest possible method of operating the camshaft. To decrease weight, the crankshaft has been hollow drilled with a .275" drill.

The camshaft is supported by two miniature ball bearings — one pressed into the crankcase / camshaft housing, and the other pressed into the removable housing cover. Every effort has been made to reduce the points of wear in the engine.

The hardened steel sleeve is a nice slip fit into the crankcase and appears to be internally finish ground only without a final honed finish. Evidently O.S. has very precise

grinding equipment and feels that the final honing operation can be eliminated. I sort of like the final honed finish myself as the cross hatch hone pattern also serves for oil retention.

The piston appears to be a permanent mold casting (aluminum) and uses a single pinned expansion type ring. In an effort to reduce piston and reciprocating weight, four large .430" diameter holes have been drilled through the piston skirt. The piston evidently being of high silicone content

continued on page 188

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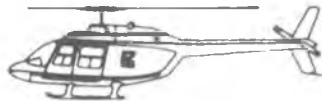
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does not use bronze bushings in the wrist pin holes.

The con rod is machined from bar stock aluminum and bronze bushed at both the wrist pin and the crankpin ends. A tubular .287" diameter hardened steel wrist pin is used with aluminum pads on each end.

The cylinder head is a rather complex design consisting of the main head and a secondary head assembly that supports the valve rocker arms. In order to get to the front head screws, the upper rocker arm casting must be removed first. The combustion chamber shape is a little hard to describe but might be considered a shallow bathtub shape elongated on one side for the glow plug. The glow plug is set closer to the exhaust valve than the intake. Phosphur bronze bushings have been pressed into the head to form the valve seats and support the stainless steel valves. The entire valve mechanism is, in turn, fully enclosed in the rocker arm boxes with removable covers. This is a departure from the early O.S. four stroke engines that had open valve mechanism. The measured combustion chamber volume was exactly 3cc which computes to a compression ratio of 7.66:1.

The carburetor bolts directly to the removable backcover and is of the rotating barrel / mixture control type. That is, rotation of the barrel moves the barrel in and out of the housing, metering the fuel through the mid-range and idle. A high speed mixture adjustment is incorporated on one side of the carburetor and a low speed adjustment on the other. This type of carburetor design is becoming pretty well standard among the various model engine manufacturers and works exceedingly well. Each manufacturer uses minor variations in design to meter the fuel. The O.S. uses two brass tubes — one slipped over the other. The main fuel feed tube has a narrow tapering slot and metering is accomplished by the external tube moving on and off of the internal slotted tube as the barrel rotates. In actual operation the carburetor worked very well and was very easy to set up for both top speed and idle. A positive idle speed stop is also incorporated which always wins points with me. So many manufacturers have eliminated the positive idle stop, relying solely on the servo to determine idle speed.

The carburetor can be reversed on the backplate so that the high speed



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needle valve can be positioned to either the right or left. As supplied on the engine, the needle valve is on the right side, the same as the exhaust. I would suggest that you change it to the left side as I found out the hard way that it is quite easy to bump your thumb against the exhaust pipe while adjusting the engine due to the close proximity. And, believe me, you have a bad burn before you realize it.

Also, incorporated into the backcover is a spring loaded choking device so that the engine can be choked remotely in cowled engine installations. The spring loading is nice as this way the choke can not be accidentally left closed when starting the engine. If left closed when using an electric starter, a hydraulic lock could occur, in turn, damaging the engine. The four stroke engine is far more prone to hydraulic locking than the two stroke engines.

Finally, we have the propeller drive assembly. Either a conventional prop nut and washer can be used or a four bolt locking prop assembly. The latter naturally requires drilling four holes in the propeller hub. As I use my test propellers on a variety of engines I did not want to drill them for the four bolt hub assembly and used the conventional nut and washer. Something else that always wins points with me is the use of a 5/16"-24 U.S. crankshaft thread rather than a foreign metric size. If you should lose the prop nut, replacement does not become a major problem.

