CO_2 F/F BIPE • "SWEET 'N LOW STIK"

(ISSN 0015-4849) 47506

MAY 1984 $1.75

FLYING MODELS

CARSTENS PUBLICATIONS

flying models

R/C PLANES BOATS • CARS

BIPLANES AT SPRINGFIELD

SCHOOLYARD SCALE SPARROWHAWK II

DUAL RATES EXPLAINED

PRATHER'S NEW TUNNEL HULLS

IRVINE 40 TEST

0 71896 47506 05

Whether you want to PUSH–

Or PULL– SAIL

Or FIGHT

Dumas has the model kit and the hardware to do it right!

Dumas offers virtually any RC or display scale model: Workboats; military vessels; power and sail pleasure yachts. Virtually every needed piece of running hardware…even complete electric power trains are available from Dumas. Plan your next vessel around our running gear and scale deck hardware.
Send $1.00 for your complete Dumas Catalog of kits and hardware.

dumas boats

The Model Boat People®

Dumas Products, Inc. 909-B E. 17th Street Tuscon, Arizona 85719

4 blade bronze props

Electric motors

6 volt, 5 amp, sealed lead/acid batteries

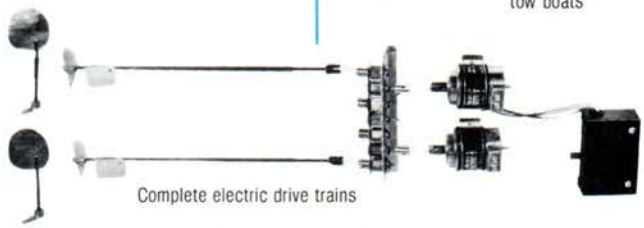
3 blade bronze props

Sail Control Units (2 sizes)

6 and 12v Speed Controls (fwd. and rev.)

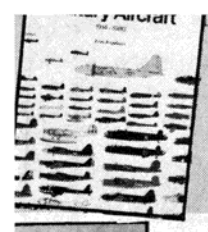
Kort Nozzles for tugs

Kort Nozzles for tow boats



Complete electric drive trains

Also Battery Chargers • Rudders, Shaft Couplings, Deck Fittings • Struts, Shafts, Stuffing Boxes



☐ **THE RAND McNALLY ENCYCLOPEDIA OF MILITARY AIRCRAFT 1914-1980,** Angelucci. This is the most complete and spectacular book of its kind. 546 pgs., 1,706 aircraft in color, 772 cutaways & 3-view drawings, 4 giant fold-outs, 15 color charts, 7 color diagrams, 2,791 B&W drawings & 1,904 color drawings, 252 photos. Describes each aircraft with extensive technical & performance data, insignia, markings, etc. Large 10¼x12¼ page size. Originally sold for $100.00 . . . . . **Now $29.95**

☐ **LOCKHEED U-2,** by Jay Miller. The U-2 "Dragon Lady" has been the subject of speculation every since Gary Powers was shot down over Russia, yet the airplane has remained a mystery. Now, with the cooperation of Lockheed and the Air Force, Miller has accurately and thoroughly detailed the history and technical aspects of this enigmatic airplane. Over 300 fascinating photographs and well-executed drawings. Softbound. **.$18.95**

☐ **LOCKHEED SR-71 (A-12/YF-12/D-21)** by Jay Miller. Billed as a Minigraph (MINiature monoGRAPH), this book is packed with excellent photos, drawings and text on all versions of the famous, yet mysterious, "Blackbird." Detail photos have been selected to convey the maximum information for the modeler and enthusiast alike. Covers A-12, 4F-12 and D-21 Drone. 71 photos, 16 pgs., 8½"x11", softcover. **$3.95**

☐ **Aircraft Of The National Air & Space Museum** . . .5.95
☐ **The Aircraft Treasures Of Silver Hill,** Boyne 22.95
☐ **Aeronca C-2,** Story of the flying bathtub 5.95
☐ **Bellanca C.F.:** Emergence of Cabin Monoplane . .9.95
☐ **Bleriot XI,** Crouch. Complete set working drwgs. 9.95
☐ **Ercoupe, Twin Tail Tiger,** Buffardi. 9.95
☐ **The Piper Cub Story,** 108 pgs., Service manual. .6.95
☐ **The Stinsons,** Underwood. 200 photos 9.95
☐ **Staggerwing,** Smith & Lempicke. 254 pgs. 27.95
☐ **Those Incomparable Bonanzas,** Ball 19.95
☐ **Tiger Moth Story,** Bramson & Birch 33.95
☐ **Travel Air,** Phillips. 203 photos, 3-views 21.95
☐ **Guide To Single Engine Mooneys,** Garrison 6.95
☐ **Waco Story,** Brandly. Waco history thru UPF-7's 22.95
☐ **Waco,** The Famous "F" Series, Brandly 12.95
☐ **Waco Airplanes,** Brandly, 83 types, & specs. . . .10.00
☐ **Waco, The Versatile Cabin Series,** was14.95**NOW 7.95**
☐ **Cessna Guidebook,** Early Cessna's 9.95
☐ **Ryan Guidebook,** 50 year history 9.95
☐ **Grumman Guidebook,** 84 types 9.95
☐ **Stearman Guidebook,** 160 photos 9.95
☐ **Reuben Fleet,** Consolidated aircraft 18.95
☐ **Howard Hughes & His Flying Boat,** Barton 19.95
☐ **Ency. World's Commercial & Private Aircraft** . . .16.95
☐ **Propeller Airliners,** Gunston 14.95
☐ **Airlines Of The United States Since 1914,** 35.00
☐ **The Dakota, The DC-3 Story,** Borge & Viasnoff .25.95
☐ **Legacy Of Leadership,** Pictorial history TWA . . .16.95
☐ **Continental: Its Motors & Its People,** Wagner . .19.95
☐ **Aircraft Piston Engines,** Smith 23.95
☐ **1927, Summer Of Eagles,** Atlantic attempts 12.95
☐ **The Barnstormers,** Don Dwiggins 5.95
☐ **Airmail.** Ill History 1793-1981, Holmes. . . .27.95
☐ **Lightplanes Since 1909,** Underwood 10.95
☐ **Flying The Old Planes,** Tallman 24.95
☐ **Fantastic Flying Machines,** Taylor 12.95
☐ **Closet Cases,** Mertens. "One of a kind A/C" . . .8.95
☐ **The Oshkosh Fly-In,** Downie. 223 pgs. 9.95
☐ **Curtiss, The Hammondsport Era,** Casey 7.95
☐ **Legacy Of Wings,** Pitcairn Story, F.K. Smith. . . .25.00
☐ **Baa Baa Black Sheep,** by Pappy Boyington 16.00
☐ **Doolittle:** A Biography, Thomas & Jablonski. . . .8.95
☐ **Larry:** Biography of Lawrence D. Bell, Norton . .29.95

