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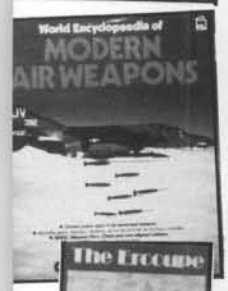

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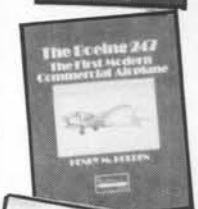

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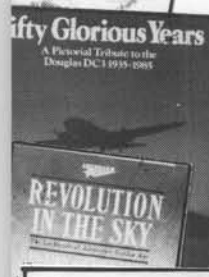

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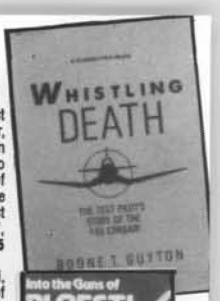

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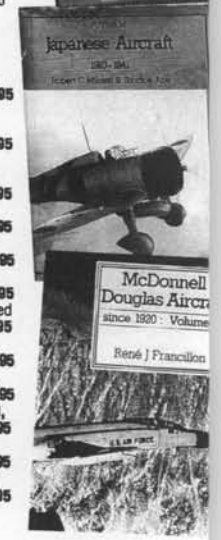

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DEPARTMENTS

HELICOPTER WORLD

FEATURES

PRODUCTS IN USE

CONSTRUCTION

ON THE COVER

First Place in Team Scale at the Top Gun 1991 Invitational Tournament went to Kim Foster (builder) and Geoff Combs (flier). All twos: (inset) The 2nd place winner in Team Scale was this two-engined Beechcraft, designed by Nick Ziroli, Sr., and built by Bill Steffes. The 2nd time these two took 2nd place! Story on page 54. Both photos by Wally Zober, Apopka, Florida, whose photos were also featured on our January and June covers.

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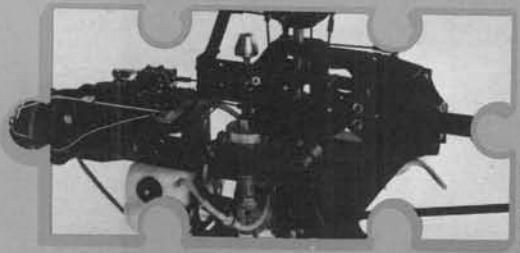

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BILL NORTHROP'S WORKBENCH

The publishing of this issue is somewhat of a momentous occasion, in that it represents the conclusion of twenty years of producing *Model Builder* magazine, and the beginning of the twenty-first year.

This writer has been a modeler since around (who can remember exactly after all these years?) 1930, and our personal model airplane hobby grew up through solid models, simple all balsa gliders, ROGs and FOOHs (Fall Out Of Hand), stick and tissue ten-cent scale rubber, tissue and microfilm indoor, sport and competition outdoor rubber, ignition gas (beginning with a vastly Baby Cyclone-underpowered-Scientific "Miss Philadelphia" that once climbed to about 25 feet), and many Jasco gliders up to WW II, followed by glo gas F/F in early post-war, and then into RC in late 1954.

Although we love, enjoy, and prefer our own personal aspects of RC (or at least did until this monster took them away!), have had over a dozen original designs published, trophied in Scale at the AMA Nationals, and held at one time both the RC World Altitude and the RC Glider Speed records, we have always believed that being successful in building and flying free flight, not necessarily for competition, but just for the

(Above left) "Free John" and "Big John" at Wright-Patterson AFB, Dayton, Ohio, during the 1976 Nationals, which was the 50th. Big John was on its way back home to its designer/builder after being gone nearly 10 years (it still exists). Free John was campaigning for another term as AMA President. (Above right) "Pay John" Worth and "Free John" Clemens exchange plaque and handshake during the banquet at the fifth Tournament of Champions, Las Vegas, Nevada, 1978. (Right) Classic photo by Don Tremain, taken in late 1978, shows Johnny Clemens in action, with Earl Witt seated next to him. Our caption read ". . . and thank you, Lord, for helping me to win the election for AMA President, and for giving me the strength to listen to one more Texas joke . . ."

heck of it, is the true essence and peak accomplishment in the model airplane hobby. During our most active years in RC, we always had some hand launch gliders and sport rubber models with us at the RC field, especially during the early days when there was only one CB frequency and long waits between attempts at controlled flight.

It has therefore been our desire over the years of publishing *Model Builder*, to keep the modeling public aware of this essence, and not to forget, as the momentum of advanced technology moves us into the stressful areas of high speed flight, exotic computerized control systems, megabuck composite structured miniature aircraft, and over-budgeted "leisure time" expenses, that when it gets a little too hectic . . . relax and take up a hobby! Build a stick and tissue rubber powered model for about ten bucks and a few evenings of building, and take it out to the local park or school grounds, and find out how much fun you can have getting a few more seconds out of each successive flight. You may be surprised how much fun it can be . . . and you may learn something!

FREE JOHN IS GONE

If there's one person in this world, well . . . until recently, anyhow, for whom a serious obituary is *not* appropriate, it's Johnny Clemens. Yes, he died on June 13, 1991, in a nursing home, in the city of Dallas, where he lived and operated The Hobby Counter hobby shop since the end of 1939. We're sure you'll read all the statistics about his many years of service to the AMA, including six years of presidency, the longest term to date, from 1972 through 1978, and of the many advancements in AMA because of, and during his time in office. But we'd like to talk about him as a private person.

Johnny figured correctly that he was put on this earth to make sure everyone had fun. In fact, this seemed to be the only thing about which he was serious. It concerned him on many occasions that certain aspects of the hobby were getting too stressed, which is not what it's all supposed to be about. So Johnny went out of his way to cure this problem. At *any* business meeting, at *any* banquet, at *any* gathering of more than two people, Johnny was "on." It was exasperatingly impossible to get a straight answer from him if he thought things were getting out of hand . . . too serious, that is. His endless string of jokes, Henny Youngman "one liners," and shaggy dog stories, mostly related to Texas-based humor, made it a challenge just to see if you could get him "off" for just a few minutes. This writer felt privileged for having really gotten "through" to the real Johnny back in 1975, and any time after that, it was like having the secret combination to a special lock. Just dial the right numbers, and we could have a serious chat.

Even when we talked to him, for the last time, about three or four weeks ago, when he was in the hospital for one of his many serious health conditions, Johnny talked mostly about the trip we took together to Bern, Switzerland, in 1975, where he was

ADVICE FOR THE PROPWORN—

BY JAKE

Dear Jake:

Does the Beechcraft Baron draw its name from Baron von Richthofen?

Chad in Charleston, WV

Dear Chad:

No, there is no connection between the German Ace and the Beechcraft airplane line.

William Bradley Beech, founder of Beechcraft, and his son and successor, Harrison Beech, were fond of naming their aircraft after family members' nicknames. Hence the "Debonaire," "King Air," and "Queen Air." Even the "Staggerwing" was named after drunken Uncle Conrad.

"Ice Little Baron" was the nickname of Harrison Beech's son, Elliott. The Beechcraft Baron was named after him.

In 1989, Elliott became the third son of a Beech to run the company.

Jake

• • •

Dear Jake:

I'm a scale enthusiast and I live near a lake, so I thought I'd build a scale model of an amphibian. I've looked at the various Grummans, but they leave me cold. What amphibian would you recommend for my project?

Would-be Aquanaut in Delaware.

Dear Would-be Aquanaut:

Well, a frog seems like the obvious choice. In fact, I think there might even be some frog model kits available. I suppose if you wanted to model a more exotic amphibian, you could go with an alligator or a caiman.

I wasn't aware that a Grumman was an amphibian. I always thought they were a fish. You know, the kind you scoop up in buckets when the Grumman are running.

Jake

• • •

Dear Jake:

The radio in my TSK helicopter has been plagued by glitches ever since I got it. It's a seven-channel, special helicopter set with all the bells and whistles. I won't mention the manufacturer, but the Land of the Rising Sun was its birth place.

I tried grounding all the metal parts on the machine. That didn't work, so I tried insulating all the metal parts. That was worse. I even tried wooden rotor blades because I thought static discharge might be coming off the fiberglass ones. No dice.

I'm ready to give up. You can't do a nice steady hover in front of the judges if the machine has a glitch-induced seizure every few seconds. Help!

At Wit's End in Wisconsin

Dear At:

I'm surprised you haven't figured out your problem on your own by now. There have been several reported cases recently of RC sets being possessed by demons. This has been especially true of Japanese imports, which seem particularly prone to possession by fallen Samurai spirits from Mount Fuji. Your radio is clearly inhabited by ancient Oriental wraiths.

Not to worry, though. A simple exorcism ritual will rid your RC set of its unwelcome visitors. You must be very careful, however, to follow the traditional exorcism procedures precisely, or you run the risk of failing to evict the spirits, or worse yet, merely chasing them into some other Japanese electronics product, like your VCR or your Honda's fuel injection system.

Adhere to the following ceremony exactly and you will have no further trouble.

1. Remove battery, servos, switches, etc., from the helicopter and place them in a 40cm length of dolphin intestine. Tie off both ends with the headphone cord from a Sony Walkman.

2. Extend the transmitter's antenna. Stuff the transmitter and the servo sausage into a Nikon camera bag. Zip up, leaving the antenna sticking out.

3. Tie a silk thread to the antenna tip and suspend the whole package from a tree branch, so that it hangs approximately one meter above the ground.

4. Build a fire directly below, out of Japanese Yew branches.

5. Start the package swinging like a pendulum in about a three-meter arc. As it swings back and forth, chant the following from the Tantra:

"Buzz off, bozos. Beat feet, Glitchi-San!

The increasing dwell time above the fire as the pendulum slows down, and the repeated demands for the spirits to leave, will eventually drive the demons from your set. Hopefully, before the thread breaks and drops your $900 radio into the fire.

Good luck. By the way, if your engine won't idle consistently, I can give you a simple ceremony involving only a yak and a volcano that will take of that, too.

Jake

P.S.

I've spent quite a bit of time in the Dairy State, but I didn't recognize your town. Where is Wit's End, Wisconsin?

• • •

Dear Jake:

You no doubt went to the Nationals last year, and you probably spent some time at the RC pattern venue. As such, you must have had a chance to observe the talents of the many competitors and the capabilities of

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With color scheme based on the movie "Out of Africa," Bob Schultheis, West Bend, WI, built this pretty quarter-scale Gipsy Moth from Bill Northrop's plans. More than enough power from an O.S. 91 four-stroke, Coverite and Black Baron paint, flies great.

This neat F-16 is one of many minutes-to-assemble, jet and original design hand-launch/catapault, sheet foam constructed gliders being produced and distributed by Flywitch Co. Ltd., in a mass market attempt to expose youngsters to the thrill of model and full-scale aviation. More in text.

representing the US as President of AMA, and I was to be US judge for the World RC Aerobatics Championships. We flew over from McGuire AFB in New Jersey to Frankfurt, Germany, courtesy of MATS, with part of the US team, but broke off from them to rent a VW Bug and drive on our own, taking the back roads and avoiding the autobans whenever possible. We caught up with the team in Heidelberg, Germany, where the team (Dave Brown, Mark Radcliff, and Rhett Miller) stayed for a couple of days to practice at a local RC club field, before going on to Bern for the championships. During that time, in the Bug, we had a most memorable trip, and Johnny still remembered the "boxed" milk that we bought at a little village store somewhere along the way. He had already been through a serious health setback about a year prior, and was now handicapped with the problems of a colostomy. If you don't know what that is, it's best not to detail it here. Ask a medical friend to describe it. It would take someone like Johnny to be able to make and take jokes about it! Suffice it to say that up to that time, I had dubbed him as AMA's "Free John," and John Worth as AMA "Pay John." However, considering his new complication, I renamed him "Porta John!"

Once at a Nats banquet (What year was it, Johnny?), we were both at the head table, and he was at the microphone, doing his Texas one-liners. We patiently waited until he launched into a long story that went on

continued on page 64

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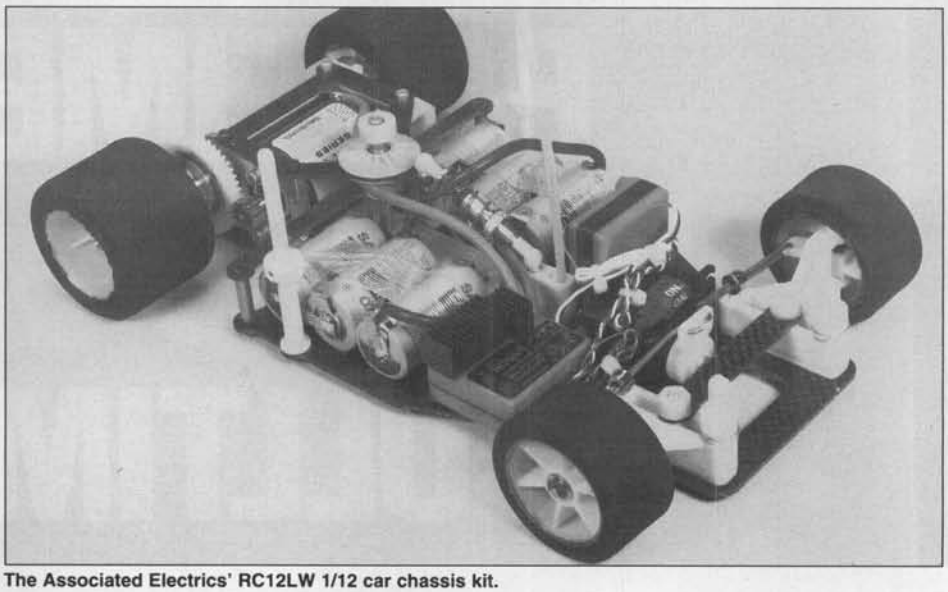
OVER THE COUNTER

Byron Originals' new catalog.



The Associated Electrics' RC12LW 1/12 car chassis kit.

MGA's 1/4-scale WW-II Navy pilot.

RC12LW chassis with optional Nissan GTP-90 body.

Product catalogs put out by some of the larger model aircraft companies are referred to as "Wish Books." This name tag is certainly well exemplified by the new 104-page, colorful, and **loaded** catalog produced by Byron Originals, P.O. Box 279, Ida Grove, Iowa 51445, phone (712) 364-3165, Fax -3901. If you'll send your name and address, plus four bucks, to the above address, you'll have one of 'em in your mail box in short order.

The new catalog is conveniently separated into sections, including Sport and Aerobatic Models, Ducted Fan Jet Models, Warbird Kits, Finishing Materials, Unique Scale and Convenience Accessories, and an information section on Byron Originals Performance Blended Fuels. For an additional $3.00 per model, you can obtain Full Info Packs, each of which includes an actual owner's manual, reduced-size assembly drawings, and a material list of all components included in the kit package. Note: Do not call to place order for catalog and info packs. These cannot be shipped C.O.D., and there is a $20.00 minimum on credit card orders.

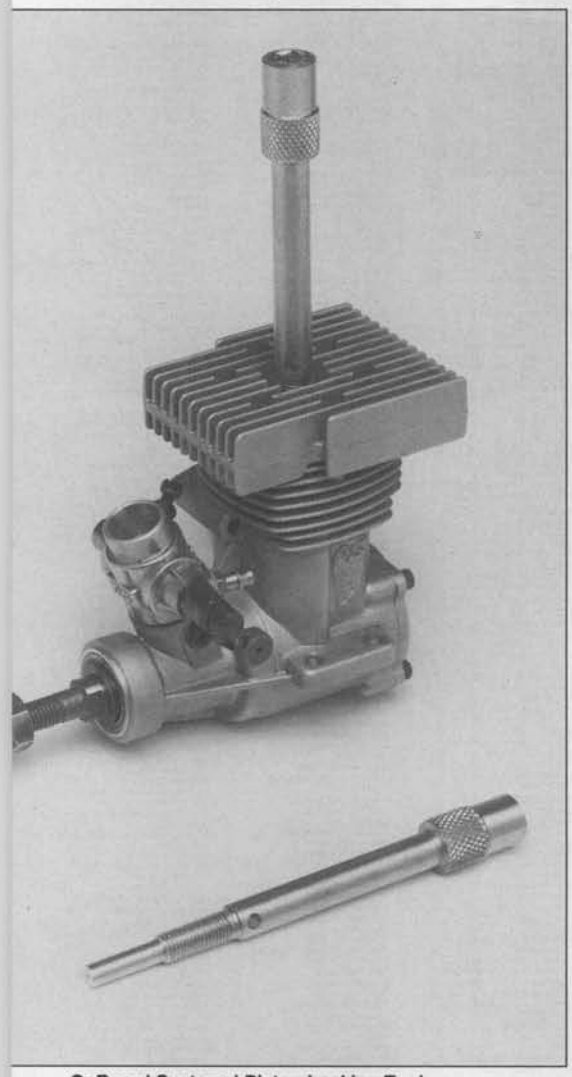
There is another, 12-page "Wish Book" included with the catalog. This is the complete list of suggested selling prices and shipping costs of all items in the catalog. In this case, you'll be "wishing" the prices were lower, however, the saying that, "you get what you pay for," is well supported by the quality of engineering and materials that go into the production of all kits and accessory materials offered by Byron Originals. It

All material published in *OVER THE COUNTER* is quoted or paraphrased from press releases, furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by *MODEL BUILDER* does not constitute an endorsement of that product, nor any assurance as to its safety or performance.

Futaba T7UHFS helicopter transmitter.

Futaba T7UHPS helicopter transmitter.

Futaba T3UCP surface transmitter.



OnBoard Systems' Piston Locking Tool.

Crown Models' Interceptor MK-III.

F-15C Eagle ducted fan semi-kit from Jet Hangar Hobbies.Over the Counter

is also noted on the "Ordering Instructions" page that you check with your local dealer first. The price list will help you decide on your purchase. If your dealer can't help, then contact Byron Originals direct to check on latest prices before ordering. You may be lucky enough to latch on to a special sale!

• • •

The latest race car from Team Associated is the 1/12 RC12LW. The original RC12E won numerous National Championships, then Associated developed the RC12i, which won the first IFMAR World Championships in Anaheim, California, then again won the next World Championships in Denmark. The RC12L went on to take 1st, 2nd, 3rd, and 5th at the World Championships in Las Vegas, including Top Qualifier honors. The Team's racers gave the new car its new identification as the "World's car," and so it became the RC12LW. The LW differs from the L, in that the weight of the batteries was shifted to the centerline of the car, resulting in more responsive steering, which is most apparent in S-curves. Basically, half of the 12L had to be redesigned to add a shock absorber. To prove the point, the Associated team took 1st, 2nd, and 3rd, as well as Top Qualifier honors at the IFMAR World Championships in Singapore!

The basic car kit is available with either a graphite chassis ($220) or a fiberglass chassis ($130). The company is Associated Electrics, Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626, phone (714) 850-9342, Fax - 1744. If you contact 'em, be sure to mention you saw it in *Model Builder*!

• • •

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718, now offers two new seven-channel helicopter radio Super Systems, the 7UHFS and 7UHPS, both available on the 72 and 50 MHx bands. The 7UHFS includes the R128DF/FM receiver, four S5101 servos, and 1000 mAH NiCd power pack. The 7UHPS includes the R129DP/PCM receiver, five S5101 servos, and 1000 mAH NiCd

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Wingspan: 78 in. Length: 62 in.
Wing Area: 1150 sq. in.
Typical Flying Weight: 6 lbs.
Wing Loading: 12 oz. per sq. ft.
For 3-Channel Radio Control

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Wing Loading: 12 oz. per sq. ft.
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3-CHANNEL
RUDDER, ELEVATOR, THROTTLE

KIT RC-60

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R/C SOARING

BY BILL FORREY

MORE TIPS FOR BEGINNERS

Last month, we covered which sailplanes are best suited for beginners and which launching devices are best suited for those gliders. This month we'll continue the theme of beginners' equipment from the viewpoint of which radios should be bought and which should be avoided.

Rule number one in choosing a sailplane radio is PLAN AHEAD! Buying the cheapest two-stick, two-channel radio you can find on the aircraft-only (72 MHz) band is nine times out of ten the WRONG thing to do for several very important reasons.

Winners of a recent Midwest regional soaring contest hosted by the Cincinnati (Ohio) Soaring Society were (l to r); Brian Smith, Nelson Itterly, Doug Bruce, and Don Tankersly.

Jack Iafret, of Michigan, flies an Ultima from Bob Seely's Quality Fiberglass company. Personal mods include more conventional low-mid-fin horizontal stab rather than the stock T-tail. Jack says it's much improved. Span: 129 inches. Area: 1254 square inches. Airfoil: S4061.

First, if you are going to be dependent on an instructor at a local field (and most learners are), you are going to need a radio system with which the instructor will feel comfortable and be competent in an emergency situation. Let me explain. There are two basic "modes" (configurations) available in modern, multi-channel RC systems: Mode 1, and Mode 2, and they are VERY different. If you buy a different mode radio than the instructor is used to, his instincts may overpower his intellect, and your plane could be lost if he gives the wrong command.

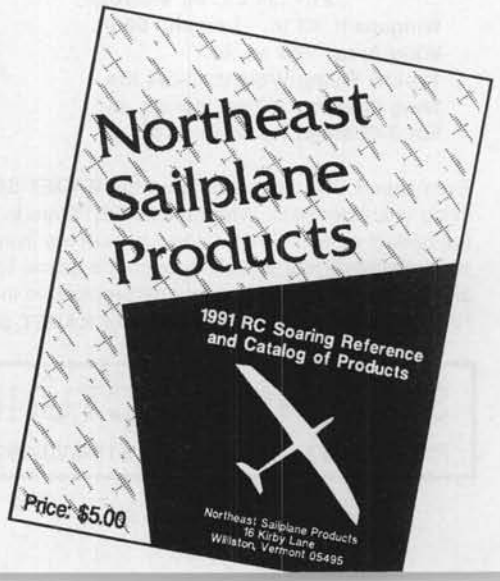
BY FAR the most common is Mode 2. This is the version which is most like the "joy stick" of a full-size sailplane. Having this single-stick control with a rudder-elevator-polyhedral beginner's plane is most desirable. This one stick, when moved left and right, moves the rudder left and right which produces roll (bank angle). It also controls the elevator which produces pitch (nose high or nose low) when moved up and down. Ninety-five percent of the guys I know who fly, fly Mode 2.

Virtually all of the four-channel and higher multi-control radio systems on the market offer Mode 2. This is only a generality, as there are exceptions; the single-stick Cox two and three-channel Cobra radios are intended for use with gliders, electric motorgliders, or rudder-elevator-throttle planes.

If for whatever reason you WANTED a four-channel, Mode 1 radio, you would probably have to special order it as they are not commonly stocked by the majority of hobby shops. So, if you learn Mode 1, you will be FOREVER special ordering Mode 1 or converting Mode 2 radios, which can be a big hassle. (Unless you retrain yourself to fly Mode 2 later on.) All of the two-channel, two-stick, inexpensive aircraft radios on the market conform to this less desirable Mode 1. It's better just to start off Mode 2.

Let's get back to the instructor problem. In Mode 1, we find that the LEFT stick controls the elevator, not the right stick as in the instructor's personal radio. It also means that he may need two hands to fly: two thumbs for the two sticks, and two handsworth of fingers for cradling the transmitter box. These are difficult MENTAL and PHYSICAL adjustments for most instructors.

Secondly, if you can see yourself continuing with your soaring hobby and flying bigger and better sailplanes, you are going to need more than just two channels. You will want such nice little "extras" as servo reversing, dual rates, and various mixing functions. So, perhaps buying the multi-channel radio at the beginning can save you



The Northeast Sailplane Products 1991 catalog is out and it's even more impressive than before! See text for ordering info.

from having to buy it as a second radio system perhaps as soon as your first or second flying season.

If you buy the multi-channel radio first and later discover that soaring isn't for you, you could try power flying (forgive me, all ye purists), or even sell off your radio to another modeler. Nobody who is experienced is going to buy a two-stick, two-channel, Mode 1 system from you! Again, my recommendation is don't buy the cheapie.

Still another convincing reason for not choosing the inexpensive two-channel radio is that they are really all supplied without batteries . . . which means that they are to be operated on dry cells, alkaline only. In spite of the drumming rabbit on TV, that's not the way to go. When the alkalines die, the rabbit dies . . . permanently. When using rechargeable (NiCd) batteries, supplied with even most low-priced four-channel radios, the radio (and the rabbit) can be brought to life with a charger! Real

Airtronics' new Infinity 600A is finally here! See text for what it can do for you!

each other. They do NOT necessarily have interchangeable servos and battery packs. You will find that once you have selected a brand name with your first radio, it is more cost effective to STAY with that brand. If you do, your new servos, batteries, switches, extensions, etc., will be interchangeable with the old.

If you are handy with a soldering iron and heat shrink tubing, you KNOW what you are doing, and you don't mind buying a lot of different after market servo leads, then you can switch brands and modify equipment to suit the application. But, why bother? Just buy your first system to be compatible with your second, and all will be well.

On this subject of non-compatibility, there are dangers with which to beware. I have a friend who learned the hard way what will happen if a Futaba charger is used on a JR Propo transmitter . . . it plugged right into the transmitter jack, so all looked well, but the resulting reverse polarity charge

Chuck Lohre of Ohio with his Weston Aerodesign Magic. The Magic has become very popular in thermal duration east of the ol' Miss and has won many a contest. Span: 132 inches. Area: 1077 square inches. Airfoil: Wortmann FX60-100. Structure: composites. Availability: Northeast Sailplane Products, (802) 658-9482.

Herb Riendfleish, of Ohio, prepares to launch his Flite Lite Composites Falcon 880. This 112-inch spanner has become one of the West's leading thermal competition sailplanes. Area: 880 square inches. Airfoil: S3021 with S3014 at tip.

nice to bank on when you go through a couple of cycles just diddling with and/or installing your radio. wcn.

So . . . what would I recommend? Buy at least a four-channel radio system. Make sure that the hobby shop or mail order company that is selling you the system sells you an AMA approved, "Gold Sticker" transmitter with an AMA approved, "1991 Narrow Band" receiver. Most units from the major radio control companies are now certified this way, but get ASSURANCES before you buy.

If you settle for less (or get less) than the above, be ready to be asked to leave the majority of club flying fields. Older, wider band TRANSMITTERS can shoot down receivers on nearby or adjacent channels. Older, wide band RECEIVERS can be jammed by RC transmitters operating on adjacent channels, and not just by RC transmitters alone! Commercial use frequencies (pagers, garage door openers, etc.) often are very close to (sometimes dead-on with) RC "non-voice" frequencies. Either way, the resulting crashes, liabilities, and embarrassing situations just aren't worth the few dollars saved with the cheaper, non-approved systems.

Thirdly, the many different brands available (Futaba, Airtronics, JR Propo, Ace RC, Hi-Tec, Cox/Sanwa, Aristocraft, etc.) . . . all have plugs and polarities which differ from

destroyed the transmitter's NiCd battery pack! That kind of mistake can cost you thirty bucks quick and dirty!

Others I've known who have rewired servos with different connectors have erroneously routed the power to the signal lead of the servo. The resulting fried IC chips make servos useless except for spare gear sets and cases. So again, beware of what you do, as you will void your warranty by altering the stock equipment!

If you have need of any further advice, visit your local soaring club (first), or hobby shop (second). Sailplaners are notoriously friendly and generous with advice. Besides, what better way to be received for your first

flying lesson than with the equipment your new instructor-friend recommends? Lacking the local club, my ear is available by phone to hear your questions (see last paragraph of column).

AIRTRONICS INFINITY 600A RADIO

Announced about a year ago as "coming," the newest computer radio from Airtronics, the Infinity 600A, has finally arrived! Lest you think this was a planned follow-up to the above beginners' tips, let me assert that it was purely coincidental! Bob Renaud, of Airtronics, met with me in early June AFTER the above was virtually finished. (Besides, this radio may be more of an investment than most novices will care to make right away.)

Personally, I believe this is one of the most significant radios to come down the pike in many years. The majority of experienced glider guiders are familiar with the Airtronics Vision 8SP eight-channel, PCM/PPM FM computer sailplane radio. It is a radio which can cost upwards of $500.00 and more, but can do virtually everthing a scale or ultra-serious competition sailplane pilot could possibly ask for in the way of adjustments and mixing. Its software was designed by US sailplane fliers, and parts of the Vision (I believe the computer parts) are actually made in the US as well.

Well, the Infinity 600A (IN600A) is a six-channel computer radio that can do most of what the Vision can do (more in some areas), but at almost half the cost! Call it a chip off the old Vision block!

Unlike the Vision 8SP (sailplane version) or Vision 8P (power version), the Infinity can be considered a one-radio-for-all system. Considering its lower cost and increased flexibility, the Infinity is a smart marketing move by Airtronics.

Infinity 600A System Features are:

- Memory for four model setups (same as Vision 8SP but 8P has only three).
- Non-volatile memory, no backup battery (same).
- User-assignable transmitter switches (same as VS8P, VS8SP to a lesser degree).
- Dual rates on ailerons, elevator, and rudder (same as VS8P, but VS8SP has only A/E).
  Two fully adjustable snap roll programs (VS8P has three, VS8SP has none).
- PPM/FM or PCM/FM operation (same).
- Programmable fail safe in the PCM mode (new feature!).
  Plug-in high capacity transmitter battery (IN600A has 600 mAH, VS8's have 700 mAH).
- Low voltage alarm for TX battery (same).
- Plug-in RF module (same).

Mixing capabilities:

- Aileron/rudder mixing (same).
- Elevator/flap mixing (same).
- Flap/elevator mixing (same). (No, it's not the same as elevator/flap)
- Flaperon mixing (same).
- Elevon mixing (same).
- V-tail mixing (same).
- Crow mixing for sailplanes (VS8P no, VS8SP yes).
- Bi-directional mixer for any two channels (VS8P yes, VS8SP no).
- Compensation mixer for any two channels (VS8P yes, VS8SP yes but not assignable).

Convenience features:

- Servo reversing on all channels (same).
- Adjustable travel volume on all channels (same).
- Electronic centering adjustments (same).
- Fully proportional auxiliary channel (same, but with VS8SP all aux's have as signed functions as determined by the mixing software, this appears to be a "free" channel in the IN600A).
- Two aileron servo operation (same).
- Electronic differential in two aileron mode (same).

There are some nice features that the Vision has for sailplaners that the Infinity does not, namely, the flight mode switch (camber/elevator presets), elevator/camber mixing via proportional camber lever separate from flap lever (or trimmable trailing edge [flap and aileron] with pitch compensation), elevator presets (just use the elevator trim tab with IN600A and mentally note the "clicks"), dual flap servos with inboard and outboard flaperon mixing possible with VS8SP, there may be other features but these appear to be the major points that I can see. Anyway, these are things most of us can live without or program around, and in most cases won't miss.

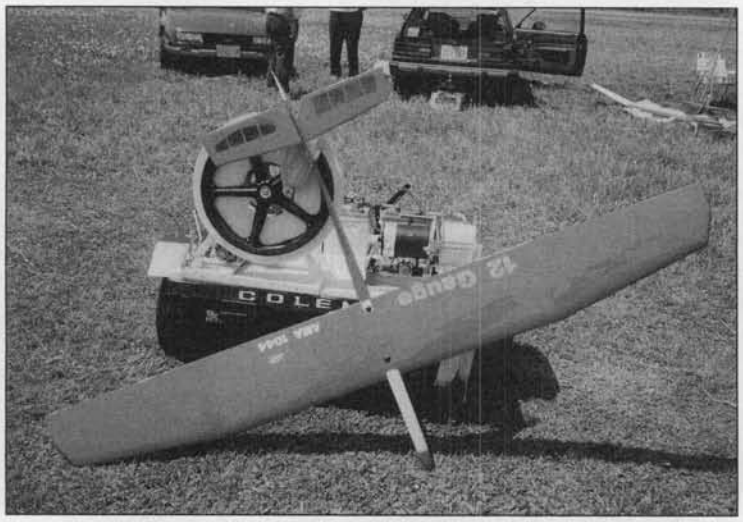
PACIFICA SLOPE AEROBATIC CONTEST

Late notification was received as this column was being typed for a rather unique slope glider contest. Jeff Raskin (CD) phoned to say that he is organizing an aerobatic contest near Pacifica, California. The date is set for August 25, so time is short for planning if you wish to participate or observe.

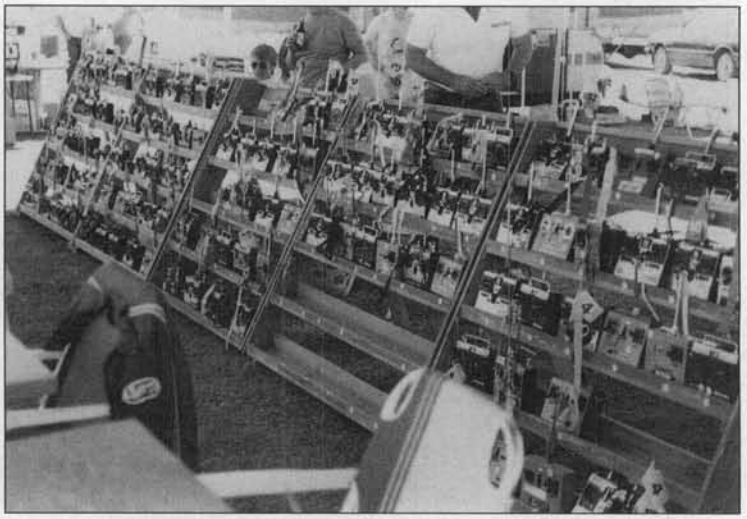
Jeff has much experience with this contest format, and he says that this experience has taught him a more fair way to judge an aerobatic contest. Rather than assign a sequence of maneuvers to everybody, then have the contestants fly the sequence one at a time (which leads to gripes about wind fluctuations and "weather luck"), he has three or four guys up at once in the same air, flying man-on-man. One at a time, each guy flies one maneuver. This way the first flier is living proof that the air is indeed good enough for the task. Judges award points after each maneuver. This way each judge has the same manueuver fresh in his mind. Jeff says with a good slope aerobatic ship, namely one with a symmetrical airfoil, all of the pattern maneuvers (with the exception of those requiring the torque or power of an engine) are possible.

Because this is the third annual such contest, and because the organizers have good experience in pulling off such an event,

continued on page 108



Brian Smith's original design "12 Gauge" two-meter ship with which he plans to "shoot down the competition." Foiled Again software produced the rib patterns which Brian used to construct the wing. Brian's snappy winch/retriever trailer in background.



Normally full when contestants aren't flying, the Visalia Fall Soaring Festival's transmitter impound area gives an idea of the wide variety of RC systems which are available. Not one of these is a two-channel "beginner's radio" . . . for many very good reasons. Beginners take note and read why not before you make your purchase.

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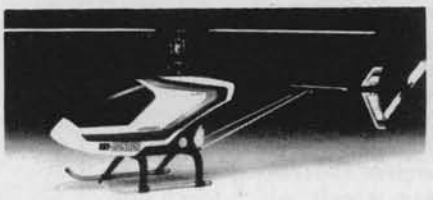

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MODEL DESIGN & TECHNICAL STUFF

BY FRANCIS REYNOLDS

BEAT THAT BOUNCE!

Let me try to define the word "bounce," as used with respect to airplanes. A rubber ball bounces by storing energy in compressed rubber. A plane may truly bounce due to stored energy in the landing gear, but that is much rarer than another thing we call bounce.

What really happens, when a landing airplane doesn't stay down after hitting the first time, is something else entirely. The airplane may appear to "bounce," but it really took off again, maybe for several short hops. The susceptibility of a plane to this kind of bouncing depends chiefly upon the type and setup of the landing or float gear, and to a lesser degree upon the roughness of the field, be it land or water, and upon the skill of the pilot. One landing is good but several in quick succession is not better.

A properly adjusted tricycle gear will not "bounce" in this manner, but a conventional taildragger gear will, if the landing is careless. The difference is that the main wheels, which touch first, are ahead of the balance point on a taildragger, and behind the balance point on a trike job.

Take a look at Figure 1. In a two-wheel landing with the wheels ahead of the bp, if there is a significant sink rate at the moment of touchdown, the upward force on the wheels will cause the plane to pitch up. If it wasn't already stalled, the resulting increase in the angle of attack increases the lift and causes the plane to take off again. If the pilot was trying to land, he should have been somewhere near stall, so his new "hop" is usually a short one. Drag rapidly eats up the remaining energy above stall velocity, and the plane lands for the second time.

It may land for a third or fourth time if the pilot really came in hot, and if he eased off on the elevator after the first bounce, so the second "landing" was also above stall speed. He had *better* ease off, however, if the first bounce is a high one. A stall at the altitude he may reach in a bad bounce could cause a crash that would be much worse than a few bounces.

Most taildragger airplanes are designed so the wing is at stall angle of attack as the piane sits on the ground. A "three-point landing" means the tail wheel touches at the same time as the main wheels, and this prevents the airplane from pitching up and taking off again. No bounce.

An experienced taildragger pilot can make another form of bounce-free landing, but it takes a bit of skill and timing. He comes in well above stall speed, and therefore at a lower angle of attack. The main wheels touch first, but he has reduced the sink rate to essentially zero at touchdown so there is no force to pitch the airplane up.

He does not pull back on the stick in such a "two-wheel landing." In fact, he may push the stick forward a tad at touchdown to assure that the angle of attack stays where it

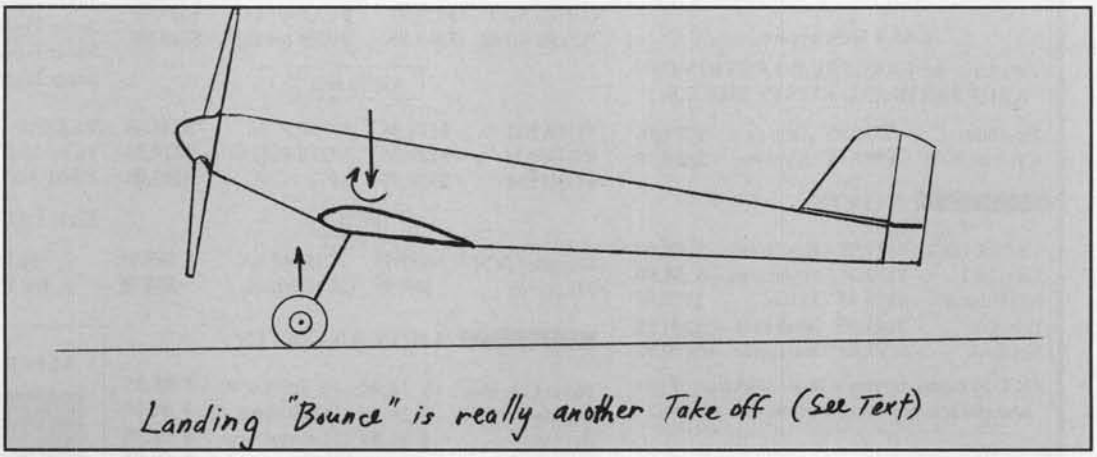


Figure 1. Landing "bounce" is really another takeoff (see text).

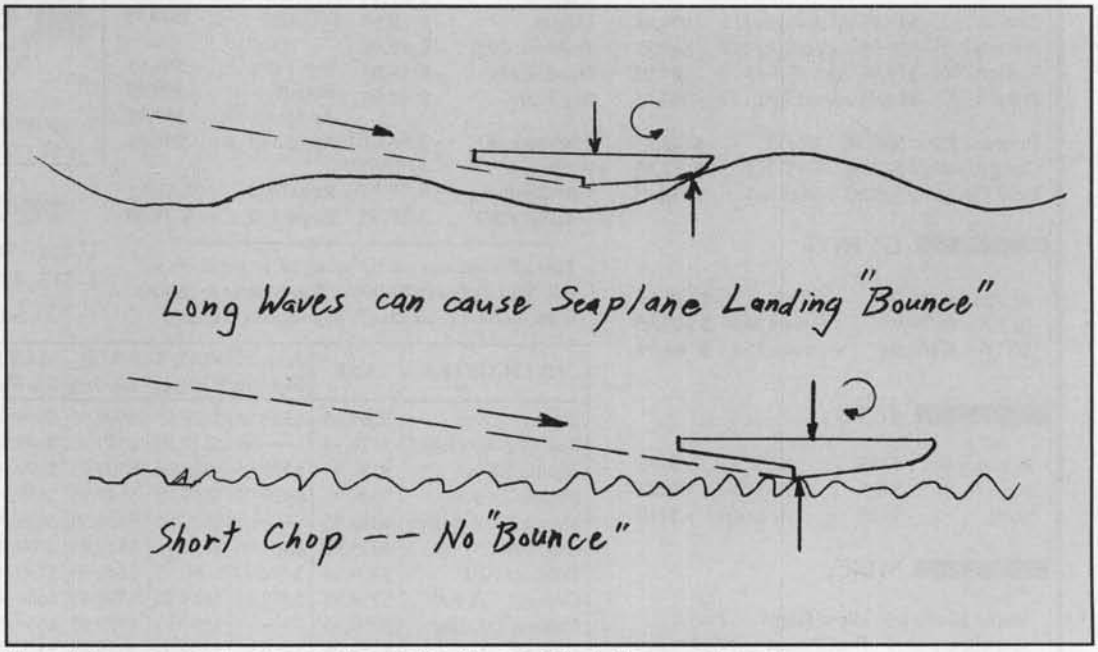


Figure 2. Long waves can cause seaplane landing "bounce." Short chop . . . no bounce.

was or goes a bit lower so the plane won't take off again. The tail is held up until the excess energy is consumed by drag and wheel friction. Eventually the velocity drops so low that the lift of the stab can no longer support the tail weight, and the tail comes down, regardless of what the pilot is doing with the stick at that late point.

With tricycle gear the main wheels (should) always touch first, but as they are aft of the balance point, both the point of support and the wheel friction tend to pitch the plane down to an angle of attack below which it can generate flying lift, so it stays on the ground. No bounce.

The tail of a jetliner slowly *rises* after touchdown. The tail skid (yes, jetliners usually have a tail scuff plate for emergencies) is close to touching when the main wheels touch down, and the plane is close to a "three-point landing." But as soon as the wheels touch, the down-pitching moment (from wheel position and drag) starts bringing the tail up. The negative stabilizer lift, due to holding the stick back, keeps the jet from suddenly banging forward onto the nose wheel(s). I'll bet most passengers in the aft end of an airliner don't realize that they "climb" many feet *after* landing.

SEAPLANE BOUNCE

I got to thinking the other day. Thinking is not always a good thing to do, but sometimes the results are interesting. I was wondering about re-takeoff "bounce" with seaplanes, both flying boats and floatplanes. I had noticed that even with a well-set-up float system, sometimes I couldn't seem to grease-on a landing without bouncing, and sometimes, when I didn't half try, there was no sign of a bounce.

Going back to my comment that rough fields affect the amount of or absence of landing bounce, it occurred to me that seaplanes have variable-roughness landing fields. If the water was smooth I could always make bounce-free landings. If the water was rough, I sometimes landed smoothly, but sometimes bounced. I think the variability of the waves and chop combined with insufficient bottom angle was responsible for my inconsistent landings.

It appeared to depend on two things: the height and frequency of the waves, and the angle of the forward bottom of the floats or hull. Let's assume the float bottoms are parallel with the plane of the water as we come in. If there is any wave action at all, the forward part of the bottom of the palne will run into a wave and pitch the plane up so it takes off again or bounces. Have a look at Figure 2.

The step should be at or slightly aft of the balance point, therefore, if there is sufficient angle to the forebottom, the area adjacent to the step will touch the water first and pitch the plane *down*, preventing bounce. For smooth water and a well-flared landing, it takes very little forebottom angle to allow the first contact with the water to be at or aft of the balance point.

In effect, a seaplane with insufficient forebottom angle is like a taildragger, and a seaplane with plenty of forebottom angle is like a tricycle-gear landplane, with respect to touchdown ahead of or behind the balance point, and therefore in susceptibility to landing bounce.

Plenty of angle? How much forebottom angle we need to prevent bounce depends upon our skill as pilots, upon the type of landings we want to make, and upon the size and nature of the waves. If we want to make hot touch-and-go's or fly from rough water, the angle must be greater.

As to waves, as Figure 2 shows that if we have widely-spaced swells, we may just clear one wave and bump into the steepest part of the next wave with the forebottom, causing a bounce. On the other hand, if the waves are close together, even though they may be higher, bounce may be less of a problem, because the plane can't sneak down between the closely-spaced waves. It can only hit the nearly-level tops of the waves, making contact near or aft of the bp. No bounce.

If the step is far enough aft, increasing the forebottom angle will almost always cure any bouncing problems. I previously used plus three degrees bottom angle, but lately I have been using six degrees with respect to the fuselage reference line. High speed touch-and-go's are now bounce-free even in pretty rough water.

By the way, some designers talk about the angle of the *top* of the floats and say nothing about the angle of the bottom. Some don't even say whether the float bottom is parallel with the top. Most of my floats are *not* parallel. Forget the top. It has no effect on hydrodynamic performance. The bottom angle is the bottom line.

Lawrence Peterson and his Beech Staggerwing electric RC. Twenty-one-inch span and eight ounce gross weight! See text. Photo by Gene Wood.

MODEL PERFORMANCE ANALYSIS BY COMPUTER

One of the most remarkable letters I have received from a reader lately was one dated March tenth, written by Dick Huang. Correction, Dick's letter itself wasn't particularly remarkable, but the enclosures with Dick's letter were.

Dick was intrigued by the performance of Tom Davis's very-high-power-to-weight-ratio Spitfire model which I discussed in the April 1991 "MD&TS" column, so he "developed a computer program to solve the standard equations of motion in three degrees of freedom," which he had then applied to Tom's Spitfire.

Dick included seventeen pages of computer printout data, on the TD Spitfire (Dick says the TD stands for Tom Davis, but it could also stand for the Cox TD. 09 which powers the model).

Dick also sent a 5-1/4 inch floppy disk, which fortunately runs on my IBM computer. My appreciation of Mr. Huang's efforts really came alive when I watched his program do its thing on the CRT screen. I've seen model design and performance programs spit out results before, but not on a second-by-second basis during a flight, like this one does. Dick had the computer compare the performance of Tom's Spitfire wearing a 6x4 Cox nylon prop to its performance with a 7x4 Zinger (the Zinger zinged better on this airplane).

One first inserts data into Dick's program as to the type of TD Spitfire flight he wishes to study. I asked for a vertical climb (for which Tom's Spitfire is noted) and told the computer to do its thing. The screen filled with data readings for all of the different

parameters of flight for the first second of that flight. Data such as velocity, altitude, angle of attack, thrust, mass, lift, drag, lift-to-drag ratio, thrust-to-weight ratio, acceleration, etc. After some seconds, the screen cleared and refilled with similar data for second number two of the flight, and so on, clear up to an assumed engine cutoff at 60 seconds, second-by-second all the way. Most impressive, and interesting to study.

I noticed that the thrust-to-weight ratio and therefore the vertical velocity was increasing slightly as the flight progressed, so I looked at the rest of the data to see why. The thrust was dropping off somewhat as the air got thinner with the increasing altitude, but the weight was dropping faster than the thrust was dropping, because it was burning off fuel.

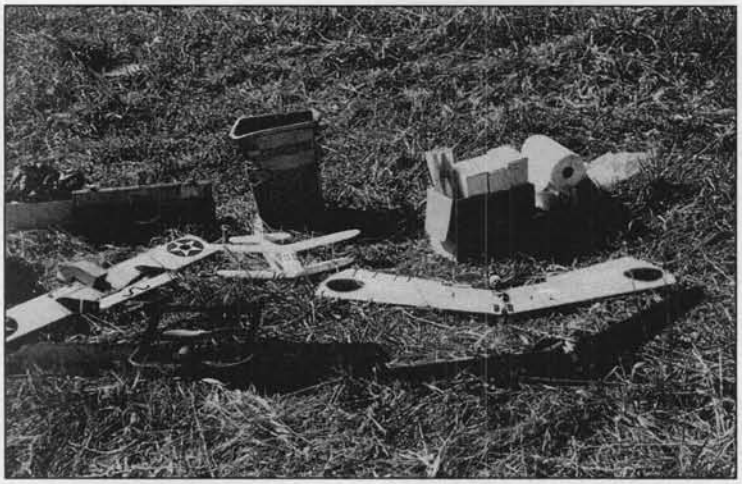
The data in Dick's program is theoretical, but he has been able to do a little testing to check it against reality. Last August, he and friend, Joe Percy, ran tests on one model and came within 2% to 10% of the program values. They put a one-ounce altitude-recording Casio watch (No. 376) in the plane to get the altitude data.

Dick's effort is the most comprehensive model performance program I have seen. It certainly took him hundreds, and perhaps several thousand hours to develop. Dick has indicated that he might sell copies of the program, if there is an interest. His address is: Richard Huang, 4032 Deep Valley Dr., Dallas, TX 75244.

ELECTRIC POWER

Yes, you are still reading the right column. My friend, Mitch Poling, should be writing this, but he toddled off to Germany a year or so ago, so I'll give him a little help from the home front.

Last Saturday I went out to the "Sixty Acres Field" north of Redmond, and east of Seattle, Washington, to watch some RC electric flying. You may recall that I have tried electric power in the past, but decided it wasn't for me. I am too spoiled by lots of power and as much duration as I want. I like hot dog aerobatics and vertical performance. I didn't get that out of electrics . . . but things change.



Author discusses these high-performance small ultralight RC electrics. Photo by Gene Wood.

Peterson's Staggerwing in action. Gene Wood photo.

I was told, by Tom Davis, that I would see hot dog aerobatics and vertical performance by electrics there. I did. The Sixty Acres Field is for flying sailplanes and electrics. Fuel burners aren't allowed there, but are flown at Marymoor Park, a couple of miles away.

The electrics were all small, but perform . . . WOW! The smallest was a scale all-foam Beech Staggerwing flown by Lawrence Peterson. It had a span of 21-1/2 inches and weighed 8 oz. flat, complete with three-channel control, motor, and batteries! This model started life as a commercial rubber-powered job. It looked like it ought to be true to its name and stagger around the field for a minute or two before it ran out of battery.

Surprise! It flew for a full eight minutes by my timer, and it didn't stagger around the field. It was all over the sky. It climbed out of sight twice, and probably could have made it a third time. It looped inside and out, made low inverted passes, rolled, etc.

This little electric Beech had graduated from an extensive Weight Savers program. I think it was trying to get its weight back down to where it was as a "rubber model." The receiver was partly homemade and had no case.The motor speed control was built into the receiver by hand, as was the decoder. It even used a special subminiature local oscillator crystal.

The servo cables and the antenna were made of number 30 wire. The servos were Cannon micros at about 0.4 oz. each. Lawrence says he plans to take the cases off the servos to lighten them up. The power battery was six 270 mAH cells. A receiver battery eliminator with a saver circuit was used.

The prop was a six-inch plastic for rubber-powered models, and was so thin and flexible it couldn't break. The motor was 20mm in diameter and would fly the plane at half throttle on ten watts. It used a homemade gear reduction with a ratio of 5.6:1. That let the little motor sit up and whine. Static thrust was four ounces. Not much, but a lot for an eight-ounce electric airplane.

Tom Davis flew a half-size Klingberg Wing. That is half-scale of the Klingberg Wing model, by the way. Again very light and very impressive. Tom's model weighed ten ounces total and had a 5.2:1 gear ratio. It covered even more sky faster, and was still more aerobatic than the Beech. It recorded a six-minute, seventeen-second flight of all-out aerobatics.

Roland Peterson (Roland seems to be a common name among electric modelers) flew several original small, light electric RC models similar to the control line combat configuration; almost flying wings, but with small close-coupled stabilators. Again fantastic aerobatics, speed, vertical performance, and duration. Roland and brother Lawrence are in business as Model/Tronics, selling kits of these high-performance, small, fun-fly electrics. Their address is 3824 24th Ave. W., Seattle, WA 98199. Phone (206) 782-9185.

PARTING WORDS

This is a true story. Bill Lear, founder of Lear Aircraft, the manufacturer of the Lear Jet, was noted for his idiosyncrasies. For instance, I heard many years ago that he had named his daughter "Crystal Chanda Lear." That sounded like a wild tale, but I later had a chance to check it. I hired an engineer, Cloyd Cockrum, who had previously worked for Bill Lear, into my organization at Boeing. I asked him, "Is it true?" To my surprise, Cloyd answered, "Yes, I knew Crystal personally. I also knew Bill's son, Gay Cava Lear." (This was back in a time when gay meant happy.) Oh well.