And now to the performance. The engine was given our standard thirty minute break-in consisting of short three to four minute runs at a rich setting for the first fifteen minutes allowing the engine to cool between runs, followed by continuous running the last fifteen minutes with the mixture richened and leaned with periods of idle in-between. This is not nearly enough time to fully break the engine in but enough to loosen the engine up for test purposes. The same break-in procedure is given to all engines tested in order to give a relative comparison.

O.S. recommends regular two stroke glow fuel in the 5%-15% nitromethane range. My own experience has shown that the oil content of regular glow fuel is generally too high for four stroke engines. Most two stroke glow fuels contain 20%-22% oil. The engine manufacturers naturally like fuels with a high oil content as a safety

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precaution for you guys who like to lean an engine in fully and then go a click or two leaner trying to get a few extra rpm. The result is overheating of the engine and a loss of power, plus possible engine damage. However, assuming that you do know how to properly set the mixture, 10%-15% oil is sufficient, 18% at the most during the break-in period. Some manufacturers recommend castor oil only but O.S. recommends either castor oil or synthetic oil. I prefer the synthetics due to their cleaner running, less carbon and varnish build-up, etc. However, the synthetics are more prone to rust formation — especially in the four stroke engines where the crankcase cannot be rid of excess fuel by running the engine out dry by pulling the fuel line at the end of a flying session. Loading the engine with a good after run oil is very important and if the engine is going to be stored for awhile the backcover or front housing should be removed and the engine flushed with solvent and oiled. Do not use alcohol. Alcohol will only attract more moisture.

Too much oil in four stroke engine fuel can cause the engine to run uneven at high speed, loading through the mid-range, and marginal idle. I have an early O.S. FS-60 with a considerable amount of running time now and have found it to run very well on 12% oil. More than 15% and the engine begins to run uneven at high speed.

For the purpose of this test, a fuel mixture of 15% synthetic oil, 10% nitromethane, and balance methanol alcohol was used. The air temperature at the time of the test was 67°F., relative humidity 16%, and barometric pressure 29.92. Ideal running conditions. The following rpm figures were obtained:

- 14-8 Zinger 9,500.
- 15-6 Zinger 9,600.
- 15-8 Zinger 8,500.
- 16-6 Zinger 8,400.
- 16-8 Zinger 7,900.
- 18-6 Zinger 6,700.

Since O.S. recommends the maximum operating rpm as 11,000, either the 14/8 or 15/6 propellers would put the engine right in this range in the air. If you wanted to lug the engine down a little, both the 15/8 and 16/6 could be used. These would be particularly good sizes for scale type aircraft. The 18/6 was getting to be just a little too much prop for the engine although it handled it with no apparent trouble.



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As mentioned in the first part of this article, first impressions can be very important. If I get an engine for testing that is soft on compression I am not too impressed with the quality or fitting of the engine, even though after break-in things may improve. I like an engine to have a good compression seal right off the bat. It makes initial starting considerably easier. The ease of starting (by hand) the first time also makes an impression. If an engine is a real bummer to get running the first time, again, I am not too impressed with the workmanship. The O.S. FS-120 scored 100% in the compression seal and ease of starting categories. Even though of ringed piston design, the engine felt like it had a lapped piston. The compression seal could not have been better. My normal starting procedure is to back the needle valve out five or six turns and with the throttle set for high speed, choke the engine until I hear the slushing sound of fuel in the combustion chamber. (This applies only to four stroke engines — don't try this with a two stroke.) Next the engine is flipped through a couple of times in the normal direction of running to distribute the fuel; then brought up against compression backwards, the throttle reduced to approximately one third, and the starting battery connected. The engine then flipped backwards **hard!** The O.S. FS-120 fired and took off running the very first flip. Quite impressive! Subsequent restarts were just as easy. I should also mention that the engine had terrific fuel draw. That is, only one or two chokes would load the engine with fuel. I have run some four stroke engines that required choking half a dozen times or more trying to get fuel to the combustion chamber. In fact, you have to be careful with the O.S. not to over-choke.

Overall handling was very nice with no bad characteristics. The needle valve range at the top end was quite broad and there was no tendency to detonate even when set too lean. The engine could be safely idled at 1,800 rpm with the smaller propeller sizes and 1,700 with the 18/6 with the starting battery disconnected. With the starting battery connected, the engine could be gotten down to 1,400 rpm.

