49115 SEPTEMBER 1979 $2.25

RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

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You've got the desire to be a Champion.

Dreams of conquering the skies are what makes a winning pattern flier. But even the best contest competitors know that you've also got to have the right equipment. Futaba's J-series radio control systems are just that. Pure, state-of-the-art electronics with high-performance features like full programming capability, dual mixing circuitry, roll and snap roll control buttons and servo reverse switching. And serious fliers can also appreciate our water and dust proof, dual ball bearing S121 servos, modular RF boards and direct servo control.

The J-series Futabas are available in 4, 5, 6 and 8 channel systems, plus a 5 channel Helicopter system. Write now for complete technical data, because the sky's not the limit any more.

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Behind the 8JN's back panel are 20 programming control settings, including 2 dual rates and 3 non-linearity functions.

We've got your radio.

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VOLUME 16 NUMBER 9 ISSN 0033-6866 SEPTEMBER 1979

R/C MODELER

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This month's cover features Miss Debra Holland displaying Ric Selber's Dirty Birdy with a modified tail. The superb rainbow paint scheme was achieved using K & B Super Poxy applied with Paasche airbrush. All lettering was done with rub-on type. Ektachrome transparency by photographer, Jack Freed.

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From the Shop

DON DEWEY

Every magazine seems to have a Shangri La! Dick Kidd, Eloy Marez, and Dick Tichenor were testing aircraft, radios, engines, etc., at RCM's secret place on this particular day.

Jerry Burpee was awarded the RCM sponsored Best of Show Trophy at the Dallas Show with his completely detailed Piper J3 Cub built from Sid Morgan plans. The J3 has many functional details, is powered by a Fox 78, and has enjoyed many realistic flights.

Everyone probably has those slightly frustrating moments when you wonder if you are losing control. Our resident editorial staff, specifically, Dick Kidd, Eloy Marez, and Dick Tichenor, are each long time modelers (over a total of one hundred years of modeling among them) and they also have a respectable cumulative time in the model publication business. These attributes seem to make them pretty slippery, if not downright sneaky.

All of the above leads into their periodic announcement that they have to go flying. A variety of reasons as to why they must test new designs, take photos, try out radios and engines, are offered as convincing justification. After each of those flying sessions it is a bit difficult to evaluate the results as the description is always intermingled with giggles and innuendos. Often one might wonder if these guys are goofing off and getting paid for their fun type flying session but somehow they manage to put together material for print that makes it all worthwhile. Just the same, there are times when I feel that I've been had, especially when they are evasive and secretive about where they go to fly.

★

Our Executive Editor, Patricia Crews, and Dick Tichenor rode the big iron bird to Dallas for The Southwest Modelers Show. The bottom line of their report advised that it was the most enjoyable show that they have ever attended. As this year was the Third Annual Dallas show, they are still suffering a few growing pains. We will go on record as predicting that co-directors Mike Clark and Chuck Holden have laid the ground work for a very successful show and RCM will definitely be among the exhibitors in 1980.

Quite a few of our long time friends were seen at Dallas and it was nice to see Zel Ritchie who has been away from the R/C scene for several years. Besides being a pattern champion and a member of the U.S. Internats team, Zel was probably most famous for being the driving force behind the Space Control R/C system. Also known as the "gold brick," Space Control was the first commercially available proportional control system.

Another pioneer R/C friend at Dallas was Ted White. Ted has to be one of the world's greatest R/C barnstorming type pilots. Ted is now in business of performing limited and/or full, repair service to all brands of radios. This is especially beneficial to owners of some brands that are no longer in production. Contact Ted White R/C Repair, 1109 Greendale, Bedford, Texas 76021 (Phone 817/283-5649).

★

We regret to announce the passing of Russ Barerra. Russ died of cancer in May 1979. Russ was a dedicated modeler with deep ambition to promote and preserve model aviation. His involvement in clubs, contests, and modeling activities were numerous and generally unpublicized which was the way he wanted it to be. In his interest of preserving model aviation history, he created a model museum. Support and memorabilia were provided by such notables as John Brodbeck, Carl Goldberg, John Pond, Larry and Granger Williams, and many, many others. In 1978 Russ moved his family to Morgan Hill, California, and constructed a building on his property to house the museum. Plans are being made to perpetuate the museum and the memory of Russ. We will miss him.

★

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Would you believe an R/C watermellon by Mike Clark and Chuck Holden, Co Directors of the Southwest Modeler's Show at Dallas? They promise a unique Texas watermellon barbeque for the 1980 show.

NEW!

Hobby Lobby's 1/4 Scale GRUMMAN TIGER A~R~F

(Almost-Ready-To-Fly)

$189.00

INTRODUCTORY PRICE

Our **Grumman Tiger** is the most **beautiful 1/4 scale "kit"** you'll ever own! But, it is so **completely pre-fabricated** that it's hard to call it a kit!

The full scale Grumman Tiger is a great performing and **sensationally good-looking 4 passenger, fixed gear airplane. (You don't need retract landing gears to make this kit exact scale!)** The full scale Tiger is a **hot rod** that cruises at 160 mph with a 180 hp engine.

Our **Almost-ready-to-fly** kit of the Tiger has a **93" wing span** and **1209 sq. inch wing area.** The wing is foam core construction and comes **fully sheeted with balsa tip blocks in place.** The plywood landing gear supports are installed. The ailerons and scale flaps come **fully sheeted with balsa.**

The model is **56" long** and stands **2 feet tall.** The fuselage is specially molded with **fiberglass reinforcement throughout.** The firewall and bulkheads are **already installed.** The firewall is designed to take the **Evra 190** engine with our **Shock-absorbing engine mount.** The cowling is specially designed to assist in easy **line-up** of the engine and engine mount.

The stab and fin are foam cores that come **fully sheeted with balsa.** The rudder and elevator are machine-cut balsa.

The main landing gear is fully shaped dural aluminum for strength and **exact scale appearance.** Included are molded scale wheel pants, steerable nose gear, hinges, fiberglass for wing joint, and control horns.

The **giant transparent canopy is 1/16 inch thick!** It is rigid like the full scale canopy.

To top it all off, the kit even includes a **factory brochure** from Grumman Aviation showing the color options of the full scale airplane. And, a full color photo that's suitable for framing is also included. Grumman figures that you might be a good prospect for their full scale Tiger.

Since the Tiger is so close to being **ready-to-fly,** you can fly it very quickly after you receive the kit. Please call or write us and order your Tiger **NOW!**

To order by phone — call (615) 373-1444 for COD or Credit Card shipment ($3.60 shipping charge will be added to $189.00 price). To order by mail — send check for $189.00 plus $1.90 for shipping (total $190.90).

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20 feet nylon tubing
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20 threaded wood blocks
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Bridi RCM TRAINER 40
List price $54.95
54" span for 4 channels, .35-.49 engine.
ADVANCED TRAINER.
SUMMER SALE! $35.99

Lanier JESTER C
List price $73.50
63" span, for 4 channels and .60 engine. HAS WON EXPERT CLASS PATTERN CONTESTS! Almost-ready-to-fly!
SUMMER SALE! $44.00

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List price $32.95
ALL FOAM—ASSEMBLED!
Flies best with a .15 and 3 channels.
SUMMER SALE! $21.99

Sig PIPER J-3
List price $44.95
SCALE KIT. Big 71" span for .19 to .35 engine. 4 channels.
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List price $23.95
72" span 2 channel glider. VERY EASY TO BUILD! Just $16 will buy the accessories to get it ready to fly!
SUMMER SALE! $14.99

Bud Nosen AERONCA CHAMP
List price $99.95
9 FOOT SPAN!
SUMMER SALE! $69.99

Sig KOUGAR
List price $47.50
SHARP LOOKING 4 CHANNEL plane. 51" span for .35-.50 engine.
SUMMER SALE! $36.99

Lanier TRANSIT A-R-F
List price $46.50
3 channel BASIC TRAINER. 65" span for .35-45 engines.
ALMOST READY TO FLY!
SUMMER SALE! $28.99

SUMMER SALE! BEGINNERS! (and CONVENIENCE-MINDED pros!)

SENSATIONAL PRICES ON KITS! PHONE YOUR ORDER IN QUICKLY!

Prices in effect only to Sept. 29, 1979. COD or CREDIT CARDS only!

When you phone for your kit, order the *KIT ACCESSORY PACK*. We've figured out every hardware and covering item that's needed for each kit in this ad. Our *ACCESSORY PACKS* contain everything you need to complete the plane except for engine, radio and tools. Cost? Usually less than the kit.

Sureflite PIPER J-3
List $39.95
SUMMER SALE! $24.99
For .15-.19 engine, 52" span, 2 to 4 channels, 2 hour assembly.

Lanier COMET II
List price $62.50
63" span ADVANCED TRAINER. For 4 channels and .50-.61 engine. Almost ready to fly!
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M.E.N. TRAINER
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Super stable beginner's plane!
SUMMER SALE! $23.99

Sig KADET
List price $39.95
GREAT TRAINER. For 3 channels, .19 to .30 engine. 57" span.
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Sureflite CESSNA SKYLANE 182 FOAM A-R-F
List $39.95
SUMMER SALE! $24.99
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Lanier CESSNA
List price $48.50
48" span. GOOD BEGINNER'S PLANE. For 3 channels, .19 engine. Almost ready to fly!
SUMMER SALE! $29.99

Midwest SUPER CHIPMUNK List $33.95
ALL-FOAM, ASSEMBLED!
46" span for 3 channels and .10 to .19 engine.
SUMMER SALE! $21.99

Sig COLT
List price $22.95
45" span FOAM WING. 3 channel trainer. For .09 to .15 engine.
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Top Flite HEADMASTER
List price $28.95
48" span for .19-.35 engines, 3 channels. Good TRAINER—EASY TO BUILD!
The kit box doubles as a fuselage jig!
SUMMER SALE! $17.99

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SUMMER SALE! *Hot summer prices on DREMEL tools!*

DREMEL MODEL 572 DELUXE MOTO SHOP WITH ACCESSORY KIT..... $59.97
List price $94.95

5 tools in one: (1) Jig Saw, (2) Disc Sander, (3) Buffing Wheel, (4) Bench Grinder, (5) Flexible Shaft tool for drilling, carving and routing.
BEST PRICE WE'VE EVER OFFERED ON THE DREMEL MOTO SHOP!

SUMMER SALE!

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FIELD BOX
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List price $29.95

Spend your time building airplanes, not a field box — this is fully assembled.

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TRIM SEAL IRON ..... INTRODUCTORY PRICE $11.88
List price $14.95

2 small tips for sealing plastic covering materials and striping tape to fillets, inside engine compartments, corners.

SUMMER SALE! *Hot summer prices on DREMEL tools!*

DREMEL MODEL 381 VARIABLE SPEED MOTO TOOL SET..... $44.97
List price $72.95

Complete kit with cutting, carving, routing accessories. Speed variable from 5000 to 25000 RPM.
BEST PRICE WE'VE EVER OFFERED ON THIS DREMEL MOTO TOOL!

615 373~1444

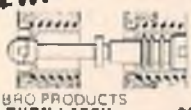
Hobby Lobby gives you the best phone and mail-order service in the RC hobby!

Since we opened in 1964 Hobby Lobby has had a reputation for giving reliable and customer-oriented service. During the past several months we have radically improved our service. We have added highly trained phone salespersons, more phone lines, customer service specialists and an on-line computer system.

Here's what our improvements mean to you:

1. We actually fill your order while you are phoning it in to us!
2. We are rarely out of stock on an item we intend to carry!
3. If we are out of stock we can tell you while you are on the phone—just ask!
4. When you order an RC kit, we can tell you exactly what accessories you'll need for it while you are on the phone!
5. We won't waste your time while you're dialing our number—we have plenty of phone lines!
6. We won't waste your time when you reach us on the phone—we have plenty of sales people!
7. Your questions about your orders, (delivery, back orders) can be answered instantly on the phone!

NEW!



DUBRO PRODUCTS
1/4 TURN LATCH $2.50
for 2-set package

NEW!

DUBRO PRODUCTS
NYLON WING BOLTS
1/4-20 ..... $1.00
for 4 bolt package

SUMMER SALE! DEVCON 9 OZ. SIZE

Giant Size
5 Minute EPOXY
$3.77
List $6.95

SUMMER SALE!

SONICTRONICS ELECTRIC FUEL PUMP

12 Volt Electric $9.99
List price $15.95

NEW!

TATONE
MUFFLER FOR K&B .40 Engine $12.95
K&B doesn't make a muffler for their .40, but Mr. Tatone does!

Would you believe a 61% Discount?!

LAST CHANCE!
$39.00
PEANUT BUGGY
Peerless-Kyosho List price $100.00

An RC dune buggy for .09-.10 engines. This 12½" long car has some very clever features—belt drive and reversing transmission, cooling fan for the engine and built-in pull starter. All necessary parts are included except engine and radio. Needs 2 channel RC. We have 40 to sell at this ridiculous price. Please phone your order in or you're apt to miss out on this.

SUMMER SALE! HOBBY LOBBY

SENIOR TELEMASTER — and — FOX EAGLE 60 RC
with PERRY CARB!

$133.00
Total list price value $182.40

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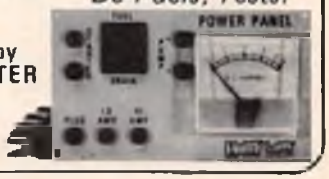
Hobby Lobby POWER CENTER
LOW PRICE!
$15.44



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(See Hobby Lobby CANADA Ad elsewhere in this magazine)

Revolutionary!

from Switzerland

High Pitch

Low Pitch

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Schneider VARIPROP

(In-Flight Variable Pitch Propeller)

$124.50

List Price $149.95

If you thought that digital proportional was the biggest break-through in RC airplane performance **you may change your mind** when you fly the **Schneider Variprop!**

The phenomenal performance of an **in-flight variable and reversible pitch propeller** is now available for RC model airplanes. On a model airplane the effects of a variable pitch prop are much more dramatic than on a full scale plane. For example, in aerobatics you can go to a low pitch and high RPM for vertical maneuvers such as loops where you want a constant airspeed through the maneuver. And, on an 8-point roll when you throttle into full power and **high pitch** during the Split-S entry to the roll you can achieve the **extremely high speed** the maneuver requires. Final approach to landing can be flown at a very slow airspeed even with a fast-idling engine when the Variprop is nearly **zero pitch.** And the landing roll can be shortened almost to nothing when reverse pitch is applied.

In a full scale airplane you wouldn't risk going into **reverse pitch in the air,** but a model airplane can perform some **incredible maneuvers** in the air using reverse pitch! The **Schneider Variprop** is 11" diameter. The spinner is 2" diameter. The nylon blades with embedded steel shanks are replaceable and are held in place to resist over 1100 lbs. of centripetal force. The servo force required to operate the pitch change mechanism is about 4 pounds – standard servo thrust.

Ball bearing collector ring and Bronze insert to fit prop shaft.

Replaceable prop blade with steel shank. Hardened steel bolt holds prop in place.

Collector ring pulled back to show pitch change cam follower.

Inside hub: Roller bearing withstands outward thrust of cam follower in which prop is locked.

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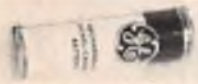
SUMMER SALE! **SAVE 66%**
(Limited Quantity — 120 to sell)

PILOT
KNEE-ACTION STEERABLE SCALE NOSE GEAR $1.99
Regular price $5.95

SUMMER SALE! *Clean engine parts quickly!*
SONAC CLEANER $22.00
Regular price $24.95

SONAC vibrates at a low frequency. It uses R&S Engine Cleaning Solution as the cleaner (odorless, water soluble and not harmful to plastic parts). 30 minutes cleaning will usually clean the dirtiest parts.

SUMMER SALE!
G.E. Nickel-Cadmium Batteries
1.2 volt 500 mah, Pencell size
4 for $7.88
Regular $3.20 each



This is the high quality G.E. cell that's original equipment in the best radio outfits. Cells have solder tabs.

BALANCE ANYTHING!

High Point BALANCER $23.95

Would you ever believe it's possible to balance not only a prop, but also the prop NUT? Don't laugh—this thing'll do just that. It'll also balance **spinners, flywheels, boat props—anything** that's got a 1/8" to 3/8" hole in it. Beautifully made.

BULK BALSA WOOD

There are three things wrong with this wood: It still has the sawdust on it; it's a little longer than 36"; it doesn't have anyone's name stamped on it.

20—1/16x3x36	***$9.95***
20—1/16x4x36	***$15.95***
20-3/32x3x36	***$17.95***
15-3/32x4x36	***$13.95***
10-1/8x4x36	***$10.95***
10-3/16x4x36	***$12.95***
10-1/4x3x36	***$9.95***

SUMMER SALE!
SULLIVAN
12 Volt ELECTRIC STARTER
$23.88
List price $38.95

Order quickly—you don't have to shop around for a better starter (there isn't one), nor for a lower price.

NEW!
SIG MFG. CO.
INTRODUCTORY PRICE
BEECHCRAFT BONANZA $59.88
List price $69.95

64" span, 652 sq. inch wing area, for .60 engines. Hybrid construction; balsa box fuselage with ABS plastic cabin, foam wing cores.
AT LAST—SOME ONE MADE A KIT OF THE BONANZA! And better yet, Sig made it a scale model of Glen Sig's aerobatic E 33A Bonanza.

NEW! *ACCESSORIES FOR EVRA 190!*
RUAL ENGINEERING CO.

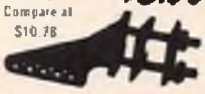
Rual PROP ADAPTER $12.95
Extends 1/2" farther than regular Evra shaft. Has 6 bolts for prop.

Rual DRILL JIG FOR PROP ADAPTER $8.95

For accurate drilling of the prop when using the Rual Prop Adapter.

Rual EVRA MANIFOLD $24.95
Two Flex ducts thread into the machined manifold. Permits easy ducting of exhaust from cowlings. Also gives some muffling.

BULK PACKAGE
Deluxe Control Horns
22 Complete Deluxe Horns
11 Small
11 Large
Compare at $10.78
only ***$3.99***



The nylon threaded studs are integral parts of the horn. This design is much more likely to **stay attached** to the control surface than the conventional type with metal screws. The large horns are **side braced** to resist bending. The large horns even include a **shim wedge** for tilting the base. These horns are much easier to line up during installation than the types that are attached by metal screws.

R&S HOBBY PRODUCTS
SKYGLASS FIBERGLASS & FOAM AIRPLANE KITS
We don't know of a cheaper way for you to outfit yourself with a high performance fiberglass RC plane.

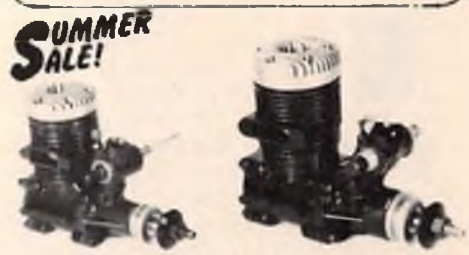
F-16A Deluxe	$129.95	$94.00	Phoenix 6 - 60	$ 65.00	$47.45
MIG 21 Deluxe	$129.95	$94.00	Nutcracker 60	$ 65.00	$47.45
F-5 Deluxe	$129.95	$94.00	Banshee 60	$ 65.00	$47.45
Corsair 60	$ 69.95	$52.00	P 47 60	$ 65.00	$47.45
E-Z Does It Trainer	$ 69.95	$52.00	Troublemaker 60	$ 65.00	$47.45
Bearcat 60	$ 65.00	$47.45	.40 Size Kits		
Sun Fli 4 - 60	$ 65.00	$47.45	A-6 Intruder 40	$ 55.00	$43.00
Kwik Fli 3 - 60	$ 65.00	$47.45	Cutlass 40	$ 55.00	$43.00
Kwik Fli 4 - 60	$ 65.00	$47.45	Phoenix 5 - 40	$ 55.00	$43.00
Cutlass Supreme 60	$ 65.00	$47.45	ME-109 40	$ 55.00	$43.00
Phoenix 5 - 60	$ 65.00	$47.45	Jap Zero 40	$ 55.00	$43.00
Vertigo II	$ 65.00	$47.45			

NEW! *Scale Instruments for 1/4 Scale!*

Hobby Lobby 1/4 Scale Cockpit Instruments
$9.95

20 Absolutely scale reproductions of full size aircraft instruments. Faces are printed in 4 colors, are die cut, and are on pressure adhesive flat black stock. Instrument housings are accurately molded scale reproductions. And there are clear plastic faces that snap into each housing. A superb product from West Germany.

SUMMER SALE!



HP 40 F-RC "GOLD CUP"
List price $126.95
$83.00

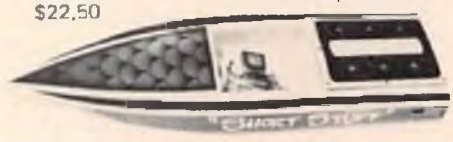
HP 61 F-RC "GOLD CUP"
List price $184.95
$117.00

Spectacular German engines. Black "Thermek" finish to reduce operating temperature. The carburetors are among the best ever put on a model airplane engine.

SUMMER SALE! *MILLER PAINT SPRAYER*
List price $81.95 **$45.88**

Includes 110v A.C. piston type compressor, spray gun, shading brush, and hose. Fine for spraying dope, epoxies.

SUMMER SALE! DUMAS
DEEP VEE 10 FIBERGLASS BOAT KIT
List price $22.50
1/2 PRICE! **$11.22**



Here's a cheap and easy way to try RC boating. Uses .049 to .09 engines.

Order one of the following Running Hardware Kits with it:

DUM 209	Running Hardware for Cox .049	$10.50
—or—		
DUM 226	Running Hardware for OS 10	$16.75
—or—		
DUM 227	Running Hardware for Enya .09	$16.75

NEW!
TOP FLITE MODELS
CONTENDER 40
$39.97
List price $49.95

Bent or straight wing! All balsa kit with 47" span for .40 engine and 4 channels.

HOBBY LOBBY INTERNATIONAL

Rt. 3, Franklin Pike Circle, Brentwood, TN 37027 • (615) 373-1444

Sunday Flier

KEN WILLARD

Ed Fitzwater, Editor of the DC/RC Newsletter, is a Sunday Flier. As we all do at one time or another, Fitz thinks about his participation in the sport/hobby of radio controlled aircraft, and what it means to him. In the May issue of the DC/RC paper, Fitz decided to "let it all hang out." The result, in my opinion, is one of the best editorials on why we fly R/C that I have ever read.

So, this month Fitz is my guest editor for part of this column. Here's his editorial column, from the DC/RC Newsletter.

Where did you start? Can you remember your first contact with aviation? I took my first flight in my mother's arms in my dad's old elephant ear Travel Air bipe. I don't remember the ride – only old, dusty logs tell the tale.

I remember playing in a backyard somewhere, watching the planes fly over. I can still remember thinking that they were held up by magic. Sometimes I still feel that way! It's a long road, full of learning and growing that leads from models to full scale and back to models again. Every now and again, a friend will ask why I spend so much time on models and so little on full scale flying. That's a hard question to answer.

I'm sure that you have watched at an airshow and enjoyed the beauty of aerobatics or just enjoyed watching a favorite warbird or bipe fly by. I have too! From the pilot's point of view things are a little bit different – while there is great satisfaction in doing good aerobatics, it's not the same picture as if you are standing outside watching. It's also hard work in the cockpit. After an aerobatic session, I always felt like I had been in combat – tired and happy to be done . . . but tired!

Another problem of full scale aviation is money. Let's face it, buying a Pitts or a Warbird will cost you your oldest son and maybe your wife too! Not to mention the cost of upkeep and overhauls, fuel and storage! Tough words, yes, but I have found an "out." With my R/C flying, I have many advantages; not only can I watch the "big picture" of an aerobatic flight, but I'm also the pilot, and that plane will fly as well as my skills as a pilot will allow. As to the cost. You may wonder why I made so little noise when I paid for my new ducted fan engine. You know, Perry pump, carb., ABC, pipe, the works . . . stiff price huh? First chance you get, call and get a price on an overhaul for a P-51 prop. Not the plane . . . just the prop. Tell the man that we're not trying to buy one, just an overhaul! You'll have to sell both new cars to pay the tab!

Okay, so I get to fly and watch myself at the same time and it's also within my financial reach, but there's more . . . I've flown a lot of aerobatics in a lot of full scale planes, both props and jets, and yet if I had double the flight time, I would never fly low level aerobatics. You need more skill and much better reflexes than I have ever had. If you make a mistake . . . you go home in a bag . . . With R/C, I can make my inverted passes down the runway and if I do mix up my controls I just pick up the parts (how nice – in its own MonoKote bag!) take them home and rebuild. Beats a trip to the hospital every time!

I saved the best advantage of R/C flying until last – versatility! One or two guys in the world can own any and all the full scale planes that they want. You can't and I can't, and that's that! In most cases, the man who owns his own P-51 or whatever, flies only it and then not as much as he would like. With my R/C planes, I fly my P-51, my gliders, my bipes and any other planes that I want to. I guess that it's all a fantasy trip to me! Now, with the advent of top notch radio gear and planes that fly much like the prototype, I have the best of both worlds of flying. Anyone who has ever had Walter Mitty dreams at an airshow should look into R/C flying. There's something here for everyone. As far as I'm concerned, R/C flying allows me to have my cake and eat it too!

Why do I fly R/C models so much more than full scale planes . . . I guess that about sums it up.

I think that R/C flying has become the greatest hobby in the world for the person who wants to fly.

Of course, there probably are more Sunday fliers who don't fly full scale than those who do --- but we all have an interest in full scale, and perhaps if the cost were a bit less, we'd be doing it too. Meanwhile, as Fitz says, R/C lets you have your cake and eat it too

As Editor of the DC/RC Newsletter, Fitz also has the responsibility to select the right items from contributors. He also has to beat on the members to get them to contribute, just like all the rest of you club newsletter editors. I thought the contribution by Paul Howard, "Glossary for DC/RC Helicopter Pilots" was much too good to be kept from you enthusiasts who aren't lucky enough to get the DC/RC paper, so here it is:

GLOSSARY FOR DC/RC HELICOPTER PILOTS

(This glossary is not alphabetized because anyone who would try to fly a helicopter couldn't possibly understand the alphabet.)

PILOT: *A person capable of sending three simultaneous control inputs to a flying machine.*

HELICOPTER: *A flying machine requiring* ***four*** *simultaneous control inputs.*

CRASH: *Result of mixing Pilot/Helicopter.*

HOVER: *To remain motionless while suspended over a fixed point --- often seen at hangings, but seldom at DC/RC fields.*

COLLECTIVE PITCH: *Request from United Givers Fund, Red Cross, etc.*

CYCLIC PITCH: *Monthly plea to wife for money for new blades, gears, etc.*

TAIL ROTOR: *Device for lateral stability --- no one ever bothered to tell the tail rotor.*

TAIL BOOM: *Noise made when the tail hits first.*

TRAINING GEAR: *Diapers, rubber pants, etc. --- a requirement for new helicopter pilots.*

SHIN: *Area on lower leg for testing hardness of rotor blades.*

GROUND EFFECT: *Standard answer to the question, "Why did it break into so many pieces?"*

AUTO ROTATION: *Backing your car over your chopper --- sometimes on purpose.*

STARTING BELT: *First drink before firing up helicopter.*

EXPERT: *Meaning unknown to DC/RC chopper pilots (Yet!)*

Seems to me that the glossary applies

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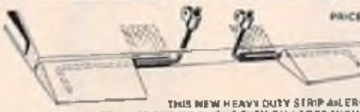
R/C Accessories engineered for Performance

WING

HEAVY DUTY AILERON HARDWARE SET



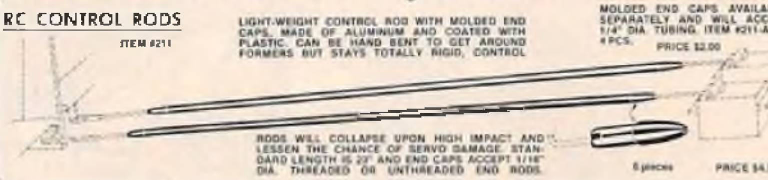
PRICE $1.89

THIS NEW HEAVY DUTY STRIP AILERON LINKAGE WILL NOT FLEX OR TWIST DURING FLIGHT EVEN ON LARGE HIGH SPEED PATTERN SHIPS. MADE OF .115 DIA. STEEL ROD WITH SNUG FITTING NYLON BUSHING AND HEAVY NYLON HORN. GIVES YOU AN UNBEATABLE CONTROL PKG. ITEM #209 6 PCS.

RC CONTROL RODS

ITEM #211

LIGHT-WEIGHT CONTROL ROD WITH MOLDED END CAPS. MADE OF ALUMINUM AND COATED WITH PLASTIC. CAN BE HAND BENT TO GET AROUND FORMERS BUT STAYS TOTALLY RIGID. CONTROL RODS WILL COLLAPSE UPON HIGH IMPACT AND LESSEN THE CHANCE OF SERVO DAMAGE. STANDARD LENGTH IS 23" AND END CAPS ACCEPT 1/16" DIA. THREADED OR UNTHREADED END RODS.



MOLDED END CAPS AVAILABLE SEPARATELY AND WILL ACCEPT 1/4" DIA. TUBING. ITEM #211-A 4 PCS. PRICE $2.00

6 pieces PRICE $4.50

COMPLETE WING INSTALLATION KIT

WING INSTALLATION PACKAGE INCLUDES 4 LOW-PROFILE NYLON WING BOLTS, 4 LARGE NYLON WASHERS, 4 WOOD MOUNTING BLOCKS, 4 STEEL SPEED INSERTS PLUS 1 HEX WRENCH. A WING BOLT DESIGNED AS A WING BOLT FOR EASIEST AND FASTEST INSTALLATION AND REMOVAL.

ITEM #212 17 PIECES PRICE $4.50

SPEED HINGES

PRICE $1.50

A TOTALLY NEW CONCEPT OF HINGE DESIGN. GIVES MORE POSITIVE FEEL OF CONTROL. DOES AWAY WITH THE FLIP-FLOP CONTROL SURFACE. WILL NOT PULL OUT, VIBRATE, OR BREAK. FAST INSTALLATION - NO MESSY EPOXIES.

ITEM #213 24 Hinges & pegs

LANDING GEAR HARDWARE

PRICE $1.79

MAIN LANDING GEAR MOUNTING HARDWARE SET. IDEAL FOR FOAM WINGS. JUST CUT SLOTS IN WING & GLUE IN.

ITEM #208 18 Pieces

ENGINE MOUNTING KIT with TAP & WRENCH

PRICE $1.89

SET INCLUDES 4 HARDENED CAP SCREWS, 4 FLAT WASHERS, 4 LOCK WASHERS, TAPPER SCREW & ALLEN WRENCH.

ITEM #218 14 Pcs

NYLON WING BOLTS

PRICE $2.00

LOW PROFILE NYLON WING BOLT 1/4-20 x 2" WITH HEX KEY HEAD FOR FASTEST AND CLEANEST REMOVAL OF WING. COMES WITH ALLEN WRENCH AND NYLON WASHERS TO PREVENT CRUNCHING WHEN WING IS BOLTED DOWN. INCLUDES 4 BOLTS, 4 WASHERS & WRENCH.

ITEM #215 9 Piece set

WING DING GLIDER

A FUN LITTLE DELTA GLIDER THAT FLYS INDOORS AND OUT. COMES WITH RUBBER BAND LAUNCHER FOR THOSE LONG DISTANCE FLIGHTS. NO METAL PARTS FOR SAFE FUN. MADE OF LIGHTWEIGHT STYROFOAM.

13" WING SPAN ITEM #500

PRICE $2.00

WING BUSHINGS

MOST PERMANENT AND ACCURATE WAY OF FASTENING WING TO FUSELAGE.

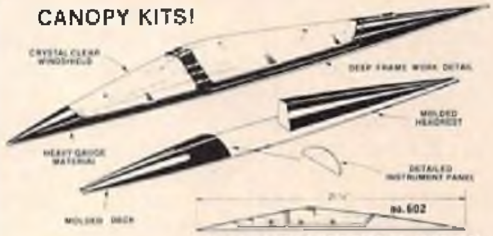
PRICE $1.29

3/4" DIA. PRE DRILLED TO ACCEPT 1/4" x 20 NYLON BOLT

THE WING SHEETING AND FOAM CORE DO NOT HAVE THE ABILITY TO RESIST CRUSHING WHEN BOLTED DOWN TO FUSELAGE. THEREFORE WING BUSHINGS CAN BE INSTALLED AS SHOWN. SIMPLY CUT A 3/4" DIA. HOLE IN FOAM CORE AND EPOXY INTO POSITION.

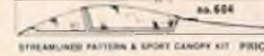
SET OF FOUR ITEM #199

CANOPY KITS!



LOW PROFILE SPEED & SPORT CANOPY KIT PRICE $4.95

GIVE YOUR AIRPLANE A NEW, EXCITING LOOK WITH A WING CANOPY KIT, THE LIKES OF WHICH YOU HAVE NEVER SEEN BEFORE. YOU GET A TOP QUALITY CANOPY WITH CRISP FRAMEWORK DETAIL (EASY TO PAINT), MOLDED COCKPIT INSERT INCLUDING HEADREST & FRONT PANEL, DECK, DETAILED PRINTED INSTRUMENT PANEL & ILLUSTRATED MOUNTING INSTRUCTIONS WITH TINTING PROCEDURES. CANOPY KITS FIT: KAOS, MACH I, NEW ORLEANIAN, ORION, TAURUS, SKYLARK, INTEGRA II, MISS NORWAY AND MOST OTHER LOW WING AIRCRAFT.

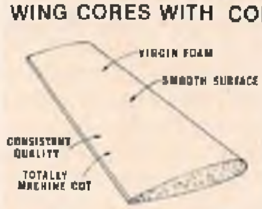


STREAMLINED PATTERN & SPORT CANOPY KIT PRICE $ 4.95

STYROFOAM CORE REPLACEMENT WINGS

WING'S EXCLUSIVE CUTTING METHOD, DEVELOPED BY RALPH ANDRAE, MAKES OUR CORES SUPERIOR TO OTHERS.

WING CORES WITH CONSTRUCTION PLAN



BUILDING A STRAIGHT WING ISN'T EASY AND IT TAKES A LOT OF TIME AND PATIENCE. OUR WING KITS SOLVE THIS BY OFFERING FAST AND EASY ASSEMBLY PLUS THE ADDITIONAL STRENGTH OF FOAM AND STRESS SKIN CONSTRUCTION. IF YOU HAVE A FAVORITE SHIP THAT NEEDS A NEW WING OR ARE BUILDING A NEW BIRD, TRY ONE OF OUR WINGS. WE HAVE OVER 150 DIFFERENT WINGS IN STOCK.

CLIP & SAVE
GOOD FOR $1.00 ON $20.00 PURCHASE OR MORE
DIRECT ORDERS ONLY

CLIP & SAVE
GOOD FOR $3.00 ON $30.00 PURCHASE OR MORE
DIRECT ORDERS ONLY

ADD $1.00 TO ANY WING AND GET THE FOLLOWING OUTSTANDING VALUE:

BOND BOARD WING SHEETING	$ 5.00
GLASS REINFORCEMENT TAPE FOR CENTER SECTION	.75
AILERON LINKAGE, BUSHINGS & HORNS	1.69
BALSA LEADING & TRAILING EDGES	.90
PACKAGE OF HINGES	1.25
WING HOLD DOWN BOLTS	1.69
COPPER CUT OUT WIRE	.29
	$11.87

PATTERN

RCM NEW ERA III	$ 8.95
SOUTHERN BOBCAT	$ 8.95
NOBLER	$11.95
SOUTHERN TIGERTAIL	$13.95
AIRBORNE TIGERTAIL	$13.95
KWIK FLI III	$13.95
DIRTY BIRDY	$13.95
TAURUS	$13.95
COMPENSATOR	$13.95
KWIK FLI (STRAIGHT)	$13.95
KWIK FLI (TAPERED)	$13.95
SUPER KAOS .40	$ 8.95
DIRTY BIRD .40	$ 8.95
SUPER KAOS .60	$13.95
BANSHEE	$13.95
CUTLASS	$13.95
PHOENIX 5	$13.95
PHOENIX 6	$13.95
PHOENIX 7	$13.95
MISS NORWAY	$13.95
MACH I	$13.95
CURARE	$14.95
J & J TROUBLEMAKER	$14.95
VIPER	$16.95
INTEGRA II	$13.95
RCM U.F.O.	$13.95
R.C.M. REVENGER	$14.95

SCALE

TOP FLITE P-39	$13.95
TOP FLITE P-51	$14.95
TOP FLITE P-40	$13.95
WING ZERO	$13.95
VK CHEROKEE	$14.95
ROYAL ZERO	$16.95
DAVE PLATT-288	$16.95
DAVE PLATT FW-190	$16.95
MIDWEST CARD. SQUIRE	$14.95
SIG J-3 CUB CLIPPED	$13.95
SIG J-3 CUB STANDARD	$14.95
ROYAL TONI	$13.95
STERLING J-3 CUB	$ 8.95
MIDWEST HE 167	$11.95

BI-PLANES

SKYBOLT	$16.95
ARGO STAR	$16.95
AEROMASTER	$16.95
AEROMASTER TOO	$16.95
RCM WAYFARER	$16.95
MIDWEST PITT SPECIAL	$16.95
RCM RODEO	$16.95
JACK STAFFORD	
ACRO SPORT	$16.95
BIG LIBERTY SPORT	$16.95
RCM BASIC BIPE	$16.95
GAS PULASIR BIPE	$16.95

SPORT/TRAINER

FALCON 56 MK II	$ 8.95
SKYLARK MK II	$8.95
BUSHWACKER	$ 8.95
K RAY	$ 8.95
SIG KOUGAR	$13.95
NEW ERA I	$ 8.95
ANDREWS MINIMASTER	$ 8.95
RCM SPORTSTER	$ 8.95
BASIC TRAINER	$ 8.95
LOVE MACHINE	$ 8.95
DRONE	$ 8.95
MIDWEST TRI-SQUIRE	$ 8.95
STERLING CITABRIA	$ 8.95
BOX FLY	$ 8.75
HEADMASTER	$ 8.95
JR. BOX FLY	$ 8.95
RCM TRAINER .40	$ 4.95
TRAINERMASTER	$ 8.95
QUICKIE 500	$ 8.95
LITTLE STICK	$ 8.95
SWEET STICK	$ 8.95
LANCER	$ 8.95
FLEDGLING	$ 8.95
FALCON 56	$ 8.95
SKYLARK 56	$ 8.95
A-RAY	$ 8.15
H-RAY	$ 8.95
BIG KOMET	$13.95
BIG RAGE!	$ 8.95
MACH II	$ 8.95
SOLO	$ 8.95
M.A.N. TRAINER .40	$ 8.95
SWIFTEE 100	$ 8.95
SPINKS ACROMASTER	$ 8.95
DEBOLT JENNY	$11.95
SWEET STICK 800	$13.95
GOLDBERG SHOESTRING	$10.95
BIG KOMMANDER	$13.95
TOP FLITE CONTENDER	$13.95
GAZARIATOR	$13.95
RCM TRAINER .60	$13.95
SPORTMASTER	$13.95
UGLY STICK	$13.95
BR. FALCON	$13.95
STRIKEMASTER	$13.95
SKYLANE 62	$14.95
JR. FALCON	$ 7.95
STERLING RIMFIRE	$ 8.95
PHIL KRAFT SUPER FLI	$13.95
BRADISON FLI	$ 8.95
SCOOTER (FLITE LINE)	$ 8.95
M.A.N. TRAINER	$11.95
STERLING LANCER SL-62	$13.95
FLEA FLI-10	$ 8.95
SEQUEL	$13.95

STABS

MACH I STAB	$ 5.75
CURARE STAB	$ 5.75
VIPER STAB	$ 5.75
CARDINAL SQUARE	$ 5.75
RCM U.F.O. STAB	$ 5.75
TAURUS STAB	$ 5.75
FALCON 56 STAB	$ 5.75
RCM REVENGER STAB	$ 5.75
DIRTY BIRDY .60	$ 5.75
FALCON 56 MK II	$ 5.75
SKYLARK 56 MK II	$ 5.75

NEW WINGS !

HOUSE OF BALSA P-51 .40 SIZE BOTH GLASS & BUILT UP VERSIONS $8.95

SEND 50¢ FOR CATALOG

NOTE: WRITE FOR SPECIAL QUANTITY DISCOUNTS FOR CLUBS & MANUFACTURERS.

FREE WING LOADING CHART IN EVERY KIT

STYROFOAM BLOCKS no. 230

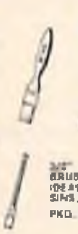
1 LB. DENSITY VIRGIN EXPANDED BEAD BLOCKS 30" x 12" x 6". FOR MAKING WINGS FUSELAGES AND STABS.
$12.00 EA. 3 FOR $30.00

More quality products from WING MFG.

¼ x 20 HOLD DOWN INSERTS

DESIGNED FOR USE WITH NYLON WING BOLTS. DRILL ¼" HOLE IN WOOD BLOCK GLUED INTO FUSELAGE & SCREW IN INSERT. KNIFE EDGE THREAD CUTS INTO WOOD AS INSERT GOES IN. WITH THIS SYSTEM WING BOLTS WON'T VIBRATE LOOSE & IN EVENT OF CRASH WING BREAKAWAY IS CLEANER.

4 PCS. PRICE $2.79



1" WIDE ALL PURE BRISTLE BRUSHES WITH WOOD HANDLES.

IDEAL FOR APPLYING WING ADHESIVE, EPOXY & POLYESTER RESIN. CAN BE CLEANED MANY TIMES WITHOUT BRISTLES CURLING. HANDLES WON'T MELT IN SOLVENTS LIKE PLASTIC BRUSHES.

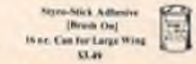
PKG. OF 4 FOR $5.00 no. 614

3/8" WIDE PURE BRISTLE ACID BRUSHES WITH METAL HANDLES. IDEAL FOR APPLYING EPOXY, RESINS, FILLERS, ETC.

PKG. OF 4 FOR $1.00 no. 615

WING SKIN ADHESIVES

These are all fast drying adhesives with excellent bonding strength.



Spray Adhesive
4 oz. Can for Small Wing $2.00
12 oz. Can for Large Wing $3.98

Styro-Stick Adhesive (Brush On)
16 oz. Can for Large Wing $3.49

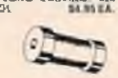
CUSTOM WINGS CUT— FOUR PAIR $75.00

SEND TIP & ROOT AIRFOIL ALONG WITH FULL SIZE PLAN VIEW OF WING (MAXIMUM WING SPAN 72"— MAXIMUM CORD LENGTH, 14").

ALL CUSTOM WINGS MUST BE PAID FOR WITH ORDER.

NI CHROME WIRE FOR FOAM CUTTING. THE SAME HIGH RESISTANCE WIRE WE USE FOR PRODUCTION. GIVES EXTREMELY SMOOTH CUT—LONG LASTING. #26 GAUGE - 25 FT. SPOOL $4.95 EA.

no. 229



NO. 240

LIGHT WEIGHT BIRCH AIRCRAFT PLYWOOD WING SKINS. HAS A SATIN SMOOTH SURFACE WITH NO OPEN GRAIN. BENDS AROUND LEADING EDGES EASILY. 10 TIMES STRONGER THAN BALSA — 48" x 48" (.018 THICK $19.95 SHEET

THE FINEST WING COVERING MATERIAL AVAILABLE!

ORDERING WINGS:

SPECIFY WING AND SEND CHECK OR MONEY ORDER FOR REQUIRED AMOUNT. ADD $1.65 PER WING FOR POSTAGE AND HANDLING IN U.S.A. IF ACCESSORIES ARE ORDERED ALONG WITH WING THERE WILL BE NO ADDITIONAL POSTAGE.

ORDERING ACCESSORIES:

SPECIFY ITEM NO. AND SEND CHECK OR MONEY ORDER FOR REQUIRED AMOUNT. ADD $1.50 FOR POSTAGE & HANDLING IN U.S.A.

CANADA ORDERS ADD $2.75 PER KIT FOR ADDITIONAL SHIPPING & HANDLING. ALSO ALL ORDERS MUST BE IN U.S. FUNDS.

SEND TO:

WING

WING MANUFACTURING
P.O. BOX 33
CRYSTAL LAKE, IL 60014
ILLINOIS RESIDENTS ADD 5% SALES TAX

SERVICE DEPARTMENT OPEN 9 AM—5 PM MONDAY THRU FRIDAY
15 MORGAN STREET CRYSTAL LAKE, IL

PHONE: 815-459-0417 FOR FAST C.O.D. SERVICE

Engine Clinic CLARENCE LEE

Dear Mr. Lee:

I hope you can solve a problem for me.

I am having difficulty getting my Cox Pee-Wee .020 to run properly. I mix my own fuel as imported Cox fuel is extremely costly, and have tried varying mixtures, from 3:1 to 4:1 Methane/castor with up to 15% nitro methane, and get the same result in most cases, i.e., the motor cuts as soon as I disconnect the battery from the plug. I have even tried T.D. .020 heads to no avail and a letter to the manufacturer asking for a recommendation for a fuel mixture did not even apparently rate the courtesy of a reply in the negative.

I am also having trouble now with my T.D. .049's – they run for approximately 15 seconds and then start to run "hard" as though they are too lean, and then quit altogether.

I have just gone onto a new batch of nitro and am wondering whether this could have something to do with my problem with the .049's (the Pee-Wee has **never** *been any good!) as they used to run beautifully on a 10% nitro/3½:1 mix.*

Thanks for a stimulating column and keep up the good work.

Bruce Abell
N.S.W. Australia

Any time an engine slows down when you remove the starting battery, either the fuel or glow plug are too cold. This is true whether the engine is a Cox .020 or one of the larger displacements .60's. This can also happen with a worn out engine that does not have enough compression. The engine runs inefficiently with a loss of combustion pressure and heat which is necessary to keep the semi-diesel operation going.

Your problem is in your home brew fuel and the amount of nitro methane you are using. The smaller displacement engines run considerably colder than the larger displacement engines to begin with and, because of this, require more nitro methane in fuel. 15% is the bare minimum you should be using and the engine would perform considerably better with 25%-30% --- particularly the Cox .020. By using lower nitro fuels and allowing the engine to run too cold the varnish build-up is increased causing the engine to become "sticky." When this happens you can expect a loss in power, difficulty in setting the needle valve, etc.

Since your problem started with a new batch of nitro, I would suspect that possibly you do not have pure nitro. Nitro methane can be had in diluted mixtures of 60% nitro/40% alcohol, 70/30, etc. You would have to check with your source as to the purity of your nitro. Nitro hydrometers are available for checking the specific gravity which, in turn, tells you if the nitro is diluted or not but nitro hydrometers are quite expensive.

Try mixing up a batch of 25%-30% nitro — 20% oil, and balance alcohol and see if the engine does not perform considerably better. The low nitro probably being the reason your .020 has never performed properly.

Mr. Lee,

I have a K & B 3.5 outboard and I have the case inverted to gain a pressure tap for the Robart pump and auto-mix system. Is there anybody who's done this before that you know of? My problem is that the Perry carb is too close to the exhaust and there is no way that I know of to exit the exhaust straight out back. Is there anyone who makes an elbow and pipe set-up for this motor? Should I change the case back to its stock configuration? The lower unit is cut away to accept the elbow and pipe, but then I lose my pressure tap! I would rather run the pipe off the top of the motor, if possible.

Thank you,
Steve Bruce
Clarkston, Michigan

Steve, there is no need to reverse the case on your 3.5 just for a pressure tap. The tap can go any place in the crankcase --- through the side of a mounting lug, bottom of crankcase, etc. Just be sure, if drilling the bottom of the crankcase, that the pressure fitting is flush with the inside and does not extend far enough to be hit by the rod, etc.

Quite a few fellows are reversing the crankcase on the K & B 3.5 outboard in order to get the exhaust out the top and, in turn, use megaphone type mini-pipe. To do this you must also use the 3.5 aircraft crankshaft with an extension pressed in the end of the crank pin to drive the propeller shaft (the 3.5 outboard crankshaft has a longer crank pin than the aircraft crank). The aircraft engine runs the opposite direction of the outboard. By rotating the front plate 90° you reverse the direction of rotation and have the carburetor on its side out of the way of the pipe.

Dear Mr. Lee:

I have a Rossi .60 that I plan to use in a Jet Ranger. I have heard from other Rossi users that they are liable to shed pieces of the brass ring surrounding the crankshaft counter-weight, with disastrous consequences.

Can you tell me what would cause this to happen and what could be done to prevent it?

Yours,
Anthony Ellis
Victoria B.C., Canada

The brass ring that covers the counter-balance on the Rossi occasionally breaks due to a bad choice of metal on the part of the Rossi's. The ring has to be pressed on the crankshaft and evidently the Rossi's used a type of brass with little stretch ability. Aluminum would have been a better choice or at least a type of brass with more stretch ability. The only cure is to cut the ring very carefully with a Zona saw and remove it. This will not effect the performance of the engine any measurable amount. The purpose of the ring is to "pack" the crankcase. However, if you run your engine and tach the rpm both before and after removing the ring, I doubt if you will be able to measure any difference in rpm.

Dear Mr. Lee,

A friend of mine and I have each purchased a Fox .45 BBRC Schneurle port engine. When I fired mine up all I could say was, "My Gawd." It sure is a powerful engine, but my friend is having an idle problem. He has the engine in an R/C Smoothie mounted inverted. When the ship is held upside down for starting, the engine idles just fine and responds to throttle like it should. When it is turned upright for flight, the engine loads up after a short time and quits when brought out of idle. The tank is on the carb centerline. Would this problem

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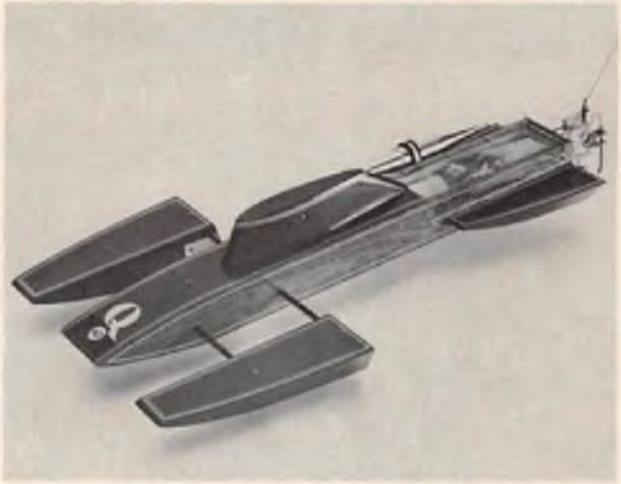

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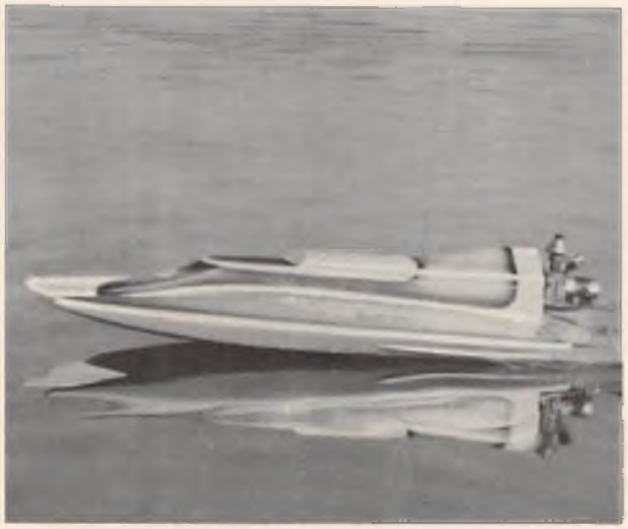

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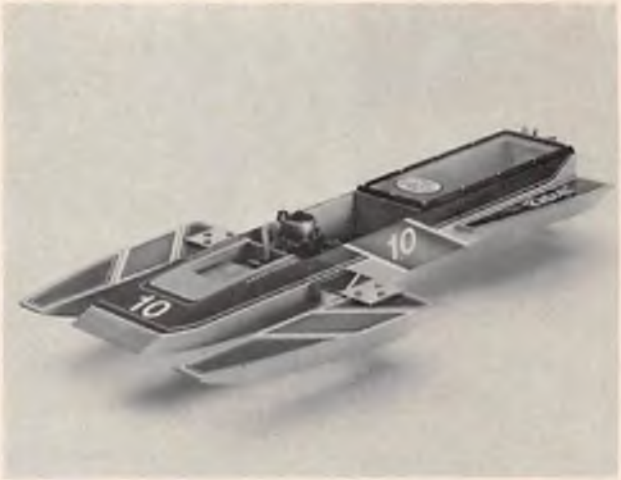

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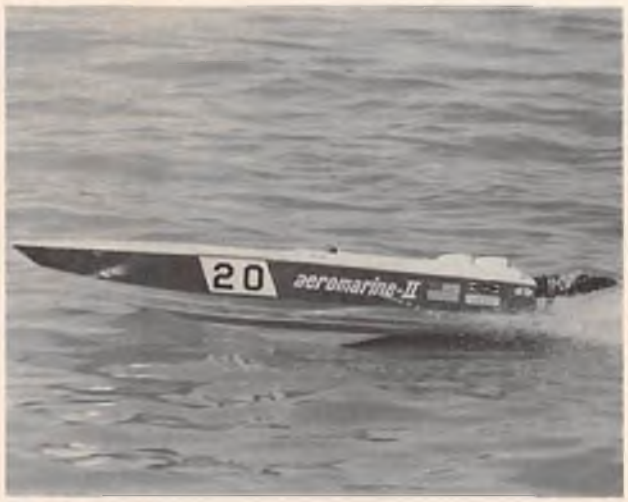

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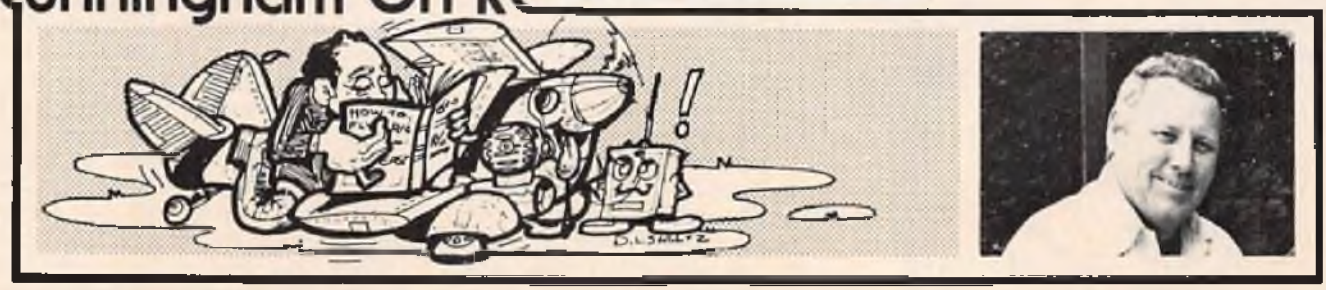

Taking Third Place in R/C sport biplanes was this attractive Gloster Gladiator by Buddy Irwin. These four photos were shot at the Southwest Modeler's Show in Dallas.

Owen Morris scaled up Wylam plans to build his Quarter Scale 1946 Beechcraft G-17-S. Quadra power, 28 lbs., aircraft Dacron covering and Pactra Poly-U paint.

RC DESIGN MADE EASY PART IV

If you're getting into designing your own RC aircraft, then there's a pretty good chance that you're not a beginner in either RC building or flying. You may not be a world class flier, but what the heck, only about thirty or forty people out of a million and a half or so RC'ers are really top pattern fliers. Most of us are Ken Willard's type people, Sunday Fliers, and we enjoy our segment of the great sport probably more so than any other group. If you're a newcomer and thinking about getting your feet wet by jumping in and designing your own aircraft for a very first effort --- don't. There are so many really top kits on the market for a beginner to make his selection that it really is less than good judgment to design your own for the first time out. But, for you guys who have built a few, flown a few and, quite naturally, crashed a few --- why not? Get out the paper and pencil and do a bit of scribbling to come up with your own design. Okay, you've been following this line of thought for several months and you've got your dream ship all layed out on paper, then what the heck to you do next? Why build it, of course. But, what size pieces of wood do you use, and where? How do you get it strong enough and, yet, not too heavy? Good questions. Let's see if we can throw some light on how much, how big, what type, and so on.

Wood sizes are just about as numerous as you can find, also the strength of each piece of wood may be completely different from the next piece of wood. Everyone who has ever built a model has gained a little feel for a piece of balsa wood. I suppose without this beautiful gift of nature, the hobby of model building would still be with us, but this veritable masterpiece has allowed many people to share the beautiful feeling of shaping and sanding a piece of wood to the exact size and to a velvety smooth texture. Great stuff, only wish I could grow a couple of trees in my backyard.

Let's take a look at the wood at the hobby shop and think for a minute just what each piece is going to do in the aircraft. First, if you're going to use blocks of balsa for the wing tips, and around the nose of the aircraft, you want to pick lightweight, soft pieces. This is not only to save weight, but to also save muscle when it comes to shaping and sanding. It's generally a good idea to make the wing tips light anyhow in order to make the aircraft more responsive to aileron control. Heavy wing tips make

Moree Morris captured First Place in 1/2A Stand-Off Scale with her Immaculate House of Balsa Chipmunk.

Lynn McCauley and Ed Couch did well with their scratch built F-100 ducted fan. The 11 lb. machine features Jet Hangar Scozzi fan, K & B 7.5 engine, and Goldberg retracts.

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the wing less likely to want to move from the direction in which it is moving. If you're an engineer, you know what I'm talking about, but, if you wonder what I mean, picture an ice skater in your mind's eye. Think about the spin that they go into with arms outstretched, slowly at first, then, when they want to turn on the speed the arms are retracted and the speed picks up drastically; then, again, when they want to stop, the arms are flung out and, presto, they stop. Obviously, they cannot remove the arms to pick up speed, so they are retracted. Same idea with light wing tips, you can't retract them, but you can roll faster and smoother if they are light.

Now, let's take a look at some sheet material. Forget what thickness, we'll get to this later. If you're going to use the sheet material for fuselage sides, then you want the grain to run the full length of the sheet, not to wander off of the side about half way down the sheet. Also, you want a sheet that is pretty strong. It doesn't have to resemble a piece of oak, but you want it strong, and straight grained. You need to pick out two matching sheets, as the fuselage sides need to be similar both in weight and strength. It is really more important than you may think, because if one sheet is stronger than the other, you're going to have a tough time building an accurate and true fuselage and the strong side will not bow as much when you pull them together at the tail post, and you will have a missaligned fuselage when you finish. How about sheet wood to use for wing planking? Again, it needs to be straight grained and strong, but not too heavy and, again, matched sheets should be used on both top and bottom, and on each side. Careful wood selection will go a long way to eliminate troublesome warps in the finished structure. Naturally, you should avoid warped wood in the first place. Sometimes this is hard to do, but give it your best shot, warp-free wood does a heck of a lot to make a warp-free aircraft. Sheet wood for use as wing ribs is another care spot. You don't want to build the wing too heavy by using heavy wood for the ribs and you don't want to make the wing too flimsy by too light of a piece of wood. Look for medium weight wood that is reasonably strong and not brittle. Often a piece of wood that looks just perfect for ribs will turn out to be very brittle and will snap across the grain much too easily. You can't go around crunching, biting, and twisting the wood in the hobby shop rack (the friendly hobby dealer will take a somewhat dim view of this) but you can learn to judge the wood by its look and feel.

How about stick wood? The choices are exactly the same --- after all, it has been stripped out of sheet wood. You need strong and straight wing spars, and if you're building a built-up fuselage type structure, strength and straightness count here also. Once again, you don't have to chop down the family oak tree to get the wood, but you've got to use a little thought and care in the selection of the balsa wood that you're going to use. Too hard will not take a bend and too soft will flex and possibly shatter much too easily. Wood that you can crush with just a slight pressure of the fingers is much too weak to use at any point except for blocks at the nose and wing tip.

If you use sheet balsa for the tail feathers of your bird you must again be wise in your selection. Not too hard, and not too soft. A too soft horizontal stab might twist and shatter in flight, or the hinges could pull out easily in a dive if the wood is dead soft. If you grab for a piece of balsa that feels more like a piece of teak, you can get the aft end of the bird too heavy with a resultant balance problem.

All of the same holds true when you're selecting spruce to use in construction, try to pick out straight grained, warp-free pieces of spruce. For you modelers who are joining me in building the biggie type aircraft, you can rip up all of the wood that you will need from just one piece of 1 x 8 board if you have access to a table saw, or a band saw with a rip fence. You can use several woods, Ponderosa Pine, Sugar Pine, White Pine or Spruce. The pines are easier to rip and keep straight than is the spruce wood. Spruce will tend to take a warp or set from the heat of the saw blade cutting through it. This can be adjusted by soaking the wood in hot water and then drying it out under pressure, such as a stack of bricks or concrete blocks --- but, lots of trouble.

Now that we have wandered back from the local balsa emporium (hopefully not with the imprint of the hobby dealer's shoe on our posterior) wiser in the selection of balsa wood it comes time to decide just what sizes to use in the structure of our aircraft. There are some rules of thumb (I've never asked my thumb a single rule, have you?) about wood sizes that are a good place to begin. Wing ribs and sheeting for aircraft up through a .35 or so, use 1/16" thick; from .40 through .60 use ribs and sheeting 3/32" thick; for larger, use 1/8" thick. For slab (ugh!) horizontal stabs, use 1/8" for 1/2A through .19; 3/16" for .19 through .40; and 1/4" for .60 size jobs. Same for the vertical stab. Fuselage sides are another matter. It depends upon if you're going to reinforce them with any type of doublers. For the small sizes, 1/16" sides with a 1/16" balsa doubler may be used. Larger size aircraft can be built with fuselage sides up to 1/4" sheet balsa. Some aircraft of this size are designed to use balsa or ply doublers, however, many popular designs such as the Ugly Stick do not use doublers. Doublers can be cross grained balsa wood or 1/32" to 1/16" plywood. Doublers can also be

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Fox R. C. wheels are made from aluminum, just like real airplane wheels. Most other model wheels are made from plastic which wallows out on the axle quickly, and will melt if you happen to touch it with a hot soldering iron. Fox aluminum wheels run true, wear almost forever, and look realistic.

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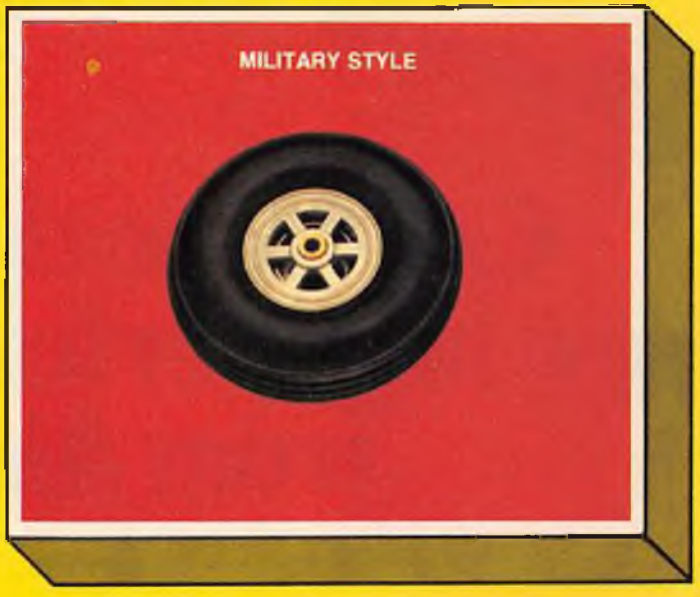
All Fox R. C. wheels have accurately sized holes, run true on the axle, and are well balanced. You will be happy with your Fox R. C. wheels.



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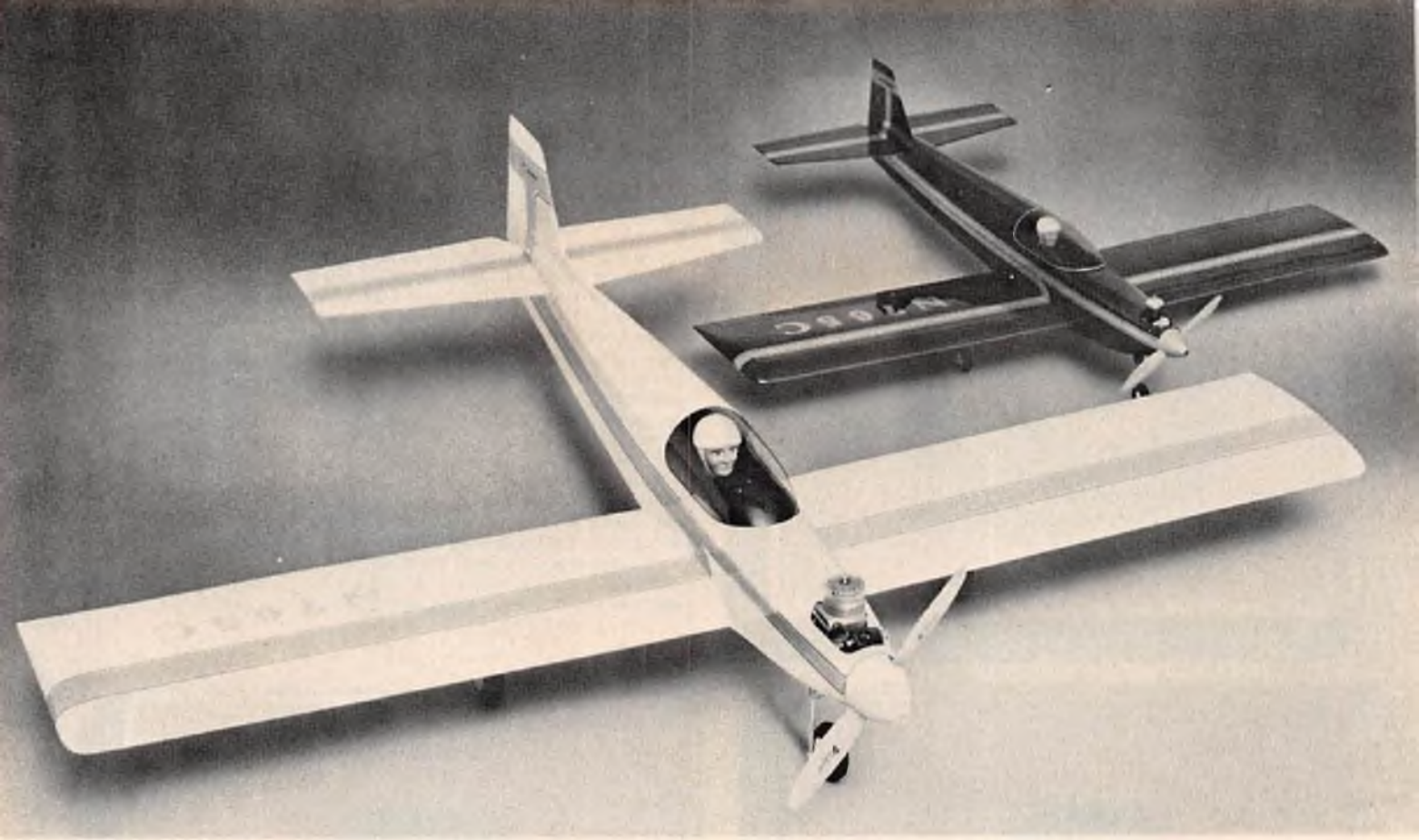

Cox Warlock .05 and .40. New high performance designs from Airtronics.