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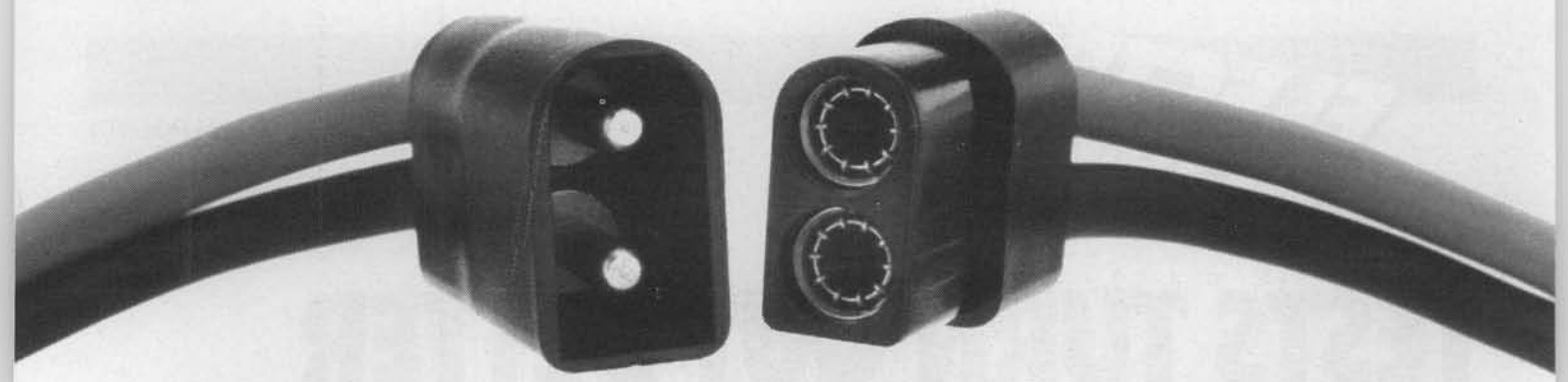

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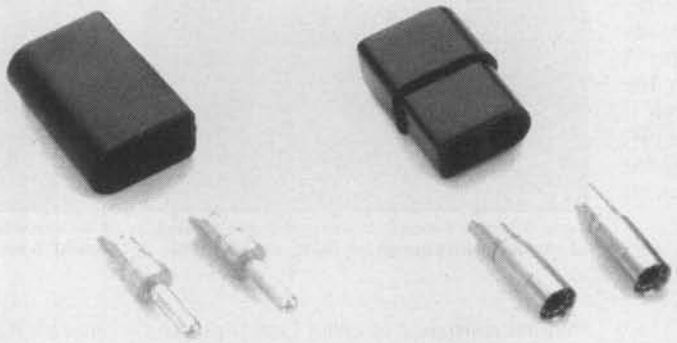

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ELECTRIC POWER

BY MITCH POLING

TESTS TURN OUT BETTER THAN EXPECTED

This month I tested my Sanyo 1700 SCE pack, and got a surprise! It is much better than I had thought! Up until now I had been familiar with the reports that these cells have higher internal resistance, get hotter, are harder to charge, and are more easily damaged. That made me shy of them. But here are the numbers I got for my seven-cell pack, which by the way, is nearly three years old, though it probably has only about thirty charge/discharge cycles on it. The pack was charged at six amperes on a peak charger (Navcom, no longer made).

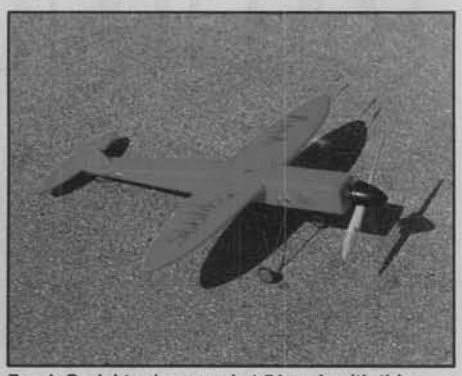
Minutes	Volts	Amps	Amp Minutes
0	9.35	9.8	0.0
1	8.60	9.3	9.6
2	8.39	9.2	18.8
3	8.36	9.2	28.0
4	8.31	9.2	37.2
5	8.24	9.2	46.4
6	8.16	9.2	55.6
7	8.08	9.1	64.7
8	7.98	9.1	73.8
9	7.80	9.0	82.8
10	7.59	8.9	91.8
11	7.12	8.6	100.5

This works out to 100.5/60 equals 1.675 Ah or 1675 mAH, which is almost exactly that promised by the label. I also checked the internal resistance by a voltage reading before and after a load. I got 8.90 volts before the load, 8.43 volts after the load at 9.4 amperes. This works out to 7 milliohms per cell! This was astonishing, right down in the SCR range. I will start to do more flying with SCE cells, to see how it all goes in practice. If you compare these numbers with the ones given for the 1400 SCR and the 1500 SCR packs in the August and July columns, you can see that the 1700 SCE pack is very impressive indeed. The SCE pack did not get any hotter than the SCR packs, which agrees with the very similar internal resistance. I would be very interested in hearing from others who are using SCE cells for electroflight. From these tests, they look better than anything else I have tested.

Does anyone have another way of testing internal resistance of cells? One problem I have with the method just described is that the voltage reading after the load is a "moving target." It is lowest immediately after the load, then rises steadily. For the SCE pack, for example, a load test ran like this: 9.25 volts before load, 8.60 volts immediately after a 9.4 amp load, rising to 9.10 volts after about 20 seconds. I use the value immediately after the load. The value also varies according to whether the pack is warm or cold, with lower values for a warm pack.

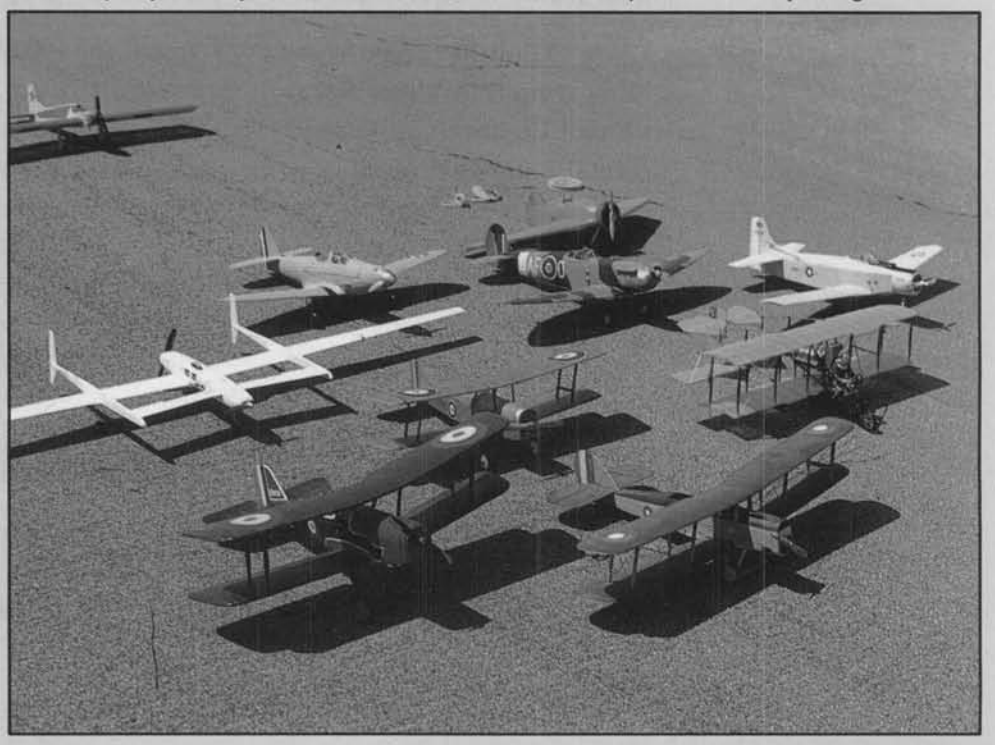
The above was for a cold pack, and gives 9.9 milliohms per cell. So, the values you get

Tony Mizzan's Seagull, cruising, but not on step, at 46 watts. Not enough for ROW, but will ROG.



Frank Godel took second at 51 mph with this speed model U/C.

There was plenty of variety in control line electrics at the Astro Champs event . . . four years ago!



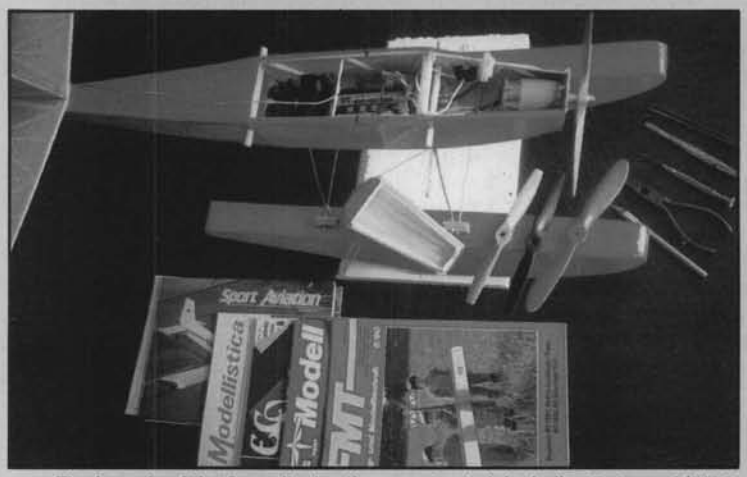
with this method vary. You are best off if you compare different battery packs under the same conditions, that is, try to pick off the voltage at a constant time after load, and at comparable temperatures. Comments from readers are invited!

Roy Brown wrote to me about building his Eclipse, and mentioned that he was breaking in the Mabuchi 550S motor that is included in the kit. That reminded me that Ted Davey, in his column in the February issue of *RCM*, had mentioned that he does not break in the 550 can type motors. In fact, neither do I, but I had not stopped to think why. So, I took the Mabuchi 550 metal back can motor that came with the Midwest Electric "Hots" and tried to give it the "water break in" treatment. This is very effective on the off-road motors with removable brushes.

Just hold the back end of the motor under water while running at half voltage. You will see a cloud of black coming out into the water, and in about five to fifteen seconds, the brushes are fully seated. The gain is usually about a thousand rpm. Hard brushes take longer, up to thirty seconds, soft brushes take hardly any time at all, like two to three seconds. I ran the 550 with the brushes under water for twenty minutes! No black cloud, and no break in! At the end of this abuse, there was no visible wear on the brushes. The motor did not change in power, just the same as before.

My conclusion is that break-in is not practical on these motors, so don't bother. Ted is right! The brushes are so hard that they are probably just about the same hardness as the commutator, and both will probably wear out at about the same time. I have a Skil cordless drill that I use heavily, and I bought it fourteen years ago. The 550 type motor in it shows no sign of the brushes wearing out. The 550 motors are inexpensive, come in many kits, have a very good power/weight ratio, and have metal backs for heat handling. We might as well accept them for what they are; good basic motors that are not likely to be improved by anything we can do to them.

George Beaver wrote and asked what charger I would recommend as he and Bill Baker fly a large variety of power systems, and are considering going up to the larger motors, such as the Astro 25 and 40. This question made me really stop and think. I know what I like, but I don't have a charger that has all of what I want in one package.



The innards of the Seagull, plus the props tested, including 7x6 wood (8100 rpm) made in the Philippines, 7x4 Taipan (8700 rpm), original Krik 7x4 (7600 rpm), and 8x4 Top Flite Super M on model (8050 rpm).

Addie Naccarato with her Curtiss pusher, which placed first in C/L Scale at the '87 Astro Champs.

Addie Naccarato with her U/C Stunt, 05 Astro cobalt, original design, which took first place.

The Barden brothers . . . John, left, with his SE-5, and Seth, with a Thomas Morse Scout, both from Guillow kits.

I like a charger that can charge from one to thirty cells, charge at up to eight amperes on all packs, including thirty cells, and runs off of 12 volts. I would like to have a reliable peak detector, so that I don't have to watch the charge. As far as I know, there is nothing in Europe like that. There are computer controlled chargers available here, but none that will put out eight amperes.

The best charger that I have for up to thirty cells is the Astro DC/DC charger. It will

maintain five amperes even with the big packs, and my charger has been very reliable. I have had it for three years, and I use it a lot. It is the best value for the dollar on the market, and I recommend it. Suggested retail is $130, but this is often discounted. CS Flight Systems sells it for less, I believe. It does not have a peak detector.

There is a computer-controlled peak detector available, from Tim Ahrens, Rt. 6 Box 54J, Austin, Texas 78737, for $125. This will convert the Astro DC/DC into a peak detector charger. I have had a couple of letters from readers who have been quite satisfied with this conversion. The other charger that I use a lot for larger battery packs is the TRC Impulse IV. This will charge 1 to 18 cells at a constant four amperes, and has the best peak detector circuit available anywhere. It stops the charge right at the peak, it does not have to wait for a drop in the voltage. It does have a voltage booster that I find is very noisy, a high frequency sound that is probably about 5000 Hertz. A soundproof box helps quite a bit. The charger does not get hot, so it can be put in a box. I have used my Impulse IV for four years with no problems other than a loose relay cover that I fixed myself. The Impulse IV is available from CS Flight Systems, 31 Perry St., Middleboro, MA 02346, for $115.

Now, back to Ted Davey! In his column in the April issue of *RCM*, he describes the new charger from TRC, the Impulse Six. It can charge up to 32 cells from a 12-volt battery, at up to 8 amps! I do not have this charger, so I cannot offer my own experience with it. I am definitely going to try to get one, however, as it fits exactly the requirements I am looking for; eight amps, peak detecting, and up to thirty cells. Ted did not have a price on this charger. If you are interested in this charger, I suggest that you contact CS Flight Systems. They will be the ones that will most likely have a reliable supply, and a "best price." Telephone (508) 947-2805.

Speaking of mail order, I support my local hobby store whenever possible, however, now that I am overseas, I have to mail order anything that I would buy in the U.S. This means that I have accumulated some experience with mail order companies. I have had good experience with C.S. Flight Systems, Hobby Shack, Indy RC, Balsa USA, Ace RC, John Pond Plans, and Hannan's Runway. Hobby Lobby and Tower have good reputations over here too, but I have not had occasion to do business with them yet. I have had bad experiences with four companies; one was selling computers, two were selling mostly off-road car stuff, and one was a general supplier who had been OK when I was in the States, but seems to have trouble with APO orders. In these cases, I waited three to four months, and finally cancelled the orders. Thus one learns.

Tony Mizzan sent photos of his "Seagull" that he built from the tracings I sent him. The tracings are still available, for an SASE plus $1 to cover my copying expenses. Tony flies his plane in Switzerland, and he tested severely my statement that the plane will fly on "any" 05! Tony builds very light, and I think he came out at about 36 ounces for his plane on floats. But, it would not ROW! He then converted it to wheels, and it would do slow ROG from pavements and long gentle flights.

Tony did send me rpm data, and I was able to work out the speed constant and armature resistance, and from that the characteristics of the motor. It turned out that the motor, which came from a glider kit marketed in Spain, was wound for eight cells. On six cells it would not put out more than fifty watts! For ROW, you do need about 80 watts for this plane. However, once in the air, the Seagull needs very little power. I like to fly mine on half power. At half throttle, it will fly for fifteen minutes easily on a six-cell 1200 SCR pack. This is with the motor continuously running. I use a Benson, Jomar or Flightec throttle, all work well. All are high frequency throttles. I would not use a low frequency throttle at half power for fifteen minutes, it would produce a lot of heat in the motor and battery pack. Anyhow, I think Tony's motor will do the job on seven cells.

Way back in 1987, Tony Naccarato sent me a batch of beautiful photos of the 1987 Astro Champs. Somehow I managed to misplace them, and I just found them while rummaging through my stuff. In case you haven't guessed, my organization and filing resemble that of the "Perfesser" in the comic strip "Shoe"! So, here are some photos to give Tony, Astro and the contestants some credit. These planes are all U-Control, and all are powered by battery packs in the plane, not from belt packs. The only way to go!

The speed model is Frank Godel's, he got second with 51 mph, while Addie Naccarato got first with 57.3 mph! The two boys are John Barden with his SE-5 from a Guillow kit, and Seth Barden with his Thomas Morse Scout from a Guillow kit. They won first and second, respectively, in junior scale. Addie won first with her Curtiss pusher using an Astro 035 with five cells. Addie also won stunt with her beautiful original design using an Astro 05 cobalt motor. The last photo shows the variety of control line electrics at the contest. Fantastic! It ranges from the Voyager to the Curtiss. Sorry to be four years late with this, but better late than never? Thank you, Tony, for the photos.

Speaking of contests, the world famous KRC Electric Fly is in September at Hatfield, Pennsylvania. Enjoy! Till next time, join the winning circle with electrics! My address is: Mitch Poling, 7100 CSW/MC, Box 734, PSC 2, APO NY 09220-5300 for U.S. postage, or international postage is Normannenweg 20, 6200 Wiesbaden-Biebrich, Germany. **MB**

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ELECTRONICS CORNER

BY ELOY MAREZ

LET'S TALK RECEIVERS AND CRYSTALS AND SUCH!

We'll start off this month's discussion with a letter from one Edwin R. McLane, of Grahanna, Ohio. Ed writes:

"I have a question I hope you can answer for me. I have a Futaba FP-5NLP five-channel PCM radio with R105iP receiver. I would like to know if the Futaba transmitter will work with a Kyosho five-channel PCM receiver.

"The big reason for this question is money. Tower Hobbies has the Futaba receiver for $139.99, and the Kyosho receiver for $59.99. I don't care if the so-called fail safe feature works or not, I only care if the five channels work."

Both the question and Edwin's reason for asking it make a lot of sense. What does not make much sense is the pricing for the equipment mentioned; $139.99 for a receiver for a system that when it was on the market sold for about $230! While on the subject, a lot of older equipment still shows up in the mail order ads for what could be attractive prices until one considers that it does not meet the current narrow band specs, nor can it be made to. Buyer Beware!

As for friend Edwin, he is out of luck also. To clarify a point that is obviously not clear to a lot of RCers, PCM is a method of encoding. Consider the name: Pulse Code Modulation . . . nothing is said about TRANSMISSION! The encoded PCM information is actually being transmitted on FM, and by and large, most all brands of PCM and FM equipment are quite similar in both transmitters and receivers, *except* for the encoding and decoding.

Anyway, PCM encoding takes place in a computer type of "language," and none are bilingual! That is, a given receiver will only interpret the language from it's companion transmitter, and none other. In the above example, we might say that the Futaba transmitter talks its home tongue of Japanese, while the Kyosho receiver responds only to its national Korean.

Which is a way of saying that the Kyosho equipment is made by Hitec, who also sells PCM equipment under that brand name through RCD (Radio Control Development, Inc.) in California. Apparently the Kyosho and RCD systems speak different dialects of Korean, because they are not compatible either, nor will either work with previous Hitec systems sold by Polk's (Challenger) or World Engines (Expert). In the case of these different brand house radios, it makes sense that they are not compatible . . . they are made available to the consumer by entirely different companies. In other cases though, it is harder to accept that a new series completely obsoletes all previous equipment, as is the case with the different Futaba PCM systems.

pF	nF	μF	mF	FARAD
1,000	1.0	0.001		
10,000	10.0	0.01		
100,000	100.0	0.1		
1,000,000	1000.0	1.0	0.001	
	10,000	10.	0.01	
	100,000	100.0	0.1	
	1,000,000	1000.0	1.0	0.001
		10,000	10.0	0.01
		100,000	100.0	0.1
		1,000,000	1000.0	1.0

pF = picofarads (10^{-12}) nF = nanofarads (10^{-9})
μF = microfarads (10^{-6}) mF = millifarads (10^{-3})

What about the others? Well, I can tell you about Airtronics . . . all of its latest receivers, PCM, et al, are compatible with older transmitters. I cannot speak for JR—which is a rara avis here in Southern California and I have absolutely no experience with any of it current systems. In all cases, it is best to ask before plunking down your money.

ANOTHER RECEIVER QUESTION comes from another Futaba 5UAP flier, John Hipwell, writing from Calgary, Alberta, Canada. In relating the trials and tribulations of trying to obtain a second receiver for his system, John writes:

". . . in this case, the Rx (receiver) happened to be on the wrong frequency-it was as far as we could ascertain `factory' and fitted with a D.C. (Double Conversion—em) crystal. Obviously, it was returned for exchange or frequency change. The latter was done, but on receipt it was noted that the crystal fitted was of the older FM type.

"Getting down to my question, can you clarify the difference between these two crystal types, and their respective merits with particular reference to this Rx in today's narrow band environment?

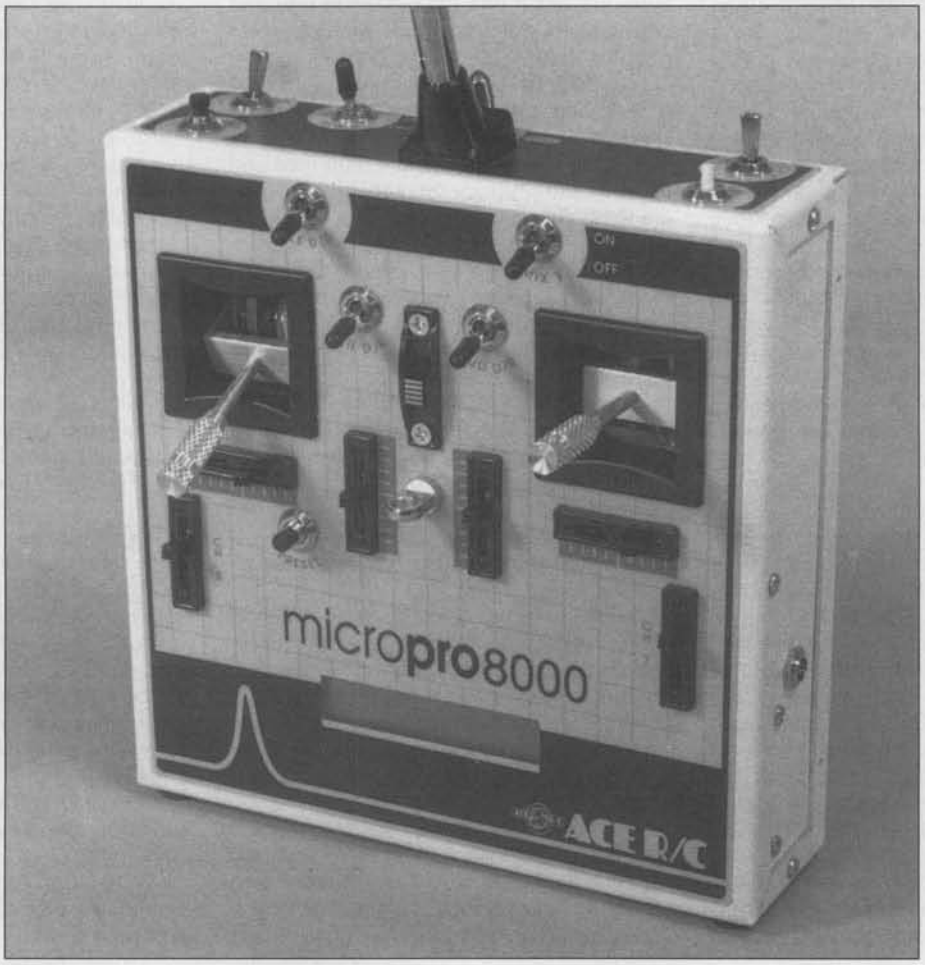
"In this part of North America we do not have any problems with pager systems, although we shall no doubt have to face this problem in the future. The Calgary RC Glider group members are all flying narrow band equipment."

In the first place, it sure sounds like John needs a new supplier! Without a doubt, the receiver as received was not "factory," as it is not a double conversion unit and did not have the proper crystal installed. Though the receiver in question is a PCM unit, as I mentioned earlier, the actual signal transmission is FM, and in the case of Futaba equipment, the crystal and frequency module in equipment so equipped, is marked simply "FM". There is no such a thing as a PCM crystal . . . if any company now or in the future identifies them as such, they indicate only that they are intended for use in that particular brand of PCM system.

Basically, regardless of equipment brand, there are four different types of crystals in common RC use; AM, AM Double Conversion, FM, and FM Double Conversion. Each system manufacturer's crystals in each category are specifically selected to work in designated equipment on the desired operating frequency, and will definitely not work correctly in any other type of equipment, even of the same brand. In some cases, a crystal used by one system manufacturer might seem to work in some other maker's

similar equipment; i.e., AM transmitter to AM transmitter, but there is no guarantee it is indeed operating with the necessary frequency and bandwidth requirements. It is definitely best to stick to the original crystals as supplied by the original equipment manufacturer.

Just what are we talking about? Well, a frequency crystal is nothing but a piece of rock . . . quartz in this case. We are making use of a characteristic of quartz that when a current is applied to it, it will oscillate at a frequency determined by its physical characteristics, such as molecular structure and thickness. A crystal has what is called it's fundamental frequency, which is the basic frequency at which it will oscillate. The point to remember is that seldom is the fundamental crystal frequency the same as the operating frequency of the equipment in which it is installed, as the fundamental frequency can be multiplied many times, added to or subtracted from, to arrive at any desired operating frequency. Furthermore, any given crystal will operate correctly, frequency-and power-wise, only in a circuit to which it is matched and vice-versa. Any other crystal of the same fundamental frequency but of different characteristics will often oscillate and appear to work, but at best, some "pulling" of the operating frequency will occur. That is, it will not be exactly on the desired frequency. Do not mix crystals!



The Micropro 8000 transmitter by Ace R/C.

Back to John up there in Calgary. Futaba lists three of the crystals listed above: AM, FM, and FM Dual Conversion. By now, as you are an expert on crystals, there is no need to explain the categories any further, but so there is no confusion anywhere, the 105iP receiver used with the 5UAP system, NOT being a double-conversion receiver, needs a plain FM crystal for correct operation.

Now that we've got our Canadian friend properly crystallized and ready to fly, he will be able to enjoy those long days they have up there this time of year. Happy Landings, John.

CRYSTALS OMT!

In the four categories mentioned earlier, I included one that is little used, AM Double Conversion. Though R/C system manufacturers are currently producing more, and in some cases, only, FM equipment, there have been some recent introductions of higher quality AM equipment than we had seen in recent years, and using double conversion AM receivers. One such is a double conversion AM receiver from RCD, obviously offered as an update for those with older receivers but still usable transmitters.

Another newly introduced system, a one-of-a-kind design, is Ace R/C's Micropro 8000 system. This is a modern system in all respects, microprocessor, LCD display, fully programmable . . . but different from all others; transmitting not FM or FM-PCM, but AM. The companion double conversion Pro 810 receiver is also available as a retrofit, with some attractive trade-ins for owners of older Ace receivers. Check it out!

Aside from that, the price of crystals is unexplainedly high. Futaba wants almost $30 for a set of them for John's 5UAP! That makes some of the ads that we sometimes see, offering R/C frequency crystals at bargain prices mighty attractive. Resist the temptation . . . as explained, all crystals are not created equal. While all these cheapie crystals might do is interfere with the guy on the channel next to yours, the reverse can just as easily happen . . . he might shoot you down! Or you might not have normal range, and whether you would admit it or not, it would be your fault. Just to save a couple of bucks, it isn't worth it.

THERE IS GOOD NEWS as regards all this narrow band business. At least a lot of us see it that way, though it might upset those who insist on continuing to fly their EK and Orbit equipment.

The fact is that in a Report and Order dated April 10, 1991, the Federal Communications Commission (FCC) has established federal narrow band requirements for radio control transmitters: "Effective March 1, 1992, all transmitters designed for use in the Radio Control (RC) Radio Service VHF band and submitted to the FCC for approval under its equipment authorization program, or manufactured in, or imported into the United States, must comply to narrow band requirements."

The Report further reads: "Additionally, the marketing of RC transmitters not authorized pursuant to narrow band guidelines is prohibited after March 1, 1993. A grandfather clause for wide band equipment purchased before March 1, 1993, allows use of such equipment until March 1, 1998."

From our own AMA, we have the following guidelines;

"Wide band equipment operating properly at this time is legal by FCC standards and may be operated until March 1, 1998.

"None of the FCC requirements address receivers. However, AMA believes a narrow band receiver is a vital component in the operation of an interference free system.

"Extreme care needs to be exercised when using wide band equipment in or near Metropolitan areas. The proliferation of high powered commercial transmitters on frequencies separated by only 10 KHz from modeling frequencies can create a critical safety hazard.

"Transmitters operated at any AMA sanctioned event must meet narrow band requirements and have an R/CMA-AMA sticker affixed. Not including 27 and 53 MHz.

"An AMA chartered club may mandate the use of narrow band transmitters for their field. Such a rule automatically becomes part of the AMA Safety Code for that field."

Any questions or comments on this FCC action, or AMA's position on the matter

continued on page 27

PYLON

BY WAYNE YEAGER

SEARCHING FOR IDEAS

The boss (Bill Northrop) likes construction articles. He likes the magazine as a teaching tool over the usual boring race reports seen in many magazines. I have to admit, race reports are fine only for the participants, however most people I know don't get much credit for their accomplishments, and an occasional line in a popular magazine stating, "Joe Pizzots done good," is welcomed.

Construction articles, on the other hand, are great if you're the inventive type and have a head full of these great ideas which will revolutionize construction of planes, race equipment, or what have you.

I've had a couple of equipment designs that we've printed in the last few months (clock and lap counter system), but this writer is fresh out of ideas. Besides, most organizations build equipment in the winter months and right now it's 85 degrees outside! As this is Michigan, you can bet your last buck it's not February and if it's summer . . . actually it's spring . . . all that's going on is racing, along with the usual requirement needed to finish a job, the paperwork, or race reports.

What I need is: (1) Creative construction ideas from our readers out there. You must have your own little method or design for some kind of equipment that you wouldn't mind sharing with the rest of the readers, all two of them *(you underestimate your column's popularity. There are at least 12! wcn)*. A guy in my club (Bob Hisey), has this thing he runs on occasion at our activities meetings, where he stands up and says, "I mount my servos this way," and everybody says, "Hey, that's neat!", or "This is the way I make push rods," and so on and on and on.

The idea is to start the ball rolling and make the other people relate the little tricks and kinks they use, and one begats another, until you have dozens of little tricks for people to peruse. Who knows? If one idea sticks to you and helps your building methods, then it's worth reading about, like the one below.

So, you get the idea . . . maybe. Got a neat little device you've built that you don't mind sharing? Send it to me with a sketch. Don't have to be fancy. We'll draw it up nice and print it, plus full credit will be given to anything used. We would also be happy with ideas. Got a special trick you use to complete a boring chore?? Send it to us . . . we'll use it. Hep me people! I'm fresh out of ideas.

Pete Bergstrom from WOWIW (Way Out West In Washington) sent me an idea that rates passing on. It is: "Uniflow Fuel Tank Construction." In Pete's words: "This type of fuel tank construction dates back to my control line aerobatics days and was designed to stop the mixture of the engine from changing as the fuel level dropped (Typically, the mixture will lean out as the level of fuel decreases).

"I have been using one of these tanks on my Q-500 airplanes for the past three years and it has worked beautifully for me. The mixture never changes from the start to the finish, and as a matter of fact, you are sometimes surprised when it quits, because there isn't the typical sag to indicate the end of the fuel.

"A Uniflow tank is very easy to construct, with only a few minor differences from the standard tank construction. Included is a sketch to help you in building one of the tanks. Basically, you will need three inlets into your tank. One for fuel pick-up, one for the muffler pressure, and the third as an overflow vent for filling, which will be capped off in flight *(See illustration)*.

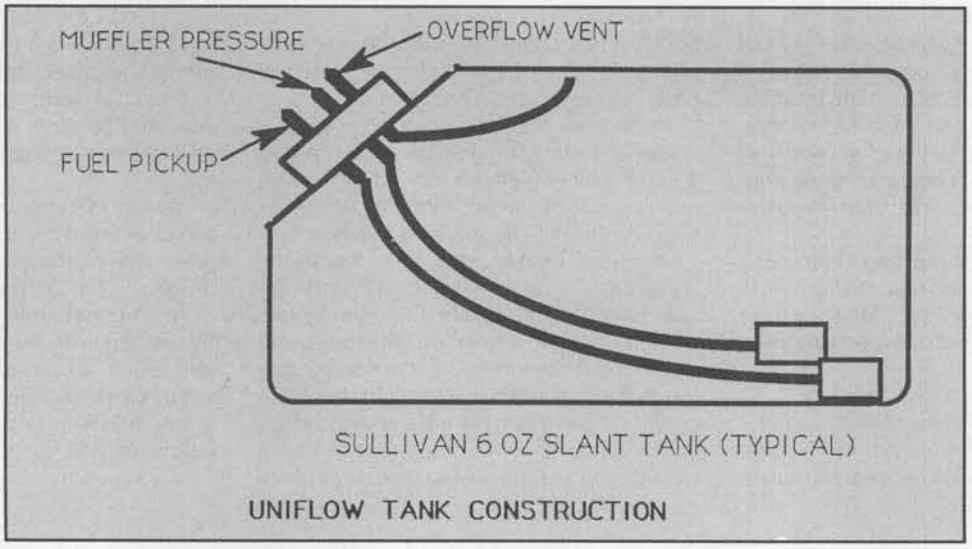
"The fuel pick-up tube is of standard construction, with a flexible hose attached to a brass tube that leads to a clunk in the back of the tank. The pressure tube is constructed identically to the fuel pick-up, with the following exception: make the pressure line/clunk assembly a 1/4-inch shorter than the fuel pick-up, so that when they lie next to each other in the tank, the fuel pick-up is longer and goes further towards the back of the tank.

"With this type of vent/pressure system, the fuel mixture never changes until the vent/pressure clunk is no longer covered by fuel. The overflow line goes to the standard location for your old vent/pressure line. For example: the top of the tank. The overflow line is necessary if you think about it, because if you were to fill your tank without a third line, you would only be able to fill the tank until the vent/pressure clunk was covered, and then your fuel would run right back out of the tank.

"For those of you who elect not to use a one-way check valve in your muffler pressure line, you will have to clamp the muffler pressure line while fueling, to prevent the fuel from siphoning and running out of your muffler."

My thanks to Pete for this idea and I hope it generates some additional input from more of you.

Uniflow tank construction.



Last month we discussed the new Nelson Quickie engine and since then this writer has had a chance to see some in action. Whoooooeeeee do they ever boogie!!! In my home club, we have several races each year called "Open Pylon," where you can fly practically anything you wish, as long as it's muffled, and in the past we've had some pretty exotic de-

signs with long thin high aspect ratio wings that never seem to slow down in the turns and powered by VRP's with tuned pipes or magic mufflers, and these beasts really do get around the course.

Last Sunday, we held another one of these meets and one fellow in particular who hasn't had the time to build one of these fancy creations, came to the contest with a plain ole quickie airplane with the engine hanging in the breeze, as Quickie's require, and he blew everybody away! Nothing fancy with this setup, except he ran a Nelson for power. Ate everybody up!!!

Sure will be an interesting Nats this year. I can hardly wait. They will be over by the time this is printed, so we will have a chance to follow up on this later.

The mailbox sometimes contains a letter from someone in a foreign country, where racing information is not as readily available as it is over here, and it's really interesting reading. We don't realize how fortunate we are, and take a lot for granted because of easy access to articles, materials, kits, and so on.

At the '85 F3D World Championships in Chicopee, Massachusetts, the Czechoslovakians had a racer (Miss RJ, I think) with a painted finish that looked like the way you'd paint your barn. Every fingerprint and smudge stood out . . . it was not a pretty sight!! Don't get on my case now because I'm not knocking these guys.

Fact is, they don't have the paints available that we have. They have a very small selection and fuelproofing is almost nonexistent. Because of this, their planes don't measure up to the fancy finishes seen over here and it's too bad, because they are good builders. Many materials as we know them are not available, so they are obligated to make do with what is, and that makes it tough. Believe me, we are spoiled!!

It's even worse now, because before Socialism took a tumble, the state supported certain sporting activities, including modeling. With the beginning of Democracy, that support is now gone, and these guys are really scratching for good materials. Know anyone in Middle to Eastern Europe? Send them a care package. Betcha they'd appreciate it.

I got a letter from a guy in Australia wanting to know if the Pylon Publications were available over here. He indicated there haven't been any of these available since 1977 where he is, and he was looking for new updates with the latest planes.

Got another letter from a guy in Buenos Aires, Argentina. Had to find an interpreter for this one, and all the guy wanted was some plans for Quarter Midgets. Said there were none in his country.

Anyway, don't mean to bore you with this drivel, but it sure is interesting to see how people in other countries get by in pylon racing, and it surely is fortunate for us that we have so very much available at a reasonable cost . . . and that's one thing I didn't touch on, the cost to the modelers in other countries. UNBELIEVABLE!! ***MB***

CORNER *Continued from page 25*

should be addressed to AMA Technical Director Bob Underwood, at AMA headquarters.

CAPACITORS have to be the most difficult to understand of all electronic components. It shouldn't be, they perform rather fixed functions in the scheme of things electronic. The confusion comes partly in that we have taken to refer to them sometimes by their action in a circuit, and sometimes by the insulating material used in their manufacture.

For example, a resistor is a resistor, and is seldom referred to in any other way. However a capacitor, which was originally called a "condenser" anyway, can be also referred to by its function to filter, coupling, decoupling, bypass, timing, blocking, suppression, et al. In addition, it can be electrolytic . . . either aluminum or tantalum, ceramic, mica, polypropylene, polyester, mylar, paper or polystyrene. There is even a later designation, monolytic, which has nothing to do with either of the above categories but refers only to the physical shape of the device.

To add to the overall confusion is the way we speak of a capacitor's rated value. I guess it all comes about because, contrary to resistors which we use in multiples of the basic Ohm, the basic capacitor value, the Farad, is too large for most applications and the strangely named sub-multiples in use get more than a little confusing for the casual user.

In an effort to clarify the situation, I have included a table of useful capacitor conversions. As stated, capacitors rated in Farads are too large for common uses, and neither will you run into any rated in mF (millifarads), I have included those values in the table merely to help establish a size reference to the more common micro-, nano- and pico-farad sizes. If capacitor values tend to confuse you too, I suggest that you copy the table and keep it handy in your workplace or with your reference materials.

SIX MONTHS HAVE PASSED since my EVENT! No, I am not now going to reveal any personal secrets . . . an EVENT is how open heart surgery is referred to by the medical profession in the cardiac field. Seems to me that a more dramatic term should be used, possibly accompanied by a bit of thunder or at least a drum roll! Anyway, I am glad to report that everything is A-OK, and that barring any personal EVENTS involving busses or pit bulls, we should be sharing the pages of *MB* for many more years. I mention this now because I wish to thank all of you, my dear friends, for the cards, letters, phone calls, flowers, fruit . . . and oh yes, the baked chicken (thanks Bob and Betty Jo!). Life without friends must be a sad thing, but there are times when they mean a lot more, and you came through! God bless, and may all of your EVENTS be of the "jug of wine, loaf of bread, and thou" type, and none of those involving injections and stitches!

Eloy Marez, 2626 W. Northwood, Santa Ana, CA 92704. ***MB***

PLUG SPARKS

BY JOHN POND

HOW IT ALL STARTED

Although a write-up on the birth of old timer flying has been done by this columnist several times, some additional data has been uncovered about the progress of SAM that should be of interest.

When the idea of full scale old time models was first discussed between John Pond and Bob Bowen, a decision was made to put on a first rate contest to stimulate interest. With Pond writing the rules and publicizing the 1961 meet in West Coast Model News, the turnout was extremely gratifying.

Unfortunately, Murphy's Law prevailed and the meet had to be set over for two weeks because of the prevailing high winds that day. Despite this, there still was an excellent turnout.

Based on Pond's publicity and write-ups in the major modeling magazines, interest was aroused to the point where quite a few contests were scheduled the following year, 1962. Among those was the First Annual Chicago Aeronuts Meet in May at the Bong Air Force Base.

This writer made a point of attending all old timer meets to promote this new phase of modeling. The Super Cyclone powered "Scram" was packaged and sent as personal baggage to help promote the first Annual O.T. Model Museum Meet. Arriving in Denver and being greeted by Tim Dannels, the box was picked up and taken to Xavier St., Denver. The next day was enjoyable but cut short at 3:00 p.m. in order to catch the return flight.

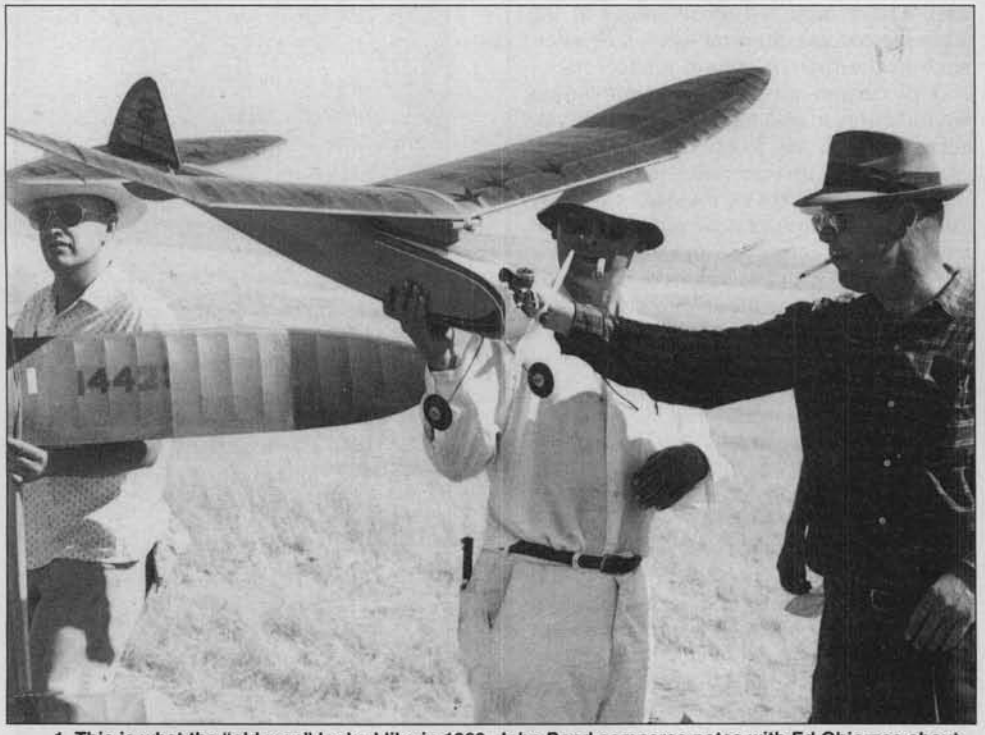
Before we get too provincial, note should be made that the Chicago Aeronuts promptly jumped on the bandwagon in 1962 and scheduled two O.T. meets a year; one in the Spring and the follow-on in Fall. Interest immediately skyrocketed in the Midwest! This all started in 1962!

It's about time we featured a photo of our "hero" as seen in Photo No. 1. Here, Pond is comparing notes with Ed Ghiorzoe's Simmons Gas Champ. After Pond's successes with this design, several were quickly built. This shot is at the First Stockton O.T. Annual held at Waegell Field in 1961.

Incidentally, write-ups on all this activity can be found in the 1963-64 issues of "Model Engine Collectors Journal," as so ably edited by Tim Dannels. No question about it, the space provided by Tim aroused interest nationwide.

In 1963, with old timer interest at an all time high, the Third Stockton O.T. Annual was held in October with contestants coming from Oregon and California, plus one observer, Martin Schindler, from Virginia. Both fellows were taken in the reliable Chrysler Convertible (called the "Red Baron" by Bill Bowen) to participate in the contest.

It was on the way that enthusiasm spilled over with ideas of a national organization and later on an Old Timer Nationals. Lee Freeman (Los Angeles) and Martin Schindler suggested the foregoing but no one (including this writer) had the time. It was only in the "Gas N' Oil" column that this writer



1. This is what the "old man" looked like in 1960. John Pond compares notes with Ed Ghiorzoe about his Simmons "Gas Champ."

2. Two major spark plugs in the early days; "Bud" McNorgan, SAM director, and Tim Dannels, E.C.J. editor.

3. The early "SAM Speaks" editor, Gene Wallock, seen at Colfax Airport, with Taibi Powerhouse.

"drafted" Lee by recommending all interested in such a league to contact Freeman.

This announcement (much to Freeman's surprise) was made in the May-June 1964 issue of E.C.J. At the same time, a discussion was carried on in the column along with the present rules of 1961-3 developed by Pond. These were to be used as a starting point for a set of firm rules.

The July-August issue confirmed Lee Freeman as the Director of the organization to be officially named. Lee Freeman suggested "Antique Model Association" based on suggestions received from various old timers. This was eventually changed to the "Society of Antique Modelers" (SAM as suggested by Bob Stalick in the March-April issue). Still using A.M.A. as the O.T. initials, Lee Freeman started a column in the November-December issue of 1964. In the follow-on column of January-February 1965, Freeman made note that six O.T. Chapters had been formed as of that writing.

The situation couldn't last forever, what with Freeman facing his own business troubles, an injured wife, plus the demands of the children. In the September-October 1966 issue, Freeman bowed out. The ball was now back in Pond's corner! It didn't take long to find a replacement.

Enter J. G. "Bud" McNorgan! With all the activity Bud was involved in for old timers, his appointment to SAM Director was almost a foregone conclusion. Through his writings of the SCAMPS newsletter, "Gas Lines", Bud had developed a large amount of correspondence.

Now it's about time we showed a shot of the two fellows who were responsible for getting the First SAM Championships off the ground. Seen in Photo No. 2 on the left is Bud McNorgan, a tireless worker in his capacity of SAM Director. Holding a well built Don Foote "Westerner" is Tim Dannels, whose unflagging interest in old timers resulted in the reality of a SAM Champs.

Based on the startling success of a SAM Champs, plans were made to again hold the Second Champs at the East Colfax Airport (east of Denver) on July 29, 30, and 31. The practicality of a three-day meet has been proven.

Although SAM has expanded and prospered under the direction of Bud McNorgan, the first SAM business meeting was scheduled to be held at a local hall in Denver. At that time, the Volunteer Board of Directors was introduced: John Pond, Historian; Harley Elmore, Secretary-Treasurer, Bud McNorgan, Director.

Bud outlined the aims and objectives to be obtained. In the problem of membership, it was decided that in joining SAM, the prospect did not have to be a member of the nearest SAM Chapter. This, in effect, eliminated group votes by Chapters and opened up SAM to the general modelers. Membership was set at $2.00, with 50 cents/Junior membership.

A committee to draft a Constitution by July 31, 1968, was proposed, with the following members: Don Whitacre, California, chairman; Vic Didelot, Ohio; Gene Lapansie, Michigan; and Bob Schliem, Colorado.

The flying rules, long a headache due to the differing nature of flying sites across the United States, came in for heavy discussion, with the proviso that 1966 rules would be used for 1968. In the meantime, the following committee was appointed to update the present rules: John Pond, California, chairman; Al Heinrich, Colorado; Gene Wallock, California; Joe Dodson, Texas; Paul Kastory, Pennsylvania.

The above is a capsule version of what went on, but does indicate McNorgan's vigorous policies to get SAM organized. Thanks are also due to Bob Schliem, SAM 01 Secretary, who recorded the proceedings.

Also about this time it was proposed that SAM have its own newsletter in addition to the material that appeared in the Engine Collectors Journal. A "volunteer," Gene Wallock, was selected to act as editor and put out a bimonthly edition. Numerous names were submitted, but it remained for Wallock to come up with the name of "SAM Speaks."

Seen in Photo No. 3 is the lucky recipient of this honor, Gene Wallock, with his good flying Taibi Powerhouse seen, at the Colfax flying area.

Having completely exhausted himself, McNorgan resigned as SAM director. The ball was again in Pond's court! This time there was no time to fool around, as 1969 was already here and the SAM Champs scheduled for Bong AFB were only several months away.

Believe it or not, on short notice, Pete Sotich ran a fine Champs. A follow-on SAM business meeting was held at the Racine Motor Motel, for the express purpose of approving the SAM Constitution presented by Gene Lapansie.

In 1970, the SAM Champs were held on the West Coast, Taft, to be exact. With Don Whitacre as contest manager, and John Pond as contest director (when you get a good

4. Alex Drobshoff's rarely seen "Little Diamond" design at the First Fresno Annual, 1940. Brother, John, on right.

5. The "Blue Bonnet Special" by Clyde Stokes, seen in a 1940 Texas contest at Kelly Field.

6. The SAM 21 gang built an electric-powered Lanzo Bomber for Pond, to silence the complaints about this design.

horse, keep him loaded!), a very successful meet was staged on June 24, 25, and 26.

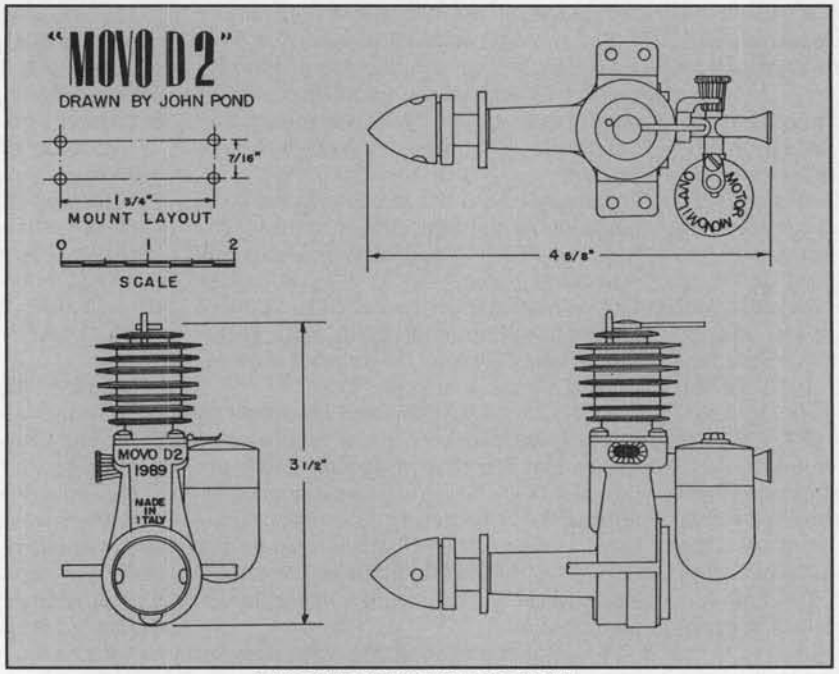
During this period, the SAM Business Meeting was held with director Pond announcing the highlights of the new constitution as printed by Gene Lapansie. New officers, President, three regional Vice-Presidents, and a Secretary-Treasurer, were nominated, with ballots to be distributed to the membership. At that time, Director Pond removed himself from the ballot after the Victory Banquet. Thus, the first SAM President was Bill Ladner, of the SCAMPS.

Modifications to the SAM Flying Rules were presented by SAM 3 (SCIFS), with a preamble that is in use to-date. These were approved and form the basis of today's competition rules.

About the only startling changes since then have been the inclusion of an Eastern Vice-President, with the rotation expanded to four years. At that time, Pond proposed a staggered rotation; i.e., East Coast, Rocky Mountain, Midwest, and West Coast. The thinking here was that anyone could attend a SAM Champs every other year with an average trip of 500-1,000 miles. This has remained in effect ever since.

ENGINE OF THE MONTH

When Gordon Burford came through California and stayed at the Pond domicile, he had actually flown westward from Australia. In his around-the-world trip, he made a point of stopping in Italy to attend their old timer activities. Being an engine man of international repute, he was immediately shown what engines were being reproduced. The first, the "Giglia," has been run in this column and the second, "Movo D2," we are presenting this month. As usual, the engines are finished impeccably, a trademark of Italian manufacture. As reported previously, this writer undertook to draw both to feature in the engine section.



ENGINE OF THE MONTH

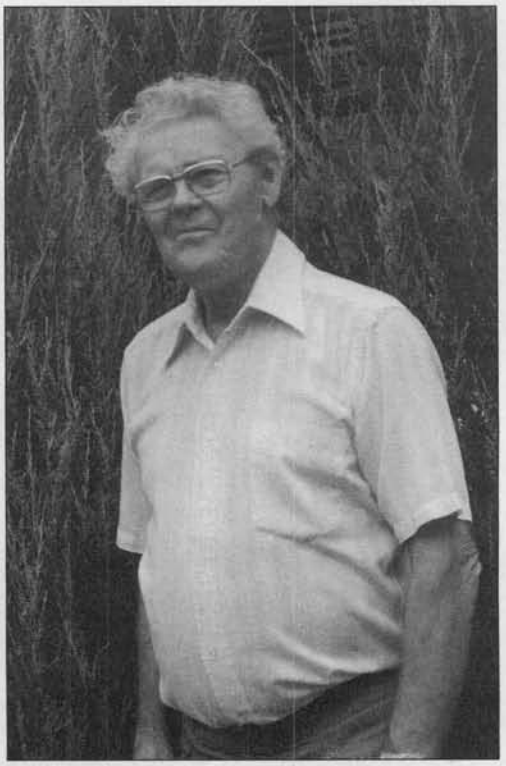
At present, the Movo D2 is being produced by Zanchi Sauro, ple S. Paolo, 10 24100 Bergamo, Italy. If you are of a mind, you can call him at 035-257-141. The price has not been definitely set, but at last report, the Movo D2 will sell for between $150.00 and $175.00, depending on style required.

The mention of style needs explanation. The basic engine can be mounted in about any conceivable angle. The movable tank and needle valve combination make a very convenient arrangement. The engine can be mounted upright, inverted, and side winder style, with the tank assembly giving two more options on each style; in other words, six arrangements.

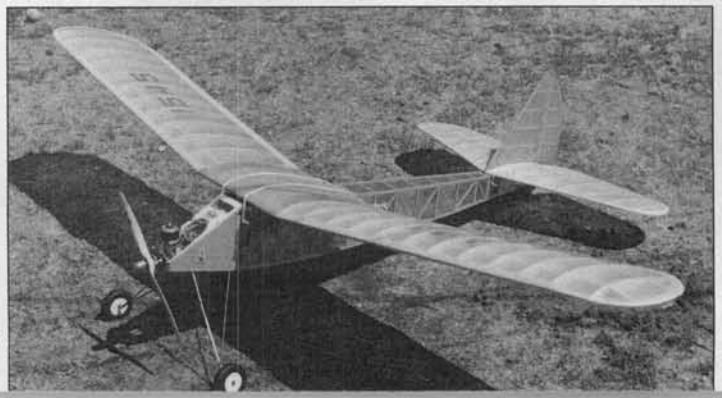
The Movo engine first came to the attention of American model builders in 1947 when an article by Jack Bayha appeared in *Model Airplane News* entitled "Diesels Grow Up." Specifications given at that time were displacement .125 cu. in, weight 5.25 oz., bore .475 in., stroke .682 in. Recommended propeller is an 11x6 type. Fuel as listed gives 5 parts Naptha, 5 parts ether, and three parts mineral.