The vibration level was moderate but not excessive for an engine of this size. Being only the second 120 size four stroke engine I have run, I do not

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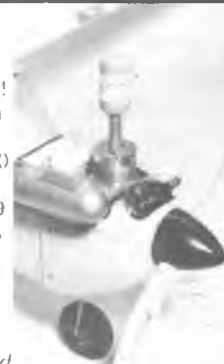
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have many others to compare it with. However, the O.S. did seem to have a little more vibration than the Saito 120 tested last March. The vibration level was about the same as the Magnum .91 reviewed in the July issue. The Saito 120 is physically quite a bit larger than the O.S. 120 and weighs almost five ounces more. A shade under 28 ounces for the O.S. versus 32½ ounces for the Saito. The additional size and weight of the Saito may have contributed to its lower vibration level. A little more counterbalance on the O.S. crankshaft

would probably prove beneficial. I have always found that if the crankshaft counterbalance will balance the combined weight of the connecting rod, wrist pin, and a small percentage of the piston, the engine will run the smoothest in the 9,000-12,000 rpm range. The O.S. counterbalance balanced the rod and a small percentage of the wrist pin weight only. This is probably the reason O.S. is now drilling the extra lightening holes in the 120 piston.

The O.S. and Saito turned the same propellers within 100-200 rpm of each other. The O.S. having the edge with one size and the Saito with another. The O.S. weighing almost five ounces less than the Saito develops a higher power to weight ratio. Something fellows building ships for the new turnaround pattern will more than likely want to take into consideration.

Shortly after receiving the engine from World Engines, I had a telephone conversation with Scotty Fahnestock. Scotty handles public relations for World Engines. During the conversation, Scotty brought out a point that both he and I felt should be mentioned. Just because the four stroke engine manufacturers supply wrenches and feeler gauges with an engine does not mean that you are obligated to put them to use as many fellows seem to think is necessary. The valves do not get out of adjustment that often and seldom need readjustment. Regardless of what the engine problem may be, the first thought is to grab the wrenches and adjust the valves. Many fellows do far more damage trying to adjust the valves than any good they do. Gene Steinkamp, who heads World Engines' repair department, gets engines back all the time with damaged valve mechanisms caused by the owner's attempt to adjust the valves. Some of you guys just do not have the delicate touch required. When you cannot find the wrench supplied with the engine for loosening and tightening the lock nuts and resort to your vice-grips and water pump pliers, bad things can happen. So be sure, when checking the valve clearance, that an adjustment is really required, and if so to use the small wrench supplied by the manufacturer. □

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# RCM PRODUCT REVIEW

## Tower Hobbies LAND JUMP 4D



### Assembly:

**W**hile this durable, fast-moving 4-wheel drive dune buggy comes with a complete set of detailed and illustrated assembly instructions, when we opened the box we found that the car comes ARR; Almost Ready to Run. We had only to assemble the clutch, install the engine, R/C equipment, and related linkage. With regard to the instructions, they were written in Japanese which means that we enjoyed some of the spelling (disc break) and sentence construction ("have it temporarily attached"). No doubt translations of our instructions to Japanese are equally enjoyable for them.

We found some filing required when installing the centrifugal clutch arms. When formed (steel plates bent in an arc with loops at both ends), the edges flared at the loops and had to be filed down to make a flat surface to contact the clutch properly. The loop ends also had to be drilled out so they would pivot freely on their mounting pins. This isn't any big deal though. It just would have been a perfect kit if the rework weren't required.