☐ **Right Stuff,** Wolfe 3.95
☐ **Janes Aviation Review,** J.H. Taylor 15.95
☐ **Lady Be Good,** Mystery Bomber WW II. 13.95
☐ **Chickenhawk,** Mason. Helicopter warfare. . . .17.95
☐ **Thunderbolt,** Memoirs WW II P-47 pilot. 15.95
☐ **Destination: Tokyo,** Cohen. A pict. history. . . .9.95
☐ **We Were Wasps,** Wood 7.95
☐ **Big Friend, Little Brother,** Turner 8.95
☐ **Aircraft Of World War III,** Robinson 10.95
☐ **Navy Colors,** 1911-1945, Bell 8.95
☐ **Huey,** Drendel 6.95
☐ **Corsair:** F4U in WW II & Korea. Tillman. 17.95
☐ **Hellcat:** F6F in WW II, Tillman, 265 pgs. 17.95
☐ **Dauntless Dive Bomber of WW II,** Tillman 17.95
☐ **Wildcat In WW II,** Tillman 17.95
☐ **Dive Bomber,** Smith 15.95
☐ **Stunt Flying In The Movies,** Greenwood 21.95
☐ **Every Man A Tiger:** Mock Combat Light AC. . .14.95
☐ **Black Wings: Am. Black In Aviation,** 6.95
☐ **Ill. Ency. Of Aircraft Of World War II,** Mason . . .9.95
☐ **Ill. Ency. Of Military Aircraft Of The World,** 9.95

JANE'S ENCYCLOPEDIA OF AVIATION

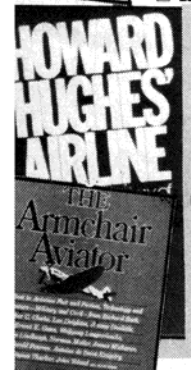
• Comprehensive 5-volume set. Over 3,000 photographs depict history-making aircraft. Fully indexed, easy to use. Invaluable reference source for researchers and enthusiasts alike. Chronology of every significant aerospace event. World directory of airlines. World directory of air forces. World records in aerospace. Was originally $135.00 —

Now Yours For Only $95.00

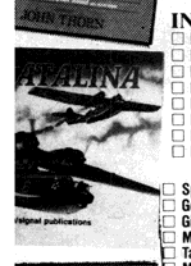
(Please add **$2.00 extra** for postage & handling for this large set.)

☐ **Air Guard,** Francilion. All units & aircraft 24.95
☐ **Dynamite Gang: 367th Fighter Gr. WW II.** Groth 19.95
☐ **Search & Rescue In Southeast Asia, 1961-75** . . .11.95
☐ **A-10 Thunderbolt II,** DeMaio 9.95
☐ **Spy Planes & Electronic Warfare Aircraft** 9.95
☐ **Dakota At War,** Pearcy 24.95
☐ **Testing Years,** Beamont. Me 109's to TSR2 . . .24.95
☐ **Delta Wings,** Mendenhall. Convair's of 50's . . .14.95
☐ **Republic F-105 Thunderchief,** Anderton 19.95
☐ **Doublas A-4 Skyhawk,** Kiduff 19.95
☐ **Aircraft Of The Soviet Union,** Gunston 45.00
☐ **Reno: Air Racing Unlimited,** Moll 11.95
☐ **Pilot Maker: The Incredible T-6,** 17.95
☐ **The X-Planes: X-1 To X-29,** Miller 29.95
☐ **B-24 Liberator At War,** Freeman. 16.95
☐ **B-25 Mitchell At War,** Scutts 18.95
☐ **Navy Air Colors,** 1911-1945, Bell 8.95
☐ **Sherman Fairchild's PT-19,** Puckett 25.00
☐ **Messerschmitt Me 262:** Arrow To The Future . . .11.95
☐ **Albatross D Va,** German Fighter WWI, Mikesh . . .8.95
☐ **P-80 Shooting Star,** Woolridge 6.95
☐ **Excalibur III,** Story Smithsonian P-51 . . . . . .5.95
☐ **Air Force Colors,** Vol. 1, 1926-1942, Bell 7.95
☐ **Air Force Colors,** Vol. 2, ETO & MTO '42-'45 . . .7.95
☐ **MiG Master:** Story F-8 Crusader, Tillman 17.95
☐ **Deadly Duo,** B-25 & B-26 in WWI 19.95
☐ **F-86 Sabre,** Allward 14.95
☐ **F-104 Starfighter,** Authur Reed 17.95
☐ **F-105 Thunderchief,** Jerry Scutts 17.95
☐ **B-52 Stratofortress,** Ethell & Christy 17.95
☐ **Darkly Dangerous,** Johnsen. P-61 Black Widow . 4.95
☐ **North American T-28 Trojan,** Ginter 8.95
☐ **The Mighty Eighth,** Freeman 19.95
☐ **Ninth Air Force in WW II,** Rust 16.95
☐ **Scrapbook Of Scale 3-Views,** Golden Age 8.95
☐ **Electric Flight,** Day 70 illus, 96 pgs. 9.95
☐ **The Best Of Wylam,** 175 pgs, scale plans 9.95
☐ **Scale Models,** Wylam, 29 detailed A/C plans . . .6.95
☐ **Giant Steps,** 144 pgs. of "How To Do" RC A/C . .12.95
☐ **Airbrushing And Spray Painting,** Peacock 13.95