In conversations with Burford (a good diesel man himself), it was his point that power is derived from the kerosene portion,

8. Frank Swaney, late well-known modeler from Long Beach, shows how to R.O.G. a Wakefield type.



7. Winnie Davis, designer of the famous "Big Gull," at 78 years of age, is still alive and active.



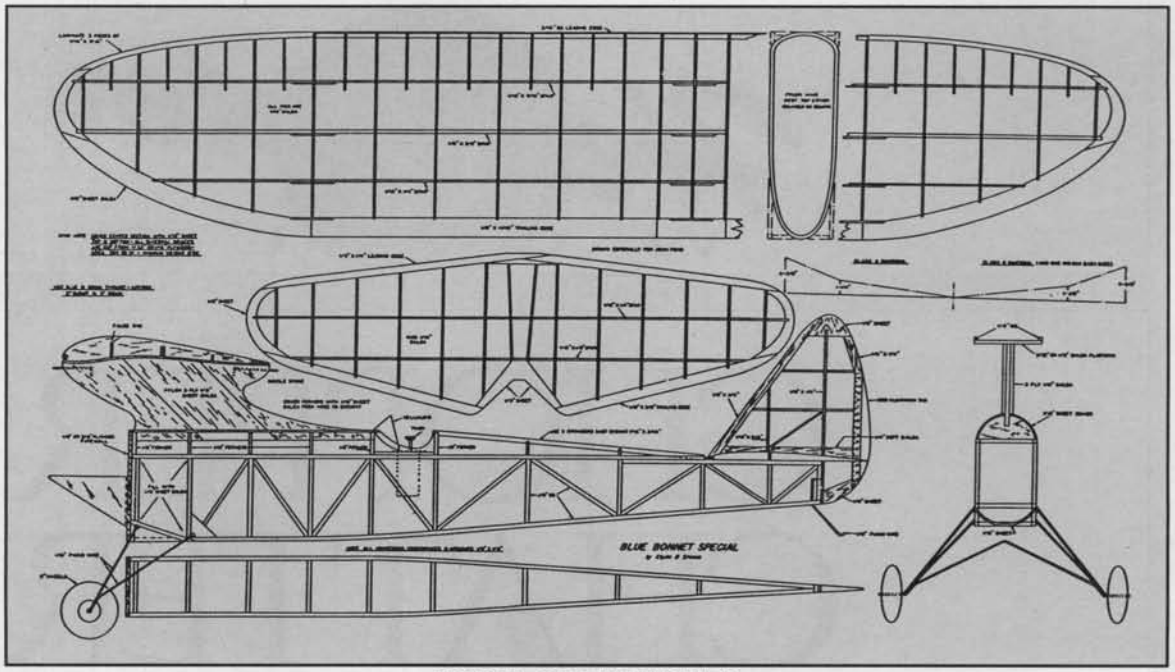
9. Art Grosheider is at it again! This time an Ohlsson 60 powered Lanzo RC. Beautiful green and white silk job.

not the ether. To be noted is the use of wax-free oils (the British call it Paroffine) only. The wax in the oil builds up a crust on the piston and of course, changes the compression ratio of the engine.

For those interested in a simple fuel that delivers the best performance, try 50% kerosene, 20% ether, and 30% castor. To this for "hop-up" purposes, a barely trifle (less than l%) of amyl nitrate can be added. Amyl nitrite is acceptable but has one less oxygen molecule in its chemistry chain. Word of caution: both amyl nitrite and amyl nitrate detonate (rather than burn) and added amounts will only damage the crank pin or wrist pin.

Diesels are interesting from the aspect of trying different combinations of fuel components. Probably the easiest way (if you don't want to mix your own fuel) is to purchase diesel fuels as manufactured by Bob Davis Development Co. or from Aerodyne fuels by Al Heinrich. Both give excellent results.

In running diesels, it is to be noted that with these long stroke engines, large diameter propellers work best even at the lower rpm. When a diesel engine "knocks," it is not lean like a glow engine, but is running rich. Close needle valve and/or increase compression. Diesels do run well when properly handled.



MODEL OF THE MONTH

MODEL OF THE MONTH

On our first feature of this section of Plug Sparks, somehow or another, the three-view drawing of Alex Drobshoff 's "Little Diamond" was left out. In its place, we offer Photo No. 4 showing Al with his design along with his brother, John. Seen on the ground is John Drobshoff's Advanced Challenger from which the Little Diamond was developed.

The models are quite similar; of course, one is a cabin and the other, a diamond fuselage, but the wings and tails are practically the same. In the case of the diamond design, the wing is a little higher in aspect ratio with a longer span. This photo is a fairly rare shot, as Al and John were inseparable in the pre-War days, but only a few shots were taken of them together. When Al died of stomach cancer, John took the loss very hard, not flying models for over five years.

This month's model is the "Blue Bonnet Special" as seen in the accompanying drawing and Photo No. 5. Looking the design over, it appears Clyde Stokes borrowed freely form the Peerless "Pippin," a design by Harold Coovert. The major change is the higher pylon, which made it fly much better, according to Stokes. For the benefit of the readers, all designs being presented in this column are approved SAM designs eligible for SAM competition. We love old photos and are always receptive to any contribution.

As far as three-views, we will continue to run the rare ones as this writer contends that very few modelers can identify over 50% of his plan list. This section is intended to overcome that deficiency.

In reviewing the old records of SAM approved O.T. and Antique designs, the application for the Blue Bonnet Special model was presented by Russell Stokes on behalf of his brother, Clyde, who was the designer and flyer of this model during 1939. SAM approval is dated August 1979.

In his letter of application, Clyde included an impressive list of wins during the 1940-41 season. Noted were places for Class A as follows: two firsts, two seconds, and two thirds. Most spectacular was the Class B version, with six firsts and three seconds, a very impressive record using an Ohlsson 19/23 combination for Classes A/B! Originally called the "Clyde Stokes Special," this design is now identified as the Blue Bonnet Special.

continued on page 102

CHOPPER CHATTER

BY JAMES WANG

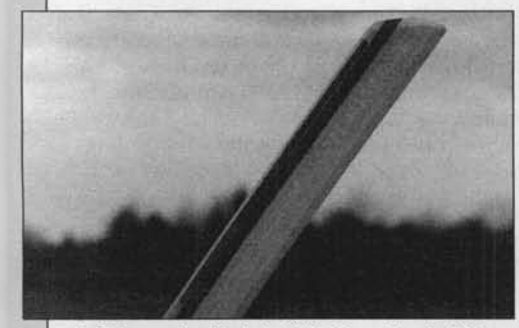
This month we continue with our discussion on model helicopter blades and airfoils, then finish up with a description of the full-size BK-117 helicopter.

Don't miss next month's *Model Builder*, for a report on the USA FAI F3C helicopter team trials held in Germantown, Maryland, in June. The purpose of the team trial is to select the best three pilots to represent the USA at the World Championships, to be held in October in Australia. The top pilots in the US gathered for a four-round contest to put forth their skills. We will have a full report on the latest arsenals used by these top pilots, including a table listing the technical details of the helicopters used by the 19 entrants. Congratulations to Curtiss Youngblood, Wayne Mann, and Robert Gorham for placing 1, 2, and 3, and becoming the 1991 USA F3C team.

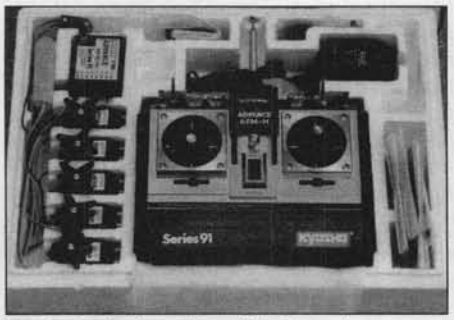
The following month, we will feature an interview with Cliff Hiatt, who was only half a point behind Gorham (692.5 to 693). When you have many top fliers, it's very difficult to decide who is actually the best. They have all beaten each other in one contest or another, but this team selection was decided with just this one contest.

Before we get started on the heavy duty stuff, let's chat on some lighter things. If you are still flying a GMP Elite or Prohead, you might want to think about changing the plastic teetering pin retainers periodically (part #1830). As the entire rotor head pivots at this steel pin/plastic retainer location, any slop will aggravate the handling characteristics. The plastic part costs only about two bucks per pair. They should be replaced about every one hundred flights. The symptom of worn out plastic retainers is the model's inability to lock on and sit solidly in hover. The older, pre-1989 Proheads and Custom heads came with needle bearings instead of plastic retainers. Actually, these plastic retainers work better than the needle bearings. The floating axle design, as on the Schluter and X-Cell, does not have this teetering slop problem.

Here's a tip on helicopters with floating axle design: If you want soft response and an easy-to-hover model, omit or use only one thin



A JRC wooden blade built by Gary Frank. JRC blades are high quality wood blades made in Japan. They were used by Dobashi to win the last World Championships. They come in 720mm length. Gary cut this one down to 680mm and added the swept tip. The mounting hole must be drilled by the builder. Two strips of lead, totalling 60 grams, were added.



Kyosho's six-channel model is the only helicopter radio in the $250 range with all of the following features in one radio: idle-up, throttle hold, dual rate, servo reverse, hi and lo pitch trims, pitch trim knob, tail rotor mixing, 1000 mAH receiver battery, six channels and five servos.

Victor Dziabczenko's gorgeous BK-117 RC model helicopter, from a Schluter Champion kit. It has a four-bladed, articulated Schluter head, and Peka narrow chord fiberglass blades. It employs Vic's own four-bladed tail rotor system. According to Vic, the narrow chord Peka blades make this helicopter extremely stable.

shim washer. For example, on Tim Schoonard's X-Cell 60 at the team trial, he did not use a shim washer at all. This makes the model more docile, and it may be ideal for beginners, too. The other extreme would be like my X-Cell 60 Custom, on which I placed one thick and one thin washer on each side of the axle. This stiffens the blade flapping and makes the model very lively, but in hover it still locks on solidly. By making the rotor "stiffer," you should use a high rotor speed, around 1600 to 1700. Stiff rotor and low rpm can cause fuselage oscillation. The reason is that a stiff rotor head gives a higher fuselage oscillation natural frequency. We always want the rotor blade vibratory frequency to be above the fuselage frequency, to avoid the resonance problem. Hence, a stiffer rotor needs higher rpm. And, for the new FAI style of low hovering rpm, the rotor head must be kept very soft to bring the fuselage frequency below the rotor blade vibratory frequency. Soft flapping can be used with high or low rpm, but stiff flapping usually can be used only with high rpm.

By the way, low rpm increases the overall vehicle longitudinal and lateral damping. The effect is mathematically similar to increased main rotor shaft height or blade weight. In a sense, it is better for the FAI contest fliers to use low rpm for hover maneuvers, because it increases vehicle damping which stabilizes the model as if having a longer main shaft. But we know that a longer main shaft is not good for fast forward flight aerobatics. Hence, by shifting into higher rpm in forward flight, it's as though the main shaft has been effectively shortened. This is nice as rpm is in-flight adjustable, but shaft length is not.

If you are having an engine idling problem, try an O.S. #8 glow plug. It is not expensive (about $4.00), and it is great. You will notice that with the #8 plug, you can remove the glow starter battery after the engine has started, and the motor will not drop a beat. It lasts through dozens of flights, too. It works great on 30-size through 60-size engines. It is a medium to hot plug; cooler than Enya 3 and Fox RC Long, but about as hot as Enya 4. When the engine is running cold, not lively, you might want to try a hotter plug. Cliff Hiatt claims that weather, temperature and humidity, do not determine what plug to use. Cliff says it is the fuel, engine, and setup that decides the optimum plug to use on your particular model.

• • •

If you are looking for an inexpensive but good gyro for your sport helicopters, the Futaba 154, Airtronics SGX, and JR130 are all excellent. These three gyros are about half the price of the more expensive gyros. The 154 and SGX cost around $70 to $80 and the JR130 is about $10 more. The SGX even includes a tail rotor servo. I have tried all three gyros, and they all work very well.The only feature that these inexpensive gyros do not have is in-flight switchable gain sensitivity. For beginners and just hot dogging around, the in-flight switchable feature really is not necessary.

Since I wrote the Concept 30 review, I have put in over a hundred flights on my Concept with the cut-down Schluter Champion tail boom. Due to the soft flapping rotor head design, it is very easy to have a tail boom strike. Kyosho's tail boom is so thin that it does not take tail boom strikes very kindly. On the other hand, my Concept with a Schluter tail boom has withstood five boom strikes already, and the boom is still extremely strong. The reason is that Schluter tail boom walls are twice as thick as the Concept's. Schluter Junior 50's tail boom is shorter than Champion's. Both are made of the same thick wall tube, but Junior 50's length is almost perfect. It costs less than $20 and the plastic tail drive wire supports are already installed inside the boom by the factory. However, Schluter tail booms are slightly smaller in diameter than Concept's. Just add a drop of CA glue and a self-tapping screw at the side-frame-to-tail-boom junction to prevent any rotation or slippage of the boom.

To get more power for 30-size engines, I recommend the MAC 3.5cc (.19-.25) part #1220 ($28.95) aircraft style straight tuned pipe. It is a true 12-inch long muffled tuned pipe. A standard aircraft style MAC header can be used for the Concept (Mac #2340). Cut it off so the length is five inches from the blades to the engine exhaust. A better choice of headers for the Concept, Enforcer and Shuttle are the Miniature Aircraft USA Peacemaker headers or Helicopter World/Century Imports mini tuned headers.

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Recently, on a trip to a helicopter conference in Phoenix, Arizona, I had a unique opportunity to visit the McDonnell/Douglas helicopter factory. It was a thrill to see how the Apaches are built. One of the highlights was a ride in the Apache flight simulator. It is a large, 30-foot diameter dome with computer-simulated ground and sky images projected on the surrounding walls. Standing inside this flight simulator, one feels almost like flying in the front seat of a real Apache. The pilot demonstrated map-of-the-earth flying. We were flying at tree level, and flew under a bridge, and he even did a 360-

On the full-size BK-117 there are two clamshell doors at the rear for loading cargo, or patients in an emergency medical service configuration. Full-size BK-117's have a two-bladed tail rotor with 45-degree Delta-3 hinge (similar to X-Cell's), but Vic says that due to the extra torque from the four-bladed main rotor, his model needs the four-bladed tail rotor system to provide crisp heading control.

BO-108, the newest member of the MBB helicopter family, was introduced in 1989. It's aerodynamically very clean. The main rotor is tilted forward slightly to improve cruise efficiency. The BO-108 has a state-of-the-art composite bearingless main rotor. Blade feathering (pitch change), flapping, and lead-lagging are all accomplished by elastically twisting and bending the pliable rotor hub.

The large vertical fins improve directional stability. Many RC models have a vertical fin that's too small, so we become dependent on yaw rate gyro. This particular full-size BK-117 is a prototype with its fuselage mostly made from composite material instead of metal skin. The composite air frame reduces weight and is stronger, but is more expensive.

degree roll. If you want to know what it's like, strap a video camcorder to your helicopter and you'll know. It was awesome!

I had a chance to swing by Southern California to visit the Orange County RC helicopter fliers. This is the field where Ray Hostetler, Fred Sage, Marty Khun, Nick Nicholas and the gang fly. On Sundays, usually as many as 50 helicopters can be seen. Fred had a beautiful triplet of Concept EP, Concept 30, and Concept 60, all painted in orange and black.

The EP Concept's stock LeMans 360 motor was replaced with a Trinity 17-turn, triple wound, Magic Speed Joel Johnson offroad car motor. It was powered by a specially made eight-cell "pushed" 1700 mAH NiCd pack from Pacific Battery in California. Its performance was impressive! It climbed out almost as good as a 30-size helicopter, and it did a triple axial roll. We timed it with a stop watch, and on a full charge it flew for 4 minutes, 35 seconds. "Pushed" NiCd means that the cells are specially prepared by the factory through a charging and discharging process. These pushed cells can now handle extremely high charge and discharge rate.

I saw two TSK 30 models, and had a chance to closely examine a third TSK 30, owned by my friend David Franklin, from Los Angeles. The TSK 30 costs about $800. That seems like a lot of money for a 30-size model that does not even come with main or tail rotor blades, but it does come with a muffler, and the all-metal mechanics are meticulously impressive. There is no slop anywhere. An overkill amount of ball bearings are used. And, instead of using one ball link to the swashplate washout, two are used on each side. There is absolutely no slop on the collective control mechanism. But interestingly, David says there is no radial bearing inside the main rotor grip, and only one thrust bearing is used. I have asked David to write a brief review on the TSK 30 for us.

• • •

In our May 1991 review of the Concept 30 SX, I suggested adding a thin strip of tie-wrap underneath the red rubber O-ring to increase the blade flapping stiffness. Many readers have told me that their static coning angle increased to four or five degrees after adding the tie-wrap, and want to know if this is normal? Well, this means the tie-wrap that you are using is too thick. Use a thin one, or shave it off slightly. I use the very thin tie-wraps.

The static coning angle should increase slightly, around two or three degrees. This serves three purposes. (1) Usually in flight the rotor will have some coning angle anyway, because the lift force and centrifugal force reach an equilibrium. A build-in coning angle reduces the bending stress at the blade root, blade holder, and hub. By adding two degrees of static coning to our Concept 30, the top portion of the O-ring damper is not compressed so tightly while the bottom half is uncompressed. (2) Static coning reduces the tendency for boom strike on the Concept 30. (3) Adding the tie wrap compresses the O-rings to make the rotor more rigid, and thus gives slightly faster fore/aft and roll cyclic controls.

Even with two degrees of static coning angle, my Concept flies great while inverted. This is because the flapping stiffness is still relatively soft as compared to most 60-size machines, so the blades still flap quite easily. Ideally, Kyosho should make the O-ring dampers thicker, and if possible, even make the bottom of the O-ring slightly thicker than the top so to give two degrees of static coning and increase the flap stiffness at the same time. Maybe you can find some thicker O-rings at some electronic stores. Let us know.

We all know that the Concept 30 in high speed forward flight tends to pitch its nose up. Some Concepts exhibit this symptom more severely than others. Besides the Concept, many other helicopters do so, too. Well, tilt your flybar up and down. Does it tilt freely? If it doesn't, that is why your helicopter pitches up. When any helicopter is new, the ball links are usually tight, hence the flybar "sticks." When the flybar cannot tilt very freely, we have lost the stabilizing Bell feedback effect from the flybar. This defeats the purpose of having the flybar to help stabilize the model helicopter.

When the Concept and Enforcer are new, the big ball links that connect to the flybar are usually very tight. After 50 flights, they loosen up. Hence, depending on the tightness of the ball links, some Concepts and Enforcers will fly straight without pitchup tendency. By the way, if the big ball link on the Concept is too loose, it can pop off during aerobatics, too.

Another trick to cure the pitchup tendency on any helicopter is to twist each Hiller control paddle's leading edge down by about one degree. Now the paddles will no longer be parallel to each other. The reason this works is because the paddles are like small rotor blades, they experience aerodynamic forces and behave dynamically similar to blades. In flight, the main rotor blades are usually at some positive angle around five degrees. In forward flight, the lifting rotor will experience a dynamic behavior called "angle-of-attack instability." This causes any rotor to flap back and thus pitches the nose upward. Now, if we add one degree of negative pitch to each paddle, this makes the paddle system produce a very slight negative

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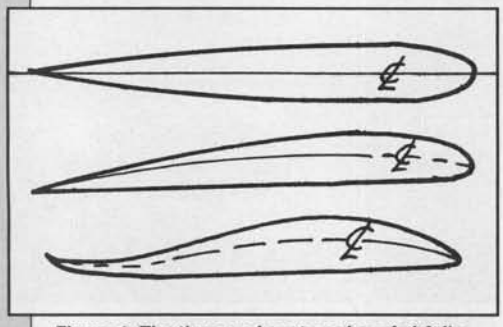


Figure 1. The three main categories of airfoils used on RC helicopter blades. Any airfoil that is not symmetrical is called a cambered airfoil because the centerline is cambered.

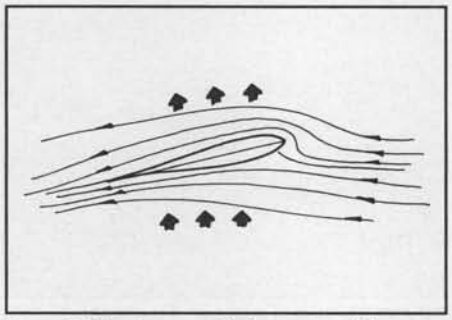


Figure 2. The air moves faster on top of the airfoil as compared to the bottom, hence a lower pressure suction is created to suck the airfoil upward. This is called lift.

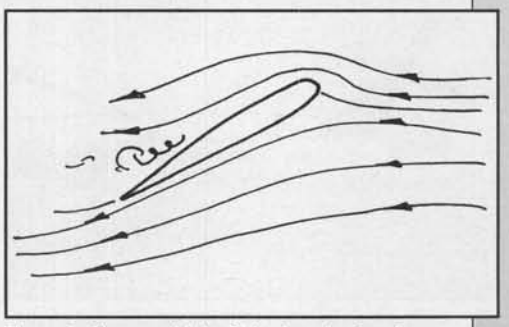


Figure 3. At a very high pitched angle, the air can no longer follow the contour as it flows over the top surface. This is called "stall" or "flow separation." When this happens, little lift and plenty of drag is produced, bogging down the engine. This happens when too much collective pitch is used, or the model is in a high-G turn.

Helicopter WORLD

REVIEW:
HIROBO MH-10 MINI HELICOPTER

BY JAMES WANG

Let's take a look at the world's smallest production two-stroke gas engine-powered RC helicopter. The Hirobo MH-10 was introduced in 1989. However, it was considered a novelty item, thus it never achieved large popularity. The version that is reviewed here is an MH-10 with a very cute looking BK-117 scale fuselage. The MH-10 main rotor diameter is only 35 inches. The gross weight at takeoff is 4 pounds, 3 ounces. It is powered by an O.S. CZ-15H engine. The small engine doesn't run as smoothly and predictably as the bigger engines.

We are impressed by the amount of engineering that went into this mini helicopter. The MH-10 includes many innovative ideas not found on larger 60-size helicopters, but we are not implying that these innovative ideas are better; they are just different. We feel that the MH-10 and the electric helis are the first generation mini helicopters. With time, they will evolve into very practical flying machines. The MH-10 is a bit squirrely in its handling and should not

(Left) The Hirobo MH-10 with scale BK-117 fuselage. It gets an A for cuteness, an A for engineering innovation, but the small, overworked engine and slop in the Hiller paddle control gets a C for handling qualities. The text explains the details. (Above) Very attractive mini helicopter. Powered by O.S. CZ-15H engine. With nothing in the photo for size comparison, it's hard to tell that the main rotor diameter is only 35 inches. A whole squadron of these MH-10's can fit in your car's trunk. From opening the box to what you see here took 19 hours. But another 20 hours of fine tuning can ideally improve the handling.

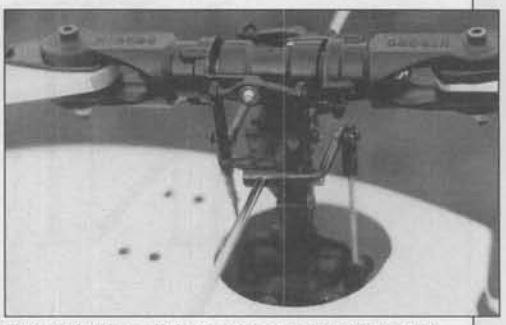
be a beginners helicopter.

One of the benefits of flying at an RC helicopter club is the possibility of seeing a large variety of models. Within 30 miles of my place, there are three RC helicopter clubs. The combined chopper pilot total probably exceeds one hundred. We have had Schluter helicopter, it still flew fine.

The entire model is molded from plastic. The side frame, servo tray and main rotor head are all plastic. Even the tail rotor is a one-piece bearingless design, similar to the one made by Kyosho or the Concept 30. There are two versions of the MH-10 bearingless tail rotor. The original version is too stiff, the servo can barely twist it to cause a pitch change. Our MH-10 kit came with an extra bag of goodies that includes the upgraded bearingless tail rotor, engine cooling fan, and clutch. The new bearingless tail is more flexible. The original bearingless tail rotor blade unit can be modified by using a model knife to shave off the ridges at the hub to make it more flexible. Then, it worked fine. Yaw control is fairly responsive. It does pirouettes almost as fast as most 60-size machines.

The MH-10 is about 80 percent finished by the manufacturer. The engine, cooling fan, clutch, control mechanism, and tail rotor come assembled. The fuselage is molded in white, only needs the addition of colorful decals. Quite easy to put together. But usually the goal is not just to whip together a model and fly . . . we want to spend the extra time to fine tune it.

Front view of the model with the forward fuselage shell removed. Everything goes together without problem. Five micro servos are needed. The landing gear is quite narrow, but very strong and resilient. The MH-10 landing struts are ideal for the electric Whisper which was reviewed last month.



The underslung flybar main rotor head is a mini copy of the Shuttle ZX, or Champion, or X-Cell rotor head. It is a floating axle with an O-ring on either side for flapping spring stiffness. The rotor head gets an A for quality. But the thin pitch control arms and soft floating axle bend readily in a crash.

reps, X-Cell reps, GMP reps, Kyosho reps, and Helicopter World/Century Import reps. The reason that I bought the MH-10 is because the local Helicopter World/Century Import rep told us that they were having a sale on the MH-10 and we could get them for half of the normal $400 price tag. Guess what? Our Virginia club members all wanted one, and we ordered 27 of them!

The model comes about 80 percent finished by the manufacturer. The CZ-15H engine, clutch, fan, tail boom, and tail drive are all assembled. The only things that need to be done are to bolt on the main rotor head, landing gear, and install the radio. It took me 12 hours of work from opening the box to flying. There are two versions of the MH-10: the pod-and-boom version, and the BK-117 scale fuselage version. I ordered the BK-117 version. The fuselage is molded from lightweight, white plastic. All you have to do is glue the fins together and install the colorful decals that come with the kit. The entire plastic fuselage shell weighs seven ounces.

As this is a compact helicopter, micro servos have to be used. Futaba S-133, JR-321 or Airtronics 94141, 94403, and 94407 will fit. MH-10 is a collective pitch helicopter so five micro servos are needed. The molded plastic servo tray has the opening and mounting holes there already to fit five micro servos. Regular size and mini servos will not fit.

The gyro is mounted in a plastic tray behind the main rotor shaft. Even with the rate gyro mounted behind the main shaft, the model came out very nose-heavy. This is alright. Usually nose-heaviness improves forward flight aerobatics. In this case, even though it is not an aerobatic

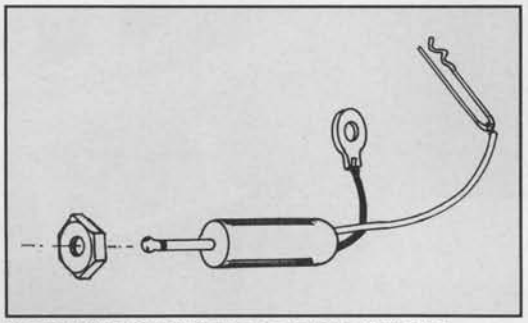


Figure 1. This is how to make a remote glow plug extension to fit a Ni-Starter connector. Solder a 6-32 nut onto a Radio Shack 3/32 or 1/8-inch audio jack. Solder a lug onto one wire and bolt it underneath the engine mount. The other wire is soldered to a metal clip that clips onto the glow plug.

The underslung flybar main rotor head is almost identical to that used on the Shuttle ZX, Schluter Champion, or X-Cell. It is a floating axle design with an O-ring on either side of the steel axle for rotor spring stiffness (Note again: the rubber O-rings are there for spring stiffness, NOT damping of the blades! This was explained in the June 1989 *Model Builder*). The main rotor head is very well made. The flap stiffness is perfect. There is no body oscillation in flight, the control response is very quick, and the rotor aerodynamic forces damp the body motion very well. The rotor head itself has very little slop.

Unfortunately, the mixing arms on the washout unit on the main rotor shaft have too much play. This is the weakest part of the entire model design. This allows the Hiller paddles to have as much as 10 degrees of play. Most helicopters only have two or three degrees of play in the paddles. When the rotor speed is kept low, the play is not noticeable in MH-10's cyclic commands. But when the rotor speed is revved up, the slop shows up in cyclic controls, and the collective also becomes jumpy. The slop is due to the poorly designed mixing arm geometry. As can

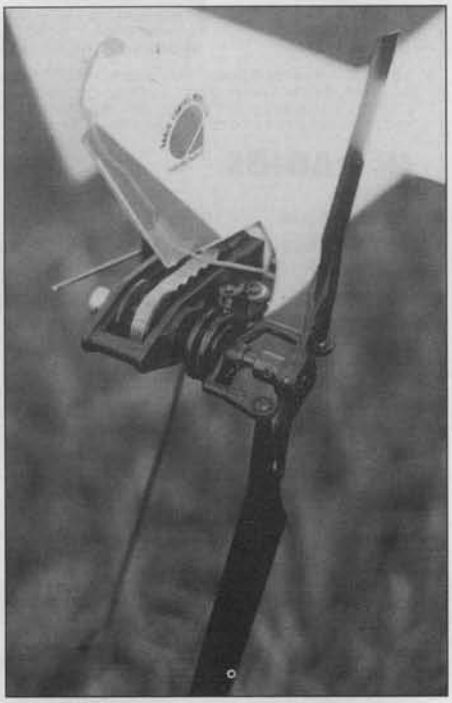
be seen in the picture, one side of the arm is much longer than the other. The side connected to the paddles is longer, therefore, the paddles can easily have leverage to move the arm. This unfavorable kinematic motion is simply due to bad geometry, rather than play at the pivot. In general, it is best to avoid this situation. This is why on the GMP flybarless rotor head, there is an extra intermediate swivel arm mounted on the hub to improve the mechanical leverage from the swashplate to the blade pitch arm, and at the same time reduces the aerodynamic feedback from the blade pitch arm to the swashplate. In the drawing, I have sketched how new holes can be drilled on MH-10s mixing arms and mixing base to eliminate the bad geometry.

This picture shows the washout unit on the main rotor mast that causes at least 10 degrees of slop in the Hiller control paddles. Note the left side of the arm on the washout is much shorter than the right side of the arm. Text has more detail. The centrifugal clutch is hidden inside the clutch bell house; the one with the tail drive belt wrapped around it. Interesting design.

In flight, the MH-10 is stable, but it does not lock on. It wants to drift in hover. Furthermore, when a cyclic command is given, the control will "stick." This mysterious symptom is the consequence of slop and play in MH-10's paddle control system.

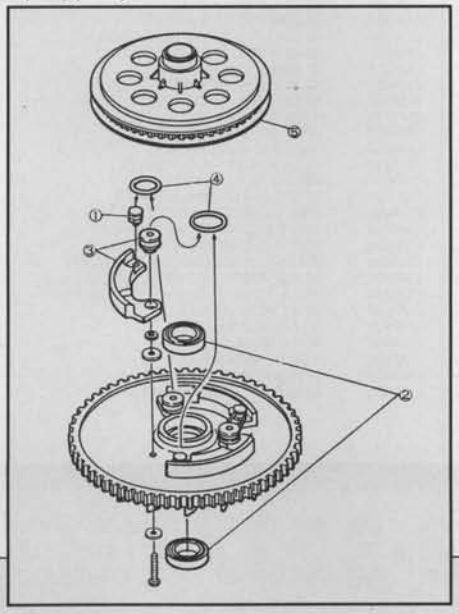
There isn't a true swashplate on the MH-10. It has a unique psuedo-swashplate located underneath the main gear. This is the only model helicopter in the world with such a design. Quite an ingenious concept. This idea actually works, but unfortunately the sloppiness of the washout mixing arms just ruins everything. But once new holes are drilled, the slop is gone. Before you fly the MH-10, pop off the ball link at the top and bottom of the four pushrods that slide up and down along the shaft. Make sure each one can slide freely without bind. I had to bend the sliding pushrods on mine very slightly to make them slide very freely. This step is crucial.

Collective control is obtained by raising and lowering the entire psuedo-swashplate assembly just like on the Hirobo Shuttle and GMP Legend. An aluminum L-arm is used to raise and lower the swashplate. A plastic L-arm is mounted on either side for roll control. Fore/aft cyclic control is achieved by rocking an arm at the bottom center of the psuedo-swashplate. At full positive or full negative collective, the four sliding pushrods may bottom out and bind when full cyclic throw is added in. I trimmed off some plastic from the plastic links to minimize binding. When you work on your MH-10, you will see.



Tail rotor is a one-piece bearingless design to reduce cost and weight. Tail blade pitch change is accomplished by elastically flexing or twisting the blade root. Tail rotor is belt driven. Tail rotor gear box and control is identical to the proven GMP Legend.

Figure 2. The unique and interesting clutch design on the MH-10. The lower plastic main gear always spins with the engine running. The top big pulley functions as a clutch bell.



Close-up shows the rate gyro hidden at far left. The psuedo-swashplate is at the left. Collective L-arm raises and lowers the psuedo-swashplate. For four-servo operation, this picture shows the throttle control arm is mechanically linked to the collective L-arm. An extra ball link was added on the L-arm for throttle. This is the author's own model. The model is really designed for five-

All pushrods come with the ball links already screwed on them to perfect length. On the first flight there are almost no trim changes necessary! Very nice. How would you like that on all the kits?

The engine is located forward of the main shaft; this is why the helicopter is so nose-heavy. The engine sits nicely in an upright position with the crankshaft facing up for easy starting. The glow plug is difficult to reach because it is blocked by the servo tray. But the kit does come with a stubby glow plug wrench and a remote glow plug extension clip. This clip is quite a good design. It is simply a wire clip that looks like a woman's hairpin clip. It clips onto the stud on the glow plug. It works even better than the McDaniel or Sonic Tronics remote glow plug extension sold in the U.S. The kit comes with the O.S. CZ-15H engine and muffler already installed by the manufacturer. But please take a screwdriver and go over every screw on the helicopter, because we have found that some screws are not completely tight.

Even though the kit includes the wire clip that clips onto the glow plug, it does not include the other end that plugs into a Ni-Starter. I have included a sketch on how you can fabricate one yourself. Just purchase a 3/32-inch audio jack from Radio Shack and solder on a 6-32 nut. Voila, you have a remote glow plug! When soldering the 6-32 nut on the plug, leave the soldering iron on the plug for only a few seconds. Anything

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COX3701	QUEEN BEE .074 R/C W/MUFFLER	36.96
COX4501	QRC .049 ENGINE W/MUFFLER	19.96
COX4505	DRAGONFLY .049 ENGINE	21.96
COX4506	TEXACO .049 BLACK WIDOW	19.96

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WEB281	28 SPEED ABC - HELICOPTER	124.96
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WEB320	32 SPEED HELI ENFORCER- CONCEPT	134.96
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WEB911	91 SPEED ABC W/DYNAMIX CARB	209.96

ENYA

SS 40 R/C w/muffler $69.96 **EMP403**

The Super Sport Series of engines from Enya are designed to be **reliable,** easy to start and **powerful** at an **economical** price. Ball bearing versions are noted by "BB" after the size notation.

EMP090	09 TV W/MUFFLER	42.96
EMP150	15 R/C W/MUFFLER	49.96
EMP190	19 R/C W/MUFFLER	54.96
EMP251	SS 25 TV W/MUFFLER	64.96
EMP252	SS 25-BBTV W/MUFFLER	89.96
EMP300	SS 30 R/C W/MUFFLER	69.96
EMP301	SS 30BB R/C W/MUFFLER	89.96
EMP351	SS 35H HELO R/C W/O MUFFLER	119.96
EMP403	SS 40 R/C W/MUFFLER	69.96
EMP404	SS 40BB R/C W/MUFFLER	94.96
EMP405	SS 45 R/C W/MUFFLER	106.96
EMP500	SS 50-H R/C HELICOPTER	139.96
EMP110	11CX R/C W/MUFFLER	72.96
EMP402	40CX R/C W/MUFFLER	119.96
EMP451	45CX R/C W/MUFFLER	129.96
EMP452	45CX W/PUMP W/O MUFFLER	189.96
EMP801	80X R/C W/O MUFFLER	179.96
EMP600	60 R/C G-8 CARB W/MUFFLER	129.96
EMP602	60XF S.E. RING W/MUFFLER	159.96
EMP604	60XL R.E. CHROME W/O MUFFLER	184.96
EMP606	60XF R/C CHROME W/MUFFLER	189.96
EMP608	60XF S.E. PUMP-CHROME W/O MUFF	219.96
EMP609	60 R.E. PUMP-CHROME W/O MUFF	209.96
EMP610	60 S.E. PUMP-HELO W/O MUFFLER	224.96
EMP530	53 4-CYCLE W/MUFFLER	199.96
EMP800	80 4-C W/O MUFFLER	249.96
EMP905	90 4-C W/MUFFLER	298.96
EMP906	1.20 4-C W/MUFFLER	319.96
EMP907	R120 4-C W/MUFFLER	359.96
EMP908	R120 4-CYCLE W/PUMP-MUFFLER	389.96

FOX

40 R/C BB w/muffler $71.96 **FOX24096**

An **American made ball bearing** engine that offers excellent **power, long life** and **easy starting.** Comes complete with muffler.

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FOX22500	25 BUSHING R/C W/MUFF	53.96
FOX24095	40 BUSHING R/C W/MUFF	59.96
FOX24096	40 B.B. R/C W/MUFF	71.96
FOX24097	Q-500 40 R/C SPECIAL	119.96
FOX24098	40 BB DELUXE W/SPIN & MUFF	79.96
FOX24197	QUICKEE .40 SPORT W/MUFF	84.96
FOX24600	45 BB SCHN R/C W/MUFF	89.96
FOX25000	50 BB SCHN R/C W/MUFF	98.96
FOX26600	EAGLE IV.61 R/C RING W/MUFF	113.96
FOX27400	EAGLE 74 R/C W/MUFF	124.96

K&B MFG

65 R/C SPORTSTER $69.96 **K&B5800**

New member of K&B's highly successful Sportster Series. Features include **excellent idle, moderate power and easy starting.** American made and complete with a super quiet muffler.

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K&B5800	65 R/C SPORTSTER W/MUF	69.96
K&B5900	45 R/C SPORT W/MUFF	64.96
K&B4011	40 R/C W/MUFF	69.96
K&B6550	61 R/C W/MUFF	84.96
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K&B8701	7.5CC-45 OUTBOARD MARINE	144.96

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SALE $319.96
FUT074

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FUT074	7UAFS SUPER SEVEN FM SYSTEM	319.96
FUT075	7UAFP SUPER SEVEN PCM SYSTEM	379.96

Dual conversion 1991 receiver, all nicads and charge, servo reversing, trainer system, control panel with ATV-4 standard servos, programmable mixing on 7ch systems. PCM models have a 10 bit microprocessor for high resolution.

9 CH PCM 1024 SYSTEM

SALE $669.96
FUT090

Dual Conversion 1991 receiver. 3 dual rates, 3 Snap roll functions, LCD Screen, programmable mixing function, precision gimbals, timer and tachometer, programmable memory for up to six different models, (4)S5101 competition servos.

FUTABA 1991

4NBL ATTACK SYSTEMS

SALE $109.96
FUT043

1991 Micro receiver. All NICADS and charger. Aircraft version with 3 standard servos. Glider version with 2 micro servos and 250MAH battery. Electric version with electronic speed control and two (2) micro servos. Servo reversing.

FUT043	4NBL AM SYSTEM W/3-148	109.96
FUT045	4NBL AM SYSTEM W/2-133	154.96
FUT046	4NBL ELECTRIC SYSTEM W/2-133	174.96

CONQUEST SYSTEMS 1991

6 CH FM

SALE $189.96
FUT061

The new 1991 series of Conquest systems from Futaba all feature dual conversion receivers, standard S148 servos, trainer system, servo reversing and full nicads.

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FUT042	4NBP PCM DC STYSTEM W/3-148	209.96
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ROY0096	MAXI TITAN FUTABA G	23.96
ROY0097	MAXI TITAN FUTABA J	23.96
ROY0098	MAXI TITAN AIRTRONICS	23.96
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ENGINES

MAGNUM

40 FSR

Inflation Fighters. The Magnum Series of engines are all **Schnuerle** for **great top end** and **low reliable idle.** The Pro Series features **twin ball bearings.** All engines include a **muffler.**

$74.96
MAG401

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MAG400	MAGNUM GP 40FSR R/C W/MUFF	54.96
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ROYAL .45

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The perfect engine for the **advanced** trainer or sport airplane. **Schnuerle ported, twin ball bearing and muffler.** Easy to adjust carb for **maximum top end and low reliable idle.**

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RJL

61 R/C

Schnuerle scavenged side exhaust, front rotary valve, **double ball bearing,** 18 oz. Comes complete with muffler.

$98.96
RJL610

SAITO

FA-65G GOLDEN KNIGHT

Smooth running, excellent idle and plenty of **power** to replace "40" size two stroke engines. An excellent choice for scale airplanes up to 8 lbs. or aerobatic midsize aircrafts.

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YS ENGINES

.61 FS

Unique pressure system, **ABC piston-sleeve, ball bearings,** excellent workmanship all add up to a **high performance long lasting** contest/sport engine.

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YSE610

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CONTROL LINE

BY JOHN THOMPSON

SHUT 'EM OFF FOR SAFETY

Control Line competitive model aviators always are on the lookout for little improvements that can give them an edge at contest time, such as that extra mile per hour, a little more smoothness in turning a stunt corner, a little more quickness in a combat turn, or another second or two of hang time in the slow phase of a carrier flight. At the same time, like all responsible model aviators, CL people also are on the lookout for improvements that can be made to the safety of their equipment and their competitive activities. The competition is more fun when the "danger" involved is the danger of losing the contest rather than the danger of injury to a contestant or bystander.

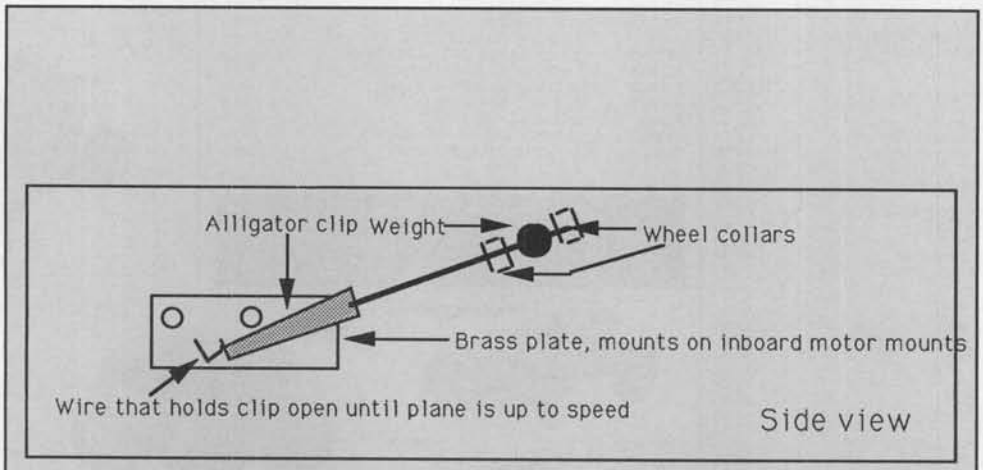
One of the groups that has been the most diligent in seeking ways to improve safety is the combat group. In recent years, leading combat fliers in the Miniature Aircraft Combat Association have carried through the Academy of Model Aeronautics rules-making process the requirement that all pilots wear safety thongs and that engines be restrained with a safety wire to hold them in check in case of a structural failure.

More informally, some contest officials have worked hard to limit the danger of flyaways in AMA (fast) combat by tightening up officiating of pilot conduct, doing all possible to eliminate circumstances that can cause cutting of lines. As a result, some of the major contests, such as the 1990 Bladder Grabber, have had a dramatic decrease in the number of undesirable incidents.

Individual fliers have worked on their own to improve safety. A number have voluntarily increased line size to .021, for example. Still, concern has remained, at some sites in particular, about the possible damage that could be done by a powered aircraft cut loose from its lines. In fact, some important contests have dropped fast combat from their schedules because of this concern. This may be viewed as an overreaction in view of the extremely small number of accidents that have occurred in the hundreds of contests over the years, but the concern of club officials and site owners is a real one, and combat fliers have recognized the need to address it.

Combat events in general have had an excellent safety record in terms of property damage and personal injury, but the occasional "close call" can create some worries. Where there has been concern, combat fliers have responded constructively. Thus, the kind of incident that caused a power outage at the 1987 U.S. National Championships in Lincoln, Nebraska, cannot happen again . . . the safety thong rule that subsequently was instituted makes it impossible for a plane to get away should a flier lose his grip on the handle. That is one type of flyaway that has been eliminated.

At the same time, it has been recognized that the nature of the event makes it impos-



How it works: The fuel tubing runs through the jaws of the alligator clip. The clip is held open by bending the small wire into its jaws. When the plane is up to speed, the weight swings the jaws open, and the wire is released. When centrifugal force ceases, as in a flyaway, the clip closes, pinching the fuel tubing.

A simple, inexpensive, flight-tested shutoff to prevent combat plane flyaways.

sible to completely eliminate instances of line-cutting. For that reason, in the past year or two, there has been an increasing effort to find ways to render the rare flyaway virtually harmless. The solution that has been drawing increasing support is the flyaway shutoff.

In fact, one major contest, the Northwest Regional Control Line Championships, reinstated AMA combat in 1991 after a one-year hiatus, by requiring fast combat planes to have flyaway shutoffs. The idea behind the shutoff is that a flyaway plane will immediately become a glider and come down to earth harmlessly, with perhaps less potential danger to people on the ground than an errant softball. *(To say that a deadstick combat model will become a "glider," especially if the lines and handle are still attached, is kinda stretching the definition of glider. However, we heartily agree it is an infinitely safer falling object than one in which the engine is still WFO! wcn)*

Once the idea of a shutoff came to the forefront, the question became: Would it work? Early theorizing centered on a mechanism dependent upon line tension. When tension was released, the shutoff would either pinch the fuel line or dump the fuel. However, the focus changed to a system that would depend on centrifugal force, when it was recognized that such a system would be considerably less complicated to set up.

Kelly Crozier, of British Columbia, showed off the first working centrifugal shutoff at the 1990 Bladder Grabber. That first attempt attracted considerable interest, but had the drawback of being a bit complicated and requiring modification of the airplane.

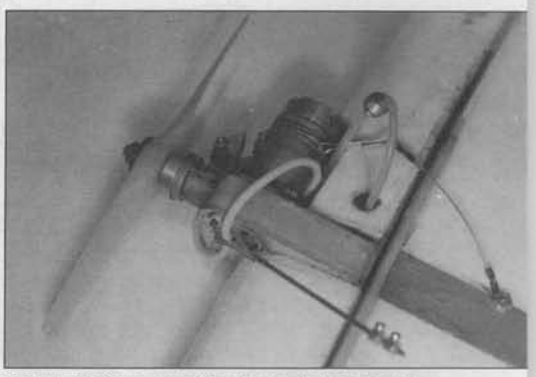
Efforts of some fliers turned to the creation of a centrifugal shutoff that would not require modification of the plane, and that could be built simply and quickly. Happily, by early 1991, such a shutoff was actually in use. There may be several research and development projects going on around the country, but this report is an opportunity to describe the first SIMPLE working shutoff of which I am aware.

After seeing Crozier's display at the 1990 Bladder Grabber, your columnist and combat expert Will Naemura, of Portland, Oregon, began moving in the direction of developing a shutoff that Naemura eventually hopes to manufacture for distribution to combat fliers.

The manufactured shutoff is intended to be a sturdy, crash-tough, bolt-on unit that will not require modification of the plane. At this writing, the prototype for that unit is not yet ready for testing. However, in order to speed up the process, and make a working design available for the region's fliers to use at the Northwest Regionals, I moved in the direction of designing a homemade shutoff that would accomplish much the same goals: It had to be simple, inexpensive and easy to build, and it had to require no modification of the airplane.

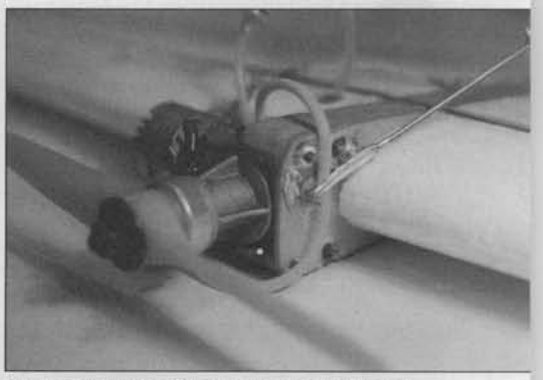
I anticipated a considerable period of testing of different prototypes, but was surprised to find that the first attempt was a success. Flight testing proved that the shutoff did, in fact, work. Its design is such that we were able to confirm that it does perform as intended, without our having to actually cut lines and send planes aloft and out of control.

The device further met our goals by costing less than $1 and taking only about 15 or 20 minutes of shop time to make. It bolts on with a single nut, using one of the engine mounting bolts on the plane's inboard side. And the shutoff does not interfere with the starting, launching or flying characteristics

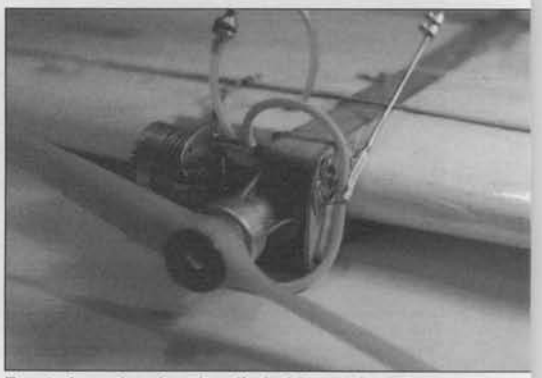


Top-view of the combat shutoff, in the closed position. Other items of note in this photo include the engine restraint safety wire mentioned in the text, and an epoxy-glass prop under development by Mike Hazel.

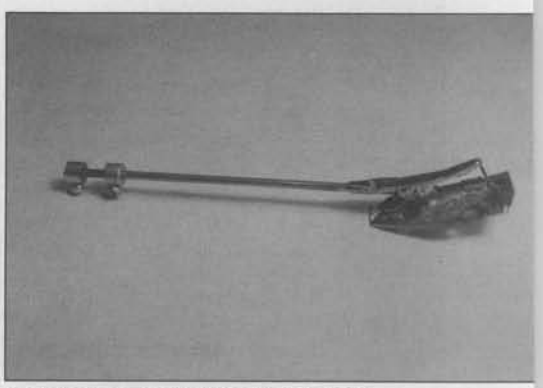
For a change of pace, here's a stunt trainer designed by Gerald Schamp, built by Mel Marcum, called "Cierra." Features an extended Tutor airfoil and an O.S. .35 F.P. engine. Silkspan, dope finish.



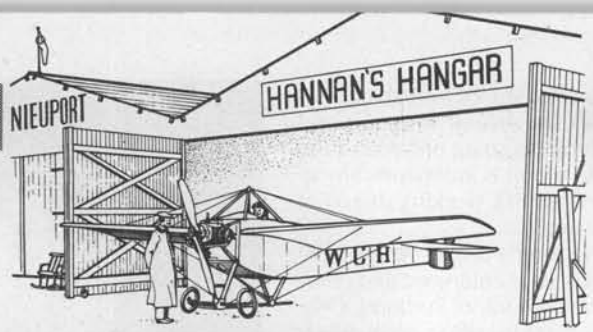
Closer, side-view of the shutoff in the closed position. Note use of surgical tubing rather than silicone; it's easier to pinch.



Front-view, showing the clip held open in the starting position; note that the small wire holds the clip open until centrifugal force swings the lever outboard, releasing the wire.



A shutoff, not mounted on plane, in open position.



BY BILL HANNAN

"THE FUTURE OF AVIATION MIGHT BE FOUND IN THE PAST"

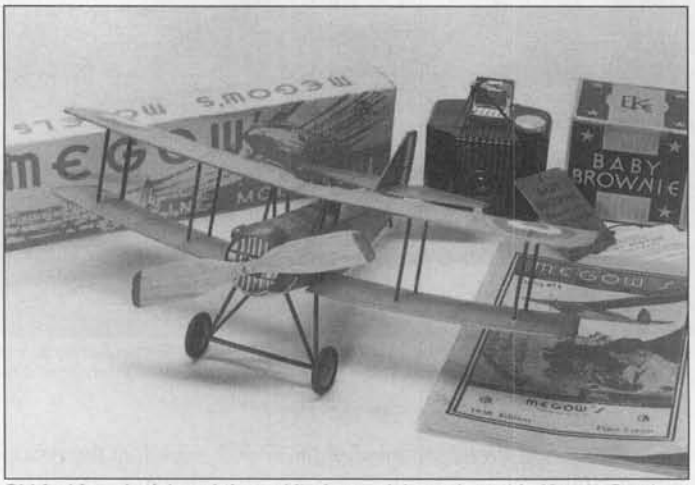
Our lead-in quotation this month was the headline on the May, 1991 *Atlantic Flyer*. The publication, which caters to pilots and aircraft owners throughout the northeast, devoted its cover and nearly four inside pages to the subject of model airplanes, and with the kind permission of Editor/Publisher Jacquelyn Lanpher, we are presenting a few extracts.

In the article entitled, "Could The Future Of Aviation Be In Rubber?", author Bob Whittier takes a fresh look at our hobby as a means of recreating interest in aviation. Bob, an authority on full-size aircraft and boats, has also been a model enthusiast since Phineas Pinkham was a Spad pilot, and thus is in a position to express opinions from a highly qualified point-of-view.

Whittier notes that an air of pessimism prevails in general aviation, and says: "Private flying is becoming too expensive for more and more people. There's too much government regulation. The news media seems to be running a campaign against little airplanes that keep seeking out and crashing into airliners. Aviation isn't doing enough to promote itself. And so on and on."