Since we were unable to locate either the Enya .19 or 21X or O.S. 21 (recommended in the assembly instructions) at

### SPECIFICATIONS

Name ..... LAND JUMP 4D  
 Type ..... 4-Wheel Drive Dune Buggy  
 Manufactured By ..... Kyosho Corp. (Japan)  
 Distributed By ..... Tower Hobbies  
 P.O. Box 778, Champaign, Illinois 61820  
 Mfg. Suggested Retail Price ..... \$359.95, (Tower \$219.98)  
 Scale ..... 1:8  
 Length ..... 515mm/20.2"  
 Width ..... 270mm/10.6"  
 Height ..... 200mm/7.9"  
 Chassis Height ..... 40mm/1.6"  
 Wheel Base ..... 315mm/12.4"  
 Tires ..... 4.2"  
 Brake ..... Disc  
 Gear Ratio ..... 8.7:1  
 Suspension .. 4-wheel independent coil spring w/oil dampened shocks  
 Drive System ..... Side winder w/chain drive to front and rear  
 axles with front wheel differential  
 Weight ..... 3.4kg/7.5lbs. w/o R/C system  
 Engine ..... .19-.21  
 Channels ..... 2; throttle/brake and steering  
 Plans ..... None  
 Instructions: 23 page detailed assembly booklet with diagrams including a complete parts list.  
 Kit Includes: Everything required including fuel lines, linkages, pushrod connectors, clevises, adhesive backed decals, spare clutch lining and master link. Everything, that is, except the engine and R/C system.  
 Options: Clutch bell/gear combinations for 9.6:1 and 10.6:1 gear ratios. Nylon round spikes for dirt roads or rectangular spikes for deep sand which are simply pressed on rubber spikes molded into tires.  
 "Normal" tires are also available for hard surface tracks. Softer oil dampened shocks.

### MATERIALS

Chassis ..... Bar stock aluminum  
 Roll Cage ..... Dowel stock aluminum  
 Gears, Clutch, Axles ..... Hardened steel  
 Suspension Arms ..... Die-cast and machined alloy  
 Tires ..... Rubber with studs  
 Clutch/Gear Shroud ..... ABS plastic  
 Fuel Tank ..... ABS plastic  
 Front Bumper ..... ABS plastic  
 Muffler ..... Cast aluminum  
 Cockpit/Driver ..... plastic  
 R/C Box ..... ABS plastic

### RCM PROTOTYPE

Engine ..... K & B .21  
 Muffler ..... Tatone  
 Radio ..... Futaba 3 channel FPT3S

### SUMMARY

#### WE LIKED THE:

Very durable construction and preassembled kit.

#### WE DIDN'T LIKE THE:

Production of the centrifugal clutch arms which required rework for proper operation (see text), method of starting the engine, and we would have liked some information about parts that need lubrication.

any of our local hobby shops or discount houses, we decided to install a hot little K & B .21 that has been hanging around without something to move. As the instructions indicate, some slight modifications were required for this engine. Fortunately, the predrilled holes in the engine mount blocks fit by just turning them around so what we

**continued on page 208**

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continued from page 205/198



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**LAND JUMP 4D  
continued from page 195**

anticipated as the most difficult part of the installation was no problem. To get some consultation about the installation we dropped by K & B to talk to an expert; Bobby Tom. After looking it over he seemed as excited about the Kyosho Land Jump 4D as we were. He anticipated that cars like the Kyosho's jewel might revive interest in glow-powered cars. When discussing the engine installation he felt it would work quite well. He also provided us with one of their heat sync heads (part #8407) for the .21. It was necessary, however, to file about 3/16" off of the edge of one side of the top 5 fins so the head would clear the aluminum dowel roll cage. We also found it necessary to add a washer between the aluminum flywheel and engine thrust washer for the proper fore-aft spacing of the clutch. It was disappointing to find, though, that due to the K & B .21 rear exhaust it would be impossible to use the neat looking tank muffler that came with

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the car. We did, however, find a Tatone muffler part #183 that worked very well with some minor filing of the molded-in fins at the exhaust port so it would fit under the oversize head. Seemed as though it was designed specifically for this car. To that we added a short length of aluminum tubing so the exhaust would be carried beyond the back of the car to keep it clean. Works good, sounds good, and we think it looks neat. One thing to keep in mind though, when you remove the muffler and mounting bracket, replace the bracket mounting screws with some of shorter length since they hold the rubber chain guide in place. Without the screws it will work its way loose and jam the rear chain sprocket. Found out the hard way.