☐ **Hap,** Coffey, "Hap" Arnold & Airforce 19.95
☐ **Miracle At Midway,** Prange 19.95
☐ **At Dawn We Slept,** Prange 22.95
☐ **Death March,** Survivors Of Bataan, Knox. 19.95
☐ **Airforce Combat Units Of World War II.** 21.95
☐ **Combat Squadrons Of The Airforce in WW II,** Maurer 29.95



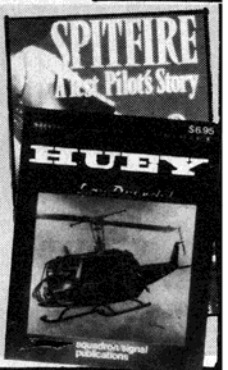
☐ **HOWARD HUGHES' AIRLINE: AN INFORMAL HISTORY OF TWA,** Robert Serling. The enigma that was Howard Hughes and the saga of the mighty airline he ruthlessly ruled for two decades are combined in this unique corporate history that reads like fiction. Movie stars and movie moguls, airline chieftains and airline people from pilots to skycaps — these are the colorful characters in this anecdote-filled book that pulls no punches. 35 photos, 320 pgs., 6"x9", hardcover. **.$16.95**



☐ **THE ARMCHAIR AVIATOR,** edited by John Thorn. A collection of 65 of the finest writings ever assembled on aviation. A panorama of flight in fact and fiction, technology and adventure — military and civil — from Lindbergh, Doolittle, Gann, Bach, and Tex Rankin on the intricacies of the outside loop. Anyone who has ever flown — or dreamed of it — will want this one-of-a-kind book. Drawings, 320 pgs., 7¼"x9", hardcover. **$19.95**

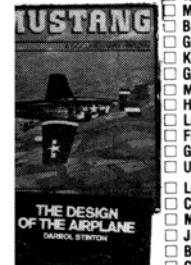
☐ **BEAMED DEFENSE,** by Fusion Energy Foundation. Describes in detail what these technologies are, how they work, how fast we can have them, and how they would change the strategic situation. Equally important, this book outlines how the development of beam technologies will bring us into cheap energy and applications of plasma technologies to industry, medicine, and science. Heavily illustrated, 176 pgs. **$7.95**

☐ **LOCKHEED C-121 CONSTELLATION** by Steve Ginter. With its gracefully curved fuselage and four powerful R-4360 engines the Connie had a special "look." This book follows both USAF and Navy usage of the Constellation through three decades. With detail drawings, lists of units, 230 B&W photos, a list of all operational models, and stories of flying the Connie, this is a "must" for historians and modelers. 77 pgs., 8½"x11", softcover. **$13.95**



☐ **SPITFIRE: A TEST PILOT'S STORY** by Jeffrey Quill. As the leading Vickers Supermarine test pilot, Quill flew nearly all the Spitfire variants, and he writes an authoritative and articulate account of the evolution of this superlative aircraft from the very first prototype to the last post-war Marks. Of the Griffon-engined MK22, he says, "a powerful, noisy, tough and aggressive lady, but a lady just the same." Fitting tribute, and well worth reading! 316 pgs., 5¾"x8¾", hardbound. **$21.95**

☐ **HUEY** by Lou Drendel. For the thousands of former Huey pilots, door gunners, crew chiefs and maintenance troops, this book will bring back the best of those days. No one but Lou Drendel could blend the narratives, the photos and the art to recall the rugged chopper that established the helicopter as more than a novelty in a jet age. With 12 color paintings, 36 color and 168 B&W photos. 64 pgs., 8½"x11", softbound. **$6.95**



IN DETAIL & SCALE $7.95 EACH

☐ B-17 Flying Fortress, (pt. 1)
☐ B-17 Flying Fortress, (pt. 2)
☐ B-29 Superfortress, (pt. 1)
☐ F-4 Phantom II, (pt. 1)
☐ F-4 Phantom II, (pt. 2)
☐ F-4 Phantom II, (pt. 3)
☐ F-5 E & F Tiger II
☐ F14 A & B Tomcat
☐ F-9F Cougar
☐ F-9F Panther
☐ F-16 Fighting Falcon
☐ F-18 Hornet, (pt. 1)
☐ F-105 Thunderchief
☐ F-106 Delta Dart
☐ F-111 Aardvark

JANE'S SERIES

☐ **Spitfire Story,** Alfred Price. 29.95
☐ **German Jet Genesis,** Masters 19.95
☐ **Giants in the Sky,** Taylor & Monday 17.95
☐ **Mighty Eighth War Diary,** Roger Freeman 29.95
☐ **Target Berlin,** Ethell & Price 19.95
☐ **Mustang, A Documentary History,** Ethell. 18.95
☐ **Boeing B-52, A Documentary History,** Boyne 19.95
☐ **German Air Force 1933-1945,** Cooper. 19.95
☐ **KC-200:** The True Story, P.W. Stahl 19.95
☐ **German Jets In Combat,** Ethell & Price 17.95
☐ **Mosquito,** Philip Britles. 19.95
☐ **Heinkel HE 111,** Heinz Nowarra 19.95
☐ **Luftwaffe Test Pilot,** Hans-Werner Lerche 19.95
☐ **Fokker, A/C Builders to the World,** Postma 19.95
☐ **German Night Fighter Force, 1917-45,** Aders. . . .19.95
☐ **U.S. Commercial Aircraft,** Munson 19.95
☐ **Lockheed Aircraft Since 1913,** Francillon 39.95
☐ **Curtiss Aircraft 1907-1947,** Bowers, 640 pgs. . . .40.00
☐ **McDonnell Douglas Aircraft—1920,** 721 pgs. 40.00
☐ **Japanese Aircraft Of The Pac. War,** 570 pgs. . . .31.95
☐ **British Fighter Since 1912,** 415 pgs. 21.95
☐ **German Aircraft of WWII,** 745 pgs. 32.95
☐ **Schneider Trophy Aircraft 1913-1931,** James . . .38.00
☐ **Canadian Aircraft Since 1909,** Molson & Taylor . .49.95
☐ **High Speed Flight,** Sweetman. 19.95
☐ **World Electronic Warfare Aircraft,** Streetly 19.95
☐ **Soviet Helicopters,** Everett-Heath 24.95
☐ **Aerodynamics For Naval Aviators, 416 pgs.** 14.95
☐ **Design Of The Airplane,** Stinton. Pract examp. .49.95