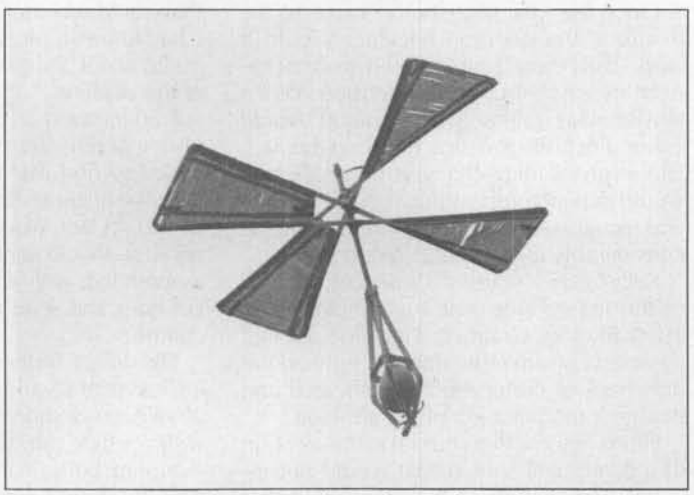
Bob attends many fly-ins and air shows intended to attract more interest in aviation, and they often include exciting demonstrations of radio-controlled models. However,

The bright Arizona sun shines through the framework of Al Lidberg's "movie star" Pilatus Turbo-Porter, mentioned in text.

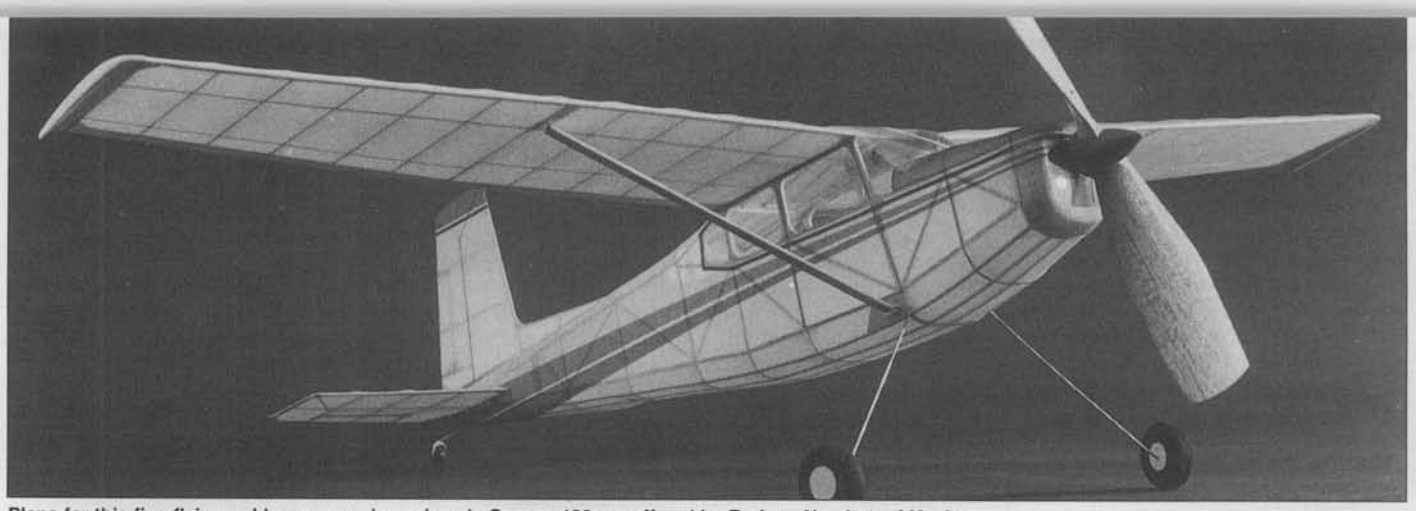


Old fashioned stick-and-tissue kits for models such as this Megow Spad are available in reproduction form today, see text. Photo by Jack Fike.

Don Campbell built this nostalgic rubber-powered Aeronca LB from Paul Lindberg 1936 *Popular Aviation* magazine plans.



Loren Wagner successfully lowered eggs from 40 feet altitude with this simple autogyro. See details in article.



Plans for this fine-flying, rubber-powered, semi-scale Cessna 180 are offered by Enrique Neudert, of Mexico.

he points out: "Each of these impressive RC models represents an outlay of many hundreds of dollars. This alone puts RC modeling quite out of reach of most youngsters. At any RC flying field, it's noticeable how much expert tinkering with models, motors and RC equipment is being done by mature adults. They display a degree of technical and mechanical skill that rarely exists among young people of school age.

"While it's true that some youngsters take part in RC activities, they tend to be the offspring of capable RC enthusiasts who provide the necessary equipment, instruction and supervision.

"So let's face up to a sorrowful reality—model aviation is an unknown activity to a vast majority of the nation's youth. Skateboards, Nintendo games and sometimes booze, drugs and premarital sex are about the only sources of thrills they know of."

Whittier explained that most of today's gray-haired aviators gained their original inspiration during the 1930s from magazines such as *Flying Aces,* and simple, low-cost rubber-powered model airplanes. And many of these people are still building that same type of model now with even greater satisfaction. But here's the irony, according to Whittier: "Understandably nervous about exposing their beautifully built but very fragile rubber-powered models to an excitable and unpredictable bunch of kids, most of the adults who still build rubber-powered models choose to do their flying at remote and deserted fields. So, few kids ever see such models perform."

And, Bob says, unsupervised youngsters seldom achieve success with toy-store kits, thus they end up quickly losing enthusiasm for them.

"When an adult who really knows how to build and fly rubber-powered models feels it's safe to demonstrate his creations to a small group of well-behaved kids, however, the expressions of delight, amazement and fascination that appears on their faces would thrill someone who specializes in photographing children. But such men are few indeed today, and budding Chuck Yeagers have become as scarce as gasket sets for 1918 Hispano Suiza aircraft engines."

Bob goes on to realistically examine the many factors which affect model magazines and hobby shops today, making it so difficult to properly promote low-cost models and still stay in business in the current financial climate. *(He's exactly right. The model airplane industry has no interest in planting seeds to produce the next generation of model airplane enthusiasts, nor do they wish to support those who do have the interest. wcn)*

"Meanwhile, the media frets about the shortage of well-trained and experienced younger pilots to replace the large number of airline pilots now reaching retirement age. They don't seem to realize that pilots get their start at small local airports."

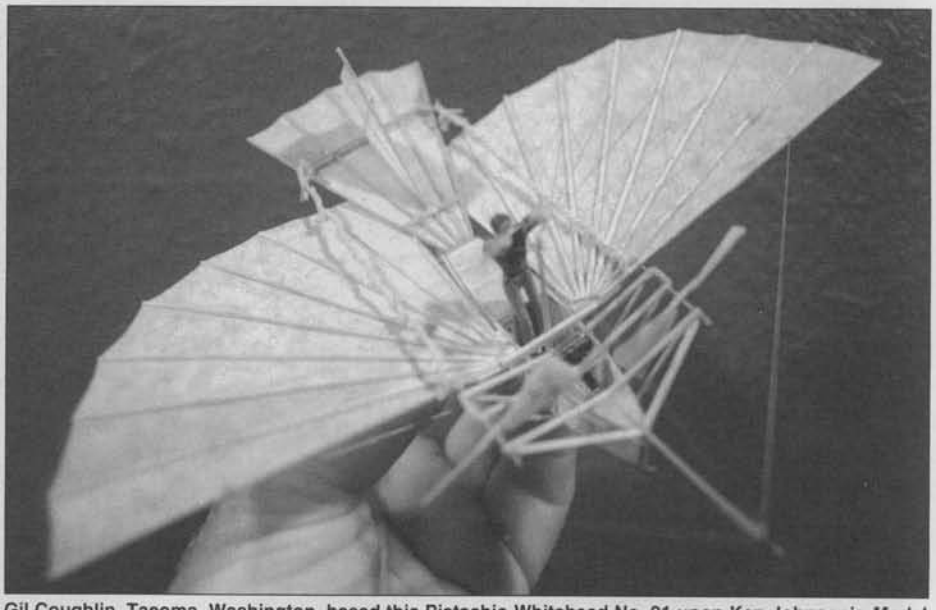
Bob suggests constructive action by the pilots themselves: "They are numerous, they are everywhere and they are in touch with the grassroots. They know enough about airplanes and flight to quickly and surely pick up the knack of building and flying rubber-powered models. They can act individually and right now to show youngsters the fun and fascination of these affordable models."

To the inevitable nay-sayers, Bob replies: "Some will yowl, `But rubber-powered models are kids `toys!' and `People would laugh at me if I showed up with one!' So? Aviation history is full of people who were laughed at—but had the guts to go ahead with their ideas and carry them to fruition."

We applaud Bob Whittier for this "tell it like it is" article, and *Atlantic Flyer* for publishing it. We have only quoted a small portion of this important story, and suggest that it deserves serious thought. Although we are not certain if back issues may be available, inquiries may be addressed to Atlantic Flyer, Civil Air Terminal, Hanscom Field, Bedford, MA 01730, or telephone (617) 274-7208.

WHERE TO GET 'EM

We realize many of our readers are rubber-powered model enthusiasts, however, some may not be currently active, or may specialize in other phases of model building. We encourage you all to try your hand at this clean, quiet form of flying. Model sizes can range from tiny eight-inch span Pistachios to huge Jumbos that may have wings in the four or five-foot range. Suppliers of kits, plans and supplies advertise in *Model Builder,* and range from tiny cottage industries to giants in the industry. Why not



Gil Coughlin, Tacoma, Washington, based this Pistachio Whitehead No. 21 upon Ken Johnson's *Model Builder* plans.

check 'em out?

SAMPLE PRODUCTS

Sample products have arrived at the Hangar recently, including the following:

Plans. Enrique Amaya Neudert is marketing construction drawings for a rubber-powered semi-scale Cessna 180. Spanning 37 inches, the model is a practical and robust flyer capable of durations of from 90 to 110 seconds, according to its designer. The plans are cleanly drawn and include propeller block dimensions. They are available for $6 postpaid from: E.A. Neudert, Calle 14a #1001, Col. Centro, Chihuahua, Chih., Mexico.

Flying Scale Incorporated. Bill Galloway is an architect who operates a model plans business in his spare(?) time. His drawings exhibit great attention to detail and first-rate draftsmanship, as well as wide variety in subjects. Al Arnold, George Payne and Curt Upshaw are also participants in the firm, and collectively the range of offerings is quite extensive, as witness this random sampling: Aeronca Champion, Berliner Joyce OJ-2, Curtiss Robin, Luscome Silvaire, Rearwin Sportster, Ryan STA, Whitman's 1938 Bonzo, Waco RNF and Stinson "T" Trimotor. We suggest sending a pre-addressed stamped return envelope for the complete list.

Lidberg's Latest. Al Lidberg has a full-time job, teaches part-time, yet still manages to add new model plans to his range regularly, making us wonder when he finds time to sleep! His most recent release is a construction drawing for a 40-inch span Pilatus Turbo-Porter. This is the long-nosed high-winger with such natural proportions for a flying model, and Al's version is based upon one example employed in the movie "Air America," complete with shark's-mouth markings. Al's plan is accompanied by unusually thorough instructions and scale documentation. Al offers the compete package including his catalog for $7 postpaid from: A.A. Lidberg, 614 E. Fordham, Tempe, AZ 85283.

Documentation. Repla-Tech International is under new management. Alain Proteau has purchased the firm from Barbara Morrison, widow of the late Bob Morrison who founded the company. Alain has greatly expanded the catalog, which now features 78 pages of three-view drawings and photographs. Included are drawings by Bob Morrison, Bjorn Karlstrom, Chuck Hafner, and Bob Hirsch, as well as drawings from such foreign publications as *Aviation News, Scale Aircraft Modelling* (England) and *Modelist Konsruktor* (Soviet Union). The variety includes racing aircraft, aerobatic types, civil and military aircraft of many nations. Alain explained that the transition to new ownership has been a painstaking process which involved many delays, however, wants all former customers to know that Repla-Tech is now back in operation. A fully-illustrated catalog is available for $4, from P.O. Box 461000, Cole Branch, Los Angeles, CA 90046-1000.

Kits. One of our photos shows a delightful Spad stick-and-tissue model from the fondly-remembered "Golden Age of Model Building," along with another relic of that period, a Baby Brownie camera and its original box. Thanks to the dedication of Jack Fike, of Scale Flight Model Company, you can once again buy such nostalgic kits. (Sorry, not the camera!). Although the Spad is a Megow design, Jack also offers reproduction kits for dozens of different designs from Comet, Peerless, and one each from the lesser-known Madison Models and Dallaire.

These kits are just as complete as they were in the "good olde days," and although prices are naturally higher now, they still represent outstanding values, with the majority being less than ten dollars. Why not send a pre-addressed stamped return envelope for the list? Scale Flight Model Airplane Company, 1219 S. Washington St., Bloomington, IN 47401.

Diels Engineering. Dave Diels favored us with a sample of his most recent kit, a 16-inch span Lacey M-lO. This offering is quite a contrast to Dave Diels' other offerings, in being a relatively simple high-winger. Laceys have established a winning reputation among Peanut Scale modelers, so it does represent a well-proven choice for the beginner in the easier-to-construct larger size.

The builder is given the option of either regular built-up tissue covered fuselage or an all-sheet balsa variation, which eliminates the need to tackle transparent cabin windows, if desired. The kit contains printed balsa sheet wood, strips, two colors of tissue, rubber, plastic propeller, complete instructions, and rather surprisingly for the type of model, decals. Priced at $12.45 plus $2.50 shipping, the Lacey may be ordered directly from Diels Engineering, Inc., P.O. Box 101, Woodvale, OH 43469.

When responding to any of the mentioned companies, kindly tell them you heard about their products from *Model Builder*. Thank you!

HAPPY BIRTHDAY BILL BROWN!

Bill Brown, of Brown Junior Motors, and his wife Dorothy, took a trip to Europe for Bill's 80th birthday, and were invited by Klaus Jorg Hammerschmidt, leading German CO_2 powerplant enthusiast, and Stefan Gasparin, who creates the smallest reciprocating engines in the world, to Czechoslovakia. We congratulate Bill on his long and productive life, and in talking with him shortly before his trip, he revealed a series of exciting new projects he plans upon his return. Stay tuned for more information.

MINUTE MODELS

Long before there were Peanut Scale models, there were "Minute Models," so-named by the late C.H. Grant, editor of *Model Airplane News* at the time, for a series of tiny rubber-powered models designed by Herbert K. Weiss. In tribute to Herb, who is still very enthusiastic about models, Dr. John Martin, of the Florida MIAMA club is sponsoring contests for any of Herb's published designs (two such plans have been reprinted in the club's newsletter, and subscriptions are available for $12.50 per year from Doc Martin at 2180 Tigertail avenue, Miami, FL 33133). Or, if you know someone with a collection of vintage *Model Airplane News* from the 193Os and 194Os you should be able to locate almost a dozen of them.

All are charming, and Doc suggests that your finished model may be entered in the MIAMA Postal contest by sending in best duration times to the above address. Separate awards will be made for indoor and outdoor flights. Even if you don't care to enter, Doc would like to receive a photo of your finished Minute Model.

SPEAKING OF PHOTOGRAPHS

Gil Horstman, of Manchaca, Texas, recently sent us some photos taken many years ago. How many years? There's the rub! Gil suggests that all model builders should date every photo they take immediately, so that they will be able to positively determine when they were taken. During my efforts in publishing books, the lack of such information has been particularly perplexing. It requires very little time or effort to attend to the task while the information is fresh in your mind. Caution: Avoid using ball-point pens or common tape for the purpose, as either can ruin photos with the passage of time. Very soft pencil (6B) may smear slightly, however, will not otherwise damage the photo if applied gently. Another possible approach is to attach typed captions with the type of frosty tape employed for repairing torn books, which should have good longevity without causing adhesive damage.

AMA MODEL MUSEUM

Plans have been announced to transfer the AMA model collection to the new site. It is to be hoped that at least a significant portion and especially the archives will remain accessible in the present Reston, Virginia, location until such time as the new facility is actually in operation. Certainly, Curator Hurst Bowers is performing an excellent service in maintaining the collection.

EGGOGYRO?

That curious object with the four rotor blades in one of our photos is the winning entry in a Problem-Solving contest, constructed by Loren Wagner, of New Wilmington, Pennsylvania. The event called for some sort of "container" which could protect a raw egg from a 40-foot drop onto concrete pavement. The rules provided for only two types of materials, soda straws and masking tape, and Ms. Wagner chose to lower the eggs via autorotation. Her design performed perfectly, lowering three out of five eggs safely to the ground (the damaged eggs resulted from wind drift causing them to strike the building wall on the way down).

Her entry received First Prize for Design Ingenuity, and Second Prize for Performance, and her entries in other Problem Solving events garnered three more trophies!

Our congratulations to Loren and also to her father, Joe, who captured the Eggogyro in descent, quite a feat in itself.

AVIATION POSTAGE STAMPS

In contrast to the usual parade of past politicians, the U.S. Post Office now offers some stamps honoring aviators: The 65-cent stamp is a tribute to N.H. 'Hap' Arnold, who gained fame not only as a military pilot, but was among the first to champion the cause of preserving historically important aircraft for future generations. He even authored an aviation book for children. The 40-cent stamp features Clair Chennault, probably best known for his efforts in leading the Flying Tigers during 1941 to 1943. And finally, our personal favorite, the 50-cent Air Mail stamp portraying pioneer aviatrix Harriet Quimby, the first woman to pilot a plane across the English Channel (fittingly, in a Bleriot). Stunning Harriet was also a magazine writer, and designed her own flying costumes, including the plum-colored outfit depicted on the stamp. Fine art!

THE GOOD OLDE DAYS?

From the June, 1934 *Popular Aviation* magazine: ". . . it is understood that a price war is in progress, making the net price of high grade aviation gasoline in Los Angeles about 9 cents a gallon."

Finally, our sign-off quotation, found in an ecology article written by David Rubenstein: "How does a 747 fly?' . . . the smug engineer replied: `It can't help but fly.' ***MB***

FREE FLIGHT

BY BOB STALICK

DETERMINING A "CLASSIC"

What makes a great free flight? You know, the ones that you remember as being classics? When you think of your favorites, which models come to mind? For me, the "Zipper" and the "Sailplane" fill the bill when it comes to Old Timer types. For the Nostalgia era, it will always be the "RamRod" and the "Spacer." For the more modern ships, it is a tossup. The models designed by Gil Morris come to mind; "Matchsticks," "Toothpicks," and the like. How about the Taibi "Starduster" or the "Dixielander" by George Fuller . . . two other great ones. Some models endure for years due to their international success . . . the "Summerwind" by Doug Galbreath, which is distantly related to a whole series of ships begun by George Albright's "High Society." These are the gas ships that I recall fondly.

Among the gliders, Elton Drew's "Lively Lady" was a classic, as was Ingersoll's glider, the "Osprey." My favorite, even though it was not an international winner, is Tom Hutchinson's "Dragmaster," because it had several endearing features; It was easy to build and fly, it was available in a kit, and people who flew it were winners in the pre-circle tow era.

Then there are the Wakefields—Korda's Wake, of course, was the rubber ship that grabbed the attention of all of the kids in the USA during the early international competitions. When you look at the model magazines during the 1940's, many ships tended to look like Korda's. Simple, square, no-nonsense ships that were all business and all success. But for sheer beauty, the "Olympia" Wakefield, by Carl Hermes, was hard to beat. In fact, it was featured as the Mystery Model for last month, just so all of us could recall the lines and proportions of this fine ship. The one that I had the most fun building and flying was the Skyscraper, by Bob Hatschek. I built three or four of them, with the last one modified with higher aspect ratio wing and stabilizer. The original was better than my modifications, but it was a classic as well.

So, what are the classics for tomorrow? Is any single current design out there so outstanding, so beautiful that it will set the standard for those who look back from the vantage point of the year 2000? Will those future free flighters point to one of the designs in use today and say, "That's a real classic"? Time will tell, but I don't think so.

What we have today seems to be an amalgam of many different ships; ships that we have analyzed and copied over and over to the extent that all of them look virtually the same. Maybe that is the future of free flight, a generic model design for gas, another for rubber and still another for glider. It's too bad if this is true; I hope not.

It may be that the reason FAI events are falling off in popularity, and Nostalgia and Old Timers seem to be either growing or holding their own, is that the charm in free flight models is in our past rather than in our present or in our future. Whatever the case, free flight, in any of its current forms, is for our enjoyment. Let's not over-analyze it, let's just build and fly it with our friends while we can. In fact, it may be that the models we recall are less important than the opportunities we take to make the best of the magic of free flight.

Scenes from Northern California: Chris Terzian holds dad's model. It's a T-Bird Nostalgia 1/2A ship . . . and here is dad, Fred Terzian, with the T-Bird. Power is a Hornet .049. Photos by Lyman Armstrong.

SEPTEMBER MYSTERY MODEL

Although this design does not make my list of unforgettable free flights, it does provide me with one outstanding memory. In 1961, when I first attended a free flight competition, I went with a local school teacher, who had built a version of this month's Mystery Model. I thought the ship was really big, and powered as it was with a Cub 14, I thought that it would not climb very fast. Well, it didn't. I had also made the mistake of volunteering to chase after it to bring it back to its owner. Little did I know that the model was not trimmed to glide in circles. Even though the climb was not

spectacular, in the 20-second engine runs (VT0) allowed in those days, it did get a ways into the sky, and it glided straight as an arrow toward a far away forest. I was in hot pursuit (it was easier then, as I was only 23 years old). Finally, just short of the forest, it dethermalized and descended into the grass. I think it was the last time I volunteered for such duty.

This model was intended as an FAI Power ship and was designed by a famous international competitor better known for his prowess as an A/2 flier than a power flier. As it emanated from the Chicago area, it carried a moniker that seemed to be unique to many of the designs from the windy city during the 1960's. If you know the name of the design, drop a line to Bill Northrop at *Model Builder* (do not send to Bob Stalick) with your best guess. Include your name and address. If your name (with the correct answer) is drawn, you will receive a free subscription to my favorite model magazine.

THREE-VIEW - VORTEX II by Bill Giffen

Last month, I shared with you the loss of one of the more active free flighters in the Northwest, Bill Giffen. Bill was a fellow who really liked big gas models, and more often than not would be flying Starduster 900s with honking K&B 40's, while the rest of us were overpowering our smaller ships with similar sized engines. One of Bill's big gas designs is what I am featuring this month. Take a look at that engine, it is a McCoy 60 with a 12x5 prop! The wing span is 112 inches and the area is 1275 square inches. So this is a BIG model . . . just the way Bill Giffen liked them.

Bill had an affinity to Spacers, just as I do, so many of his designs showed a definite relationship to this classic design. Such is the case with the "Vortex." Take a look at the wing planform and the fuselage shape. The ship was undoubtedly covered with silk and flown right-right. I never saw this ship up close, but I know that watching Bill get it ready for flight, starting the engine by hand and launching the monster would have been a sight suitable for a Marx Brothers movie. I wish I could have been there!

DARNED GOOD AIRFOIL: Gottingen 133 (MVAH 11)

During the past couple of months, I have spoken at some length about Cargo models. The airfoils of most of these ships that I've reviewed recently were either Clark Y derivatives or NACA 6409 types. I offer to you the Gott. 133 as a better alternative. The high point is far forward at 30%, the Phillips entry is rounded and low to the datum line, and undercamber is modest. This should be a forgiving high-lift airfoil. It is not too thick, better than the Clark Y and just about the same as the 6409, with the high point farther forward.

I am building the Atlas Cargo model as portrayed in the June issue of *Model Builder*. That ship has the 6409 airfoil in its original form. I am building the model with the Gott. 133 airfoil instead. I'll keep you posted on the results. I hope I will be pleased.

TERRY'S TIPS

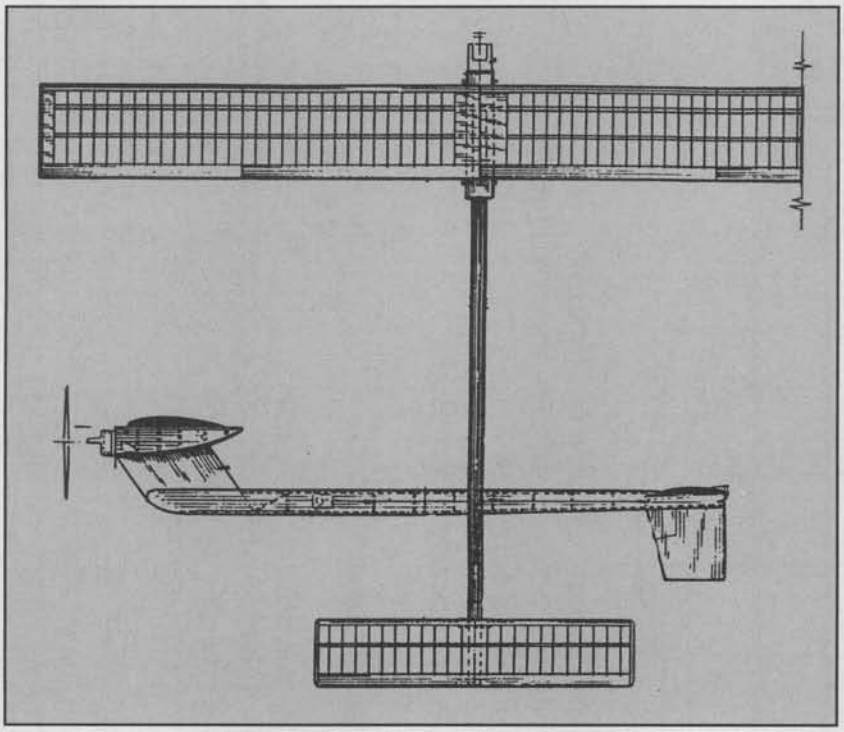
Over the past several years, Terry Thorkildsen has come up with many construction and flight tips that I have passed on through "Free Flight." Just recently, Terry sent along a whole package to share. Five of them follow. Over the next couple of months, I hope to share all of the new ones with you. So, here goes:

"1. So, you've got an older Tee Dee that runs good, but has a small crack at the plastic carb body where the air intake screws in. A simple way to fix this is with thread and epoxy. Just wrap the thread around the carb body (clean the carb body thoroughly first) and pull it tight so that the crack is closed up and then put some 30-minute epoxy on the thread. Don't use Hot Stuff for this fix as it won't stand up to the 65% nitro you may want to try. The epoxy will also work well to seal up the side pressure tap if someone drilled it out, and you don't need to use it because you are running bladder tanks anyway. Bob Hunter gave me this tip about four years ago, and I have used it on numerous occasions. Oh, go ahead and use the Hot Stuff everywhere else!

"2. So, you've got some junk wood that is just too heavy for anything you want to throw into the air? If it is 1/16-inch thick, then use it for a rib template, and the harder the better. If you back it up with 1/64-inch plywood then you will have a great permanent rib template.

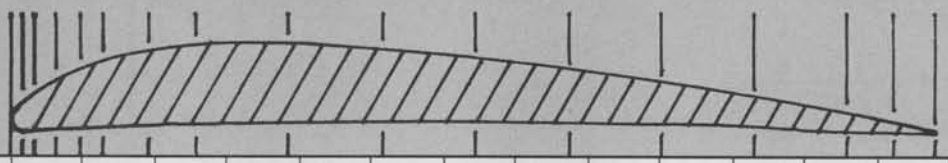
"3. To confirm that your newest engine is really any better than the others, you should always run it on the same prop. I use the same Cox grey 5x3 for all my 1/2As, and that way I know what I really have for comparison. I also paint the center of the prop hub with white paint to insure I don't get it mixed up with my other props.

"4. Have you had a hard time stuffing that fuse into the snuffer tube when you get a fuse that is a little bigger? A neat trick is to cut the one end of the fuse at an angle before you shove it in the tube. It will slip right in then. Thanks to Terry Kerger for this tip. I hate to think how many times I have fought a stub-

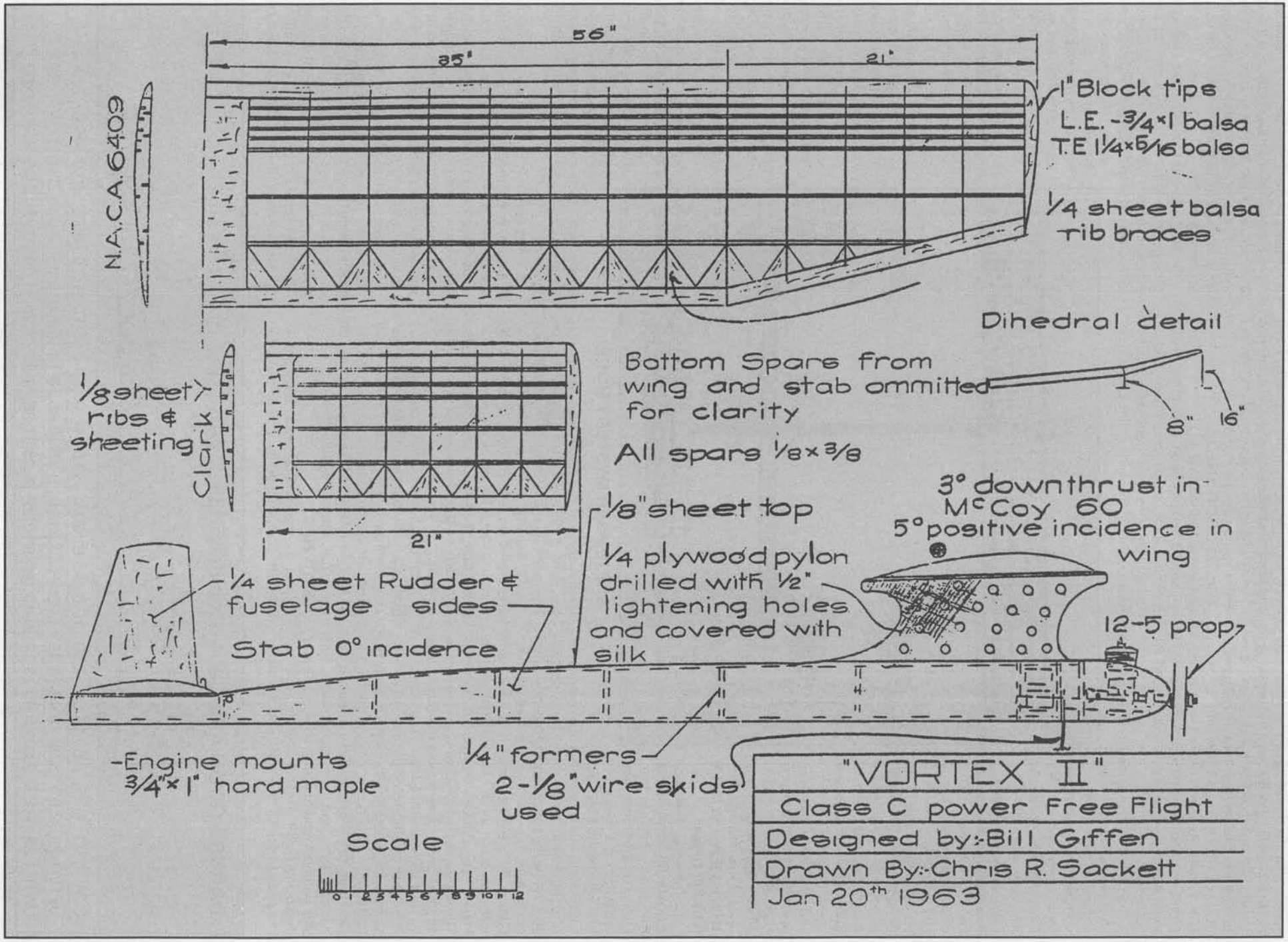


SEPTEMBER MYSTERY MODEL

DARNED GOOD AIRFOIL — Gottingen 133 (MVAH 11)



STA	0.00	1.25	2.50	5.00	7.50	10.0	15.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	95.0	100.	
UPR	1.25	2.89	3.99	5.45	6.45	7.23	8.30	8.96	9.25	8.96	8.15	6.94	5.65	4.05	2.31	1.35	0.29	
LWR	1.25	0.29	0.10	0.00	0.17	0.40	0.75	0.92	1.25	1.35	1.27	1.20	1.00	0.75	0.45	0.25	0.00	


56"
35"
21"
N.A.C.A.6409
1" Block tips
L.E. -3/4×1 balsa
T.E 1/4×5/16 balsa
1/4 sheet balsa
rib braces
Dihedral detail
8"
16"
1/8 sheet ribs & sheeting
Clark Y
Bottom Spars from wing and stab ommitted for clarity
All spars 1/8×3/8
21"
1/8" sheet top
3° downthrust in McCoy 60
5° positive incidence in wing
1/4 plywood pylon drilled with 1/2" lightening holes and covered with silk
1/4 sheet Rudder & fuselage sides
Stab 0° incidence
12-5 prop
-Engine mounts 3/4"×1" hard maple
1/4" formers
2-1/8" wire skids used
Scale
0 1 2 3 4 5 6 7 8 9 10 11 12
"VORTEX II"
Class C power Free Flight
Designed by:-Bill Giffen
Drawn By:-Chris R. Sackett
Jan 20th 1963

born fuse that didn't want to slide in. As a caution, I wouldn't advise wetting the end you shove in, as it may get the tube and/or the fuse wet enough that it goes out at the end just before it burns through the rubber band. Another way to solve the problem of fitting the fuse is to flare the end of the snuffer tube and polish the inside of the tube with fine wet-or-dry sandpaper; this makes the fitting of fuses a snap.

"5. You can remove a warp in a piece of stringer type wood by kneading or drawing it across a round edge while applying pressure in the opposite direction as you slide it back and forth. Go easy when you do this, and keep sighting along the piece of wood until you get it straight. It is amazing how you can straighten it. This technique will even work on trailing edge stock if it is warped up or down, but it won't work if it is warped from front to back."

Paul Kellas poses and nearly has his head cut off in front of his full size home built. The model is a Class C original with K&B .65 engine. No VIT, autorudder or anything of the sort. Armstrong photo.

NOSTALGIA RULES BOOK #4 IS READY

About the time that you read this, issue Number 4 of the *NFFS Nostalgia* rules book should be ready for distribution. This version contains all of the approved changes in the rules, plus an update of all of the eligible designs and engines for both Ignition and regular Nostalgia events. One of the rules changes that is still in keeping with the spirit of Nostalgia includes the change that allows the use of T.D. glow heads on any Cox engines. For the Southern California buffs, who have been politicking for the addition of the Cox Medallion engine, don't hold your breath. The current four-person committee is not inclined to violate the spirit of Nostalgia for this concession.

Quite a bit of discussion has taken place about whether the Holland Hornet "M" series engine should be disqualified, but after some research, it was discovered that the "M" series is identical to the other Hornets. Some speculate that the "M" was assembled with hand-selected parts from the assembly line; however, the general opinion is that it was primarily a sales technique. So, the "M" remains an eligible engine. For at least one modeler, who has had a standing $150 offer in the MECA Swap Sheet for New-In-The-Box "M" model Hornets, the revelation may come as a surprise, but so be it.

The new rules also establish a Nostalgia Payload event, and allow ROG for Nostalgia Ignition. These are all good changes and should be welcomed by those who fly Nostalgia models. Although the rules will be out at the end of the current summer flying season, they will be effective upon publication. If you would like a copy of them, contact Bob Larsh at 49 S. Whitcomb Ave., Indianapolis, IN 46241. The price for the whole package has not been set yet, but a five-dollar bill should cover it.

THE SIX-FOOT BROOKLYN DODGER

Sal Taibi dropped me a note recently to announce that SAM has just approved his six-foot wingspan "Brooklyn Dodger" for competition. This ship, in its smaller size, has been a mainstay at Old Timer Free Flight competitions over the past 25 years, so it is appropriate that a larger one is now approved. Sal notes that you can get a complete set of full-sized plans sent rolled in a tube for 50 cents postpaid. If you are interested in a specially produced 3/8"x1-1/4" trailing edge, toss in an extra $1.50 and Sal will include them with your plan set. Sal notes that three of these ships have been built recently and they fly super. His is powered by an Orwick and driven into the air by a 14x6 prop.

HOW I GOT STARTED IN FREE FLIGHT

This month's letter (slightly edited) about "how I got started in Free Flight, is from Jim

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R/C PRECISION AEROBATICS

BY RICK ALLISON

DO IT ON THE WORKBENCH

Last month we spent some time on trimming, which, in the order of things, was probably tantamount to placing the cart firmly in front of the horse. This month we are going to unstrap the thing from Dobbin's nose and stick it back where it belongs, following his, ah, business end, you might say. The topic of this month's month is "set up."

Set up refers to what hopefully happens to your airplane before it first slides gracefully into that great blue ocean of air where it will spend its working life. (You do attempt to slide gracefully, don't you?) The process starts during construction, but the bulk of it is accomplished during the radio installation. What is or isn't done to the airframe in terms of rigging, balancing, setting and measuring control surface deflections, etc., during this phase has a humongous effect on the trimming which follows.

Perhaps first we should talk a little bit about radio installation. By the time a guy buys his first pattern plane, he probably has learned how to install the little black magic bits well enough to get the floppy parts of the birdy to wiggle in the right direction most of the time, especially if the aforementioned birdy is a trainer or a sport plane.

The problem is, a pattern plane is not a trainer or a sport plane. I don't want to seem exclusive about this. Competition sailplanes, helicopters, scale aircraft, and ducted fans also have special and complex radio installation problems. But, this is a pattern column, and here we will talk about pattern stuff. Mr. Bill pays other folks to talk about the other stuff.

The demands of pattern competition dictate that the radio control system be as thermally stable, slop free, bind free, vibration resistant, precise, and fast as possible. When you consider that fiberglass fuselages are the norm with pattern planes rather than the exception, and that fiberglass is not known for its ability to dampen vibration, and add to that the indisputable fact that the normal in-flight control surface loads on a .60 sized pattern bird far exceed the normal loads imposed on a similar sized trainer or sport model, you should reach the conclusion that what works for a goose might not always work for a gander, especially if the gander is repeatedly called on to fly six-G square corners at 100 mph. . . .

Accordingly, avoid the following (and I have personally seen everything on this list in or on a pattern plane at one time or another . . .):

1. Nylon tube type pushrods.
2. Balsa pushrods.
3. Unsecured nylon mini-clevises.
4. Unsupported soft wire "quick link" pushrod ends over six inches long. (Actually, anything over three inches gives me the willies.)
5. Unpadded and unsecured receivers and battery packs.
6. Components directly secured to fiberglass with double-sided tape.
7. Nylon doughnut-type set screw connectors on major flight surfaces.

The scene at the Spring Opener meet in Othello, Washington. Lovely place to fly. Who says it always rains in the northwest?

8. Hinges made of covering material.
9. Servo trays or rails glued to fiberglass with epoxy or CA.

There are other sins, but these are some of the biggies. If you want to save building time, save it in the finish work or on the decoration. It takes me a good 10 hours to install a radio in a pattern plane and set it up properly. If you give something a chance to go wrong, it will, and if something goes wrong with the radio system, the result is usually a scrambled airplane. This is Nature's way of telling you that you need more practice installing radios. Unfortunately, you also get more practice building airplanes so that you can install the radios.

There are multiple "right" ways to accomplish everything on the list above. I personally favor pushrods made of carbon fiber or fiberglass arrowshafts. They are quite stiff and expand and contract at the same rate as the fiberglass fuselage, leading to little or no trim changes with temperature changes. Pull-

continued on page 92

John Nosler, of Eugene, Oregon, and his new Summit III, dubbed the "Nozelbug III."

Dave Powell's new LA-1. YS powered, Airtronics radio. Dave is from Moses Lake, Washington.

Well done Summit III by young Expert turnaround flier, Jeff Carder of Eugene, Oregon. O.S. long stroke power.

Nice new Boxer by Gus Ozols. O.S. Hanno Special, JR radio, 7-1/4 pounds. Paint over MonoKote finish. Awesome vertical performance.

Former NSRCA District 8 vice-president, Jim Hiller, of Spokane, Washington, and his new design, the Option III. O.S. .90 Surpass four-stroke powered, 730 square inches, 6-1/2 pounds, slow and quiet for Expert Turnaround.

Jack Wyatt, of Spokane, Washington, and one of his several Cursors at the Othello contest.

TOP GUN 1991 INVITATIONAL TOURNAMENT

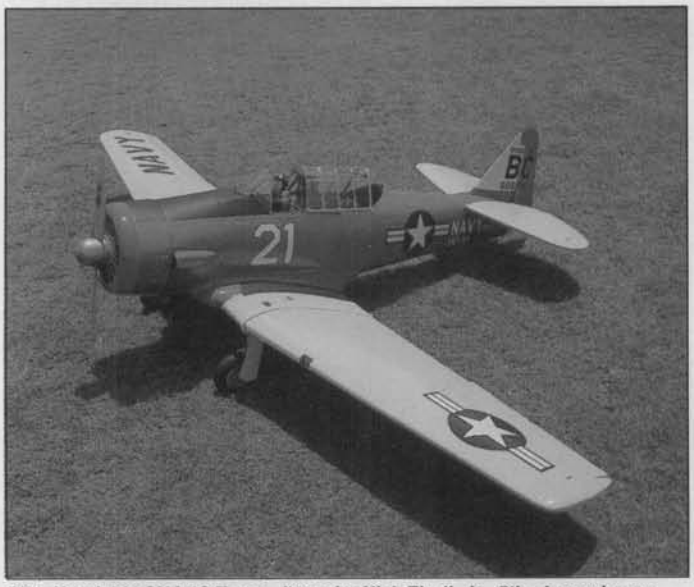
BY WALLY ZOBER

The Top Gun 1991 Invitational Tournament began on Thursday, May 2 and ran through Sunday, May 5, 1991. Thursday and Friday were set aside for static judging and field familiarization flights. Competition flying began on Saturday with two rounds of flying. The same flight program was carried out on Sunday. After the last rounds were flown, final scores were tallied and the awards were presented to the winning contestants. Thursday, Friday and Saturday evenings were set up as social events for the contestants, their wives, and friends. On Saturday night, the annual Top Gun dinner-dance was held at the Palm Beach Polo Club. A live band provided dinner music and later in the evening they played dance music. M.C. Sam Wright introduced Tom Atwood, editor of *Model Airplane News*, and Herschel Worthy, director of sales for Pacer technology. These two companies donated over fifteen thousand dollars in cash to promote and make this Top Gun event a success. There were other manufacturers and dealers who also contributed heavily to this event. I'll tell you about them later.From beginning to end, the Top Gun 1991 Invitational Tournament had to be one of the best organized and professionally run events that I have had the privilege to attend. I personally feel that we now have three premier RC events which

Dick Hansen's beautiful Proctor Albatross DV-A.

Charlie Chambers' P-51D. He won 5th place Expert, High Flight, Score, and Best Markings.

Diego Lopez's Douglas AD-6 Skyraider taxies out onto the runway; wings are unfolding. Diego took fourth place.



Rich Uravich's SNJ-5C Texan, flown by Nick Ziroli, Jr., 5th place winners.

Wayne Seiwert's Nakajama KI-84 Frank won "Critics Choice."

have erased theimage of grown men playing with toy airplanes. The first one is the Tournament of Champions, which is sponsored by Circus Circus Hotel and Casino. The second one is the Byron Aviation Expo, which is held every year in Ida Grove, Iowa, and now we have the Top Gun Invitational Tournament, held at the Palm Beach Polo Club in West Palm Beach, Florida.

The Top Gun Invitational Tournament is the brain child of Frank Tiano, and was conceived by him in 1988. Frank wanted to come up with an event that was a little more challenging than the Scale Masters. He also wanted to have the top model builders and fliers participating in this event. That's why it is an invitation-only event. This proved to be a smart move by Frank, as witnessed by the success of the three Top Gun events that have already been held.

Competition flying started on Saturday morning. It was a typical Florida morning, bright and sunny, with a few spotted clouds and a slight crosswind off the main runway. There was an alternate runway laid out to compensate for any crosswind condition. I arrived at the field a little late Saturday morning and missed the first few flights.

By ten in the morning, the parking fields were 90% filled, as was the grandstand. Everywhere you looked, there were spectators milling about. The flight line was busy with pilots and helpers getting their airplanes ready for flight. Dave Platt and Sam Wright were making announcements and describing the fliers' maneuvers for the benefit of the spectators.

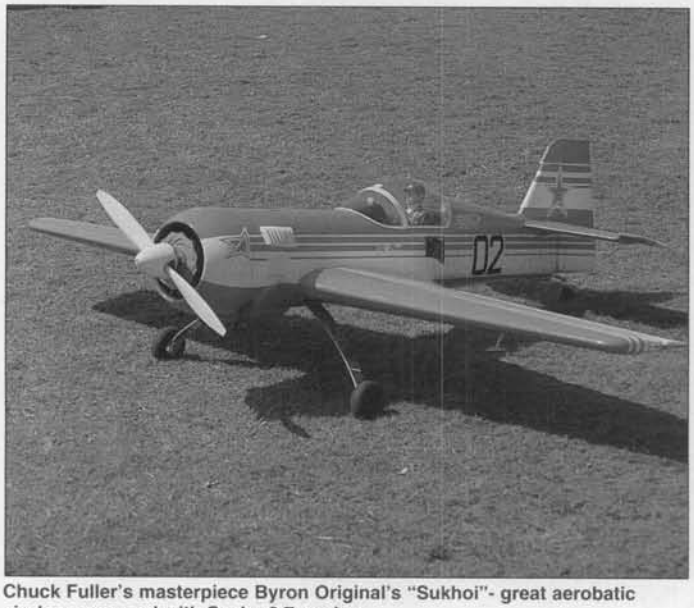
Static scores were posted early Saturday morning. After the first round of flying was completed, the flight scores were posted. This gave the competing pilots a chance to see who the early leaders were at the start of the flight competition. The first ten places, based on static scores only, were: 1st, Steve Sauger; 2nd, Charlie Nelson; 3rd, Mel Whitley; 4th, Terry Nitsch; 5th, Art Johnson; 6th, Wayne Seiwert; 7th, Ron Gilman; 8th, Diego Lopez; 9th, Charlie Chambers; and 10th, Bob Violett.

After the first round, flight scores were posted and the top ten deck was reshuffled as follows: 1st, Mel Whitley; 2nd, Ron Gilman; 3rd, Terry Nitsch; 4th, Diego Lopez; 5th, Charlie Nelson; 6th, Bob Violett; 7th, Charlie Chambers; 8th, Steve Sauger; 9th, Wayne Seiwert; and 10th, Art Johnson. As you can see, once the flying began, positions change rather quickly. As the flight rounds proceeded, the contestant flight scores improved, with an exception here and there; i.e., Mel Whitley scored high flight scores on his first three rounds, but his fourth round flight score was a little low. However, the low score was dropped and the average of the three top flight scores was taken. These three flights put Mel over the top to become "Mr. Top Gun 1991". Mel came down from Panama City, Florida, to enter his "Sea Fury." This was Mel's first attempt at competing in the Top Gun Invitational Tournament.

Mel's Sea Fury is absolutely flawless. It is a fairly large model, with a wing span of 80.5 inches, and weighing in at 24 pounds. It has an O.S. 300 four-cycle twin engine for power. It is also extremely quiet and sounds like a full size airplane. Mel flies his Sea Fury with a Futaba seven-channel 1024 PCM RC system. This plane also features drop tanks, flaps, electric retracts, and a servo-driven sliding canopy. Mel's Sea Fury has won two "Best of Shows," "Pilot's Choice," and several first place awards. Mel is a top competitor, and took home the following prizes for

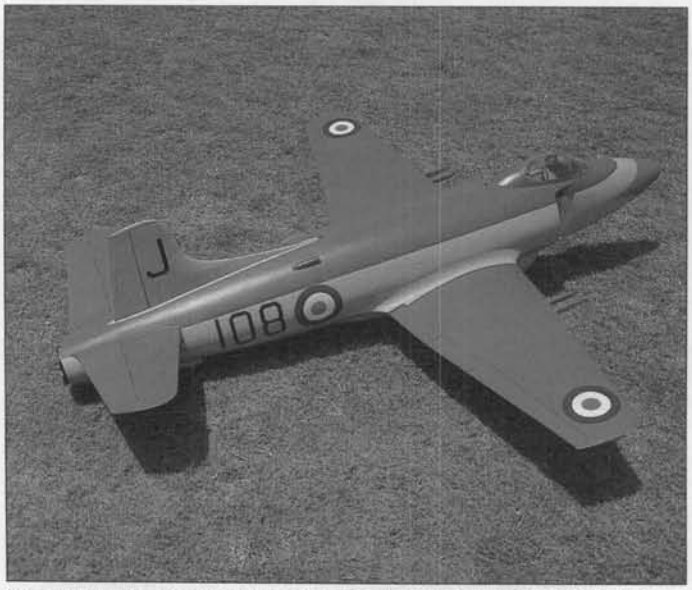
Bob Campbell's 16-1/2 ft. wingspan B-17F weighs in at 98 lbs., four 2.4 Koritz engines, Futaba 1024 PCM, uses 18 servos.

Eduardo D. Esteves with his Rearwin Sky Ranger, 9 ft. wingspan, weighs 20 pounds, Futaba nine-channel PCM radio.

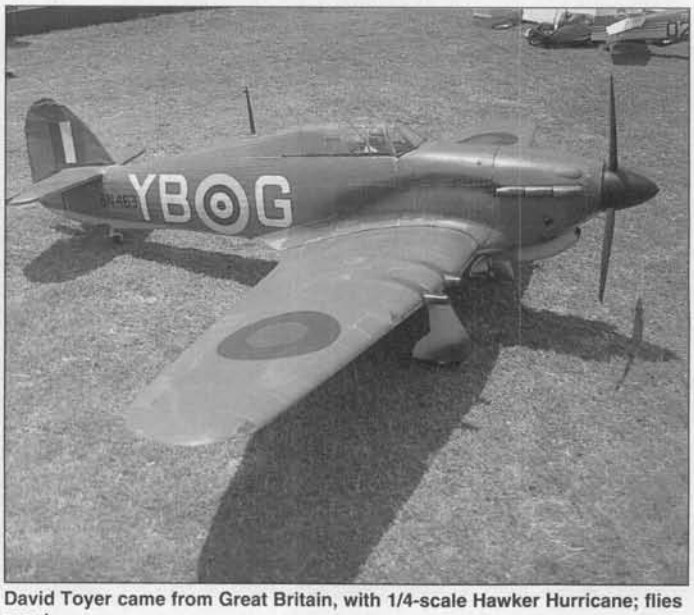


Chuck Fuller's masterpiece Byron Original's "Sukhoi"- great aerobatic airplane powered with Sachs 3.7 engine.

Fred Beard came all the way from England with his Navy version "Tiger Moth."



Mike Kulczyk had a super flying 1/7 scale Vicker's Super Attacker, a tail-dragger jet.



David Toyer came from Great Britain, with 1/4-scale Hawker Hurricane; flies great.

his Top Gun victory: a check for $2,000, a BVM F-86 kit, a transmitter case, a beautiful silver Top Gun loving cup, and a signed photo print by J. Crandall. I'd call that a clean sweep.

Terry Nitsch, a top notch flier and model craftsman, came down from Ohio to compete in the Top Gun Tournament. Terry brought his beautiful Bob Violett Model F-86F "Puddy Tat." The F-86F sports operating flaps, full cycling landing gear doors, drop tanks, scale retractable landing gears, and is endowed with over 30,000 rivets. Terry knows how to please the spectators with his flying of this plane. He didn't do too bad with the judges either. Terry was only 1.75 points behind Mel Whitley, taking second place and winning $1,500, a beautiful silver loving cup, an Airtronics RC System and a signed photo print by J. Crandall.

Ron Gilman, last year's Top Gun Champion, came all the way from California to defend his title with his award-winning BVM F-86 Sabre, an absolute beauty. It features drop tanks, scale retracts, full cycling gear doors, flaps, speed brakes and inlet, and tail pipe covers with red flags on them saying, "Remove before flying." Now that scale! Ron had good flight scores, but his static score was a little low. Ron took 3rd place, but was only 2.03 points out of 1st. He received $1,000, a Futaba RC system, a silver loving cup and a signed print by J. Crandall.

Fourth place winner was Diego Lopez, from California, with his stunning Douglas AD-6 Skyraider, which won the "Critics Choice" award at the 1990 Top Gun Tournament. Diego's famous war bird features a complete lighting system, folding wings, retracts, flaps, etc. Lopez is a tough competitor, right up there with Mel, Terry, and Ron. His static score and flight scores were not high enough to capture the number one position, but he was only 3.08 points away from first place. Diego received $700, a silver bowl, Futaba radio and a carrying case. If this were a horse race, these four top competitors would have been grouped so close together, it would have taken a photo finish camera to determine the places. At this time I would like to applaud the judges for a job well done.

Fifth place went to Charlie Chambers, a tough competitor, who flew his absolutely meticulous P-51 and received $500, a silver loving cup and a kit. Charlie Nelson flew his Waco VKS-7F cabin bipe, nicknamed "Windy," and took 6th place. Charlie is affectionately called Mr. Waco. He believes that real airplanes have two wings and round engines. Vital statistics are 96.4-inch wingspan, 15 pounds, and an O.S. 91 Surpass four-cycle engine. Charlie scratch-built from his own plans. His Waco features retractable operating landing lights, and flies extremely well. Charlie won $300, a kit and a trophy.

Seventh place went to Gene Barton, who competed with his award winning A1H Skyraider. Gene uses all nine channels on his Futaba l024 PCM RC system. Features on the Skyraider include folding wings, working tail hook, bomb drop, scale retracts, and flaps. Gene received $100, a kit and a trophy.

Eighth place went to Bob Violett, who flew his award-winning F-86F Sabre. This was Bob's third Top Gun Invitational. His F86-F has a 58-inch wingspan, weighs in at 12.5 pounds, and flies in excess of 160 mph. Bob's plane has over 150 flights. This model won first place at the 1989 Masters and second place at the 1990 Top Gun. Bob received $100, a kit and a trophy.

Ninth place went to Bob Fiorenze, proprietor of Fiorenze's Hobby Center. Bob is no stranger to the winner's circle. He returned to Top Gun for the second time with his award-winning F-18, which won first place at the 1985 NATS, the 1988 Masters, and the 1989 Top Gun. Bob received $100, a trophy and a kit.

Tenth place went to a real nice guy, Corvin Miller, and it appears that he has retired his F-6-1D Corsair. Corvin is now flying a beautiful Globe Swift aircraft. He chose the Swift because of its aerobatic qualities. Corvin's Swift has full cockpit detail, retracts, and he uses an Airtronics sail winch to retract his landing gear. It looks more like the full size airplane when they retract. Corvin received a check for $100, a trophy, and a kit. Keep your eyes on Corvin and his new Globe Swift. I think you are going to see both of them a lot in the winner's circle.