There was nothing much to installing the radio and linkage. The servos fit into the servo mounting tray provided by relieving the cut-outs slightly. Because of the different engine, we used cable in a guide tube for the throttle linkage. A small metal bracket was prepared to anchor the guide tube at the throttle arm end. The disc brake linkage was used as designed. While the linkage for the steering calls for a "Z" bend step to connect to the steering horn, we used a ball-end fitting left over from a helicopter to raise it up so no bend was required. Seemed more sanitary that way. The radio, battery, and servos mount in a dust proof ABS plastic box, with a little room left over for some insulating foam. The kit even includes a rubber switch cover to prevent dust or dirt contamination and rubber fittings for the pushrod exits in the radio box. Talk about a complete kit! **Off and Running:**

Time to start it up. The instruction booklet shows starting the engine by using a rubber doughnut on a starter, which is held to the knurled edge of the flywheel on the underside of the car. That means you have to get someone to hold the car over your head while you start it. Not the most convenient scene to play. Furthermore, since the bottom side of the chain runs within about 1/2" of the flywheel, we were also concerned that we might inadvertently damage the chain when starting the engine. And, due to the fuel tank pickup, it can't be started upside down. Fortunately, we have a Kavan geared starter that would just fit inside the roller cage to start the engine on the top side. And it worked fine.

The clutch springs permit the engine to idle at relatively high rpm's before the clutch plates engage. That means you can get a very reliable idle and good throttle setting to start the engine without fear of engaging the

clutch. When the throttle is increased the clutch engages smoothly. Once rolling we could detect no slippage even on 45 degree hills. Incidentally, that Tatone muffler does a nice job of muffling the sound so there's no problem in running it in your backyard. And we were also surprised with how smooth our K & B .21 ran. Seemed almost vibration free.

Our first test runs were the most fun we've ever had with this type of car. A nearby golf course seemed a good place to test it out. We used the handy plug wrench provided with the kit to loosen the glow plug a turn and a half to make the starting easier — like the boat boys do. Then, once running, we tightened it up. Again, thanks to Bobby Tom for the handy hint. It went through the cut grass and tall grass in the rough like nothing, with the front bumper acting as a plow pushing the stuff out of the way. It went up and down 30-45 degree hills alongside the fairway like they weren't there. Tracking was very positive. There was no hint that it might tip over as we made high and low speed turns on the side of the hills it effortlessly conquered. And, regardless of how long the hill was, the little jewel kept right on moving without any apparent loss of speed. If we wanted it to stop, it would. The disc brake and 4-wheel drive do the job first class. Apply the brake (by pulling the transmitter throttle control lever all of the way back), the engine goes to an idle and the wheels stop. Right now. Open it up again and off it goes. Bumps and jumps it found along the way meant nothing. Matter of fact, the only way we knew it was airborne sometimes was that we could hear the engine rev up.

After we had been running it around a bit we decided to go for it. And it does move out. Regardless of the speed, the superb handling was still there. Turn, and it would turn. Stop, and the wheels would freeze. In an attempt to tip it over we got it running straight and screaming, then hit the stick for a hard turn. Around it went. Regardless of the speed or the terrain, it kept the wheels down and rolling. Unbelievable suspension. Throughout our tests the Futaba R/C system with FPS 26 worked flawlessly, so we've come to expect.

When we brought it back to the work bench for a clean-up and check-out after several tanks of fuel, we found that the car itself was almost clear of any engine oil, which made the clean-up not much more than a dust job. On removing the clutch we found no signs of wear. The chain idler was still where we adjusted it for proper tension — as indicated in the

continued on page 214

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**LAND JUMP 4D**  
continued from page 211/195

instructions. All nuts and bolts were tight and we could find no play in the steering or wheel bearings. There was no evidence of any wear on the disc brake. Of course, we only ran several tanks of fuel through it, but any evidence of wear or things coming loose would suggest that these parts would probably be in need of frequent attention, which wasn't the case with the Land Jump 4D.