SQUADRON/SIGNAL IN ACTION $4.95 EACH

☐ P-38 Lightning
☐ P-39/P63
☐ Curtiss P-40
☐ P-51 Mustang
☐ F4U Corsair
☐ F6F Hellcat
☐ SB2C Helldiver
☐ A-20 Havac
☐ A-26 Invader
☐ B-24 Liberator
☐ B-25 Mitchell
☐ B-29 Superfortress
☐ PV-1 Ventura
☐ Spitfire
☐ Lancaster
☐ Messerschmitt Bf 109, Pt. 1
☐ Messerschmitt Bf 109, Pt. 2
☐ Focke Wulf FW 190
☐ A6M Zero
☐ Albatross Fighter WW I
☐ Gunslingers (Helicopters)
☐ B-17
☐ AD Skyraider
☐ Harrier
☐ SR-71 Blackbird
☐ B-36
☐ B-52 Stratofortress
☐ C-130 Hercules
☐ A-7 Corsair II
☐ A-10 Warthog
☐ F-5
☐ F-8 Crusader
☐ F9F Panther/Cougar
☐ F-14 Tomcat
☐ F-15 Eagle
☐ F-16 Falcon
☐ P80/T33/F94
☐ F-86 Sabre
☐ F-104 Starfighter
☐ F-105 Thunderchief
☐ F-106 Delta Dart
☐ F-111
☐ F-84 Thunderjet
☐ PBY Catalina

AIR FORCE STORY WWII by RUST

☐ Fifth 7.95
☐ Seventh 7.95
☐ Eighth 8.95
☐ Ninth 8.95
☐ Tenth 7.95
☐ Twelfth 7.95
☐ Thirteenth 7.95
☐ Fourteenth 7.95
☐ Fifteenth 7.95
☐ Twentieth 7.95

PILOT MANUALS

☐ P-38 Lighting 6.95
☐ P-39 Airacoba 6.95
☐ P-40 Warhawk 6.95
☐ P-47 Thunderbolt 6.95
☐ P-51 Mustang 9.95
☐ P-61 Black Widow 7.95
☐ P-63 King Cobra 7.95
☐ F-82 Twin Mustang 7.95
☐ B-17 Flying Fortress 8.95
☐ B-24 Liberator 10.95
☐ B-25 Mitchell 10.95
☐ B-26 Marauder 6.95
☐ F-4U Corsair 7.95
☐ F-6F Hellcat 7.95
☐ FM-2 Wildcat 10.95
☐ Texan AT-6 7.95
☐ Spitfire 3.95
☐ Hurricane 3.95
☐ Mosquito 3 95
☐ Messerschmitt Me262 7.95
☐ F-80 Shooting Star 7.95

TOLL FREE 800/225-5575

MN, AK, HI & CANADA USE 612/454-2493 (NOT TOLL FREE)
CHARGE VISA OR MASTERCARD, DEALER INQUIRIES INVITED.

HISTORIC AVIATION
3850-F CORONATION RD., EAGAN, MN 55122

14 Day Money-Back Guarantee **Please Print**

_____ Total for Books
2.50 Handling Fee
ENCLOSED IS: $_____ Total (U.S. Funds)

CHARGE: ☐ VISA ☐ MASTERCARD

Acct. # _____
Exp. Date _____ MC Bank # _____
Name _____
Address _____
City _____
State _____ Zip _____
Country _____

flying models

Harold H. Carstens
publisher

Robin W. Hunt
editor

Frank Fanelli
associate editor
Robert Aberle
technical editor
Ron Farkas
contributing editor R/C
Vic Macaluso
contributing editor R/C Boats
Robert O. Cosgrove
director of advertising
David Case
advertising production manager
Camille Cullen
editorial secretary
Judy Lovas
office manager and bookkeeper
Phyllis Carstens
assistant to the publisher

Circulation manager: Linda Headley
Circulation: Jeanne Sipley, Lisa Kwietniewski, Faith Betz
Advertising production: Mary Ann Lengle, Brian Taylor
Reader and plans service: Catherine Streeter
Dealer service: Judith E. Koester
Advertising billing: Joann McMickle
Bookkeeping and mail: Lisa Kwietniewski
Shipping: Stephen C. Graham
Plans department: Sandra Shoemaker

FLYING MODELS (ISSN 0115-4849) is published monthly by Carstens Publications, Inc., Fredon-Springdale Road, Fredon Township, P.O. Box 700, Newton, New Jersey 07860. Phone: 201/383-3355. Harold H. Carstens, President; Marie L. Merkle, Vice President; Phyllis M. Carstens, Secretary-Treasurer. Second-class postage paid at Newton, NJ 07860 and additional mailing offices.
POSTMASTER: Send address changes to FLYING MODELS, P.O. Box 700, Newton, New Jersey.
SUBSCRIPTIONS: U.S.A. and possessions: $16.00 per year, $30.00 for two years, $40.00 for three years. Single copies $1.75. Postage outside U.S.A. $3.00 extra per year. All communications regarding subscriptions and changes of address should be sent to: Circulation Manager, FLYING MODELS, P.O. Box 700, Newton, New Jersey 07860. Please allow six weeks for change of address.
CONTRIBUTIONS: Articles and photographs are welcome. Contributors are advised to keep a copy of their manuscripts and illustrations. When requested we will endeavor to return all material in good condition if accompanied by return postage. FLYING MODELS assumes no responsibility for unsolicited material. Payment is made upon publication. The contents of this magazine must not be reproduced without written permission from the publisher.
ADVERTISING: Main advertising offices: P.O. Box 700, Newton, New Jersey 07860. Phone: 201/383-3355.