The world's best balsa kits now offer an even wider selection, featuring two new designs.

Cox/Airtronics introduces the Warlock .05 and .40. It's a maximum performance aircraft in two popular sizes. Clean design and realistic appearance in a *fully* aerobatic aircraft offer the sport flier a new challenge. Plus, you get the engineering and design features that have made Airtronics kits world famous.

Warlock .05—for serious ½A fliers.

Designed around the Cox Tee Dee .051 engine, this compact plane flies the pattern like the larger ships. It's set up for aileron and elevator control, with our catalog #3615 throttle/muffler as a third channel option. With a 32.5-inch wingspan and area of 219 square inches, you get the bonus of a competitive entry in the ½A pylon race circuit.

The Warlock .05 is the ideal move-up from our popular ½A RTF designs, or from our Q-Tee and S-Tee kits. Use Cox/Sanwa's 8020, 8022, or 8031 radio systems. Complete installation details are included on the plans.

Warlock .40—realism and precision.

Designed for popular .40-size front rotor engines, this new aircraft is fully acrobatic with any four channel radio system. With a span of 52 inches and 481 square inch area, this ship is sized-right to move out. And the realistic appearance sets it apart from the rest of the pack.

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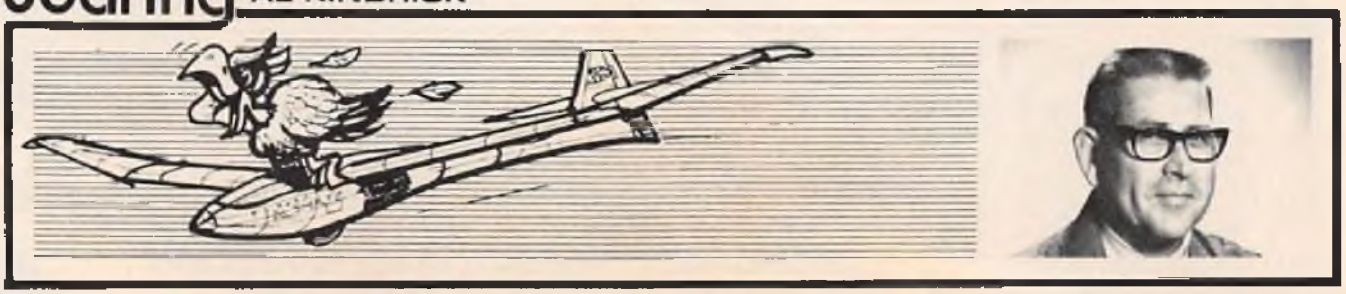


One of the many ways used to transmit forces to our control surfaces on our sailplanes is the use of inner and outer plastic tubes. After your many sizes of sailplanes are completed, short lengths of these plastic tubes are accumulated around the workbench. Jack Cash of Monrovia, Maryland, sends in a good suggestion for the use of the inner tube.

"A couple of years ago I became aware of the advantages of sealed hinges. Although I never like making them nor trusted their strength (I've had one rudder hinge break), I wasn't willing to give up the increased effectiveness of the control surfaces. Consequently, I have been continually looking for a way to have my cake and eat it too.

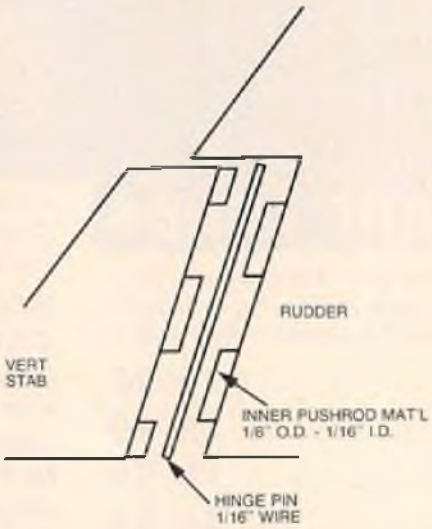
"Well, I've found my solution. In effect, what I use is a piano hinge, using a smooth inner nylon pushrod and a length of 1/16" wire. First cut the pushrod material to a length of the hinge line. Next cut the pushrod into an even number of equal length pieces. Now cut one piece in half. This results in two short pieces of equal length and an odd number of longer pieces. Now place the two short pieces on the 1/16" diameter wire and position at the top and bottom of the vertical stab's rudder post. Take care to center accurately as these pieces determine the hinge line, and glue in place using epoxy. Next, position two long pieces on the rudder's hinge line inside the two short lengths and glue, again taking care to center accurately. Repeat these steps until the hinge is complete, alternating between the rudder and stab. Some trimming may be necessary to allow the hinge to move more freely. Also be careful not to allow epoxy to seep into the I.D. of tubing."

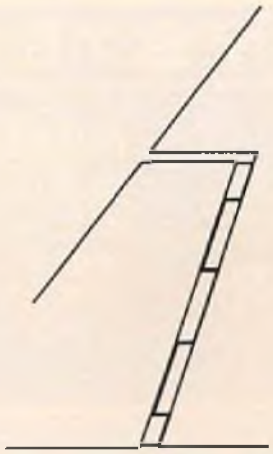
• • •

By "bob-sled" comes word from possibly the most northern soaring club in the western hemisphere. Larry Rice of the Anchorage League of Silent Flight, states that their contest season runs from March through October. The first contest, Larry states, was ideal weather --- in the low thirties --- ugh. They don't have dues to run the club; they have found out that by charging three dollars as contest entry fees, it covers all the costs of postage, trophies, and necessary club fees. To my ears this is great, as I read many newsletters that give financial reports of hundreds of dollars in savings and hundreds in the operating checking accounts. My personal feeling is that all assets should wash themselves out by the end of every year. This gives the membership the maximum benefits from their dollar invested as new members come aboard every year and some drop out. Anyway, we welcome these hearty flyers to the fun field of soaring; their newsletter didn't say which of the many sailplanes was favored in the club --- maybe the "Snow Goose."

• • •

Browsing through shops while the wife is out distributing our wealth, I look for items that can be used successfully in our modeling. I came across an item from 3M and I have used it and it is great. It is called Mounting Squares by Scotch Brand. It is self sticking adhesive on both sides of a closed cell foam center. It is ideal for servo mounting, and I used it to attach a skid on a fuselage when a flying site was changed from a grass field to an asphalt roadway. The best thing is that I got sixteen 1" x 1" squares for 49 cents.





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Some months ago I talked about the duties of a timer and his importance in doing a good job. The SULA News, under the expert guidance of editor Rick Norwood, has put together an excellent timing procedure and it is worth passing on to the beginner as well as to joggle the mind of the expert.

In a hard fought contest, a timing or count-down error can turn a winning to a loss, just as surely as folding a wing. When an error occurs we all feel terrible, but that won't bring the contest back, so let's see what we can do to avoid it. Flyers are not born with good timing techniques. It is nearly always a strategic error to assume that the fellows you ask to time for you actually knows how.

If you don't know your timer, check him out. Ask to see his watch (if it's a 30 second sweep get someone else). Tell him how you want the countdown and then ask him to demonstrate the last 30 seconds. If you don't have confidence in his ability, get someone else --- no one expects you to blow a contest just to be polite.

As a timer your duties include getting your flyer ready --- check the winch on-off switch and help him hook-up. Ask for a control surface wiggle and check your watch (start - stop - reset). As soon as your flyer releases, start looking for a "pop-off." If he has to fly an early "pop-off," every second counts. At the conclusion of a successful launch, announce, **Mark,** as the chute drops away. Your flyer now knows you're awake and the watch is running.

The next step is critical. As you wind the winch down, **don't abandon your flyer.** Get the chute down and get back on the job. If a small backlash develops, wind in on top of it, it will probably unwind itself anyway. Do not stop winding to run around the winch in a futile attempt to pull the backlash out.

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DAVE'S CUSTOM

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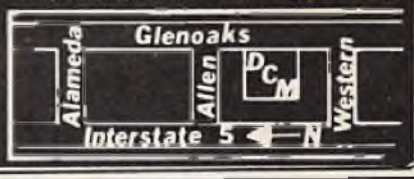

Scale Views

CLAUDE McCULLOUGH

Some views typical of the pictures obtainable from the Air Force photo library. The Berliner-Joyce P-16 appeared as a construction article in the December 1974 issue of RCM and full size plan #579 is available from RCM for $5.00.

SCALE DATA BANK:
Air Force Photos

In the November 1978 issue, Scale Views told how to get photos from the National Archives. The Archives are heavy with Navy aviation photos because the back files of the Navy photo department have been transferred there. They also have a number of Air Force pictures but not in as great a depth because the USAF still has most of their own. These records are held by the 1361st Audiovisual Squadron, Depository Services Section, USAF, 1221 S. Fern St., Arlington, VA 22202. I recently sent for a copy of their latest photo ordering instruction sheet. Prices are still very reasonable compared to the Archives. Typical prices for black and white, single weight, glossy prints are: 4 x 5, $0.75; 5 x 7, $1.00; 8 x 10, $1.25. A 20 x 24 double weight matte finish print is $6.50. For color: 35mm. slide, $1.00; 4 x 5, color transparencies or negatives, $6.75; 8 x 10 Ektacolor print, $4.50; 16 x 20 Ektacolor print, $17.50. For a complete price list, write for a copy of the sheet.

There is a new charge listed that wasn't in effect when I last ordered photos. A research fee of $13.00 per hour, with a minimum charge of $10.00 is stated. Considering the fully cross-indexed files of the photo library, I would expect that a lot of pictures could be located in an hour. It is possible that this fee is only for orders requiring out of the ordinary research. The National Archives makes no charge for research but gets $4.65 per 8 x 10, so the Air Force pictures should still figure out at an advantageous price.

The key to getting the photos you want is stating complete and specific descriptions of the subjects desired. If known, give the serial numbers of specific aircraft, the name of the pilot or the squadron number. Or, if you have no particular aircraft in mind, ask for colorful markings or unusual color schemes. Detail photography, such as instrument panels, bomb racks, landing gears, structural views, etc., can be obtained for many Air Force aircraft, but not all. (The Archives may have the missing links.) If the photos you want can't be furnished, your money will be refunded. They will pick photos based on your descriptions and you will have to accept them since the photos are not returnable. Money for the photos must be sent with the order in the form of certified check, bank draft or money order. Personal checks will not be accepted. Make payment to "ADSN 5037, A&FO, Bolling AFB."

I understand that it is possible to visit in person at the Fern Street address and look at books of prints in the library to pick out photo numbers. If any Scale Views reader tries this out, write in about the experience for the benefit of those of us held prisoner out in the boondocks.

MAILCALL:
Figuring Wing and Tail Area

Dear Claude,

Having chosen several models for scratch-building, I have had success at drawing plans for R/C. Using three-views by Hirsch and Mendenhall, I think my plans are fairly accurate, and you might like to know what the subjects are: A Travel Air Mystery "S," A Gee Bee Q.E.D., and a Miles-Atwood Special. All are in 2" scale except the Special, which is in 3" scale. All have somewhat elliptical wingtips and stabs of varying shapes. I have, however, ground to a halt regarding engine size and Center of Gravity placement. As you know, these subjects are determined by weight, tail moment arm and area. Area of the wing and stab directly control the Center of Gravity and, therefore, control flight stability.

My previous trainers were kits, as was my first SS, a Hawker Tomtit, and all specs were already provided. My question is, how do you calculate the area of the wing and stab? Is there an easy method, or is a crash course in calculus necessary? Other beginners and I gratefully acknowledge your efforts and some information on area will do much to lessen our problem.

Yours for better modeling,
Kevin S. DeVenny
Cherryville, NC

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FOR BIG AIRPLANES

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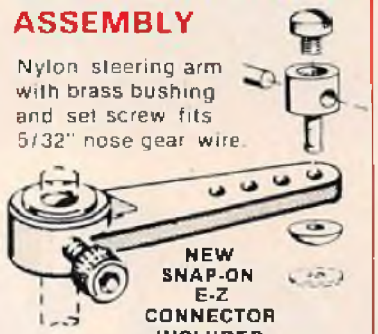

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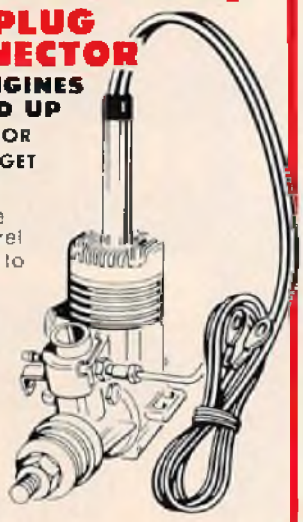

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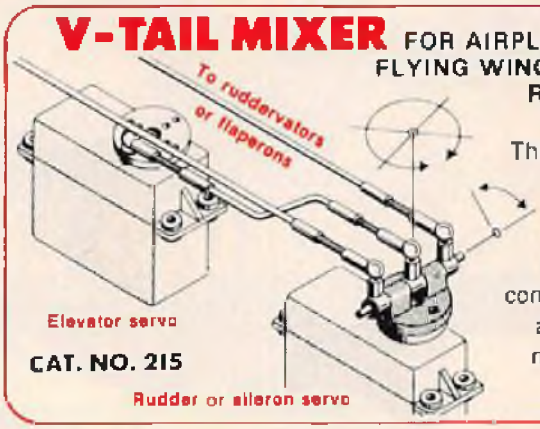

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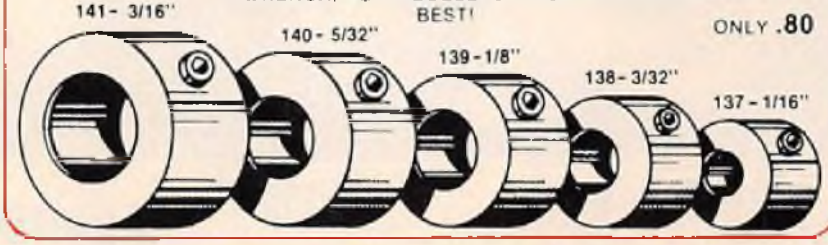

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Aero Sport Two Systems Include: 2 channel receiver, 2 channel transmitter, both for AA Alkaline battery operation (batteries not included), two (2) NS-1C servos, dry airborne battery box, switch harness, frequency flag, extra servo wheels and full 180 day warranty. 72 mHz only.

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When you select an Aero Sport system you are getting quality, dependability, up to date engineering design and back-up service & warranty. That is the reason we have always sold so many radio systems each year, and know we have the best for 1979.

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Diam.	Pitch
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6"	3, 4
7"	4, 4½, 5, 6
8"	4, 5, 6
9"	4, 6, 7, 8
10"	6, 7, 8
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12"	4, 5, 6, 8

Large	Diameter
16"	4, 6
18"	6, 8, 10
20"	6, 8, 10

SUPER-M TOP FLITE PROPS

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9"	4, 5, 6, 7, 8
10"	4, 5, 6, 8
11"	4, 5, 6, 7, 7¾, 8, 8¼
12"	4, 5, 6, 8
13"	5, 6
14"	4, 6

NYLON PROPS

Diam.	Pitch
5½"	3, 4
6"	3, 4
7"	4, 6
8"	4, 6
9"	4, 6, 7
10"	3½, 6
11"	4, 6, 7, 8
12"	6

SPEED PROPS

Diam.	Pitch
6"	7, 7½, 8
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8"	7½, 8, 8½, 9
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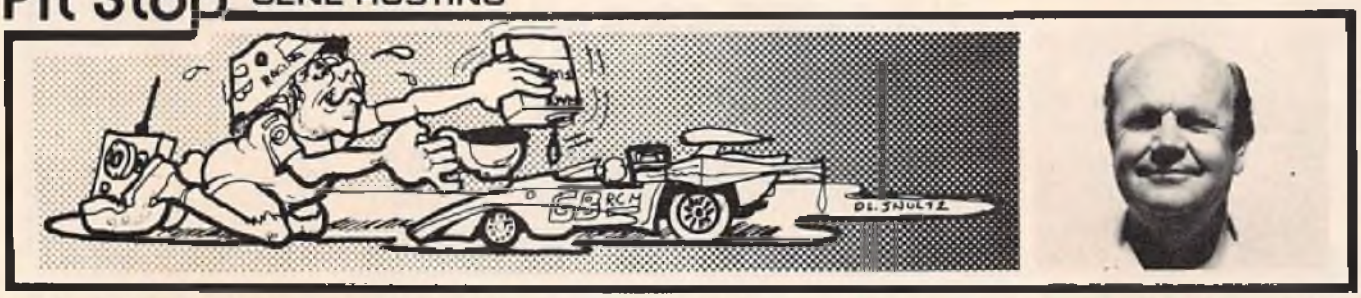

Track layout for the Mini World R/C car race in San Diego, California, which is the same layout as will be used in Geneva.

While I was telling you about all the problems in modifying a K & B .21 in last month's column, K & B was busy correcting them in their latest batch of K & B .21's. Most of the guys at K & B race boats, including John Brodbeck, Sr. (the "B" of K & B), so they're just as familiar with our problems as we are, and they're more anxious than we, to correct them.

New K & B 21 sleeve (on the right) showing the 2 exhaust port windows with raised ports.

As I said before, each batch of K & B .21's they make, they've improved them, including this latest batch. The most obvious change you'll notice is in the sleeve. One of the problems before, was the upper edge of the piston was catching on the top of the exhaust port. To correct this, there are now two windows in the exhaust port. And to improve performance further, they've raised the exhaust port to .030. This will probably increase the top rpm while cutting down somewhat on the bottom rpm, which will make our cars easier to drive. They've also done away with the screw cut-outs in the top of the sleeve. I think this is a great idea, because now it should be easier for them to be able to manufacture a higher quality sleeve, at a lower cost. But remember, without the screw locating cut-outs, be sure to check the sleeve positioning through the exhaust port. This is important. The top flange of the sleeve can now be made flatter, easier, and they've also made the mating surface in the crankcase flatter. All this has to help. The grinding finish on the piston looks much better, so they should be rounder which will help that all important piston-sleeve seal. You'll notice the new sleeve in the photo has the screw cut-outs, but that is a pre-production sleeve. I just received the new engines, and they do not have the screw cut-outs. I received the engines too late to test, but my friends at K & B tell me they're much better, and they should know.

New OS Max 21 R/C car engine.

New OS Max 21 R/C Car

OS Max makes some of the most popular engines used throughout the world, and I think OS and Super Tigre do the best machine work of any. OS has finally released a .21 size engine especially for R/C cars. The heatsink, as well as the inside parts, have the most beautiful machining I've seen. This is a Schneurle ported engine, but it has a different "twist." It has three intake ports

Sleeve exhaust port is angled 45° counterclockwise in the crankcase.

Steel sleeve is similar looking to the OPS 21.

to page 30

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R/C MODELER MAGAZINE 1979 R/C DESIGN CONTEST WINNERS

FIRST PLACE: **Donald C. Hewlings, Cresco, Pa.**

SECOND PLACE: (Tie) **Chris Lakin, Springfield, Mo.**
Vince Micchia, Riverside, Ca.

THIRD PLACE: (Tie) **Pat Bunker, Las Vegas, Nv.**
Michael A. Rossi, E. Layton, Ut.
Martin A. Fallandy, Canoga Park, Ca.

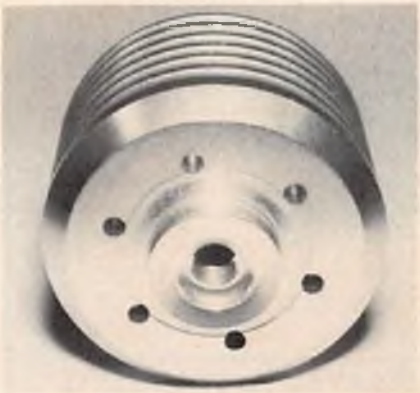
Response to the 1979 R/C Design Contest was tremendous! The variety of subject matter, high quality drawings inked on mylar, excellent photos, and comprehensive manuscripts in attractive presentations resulted in difficult decisions for the judges. Because the standards of the entries were so high, duplicate prizes are being awarded to those entries that tied for second and third places.

The editorial staff of RCM thanks everyone who submitted material to our design contest and many of the contestants not listed as prize winners will be contacted for possible publication of their designs.

PIT STOP

from page 27

Aluminum piston, without ring and strong bushed rod.



Standard shaped hemi head. Beautiful machining throughout.

and one exhaust port, very similar to the OPS. However, the similarity ends there. The sleeve is rotated 45° — not 90° — clockwise to the OPS in the crankcase. I don't know exactly what this does. My guess is OS feels it must give a better porting layout, because all their Schneurle engines are designed like this.

Standard crankshaft with large outer bearing.

The engine uses an aluminum piston, without a ring, in a steel sleeve. The carb, as supplied, is rather small for cars, but this is easily changed. I also received this engine too late to test.

The Mini-World Race

The San Diego R/C Model Car Association presented a special race for the benefit of all racers who would be going to the World's Championships in Geneva in July, and also for anyone else who just wanted to race on the World's Championship track layout. The idea being that the Europeans have already run on the surface of the championship race, and so, therefore, know the best tire, wing, chassis, engine, clutch, etc., etc., combinations for this surface. To

Rich Lee was Top Qualifier and won the "A" Main.

even out this advantage, we wanted to run on the championship track layout, even though the track surface was entirely different. Although, the Championship race we staged here in 1977 at Thorp's Raceway, in Pomona, was held on a commercial track, which we had run on before, it was open for practice continually. The So. Africans came three weeks early to practice, and everyone else had at least a full weeks practice to learn the track. We'll have exactly 1½ days practice in Geneva, about three times on the track, which is just about enough time to figure out carb settings, wings and tires, but hardly

to page 158

BRIDIBIRDS

DESIGNED TO MAKE YOU LOOK GOOD IN THE AIR

U.F.O.
Joe's get up and goer.
Swept-back wing and
anhedral stab.
Glass/foam construction.
64½" wing span.
$129.95

DIRTY BIRDY
Takes pipe, pump, & retracts.
Available either as glass/foam
or all balsa kit.
64" wing span.
Balsa **$84.95**
Glass/Foam **$124.95**

KAOS
Great model for learning
to fly maneuvers.
All balsa construction.
58½" wing span.
$66.95

SUPER KAOS
Super flyer.
All balsa construction.
Takes retracts.
58½" wing span.
$69.96

THE DECEPTION
Our newest.
Quick and smooth.
balsa/foam construction.
63" wing span.
$89.95

PATTERN AIRCRAFT

Send $1.00 for a complete set of Bridikit Catalogue Sheets

TAKE A LOOK AT OUR GROWING LINE OF QUALITY R/C KITS

STAND-OFF SCALE BRIDIKITS

	Eng.	Wing Span	Const.
Brown Racer	.60	59"	glass/foam
Sirius	.60	64"	glass/foam
Chipmunk	.60	58"	glass/foam
AT-6	.60	68"	glass/foam
P-51	.60	64¾"	glass/foam
T-28D	.60	68"	glass/foam
Kraft Super Fli	.60	60½"	balsa/foam
Shrike	T/.40	79½"	glass/foam
Tiger Cat	T/.40	65"	glass/foam
Spitfire*	.60	64"	glass/foam
Waco Meteor*	.60	62"	glass/foam

*Available late '79

TRAINER BRIDIKITS

	Eng.	Wing Span	Const.
RCM Trainer .60	.60	60"	balsa
RCM Trainer .40	.40	50"	balsa
RCM Trainer .20	.20	45½"	balsa
RCM Trainer .10	.09	36¾"	balsa
RCM Trainer .05	.049	36¾"	balsa
RCM Basic Trainer	.19	50"	balsa

SAILPLANES

Soar Birdy	.049	78"	balsa
Big Birdy		99"	balsa

BOATS

Chubasco	.40-.60	glass
Chubasco	.21 I/O	glass

SPORT FLYER BRIDIKITS

	Eng.	Wing Span	Const.
Tweedy Bird	.19	48¾"	balsa
15-500	.40	51"	balsa
Quickest 500	.40	50¼"	balsa
Quickest 200	.051	31¼"	balsa
Sun Fly 4-20	.19	48¾"	balsa
Super Kaos	.40	52"	balsa
Dirty Birdy	.40	58"	balsa

1/4 SCALE BRIDIKITS

Cosmic Wind	.60-.90	64"	glass/foam
Rearwin Speedster	.90-1.25	96¼"	balsa
CAP 20L	1.5-2.4	81"	glass/foam
Corbin Baby Ace*	.90		balsa
Dalotel*	.90-1.25	78"	balsa

BRIDI HOBBY ENTERPRISES

1611 E. Sandison St., Wilmington, Calif. 90744 (213) 834-0801

Though it doesn't have quite the same lines as Anita Ekberg, it also comes from Sweden. We are proud to present Par Lundqvist's faithfully reproduced Eastbourne Monoplane, for .30 to .40 engines and 4 channel R/C.

EASTBOURNE MONOPLANE 1911-1913

The Eastbourne Monoplane presented here is a Stand-Off Scale model for .30 to .40 engines. It is guaranteed to bring out the old nostalgia feelings of aircraft of that era, complete with very low airspeeds, the singing of the wires, and a whispering exhaust.

The EAC (Eastbourne Air Corporation) Monoplane is without a doubt an old timer, but in its time it was a very modern aircraft, being one of the first to use ailerons instead of wing warp for roll control. This particular model has gone through a long period of evolution and rebuilding as more material became available, and is now considered to be an extremely accurate reproduction.

The Eastbourne is an easy model to build, utilizing only old and proven techniques, with only few exceptions.

The 1/4" square balsa locking braces between each fuselage vertical brace (see Section C-C) results in a much stronger fuselage with very little additional weight.

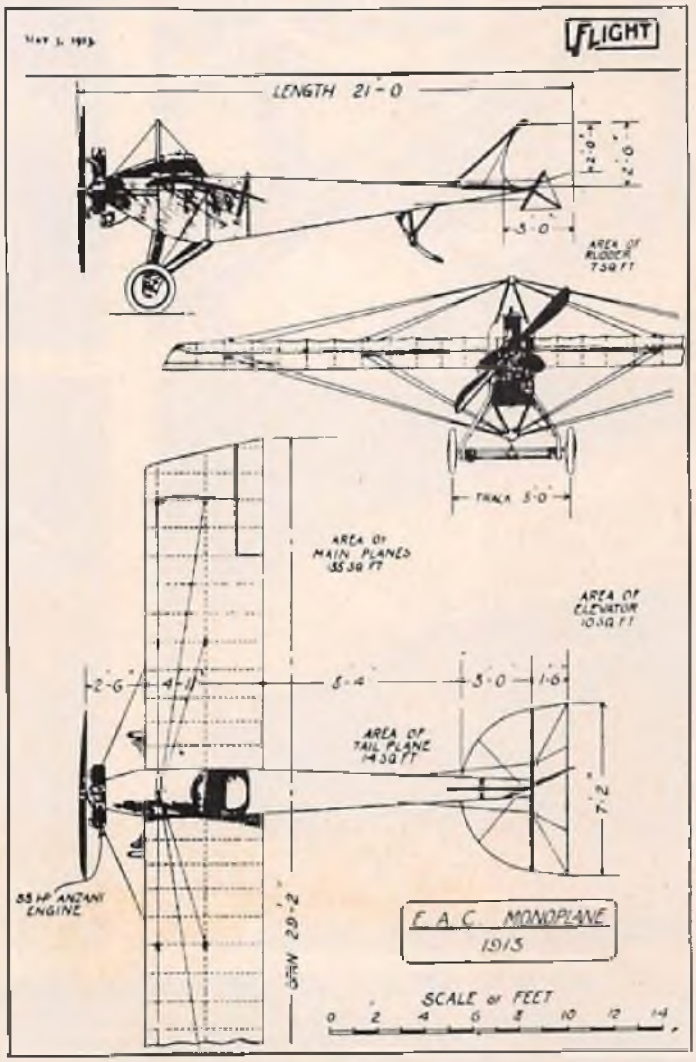
Another unusual feature is the use of 1/64th plywood for the front section of the fuselage. The wing is built in two pieces, and attached to the fuselage with the wire in a tube method as commonly used in R/C sailplanes. Flying wires effectively take care of the necessary strength and rigidity. The unusual configurations of the original aircraft also require some rather original and unique tail surface hinging and operating methods. But there is nothing actually difficult about them, and everything is fully detailed on the plans and in the photographs.

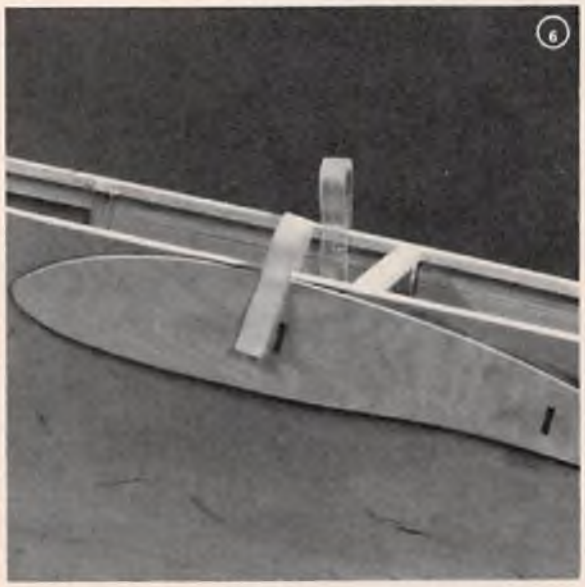
The Eastbourne Monoplane is the most fun to fly of any model I have owned. It flies completely realistically, very slowly but perfectly controllable. The full size one was a low altitude airplane, and the model should be flown that way. While it is capable of loops and rolls with the proper airspeed and power, it is more fun to fly it and to see it perform in the manner in which the real one did. □

EASTBOURNE MONOPLANE
1911-13
Designed By : Par Lundquist

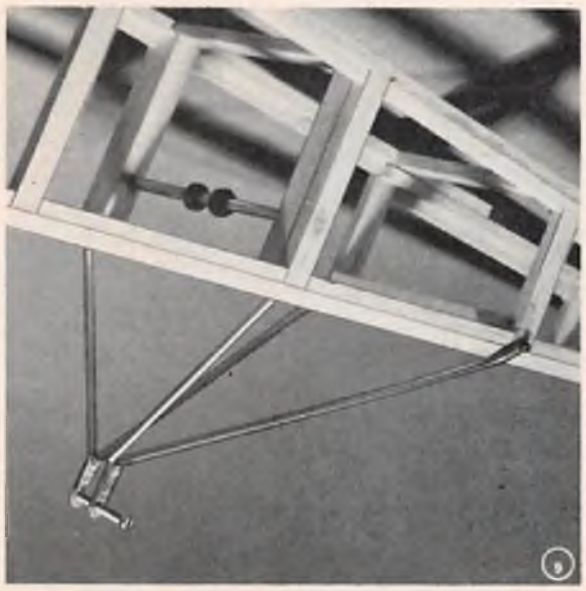
TYPE AIRCRAFT
Stand-Off Scale
WINGSPAN
71 Inches
WING CHORD
14¼"
TOTAL WING AREA
890 Square Inches
WING LOCATION
Shoulder Wing
AIRFOIL
Undercamber
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
None
OVERALL FUSELAGE LENGTH
45¾ Inches
RADIO COMPARTMENT AREA
(L) 17" x (W) 4½" x (H) 5"
STABILIZER SPAN
21¼ Inches
STABILIZER CHORD (Incl. elev.)
9½" Average
STABILIZER AREA
178 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
7½ Inches
VERTICAL FIN WIDTH (Incl. rud.)
6⅝ Inches
REC. ENGINE SIZE
.30-.40
FUEL TANK SIZE
8 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION

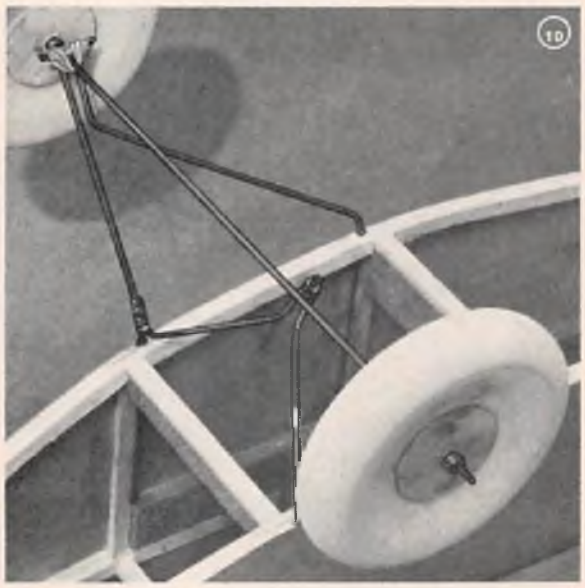
Fuselage	Balsa, Ply and Pine
Wing	Balsa, Spruce
Empennage	Balsa, Spruce
Wt. Ready-To-Fly	80 Ounces
Wing Loading	13 Oz./Sq. Ft.

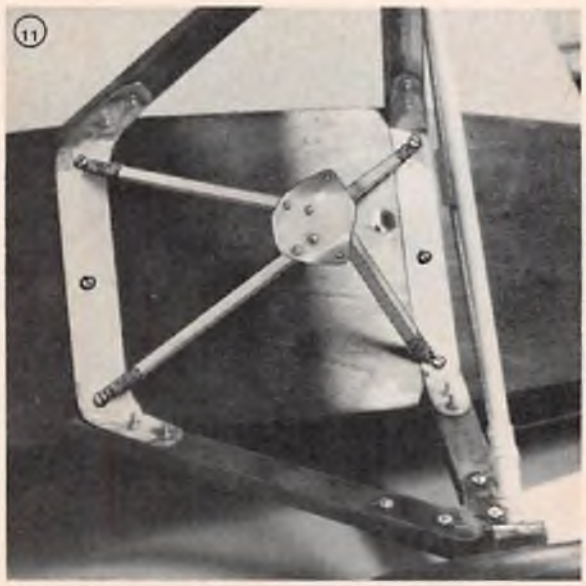


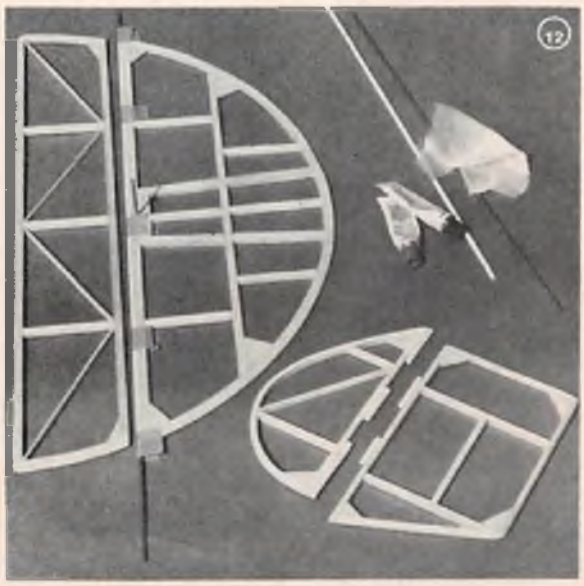


1. Fuselage framework, with front section plywood covering applied. 2. Top view of the fuselage aft section, showing 1/4" sheet balsa reinforcement. 3. View of fuselage framework, showing the use of balsa locking braces. 4. Close-up for front fuselage section, showing plywood sides, and 1/4" sheet balsa wing mount reinforcements. 5. The underside covering should be added last, secured with pins and scrap balsa stock while glue dries. 6. Externally mounted 3/32" plywood rib, part of wing holding assembly.

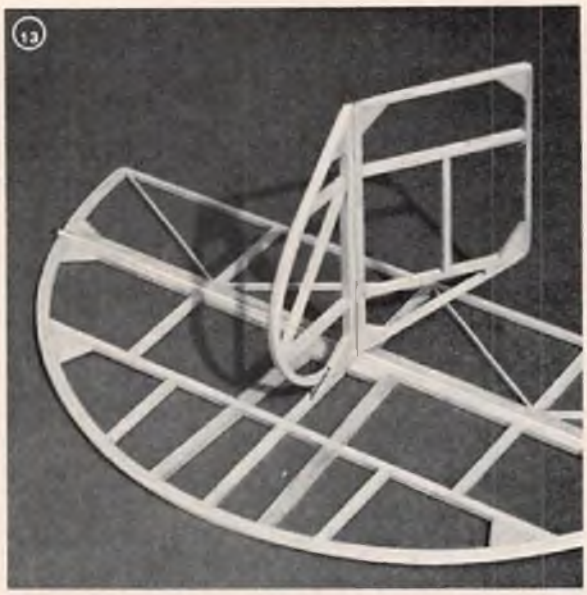


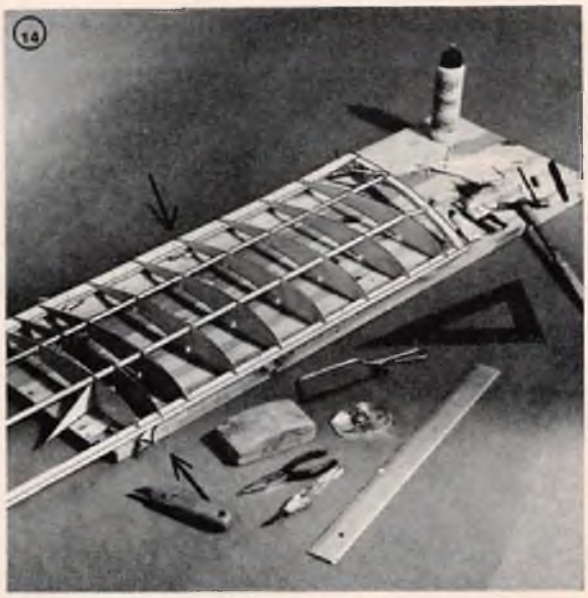


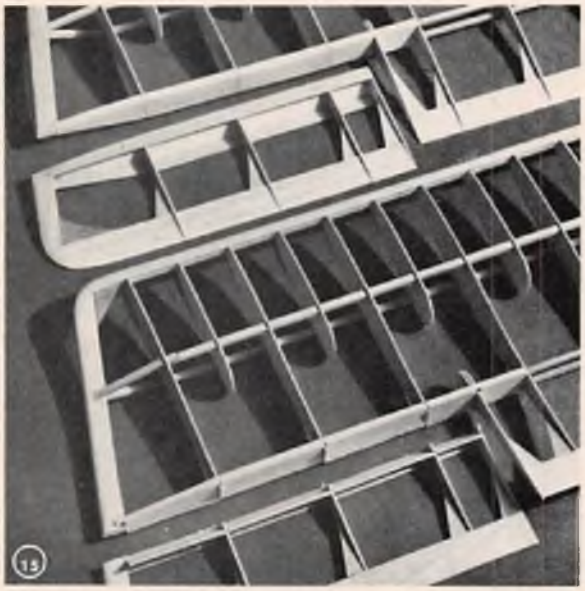


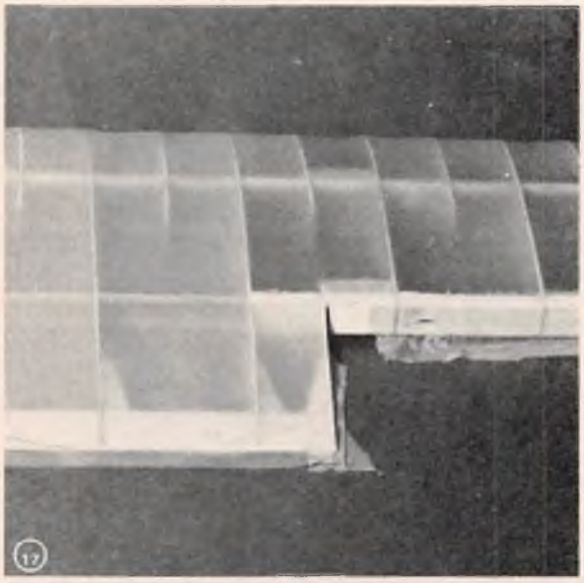


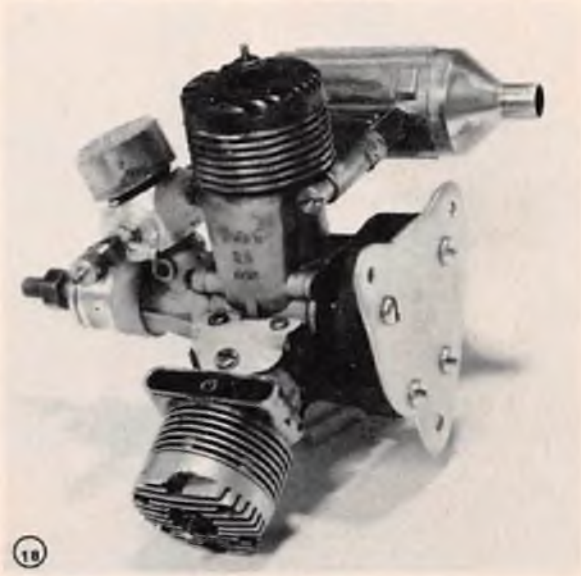
7. Another view of the fuselage framework, showing the landing gear mounts and braces. 8. Top view of covered fuselage showing cockpit and pylon. 3/16" balsa cockpit bottom is added later. 9. The tail wheel support. Front struts are inserted into tubing inlaid in the vertical braces, rear fastened with screws. 10. Landing gear detail; made from 1/8 and 5/32" wire. Wheels shown are homemade, but William's Bros. 5 inchers fit and look just right. 11. Optional landing gear assembly, of plywood and metal, as used on one of the prototypes. Outlines shown on plan for wire struts with wood added to simulate all wood struts. 12. Stab and fin, in the nude! Tube and pin full length hinges as shown were used on the original; optional Du-Bro hinges shown on plan.



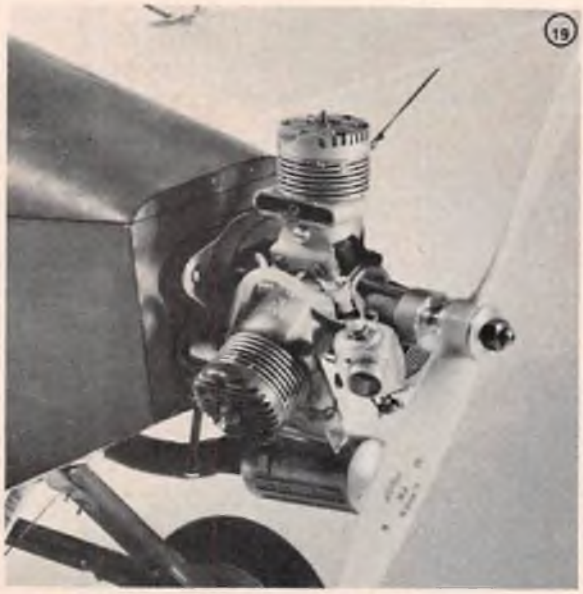


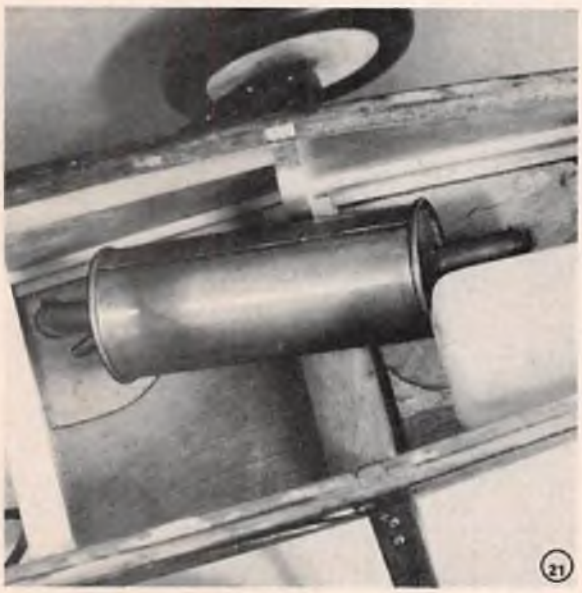






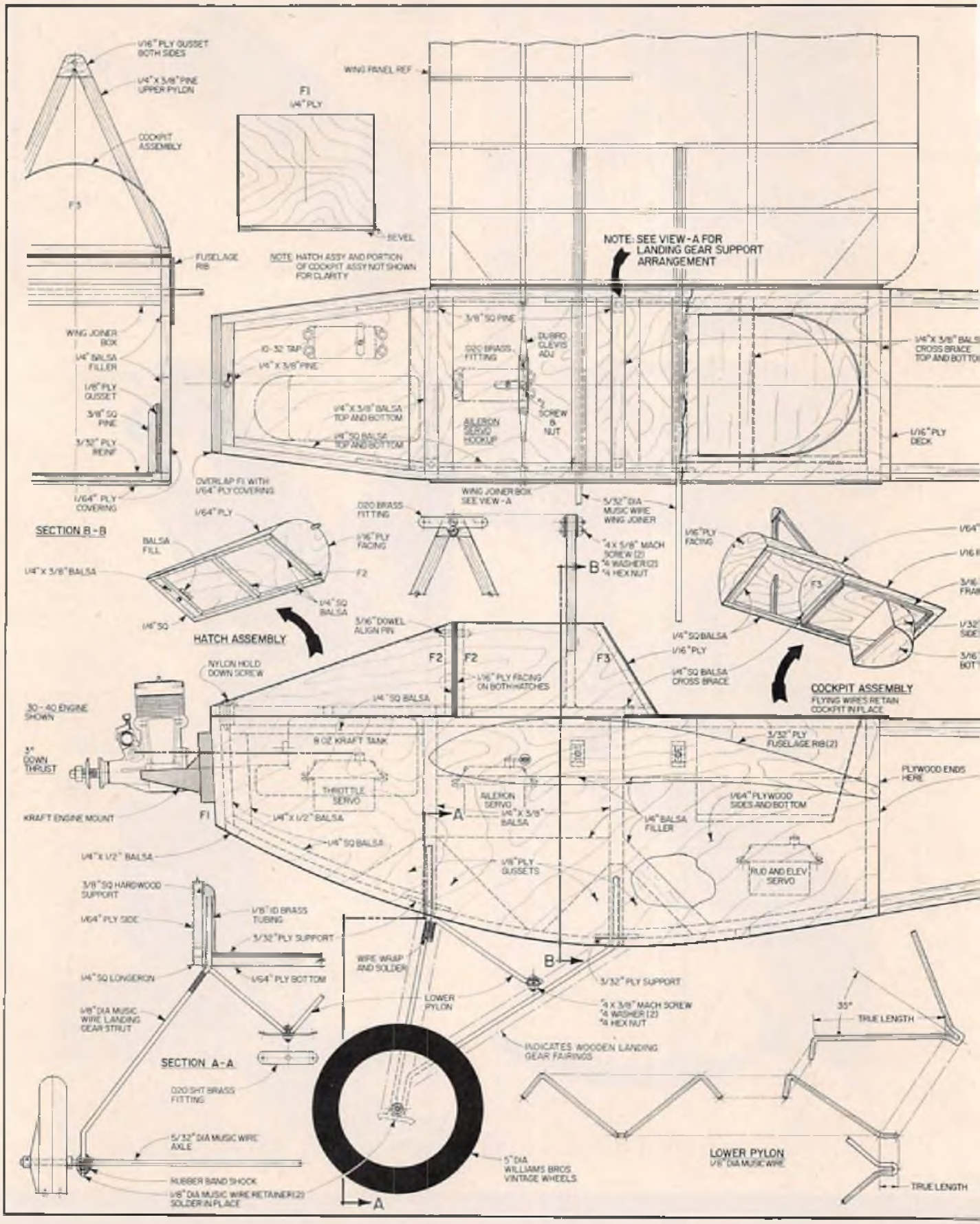
13. Fin and horizontal stab union. 14. The wing during construction. The arrow shows the blocking up of the trailing edge assembly. Note also the angle gauge on the root rib. 15. The ailerons are built as an integral part of the wing, then cut away and finished, as shown. 16. Installation of the aileron pushrod guides. First a piece of music wire is pushed through ribs, then hole is enlarged with drill bit. 17. And please, cover it with silk, none of the plastic iron-on coverings. The area under the stab and under the tailskid rubber band are uncovered. 18. Dummy cylinders from old engines are attached to the actual engine to simulate old time three cylinder job.



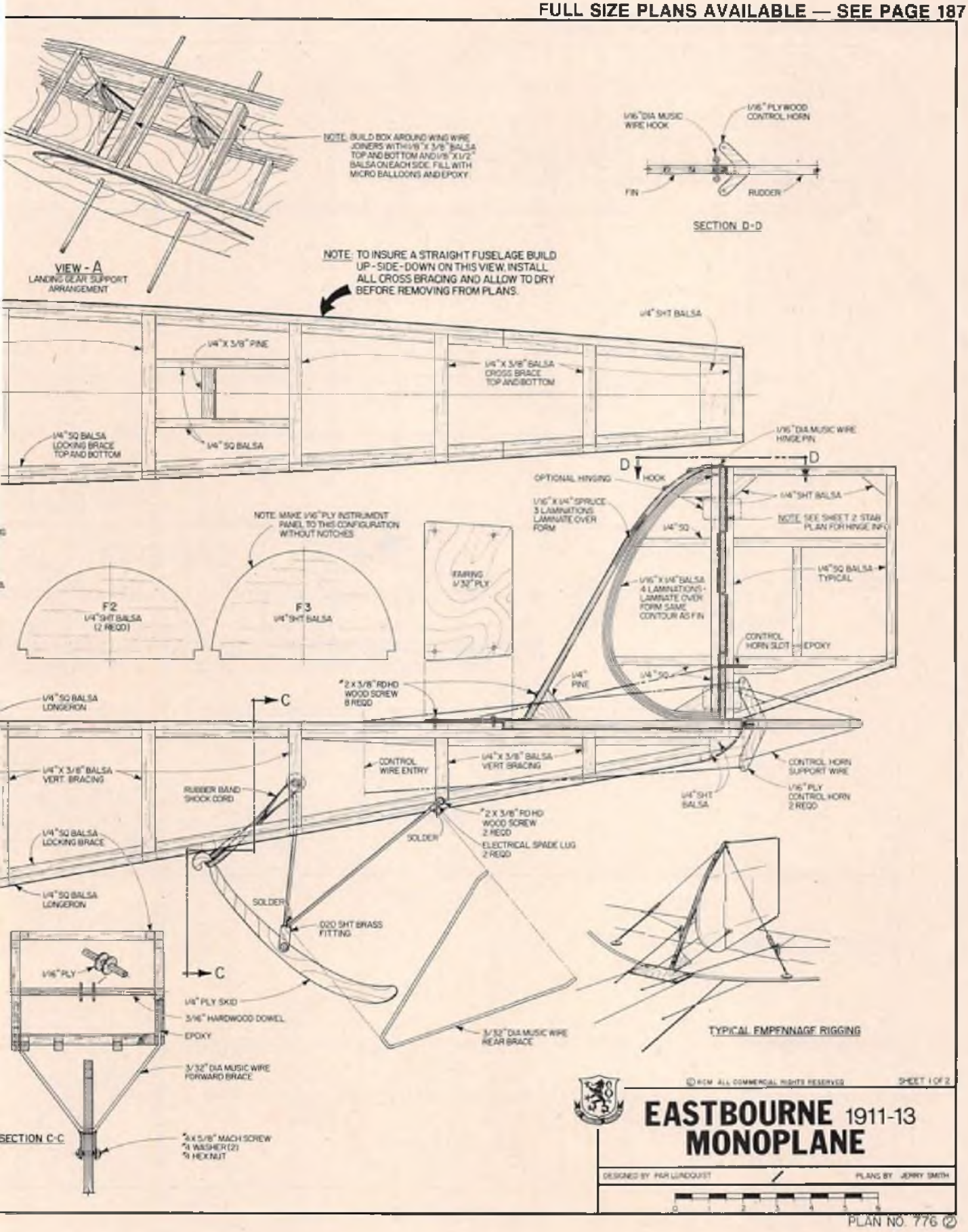


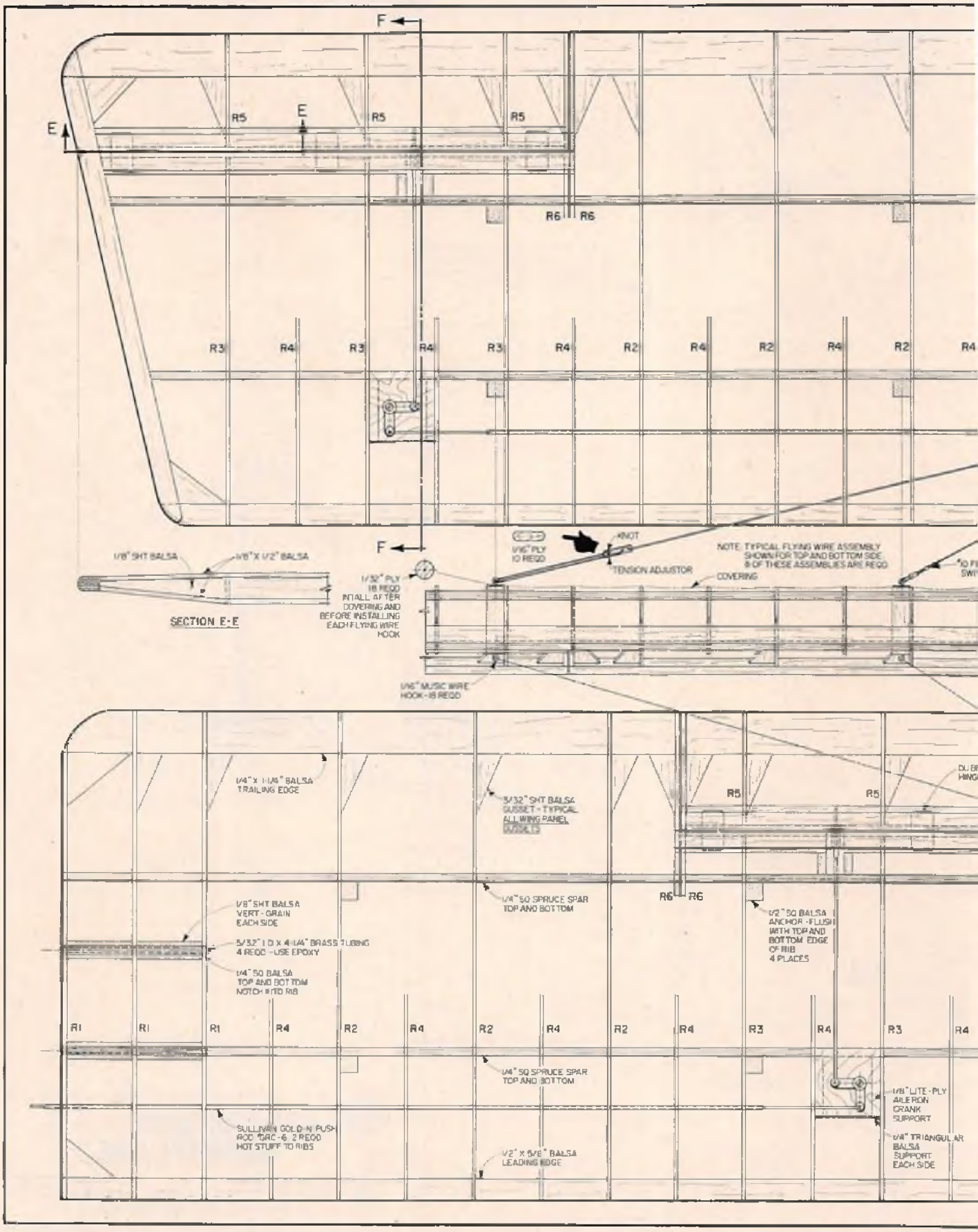
construction photos continued on page 42

19. Another view of the ersatz three cylinder engine. The cylinder in the foreground is the active one. 20. The muffler's muffler! Juice can is connected to engine muffler with silicone tubing. Outlet side in foreground, small tube is oil drain. 21. Installation of second muffler on the underside of model. 22. Throttle servo, tank, and second muffler in front of plane, also showing the servos for the other controls. Ample room all around. 23. Exact scale tailskid, including rubber band shock absorbers. 24. The empennage birdcage. Note the screws holding the horizontal stab and plywood hatch just forward.

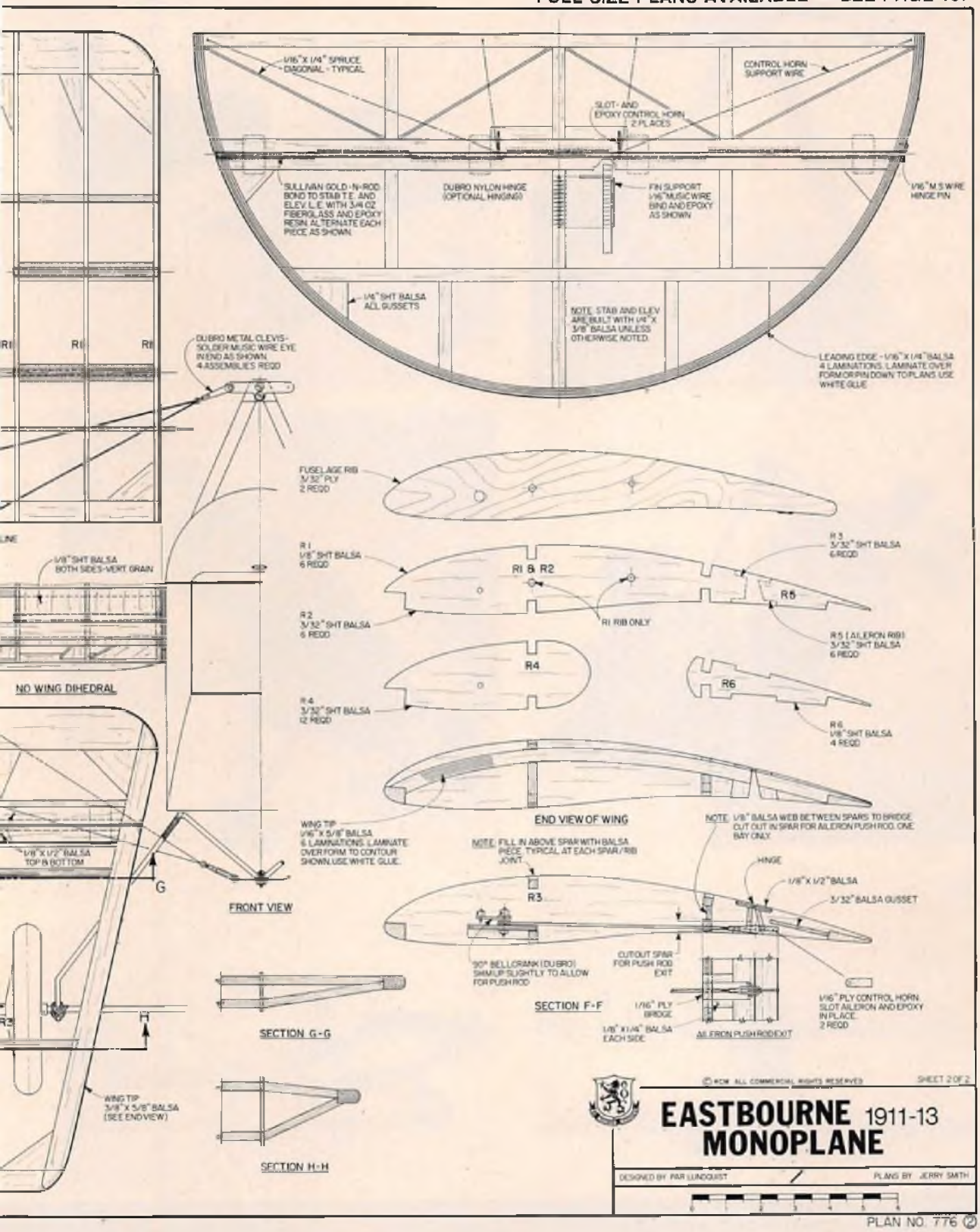

1/16" PLY GUSSET BOTH SIDES
1/4" X 3/8" PINE UPPER PYLON
COCKPIT ASSEMBLY
F3
FUSELAGE RIB
WING JOINER BOX
1/4" BALSA FILLER
1/8" PLY GUSSET
3/8" SQ PINE
3/32" PLY REINF
1/64" PLY COVERING
OVERLAP F1 WITH 1/64" PLY COVERING
F1
1/4" PLY
BEVEL
NOTE HATCH ASSY AND PORTION OF COCKPIT ASSY NOT SHOWN FOR CLARITY
WING PANEL REF
NOTE: SEE VIEW - A FOR LANDING GEAR SUPPORT ARRANGEMENT
3/8" SQ PINE
10-32 TAP
1/4" X 3/8" PINE
.020 BRASS FITTING
DUBRO CLEVIS ADJ
1/4" X 3/8" BALSA TOP AND BOTTOM
1/4" SQ BALSA TOP AND BOTTOM
AILERON SERVO HOOKUP
#2 SCREW & NUT
1/4" X 3/8" BALSA CROSS BRACE TOP AND BOTTOM
1/16" PLY DECK
WING JOINER BOX SEE VIEW - A
5/32" DIA MUSIC WIRE WING JOINER
.020 BRASS FITTING
#4 X 5/8" MACH SCREW (2)
#4 WASHER (2)
#4 HEX NUT
B
SECTION B - B
1/64" PLY
BALSA FILL
1/16" PLY FACING
1/4" X 3/8" BALSA
F2
1/4" SQ BALSA
1/4" SQ
HATCH ASSEMBLY
3/16" DOWEL ALIGN PIN
F2
F2
F3
1/16" PLY FACING ON BOTH HATCHES
1/4" SQ BALSA
NYLON HOLD DOWN SCREW
1/16" PLY FACING
F3
1/4" SQ BALSA
1/16" PLY
1/4" SQ BALSA CROSS BRACE
COCKPIT ASSEMBLY
FLYING WIRES RETAIN COCKPIT IN PLACE
30 - 40 ENGINE SHOWN
3° DOWN THRUST
KRAFT ENGINE MOUNT
8 OZ KRAFT TANK
THROTTLE SERVO
1/4" X 1/2" BALSA
1/4" SQ BALSA
F1
A
AILERON SERVO
1/4" X 3/8" BALSA
1/4" BALSA FILLER
3/32" PLY FUSELAGE RIB (2)
1/64" PLYWOOD SIDES AND BOTTOM
PLYWOOD ENDS HERE
RUD AND ELEV SERVO
1/8" PLY GUSSETS
1/4" X 1/2" BALSA
3/8" SQ HARDWOOD SUPPORT
1/64" PLY SIDE
1/8" ID BRASS TUBING
5/32" PLY SUPPORT
1/4" SQ LONGERON
1/64" PLY BOTTOM
1/8" DIA MUSIC WIRE LANDING GEAR STRUT
WIRE WRAP AND SOLDER
LOWER PYLON
B
5/32" PLY SUPPORT
#4 X 3/8" MACH SCREW
#4 WASHER (2)
#4 HEX NUT
INDICATES WOODEN LANDING GEAR FAIRINGS
35°
TRUE LENGTH
SECTION A - A
.020 SHT BRASS FITTING
5/32" DIA MUSIC WIRE AXLE
RUBBER BAND SHOCK
1/8" DIA MUSIC WIRE RETAINER (2) SOLDER IN PLACE
A
5" DIA WILLIAMS BROS VINTAGE WHEELS
LOWER PYLON
1/8" DIA MUSIC WIRE
TRUE LENGTH

FULL SIZE PLANS AVAILABLE — SEE PAGE 187




F
E
R5
R6
R3
R4
R2
R1
1/8" SHT BALSA
1/8" X 1/2" BALSA
SECTION E-E
1/32" PLY 18 REQD INTALL AFTER COVERING AND BEFORE INSTALLING EACH FLYING WIRE HOOK
1/16" PLY 10 REQD
KNOT
TENSION ADJUSTOR
COVERING
NOTE: TYPICAL FLYING WIRE ASSEMBLY SHOWN FOR TOP AND BOTTOM SIDE 8 OF THESE ASSEMBLIES ARE REQD
1/16" MUSIC WIRE HOOK - 18 REQD
1/4" X 1 1/4" BALSA TRAILING EDGE
3/32" SHT BALSA GUSSET - TYPICAL ALL WING PANEL GUSSETS
1/4" SQ SPRUCE SPAR TOP AND BOTTOM
1/8" SHT BALSA VERT - GRAIN EACH SIDE
3/32" I D X 4 1/4" BRASS TUBING 4 REQD - USE EPOXY
1/4" SQ BALSA TOP AND BOTTOM NOTCH # TO RIB
1/2" SQ BALSA ANCHOR - FLUSH WITH TOP AND BOTTOM EDGE OF RIB 4 PLACES
1/4" SQ SPRUCE SPAR TOP AND BOTTOM
SULLIVAN GOLD-N PUSH ROD "GRC-6 2 REQD HOT STUFF TO RIBS
1/2" X 5/8" BALSA LEADING EDGE
1/8" LITE-PLY AILERON CRANK SUPPORT
1/4" TRIANGULAR BALSA SUPPORT EACH SIDE

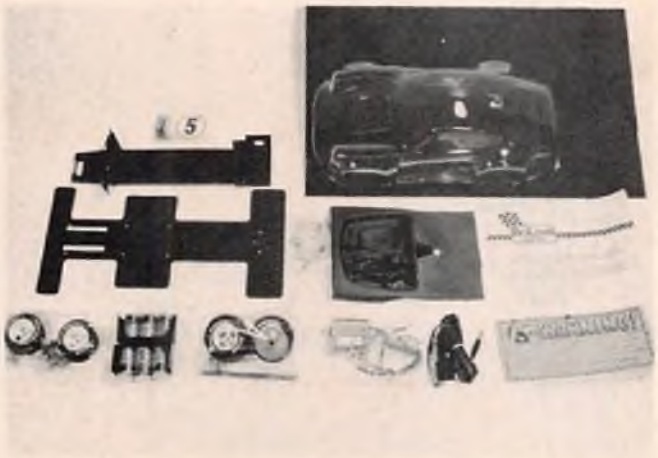
FULL SIZE PLANS AVAILABLE — SEE PAGE 187

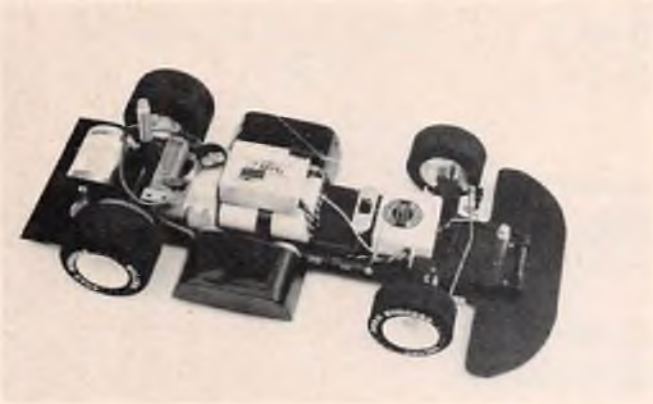


25. Pylon top rigging details. Proctor Enterprises makes a complete line of flying wires and fittings which can also be used. 26. Wings in place, ready for installation of hatchlpylon, and flying wires. Once length of wires is adjusted, field installation is rapid. 27. Looking over the pilot's shoulder just as he says "Clear!" Antique Al is sculptured from hard foam and epoxyitalc mixture. 28. Front view showing rigging details and realistic look on pilot's face. 29. A three cylinder spider web just before it catches up with you. 30. Hard to believe, but this was state of the art in aerospace at one time.