Next are the winners of team scale. This also was a very competitive event with superb builders and equally superb flyers.

First place went to the team of Geoff Combs and Kim Foster. Kim built his first place Top Gun winner from a Proctor Enterprise Kit. This was a highly detailed airplane and a fairly large one. Kim's "Jenny" had the highest static score. Kim and Geoff went home with $800, and two bronze trophies.

Second place went to Nick Ziroli, Sr. and Bill Steffes. This was the second time this team competed in Top Gun and the second time they took second place. Nick designed the twin-engine Beechcraft and Bill Steffes did a beautiful job of building it. Bill and Nick received $500 and a bronze trophy.

Third place went to the team of Paul Schuessler and Patti Violett. This Florida team entered a Bob Violett Model F-86 Sabre, which was built by Paul and flown by Patti. They were awarded $300 and bronze trophy. Note: Patti was the first female competitor invited to Top Gun.

Mark Frankel and Dennis Crooks took fourth place. Dennis flew Mark' gorgeous Lear Jet. This was their first Top Gun appearance, and the team received $200 and a kit.

Fifth place went to the team of Rich Uravich and Nick Ziroli, Jr. Rich campaigned his beautiful North American SNJ-5C Texan. This was Rich and Nick Jr.'s first invite to Top Gun. They both did a great job and were awarded $100 and a kit.

As I said earlier in this text, one of the nice events at Top Gun was the awards presentation at the dinner-dance. Sam Wright was the M.C. and Frank Taino made the presentations. Frank injected a little humor into the presentation ceremony. He can be pretty funny when he has a microphone in his hand, especially when he is roasting his buddy Charlie Chambers. Space doesn't permit me to describe the roasting, but it was funny. Let's get on with the awards.

Kim Foster received the *Model Airplane News* "High Static Score" award for his Proctor "Jenny," and $100 plus a trophy. Richard Crapp won the "Best Biplane" award, which was donated by *R.C. Report,* plus $200 and a trophy for his DeHavilland Rapide. Bill Steffes received the F.T.E. "Best Military" award, $100 and a trophy for his twin-engine Beechcraft.

Mark Frankel won the "Engineering Excellence" award for his very beautiful Lear Jet, and received $200 and a trophy donated by Robart Mfg.

Corvin Miller won the "Best Civilian" award for his Globe Swift aircraft, and received $100 and a trophy donated by Pacer Technology.

Charlie Chambers won the "High Flight Score" award for his good looking P-51. Charlie received $200, a trophy donated by Byron Originals, and a gift certificate from Aeroloft for $200, for "Best Markings."

Last but not least, Wayne Seiwert won the "Critics Choice" award for his highly detailed and weathered Nakajima K1-84 Hayate, Allied code name "Frank." Wayne received a custom, handmade Ace Series 8000 RC system donated by ACE R/C Products, plus a trophy.

The sad part of this fly-in was that there were quite a few crashes. I'm not going to give you a morbid postmortem on them. They happened for various reasons: mechanical failure, radio failures, structural failure, or possibly dumb thumbs. Whatever the reason, it's sad to see a beautiful scale model destroyed.

In summing up, I would like to say that putting a contest together of this magnitude takes a lot of work, a lot of money, and a lot of workers. Space does not permit me to mention everyone who helped, however, I would like to mention the following supporters: the Palm Beach Polo Country Club, the Palm Beach Aero Club, Pacer Technology, Model Airplane News, Airtronics, Futaba Radio Corp., Byron Originals, Power Master Products, Inc., Prop Wash Videos, Don Smith RC Scale Plans, Dave Platt Models, Glenn Torrance Models, Hobby Dynamics, Aeroloft Designs, Ace R/C products, Scale Plans and Photo Services, Bob Violett Models, Fiberglass Masters, Nick Ziroli Plans, Lanier R/C Products, Craft House Hobby Shop, Bob Fiorenze Hobby Centers, Robart Mfg., House of Balsa, Frank Tiano Enterprises, McDaniel R/C Products, Orange Blossom Hobbies, Loyal Products, Tanzer Plans, Cox Hobbies, Eagle Editions (Jerry Crandall), Hanger One, Hobbico, Impact Engineering, Innovative Design, and J-Tec Products.

Till next year—stay well and keep 'em flying. **MB**

Part II • Roy Clough's 1954 "Anti-Grav" Martian Spaceship

Redesigned for Radio Control

BY SKIP RUFF

This is a continuation of the Martian Spaceship construction; Part I appeared in the August 1991 issue of Model Builder.

We can start on the tail surfaces next, and these are of fairly conventional (for a spaceship!) construction **(photos #16 and #17)**. The connecting wire for the two elevator halves is 3/32-inch with an outer sheath of aluminum or brass tubing. Notice how the rear spar for the vertical stab is notched for clearance over it. The 1/16-inch tailwheel wire also has an outer sheath of brass tubing that extends down about 1/4-inch below the bottom of R-1. A washer is soldered onto the bottom end of the tubing to prevent rubber bands, which hook over it to secure the tail section to the fuselage, from slipping off. A washer should be soldered on the tailwheel wire as shown on the plans to transmit the landing loads to the brass tubing and not to the rudder assembly. After the tail surfaces are removed from the plans, they can be sanded with the leading edges rounded and the trailing edges of the control surfaces and rear tip of the vertical stab sanded down to 1/8-inch thickness. Then, 1/16-inch wide C.F. strips are CA'd on both sides of the surfaces as shown in the plans and **photos #16 and #17.**

The previously mentioned brass and aluminum tubing can now be glued to the horizontal and vertical stabs as shown on the plans. Next, glue the vertical stab to the horizontal stab **(photo #19)** using a right angle to insure a 90-degree joint. Cut grooves in the forward edges of R-1, E-1 and E-2 to provide clearance for the tubing, and CA these in place **(photo #19)**, being careful not to get any glue on the music wire itself or allow it to wick between the wire and tubing. Fit the tail assembly on the rear of the fuselage (which should still not yet be sheeted). With the forward vertical and horizontal stab spars lined up with and firmly against bulkhead F-8, and the rear vertical stab spar in line with, but not touching the bottom longerons, tack glue the tail assembly to the fuselage. There should be just enough clearance to slide bulkhead F-10 in place between F-9 and the rear stab spar. If not, shim or trim the spar until it fits. Glue F-10 to the rear vertical and horizontal stab spars and then cap both sides of the rear vertical stab spar and R-1 joint with 3/4-inch squares of 1/64-inch plywood. Next, drill two 1/8-inch holes, next to and on both sides of R-1, through F-10 and F-9. Slide two one-inch long pieces of 1/8-inch dowel, that are slightly pointed on the forward end, into these holes about halfway, and CA them securely to F-10 and the 1/64-inch plywood **(photo #20)**.

For the forward attachment points, CA one-inch long pieces of 1/8-inch dowel, again slightly pointed on the front end, onto 1/2-inch square hard balsa pieces end cut to 1/4-inch thickness, or 1/4-inch lite-ply squares. Reaching through the bottom of the radio compartment (now you know why I said not to sheet it yet!), slide the dowel ends forward through the 1/8-inch holes in the bulkhead F-8 and glue the 1/2-inch square end cuts or lite-ply onto the forward stab spar and 1/4-inch sheeting. You should now be able to cut through the tail section/fuselage tack glue joints and pull the tail assembly back and off the fuselage. Using plenty of CA and some light glass cloth, finish gluing the forward dowel assemblies to the horizontal stab **(photo #21)**.

You can now sheet the rear section of the fuselage (at last!) with light 1/16-inch balsa, with the grain, again, running vertically. If necessary, sand and bevel the top half of the bulkhead F-8 down to the level of the cap strips on the top longerons and the bottom sheeting.

Slide the tail section back on the fuselage and add the rest of the tail section superstructure **(photos #22, 23, and 24)**, extending the

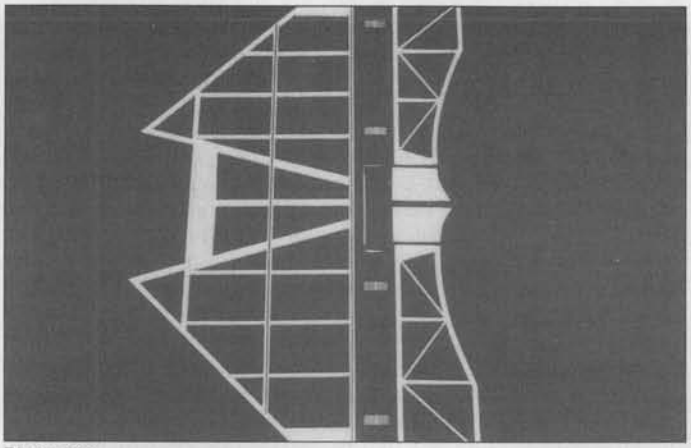


Photo #16

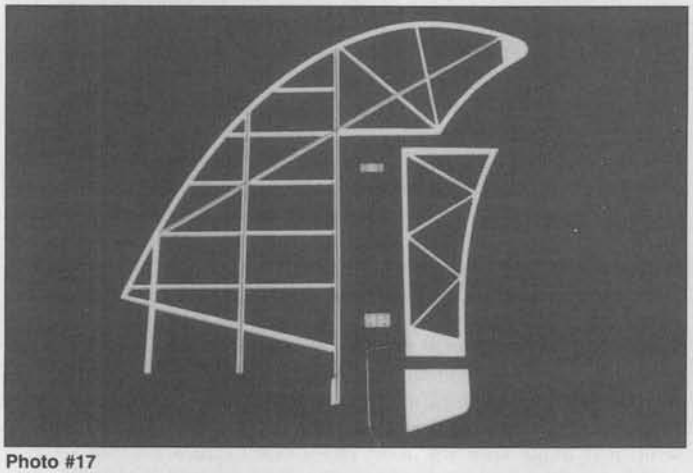


Photo #17

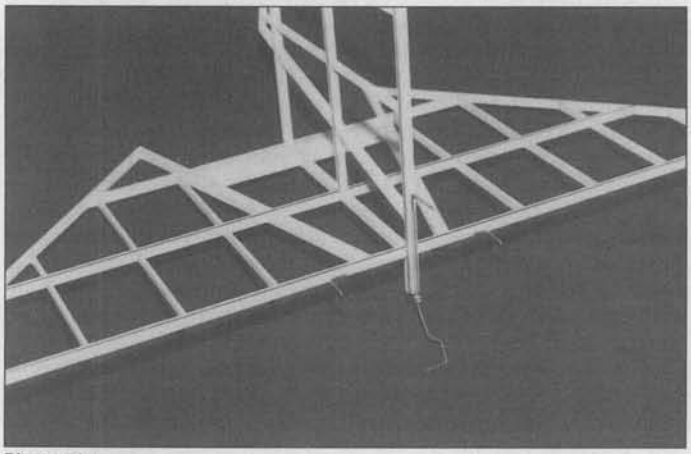


Photo #18

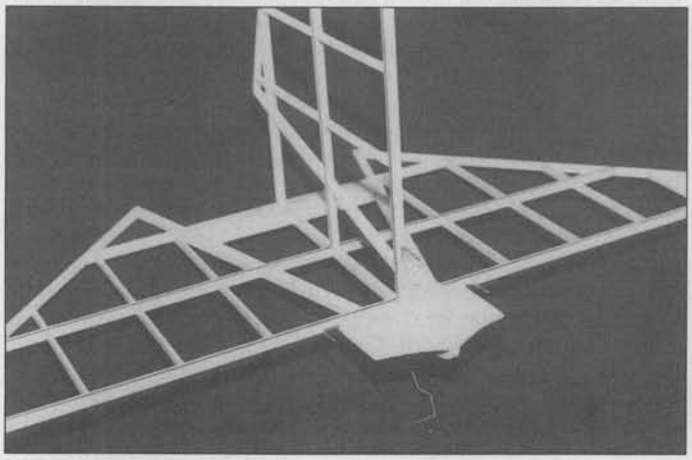


Photo #19

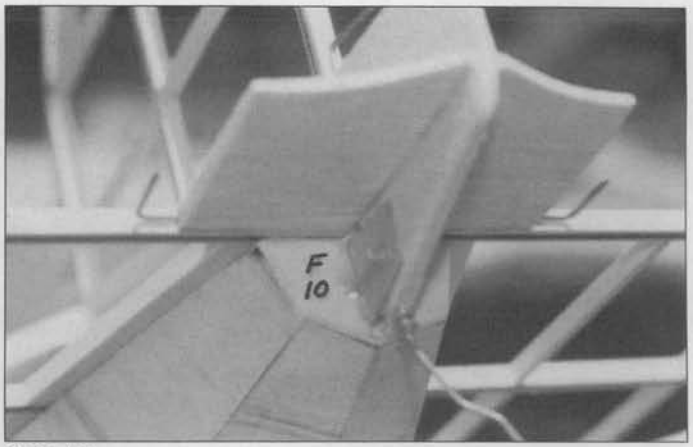


Photo #20

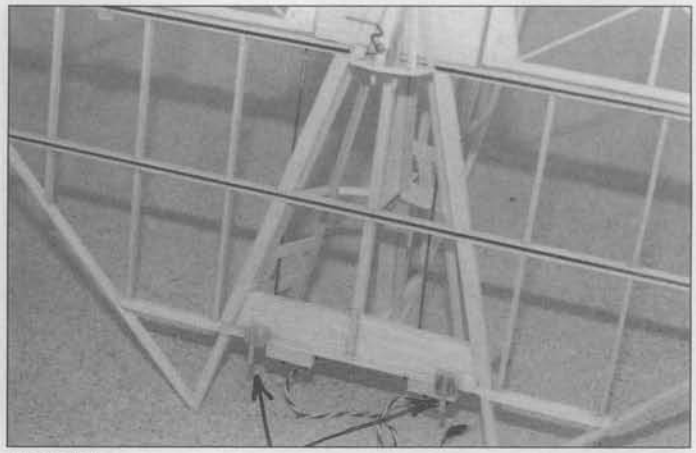


Photo #21

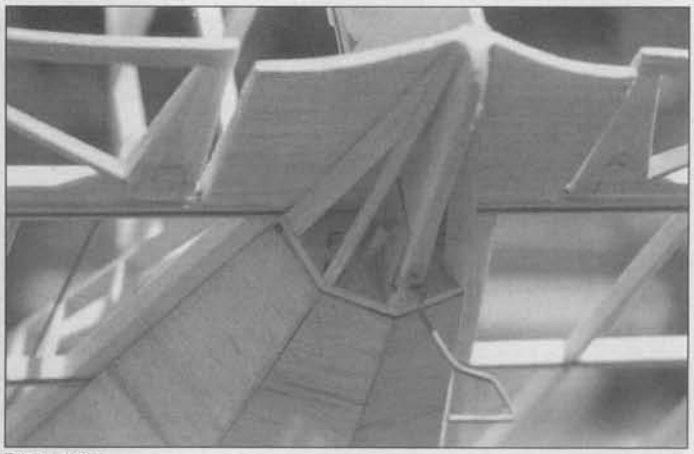


Photo #22

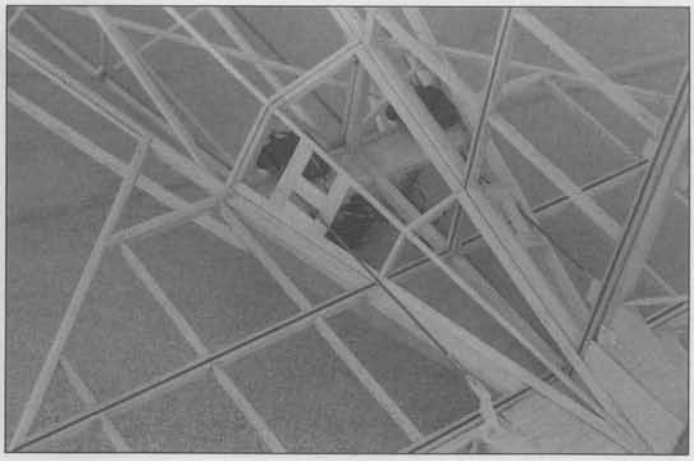
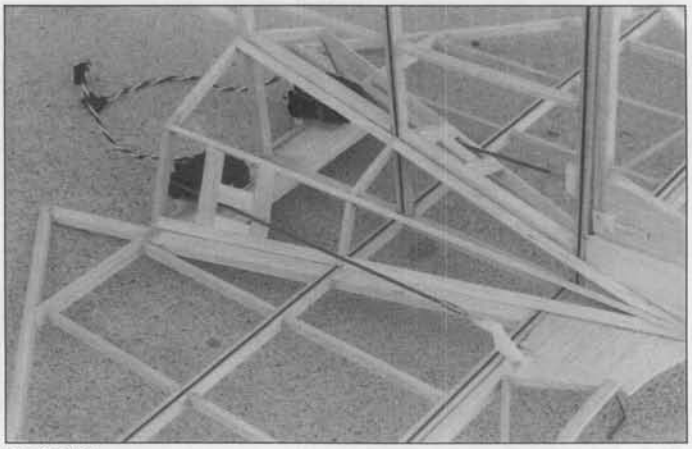


Photo #23



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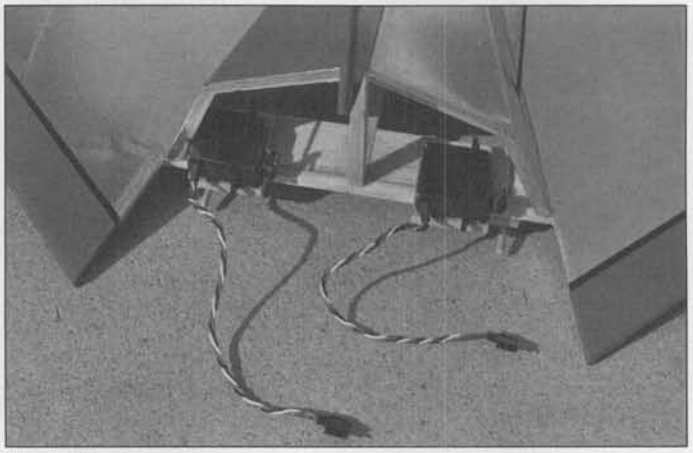


Photo #25

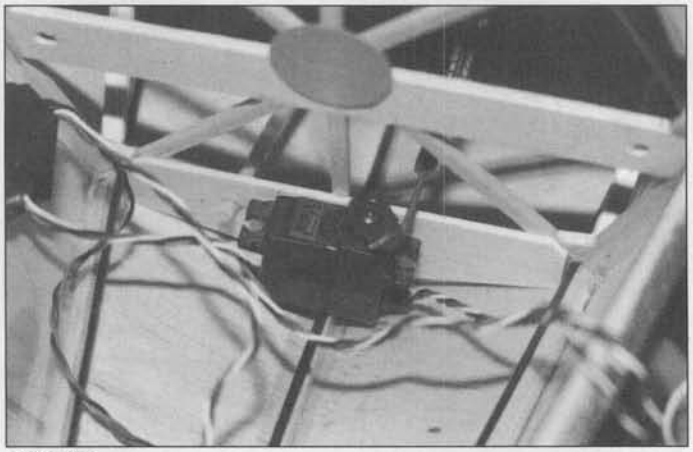


Photo #26

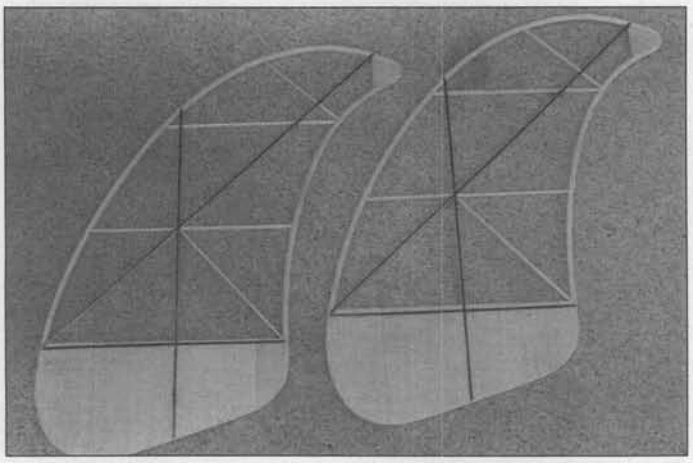


Photo #27

profile of the fuselage down to the tip of the tail. The superstructure is made out of 1/8x1/4-inch balsa, except for the covering attachment strips which are 1/16x1/4-inch. You'll probably have to sand F-10 down to match the rear of the fuselage.

The rudder and elevator servos can be installed as also shown in **photos #23, 24, and 25** (which illustrate their position with the tail section already covered). Before covering, you'll need to make up your pushrods (with the control surfaces temporarily attached) and add the 1/16x1/4-inch balsa pieces for the pushrod exit holes. The elevator pushrod length should give about 1/2-inch of up elevator (measured at the outer tip of the surface) with the servo in the neutral position. Throw for the control surfaces is two inches (1-inch left and right) for the rudder, measured at the top, and 1-1/2 inches (3/4-inch up and down) for the elevator, again measured at the outer tip. Regarding the servos themselves, they are held in place with double-stick servo tape to 1/64-inch ply plates which are glued to the horizontal stabilizer. Note how they project slightly forward, about 3/8-inch, to allow easy access to the servo arm retaining screws. The throttle servo **(photo #26)** is also held in place by tape onto a 1/64-inch ply plate that is glued onto a piece of 1/8-inch balsa that, in turn, is glued to the bottom half of F-8.

While on the subject of radios, try to utilize the lightest system available. The total weight of the airborne pack you see in the photos is four ounces, and consists of three micro-servos, a small four-channel receiver, and a battery pack made from a nine-volt rechargeable transistor radio battery. (Steps on how to make such a flight battery appear in the August 1990 issue of *Model Airplane News*, page 19). It is important to try to keep the tail as light as possible, as your model, in spite of your best efforts, will probably come out slightly tailheavy, like mine, and you'll have to add nose weight. If you don't have a lightweight system available, I suggest mounting your receiver battery in a compartment under the fuel tank, with a long ex- tension cord going from it to the rest of the radio in the tail. This is the setup I used in the first prototype and it worked well. Just make sure the long wires don't cause an interference problem with your particular radio system, and you'll have to decide whether or not to do this before covering.

The tip fins can be built next. Note the 1/16-inch wide C.F. strips on both sides as shown on the plans and in **photo #27**. The photo shows leading and trailing edges made out of four laminations of 1/32x1/8-inch balsa, but these buckled in and caused wrinkles when the covering was shrunk, so the plans specify six laminations.

Construct the strakes as shown on the plans. Note that there are four short ones and two long ones for the sides of the fuselage **(photo #28)**. The 1/8-inch square inner and outer edges of the strakes are laminated out of 1/16x1/8-inch balsa over the same cardboard jig used for the longerons. When removed from the jig, they will straighten out somewhat, but once the entire strake is constructed and removed from the plans, it will retain its shape.

If you've come this far, you're ready to do some covering. Chrome Monokote was used on the first prototype with red for the trim, and this worked out fine except that it's heavy covering. On the second one, Coverite's aluminum Micafilm is used to save weight and this is what I recommend. If used carefully, one 15-foot roll should be enough for the base color as shown in the photos, with just a little over one six-foot roll of red Black Baron Film being required for the trim and strakes. A lot of red is wasted here because of all the curves.

Covering the fuselage one section at time **(photo #29)**, is the easiest method and wastes the least amount of material. This was the first time I've ever used Micafilm and suggest following Coverite's instructions closely with the following exceptions. Although they recommend a 1/2-inch overlap of all seams, that tended to cause wrinkles on my model and I found that 1/8-inch to 1/4-inch is sufficient if you do the following: **Lightly** and carefully sand, with 400-grit sandpaper, the edge that is to be overlapped and coat **both** that area and the bottom of the piece that's doing the overlapping with two coats of Balsarite. Once the entire fuselage is covered, before shrinking, the excess Balsarite around the seams can be removed with Ironex. When shrinking, a setting of around 375 degrees (on my iron, nearly wide open) was required to get all of the wrinkles out. You might want to make a test piece first to get the hang of it. Be very careful not to touch the seams when shrinking, keep

the iron moving constantly and shrink each section only partially before moving on to the next and doing the same. This will prevent the longerons from being warped laterally, which would occur if you shrank each section fully before doing the others. You might have to make three or four passes over the entire fuselage before all the wrinkles are out so have patience! The extra attention that was given to the seams will keep them from loosening when the engine is running, as certain engine RPM's tend to make the covering vibrate like a drum skin.

Covering the tail surfaces is not much of a problem, except that they tend to warp somewhat and you may not be able to get every wrinkle out (I couldn't!), especially on the fragile tip fins. Most of the warping and twisting can be taken out by twisting the surface in the opposite direction and reapplying heat to the covering.

Cover the strakes but do **not** shrink them at this time. This will be done after they have been attached to the fuselage. Also, the inside edge should not have the covering lapped over, as glue will be applied here.

The strakes are epoxied to the fuselage, one at a time, in the position shown on the plans and photos. First lightly sand the covering over the longerons where the strakes will be located and then stick pin holes through the covering into the balsa cap strips at about 1/8-inch spacing **(photo #30)**. Using pins, stuck into each bulkhead just at the sides of the longerons, as guides **(photo #31)**, coat the inside edge of the strake with slow epoxy and place it in position on the fuselage. Likely, there will be gaps at various locations between the strakes and longerons. Using masking tape, pull the strakes down until the gaps are closed **(photo #32)**. The tape is also used to make sure the strakes are perpendicular and don't snake around too much. The strakes are very fragile at this point so use care when applying pressure with the tape. It really takes two people to do this operation, one to hold the fuselage and the other to apply the tape.

Once the epoxy has set and the tape and pins are removed, shrink the covering on the strakes with an iron, starting at one end and working both sides of each one a little at a time. They will, no doubt, tend to twist around a bit along their length as the covering is shrunk, but this can be mostly eliminated by gently bending them the other way and applying the iron to the covering. They don't have to be perfect. Once the covering is shrunk, you'll find the strakes to be much more rigid, but still be careful not to bump them around.

Once covered, glue the forward fin on after first removing the covering under it on the fuselage. This has to be secure for its use as a handle.

The wheel pants shown in the photos are optional and therefore I've only enclosed an outline of them on the plans. If you decide to use them, use your favorite building method, keeping in mind they should be as light as possible. Mine were laminated from very light balsa, with 1/64-inch plywood for the sides. A wheel collar soldered to a thin piece of brass shim-stock, which is in turn glassed to the inside of the pant, secures them to the axle. You may have to grind a flat spot on the axle for the wheel collar set-screw, to keep the pant from rotating. The flat spot, along with the wheel collar in the pant, should be on the outer end of the axle.

Glue the tip fins securely to the ends of the horizontal stab, using a triangular piece of balsa on the bottom for reinforcement. Install the control surfaces with your favorite hinges. A small wire hook should be glued to the bottom longeron about 1-1/2 inches ahead of F-9 and extend out of the bottom of the fuselage enough to wrap a few small rubber bands around. Rubber bands from this to the brass tubing on the tailwheel wire secures the tail section to the fuselage **(photo #33)**.

With the model completely assembled, check the balance, according to the location on the plans, by placing a finger under the inside edge of each side strake and adding either tail, or more likely, nose weight until the model hangs level (fuel tank empty!). Mine needed about 2 ozs. of nose weight and came out at 2 lbs., 11 ozs. ready to fly (minus fuel).

FLYING

With the engine thoroughly broken-in, pick a nice calm morning or evening for the first flight. Midday turbulence tends to make the ship rock around. Head directly into any breeze and give power

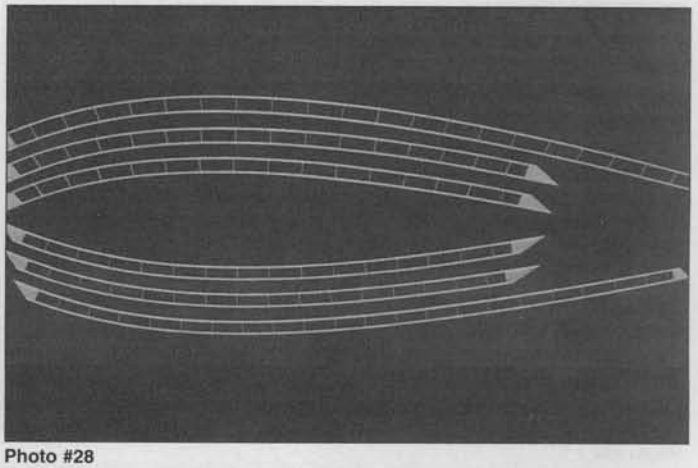
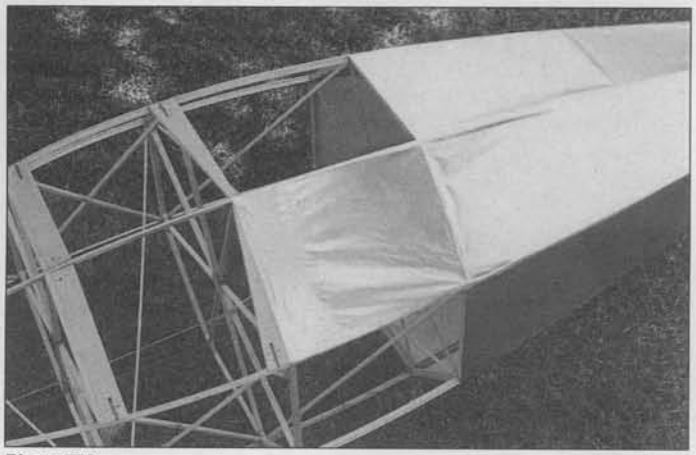


Photo #28



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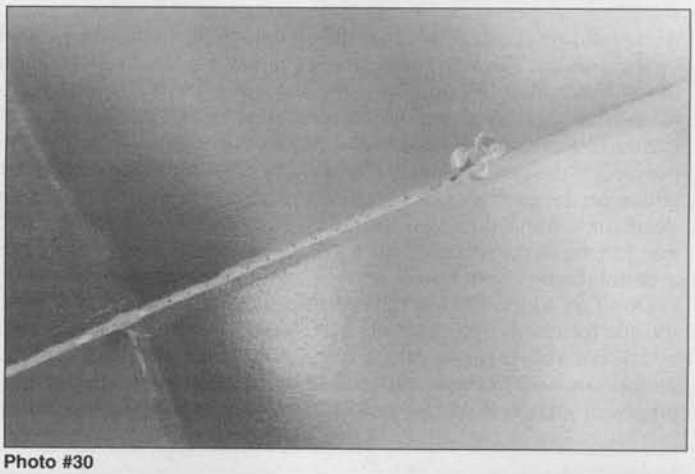

Photo #30

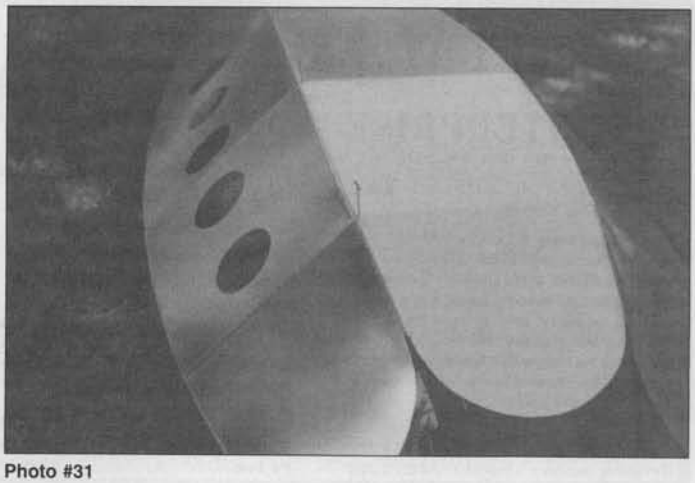

Photo #31

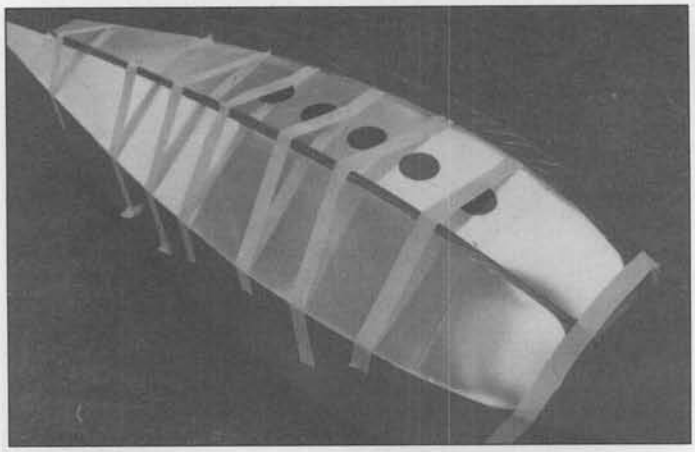

Photo #32

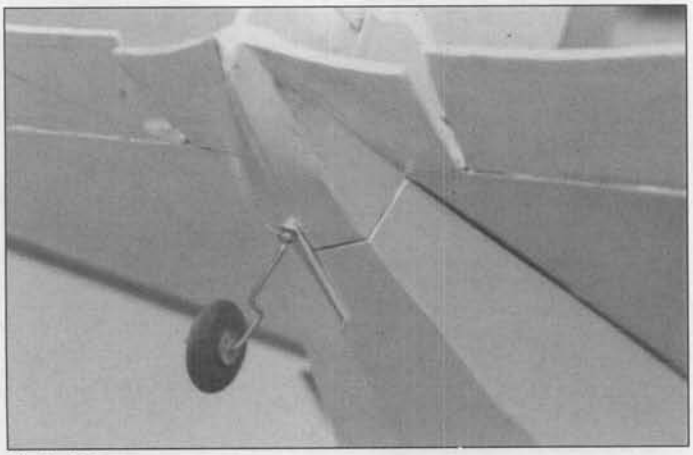

Photo #33

while holding about 50% up on the elevator to keep the tail planted on the ground. The ship should track straight. Upon liftoff, let off on the elevator slowly and retard the throttle slightly, if needed, to establish a shallow climb. The neutral elevator position mentioned earlier is a cruise setting and the model will climb steeply at full power and descend slowly at idle with the elevator at that setting. Be gentle on the rudder under high power as it is sensitive. At idle, or dead-stick, the rudder will lose most of its sensitivity and you will need all the throw specified. Be cautious with down elevator as it has a destabilizing effect in roll.

Don't try to fly it like a pattern ship, it responds much better to throttle for climb and descent. Use elevator for pitch and angle of attack control. It is capable of very slow flight in a near vertical attitude and will not stall, although it will tend to rock slightly at high angles of attack. If you've built it light enough and have enough power, it is capable of looping if your entry is correct. Full power and a shallow dive for speed is needed to get it over the top cleanly, as once you ease back on the stick and start to pull some "G's," speed bleeds off rapidly. If your model is banked slightly in either direction on entry, it will tend to roll out on top of the loop, performing a neat Immelman.

The destabilizing effect of down elevator allows you to perform some very rapid rolls. Again, full power and a shallow dive to gather speed. Then pull the nose up to about a 30-degree angle and immediately apply full down and full left or right. The model will begin a series of fast rolls and will continue until the controls are neutralized. Have plenty of altitude when you first try this!

As might be imagined, the spaceship's gliding abilities are nothing to write home about. In fact, it makes the Space Shuttle look like a sailplane! Unless you have a dead reliable (?) engine, it is wise to limit your flying to directly over your field, especially when low. The glide ratio is about 3-to-1, at best, and less when downwind and trying to get back to the field! On a power-off landing, you'll need to enter a shallow dive, at about fifty feet of altitude, if you want any speed left for a flare at touchdown and you'll have to time it just right to grease it on. This thing will definitely **not** float down the runway in ground-effect!

With the light framework and large unsupported areas of covering, you'll find that the model resonates like crazy at certain engine speeds. In fact, it sounds rather like the buzzing noise made by the spaceships in the old Flash Gordon/Buck Rogers serials. One fellow commented that all it needed was smoke and sparks coming out of the tail and "Ming the Merciless" waving out of a porthole to complete the effect!

Probably only having scratched the surface with my experiments with this design, I'm sure it can be developed further to improve its flight capabilities, with maybe elevons on a modified tail for roll control, changes to the strakes or tail surfaces for better handling in turbulence, and many other things. Wouldn't retracts look neat, too?

With that in mind, photos, comments and letters regarding this project can be sent to me at 128 Lexington Ave,Taft, CA 93268. Please include an SASE if you wish a reply.

You may be wondering whatever became of the original designer Roy Clough. The abrupt cessation of his articles in the late 1960's seemed to indicate to me,and others I've talked to,that he might have passed away. Well, I'm happy to report that Roy is alive and well, and after a nearly 20-year hiatus from the hobby, he's now back into it and is currently working on a number of new flying projects, many of which are electric powered. He may also be producing a line of electric powered F/F kits soon, so watch this magazine for further developments.

In closing, I wish to thank Roy Clough, George Ardwin, J.T. Herrod, and Russ Hiatt for their help with this project.

For carbon fiber supplies contact: Aerospace Composite Products, P.O. Box 16621, Dept. A, Irvine, CA 92741; telephone (714) 250-1107. The cost is $24.00 plus $3.00 shipping and handling for the 4x72-inch, .007 carbon fiber sheet. ***MB***

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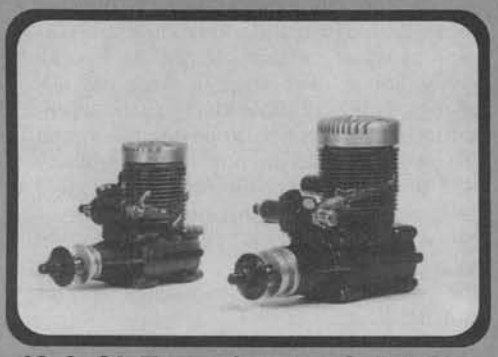

40 & 61 Front intake Gold Cup

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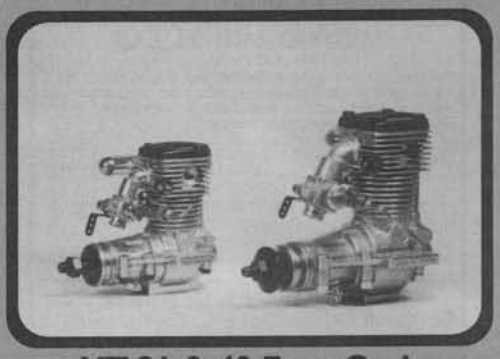
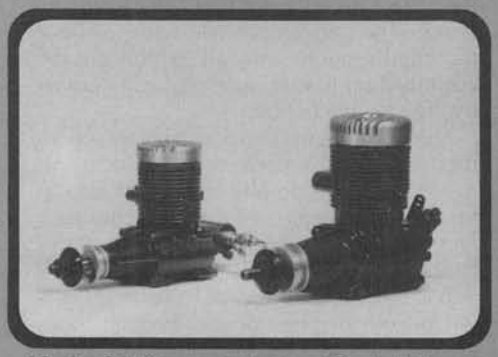


VT 21 & 49 Four Cycle



40 & 61 Rear intake Gold Cup

HP is well known for their ultra high quality and design innovations. A leader of model engine technology since the mid 1960's, they pioneered Schnuerle porting and rotary four cycle valves.

HP engines are produced with the latest computer controlled machinery and the finest materials available assuring you of unsurpassed quality. All engines feature hardened steel crankshafts supported by dual ball bearings, true hard chrome cylinder bores, low expansion cast pistons, forged con rods bushed at both ends, and high pressure alloy case castings.

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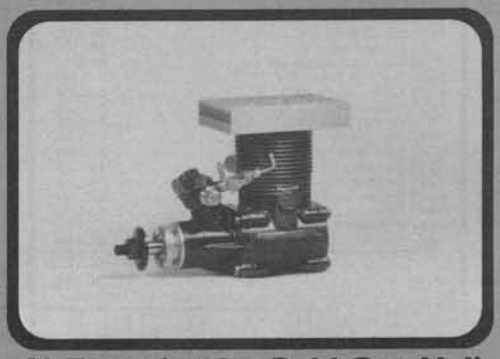
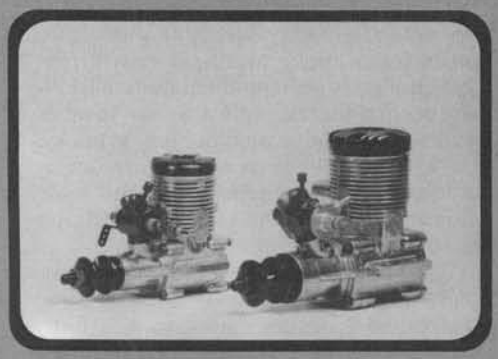
HP is American owned by RJL Industries, so parts, service and technical assistance are just a phone call away with the owners of the factory, not just an importer or distributor.



61 Front intake Gold Cup Heli



40 & 61 Front intake Silver Star

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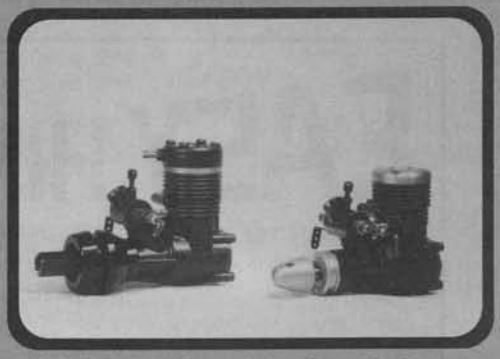
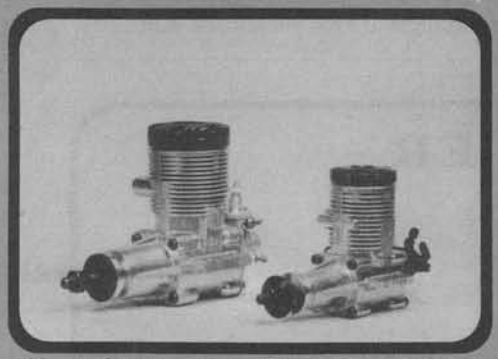
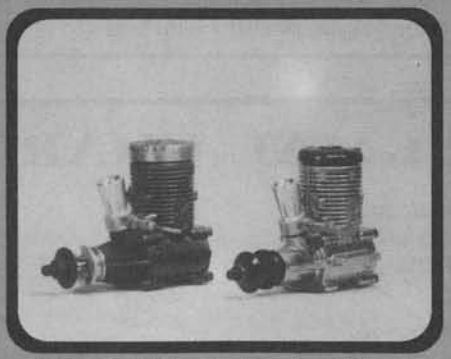


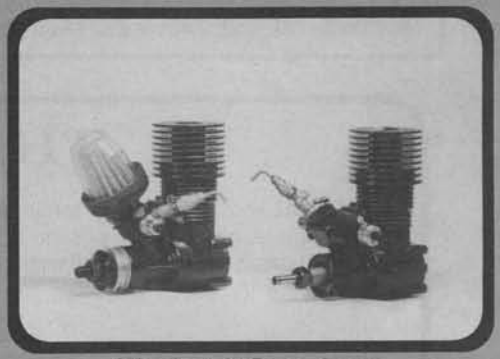
20 Gold Cup Marine & Aero



40 & 61 Rear intake Silver Star



40 GC & SS Control line



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WORKBENCH *Continued from page 6*

for several minutes, quietly backed away from the table, snuck up behind him, and then cut loose with a spray can that put a mist of stuff all around him. When the audience quieted down from having a surprised laugh, I read the label on the can over the PA system. It was B.S. spray (do I have to spell it out?) and had been sent to me to use on Johnny at an appropriate moment by the late Ralph Brooke, former RC Aerobatics World Champion.

Right now, I feel as though Johnny is looking over my shoulder and is about to do the same to me if I don't finish this. So John, if you've gone to the same place I hope we're both gonna be, save me a seat in the ice cream parlor, but don't wait for me . . . just go ahead and order.

AERODROME NINETY TWO

Truly the world's "Biggest Show on Earth" for World War I aviation buffs will take place on Labor Day Weekend, September 5, 6, and 7, 1992, in Guntersville, Alabama . . . yes, that's **1992**. This will be the largest ever World War One Aircraft Convention, celebrating the 75th Anniversary of 1917, considered by many to be the most important year of the birth of aerial warfare.

Guntersville Airport is located in the northeastern part of Alabama, just 100 miles south of Nashville, 150 miles west of Atlanta, and 60 miles north of Birmingham. It is located in the Appalachian foothills adjacent to Lake Guntersville on the Tennessee River, with paved and sod landing strips, as well as water for float aircraft. As eyeball navigation is often used in these old airplanes, fly IFR (I Follow Rivers) to the southernmost bend on the Tennessee River, and it's on Buck Island, just north of the Highway 431 Bridge! Guntersville Airport (8A1) will be closed to modern airplanes from September 4 to September 8, 1992. Non-World War One aircraft will be accommodated at the nearby Albertville Municipal Airport (8A0).

All authentic and replica World War One aircraft of any scale or construction are invited, with free overnight hangar space for the first 50 aircraft registered. (That's already done!) The convention will have 24-hour patrolled security with all exhibit aircraft cordoned off to eliminate physical contact by the viewing public.

Fly-bys and simulated dog fights are scheduled throughout each day. Builders are invited to bring partially completed aircraft to show off different construction techniques. Free fuel will be provided to all visiting WW I aircraft during their stay, and they will depart with full tanks. WW I aircraft owners will be provided free lodging through cooperation with area motels and EAA Chapter 683 members.

Yes, modelers, flying of giant-scale (1/4 or larger) radio controlled WW I models will be featured each day. In fact, RC models are on the list for trophy awards, along with pre-1918 full-scale genuine antique aircraft, full-size replica aircraft, replica aircraft in other scales, and antique automobiles or trucks. Hank Iltzsch, who has done construction articles for *Model Builder* (The 1/3rd-scale Dormoy "Bathtub" and 1/4th-scale DH-5) is handling the RC portion of the event.

An affair such as this would not be complete without a flea market area for parts, memorabilia, artwork, books, plans, T-shirts, jackets, and various artifacts. Food and drink will be available, and the public is invited with paid admission. It will be a rare opportunity for those wishing to buy and sell World War One aircraft and parts.

Lake Guntersville Aero Replica Fighter Museum, located on the host airport, currently owns two Fokker Triplanes, two SE-5a's, a Nieuport 17, a Sopwith Pup, two Pfalz D3's, two Fokker D-VII's, a Caudron 277, and a Fokker D-VIII. An Albatros DVa, a Nieuport 28, a Bristol Fighter, Sopwith Camel, and Spad 13 are all expected to be added in time for "Aerodrome Ninety Two."

By the way, if you are among those involved in building or restoring WW I aircraft, and have not received notice of this happening, you are invited to contact the convention organizers at: Aerodrome Ninety Two, c/o Ryder International Corporation, Box 564, Arab, Alabama 35016. This is also the contact for anyone wishing more information on this convention.

For those "coming along for the ride," one of the world's largest outlet malls is in the neighboring town of Boaz, featuring over 170 stores. A beautiful state park is located directly across the lake, with camping facilities, and Lake Guntersville State Park also has an excellent mountaintop golf course.

All-in-all, this convention, which is being established as a biennial event, should easily become one of the major aviation extravaganzas, right up there with Oshkosh and Reno. Like the brochure says, "For September 5, 6, and 7, 1992, you can forget Auburn/Alabama football, bass fishing, space shuttles, quail/dove/turkey/deer hunting, walking/racing horses, water skiing, Talladega race cars, and all the rest of our usual pastimes . . . World War One will reign supreme!"

• • •

Many of today's adult modelers, who made their start in the hobby as youngsters, with simple, quickly assembled all-balsa gliders and rubber models, lament the disappearance of such models from the display racks of various stores that are easily accessible to kids who are at the same ripe age now, several generations later. In fact, all of the model airplane hobby industry should be lamenting the same serious situation . . . if you don't plant seeds, you don't raise a new crop . . . in fact, not only the model industry, but full-scale aviation should be equally concerned.

Today, for example, as thousands of airline pilots approach retirement age, the airline companies are discovering that replacements are not coming along fast enough. And it's a known fact that aircraft and aerospace companies are having difficulties finding the air-minded manpower to operate their production facilities. In the past, there was always a steady flow of young men who who already had a working knowledge of aerodynamics and knew how to read drawings because they had discovered the fascination of model airplanes, inspired by their introductions to flight through those simple gliders and rubber models that could be

continued on page 80

DEAR JAKE *Continued from page 5*

the various aircraft designs. Who do you think made the best rolls?

Spectator from Spartanville, PA

Dear Spectator:

The Coffee Shop at the Marriott.

Jake

• • •

Dear Jake:

I was in Canada last month, and I think I almost got taken at a local hobby shop. I needed fuel. I usually buy it by the gallon. The proprietor said he had fuel in U.S. quarts and Imperial gallons. A quart was $3.00 and a gallon was $13.00.

Now everybody knows there's four quarts in a gallon, so the gallon should have been no more than twelve bucks. But no! This guy says there's five quarts in an Imperial gallon.

Well, I wasn't born yesterday. I used to drive a Chrysler and its gas tank held the same size gallons as any other car. So I told the guy where he could put his Imperial gallon. I bought four quarts for twelve bucks total and had the last laugh.

Imperial gallon, my foot! Can you imagine the nerve of some people?!

Crafty Consumer, Usually in Detroit

Dear Crafty:

I guess you showed him. Now at least he knows what a metric moron looks like.

Jake **MB**

INDOOR

BY KEN JOHNSON

A NEW ORNITHOPTER CLASS

A new simple type Ornithopter (flapper) classification is in the works. I have long felt that many modelers long to build flappers, but are hesitant because they feel it's too difficult for them. Mr. Frank Kieser, of Vero Beach, Florida, recently wrote to announce a new class. The SOD (Simple Ornithopter Design) will have the following rules:

1. No high tech materials, such as Boron.
2. Minimum weight is 3.1 grams, like Pennyplane.
3. Maximum span is 16 inches.
4. Mylar covering is okay.
5. Stab area not over 50% of flapping area.
6. Solid motor stick is mandatory.

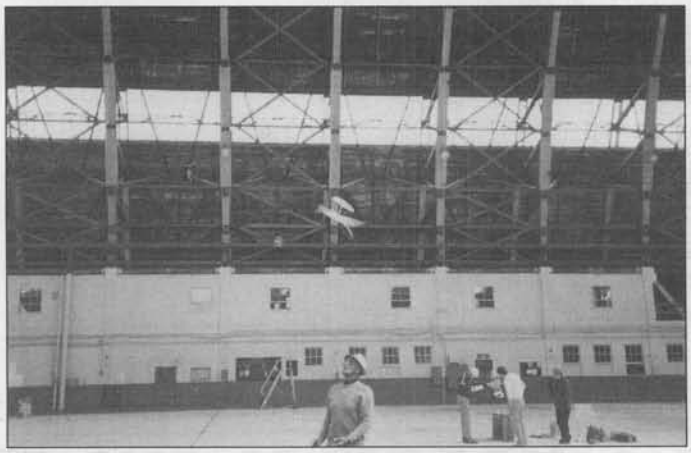
The design is not restricted to monoplanes. Frank has asked Roy White, Joe Krush, Les Garber, and Warren Williams to consider the design problem and perhaps conceive their own models, using these rules. I spoke with Warren and he already has several flappers built and ready to test. If you want to build ornithopters or want to try one, write to Frank Kieser, 2595 Whippoorwill Lane, Vero Beach, FL 32960. Make this new class a go and give it a whirl. Actually Tony Italiano of the NFFS came up with this beginning idea and broached the idea to Frank.

PENNYPLANE "O" RINGS

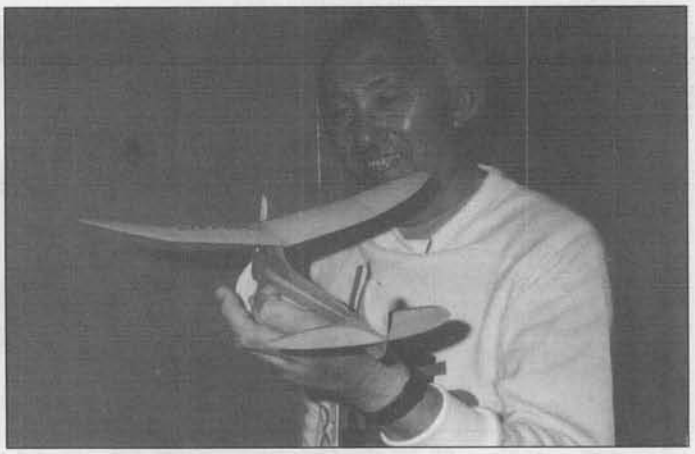
Ray Harlan is now selling O-rings for use on Pennyplanes to retain the rubber. The O-ring is looped over the front of the rubber motor (just behind the wire hook) to keep the rubber from climbing off the hook. The price is $2.50 per dozen or $12.00 per hundred. Write to Ray Harlan, 75 Happy Hollow Road, Waylan, MA 01778.

CONDENSER PAPER PENALTY

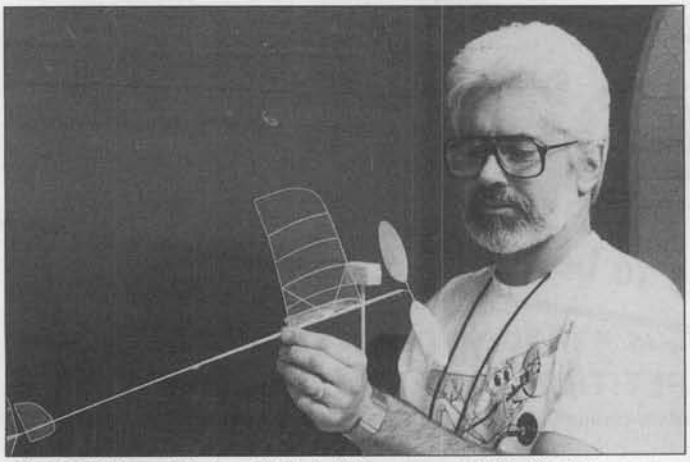
Recently I wrote about the penalty assessed to Scale and Peanut models covered with condenser paper. I feel it is unfair to penalize condenser paper, as Japanese tissue covered models fly faster and come down sooner (because of the heavier weight), and I prefer longer flying and slower flying models. I received three letters in one week on this subject. Dave Linstrum agrees with me. David Wagner, of Singapore, prefers the



Warren Williams watches his Canard ornithopter climb out at Santa Ana Hangar in Tustin, California. Warren has about 100 ornithopters built and ready to fly. Photo by Patrick McDonald.