On the cover

Don Srull is a master of scale illusion in model aircraft. Here his Supermarine Sparrowhawk II makes a fly-by. Photo: Tom Scmitt. Diane Macaluso poses with hubby, Vic's latest review subjects, Prather's new tunnel hull designs. Photo Vic Macaluso

May 1984 Vol. 87 No. 5/522

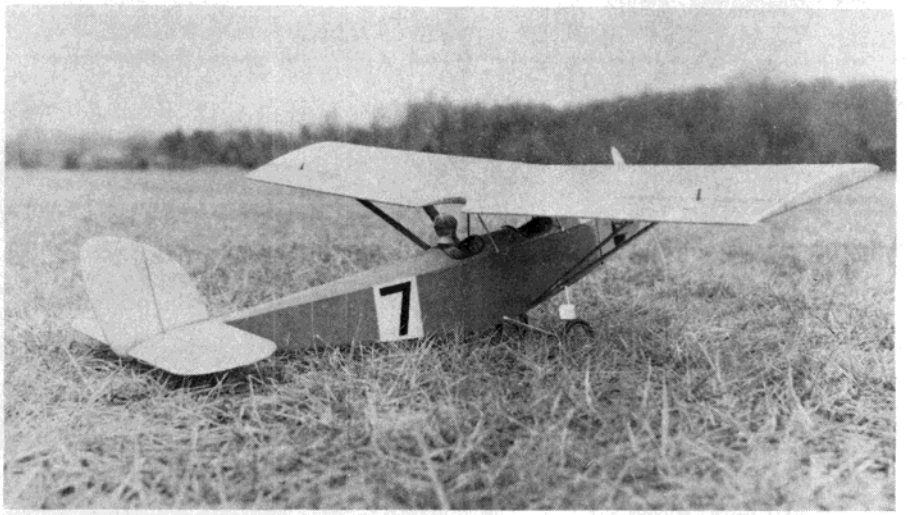
Aircraft features

R/C model boating

Departments

CARSTENS PUBLICATIONS®

editorial



Schoolyard Scale returns to FLYING MODELS' pages with Don Srull's design of the Supermarine *Sparrow II* for 1/2A and two or three channel control. Don's plane keeps a promise he made in the October '82 issue.

In the October 1982 issue of FLYING MODELS, Don Srull wrote a piece on 1/2A scale R/C planes which answered the most often asked questions about the diminutive replicas. The term "Schoolyard Scale" was used to describe the planes in this category; R/C models that could be flown easily from very small fields. Don's article included charts and graphs which gave the weights of the various "micro" R/C systems then available, suggested wing loadings, typical airframe structure weight per square foot of wing area and two charts that projected the design parameters of a not yet built Supermarine *Sparrowhawk II* for this class.

Don also promised to work up a set of plans and build the model for a future construction feature. Well, the future is upon us and Don has made good his word with another gorgeous example of his outstanding abilities. That's the *Sparrowhawk II* featured on our cover this month. Looks almost too real, doesn't it?

For those of you who may have missed Don's SYS article in '83, back issues are still available in good quantity. It is must reading for the serious small R/C scale enthusiast.

Charge account

Bob Aberle is continually reminding us of the importance of proper care and "feeding" of R/C batteries. He wrote an in-depth series of articles in 1981 on the many facets of this care. Among the suggestions which Bob offered in the series was the use of a modified 24 hour timer to safeguard against overcharging. These modifications were outlined then, but apparently not in sufficient detail, as Bob still receives much mail asking him for more specific instructions. Just knowing what it is you want to see is Bob's main motivation it seems, and so he's redone the piece on 24 hour timers in greater detail for this issue.

While on the subject, Bob's second piece this month is aimed at those of us who have purchased one of the newer breed of R/C systems featuring dual rates. Most new R/C pilots choose to ignore them as if they were something for only the more advanced flyers. Bob gives strong argument for their use by beginners and outlines why. Even the experts could pick up a hint or two here.

Among the missing

Regular FM readers make no bones about their favorite section of the magazine. Among the front runners in this respect are Rich's Uravitch's R/C Sport Scale column and Back to . . . Square One. Rich couldn't be with us this month, but promises to be back next month with a very neat method of putting rivet detailing on Chrome MonoKote® covered models.

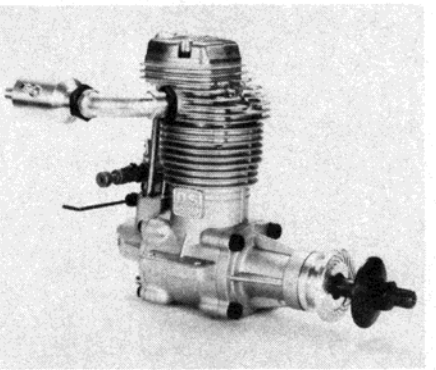
Back to . . . Square One *is* with us, in the form of a simple, all sheet balsa, CO_2 biplane design by Larry Kruse. The usual format of Back to . . . Square One is a how-to. Look at this month's offering as how-to have fun!

It seems as the idea for the *Prairie Duster,* as Larry calls it, started during the trip back from the 1983 Chicopee Nats. Larry just couldn't get off his mind the vision of all the biplanes he had seen during the week. Never one to fight the flow, Larry grouped several shots of F/F bipes together in a piece entitled *A Medley of bipes from Springfield.* This didn't soothe Larry's desire to have a new biplane of his own, however, and so this month's F/F construction feature was born. We've included both articles here for your enjoyment.