RCM PRODUCT REVIEW

BoLink Ind.
PORSCHE 911S





SPECIFICATIONS

Name	PORSCHE 911S
Car Type	1/12 Scale Race Car
Manufactured By	BoLink Ind. P.O. Box 80653 Atlanta, Georgia 30366
Mfg. Suggested Retail Price	$79.95
Available From	Both Mfg. & Retail
Length	14 Inches
Width	6½ Inches
Height	4 Inches
Wheel Base	7½ Inches
Tread	Front 5⅛" — Rear 4⅞"
Weight	42 Ounces
Suspension	Front — independent Ackerman Rear — controlled chassis flex.
Gear Ratio	3.67/1, 15T & 55T
Mfg. Rec. Engine	05 Electric (supplied)
Power Supply	Six .12v sub 'C' nicads (supplied) Cigarette lighter charge cord (supplied)
Speed Control	Ribbon wound resistor (supplied)
Recommended No. Of Channels	2 — speed & steering
Basic Materials Used In Construction:	
Chassis	Molded glass filled Polyethylene
Bracing Plate	Kydex
Gears	Drive/brass, driven/nylon
Shafts	H.D. steel
Wheels	Molded plastic
Tires	Long wearing sponge rubber
Body	Vacu-formed Tuffak
Instructions	13 pages w/diagrams & drawings
Photos	No
Kit Includes	Everything required except paint & trim

RCM PROTOTYPE

Finishing Materials	See text
Radio Used	Kraft KP2AW

Like some other R/C car manufacturers, BoLink uses the basic Jomac chassis and front end steering and springing assembly. However, BoLink also uses a 'Kydex' plate which bolts to the underside of the chassis through predrilled and countersunk screw holes which considerably stiffens the chassis and forms the front and rear bumpers too. The 'Kydex' plate also extends outwards on either side to form the support platforms for the six sub 'C' size, nicad, power-supply batteries.

Assembly instructions are sectioned A, B, C, etc., and these sections are subsectioned 1, 2, 3, etc., making a very clear sequence of assembly, even for someone having little or no experience in model car building. We were particularly impressed with the way they described the physical appearance of the various components to be used in each building step. This would be a big help to a novice builder (e.g., "C2 --- Find charging resistor — looks like a small white brick 3/8" x 3/8" x 3/4" with bare wires coming out of each end"). In addition to descriptions like the example given, there are eight pages of detailed assembly instructions, a separate complete list of parts in the kit and another list of accessories available for finishing the body, etc. (these accessories are **not** included in the kit, each modeler has his own ideas of how much body work he wants to do). There is also a sheet of helpful hints on finishing up the body and, finally, there is a full page perspective drawing of the completed chassis showing the names and locations of every part used in the project.

Quite frankly, we just started on page 1, section A1, and followed the whole thing through, exactly as it was written, and when we got to the end we had a car that worked perfectly! Is there any need to say more about how well the components fit or how clearly worded the instructions are? Well, we do have maybe just one suggestion. The instructions call for putting a partial charge in the batteries when the wiring is completed before the radio installation is made. It is not easy to adjust the arc and travel of the wiper arm across the speed control resistor when the system is 'live.' The car has to be jacked up or it flies off the workbench as the arm moves across the resistor controller. To simplify this set-up and adjustment, we soldered the positive lead onto the wiper arm **after** the arc and

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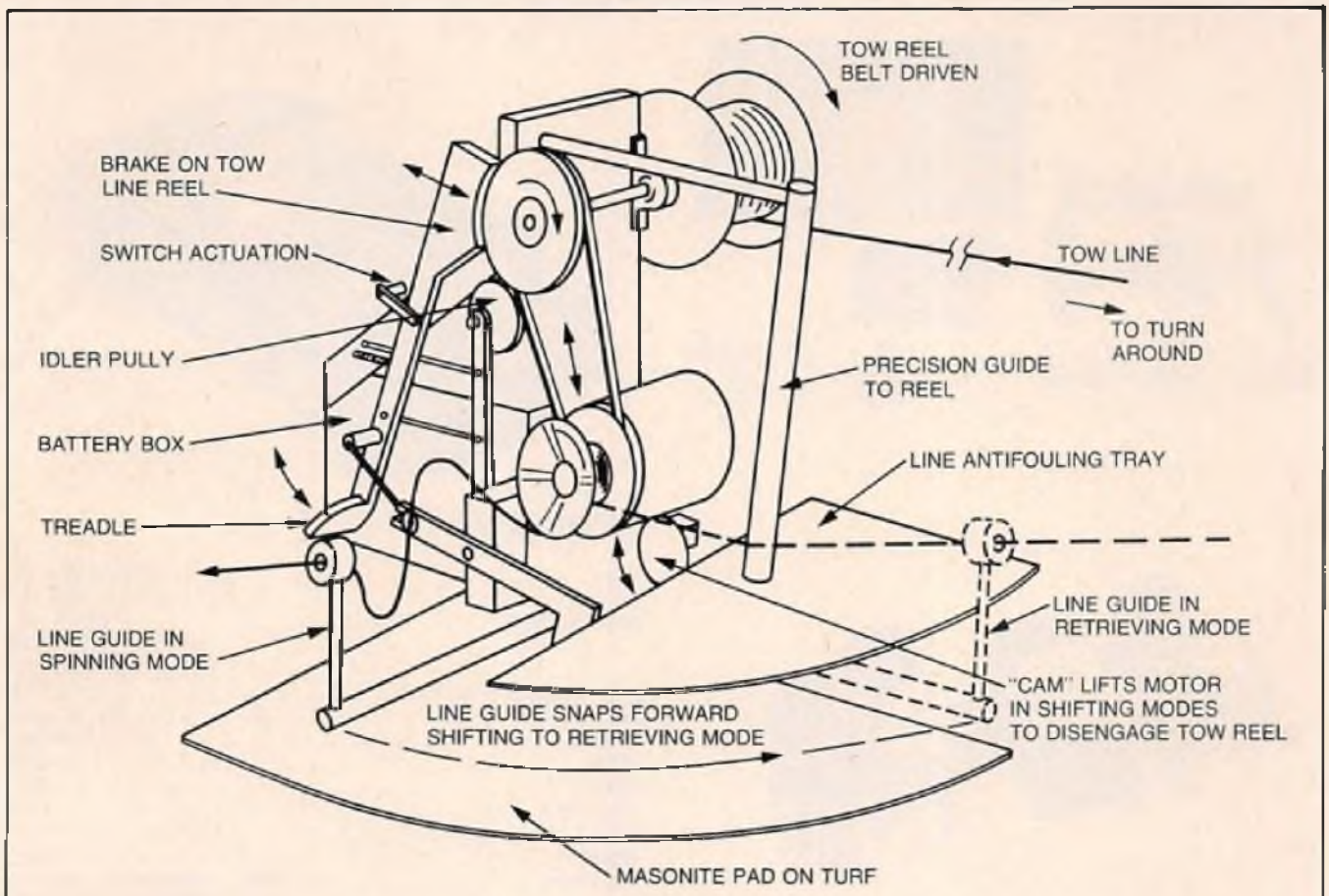
LAUNCH-RETRIEVER

By Richard D. Pratt



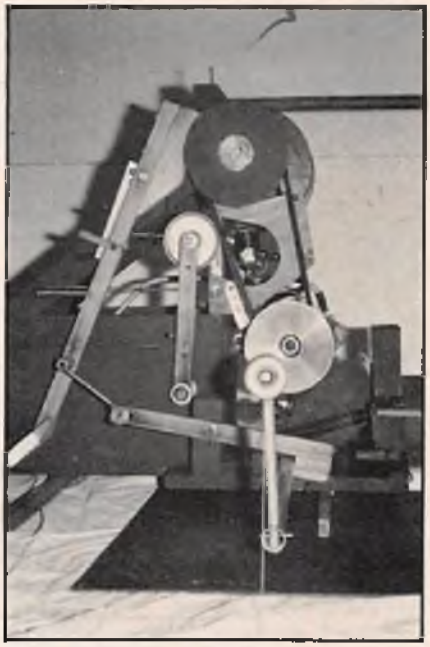
SCHEMATIC DESCRIPTION

ABOUT THE AUTHOR

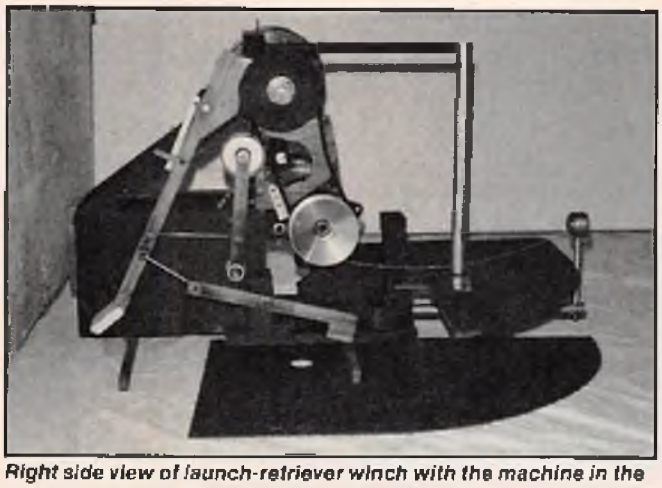
Dick Pratt, age 46, is married, has two children, and is a native of Cincinnati, Ohio. He is a Structural Plastics Engineer in the Aircraft Engine Group of the General Electric Company. His interest in RC flying started about a year ago when his brother, Tom (a master builder), gave him the "bug" on sailplanes which appears now to be incurable. Dick has just about torn the wings off his standard class Windrifter. The launch-retriever machine he has developed has created a lot of interest for both RC sailplaners and spectators alike. Dick's other hobbies are sailing and canoeing.

●*The hiking part of "Soaring and Hiking Society" would be over for you if you had a launch-retriever winch like Dick Pratt of Cincinnati, Ohio, designed and built. The machine makes use of the usual auto-starter motor to power the winch, but then includes a spinning reel that allows the retrieving line to follow the glider to hook release and then retrieves the line for you.*

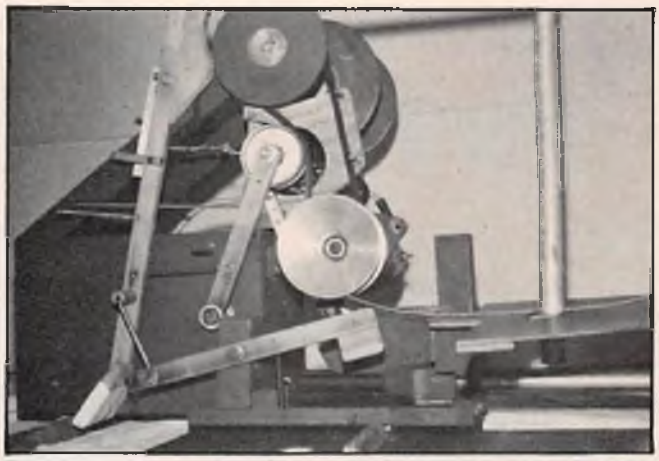
The idea started with the need to keep our "High Start" and standard winch lines in a narrow field after launching our gliders. Unless the wind was directly from the east or west, the lines might end up in a woods to the south or a field of blackberries to the north. After spending some time cutting trees to get lines or chutes back from the woods or gingerly picking them out of the briars, my brother, Tom, and I decided either we needed a new flying field or a method to keep the lines in the field. The mother of invention prevailed and an idea for a retriever was born. The first attempt to test the idea was made last fall with disastrous results. Tom and I used two winches to try the idea. One was used to launch the glider and the second one



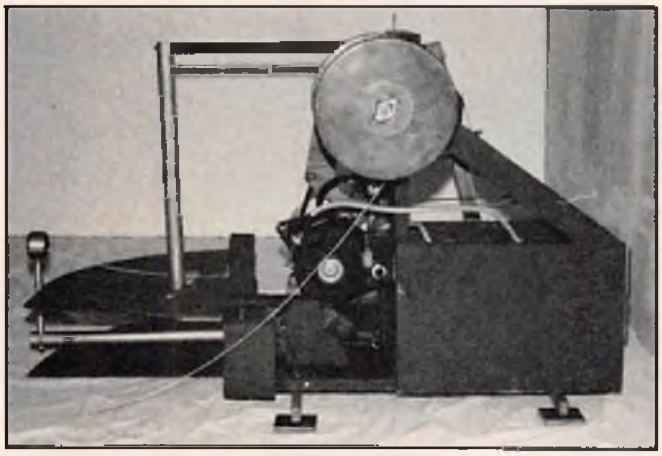
Right side view in the towing spinning mode. Note the line guide is at right angles to the retrieving reel. In this position line will spin off the reel – even while rotating – while being pulled aloft with the glider.



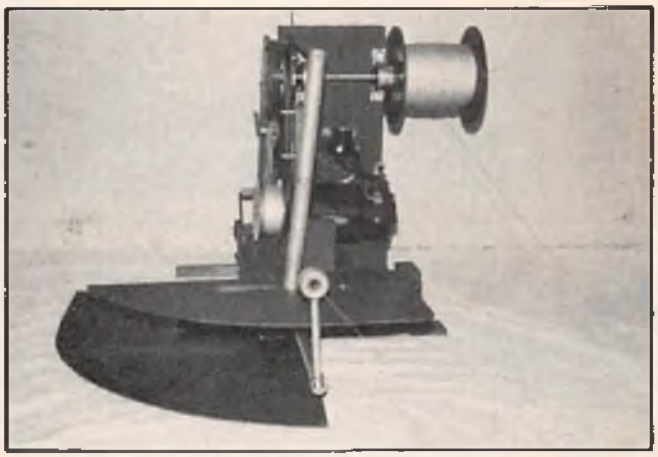
Right side view of launch-retriever winch with the machine in the retrieving mode. Note the line guide is positioned so that the retrieving line will wind up on the reel. The winch reel is disengaged with the treadle on the left only partially depressed.



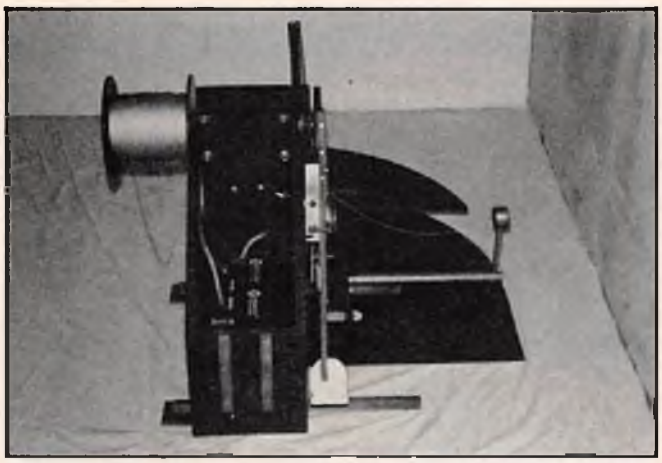
Right side view in retrieving mode, only with the treadle fully depressed. This engages the idler wheel driving the winch reel.



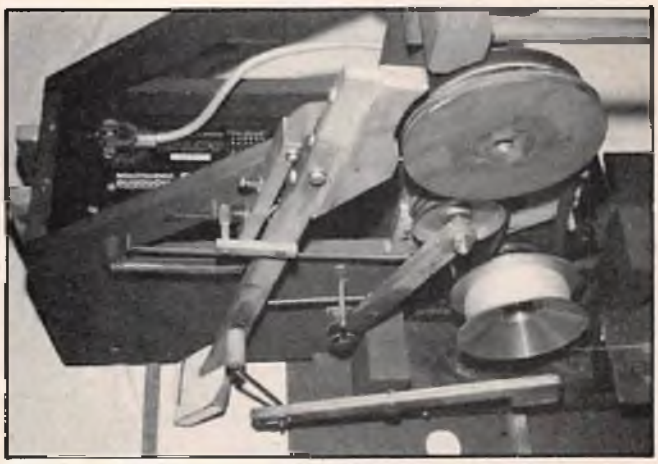
Left side in the retrieving mode.



Front view in the retrieving mode.



Rear view in the towing-spinning mode. Note the battery box and the control switches on the treadle.



Close up of battery box, brake, idler pully and treadle.

was rigged with a reel made so that a retrieving line would spin off the side of the reel and be towed aloft with the glider. The guinea pig glider was Tom's "Wanderer," which was used for all subsequent test flights. During launching we noticed how freely the spinning line followed the glider; so freely that it started to billow in the wind. At release the retrieving line drifted toward the woods and by the time I got the rewind started the line was in the woods. The idea showed some sign of working, but that billowing line had to be contended with.

With winter coming on flying weather gave way to building weather and the machine started to take form.

The principle of having a spinning line, carried aloft by the glider, for retrieving the winch line needed only refinement. Switching from the spinning mode of the reel to a retrieving mode was readily demonstrated by using an eye-type line guide that snaps from the side of the reel to its front instantly with the push of a

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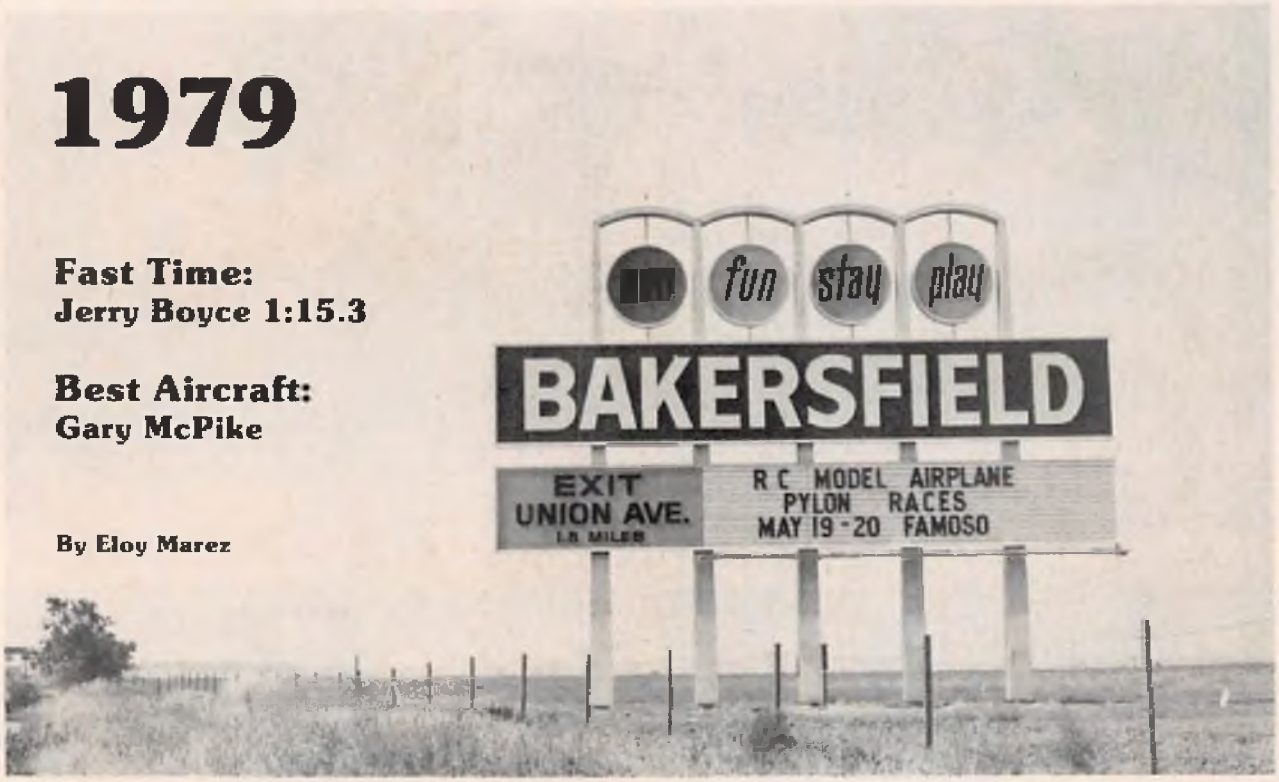
1979

Fast Time:
Jerry Boyce 1:15.3

Best Aircraft:
Gary McPike

By Eloy Marez



Dave Shadel, 1st Place Expert. Calls by Jim Shinohara

Expert Class

1. Dave Shadel
2. Tom Cristopher
3. Jerry Boyce
4. Clay/Barrett Team
5. John McDermott
6. Harley Condra
7. Ron Gilman
8. Rusty Van Baren
9. Andrew McIndoe
10. Leonard Walker

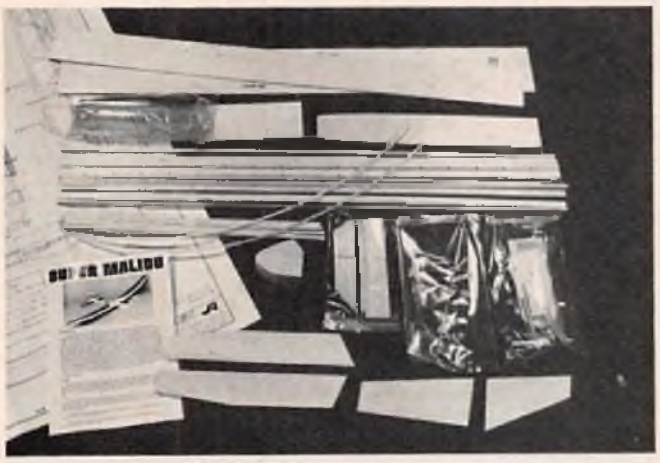
Standard Class

1. Larry Eckersley
2. Bruce Brown
3. Tad Sato
4. Tony Huber
5. Don Rice
6. Mack Moffat
7. Jay Ross
8. Tony Amezcua
9. Harry Gould
10. Gary Lennon

Larry Eckersley, 1st Place Standard. Caller: Andrew McIndoe

RCM PRODUCT REVIEW

Astro Flight Inc.
SUPER MALIBU



IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging		●				Pre-Shaped Parts		●			
Plans		●				Parts Match to Plans		●			
Written Instructions			●			Overall Parts Fit		●			
Quality of Hardwood		●				Ease of Assembly		●			
Quality of Fiberglass			NA			Fidelity to Scale			NA		
Other Materials		●				Flight Performance	●				
Accessories		●				Overall Appeal		●			
Die-Cutting		●									

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

SPECIFICATIONS

Name ..... SUPER MALIBU
Aircraft Type ..... Electric Power Sailplane
Manufactured By ..... Astro Flight Inc.
13377 Beach Ave.
Venice, California 90291

Mfg. Suggested Retail Price .....
(Sailplane Kit — $34.95)
(05 Electric Flight System — $54.95)
(Rapid Charger — $29.95)
Available From ..... Both Mfg. & Retail
Mfg. Recommended Usage ..... Sport Sailplane
Wing Span ..... 72 Inches
Wing Chord ..... 8" Inboard
7" (Avg.) Outboard
Total Wing Area ..... 525 Square Inches
Fuselage Length ..... 40 Inches
Radio Compartment Dimensions ..... (L) 14 ' x (W) 2" x (H) 2"
Wing Location ..... High Wing
Airfoil ..... Flat Bottom
Wing Planform ..... Constant Chord w/Double Taper Tips
Polyhedral ..... 2½ Inches
Stabilizer Span ..... 25 Inches
Stabilizer Chord (incl. elev.) ..... 5 Inches
Total Stab Area ..... 125 Square Inches
Stab Airfoil Section ..... Flat
Stabilizer Location ..... Top of Fuselage
Vertical Fin Height ..... 6 Inches
Vertical Fin Width (incl. rud.) ..... 6 Inches
Mfg. Rec. Motor Range ..... 05 Electric
Recommended Fuel Tank Size ..... NA
Landing Gear ..... Skid
Recommended No. Of Channels 2-3
Recommended Control Functions ..... Rudder & Elevator
Basic Materials Used In Construction:
Fuselage ..... Balsa & Ply
Wing ..... Balsa, Spruce & Ply
Tail Surfaces ..... Balsa
Hardware Included In Kit ..... Very Complete
Plan Size ..... 48" x 36" (1 sheet)
Building Instructions on Plan Sheets ..... Yes
Instruction Manual ..... Yes (6 pages)
Construction Photos ..... Yes
Kit Includes ..... Shaped & Die-Cut Parts
Mfg. Rec. Flying Weight ..... Not Given
Wing loading based on rec. flying wt. ..... Not Given for electric

RCM PROTOTYPE

Weight, Ready To Fly ..... 40.6 Ounces
Wing Loading ..... 11.2 Oz./Sq. Ft.
Covering & finishing materials used ..... Red & White MonoKote
Engine Make & Disp. ..... Astro 05
Muffler Used ..... N/A
Radio Used ..... Citizenship
Tank Size Used ..... N/A

The Super Malibu is the result of many years of improvements on the original Malibu which set a world's record for closed course distance of 189 miles in Hawaii in 1970. The wing was changed to use polyhedral, and the wing area was increased 100 sq. in.; the stab is now built-up and is 50% larger. This makes the Super Malibu much more stable and flys hands-off.

In the past year the Super Malibu has won three contests in California for electric powered sailplanes. When properly trimmed, the plane will give a motor run of from 5 to 7 minutes which will average out to a 20 to 30 minute flight when there is lift present. For this reason, we decided upon building the electric version. It can be built either way.

When you open the kit, the packaging will take your eye immediately, the pre-shaped wing ribs are enclosed neatly in a plastic bag as is the hardware. The balsa wood is of excellent quality and aircraft grade ply is used throughout. All ply pieces in the kit are sawed to shape not die-cut. The fuselage sides are die-cut and are so labeled to keep you from cutting them up for top or bottom sheeting. The only difficulty encountered in building the whole kit was the nose block. The hole for the motor/ballast was drilled part way through from the back, when you cut off the front end for electric and it was difficult to find a tool to use to cut out the remainder of the hole. A 1⅜" (11/8) hole saw was chucked into the electric drill and cut through as far as it would go. This piece was then cut out all the way through with a No. 15 X-Acto saw, the one with the long narrow blade.

A thorough look through the instructions, plans and photographs, gave no indication of how the motor was to be

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PURANAS

BY MARK GUMPRECHT

You ease the stick back just a bit further, trying to gain a few more precious feet of altitude. A quick turn, and then back along the slope, diving for speed. The sound of the wind whistling over the wings rises in pitch as the plane accelerates in the dive. You level out at cliff-top level and do a long four-point, a gigantic loop, or a few snap rolls, whatever suits your fancy, then begin to climb for altitude once again. What will it be this time? Perhaps a few outside loops or maybe a beach run followed by a vertical roll. This is what slope aerobatics is all about!

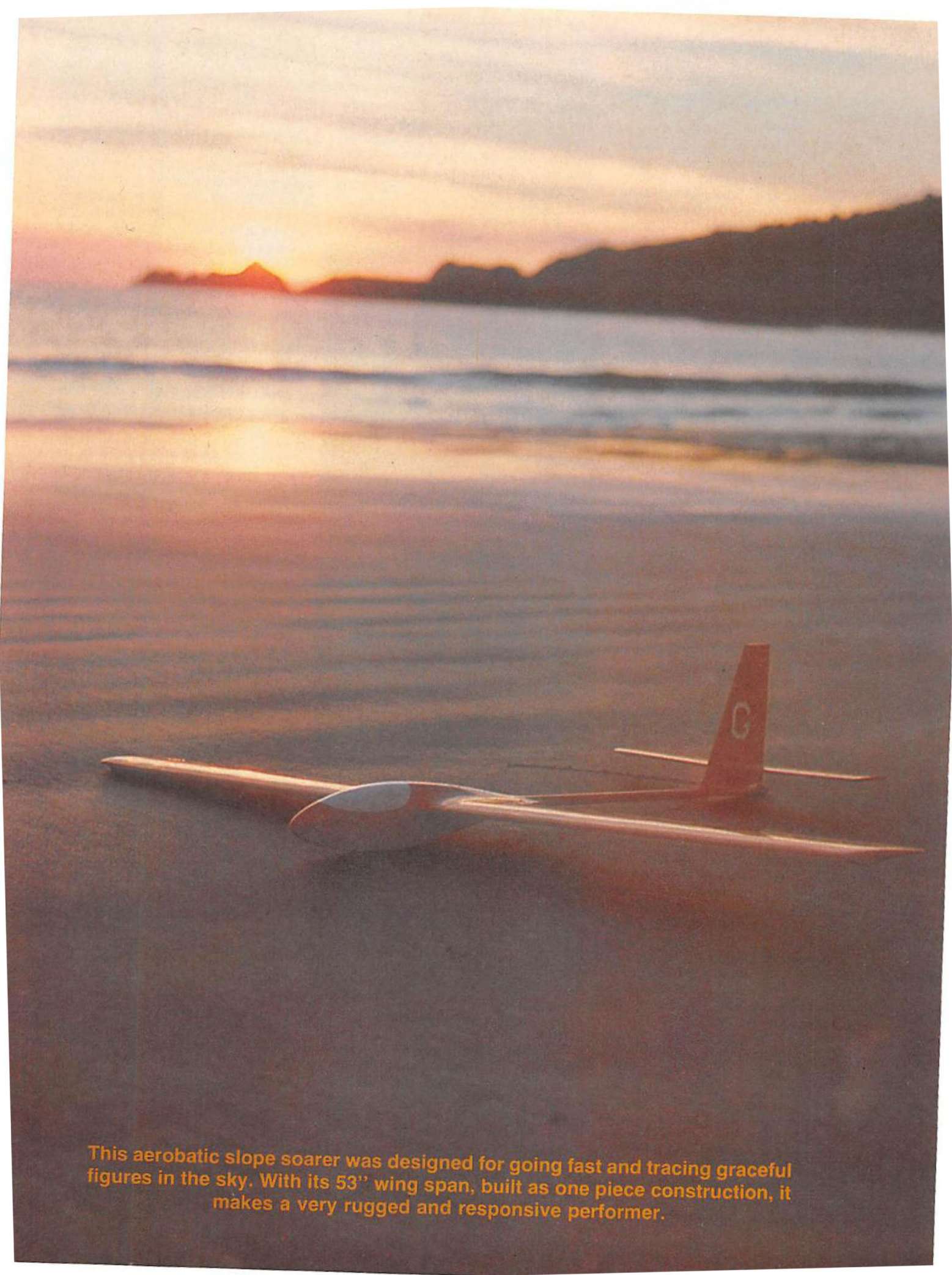
Puranas is designed for slope aerobatics; for going fast, tracing graceful figures in the sky. With a wing span of 53", it's smaller than the average slope ship. The most important consideration in deciding on the size was the planned one-piece construction. A larger plane would be too hard to work on without using a removable wing. One-piece construction gives a more rigid airframe which is important for high speed flight. The ailerons are permanently connected, saving the trouble of making some sort of detachable linkage necessary when detachable wing panels are used. A removable one-piece wing would seriously weaken the fuselage because of the mid-wing design. From past experience, I have noticed that aileron response is too slow for good aerobatics with wing spans above 65". The pilot must remain in one place, and by the time three rolls can be executed, the plane is almost out of sight. This can be detrimental in contest flying, as it is difficult to keep maneuvers within the visual limits, except by flying farther away. I find it hard to do accurate maneuvers when flying far away. A wing span of 53" gives the Puranas a fast roll rate, making it easier to do maneuvers closer in to the slope, but is not so small as to have that skitterish feeling of some smaller gliders. The smaller size also is nice when trying to fly on smaller, more confined slopes. The only disadvantage of smaller planes is increased sensitivity to turbulence, although it hasen't been much of a problem with this design. I've flown in some very strong winds with no problems, except the severe turbulence in the landing area where I fly.

The Puranas is designed along different lines than most slope stunters. I wanted to design a plane that was light and slippery, instead of heavy and fast. A heavy plane is more prone to breaking when it contacts the ground; a light, strong plane can take more bouncing about without getting hurt. Because I tend to build light planes, I decided to try a thinner airfoil of about 10-11% thickness. Then airfoils can perform well at slow speeds if they are lightly loaded. Several other tricks can be used to make thin airfoils behave. I always use a tip airfoil that is slightly thicker than at the root, with a blunter entry. This gives a wing with very gentle stall characteristics; I can still control the plane while holding full up elevator. No washout is used as it would have the reverse effect while inverted.

Most slope soarers rely on weight to overcome the drag of thick airfoils and boxy fuselages. Streamlining is very important if you expect a small, light plane to go fast. Every effort was made to reduce drag, as a clean airplane will go faster at lighter wing loading, and carry speed better. I used a pod and boom fuselage because I believe it is the cleanest configuration, as evidenced by trends in full size sailplanes. A fiberglass boom was used and has proven more durable than a conventional wood tail — it bends instead of breaking — yet is sufficiently rigid in flight. Since I began using the pod and boom configuration, I have noticed a definite improvement in L/D and speed, and no more broken tails.

Although not incorporated in this design, another plane of mine uses a fiberglass boom and plug-in rudder, mounted on music wire. This gives the ultimate in durability — there are no rigid joints to break. I have bounced the plane on its tail and sustained no damage. One disadvantage of a pod and boom fuselage, some will say, is lack of side area necessary for knife-edge flight. This is believed to be true because most planes have short, wide fins and need side area for good yaw stability. A tall, narrow fin with a good airfoil section is more efficient than a short, flat one — it generates more lift where it is needed — back in the tail, and eliminates the need for much side area. A flying stabilator, essential for good outside maneuvers, and a long tail-moment make for a smooth flying plane. The Puranas flies very well on ailerons and elevator alone, but I prefer to have rudder control for spins, snap rolls, and a little help on slow and 4-point rolls. I would recommend adding it if you feel you can squeeze in a third servo.

The Puranas has one surprising but enjoyable, characteristic. With most slope designs, it is necessary to adjust the wing loading according to the lift conditions. This can mean adding up to a pound of weight in larger planes. In a crash, this weight can be very destructive. Because of the thin airfoil, large wing fairings, and pod and boom fuselage, the Puranas seems very happy in all conditions at a flying weight of 24-26 ounces, or about 12 oz./sq. ft. It penetrates well even in very strong winds. I've never found it necessary to add ballast; which is good, because there isn't really much extra room for it.



This aerobatic slope soarer was designed for going fast and tracing graceful figures in the sky. With its 53" wing span, built as one piece construction, it makes a very rugged and responsive performer.

Because of the one piece construction and no need for ballast, assembling the Puranas at the field is simple — you just take it out of the car and throw it off the cliff.

CONSTRUCTION

The Puranas is not an altogether easy plane to build and I would recommend some building experience before attempting it. The radio installation is tight, so first determine if you can fit your radio in. The battery pack is the most critical — a KB-4M 450 ma Kraft pack fits very well. Also, some receivers may not fit. If you decide to use three servos, you may have to locate the hatch in a different place than shown on the plans. All linkages, except the rudder, are internal, to reduce drag, but may be made external to simplify construction.

Fuselage

First you must find a suitable fiberglass tube to use for a boom. It should be at least 1/2" in diameter, preferably tapered. You may be able to get something from a fishing pole manufacturer. Cut bulkhead B out of 3/32" plywood and two root airfoil templates out of 1/16" plywood. Locate some type of foam that can be sanded fairly well, and cut a piece the same length, width, and height as the fuselage. Make a template out of thin cardboard of the side and top profiles, and transfer the profiles to the foam block. Sand the foam to these two dimensions, but don't round the corners. Mark the location of bulkhead B on the foam block and cut the block at this location. Glue bulkhead B in-between the two pieces. Make sure you have already drilled the hole for the boom through the bulkhead. Don't use a solvent glue. Cut out a small piece of plywood the same diameter as the boom and glue it on the back of the foam plug where the boom leaves the fuselage. The wing fairings are built as part of the fuselage. Cut and shape two pieces of foam to extend the wing root on either side of the fuselage and glue them roughly in position. Cut the wing root templates where the wing brace extends from the fuselage and glue the templates in place. Be sure to subtract the thickness of the brace from the templates, and align them correct on the fuselage. The wing root should be directly in line with the boom. Now the foam plug is sanded to final shape, using bulkhead B and the root airfoil templates as guides. Shape according to the plans and the profiles drawn on the foam. The foam plug is now ready for glassing.

On the original, I used Hobbypoxy 2 and two layers of 6 oz. cloth with satisfactory results. But I have since learned of an easier method, as Hobbypoxy is hard to sand and 6 oz. cloth is a bit thick to follow the compound curves. Coating the foam with Devcon 5-Minute epoxy makes it possible to use polyester resin over the foam. Three layers of 4 oz. cloth would probably be better than 2 layers of 6 oz. cloth. Sand between each layer of cloth. After all the layers of cloth have been applied, sand the fuselage smooth. Using a razor saw and a cutting wheel, cut the hatch loose. Dissolve the foam out using acetone. Remove the plywood plug for the boom and insert the boom in the hole and through bulkhead B. Epoxy in place. Use 1/16" plywood webs between the boom and the fuselage and fill to final shape with micro-balloon and resin.

PURANAS
Designed By : Mark Gumprecht

TYPE AIRCRAFT
Aerobatic Slope Soarer
WINGSPAN
53 Inches
WING CHORD
7" root — 5" tip
TOTAL WING AREA
300 Square Inches
WING LOCATION
Mid Wing
AIRFOIL
11% Semi Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
0.5 Degree
O.A. FUSELAGE LENGTH
35 Inches
RADIO COMPARTMENT AREA
(L) 8½" x (W) 2" x (H) 2½"
STABILIZER SPAN
17 Inches
STABILIZER CHORD
2⅝" Average
STABILIZER AREA
45 Square Inches
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Mid-Fin
VERTICAL FIN HEIGHT
8 Inches
VERTICAL FIN WIDTH (inc. rudder)
4" Average
REC. NO. OF CHANNELS
2
CONTROL FUNCTIONS
Ailerons & Flying Stab
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Foam, Ply & Fiberglass
Wing ..... Balsa, Ply & Spruce
Empennage ..... Balsa & Ply
Weight Ready-To-Fly ..... 25 Ounces
Wing Loading ..... 12 Oz./Sq. Ft.

Wing

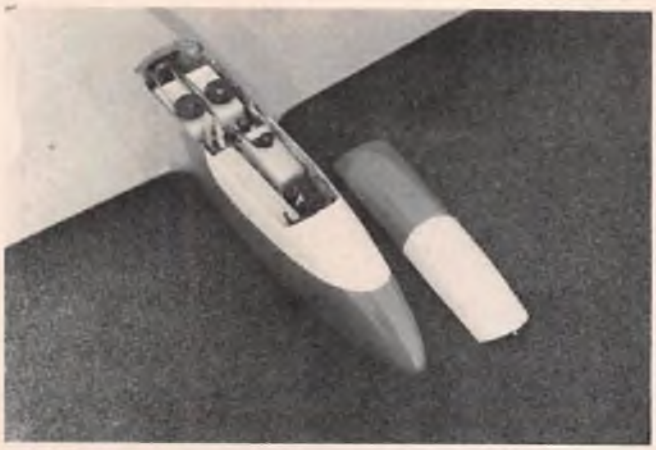
The wing uses all wood construction but would lend itself easily to foam construction if preferred. Cut out plywood templates of the root and tip airfoils, subtracting the skin thickness and aileron width. Mark the position of the spars. Make the rest of the ribs by stacking the correct number of 1/16" balsa blanks between the templates, pinning them together, and sanding to shape. Notch for the spars with a razor saw. Trim the backs of all the ribs so they form a straight line, and extend halfway into the trailing edge. Cut notches in the front of the ribs for the 1/8" x 1/4" leading edge. Position the 1/8" x 1/4" spruce spar over the plans and glue the ribs in place. Then glue the top spar in place. Make 1/16" notches in the 1/4" square balsa trailing edge and glue it onto the ribs. Glue on the 1/16" vertical grain balsa webbing while the spar is pinned to a flat surface. Glue the 1/8" x 1/4" spruce leading edge into the notches in the front of the ribs.

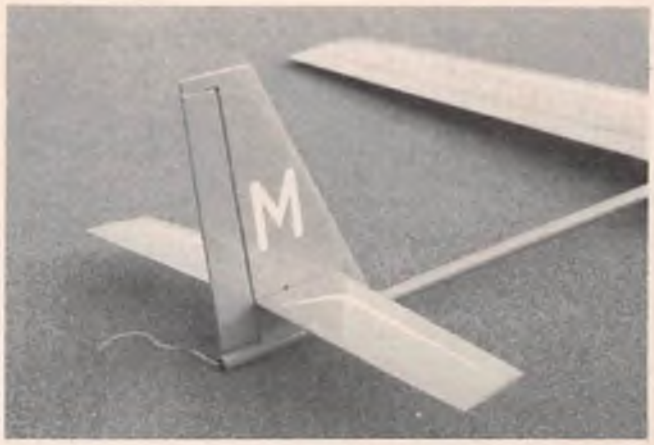
Bevel the edges so they follow the airfoil contour. Sheet the wing with 1/16" lightweight balsa, making sure the wing is true. Leave the sheeting off behind the spar next to the root section so the wing brace can be glued to the back of the spar. Now build the other wing panel. Install the wing tips on both panels.

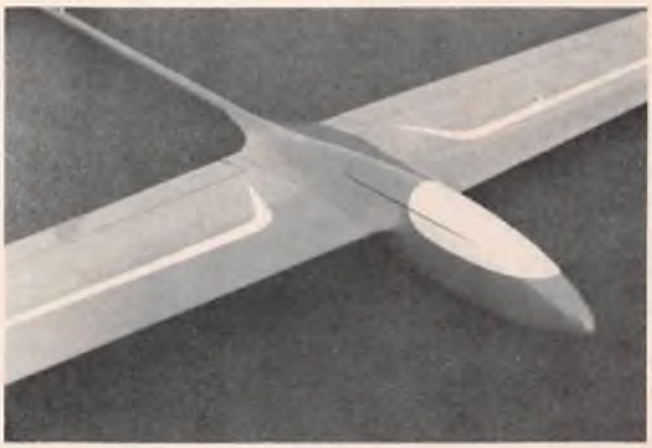
Now the wing panels are glued to the fuselage wing brace. If a foam wing is used, you might want to extend the braces. The wings should have just enough dihedral so they don't appear to droop. Epoxy the wing panels to the fuselage and wing brace, then glass the junction with 3/4 oz. cloth. Fill any irregularities with micro-balloons and resin. The aileron linkage is installed now by cutting a small hatch out of the top of the fuselage. Use 3/32" solid brass for the torque rod and a brass tube for the bearing. Insert the torque rod and bearing into the fuselage through the wing root and glue the bearing in place from inside of the fuselage. Solder a short control arm of brass to the torque rod. Make it as long as possible without hitting the top of the fuselage. Connect the aileron pushrods to the control arms with a clevis. Glass the hatch back in place and fill any cracks. Carve the ailerons out of tapered 3/8" balsa trailing edge stock and fit temporarily in place with hinges.

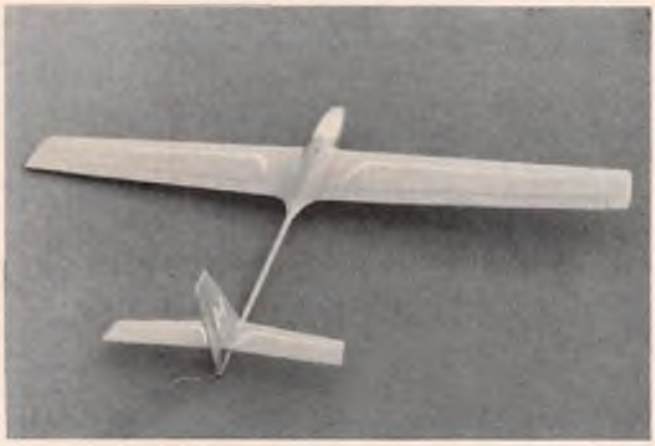
Tail Section

The stabilator is cut from 1/4" light balsa sheet and carved and sanded to airfoil shape. Install the plywood root ribs and cut slightly oversize slots where the brass tubes will go. Slide pieces of brass tubing into both stab halves and lay them onto a flat surface. Fill the slot with micro-balloons and epoxy; when dry, cut the halves apart and trim the tubes flush. Build the fin from 1/16" balsa sheeet with ribs to separate the skins. Leave enough space so the elevator horn will fit inside the fin. 1/16" plywood is used to reinforce the bearing area. Sand the fin to airfoil shape. The elevator horn is made from curcuit board material. I solder the brass bearing directly to the horn, then file them down so the horn will fit inside the fin. Remove the foil where the clevis will contact the horn. Make the horn just long enough to stick halfway into the boom when the fin is mounted. Make the elevator pushrod with 1/16" music wire and a 1/8" dowel. Solder a









clevis to one end. Make a slot on the top of the boom where elevator horn inserts. Make it long enough to allow sufficient movement of the elevator horn.

Put the elevator horn in the fin, insert the pivot bearing through the bearing in the horn, and epoxy the pivot bearing in place. The elevator pushrod is then connected to the horn while inside the boom. Epoxy the fin to the boom and slip the elevator horn down in the slot. Don't get any glue on the horn or pushrod. Cut a slot in the fin for the back pin of the stabilator and fit the stab to the fin, bending the stab wires slightly so they won't slip.

Finishing

The fuselage is filled and sanded, then painted with your favorite finish. The wings and tail are covered with MonoKote or some similar material to keep the weight down. Seal the ailerons with a thin strip of covering. Install the radio securely. The antenna can be run inside the boom.

I use several layers of Mystic clear plastic tape to protect the bottom of the fuselage. Make sure the plane balances as per the plans or slightly farther forward. The ailerons should have ±5/16" throw and the stabilator ±1/4" at the trailing edge. I use differential on the stabilator — more down than up — so less stick movement is needed for outside and inverted maneuvers. No differential is used on the ailerons.

Flying

Head out to your favorite flying site, and if the lift is good, throw your creation off. After you trim out, check the balance by putting the plane into a dive. Neutralize the stick. If the plane tucks, it's tail-heavy, if it pulls out it's nose-heavy. Ballast the plane accordingly. A nose-heavy plane is harder to fly than a correctly balanced one — more correction is needed during rolls and more elevator is required for loops. When balanced correctly, very little elevator is needed for inverted flight. The Puranas accelerates very quickly for such a light plane, so it's easy to gain the speed to do rolls even in light lift.

Tracking and handling are very smooth at all speeds. When the lift gets strong, the fun really starts. Most any pattern maneuver is possible with enough speed. Stall recovery is very fast and the ailerons work right up to stalling speed. Landing is fairly easy, but you must work at losing speed because the

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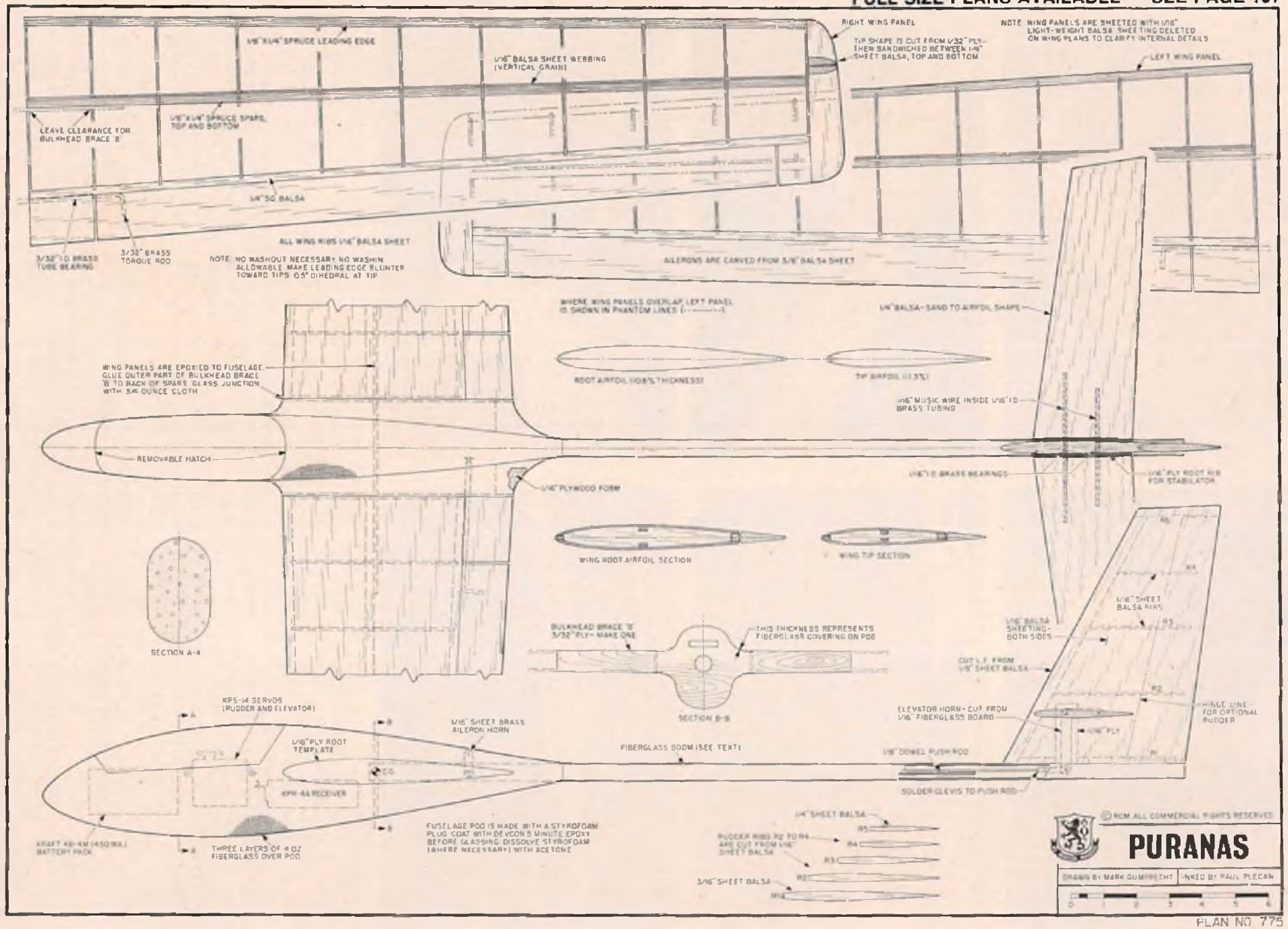
FULL SIZE PLANS AVAILABLE — SEE PAGE 187



PLAN NO 775

ON MAKING THE RIGHT HAND TURN

By Richard Teneau

The title of this article may seem strange to the uninitiated, but to anyone who had learned, or is learning, to fly radio controlled model aircraft, the right turn is a very real problem.

All of you who make right turns all the time with ridiculous ease might as well stop reading right now. This article is **not** for you. Believe it. These sage words are aimed smack dab at those of you who begin to shake uncontrollably at the mere thought of making a right turn (with your winged wonder). I know how it feels friend, I resisted every attempt to learn this unnatural maneuver for years. Oh I learned to fly all right. Take-offs, landings, loops, rolls, Immelmans, even an occasional Cuban Eight. But try a right turn? **No** thanks. As I had proved several times, right turns make airplanes fall out of the sky. I had begun to think of this fact as an overlooked aerodynamic theorem --- but even I had to admit full sized aircraft ignored my hypothesis. But in that unusual case, the pilot was in the plane --- not on the ground where he should be. That's a big difference I claimed --- loudly.

Then one day one of our better flyers draped a comforting arm over my shoulders and explained his unique method of learning to turn to the right. On just hearing about it, I knew my problems were solved --- no longer would I have to make four left turns with an out-of-fuel airplane to avoid one --- you know what. No longer would I have to avoid flying in contests because the rules call for maneuvers using right turns.

I began to chortle happily at the mere thought of piloting my craft through a **series** of right turns. That would show 'em. No longer would they shout, "How about a **right** turn?" as I flew, causing a flush of uncontrollable shame. A right turn **on take-off.** That was it. That was my goal!

My buddy — a wise and kind man who, himself, had flown 3 years before even attempting his first right turn — explained his system. "The problem is conquering fear." I nodded sagely.

"The only thing you have to fear is fear itself," he said solemnly. I was about to mumble that I'd heard that somewhere but he plunged into the nuts and bolts of his method.

"You've got to learn to talk to yourself. It's the only way. Imagine that you're flying along --- everything is nice and relaxed. You decide it's about time to try a right turn."

I shuddered.

"You stay calm ol' buddy and start talking **out loud** to yourself."

"Won't other people notice that?" I queried.

"No, not really --- they never tumbled to it when I was training myself. Anyway, don't worry about it. **You need to talk out loud to learn to turn right. Out loud, buddy. Out loud."**

He punched me in the chest with his sun bronzed finger, for emphasis. I paid close attention. He continued, "You simply keep reminding yourself out loud, how to get out of the right turn without crashing. For example, you start a right turn and, as you're turning, you keep telling yourself, 'I'm turning right . . . correct left . . . turning right . . . correct left . . .' This way, if any panic starts creeping in, you are already telling yourself what to do to get out of trouble. You **correct left** — and the plane comes back to a straight and level."

"You mean," I said catching on, "I just keep repeating --- turning right, correct left --- turning right, correct left. And like you say, if I begin to feel confused, I'm already telling myself how to avoid a crash."

"That's it. Simple, huh?"

I looked at my friend with genuine awe. "You're a genius," I said solemnly.

"Try it," he said humbly.

I did try it, right then and there. And it worked. Two scant weekends later, I realized a dream. I took-off and turned **right** immediately. It felt as if I'd invented Orville and Wilber. I was free, free to leap tall buildings at a single bound, run faster than a locomotive, and do all the things that a right turn really means.

Very seriously, the self correcting talk-to-yourself method of learning the right turn is almost guaranteed to succeed. With just a little practice, you'll become as proficient as the best in your club. And the rewards are extraordinary! The procedure turn, one of the most common contest maneuvers, uses a right turn. Only after you master the right turn can you master this key to contest participation. Consider also, the Figure Eight maneuver used in scale competition. Once again, our friend 'the right turn' is part of the maneuver.

Besides, as mentioned before, you can save valuable time in a "dead stick" situation. One right turn will often line you up for a quick landing that can save an airplane to fly again another day. Think about all the controlled crashes that you've seen happen just because the flyer was scared to death of a single right turn. Try it, you'll wind up with a right turn for a new friend.

NOTE: The author of this article is not responsible for any model aircraft damage due to any pilot error while trying this system for right turns.

□

RCM PRODUCT REVIEW

Balsa USA
PIPER J-3 CUB

IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging		●				Pre-Shaped Parts		●			
Plans	●					Parts Match to Plans		●			
Written Instructions		●				Overall Parts Fit		●			
Quality of Hardwood		●				Ease of Assembly		●			
Quality of Fiberglass			NA			Fidelity to Scale		●			
Other Materials	●					Flight Performance	●				
Accessories			●			Overall Appeal	●				
Die-Cutting	●										

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

The bigger they are the better they fly. 1/4 size models are now on the increase, thanks to larger engines which are easily available to the hobbyist.

Now we are talking about bigger models such as the J-3 Cub by Balsa USA. The span is 9' and the weight is 12 to 13 pounds with Quadra, O & R, and chainsaw engines. Pretty soon we'll be building them full size and flying them by radio.

If you haven't been bitten by the quarter size model bug, now is the time. In my estimation the bigger scale models with enough power are much easier to fly and are much more realistic in the air than, let's say, a model with a span of 5'.

So the next thing was to get my hands on the Cub kit. I gave Balsa USA a call and before you knew it my kit had arrived. I unrolled the plans and was completely amazed at the fuselage drawing and **both** wing drawings.

You should have a fairly good size workshop to build this baby in, it takes up more room than you can imagine. As there is a full size Cub at my local airport, pictures were no problem. The next step was to obtain a good set of 3-views for my presentation book and, after a lot of research my Cub was under construction.

The Balsa USA kit comes complete with all necessary hardware and also a nice vacuum formed cowl along with Cub decals. The plans are extremely well drawn and the instruction book is a must for building this model. Read it a few times to familiarize yourself with all of the building ideas used. I found all of the balsa and other materials in the kit to be of good quality, all die-cutting was of excellent quality and all parts fit good.

Wing construction is quite conventional with sheet leading and trailing edges. The rib at the fuselage end is laminated balsa and plywood. The leading edge itself is quite different and works out very well. It is pre-shaped and the upper and

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SPECIFICATIONS

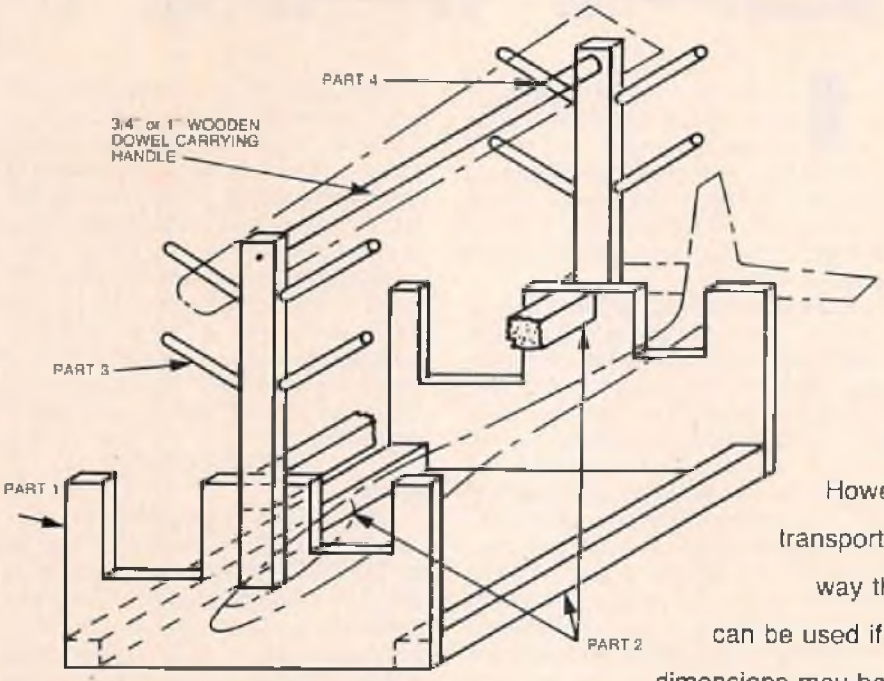
Name	PIPER J-3 CUB
Aircraft Type	1/4 Scale
Manufactured By	BALSA USA P.O. Box 164 Marinette, Wisc. 54143
Mfg. Suggested Retail Price	$74.95
Available From	Direct from Mfg.
Mfg. Recommended Usage	Sport Scale, General Sport
Wing Span	108 Inches
Wing Chord	16 Inches
Total Wing Area	1728 Square Inches
Fuselage Length	67⅞ Inches
Radio Compartment Dimensions	(L) 11¼" x (W) 7" x (H) 6½"
Wing Location	High Wing
Airfoil	Flat Bottom — Clark Y
Wing Planform	Constant Chord
Dihedral (each tip)	3 Degrees
Stabilizer Span	29½ Inches
Stabilizer Chord (incl. elev.)	12⅛ Inches
Total Stab Area	354 Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	14-3/16 Inches
Vertical Fin Width (incl. rud.)	13¾ Inches
Mfg. Rec. Engine Range	.60-2.0 cu. in.
Recommended Fuel Tank Size	12-16 Ounce
Landing Gear	Conventional
Recommended No. Of Channels	4
Recommended Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa & Ply
Tail Surfaces	Balsa
Hardware Included In Kit	See text
Plan Size	30¼" x 54"; 30¼" x 94¼" (2 sheets)
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (10 pages)
Construction Photos	No
Kit Includes	Shaped & Die-Cut parts
Mfg. Rec. Flying Weight	192 Oz.
Wing loading based on rec. flying wt.	16 Oz./Sq. Ft.

RCM PROTOTYPE

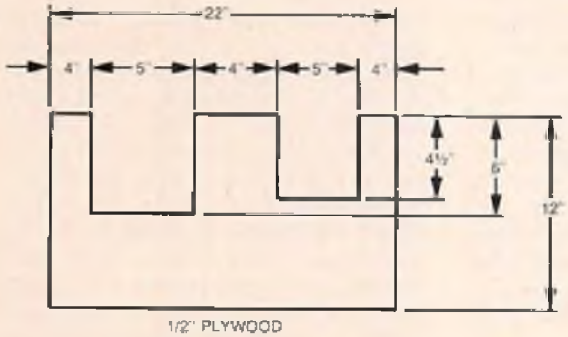
Weight, Ready To Fly	196 Ounces
Wing Loading	16.3 Oz./Sq. Ft.
Covering & finishing materials used	See Text
Engine Make & Disp.	O.S. Max .80
Muffler Used	Du-Bro
Radio Used	ProLine
Tank Size Used	14 Oz.

AIRCRAFT CARRIER

By Richard L. Shirey



Many times we do more damage to our aircraft in transporting them to and from the flying field than we do flying them. In order to reduce this kind of damage and also make the placement of the various wings and fuselages into the car easier, a holding/carrier device of some sort is needed. I generally carry a .40 size powered model and a 100" sailplane. However, at times 1/2A to .60's have been transported. The drawing presented shows the way the original was made. Other materials can be used if they are more readily available. Also, dimensions may be altered to suit the particular needs of the models to be transported. Assembly can be made with glue and nails or with flat head wood screws. I used the latter. Foam rubber was stapled to the fuselage notches for protection purposes. The dowels were also foam wrapped to protect the wings. Tape was used to secure the foam. The carrier rides well in the back of a station wagon, van, pick-up, hatchback, or whatever, and prevents many of the accidents and/or frustrations of loading and transporting. If you are going to damage your model, do it the right way. Do it while you're flying.