Los Angeles artist and indoor modeler Sweeney Hayashi with 13-inch all sheet old timer Zippe. model.



Bob DeShields and his beautifully built Easy B model. His flight times are outstanding.

Warren Williams with Canard Flapper. Photo by Patrick McDonald.

Florida's Carl Hedley launches a Pistashio at Proxy contest. They sure look small in relation to the flier.

Airline pilot Paul Avery with his Curtis Robin Coconut scale aircraft. Slow and realistic appearance in flight.

Doc Martin and Carl Hedley at MacDill AFB hangar 67; scale judging time again.

heavier covering. Antonin Alfery, of Czechoslovakia, covers with condenser paper, then sprays the covering with Humbrol paint to make it opaque. He does not care for the translucent appearance of condenser paper. The condenser paper is not porous like Japanese tissue, so the sprayed color lays on the surface more easily. Let me know your opinion on this subject.

TORQUE METERS

Our photos this month include two examples of rubber reading torque meters. One can be purchased from IMS (Lew Gitlow). The other can be built with materials from your local hobby store. This one was designed by Cezar Banks. The torque meter is a necessity for the serious indoor modeler. Write to Indoor Model Supply, Box 5311, Salem, OR 97304. Actually, IMS has two models available.

SEND PLANS

It's not often that I relate all or part of a letter from a particular builder, but I feel this one is an exception. Some time ago, I received a note from Mr. J. Osorio, who notified me that he is an inmate at the Sierra Conservation Center in California. He obtained a copy of *Model Builder* magazine and read about Peanuts and Pistachios. Using materials available to him, he built a couple of Hergt monoplanes. The models were constructed from popsicle sticks and typing

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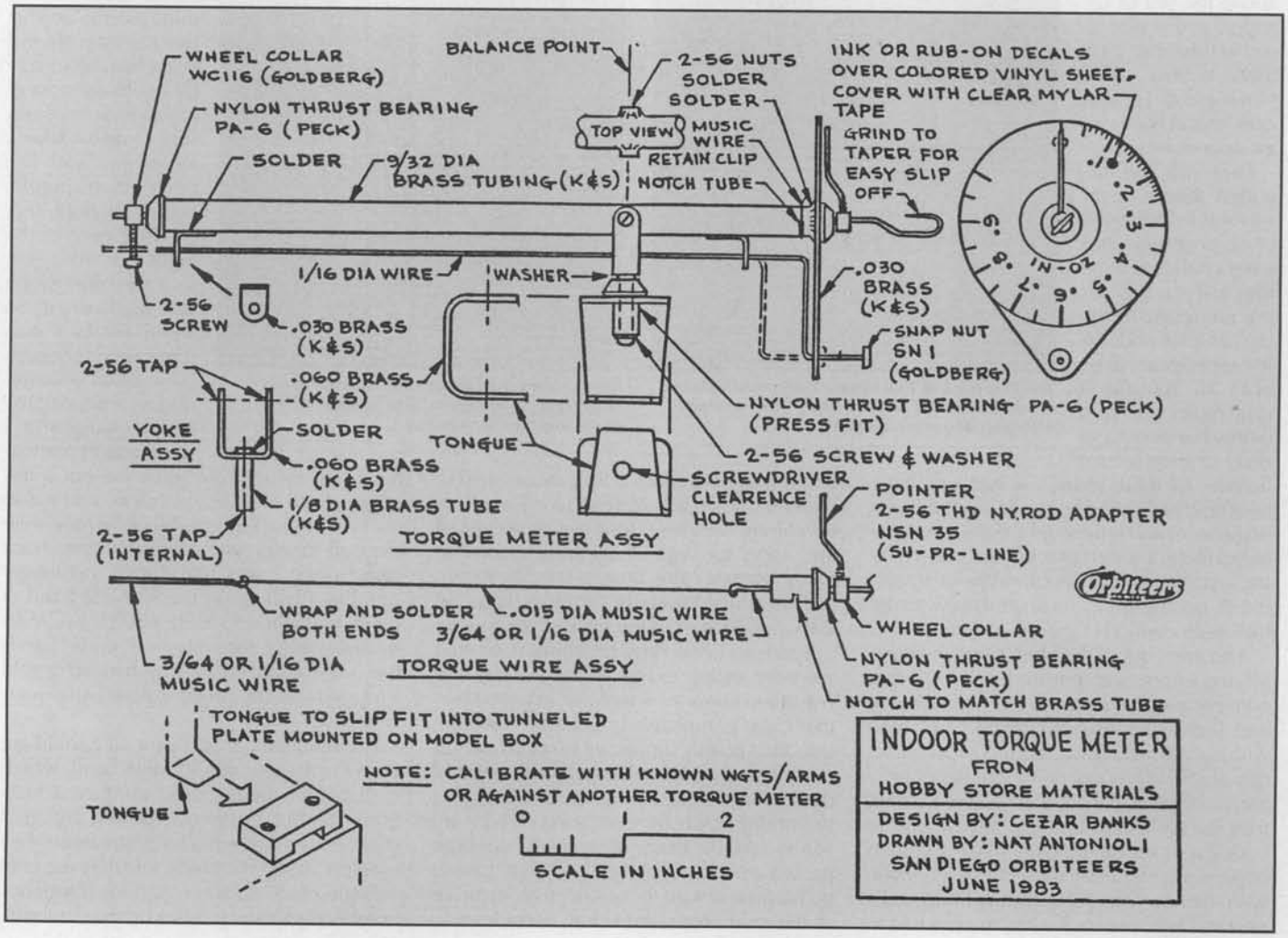


ALL ABOUT ARFS

BY ART STEINBERG

HAM LICENSE GAINS MORE THAN JUST FIVE RC CHANNELS

For the past twenty some years, one of the dreams of my life has been to have a ham radio operator's license. How I envied the RC pilots who sauntered up to the flight line, never waiting for an overcrowded frequency, flying anytime they pleased, deriving a full measure of enjoyment from their flying sessions. My goal was always to join the ranks of this group, which seemed so head and shoulders above the rest of us, and so every year or so I resolved to pass the amateur radio Novice and Technician tests at the earliest opportunity.

The first page of Phil Kraft's 1966 construction article shows the original "Ugly Stik," complete with pilot and machine gun.

***Grid Leaks* magazine of 1966 introduced the "Ugly Stik" to modelers. This version on the cover had circular cowling.**

Learning the required theory never seemed to be much of a problem, but what challenged me the most was becoming proficient in the use of Morse code, as it was necessary to be able to handle a minimum of five words per minute of code to earn a ham license. All these years, I've had a practice telegraph key sitting on my desk, staring me in the face, and whenever the guilt became unbearable, I'd start practicing code. Making a stab at it every six months or so just didn't do the trick, no matter how many high-tech methods I tried.

And then, out of the blue, came the electrifying announcement from the FCC that commencing in February, 1991, the Novice and Technician licenses would be granted with no Morse code test required! Of course, this would allow operating privileges only above 30 MHz, but so what? All the RC ham frequencies would be legal for use on the codeless ticket, so it looked like my golden opportunity had arrived! However, even with the new requirements, my innate laziness still held me back, until my son had to encourage me to take the test along with him.

First, he bought a few study books on radio theory, and he began a daily regime of earnest preparation. After a week or two, I could see he really knew his stuff, and still I hadn't cracked a book. Then he told me he was prepared to take the test; and wanted to know if I was ready to send in my application along with his. I told him to go ahead and apply for both of us, and I would be ready when it came time to take the exam. So Gary sent in the applications and I pushed the whole matter to the back of my mind.

Suddenly, one day, he announced that we were taking exams in three days, and wanted to know if I was ready. I assured him that I was completely prepared to take the test, and I quietly slipped off to my office, got out the study materials, and three horrible days later, with facts, figures, and formulas swimming before my eyes, went off with my son to take the exam. Amazingly, we both passed with flying colors, and were told to go home and wait for our licenses to arrive in the mail. We were strictly forbidden to operate on any ham bands until we received our licenses.

We waited, and we waited, and we waited. A month. Two months. Nine weeks. Finally, ten weeks later, our licenses duly arrived, and Gary is now officially known as KC6TYU, and my call sign is KC6TYV. Meanwhile, knowing my license was coming, I wasn't wasting any time getting my Futaba radios changed over to ham frequencies. Now, stuck in my mind was the fact that the RC ham fliers I knew had these jazzy two-colored streamers on their transmitters, one black streamer, and the other green, purple, yellow, orange, red, or what ever of the eight 53 MHz frequency colors which appealed to them. So when Futaba's customer service department asked what frequency I wanted my radios changed to, I said I wasn't particular. I told them to just pick me out a frequency with nice, bright colors, and not to use brown/black or gray/black, as they were too dull for my taste. Well, my first shock came when I was told Futaba no longer supplies anything on the 53 MHz band. It seems that while 53 MHz is still legal, AMA recommended they stay off these bands because they are not narrow-banded or gold stickered. So the bright colored streamers were out!

Consequently, that meant all I could get from Futaba was the 50 MHz band, which includes ten frequencies, numbered from 00 to 09, but all narrow-banded and gold stickered. I asked what color streamers they used on 50 MHz, and was told they use only a single black streamer with the frequency number displayed just like on the common,

Marc Bird, of Oceanside, California, built this "Ugly Stik" faithfully to original specifications, and flies the 25th anniversary model with his 25-year-old radio.

Marc Bird shows his 1966 vintage Kraft transmitter, which has been brought up to modern standards.

unlicensed frequencies. Boy, what a comedown!

In order to get someone to notice what a bigshot I am with a ham frequency, I'd practically have to stick my antenna in his eye. Rats! Well, I pondered which of the ten frequencies to select, wondering which one might impress the guys the most, and which one would give me the best chance to brag about how I had a ham license. Again bad news. Futaba is presently only supplying crystal modules and receivers on the five even-numbered 50 MHz ham frequencies, 00, 02, 04, 06, and 08. So I just threw up my hands in surrender and told them to pick any available 50 MHz frequency.

Now, in retrospect, I really don't know why I went to all the trouble of earning a ham license just to operate on the RC ham bands. Without the ham frequencies I already had free use of fifty channels on the 72 MHz band. My state-of-the-art FM/PCM Futaba equipment on these channels had never given me the slightest inkling of a glitch, running absolutely rock steady under all conditions. The waiting on the local flight lines was no problem at all, because with all the new frequencies there hardly ever seemed to be a conflict. After knocking myself out to get on the ham bands, I now find myself able to use only five additional frequencies, at least with my Futaba radios. If one or two other hams show up at the field, we are almost certain to have a conflict, unless they have older radios on the 53 MHz band.

Now, I don't by any means mean to give the impression that all of the manufacturers are producing only 50 MHz band radios, because I know that at least one, Ace, will still supply equipment on 53 MHz. But as far as I am concerned, I have gained very little to enhance my enjoyment of RC flying, having achieved access to 55 RC channels in place of fifty channels. However, all is not so bleak as it seems. A side benefit of my Technician license is that it permits me to transmit on the 144 and the 440 MHz bands, which has opened up a whole new world of communications to me. I now own a Kenwood TH-77A dual band transceiver, a tiny little thing which you can slip into your pocket or flight box. Using the scores of repeaters located in my area, I can reach out and communicate with nice folks a hundred or more miles away.

My son and I have joined a local club (the Palomar Amateur Radio Club, Inc.) and we are slowly, but surely, learning a great deal from our fellow club members about ham radio communications. The club owns and operates a number of autopatches, permitting me to call my friends and family by patching my portable transceiver (called an "HT") into their telephones. My wife loves to have me call her while I am at the flying field, to let her know when I'm coming home. I can communicate with other hams at other fields, exchanging valuable technical information and news of the RC flying community.

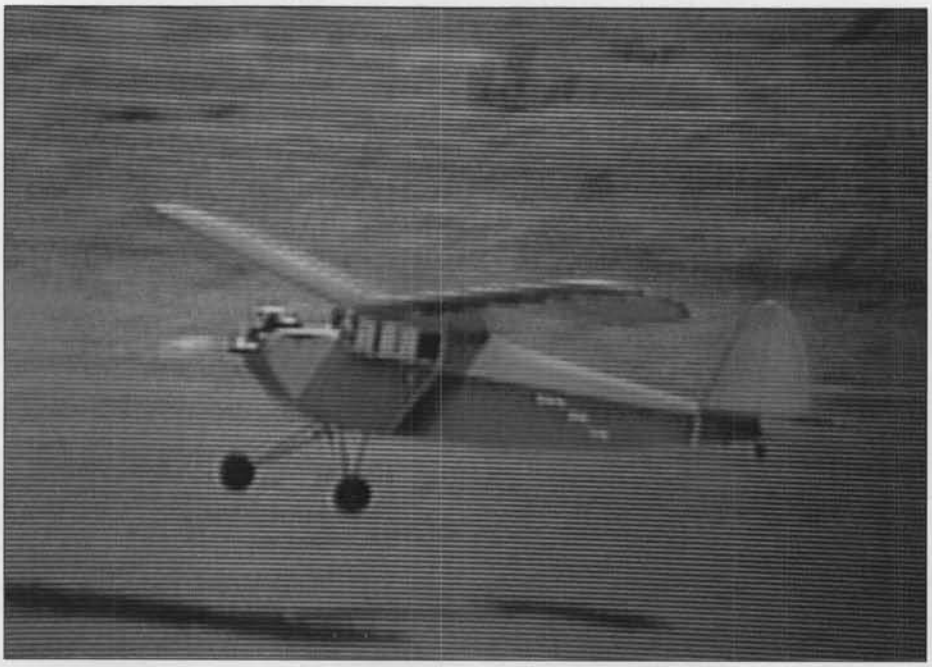
I am presently equipping my vehicle with a more powerful mobile transceiver, which should substantially improve my transmissions. Ham radio? I love it. Aflame with new found enthusiasm, I'm practicing my code and studying my theory further, looking forward to the day when I can earn a more advanced rating, enabling me to talk to other hams all over the world. So, if any of you RC fliers out there have been considering trying for a ham license and entering the fascinating world of amateur radio communication, I heartily encourage you to do so at the earliest opportunity. But as far as operating an the RC ham bands, that's a decision you will have to make for yourself.

Personally, I'm not convinced it's at all worthwhile or necessary with the fifty channels now available to you on 72 MHz, but if you want to branch out into the exciting ham radio hobby, you'll never regret getting your ham license!

HISTORY REPEATS ITSELF

At a recent flying session at our local flying field, I noticed that one of the planes in the pits was a really sharp looking "Ugly Stik." Nowadays, these are pretty common, even the beautifully built ones, so at first I didn't pay it any real attention. As I drew closer to the model, I noted the attractive decal on the left wing, which said, "Grid Leaks—25 Years of Ugly Stiks." And then it hit me like a ton of bricks. *Grid Leaks* was a leading RC model magazine back in the early days, and 1966 was the year the Ugly Stik was introduced, complete with a construction article and plans by the designer/author, Phil Kraft. Of course, Kraft is a world famous RC pioneer and competition flier who is perhaps best known for his popular line of Kraft radio equipment.

In his 1966 *Grid Leaks* article, he said, "The original concept of the Ugly Stik was to design a radio controlled aircraft which could be built in an absolute minimum of time. Its purpose was towards a flying test bed for new proportional control developments and an all-around shop airplane which could be used as a loaner for visiting fliers, testing repaired equipment, and any use which required an airplane which could be considered expendable." *continued*



As an experiment, the author photographed this VCR still-frame directly from a television screen.

Little did Kraft suspect that this would be the most popular and successful RC airplane ever designed! Accordingly, the model resting before my eyes was built by Marc Bird, of Oceanside, California, to commemorate the 25th year of the Ugly Stik. Marc is an A&E mechanic and a demanding workman who pays great attention to detail. As a hobby, he flies and maintains his own full-size 1946 Bellanca Cruisair in immaculate shape, sharing his spare time with this and his RC pursuits.

His Ugly Stik was built exactly according to the original plans, even to the externally mounted aileron bellcranks. The finished airframe was covered with Top Flite Fabricote, given three coats of Sig clear butyrate dope, two coats of color, and then an additional two coats of thinned clear dope. For power, he wanted an engine which was comparable to the engines commonly used for sport flying back in the sixties, so he installed a K&B Sportser .45, and as a finishing touch, he copied the *Grid Leaks* logo, embellishing it with the 25th anniversary slogan, and constructing the entire sticker from Monokote trim sheets!

Just to complete this trip back to yesteryear, Marc decided to use a 1966 vintage Kraft transmitter, which he restored to a gleaming new state. He then gutted the electronics, installing an Ace Silver 7 encoder and RF board, while retaining the mechanical parts, such as the sticks, levers, springs, and original meter.

Marc really causes a few lifted eyebrows, especially among us old timers, until it becomes known he is actually flying on a gold stickered up-to-date radio! Hats off to Marc for his wonderful, nostalgic project, and his successful effort to preserve the history of radio controlled flight.

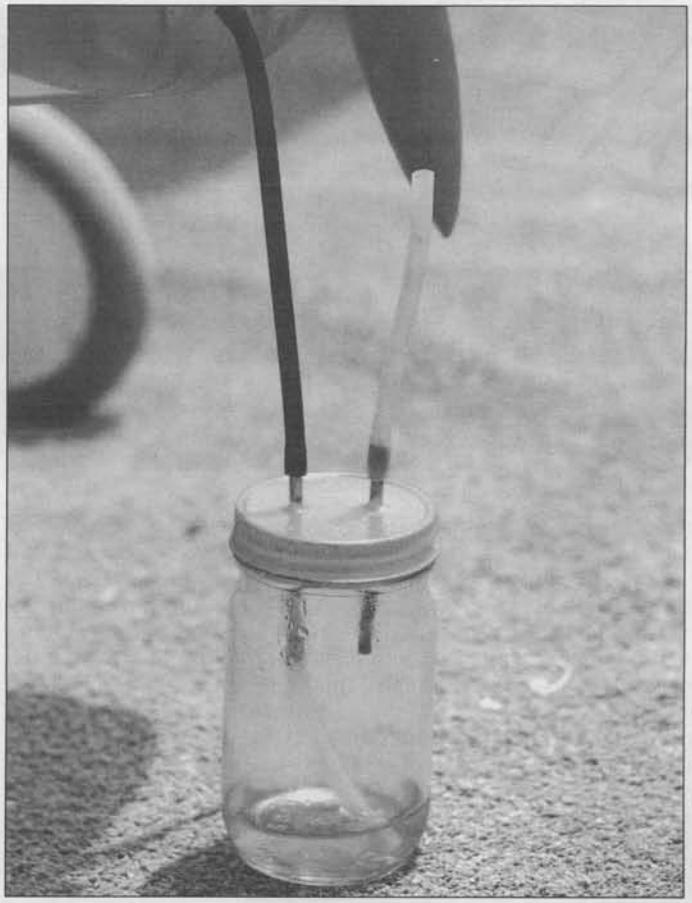
ARF: ALMOST READY TO FOTOGRAPH

Writing about airplanes is a difficult enough task, but photographing them is even more trying. What with spotty quality from various photo finishers, changeable lighting conditions, and airplanes which are

unwilling to be caught in the right flight position, the model airplane photographer's lot is not an easy one. Recently, I was viewing one of my video tapes of action at the model flying field, and I realized that through the magic of my VCR, I could stop the action anywhere I wished. The next logical thought was to photograph a still image from the video screen, and come up with enough quality to use the resulting photograph for magazine illustration purposes.

The photograph accompanying this article was taken of one of my videos, depicting an old-timer in a slow fly-by. For those interested in the technical information, the camera was a Canon EOS 650 mounted on a sturdy tripod. The lens was a a Canon 35-100mm zoom, the film was Kodak Gold 100, and the exposure was 1/10 second at f4.5. The exposure was arrived at by the automatic function of the camera. The TV's lines of resolution show up a lot, but the technique may be usable to get a stop-action shot of something spectacular you'd probably never get with a still camera. Reader input from some of you experienced photogs out there will be greatly appreciated.

Your comments should be sent to me at 2267 Alta Vista Drive, Vista, CA 92084, or you can telephone me at (619) 726-6636, preferably in the evening, as I spend most days at the flying field. My FAX number is (619) 726-6907. ***MB***



Tired of fuel on your clothes, field box, or carpet? Author constructed this simple fuel overflow bottle to prevent messy spills. When full, return the excess fuel to the flight box fuel container.

STRICTLY SCALE

BY AL TUTTLE

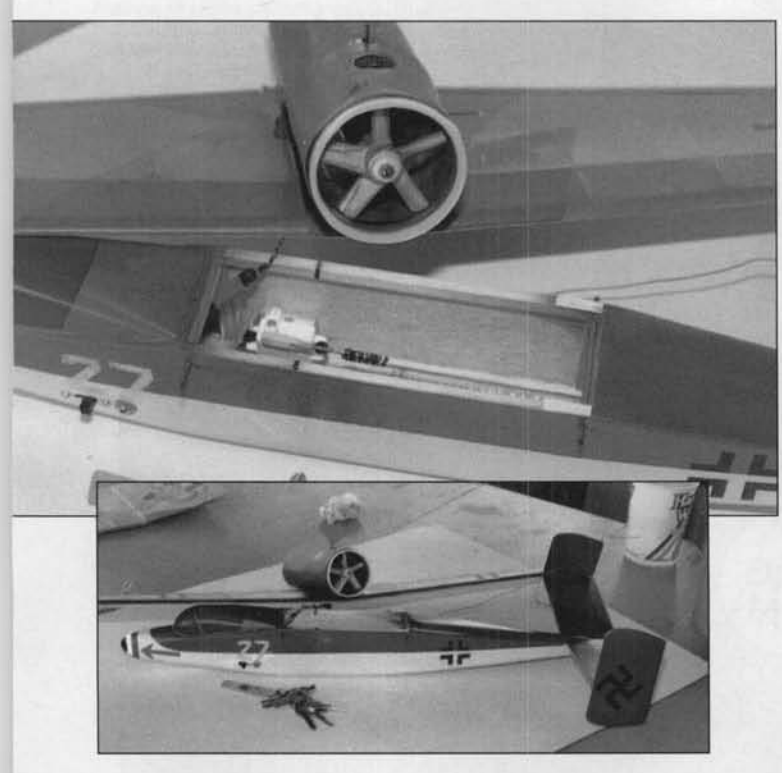
THOUGHTS ON BUILDING 'RECOGNIZABLE' SCALE

There has the summer gone? There are still a couple of months left of good flying for those of you live in the northern climes and then it is into the ol' workshop to start that project for the 1992 season. I realize that the more hardy types do fly all winter, regardless of the cold and snow. When I was living in Maine, we flew every chance we got. We didn't let a bit of cold weather or snow on the ground stop us. Flying off the snow with skis on the models was a blast. I do remember how bad it hurt when the prop kicked back and walloped cold fingers, and having to preheat the engine head with a propane torch or auto exhaust pipe, in order to start the engine. That sure was "fun," and if we hadn't migrated to a warmer climate, we would still be flying year 'round.

I recently received a letter and some photos from my ol' flying buddy, Al Wheeler, of Maui, Hawaii, who has had a couple of his EZ sport planes and plans published in *Model Builder*. Al's bag is scale, and he designs and totally scratch-builds his models. His planes are .25 size and every one that I have seen and flown, flies just like a sport ship.

Al writes, "I operate in the category that you might call `recognizable' scale. If the aircraft flies by and someone says, `Hey, that's a Ryan STA' or, `Gee, look at the Staggerwing Beech,' I am happy. I've built a `recognizable scale' airplane. It flies well, isn't so sophisticated that you're afraid to fly it, and people know what it's a model of. Maybe that's Maui speed, but why knock it."

Al, you hit the nail on the head. Recogniz-



(Left) The Heinkel 162A has a fan diameter of only 2-1/4 inches; note keys for size comparison. (Below left) "Tiny" Heinkel 162A, .020 power.

Lou Davila and his .020 powered ducted fan Heinkel 162A.

Lou's Heinkel in flight.

Al Wheeler's "recognizable" scale P-51; future MB plan.

Al Wheeler's .25 powered "recognizable" scale Staggerwing; future MB plan.

able Scale. Al's models are several steps above what is called AMA Fun Scale. Back in '86, when I was living on Maui, I was in the process of assembling a Byron Staggerwing. Al dropped by, studied the model for a while, and stated that he would sure like to have one of those. About two weeks later, Al showed up at the field with a .25 powered Staggerwing that flew beautifully. The photo of his Staggerwing shows that he is being very modest by calling it "recognizable scale." His models are quite unique in as much as the piece count is low, i.e., the structure is simple to cut out and assemble, using the least amount of material.

Al has a beautiful P-51 Mustang and several biplanes of the golden era, all of which are .25 size. The models fly exceptionally well and are very stable. I have had the good fortune of flying many of Al's models and can verify their capability. Al sent me several photos which I will try to include in future columns. Al, do us all a favor and send in some construction articles on his scale planes. I'm sure WCN will publish them (We're way ahead of you. The P-51 article and plans are here, and the Staggerwing is coming soon. wcn). I know that if I was a kit manufacturer, I would take a real close look at Al's models and construction methods. Not only do these models readily lend themselves to production, but they are super fliers as well . . . the type of model that does not require an expert to build or fly.

It seems as though one frequently hears modelers bemoaning the fact that no one is doing any innovating or experimenting like in the "good ol' days." Don't you believe it! They are out there, only one seldom hears about them because this type of person is generally an introvert and could care less about touting his successes or failures. For the most part, we only hear about the "big name" personalities in the modeling world, who tend to be perpetuated via the modeling media and advertisements. These modelers are the ones who regularly attend and compete in the contest circuit. Naturally, their names are continuously at the forefront. This is good. These contest fliers have forced the radio and kit manufacturers to continually improve their products in order to remain competitive. Because of this, we seldom hear about the unknown local modeler who has made significant breakthroughs or accomplishments, such as Al Wheeler of Maui who we just read about. He is on an island where few are interested in scale modeling. If he lived on the mainland, I'm sure his models would be very popular with the scale modelers.

DUCTED FANS

Speaking of accomplishments, several of us here in Central Florida were witness to what we feel is a significant breakthrough in ducted fan technology by a local modeler. This person is Lou Davila, of Altemonte Springs, Florida. A member of the Radio Control Association of Central Florida (RCACF), Lou has for years been a proponent of small RC models (.010-.020) and has been very successful with them. Then he got interested in ducted fans. His first one didn't fly due to lack of thrust. His second one didn't fly either, but it did seem to go a bit further before it hit the ground.

Undaunted, Lou continued to experiment, and this past Sunday (May 15 to be exact) Lou showed up with a scale model of a Heinkel 162A Salamander, and darned if it didn't fly! The fan unit is his own design, fabricated out of plywood, using one of the late English modeler P.E. Norman's design techniques. Lou said that Stu Richmond had given him several past issues of a British model magazine that had a series of articles on the design and construction of ducted fans by Norman, a noted British model ducted fan pioneer. The five-bladed fan unit is approximately 2-1/4 inches in diameter. The engine used is a Cox .020. This combination produces 4-1/2 oz. of thrust, which is more than enough to fly the model. Fuel tank is an old 1/2-oz. Hot Stuff glue bottle mounted directly behind the engine. Wing span is 30 inches and fuselage length is 26 inches. Airframe is built up balsa. The wing is covered with silk and the fuselage is bare. It is finished with flat Aerogloss paint. Radio is a four-channel Cannon, utilizing two channels; ailerons and elevator. Battery pack is 125 mAH. All up weight is 10.5 oz., with a wing loading of l0.4 oz./square foot. Total money invested: 20 to 25 bucks. Of course, if one counted the man hours, then the plane

The Nakajima KI-84.

would have a total investment of several thousand dollars! Lou spent a lot of time on R&D, which has paid off. To date, the plane has five solid flights. On the flight we witnessed, Lou looped and rolled it, and the plane performed these maneuvers with power to spare. Lou is to be congratulated on a superb accomplishment. Can't wait to see what he comes out with next. A tiny F-16 perhaps?

NAKAJIMA KI-84

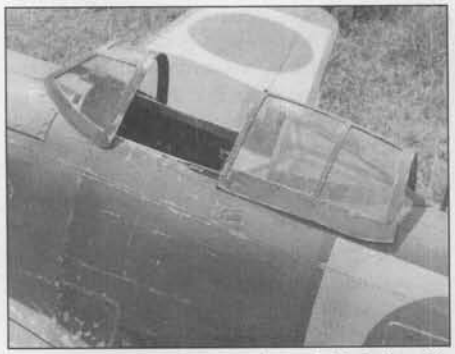
While attending a local scale meet this past weekend, I spotted a well-done model of a Japanese fighter. The plane was built and flown by Wayne Siewert of Minneapolis, Minnesota. Wayne constructed the model from purchased plans. The model is a replica of a Nakajima KI-84, code name "Frank." According to Wayne, it was a late production aircraft and didn't see action until 1943. Only 3300 were built and were said to outperform the P-51 and P-47.

Wayne said the reason he liked this airplane as a scale subject is that it has about the same moments as a P-47, except for the longer fuselage length. It does look a bit like a P-47. This is the first year on the campaign trail for the aircraft, and a scale contest held last weekend (May 3-5) was its first outing. The model is constructed basically of balsa, covered with light weight cloth. The plans, cowling and retract mechanism were the only things purchased. Everything else was scratch-built, including the struts.

Aside from the superb job of finishing and weathering, things that caught my attention were the cockpit, canopy, and fueling method. Wayne said about the cockpit, "The only way I could make it realistic was to try and make it out of aluminum. This was my first attempt at doing that. The floor boards, the side panels, the ribs, the longerons going down the sides of the fuselage, and the main ribs, are all formed aluminum pieces. There are many bolts and screws that are actually holding things together.

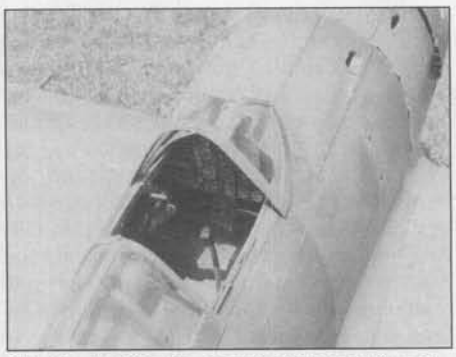
"I used Innovative Models' PFM adhesive to hold things together inside the fuselage, as I didn't want it to shake loose from the vibration of the Sachs 4.2 engine. That stuff works pretty good and is holding it all together. I used a greenish paint, that was quite unique, in the interiors of the Japanese aircraft. The seat and all the side panels were wire-brushed to scrape off the paint in such a way that it would look as though a pilot had been in and out of the cockpit many times. It ended up looking real scale.

"The windscreen and canopy framing is all made out of brass, silver-soldered together. Each glass panel is riveted in with a piece of aluminum backing, so that the rivets are actually holding the panels in place. I over bent some of the clear plastic to give it a crazed look. The only thing I haven't done yet is to put a yellowish cast on some of the panels, to represent discoloration caused by the sunlight. I fuel the gas tank through the gas filler in the wing, just as on



Wayne Siewert built this replica of a Nakajima KI-84, code name "Frank."

The operating fuel filler is on the wing, same as full-size craft.



Note the detail in the cockpit of the Nakajima KI-84.

the full-size bird. The tank is actually up behind the firewall. Every time I fuel it, I purposely spill a bit of fuel on the wing and let it streak as in the full-size plane. If the airplane hangs around for a while it should really look neat next year. The fuel filler on the other wing is where I put in air for the retracts.

The model weighs 33 pounds at takeoff, and the Sachs Dolmer engine is on glow. Flying prop is a two-blade 24x10 Zinger. The gear actuators are Impact Engineering and I fabricated my own struts. The struts are unusual as the strut scissors face inward, whereas the strut scissors on other planes face forward or rearward."

When asked about the rivets, Wayne stated, "After the plane was painted and panel lines put on, I penciled in rivet locations. I used a medium viscosity CA with a micro dropper attached to the bottle. I put a drop at the spacing desired until I have gone about ten to twelve inches, then I hit it with a kicker. I put the rivets on the wing in one evening."

I asked him if he counted the rivets. Wayne said he gave up counting after a while, but he says there are one helluva lot of 'em on there! I asked him how he made out static-wise at the contest. I don't remember where he placed. He said the judges knocked him down on several places for outline accuracy. He showed me his presentation and three-views, and asked me if I would judge the outline. I stood back the required distance and studied the side-views. I saw a couple of very minor discrepancies. He then pointed out the flaws the static judges called out. Two of them were what I saw, however I could not find the other flaws. But who am I to say what is or what is not correct? I understand that the judges at that contest were supposedly the top scale judges in the country.

• • •

I received a new catalog from old friend Bob Banka, who owns and operates Scale Model Research, 2334 Ticonderoga Way, Costa Mesa, CA 92626; telephone (714) 979-8058. The list of planes on which he has photo documentation and three views is IMPRESSIVE. If you are contemplating a scale project that you think is obscure, unknown, etc., I will bet you anything that Bob either has it or will find it for you. I have used his documentation in the past and have found his product to be top drawer. Bob's listing is getting so large that he should change his format so the pages can be three-hole punched, permitting the customer to put them in a loose leaf binder. The way it is now, the left hand margin is close to the paper's edge. Consequently some info is lost when using a three-hole punch. Keep up the good work, Bob.

• • •

Received a bunch of samples from Hank Hankinson of Sonic-Tronics. He has some new products that are just what the doctor ordered. I plan to review these and have some photos in next month's column. Among the samples was a Glo-Devil RC long glow plug which looked the same as the everyday, garden variety plug, and I put it away for future use. A few days later, I pulled out an old model that I hadn't flown for a couple of years. The engine, when put away, was running perfectly. Now, however, it wouldn't idle and it surged at top end. The engine was pulled and all screws were checked for tightness. A new fuel tank and lines were installed and the engine was fired up again, with the same results. Different brand glow plugs were tried, but to no avail. Then I remembered the Glo-Devil plug. Most plugs are generally produced by a couple of manufacturers, to their client's specs. Maybe this plug will be better. To make a long story short, the plug was installed and the engine operated flawlessly at home and at the field. Both idle and top end were as smooth as silk. Try one, I think you will like it. Hank also has special plugs for four-stroke engines, and a special plug for the OS four-stroke. Best of all, the price is right.

That's about it for this month. If you have any input, and photos with good contrast, resolution and sharp focus, send 'em in with all the necessary info, and we will try to include them in the column, to Al Tuttle, 4223 New Haven Court, Port Orange, FL 32127; telephone (904) 760-4246. **MB**

BIG BIRDS

BY BRUCE EDWARDS

TIE DOWN THAT BIG BIRD!

During one of our recent meetings of the Lesser Seattle Giant Aero Squadron (LSGAS), a general discussion was underway and it became apparent that two, possibly three, of our members had crashed their Big Birds due to servos that had been damaged when the owners had made emergency stops with their vehicles. The aircraft were in pickups and slid into the forward part of the bed. One such incident stripped a tooth off a servo gear, another cracked a servo control arm. Both planes were then flown, and both crashed. There was a third crash, which the owner also now realizes was probably a result of his plane being slammed around in his pickup during a panic stop.

A fourth incident occurred when a local flier had his Big Bird exit the bed of his pickup truck while on the way to our April Fly-In. Remarkably, the plane only suffered minor damage and is still flyable. A.M.A.'s Safety columnist John Preston related in his June 1991 article that a person actually caused a two-fatality accident while trying to avoid a panic stop, because it might have damaged his plane. I am not aware of this being a Big Bird, but that is not really relevant to the situation.

I transport my Big Birds in my long-bedded Ford Ranger pickup. It is equipped with a canopy, to keep my planes safe and out of the weather, regardless of how far I am traveling to go flying. If you cannot afford a new canopy, used ones are readily available in most cities of any size or in the "want ad" section of your local newspaper.

If you must transport your plane in an open bed pickup, buy a piece of plywood, lay it down in the bed of the truck, add some eye-hooks and lash the plane down securely. This will also work on the inside of a van.

Last month, I mentioned using a safety board on which I start my planes; this also doubles as the plane hold-down in my pickup. I put a thick piece of foam rubber in front of the spinner and then push the nose against the front of the bed of the truck. If I have to make a panic stop, the plane is not going to be damaged. The rest of my flying gear is well secured so that it will not be-come airborne, and crash into the plane during a quick stop.

If for any reason your plane does get banged around on the way to the field, may I suggest that you cancel your day's flying and return to your work bench for some serious examination of your equipment. It could well be worth the life of your plane and more importantly, prevent serious injury and property damage to other people around you.

We all have bad days occasionally when we go flying; it just seems that no matter how well we have prepared for the day's flying, one thing after another breaks or quits working. Some folks will rush around all day and finally throw caution to the wind and attempt to fly their plane. This usually ends in one disaster or another and the pilot winds up eating a lot of humble pie.

If your flying session starts to deteriorate due to one sort of failure after another, heed the warning signs; such as jumpy, malfunctioning servos, shorter than normal range test, or any other conceivable failure that may be sending you a pre-crash message. When you back off and let your plane live to fly another day, you are also sending the message that you care about those around you, and when you come to the bottom line of flying our Big Birds safely, you may find that concern for yourself and those around you is what model safety, or indeed any type of safety, is really all about.

Frank Ward built this "Weeks Special" from Miles Reeds plans; it uses carbon fiber on the spars and has an adjustable horizontal stabilizer. The sixteen-pound plane is powered by a Saito "270."

Randy Krause has a great time flying his trusty Big Bee. The Big Bird is Quadra powered and weighs 18 pounds.

This past month has been an interesting one. I spent an afternoon working with Kevin DeShazer, designer of the K.D.I. Rubber After-Muffler, experimenting with his After-Muffler on a Super Tiger 3000 and a Zenoah G-38. The figures are preliminary, but early results are very encouraging. I will keep you posted and let you know when Kevin's mufflers will be available for Big Bird engines. As far as I am concerned, it's almost impossible to make an engine too quiet. We were using John Tatone's mufflers, and while these are very well made units, that give long life, the K.D.I. add-on may be just what you need to save your flying field. We were not able to get any

results from the G-38 because my ignition module failed, so as soon as I am able to have the module repaired, the tests will resume.

The add-on mufflers are a silicone product that did not seem to be affected by the gasoline I was trying to use in my G-38. The photo accompanying this article will give you some idea of the size of the mufflers, and how they fit on the Tatone muffler.

ELECTRIC POWER BIG BIRDS

Most of you are aware that there is not yet a lot happening with large electric powered Big Birds, and I recently expressed this sentiment to my good friend, Bob Benjamin. This was the equivalent of waving a red flag under a Spanish bull's nose. To say that I fanned Bob's interest would be like telling someone standing in front of a tidal wave they were about to experience moisture!

The 'Elector' of electric flight did indeed illuminate, and educate me on the feasibility of electric powered Big Birds, and as I work for a power company, it seemed like it would be fun to try electric for Big Birds. It was necessary to choose a plane that was fairly quick to build and I had a nice "Stampe" biplane kit on the shelf. It was chosen for the electric experiment. The wing loading will only be between sixteen and twenty ounces per square foot, using 28 NiCd cells to power an Astro Cobalt "60".

Bob Boucher, owner of Astro Flight, was also instrumental in assisting me in assembling the components for this project. Boucher is very knowledgeable about electric power, and is very helpful in sharing his knowledge with those, like myself, who are not familiar with what is available for electric Big Birds. I have no intention of giving up my wonderful Saito twins, but electric power deserves its place in the sun. It's quiet, clean, and may well be the ultimate answer to the noise problem in some areas.

Astro Flight's equipment is top quality throughout, and the entire setup, from battery packs to motor control, is impressive. Preliminary placement of the Astro Flight's equipment on the plans indicate that the "Stampe" and Astro Flight equipment fit together very nicely. I will keep you posted on progress with this exciting project.

SWELLING SPAR JOINERS

Last month's column related to the inclement weather we had for our L.S.G.A.S. Fly-in. However, an unusual occurrence took place which slipped my mind. One of the fliers arrived with a very nice Sopwith Triplane. All of the components were inspected, with a final inspection due after full assembly. The owner finally came around and said he could not assemble his plane! Further investigation revealed that the spar joiners on his triplane were bare wood, and when they became damp, they swelled and could not be inserted into the wing center sections!

Perhaps it was best that the spar joiners swelled **before** they could be installed, because it would have probably been even more difficult to dry them out if they had been in the wing center sections. The wood only has to swell a few thousands of an inch to become immovable, particularly if the stubs are tight to start with, so let's look at several cures for the situation.

Do not make the spar stubs an exact fit if they are wood and are being inserted into wood box spars. Make the stubs so that they are slightly loose, then paint them with epoxy or coat them with thin super glue. After the grain is filled, sand lightly then rub down with a candle wax; WD-40 also works, and so does silicone lubricant. I generally prefer candle wax, because it is less messy and does the job just fine.

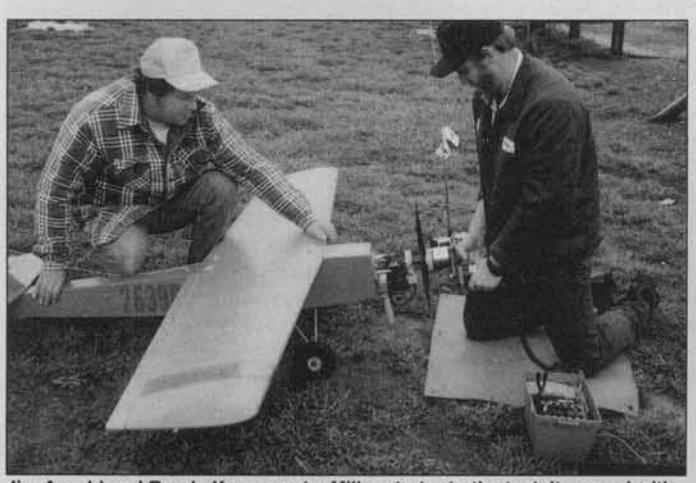
Metal spars should not be much of a problem if you use some sort of lubricant on them. However, if you have the plane stored for a while, corrosion could cause the spar stubs to become fused together, if they are not lubricated. An ounce of prevention is definitely worth a pound of cure in this situation.

ELECTRIC STARTERS

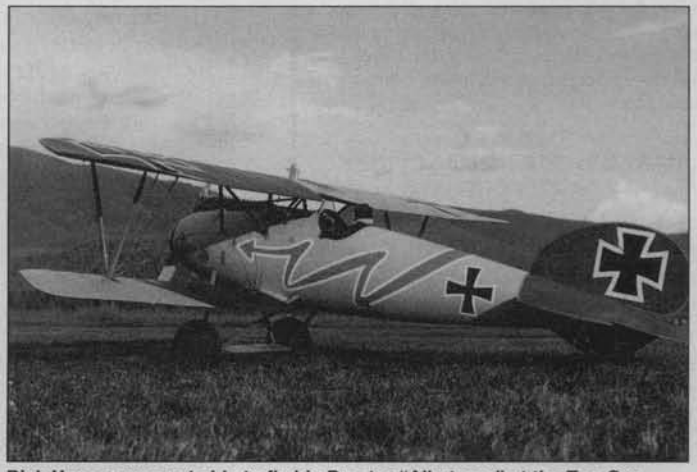
Electric starters are another area that has intrigued me for sometime. In the past, Hap and Nancy Miller's product was mentioned as a good geared belt reduction electric starter. They are now available in three-to-one or four-to-one ratios. The Miller Products starter may be supplied complete, ready to run with a new electric starter attached, or just the gear drive may be ordered for the starter you already have in your tool box.

Regardless of what type of starter you are using, there are several things you can do to help your gear drive starter work for you. Do not use a twelve-volt battery that is too small to do the job. A motorcycle battery cannot supply the watts necessary to do the job. A twelve-volt auto battery will do the job and it is possible to purchase them on sale at very little additional expense compared to the motorcycle battery.

Always pull the propeller all the way back off compression, so that the momentum of the starter has time to build up before compression is reached. Do not try to crank a



Jim Arnold and Randy Krause put a Miller starter to the test. It passed with flying colors.



Dick Hansen was not able to fly his Proctor "Albatross" at the Top Gun Competition this year due to radio problems. Proctor kits are as good as you can get.

These two Fleets were captured at rest during a Fly-in near Vancouver. The RC Flying Club of British Columbia was the sponsoring club.

Jim Arnold holds a B.N.B. starter on the left, while Randy Krause displays the new Miller RC Products electric gear and belt drive starter.

duke's mixture

This column was started many years ago to help you, the modeler, with problems and to give advice. We plan to continue it in that tradition, and dedicate it to the memory of Duke Fox.

UPDATED CARBURETOR INSTRUCTIONS FOR FOX ENGINES

All carburetors on Fox engines have been pre-set at the factory!

The proper procedure to set the Fox carburetor is to follow these simple guidelines:

Loosen the needles out of the friction clips until there is no drag as you turn the needles. Then turn the needles in until they start to engage the drag on the clips. After you feel the needles start to click, turn them in the number of turns as listed in the chart below.:

19 - 25 Carb Setting
Low Speed - 4 Turns
High Speed - 5 Turns

36 - 40 Carb Setting
Low Speed - 4 Turns
High Speed - 6-1/2 Turns

45 - 50 Carb Setting &
60 - 74 & Quickee Carb Setting
Low Speed - 2 Turns
High Speed - 5 Turns

This will result in a rich setting, but should allow the motor to be started. From these settings, 1 or 2 clicks at a time should be all that is needed to lean the motor in.

The motor should be run **rich**, not lean, and you should use fuel with a minimum of 17% all **castor oil**, not synthetic oil or blends. Adding castor oil to your fuel is permissible to achieve the proper mixture.

To properly adjust the motor from these settings, open the speed up to full throttle, lean the high speed needle for maximum R.P.M., and then richen 1/3 turn. To set the mid-range and low speed side, let the motor slow to an idle and lean the low speed needle until maximum R.P.M. is reached, then richen 1/3 turn.

After this is done, throttle up slowly. If you find it to be lean in the mid-range, then richen the low speed needle a click or two. The low speed needle controls the mixture from idle to 7/8 throttle. If adjustments are made correctly, then the final adjustment on the high speed needle for different temperatures and humidity levels will take care of all adjustments.

flooded engine that has become liquid locked, because there is a good chance you will strip the teeth off the belt drive.

Good buddy, Bruce Jones, informs me that he purchased a Gates 120xL037 drive belt for his Miller starter from a local bearing supply house and it has been performing very well for him. Jim Arnold and Bruce Jones have had their Miller starters for some time now and are very pleased with them. They are rugged enough for continuous field use and have been starting up to four-cubic-inch engines with no problems.

Local Big Bird flyers, Bill Link and Nick Dundon, have been operating their own-design gear drive starters for some time. Their design is heavy duty and stands up well to the rigors of every day flying. The heavy duty direct drive starter I have was totally inadequate for Big Bird engines; on twelve volts the big engines would not turn over, on twenty four volts the starter was turning at twice the twelve-volt rpms, but was difficult to hold on to, and overheated in short order.

BNB STARTER

Nick and Bill were kind enough to give me some hints and I drew up my version of their starter which we jokingly call the B.N.B. (for Bill, Nick and Bruce) starter. These are not available commercially; buy a Miller and go flying unless you like to tinker.

Our Big Bird club president, Bennie Phillips, who is a race car equipment supplier, directed me to a local bearing sales company that supplied me with a timing belt, also known as a Gilbert belt, and two gears for the belt that gave me a three-to-one reduction drive. To build my B.N.B. starter, I first purchased the reduction gears and belts, a foot of 3/8-inch steel shaft, two ball bearings to fit over the shaft, a Miller giant starter cone and rubber insert. Then a trip to the local metal supply yard furnished me with the quarter-inch by four-inch sheet aluminum stock for the end plates of the starter body. The end plates were scrap, so they were not expensive. The two-foot piece

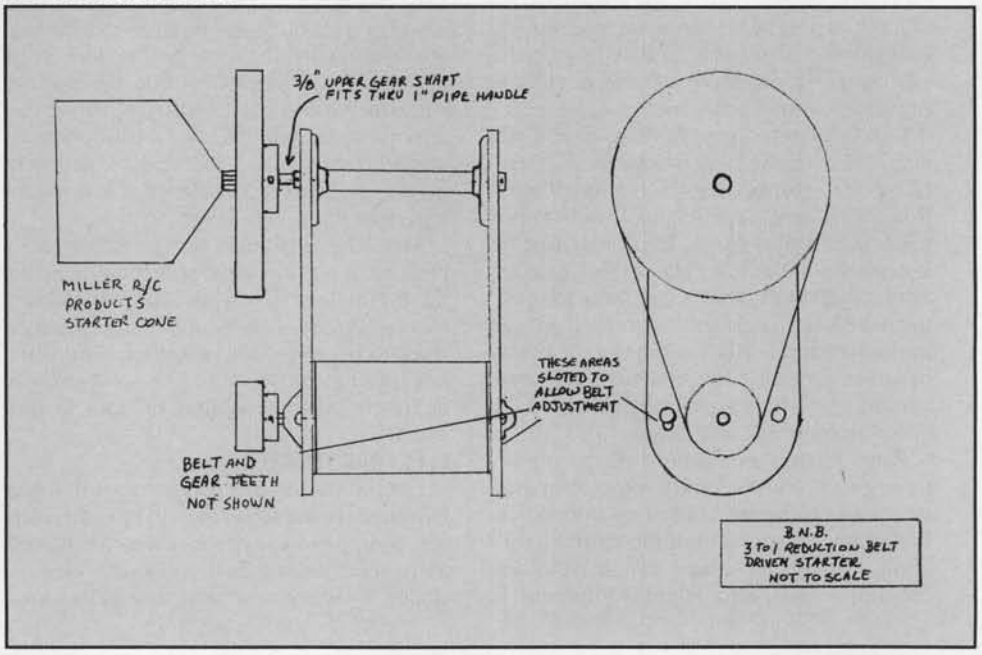
Len Bosman's standoff Scale Ryan is Quadra powered and has many hours in the air.

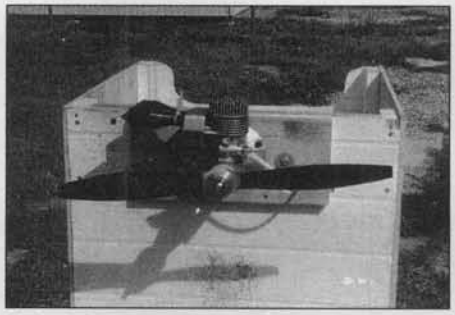
was more than adequate for the job, steel would have worked too. Two three-eighths collars for the shaft are also necessary.

The next stop was at a local electrical supply house and motor rebuild firm, where an electrical foot switch was purchased. The side-mounted switch on my starter had proven to be very troublesome and the foot switch has worked very well, freeing both hands to hang on to the starter. A stop at the local hardware store was next, where a piece of one-inch pipe and two pipe stand-off flange plates for the one-inch pipe were bought. The standoffs have four mounting holes each, so eight quarter-twenty by three-eighths flat head bolts were needed to fit in the counter sunk holes, which mount the standoff to each end plate. Two 1/2x10/32 brass threaded rods were needed next to replace the bolts that hold the starter together. It is difficult to replace the steel bolts because of the magnets in the motor. Four acorn nuts were bought to fasten the rods together and give a nice appearance.

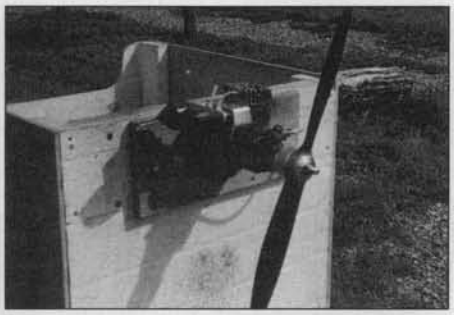
After gathering the hardware for the project, the end caps of the starter were removed, the starter endplate had some raised areas that stuck out about 1/16-inch, so shims were fabricated that fit around the raised areas. The total length of the starter motor with shims was carefully measured. It was then a good time to lay the gears on a flat

The BNB Starter; see text.





Kevin DeShazer's K.D.I. after-muffler is mounted on a Tatone muffler that has been on the S.T. 3000 for some time. Initial tests were encouraging, final results will follow.



Kevin DeShazer designed this after-muffler to fit most common brand name mufflers. Early test results were impressive.

Miller RC Products will sell you a geared starter complete, or supply you with a gear drive for your own starter.

surface with the belt around them, so that the distance between the motor shaft and the upper gear shaft could be measured. Incidentally the small gear goes on the motor shaft, while the large gear goes on the 3/8-inch upper shaft.

Once the distance between the shafts is determined, you will be able to determine the lengths of the front and back plates that the motor fits between. Carefully mark and set punch the centers. Measure the distance between the screws that go through the motor and end plates. A motor mount screw hole on one side of both end plates is elongated, as are the larger holes made to accommodate the raised areas for each end of the motor shaft. These elongated holes let you adjust drive-belt tension.

The end plates are then machined to accept the ball bearings for the upper shaft and the pipe flanges must be machined flat to fit on the inner side of the end plates. My machinist pressed the bearings in the end plate holes and staked them for me.

Back at the ranch, the motor was put between the end plates and fastened together with the brass threaded rods. The length of the one-inch pipe was determined and cut to size. Then screwed into the standoffs, the width between the pipe and standoffs will have to be the same as the width of the electric starter motor and shims. How far you screw the flanges on the pipe allows you to easily adjust the width. Drill and tap the end plates to receive the 1/4-20 flathead bolts. Loosely install the eight standoff mount bolts through the standoffs and then insert the upper shaft through the one inch pipe and flanges.