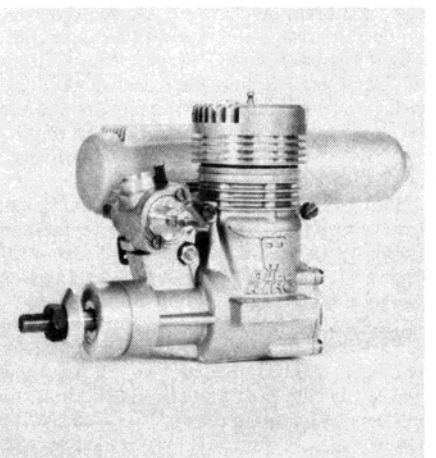
A real sport

The most exciting news of the month, for me, is that Dick Sarpolus begins a new R/C Sport column aimed at all subjects related to R/C fun flying. Expct Dick's column to deliver much useful technical information, as well as personal insights on the myriad ways in which to enjoy this great hobby. We've talked about Dick's exploits and qualifications many times in the past, and it is with great pride that we welcome him aboard each month.—BOB HUNT

flying report

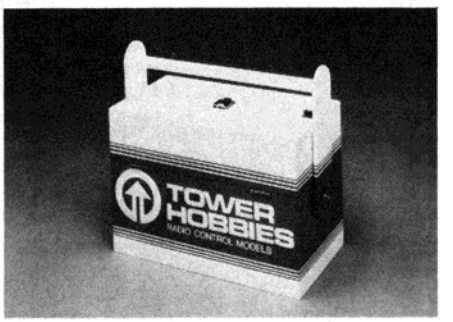


WORLD ENGINES, *8960 Rossash Ave., Cincinnati, OH 45236,* has added the OS FS-90 4-stroke engine to its line of imported model engines. The new FS-90 is quite compact for its size being only slightly larger than its 2-stroke .90 FSR counterpart. Specifications: displacement - 0.913 cubic inches; bore - 1.091 inches; stroke - 0.976 inch; weight - 22.7 ounces; and propeller - 13X6 to 14X6. As with the other OS 4-stroke engines, the FS-90 offers fuel economy with very low noise levels. For additional information, contact World Engines at their address above.



WORLD ENGINES, *8960 Rossash Ave., Cincinnati, OH 45236,* has announced the introduction of the SuperTigre Bull Ring 46, a much improved update of the G21/46 two cycle engine. Incorporation of modifications such as schnuerle porting, twin ball bearing crankshaft, bronze bushings at both ends of the con rod, and single ring aluminum piston in a steel cylinder liner help improve power output as well as reliability. Some additional features include a tapered cyclinder liner, a larger cyclinder head to improve cooling and the new, heavy duty Mag IV carburetor. Offered as an R/C engine, an optional venturi and C/L needle valve are available for use as a controline engine. For additional information contact World Engines at their address above.

TOWER HOBBIES, *PO Box 778, Champaign, IL 61820,* has introduced their new Deluxe Field Box. Big enough to hold transmitter, electric starter, power panel, fuel pump, motorcycle battery, tools, spare parts, and a gallon of fuel, the Deluxe Field Box closes completely to protect all these contents from the elements. Transport is easy since the box measures 16 × 10½ × 12½ inches; the box



also has special cushioned cradles to handle your aircraft. High quality, pre-cut plywood parts, all necessary hardware, and a photo-illustrated instruction manual come with the Field Box kit. For more information, contact Tower Hobbies at their address above or call, in the Continental US only, 800-637-6050.

TOP FLITE MODELS, *2635 South Wabash Ave., Chicago, IL 60616,* has introduced a new spray-on product, MonoKote® Cleaner/Polisher, which comes in an eight ounce bottle with spray pumper. This new product, besides being a cleaner and a polisher, is also anti-static and will repel dust and resist fingerprints. Application is simple. Sprayed on, it is then buffed to a high glaze with a

AMERICA'S hobby center, inc.

146 West 22nd Street
New York, N.Y. 10011

'superstock' BRAND NAME SAVINGS

Peerless SPEARFISH Kit

Length: 32"
Height: 9"
Beam: 9"

59.95 Sale

1/6 Scale kit. Complete with two electric motors, drive units, metal fittings, pre-finished ABS vacuum formed plastic hull, deck and cabin. Decals and battery cases..... R/C System NOT included....

POWER BOAT COMBO

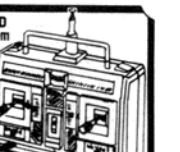
Boat Combo with 2 Ch. System & 2 Servos..... **184.95**

SALE

Dumas PT-109 BOAT Kit, Dumas H-8 Hardware, PLUS Pitman Electric Motor **86.95**

FAMOUS BRAND 4 Channel System

Dual stick with Four Servos Nicad battery pack and Charger



129.95

SALE 109.95

With Three Servos.

TOWLINE GLIDERS

Jetco Models THERMIC '36' 36" Wingspan

Kit G-7 **5.50**

Campbell Models Band saw Balsa parts rolled plans for .049 Eng.

HALF 'A' SPACER. **13.88**

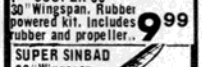
A-B SPACER 66" Span, for .19-.29 Eng. **28.95**

Campbell Models 1/2 A ZEEK 33" Wingspan for .049 Engine **13.88**

SOUPER 30 30" Wingspan. Rubber powered kit. Includes rubber and propeller.. **9.99**

SUPER SINBAD 62" Wingspan Sig Models Kit FF-2 **17.99**

Star Pro SUPER CONDOR 72" Wingspan Towline or .020 Power **2.95** PLANS ONLY



Sterling CIRRUS 87-5/16" Wingspan Kit E-7 **20.88**

Sterling DIAMANT 74" Wingspan Kit E-3 **13.95**

Sterling SCHWEIZER 2-32 42¼" Wingspan Kit A-27 **7.95**

HAND LAUNCH GLIDERS

THERMIC 'B' 20" Wingspan Jetco Models Kit SG-4 **3.69**

Jetco THERMIC 18 12" Wingspan Set of 2 Kit SG-2 **2.39**

6 Pc Screwdriver Set. Sizes #1 to #6..... **3.99**

5 Pc. Nut Driver Set. Sizes 5/64 to 5/32.. **3.99**

PEANUT SCALE MODELS

All 13" Span Kit PP-1 Miles M18

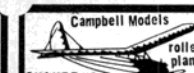
Peck Polymers	Price
PP1 Pietenpol	5.95
PP2 Miles M-18	5.95
PP3 Druine Turbelent	5.95
PP5 Piper J3 Cub	5.95
PP6 Andreason BA4-B	5.95
PP7 Nesmith Cougar	5.95
PP8 P-51 Mustang	5.95
PP9 Zero	5.95
PP11 Gipsy Moth	5.95
PP12 Canogobie	5.95