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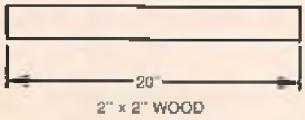

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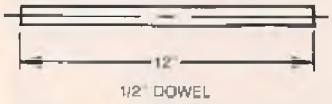

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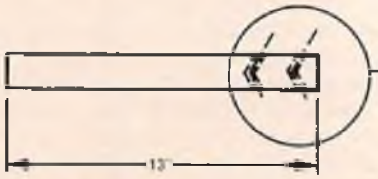

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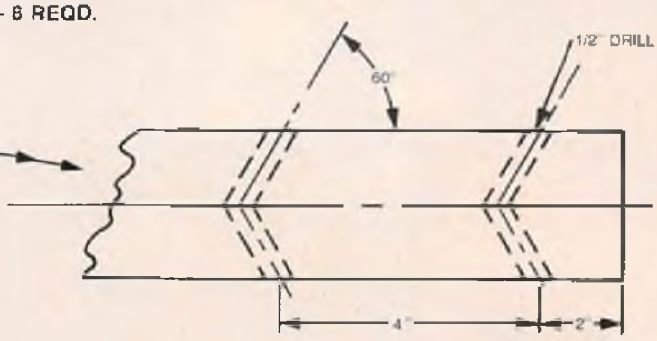


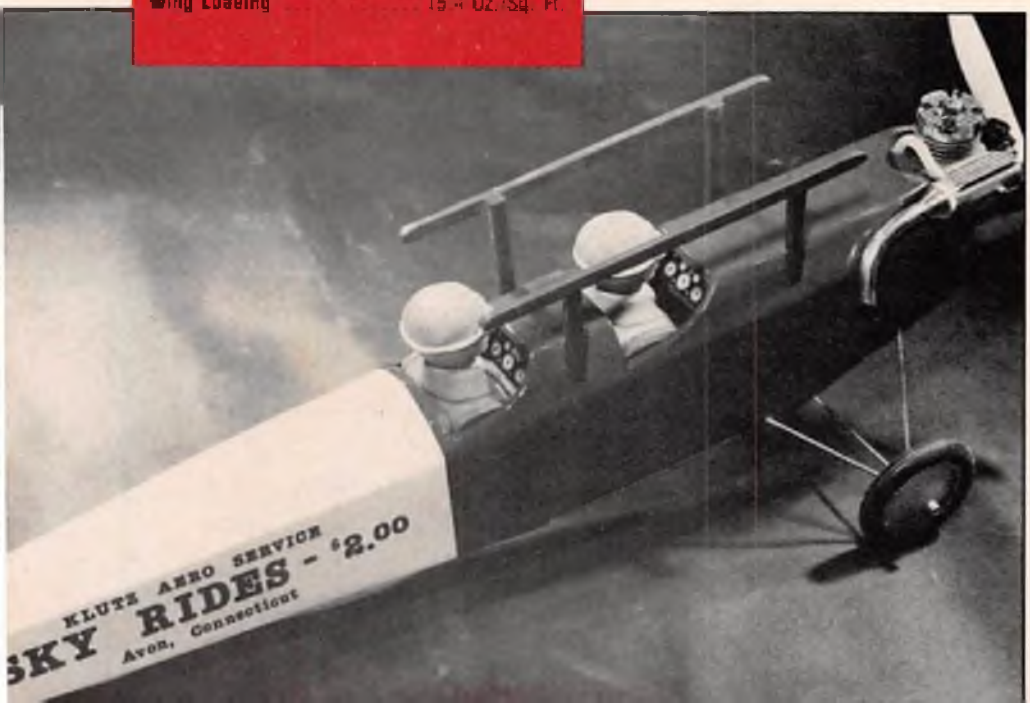
ENLARGED VIEW

PRAIRIE CANARY

PRAIRIE CANARY
Designed By : Bob Wallace

TYPE AIRCRAFT
Sport
WINGSPAN
36 Inches
WING CHORD
7 Inches
TOTAL WING AREA
252 Square Inches
WING LOCATION
Parasol Wing
AIREOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1¾ Inches
OVERALL FUSELAGE LENGTH
25½ Inches
RADIO COMPARTMENT AREA
(L) 5-5/16" x (W) 2⅛" x (H) 2⅝"
STABILIZER SPAN
12¾ Inches
STABILIZER CHORD (incl. elev.)
4⅝ Inches
STABILIZER AREA
60 Square Inches (Approx.)
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
4¼ Inches
VERTICAL FIN WIDTH (incl. rud.)
4⅜ Inches
REC. ENGINE SIZE
.049-.09
FUEL TANK SIZE
1 or 2 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
2 or 3
CONTROL FUNCTIONS
Rud., Elev. and Opt. Throt.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Spruce
Empennage	Balsa
Wt. Ready-To-Fly	27 Ounces
Wing Loading	15.4 Oz./Sq. Ft.



In aviation's short history the late 1920's and early 1930's bore witness to rapid proliferation and growth of homebuilt aircraft designs, several of which continue to this day to be popular subjects amongst the full scale aircraft building fraternity.

The era of the Pietenpol Air Camper, Heath Parasol, Corbin Baby Ace, Irwin Meteorplane, etc., is filled with nostalgia and offers the R/C modeler an extensive variety of designs to ponder. The Heath Parasol for example was one of the most popular designs of that period, yet virtually no two were built alike. Some of the less notable homebuilts of the 20's and 30's, illustrated the fact that their designer's engineering and building capabilities did not always match their enthusiasm to fly — a short coming for which they often paid the ultimate price. This colorful and zany period of aviation history is, to me, infinitely fascinating. If you share a similar interest in that era — read on — for the Prairie Canary is a composite of several older homebuilt designs. While it is not a scale model of any particular design, it does retain the distinctive look of a vintage homebuilt.

The Prairie Canary is easy and rapid to build; and demonstrates trainer like flight characteristics. To those virtues, add the economy of low fuel cost, small field capability, easy transportability; and you have an R/C design that spells "FUN."

Interested? If so rummage through your balsa wood supply, grab your X-Acto, and let's get into the construction details. The following construction details are laid out with the R/C modeler, who is building from plans for the first time, in mind. The experienced modeler will therefore find many of the construction steps and information to be of a redundant or unneccessary nature. In either case, it is recommended that you study and familiarize yourself with the plan before proceeding.

CONSTRUCTION

Wing:

Start by cutting out the wing ribs, you'll need twelve W2 ribs and six W1 ribs, all cut from 3/32" sheet balsa. Stack each group of ribs and pin together. Carefully sand the pinned together ribs to a uniform contour. (No matter how carefully you have cut each rib out, there will likely be minor variations in them.) Cut or file the main spar notches to the proper size. Cut 1/4" (as indicated on the plan) from the trailing edge end of four of the W1 ribs. Place the wing plan on your flat building board surface and cover it with wax paper or clear vinyl. Both wings can be built simultaneously. The trailing edge, main spar and leading edge pieces are cut to the proper length for each wing. Pin the main spars in place over the plan. Using several ribs placed temporarily on the main spars as spacers, pin the leading and trailing edge pieces in place. (The use of ribs as spacers will insure a proper joint when the ribs are glued in place.) The bottom 1/16" balsa center section sheeting is glued in place between the leading edges and the main spars. Note the position of the 1/4" square center section, trailing edge reinforcing pieces, and the angle to which they must be planed or sanded to allow for the top sheeting.

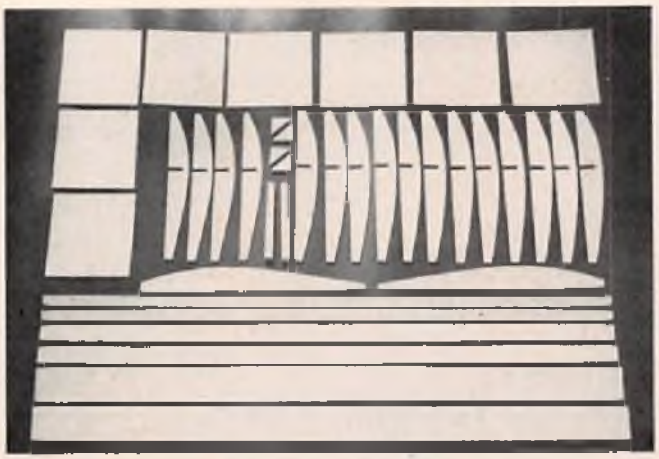
Install the 1/16" bottom sheeting between the main spars and the trailing edges. Glue the 1/4" square trailing edge reinforcement pieces in place. As the bottom sheeting now covers the center section rib positioning lines on the plan, use the small guide lines in front of the leading edge and aft of the trailing edge to properly position the center section ribs. The two center ribs should be angled slightly to produce the proper dihedral angle when the two wing halves are joined together. (An angle gap of

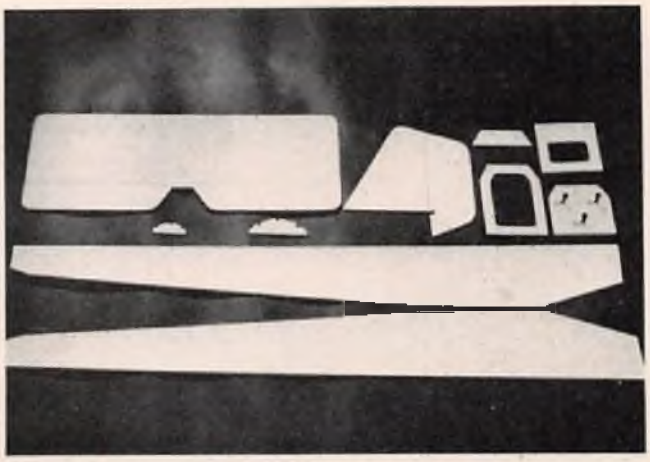
Color Photo by Lloyd Burnham

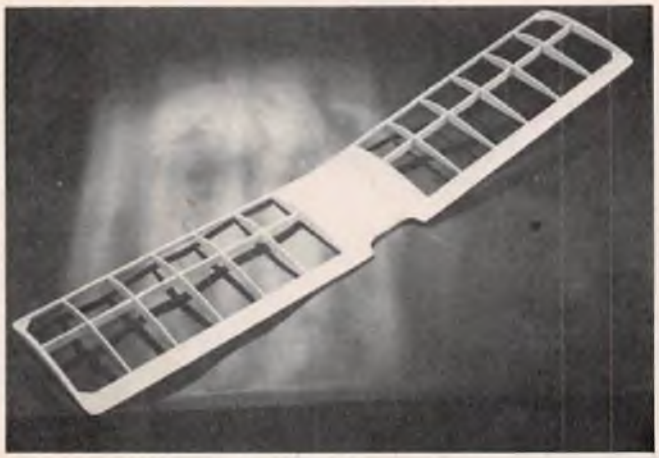
Designed and presented for the RC'ers first scratch-built model. It's easy and rapid to build, along with low fuel cost, small field operation and demonstrates trainer type flight characteristics. It all adds up to an RC design that spells "fun."

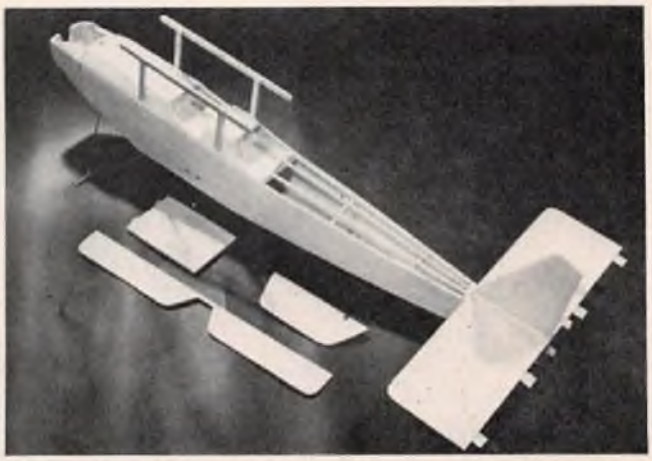
BY BOB WALLACE

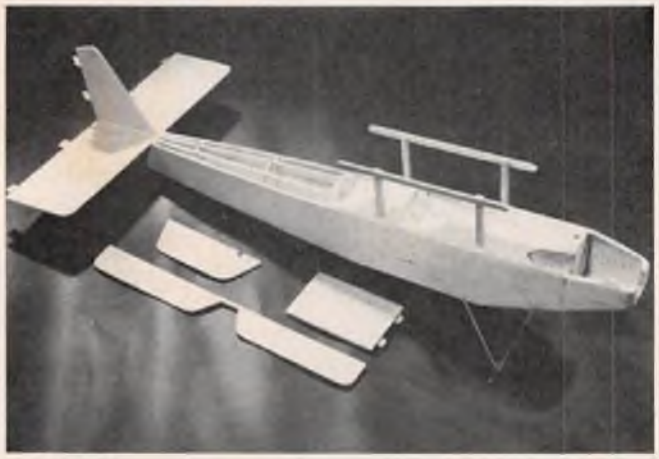
3/16" between the top of these ribs, over the main spar, is just right). Pin and glue all ribs in place. Care should be exercised in not gluing the two center ribs, sheeting, spars, and leading and trailing pieces together at the wing centerline. Glue the 1/8" sheet balsa gussets in place. After the glue has dried, remove the pins holding the center section ribs in place and glue the 1/16" sheet balsa top center section sheeting in place on each wing half. When dry remove the wing halves from the building board and glue the 1/8" sheet balsa tips in place. The wing leading edges should be carefully planed and sanded to the proper shape, as shown on the plan. The two wing halves are now joined by blocking up the wing tips to the indicated dihedral angle (1¾" each tip) and gluing them together. Use your building board for this step, to insure that the wing will be true with no "built-in" twist. When dry, remove from the building board. The entire wing should be sanded smooth. The center











section joint should be reinforced by covering it with a 1" wide strip of 2 ounce fiberglass cloth and polyester resin. (Epoxy may be used instead of resin.) To do this simply coat the joint liberally with resin and lay the strip of fibreglass cloth in place. Gently smooth the cloth out and blot off the excess resin with toilet tissue or a paper towel. When the resin has hardened, the fiberglass cloth strip should be lightly sanded to remove any high spots or rough edges. The wing is now fine sanded in preparation for covering and set aside.

Tail Surfaces:

The tail surfaces are cut from 1/8" sheet balsa, as indicated on the plan. The two elevator halves are joined together by the use of a short piece of 1/8" hardwood dowel; which is glued in place, as shown, with both elevator halves pinned down to your building board to insure that they will be aligned properly. Cut the hinge slots. If you intend to cover the tail surfaces with a heat shrinkable film type covering, do not install the hinge now. It is far easier to cover the tail surfaces separately and install the hinges and control horns afterwards. A tighter hinge line (small gap) is then obtainable. This makes your control surfaces more efficient and also looks better. The tail surface pieces should be rounded on all exposed edges, as shown, fine sanded, and set aside.

Fuselage:

Start by cutting the fuselage sides out of 1/8" sheet balsa. Cut out all fuselage formers from plywood or balsa as indicated on the plan. Mark the location of the respective formers on the inside surface of the fuselage sides, lightly with a pencil. Lay a fuselage side directly on the plan over the fuselage side outline and glue the 1/4" x 1/8" spruce wing support pieces in place. This will insure that you have the proper wing incidence, built-in. Construct the wing supports on the fuselage left side directly over the right side. The vertical spruce pieces should be laid down first on top of the right side uprights, otherwise you will wind up with two right fuselage sides! Glue formers F1, F2, & F3 in place, being sure that each is square to the

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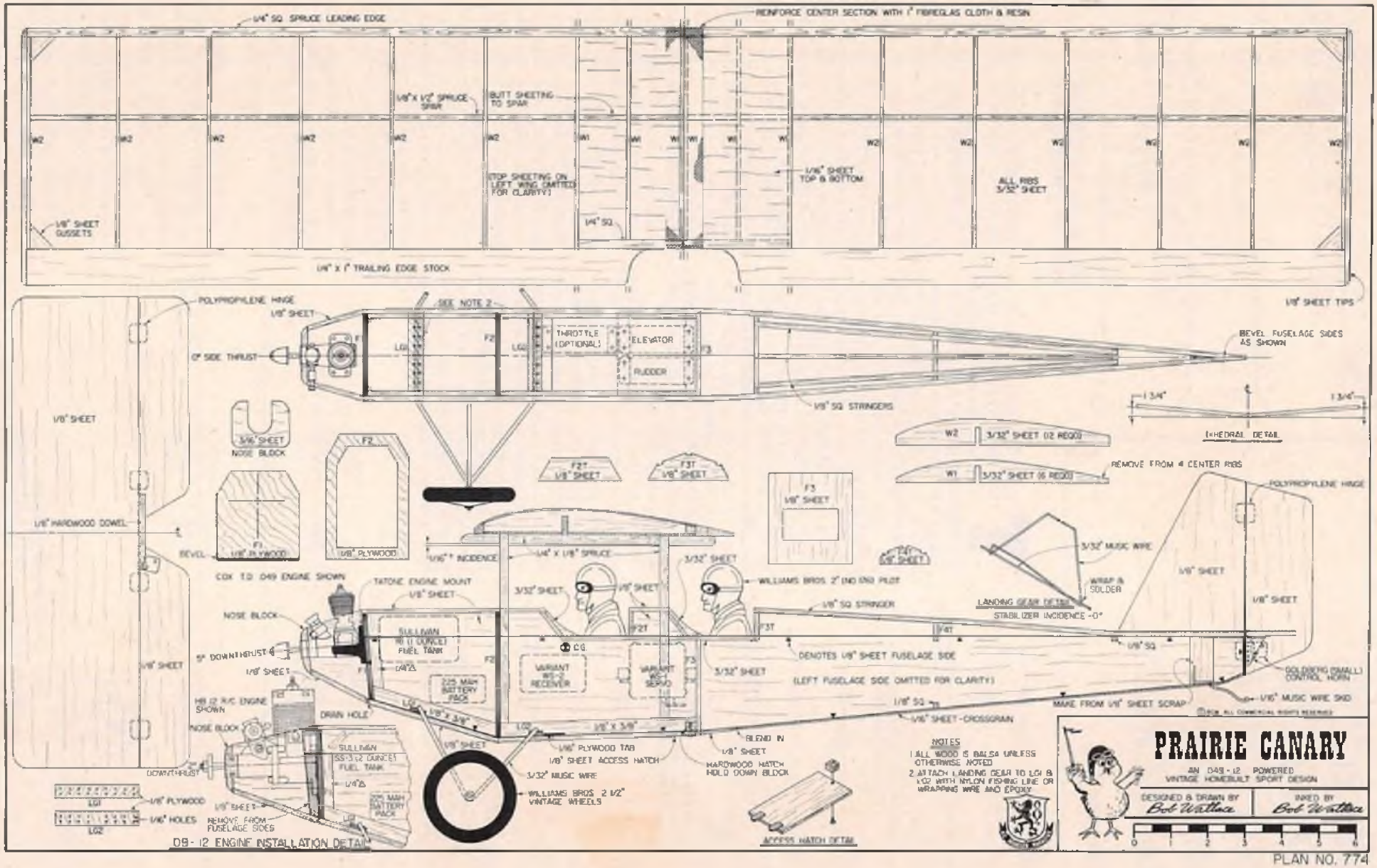
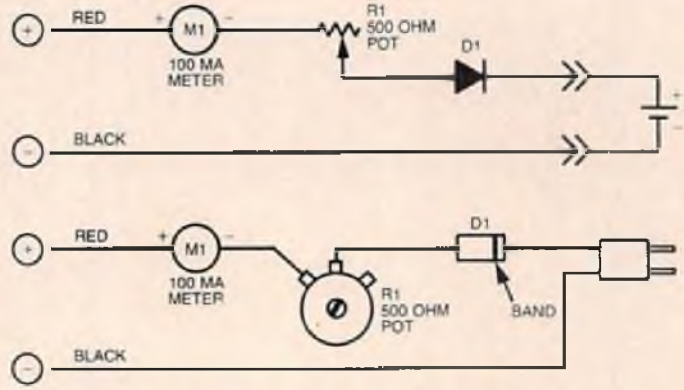
FULL SIZE PLANS AVAILABLE — SEE PAGE 187



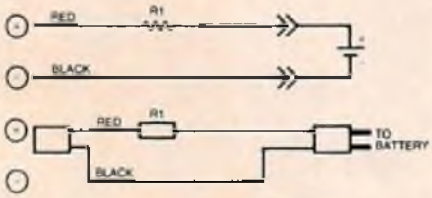
PLAN NO. 774

CHARGING ADAPTERS FOR SMALL AIRBORNE BATTERIES

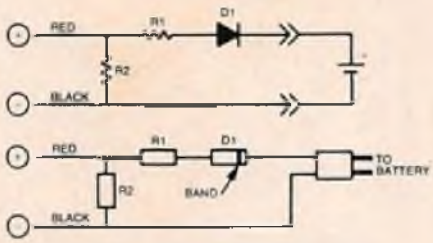
By Eloy Marez



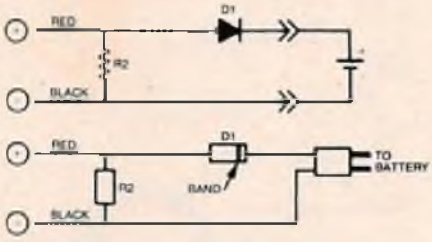
TEST SET-UP TO DETERMINE VALUE OF SIMPLE ADAPTER



SCHEMATIC AND PICTORIAL DIAGRAM OF SIMPLE ADAPTER



SCHEMATIC AND PICTORIAL DIAGRAM OF MORE COMPLEX ADAPTER REQUIRED IN SOME CASES



SCHEMATIC AND PICTORIAL DIAGRAM FOR ADAPTER AS NEEDED FOR 225 MAH PACKS AND NON LED OR SIMILAR INCANDESCENT BULB CHARGER

The normal 500 or 550 mah (Milli-Amp Hour) battery pack furnished with the majority of R/C systems is without a doubt the best size for the average four or five channel radio in the average airplane for the average flyer's 8 or 9 flights per day. But you can't always stand the size and weight, and you don't always really need that much capacity. As an example, racing airplanes that at most might be in the air a maximum of 15 to 20 minutes during a day's competition. In such cases, a 225 mah pack is perfectly adequate, and you can use the ounces saved to maybe go a little faster, or to build a bit more mechanical integrity into your machine. And of course the Half-A gang know all about the problems with equipment size and weight.

Some of the R/C manufacturers recognize the need for smaller airborne batteries, and have them and the proper chargers or charging adapters available. Unfortunately, not all of them do so, and there are also a large quantity of older, now out of production, systems such as Orbit, Micro-Avionics, and RS for which smaller batteries are not to be had from the original manufacturers. The rest of the airborne components are small and light enough so that the radio can be used in all but the smallest models with the simple addition of a smaller battery pack.

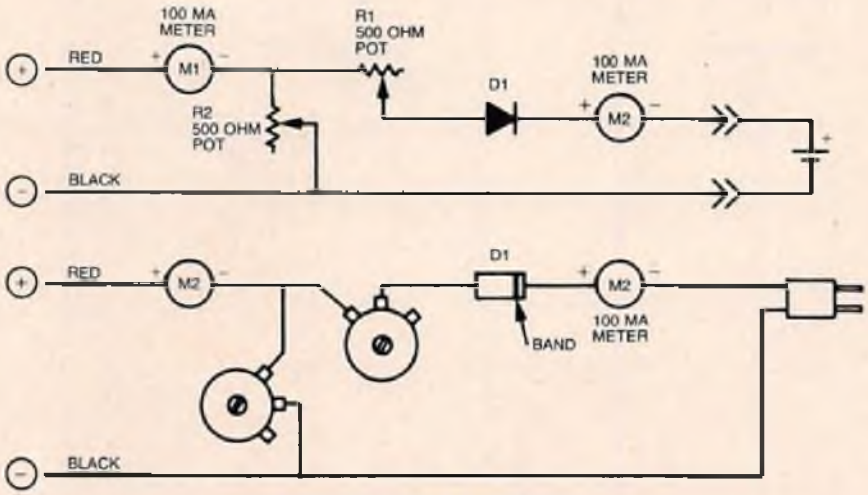
Said small batteries come in a number of sizes; the smaller ones most commonly available directly from the system manufacturers is a 225 mah. However, they are also made available to us in 100, 150, 175, and 250 sizes. They can all be readily adapted to your system by merely adding the correct wire harness and charging them at the proper rate.

Presented here for you is a directory of sorts of the different sizes, what they can do for you, where to get them and, most important, how to charge them properly.

For a source, first try the company that made your radio. It may have smaller batteries and charging devices that you didn't read about in the small print. A good source is Novak Electronics, 1915A S. Evergreen St., Santa Ana, Calif. 92707, (714) 549-3741. It lists 100 and 250 mah packs, in cases, and with the proper harness to match all currently produced systems as well as many older ones. There is also a Novak mini-switch harness if the original is considered to be on the bulky side and you'd like a smaller, lighter unit. And from the same source you can also get the necessary male and female harnesses that you will need to fabricate the charger adapters to be described later.

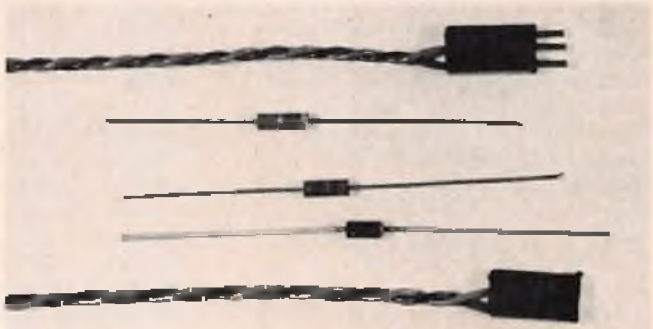
Novak battery packs, in either size, with case and harness are $14.95. The switch harness is $7.95, while the wire harnesses are $3.90 for the set of two. Shipping, to include insurance is $1.00 extra.

Another excellent source is Ace R/C Inc., Box 511, Higginsville, MO 64037, (816) 584-7121, who have uncased packs in 100 and 175 mah sizes at $13.50 each. Cases of the proper size and shape are $1.00. They have available D & R harnesses, as used by RS Systems, Mathes Electronics and undoubtedly, some others. A set of male and female harnesses is priced at $2.25; a single battery harness is not listed but



TEST SET-UP TO DETERMINE VALUES FOR MORE COMPLEX ADAPTERS

Use of a 225 mah battery, right, to replace the usual 500 or 550 mah battery, center, requires an adapter, described in text. Kraft's new dual rate KBC-D charger shown.

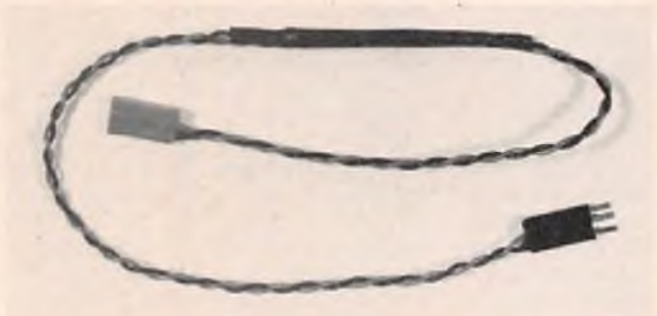


Components required: male/female plugs, resistors and in some cases, a diode. Values given in text.

Views of simple adapter before application of shrink tubing. Solder connections should not face each other.

More complex, but still simple adapter as required in some cases for 100 mah and similar batteries.

Shrink tubing applied over components. Heat applied with Top Flite's MonoKote gun.



Full view of completed adapter, ready to install between charger and battery.

Adapter being used with MRC charger and 225 mah battery pack.

should also be available, probably at one half the above price. Ace R/C also has the popular Deans solder-on connectors in all types for those systems using them.

Both Novak Electronics and Ace R/C Products are sold by some hobby shops, and can be obtained by all of them. Try your hobby shop first.

Let's take a close look at the batteries themselves. First, you are going to save space and weight. Just how much will depend on what you replace, and what you replace it with. For example, going from the popular Kraft KB-4E 550 mah pack to the KB-4L 225 mah type, you'll save 2.56 cubic inches, and 2.65 ounces. Going to the even smaller Ace R/C 100 mah battery, you'll save 2.92 cubic inches and 3.37 ounces over the 550 mah size.

One of the cold hard facts of life being that you seldom get something for nothing (as with the American dollar lately), let's look at what we've had to sacrifice in order to gain that size and weight reduction. We know we have reduced capacity, which translates directly into reduced flight, or operating time. Now, it is important to remember that it is not always a matter of simple arithmetic; a 225 mah pack in a two channel airplane will not give us exactly half of the flying time of a 450 battery in a four channel airplane. In fact, using math only, it is difficult to calculate exactly the flight time for any battery using its capacity only as a data point. There are simply too many variables!

To recount some of these variables, remember that the airborne system draws a certain amount of current when the system is "ON," with all servos at rest. The current consumption increases when you move the stick; when a servo is moving to a new position. The current again decreases when the servo is at rest, even if it is in a position other than neutral. It will also use the higher current when it travels back to neutral on your command. Thus, you can see that a smaller airplane, requiring more control movements merely to keep it in sight, might be a higher current eater than a larger one. Of course, there is less control surface pressure on the smaller bird, requiring less torque and less current to move them, which might average the consumption out to a degree.

Notice we keep saying "might." There are others. Trim comes into the problem. If you are constantly using stick movements to compensate for an out of trim condition, you are shortening your total available operating time. The same applies if you are nervous and constantly twitch the sticks. Hard to move controls will also drain your batteries faster, as will a servo working against a throttle that has reached its mechanical stop.

It is easy to see why it is impossible to juggle figures and estimate your available flight time with any accuracy. The only rule of thumb is that the smaller the battery, the less time.

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If you have one of the battery cycler devices now on the market, the matter is simplified for you. Almost all will come with similar instructions; run a discharge cycle and record the time. Charge, fly a number of times and measure the percentage of the full charge left in the pack. With this information, you can then determine the average consumption per flight and, of course, the average number of flights possible per charge. Without a cycler, consider the percentage of the capacity of the small battery to that of the one furnished, and take that percentage of the flight time as estimated available by the manufacturer of your R/C system. For safety's sake, deduct 20% or so until you get a chance to check it closer.

Examples: I know of a group who had many discussions about battery capacity, and finally put it to the test with a .60 powered Ugly Stick. I don't know the size of the fuel tank --- other than it was not installed especially for this test --- it was the one normally there for everyday flying. They crashed on the 21st flight due to battery failure.

Being somewhat enthusiastic about my testing, and using a cycler, I have calculated that my 1/2A Miss Norway, running on a Cox .051 with a one ounce tank, and using two Ace Micro servos for muscle and a 100 mah battery for power is good for seven flights. I have flown it six flights per charge many times, but never that seventh one.

Knowing the limitations, we can now go into the other important factor about using small batteries: proper charging. The little ones like their larger counterparts, are also available in slow, fast, and quick charger types. The latter two require special precautions, we are going to deal only with the normal overnight charging procedures, at what is called the C/10 rate, being 1/10th capacity per hour.

Thus, our 100 mah battery needs to be charged at 10 milliamps; the 225 at 23, etc. Considering that the average airborne charger made for 500 mah batteries is putting out approximately 50 mils, the object then becomes one of cutting down that value to the lesser one required. Theoretically this is simple and requires only the insertion of the proper value resistor in one of the charging leads.

In practice, there are a couple of things to consider. You'll want to keep the charger standard for use with the original battery, so a plug-in adapter is called for. Then, too, when you get down to the small currents sometimes required, they are not enough to light the bulb or LED (Light Emitting Diode) charge indicator, so a slightly more complex method has to be used.

Another variable rears its ugly head. All makes of chargers differ enough so that we cannot just tell you to use a such and such resistor for a certain size battery. The variation from one brand to another might only be a couple of mils one way or another, but when you consider that two mils of the ten mils required by a 100 mah pack is 20%, that is too much error for safety.

I will give you some examples, as calculated for two current indicator chargers, the MRC, and Kraft Systems latest dual rate KBC-D used only in the low, or 50 ma rate. Enclosed also are the values necessary for using an older syle Orbit charger, which uses No.47 incandescent bulbs for indicators. This charger is representative of those in use before LED's. Notice that these values apply only to those chargers mentioned, we will tell you later how to determine the correct ones for your charger and your choice of small battery.

The physical configuration of your charger/adapter will require a harness to plug into the battery, and one to mate with the charger plug. Between the two, we'll insert a resistor, or a combination of resistors and a diode, per the diagrams shown.

Refer now to the diagrams, and notice that we show two basic types of adapters, one for the simple series resistor type that will drop the current and still light the indicator. The other one, for the lower rates, requires a higher load be applied to the charger so the indicator will glow at the same time the battery is being charged. The indicator does not actually have to be lit, only as a safety check to indicate proper connections and that charging is actually going on. This adapter requires another component, a diode, such as a 1N4001, 1N4002, or any 50 volt, over 100 ma type, to be inserted in the positive lead. This is to prevent discharging of the battery through the adapter in the event that you unplug it from the charger but not from the battery. Some of the adapters will cause the indicators to glow if plugged into the charger with a battery also being attached. This does not harm anything and is of little consequence.

Referring to the schematic and pictorial diagrams, notice that the resistors are referred to as R1 and R2, and the 1N4001 diode is D1. The values, in ohms, for the different batteries using the MRC charger are:

100 mah battery @ 10 ma: R1 82, R2 270, D1.
150 mah battery @ 15 ma: R1 100
175 mah battery @ 18 ma: R1 82
225/250/mah battery @ 25 ma: R1 47

The values for the Kraft KBC-D charger only, in "low" rate:

100 mah battery @ 10 ma: R1 33, R2 82, D1
150 mah battery @ 15 ma: R1 390
175 mah battery @ 18 ma: R1 330
225 mah battery @ 23 ma: 270
250 mah battery @ 25 ma: 220

The Orbit charger, using incandescent lights for indicators, requires the following values:

100 mah battery @ 10 ma: R1 47, R2 150, D1
150 mah battery @ 15 ma: R1 22, R2 150, D1
175 mah battery @ 18 ma: R1 15, R2 150, D1
225/250 mah battery @ 23 ma: R2 150, D1

All resistors used can be either 1/4 or 1/2 watt. Notice that they are placed physically so that none of the connections are opposite each other, and that the resistors, diodes, and connections are all nicely enclosed in heat shrink tubing after testing.

Now, to come up with the values needed for your particular system charger, and the small battery of your choice. In making the following measurements, be sure that the transmitter is also plugged into the charger since the load that it places on the charger transformer also affects the current into the receiver pack.

To determine the resistance value required for a certain adapter, use your male and female wire harnesses, a diode and a variable 500 ohm pot temporarily soldered up as shown, also connecting a milliameter in series, set to read 100 mils. Note the polarity of the meter leads. Be sure to start with the pot shaft fully counter clock-wise, looking at it from the shaft end and the connections being made to the tabs shown. With everything connected, and with the charger plugged in, there should be little or no current flow. Now slowly advance the pot clockwise until the meter indicates current, and stop at the pot position that gives the proper value. If the indicator is still lit, you are in luck and can use the simple single resistor adapter. Now, being careful not to disturb the pot shaft setting, disconnect it and measure the resistance in ohms across the two terminals to which the connections were made. This is the value of the fixed resistance necessary to give you the current flow indicated by the meter. Now resistors only come in standard values so use the closest one in size from Radio Shack or your electronic's supplier.

In the test above, if the indicator goes out, you'll need the other type of adapter. Hook up two 500 ohm pots and the diode as shown; you'll have to read the current in two places. As shown, meter M1 reads the total current being drawn from the charger, which has to be measured to be sure that we don't overload it. Meter M2 is reading only the current going into the battery. The same meter can be used, switching it from one position to the other, though when it is taken out of the circuit, those wires have to be connected together to complete

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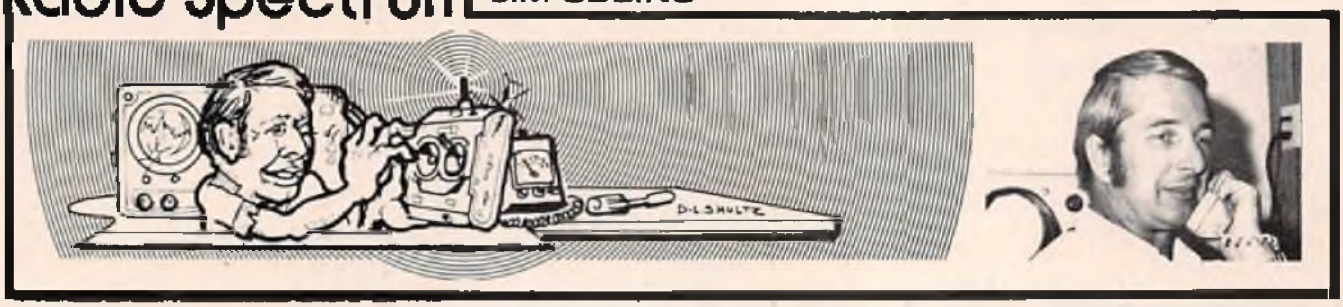
Radio Spectrum

JIM ODDINO



FM System

Got a note from Clarence Lee the other day, along with an article from the English magazine RCM & E. The article is the first in a series by Terry Platt for a home constructed FM system. The first installment covered the transmitter electronics. I was very pleased to see an RF section, just like I described in the May issue, namely an FET power amplifier without the usual buffer. The system shown is for 27 MHz, but should be easy to get going on other frequencies as well. Besides, rumor has it that the FCC is starting to move and we could have some 30 to 40 MHz frequencies in the not to distant future. I thought I would print the schematic for the RF section so some of you can get an early start. I'm sure RCM & E won't mind. It might even have some small effect on their sales because I'm sure many of you will want to get the whole series.

My intent is just to show you how simple it is. Referring to Figure 1, TR1 along with the two 100pf capacitors and the crystal form a Clapp oscillator. The crystal must be a fundamental type and in this case operates at one half the transmitter frequency. In series with the crystal are a trimmer and variable capacitance diode (they used a Siemans BB109G). The total capacitance affects the operating frequency and thus the oscillator can be FM'd by applying a modulating bias voltage on the diode. Terry uses a swing of ±1.5 KHz. The crystal frequency is doubled in the collector by means of a tuned circuit.

TR2 is a Siliconix VN46AF which is a VMOS FET. It has the advantages of low drive power required, very fast switching speed, low saturation voltage and almost indestructable nature. As Terry says "useful for all those prone to operating with no aerial." He claims an efficiency of close to 70 percent. His circuit includes a power monitoring circuit which I did not show.

His encoder is simple but I think you can do better with the new Signetics IC encoder. Get yourself a copy of RCM & E and get to work. Let us know how you make out.

Left/Right Roll Button

I like to have a little construction project for everyone and thought many would be interested in this simple one. I've been using a roll button for years, to perform three continuous rolls. This allows me to set some pre-determined fixed roll rate for the rolls and still have a faster roll rate with hardover stick. As a result I feel pretty lost without the button. When the new FAI rules came out calling for rolls in opposite directions, I figured the only way to get the roll rates the same in both directions was independent adjustments. As it turns out, if you have a linear encoder and linear servos, you may not need independent adjustments. Anyway, I went down to the local electronics store and got a center off, momentary left/momentary right, bat handled toggle switch no bigger than the switches normally used on RC transmitters. It has the same action as the switches used on old reed transmitters but is much smaller. Next came the decision of how to tie it in to the Kraft encoder. In the Kraft Signature Series they use a "purist" approach and sum in the pushbutton commands at the OP amp summing junction. This has the advantage of making the roll rate the same, independent of the high/low rate switch position. See Figure 2.

I decided to do something different. By putting the new switch in the existing aileron circuit I can have two roll rates from the new switch depending on the setting of the high/low rate switch. I can then have a slower rate for the reverse rolls, where I'm only doing two, verses a slightly higher rate for the three horizontal rolls. This is a good theory, but I'm not sure I have achieved the right combination yet. Anyway, see Figure 3.

This same technique can be used on older "half shot" type encoders as well. The circuit is exactly the same, and the only points you need to find inside your transmitter are the aileron pot terminals.

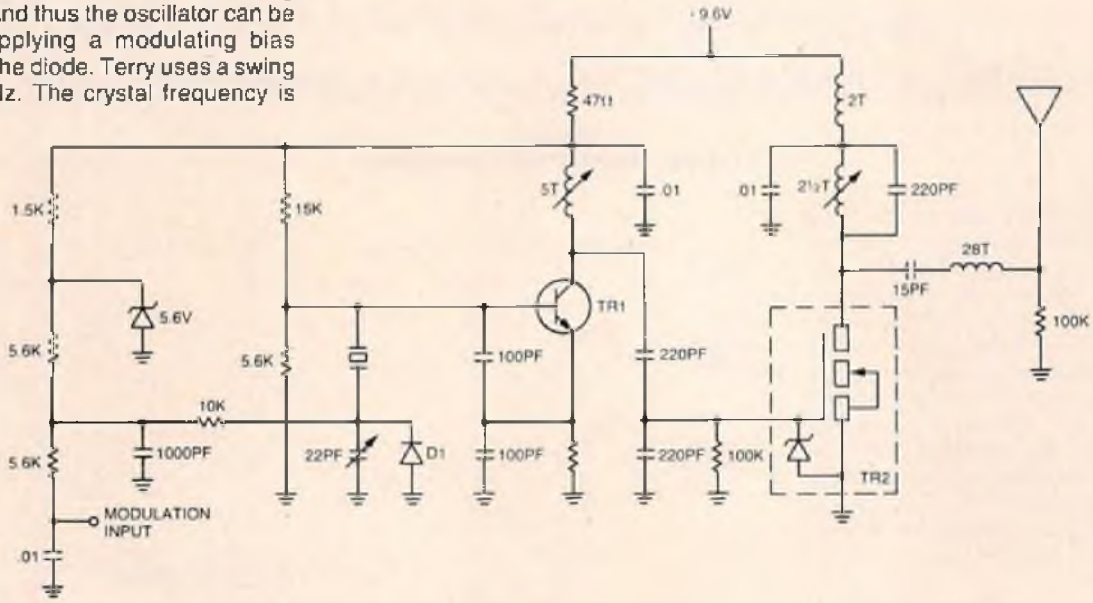


FIGURE 1

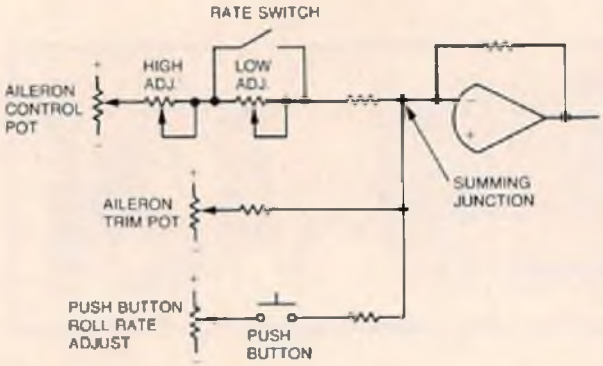


FIGURE 2

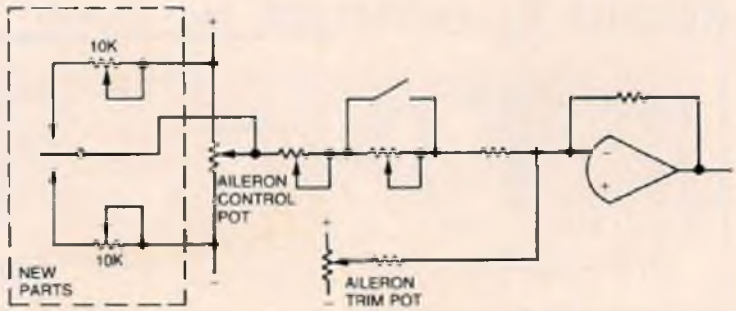


FIGURE 3

True Digital System

RCM has decided not to print Dennis Knowlton's description of his true digital system in its entirety so I thought I would pass it along to you in installments. I think it is the first work to be published on what I feel will be the standard RC system of the future. The objectives of the system are to provide advantages in the area of noise and interference rejection and to allow multiple simultaneous use of a single RF frequency. Servo stability and linearity or non-linearity if desired are inherent in the design. Of course cost, size, power consumption and living with the FCC regulations must also be considered. The following will be a mixture of Dennis' words and mine. We'll let him go first:

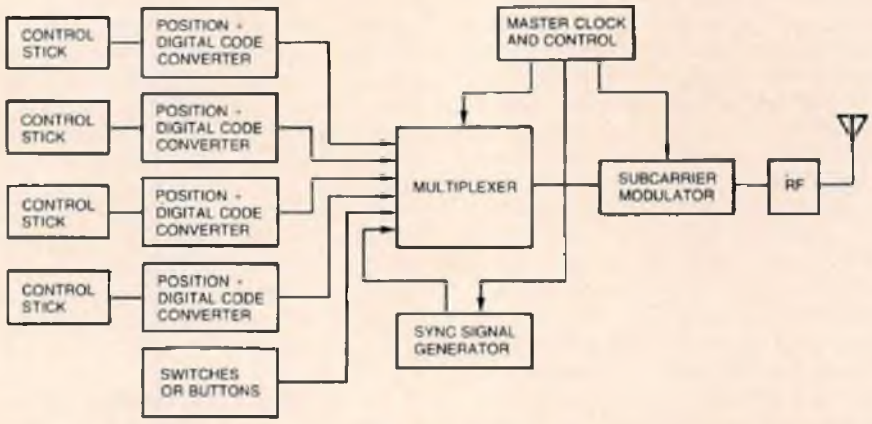


FIGURE 4
TRANSMITTER BLOCK DIAGRAM

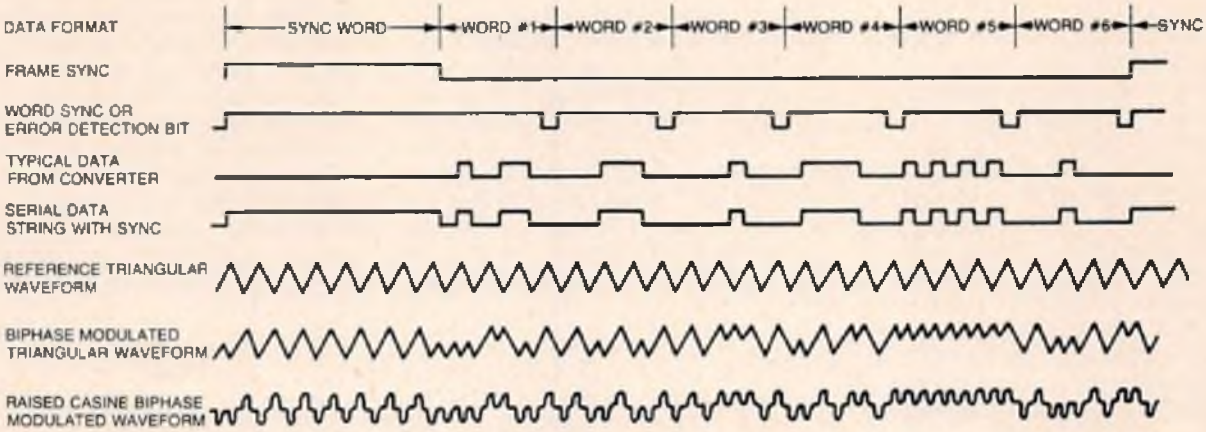


FIGURE 5
TYPICAL TRANSMITTER WAVEFORMS

Information theory defines the limits as to how much information can be transmitted in a given bandwidth. Our present-day systems don't approach these limits. In fact, many users can theoretically simultaneously transmit the limited information required by our R/C systems on the 5 KHz bandwidth allowed by the FCC on a single RF frequency. To take advantage of these limits, a different modulation technique must be employed. The one I have chosen is only one of many, but is within the state of the art and easy to implement.

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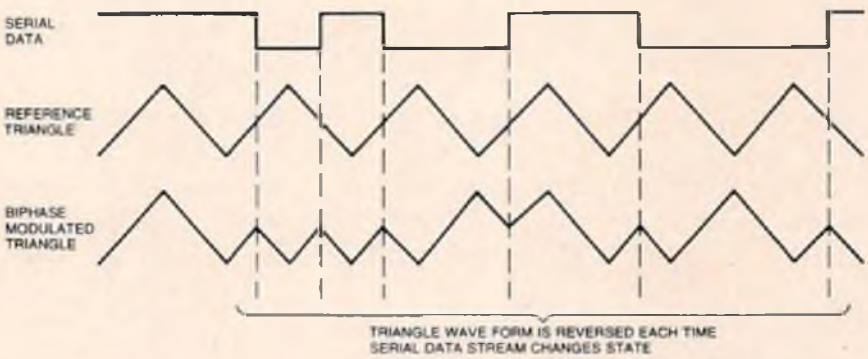

FIGURE 6

SILENT POWER

BY JIM ZAREMBSKI

The origin of electric powered model flying is lost somewhere back in history, though the purist might insist that it actually started with Ben Franklin. In more modern times, we know about Germany's Fred Militky, England's Colonel Taplin, and here in the U.S., Bob and Roland Boucher, Astro Flight.

Development of electric power systems has continued slowly but steadily since those days, and has culminated in, would you believe, electric powered R/C pylon racers. However, as with most other types of R/C flying, it is not recommended that one start with a bomb dropping six engine B-36, or a pylon racer. Instead, sailplanes are highly recommended as an entry into this part of our hobby, and we will attempt to present to you here a summary of what is currently available, both motors and planes.

ABOUT THE AUTHOR

Jim Zarembski, age 29, resides in Perrysborg, Ohio. He is married and the father of a future RC'er, 3 year old Todd.

Jim is Manager of Industrial Engineering at the Sheller Globe Corp., City Auto Stamping Division. He is a graduate of the University of Toledo where he also teaches Applied Statistics for Engineers. He is the President of the local chapter of the American Institute of Industrial Engineers.

Jim began R/C flying in 1968 and his major interest has been in sailplanes. He began experimenting in Electric Power in 1974 and has continued his interest up to the present time having built and designed several planes as well as writing several construction articles published in RCM.

System	Weight	Prop	RPM	Duration	Recharge Voltage	Charge Time
Astro 05	14 oz.	7 x 3½	12,000	4.5 min.	12V	15 min.
Astro 10	21 oz.	7 x 5	11,000	4.5 min.	18V	15 min.
Astro 15	26 oz.	8 x 4	12,700	5.0 min.	24V	15 min.
Graupner Electroprop	18 oz.	14½	Unkn.	12 min.	12V	30 min.
MRC/Mabuchi	21 oz.	7 x 5	9,800	4.0 min.	12V	25 min.

Unfortunately, the Graupner unit is not readily available in this country, but is mentioned in case you have a friend back in Deutschland. The MRC/Mabuchi includes a 2½ ounce CVR (Cutoff Voltage Regulator) which powers the R/C system thus eliminating the need for a separate battery.

Some of the sailplanes available and recommended are:

Astro Flight Super Malibu:

The 72" Super Malibu with the Astro 05 power system is, in this writer's opinion, the best all around combination available today. I have flown several Malibu's with the newer Astro 05 (black instead of blue back plate) using a Cox 7/3½ propeller with Cannon and Futaba radios. The all-up weight is in the 32-35 oz. range. This model will do 6 minutes from a 2 minute power burst in still air. For sport flying, the still air flight duration of my Malibu's are about 12 minutes.

Astro Flight Super Monterey:

Powered by the Astro 05, the Super Monterey has a better glide ratio than the Super Malibu with its 100" wings, however, it won't climb as fast as the smaller Malibu. In the long run, flight duration is about the same as the Super Malibu but the Malibu is much more responsive to your commands. The Super Monterey features a two piece wing with an aluminum wing joiner rod. This bird is very majestic in flight and will provide the soaring enthusiast with an effective thermal rider. It will be reviewed in a future column.

Cox/Airtronic's Lee Renaud prepares to launch his Graupner Electroprop powered Olympic II.

Bob Boucher holding prototype Super Monterey.

Astro Flight Fournier RF-4:

The Astro Flight Fournier has been around since 1969 when it was introduced as a glow engine powered sailplane. The model has been redesigned and improved several times since 1973. It is now kitted specifically for use with the Astro 10 or Astro 15 motor system. The semi-scale Fournier has a 73" wing span and is one of the most striking models I have ever seen in the air. It features a single wheel landing gear like the prototype and can be finished to a very presentable representation of the real RF-4. In flight it is a mild flying sport plane with the Astro 10, however, it will do consecutive loops from level flight with the Astro 15. Still air flight duration is in the 10 minute range when flown as a sailplane.

Bob Imerisk's Astro 15 powered Fournier RF-4.

Tat Li launches Das Slupen Thing with Astro 05 at recent Model Builder Astro Flight Electric Championship.

Graupner Mosquito:

The Graupner Mosquito has a span of 98½" with 682 square inches of wing area. It is powered by the Graupner Electroprop motor with a gear driven 14½" folding prop. It too is recharged from a 12 volt car battery (charging time 30 minutes). Flight duration is in the 20 minute range and at 57 oz. the model is reported to be able to handle high winds very well. The engineering of the model and the Electroprop system designed for it is a marvel. It is too bad that the decline in the dollar has taken this system out of the reach of the average R/C modeler.

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HERE'S HOW

This month a number of ideas crossed my drawing board. Rather than pass them along one at a time I thought it best to cram as many as possible in the space allowed for my monthly stint; and surprise the socks right off the fearless leader!

Connector Marking

Many of you out there have had the problem of identifying control functions at the receiver. For many years I have used the method shown and would like to pass it on to you. It's a sure fire method that anyone can do. And believe me, there is nothing like knowing what function you are plugging into. This method of marking will not apply to all receivers, but is particularly useful when a connector block or loose leads with connectors are employed from the receiver. Make sure the surface to be marked is clean before applying the "Liquid Paper" or "Snopake." These products can be purchased at most stationary stores and are quite common around typing pools. Liquid paper seems to adhere quite well to the connector material. After marking, a good coat of clear dope or lacquer (finger nail polish) will provide adequate protection. In case of removal, just scrape the whole mess off with a razor blade.

Fuel Line Support

The other day, while scratching my head and trying to think of a clever way to support the overboard vent line from the fuel tank (I have difficulty doing two things at once, like the above), I accidentally knocked a control horn off the work bench. Picking it up, the idea suddenly came to me that in my hand was just what I needed. A simple modification and I was in business. Of course, there are other ways to support lines, however, this seemed to suit the purpose and ended up looking very professional. A screw eye will do the same job but the modified control horn will allow you to obtain a better fit with regards to the fuel line size and retaining hole. If you happen to get hung up with this problem, as I did, give it a try.

Gapless Hinge

Received a nice letter from John Thomas who is with the Military Community in Frankfurt, Germany. John has had little time to build and fly R/C since going to Germany so he has spent some of his free time attempting to solve some basic construction problems. One of the most difficult being that of hinging tail surfaces on 1/2A power planes and gliders. Perhaps you have had the same problem. Most are made of thin balsa sheet and difficult, at best, to slot for the conventional type hinge. John has been down this road and has tried the Du-Bro hinge slotter, small Klett hinges, narrow strips of MonoKote (an old RCM article) and the figure-eight thread routine. The results have been far less than adequate, with bulged and split surfaces, or large unsightly gaps with the sewn hinges. He tried making some hinges as per parts of construction articles (the inverted "V", MonoKote both sides of the surface) but the hinge turned out stiff. And, finally, he "looled around" with Scotch Magic Tape and found it tore too easily.

Glue Stic adhesive. Great for bonding paper templates to balsa wood. Will allow you to remove the template – even later on.

After careful consideration of the problem, John developed a simple hinge that satisfied his needs. His method requires some scrap plywood, an X-Acto blade, Hot Stuff, and clear MonoKote, which produces a strong, flexible, neat appearing, and very low cost (almost free) hinge. The accompanying sketch should adequately explain the idea. **Remember, this hinge was designed for 1/2A airplanes.** If you intend to try it on larger aircraft, you are on your own.

In order to centrally locate the slot required in both pieces, John constructed a simple fixture. That is, something to hold the X-Acto blade 1/2 the thickness of the balsa, guaranteeing consistency from slot to slot. A spacer under the blade, as shown in the sketch, is a quick and dirty way of achieving almost the same results.

I personally hinged several mock-ups and had no difficulty with John's method. It provides you with a reasonably strong and free hinge which is quite easy to attain.

Let's go through the process of constructing a hinge. First, construct a slotter as mentioned, or find a spacer 1/2 the thickness of surfaces to be slotted. Slot each half of the surface to be hinged approximately 3/8" deep. Bevel the hinge line of each surface as required. Pre-finish the bevel with dope or MonoKote. Cut a 3/4" wide strip of clear MonoKote for the hinge slightly longer than surface. Insert the MonoKote hinge in each half of the surface leaving about a 1/32" gap between the surfaces. Check alignment of surfaces. Use an awl (or drawing compass point) to poke holes through half of the surface about 1/8" from the hinge line. Insert one drop of Hot Stuff in each hole. Trim off excess hinge. Now, apply MonoKote to flying and control surfaces. Give it a try. I know you will like it.

Glue Stic

There are a number of adhesives on the market that serve us for our needs in model building. Each has its specific purpose. However, I have never found one that would remain in such a state that it would allow you to take apart what you put together — a week later! The adhesive I am speaking of is called Glue Stic, a product of Dennison. It appears to have a wax base and comes in a tube like that of lipstick. It is especially good

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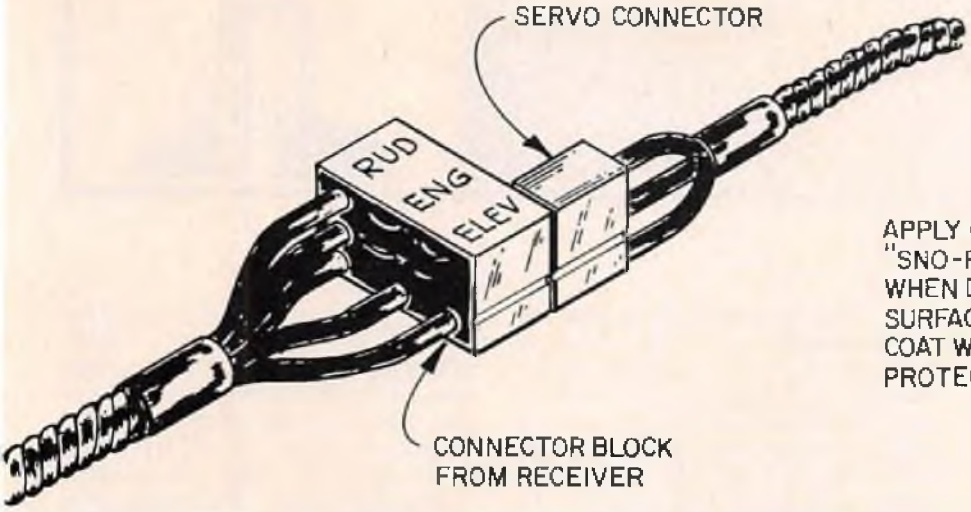
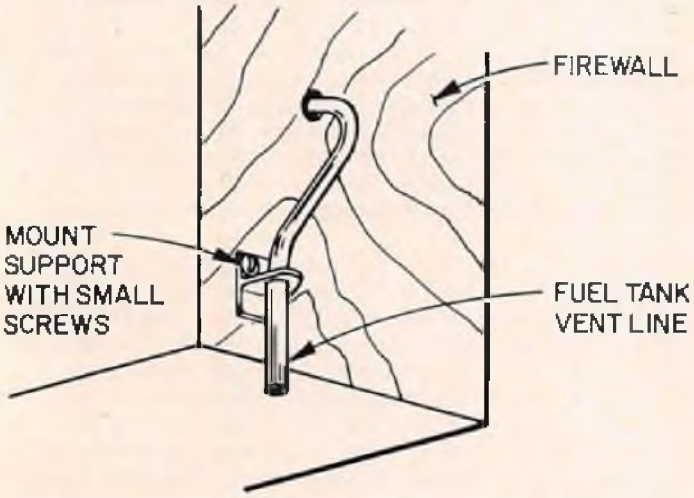
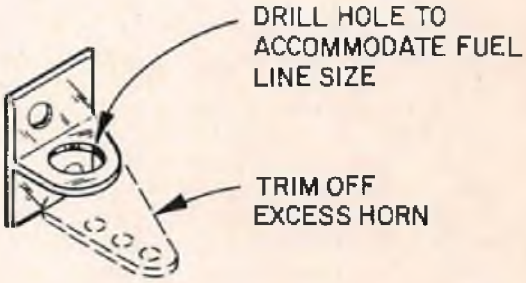
CONNECTOR MARKING



APPLY COATING OF "LIQUID PAPER" OR "SNO-PAKE" TO TOP EDGE OF CONNECTOR. WHEN DRY MARK FUNCTIONS ON COATED SURFACE WITH FINE POINT FELT TIP PEN. COAT WITH CLEAR LACQUER OR EQUIV. FOR PROTECTION.

FUEL LINE SUPPORT



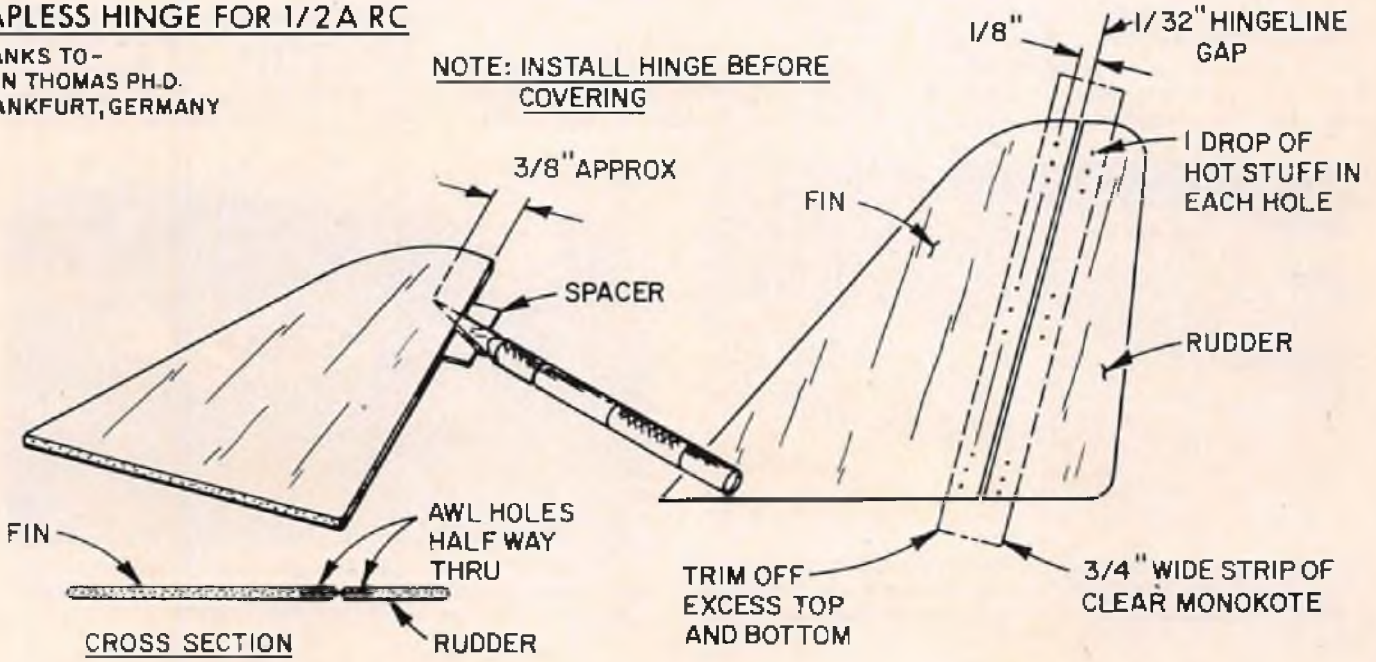


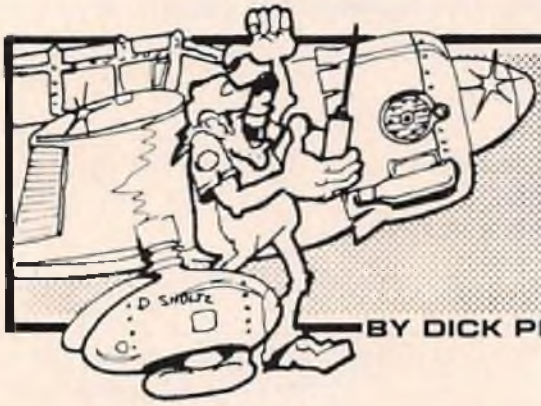
MODIFY CONTROL HORN AS SHOWN

GAPLESS HINGE FOR 1/2 A RC

THANKS TO-
JOHN THOMAS PH.D.
FRANKFURT, GERMANY

NOTE: INSTALL HINGE BEFORE COVERING





BIG is Beautiful

BY DICK PHILLIPS

Having grown up in the thirties, when airplanes were a lot less plentiful, and to ride in one was a rarity, I have a soft spot for aircraft built and flown during the so-called "Golden Age." That was the period between the end of World War I and the start of World War II. There were some really beautiful, some really odd-ball, and some really weird airplanes built during those years. Most of my really favored planes have a couple of wings and some of them are treasured classics today. The Taperwing Waco, the Beechcraft Staggerwing, the Bucker Jungmeister, and the "Plywood Bullets" built by Lockheed, are among the more beautiful of the lot.

The Staggerwing and the Bucker have long been a couple of my very favorite machines and Dave Platt's recent release of a Quarter Scale Bucker hit me where I live. Now Model Engineering of Norwalk is producing a Quarter Scale model of the Beech Staggerwing and that just about makes my day. The kit should be available about July.

It isn't possible to cram too much information into a half hour phone call, but we did manage to get a fair amount of information on the kit. The span is 8', 2700 square inches of area; the cowl is 13.25" in diameter (hides anything you want to put in it!). Flying wires will be stainless steel and will be shaped to approximate streamline flying wires. Over 70 dies were made to fabricate the parts necessary to build this model and MEN will be using their well-tried interlocking construction. The claim is that if you follow the directions, you won't be able to make a mis-formed fuselage. The fuselage is built up on a crutch which will certainly assure sturdy and straight construction.

Weight in the prototype should come out at about 18 pounds 6 ounces and power will be a Moki. That would be with a shrink covering material, a silk type (a painted fuselage will result in a heavier bird, obviously). The original kits will come with a fixed gear formed from 1/4" piano wire. Following the kit, MEN will make a retract set available and the retracts will operate in a prototypical fashion, similar to the original. These will be semi-scale but will hew as close to the original aircraft as is possible.

It will not be a cheap kit, with all that that implies. The kit will run approximately $250 to $300 and will be the best it can possibly be. If you want something really different, this probably won't be seen at every fun fly in the country. (Now I can discard the plan I've been working on for over a year now and wait for the kit.) I always wanted one of them, and now it is going to be a bit easier!

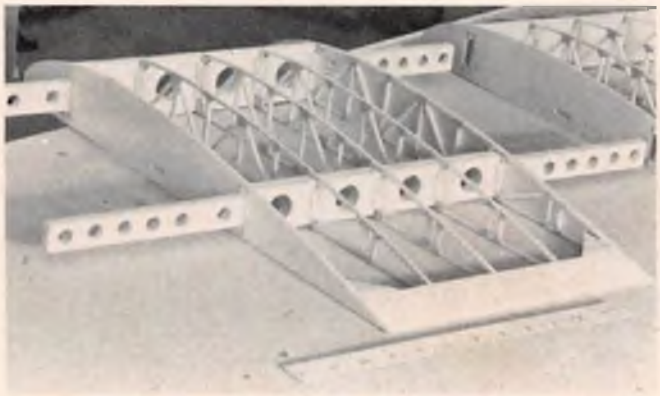
◆

Charlie Mills of Millmount Enterprises (RR #1, Chatham, Ontario, Canada N7M 5J1), has come up with another addition to his line of accessories for the Quadra. He has developed a throttle control for the engine which operates quite differently from anything I have seen before. A shaft projects through the firewall in a nylon bearing, and rotary movement to the shaft operates the throttle (see sketch). The addition of a steering arm and throttle connection inside the firewall completes the set-up. It's simple and sure fire without the complicated arrangements I've seen up till now (my own included!).