Mount the lower gear on the motor shaft and tighten the set screw down on the flat of the shaft. If the shaft does not have a flat, use the set screw to mark the shaft, remove the gear and file a flat for the set screw. A Dremel tool with a cutting wheel works well to make the flat.

Install collars on the upper shaft on the outside of the end plates, then install the upper gear on the shaft so that the belt runs true with the smaller gear on the motor shaft.

Determine how much of the upper shaft requires threading to mount the Miller cone. Remove the shaft and thread it. Tap the Miller cone to fit the shaft thread. I made the threaded area of the shaft long enough to have a nut on both sides of the cone. Reassemble, and this time tighten the upper gear shaft screws and all flange mount screws, check for a smooth turning upper shaft. Locktite everything as you assemble the unit. With the cone installed and the belt adjusted, wire up your foot switch.

You will find that the B.N.B. starter is pretty hefty. However, this works for you when starting a big engine. A starter that is too light would not be helpful. My B.N.B. has been working for over a year on all sorts of engines, so if you want to take the time to build one, enjoy. Just remember this project is not for the faint of heart! If you do not want to fool around, the Miller starter is going to give good service and save you a lot of aggravation (Miller RC Products, P.O. Box 425, Kenwood, CA 95452; (7O7)-833-5905).

Sid Rosen phoned me from Harrisburg, Pennsylvania, the other day, with a few questions regarding the hookup of a kill-switch for his Zenoah G-38. Fortunately the old parts box still had my magneto in it and it did not take long to assist Sid.

It was very nice to hear from someone from the East Coast, because I have heard several people refer to *Model Builder* as a West Coast magazine *(A misconception, based only on the location of our business*

continued on page 99

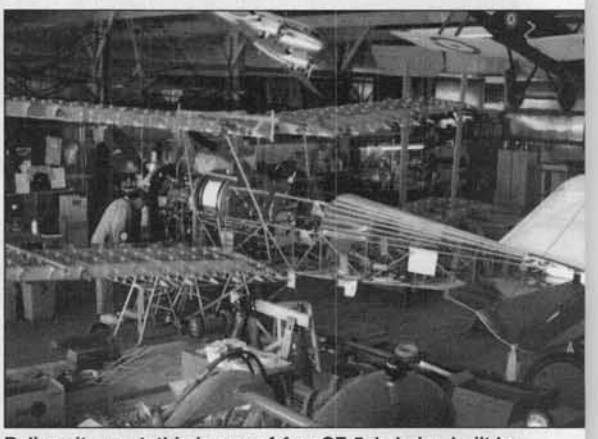
WORKBENCH *Continued from page 65*

found everywhere, not just in some remote corner of a hobby shop that might be miles from their homes, and only accessible if a knowledgeable parent or friend took them to the shop in their car.

It may seem to be a very remote and unlikely relationship . . . simple model gliders to full-scale aviation . . . but it's very real.

Where are we going with this discussion? There is a company called Flywitch Co., Ltd. based in El Cajon, address 1464 Graves Ave. #107, California 92021, phone (619) 440-6382, and headed up by Burt Quackenbush, that is putting something into motion right now that is right out of the 1930's. In those days, and kids loved to join them, there were national clubs, such as the Bobby Benson Club, the Orphan Annie club (remember the code rings and stuff?), the aviation oriented Jimmie Allen club, of course the Junior Birdmen of America, etc., etc. The Junior Birdmen, for instance, had over 640,000 members, more than four times the present AMA enrollment . . . and these were all kids, whereas the majority of AMA members are adults!

Well, Flywitch markets an ever-growing series of hand launch/catapult and rubber powered models. In keeping with the present, the gliders are constructed of foam sheet, and are colorfully printed and shaped to represent various modern jet fighters, along with some radical and pretty wild original designs. The rubber powered models are various original design monoplanes and biplanes, plus two scale-like WW I models of the Spad 13 and Sopwith Camel. The clever thing about all of these brightly colored models is that, in from 30 seconds to a couple of minutes, they shape up by unfolding from display packages, and everything locks into place using flat plastic discs . . . and, *they all fly surprisingly well!* The models are developed and made in Taiwan, with Burt, a long-time free flight and control line modeler, as their US advisor and marketing expert.



Believe it or not, this is one of *four* SE-5a's being built by C.A. Schuchmann, Waterloo, IL. Power is Ford V-6. Read about "Aerodrome Ninety-Two" in text.

In each package is an announcement about the Flywitch Flyers Club. There is no charge to join, and membership includes a certificate of membership to pin up on the wall, a membership card, and a periodic newsletter which contains flying tips, safety notes, letters from members with answers from Burt, plus news of flying contests (!) and their results.

OK, model and full-scale aviation industries, can you see the potential from this effort to get aviation into the minds of our next generation and grow a new crop of modelers? Burt and his company is the seed man. We need to make lots of fertile ground available so that new crop will begin to sprout in the near future! ***MB***

COUNTER *Continued from page 9*

power pack.

Both systems offer Four Model Memory, with helicopter (2), glider, and aircraft software, LCD computer screen, ATV(7), Dual Rates (3), Programmable Mix, CCPM Mix, Idle Up, Timer, Invert, servo reverse, plug-in RF module, and trainer system.

Another new Futaba offering is the 3UCP three-channel Super System for surface operations (cars and boats) on 27 and 75 MHz. It includes the R113IP/PCM 1024 receiver, two S9301 servos, and transmitter NiCd power pack. It has Six Model Memory, with car and boat software, LCD computer screen, ATV, ATL, Dual Rates, Exponential, Programmable Mix, Timer, One-Touch Key programming, servo reverse, and plug-in RF module. It's also available with S132H servos.

• • •

Crown Models, P.O. Box 707, Delavan, IL 61734, phone (309) 244-7063, offers the Interceptor Mk-III, a pusher-prop powered jet RC aircraft. It is of 90 percent epoxy glass composite construction, white gel coated fuselage and cowl, clear canopy with cockpit and foam-filled pilots, pushrods pre-installed for ailerons and optional drop tanks, pre-installed wing hold-down bulkhead, complete hardware and full-size drawings, 18-page photo-assisted instructions, optional 18-inch drop tanks available, and super flight performance on .25 to .40-size engines at a total weight of four to five pounds. Contact Crown Models for additional information and an available video tape.

• • •

Another of many pilot busts available to liven up the cockpit of your scale or scale-like RC aircraft is available from MGA Enterprises, P.O. Box 5631, Fresno, CA 93755, phone (209) 224-4170, Fax -2789. This quarter-scale U.S. Navy fighter pilot bust is five inches high, five-and-half inches wide, and weighs only six ounces. He's all ready to man his plane in combat flying gear, including yellow Mae West (life vest), white parachute straps, brown leather helmet and goggles. If you can't find him at your loacl hobby shop or Navy recruiting office, you can request his transfer from Fresno for $19.95 plus $3.25 for luggage and travel expenses!

• • •

Seeing James Wang's "Rube Goldberg" method of locking up a crankshaft in order to tighten a prop nut, in his column, on page 57 of the June issue of *Model Builder*, Chuck Alessio, of OnBoard Systems, 7210 Jordan Ave., #D37, Canoga Park, CA 91303, phone (818) 999-3952, sent us information on a better solution to the problem. The solution is called the "Piston Locking Tool" (PLT), and like Chuck says, "It should solve many, if not all of the problems associated with tightening the prop nut on any fuel powered model.

Just so there would be no confusion, Chuck sent along a photo for this column and a sample PLT for us to (regretably) send along to James to try out. (I shudder when thinking of the "good ole days" when we used to stuff a wooden prop blade through the exhaust opening to jam the piston so a prop nut could be tightened. Well, at least the prop was softer than the piston and cylinder wall, so there was less chance of doing real damage. With today's composition props, forget it!)

• • •

Through arrangements for a marketing license, Jet Hangar Hobbies announces the release of the "Americanized" version of Philip Avond's 1/9-scale F-15C Eagle ducted fan model. Designed for twin Turbax I fans and K&B 9101's, this plane is a two-time FAI World Scale Champion. Length is 86 inches, span is 56-1/2 inches.

The Jet Hangar Hobbies semi-kit consists of all epoxy fiberglass fuselage, all fiberglass liners, and separate landing gear doors. Clear canopy, foam wings, stab, and dorsal cores, detailed plans and instructions are also included. Price is $800.00. To order yours, or to obtain more information, contact Larry Wolfe at Jet Hangar Hobbies, Inc., 12130G Carson St., Hawaiian Gardens, CA 90715, phone (213) 429-1244. Be sure to tell Larry where you read about it when you contact him! ***MB***

The Whirlwing

BY TYRONE PARKER

The latest Whirlwing variant and the wildest of the bunch. There's some incredible hot-dog flying in store for those who build one!

Whirlwing derives its name from its unique flat spin. This machine spins so flat that it resembles helicopter blades whirling around. If you execute a stall turn and pull full up and full left aileron while holding full right rudder as it comes over the top, it will tumble end over end in a knife-edge attitude. If you apply full down, full left aileron and full right rudder while blazing along at full speed, it will tumble upward, snap spin a couple of times as it slows, then fall into an inverted flat spin. If at any time the action becomes a bit confusing, simply neutralize the controls; the nose will drop and you can easily pull out and away.

Despite the wild gyrations the plane will execute, it is very stable in level flight and docile at slow speed. If you are interested in a really fun-to-fly and attention-getting change of pace, this is the plane for you.

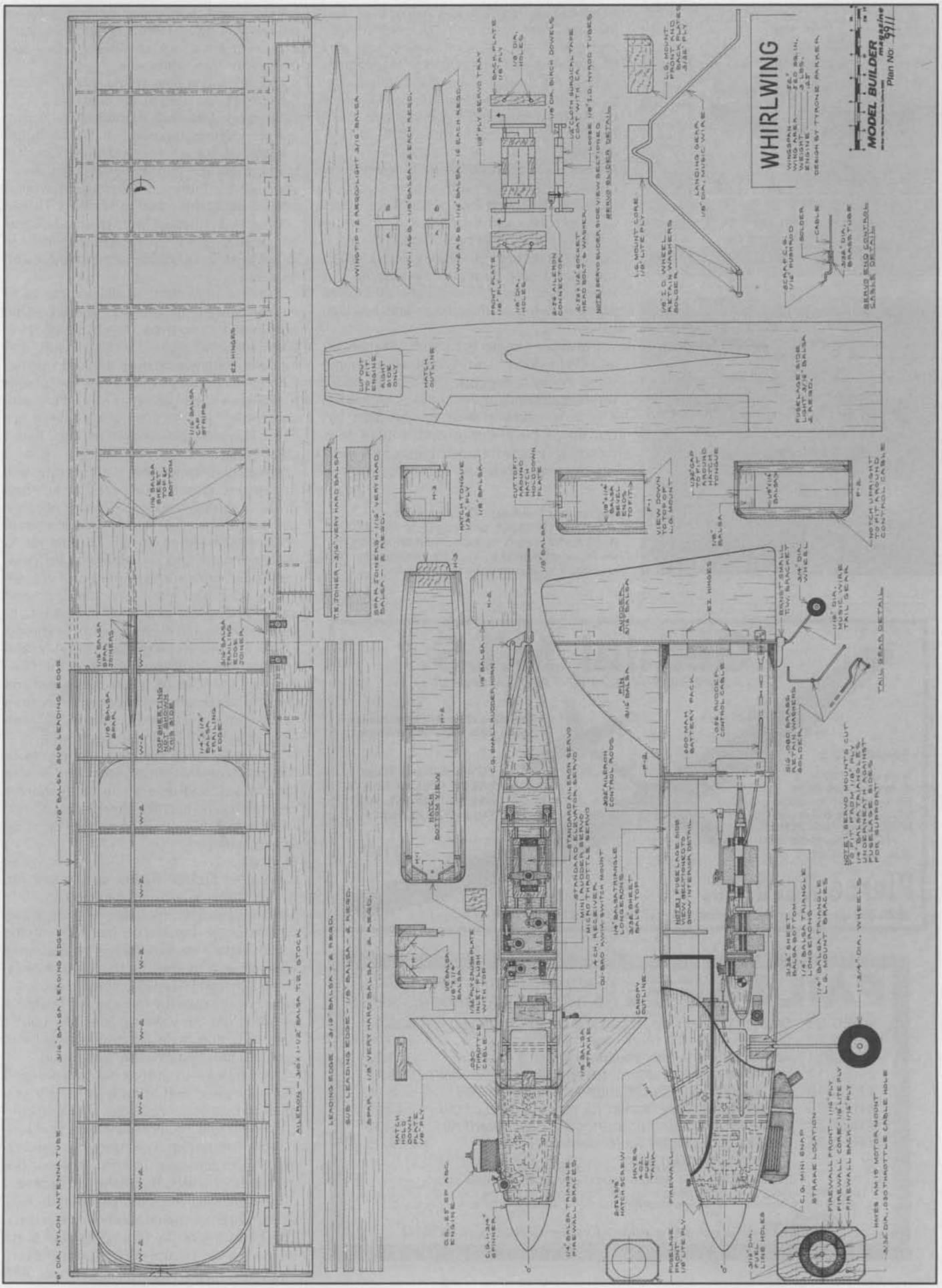
CONSTRUCTION

Cut wing parts from balsa as indicated on plans. Glue spar halves together then glue spar joiners in place. Glue trailing edge halves together and add T.E. joiner. Glue W-2 aft ribs and W-2 aft tip ribs to back of spar, and taking care to keep it straight and level, attach trailing edge. Add remaining W-2 aft ribs. Glue W-1 front ribs and W-2 front tip ribs to spar front. Taking care to keep them straight and level, attach sub leading edges, then add remaining W-2 rib fronts. Using a sharpened 1/8-inch diameter brass tube, punch left ribs and spar tip to accommodate antenna tube, then fit and CA antenna tube in place. Bevel sub leading edge and trailing edge to rib contour, then attach leading and trailing edge sheeting. Sheet center section, then add fillets and cab strips.

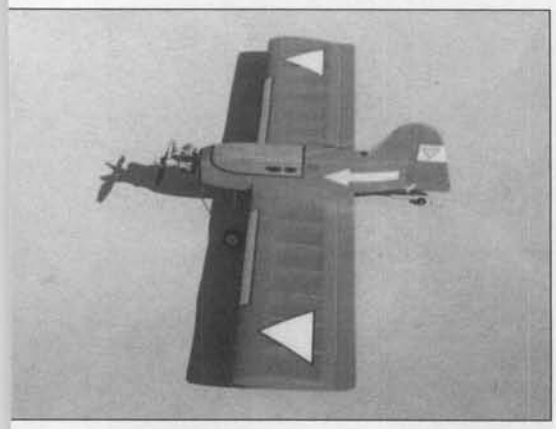
Cut elevons to length from light balsa trailing edge stock. Glue fixed elevon tips to trailing edge tips with bevel on bottom to provide slight airfoil reflex. Fit elevon control torque rods to trailing edge center section. Notch elevon center section to fit, and again with bevel on bottom, CA in place. Drill and notch elevons to fit torque rod ends, then bevel elevon leading edges and set aside. Attach wing leading edge, carve round and sand. Attach wing tip and sand completed wing structure smooth.

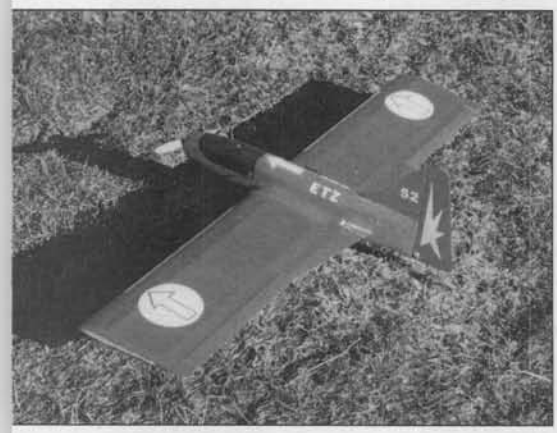
Cut fuselage sides from light 3/16-inch sheet balsa and take special care to get a snug fit around wing openings. Glue 1/4-inch balsa top and bottom fuselage longerons in place. Slide fuselage sides onto wing and CA into place. Bevel inside of fuselage at tail, soak fuselage sides aft of wing trailing edge thoroughly with ammonia, then carefully press fuselage tail ends together and clamp till dry. When dry, secure with CA. Bend landing gear to shape from 1/8-inch diameter music wire. Cut L.G. mount core to shape from 1/8-inch lite-ply. Cut L.G. mount front and back plates from 3/32-inch aircraft ply and laminate to core with CA. Notch bottom fuselage longerons to fit and CA L.G. mount into place. Cut front and back L.G. mount braces from 1/4-inch balsa triangle stock and CA in place.

Cut firewall core from 1/8-inch lite-ply. Cut firewall front and back plates from 1/16-inch aircraft ply and laminate to core with CA. Drill motor mount holes, fuel line holes and throttle cable hole, then CA firewall into place. Cut firewall braces from 1/4-inch



FULL SIZE PLANS AVAILABLE, SEE PAGE 106.





balsa triangle stock and CA in place. Cut fuselage front plate from 1/8-inch lite-ply and CA in place. Sheet fuselage top and bottom with 3/32-inch balsa. Mark hatch outline on fuselage and cut hatch loose. Glue hatch hold-down plate to fuselage. Cut F-1 and F-2 to fit and CA into place. Glue hatch tongue to hatch and add H-3, H-2, and H-1.

Inset 1/32-inch ply hatch hold-down screw crush plate to fit flush with hatch top and CA in place. Fit hatch into place. Tack scrap 3/16-inch balsa to fuselage top where fin will be fitted. Fit tailwheel bracket into place but do not secure yet. Carve fuselage edges round and sand structure thoroughly. Cut strakes to fit from 1/8-inch balsa and CA in place to wing leading edge and fuselage sides.

Cut servo mounts to fit from 1/8-inch ply and CA in place. Cut 1/4-inch balsa triangle servo mount braces and CA in place under servo mount ends and against fuselage sides. The servo slider shown on the plan has proven to be effective and trouble free, though if you are fortunate enough to own a transmitter with electronic mixing, you can save yourself a little weight and a lot of tedious cutting and fitting by simply installing a mini-servo for each elevon surface and using your transmitter mix.

(Above left) The first of the author's five Whirlwing variations, powered by an Enya CX-11. (Left) Another early version of the Whirlwing, equipped with an O.S. .15. This one had separate elevator and aileron control surfaces.

Cut fin and rudder from light 3/16-inch balsa and CA fin into place. Bend tail gear to shape from 1/16-inch diameter music wire but do not bend top over yet. Solder inside wheel retaining washer, add tail wheel, and solder outside retain washer. Solder inside main gear retaining washers, add wheels and solder outside retaining washers. Thread washer and tailwheel bracket onto tail gear and bend top over. Drill and notch rudder to fit tail gear, bevel rudder leading edge and set aside.

Cut out right front fuselage side to fit engine. Install throttle and rudder cable housings. I used tissue to cover all sheet balsa surfaces, applied with Balsarite and followed with two coats of thinned Sig Lite-Coat clear dope. I covered the wing with translucent Micafilm. After MonoKote trim sheet, trim and stick-on decals were applied, I sprayed on two coats of Black Baron clear epoxy.

Hinge elevons to wing trailing edge with EZ hinges. Glue tail wheel bracket into place, and hinge rudder to fin and fuselage tail with EZ hinges. Install rudder control horn. Install servos. Install Du-Bro Kwik-switch mount and remaining radio gear. Install fuel tank, motor mount and engine. Epoxy main gear into place. Install control cables and solder tailwheel bracket retaining washer. Install elevon control pushrods. Check all controls for smooth operation and correct direction. You'll want about 3/16-inch up and 3/16-inch down elevator and about 1/4-inch aileron on top and on bottom of that. About 1/2-inch left and 1/2-inch right rudder will be fine to begin with.

Affix prop and spinner and carefully check balance. Note that the balance point is quite far forward, and unless you really want a heart attack, do not take off with the balance more than 1-1/2 inches back from the wing leading edge.

FLYING

For your first few flights, simply take off, fly up to altitude and cruise around until you are familiar and comfortable with the somewhat strange visual configuration of the plane. Make a few slow fly-bys to familiarize yourself with its slow flight characteristics. Bring it in flat at a fast idle, throttle on down when you're over the runway and let it sink on in. Avoid the rudder if possible, until it rolls to a stop, as it is close coupled and consequently sensitive on the ground.

As you begin to wring it out, you will find that the speed and attitude at which you enter the various maneuvers are fairly critical, and it may require some time and serious concentration to perform, in a predictable and consistent manner, the various gyrations of which the plane is capable. I don't think you will mind so much though, as the plane is intriguing and really fun to fly. The plans are of the fifth generation that I have constructed and flown during the past five years, I hope you will enjoy yours. **MB**

of the plane. Being light weight (about 3/8 to 1/2 ounce) it does not measurably affect the plane's balance. It is designed to arm itself in flight, so it does not require any special action on the ground, except to open it when you are ready to start the engine. Thus, this flyaway shutoff is simple, inexpensive, easy to build and requires no modification of the airplane. Voila!

The device described here is still in the testing stages, so some of the measurements mentioned below will be left a bit general. The shutoff as described works, but there may be some fine-tuning to be done on the exact dimensions of various parts of the device. We leave the door open for individual experimentation.

At this writing, the shutoff has not been used in a contest, but it is expected that several Northwest fliers will be using them at the Regionals. I hope to follow this report up with some information on how the shutoff works in actual competition. Undoubtedly, we'll learn some modifications that can be made to improve its performance and ease of use. At the same time, this shutoff undoubtedly will spark some of the hobby's master craftsmen to begin development of even better shutoff designs.

For now, here is some detail about the first working flyaway shutoff we made. This shutoff is designed to be both armed and triggered by variations in centrifugal force. A buildup of centrifugal force as the plane gains speed arms the shutoff; the shutoff is triggered when centrifugal force ceases.

The shutoff mounts on the inboard side of the plane, using the top front engine mount bolt. The fuel line is routed from the bladder (or from the pressure regulator, if one is used) through an alligator clip that is the basic working part of the shutoff. One handle of the alligator clip is extended to provide a weighted lever that swings outboard when centrifugal force is exerted on it, thus opening and keeping open the shutoff as long as the plane is flying normally on the end of its lines.

To build the shutoff, you will need to purchase the following items:

Brass sheet - Our schematic drawing shows the plate as rectangular, but in actual practice, as the photo shows, the plate can be shaped to fit the airplane and thus save a little weight.

3/32 music wire - Early prototypes were tested with a wire of 3-1/2 to 4 inches in length. It may be possible to shorten the wire even more; experimentation is continuing (see below for some details on this issue).

Alligator clip - Use a type of alligator clip that is small and has a relatively weak spring tension. The best I found here in my town was discovered in the auto parts section of a discount store, packaged as an "electrical test clip." The clip was covered with a small rubber boot, which I discarded. Various other clips may be found that will work. I was surprised to find how easily the centrifugal force opened the clip - which was what I expected to be the most difficult aspect of making the shutoff work.

Tiny music wire - About a 3/4-inch length of wire is needed - the exact diameter is not critical.

HOW TO BUILD THE SHUTOFF

1. Cut the small brass plate to shape. For your first one, leave the plate oversize and grind it to fit after the shutoff is finished. Drill two holes in the plate, one for the top front bolt of the engine mount, and the second for the top rear bolt.

2. Solder the 3/32-inch wire into one handle of the alligator clip. I also found it advisable to solder a length of tiny music wire (not listed above) along the outside of the same handle of the clip as a reinforcement against metal fatigue. Your own experiments will direct you toward the optimum lever wire length; my early tests lead me to suspect that the wire can be even shorter than the 3-1/2 to 4-inch length specified above.

3. Solder the alligator clip onto the brass plate as shown in the drawing. Make sure the clip is out of the way of the hole that will be used to mount the plate on the plane, and that it clears the second hole by enough for the top rear bolt to extend through; though there is no need for a nut in that location. The point of the clip will be to the front of the plane, the wire extending backward. and above the wing.

4. Bend the tiny music wire into an L-shape, and solder it onto the plate in a position such that the short end of the "L" can be bent into the alligator's jaws. This small wire will be used to keep the clip open during starting and launching, and also helps make sure the fuel tubing stays in the clip.

5. Screw the wheel collars onto the end of the 3/32-inch wire. If the collars are not enough weight in themselves, the small lead weight can be secured between them. At this writing, the actual amount of weight has not been determined, but it is less than I originally anticipated. The shutoff was designed to use a weight between the collars, but early tests indicated that, for the prototype at least, the collars were enough weight in themselves. Adding weight could allow the wire to be shortened.

INSTALLING THE SHUTOFF

The shutoff is installed by a single nut on the top front motor mount bolt; a nut on the second bolt is optional. Run your fuel tubing through the jaws of the clip. A note on fuel tubing: The small alligator clip does not have enough strength to close silicone or neoprene tubing. Use surgical tubing in this area and plan to replace it regularly. Filing the teeth off the jaws of the alligator clip will extend the life of the tubing.

After installing the shutoff, you will probably find it desirable to slightly bend the upper jaw of the clip outward, to assure a more complete pinchoff of the tubing along the length of the jaws, especially after filing away the teeth.

Before starting the engine, open the clip and bend the tiny wire into its mouth, so that the wire holds the jaws open during starting

and launching. When the plane is up to speed, the centrifugal force further opens the clip, causing the small wire to snap out of the way. The centrifugal force keeps the clip open during flight. When centrifugal force ceases, such as in a flyaway, the clip closes, pinching the fuel line and shutting off the engine.

Initial flight testing of the prototype shutoff pictured with this column was successful immediately. The shutoff armed itself every time, and was closed each time on landing. The plane flew through the usual violent maneuvers without any problems.

On an early flight when the engine happened to be dead rich, the shutoff pinched the tubing and leaned the engine out (this cycle repeated itself several times, as the C-force opened the jaws as the plane speeded up and the engine flooded again, as might be expected). During flight testing, the crankshaft broke on an old Fox Combat Special Mk III powering the test plane, and the engine went into a "shaft run." As the plane coasted to a slow speed, the device shut off the runaway engine!

It is likely that the shutoff described above would be susceptible to some crash damage. Therefore, the recommended procedure would be to have a spare in the pit box, which could be a quick replacement in case of damage. My own plan is to have one shutoff per airplane, plus a spare always available in the pit box.

In contests where the shutoff is not required, it will depend on circumstances whether a damaged shutoff would be replaced during a pit stop. Where the shutoff is mandatory, the change should take only a few seconds, similar to the process of replacing a prop or a glow plug.

I would like to receive reports from other fliers on development of other shutoff ideas and on the concept of shutoffs in general. I plan to update this topic in a future column.

In examining the photos of the shutoff, sharp-eyed combat enthusiasts will note the presence of an epoxy-glass prop, which is a copy of the popular, now unavailable, Top Flite Pylon Racing 8-1/2x6-1/2 prop, cut to 8 inches. This glass prop is being developed for combat use by Mike Hazel. Pictured is an early version, which Mike intends to further refine before making it available for general distribution. Mike is working on lightening the prop to as near the wood version as possible, and moving the airfoil back through use of a cuff in order to offset any performance degradation caused by the slightly higher weight of the glass prop.

We'll report on further developments with this prop. Those interested in inquiring directly can contact Mike Hazel, 1073 Windemere Dr. N.W., Salem, OR 97304. Mike has a full range of speed and racing props available and is also regularly developing new products.

NEWSLETTER OF THE MONTH

For the past several months we have been featuring a "newsletter of the month" in this column, highlighting the excellent publications put out by and for control line modelers. As we often draw on such newsletters for inspiration, the highlighted newsletters may have been mentioned before in the column. This month we introduce *On Line*, published by the Skyliners Control Line Club from the Clark County area of Indiana. The Skyliners were organized in 1959, and cater to all forms of control line flying and building for both sport and competition. Experts in the club offer building and flying instruction for novices.

The latest issue received in April featured a "Meet the Flyer" column on John Hale, a control line modeler since 1946 who started his competition career in speed and now flies mostly scale. There's also a calendar of upcoming events, news on club meetings, a swap meet, field work and a static show. A classified ad section is also included.

The Skyliners fly at the Clark County Airport. Meetings are held at 7 p.m. on the first Tuesday of each month. Club president is Mike Starrett, of Greenville, Indiana. Newsletter editor is Jim Correll, of 2701 Knob View Drive, New Albany, IN 47150.

Speaking of newsletters, De Hill of the Tulsa, Oklahoma, Glue Dobbers has taken the lead in promoting an exchange of newsletters between control line publication editors. Similarly, I've been trying to get all the newsletters I can in the hopes of building a comprehensive list for a future article.

In the meantime, here are some words of wisdom from De, as published in a note to newsletter editors:

"Control line is alive and well! Old clubs are revitalizing, and new ones are springing up. During the past three years, control line's growth has been amazing! You can buy almost anything that was ever manufactured if you know where to look.

"We do have one problem; control line fliers don't have an organization, and we don't even know how many of us there are. Now, I'm not trying to start an organization; I don't have enough time to build and fly as it is! But, if we were all to exchange newsletters, we should be able to communicate with each other.

"I realize that some of you probably put out a two-page newsletter every other month and feel like no one would want to exchange newsletters with you. Hogwash! Look, we are all we've got; I think that the vast majority of newsletter editors would like to know what is going on in all the organized control line clubs (and the unorganized clubs, too)."

De asks newsletter editors put him on their mailing list. Send them to this column as well. De's address is: De Hill, 5811 S. Utica, Tulsa, OK 74105.

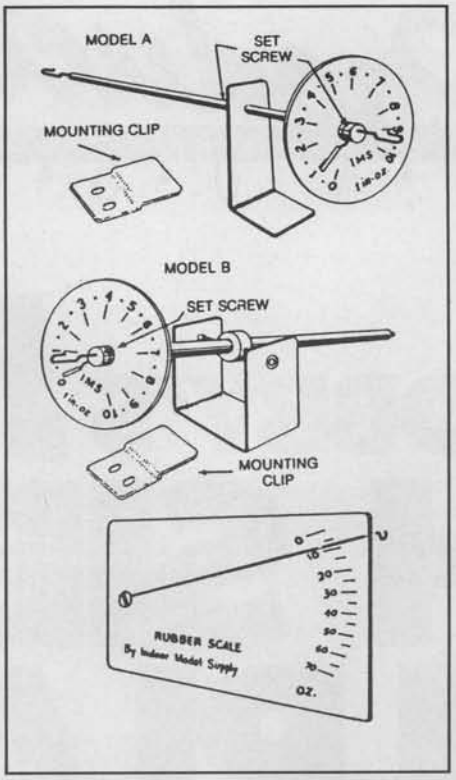
As always, questions, photos, club news, contest reports and technical tips are welcomed. Write John Thompson, 1145 Birch Ave., Cottage Grove, OR 97424. **MB**

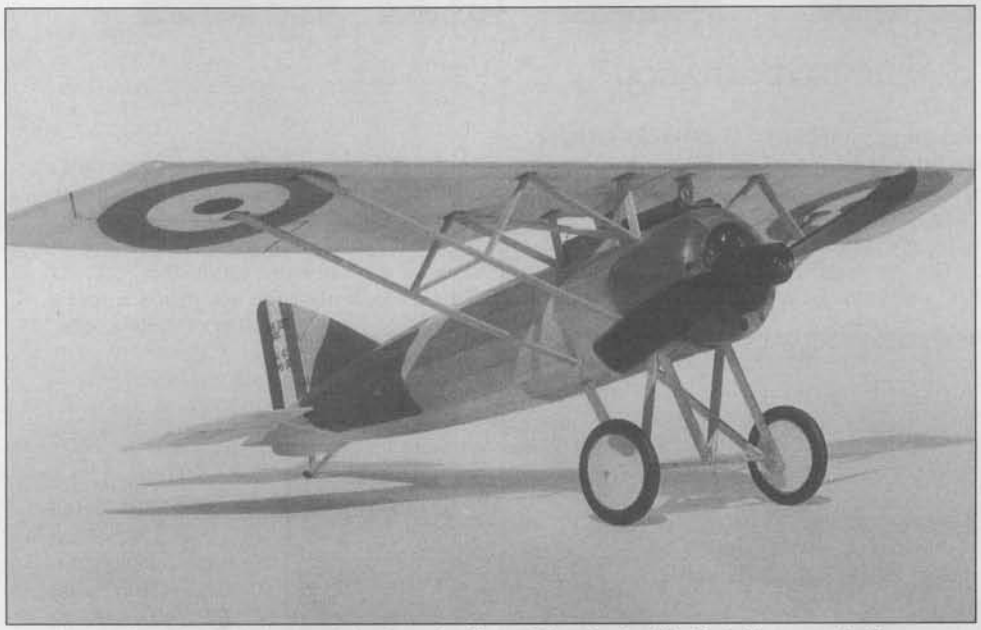
paper. He then sent the planes to his sons for Christmas.

Money and information is scarce where Mr. Osorio is kept. He is looking for plans for the Waco SRE. He will appreciate any plans that are sent to him. No cameras are permitted in his penitentiary, so proof of his ability in building is not possible. Perhaps a kit, three-views and plans would help fill his time. Write to J. Osorio D41878, 7410, Box 617, Jamestown, CA 95327.

PISTACHIO MISCUE

About two months before the Pistachio Inter-Gnats proxy meet in Miami, Florida, I wrote to Doc Martin and informed him that I intended to send in models for this meet. He sent me rules and club photos for this column. A Waterman Racer was already completed in the eight-inch size. I then built a Canard Bleriot 25 and a DH-6 biplane. Finally, a Dyke Delta flying wing (homebuilt) came off my board. All that was left was trimming. Two of our flying sessions were cancelled. When one was finally attended, I found that trimming this little eight-inch wonder was quite a chore. The DH-6 was torquing in to the left. The Dyke was





Morane Saulnier A-1 indoor scale by Antonin Alfery of Czechoslovakia. Model is covered with condenser paper and sprayed with Humbrol colors.

doing everything but flying. The Bleriot was damaged when it collided with a folding chair. Only the Waterman was flying at all. When the time came to ship the planes, they were not trimmed to my satisfaction. Finally, a decision was made not to send them. Since then, each model's problems have been worked out. I hope the Miami indoor club will forgive me. Next year it will be better, I know.

COCONUT SCALE

At various times in the past few years, I have received photos of large indoor scale models. This relatively new event is called Coconut scale. I understand that it was started in Washington, D.C., by the Maxicuters club. The wingspan on these behemoths is a whopping 36 inches. Doc Martin's indoor group in Miami, Florida, is into Coconut. Photos have been sent to me, with models by Dave Linstrum, Doc Martin, and Millard Wells, to mention a few.

"Indoor" recently featured a pix of a transparent Curtis Robin by Paul Avery. I decided to try a coconut myself. After some consideration, it was decided to build the Bellanca YO-50. This high wing observation plane seemed a good choice. The model plan was designed by Hal Osborne in March 1964. The 20-inch version I built, years ago, flew like a champ. The covering material I first considered for the new model was condenser paper. My old Bellanca was covered with it. After much thought it was deemed that yellow and blue Japanese tissue was more appropriate for the bigger one. An indoor scale model of this size is new for me. A 30-inch Vagabond was the largest up to this time. Photos and flight performance are forthcoming.

See you next time. Keep those rubber bands well lubed, fliers. Write comments to Ken Johnson, 16728 Bermuda Street, Granada Hills, CA 91344. ***MB***

Products I·N U·S·E

HOBBY LOBBY'S MFA HIGH SIERRA SAILPLANE

BY DAVE GARWOOD

The "High Sierra" is a two-meter, two-channel sailplane, made by Model Flight Accessories in Great Britain, and imported by Hobby Lobby International. Its long wings, V-dihedral, sleek fuselage, clear canopy, and full flying stabilizer give it visually pleasing lines, similar to full-scale sailplanes.

The "High Sierra" is heavily prefabricated. The kit features a molded fiberglass fuselage with gel-coat finish, and foam wings already sheeted with hardwood veneer. With inclusion of a pre-tinted transparent canopy, a great deal of the building and prep work has been done at the factory.

The hardware provided are wing and elevator rods, molded clevises, mylar hinges, threaded control rods, elevator bellcrank, molded towhook with mounting screws, and a rudder control horn. I added only a radio antenna lead-out tube.

Also included are machine-cut balsa parts for the stabilizer and rudder, balsa sticks for the wing leading edge and control surface pushrods, an instruction sheet with 12 photographs, a plans sheet, an "MFA High Sierra" water slide decal, and a "Hobby Lobby" peel and press decal.

CONSTRUCTION

The foam wing comes fully sheeted with Obechi and all that's required of the builder is to attach and shape the leading edge, install the tubes that receive the wing joiner rod, install and shape the wingtip blocks, attach wing root plates, sand, and cover the wings. It goes smoothly, using white or tan carpenter's glue and epoxy.

You may want to add balsa stock from the scrap box to get a sharper trailing edge, as I did. Some designers believe this is important for performance, while others don't.

The fiberglass fuselage comes with a beautiful gel-coat finish, but it has a noticeable mold seam line. If you decide to leave the joiner line, fuselage construction goes quickly. If you want a topnotch finished appearance, you'll have some sanding and painting to do.

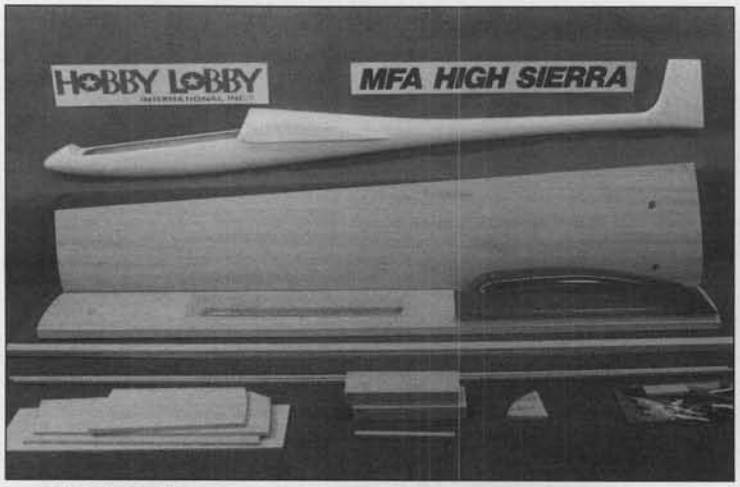
I went down the second path and sanded the fuselage with increasingly fine wet-and-dry sandpaper, mainly using an auto body rubber sanding block. It's distressing to see the gel-coat destroyed, but encouraging to see the seams disappear.

On one seam, sanding opened up several small holes. I filled these with epoxy daubed on the inside with a dowel, held in place with

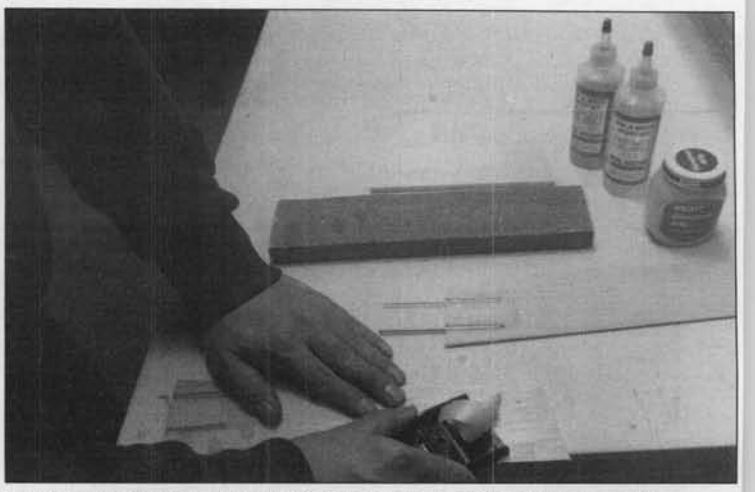
masking tape on the outside. The next night, I added a layer of epoxy on the outside, allowing it to cure in an inverted position to build up the seam. With a little more sanding and a coat of gray primer paint, the seams became invisible.

Normal pin holes in the fuselage were filled with auto body glazing putty. The fuse was then final sanded and sprayed with gloss enamel. Another advantage of refinishing the fuselage is that you can pick your own final color.

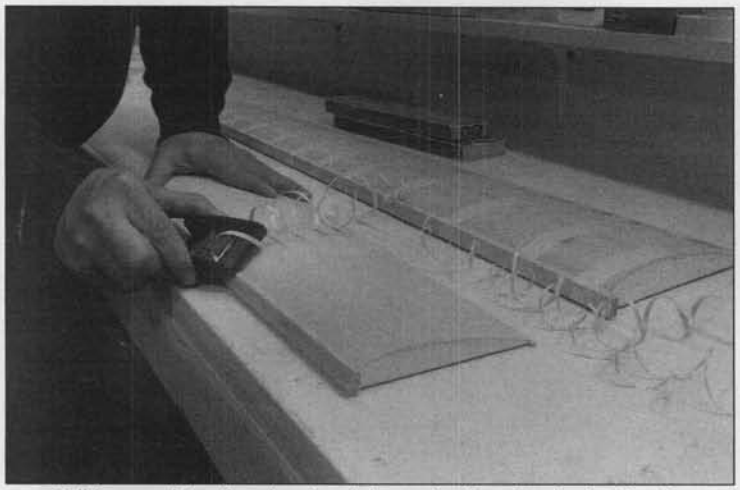
I used Hobby Lobby Oracover to cover the wing and tail surfaces. It goes on easily and looks great. Its low sheen closely matches the painted finish of my fuselage. I made two substitutions for materials provided in the kit. First was to use Sig Easy Hinges to save the extra step of pinning them in place with a dowel. Second was to use 3/16-inch dowels for control surface pushrods instead of the 6mm by



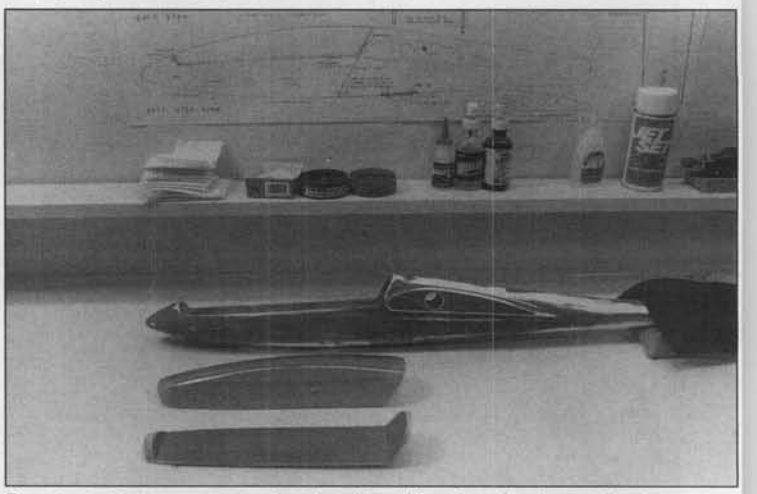
Kit includes fiberglass fuselage, foam wing cores factory sheeted with Obechi wood, tinted canopy, wing lettering, along with all hardware and balsa needed to complete the model.



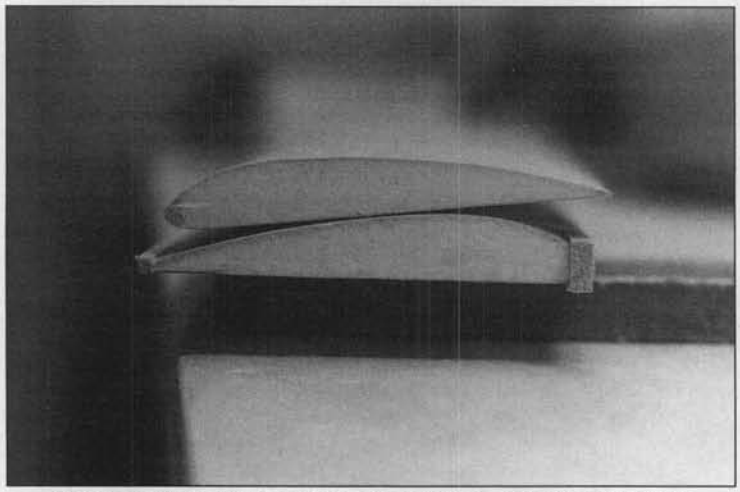
Full flying horizontal stabilizer is shaped with plane and sandpaper after installing tubes to receive rods with epoxy. Petroleum jelly can be used to keep epoxy from sticking to the rods.



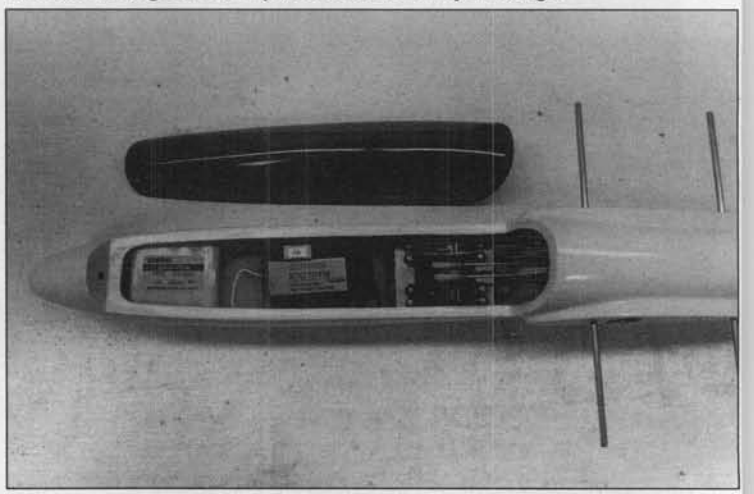
Builder completes the wings by gluing on leading edge (and optional trailing edge) stock, and shapes them with modeler's plane and sandpaper block.



From top to bottom: construction drawings, fiberglass fuselage with primer paint partially sanded off, pre-tinted canopy, and canopy base built by the modeler. Fuselage is held in place on the bench by sandbags.



End view of wing shows wing construction: foam core pre-sheeted with hardwood veneer with leading edge (and optional trailing edge) glued on by the modeler. Top wing half (right panel) has been planed and sanded to shape.



Finished fuselage front with wing rods installed and canopy assembly completed. There is plenty of room in front of the wing for 500 mAH battery pack, standard receiver and mini size servos. Standard size servos will fit if staggered.

6mm balsa stock provided. A special type of heart failure occurs when you run out of rudder while flying in high wind on a slope. When you later discover the lack of control is caused by bending pushrods, you decide never again to build these vital control links of balsa. This happened to me once, but only once.

Construction took me 26 hours over 11 evenings, and would go faster if you used the fuselage as it came from the box. The cost to build the model is about $134, including $117 for the kit, $16 for two rolls of Oracover, and 50 cents for an antenna tube, but not including adhesives or radio.

There's plenty of room for a standard size receiver and a 500 mAH battery pack. Because of the fuselage curvature, the useable servo space is not as large as in some box shape fuselages, so you can make good use of miniature servos in this installation. Micro servos are not

required, however, and the plans show a staggered installation layout for standard size servos.

With an Airtronics 92765 receiver and a pair of 94381 mini servos, a 500 mAH battery pack and two ounces of modeling clay in the nose, the flying weight is 37 ounces, yielding a wing loading of 11.6 ounces per square foot.

FLIGHT TESTING

The first hand-toss produced a long, flat glide of about 250 feet with absolutely no control input needed until the landing flare. I was impressed with the "High Sierra's" stability and efficient glide.

My flying buddy, Bob Powers, found some productive lift on a small hill, and the next launch was out over the slope. The "High Sierra" launched well and caught lift. Turns were smooth with plenty of control, and after a couple of flights, I reduced the rudder travel by moving the clevis out a notch on the rudder control horn.

Later, at another field, we tried bungee launches, using Northeast Sailplane Products Pinnacle Up-Start. The model tows up on the line quickly and efficiently with little corrective control input. On the third launch, I caught a thermal and was again favorably impressed with the "High Sierra's" performance. It circled tightly enough to core the thermal and gained altitude quickly and easily. By building some speed in a shallow dive, the "High Sierra" performs graceful loops. No rudder input is needed, as the dihedral tracks the model solidly through the maneuver.

The only unsettling flight characteristic I noticed was a tendency to drop a wing and spiral toward the Earth if slowed too much in a turn. It takes 15 or 20 feet of altitude to recover, but the airplane does recover when it regains some speed. This tendency was eliminated by adding 1-1/2 ounces in the nose, which moved the balance point forward to 2-3/8 inches behind the wing leading edge. Note that this is further forward than the 3-1/8 inches suggested by the manufacturer, and the 2-3/4 inches specified by the importer, but this is my recommendation, at least for the first few flights. *(Wing tip washout may be another cure, but difficult to accomplish with pre-sheeted foam core wing. wcn)*

LIVING WITH THE HIGH SIERRA

We took the "High Sierra" on a slope soaring trip to Cape Cod, and found it to be very much at home in slope lift. The model is heavy enough to penetrate in wind up to 25 mph and its Clark-Y airfoil generates enough lift to stay up in 10-12 mph wind. With its sleek fuselage and graceful wing and stab shapes, this plane just looks right soaring by the ocean.

During inland slope soaring, I had a disastrous landing where the model cartwheeled on all four points, but required repairs only to the rudder; the fuselage and wings were undamaged. On another flight, I stalled in a downwind turn, dropped to the ground from twenty feet, crashed on a wingtip and sustained no more damage than a slightly crushed wing corner. Not many models resist damage as well as this. Once again, I'm impressed.

Finally, I had the opportunity to launch the airplane on a contest winch, stressing the wing joiner system heavily, and the "High Sierra" handled this task without a problem. This is one tough airplane, something that adds a lot to the kit's value.

CONCLUSION

Is the "High Sierra" the best thermal sailplane ever designed? No. Is the "High Sierra" the fastest slope ship ever offered for sale? No. Is the "High Sierra" an uncommonly versatile sailplane that thermals and slopes better than most? Yes, it sure is. It's also fast building, good looking and unusually durable. This is one of the good ones.

The suppliers mentioned above include:

Airtronics, 11 Autry, Irvine, CA 92718; telephone (714) 830-8769.

Hobby Lobby International, 5614 Franklin Pike Circle, Brentwood, TN 37027; telephone (615) 373-1444.

Northeast Sailplane Products, 16 Kirby Lane, Williston, VT 05095; telephone (802) 658-9482.

Sig Manufacturing Company, 401 South Front Street, Montezuma, IA 50171; telephone (515) 623-5154. ***MB***

AEROBATICS *Continued from page 53*

pull cable systems are equally as good and maybe better in some installations. There are several brands of quality clevises available which feature steel pins. Helicopter or RC car ball links make excellent, slop free, vibration resistant servo arm hookups. A less brittle and more vibration resistant choice for gluing in that servo tray would be one of the many silicone based adhesives now available. Foam rubber and velcro strapping work very well to pad and secure components, and so on.

Actually, I shouldn't belabor the point, because most people realize that most things are done a little differently with a pattern ship. This is why the major sport in the pits at most contests is peering into the innards of other people's airplanes in hopes of encountering new and exotic hardware or discovering a new and better way of installing some component.

SURFACE DEFLECTIONS

Once the major components are installed, and things are moving around on command (hopefully, the balance point location was determined by shifting those components prior to gluing, screwing and tattooing them in place), it is time to set surface deflections. Most of the time, the construction notes will give you a starting place on measurements. If not, then I usually consider that anything over 15 degrees of deflection on elevators or ailerons is adding more drag than effectiveness . . . depending, of course, on the size and shape of the control surface and the design of the airfoil of which it is a part.

Most modern radios have some provision for setting the exact surface throws at the transmitter, so set up the arms and horns for a little more throw than you think you might actually need, to give yourself an adjustment range. Be careful not to overdo this, because having to severely cut down or limit servo travel at the transmitter leads to a very coarse flight trim adjustment and accentuates any poor servo centering problem which might be present.

Speaking of servo centering, things today are much better than in the past. The standard servo of today is far superior to its 1970 counterpart in terms of power, centering, transit time, and reliability. Even so, my advice to you is still to save up your bread, or sell the children if you have to, and buy the best servos you can possibly afford for ailerons, elevator, and rudder, if you are serious about competing. Given a choice between a fancy transmitter with standard servos, and a more basic model with high speed, coreless, ball bearing servos, I'll opt for the better servos every time. You can't trim accurately with servos that don't center, and to me, flying with slow servos feels like moving a pair of pretzel sticks around in a jar of mud while watching airplane videos in slow motion.

Beyond ensuring that the surfaces have adequate throw, now is the time to make very sure that the geometry of the mechanical connections to paired surfaces (to wit: ailerons and split elevators) is identical. This means making sure that the clevis attachment points of the control horns are exactly the same height and distance from the hinge line on both surfaces, and that the connection at the servo arm is at the identical location on the arm if separate servos are used (as is most often the case on ailerons).

The next step is to ensure that the throws on the paired surfaces (again, ailerons and elevators) are exactly the same on both sides, and that the surfaces are properly centered. For this, you need to either make or buy a special tool: a surface deflection indicator. These gadgets are available from several manufacturers, including Gator RC Products, Robart, and Tettra. I use the Tettra SDI, and find it to be a very handy little tool. Once you use one of these items, you won't want to do without it when setting up any sort of aircraft. You may find it necessary to bend (in the case of an imbedded "threaded rod" type of horn) or move (in the case of a "screw on" nylon type of horn, which, incidentally, is not recommended for pattern planes for this very reason) the control horn to get things just right.

Failure to do the above step leads to a very large can of wiggly trim problems like poor loop tracking, wing drop on squares, unequal roll rates right and left, etc., and to much public hair pulling. It is a lot easier to eliminate this sort of thing at home on your bench than it is to adjust it out by trial and error at the field while your friends point and laugh.

Balance the wing laterally. If the design is one of the older types that features all the exhaust plumbing hanging out in the breeze on one side, balance the whole model laterally. Use the spinner and the fin extension or top rudder hinge for this.