All 13" Span 2 in 1 Kits Monocoupe Sterling Per Set **5.95**

P1 SE-5 and Fokker D8	
P2 Citabria and Monocoupe	
P3 Waco & Interstate Cadet	
P4 Corsair and Zero	
P5 Stearman & Taylorcraft	
P6 Jenny & Spirit of St. Louis	

Campbell Models

rolled plans



QUAKER 54 54" Wingspan for .09-.15 Eng. **28.95** Band saw parts

U-Control COMBO

Top Flite Gieseke Nobler 50" Wingspan Fox .35 STUNT **53.95**

U-Control COMBO

Sterl. F-51 MUSTANG Profile Fuselage

SALE

Fox .35 STUNT Combo X7 **37.95**

U-Control COMBO

Jetco DOLPHIN 49" Wingspan Fox .35 STUNT **47.95** SALE

PICA Pressure Sensitive Decals

	Sm.	Lg.
RAF Spitfire	xxxx	5.15
USN T-28 B	xxxx	5.15
German WWII Fw.	xxxx	5.15
Civilian Waco	xxxx	5.15
Luftwaffe WWII	3.95	5.15
Luftwaffe WWI	3.95	5.15
US WWII Dk.Blue	3.95	5.15
US WWI Lt.Blue	3.95	5.15
RAF WWII Roy.Blue	3.95	xxxx
RAF WWI Lt.Blue	3.95	5.15
Civilian Waco 1/5 scale		6.95
NCAM 1-0.3" (Bk.)(Wh.)		3.25
NCAM 1-0.2" (Bk.)(Wh.)		2.65
NCAM 1-0.1" (Bk.)(Wh.)		1.90
Aircraft Stencils		3.95

BIG WHEELS (DuBro) Smooth Inflatable Type

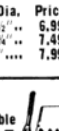
Dia.	Price	Dia.	Price
4"	6.95	5½"	12.95
4½"	8.95	6"	14.95
5"	10.95		

Robart Diamond Tread WHEELS

Dia.	Price	Dia.	Price
2½"	4.49	3½"	6.99
2¾"	4.99	3¾"	7.49
3"	5.49	4"	7.99
3¼"	5.99		

K&S TOOL SETS

421 TAP Set With Interchangeable Tips, Set Includes: Nos. 0-80, 1-72, 2-56, 3-48, & 4-40 Taps, Complete with Grip Collet Handle..... **10.95**



Other Available Sets:

422 Nutdrivers (5)	.25
423 Open end Wrenchs (5)	6.95
424 Phillips-Allen (5)	6.95
426 Screwdrivers (6)	6.95
431 4 in 1 Screwdriver	3.95

IGNITION ACCESSORIES

Hi-Tension Lead	.25
Spark Plug 3/8-24 (V)	10.00
Spark Coil	11.95
6' Stranded hookup wire	.35
Wood Coil Holder	.25

SID MORGAN PLANS

R/C Plans		Span	Price
100	Heath Parasol	90"	6.95
101	St.Voyager	101"	15.95
102	Gr.Widgeon	80"	12.95
103	Aeronca Ch.	66"	6.00
104	Fokker E111	68"	5.95
105	PBY Catalina	108"	16.95
106	Fiesler Storch	92"	16.95
107	Boeing F4B4	60"	13.95
108	Curt.Condor	82"	15.95
109	Grumman F8F	70"	15.95
110	N.Noorseman	84"	16.95
111	P.Skycycle	60"	12.95
112	Piper J3 Cub	108"	16.95
113	B25H Mitchell	71"	16.95
115	Waco UMF3	60"	13.95
116	Mitsu.Zero	63"	13.95
117	F6F3 Hellcat	64¼	16.95
118	Stagg.Beech.	64	18.95
119	Beagle Pup	72"	14.95
175	Rearwin Sky R.	108"	19.95
303	JU-87B Stuka	68"	14.95
304	Pitticairn Bipe	66"	13.95
126	Waco SRE Bipe	69½"	15.95
U-C Plans			
120	Gee Bee R1	27¼"	5.95
200	F.Albacore	25½"	3.50
201	Gr.G44 Widgeon	40"	5.00

EPOXY BRUSHES

1/4" or 3/8" Width 4 FOR **99¢**

1/2" Width 3 FOR **99¢**

RUBBER BANDS

No. 62 or No. 64 Bands 1/4 lb. Box SALE **1.49** Per Box

SILICONE FUEL LINE TUBING

3 Feet FOR Sale **1.25** 6 Feet FOR **2.25**

SAW and MITER BOX Combination

3.19 Sale

Angle guides, 45,60, & 90°

RAZOR PLANER

Converts the Safety Razor into a handy Planer..... **4.95**

NEEDLE FILE SET

Assorted Shapes Set of 12 **11.95**

5½" Long Set of 6 FILES **8.29** SALE

LIQUID Masking Film

5.95 16 oz.

Easily masks Letters, Insignias, Masks any finish or surface, Thin lines or curve. Leaves sharp clean lines...

FUEL PRIMING BOTTLE

With Self Sealing Spout. Ideal for priming your Engine....

Star Pro Prod. **69¢**

INSTRUMENT DECALS

98¢ Pkg. 7/16" Scale 3

Over 40 Assorted Popular Instruments.. Sale **2.49**

K&B GLOW PLUGS

R/C Long or R/C Short 3 FOR **4.79**

Standard Long or Short 3 FOR **3.49**

INSTANT GLUES (Cyanoacrylate)

Size	Zap	Z.Gap	Jet	S.Jet
½ oz.	2.49	2.49	2.49	2.49
1 oz.	3.75	3.75	3.75	3.75
2 oz.	7.49	7.49	7.49	7.49
Zip Kicker 2 oz.				3.98
X-Cel 3 oz.				3.95

Robart SUPER PUMPER

SALE

For .049 to .15 Engines **11.95**

For up to .80 Engines **11.95**

FLY with ELECTRIC motors

Flight Systems include the Battery.