Charlie reports he has had a few problems with his own muffler and has a new batch on the way --- these should be available by the time this reaches print. His muffler and motor mount were detailed in a previous column so no further elaboration is required on them.

◆

Col. John deVries, who certainly needs no introduction from a lowly hacker like me, sent me a photo of the center section of his wing for the Ryan B5 Brougham now under construction. You may have seen his article on wing rib construction in the Feb. 1979 issue of RCM ... well, this is what it looks like in action. As can be seen in the photo, the ribs are constructed to slide onto the spars which are made up of two laminations of 1/8" ply. Those stub spars are 24" in length; the entire wing will be 110"; fuselage is 78" and the bird should be in the air about the time this reaches print. I don't think anyone could deny



Col. John A. deVries proves conclusively that he believes in what he writes of. This wing center section is composed of individual wing ribs, jig built and then assembled over the spars. It will be a shame to cover this kind of workmanship.

Early photo of the prototype Brougham being modeled by Col. deVries. Aircraft was operated out of Colorado Springs, Colorado as will the model (see text for additional details).

that it is pretty handsome construction and will look very realistic when completed. It's almost a shame to cover it and hide all that lovely work. John says the leading edges in the original Brougham were aluminum and he will be using litho plates on the model to duplicate the original construction. The Brougham being modeled is one that was flown by Pikes Peak Air Commerce in 1930 at Colorado Springs. The Colonel will be using scale struts and the bird should have a great deal going for it. It will be unusual; it will be built very well indeed, and the Quadra John is mounting in it should pull it around the sky very nicely.

John will be doing an article and plans for the bird and, hopefully, we'll be able to share the building with him one day in the not too distant future.

◆

I have had a few inquiries from modelers wondering which engine they should buy and which they could expect the best results from. Well ... there are a couple of problems inherent in the question. For one thing, Clarence Lee has been RCM's Engine Clinic for a good many years and I am not about to cut into his area. It is my understanding that Clarence has all the work he can handle with the glow engine material he covers in his column so we can't expect him to enlarge that work load by taking on even more responsibility.

I have neither the equipment nor a sampling of the various engines with which to do a test program, so all I can offer is my own experience which I admit is limited. I personally use Quadra engines and since having them re-balanced by Dario Brisighella, I am very pleased with them. We have one Hustler locally which has been run but not flown, which is hardly a definitive program on which to base an opinion.

Anyway ... I am going to stick my neck out a bit here and give you some personal opinions ... coupled with some information I have received from other modelers ... on the engines currently available.

The Quadra was first on the scene and has a good deal of experience behind it with somewhere around 5000 in use. As with any single cylinder engine, vibration has been a problem. I was quite impressed with the difference in my engines after they had been rebalanced by Dario Brisighella (detailed in a previous column) and it is my understanding from Ron Shettler, who markets the engine, that the vibration problem is being given some serious attention at the manufacturing level and that this should be much improved in the very near future. The engine uses a magneto and is very straightforward, gives very little problem with minimal service, and runs very reliably. There is a bit of a flat spot (for lack of a better term) in the mid-range and accurate throttle settings can be a bit awkward at mid-range although this can be improved by setting the servo and throttle linkage up to give you what you want. The engine has super cooling and runs very cool even closely cowled as long as you observe the usual rule of letting the air into the engine room and, even more important, letting it out. Power is adequate to most Quarter Scale models, although a bit on the low

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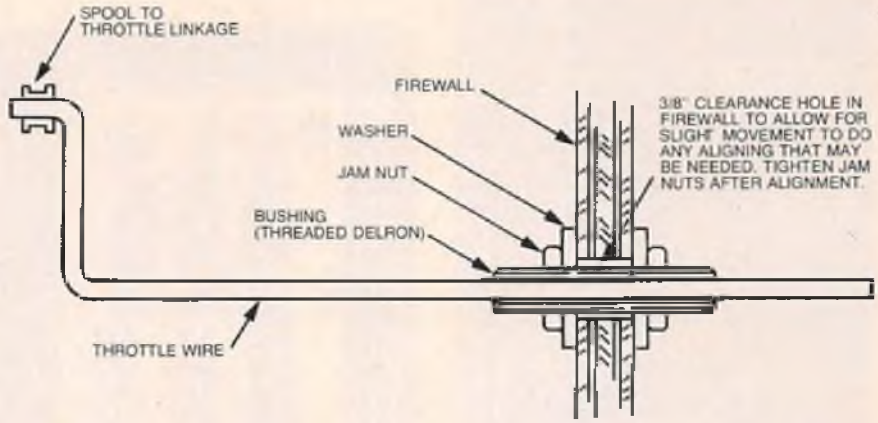
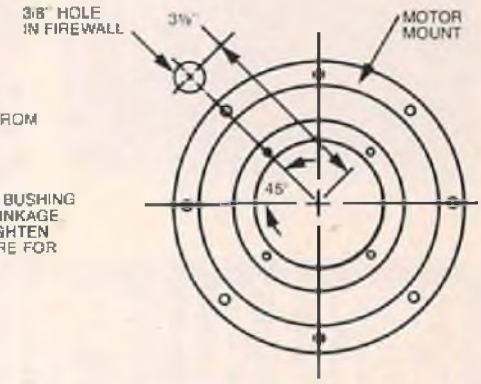


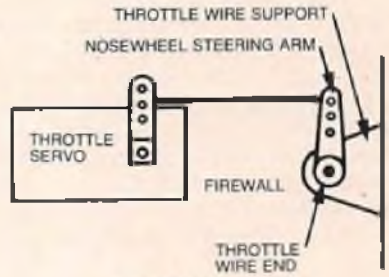
INSTALLATION

1 — DRILL 3/8" HOLE THROUGH FIREWALL 3⅛" FROM CENTER OF MOTOR MOUNT AT 45° IN THE QUADRANT LEADING TO THE CARBURETOR.
2 — REMOVE REAR NUT & WASHER AND PLACE ASSEMBLY THROUGH FRONT OF FIREWALL
3 — PLACE THROTTLE WIRE THROUGH DELRON BUSHING AND ATTACH SPOOL END TO CARB THROTTLE LINKAGE REPLACE REAR NUT & WASHER AND FINGER TIGHTEN
4 — ATTACH BELLCRANK TO OTHER END OF WIRE FOR SERVO OPERATION. (NOSEWHEEL STEERING ARM MAKES A GOOD BELLCRANK.

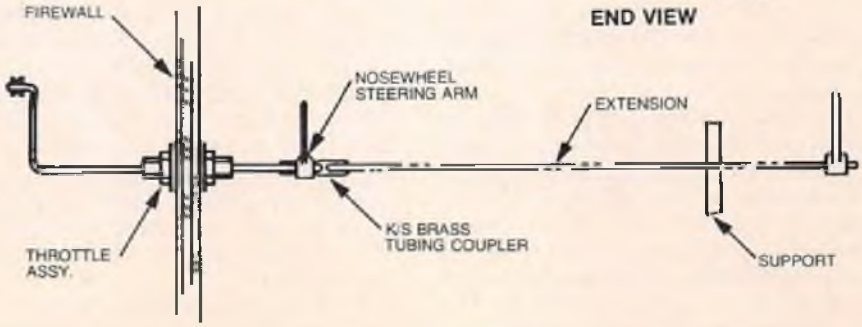


POSSIBLE HOOK-UP SHOWN BELOW

IF EXTENSION TO THE THROTTLE WIRE IS NECESSARY, USE 5/32" O.D. BRASS TUBING AS A COUPLER.



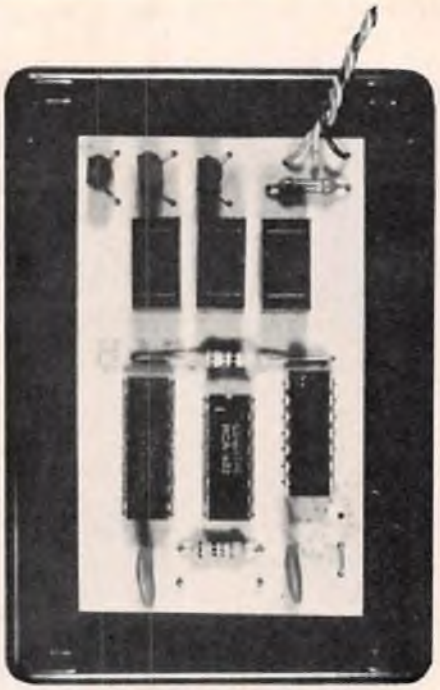
END VIEW



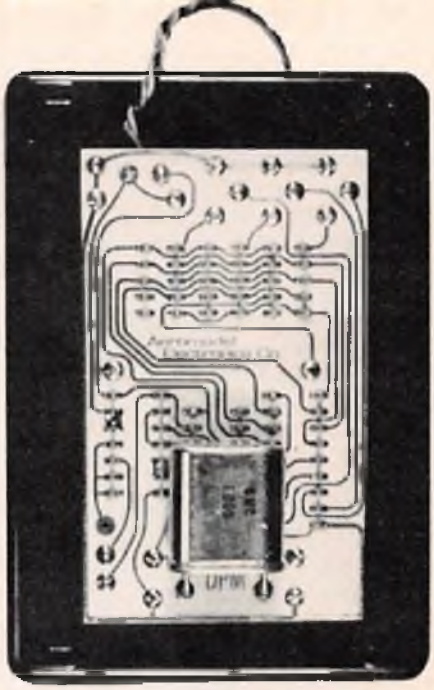
SIDE VIEW

MILL-MOUNT ENTERPRISES QUADRA THROTTLE CONTROL

Completed digital pulse meter.



Printed circuit board with components installed.



Bottom view of printed circuit board showing crystal and wire installation.

DIGITAL PULSE METER

By Kenneth A. Jesser

Editor's Notes:

In our opinion, this is one of the most worthwhile accessories to come along in a long time. For the technician, it'll save countless hours. For the non-tech, but advanced and interested modeler, it will provide a means of setting up his system in a way that can't be done even with a good oscilloscope; the Digital Pulse Meter can be used in the field.

The applications for this instrument are:

(1) Setting pulse length change and therefore servo travel, and neutral pulse length (centering) alike for each channel in the transmitter.

(2) The amounts of servo travel in dual rate transmitters can be recorded by connecting the Digital Pulse Meter to each channel and reading the pulse length at extreme stick positions, allowing these rate settings to be duplicated after determining the proper settings, or after resetting the transmitter for a different airplane.

(3) If all channels on a transmitter are set up for the same overall change of pulse length and the same neutral pulse length as it should be, the servos can now be adjusted for complete inter-changeability from channel to channel.

(4) By using a servo testing scale as mentioned in the article, in conjunction with the Digital Pulse Meter, it is possible to plot a graph of servo position versus input pulse length to find non-linear servo travel.

Pulses!! Digital radio systems love them! Transmitters create them, receivers decode them and servos are controlled by them. A radio column explains them and construction articles show how to modify them. The only thing missing is a way to measure them.

The Digital Pulse Meter is a piece of test equipment designed to plug directly into a receiver's servo connector to measure the exact width of the pulses that control the position of the servos. It has a number of uses in the routine maintenance and adjustment of radio control systems. Transmitters can be adjusted so that the range and neutral settings for each channel are identical. Servos can be tested for linearity and adjusted for proper centering. The Digital Pulse Meter is ideal for use with the new 'super' transmitters to record the settings of rate and mixer controls.

How It Works:

For those who are not too familiar with the operation of a digital radio system, we'll go through a brief description of their operation. The top waveform in Figure 1 is a received pulse train before being decoded and switched to the different servo connectors. The spacing between the first and second pulses is the channel 1 signal. The width of this space is controlled by the channel 1 stick on the transmitter. The space between the second and third pulses is channel 2. This continues for the number of channels being transmitted. The bottom of Figure 1 shows the decoded channel 1 and 2 pulses as they appear at the servo connectors. It is the width of these pulses that controls the position of the servos.

The Digital Pulse Meter is a specialized type of event timer, similar to a stopwatch in operation. The major difference is that the Digital Pulse Meter automatically times and displays an event (the width, or elapsed time, of the pulses that control the servos) that occurs too quickly to be read with a stopwatch. The width of these pulses is measured by counting the number of cycles generated by a precision oscillator during the duration of the pulse.

Referring to Figure 2 and to the schematic (Figure 3), the incoming pulses are buffered and inverted by IC-1a and again by IC-1b. With a positive pulse radio system the jumper between terminals 'B' and 'C' will send a positive pulse to the input of Ic-1c. With a negative pulse radio system the jumper would be connected between terminals 'A' and 'C', sending a positive pulse to the input of IC-1c as above. IC-1c is used as a switch, allowing the output of the crystal oscillator to pass through to the counting input of IC-3 only during the duration (width) of the incoming pulse. IC-3 is a four decade counter, capable of counting from 0 to 9999. It also contains circuitry to hold and display the resultant count on the LED displays. As the oscillator is crystal controlled at a frequency of 1 MHz, an incoming pulse

will allow 1000 cycles to be counted by IC-3 for every millisecond of pulse width. As an example, a pulse of 1.5 ms (milliseconds) would allow 1500 cycles to be counted by IC-3. Although four decades are counted, only the three most significant are displayed (150). The decimal point is located to allow the display to be read directly in milliseconds (1.50 ms). IC-2 is a counter used to control the sequence of operations within IC-3. When the incoming pulse ends, this counter will cause IC-3 to store and display the count and reset the counters in preparation for the next pulse. The three 7-segment displays are driven directly by IC-3 and transistors Q1, Q2, and Q3.

Assembly:

The Digital Pulse Meter is not difficult to assemble. If care is used to install the parts as shown on the assembly drawing and in soldering, the meter should work with no problems. Care **must** be exercised when soldering connections due to the close spacing of the pins on the IC's and LED's. A soldering iron with a fine tip should be used to allow soldering without bridging solder between the copper lands on the PC board.

Refer to Figure 4 for the location and orientation of each part. Solder each part as it is installed and check for solder bridges. Check off each step as it is completed.

( ) 1. Install R1 — 10K resistor (Brn, Blk, Or).

( ) 2. Install R2 — 10M resistor (Brn, Blk, Grn).

( ) 3. Install R3 — 82 ohm resistor (Gry, Red, Blk).

( ) 4. Install C1 — 33 pf. capacitor.

( ) 5. Install C2 — 33 pf. capacitor.

( ) 6. Install Q1 — 2N3904 transistor.

( ) 7. Install Q2 — 2N3904 transistor.

( ) 8. Install Q3 — 2N3904 transistor.

( ) 9. Install DS-1 — 7-segment display.

Note: The ribbed end of the display must face the top end of the board.

( )10. Install DS-2 — 7-segment display.

Note: The ribbed end of the display must face the top end of the board.

( )11. Install DS-3 — 7-segment display.

Note: The ribbed end of the display must face the top end of the board.

( )12. Install IC-1 — MC14011.

Note: The notched end of the IC must face the top of the board.

( )13. Install IC-2 — MC14017.

Note: The notched end of the IC must face the top of the board.

( )14. Install IC-3 — 74C926.

Note: The notched end of the IC must face the top of the board.

( )15. This step determines whether the pulse meter will work with positive or negative pulse receivers. Follow the part for your type of radio system only:
(A) **Positive Pulse Systems** — Install a jumper between terminals 'B' and 'C'.
(B) **Negative Pulse Systems** — Install a jumper between terminals 'A' and 'C'.

( )16. Refer to the drawing (Figure 4) and install the crystal on the bottom of the PC board. Leave enough lead length to allow the crystal to be positioned flat against the board.

( )17. Wrap a piece of electrical tape around the crystal to insulate it and bend the crystal leads to position it flat against the PC board.

( )18. Install a grommet in the hole at the top of the case.

( )19. If the servo connector (socket) you are using already has wires attached (Kraft, etc.), run these wires through the grommet into the case. If your servo connector does not have wires attached, take three lengths of wire (Red, Black, and Yellow) and connect them to your servo connector with the red wire to the positive pin, the black wire to the negative pin and the yellow wire to the signal pin. Twist these wires together and insert them into the grommet as above.

( )20. Refer to the drawing (Figure 4) and connect these wires to the bottom of the PC board.

( )21. Mount the red filter on the inside of the cover, over the display opening, using two pieces of tape.

( )22. Place two pieces of foam in the bottom of the case.

( )23. Position the PC board in the case and place the cover on the case with the LED displays positioned behind the display opening.

( )24. A piece of plastic tape can be used to hold the cover in place by running it along the seam between the cover and case.

This completes the assembly of the Digital Pulse Meter. It can be tested by plugging it into a receiver, in place of a servo, and turning on the receiver and transmitter. If everything is working properly, a number will be displayed that will change when the transmitter stick for that channel is moved.

Using The Digital Pulse Meter:

The Digital Pulse Meter is plugged into the receiver's servo connector for the channel to be displayed and is powered by the receiver's battery. With

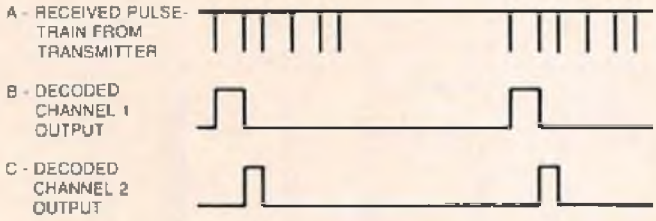
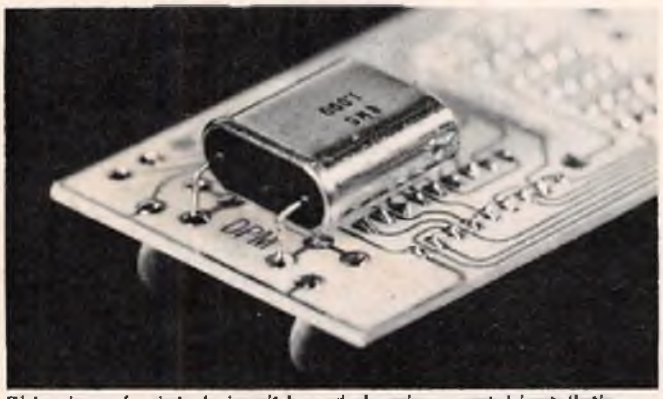
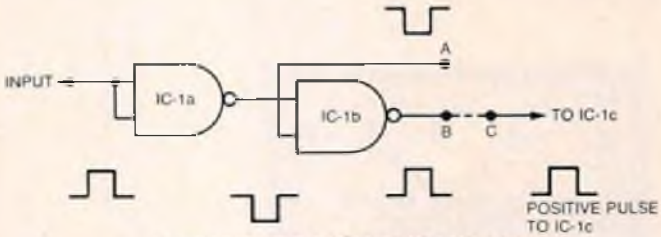


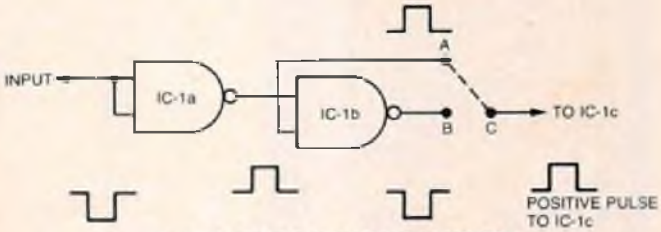
FIGURE 1
WAVEFORMS



Side view of printed circuit board showing crystal installation.

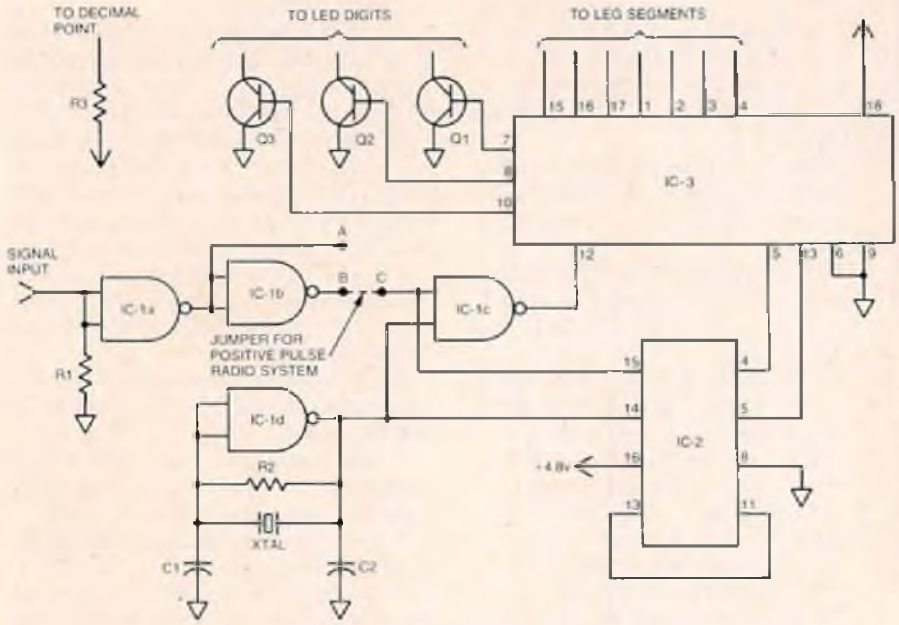


A - POSITIVE PULSE RADIO SYSTEM



B - NEGATIVE PULSE RADIO SYSTEM

FIGURE 2
INPUT CONDITIONING OF POSITIVE AND NEGATIVE PULSE RADIO SYSTEMS



PARTS LIST:

IC-1 - MC14011 - Quad 2 input NAND gate.
IC-2 - MC14017 - Decade counter/decoder.
IC-3 - 74C926 - 4 decade counter / decoder / driver.
Q1 - 2N3904 - NPN transistor.
Q2 - 2N3904 - NPN transistor.
Q3 - 2N3904 - NPN transistor.
DS-1 - FND 70 - 7-segment LED display.
DS-2 - FND 70 - 7-segment LED display.
DS-3 - FND 70 - 7-segment LED display.
R1 - 10K, 1/4 watt resistor.
R2 - 10M, 1/4 watt resistor.
R3 - 82 ohm, 1/4 watt resistor.
C1 - 33 pf. disc capacitor.
C2 - 33 pf. disc capacitor.
XTAL - 1.00 MHz crystal.
Printed circuit board.
Plastic case.
Red filter.
Grommet.
Servo plug to match radio system.

FIGURE 3
SCHEMATIC DIAGRAM

the transmitter and receiver turned on the Digital Pulse Meter will display the width of the pulses that would normally control the servo plugged into this channel.

Transmitter Adjustments:

Most transmitters have a potentiometer on the PC board for each channel to adjust the pulse range for that channel. The pulse range is the amount that the pulse width will change when the stick on the transmitter is moved from one extreme to the opposite extreme. On these transmitters, neutral is adjusted by turning the potentiometer mounted on the stick assembly. With the Digital Pulse Meter plugged into the output for the channel to be adjusted, the

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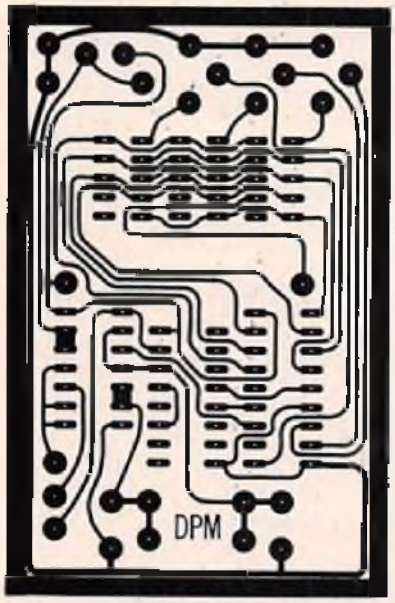

FIGURE 5
ACTUAL SIZE
P/C BOARD

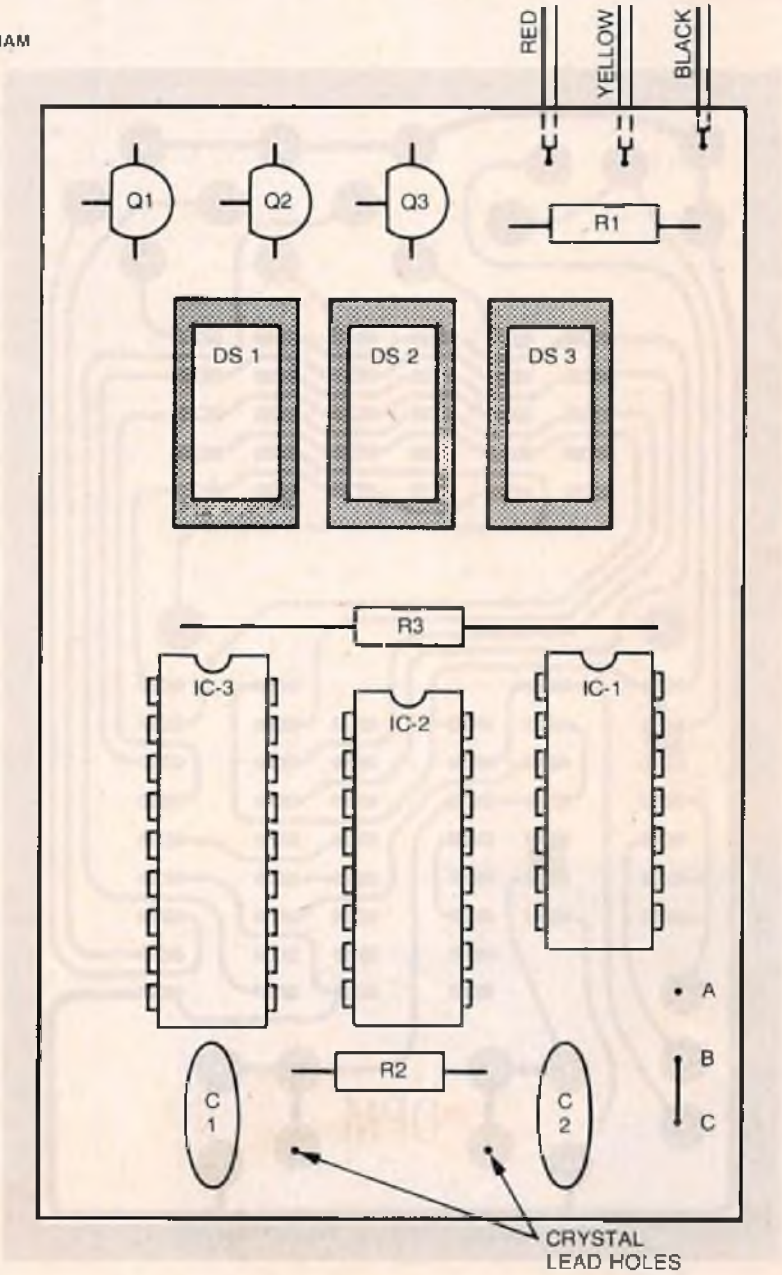

FIGURE 4
PRINTED CIRCUIT BOARD PARTS LOCATION

RCM PRODUCT REVIEW

Jemco Models GRUMMAN HELLCAT

IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging	●					Pre-Shaped Parts	●				
Plans		●				Parts Match to Plans	●				
Written Instructions		●				Overall Parts Fit	●				
Quality of Hardwood			NA			Ease of Assembly		●			
Quality of Fiberglass			NA			Fidelity to Scale	●				
Other Materials		●				Flight Performance	●				
Accessories		●				Overall Appeal	●				
Die-Cutting		●									

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

The Grumman Hellcat represents an exciting addition to the Jemco line of sport scale kits. Although previous Jemco offerings have been very close to scale, the Hellcat is nearly perfect and could easily be built for AMA scale.

The kit is quite impressive and comes complete with ABS molded belly tank, two 500 pound bombs, a very nice accurately molded cowling complete with crankcase and engine cylinders. Finally, there are landing gear strut covers and pre-formed landing gear legs for the fixed gear version. If you prefer to install retracts, Jemco makes available (for $4.00) plans for both retract and scale flap installation.

Construction follows the previous Jemco pattern, fuselage is built over an accurate plywood jig which insures proper location of formers and a true fuselage. The wing is balsa sheeting over a foam core. All materials included in our kit were of very high quality. We also found that parts match to plans was excellent.

Speaking of plans --- these are quite thorough and include a number of useful suggestions to simplify construction. The builder's manual is also well thought out and can be followed by the average builder without fear of overlooking any details. As an additional aid an exploded view of fuselage construction is provided. This view clarifies questions which may arise concerning parts identification.

There are a few cautions in order but they are minor. If you plan to use a .60 (as we did) you may wish to enlarge the fuel tank compartment a bit. This is easily done during construction

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SPECIFICATIONS

Name ..... GRUMMAN F6F-3 HELLCAT
Aircraft Type ..... Scale
Manufactured By ..... Jemco Models
1305 Foothill Drive
Vista, California 92083
Mfg. Suggested Retail Price $74.95
Available From ..... Both Mfg. & Retail
Mfg. Recommended Usage ..... Sport or Stand-Off Scale
Wing Span ..... 56 Inches
Wing Chord ..... 10½" (Avg.)
Total Wing Area ..... 610 Square Inches
Fuselage Length ..... 44" (incl. spinner)
Radio Compartment Dimensions ..... Ample
Wing Location ..... Low Wing
Airfoil ..... Semi-Symmetrical
Wing Planform ..... Double Taper
Dihedral (each tip) ..... 2½ Inches
Stabilizer Span ..... 24 Inches
Stabilizer Chord (incl. elev.) ..... 6" (Avg.)
Total Stab Area ..... 144 Square Inches
Stab Airfoil Section ..... Flat
Stabilizer Location ..... Top of Fuselage
Vertical Fin Height ..... 6½ Inches
Vertical Fin Width (incl. rud.) ..... 6 Inches
Mfg. Rec. Engine Range ..... .40-.60 Cu. In.
Recommended Fuel Tank Size ..... 8-10 Oz.
Landing Gear ..... Conventional
Recommended No. of Channels 4-6
Recommended Control Functions ..... Rud., Elev., Throt., All. Flaps & Retract Gear optional
Basic Materials Used In Construction:
Fuselage ..... See Text
Wing ..... See Text
Tail Surfaces ..... See Text
Hardware Incl. In Kit ..... See Text
Plan Size ..... 48" x 30" (1 sheet)
Building Instructions on Plan Sheet ..... Yes
Instruction Manual ..... Yes (14 pages)
Construction Photos ..... No
Kit Includes ..... Die-Cut & Shaped Parts
Mfg. Rec. Flying Weight ..... 112-128 Oz.
Wing loading based on rec. flying wt. ..... 26-30 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly ..... 110 Ounces
Wing Loading ..... 25.9 Oz./Sq. Ft.
Covering & finishing materials used ..... See Text
Engine Make & Disp. ..... K & B .61
Muffler Used ..... No
Radio Used ..... Kraft
Tank Size Used ..... 10 Oz.

RCM PRODUCT REVIEW

Royal Products F4U-1D CORSAIR

IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging		●				Pre-Shaped Parts		●			
Plans		●				Parts Match to Plans		●			
Written Instructions	●					Overall Parts Fit		●			
Quality of Hardwood		●				Ease of Assembly		●			
Quality of Fiberglass			NA			Fidelity to Scale	●				
Other Materials		●				Flight Performance	●				
Accessories			●			Overall Appeal	●				
Die-Cutting			●								

E–Excellent / G–Good / A–Average / F–Fair / P–Poor

Many Corsair models have been around in the past few years with little or no attention given them. Then, the TV show Baa, Baa Black Sheep (now Black Sheep Squadron) hit the air and everybody knew what a Corsair was and wanted one. Royal has been improving and expanding their scale kit line and one of the new kits is a 1:25" to 1' (.40 cu. in. size) F4U-1D Corsair.

This new Corsair is an outstanding scale kit. It can be built Stand-Off Scale or AMA Scale. Construction is a conventional type construction, built-up wings, sheeted fuselage, etc., not just a bag of blocks. The spun aluminum cowl makes the front end a snap to build, and it is soft aluminum which makes it very easy to work with. Written instructions supplement the full size plans and guide you through construction (yes, they are in English).

The Corsair is not a beginner's kit; building experience is required and the kit is a lot of work. But, when you have finished it, it looks good and it is light. The prototype has Rhom Products retracts, Vortac release and bomb, pilot and instrument panel and weighed 6 lbs. This works out to a 28.5 ounce per square foot wing loading --- a little high, but very livable for a scale ship.

Silk was used to cover the entire airplane and then finished in the three tone blue paint scheme. The kit does not come with decals, but the Jemco Corsair decal sheet is the correct size and may be used.

Flying the Corsair is remarkable. It performs and handles, much like a pattern ship and landings are not difficult. With a 6 lb. weight you can make a hard landing and not collapse the gear; this definitely helps in the points department. The O.S. Max .40 FSR has plenty of power and does an excellent job of moving the airplane through the air. The Vortac bomb release and bomb worked as advertised and they really add appeal and flight points.

A few items to remember that will help make your first flight a success: Elevator throw should be 3/8" maximum with the C.G. located as shown on the plans. Ailerons at 3/8" is more than enough. Make sure the C.G. is where it belongs. Add nose weight if you have to, we did --- 6 ounces. If you have retracts, balance the plane with the landing gear in the up position. A little nose heavy will **not** hurt this airplane.

In conclusion, the Royal .40 size Corsair is an excellent Stand-Off/AMA Scale airplane. The kit is well thought out and well worth the time it takes to build. The kit is outstanding in performance and overall appeal.

The following are reference publications that can be used to select the model type and paint scheme of your Corsair. These are just a few of many publications that cover the Corsairs:

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SPECIFICATIONS

Name	F4U-1D CORSAIR
Aircraft Type	Scale
Manufactured By	Royal Products Corp. 790 West Tennessee Ave. Denver, Colorado 80223
Mfg. Suggested Retail Price	$74.95
Available From	Both Mfg. & Retail Outlets
Mfg. Recommended Usage	Sport & Competition
Wing Span	51⅛ Inches
Wing Chord	9⅜ Inches
Total Wing Area	480 Square Inches
Fuselage Length	41¼ Inches
Radio Compartment Dimensions	(L) 8" x (W) 4" x (H) 3"
Wing Location	Low Wing
Airfoil	Semi-Symmetrical
Wing Planform	Double Taper
Dihedral (each tip)	3"
Stabilizer Span	21 Inches
Stabilizer Chord (incl. elev.)	4¼ Inches
Total Stab Area	89¼ Square Inches
Stab Airfoil Section	Symmetrical
Stabilizer Location	Mid-Fuselage
Vertical Fin Height	6¾ Inches
Vertical Fin Width (incl. rud.)	5 Inches
Mfg. Rec. Engine Range	.35-.51 cu. in.
Recommended Fuel Tank Size	8 Ounce
Landing Gear	Conventional
Recommended No. Of Channels	4 (opt. ret.)
Recommended Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa
Wing	Balsa
Tail Surfaces	Balsa
Hardware Included In Kit	See text
Plan Size	57½" x 37½" (1 sheet)
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (12 pages)
Construction Photos	Yes
Kit Includes	Shaped & Die-Cut parts
Mfg. Rec. Flying Weight	96 Oz.
Wing loading based on rec. flying wt.	28.5 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly	96 Ounces
Wing Loading	28.5 Oz./Sq. Ft.
Covering & finishing materials used	See Text
Engine Make & Disp.	O.S. .40FSR
Muffler Used	O.S. Max
Radio Used	S & O
Tank Size Used	8 Oz.

1979 SOUTHWEST MODELERS SHOW

The Third Annual Southwest Modelers Show was an outstanding success. Over 110 booths were occupied by manufacturers, exhibitors and associations! One hundred and forty-one trophies were awarded to static model displays which were more numerous than ever before. The floor plan was rearranged this year to offer maximum exposure to each booth and increase the area for model displays. The 3200 square foot model display area was covered with nearly 400 models of every conceivable kind. Categories included all types of R/C aircraft, boats, cars, U-Control, Free Flight airplanes, rockets, helicopters, trains and plastic models (including dioramas).

The crowds were treated to actual demonstrations of R/C boats, cars, helicopters, ducted fan aircraft, the Byron Pitts and Mig-15, and the Jet Hobby Hangar Mirage. A special feature was an R/C motorcycle (honest!) run by Phil Kraft and Marty Barry. The helicopter demos were presented by the American R/C Helicopters, Schluter and Horizon. Don Dombrowski put on a nifty demonstration of "Beer Can Bowling" during the exhibitors fun fly which was held on Friday preceding the show. This fun fly was capped with an excellent catered barbeque dinner which was prepared by Angelos of Fort Worth.

Highlights of the show were exhibits by the Vought Corporation (an A-7 model in perfect detail) and the NASA display of the Space Shuttle and the rocket powered R/C Space Shuttle model used for canard tests.

We sincerely hope that you will join RCM for the 1980 Southwest Modelers Show. The date has already been set for June 7-8, 1980. □

1979 STATIC MODEL WINNERS

R/C SPORT TRAINER
1. Jim Russell ..... Bedford, TX
2. Bill & Ruth Boyd ..... Arlington, TX
3. Bobby J. Krider, Jr. ..... Dallas, TX

R/C PATTERN
1. Jim Ellis ..... Plano, TX
2. Ted White ..... Bedford, TX
3. Larry Stanfield ..... Crowley, TX

R/C SAILPLANE
1. Jack H. Hamilton ..... Dallas, TX
2. Connie J. Jones, Jr. ..... Waco, TX
3. Richard A. Black ..... Richardson, TX

R/C HELICOPTER
1. W.R. Ellis ..... Euless, TX
2. Richard P. Morris ..... Arlington, TX
3. Tim Schooraid ..... Winter Park, FL

R/C SPORT BIPLANE
1. Ralph Burch ..... Denton, TX
2. Maj. Frank Dibartolomeo . Ft. Worth, TX
3. Buddy Erwin ..... DeSota, TX

R/C SPORT SCALE
1. Robin McGeorge ..... Richardson, TX
2. Charles Robert ..... Richardson TX
3. Brad Shepherd ..... Victoria, TX

R/C JUMBO
1. Jerry Burpee ..... Plano, TX
2. Dean Copeland ..... Omaha, NE
3. O.G. Morris ..... Seabrook, TX

R/C MILITARY SCALE
1. Lynn McCauley ..... Euless, TX
2. Bob Huffines ..... Ducanville, TX
3. Grant Wilson ..... Tulsa, OK

R/C Q. 500
1. Mark Morgan ..... Dallas, TX
2. Lawrence D. Eads ..... Carrollton, TX

R/C OLD TIMER
1. Larry G. Buchweller ..... Plano, TX
2. Lawrence D. Eads ..... Carrollton, TX

R/C STAND-OFF 1/2A SCALE
1. Moree Morris ..... Seabrook, TX

R/C DEEP VEE BOATS
1. G. Ray Hamby ..... Richardson, TX

R/C SAILBOATS
1. James H. Behrens ..... Dallas, TX

R/C OUTBOARD BOATS
1. G. Ray Hamby ..... Richardson, TX
2. Gene Patty ..... Abilene, TX

R/C ELECTRIC BOATS
1. W.J. Schurr ..... Duncanville, TX
2. W.J. Schurr ..... Duncanville, TX
3. Tom Casper ..... Irving, TX

R/C HYDRO BOATS
1. Donald Scott ..... Arlington, TX
2. David Stutts ..... Dallas, TX
3. Gene Patty ..... Abilene, TX

R/C SCALE BOATS
1. Wolf A. DeVallette ..... Dallas, TX
2. Jack Plomen ..... Arlington, TX
3. Roy E. Hill ..... Grand Prairie, TX

R/C 1/12 ELECTRIC CARS
1. Lynn McCauley ..... Euless, TX
2. Mike Hamilton ..... Denton, TX
3. Roy E. Hill ..... Grand Prairie, TX

R/C 1/12 SCALE GAS CARS
1. J.T. Hunt ..... Dallas, TX
2. J.T. Hunt ..... Dallas, TX
3. Garon Wade ..... Euless, TX

R/C 1/8 SCALE GAS CARS
1. J.T. Hunt ..... Dallas, TX
2. Floyd Clark ..... Garland, TX
3. Jack Leonard ..... Dallas, TX

R/C 1/8 SCALE CAN AM
1. Mary Jane Sanders ..... Dallas, TX
2. J.T. Hunt ..... Dallas, TX
3. Ronald Chamness ..... Dallas, TX

SPECIAL AWARDS

BEST MILITARY SCALE
Lynn McCauley ..... Euless, TX

BEST NON-MILITARY SCALE
Robin McGeorge ..... Richardson, TX

BEST ORIGINAL DESIGN
Ted White ..... Bedford, TX

BEST MONOKOTED MODEL
Gene Hansrote ..... Garland, TX

BEST OF FINISH
Jim Ellis ..... Plano, TX

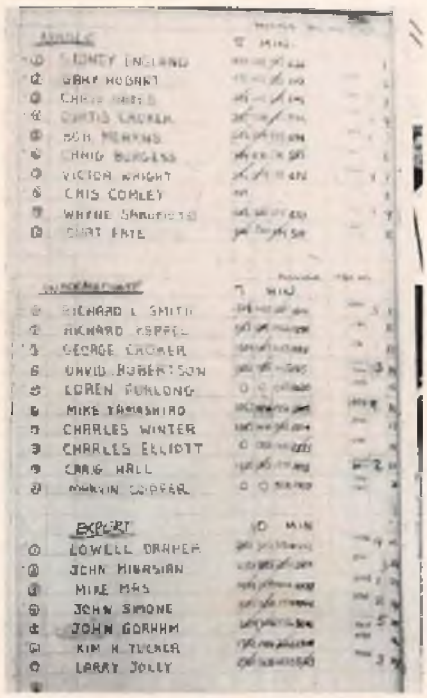
BEST OF SHOW
Jerry Burpee ..... Plano, TX

Register (Santa Ana) Newspaper Photo by Ignacio Nanetti.

1ST ANNUAL WEST COAST HELICOPTER CHAMPIONSHIPS AND CLINIC

By Chris Hayes

At 11:30 on Saturday, May 19, the flight deck was stacked with 27 entrants in this, the First West Coast Helicopter Championships. And 108 grueling rounds later, it was the flying rather than the aircraft that garnered the winning scores. In a contest where safe, precise control got more points that a flashy loop or roll, the winner in Expert Category was Mike Mas, of Homestead, Florida.



This says it all! The next to the last column lists the first through fifth place winners. The best two of four rounds total score.

The meet's planning was almost flawless, a real tribute to Marvin Copfer, President of the MCAS(H) (Marine Corps Air Station, Helicopter, Tustin, Calif.) Model Aircraft Association, and the Marine Corps organizers who were themselves pioneering this, their first model contest. Bleachers, latrines, a public address system, supervised parking and crowd control problems were anticipated and taken care of. All the contestant had to do was fly well. Concession stands serving food and drinks manned by Marine volunteers raised $3,046 for the Navy Relief Fund. To this was added $774.50, the take from contestant's fees and commerative T-Shirts.

Attendance was, on the whole, very gratifying. Participants and spectators came from as far away as Canada (Gary Hobart), Germany (Dieter Schluter), and Florida (Mike Mas). Others came from Las Vegas and equally distant California points. Barry Walker brought his wife, seven year old son, and three month old Rev 40 all the way from New Market, MD to view the contest and to attend the manufacturer's clinic. It was hoped that the clinic, held on Friday, would be fully supported by all helicopter manufacturers. Conceived as a means of getting all those hundreds of helicopters out of the closets and into good flying trim, the clinic drew three manufacturers (American R/C, Kavan, and Schluter) and seven applicants.

Joe Bridi, who needs no introduction, was C.D., and contest judging was provided by full size helicopter pilots from the Marine Corp. They openly applauded the autorotations performed by both Commanders and Heli-Boys. You could imagine they felt every one of those maneuvers right in the gut! Two groups of four judges split the responsibility between the two days over which period four rounds were flown by each contestant.

To relieve the monotony of continuous hovering, the Novice, Intermmediate, and Expert categories were scrambled and flown in random order. Between contest rounds, a flight demonstration of X-wing planes, inspired by the movie "Star Wars" was put on by Dave Herbert and Steve Lepler for Bill Evans Aircraft, the designer and kit manufacturers. Also providing some between-rounds

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The manufacturer's clinic. Each was provided with his own tent in which to service the aircraft of their type.

Marvin Copfer, host club President, holds the pre-contest pilot's briefing on Saturday morning.

C.D. Joe Bridi (kneeling) confers with the judges. Marine Corp chopper pilots did the actual judging.

Winners (L to R) Mike Mas, John Simone, Jr., George Croker, Dave Robertson, Craig Hall, Curtis Croker, Larry Jolly, Bob Mears, Wayne Sakamoto.

Mike Mas demonstrates his winning form doing a constant heading Figure 8. Mike keeps a fixed 3 foot distance from his Commander.

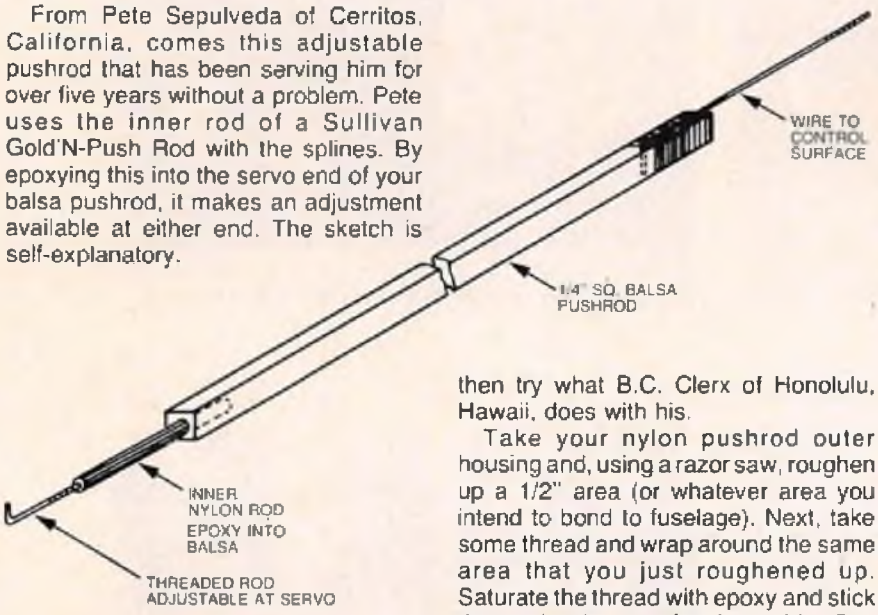
John Gorham does a tail-in, 45° hover in Expert Class. Only 3 minutes are allowed in which to get off 16 maneuvers.

The only thing prettier than one helicopter in the air is two helicopters in the air . . .

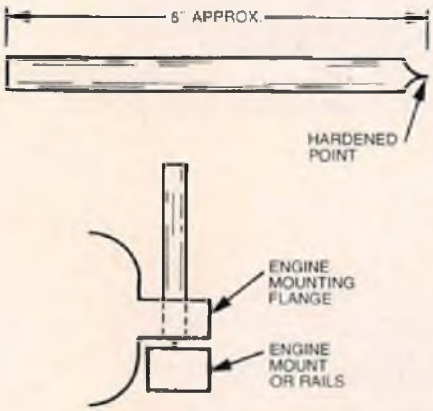
Joe Aguilera flying his 1/4 Scale Stearman kept the crowd entertained while the chopper fliers took a break.

FOR WHAT IT'S WORTH

From Pete Sepulveda of Cerritos, California, comes this adjustable pushrod that has been serving him for over five years without a problem. Pete uses the inner rod of a Sullivan Gold'N-Push Rod with the splines. By epoxying this into the servo end of your balsa pushrod, it makes an adjustment available at either end. The sketch is self-explanatory.

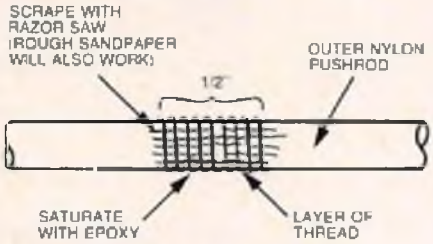


Many modelers will agree that one of the most difficult operations in mounting engines is the hole alignment from the holes on the engine flanges to the holes on the mounting plate or engine mount. Trying to get these all matched and lined up can be a problem. A very simple and positive solution to this problem is the use of "transfer punches." This is an item readily available at tool supply, mill supply and machine shop hardware sources. These punches are available in exact hole sizes and will automatically self center. They cost from 80 cents up to $1.25 each depending on size. This suggestion and sketch was sent in by Lawrence E. Mulholland of Roselle, Illinois.

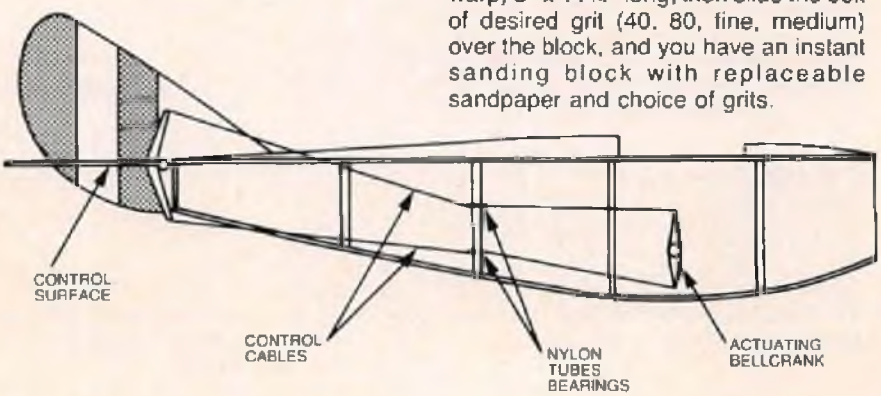


Have you ever had a nylon type pushrod come unglued after a hard landing because the epoxy wouldn't stick too well to the nylon type material? If you have had this problem or just want a much stronger bond on your pushrod, then try what B.C. Clerx of Honolulu, Hawaii, does with his.

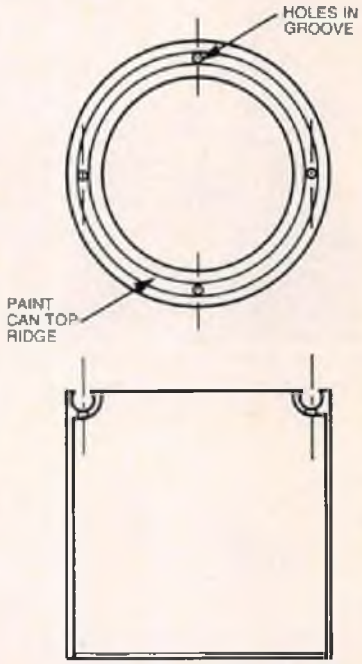
Take your nylon pushrod outer housing and, using a razor saw, roughen up a 1/2" area (or whatever area you intend to bond to fuselage). Next, take some thread and wrap around the same area that you just roughened up. Saturate the thread with epoxy and stick the pushrod to the fuselage side. See accompanying sketch.



To avoid the exasperation of trying to figure out exactly where the control cables should enter the fuselage of your scale WW I type aircraft by sight, geometry, trigonometry, etc., simply mount a small piece of 1/16" diameter outer NyRod (Gold'N-Rod, etc.) on the inner framework exactly where you would like the cable to enter and route the cable through it. If the cable does not run a straight route to the servos, the nylon tubing acts as an excellent bearing surface and no one but you will be the wiser. This idea and sketch was submitted by Capt. Michael G. Danielle of Del Rio, Texas.



Usually when you replace the lid on a paint can there is some paint left in the rim. Upon pressing the lid tight, sometimes with a hammer, or some such tool, you are covered with the paint that splatters out of the rim. To solve the problem, Robin Aube of Dayton, Ohio, when first removing the lid, takes a medium size nail punch and punches four or five holes in the bottom of the groove that the lid fits in. With these holes, the surplus paint that collects in the groove can drip back into the can. See the accompanying sketch.



Pete Reynolds of Wheaton, Maryland, sent in the following idea for a sanding block with a replaceable sanding surface. In order to accomplish this, the following materials would be needed:

One (1) 3" x 24" sanding belt for the average belt sander (i.e., Black and Decker).

One (1) block of 3/4" plywood, pressboard, etc.

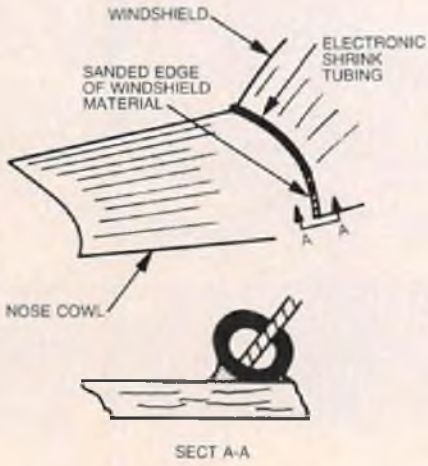
Directions: Cut a piece of wood (pressboard is best because it won't warp) 3" x 11¾" long; then slide the belt of desired grit (40, 80, fine, medium) over the block, and you have an instant sanding block with replaceable sandpaper and choice of grits.

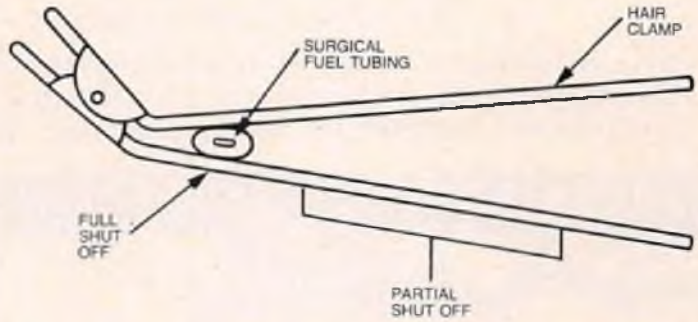
FOR WHAT IT'S WORTH

Here is a relatively easy, yet realistic, way to secure the windshield to the nose cowling on a cabin plane. This was sent to us by Don D. McColgan of Claremont, California.

It should also work in securing the canopy on other types of aircraft but Don hasn't tried it yet. First, lay masking tape about 1/8" from the edge of windshield, then sand the edge so Zap will stick to it. Remove the masking tape. Second, lay a piece of 1/8" diameter electronic shrink tubing on your hot MonoKote iron and let it shrink. Next, slit the tubing with a pointed X-Acto knife. (Once started, the tubing can be pulled into the point of the blade by pulling the tubing back parallel to the knife handle.) Now insert the tubing to the bottom of the windshield, or cowl, and lay a drop of Zap on it to secure. The tubing can now be glued to the cowling with Zap (or whatever glue you like) resulting in a low cost, yet very scale appearing, weather stripping. See sketch.

Another use for shrink tubing suggested by Don is to make a seal so fuel won't run along the throttle pushrod into your servo. Find a piece of shrink tubing that will slide easily over the outside of the throttle pushrod outer tube. Cut the tubing slightly longer than the servo throw. Let the outer rod extend from the firewall so that when the shrink tubing is shrunk down over the pushrod coupler, and the throttle set to idle, there is a little overlap. See sketch.





For model boaters who use surgical clamps for clamping off their fuel line to prevent engine flooding during starting, you might want to try this method. Use a hair clamp in place of the surgical clamp as suggested by Michael Paul of Springfield, Missouri. The advantages are that it's much cheaper and by adjusting where the fuel line is placed on the clamp, you can vary the fuel flow. The sketch is self-explanatory.

Instead of messing with Rit dye to tint canopies, try this method from George Zimmer of West Monroe, Louisiana. Wash the inside of the canopy with detergent and rinse with warm water. When the canopy is dry, spray the inside only with Testor Transparent PLA. Transparent blue and green are very attractive. This looks great and since the color is on the inside, fuel, cleaners, scratches, etc., won't bother the tinting.

George tints all of his canopies for a reason other than looks. A clear canopy can't be seen at normal flying distances and on most all planes, whether Mustang, Kaos, or Cub, you need a reference as to aircraft attitude. An easily seen canopy helps keep one properly oriented.

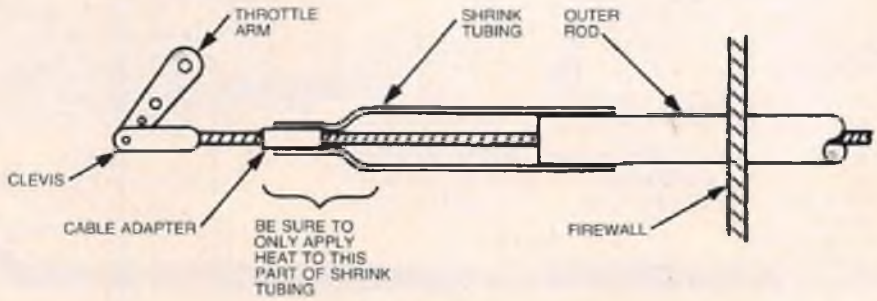
An inexpensive and very simple weight that will contour over compound curves without slipping, can be made from Zip-Loc food bags found in most grocery stores. Fill these with sand and zip loc the top. These are perfect for holding wing skins on foam cores while adhesive cures. This suggestion was sent to us by Lonnie Prince of Decatur, Illinois.

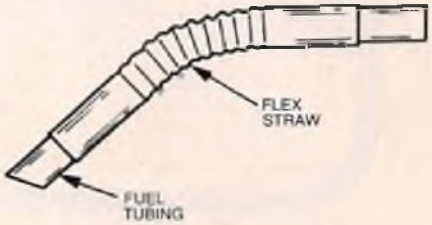
Gary Grant of Oakland City, Indiana, has been using auto bug screen as a good substitute for glass cloth when strengthening center sections of wings. Gary purchases his at Western Auto stores for 99 cents. It has a grid pattern that holds the resin and keeps it very light as well as being able to cut it with scissors. This same material is also used in window screens.

While completing a Jemco F4U Corsair cockpit interior, Joseph Bukovchik of Vista, California, wanted a black satin finish. Painting it black was not satisfactory to Joe, because of the small, tight area being extremely difficult to get smooth and free of balsa grain. A quicker and easier method was used by cutting out panels of #320 grit black emery paper to fit the dash, floor, deck and back. The next step was to glue on the instruments to the paper panel before gluing it to the dashboard. Joe then cut a hole in the floor panel slightly smaller than the bottom of the pilot so it would adhere to the wood floor. The final results were superb due to the clean, uniform, soft beaded black interior. This method can be used on most Stand-Off Scale cockpit interiors.

Presented here is a simple solution to a vexing R/C problem --- that of making reliable sharp radius bends in rubber fuel tubing. Use the accordian pleated portion of a plastic flexible drinking straw to cover the bend in the tubing. It is virtually impossible to kink the tubing, even with a 180° 1/8" inside radius bend.

It costs nothing (use straws that have been previously used and washed out), and is light, simple and foolproof. See attached sketch. This idea was submitted by Doug Bebensee of Goodells, Michigan. □





showcase '79

All items appearing in Showcase '79 are press releases supplied by the manufacturer of the product and/or their advertising agency unless otherwise specified. Note: The review or discussion of any product by Radio Control Modeler Magazine does not consititute an endorsement of that product nor any assurance as to its safety or performance by RCM.

MRC'S GUIDANCE SYSTEM

In the face of consistently rising prices on everything, in or out of the hobby, it is somewhat refreshing to note that R/C system prices in general seem to be holding their own pretty well, and in some cases, even coming down. For example, take a close look at MRC's latest, its Guidance System 2000, two channels of modern state of the art proportional radio control for only $99.95. The three channel version costs $149.95, while the four channel is priced at $249.95. Now some of you old timers will remember the Orbit 3 + 1, the very first three channel proportional system introduced back in 1966. What you might not remember is the price, $350.00. As stated, this new MRC is modern in all respects, including open gimbals and sealed pots, and gold plated pins as found on its top of the line 775 sets. Powerful MR-12 servos are standard equipment, however, smaller MR-60's can be specified, at an additional $10.00 cost. The concept is new also, in that the Guidance System 2000 is expandable whenever required to 3 or 4 channels, at only $10 over the basic price difference. Thus a beginner can start his R/C career at minimum cost, and increase the capability of his equipment as his needs dictate, without fear of any great monetary losses as are sometimes experienced. Airborne system weight for the 2000 is a mere 9 ounces, with a 450 MAH battery pack. For compactness, the transmitter antenna folds completely inside the case when not in use. There are some other price options, for nicads and additional servos for which complete information is now at your MRC dealers, or inquire from Frank Ritota, Model Rectifier Corp., 2500 Woodbridge Ave., Edison, NJ 08817.

DUMAS "AMERICAN ENTERPRISE"

If the "American Enterprise," as designed by Halter Marine Inc., is any indication, the crew of offshore drilling rigs really travel in style. Let's all hope that this keeps them in a good mood and they are soon able to do something about our present gas problems. Anyway, Dumas Products has recently released a 52" long, 12" beam kit of this beautiful high speed crew boat, for R/C with electric or gas power, or for static display. The kit, No. 1213, features all pre-cut plywood with deck hardware. A twin prop running hardware kit, No. 2332 is also available. Look for the "American Enterprise" at your local boat shop, or inquire from Dumas Products Inc., 909 E. 17th St., Tucson, AZ 85719.

C & D GLO-DRIVER AND START-PAC

A couple of items of interest to all glow engine operators have recently appeared. The manufacturer is a relatively new company, C & D Enterprises, 10042 Merrimac Dr., Huntington Beach, CA 92646. Appearing first was the C & D Glo-driver, a self-contained unit which automatically provides pulsed glow plug power according to the engine's needs. The basic power source is a 4.8 volt G.E. nicad battery, and the electronic solid state circuitry does the sensing and current control. The results are fast and reliable starts. A full faced meter is included for easy visual detection of open, shorted or flooded conditions, and charging can be done with your normal airborne battery charger. The Glo-Driver comes complete with the new "Head-lock" plug connector, and is priced at $59.95.

Next, C & D introduced its electric starter Cordless Start-Pac, a strap on 12 volt nicad supply which converts your starter into a compact and portable unit. The Start-Pac also uses high capacity G.E. nicads, and includes all hardware necessary to mount your starter motor. An AC charger is also included. The price of the Start-Pac is $46.95; and both items are now at your local store or may be ordered direct.

BALSA USA'S AERONCA C-3 COLLEGIAN

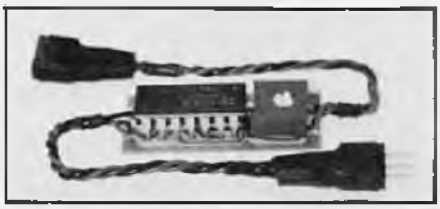
That perennial favorite, the Aeronca C-3 Collegian is now available as a 9' span R/C kit by Balsa USA. The complete kit includes all the necessary hardware, including turnbuckles and cable, and formed wire pieces. The cowl is preformed of ABS, and only AAA balsa and plywood is used throughout. Three rolled sheets of plans are included, as is a 13 page instruction booklet with photos. This Quarter Scaler is priced at only $69.95, shipped prepaid by UPS.

A complete catalog is available for 25¢, further describing this and many other Balsa USA sailplane and power plant kits. Balsa USA, P.O. Box 164, Marinette, WI. 54143.

FULL COLOR AIRCRAFT PHOTOS

Historians and scale-builders, Achtung! A new source of full color aircraft photos has just appeared. The well known Dale Willoughby is now providing us with this service, and will

gladly send you a current list of all available photos upon receipt of a self addressed envelope. Included are such interesting and varied birds as the Quickie homebuilt canard, the Pou-de-Ciel, and the Bleriot Monoplane. More modern designs include the F-102 and A7E Corsair jet, with a wide range of in-between these two periods in history. Write to Dale at 1999 Larkin Ave., Elgin, IL 60120.



KRAFT ORANGE COUNTY PRODUCTS

Kraft Orange County, well known facility for Kraft, Tower, K.S.E. and P.C.S. service, has recently announced some interesting products of its own. First and foremost, it has replacement or additional servos, in three sizes. They utilize the famous Kraft KPS-14II, Kraft KPS-15II or D & R Bantam Midget machines and a special amplifier designed and manufactured by Electronic Model Systems. The amp uses the improved Signetics NE544 integrated servo with silicon output drive transistors. The Bantam Midget uses conductive plastic pots, while the other two types use CTS pots with the acclaimed Giezendanner wipers for best competition performance. The servos are priced at $29.95 in the Midget size, and $32.95 in either of the Kraft mechanic sizes. They are available for most modern digital systems, and are furnished with the proper connectors to match.

A new plug-in servo reverser is also available, which installs between the receiver and servo when output rotation in the opposite direction is desired. Extremely light and useful, at only $10.95.

Kraft Orange County has another handy dandy, a Field Bender, shaping and straightening heavy gauge landing gear wire. This simple but effective device belongs on all workbenches and in all tool boxes, and is priced at only $3.49: available at your dealers. For further information, inquire from Kraft Orange County, 330 E. Orangethorpe Ave., Suite J, Placentia, CA 92670.

HUSTLER MK II 3.5cc OUTRIGGER HYDRO

The Hustler MK II Outrigger Hydro, currenty IMPBA Class B oval record holder, originally produced by A & L Boats, is now available in an improved version by Mini Marine Racing Equipment. An Al Churas design, the original Hustler is the first boat of its class to go over 70 mph and has been a consistent Class B, C, and D winner. The kit contains all pre-cut plywood parts, adjustable front sponsons, machined aluminum sponson brackets, and aluminum motor mount. A newly designed hull featuring an extended nose for better turning characteristics and a high speed aerodynamically styled cowling were developed and are used. The Hustler MK II is 31" long, 15¾" wide, and is designed for 3.5cc engines. A larger 7.5cc version is in final development and should be available around June. Future plans call for a 10cc version as well. The Hustler MK II is priced at $110.00; available now at many nationwide R/C boat shops, or inquire direct from Mini-Marine Racing Equipment, 542 North Vale, Villa Park, IL 60181.