**Conclusions:**  
As you no doubt have already inferred from our earlier comments, in our opinion, the Kyosho Land Jump 4D is a super fun machine. The car is well-engineered and is very durable. It requires only a few hours to assemble the clutch and to install the engine and R/C equipment. The handling is superb. Aim it and it goes. Open it up and that K & B .21 power plant will do the job you want it to; up hills, down hills, screaming straight and level, or, flying over the jumps. What more could you ask? Bobby Tom may be right. Cars like this one may well-revive interest in the raw power and exciting sound of glow engine powered cars. That has certainly happened in our case. About the only modification we've considered is to add a piece of plastic to the bottom of the frame to protect the chain before we run it in dirt or sand. We're eagerly looking forward to getting in some more time on this great machine. Kyosho Land Jump 4D is listed in Tower Hobbies catalog for \$219.98. The regular retail price is \$359.95. We feel it's well-worth the price and will give you many hours of exciting fun. Send \$2.00 to: Tower Hobbies, P.O. Box 778, Champaign, Illinois 61820, for their catalog just full of great items. □

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### GIVE IT A WHIRL

continued from page 151/144

speed reduces on a fixed pitch helicopter, you can be in real trouble. "Cricket," however, rolls very well-indeed using this technique.

Well, I hope that the foregoing will help some of you try a roll. It's usually one of the last maneuvers that you attempt after getting into forward flight and it's probably one of the most difficult to do. It is also a very pretty and rewarding maneuver when done well, however. Please don't write in and tell me I've overlooked the use of the pitch attitude and tail rotor inputs — both of which are definitely needed for a slow four-point roll. Either of them **may** be needed even for a faster continuous roll if it is to be perfectly axial. The object of this column, however, is simply to encourage and perhaps give some confidence for fliers to do their **first** rolls with an R/C helicopter. Please write and tell me your experience during your first helicopter roll. See you next month. □

### CUNNINGHAM ON R/C continued from page 96/94

touch-down technique resulted in gentle contact with the water, with light results. The point is to learn to make nose high landings with float equipped models, not a quick bash at the water. Also, it is very hard to make a fast touch and go in choppy water. On a smooth pond, it's no sweat, but in choppy water the chance of hooking one pontoon is very great. If you hook one pontoon, then the aircraft will do a water loop in short order. If the lake is choppy, make a landing, turn again into the wind and make another take-off, don't try a touch and go. I learned this the hard way last summer with my Hooker on floats, hooked some chop and did a complete flip, kind of crunching the tail end of the Hooker. If you're planning on float flying this year, give some thought to how you fly or, rather, how you land, and what aircraft you're going to equip with floats. Make sure that the aircraft has enough wing area to compensate for the extra weight of the floats, and has enough power to lift the model off of the water.

Since this is the August issue of RCM and the Seventh Annual Southwestern Jumbo Fly-In is scheduled for July 21 and 22, it seems kind of dumb to remind you to plan on coming . . . but as this issue will be in your hands early in July, it really is time once again to remind you to show up at Thunderbird Field, just Southwest of Forth Worth, Texas, for this great two day happening. Bring the family and your big airplane, 'cause we're going to have a good time again this year. If you need any additional information, contact me at 2440 Colonial Parkway, Fort Worth, Texas 76109. □

### ENGINE CLINIC continued from page 75/62

*given engine and two or three bladed props, and the relationship between 2 and 4-cycle engines. I would like to use a pair of O.S. .60 4-cycles on a PBY-2 with a 134" span. The engine nacelles are 6½" diameter and the scale prop would be a three blade 16" diameter.*

*As the PBY was never meant for fast flying or stunts, would a 16" three*

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*blade with possibly a reduced pitch be appropriate.*

*Yours truly,  
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Moberly, Missouri*

A 16" three blade prop would be quite a load for the O.S. .60 four stroke engine. A 14/6 two blade prop is about the largest prop size the engine can handle and even that is a considerable load. About the largest three blade you would be able to turn would be a 13/5 and I have to guess at that. If you want to use a 16" three blade propeller, then you are going to have to use a larger displacement engine. Four stroke engines develop approximately 2/3 the power of an equivalent displacement two stroke but do have the ability to turn the larger prop sizes without working as hard and overheating. If you want to use four stroke engines you had better consider a couple of .90s. The O.S. .90, for example, is approximately the overall size of a .60.

That does it for another month gang. I have just completed running tests on the O.S. FS-120 four stroke engine and it will be the subject of our engine review this month. □



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