WING WEIGHTS

I know that you've been told to add weight to wing tips at the field after you fly the thing, but the odds are good that if the machine balances laterally in the shop, adding wing weight at the field won't be necessary. In fact, if you have balanced the plane laterally and it still doesn't loop straight, I would advise that you look elsewhere for the root of your misery. Check for unequal elevator throw, unsealed hinge gaps, or wrong thrust offset.

Speaking of sealing hinge gaps, it has become so much of a standard practice that I almost forgot to even mention it. I do mine during the covering and hinging process, using long, narrow strips of whatever covering material I used to cover the wing. Trimming an airplane without doing this is like

attempting to put up a kite without a tail. It will fly, but the results may be more entertaining than they are controllable or predictable.

Finally, set the rudder throw for all you can get, and then double check to see that this important device *centers*. I use a pull-pull cable arrangement because it provides very positive control and very good centering. Many good cable setups are available commercially, so check with your hobby retailer. Try your best to avoid nylon line; it stretches. I use stranded steel cable, although some of the new synthetic composite cords made of materials such as Kevlar may be just as good.

As an afterthought, take time to make sure that the retract installation is tight and especially in the case of mechanical retracts, bind-free at the ends of the servo travel. A stalled retract servo can drain a battery pack faster than a 20-year Boatswain's Mate can pound down a pitcher of beer.

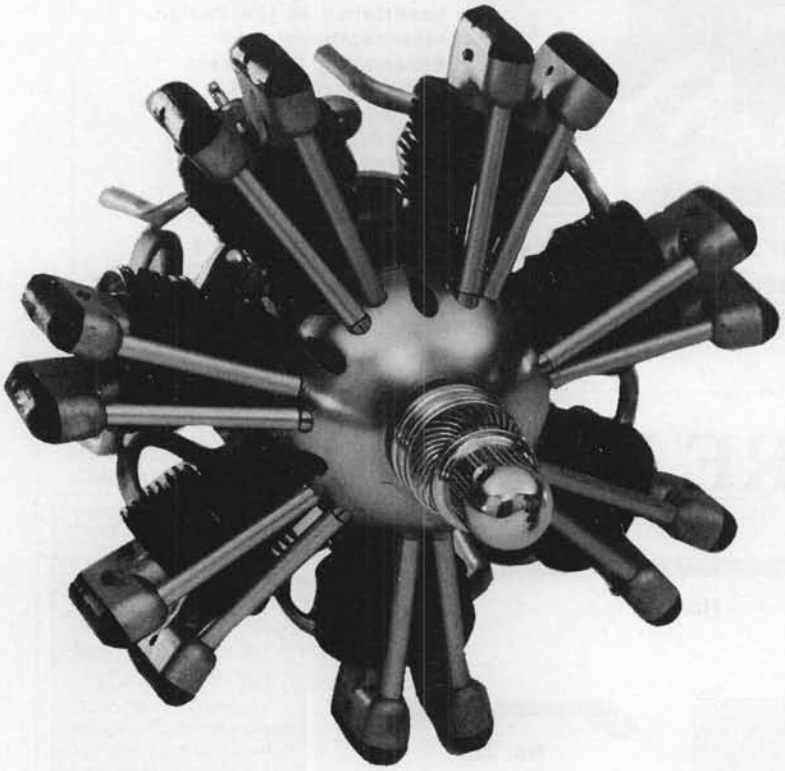
You might also check to see that all three wheels are tracking in the same direction, as it makes takeoffs and landings so much easier. If you are still using one of those atavistic nosewheel devices, by all means limit the steering throw to a few degrees each side of center. Takeoff is not a Slalom event.

After reading this far, it should be obvious that the point of all of this is to make your life simpler by eliminating problems up front instead of having to solve them later. There are only two reasons for not setting up an airplane properly: ignorance or laziness. As far as ignorance goes, the information that you need to accomplish what you want to do in pattern, or indeed, in any type of modeling, is almost always available. Magazines like this one, other competitors, specialty publications—the sources are all around you. Take time to ask questions and research the areas where you lack expertise. Doing it wrong leads to having to do it over. Reinventing the wheel is dumb. Both approaches take more time than asking a few questions possibly can.

I can't do a darn thing about laziness. I've been fighting that one all my life, and I haven't whipped it yet. I *can* tell you this: people who give in to laziness seldom wind up in the winner's circle. Besides, doing things right the first time is really the height of creative, farsighted laziness. You get to sit calmly and gaze fondly at your well-oiled machine while the shortsighted ones waste hours with hit-and-miss fiddling and tweaking on the very same adjustments that took you 15 minutes to measure properly and set up right in the shop. This provides a good deal of self satisfaction as well as time to consume your favorite beverage while you chuckle smugly at their antics. Of course, you could hustle over and lend them a hand. Hmm. Naaaahh!

That's all for this month. The results of the contest board voting are just coming in as I write this, and next month we will talk about the shape of things to come in '92. See ya' at the field. ***MB***

WIN A RADIAL!



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By Technopower

The Technopower radial, originally based on the Armstrong Siddely Genet Engine of the 1930's era, has taken over five years of design and development work. The result is a unique, aesthetic, highly practical scale flying engine of great engineering interest. These engines are fully operational, multi-cylinder, four-stroke, O.H.V. glow or spark, and contain over 300 component parts. Each engine is individually hand built, checked and test run before leaving the factory. This seven-cylinder engine is built to two-inch scale.

HERE'S ALL YOU DO

Just by subscribing or renewing their subscriptions to *Model Builder,* Bob Yurkowski, of Mt. Prospect, Illinois, has won an Airtronics Spectra PCM radio control system; Bob Shakespeare of Naples, Florida, has won an Uber Skiver knife set; and Radoslav Cizek, of Kamenna Zehrovice, Czechoslovakia, and Rafael Sela, of Newark, Delaware, have each won a six-month extension to their *Model Builder* subscriptions.

To be eligible for the next quarterly drawing of four winners (which will include the Technopower Radial Engine), subscribe or renew your subscription to the finest all-around modeling magazine available, *Model Builder,* by sending your name and address, along with a check or money order for $25.00 for one year, or $47.00 for two years ($38.00 for one year [includes postage], outside U.S. including Mexico and Canada), to Model Builder, 898 W. 16th St., Newport Beach, CA 92663. *All payments must be in U.S. funds drawn on a U.S. bank.* Mastercard or Visa orders welcome. The easiest way to do this is to call our toll-free subscription hotline: (800) 243-9593 (in California: 714-645-8830) and place your order. If you've been thinking about subscribing or renewing your subscription, now's the time!

HIROBO *Continued from page 37*

longer will melt the plastic insulator inside the plug.

The muffler is quite unique, a two-piece design. The front half is molded from aluminum, the back half is rubber, like a rubber glove. The little engine runs quite hot, but the rubber muffler did not melt. The exhaust hole is very small, less than a 1/4-inch in diameter. The engine ran worse when the three-inch long exhaust that came with the scale BK-117 fuselage was added. Instead, I later cut off the rear half of the rubber muffler and inserted the 90-degree elbow section cut off from a Magna pipe rear exhaust header. This eliminated the exhaust constriction that made the engine speed oscillate. With this modification, the engine screamed like a Formula 1 race car, and the rotor speed was well over 9000 rpm. The MH-10 leaped into the air like a rocket. There is a noticeable 95% improvement in power and smoothness. The drawback is that the engine is unbearably noisy. Therefore, my recommendation to you is to cut off the rubber muffler only near the rear tip. Then insert a 90-degree aluminum tube with an inside diameter around 3/16 to 1/4-inch. An old 60-size helicopter landing skid would be perfect.

The engine started without any problem, except the hex starting key system that came with the kit did not work well. Unlike X-Cell, GMP, and Schluter machines, which all have an aluminum cone on the engine starting shaft, the MH-10 has a big Allen head bolt on the starting shaft. This is similar to the $30 hex starting system sold by Raves and Helicopter World. These $30 hex starting systems work because the Allen driver is bolted solidly onto the electric starter shaft. With the MH-10, the Allen driver supplied is a friction fit inside the rubber cup on Sullivan-style electric starters. Every time the engine starts, the Allen driver would violently jump out of the starter rubber cup. This could even poke out someone's eye. Quite dangerous! In fact, Andrew Sitton, the owner of Copter Corner in Santa Monica, California, had the hex starter fly through the front window of his brand new Ford Bronco!

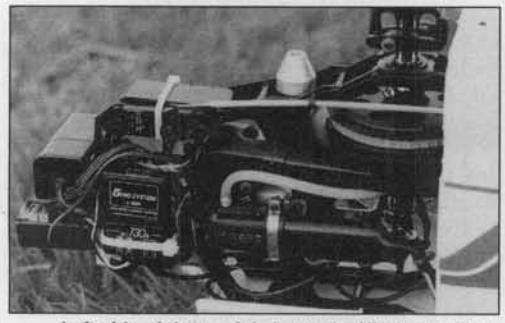
We have instead fitted a GMP Rebel starting cone over the Allen bolt so that a conventional cone-style starter extension can be used. By the way, if you are looking to buy a starter extension for your 60-size helis, the red one made by Miniature Aircraft USA is one of the best available; it doesn't slip. In order to fit the GMP Rebel's aluminum starter cone on the MH-10, the hole in the cone must be enlarged quite a bit. Drill it out carefully so it will fit snuggly and center on the Allen bolt. Then tighten the two set screws to secure it. This mode has worked extremely well. Another flier has successfully modified an X-Cell 30 aluminum starting cone to fit on the MH-10. The Schluter Junior 50 starting cone also fits easily.

Surprisingly, the original centrifugal clutch on the MH-10 works quite well. As the original clutch worked fine, I have not tried the optional upgraded clutch that also came with the kit. In fact, other club members have installed the new smaller, and lighter weight upgraded clutch and found that the clutch will not swing out far enough to engage. Therefore, use the original, heavier clutch shoes that come with the kit.

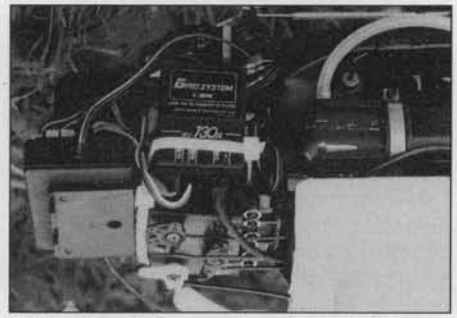
The MH-10's centrifugal clutch system is unlike any other in the world. The clutch is not mounted on the engine shaft as on all the other helicopters. Instead, the clutch is mounted on top of the main gear. This means that when the engine starts, the plastic main gear will spin immediately, but the rotor will not spin. The clutch bell is about three inches in diameter and it sits on top of the main gear. The clutch bell also functions as a large pulley for the tail rotor drive belt. This large pulley at the front drives a small pulley at the back and is what is responsible for a fast tail rotor speed, and thus a very responsive yaw control. With this clutch above the main gear design, we automatically get driven tail rotor as a freebie. But don't get excited, the MH-10 will not auto. The blades are too light, and the tail rotor is always connected, which saps energy. I had an engine flame out at 50 feet, and the thing plummeted like a rock. The final flare and tall grass saved it. There were no broken parts; very robust.

The engine-to-main gear-to-tail rotor gear ratio is 9.7:1:5, which means the main rotor spins one revolution for every 9.7 revolutions made by the engine. And the tail spins five times faster than the main rotor.

This MH-10 definitely packs many innovative design concepts in one package. It is quite impressive. Unfortunately, the bad geometry at the washout added slop and the little 15 engine does not run as predictably as the 30's or 60's. The engine screams, but the helicopter gets nowhere. Using a Skytach, we tached the main rotor at around 1600 rpm. However, it sounded like the thing was revving at 2000 and about to explode. But nothing ever flew off. However, one of the three screws that hold down the three clutch shoes came loose. The factory did not Locktite anything! So either remove all nuts and bolts and add Locktite yourself, or drop some thin CA on all the nuts and bolts. The little helicopter likes high rotor speed because the small engine runs better at high



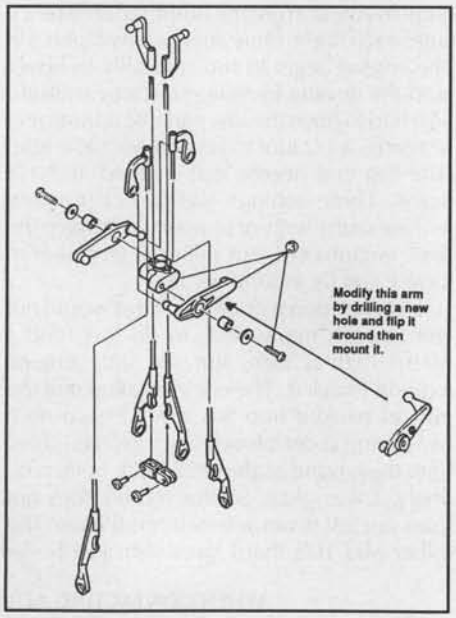
Left side of the model shows the Hirobo muffler that comes with the kit. Receiver and 500 mAH battery pack are at the front of the servo tray. JR-130 gyro control box is tie-wrapped to the servo tray. Tail rotor control servo is at the top. It fits in the servo tray and is secured with tie-wrap. Note the aluminium starter cone from a GMP Rebel or GMP Cricket modified to fit on the MH-10. This is a must.



Bottom view of the servo tray shows the three servos sitting side by side. These are for collective, roll cyclic, and fore/aft cyclic.

Right side of the MH-10. The front shell was supposed to be held on by small screws, but author modified it by fastening it with velcro for quick removal. Note the small 1/2-inch by 1-inch velcro strip on the side of the fuselage. It is easier to remove the front end to start the engine. Notice the collective L-arm and fuel tank.

Figure 3. This diagram shows the interesting cyclic and collective control system on the MH-10. To eliminate the ten degrees of paddle slop, the arm must be redrilled and flipped around as shown above. This will reduce the paddle travel, too.



rpm. The engine overheats very quickly. Make sure it is not leaned out too much. It takes 30 to 40 flights to break in this little engine. It is more finicky than the larger ones.

I first flew the MH-10 without the BK-117 fuselage, to check all the controls and time the engine. It flew fine that way. The model hovers fine and climbs as fast as electric helicopters, but definitely not as fast as 30-size helicopters. Magna/Coolpower 30% nitro heli fuel is used. This is a must. Regular 15% nitro fuel just isn't enough for the little engine. A gallon of high nitro fuel may be about $20 a gallon, but it gives over fifty flights on this tiny machine. Even with the 30% nitro fuel, this little jewel just gets off the ground and barely flies around.

I found that 2-1/4 turns is about right on the main needle valve. The little engine needs priming to get started. Unlike 30 and 60-size engines, it does not flood easily. To prime it, simply squeeze the end tip of the rubber exhaust stack, while letting the starter crank the engine. This will immediately help the carburetor suck the fuel. This trick can be used on your larger helicopter, too. Simply seal off the exhaust hole with your fingertip while cranking.

After a few successful flights without the body, the BK-117 fuselage was fitted onto the MH-10. A small diameter (1/4-inch inside diameter), three-inch long metal tube was provided in the kit to extend the exhaust to outside the fuselage. With this extension stack, the engine did not seem to run too well. A power loss was detected. Maybe a mini tuned pipe from small gas powered cars can be adapted to improve performance. But cutting off the rubber muffler and adding the large diameter 90-degree elbow stack helps.

We have been using the Miniature Aircraft optical Skytach, showing the main rotor to be around 1500 to 1600. This range offered the best performance on the MH-10 (the specs for the O.S. CZ-15H engine says the engine horsepower peaks at 17,000 rpm, which means a main rotor speed of 1753). Our little O.S. engine took quite a long time to break in. We noticed a distinct improvement in engine running consistency after each flight. Only after twenty flights did the engine begin to run smoothly in hover and the throttle transition became smooth. We had to open the low end idle adjustment screw by a 1/2 turn to get a smooth low idle. The top end needle was opened at 2-1/4 turns. These settings give a rich running engine with plenty of blue smoke to keep the little engine cool, but still enough power to hover and fly around gently.

I tried to loop it once, but it just would not get enough momentum to do it. I tried a sharp high-G turn, but the little engine couldn't hack it. The engine stalled and the model banked into the ground because it was flying at deck level. The model tumbled into the ground at about 25 mph, but amazingly it was okay. So this model does not pass our test for an aerobatic certificate. The other MH-10's that I have seen just hover and putt around slowly.

Other club members' MH-10s are fitted with five micro servos. My MH-10 is fitted with a standard Airtronics aircraft radio. I only used four mini servos. It is hooked up just like we used to hook them up on the Schluter Heli-boys in the old days. In this case, it's just the old days, not good old days! In the seventies, there were no helicopter radios, so RC aircraft radios had to be used on model helicopters. The four servos are for tail rotor, pitch and roll cyclics, and engine and collective are driven from the same servo. The picture shows how the throttle on mine is mechanically linked to the collective L-arm on the right side of the helicopter. The MH-10 flew fine without any problem. As all I expected out of this cute little machine was just hover and cruise around, there was no need for fancy throttle/pitch curves. It just doesn't have the power-to-weight ratio for aerobatics.

In order to fit the mini servos (mini servos are slightly larger than micro servos, but smaller than regular servos), the two webs inside the servo tray hole must be removed. The collective, aileron, and elevator servos sit side by side. The large servo tray hole was also elongated by a 1/4-inch to fit the mini servos. A JR-130 gyro was used. Receiver and battery were taped with double-sided tape to the front of the servo tray. The space in front of the glow plug was left empty so a glow plug connector could be easily connected.

Overall, the engineering is quite innovative and different from the run of the mill machines. We do not recommend this machine to beginners because it is more squirrely than the 30-size machines. The small engine is more critical to set up optimally. When the engine is not running very smoothly, the model can be difficult for beginners to control. The marginal power-to-weight ratio requires experience to set up the model properly.

If you are willing to spend extra time to tweak the machine, it actually can fly quite well. I spent the extra hours to make sure all the sliding pushrods were free from binding, drilled all the holes on the mixing arm to remove the slop, reworked the muffler, CAed all the nuts and bolts, made sure the swivel arm at the blade pitch arm was wobble-free, and minimized friction at all the moving points. It may take only 12 hours to build the model, but the extra hours on fine tuning can enhance the handling qualities.

Before we end this review, let's discuss power-to-weight ratio. If we take the horsepower divided by the weight of the helicopter, we get the power-to-weight ratio. For example, the specs for the O.S. 61SFN say it can produce a maximum of 1.8 horsepower. The manufacturer's rating is usually given for running with open exhaust. Using a muffler may reduce the power by ten percent. Using a tuned pipe may improve the horsepower by 10 percent. Let's just use 1.8 hp, divided by 10 pounds (typical weight for a 60-size helicopter), which gives us 0.18. The higher the ratio, the better the perform-

ance. This ratio means for every pound of weight of the model, we have 18 horsepower to accelerate it.

The O.S. 32H is listed at 1.0 hp. A typical 30-size helicopter like the Shuttle, Enforcer, or Concept weighs around 5.8 pounds. So 1.0 hp divided by 5.8 gives 0.17. This means under ideal open exhaust conditions, a Concept should climb vertically almost as fast as a 10-pound X-Cell 60. Well, these 30-size helicopters do accelerate pretty good, but not as fast as 60-size machines. Part of the reason is, the larger the helicopter, or any flying object, including airplanes, the more efficient it becomes. This is why model airplane wing loading is only around 20 ounces per square foot, while full-size passenger planes can have 90 pounds per square foot wing loading. This is a fluid mechanics behavior that has to do with Reynolds number.

The MH-10 weighs 4 pounds, 3 ounces. The specs for the O.S. CZ-15H say 0.45 hp at 17,000 rpm. Dividing 0.45 by 4.1875 pounds yields 0.107 hp per pound. This power-to-weight ratio is a lot worse than the 30 or 60-size helicopters. Therefore, the MH-10 performance is marginal. If we convert the electric helicopter's power drain in watts to hp and divide by the weight, the ratio is about the same as the MH-10. For example, the Kalt Electric Whisper or the EP Concept fitted with an eight-cell battery draws about 12 to amps in hover. Multiplying 9.6 volts by 15 amps equals 144 watts of power consumption (this is slightly more than the power drained by a household 100-watt light bulb). The 144 watts is equivalent to about .19 hp. The electric helis weigh around 2-3/4 pounds. This gives a power-to-weight ratio of 0.069. This power-to-weight ratio is definitely worse than the MH-10's.

But the electric helicopters seem to have good power margin in flight. This is because electric helis have much lower rotor disk loading than gas models. Disk loading is similar to airplane wing loading. It means dividing the helicopter weight by the main rotor disk area. The MH-10 and electric EP Concept have about the same diameter rotor disk, but the MH-10 weighs 4 pounds, 3 ounces, while the EP Concept only weighs 2 pounds, 12 ounces. Thus, the large rotor disk is what improves the aerodynamic efficiency of these modern electric RC helicopters. This is also why the electric helicopters feel "lofty," almost like flying a butterfly or a glider. The MH-10 feels more solid in flight and more like the larger 30 and 60-size helicopters because of its weight. The MH-10 will probably fly better if the main rotor disk is increased from 35 inches to 40 inches to lighten the disk loading. Then the rotor speed can be lowered to reduce the cyclic sensitiveness, which should mellow the model a bit. The MH-10 is a cute, strong model with innovative design concepts, but the little engine requires patience to set up. By the way, the MH-10 upgrade bag includes a gasket for the O.S. 15. So far we have found the engine runs better without installing **MB**

Perdue:

"We lived on a small farm, which I still own, outside of Gallatin, Tennessee. In the afternoons after elementary school, I spent many hours reading comics and the model magazines available in the drugstore. The best I can remember, I started building models at the tender age of eight. Anyway, I didn't read so well, and I was so dumb I would spend hours on end holding the pieces together until the glue dried, because I didn't know to use pins! There was a bookstore in town that sold stick-and-tissue models and some model building supplies. I remember they had a good stock of the Comet line, but I never had any money to buy any large kit.

"When the war broke out, my Pa moved the Perdue bunch to Atlanta, Georgia, and was employed at Ft. McPherson with the Army. Later, we moved to Marietta, with Bell Aircraft, where they built B-29s. By this time, I had learned to read much better and had discovered the use of pins. I built anything I could get my hands on, but they were mainly the small rubber-powered stick-and-tissue models, which also included small scale jobs . . . Joe Ott, Wheaties, Speedee Bilts, etc. During my time in Atlanta, I received a tremendous birthday present. No, it wasn't a fancy model airplane kit or engine! Rather, it was a push reel type lawnmower. This came in quite handy, because I used it many hours weekly to mow the neighbors' yards to earn money to buy my models. After many weeks, I would accumulate five or ten dollars and head for downtown Atlanta, to blow it all (except for trolley fare) on models and supplies. I never got enough money together to buy an engine, even if it had been available during the war.

Bud Romak took first place with this ABC ignition O.T. F/F at the NorCal Champs last April. It's a Don Foote Westerner powered by a Super Cyc. Armstrong photo.

Ray Ghio with his 20-year-old AB Spacer, in Sacramento, California, for the NorCal Champs. Armstrong photo.

"We lived on the corner of a dead end street, which was just a block from Joel Chandler Harris' home. He was the author of the famous "Uncle Remus" stories. I spent many hours playing in his back yard. Our house was on a small hill, and I remember letting my models R.O.G. off the front porch. They would climb gently, make a 90-degree right turn and land in the center of the dead end street. This was great fun, but I really didn't know much about trim and adjustment. It was in Atlanta, out in the boondocks, which after the war became an airport, where I saw my first gas-powered model fly. I was impressed!

"After the war was over, we returned to the farm outside of Gallatin. I began high school in 1945. Soon I acquired my first engine, an Ohlsson 23. I built my first gassie, which was a Spook 48. There's no telling how many times I tried, failed, and repaired that dern thing. I never did get it to fly, because I didn't know anything about trimming and flight adjustment. I was an only child who lived in the sticks, and didn't know anyone who built models. Everything I learned I got from reading *Air Trails, Model Airplane News,* and others, but most of it was trial and error.

"I finally gave up on the Spook and somehow got an Atom. I think the kit was a Crusader, a small cabin model which might have been put out by Berkeley or Capitol. To my thrill and surprise, it flew . . . not spectacular, but it was stable and forgiving. Even with the troubles encountered with spark ignition, I had many, many enjoyable hours and short flights with that little model. I'm sure it had an Austin timer, but I think I would just let it run until it ran out of gas. This model gave me the "bug," and I never quit enjoying building and flying free flight. I have never been really successful or famous for my free flight activities, but it has been my life. It is a shame that free flighters appear to be a dying breed, but we'll just have to keep on hanging in there.

"Incidentally, I attended my first model contest in Nashville, at Cornelia Fort Air Park, during the time I was still trying to get the Spook to fly. Even though I had never had a successful flight, my mother drove me the 30 miles to Nashville, and I spent my time cranking on the balky Ohlsson. I never got airborne."

Well, Jim, great story. Thanks for sharing it with us. I think it's amazing how some folks, like Jim, hung in there with the models even under the most trying circumstances. It just goes to show you that when the free flight bug bites, it bites hard. And by the way, success is not measured by the number of national records you've set, or the number of trophies on the shelf. Success is doing something that you really enjoy doing.

THE END

That wraps and ties it for another month. I hope you are enjoying the wonderful summer flying season. This has been one of my more enjoyable ones. This month, I will catch my own thermal, thank you. ***MB***

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MODEL MARKETPLACE

BIG BIRDS *Continued from page 79*

office. Like all magazines, sales follow population density, i.e., the northeastern US is our strongest area. Editor/Publisher Bill Northrop spend most of his life in Delaware; General Manager Anita Northrop is a dyed-in-the-wool New Yorker! wcn), which is not the image we wish to encourage, although many *Model Builder* staffers live on the West Coast, most of us have Eastern ties. I was born in Southern Indiana, went to school in Kansas, Rhode Island, Virginia, Florida, Illinois, and Trinidad, West Indies, then Air Force Tech School in Texas. I have many happy memories of Norfolk, Virginia, because my first tie in the hobby business was working for Al Shoemaker's Tidewater Hobby Shop, near Ward's Corner in Norfolk. Two-and-a-half years of high school were spent at Granby High School in Norfolk. I finally was graduated from Leesburg High School in Leesburg, Florida.

While going to Electronics School in Chicago in 1966, I was a member of the Chicagoland RC Club, one of the oldest RC Clubs in the United States. They were a very friendly group and I recall Sid Axelrod giving one of his first Monokote demonstrations at one of the club meetings.

Big Birds Book-of-the-Month is V.I.P.'s *Directory of Giant Scale Plans* by Col. J.A. Devries and Dick Phillips (V.I.P. Publishers, Inc., P.O. Box 16103, Colorado Springs, CO 80935). This book is chock-full of Big Bird plan reviews and if you choose one of the plans from the book, Bob Banka will probably be able to supply the necessary documentation for your scale project, through "Scale Model Research". Three bucks will get you a forty-page catalogue, from Scale Model Research, 2334 Ticonderoga Way, Costa Mesa, CA 92626.

I really enjoy hearing from Big Bird fliers and builders from all over the United States and from other countries as well. Comments and good quality pictures are always welcome. Tie your plane down and go flying. Bruce Edwards, 8304 53rd St. Ct. West, Tacoma, WA 98467; telephone (206)-564-4416. ***MB***

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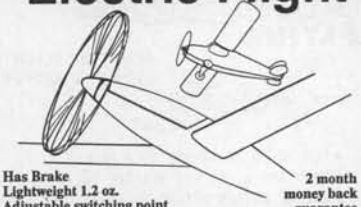

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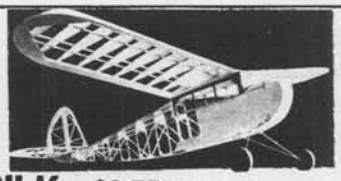

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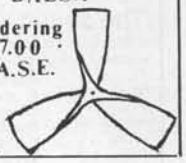

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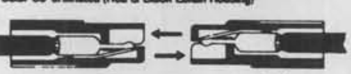

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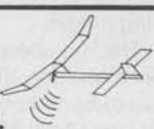

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PLUG SPARKS *Cont. from page 31*

LANZO BOMBER

This is the design that this columnist has been berating for some time now, as it has been so badly overdone. A look at most of the contest results reveal that the majority of the places are taken by this design. Naturally, it follows the old adage "Monkey see, monkey do" *(and "monkey" win!" wcn).* In other words, there is an implied guarantee of success if you produce a copy of the winning model.

The members of SAM 21 fixed Pond up once and for all by presenting him with a Lanzo Bomber constructed from the Leisure kit (see Photo No. 6). The model was ready to go with .05 electric motor. Jack Alten installed the radio set and actually tested the model. No excuses now, Pond!

Sure enough, under the electrical expertise of Jack Alten (setting up battery and motor for optimum performance), the model won for Pond in the third NCFFC meet, featuring the Electric Limited Engine Run. This writer has to admit the model is a superlative flyer. He is reminded of the days in 1939 when the Comet "Zipper" as designed by Carl Goldberg made its appearance on the market. Everyone was an immediate competitor and in many cases, the winner!

Eventually, the design was improved by others and displaced the Zipper for popularity; the Joe Elgin "Playboy" coming to mind immediately. In our SAM movement, the biggest problem is that we cannot improve on existing designs nor design a new concept. There are very few old models that will compete on even terms in the Antique Event. The nearest bet at present is the Anderson Pylon as designed by Alvin Anderson, one of the early founders of the pylon design.

WINNIE DAVIS REVISITED

One of the nicest surprises for this columnist occurred at a recent SAM 21 meeting where Jack Sprinkle, of Hayward, California, presented a late photo (No. 7) of Winnie Davis at the age of 76. Winnie looks hale and hearty at this age, but, so far, no one has been able to convert Davis to the SAM movement. Hopefully, Bryan Wheeler may be able to turn the trick as he has offered to restore the original.

All that remains to be done is to retrieve the parts of the Big Gull originally shipped to the AMA Museum. Bryan Wheeler reports Winnie's address is 4901 E. 37th, Kansas City, MO 69133. One of these days we will do an article on Davis.

MECA GRAND NATIONAL COLLECTOGETHER

Latest info from Dick Dwyer, president and coordinator, is that a MECA "Grando" will be held in conjunction with the SAM Champs at Jean, Nevada, on October 6, from noon to 6 p.m. The Nevada Landing Hotel/Casino will be the site. For further info and pre-paid registration, write to Richard J. Dwyer, 1837 Flood Drive, San Jose, CA 95124. Plenty of awards!

NOSTALGIA CORNER

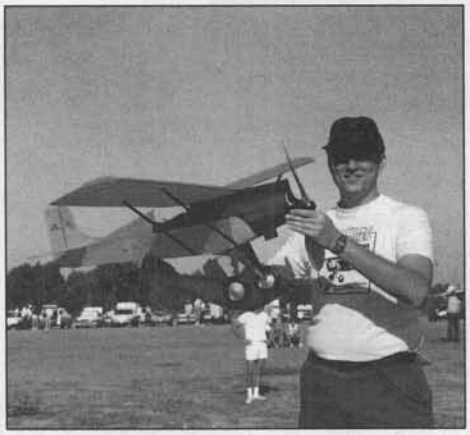
We still have a flock of post WW II photos taken by Dick Everett, during the time he was writing a column, "Out West" for *Air Trails.* How Dick ever got time to photo models yet compete in contests (and win!) sure beats me. This month, we have selected a shot of the late Frank Swaney in his younger days (before he added ballast). He is seen in Photo No. 8 launching what apparently looks like a Thunderbuggy rubber FAI type.

This would be no wild guess, as Frank was a member of the Long Beach Thunderbugs, Southern California, and was quite active. In addition, he ran a Jim Dandy of a hobby shop in Long Beach. After a disastrous fire instigated by some smart kids with fire crackers, Frank finished up working for California Hobby Distributors. Leaving Long Beach, Frank bought a home in Colusa in the heart of the rice growing area.

Frank died about three years ago, being survived by his wife. There are probably some of his models still around. He was a prolific builder!

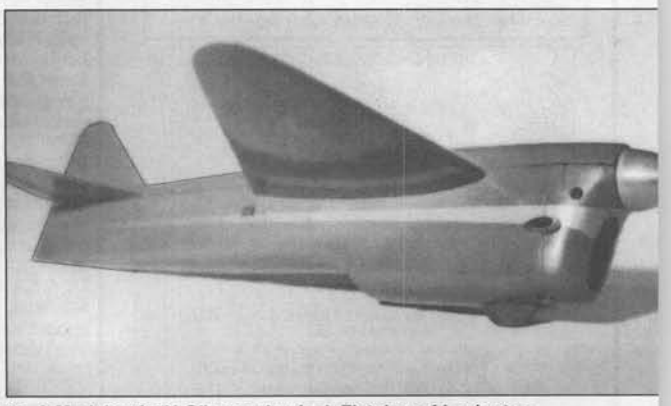
READERS WRITE

Art Grosheider of SAM 1 sends in such clear and colorful photos, we simply can't resist publishing some. This time we feature Photo No. 9 depicting (yes that's the right word!) his latest effort, a Lanzo RC1 covered in green and white silk. Art says he built it from plans from Jim Adams (everyone wants to get into the plans business!). The model has about 20 coats of Sig dope and shows it! The model is powered with an Ohlsson 60 using 77 Products' (Phil Bernhardt) transistorized ignition system. No reports on how the model flies, but most Lanzo models fly well, both free flight and radio control.



11. (Far left) Norm Bell, of Victoria, Australia, with latest, an Anderson Spitfire powered Flying Quaker. Smooth flier! 10. (Left) Tim Bucher seen with a Peerless Co. Corben Super Ace, for the Flightmaster Jumbo Scale Event. Took first!

12. Lennert Flodstrom with his 1938 "Labon" design. Was unbeatable until the geared rubber motors came in style.



13. A Modelcraft "V-G" racer by Jack Fletcher of Lexington, Massachusetts. Smooth speed flier!

We haven't run any photos by Mik Mikkelson of the SCIFS, so Photo No. 10 fills the bill. Seen is Tim Bucher with a Peerless design of the Corben Super Ace. This 54-inch model took first place in Jumbo Scale at the Flightmasters Annual. Note this is a rubber model. This model size is even too large for the new Texaco R/C Flying Scale Event. A Cox Black Widow would have its problems!

AUSTRALIA

Norman Bell, of Melbourne, Victoria, sends in Photo No. 11 showing his latest effort, a Megow Flying Quaker, for the Duration Event held annually at the Australia SAM Champs at Canowindra, New South Wales. Norm reports the model flies like a dream and has an Anderson Spitfire for power. Bill says the Anderson is a lovely engine, handles so well. He runs the engine on a four-to-one gasoline mix.

In addition, Bell has also built two 75% Dallaire Sportsters, one with a Super Cyclone and the other with an Ohlsson Gold Seal. Bell finishes by commiserating about the abominable weather at the Bendigo Nationals. I agree with him when he says it was without a doubt the worst weather encountered for a Nationals. That was a disappointing long trip.

SWEDEN

We are again indebted to Sten Persson of Halmstad, Sweden, for the latest photos taken at the Swedish O.T. Nationals. Between Sten and Sven Olav-Linden, this writer is well supplied with photos and their excellent newsletter, *Old Timer*, which is large enough to be bound. Seen in Photo No. 12 is Lennert Flodstrom, a well known Wakefield flyer, with his 1938 design called the "Labon." This model, used for the 40-inch class is a potent design and dominated its class before the crop of geared models started to appear. Placed third this time!

LATEST SAM CHAMPS INFO

Almost went to press without acknowledging SAM president Jim Adams' announcement of the 50th Anniversary Wakefield to be held at Jean, Nevada, SAM Champs, on Monday, October 7. There will be three classes of Wakefield competition: (1) Designs between 1934 and 1936 (previously known as pre-1937) that must weigh a minimum of four ounces; (2) Designs of models flown from 1937 through 1950 with minimum weight of eight ounces; (3) A new class for models designed and flown from 1928 to 1933 with no weight rules. Rules call for strict adherence to the original plans, with the following deviations being allowed; addition of dethermalizer, and accommodation for winding tube and stooge attachment (What about motor sticks? wcn). Materials should be the same as original, although bamboo tips, sheet wing and stabilizer tips may be replaced by laminated outlines.

Flying: (1) All models must R.O.G.; (2) Six attempts will be allowed to make three official flights; (3) Flights under 20 seconds are attempts; and (4) Max flights are five minutes.

Summarizing, the 50th Anniversary Wakefield competitions are based on pre-WW II rules. Early models had no size or weight restrictions. In 1934, the wing area was set at 200 sq. in. (plus or minus 10) with a four-ounce minimum weight. In 1937, the weight was increased to eight ounces and in 1938, the stabilizer area was limited to 1/3 of the wing area.

Jim points out there could have been a fourth event for 1937 models, but to avoid this the 1937 models will fly in the eight-ounce category. So, register at the SAM Headquarters on Sunday, October 6 at the Nevada Landing Hotel/Casino. Flying starts on Monday at 8 a.m. and closes at 4 p.m. This should be a great meet, with contestants attending from England, Canada, and Australia. Should be real fun!

THE WRAP UP

This writer is often fond of saying, "There is only one thing worse than getting old, and that is being old!" This was never truer than the obit I wrote on Virgil Rice in last month's column. My "steel-trap" memory broke down when I identified Virgil Rice as a member of the V-G racing team.

Received a rather irate phone call from Granger Williams, who is still operating William Bros. Mfg. Co. It appears the "V" of V-G should have been Virgil **Clark**. The VG Racer was a joint product that came out while in the service.

Granger remarks that both of them did the engine reworks while those good looking paint jobs were put on by Virgil. This little correction has led also to a letter from Jack Fletcher, of Massachusetts, who submits Photo No. 13, showing his VG championship Racer. Powered by a Torpedo 29, Jack reports the model flew beautifully, steady as a rock, hitting somewhere in the 90-plus speed.

This all came about when Jack and a group of modelers taking aeronautical engineering at the University of Toronto managed to talk the college officials into providing a small aeroplane workshop on campus. "We had a lot of fun, but at the expense of submitting lab reports late. The Torpedo 29 engines being used had the habit of fouling up the ignition points with oil. We found they had to be blotted and mopped thoroughly after each flight. I often wonder what kind of flights we could have gotten if we had some system of keeping the points clean during flight. The V-G kits came with a big can of blue dope, of a shade I had never seen before, and for that matter, seen since. The shade was sort of a horizon or French blue. Beautiful! We called it the "V-G Blue." It certainly stopped the loss of tools as no one else had this blue to mark their equipment. No other color quite like it!" ***MB***

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CHATTER *Continued from page 34*

thrust to make the flybar want to tilt downward in forward flight. Because the flybar is mechanically linked to the main rotor blades, it will help keep the main rotor tilted forward to reduce the pitchup tendency. My friend Jim Westhoft recently tried it on his new X-Cell 40, and he says it removed any nose-up tendency in high speed forward flight.

• • •

This month's technical topic is model helicopter rotor blade pitching moment. Most RC helicopter blades sold on the market have the mounting and lead-lag pivoting hole drilled at about 33 percent chordwise location from the leading edge. Let me explain why, but first, let's learn some fundamentals about airfoils. There are generally three types of airfoils used on model helicopter main rotor blades: symmetrical, semi-symmetrical, and reflexed. X-Cell and Schluter kits come with symmetrical airfoil blades. GMP, Hirobo, Concept 30, and Kalt kits sold in the US come with semi-symmetrical blades. Miniature Aircraft USA sells wooden blades that have reflexed airfoils.

ADVERTISER'S INDEX

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Fiberglass blades with reflexed airfoils are very popular in Europe, but not in Japan. Most Japanese independent blade manufacturers use semi-symmetrical airfoils. In Europe, Len Mount, Robbe/Schluter, and Sitar make fiberglass blades with reflexed airfoils.

Semi-symmetrical and reflexed airfoils are also called "cambered" airfoils. This is because if we look at these airfoil shapes and draw a line in the center between the top and bottom of the airfoil surfaces, the line looks like a cambered arch. If we draw a center line for the symmetrical airfoil, the line would be straight.

The advantage of using cambered airfoils over symmetrical airfoils is that cambered airfoils can usually produce more lift and less drag. All airfoils develop lift by creating a suction on top of the airfoil and a high pressure underneath the airfoil to push the airfoil upward. If we look at the figure, we can see that the air molecules traveling over the top of the airfoil have a greater distance to cover than the molecules flowing below the airfoil. Thus, in order for all the molecules to reach the trailing edge at the same time, the flow over the top must be faster than below. According to some fluid mechanic guy by the name of Bernoulli, who lived a hundred years ago, the faster the flow is, the lower the local pressure. Hence, the airfoil gets sucked upward.

It should be obvious that symmetrical airfoils cannot produce any lift if the pitch angle is at zero degrees. However, a cambered airfoil can produce lift at zero degrees. This is because the center line of a cambered airfoil is arched, so the flow over the top is faster. Most of the RC pattern planes have symmetrical airfoils, and their wing is mounted at zero incidence relative to the fuselage. Then how can they generate lift? Simple . . . when a pattern plane flies through the air, the entire airplane is actually flying through the air with about one degree nose-up attitude. As the airplane's flying speed is reduced, the nose-up attitude must be increased to generate the same amount of lift to keep the plane in the air.

When the nose-up attitude exceeds 12 to 15 degrees, then the air molecules can no longer flow over the top of the wing and follow the contour of the airfoil. We call this a "stall." And, the plane will suddenly fall out of the sky. It will recover when sufficient air speed is regained. Similarly, on RC helicopters, the blades are stalled when too much collective pitch is used on the top end. When an airfoil stalls, the lift generating ability drops tremendously, and lots of drag is produced. As a result, the blade speed slows down, and the engine gets sluggish.

The advantage of cambered airfoils is that they produce slightly more lift before they stall. But the drawback is that they produce a pitching moment that wants to twist the airfoil nose downward. Symmetrical airfoils do not produce any pitching moment. They have the center of lift produced exactly at the 25 percent chord location. Hence, for symmetrical blades the blade mounting hole should be drilled at the 25 percent location. Semi-symmetrical airfoils also produce lift at the 25 percent chord location, but there is also a nose-down pitching moment.

Thus, for semi-symmetrical blades, if the mounting hole is drilled at about 30 to 35 percent chordwise location, then the lift produced at the 25 percent location can be effectively used also as a leverage to cancel the aerodynamic nosedown pitching moment. Hence, only semi-symmetrical blades should have the mounting hole drilled at the 30 to 35 percent chordwise location. However, the total pitching moment will only be zero at certain lift conditions because the aerodynamic nose-down pitching moment is fairly constant, but the lift increases at higher pitch angle. Therefore, 33 percent is selected because it gives about zero total pitching moment at the mounting point when the pitch angle is around five degrees.

Schluter helicopters always use a 16 percent thick symmetrical airfoil, therefore, their blade mounting hole is drilled at the 25 percent location. Most semi-symmetrical airfoil blades on the market have the hole drilled at 30 to 33 percent location.

Ideally, we want to minimize the moment transmitted from the blade to the pitch arm because that would add loading to the pushrod, mixing arm, swashplate, bellcrank,

and finally to the servo. For full-size helicopters without any hydraulic control boosts (most small passenger helicopters), the blade pitching moment would be transmitted directly to the pilot's joystick. This is why around 25 percent.

Another blade property that is very important is the chordwise location of the blade's center of gravity. Ideally, we would like the CG at the 25 percent location. Hence, the be used for the rear half of the blade and lead weight must also be added very close to the leading edge. This is pretty good for wood blades. Gary Frank built a set of JRC blades (probably the best wooden blades available)

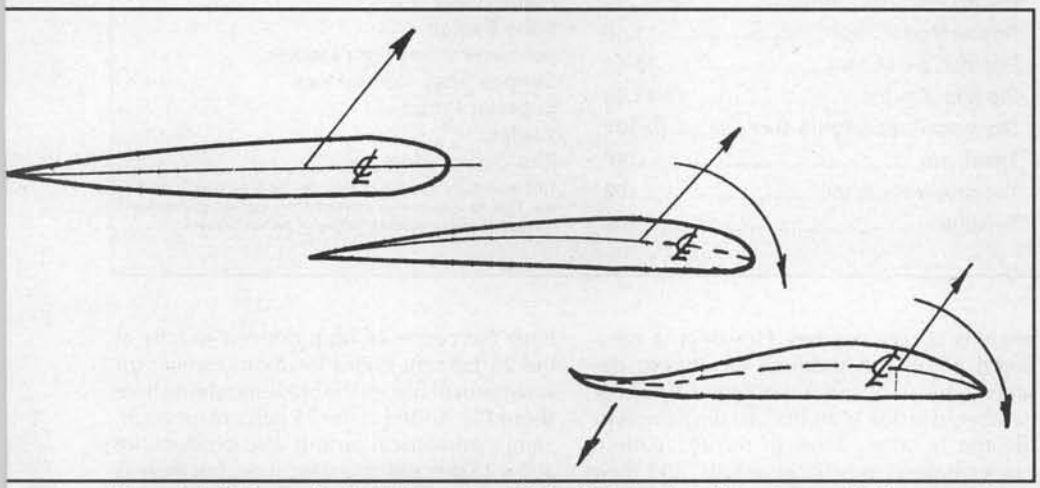

Figure 4. Left: Symmetrical airfoil's center of lift is at 1/4 chord, and there is zero pitching moment. Middle: Center of lift of semi-symmetrical airfoil is about 1/4 chord, but a nose-down pitch moment is also created. Right: Reflexed airfoil's center of lift is at 1/4 chord. The total pitching moment is also zero because the nose-down pitching moment is cancelled by the downward load at the trailing edge.

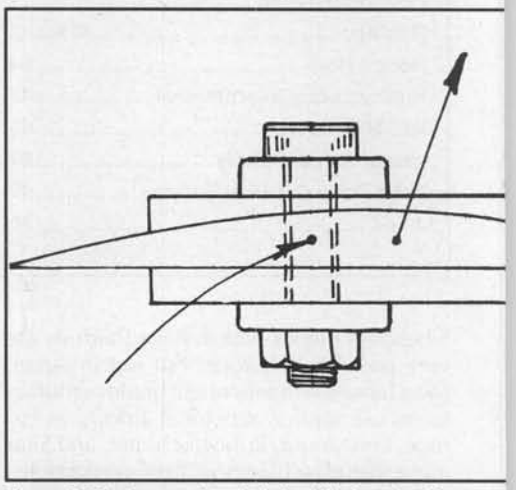

Figure 5. Blade mounting hole is drilled at the 33 percent chordwise location to make the "total" pitching moment about the feathering axis zero by using the lift as a reverse leverage.

reflexed airfoils have been developed for use on full-size and model helicopters.

Reflexed airfoils are modified semi-symmetrical airfoils that have the trailing edge bent upward, which produces a slight downward force at this trailing edge. The result is to counteract the nosedown pitching moment from the camber effect. The result is a blade with lift and almost zero pitching moment at the 25 percent location, while retaining the benefit of high lift-to-drag ratio, and high stall angle behavior associated with semi-symmetrical airfoils. With a properly designed reflexed airfoil blade, there is no need to drill the mounting hole at the 33 percent region, instead it can be drilled at the 25 percent point. Remember, it is nicer to have the mounting hole drilled at the 25 percent point because that is where the lifting force is produced. Furthermore, when the blades flap up and down, the elastic axis (where the blades flex up and down without distortion) is also right aerodynamic lift, blade mounting point and feathering axis (the axis that the blade rotates about to change pitch angle), the structural elastic axis, and CG (where the inertia force acts) will all occur at the same point. This minimizes blade flutter and woofing problems. Some of the recent blade designs, such as Hi-Product and other expensive fiberglass blades from Japan, have achieved the above combination. The stock foam blades on Concept 30 also have an excellent combination. These foam blades have the CG at 27 percent, a good symmetrical airfoil for high lift-to-drag, and the elastic axis very close to 25 percent. The worst type of blades are the ones that use a single piece of hardwood for the entire blade. These blades have the chordwise CG almost as far back as 40 percent. These one-piece wood blades usually cause tracking problems, too.

In order to have any wood rotor blade with chordwise CG located near the 25 percent point, light weight balsawood must and added 60 grams of lead near the leading edge. This brought the chordwise CG close to 25 percent, which not only reduces blade flutter, but also has the special ability to stabilize the entire helicopter! When the blades flap due to tilting of the main rotor disk, the inertia force acting at the blade CG to oppose flapping can twist the blade to produce a feedback effect to stabilize the helicopter. The effect is similar to having an extra set of flybars.

We have flown Gary's X-Cell 60 with the torsionally soft and forward CG JRC blades. The model was very stable; so stable that we can feel the roll rate was reduced quite a bit. This changed his model from a hot-dogging machine to an over-soft FAI machine. The cyclic became so mellow that we are unused to it. By the way, the particular JRC blade that Gary used also has four degrees of twist (called washout) to reduce the induced drag. How twist reduces drag was explained last month. ***MB***

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RC SOARING *Continued from page 14*

the turnout is likely to be quite good. If you would like to attend, please call Jeff Raskin at (415) 359-8588 for directions. Pacifica, California is located south of San Francisco, on California State Highway 1.

OHIO CONTEST ACTIVITIES

Regular readers may recall a few issues back a photo and description of a winch and retriever permanently mounted and forever properly aligned on the rear of a small car trailer's frame. Well, the ingeneous and injured-back-owner, Brian Smith, of Berton, Ohio, sends word of a regional contest held in May by the Cincinnati Soaring Society, "a real bunch of honest fun guys who run a good contest." Bob recommends that anyone who has the opportunity should try to make it to one of the contests hosted by this club.

The contest on this particular day attracted fliers from five states: Ohio (naturally), Missouri, Indiana, Michigan, and Kentucky. The task was Triathlon with 100-foot measured landing tape. Lift consisted of short cycles of light lift throughout the day. Winners were Brian Smith (the same) flying a Sagitta 900 in the Standard Class (100 inches or less wingspan), and Doug Bruce flying a Bob Sealy Laser in the Unlimited Class (over 100 inches wingspan).

In addition to the contest report, Brian sends word of his scratch-building project based on rib templates which this author supplied via Foiled Again software for a two-meter sailplane Brian calls the "12 Gauge." (Named for its ability to shoot down the competition, he claims with a tongue-in-cheek "ha-ha").

The 12 Gauge features the very popular Michael Selig airfoil called the S3012 which was a computer-spin-off improvement of the previously "supreme" Eppler 205. The 78-inch wing has a root chord of ten inches, and an area of 730 square inches. The sailplane's wing loading works out to eight ounces per square foot empty, and ten ounces ballasted. At present, Brian is changing the stabs and stab airfoils, but all-in-all he claims he's very "impressed" with its performance.

SOARING STUFF TEMPLATES

Those wishing to scratch build sailplanes using the latest "hot shot" airfoils but lacking access to a personal computer are in luck. Ex-MB columnist, long time friend, fellow sailplaner, and one-time neighbor, Taylor Collins, sends word (and a free preliminary copy) of his latest commercial model soaring effort, "Airfoils to Go." This is a compilation (he calls it a compendium) of ready-to-use airfoil templates for RC gliders of all kinds.

Featured are many of the most popular airfoils: 21 Eppler, 4 Gottingen, 3 NACA, 8 Quabeck (HQ), 9 Selig, and 3 miscellaneous (Bame MB303515, Girsberger RG15, Clark-Y). Each airfoil is drawn by what appears to be a laser printer or line plotter of some kind (better than dot matrix) and is given in 11 different chord lengths from about 4.5 to 13 inches. These can be photo-copied and/or photo-reduced in an infinite variety of ways to produce any wing taper or planform you can dream up.

Taylor writes to say he'll send a finished book to anyone who'll send him a mere $19.95 (this includes shipping and handling). This seems a more reasonable approach than buying a computer and dot matrix printer, but you decide. The address is Soaring Stuff, 9140 Guadalupe Trail NW, Albuquerque, NM 87114; telephone (505) 898-1129.

SYMPOSIUM PROCEEDINGS

Prof. Alan Scidmore, of Madison, Wisconsin, this past February sent me a sample copy of the 1989 National Sailplane Symposium proceedings, and that delay along with my own, plus the publishing delay means you may already know about the newest release of "Paths of Future Flight 1989," but what the heck.

This technical journal is loaded with interesting info, such discussions as Larry Jolly's "Designing to Win," Walter Panknin's "Fling Rainbows" (flying wing design), Selig-Donovan-Fraser's "Princeton Airfoil Tests" (Al says it's a perfect companion work to "Soartech #8"), Bob Steele and "Whither Soaring," Tim Renaud on the future of computer radios and radios in general, Ed Eloranta's "Sailplane Meteorology" or (what is a thermal and how is it made), and more.

If this interests you, and it probably does, send $12.00 (3rd class mail) or $13.50 (1st class mail) to Walt Seaborg, 1517 Forest Glen Rd., Oregon, WI 53575. Copies of past proceedings 1983-1988 are also available.

NORTHEAST SAILPLANE CATALOG

Without question, the Northeast Sailplane Products catalog is the best source of information about sailplane kits in the USA and parts of Europe. This little Vermont company won't be little for long among glider guiders looking for those rare kits that no hobby shop ever seems to stock for one reason or another. The service provided by owners Sal DeFrancesco and Stan Eames is invaluable!

This book is over 100 pages in length and is not only the most complete sailplaner's catalog in existence, but also a very handy work of how-to tips for the intermediate to advanced kit builder. Kits are organized by class (slope, hand launch, two-meter, 100-inch, unlimited, cross country, and scale), and each kit is described in great detail. The NSP catalog even lists radios and accessories!

I don't like to endorse mail order company catalogs because of the possibility of being unfair to any competitors, but in this case, NSP is in a class all by itself, and its catalog is proof. If you are an avid glider guider, you need this catalog if only to use it as a reference work or soaring encyclopedia.

So, having made such an outspoken statement, you will on my advice send $5.00 to Northeast Sailplane Products, 16 Kirby Lane, Williston, VT 05495, or call Sal or Stan at 802-658-9482. You won't be disappointed! ***MB***

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