GEE BEE PRODUCTS WHEEL PANTS

Probably the easiest way to really dress up a model is with the simple addition of a pair of wheel pants. The whole thing just became easier, with the introduction of Gee Bee Products new pants, designed for 2¾" to 3¼" wheels. They are molded of a virtually indestructable ready to paint material, and are complete with an exclusive axle and "Pant-loc" device for aluminum struts. Instructions are included for mounting to wire gears. Only $9.95 per pair, at your dealer or direct from Gee Bee Products, P.O. Box 18, East Longmeadow, MA 01028.

DIXON HEMOSTATS

Two hemostats, one with curved and one with straight blades, have been added to the tool line of the William Dixon Co. Both models have vinyl clad handles for comfort and protection when working with heat. A three position locking device in the handle makes this a versatile tool for all modeling and electronics work; it can be used as a clamp, heat sink, or miniature vise. The jaws are 1¼" long, serrated for a firm grip, but claimed not to cut into soft materials such as plastics or wire insulation. They are especially useful for clamping off engine fuel lines. These stainless hemostats are designated as No. H340 for the straight model, and No. H341 for the curved ones. Look for them at your dealer, and ask for a price list and catalog of its many small tools from William Dixon Co., 750 Washington Ave., Carlstadt, NJ 07072.

KAVAN GLOW PLUG CONNECTORS

Kavan Model Aircraft Inc., 1414 E. Borchard Ave., Santa Ana, CA 92705, recently introduced a new glow plug connector system, of the push on type, using specially shaped internal fingers for best electrical and mechanical

Bud Nosen's
spectacular
102″ P-51 D
KIT $169.95

- Stand-off Scale
- 2.75″ equals 1′
- 102″ Span
- 16.5# flying wt.
- 1800 sq. in. wing
- 26¼″ chord at root

- 4 channel radios required
- Designed for .60 engines with prop driver
- Very stable flyer
- Proof of scale 3 views
- Kit includes 21″ canopy

- No foam or plastic
- 6″ spinner is not included available direct only $16.95
- Huge rolled Plans
- Machine and die-cut parts
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BUD NOSEN MODELS, INC.

Box 105 Two Harbors, MN 55616 catalog 50¢

BUD NOSEN MODELS

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All kits feature all wood construction, fast assembly, huge rolled plans, assembly instructions, machine and die cut parts, all necessary hardware and much, much more. Designed for .60 engines on up. Write for our illustrated catalog—50¢.

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Standoff Scale Formed ABS cowl Kit -
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3 or 4 Channels Flys like a trainer Kit -
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Big airplane fun— Quadra economy
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1/3 size Standoff scale 4 Channels required Kit -
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9' "MR. MULLIGAN"

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1/4 size Standoff scale Molded cowls Kit -
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10' CESSNA 310 TWIN

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400 Cuyler Street
Thunder Bay, Ontario

contacts. The first one, No. 39, designed to be used with existing battery supplies or glow drivers, is attached to a length of heavy gauge insulated wire. It is priced at $7.50. The second, No. 135 connector includes a molded clip attachment into which a 4 amp, size "D"

nicad battery is fitted. Thus, you have a convenient one piece lightweight glow plug supply that is good for a large number of starts. In actuality, a size "D" nicad will light a plug for almost two hours, however, note that some of the cells available in non-hobby stores are not rated at 4 amps, which a true size "D" nicad is. These lower capacity cells will not last as long for each charge and are not recommend for this application. And, last but not least, a charger adapter No. 135A is also being manufactured, looking almost like No. 135, except with the addition of a length of two conductor wire instead of the plug socket. Both 135 and 135A are $11.25, without a nicad cell.

NEW STANLEY KNIVES

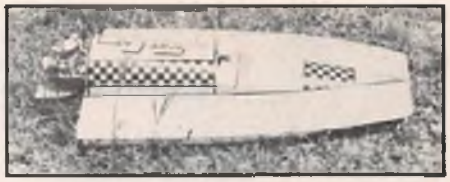
Two new knives of interest to modelers and all hobbyists have just been introduced by Stanley Tools, the well known tool makers. First, is a Quick-Point Snap-Off Blade knife that contains 13 new cutting points on a blade that will not slip. The contoured knife body is lightweight, comfortable, rust resistant, and handles like a pencil for fine cutting. An adjustable positive lock holds the blade at each position. When a new point is needed, the blade is extended and the end snapped off with the removable pocket clip cap. The Snap-Off Blade Knife is No. 10-300, at $2.40; replacement blade is 80¢. Second, is a replacement blade folding pocket knife with stainless steel case and a unique blade locking feature for safety and ease of handling. The replaceable blade means no sharpening is ever necessary, and the handle will accept all Stanley Slimknife blades of varying sizes and shapes. It is priced at $2.60. Look for them at your local stores. By Stanley Tools, Box 1800, New Britain, CT 06050.

LARGE MUSIC WIRE

Sig Manufacturing Co., Montezuma, IA 50171, has added 7/32" diameter music wire to their extensive line. This new heavy duty size is suitable for landing gear struts on many of the quarter size aircraft models. It is also useful as mounting rods for the larger sailplanes with removable wing panels. Sig's products are available at all hobby shops.

TRANS TOTE

A really good idea . . . after all, that R/C transmitter cost a lot of money, and there is no doubt that its continued operation is very important. Some protection for it while on the way to the flying field certainly seems to be in order. L.R. Taylor & Co., has just the thing, which they call a Trans Tote. This transmitter carrying case is made of high quality vinyl for long life, and is designed to protect your investment from dust, dirt, water, and fuel. It also offers excellent protection from scratches, dents and dings. The reinforced carrying handles make it easy to carry, and it comes in the colors of your transmitter frequency to further help in preventing those frequency problems that we all hate. A $7.95 well spent, at your dealers or direct from the L.R. Taylor Co., 20831½ Roscoe Blvd., Canoga Park, CA 91306.



SCAT CAT

Hyde Engineering Co., has recently introduced its redesigned version of the "Scat Cat," a competition R/C boat for the K & B 3.5cc outboard tunnel hull class. The new "Scat Cat" has an improved bottom running surface which is claimed to make the boat 10 to 15% faster than the original "Scat Cat" which won First and Third in its class at last year's Naples Nationals. The hull is vacuum formed from .10 thick ABS sheet, with reinforcements at all the critical areas. The hull is 26½" long, with a 14½" beam, and is furnished with pre-drilled and tapped aluminum engine mounting plates, socket head screws, built in radio box, gasket, cover, and hood. This completely finished boat comes in white polished finish only, but it can be painted or trimmed with most of the model paints in common use. The ready to float "Scat Cat" is available direct only, postpaid anywhere in the Continental U.S. for $65.00. It is also available completely ready to run, with engine and Futaba FB2GA R/C system installed, and Pylon high torque starter, at $350.00. Delivery time is about two weeks, and cashier's checks or money orders are requested. For more information on the "Scat Cat" and its extensive line of R/C boats, write Hyde Engineering, Rt. 3, Box 236, Crystal River, FL 32629.

.60 POWERED SOPWITH PUP

Following in the slipstream of its Fokker DVII, Orline Inc., is now delivering its Stand-Off Scale Sopwith

Pup, for .60 size engine and four channel radio systems. It has a wing area of 1586 sq. in. and weighs in at around 10 pounds, depending on engine and radio used. The kit features die stamped balsa parts, machine cut and sanded plywood parts, pre-formed balsa blocks, pre-formed leading and trailing edges, pre-formed gear and cabane struts, and a heavy duty one piece ABS cowl. A complete hardware package is included, which contains aluminum motor mount, hinges, links, horns, bolts, gear straps, nuts, bolts and all necessary fittings. Even a scale wheel, a scale machine gun and pilot, and self-adhesive decals are included. And of course, Orline's full size rolled plans and step-by-step illustrated construction manual. Orline's Pup is priced at $119.50, and is available at most hobby shops, or direct. Orders or information from Orline, Inc., 11235 Portland Rd. N.E., Brooks, OR 97305.

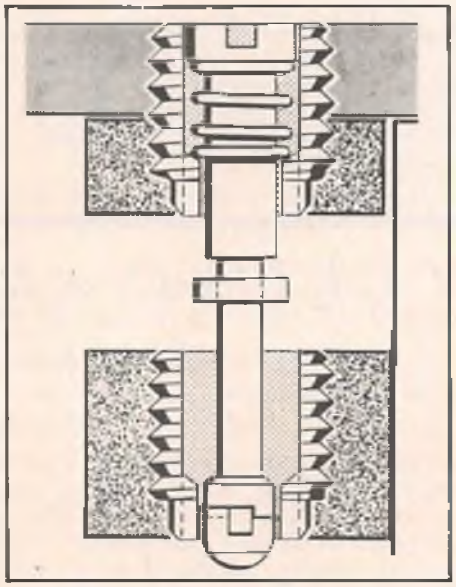
LIVE WIRE CHAMPION MARK III

RC'ers from the early days will certainly remember the Live Wires, as designed and then kitted by Hal DeBolt. We doubt if they ever completely disappeared from R/C skies, and they are about to reappear in larger numbers. One of them, the Live Wire Champion is now available in an updated modern version designated as the Mark III; the third time that this classic has been revived. The Champ is designed for one to three channel operation, and for engines from .15 to .35 displacement. The wingspan is 55", and can be assembled with either tricycle or conventional landing gear. New plans, assembly instruction book, and color decals are also included. Look for the Champ at your nearest hobby store, or direct from Midwest Products Co., 400 South Indiana St., Hobart, IN 46342.

EASY BAILER

R/C boats and boaters have to have water — but it is desirable to keep it all on the outside of the hull. Eastcraft Specialty Products has just the thing to guarantee that, with its recently introduced "Easy Bailer." This simple looking device is a one way valve which

you install in the boat's transom and which automatically removes unwanted water from the interior of your boat without letting water in. It does this by automatically closing itself when the boat is at rest, and opening once the boat is underway. The results are a lighter boat, which means a higher speed, and more reliable operation of the engine and radio, and less water and oil on the flywheel and starting belt. Small and light, requires no maintenance, but fully effective, the "Easy Bailer" is only $3.50, at boat suppliers or from Eastcraft Specialty Products, 709 Longboat Ave., Beachwood, NJ 08722.



DU-BRO'S 1/4-TURN LATCH

Described as the perfect way to latch your hatch, Du-Bro Products' new 1/4-Turn Latch will work equally well for cowlings, canopies, inspection covers, molded bodies; in fact anything that has to be made removable on your airplane, car or boat models. The actual size of the latch assembly is only 3/4" x 1/4", and is all steel and brass machined parts. It is simple to line-up and install, and results in a perfect alignment every time. It locks positively, and releases easily, both with a mere 1/4 turn with a screwdriver. It mounts flush with the outside surface of the model, for a low drag, no show installation. Since the length is adjusted to each individual installation, it is always a perfect and secure fit. These new accessories are only $2.50 for two complete sets, at your nearest supplier. From Du-Bro Products, Inc., 480 Bonner Rd., Wauconda, IL 60084.

DREMEL'S VISE CLAMP BASE AND D-VISE/CLAMP COMBINATION

Who among us has not often wished for a third, or extra hand? With that thought in mind, Dremel, A Division of Emerson Electric Co., has introduced its new base clamp and vise/clamp combination. The new Vise Clamp is designed to be easily placed over the Dremel D-Vise for easy clamping to any flat surface for greater stability without permanent mounting. No screws are needed. The D-Vise offers 180° tilt, and 360° swivel for best positioning of your work or one of Dremel's popular Moto-Tools. Precision slide rods assure parallel jaw alignment and equalized pressure. The guide bars are firmly supported at three points for completely wobble free operation. The D-Vise/Clamp Combination, No. 2221 is priced at $28.00. For previous purchasers of the D-Vise, the Clamp alone, No. 2218 costs only $4.95. Look for them down at your favorite Dremel supplier, or order direct from Dremel, Division of Emerson Eelectric Co., 4915 21st St., Racine, WI 53406. □

HELICOPTER CHAMPIONSHIP

from page 76

entertainment were flights by Dave New of the Anaheim R/C Club with his 1/3 Scale Pitts bipe, and Joe Aguilera with his 1/4 Scale Stearman. Both were Quadra powered and drew healthy applause from the crowd, particularly when Dave did a three point that included his spinner. Crowds love crashes!

The helicopter contest itself was remarkably free of spectacular crashes. The main exception being Expert 3rd Place winner Larry Jolly's abrupt end of his fourth and final round when his prototype design autorotation clutch failed coming out of a 360 degree stall turn. Also plagued with bad luck was Intermediate contestant Bob Goff, who after successfully curing a persistant lean running Super Tigre was taken out by a radio failure. Engine and trim difficulties also kept our only lady contestant, Tricia Copfer, grounded. She served as an able monitor of the transmitter instead.

A pre-contest pilot's briefing was held by Marvin Copfer on Saturday morning for discussion and clarification of the rules, and perhaps equally important, the meet's organizational plan. Questions not covered by the rules, like the number of rounds to be flown, the order of appearance of each contestant (almost everyone wanted to be last), and the consequence of missing your appointed round all needed resolution. The order of appearance was partly dictated by radio frequencies, a contestant or flight deck must not be preceded or followed by anyone on the same frequency, otherwise the order was selected by random selection. And once established, the flight order did not change from round to round. The contest was begun with the expressed hope that a total of five rounds would be flown by each contestant. At the end of the fourth round on Sunday afternoon, there was some doubt about the desirability of going the fifth round. A meeting of all contestants was called and a vote taken by show of hands. It was voted to stop at that point.

What did we learn that might be applied to future contests? One might argue that use of full size helicopter pilots as judges is inappropriate. While certain maneuvers like autorotations are fully understood because they are scale-like in nature, the equally difficult pilot walk-around and nose-in hover may be hard for a full scale pilot to appreciate. What is required is that the judges and referees know the rules of the contest. Perhaps the judges and contest directors should be qualified by having to pass a written test establishing their knowledge of the rules. Beyond this, some sort of official qualification might be required, but this is difficult to ask of an unpaid volunteer. (Ed. Note: Such a system exists under the USPJA for pattern judging.)

The awards ceremony that followed seemed almost anti-climactic, even to the winners laden with loot. Base Commander Col. Glenn Schaefer did us the honor of passing out the trophies and prizes, which included a Futaba 5JH system, a Schluter "Fohn" glider and a "Manta" delta kit, a Powermite Sander, a Sullivan Starter, and a Profi .61 engine.

For you closet flyers, here is a final word. A properly trimmed helicopter in good mechanical condition is not, despite all the myths to the contrary, hard to fly. Given a little time and dedication, it can become a source of great pleasure.

We also wish to extend our heartfelt gratitude to Col. Schaefer, MCAS(H), and to the Marine Corps and its many volunteer workers who made the meet possible. There are many logistical and legal problems involved with running any contest, more so if it is to take place on a military installation. In all, a lot of work was done by a lot of people, we only hope that they too felt, as we did, that it was worthwhile, and that we can look forward to a 2nd Annual Helicopter Champs at Marine Corps Air Station, (Helicopter). □

F4U-1D CORSAIR

from page 74

"Saga of the Bent-Wing Birds," by Walter A. Musciano, Aerofile, Inc., Bronx, New York; "F4U Corsair In Action," by Jim Sullivan, Squadron/Signal Publication, Warren, Michigan; "Chance Vought F4U Corsair," by Edward T. Maloney and Uwe Feist, Aero Publishers, Inc., Fallbrook, California; "US Navy and Marine Corps Fighters," by William Green and Gordon Swanborough, Arco Publishing Company, Inc., New York, New York. □

GRUMMAN HELLCAT

from page 73

.... but is very difficult if left until later. We also had difficulty in utilizing the engine cooling duct provided with the kit. We, therefore, discarded it in favor of a slightly larger opening in the cowling above the cylinder head. Thus far, no cooling problems have been evident.

Jim Meister, the designer, cautions the builder that approximately 8 ounces of nose weight may be necessary for balance. This advice is worth repeating. The Hellcat is short-coupled and could be a real "hellcat" if flown tail heavy. By the way, ours required exactly 8 ounces of nose weight.

Our model was very light, weighing less than seven pounds after finishing with Super Poxy paints. Although retracts were not installed, we did install a Vortac bomb system for a little extra thrill in the air. The first flight convinced us that the model is well worth the extra effort required to install retracts. The Hellcat is a superb flying machine. Lift off is smooth and straight and the plane flies like a good model should --- smoothly. The greatest surprise is the way the Hellcat does touch-and-go's. It's a pleasure to fly the Hellcat. It loops, rolls, and lands with no bad habits and represents an addition to the available scale models on the market. □

QUARTER SCALE FLY-IN at LAS VEGAS

October 11, 12, 13 & 14, 1979

Sponsored by The Quarter Scale Association of America

Entry fee will be $20.00 per pilot, including 3 days of Insurance, plus a banquet on Thursday, October 11, at the Stardust. Planes will be on display also on Thursday, October 11 at the Stardust Hotel Convention Center.

150 Aircraft ★ 50 Manufacturers ★ Largest Model extravaganza in the world!

During the 4 days in October, we will be offering model displays, food, sky divers, demonstrations, new products, info, exhibits, rides on an original Ford Tri-motor, full scale aircraft demos, fun events, drawings, hot air balloons, perpetual trophies, and loads of flying time, plus the night life of fabulous Las Vegas. For those modelers who wish to ship their aircraft ahead, the Q.S.A.A. has set up a depot in Los Angeles, that will transport it to the Stardust Hotel in Las Vegas at no charge. Contact Mr. Ray Baker, 155-12 Gridley Rd., Norwalk, Calif. 90650. Call (213) 864-4758 upon arrival. October 1 deadline.

For additional info, contact: **Ed Morgan, 2310 Cimarron Rd., Las Vegas, Nevada 89117. 702/878-1306**

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Whizard	11.95
Foam Wings	2.07

-A-JUSTO JIG-

Full House	36.95
½A Retracts	6.95

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Big H Ray	29.95
S Ray	24.95
H Ray	26.95
X Ray	34.95
Quick Ray 500	32.95
Sportsmaster	45.95
Trainermaster	36.95

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Square Soar	16.95
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Aquila Grande	84.95
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Cadet 62	23.95
Acro Star	62.95
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Soar Bridi	12.50
Waco	66.95
UFO	89.95
AT6 Texan	95.95
Dirty Birdy(glass)	84.95
Dirty Birdy 60	54.95
Dirty Birdy 40	38.95
Basic Trainer	24.95
RCM Trainer 5	18.95
RCM Trainer 10	19.95
RCM Trainer 20	24.95
RCM Trainer 40	34.95
RCM Trainer 60	40.95
Quickest 200	18.95
Quickest 500	29.95
Super Kaos 40	36.95
Super Kaos 60	47.95
Kaos	43.95
Tweedy Bird	29.95
15-500	26.95
P51D (glass)	95.95
Lockheed Sirus	95.95
Chipmunk (glass)	82.95
Shrike (glass)	126.95
RCM Sportster	24.95
Rearwin Speedster	89.95
Sun FII 4-20	21.95
Deception	58.95
T28	106.95

-CASS ENG.-

Pulsar Bipe	77.95
Steen Skybolt	83.95

-COVERITE-

Super coverite	5.25
Slikspun coverite	5.25
Permagloss Coverite	6.39
Antique Coverite	5.25
Balsarite	2.24
Glaskote (½pt)	2.24
Glasskote thinner(pt)	1.89

WE WILL BE CLOSED FOR INVENTORY & VACATION SEPT.4 THRU SEPT.21

This ad was printed for publication on June 10.

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Drifter II	13.95
Windrifter	27.95
SD100	35.95
J-Bird	39.95
Sailaire	85.95
Viking	55.95
Butterfly II	28.95
Field Boxes	18.95
E.S.Voltmeter	15.95
Std. HiStart	25.49
H.D.HiStart	29.95
Piece of cake	16.95

-D.A.E.-

Single Range	14.95
Dual Range	17.95
Mini	11.95
Series IV	23.95

-DREMEL-

210 Drill Press	14.95
217 Foot sp.control	15.95
261 Moto-tool kit	29.95
271 Moto-tool kit	29.95
281 Moto-tool kit	35.95
371 Moto-tool kit	35.95
381 Moto-tool kit	41.95
571 Moto-shop	44.95
572 Moto-shop del.	56.95
580 Table Saw	59.95

-FLITE LINE-

Skooter II	21.95
Skooter II (racing)	21.95
EZ Trainer	21.95
EZ Sport	21.95
EZ FII	21.95

FLYING SPECIAL

Fox r/c long plugs	*1.04*
Fox r/c short plugs	*1.04*
K&B r/c long plugs	*1.47*
K&B r/c short plugs	*1.47*
Glo-devil r/c longs	*1.04*
Glo-devil r/c shorts	*1.04*
glo-bee r/c longs	*1.05*
glo-bee r/c shorts	*1.05*

Buy a dozen and get 10% more off

-FUSITE-

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Fire Plug Charger	5.17
Stinger(½A starter)	22.95
Stinger Charger	5.17
½A racing plug	1.25
½A sport plug	.97

-GOLDBERG-

Falcon 56 MK II	27.95
Skylark 56 MK II	27.95
Sr. Falcon Deluxe	37.95
Skylane 62	38.95
Ranger 42 (ARF)	18.95

-HALLCO-

B105-1 landing gear	2.63
B105-2 landing gear	2.98
B105-3 landing gear	3.33
B105-4 landing gear	3.85
B105-5 landing gear	4.38
B106-3 landing gear	3.50
B106-4 landing gear	4.03
B106-5 landing gear	5.25
B106-6 landing gear	6.83

-HOT STUFF-

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Clear ½oz	1.95

-JENSEN-

Das Ugly Stick	42.95

-JEMCO-

AT6	44.95
FW190 D9	44.95
Corsair	55.95
Hellcat	58.95

-L.R.TAYLOR-

Power Pacer	42.95
Multi Charger	19.95

-LANIER-

Comet II	36.95
Jester C	43.95
Caprice C	43.95
Cessna	30.95
Transit	26.95
Pinto	30.95

-MACO-

Tiger Cat	40.95
Simplex Trainer	28.95
Vaga	42.95

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Wanderer	13.95
Windward	20.95
Windfree	25.95
Bushwacker	25.95
Sunny	19.95

-MASTER KIT-

Stinger II	41.95
Hiperbipe	47.95
Peppermint Pattie	27.95

-MEN-

MEN Trainer	20.95
MEN Trainer 40	34.95
Buzzard Bombshell	34.95
Piper J3	32.95

-MIDWEST-

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Super Chipmunk	22.95
Cessna Cardinal	22.95
Sweet Stick	29.95
Strikemaster	48.95
Silent Squire	26.95
Attacker	26.95

-MILLER-

2115 set&15gun	49.95
2134 set&3guns	50.95
2129 set&2guns	50.95
2018 1 gun set	43.95
2017 set&2guns	43.95
2011 air brush set	40.95
2016 set&1 gun	40.95
18 gun	9.57
16 gun	5.70
14 gun	4.50

-NOSEN-

Citabria	74.95
Trainer	55.95
P51	118.95
Jenny	98.95
Mulligan	97.95
Aeronca	69.95
J-3	83.95

-PACER-

Econo-Pak Zap	3.38
½oz Zap	1.79
X-30 (30 seconds)	1.69
Zap Applicators	.35

-PEERLESS-

Sydney Sailing yacht	45.00
Newport " "	35.00

-PICA-

Spitfire	52.98
T28	52.98
FW190	52.98
Waco	52.98
Duellist 2/40	58.95
Cessna 182	58.95

-PRATHER-

Little Toni	74.95
Little Toni(¼midg)	49.95
Sport Panther	74.95
Pole Cat	20.95

-R & S-

Vertigo II	44.95
Phoenix 6 (60 size)	44.95
Phoenix 5 (60 size)	44.95
Phoenix 5 (40 size)	41.95
F16	89.95
Mig 21	89.95
F5	89.95

-R/C KITS-

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Acromaster	48.95
F7F Tigercat	87.95
F100 Super Sabre	59.95
Super Hunter II 60	48.95
Super Hunter II 40	41.95
Lockheed U2	83.95
Maxi Acro Trainer	87.95
Acro Trainer	48.95
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Cessna 206	63.95
Cessna 310Q	72.95
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P38	93.95
Phantom F4J	63.95
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-SIG-

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Kiwi	29.95
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Citibria	44.95
Liberty Sport	50.95
P51 (kwik built)	43.95
Cessna 150(kwik)	51.95
Smith mini-plane	38.95
Piper J-3	30.95
Clipped wing cub	30.95
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Zlin Akrobat	41.95
Aerobipe	17.95
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Kougar	32.95
Klipper	15.95
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Komet Balsa Skin	35.95
Komet Ply Skin	39.95
Komander	30.95
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-SOARCRAFT-

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Diamont	62.95
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Magnum 12	89.95
Skybolt	69.95

-SOLUTION-

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Saker	39.95

-SONIC-TRONICS-

Side winder pump	6.27
Electric fuel pump	10.95
Crazy tape ¼x50'	2.49
Crazy tape ¾x50'	5.95

-SONIC SYSTEMS-

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3 gear system	31.95
Retract Mains(pr)	12.95
Retract nose gear	12.95
S.C.II Pump	8.95

-SOUTHERN R/C-

Alley Cat	35.95
Sweetater	59.95
Tiger Tail	57.95
Sweetater Delux	84.95
Tiger Tail Delux	82.95
Atlas	74.95
Southern Kite	49.95

-STAFFORD-

Twin Comanche	94.95
Comanche	49.95
B-24 liberator	128.95
P39	41.95
P-51 (retract gr)	44.95
Aircoupe	51.95
Chipmunk	41.95
EAA Acro Sport	44.95
EAA (foam wings)	52.95
Super Buckaneer	29.95
Tom Kitty MK15	27.95
Tom Kitty MK40	37.95
Super Minnow	39.95

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Mini Fledgling	14.95
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Puddle Jumper	11.95
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Waco S.R.E.	51.95
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Tri Pacer	27.95
Rimfire	34.95
Gazarlator	44.95
Lancer	30.95
Lancer SL62	38.95
Fokker D7	61.95
PT 17	68.95
Super Cruiser	34.95
J3	18.95
PT 19	18.95

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-SURE FLITE-

Cessna 182 (foam)	22.95
Piper Cub (foam)	22.92
Spitfire (foam)	22.95
Howard dga ½a pete	16.95
Baby Birdie	11.95
Super Eye Soar	34.95

-TOP FLITE-

Freshman Trainer	28.95
P51 Mustang	43.95
P40 Warhawk	43.95
P39 Airacobra	43.95
P47 Thunderbolt	59.95
Kwik-Fli III	41.95
SESA	41.95
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-VK MODELS-

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Cherokee Babe	27.95
Cherokee	46.95
Navajo	46.95
Corben Super-Ace	31.95
Sopwith Camel	46.95

-WING MFG.-

Drone	26.95
Love Machine	26.95

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O.S.Max:	
15 R/C	27.95
25 R/C	31.95
25 F SR R/C	41.95
30 R/C	35.95
35 R/C	37.95
40 R/C	51.95
40 F SR R/C	63.95
60 F SR R/C	89.95
60 F SR w/pump	111.95
K&B:	
61 R/C	57.95
61 R/C w/pump	74.95
40 R/C	43.95
40 R/C w/pump	62.95
40 R/C Marine	57.95
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Cox:	
TD049&051	15.95
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19 R/C Bushing	21.95
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60 Eagle R/C	44.95
60 Hawk R/C	49.95
twin engine	174.95

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Futaba:	
4 channel w/S18	178.95
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KP4A	188.95
KP6A	209.95
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KP7C	368.95
Signature series	674.95
World Engines:	
7 cha. dual stick	254.95
5 cha. dual stick	234.95
COX:	
8068 6 channel	299.95
8054 5 channel	175.95
8031 3 channel	101.00
8020 2 channel	59.95
8021 2 channel	92.95
8022 2 channel	92.95

-ZINGER PROPS-

7-4,7-5,7-6,7-7	.84
7½-4,7½-5,7½-6,7½-7	.84
8-4,8-5,8-6,8-7	.91
8½-4,8½-5,8½-6,8½-7	.91
9-4,9-5,9-6,9-7	.91
10-4,10-5,10-6,10-7	.98
11-6w,11-7w	1.12
11-5,11-6,11-7,11-7½	1.12
11-8	1.12

also 12-6 thru 24-10
Buy them by the dozen and get 10% more off.

BALSA SPECIAL

Buy quantities of 12 pieces of any size and save.

1/16 x 3 x 36 @	.32each
1/8 x 3 x 36 @	.44each
1/4 x 3 x 36 @	.61each
1/16 x 6 x 36 @	.92each
3/16 x 6 x 36 @	1.19each
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1/8 x 4 x 36 @	.81each
1/16 x 4 x 36 @	.55each
1/8 x 6 x 36 @	1.13each
1/4 x 6 x 36 @	1.50each

SORRY DUE TO ADDED EXPENSE WE DO NOT ACCEPT CHARGE CARDS

Postage & Handling $2.00. C.O.D. $1.25. Personal checks will delay order 2-3 weeks. Heavy, long distance & oversized parcels extra. Prices subject to change. No return without authorization.

DIGITAL COMMANDER
THREE CHANNEL SYSTEM KIT

OUR BEST SELLER!

SINCE ITS INTRODUCTION, our Three Channel System Kit has gained tremendous popularity in the field. Its flawless performance, easy assembly, sensible mechanical layout, and low price all have combined to make a radio system kit that is one of the best bargains in the industry today.

This is not only a top quality Three Channel System equipped with precision open gimbal sticks, trim on the throttle function, ESV battery condition meter, two high performance servos with Signetic's 544 IC amps (one of which is assembled), state-of-the-art CMOS double deck receiver, plus rechargeable ni-cd flight batteries and charger (the transmitter takes a 9V dry battery which is not furnished). It is also an expandable system---transmitter conversion kits are available to upgrade to five or seven channels at a reasonable price. The builder can start at an economical novice level with a three channel system and then, as he gains competence, he can add functions at a minimum of expense; none of his equipment is obsoleted.

Since the receiver has eight channel capability, all that needs to be added to it is more wires and connectors plus additional servos for each additional channel.

If you didn't buy a Three Channel before because you knew you would want to go the more channels later, you no longer have any excuse.

STANDARD BANTAM FLIGHT PACK (450 MAH BATTERIES)
COMPLETE SYSTEM KIT (10G30) $119.95

AVAILABLE ON ALL AMERICAN R/C FREQUENCIES.

If not specified, we will ship on any 72/75 MHZ.

BANTAM MIDGET OPTION (450 MAH BATTERIES)
COMPLETE SYSTEM KIT (10G30R) $124.95

MICRO OPTION (100 MAH BATTERIES)
COMPLETE SYSTEM KIT (10G30M) $129.95

FIVE CHANNEL TRANSMITTER CONVERSION
11G35 D & R $21.95

SEVEN CHANNEL TRANSMITTER CONVERSION
11G37 D & R $26.95

OTHER OPTIONS

CUSTOM ASSEMBLY- Any of these Three Channel Systems are available completely assembled, tuned, and tested for $35 additional--to order, add a "C" suffix to the catalog number. (Ex. 10G30MC, $164.95)

TRANSMITTER NI-CDS- Any of the systems are also available with transmitter ni-cds and charger for $22 additional ($27 additional if it is an assembled unit.)--to order, add a "N" suffix to the catalog number. (Ex. 10G30RN, $146.95)

ACE R/C, Inc.

BOX 511 116 W. 19TH ST. HIGGINSVILLE, MO. 64037

50L213—Ace Alpha 15 Kit
$39.95

Designed by Tom Runge

Span: 50"
Area: 425 sq. in.
Engine: .15 to .25 R/C
Functions: Three or Four Channels

ALPHA 15

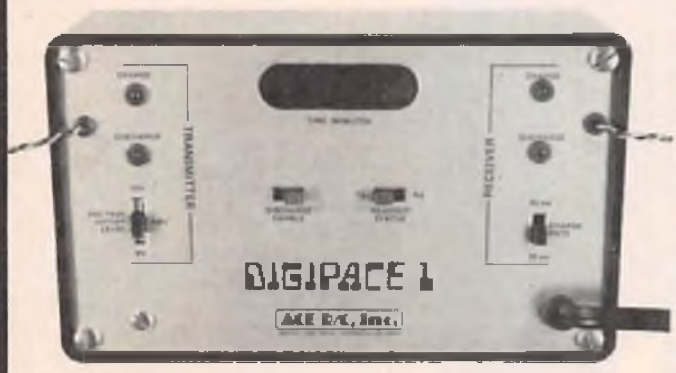
A big brother to the Alpha, the Alpha 15 is a sturdy, easy to build, rock stable trainer/sport plane for three or four channel control and a .15 to .25 engine. On a .15 this plane will easily take off of grass and has plenty of power for loops and rolls. It doesn't have any bad spin or snap roll tendencies and has excellent slow flight characteristics.

Plywood faselage and built up wing construction is featured for sturdiness and durability. Even at the reasonable price, the kit contains complete hardware: steerable nose gear, formed main gear, all control linkage and hardware; all you need to complete the model is tools, glue, finishing material, engine with mount, tank, wheels and radio.

A perfect full house trainer/sport plane!

KIT IS NOW AVAILABLE!

DIGIPACE 1



A sophisticated piece of lab quality equipment for cycling ni-cd batteries. Accurate, dependable, and attractive.

--Automatic discharging and recharging of both receiver and transmitter batteries, simultaneously or independently.

--Switch for three different transmitter voltages, (6V, 9.6V or 12V).

--Switch for two different receiver charge rates, (20 ma or 50 ma).

--Four digit LED readout; no mechanical clock motors.

--Modern design and tight tolerance components insure total accuracy down to 1% and 1/10 of a minute.

--Available in kit form or assembled and tested.

34G15	Ace Digipace I, assembled	$94.95
34G16	Ace Digipace I, kit	79.95

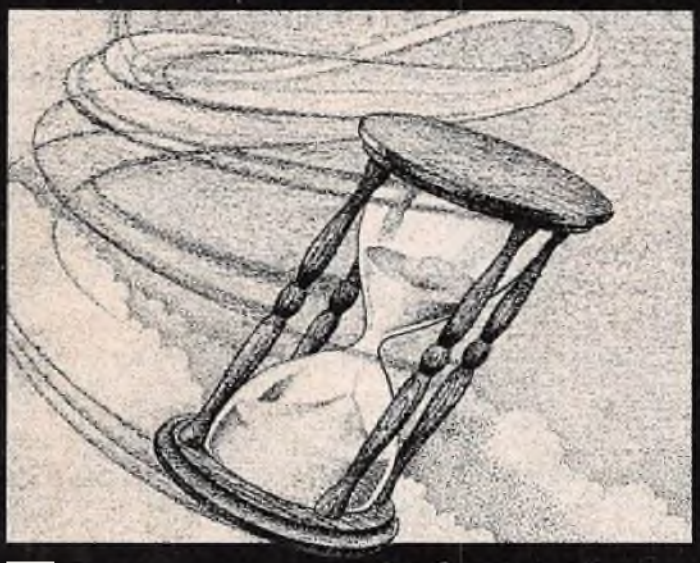
THE KIT IS RECOMMENDED FOR EXPERIENCED BUILDERS ONLY.

Please send me your complete catalog. Enclosed is $1.00 which is refunded on my first order. (Add $.50 for 1st class mail return; add $1.00 handling on all other orders.)

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

ACE R/C, Inc.
BOX 511B, HIGGINSVILLE, MO. 64037

Time out-flys us all.



Ten years ago we opened Hobby World.

None of us can avoid the lumps and bruises we get from old father time but we can all be better off for the experience . . . by taking encouragement from the victories and by learning from each mistake.

We've been in business ten years now and we've grown and prospered. For this we are grateful.

Many firms have crashed along the way. Of the continual advertisers in R.C. Modeler, (starting with July 1969) only 3 quality firms have taken their lumps from old father time and kept on flying. They are "Ace Radio Control, Inc.", "World Engines" and "Hobby World".

You can benefit from our experience by letting us help with any R.C. project. We'd like to help you take your lumps from the "old man" and maybe get in a few of your own.

Give us a call TODAY! And remember, times a-flyin'!

BOB REUTHER'S HOBBY WORLD

6602 HIGHWAY 100 • NASHVILLE, TENN. 37205 U.S.A.
9:30 AM to 5:30 PM Monday thru Saturday (615)356-1225

from page 72/70

range can be set by moving the stick and trim knob to the extreme that gives the longest pulse width and recording this pulse width. The stick and trim knob are then moved to the opposite extreme and the resulting pulse width is subtracted from the first reading. As an example, some manufacturers specify a range of 1.0 ms with neutral at 1.5 ms. If a channel's pulse width with the stick and trim knob at one extreme is 2.31 ms and 1.31 ms at the opposite extreme the range would be correct (1.0 ms) but the neutral setting would have to be off. Neutral can now be set by centering the stick and trim knob and rotating the stick's potentiometer until a pulse width of 1.5 ms is obtained. In this manner all channels can be adjusted for identical response, allowing servos to be used in any channel without the need to recenter them.

'Super' Transmitter Adjustments:

One of the advantages of the new series of transmitters is the ability to adjust the rate, or amount of servo movement for a given amount of stick movement. The only problem with this is that once you have the transmitter adjusted so that it 'feels' good with a particular model, the settings may not be right for a second model. If the Digital Pulse Meter is used to record the rate (range) and neutral for each channel, these settings can be reset at any time, even at home. The Digital Pulse Meter can also be used to determine the amount of control mixing obtained when using a transmitter equipped with this feature.

Servo Testing:

If the Digital Pulse Meter and a servo to be tested are both connected to a receiver or servo tester with a 'Y' cable, the exact length of the pulses controlling the servo can be monitored. R/C Modeler Magazine had an article by Jerry Smith in the September 1977 issue which included plans for a protractor-like servo travel and centering gauge. A full size plan is available from the RCM Plans Service by ordering plan #702 and enclosing $1.75. With the servo travel and centering gauge to measure the servo's position and the Digital Pulse Meter to measure the input pulse width, a graph can be plotted to show the servo's linearity and accuracy. This can be very useful when trying to match servos for applications such as using individual aileron servos in the larger models that are becoming popular.

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THE HOBBY MARKET

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P.O. Box 2172 76113 Phone (817) 738-2301

ORDER from The HOBBY MARKET
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Use your MASTER CHARGE or VISA or we can ship C.O.D. There is a $2.00 handling charge on credit card or prepaid orders. There is a $4.00 handling charge on C.O.D. orders. These charges include postage and insurance. There are no additional charges or surprises. Texas residents add 5% sales tax.

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TEXAS RESIDENTS ONLY **1-800-772-2313**

FOREIGN, ALASKA, HAWAII & PUERTO RICO (817) 738-2301. For information (817) 738-2301

SIG

KOUGAR

- 51" wingspan
- 550 squares
- .35-.50 engine
- List $47.50

$31.99

The Kougar will do every stunt in the book — even the lomcevak — and yet is not difficult for the low-time pilots to handle. The wash-out incorporated into the foam wing allows the model to be slowed down to a walk for landing, without stalling or snapping.

TOP FLITE TF

NEW TRIM SEAL TOOL

One tip designed for fillets and curves, the other for hard to reach corners and pin striping. High & Low heat settings. Order yours now!

$10.45

FUTABA RADIOS

FP2F Wheel, Dry, w/S-18's	$ 86.99
w/S-20, 16, 7's	$ 99.99
FP2E Dual Stick, Dry	$ 99.99
FP4FN w/S-18's	$179.99
w/S-16, 20's	$207.99
FP6FN w/S-18's	$208.99
FP6FN w/S-16, 20's	$234.99

VISA master charge

LOGICTROL RADIOS

Champion
$245
Super Pro
$279

Others available

CG

FALCON 56 MARK II

- 56" wingspan
- 558 squares
- .19-.40 engine
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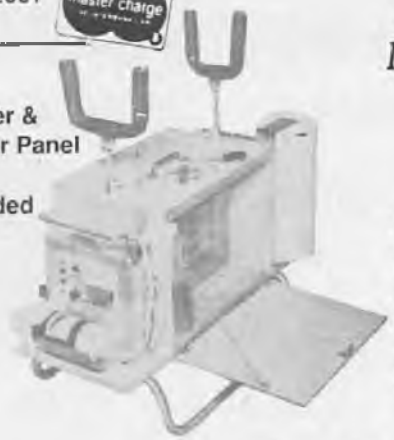

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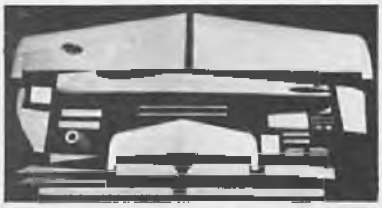

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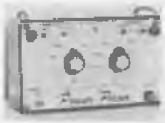

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DIGITAL PULSE METER

from page 90/70

The only problem encountered with the Digital Pulse Meter is that when friends borrow it they don't want to give it back, so be careful!

Note: A complete parts package, less instructions and connector, for the Digital Pulse Meter is available from Royal Electronics Corp., 3535 So. Irving St., Englewood, Colorado 80110, for $37.50 plus $1.75 postage. Individual parts are also directly available from Royal. □

BIG IS BEAUTIFUL

from page 69/68

side for the Andy Sheber Pitts if the model comes out a bit heavy as ours here did.

The Hustler has had mixed acceptance. I have heard from several modelers who sent theirs back for credit. One of these is a well known modeling name and one who has been a regular correspondent over many months. Both of these gentlemen had some reservations about the higher price and about the engine's durability. Its lack of a flywheel has been seen as a problem although, to the non-engineering eye, the internal arrangement and construction of the engine appears good. Several modelers have written me to say they have had a problem starting the engine and keeping it running. As this is written, the electronic ignition advertised has not made its appearance on the market, nor has it been supplied to those who earlier purchased the engine. If and when it will appear, remains to be seen. It is substantially heavier than other engines and this could make for a balance problem although it would not be as serious as having a tail heavy model.

The Evra is quite new on the market and is complete with electronic ignition (not requiring an on-board battery pack as I erroneously reported a couple of columns ago). I have heard from several people who have had trouble starting the engine, one who has not been able to hand start his at all and finds he must use the recoil starter shipped with the engine in order to turn it over fast enough to fire. I wrote to Dick Wangler of Hobby Lobby, who I met last October at Las Vegas, and Dick says they have also heard the same comment with the replies running about 50/50 pro and con on hard starting. Dick says the engine gets easier to start after break-in and with some running time on it. I have not yet seen or flown one so cannot comment from personal experience.

The Tarno and the McCulloch (shhh ...

that's supposed to be a secret!) are both so new it would be hard to comment on them at all. The Tarno has received some attention in my mail and I am told by one Canadian modeler that it is super smooth running. I must say that it certainly looks like a well finished, quality product although that judgment is made from photographs only. Having had some experience with McCulloch racing engines in Go-Karts, I suspect they will be good. They sure put out the power and can be real screamers, properly set-up.

Considering all of the variables, price, performance, availability (parts as well as the engines themselves) I'd still favor the Quadra, but that is my opinion only.

I'd very much appreciate input from anyone of you who have used any of the above engines (and any others) and who would care to comment on your results. Failing availability of most of them to actually see them run, I'm having to rely on the comments of those of you who have flown them to let me know what you think. This may well help others to decide which way they'll go. While it is not necessary to write me a book, I'd appreciate having information on what engine you have used, in what model at what weight and what the flying characteristics of the model were. It would also help to know what length of time you have been in the modeling game and what type of flying you have done in the past. I'll compile the results and print them in a future column.

I just realized that I have neglected to mention one other engine which has been around longer than any of the above. The Cox/Roper gas engine.

Most of these I have heard of have been converted to glow from gas and the principle problem appears to have been heat. I gather from those few who have written me about it that as a glow engine it tends to run a bit hot and is therefore subject to sudden (and often terminal) stoppage. Murphay's Law, as we all know, states that the only time this will happen is when the model is all but stalled on a steep climb-out and the result is usually a basket case. Power has been commented on as being a bit marginal even though most of the models flown on the engine have been of fairly conventional construction (i.e., balsa, rather than the other softwoods such as spruce, white pine, etc., which would make for fairly light birds.

◆

Hobby Lobby has a new offering which was scheduled to arrive on the market around the end of May. It is a Quarter Scale ARF Grumman Tiger. The span is 93"; 1209 square inches. The fuselage halves come joined with all of the bulkheads installed. The firewall is 5/16" 7-ply with block and glass reinforced corners. J & L Modelcraft are putting the Tiger together for Hobby

to page 98

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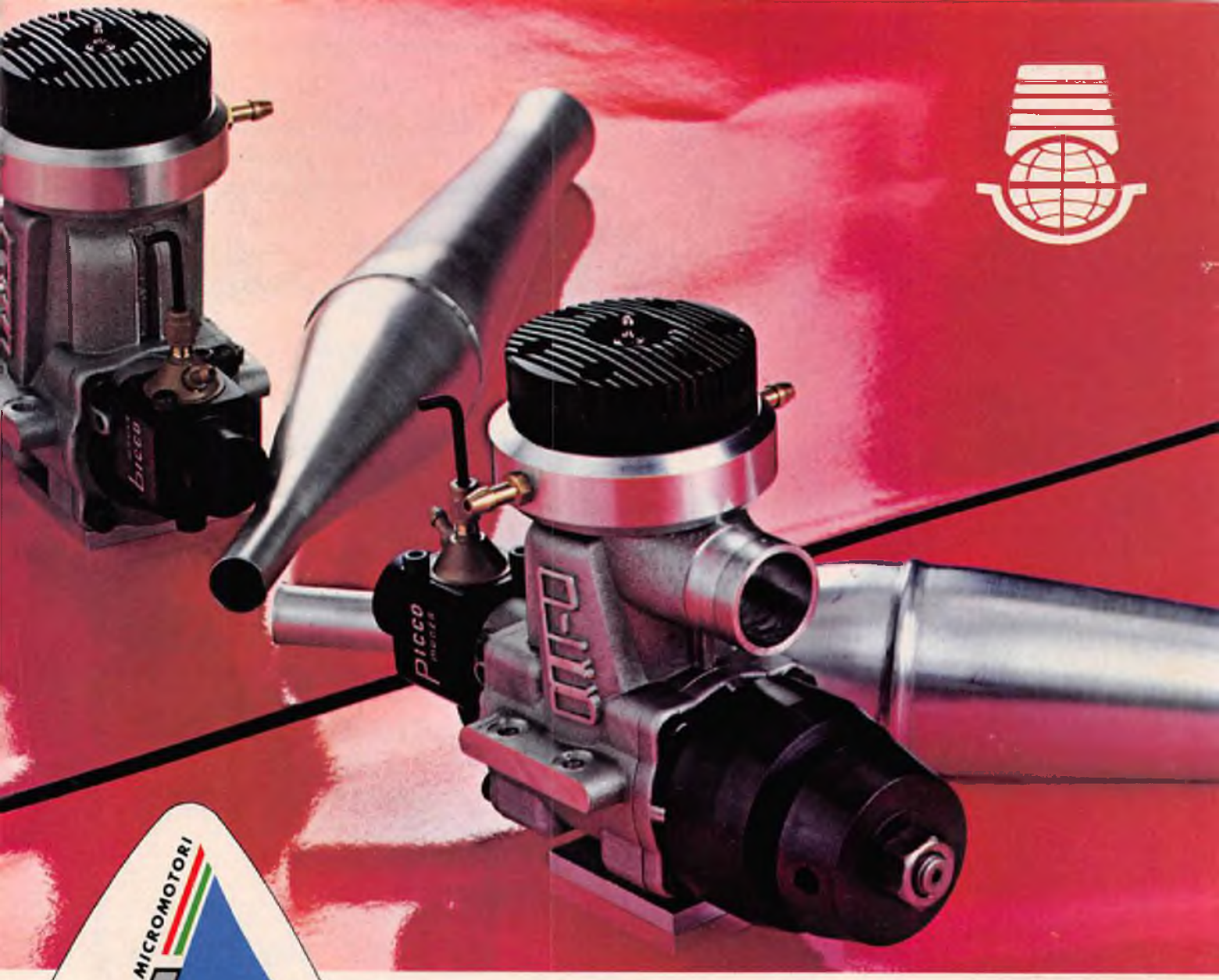

Picco Gualtierangelo

SPECIFICATIONS

Displacement	.65 cu. in.
Disc: Metric	10.62cc
Bore	24.80mm
Stroke	22.00mm
Wgt. (w/flywheel less pipe)	30 oz.
Cyl. Assy.	ABC
Suggested Retail.	$250.00

The Picco 65 marine is an extremely nice looking piece of machinery. The pipe and connector are included in the price. The first question that comes to mind is, "How does it run?". To test the engine we turned it around so that the exhaust pointed out the rear, took off the flywheel, and ran it on a 10/6 propeller while pumping water through the cooling jacket. This is a marine engine designed and timed to really crank on a marine propeller so we ran it on a 10/6 instead of an 11/7½ to allow the engine to run at a more advanced speed. Under these conditions, the engine turned approximately 19,600 which impressed us here at World Engines. We have tested similar engines with this prop in this configuration. A close inspection of the parts reveal a high degree of finish by Mr. Gualtierangelo. Also, the feel of the fits as the engine was assembled and disassembled, have the competition engine feel. Mr. Gualtierangelo is an old hand at marine engines being the principal and technical side of one of the better known Italian marine engine manufacturers. We are already taking orders for our first production commitment. We are anxious to serve competition model boaters running this class so have your dealer order for you now.

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BIG IS BEAUTIFUL

from page 95/68

Hobby Lobby's New Grumman Tiger ARF kit. If it flies as great as it looks, it should really be something (see text for further details).

Lobby using their patented **polyflite** fuselage. The wing and tail assemblies will be foam cored, balsa sheeted and sanded. Hobby Lobby claims that a competent modeler should be able to have this bird in the air inside a week. No engine recommendations or price were included with the information supplied. I would suspect that Hobby Lobby's well known advertisements will feature the kit by the time you read this. It is a rather impressive looking bird (the young lady is unfortunately not identified) and should it fly as well as it looks, it could be a very fine model indeed. Just judging by my own reaction to its appearance, I would expect to see a lot of them in the air in the coming months. It has nice lines, and with the right power up front it should also be quite a performer. I have no idea how many of the originals have been sold by the Grumman 'iron works,' but I'll bet there will be few who own the full scale version who will be able to resist this new offering from Hobby Lobby.

◆

That's it for this month. Let me hear from you gas engine jockey's out there and I'll print a run down of your comments in a future column. □

HERE'S HOW

from page 66

for bonding paper to paper or paper to wood or plastic. I found this adhesive ideally suited for retaining paper templates to balsa wood. After cutting out the part, you'll find it a simple matter to remove the template from the wood --- even if you decide to do it later. I am sure there are other uses for this adhesive that will come to mind after you start using it. You can find Glue Stic in photo, stationary or discount stores for less than $1.00. Make sure you apply the adhesive to both mating surfaces. It's great stuff but use it sparingly. □

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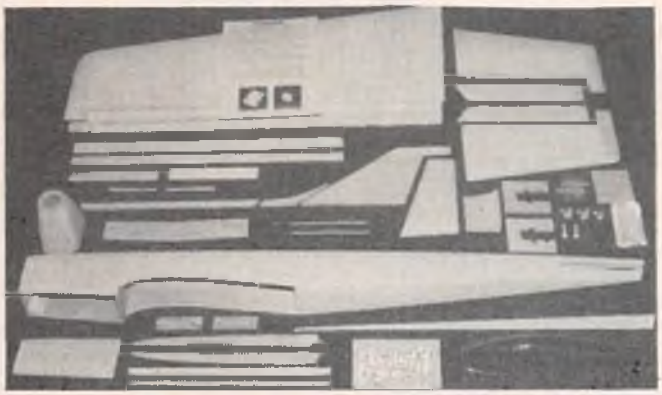

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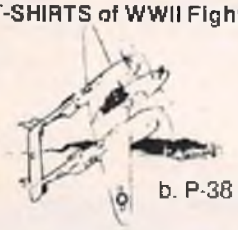

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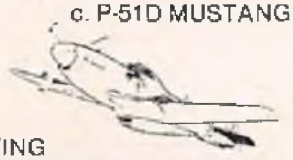

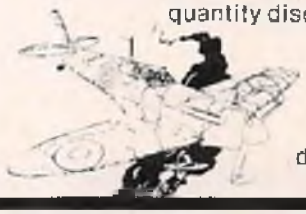

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SILENT POWER

from page 65

MRC/Mabuchi System:

The Model Rectifier Corp./Mabuchi system was introduced in this country last year. At this time, there are no sailplane kits specifically designed for it, however, it can be easily adapted to most of those mentioned. It features a direct prop drive using a 7/4 to 8/4 prop and achieves 9800 rpm for a motor duration of over 4 minutes. The system weight is 21 oz. which includes a CVR unit which furnishes current from the motor battery to operate the R/C system, thus saving the weight of an airborne battery pack. If installed in a powered sailplane without a motor control servo, the CVR will automatically shut off the motor when the batteries are drained to about 7 volts. At this point there will be enough power left to power the R/C system for nearly 45 minutes. A micro-switch attached to the CVR can be triggered by a servo for on-off motor control.

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Recent Products

Several new products are being tested which will add greater flexibility to the application of electric power to RC model aircraft.

First and foremost, Bob Boucher, President of Astro Flight, is nearing

to page 112

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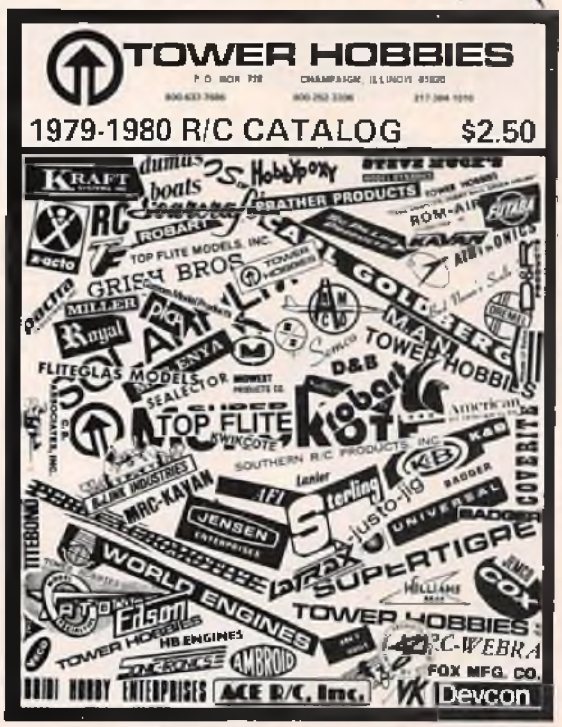

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217-384-1097: This number is a HOT LINE direct to the desk of Bill Baxter, who is our resident RC expert. If you have a technical question or a problem you need help with then call Bill on this number. It is answered on Monday through Friday from 9:00 A.M. to 5:00 P.M. only.

217-384-7217: This number is a HOT LINE direct to our main office. If you should have a question about an order such as when it was shipped, then call this number. Our office staff will immediately look up whatever you need to know and give you an instant answer to your question or problem, Monday through Friday, 9:00 A.M. to 5:00 P.M. only.

REMEMBER, THESE ARE ONLY A FEW OF THE SEVERAL THOUSAND DIFFERENT ITEMS THAT TOWER HOBBIES STOCKS. IF YOU NEED AN ITEM THAT DOESN'T APPEAR IN THIS ISSUE, GIVE US A CALL TO SEE IF WE HAVE IT; CHANCES ARE GOOD THAT WE DO. BY ALL MEANS COMPARE OUR PRICES BEFORE YOU BUY ELSEWHERE; YOU'LL BE DOLLARS AHEAD!!

TOWER HAS EVERYTHING!

You can count on Tower for all of your day to day modeling needs, as well as a one stop source of full information. Think of Tower the next time . . .

- . . . You need new product information
- . . . You want to check on current prices
- . . . You need to know current availabilities
- . . . You want super fast service
- . . . You want to save money on all of your R/C needs
- . . . You want to do business with the BIGGEST AND THE BEST!

TOWER

P.O. BOX 778
CHAMPAIGN, ILLINOIS 61820

These specials are good until the 15th of the month i this issue, only. All special prices are subject to chan if retail prices change during sale period.

TOWER SIX CHANNEL — $139.95!

NOW YOU CAN OWN A TOP QUALITY TOWER HOBBIES SIX CHANNEL SYSTEM WITH KPS-141 SERVOS FOR AS LOW AS $139.95! PERFECT FOR PEOPLE WHO WANT A 2 OR 3 CHANNEL SYSTEM NOW AND WANT TO ADD MORE FUNCTIONS TO THEIR SYSTEM IN THE FUTURE!

TOWER HOBBIES SIX CHANNEL W/2 KPS-141I SERVOS	$139.95	RCM293
TOWER HOBBIES SIX CHANNEL W/3 KPS-141I SERVOS	169.95	RCM294
TOWER HOBBIES SIX CHANNEL W/4 KPS-141I SERVOS	199.95	RCM205
TOWER HOBBIES KPS-141I SERVO	30.00	RCM206

THIS SPECIAL IS NOT RETROACTIVE

EVERYTHING YOU WANT!

TOWER IS DEDICATED TO OFFERING YOU THE VERY BEST VALUE AND SERVICE THAT IS POSSIBLE! IN KEEPING WITH THIS PHILOSOPHY, WE HAVE RESEARCHED THE INDUSTRY WITH PAINSTAKING CARE TO FIND OUT EXACTLY WHAT YOU WANT IN A RADIO CONTROL SYSTEM.

YOU WANT QUALITY! That's why we took our Radio Control System Formulas exclusively to Kraft Systems, Inc., of California to be manufactured to our exact specifications. Kraft quality is absolutely unparalleled by anyone else in the world. Kraft's outstanding success is attributed to their experience, high standards for materials and production, and quality control systems. Kraft means quality in every detail. For example, our rugged servos are made of tough ABS plastic which helps them live longer. Our sockets are gold plated berylium copper, crimp connected to machine-cut and stripped wire to assure you reliable conductivity. The plastic plug body extends over the wiring insulation to prevent stress at the junction between the pin and the wire. Not only is this wiring method inherently more reliable than soldered connections, it also insures uniform quality. Tower Hobbies is the most reputable RC distributor in the business. Tower Hobbies and Kraft Systems make an unbeatable combination! Just ask any one of the thousands of modelers who own one of our fine digital proportional radio control systems!

YOU WANT VALUE! Tower Hobbies radios give you absolutely the maximum amount of radio for the least amount of money -- and that's value! There is nothing cheap about a Tower radio. The design is the latest, the manufacturer is the finest, the quality is peerless, and the service is second to none. So how then can the price be the lowest in the industry? Simple. Tower's tremendous buying power allows us to create economies due to volume – and there are no middlemen between us and the manufacturer to artificially jack up the price. You're paying the bottom dollar price for the top of the line product.

YOU WANT PRECISE, TOTAL CONTROL! All of our receivers have double tuned R.F. sections to minimize harmonic type interference and all have special noise rejection circuitry permitting their operation even under the most adverse conditions. Both Tower systems feature a dual function meter that allows you to check RF and absolute battery voltage. This allows you to monitor your flying time and to check for possible cell malfunction. This deluxe feature is usually found only on systems in the $500.00 price range. All of our servos use an integrated circuit amplifier to produce centering and tracking accuracy better than ½%, virtually zero drift with changes in temperature and voltage, uniform duty cycle in both directions, smoothness, and excellent damping characteristics. The reference potentiometer element is driven directly from the output drive. This is extremely important for servo accuracy! Our control sticks give you a true, accurate feel for precision flying, and the popular closed gimbal configuration protects the transmitter from the elements for a longer life. We were thinking about your desire for precise, total control when we designed our powerful, yet light weight airborne systems! This gives you greater maneuverability, and faster climbing, acceleration, and top speed.

YOU WANT PRESTIGE! Radio control Modelers represent an artistic breed of people who demand quality detailing, and can appreciate the most subtle esthetic appeals. Tower radios were designed with this in mind, of course. There is just something very elegant about that rich ivory color accented with black trim pieces. That's in keeping with the total quality feel of Tower radios – that first class feeling. With Tower Hobbies radio control systems you go first class in quality, performance, and appearance. When you show up at the field with a Tower radio, everyone will know that you're a person who demands only the finest value. Your choice of a Tower radio shows you're a smart shopper!

YOU WANT FLEXIBILITY! Tower radios will give you the widest range of applications and the greatest performance that you could possibly ask for. The top of the line Tower 6 channel system is perfect for all radio control applications from ¼A to pattern ships. The top of the line Tower 3 channel system is perfect for small aircraft, gliders, boats, and cars; light weight, yet very rugged. The Tower 6 and Tower 3 components are fully compatible with the previous Tower 5 model as well as the entire line of Kraft Systems radios (except for the "A" Series). This gives you the greatest accessory and feature availability in the industry -- interchange flight packs, servos, trays, output arms, or almost anything else from the Kraft line-up of outstanding products.

YOU WANT ASSURANCE! Even in consideration of the meticulous care that goes into every Tower radio, you know that nothing on Earth is truly perfect. Our Tower radio control systems are warranted against defects in materials and workmanship for 180 days from the date of purchase. There are six Tower Hobbies Service Centers across the United States authorized to perform warranty repair work. If you should need repair work after the warranty period, any one of dozens of Authorized Kraft Service Centers can perform such work for you.

ORDER NOW! Both systems are in stock for immediate delivery on the 72 MHz frequency of your choice. Call Toll Free right now for immediate COD delivery, or send your order in the mail along with the purchase amount plus $2.50 for postage, handling, and insurance. If you are not 100% satisfied with your Tower radio after receiving it, then simply send it back in original condition within 10 days for a full refund.

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ILLINOIS TOLL FREE: 800-252-3336
CONTINENTAL UNITED STATES TOLL FREE: 800-637-7686

TOWER SIX CHANNEL SYSTEM - The Tower 6 channel transmitter comes in the popular 2 stick closed gimbal configuration. Standard equipment includes a fully proportional fifth channel; toggle switch sixth channel; choice of 2, 3, or 4 KPS-14II servos, or 4 KPS-15II servos; lightweight slimline high range receiver which is very convenient to install; nicad transmitter battery pack; powerful 550 MAH nicad receiver battery pack; charger; switch harness with external receptacle for charging convenience; servo trays; full servo accessories, and a dual function meter that indicates both RF and absolute battery voltage. The Tower 6 channel system has an airborne pack weight of only 11.9 ounces with 4 KPS-14II servos, and 13.5 ounces with 4 KPS-15II servos.

WITH 4 KPS-15II SERVOS - NOW ONLY $209.95 - STOCK NO. RCM121

TOWER THREE CHANNEL SYSTEM - The Tower 3 channel transmitter comes in the popular single stick closed gimbal configuration. Standard equipment includes a fully proportional third channel, two KPS-14 servos, lightweight slimline high range receiver which is very convenient to install, powerful 450 MAH nicad receiver battery pack, charger, switch harness with external receptacle for charging convenience, servo accessories, and a dual function meter that indicates both RF and absolute battery voltage. The dry cell transmitter (battery not included) can easily be converted to nicad operation by adding a nicad pack. The Tower 3 channel system has an airborne pack weight of only 7.9 ounces.

STOCK No. RCM204 **RETAIL $210.00** **NOW ONLY $119.95**

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HOT STUFF 30% OFF

Hot Stuff is an instant bonding cyanoacrylate super adhesive that is a must for modelers. Stock up now at this super price. .5 oz.

RETAIL $3.95 — NOW ONLY $2.78 — RCM007

TOWER HOBBIES R/C LONG GLOW PLUGS 48% OFF

These excellent glow plugs feature an idle bar. Made by the world's finest plug manufacturer especially for Tower. 6 plugs per package. The best buy anywhere!

RETAIL $8.94 — NOW ONLY $4.68 — RCM002

COX READY TO FLY SPORTAVIA THE PERFECT TRAINER 32% OFF

This ready-to-fly foam design has been acclaimed by many flyers to be undoubtedly the best trainer ever for the first-flight beginner. Its 70" span, slow flight, and unbelievable stability make it a beginner's dream. It comes complete with a Cox .049 engine and all hardware installed. Molded cavities inside the fuselage are designed so the Sanwa No. 8020 2 channel radio drops right into place. With very little change any 2 channel works great. Factory finished in gleaming white with pressure sensitive decals. No building required. Be in the air in less than 1 hour. Radio not included.

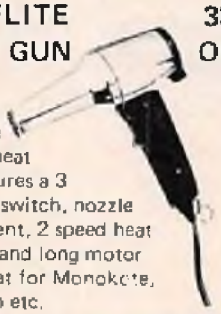
RETAIL $89.95 — NOW ONLY $60.98 — RCM014

STERLING 1/2 A CORSAIR 35% OFF

This all balsa 36" span kit features special hardware and decal sheet. Requires a .049-.10 engine and a 2 channel radio.

RETAIL $31.95 — NOW ONLY $20.98 — RCM003

TOP FLITE HEAT GUN 33% OFF



This fine quality heat gun features a 3 position switch, nozzle attachment, 2 speed heat control, and long motor life. Great for Monokote, Solarfilm etc.

RETAIL $29.95 — NOW ONLY $19.98 — RCM005

COX/SANWA No. 8020 2 CHANNEL RADIO 30% OFF

This 2 channel favorite comes with 2 micro servos which will fit into the smallest airplanes, gliders, cars, or boats. It is designed to drop right into the Sportavia and Centurion. 12 pencell batteries are required.

RETAIL $99.95 — NOW ONLY $69.98 — RCM105

FUTABA FP-2GS 2 CHAN. RADIO 35% OFF

This is the least expensive 2 channel available anywhere. It comes with 2 servos and is ideal for cars, boats, small airplanes, or gliders. Works great in the Centurion or Sportavia. Requires 11 pencell batteries.

RETAIL $109.95 — NOW ONLY $71.98 — RCM091

DUMAS HOT SHOT 21 35% OFF

This fiberglass tunnel hull with pickle fork bow is 27" long and is very competitive. Add the K&B .21 outboard engine and a 2 ch. radio and go!

RETAIL $70.00 — NOW ONLY $45.48 — RCM008

K&B .21 OUTBOARD 38% OFF

This water cooled 3.5cc competition engine is the ultimate in outboard engines. It offers the superior control characteristics of outboard drive.

RETAIL $107.00 — NOW ONLY $65.98 — RCM152

COX READY TO FLY CESSNA CENTURION 32% OFF

Like the Sportavia, this all molded foam scale Centurion with 36" span comes complete with a Cox .049 engine, prop, push rods, horns, and all other fittings already installed. The Sanwa No. 8020 radio drops right into place, but with very slight modification any 2 channel radio will fit easily into this kit. Great for the beginner who wants the most airplane for the least amount of money. Radio not included.

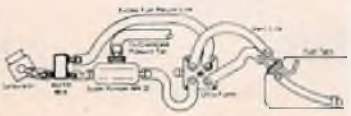
RETAIL $69.95 — NOW ONLY $47.98 — RCM001

K&B .61 RC W/MUFFLER No. 6525 40% OFF

Features a new crankshaft that eliminates the necessity of enlarging the hole in propellers. A top performing pattern engine that competes with the best.

RETAIL $96.50 — NOW ONLY $57.88 — RCM012

ROBART AUTO MIX 25% OFF



This device actually reads fuel pump delivery and engine fuel requirements and routes excess fuel back to the tank via the overflow line. Works on all displacement type fuel pumps.

RETAIL $9.95 — NOW ONLY $7.48 — RCM255

DU-BRO KWIK FILL FUEL PUMP 36% OFF

RETAIL $10.95
NOW ONLY $6.98
RCM010

HOUSE OF BALSA P.51D (.29-.40) 39% OFF

This outstanding all balsa sport, stand-off scale ship is beautiful. 49" span. Requires a .29-.40 size engine and a 4 channel radio.

RETAIL $64.95 — NOW ONLY $39.98 — RCM011

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TOP FLITE SEALING IRON — 30% OFF

This sealing iron is great for covering with Monokote, Solarfilm, etc. It features adjustable temperature, teflon shoe, and a handy shape. Excellent quality.

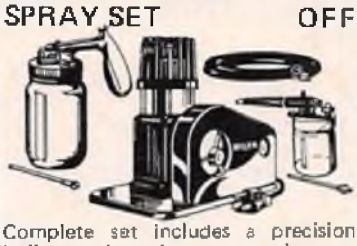
RETAIL $19.95 — NOW ONLY $13.98 — RCM202

DREMEL MODEL 381 MOTO-TOOL WITH FULL ACCESSORIES — 38% OFF

The Model 381 is the ultimate in hand grinders. It features variable speed control, ball bearings, and full accessories.

RETAIL $72.95 — NOW ONLY $44.98 — RCM015

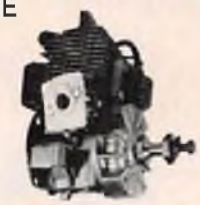
MILLER No.2017 SPRAY SET — 40% OFF



Complete set includes a precision built genuine piston type air compressor, 12 ft. air hose, 16G siphon type spray gun & 14G air brush both with open & fine spray nozzles.

RETAIL $77.95 — NOW ONLY $46.78 — RCM016

QUADRA 2 CU. IN. ENGINE — 29% OFF



Develops 2 horsepower! An engine suitable for large models with its scale-like sound and realistic performance. Comes with muffler, mount, and Tillitson pump/carb.

RETAIL $139.95 — NOW ONLY $99.98 — RCM017

DEVCON 5 MINUTE EPOXY IN ECONOMY 9 OZ. SIZE — 36% OFF

Now in squeeze bottles for your convenience. Limit of 3 per order.

RETAIL $6.95 — NOW ONLY $4.48 — RCM018

DREMEL 572 MOTO SHOP — 36% OFF

This deluxe saw features a complete accessory set of blades, discs, etc. and flexible shaft.

RETAIL $94.95 — NOW ONLY $60.98 — RCM019

GOLDBERG FALCON 56 MK II — 40% OFF

This all time best seller is now redesigned with ailerons. 56" span. Uses a .30 -.40 engine, all balsa construction. An excellent trainer.

RETAIL $47.98 — NOW ONLY $28.78 — RCM020

K&B .40 RC ENGINE No. 8011 — 40% OFF

THE MOST POPULAR RC ENGINE EVER MADE!!

Features a unique design for high power; and a Perry carburetor for excellent throttle response and easy adjustment - from a slow smooth idle to a roaring top speed.

RETAIL $72.50 — NOW ONLY $43.48 — RCM009

POWER PACER BATTERY TESTER — 22% OFF

A new ni-cad battery tester, cycler, and charger. Works great!

RETAIL $59.95 — NOW ONLY $46.98

RCM023 — 9.6 volt
RCM024 — 6 volt

GOLDBERG SKYLARK 56 MK II — 40% OFF

Fun to fly sport airplane with pattern capabilities. 56" span. .30 to .40 size engine, all balsa constuction. New improved design!

RETAIL $49.95 — NOW ONLY $29.98 — RCM025

SULLIVAN ELECTRIC STARTERS

Hi - torque, hi - rpm 12 v. starters. These heavy duty, long life starters develop more torque and rpm's than any other starters!

RETAIL $38.95 — NOW ONLY $24.98 — RCM026

Dix. model has V-groove in drive cone for starter belt. Starts copters, airplanes, boats, and cars.

RETAIL $41.95 — NOW ONLY $27.28 — RCM182

BOLINK ELECTRIC CAR

This 2 ch. 1/12 scale electric car comes already assembled with .05 motor, nicads, & charger. Goes over 25 miles per hour!

RETAIL $99.95 — NOW ONLY $79.98 — RCM027

Bolink kit for above car - must be assembled. BLX-155.

RETAIL $79.95 — NOW ONLY $59.98 — RCM280

CRAFT-AIR FIELD BOX — 33% OFF

It's ready to use, not a kit, made of lightweight indestructible polyethelene. 22" long & holds everything. A SUPER BUY!

RETAIL $29.95 — NOW ONLY $19.98 — RCM028

CRAFT-AIR HI - START HEAVY DUTY — 38% OFF

Features reel, tubing, towline, parachute, stake, tow ring, and strong construction. For sailplanes of 100" wingspan and larger.

RETAIL $52.95 — NOW ONLY $32.98 — RCM029

CRAFT-AIR DRIFTER II — 30% OFF

Would you believe? A competition sailplane for only $13.98! It isn't just a trainer, it's a contest winner! 71½" span. Uses a 2 channel radio.

RETAIL $19.95 — NOW ONLY $13.98 — RCM214

S & O BATTERY TESTER — 33% OFF

Tests 8 cell transmitter and 4 cell receiver nicad packs under load. Extremely accurate scales. Detects bad cells and/or abnormal current drain.

RETAIL $29.95 — NOW ONLY $19.98 — RCM031

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FOX .40 RC SCHNEURLE — 38% OFF

No.24000

The economical Fox .40 RC Schneurle features a restyled exterior, steel thrust washer, improved carb suction, and lightweight pistons. Very good power!

RETAIL $45.95 — NOW ONLY $28.48 — RCM136

BRIDI RCM TRAINER 40 — 32% OFF

This popular all balsa trainer has a 52" span. Requires a .35 to .49 size engine and a 4 ch. radio. A high quality kit!

RETAIL $54.95 — NOW ONLY $37.38 — RCM034

COX TD .049 STD. ENGINE — 36% OFF

A super hot ¼A engine ideal for free flight, control line, ¼A RC, and more.

RETAIL $24.95 — NOW ONLY $15.98 — RCM035

PEERLESS POP BUGGY — 37% OFF

Designed for a .15 -.21 size engine and a 2 ch. radio. 19" length. Body is made of tough ABS plastic. Built in pull cord starter.

RETAIL $140.00 — NOW ONLY $87.98 — RCM28

12 VOLT MOTORCYCLE BATTERY — 50% OFF

These are high quality, heavy duty motorcycle batteries that are perfect for all electric starters. Brand new.

Electrolyte not included

RETAIL $25.95 — NOW ONLY $12.98 — RCM037

AFI 6 & 12 VOLT BATTERY CHARGER

This high quality charger is designed to charge 6 or 12 volt wet or gel cell batteries. It works very well with the battery at left. Charges overnight from a 110 volt wall outlet. It's safe and easy to use. These chargers are tested twice before they leave the factory.

RETAIL $13.95 — NOW ONLY $6.98 — RCM038

SCHLUTER HELI - BOY

The best RC helicopter ever made! Requires a .60 size engine and a 4 ch. radio. Collective pitch is standard. Features no - belt starting. Can be started with a Sullivan Electric Starter and a starter extension.

CALL FOR PRICE!

ANDREWS AEROMASTER — 35% OFF

The world's most popular RC biplane. This balsa kit has a 52½" span. Uses a .60 - .78 size engine and a 4 channel radio.

RETAIL $79.95 — NOW ONLY $51.98 — RCM06

DA ENTERPRISES SERIES IV POWER PANEL — 36% OFF

The all-in-one power panel!

This quality panel distributes power from your 12 v. battery to starters, plugs, pumps, etc, & allows you to fast charge your radio at the field.

RETAIL $34.95 — NOW ONLY $22.48 — RCM033

K&B .61 RC W/PERRY PUMP & CARB & MUFF

40% OFF

Equipped with a Perry Pump/Regulator and a larger Perry Carburetor specifically designed to be used with the Pump/Regulator system. Easy to start. Number 6535

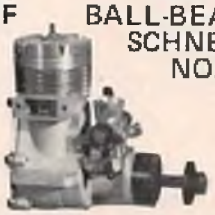
RETAIL $125.00 — NOW ONLY $74.98 — RCM042

BRIDI RCM TRAINER 60 — 32% OFF

This popular all balsa trainer has a 58" span. Requires a .40 to .60 size engine and a 4 ch. radio. It makes a great trainer.

RETAIL $62.95 — NOW ONLY $42.78 — RCM043

FOX .45 RC BALL-BEARING SCHNEURLE NO.24600 — 38% OFF



Tests show this to be one of the most powerful .45's on the market. Puts out over one horse. Starts easily- idles well- extremely durable.

RETAIL $64.95 — NOW ONLY $39.98 — RCM044

HB .61 RC PDP No.6300 — 27% OFF

This powerful, high quality ball bearing engine comes with a Perry carb and features Perry Directional Porting for increased power.

RETAIL $119.26 — NOW ONLY $87.68 — RCM143

SIG KADET WITH AILERONS — 28% OFF

The Kadet is an excellent trainer! This balsa kit has been improved to include ailerons! 57" span. Requires a 3-4 ch. radio and a .19-.35 size engine. Easy to follow plans and accessories included.

RETAIL $39.95 — NOW ONLY $28.78 — RCM256

LANIER COMET II — 36% OFF

This popular trainer comes almost-ready-to-fly. 63" span. Designed for a 4 ch. radio and a .50 -.61 engine. The Comet II makes a great trainer!

RETAIL $62.50 — NOW ONLY $39.98 — RCM047

ASSOCIATED RC 200 KIT — 39% OFF

See Tower Hobbies Catalog P.118 for available bodies. 22" body length. Features ball bearings for rear axle & clutch, glass chassis, disc brakes. Kit comes complete less engine, body, & radio. Best gas car anywhere!

RETAIL $195.00 — NOW ONLY $119.98 — RCM048

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K&B .40 RC W/ PERRY PUMP & CARB NO. 8360 — 40% OFF

Features Perry Pump/Regulator and a larger Perry Carb specifically designed to be used with the Pump/Regulator system. Adds 1000 RPM's!

RETAIL $105.00 — NOW ONLY $62.98 — RCM049

ASSOCIATED RC 12E ELECTRIC CAR KIT — 30% OFF

No. 3012

This is the 1/12 scale electric race car that was the winner of the first 4 places at the 1977 ROAR Nationals! Motor and radio (requires a 2 ch. radio) are not included. Fiberglass chassis.

RETAIL $102.00 — NOW ONLY $69.98 — RCM246

PICA DUELIST 2/40 — 33% OFF

This easy to fly, all balsa kit is an ideal twin engine trainer. 67" span. Uses two .23 -.40 size engines and a 4 or 5 channel radio.

RETAIL $89.95 — NOW ONLY $59.98 — RCM051

JENSEN DAS UGLY STICK — 33% OFF

This all balsa kit is the ideal trainer. 60" span. Uses a .45 to .61 size engine and a 4 ch. radio. Very stable.

RETAIL $69.50 — NOW ONLY $46.98 — RCM052

MRC PORSCHE 934 TURBO — 33% OFF

This electric RC favorite is 1/12 scale & 15" long. It features a high output electric motor, 2 forward & 2 reverse speeds, precise scale detailing, & a rugged ABS plastic body. Requires any 2 ch. radio.

RETAIL $74.98 — NOW ONLY $49.98 — RCM074

MIDWEST ATTACKER — 35% OFF

This all molded styrofoam kit builds fast and flies great. 48" span. Uses a .19-.35 engine. Very popular.

RETAIL $42.95 — NOW ONLY $27.98 — RCM054

A-JUSTO-JIG — 30% OFF

This complete wing & fuse jig holds alignment within .1%. Allows you to make up to a 6 foot wing. Fuse jig fits on without tearing down your wing jig.

RETAIL $59.95 — NOW ONLY $41.98 — RCM055

DREMEL 580 TABLE SAW — 38% OFF

CUTS UP TO 1" THICKNESS!

Multi-purpose table saw especially designed for hobbyists. Rips, cross cuts, miters, straight cuts, dadoes.

RETAIL $99.95 — NOW ONLY $61.98 — RCM056

MIDWEST CARDINAL A.R.F. — 35% OFF

This all foam trainer has a 46" span. Uses a 2 - 3 ch. radio, & a .049 to .15 size engine. Rugged and flies great.

RETAIL $32.95 — NOW ONLY $21.38 — RCM057

STERLING PUDDLE JUMPER MK II — 30% OFF

This airboat has a plastic hull and cabin with balsa and plywood parts. It uses a 2 channel and a .15 to .35.

RETAIL $41.95 — NOW ONLY $29.38 — RCM058

LATRAX CORVETTE W/RADIO — 25% OFF

Won a 1st & a 2nd in the ROAR NATS!

Add 8 AA pen cell batteries to the radio, charge the car for 15 minutes, & you're ready to race!

THIS IS A FANTASTIC VALUE! Comes with a powerful 2 ch. radio (w/wheel stick) already installed, 6 cell nicad battery pack, & a quick charger. 16" length. Runs up to 30 mph! Electronic speed control.

RETAIL $159.95 — NOW ONLY $119.98 — RCM244

DUNE BUGGY — 25% OFF

This unbelievably rugged kit can tackle the roughest course imaginable. Uses a 2 ch. radio and a .19 size RC engine. 17" length.

RETAIL $199.95 — NOW ONLY $163.98 — RCM036

MARK'S MODELS WANDERER — 40% OFF

This easy to build and easy to fly glider has a 72" wingspan. So stable it will fly free flight without a radio. Great for the beginner!

RETAIL $23.95 — NOW ONLY $14.38 — RCM041

STAFFORD TWIN COMANCHE — 30% OFF

This museum scale twin is always in high demand. 72" span. Requires two .40 size engines and a 4-6 ch. radio. This balsa kit includes precision molded fittings.

RETAIL $139.95 — NOW ONLY $97.98 — RCM062

DUMAS BIG SWAMP BUGGY — 36% OFF

This rugged and stable airboat runs on water, dry grass, or snow. Really moves out with a .40 and speeds with a .60. Lots of fun!

RETAIL $35.00 — NOW ONLY $22.38 — RCM063

X-ACTO No. 5087 KNIFE & TOOL CHEST — 30% OFF

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HB .40 RC PDP No. 4200 — 27% OFF

This powerful, high quality ball bearing engine comes with a Perry Carb and features Perry Directional Porting for increased power (HB .61 RC PDP pictured).

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61" span. Requires a 4 ch. radio & a .60 size engine. Balsa sheeting for wings and stabs, hardware, and nylon fittings are included.

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NEW!! This balsa scale ship makes an ideal scale trainer with a .40 size engine, & with a .60, it's great for aerobatics. 72" span. Requires a 4-5 ch. radio. Hardware, molded parts, & plans included.

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MRC RTF HAWK TRAINER — 25% OFF

You can be ready to fly this foam trainer within one hour. Comes with an Enya .15 engine already installed with muffler. Uses a 2 or 3 ch. radio.

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This 1/12 scale electric RC vehicle has 2 forward & 2 reverse speed control. Big output electric motor for indoor or outdoor quiet running. Excellent detailed scale! Requires a 2 ch. radio. 15" length.

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Designed for the 1st time RC pilot! Single channel proportional radio system and Cox .020 engine already installed! Rugged foam construction. Has a 28¾" wingspan.

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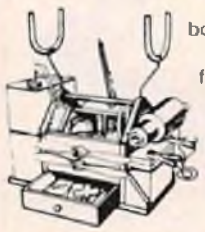

This flight box is compact yet has room for everything you need.

Most popular flight box ever made!

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This balsa and plywood kit has a 60" span. Uses a 4 - 6 ch. radio and a .40 - .60 size engine. All nylon fittings, wire landing gear, and struts included.

RETAIL $89.95 — NOW ONLY $54.98 — RCM165

MRC MARTINI PORSCHE — 30% OFF

This 1/12 scale RC electric racer has 2 forward & 2 reverse speed control, high output electric motor, & scale detailing. Requires any 2 ch. radio. Batteries not included. 15" length.

RETAIL $77.98 — NOW ONLY $54.58 — RCM073

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NEW

The new, complete sealer-filler-primer for balsa wood models. Sands as easily as primer! Easy to apply. Dries hard, fast, and flexible.

RETAIL $9.95 — NOW ONLY $7.98 — RCM077

MIDWEST SWEET STIK — 40% OFF

54" span. Uses a .19 to .45 size engine. Requires a 4 ch. radio. This is a small version of the famous Ugly Stik. It's an excellent, ultra simple trainer.

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GOLDBERG SR. FALCON — 40% OFF

The Sr. Falcon is the standard big trainer. 69" span. Uses a 4 ch. radio and a .35 to .60 size engine. Every design element is engineered for simplicity and fast - building.

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KP-2A (2 Stick) w/14IIA's	139.95	91.98	RCM081
KP-2A (2 Stick) w/15IIA's	145.95	95.98	RCM268
KP-2AS (1 Stick) w/14IIA's	139.95	91.98	RCM082
KP-2AS (1 Stick) w/15IIA's	145.95	95.98	RCM269
KP-4A w/KPS-14IIA's	309.95	191.98	RCM083
KP-4A w/KPS-15IIA's	321.95	200.98	RCM270
KP-6A w/KPS-14IIA's	339.95	212.98	RCM084
KP-6A w/KPS-15IIA's	351.95	219.98	RCM271
KP-5C w/14II's or 15II's	389.95	274.98	RCM085
KP-5CS w/14II's or 15II's	389.95	274.98	RCM086
KP-7C w/14II's or 15II's	529.95	377.98	RCM087
KP-7CS w/14II's or 15II's	529.95	377.98	RCM088

BUY A KRAFT 7C OR 7CS RADIO NOW AND RECEIVE A COUPON THAT WILL LET YOU BUY A KRAFT 2 CHANNEL FOR ONLY $29.95. IF YOU DON'T NEED A 2 CHANNEL, SELL THE COUPON & SAVE EVEN MORE!

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KPS-18 Servo (Super Mini)	54.95	43.98	RCM222
KPS-14IIA Servo	39.95	27.98	RCM272
KPS-15IIA Servo	42.95	29.98	RCM273
FUTABA FUTABA FUTABA	FUTABA	FUTABA	FUTABA
FP-2GS	109.95	71.98	RCM091
FP-2F w/S-7's	149.95	98.98	RCM092
FP-2F w/S-18's or S-22's	134.95	89.98	RCM274
FP-2E w/S-7's	149.95	98.98	RCM093
FP-2E w/S-22's	134.95	89.98	RCM275
FP-3S w/S-18's	144.95	94.98	RCM094
FP-3S w/S-20's	169.95	109.98	RCM208
FP-3FN w/S-18's or S-22's	219.95	139.98	RCM095
FP-4FN w/S-18's	289.95	179.98	RCM096
FP-4FN w/S-16's	319.95	199.98	RCM097
FP-5FN w/S-18's	319.95	204.98	RCM276
FP-5FN w/S-16's	359.95	222.98	RCM098
FP-6FN w/S-18's	339.95	209.98	RCM099
FP-6FN w/S-16's	369.95	234.98	RCM100
S-16 Servo	39.95	29.98	RCM103
S-7 Servo	39.95	29.98	RCM104
SANWA SANWA SANWA	SANWA	SANWA	SANWA
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STOCK NUMBER	DESCRIPTION	RETAIL	NOW ONLY
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RCM133	Fox .19 RC	36.95	22.98
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RCM287	House of Balsa .40 P-51D - glass	109.95	79.98
	Jamco Kits	25 - 30% Off Retail	
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RCM153	K&B .21 Inboard	74.00	44.38
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NEW FOR 1979

Schluter „System 80"

New 1979

Bolkow BO 105

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- A new **basic** non-collective 'Heli-Boy' — lower cost and great for the sport flier.
- The **new improved** 'Heli-Boy' with 11 design changes asked for by the American modeler.
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SILENT POWER

from page 100/65

completion of a "Voltage Booster" to be used with the present Rapid Charger. This unit, when perfected, will convert 12 volt DC from your automobile battery to 24 volt DC for charging the Astro 15 and 25 System batteries.

One of the drawbacks of these larger electric motor packages has been the requirement of two 12 volt motorcycle batteries for charging. With the new booster you'll be able to charge either systems by plugging in to your car's cigarette lighter.

Bob Laffinger with prototype Astro Sportster – used Astro 05 and Midwest Cardinal wing. Production model from AF1 will have balsa wing.

The unit will be mounted in a plastic case approximately the size of a large R/C receiver. It will have two leads with plugs for use with the Astro Flight Rapid Charger. One end will connect directly to the Rapid Charger and the other end will plug directly into the aircraft's electric system.

For those who have 110 volt AC at their flying site and especially for the R/C car enthusiast a 110 volt AC to 12 volt DC charger is also in the experimental stage.

Earlier this spring several California electric modelers began experiments with gear reducers for use on the Astro

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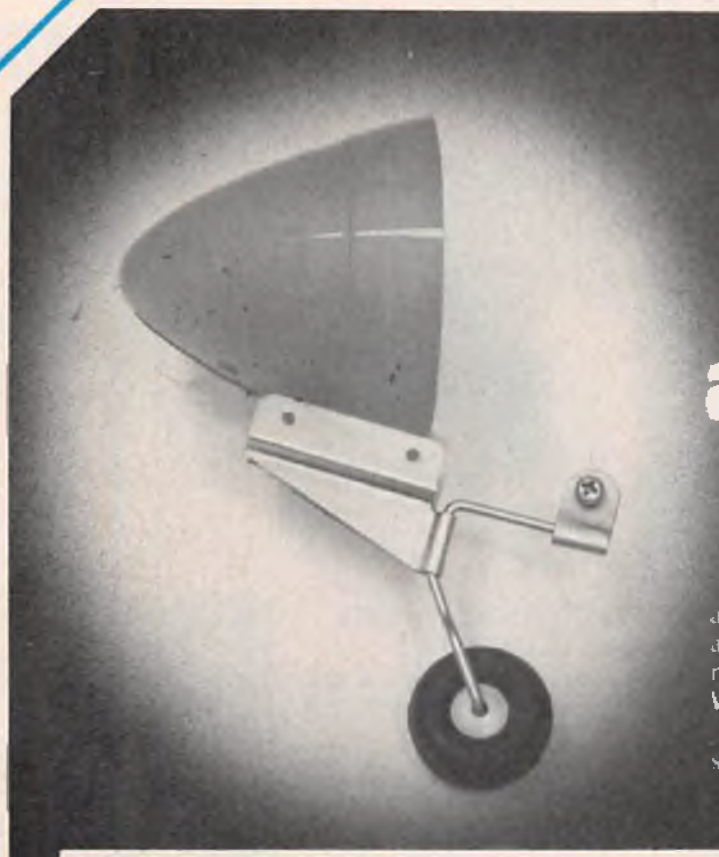

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	Standard Color	Chrome Color	Size	Standard Color	Chrome Color
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1¾"	1.39	2.49	2¾"	1.79	3.35
2"	1.49	2.69	3"	1.89	3.55
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Pair Nylon Control Horn w/Mount Plate (Sm.)	.49
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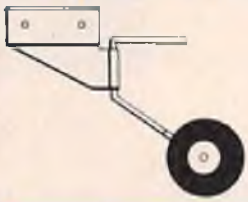

Comes complete with mounting hardware & wheel. Unit is directly activated by model's rudder.

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Set

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8½" Main Gear	.99
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ROYAL TREADED WHEELS

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2¼"	=	2.49
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1979 SIG IMAC CHAMPIONSHIPS

Above: Sig Skybolt climbs out from takeoff. The Skybolt was by far the most popular model at the meet. Below: Larry Sroufe placed second in the Sportsman Biplane event with this smooth Skybolt, only 2 points below the first place winning score of Darrell Gideon's Smith Miniplane.

Above: Pete Frankenthal's O.S. 40 powered Miniplane leaps into the air. Darrell Gideon took first place in Sportsman Biplane with an O.S. 80 powered Smith Miniplane.

Above: Bob Camarata's O.S. 80 powered Liberty Sport putt-putts in for a landing. That's a Curtiss Hawk P-6E color scheme.

Below: Maxey Hester, with his Decathalon and Hazel Sig, flying her Clipped Wing Cub, took up dozens of people on tours of the area. Since they used the lower part of the runway, the contest was able to proceed full blast at the same time.

93 ENTRIES IN 5TH ANNUAL CONTEST AT SIG FIELD JUNE 16 AND 17.

Despite independent truckers strike pickets shutting down pipeline terminals and protest closings of gas stations, enough hardy model builders ventured out on the road to raise the '79 meet list to a new high. And in the face of weather conditions ranging from too hot to too cold with winds from gale force to calm, more flights were flown than ever before. This fact is a tribute to the efficient efforts of the Des Moines Modelaires crew, who again operated the contest and kept things moving along at a rapid pace. As Maxey Hester, Contest Director for Sig, said during the award ceremonies, "This contest would not be possible without the Des Moines Modelaires."

SPORTSMAN BIPLANE

1st Darrell Gideon, Norwalk, IA
2nd Larry Sroufe, Aberdeen, SD
3rd Bob Camarata, Waterloo, IA
4th Dean Maupin, Cordova, IL
5th Vernon Kramer, Dyersville, IA

ADVANCED BIPLANE

1st Norm Casella
2nd Keith McClure, Bartlesville, OK
3rd Roger Schlenker, Des Moines, IA
4th Don Kadous, Spencer, IA
5th Chuck Jones

SPORTSMAN MONOPLANE

1st Darrell Gideon, Norwalk, IA
2nd Larry Kramer, Dyersville, IA
3rd Denny Baker, Manito, IL
4th Dean Maupin, Cordova, IL
5th Vernon Kramer, Dyersville, IA

ADVANCED MONOPLANE

1st Doug Brueshaber, Minneapolis, MN
2nd Leonard McCoy, Grandview, MO
3rd Bill Heger, E. Peoria, IL
4th Don Kadous, Spencer, IA
5th Chuck Jones, Spencer, IA

MAMMOTH

1st Leonard McCoy, Grandview, MO
2nd Larry Scott, Harlan, IA
3rd Maurice Rossi, Rochester, MN
4th Jewel Ness, Cannon Falls, MN
5th Ray Graniczny, Oak Forest, IL

DES MOINES MODELAIRES CONTEST OPERATION CREW

JUDGES
Al Grier
Dick Wickham
Fred Miller
John Mertz
Roger Boox
Charles Austin
Gwen McClure
John Schwemler
Darrell Gideon
Don Yount

FLIGHT LINE
Roger Schlenker - Chief Judge
Line Director
Harold Lee
Paul Austin

SCORE KEEPERS
Larry Andrews
Vern Lundquist
John Bimson
Kevin Brooner

ASSISTANT
John Brooner

RUNNER
Dean Lee

Above: Keith McClure with his Skybolt. K.K. and Gwen are former Des Moines Modelaires members now living in Oklahoma. Gwen worked as a judge while he was flying.

23 SIG SKYBOLTS ENTERED . . . . .

Sportsman Biplane continued to be the most popular event, with 41 fliers. This is less than last year due to the fact that many previous Sportsman Class entrants had graduated to Advanced Biplane. The Sportsman and Advanced Monoplane events both had increases, continuing a steady growth in the popularity of this application of the International Model Aerobatic Club idea. A proposal is before the RC Contest Board to add the monoplane events to the AMA rule book.

Above, left: Ray Dray holds Howie Wayne's Skybolt as he checks out the needle valve setting. Above, right: The winning smiles belong to (from left to right) Darrell Gideon, Leonard McCoy, Norm Cosella and Doug Brueshaber. Left: Darrell Gideon took one of his two first places with this Sig Super Chipmunk. Right: Dennis Essary has a good combination to catch a Sig photographer's eye — a Miniplane and a plug! Below, left: Vernon Kramer taxies out with a Sig Kwik-Bilt Cessna 150. Below, right: No, not a Mammoth Scale Pitts. This is the real thing, Glen Sig's red and white beauty, going by during the full-size airshow at noon on Sunday, put on by the Sig Mini-Air Force.

JOIN THE INTERNATIONAL MODEL AEROBATIC CLUB

The concept of an aerobatic competition, using scale like models, and following the procedures used in full-size aerobatics was originated by Jerry Nelson. He formed the nucleus of the present IMAC group at the 1974 Toledo show. The first experimental contests, one of them the Sig meet, were held that year to try out the new rules. The idea has steadily gained ground ever since.

To become a part of this innovative approach to modeling, send $5.00 to Glenn Carter, 2020 Gill Port Lane, Walnut Creek, CA 94598 for a year's membership in the IMAC. Members receive information on contest rules, regular newsletters on organization affairs, decals and a license card.

Below, left: Larry Skiles' Skybolt whips around on a wing tip. Below, right: Bud Hall entered this sharp red Citabria in Sportsman Monoplane.

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IMPORTANT

In the July 1979 issue of RCM, the article titled "How To Finish Props With A Touch Of Class," had an omission. Overlooked was the source of obtaining the manufacturer's brand name decals. These are KDH Propeller decal sheet, No. 1147 priced at $3.45 and available from Hobby Lobby International, Inc., Rt. 3, Franklin Pike Circle, Brentwood, TN 37027. (615) 373-1444.

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SILENT POWER

from page 112/65

020 and 05 motors. Bob Sliff modified an Astro 10 gear reducer for mounting on an 05 by drilling out the front of the mounting case and has had excellent results using this with a Dumas Evolution. The unit will drive a 12/8 propeller at 4000 rpm or a 13/8 propeller at 3600 rpm.

A similar 020 conversion was made and achieved 3500 rpm with a 10/6 propeller or 5000 rpm with a 7/4 prop.

This conversion is the unit which was used quite successfully on the ultra light electric powered indoor models introduced this past winter in California.

While on the topic of gear reducers a new pinion for the Astro 25 reducer is available from Astro Flight which will result in a 2½ to 1 reduction as opposed

Bob Laffinger holds Bob Sliff's Pilot Mini Star with 48" Pilot ASK-14 wing, Astro 05 power.

Bob Sliff with experimental Astro 05 gear reduction unit in Dumas Evolution.

Three of the popular "Jack Rabbits."

to the 3 to 1 reduction with the off the shelf unit. This will allow the scale modeler to reduce propeller size to 16/10 at 4200 rpm with a 25 amp load.

The Electric Pylon Race held March 4, 1979, at Sepulveda Basin near Los Angeles saw the introduction of "Jack Rabbit." The designer, John Szary, has achieved a lightweight highly maneuverable sport racer. At 29 oz. with Astro 05 power, the Jack Rabbit really scoots. It has a wingspan of 40" and a wing area of 300 sq. inches. The propeller used on the model is a Cox 6/4. The secret of the speed of this ship is a 7% thick wing. Controls used are aileron, elevator and motor on-off. The flight system power was taken off the motor system battery. Construction is balsa with MonoKote covering.

Bob Boucher's new book, "The Quiet Revolution" was recently released and is now available. It is the most comprehensive source of information about electric power for models that we have yet seen, and is recommended reading for both newcomers and experienced electric RC'ers.

If you have any questions, information, or comments, please feel free to write: Silent Power, RCM Magazine, P.O. Box 487, Sierra Madre, Calif. 91024. □

RADIO SPECTRUM

from page 64/63

I haven't looked lately, but I think we are allowed 8 KHz. Of course if we have to operate 10 KHz apart like they do in Germany, we'd have to tighten up. As you will see this is no problem with Mr. Knowlton's concept. It would probably be more accurate to say, on a single RF channel as opposed to single RF frequency. When we modulate a carrier we create a spectrum of frequencies. The individual frequencies will be different for different modulation waveforms even though both systems started with the same carrier frequency. The receiver then must pick out the ones it wants even though they are intermixed with the frequencies generated by others using the same channel. Not an easy task.

Dennis received a patent in 1977, but the mechanization, that is the circuits were already obsolete by that time with the great advances in microprocessors, etc. Therefore, what we will show is at the block diagram level which will have enough detail to let you design your own system (if you are a genius).

Let's start with the transmitter.

The detailed implementation of this transmitter system today would undoubtedly be accomplished through microprocessor software. Now to some of the details. Refer to Figure 4

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★ WING HOLDERS - - - - - - Fold out on back of "Flight Box" and are lined with neoprene coated sponge rubber.

★ POWER MODULE - - - - - Slides out for use at the flight line. Holds battery & starter and has holes drilled for necessary tools. Built-in carrying handle. Optional DAE Power Panel.

★ CONSTRUCTION - - - - - - Birch plywood & Maple hardwoods, aluminum, steel, and brass machined parts. Interlocking construction.

★ FINISH - - - - - - - - - - - - - - Medium Pecan & Urethane. Very durable.

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EMS Bantam Midget
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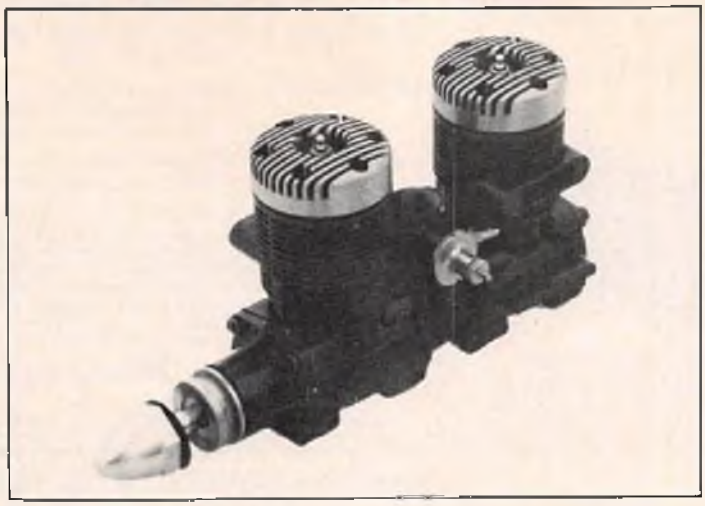

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(transmitter block diagram). Control sticks --- nothing to be said here.

Position to digital code converters --- there are two interesting approaches to this function. To satisfy the servo linearity requirement, a shaft encoder could be used here. (A shaft encoder is a mechanical device which gives as an output a digital code representing the angular shaft position.) Early attempts at using shaft encoders showed that the size requirement could not be met with state of the art encoders. The second and presently most practical approach is the use of pots and A/D converters. They are small and very inexpensive. Options here include using one converter per control stick or multiplexing the analog signal from each stick to a single converter. The final result, whichever method is used, is a digital code representing control stick positions. The codes from each stick are then serialized along with some sync code to be made ready for transmission. Figure #5 shows a typical code sequence for a 6-channel system. There are eight bits in each word. Each word represents the shaft position of a particular stick. One bit in each word is used for syncing or error detection. This leaves seven bits for shaft position information. The accuracy associated with the particular implementation is one part in 128. If the control stick moves through a 60° arc, you can see that the resolution is better than 1/2°. If higher accuracy is desired, adding one more bit to each word doubles this resolution. I'll add here for the technically inclined that the total number of bits in each frame should be odd. This eliminates the DC component in the modulated subcarrier thereby reducing the bandwidth on the low frequency end. So far we have a serial string of data bits representing the positions of six control sticks plus some sync bits which will help us later to sort out which words represent which control sticks. Now comes the part of modulating a subcarrier. Why not simply modulate the RF carrier? To satisfy the multiple use of a single RF channel requirement, some method must be used to discriminate between different users of the same RF channel. To do this, a unique subcarrier frequency is used by each system. This subcarrier frequency is locked onto in the receiver using a phase locked loop (p11). The design of the p11 is such that it cannot lock onto another unique subcarrier (narrow locking range) but on the one transmitted by your own transmitter. Along with locking onto your unique subcarrier, a method must be devised to eliminate the "noise" created by other subcarriers on your same RF channel. In this system, correlation detection is used. I don't intend to explain the theory of correlation

to page 122

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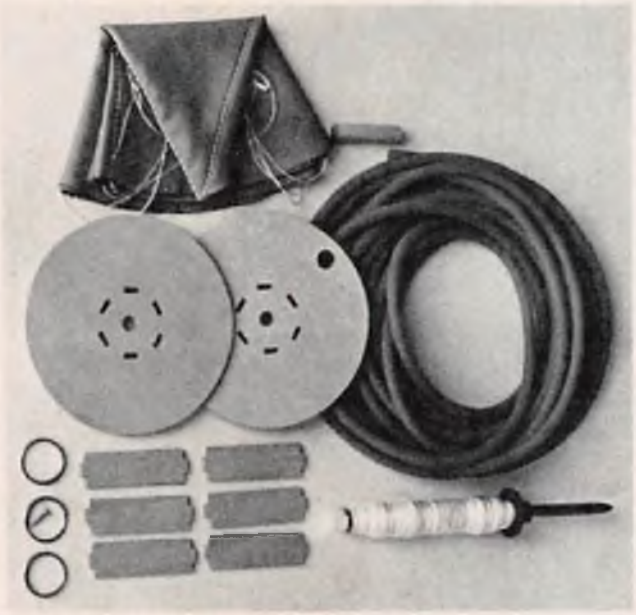

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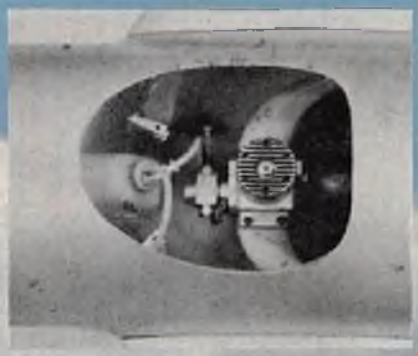

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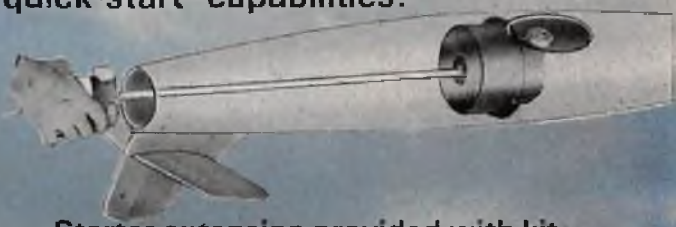

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RADIO SPECTRUM

from page 118/63

detection, but through the discussion of the signal waveforms in the receiver, you can gain an insight into its inherent noise rejection capability. I've skipped a little in the transmitter, so I'll return to it to finish up.

The serial data string we discussed earlier is used to modulate a subcarrier. For ease of understanding, a triangular wave subcarrier is used. To reduce bandwidth, a raised cosine subcarrier would be implemented. This raised cosine waveform is shown in Figure #5.

Referring again to Figure #5, you can see where the top half or bottom half of the triangular wave is reversed (biphase modulated) from that of the reference triangular wave depending on whether the data bit is a one (high) or minus one (low). If the data bit is low, the half triangular wave is reversed.

I found this description confusing and inconsistent with the waveforms in Figure 5. It seems it would be accurate to say that the top or bottom half of the triangular wave is reversed from that of the reference wave each time there is a change from a one to a zero or vice versa in the bit stream. See Figure 6.

Using a triangular wave means the upper bandwidth cutoff is approximately three times the subcarrier frequency, however, using a raised cosine subcarrier the upper cutoff is 1.5 times the subcarrier frequency. The lower cutoff frequency, assuming an odd number of bits per frame is approximately one-half the number of frames transmitted per second. A typical system then could be implemented with a bandwidth of 30 to 1.5 KHz or approximately 1.5 KHz bandwidth. These bands of information can and do overlap --- a 500 Hz spacing would be typical and is allowed because of the detection scheme.

to page 128

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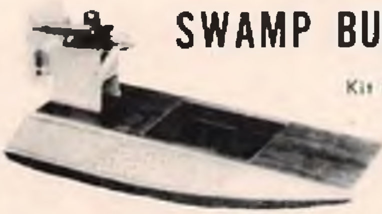

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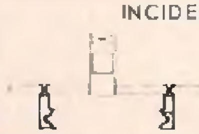

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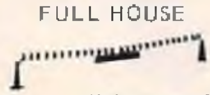

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RADIO SPECTRUM

from page 122/63

Mr. Knowlton implies a 60 Hz frame rate here, which is similar to what we use in our present systems. However, from a servo frequency response standpoint this is an overkill. Ten to twenty Hz would be more than adequate. It is not adequate in our present systems because of the way our servos are implemented. The pulse stretchers require the higher update rate, for smooth response. Also, it seems impossible to have eight channels with eight bits plus a sync word sixty times a second, synchronized to a 1.5 KHz subcarrier. By the way I think you need the eighth bit of position information in order to get that one part in 256.

Depending upon the method of A/D conversion, the total transmitter could consist of a microprocessor (1 chip), an A/D converter (1 chip), and a subcarrier generator (1 chip). An interesting note here might be that because of the implementation of the total systems data control using a microprocessor, the options (roll buttons, servo reversing, specific servo non-linearity, etc.) are limitless and custom programmable for the user.

Next month we'll cover the receiving end. Be sure to write if you enjoy this far out technical stuff, and even if you don't, write to tell us what you do want. □

CHARGING ADAPTERS

from page 62/60

the path, as if the meter were still in place.

Due to the standard resistor value situation, it is best to pre-set R2 at some standard value such as 150 ohms for incandescent lamp or 270 for the LED types, and then look for the proper value for R1. Do not exceed 50 ma through meter M1; if it's higher use a greater value for R2.

Once the proper values are determined, substitute them for the pots, test the current flow, and permanently make up the adapters as shown in the sketches and photos.

Unfortunately, for one not familiar with electronics, components and diagrams, this is a lot more complicated in the telling and the reading than in the doing. Believe me, if you can install a radio, start an engine, or fly an R/C airplane, you'll have no trouble figuring out a couple of resistors, and putting together an adapter for whatever size battery you've decided to put in your small or racing airplane.

to page 134

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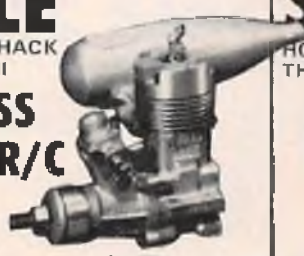

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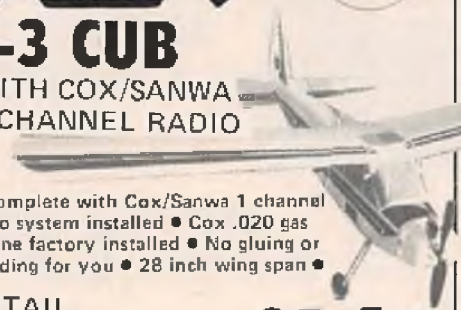

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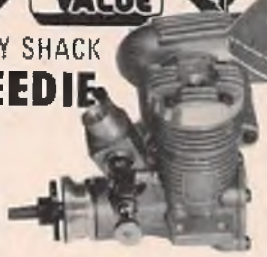

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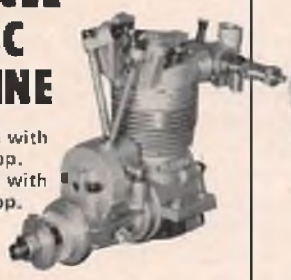

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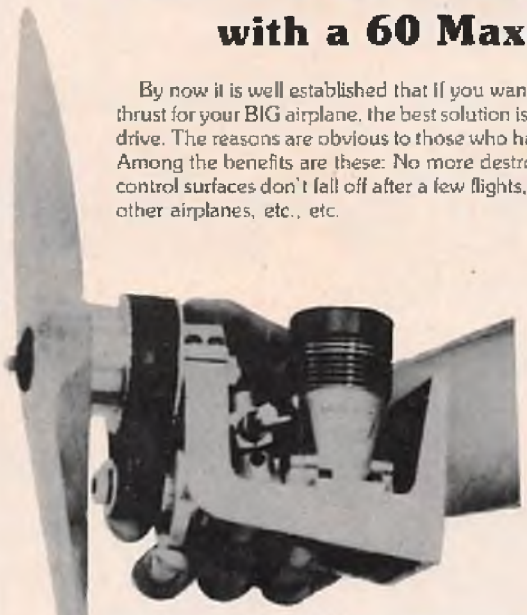

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CHARGING ADAPTERS

from page 128/60

Caution! Do not attempt to build this type of adapter for a transformerless charger, such as used on some of the early systems that had a charger built into the transmitter. Such a charger will have enough voltage to shock and possibly kill you at the output of the cable going to the receiver battery. Used as directed, they are safe, but are not for the untrained to work with.

The transformer chargers are dangerous only where they plug into the wall, but no more so than anything else you plug in. Use normal caution to avoid short circuits while doing your testing, otherwise you'll be okay. And your battery will be properly charged. □

PRAIRIE CANARY

from page 58/56

fuselage sides. Glue the 1/8" x 3/8" lower fuselage reinforcement strips in place. (Note: be sure these strips are notched to accept the landing gear strips, before gluing in place.) Bevel the fuselage sides at the tail, as shown, and draw together and glue. Install the 3/32" sheet balsa cockpit floor, remainder of the fuselage formers, and cross braces. Use the fuselage top plan view as a guide to obtain a symmetrical fuselage contour. Glue the 1/4" triangle stock, firewall reinforcing pieces in place and drill the holes in the firewall (F1) for your engine mount and fuel lines. Bend the landing gear as shown on the plan and wrap and solder the axle attachment points. Attach the landing gear to LG1 an LG2 with either nylon fishing line or wrapping wire and epoxy. The landing gear assembly is now glued in place. The fuselage sides will have to be notched (about 1/4") to accept the landing gear wire and the plywood strips (LG1 and LG2) should fit into the notches which were cut previously into the 1/8" x 3/8" stiffening strips. Bend the 1/16" music wire tail skid and glue it in place using a piece of 1/8" sheet scrap as shown.

Glue the 1/8" and 1/16" balsa sheet fuselage bottom pieces in place. Cut and fit the 1/8" sheet access hatch in place. Glue the 1/16" plywood tabs in place on the hatch and glue the hardwood hatch hold-down block in place on F3. With the hatch in place, drill the small hole through the hatch and into the block to accept the retaining screw. (Use either a small wood screw or a sheet metal screw.) Glue the 1/8" sq. stringers, 3/32" sheet instrument panels and 1/8' sheet fuselage top pieces in place. The engine should now be bolted to the engine mount and installed in place on the firewall. Be sure to cover the exhaust, venturi, and fuel nipple to keep dirt and balsa dust out of the engine. The 1/4"

balsa nose block and 1/8' sheet balsa cowl pieces are now glued in place around the engine. When dry, the fuselage should be shaped as shown around the cowl and cockpit area and the entire fuselage sanded. Install the elevator and rudder pushrods. Either nyrod or balsa pushrods will work equally well. Install the throttle pushrod or cable if you are installing a throttle equipped engine. Remove the engine and mount and drill a small hole in the bottom of the cowl as shown, so that any accumulations of engine oil will drain free from the cowl interior. An HB .12 R/C engine was used to power my Prairie Canary. This engine has the added feature of both radial and beam mounts, as part of the crankcase casting. We mounted it via the radial mounts, thus eliminating the need for an engine mount. We also added a piece of brass tubing to the muffler outlet, which was elbowed downward, to deflect the exhaust away from the fuselage cockpit area. The brass tubing adds to the vintage appearance of the aircraft and reduces the amount of oil accumulation along the fuselage side. If an .09 to .12 engine is to be used, the engine downthrust angle should be reduced to 2 degrees, and the fuselage sides shortened, as shown on the larger engine installation detail. A 2 ounce tank should also be used, with the larger engine. The vertical fin and stabilizer can now be glued in place and the entire fuselage, fine sanded in preparation for covering.

Finishing:

The Prairie Canary was finished with yellow Solarfilm on the wing and tail surfaces, and K & B Super Poxy primer and blue enamel on the fuselage, simply because I prefer a painted fuselage. The choice of the finishing process is left to your discretion, as we all have our own favorite methods. Regardless of what finishing materials you decide to use: your primary consideration should be in keeping the weight down!

For this reason the use of a heat shrinkable film type covering, such as MonoKote or Solarfilm, is highly recommended. I believe a painted fuselage is perfectly acceptable providing that you go easy with the primer and paint build-up. (It helps to tint your primer as less color coat build-up is required.)

If you decide to use film covering on the fuselage — just remember to first seal the engine cowl area and wing supports with a fuel proof epoxy or paint.

Radio Installation:

The Prairie Canary was built and flown with Westport International Variant radio equipment installed. There is sufficient space in the radio compartment to accommodate almost any type of radio system. Your radio should be installed according to the system manufacturer's instructions.

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PIPER J-3 CUB

from page 54

. . . . lower leading edge sheeting lap over instead of butting up to it. All holes for pushrods and bolts are punched out or have a center punch mark for drilling. Both wings can be built at once as both are shown on the plan. A die-cut angle template is even supplied for the correct angle of the root rib.

Wing struts are redwood, pre-slotted for the aluminum end fittings and go together quite fast.

The fuselage is built with 1/4" pre-cut sides and balsa longerons and stringers aft of the cabin area. Bulkheads in the nose section are 3/16" and 1/4" plywood and are lite ply in the cabin area. All parts fit well.

The upper cabin area and wing attachment requires some thought as it can be built two ways: one is with a plywood hatch on top and one aileron servo, the other is to eliminate the hatch and use two servos with a wire harness. I used the last method as it makes a cleaner model. I used thin aluminum (newspaper print plate) to make a hatch in the bottom of each wing for access to the servos.

The tail surfaces are built up from 1/4" x 3/8" strip and pre-shaped 3/8" sheet for the outline. On my model I added a strip of 1/16" thick redwood around the outline of the tail surfaces and wing tips. This makes a very tough edge and also resists hangar rash.

Included in the Balsa USA kit is all the necessary windshield material. On my model, instead of laying the windshield material directly on the fuselage side, I fitted each panel of glass flush with the side of the fuselage. I applied a thin layer of Carl Goldberg Jet Super Glue to hold the windshield in place. This worked out extremely well and the windows have yet to come loose.

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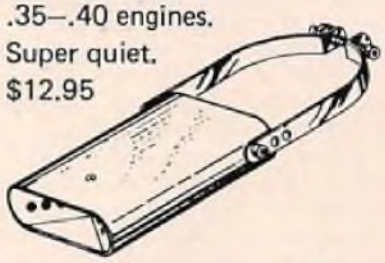

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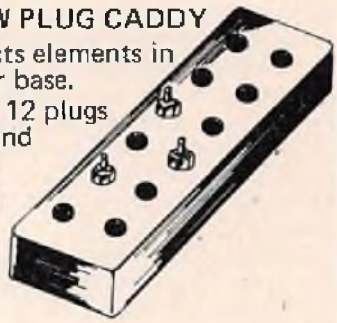

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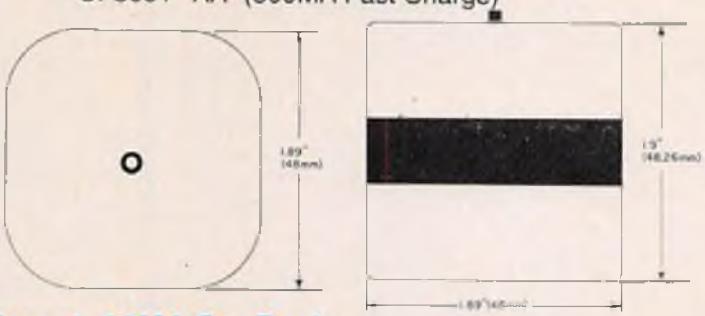

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PIPER J-3 CUB

from page 136/54

Dummy engines are always a problem but not with the Cub. The full size Cub was powered with a 65 HP Continental engine. Span Aero of Norwalk, Connecticut, is now producing a complete set of dummy cylinders for the J-3 Cub. The set comes with four valve covers and two cooling shrouds and they are molded out of solid black plastic and weigh about one pound. The dummy engines will take care of any nose weight you may need.

My model was covered with Super Coverite which can be purchased from Balsa USA with the Cub kit for $18.99 for the 15' roll, also 4½" Du-Bro Big Wheels for $4.99.

Randolph clear dope was used over the Coverite; the color dope used was Randolph Cub Yellow as per the full size Cubs.

A well used Max .80 with 13/5 prop was installed, which turned out to be plenty of power. I have had no problems with engine cooling; the scale openings in the cowl are sufficient. Be sure to run your engine just a shade on the rich side and you should have it made.

Before you test fly the Cub, make sure it is balanced as shown on the plans. It is also important to be sure you do not have too much throw on your tail surfaces and ailerons. Since all surfaces are extremely large, very little throw is needed.

The first test flight turned out very successful and flew just like they said, right off the board. The only trim needed was a little down elevator. Aileron and elevator throws were perfect.

The J-3 does nice loops and also does a most realistic aileron roll, not to mention a beautiful side slip. The first landing was a dead stick and, again, there were no problems except that the Cub had a longer glide ratio than what had been

to page 142

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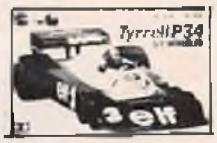

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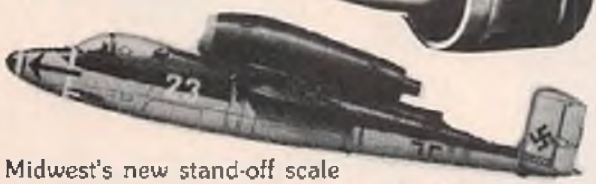

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PIPER J-3 CUB

from page 138/54

planned. So, how about going **Big**. It's almost like the real thing and the Balsa USA J-3 Cub comes as close to it as you can get. For sure, you can't beat the price. We feel it's a real bargain. □

PURANAS

from page 51/48

Puranas would rather fly fast because of its clean lines. The hill where I fly has an almost vertical face and a very abrupt edge, which causes severe turbulence over the landing area. Landing really gets the adrenalin flowing because I never know what's going to happen. Often the plane is flipped up-side down and side-ways; it takes all your concentration just to keep the wings level. The landing approach consists of spinning halfway down the face of the cliff, then hauling the plane up over the lip of the hill, trying to lose enough speed to land.

Any landing where you hit with the wings level is good, but occasionally turbulence may throw you against a bush or tree. At times like that it sure is nice to have a strong but lightweight plane — a heavy plane would surely break itself.

If you think glider flying is slow and boring, build a Puranas and be surprised. □

SUPER MALIBU

from page 47

. . . affixed to the plane. It is quite simple, just glue it in with small spots of white glue. When you want to remove the motor, just dab the glue with water from a brush, when the glue softens just push the motor out the front end. The first wing joint dihedral is 3/4" as stated on plans.

If the the switch harness is not included with your motor and battery, they may be purchased from Astro Flight direct, or from your hobby shop. It is strongly recommended that you also

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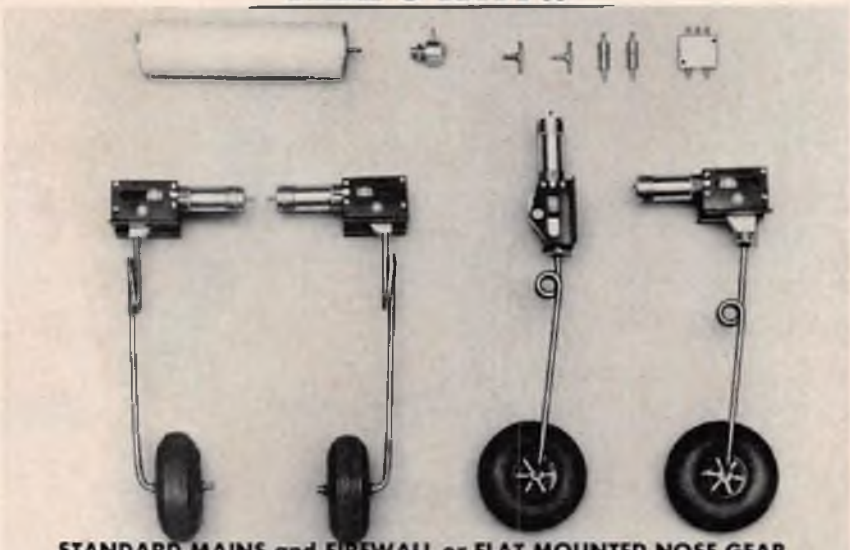

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from page 142/47

purchase the Rapid Charger or the Field Charger since a home-brew charging set-up might totally destroy your battery pack. These goodies are listed on the accessory sheet included with your motor.

Even though the bottom of the fuselage is ply, hard landings or landings on dirt or gravel will wreck the bottom covering job. For a skid on the bottom of the RCM prototype, we sanded the printing off of a foot of a wooden yardstick, applied that to the bottom of the plane with double sided sticky tape then doubled that with a 1" x 12" piece of thin sheet metal. If you are contest flying and need that stopping ability when you near the center of the landing circle, then apply the proper rubber skid.

A pleasant surprise was discovered when we tried to find the soft balsa wing tip blocks --- there were none --- only two pieces of 1/8" ply with the proper shape. It took a bit of looking on the plans and in the pictures to discover that these pieces of ply actually were the wing tips and they fit between the leading and trailing edges at a neat 30° angle.

The toggle switch included with the switch harness posed a tantalizing problem — how do you turn it off in flight? We had used the pushrod method to switch the flight pack off and on when the switch was in the servo tray, so why not adapt that idea? To a 6" length of 1/32" wire we soldered a piece of the threaded tubing that comes with the throttle cable. The switch was mounted to the fuselage side in the canopy compartment with the toggle up. Holding the end of the toggle in vise pliers, we drilled a 3/64" hole in it. The threaded tube was screwed into the end of the NyRod coming from the elevator servo. The wire was passed through a 1/16" wheel collar, then through the toggle. With the switch in the on position and the elevator servo in almost full down position, the wheel collar was moved up against the toggle and secured. When a full down elevator signal is given, the wheel collar pushes against the switch toggle moving it part way through its travel. The spring in the switch will complete the movement for you. The toggle will be far enough away so that you have full down movement with no restrictions. The end of the wire must be left long enough so that it does not pull back through the toggle when full up is given. We haven't gotten around to trying to turn it back on with another wheel collar near full up --- might work --- Hmmmmm? If you are using a 3 channel radio, use the third servo for on-off.

The pictures in the instruction sheet show the Astro Flight prototype using a

to page 148

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If you haven't heard this baby roar, ask for a demonstration wherever hobbies and toys are sold.

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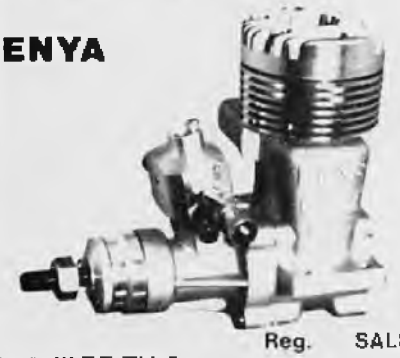

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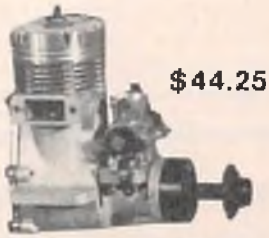

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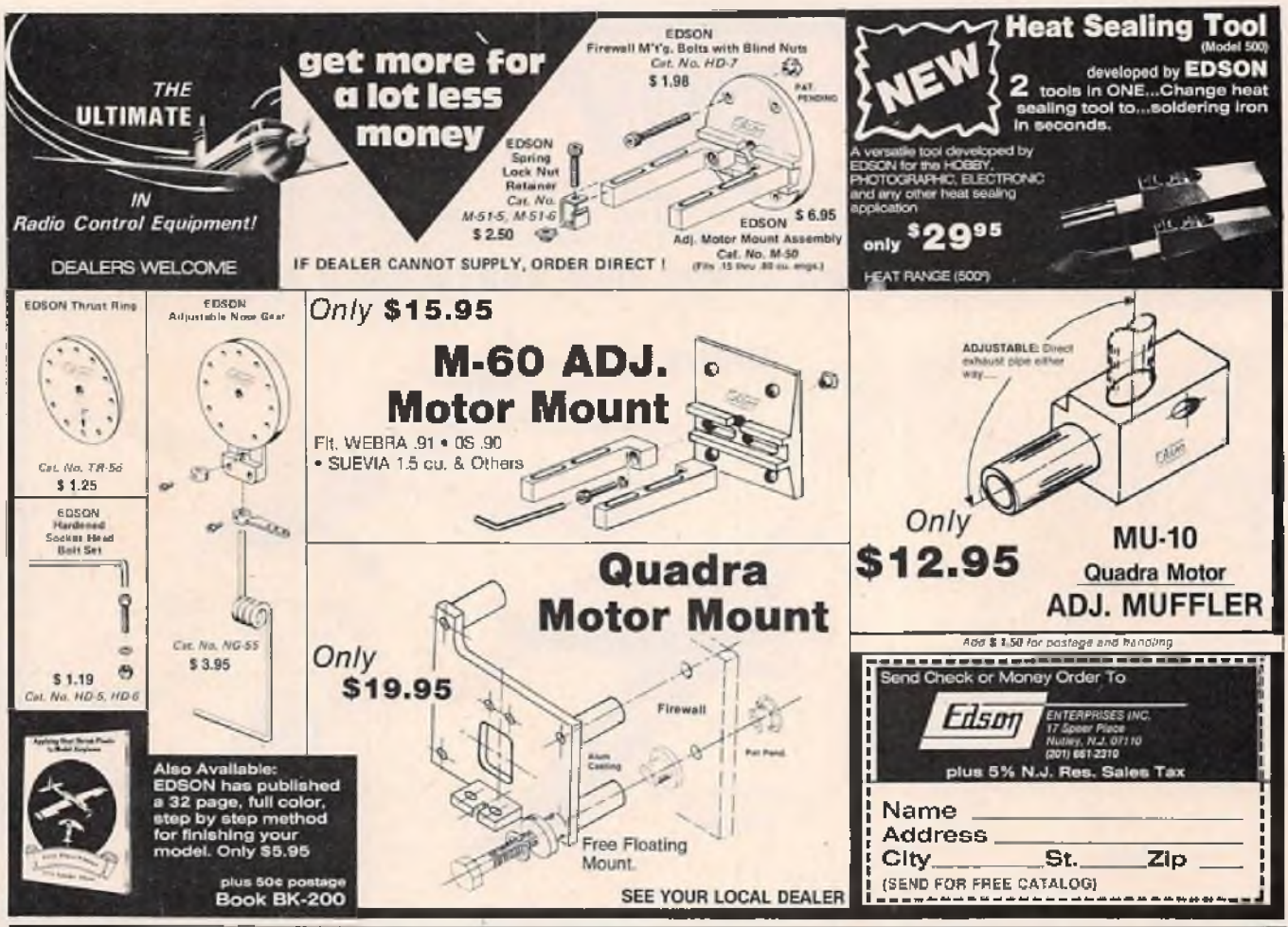

SUPER MALIBU

from page 144/47

brick; if you intend to use separate receiver, servos and battery, it will be necessary to mount the receiver and the switch in the fuselage just behind the wing. The first 3" of the top sheeting was fashioned into a hatch for easy installation and removal of the receiver. The servos were located at the very rear of the radio compartment and the flight pack battery is wedged between the servo tray and the former that forms the motor battery compartment. This former was made from lite ply instead of balsa as furnished. It is important that you do not block the ventilation hole in this former with foam.

When you are ready for your first flight, check to see if the plane balances where it is indicated on the plans. We placed the receiver aft of the wing and the balance came out perfect.

It was recommended (if we could find them) that we use Cox gray props. In the bottom of the tool box we found both a 6/3 and 6/4. The 6/3 bored out to 1/4", and installed. She took off smoothly in a slow climb that could have been handled by a beginner --- a beauty to behold.

On the next flight we installed the 6/4 and what a difference! It got up to speck size in a big hurry. We were glad we had

to page 150

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Designed by George Campbell

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SUPER MALIBU

from page 148/47

installed a shut-off switch and immediately gave her a quick flip of full down and, without even tucking her nose, the motor came to an immediate stop. We were on our own soaring up there in the blue. Twenty minutes expired before she gently ended the flight not 15' from where we were standing.

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LAUNCH-RETRIEVER

from page 45/44

treadle.

The next step was to make the starter motor power two reels, the conventional towing winch and the spinning reel. The first idea was to make a machine having two shafts with the tow line reel on one and the retrieving spinning reel on the other. This idea was abandoned when I discovered the line would spin off the side of a reel, even while it was turning at full speed on the starter motor. This principle allowed the winch reel to be powered with a belt drive from the same motor the spinning reel is on. In other words, the spinning reel runs all the time, but the winch is driven by a belt that can be loosened to disengage the drive when shifting from the towing spinning (launching) mode to the tow line retrieving mode.

The machine was first built with the clutch constructed so as to disengage the towing reel completely at the moment the retrieving mode was engaged. This arrangement proved very satisfactory except when we launched in strong winds or cross-winds, as it did not solve the billowing line problem. The free wheeling of the tow line reel would unwind by the drag of the parachute and sail over our heads and back into the

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woods or into the blackberries again. Launching into a light breeze worked perfectly, though, as the parachute dropped in the field, even with the retriever pulling it toward us at full speed. The last version of the machine uses a red streamer at the tow ring replacing the parachute and incorporates an idler wheel connected into the drive so that the retriever reel and the tow line reel can be run at our option; either at the same time or with the retriever reel by itself and tow line reel free wheeling. This was the answer to high wind and cross-wind retrieving.

Retrieving the tow line from an open hook on the aircraft is started before flying off the tow ring. With a releasable tow hook, the tow ring is, of course, dropped before starting to retrieve. In either case we first shift from the towing spinning mode to the mode that retrieves with the tow reel disengaged. After a moment we shift into the mode which causes both tow line and retrieving line to wind simultaneously. This mode winds the line right out of the sky and in line with the turn-around and the winch, regardless of the wind's direction or speed. As the streamer nears the ground the drag from both lines pulling at opposite sides of the tow ring slows the starter motor. This is a signal to let up on the treadle and shift back into the mode that only retrieves and lets the tow line free to be pulled back to the winch. The tow ring does not need to be retrieved immediately if you choose. I incorporated a brake on the tow reel which stops it from free wheeling when the retrieving reel stops. This keeps the system free of backlash.

So far the machine has worked with few problems. However, it needs a pre-flight check just like the aircraft, radio and servos do to make sure it is flight worthy. A slipping belt that shouldn't be slipping or a shifting action that doesn't engage because of adjustment or lack of lubrication can

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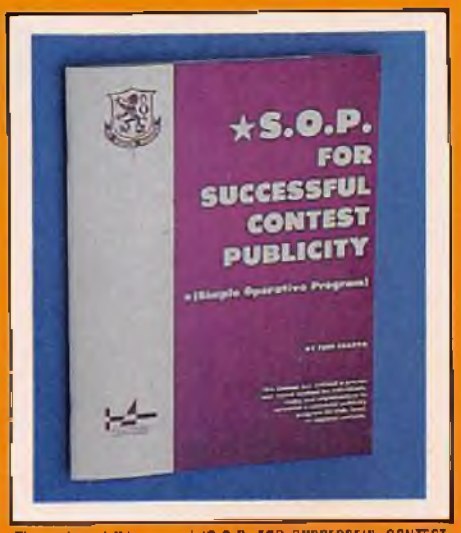

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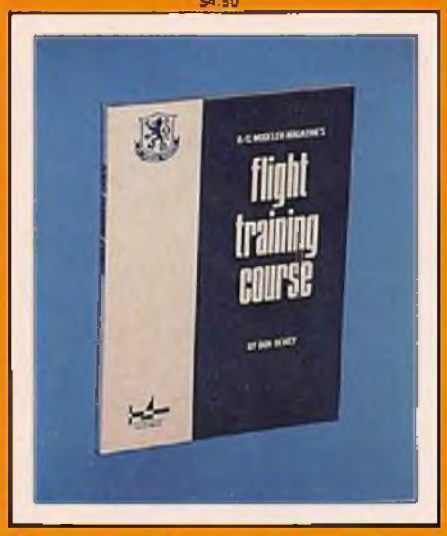

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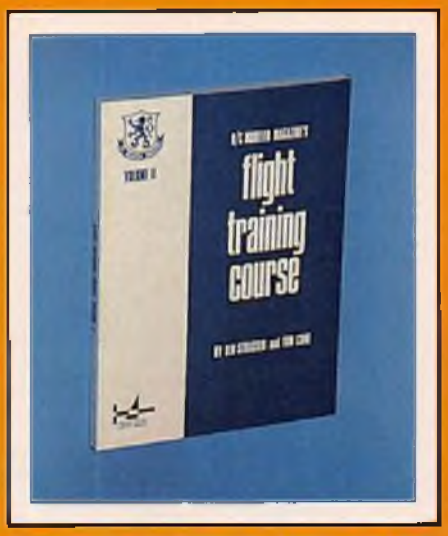

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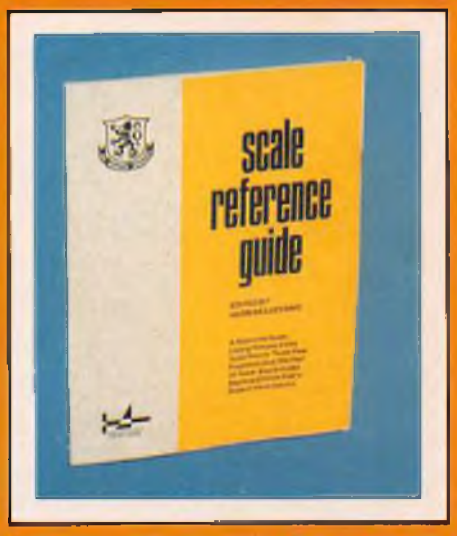

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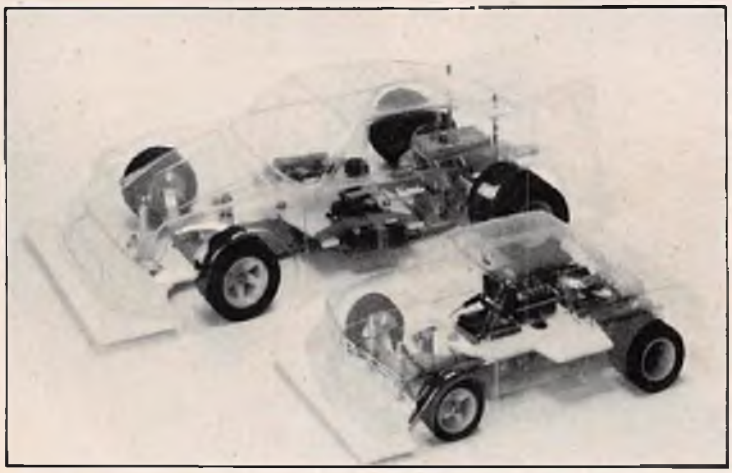

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LEE'S ENTERPRISES

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LAUNCH-RETRIEVER

from page 151/44

cause trouble. Unwinding and rewinding several thousand feet of nylon line at high speed is a good trick and you need some practice before you can call yourself 'expert.'

The payoff for all this effort has been the extra flights we get without getting sore feet. We also find that we can launch one glider after another and put a flock of birds up soaring together without chasing the line. We've launched Windrifters, Aquilas, a Cirrus, a Wanderer, a 99" Wanderer, and a Born Free. □

PORSCHE 911S

from page 43

. . . travel of the arm on the servo had been correctly set, not **before** as the instructions suggest.

After spending at least 30 minutes searching everywhere for the female charging jack we finally came to the sad conclusion that Mr. BoLink had inadvertently forgotten to included it in the kit. We realized that a simple letter to their offices would have been honored immediately and they would have sent one by return mail. But that process would have taken at least a couple of weeks or so (not BoLink's fault, it's just that mail delivery is about as fast as Wells Fargo Stagecoaches and a bit slower than the Pony Express used to be). We happen to have an extremely good model shop close by (Chuck's Models in Hawthorne, Calif.) who carries a tremendous stock of parts and pieces for everything imaginable, so we took a quick run over there to see if by some remote chance he must might have a BoLink female charging jack. Sure he did! Not just one but three, and five male jacks too and then the final surprise — his price was only $1.49. This was only one of many occasions that we have been able to obtain the most odd-ball items from Chuck's large parts inventory and it just goes to show that the more you use your local model shop the more inventory he can afford to carry to help you out when you are really in a jam for something right now.

The chassis has vertical side rails, for rigidity, and to get the steering servo down into the chassis, so it can be held in place with adhesive tape, required removing the servo mounting lugs from the servo case. We use our radios in many other pieces of R/C equipment and did not want to cut off the lugs, so we cut a piece of 1/4" plywood that fit down in the chassis between the rails then glued it in position and taped the servo

to page 156

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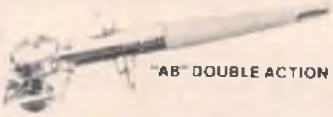

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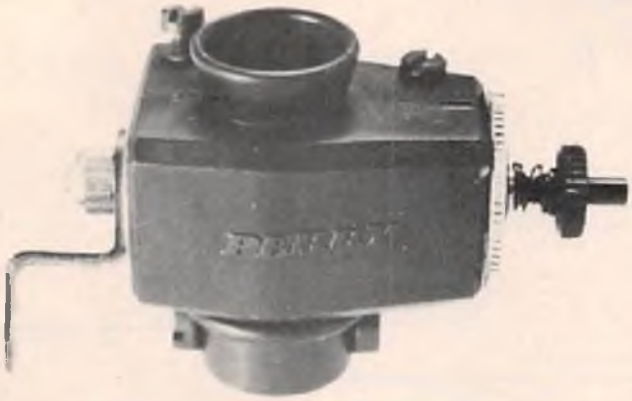

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from page 154/43

on top of the plywood. The servo lugs cleared the side rails nicely and the rest of the steering assembly was completed according to the Gospel of Saint BoLink. As we have an Astro Flight Rapid Charger we bypassed the charging resistor (supplied in the kit) wiring sequence, as recommended in the instructions for people using this type of charging equipment.

Then came the tricky part --- painting and detailing the body. The body is clear, vacu-formed 'Tuffak.' It is necessary to mask off all window areas and windshield **from the inside** which calls for some very nimble finger work (or 'manual dexterity' if you want to sound impressive) and a great deal of patience. We masked all edges with standard 1/8" striping tape then laid regular masking tape over the remaining inner portions of the windows. (This way you get very sharp and clean edges to the paint when the masking is removed — masking tape comes off first then the striping tape is removed last.) We then sprayed three light coats of acrylic, green metalflake over the entire inner surfaces and set it aside to dry like the can said to do. After removal of the masking materials we were more than satisfied with the results of our labors. Painting clear plastic from the inside gives an extremely high gloss finish from the outside. By the time we had painted flat black bumpers, silvered the headlights, added racing numbers, put on some manufacturer's decals, and edged all the windows with Bridi silver 1/8" striping tape, we had a heck of a good looking car sitting there. However, it was a lot of work and called for a goodly degree of modeling skills. We would suggest that the real novice obtain a body which has already been painted by the manufacturer. Just trimming the body edges and carving out the wheel wells would cause problems for the inexperienced.

The car is fast and handles extremely well and can easily be brought up to race readiness with the addition of the various BoLink accessories made especially for this purpose. It already has an all-out top speed of around 30 mph and handles this speed very well on any decent surface. We feel it is a well thought out kit and instruction sequence and the quality and fit of all components was excellent. It was a real pleasure to build and even more fun to drive if you can manage to make it dodge all the invariable crown of excited spectators who seem to always appear miraculously out of nowhere every time you take it out for some fun and games. □

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from page 30/27

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enough time to learn the track. So this race would help.

The track was located at the new Clairemont Square Mall in San Diego, an ideal location with lots of spectators. ROAR President Rick Perry did the announcing, and he did such a fabulous job, the spectators didn't even leave for the lunch break! Bill and Reba Steele, Ray and Steve Douglas, the Sortillon's, Miranda's and the San Diego Club, deserve a great deal of thanks in presenting this Mini World race. You can see by the size of the track, how much work it is.

This race was over the three day Labor Day weekend, with Saturday practice, Sunday qualifying and Monday the Mains. The first time on the track, it was evident we weren't going to learn too much, because the track surface was fairly rough, and learning this track wasn't going to be easy. And, yet, there was someone who thought the track was just fine — thank you. We had a visitor staying with us for a month before going with us to Geneva. Debbie Preston, from England, unquestionably the fastest woman driver in the world, thought the track wasn't any different from the tracks back home. Another thing, her father, Dave, had perfected a silencer that made her OPS as fast as our K & B .21's and, yes, she was running a diff - thank you. Someone else who thought the track was just fine, was Bill Steele, who was really going quick in practice, with a diff. But Bill had nothing but motor problems during qualifying.

After the first round of qualifying, Rich Lee had fast time of 3:44.57 with Chuck

Chuck Phelps was 2nd in the "A" Main.

to page 162

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	R2000	Receiver regular, assembled	Frequency_____	36.00	
	R2001	Receiver micro, assembled	Frequency_____	39.00	
	B1000	Battery regular, assembled		13.00	
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	H1001	Switch harness, assembled		5.00	
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	S5442K	Kit of S5442 servo		19.00	
	S5443K	Kit of S5443 servo		27.00	
	S5445K	Kit of S5445 servo		20.00	
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	List	CHC
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	LIST	CHC
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O.S.	LIST	CHC
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.35 RC	55.95	42.95
.40 RC	76.95	53.95
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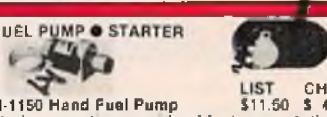

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Super Kaos .60	69.95	47.98
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Trainer .10	27.95	18.98
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Classic .40	54.95	36.88
Tweedy Bird	39.95	26.98
Quickest 500	42.95	28.98
15-500	39.95	26.98
Trainer 60	62.95	40.98
P-51 Mustang	134.95	95.98
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.19 RC X Sch. w/Muf.	104.98	65.98
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.40 RC X Sch. w/Muf.	149.98	93.98
.45 RC X Sch. w/Muf.	159.98	99.98
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.10 FSR RC w/Muf.	36.95	27.95
.25 FSR RC w/Muf.	61.95	44.95
.40 FSR RC w/Muf.	89.95	61.95
.45 FSR RC w/Muf.	104.95	74.95
.21 FSR RC - Car	68.95	52.25
.10 FSR RC Mar w/Muf.	42.95	32.25
.21 FSR RC Mar.	75.95	54.25
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FW 190	#RC3	79.95	53.98
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PIT STOP

from page 158/27

Phelps just a tick away at 3:44.75. Chuck said he was going to reverse the tables in the next round and sure enough he did with a 3:43.72. But in the final round Curtis Husting was on a record setting pace, but he hit a tire while leading on the last lap and Rich Lee slipped by setting a time of 3:39.90 with Curtis second at 3:41.22. This put Phelps 3rd and Debbie 4th in qualifying.

All the hard work of staging this race didn't slow Reba Steele down as she beat all the boys in winning the "C" Main. A hard charging Joe Zimmerman, who had lost about 10 laps earlier, finished 2nd with Bennie Hill taking 3rd.

Jerry Snow and Mike Plant had a close race in the "B" Main with Jerry winning, Mike taking 2nd and Dennis Thomas 3rd. Jim Cade had run a strong 2nd for most of the race, until he lost a servo.

The bite on the track had come way up during the three days and, in spite of the bumps, all the cars were now going very fast and the 100 lap "A" Main promised to be very fast. Bill Jianas, who had been trying a lot of new things on his car, finally got it working the way he liked and jumped off to an early lead with Curtis Husting no more than 1' behind. After five laps Bill touched a tire and Curtis grabbed the lead. Jianas was close behind but then hit another tire and Curtis pulled away.

At about 30 laps Debbie pulled to within 20' of Curtis, but then Curtis started to pull away and by seventy laps Curtis had a full lap on the field. On the next lap his new battery pack went dead and Debbie took over the lead. Debbie held the lead for five laps until the hose on her muffler came loose which necessitated a pit stop. Rich Lee then took over the lead and went on to the win with Chuck Phelps 2nd and Debbie 3rd.

to page 164

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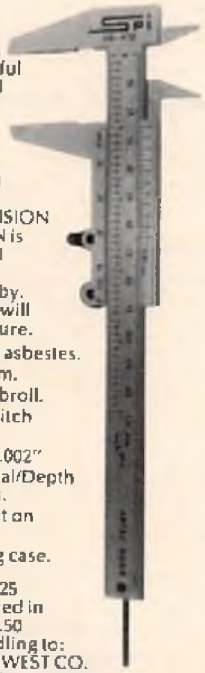

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from page 162/27

Debbie Preston came all the way from England to take 3rd Place in the "A" Main.

Tony Williams won Concours with this beautiful Elfin body.

The practice we got on this track hopefully will help. Although the dimensions of the track weren't 100% exact they were probably close enough. We also ran in a counter-clockwise direction which didn't seem to be any problem. It looks like there'll be about 25 Americans going to Geneva. Wish us luck.

Mini World Race Results

"A" Main
1. Rich Lee
2. Chuck Phelps
3. Debbie Preston
4. Bill Jianas
5. Rich Heisel
6. Curtis Husting
7. Chuck Hallum

"B" Main
1. Jerry Snow
2. Mike Plant
3. Dennis Thomas
4. Joe Sortillon, Jr.
5. Gordon Nakano
6. Jim Cade
7. Bill Steele

"C" Main
1. Reba Steele
2. Joe Zimmerman
3. Bennie Hill
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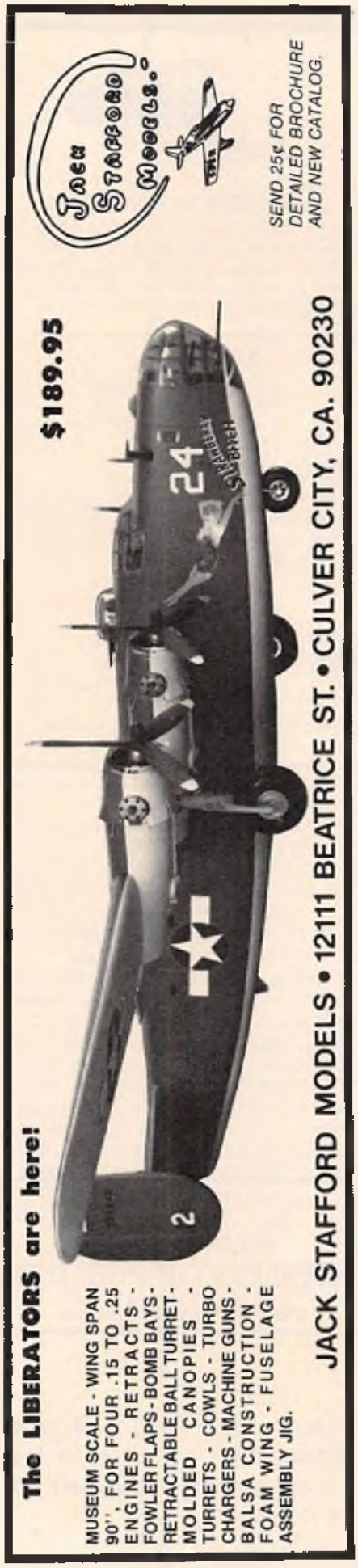
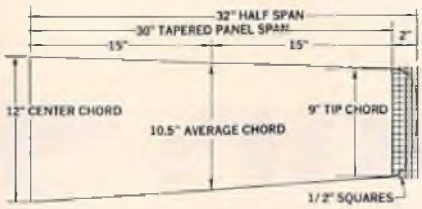


SCALE VIEWS

from page 22

There are a number of ways that areas of off-beat shapes can be determined. I have used several simple ones that do the job as accurately as is necessary.

Probably the least mind-vending method is to simply graph a drawing of the surface and count the squares. Knock out the larger areas with big squares and go down to smaller ones as the shape gets more elaborate. Some of the squares will be cut in half, or in other fractional segments, by the edge of the outline. Match the partial squares up with each other to make full squares, checking off the segments as you go. Not very scientific, but it works.



Computation: 30 x 10.5 = 345 Sq. In. + 17 sq. in. Tip Square Count = 362 Sq. In. Wing Half Area or 724 Sq. In. Wing Area.

For curved or elliptical shapes, graph the entire surface with squares, using large squares in the inner area and small ones around the edge.

Straight sided tapered shapes should be figured by taking the average chord, as shown in the accompanying drawing. If a rounded or shaped tip is attached, use the graph squares method to figure that part and add it on to the main area figure.

An ingenious method of figuring really complicated shapes was used back in 1941 at the Nationals in Chicago. In those days, the free flights had to have a minimum fuselage cross section area. Since many models had oval fuselages with filleted pylons, the required calculations drove contest operators nuts. At one meet, a specialist with a Pantograph-like device called a polar planimeter, a slide rule and various calculating aids produced very scientific, but time consuming, answers. But the Chicago Park Board, sponsors of the Nats, set innovative standards for model meets, including a catered box lunch handed to every contestant at noon. To eliminate the delay in cross-section figuring, entrants were given a piece of cardboard and instructed to draw their fuselage shape on it and cut out the cross section with scissors. In the processing line, all the contest official had to do was make a quick check of the contestant's honesty by checking width and height with a big pair of calipers and plunk the cardboard on a special scale. It was calibrated to read directly in square

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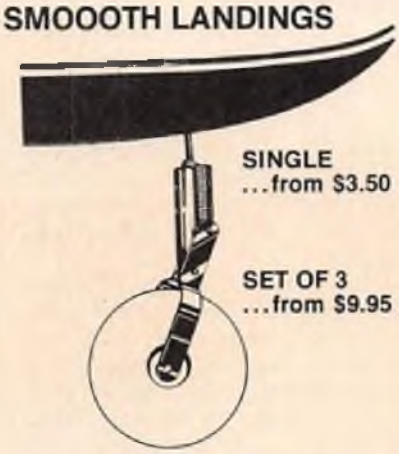

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inches. No reason why this idea can't be used on elliptical or complex RC design shapes. I'd imagine that cardboard or bristol board that is hard surfaced on both sides is the most uniform, but even cheaper cardboard with only one side smooth surfaced seems to weigh out very evenly per sheet, with minor or no variation between them. Weigh the full sheet, figure out the weight per square inch, cut out the shape and weigh on a sensitive scale to determine the area. A postal scale should be acceptable.

Some time ago I saw in Carrier Wave, the newsletter of the St. Louis McDonnell-Douglas RC Club, a clever formula for figuring the area of a model's surfaces when the area of the full size airplane is known. These full size figures are available in such reference volumes as Jane's All The World's Aircraft, Aircraft of The World and Aircraft Yearbooks. The piece had no author listed, but John Britt was the editor at the time:

To calculate what wing area a model will have when you know only the wing area of the full scale aircraft and the scale to which you want to build your model, use the following technique.

Square the scale (in in./ft.) and multiply times the full size wing area (in ft.^{2}). The result will be the wing area of your model.

Example:

(1) F-4 wing area (Full Scale) = 530 ft.^{2}
model Scale = 1.2 in./ft.
1.2^2 (in.^{2}/ft.^{2}) x 530 ft.^{2} = 763.2 in.^{2}

(2) Full Scale Grundle - Wing Area = 200 ft.^{2}. Model Scale = 2 in./ft.
2^2 (in.^{2}/ft.^{2}) x 200 ft.^{2} = 800 in.^{2}

Try it, it works with any scale.

One good use of wing area figures is to convert them to square feet and divide this into the model weight to arrive at the wing loading. Through the years I've paid close attention to the wing loadings of various scale models. Many heavy scale models have been successfully flown, but I've always considered something like 30 oz. per sq. ft. to be the

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highest tolerable loading on a 6' span airplane and still have reasonable performance. And --- because of scale effect --- as the model gets smaller the wing loading must be reduced for equivalent performance and flight characteristics. By the same token, the wing loading of a larger model, such as a 1/4 scale, can be heavier. But the bottom line on wing loadings is the lighter you can get them, the better. I even think that goes for windy weather, in which condition someone is forever saying, "Well, it may be heavy, but it's better on a day like this."

Another interesting figure is the stabilizer area. When I first started building RC Scale, my old FF Scale worries about tail size made me look for airplanes with naturally large tail surfaces or even to cheat a little on scale size and add on some area. It soon became evident that an RC Scale would fly fine without a really big stab and will do okay on a fairly small one. If a reader of Scale Views has some proven-out formulas for locating the C.G. for various stab area percentages, we'd be glad to present them here. I'll have to confess that I use nothing but a rule of thumb learned in the school of hard crack-ups: that to live with a small area stab you must move the C.G. forward and the smaller it is, the more forward the balance should be. Test flying of any new RC Scale should be done deliberately on the nose heavy side anyway. There would be fewer models lost to catastrophic snaps if attention were paid to that little rule. Then tinker with the C.G. position to obtain the desired response and flying characteristics, just as you fine trim the incidence and control surface settings. But we're getting into a separate subject that needs its own space. Later!

Good Things Come In Small Packages

Bill Hannan wrote in to suggest that plastic kits can be a fine source of data for RC scale models. An excellent point,

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The Wedell-Williams would make an unusual R/C subject. Williams Bros. 3-view shows 3 different color schemes.

since many of them include 3-views of the subject and a lot of color and markings information. The art work on the box lid as well as the written descriptions of markings are all acceptable under AMA rules for use in a presentation for static judging.

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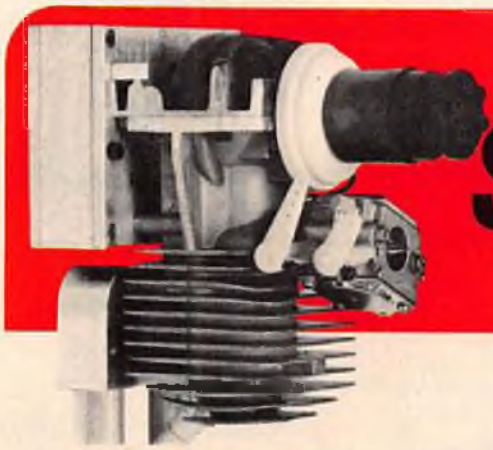

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Because of this the super detailing can be transferred to an RC Scale in the form of panel lines, access panels, etc. It has sometimes been suggested that AMA rules be amended to allow submitting a plastic kit model as part of the scale presentation. No one has ever submitted a formal proposal along those lines to the Scale Contest Board, so the idea has never been put to a vote.

Bill sent in some samples of the 3-views that Williams Bros. put in their plastic kits for the Martin B-10, Boeing 247, Northrop Gamma and the most recent release, Wedell-Williams Racer. I've got a soft spot in my heart for the Wedell-Williams --- it was the first model I ever tried to build, a 10¢ solid model from Woolworth's. My version didn't look very much like the box picture and I found out why when I went back to the 5&10¢ store and saw another builder's W-W on display. I had cut out the fuselage from the top view and the side view but left the block unshaped with a square cross section! The kits now available are a far cry from those primitive 1930's affairs. Williams Brothers entries in the field have been applauded by specialists in this type of modeling because they have picked unusual subjects instead of following the well-worn "Mustang, Spitfire,

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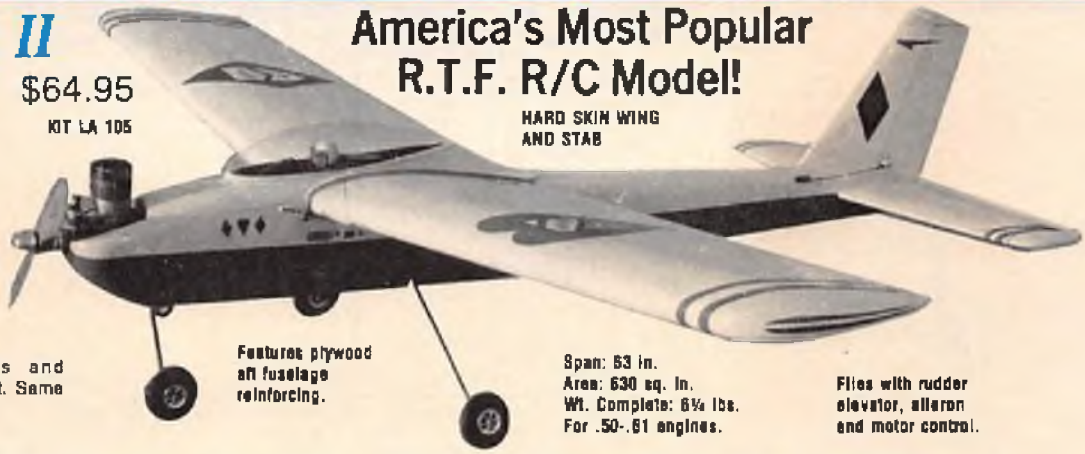

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Messerschmitt" rut of the competition. The plans for the Williams Brothers kits are available separately for $1.00 each or 3 for $2.50 from them at 181 Pawnee, San Marcos, Calif. 92069.

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I was one of the early members (No. 107) when the International Plastic Model Society was formed many years ago. Not only was I interested in all types of scale models --- and I think every real scale nut is --- but I recognized the interest of plastic modelers in fine details and accurate color and markings is applicable to RC scale. The Society publishes four major quarterlies and a supplementary news magazine called "Update" six times a year. Both have coverage of items of interest to any scale enthusiast --- 3-views, color schemes, new aviation books, etc. Membership costs $12.00 per year ($15.00 overseas) for adults, and $8.00 for those 17 and under. Address: IPMS /USA, Box 2555, Long Beach, CA 90801.

A color and markings feature on Korean War Mustangs, typical of the material in IPMS publications.

Pusher Postscript

Bruce Lund's 1/4 Scale Curtiss, Jr., in the July 1979 issue of RCM, is a beautiful job of design work. As I was reading the construction article and studying the light, strong structure, I noticed on the plan the statement that scale data on the Junior was in Paul Matt's Historical Aviation Album — Volume Eleven. (I spelled the number out because on the plan it could be read

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as the Roman numeral II and the series is numbered in the Roman fashion on the covers.) I checked several book catalogs and confirmed my feeling that Volume XI appears to be out of print. Builders of the model will need this information if they are interested in competition since the odds look good that the AMA Scale Contest Board will enact a 1/4 Scale event for the 1980-81 rule book. I'll be glad to furnish photocopies of the text and pictures at the cost of reproduction from my copy of Vol. XI. However, the 3-view drawings are still available from HAA, Box 33, Temple City, Calif. 91780. The three sheets, enlarged from the Album size to 17" x 22", are $4.00. Add $1.50 extra if you want the plans shipped rolled in a mailing tube. Even if you aren't building the Curtiss, send a self-addressed stamped envelope and ask for HAA's list of drawings. The 3-views are of top quality and cover a wide range of interesting subjects. □

SOARING

from page 19

You are wasting your time, dropping your chute on other winches and hurting your flyer's chances of winning. Wind down on small backlashes.

If a major backlash develops, don't wind down, call for help and go help your flyer. If the line falls on other winches, a restart may be necessary anyway.

After a good launch, devote 100% of your attention to your flyer and his flight. Spot the other flyers, figure out who is going up and who is going down. Look for birds, bits of paper or floating debris but, above all, keep counting.

Your flyer will probably want to drop down to launch height at about 2 minutes. Bleed down to about 100' at 1 minute and run two patterns in the last minute, hopefully, landing at the end of the second pattern.

to page 174

Andre' Bouchard up and coming young Master Flyer placed 13th at the 1978 Nat's.

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KP-5CS	389.95	277.99
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KP-7CS	529.95	384.99
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OS 20 STD	38.00	30.40
OS 20 R/C	46.00	36.80
OS 25 STD	41.00	32.80
OS 25 R/C	49.00	39.20
OS 25 FSR R/C	64.00	51.20
OS 25 FSR STD	57.00	45.60
OS 30 STD	48.00	38.40
OS 30 R/C	53.00	42.40
OS 35 STD	52.00	41.60
OS 35 R/C	58.00	46.40
OS 40 R/C	80.00	64.00
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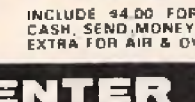

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281 TOOL special	64.95	39.00
370 TOOL special	54.95	33.00

	LIST	BHC
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K & B ENGINES

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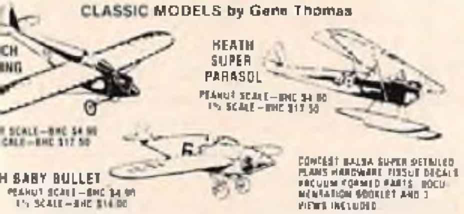

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BRAND NEW 1978 KRAFT 5 CHANNEL 2 STICK (KP5C) SYSTEMS ON ANY 72 THROUGH 75 MHZ. CHOICE OF SERVOS-14's OR 15's
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LIST $375.43 BHC $264.95
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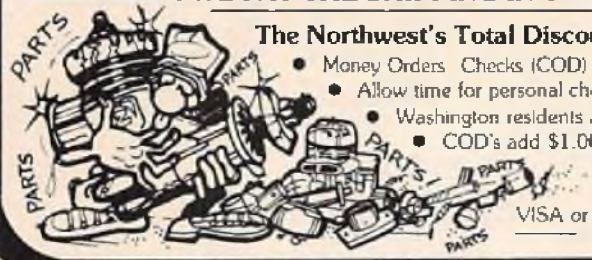

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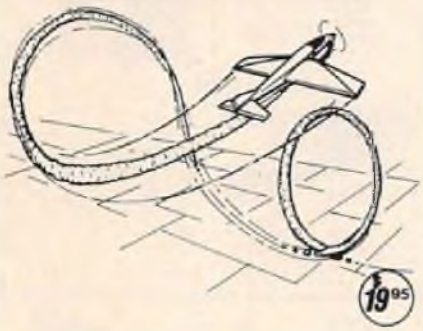

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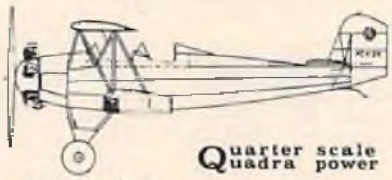

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from page 171/19

Most of the better SULA flyers prefer a countdown (down, not up), with 30 second tick to 2 minutes, 15 second ticks to 1 minute, 5 second ticks to 15 seconds and 1 second tick to zero. For example, a 4 minute task would be counted as follows:

Mark, 3:30, 3, 2:30, 2, 2:45, 2:30, 2:15, 1, 55, 50, 45, 40, 35, 30, 25, 20, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, zero.

Do not count up from zero; at that point your flyers brain is in "tilt" anyway and he is doing everything possible to get the plane down so your voice won't help.

As you count down from 15 seconds, develop a nice rythmic chant. Glance at your watch occasionally for minor adjustments, but watch the plane for contact with any stationary object such as grass, trees, etc.

Learning to count down while your watch counts up is not easy, so **practice** --- with practice you'll avoid ruining someone's contest chances.

• • •

In closing this month, some humor that tickled my funny bone was lifted from the East Bay Radio Controllers Newsletter, edited by Dave Pastor.

Many times it is desirable to know how much your latest creation weighs, but finding a suitable scale can be a problem. Bathroom scales are crude, and hauling your model down to the market to weigh it on the check-out scales attracts a lot of attention. One method that can be used is to print your name, address and zip code, along with the words "First Class" on the wing, and drop it in the mail. Then when your model is delivered (allow six weeks) simply divide the postage by $1.60 to determine the weight in pounds. This method has certain drawbacks, however, occasionally an overzealous postmaster will send the model by airmail (allow eight weeks for delivery) in which case the answer obtained will be incorrect. Also, the model may sustain some damage in passing through the cancellation and sorting machines. To circumvent these problems, you may want to construct your own balance.

"You will need a 1 x 6 8' long, a 1' length of 6" diameter pipe (sewer pipe works well) a mop bucket and some rocks. Place the 1 x 6 on the pipe and adjust back and forth until it balances. Then place your model on one end of this See Saw and put the mop bucket on the other end. Add rocks to the bucket until balance is attained, then guess the weight of the bucket of rocks."

Good lift. □

from page 16/15

made by using stick wood glued to the inside of the fuselage in a truss fashion.

If you're building larger aircraft and opt for the open framework type of structure, then you need to pick out adequate sizes of wood to use for the main structure. On my Eindecker, for example, I used main longerons of pine, 1/4" x 3/4", with intermediate truss webbing of balsa, 1/4" x 1/2". This makes for a very strong, but reasonably light fuselage. Cross braces in the aft end are 1/4" x 1/2" balsa, and the main formers are all of 1/4" plywood. On the smaller (but really not much) Lazy Ace, the main longerons are spruce, 1/4" x 1/2", and the truss braces are 1/4" x 1/2" and 1/4" x 1/4". The formers are balsa.

Wood sizes for use as wing spars is another knotty problem. Trotting out the old thumb again, and listening to its rules we find that there really aren't any. A lot of models have spars that are way under-designed, and a lot have spars that are over-designed. In some cases the modeler who designed the aircraft is a sane, gentle flier, not prone to high speed snaps at the end of a long dive at the field, while in other cases, the opposite is true. Aircraft can fold a wing for a number of reasons, not the least of which is a lousy building job. Poor glue joints, and inadequate dihedral braces can and do account for a number of wing failures. Neither can you depend upon a wing not folding by building it very stiff. A good wing needs to have some flexibility. Have you ever sat in a window seat on an airliner and watched the wing flex as the aircraft moves through turbulance. They flex a bunch. Or, have you ever stood and watched a Formula I racer come around number three pylon, and watch the wings flex to negative? They can, do and will. A wing that is too stiff will fold up just at that spot. How about watching the wings on a sailplane flex when it is going up on tow. You better believe that they do flex. Wood selection is a must in spars; check the wood for strength and for flexibility. Some wood that is strong simply will not flex, it snaps.

Sizes, who knows? For example, on the Sporty Ace I used 3/16" square spruce spars because I know that fliers like to try and tear the wings off of a small bipe. Balsa could have been used, but I like to be a little safer. The easiest way to select a proper spar size is to thumb through magazine plans, looking at spar sizes. When in doubt, go up a notch.

Webbing the wing spars is really the easiest way to add a lot of strength to the wing structure. There are two methods of wing webbing. The first is to cut the webbing so that it exactly touches the bottom of the top spar, and the top of the

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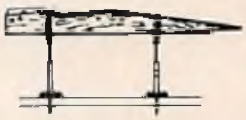

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Bob Haden of Jeanette, PA has already won three 1ST PLACE (Helicopter) trophies at the Tri Valley Static Show in Pittsburgh, PA, the WRAMS R/C Jamboree in White Plains, NY, and the Toledo Weak Signals 24th R/C Exposition in Toledo, Ohio, with his super sharp, highly modified "Kaven Bell Jet Ranger."

Bob says: "As you can see by the photo Formula-U really helped to make this highly detailed paint job turn out great. The base color is Flight Aluminum with Raven Black on the nose with Metallic Red, Fiery Orange and Aviation Yellow trim. I'm happy to tell you that Formula-U stands up too! Prior to this photo the model was flown 6 times, plus the friction and wear of transporting it to shows and events all over the country."

We are happy and proud that Bob is pleased with Formula-U's performance, and hope you will give it a try on your next model. Here's a few winning reasons you might consider: 18 popular Gloss, Metallic and Flat flight line colors, in matching brush and spray. Quick Drying, One-Step System, One-Coat Coverage, Higher Gloss Finish, Fuel-Proof, Mar-Resistant, Lightweight, Super Tough, AND matches Pactra's "Solarfilm" Colors.

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bottom spar, and each rib. This is sometimes a bit hard to cut exactly. The other method is to cut the webbing so that it overlaps the spars, both top and bottom, this gives you much more surface for gluing, and is a lot easier to cut. Theoretically, this method is not quite as strong as the center webbing, because the beam that you have created is a bit eccentric but, in actuality, it is much stronger due to the positive glue surface.

Returning to the fuselage for just a minute --- if you use a built-up structure of stick, then you must make very good glue joints. To really be sure that you have built a strong structure, reinforce the glue joints with triangular gussets at each intersection. It takes a bit more time, but you will gain a really strong structure. Don't be afraid to use plywood in the fuselage, and in the wing dihedral brace. Naturally, you will use plywood for the firewall, but it is also good to use for landing gear location, main formers, and any place where a bit of extra strength is needed.

If you select your wood wisely, and take care with your glue joints, you should build an aircraft that really will hang in there.

The House of Balsa has recently introduced a new, larger cut-off wheel that is really a little gem. This new wheel has a diameter of 2" and is reinforced with fiberglass so that it will not shatter. It requires a special, larger mandrel designed to fit into a Dremel tool. The combo package, of mandrel and one cut-off wheel is $3.98, and extra wheels are only $2.98. These cut-off wheels are just the thing for cutting off 5/32" and 3/16" music wire. But, be sure to wear safety glasses when you're using this, or any cut-off or grinding wheel. Try one --- House of Balsa has come up with another of a long line of winners.

Last month I told you about a picture of a Lazy Ace and a lovely Hawaiian girl, Beverly Leilani Roskopif, the model built by, and the pictures taken by Jim Miura. Well, thanks to the great service by the postal department, my column and the picture was lost in the mail. I had a chance to send a copy of my column in time, but not another picture, so this month here is the picture of Jim's aircraft.

Jim Miura's Lazy Ace watched over in Honolulu by Beverly Leilani Roskopif.

Before closing, I just want to add that the Dallas Trade show this year was a huge success as well as a great time for renewing old friendships. See photos at beginning of column.

Keep on building and flying, it's the greatest hobby/sport in the world. □

ENGINE CLINIC

from page 10

be due to the engine being Schneurle ported?

Is it okay to add Lubricin N-1 to a synthetic oil based fuel and would it help any?

I don't like synthetic oil based fuels and it is getting harder and harder to get castor based fuels at a reasonable price. I've had rusting problems with synthetic oil based fuels whereas I've never had the same problem with castor based fuels. When I'm done flying for the day using synthetic oil based fuel, I have to rinse the engine out with a solvent and then oil it thoroughly. When Midwest Products was making fuel and went to a synthetic oil I didn't have the rusting problem. Why? Do some synthetic oils draw moisture and others don't?

Yours truly,
William G. Mitch
Hebron, Indiana

When you invert an engine the glow plug becomes a sump where the excess fuel and oil can collect. This, in turn, puts out the fire and the engine dies. Some engines are more tolerant than others --- even engines of the same make --- due to variations in port timing, compression ratio, etc. The smaller the displacement, the worse the condition. Schnuerle porting has little to do with this, other than some Schnuerle ported engines do run a little cooler than cross-flow types.

The level of the fuel tank is a little on the high side. It is always desirable to have the centerline of the fuel tank at least 1/4" to 3/8" below the centerline of the needle valve. This lowers the head pressure with a full tank that, in turn, causes an engine to load up at idle. Setting the idle mixture as lean as possible should also be done. When doing this with a full tank be sure to also check the mixture with a near empty tank. You do not want the mixture so lean that the engine dies with a near empty tank. The best assurance to keep the engine running is to have an on board nicad connected to the glow plug that is turned on by a micro-switch below half throttle.

Adding Lubricin N-1 to synthetic oil will not hurt anything as long as they mix. Some synthetics do not mix and others do depending on the synthetic base. There are many synthetic oils using different types of base stock --- some

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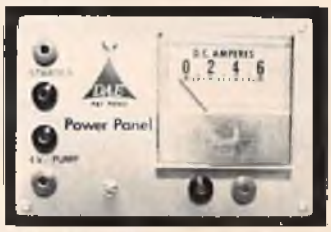

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more resistant to rusting than others. Some of your synthetics are an acid base which does contribute to the rusting. Actually it is the combination of alcohol (which draws moisture) nitro methane, and the synthetic, that causes the rust formation. As far as I know, Midwest has always used Klotz Special Formula with 5% castor oil. The addition of the castor oil helps to hold down rust formation as well as providing extra protection on a lean run.

Dear Clarence,

What with the price of fuel "doing its thing," I am giving strong thought to brewing my own. My question is about castor oil: Is "AA" grade okay? AAA is expensive, but I can get AA for $10.00/gal. What is the difference? Is AA grade "degummed"? What does degummed mean? Is there any way to tell the difference? I would appreciate any answers you may have on this subject.

I have a friend who shoots WD-40 in his engines after flying in place of 3-and-1 oil. Is this better? Worse? Or?

Thank you.

Regards,
Doug Dahlke.

The Baker Castor Oil Co. has many grades of castor oil intended for many purposes: cosmetics, hydraulic fluid, laxative purposes, etc., to name a few. Their top grade is AA. Baker does not make an AAA. Anybody selling AAA is putting you on or it is some off brand other than Bakers. In years past some fuel manufacturers would list AAA castor oil on the label in an effort to make their fuel sound as if it had better lubricant than someone else listing Baker AA. There are other companies producing castor oil besides Baker and their product may be equal in quality. However, there is no castor oil of better quality. So if the guy with his AAA wants more money, forget it and get Baker AA.

Degummed means just what the term implies. The excess gums, fats, etc., have been removed from the oil leaving only the lubricating parts of the oil. Drug store castor oil that you buy for laxative purposes has not been degummed. A castor oil that has not been degummed will form excess varnish in an engine. So be sure when you buy castor oil that it is Baker AA and you won't have any problem. Incidentally, Baker AA comes in both Standard and Pharmaceutical. It does not matter which of these you use. The Pharmaceutical has had the growing of the castor beans controlled by the government as to insecticides, etc.

I did a write up on WD-40 a few columns back. I prefer 3-in-1 or similiar gun, sewing machine, etc., oil myself. WD-40 is okay in a new engine but if used in an older engine it will loosen the rust, carbon, etc. This muck then passes through the engine. Rust is iron oxide

which is used as a lapping agent --- loose in an egnine, it can wear out rings, etc.

Dear Mr. Lee

I am fairly new to R/C and run a K & B .40 in a Rev-olution. I had trouble with this engine and a guy told me I was not running enough nitro in it.

So what I would like is your opinion of what nitro content to run (I was running 15%). Is it true that the higher the nitro content the cooler the engine will run in respect to watching so as not to over-rev because of more power and rpm. For a K & B .40, is 15% too much or is it okay for the summer? Is 15% too much for a helicopter?

The K & B has a Perry carb on it and I have trouble with the setting changing (threads loose). I tried a stronger spring and pinching the threads but it changes and then I find it too touchy to reset in the helicopter. So I wonder if you have a suggestion for me of another carb brand or something.

Bruce Musser
New Holland, PA

There is nothing wrong with using 15% nitro in the K & B .40. 12%-15% is the recommended percentage for the engine. Increasing the nitro is **not** going to let the engine run cooler. More nitro means more power and power is **heat!** There seems to be a big misconception going around about this.

Most helicopter flying is done at mid-throttle. In an effort to gain more mid-range power, fellows are resorting to more nitro in the fuel. This works out okay as long as the engine is run rich. The theory is that high nitro fuel at the rich setting gives more power and less heat than lower nitro fuel at a leaned-in setting. However, the first time some dirt gets in the carburetor or the guy sets it off too lean the engine gets cooked.

If you are having trouble with the needle changing on the Perry carburetor, it is due to vibration. This will not happen if the engine is properly mounted, your rotor balanced, etc. One source of vibration in helicopters is the cooling fan on the engine itself. Be sure that this does not wobble or have any run-out. I have seen some with as much as 1/8" run-out that were literally shaking the aircraft apart. Finding the source of your vibration will cure the needle problem and possibly your other problems which you did not explain.

Dear Mr. Lee

I have a problem with my Super Tigre .46 in that it seems to take quite a bit of fuel. I can fly for about 8 minutes on an 8 oz. tank. The engine is new but is well broken in. A friend has a K & B .40 with a Perry carb and he can fly for 10 to 12 minutes on the same 8 oz. tank of fuel.

I've always had the idea that the K & B was a higher performance engine than the Tigre and so, therefore,

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Cox 8022	139.95	93.	2	no
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Futaba FP-2GS	169.95	77.	2	no
Futaba FP-2E	149.95	100.	2	no
Futaba FP-2E S18	134.95	91.	2	no
MRC 772	119.95	84.	2	no
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Futaba FP-2F	149.95	100.	2	no
Futaba FP-2F S18	134.95	91.	2	no
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Futaba FP-3S S18	144.95	97.	2	no
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Cox 8048	449.95	285.	4	yes
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Logictrol Nimbus	324.50	197.	4	yes
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MRC 775	379.95	251.	4	yes
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Logictrol LRB 1-5	325.50	207.	4	Rx only
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Cox 8068	479.95	305	4	yes
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Futaba FP-6FN S18	339.95	216.	4	yes
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R/C MODELER MAGAZINE'S
MODEL OF THE MONTH CONTEST

The Model of the Month Award Program is designed to encourage the sport and novice competition flier to submit details of his most recent kit or scratch-built model to RCM in order to encourage general model craftsmanship and the overall promotion of R/C flying.

Each month Dremel will award a 371 Variable Speed Moto-Tool as illustrated in the photograph. The second and third place winners each month will receive a one year subscription to R/C Modeler Magazine, or, if they are a subscriber, an extension of their current subscription. If you would like further information concerning the winning models, write to us giving us the winner's name and what month he won, and we will forward your letter on to the winner. For rules of Model of the Month Contest, see the July 1979 issue.

SEPTEMBER WINNERS

FIRST PLACE

Lyman L. DeCamp
Old Forge, New York

A 72" wingspan Grumman Widgeon scratch-built from Oscar Weingart plans features an electrically powered set of scale retracts designed by Mr. DeCamp. The Widgeon weighs 13 lbs., is powered by 2 inverted Enya 40's, is finished with glass cloth, resin, and Perfect Paint. The usual controls plus flaps and retracts are operated by a Logictrol Super Pro single stick radio.

SECOND PLACE

S Sgt. Garland Hamilton
Washington, D.C.

This F4U-1A Corsair was scratch-built from the Brian Taylor Plan Pac. It has a 61½" wingspan, weighs 9 lbs., and is powered by an HP .61 with a Semco Pitts muffler. The K & B finishing system of glass cloth, resin and Super Poxy was used. Sonic Systems actuators operate Robart 90° retracts and tailwheel. Museum quality details are incorporated throughout. A Kraft Signature Series radio using all 7 channels is used for control

THIRD PLACE

Garnet W. Hogg
Shelborne, Nova Scotia, Canada

Miss Grandin is a sport seaplane built from RCM Plan #732. With an 81¼" wingspan, weighing 8½ lbs., she is powered by a Fox Eagle. A Futaba 6 channel radio is used. Glascote and Aero Gloss dope was used for finishing. Mr. Hogg reports that it is a pleasure to fly.

---

should not fly as long on the same amount of fuel.

Now to my question. Will my Tigre fly longer if I equip it with a Perry?

Both of us use 10/6 props. My Tigre has plenty of power, idles well, and starts very easy, but I'd like to improve the fuel economy if possible.

Another friend of mine has a Super Tigre .46 that is about ten years old with the older style Tigre carb and he says that his engine takes a lot less fuel than mine. I wonder if the new breed on Tigre carbs are at fault?

I'll appreciate your comments. Thank you.

Yours truly,
Ralph P. Voogd
Parkersburg, Louisiana

Although the K & B .40 is a higher performance engine than the S.T. .46, it is also a smaller displacement engine so in regards to fuel consumption you are going to run about the same. Your S.T. .46 should be getting considerably more than 8 minutes with an 8 oz. tank. You should be getting closer to 12 minutes. Check and make sure your tank is actually filling all the way and that you do not have a fill or vent tube that is siphoning during flight. This is a very common cause of high fuel consumption. About the only other thing

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HALF THROTTLE. IT SIMPLY WOULD
DRAW FUEL AS THE CARBURATOR D
METER WAS TOO LARGE. I THEN INS
A SUPER PUMPER AND AUTO MIX A
PROBLEM WAS SOLVED. I PLAN ON
THE WEBRA 91 CARBURATOR ON MY
PATTERN AIRPLANE NEXT YEAR BE
THE WEBRA 91 CARBURATOR HAS A
MIXTURE CONTROL. AS THE WEBRA
URATOR IS UNPRESSURIZED YOU M
THE SUPER PUMPER / AUTO MIX
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JUST A NOTE TO LET YOU KNOW HO
SUPER PUMPER / AUTO MIX COMBIN
IS WORKING OUT. I HAVE INSTALLE
IN MY LAS VEGAS TOURNAMENT D
IONS AIRPLANE WHICH USES A 91 E
RESULTS ARE OUTSTANDING. IT WO
PERFECTLY AT ANY RPM AND IN AN
POSITION AND TRANSITIONS FROM
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that could cause high fuel consumption would be excessive fuel leakage out the front bearing. However, the fuel would have to be coming out in a heavy spray to effect fuel consumption to the amount you are experiencing. A sleeve that is too loose in the crankcase will also let fuel blow out the exhaust. Either of these being the case, there is no cure other than to send the engine to World Engines and have the crankcase, crankshaft, or both, replaced.

Changing to a Perry carburetor might help fuel consumption a little but would not add four minutes to your flight time. The problem is not in the carburetor but in the engine itself, or your fuel tank. Be sure that both the back cover and head are tight as either of these being loose will affect fuel consumption. However, the idle and starting would also be affected which are okay in your case. □

SUNDAY FLIER

from page 8

to all clubs!

It has been said before, but let me say it again. Here at RCM, we get many club newsletters, and we appreciate them very much. Without them we wouldn't have the same feeling of being "in touch" with you modelers. So keep them

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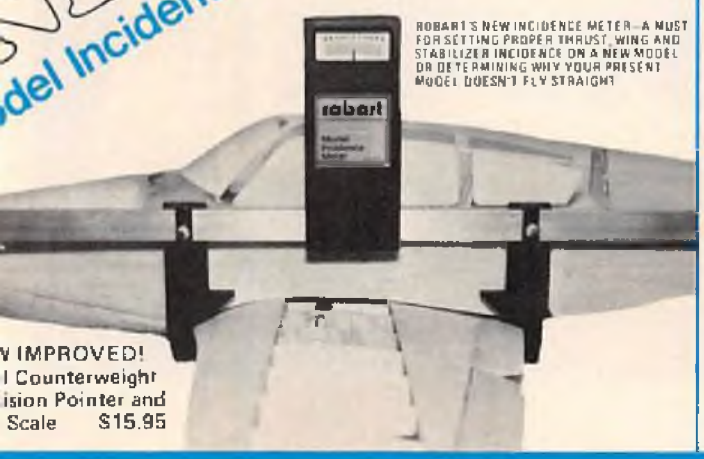

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The contest season is in full swing now, and some of the models that won prizes for static display at some of the shows like Toledo and MACS are now being called upon to show their flight capabilities. We've had a couple of scale events out here --- and I'm sure you're all having them in your areas. So the odds are that you're interested in seeing some pictures of the entries, even if you don't really care too much about who won what at Santa Clara, when you're competing at Beltsville, or Memphis, or Fort Lauderdale. Wish I could attend them all.

★

I am always a little awed by the intestional fortitude of some modelers who spend months and months building an exact scale model, then entrust it to an invisible radio wave to control it in flight. But then, it wasn't too long ago (say twenty five years) that modelers would do the same job of meticulous building only to let the model become airborne and depend on invisible aerodynamic forces which the modeler couldn't even control. For those of you who don't go that far back, the models were called "free flight." Sometimes spelled "freefright."

Anyway, I went to the Warbirds West Contest staged by the Hill Country Flyers, and there were some very fine models competing. Here are some that particularly attracted me, and you'll immediately see why.

Picture No. 1 shows Rodger Grotheer's FW 152C. Wait a minute, you say, isn't that an FW 190? Nope; I was fooled at first too, until Rodger explained. Rodger took a Dave Platt kit and modified it by lengthening the wings 3½" at the tips and the fuselage nose and tail lengthened by an inch. The full scale aircraft was used for high altitude fighter recon missions, which is the reason for the longer wing.

Picture No. 2 is Ralph Walker and his N2S3 Navy trainer, made from a Sterling kit. What intrigued me was that Ralph was flying it with a .61 for power, even though it weighed 14½ pounds. Some modelers would say it was underpowered; I prefer to say it has more nearly scale power than the ones that are powered by the big .80's or .91's, and as a result, its scale-like flight

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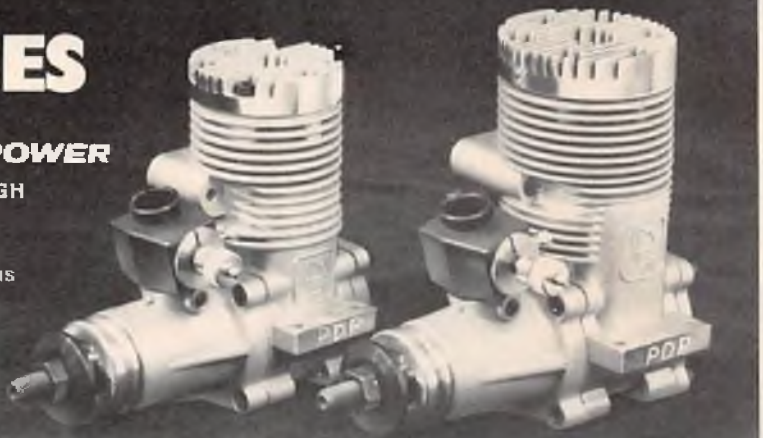

.40 PDP* Model 4200
.61 PDP* Model 6300

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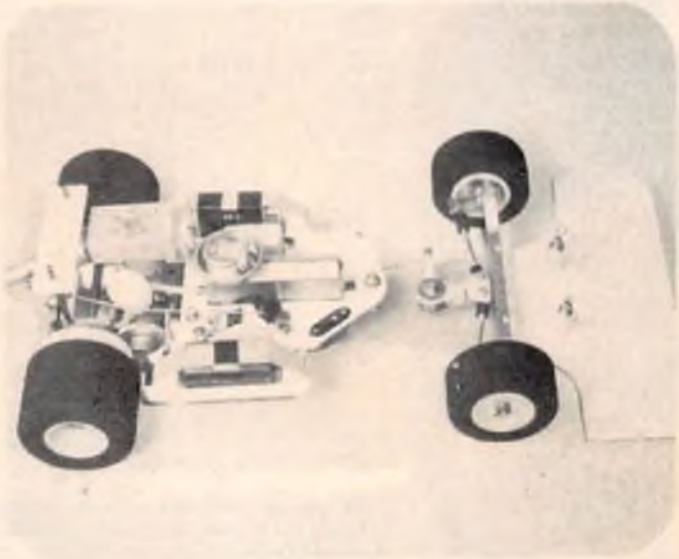

was very impressive. Take-off run and climbout was a bit lumbering --- just like the full scale job. And, just like the full scale job, to do a loop, there had to be a preliminary dive to build up speed to take it over the top. And that's what scale is all about, as I see it. Look scale --- and fly scale. Ralph's did.

This third photo is of one of the finest scale models I've ever seen. Here's a bit of background: Several years ago, Monty Groves and Floyd Carter teamed up to restore a Focke Wulf 44J. They rebuilt in the colors of the Swedish Air Force, which had purchased some of them and designated them as the SK-12. The popular name was the "Steiglitz" or "Goldfinch." It was powered with a Seimens-Halske 150 hp radial engine --- and Monty and Floyd rebuilt the original engine. The full scale airplane is hangared at Hill Country Air Museum; it has won several trophies at various fly-ins. Deservedly so.

Earl Thompson built the scale model of the FW 44J, using Monty and Floyd's airplane as his subject. He even used the dope from the same containers, so his colors were absolutely authentic. Photographs of the control panel were reduced to exact size, and the instruments precisly mounted. Cockpit doors are hinged identically, Pitot Tube exact scale --- I could go on for pages. But this says it all --- out of a possible 450 AMA scale points, the aircraft was awarded 444! And the minor discrepancies are such that they can easily be corrected.

In flight, the model is equally impressive. A little faster than scale speed, but not distractingly so. I predict it will be a serious competitor for the National Championship. Earl will have to polish up his flight technique just a bit, but I don't see how it can be surpassed for static points.

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District III	September 29-30, Orlando, FL, Wayne Potter C.D.
District IV	September 1-2, Celina, OH, Forest Yocum C.D.
District V	August 25-26, St. Louis, MO, Tom Walker C.D.
District VI	To be announced.
District VII	September 8-9, Las Vegas, NV, Don Weitz C.D.
District VIII	August 25-26, Auburn, WA, Charles Davenport C.D.

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A week following the War Birds West meet, the Pioneers R/C Club held their annual World War II Scramble. Bent wing Corsairs, Spitfires, Thunderbolts and all the usual models were there --- even a couple of Stafford B-24's. All very impressive, but the two that caught my eye were a couple of scratch built models that were certainly not "run of the mill" types.

Take a look at photo No. 4. It's Chuck Fuller's XP-81.

This unusual model is a "one-off from a one-off" scale job. The full scale aircraft, built by Consolidated Vultee, had a reciprocating engine in the nose and a jet engine in the tail. It originally was intended to have a propjet engine in the nose, but it was never delivered in time --- and by the time the airplane was test flown, the reason for it had disappeared, so only the one full scale airplane was built. Chuck got some of the documentation, and his model is the only one in existence. Here's another shot, showing the jet exhaust cone in the tail. Yes, it really is a model, and not a picture from the archives!

This next model really caught the crowd's fancy. It is a Westland Whirlwind night fighter of the Royal Air Force 263rd Squadron. Dick Enas, the builder, told me he took a year and a half to build it. It weighs ten pounds, has two K & B .40's for power, and like the other scale jobs, if you couldn't see the heads of the cylinders of the K & B's sticking up there, you'd swear you were at the RAF aerodrome and the Westland Whirlwind was on the line, getting ready for action.

So that's the way it is. We Sunday fliers love to take part, but we're greatly impressed by the dedicated scale modelers. Yet they really are Sunday fliers too. Just a bit more meticulous, and

certainly a lot more courageous than most of us.

However, I gotta wind this column up with this special shot of my own personal quarter scale model. Made it myself. Used Hot Stuff so I could finish it fast. Fast? You bet. I built this quarter scale Fleet biplane in less than an hour!

Eat your hearts out, you Mammoth Scale addicts. This is the only quarter scale model that can be built in twenty minutes! □

FROM THE SHOP

from page 2

Our thanks to Ben Fenton of the Portsmouth, Ohio R/C Club for the following:

Dear Don,

While at the "25th Toledo" our group discussed the pleasant and helpful attitude of the exhibitors, and this just couldn't have been easy when confronted with the "small" group that attended the show (what was the count?). During our R/C bull session after the show, it was a unanimous decision that the manufacturers associated with our R/C hobby are, in fact, so darn good about everything that the rest of the U.S. industries could learn a lot from the way this group conducts business. Not one of us went through 1978 without something nice to say about at least one manufacturer.

Two times in the past year I personally had occasion to request information and assistance and on both requests came the most knowledgeable and pleasant help you could ask for. Specifically, I would like to thank PICA Enterprises and Fox Manufacturing for the professional know-how they so generously extended me. It's appropriate to write a company thanking them for unusual assistance, but I thought that if I contacted R/C Modeler perhaps you could see fit to relay our feelings to the entire industry – from the fly-boys down on the banks of the Ohio.

Very truly yours,
Ben Fenton
R/C Ports
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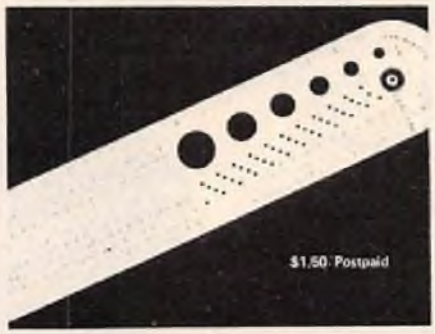

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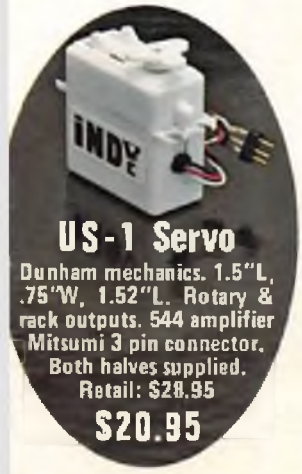

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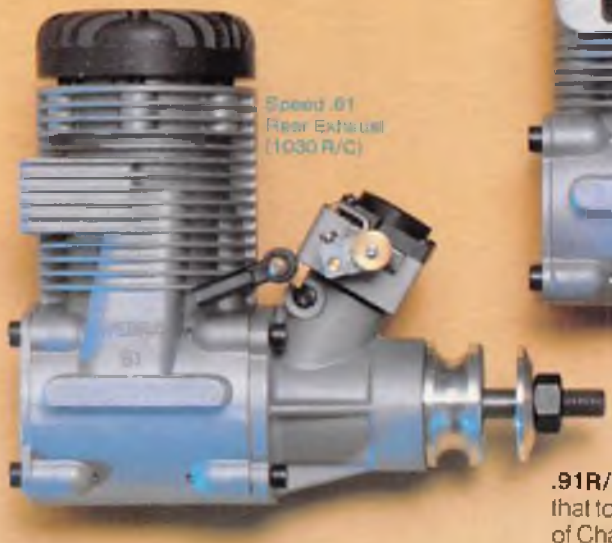

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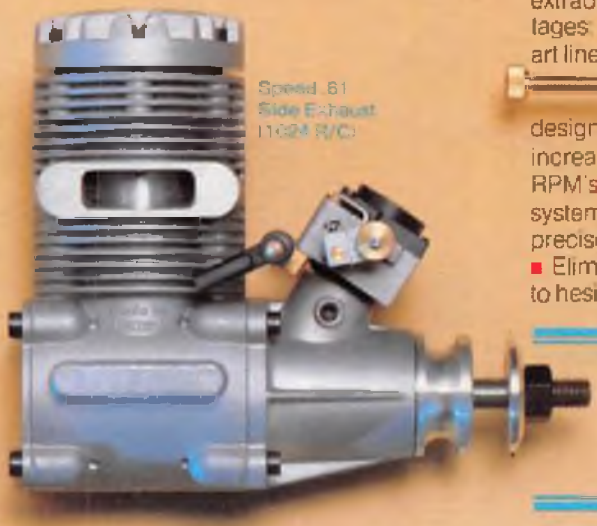

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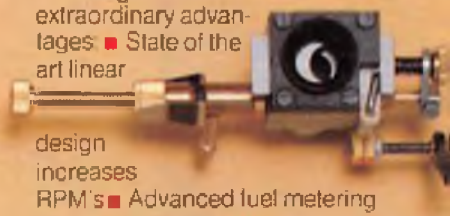

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