ASTRO 05	44.95
ASTRO 075	47.95
ASTRO 10	74.95
ASTRO 15	98.95
ASTRO 25	129.95

Airplanes for Astro Motors..

Bushmaster (for A25)	34.95
Electra Fli (for A10)	19.29

EconoKote

The Covering with the Built In Finish, Fuel proof, Lightweight, Fade proof, and Puncture resistance.

25½" x 72" Rolls

Colors: Insignia Blue, Red, Yellow, Orange, Sky Blue & White.

YOUR CHOICE of Colors

Sale 3 ROLLS FOR **17.49**

TAP and DIES

Size	TAP	DIE	Dia. O.D.
00-90	3.35	5.25	13/16"
0-80	2.79	5.25	13/16"
1-72	2.25	5.25	13/16"
2-56	2.25	5.25	13/16"
3-48	2.25	5.25	13/16"
4-40	2.10	5.25	1"
5-40	2.10	5.25	1"
6-32	2.10	5.25	1"
8-32	2.10	5.25	1"
¼-28	2.10	5.25	1"
¼-32	9.95		

Tamiya R/C 4x4 TOYOTO HILUX Truck, with Four Amp Nicad battery and Charger **234.95** Less R/C

GAS WELDING TORCH Sale

A-JUSTO JIG.. Full House Wing and Fuselage Jig .... **SALE 54.95**

Build your Wing and Fuselage in less time. The unit rotates 360°, choose any position for assembly, planking, gluing or sanding.....

Microflame **28.95**

Deluxe TORCH kit No.4000 Contains Flametips, bench bracket, Brazing Rods, Flux, Spark lighter, 3 Butane, 6 Micronex & Welding Book..

3100 Brazing Rod Kit $7.25

Snap Starter

COX WILD WINGS 6230 BARON

6270 DELTA F-15 **16.49** EACH

Plastic Ready to-Fly Airplanes with Cox .049 Engine

6220 EAGLE 6290 Red Wing Racer

U-C Star Pro SUPER LOOPER Kit **3.49**

17½" Wingspan For .020 to .049 Engines

Ideal for sport or stunt

All sheet balsa construction

Pica Prod. GLUIT

4 oz. Gluit	1.69
8 oz. Gluit	2.69
12 oz. Gluit	3.50

Tamiya LAMBORGHINI COUNTACH Kit Comp.Special 1/12 Scale **79.95**

TOYOTA CELICA Kit Comp.Special RA1209 **79.95** 12 Scale

R/C Tank Kit 1/16 Scale

TANK Kit 1/16 Scale, with Electric Motor New

MRC Tamiya KING TIGER TANK For 2 to 5 Channels Sale **189.95**

Tank Kits DO NOT include Radio Control System .....

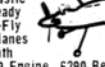
U.S.C.G. 40' UTILITY BOAT, Length: 35" For Electric Motor **47.88**

No.2329 running Hardware **40.88** Dumas

Taijet FA-200, 35" Wingspan For .15 to .25 Engine **11.95** SALE With Tank and Wheels..

U-Control kit

Schluter Helicopter Manual	18.95
Flying Ducted Fan Aircraft	6.95
RC Thermal Soaring	19.95
Higley There are no Secrets	9.95
Modelmakers Handbook	19.95
Power Boat Modeling	9.95
World of Model Planes	9.98
Scale Modelers Handbook.	8.98
Scale Models in Plastic	14.95
R C Buyers Guide	7.95
Peanut Power by Hannan..	5.95



Tamiya MRC FORD RANGER TRUCK Kit .. with Electric Motor For 2 Channel Systems R/C NOT included... **118.95**

ZEPPELINS

Built up Construction.. Tissue covered display model. PLANS ONLY. Star Pro

GRAF ZEPPELIN 30" Long **3.49**

U.S.NAVY ZEPPELIN 36" Long **3.95**

LOS ANGELES ZEPPELIN 24" Long **2.95**

Rubber Model ACCESSORIES

Japanese Tissue: 18" x 24" Colors: Red, Yellow, Orange, Blue, Green, & White. **1.49**

3 Sheets (same color)

Silkspan, Light ... 6 For 1.50

Silkspan Heavy ... 3 For 1.50

Plastic PROPELLERS

3½" or 4"	Each	.25
4¾" or 6"	Each	.30
7"		.45
7¾" or 8¼"	Each	.50

Rubber POWERED Models

Kit 208 DeHavilland

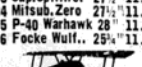
Guillow	Span	Price
201 T.Morse Scout	24"	8.50
202 British SE-5	24"	8.50
203 Nieuport II	24"	8.50
204 Fokker Tripe	20"	8.50
205 DeHavilland	27"	8.50
206 Rumpler C5	24"	8.50

Kit 303 Piper Cub

Guillow	Span	Price
301 Aeronca Champ	24"	6.50
302 Cessna 170	24"	6.50
303 P.Super Cub 95	24"	6.50
307 Piper Cherokee	20"	6.50
308 B.Musketeer	24"	6.50
309 Cessna	24"	6.50

Kit 401 Messerschmitt Bf-109

Guillow Models	Span	Price
401 Mess.Bf-109	24½"	11.00
402 N.A.Mustang	27½"	11.00
403 Sup.Spitfire	27½"	11.00
404 Mitsub.Zero	27½"	11.00
405 P-40 Warhawk	28"	11.00
406 Focke Wulf	25½"	11.00

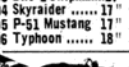


Kit 801 Sopwith Camel

Guillow Models	Span	Price
801 Sopwith Camel	28"	11.95
802 Cess.Skyhawk	36"	11.95
803 Stear.PT-17	28"	11.95

Kit 901 N.A.T-28D Texan

Guillow Models	Span	Price
901 T-28D Trojan	16"	2.75
902 Cess.Bird Dog	18"	2.75
903 Dhc-1 Chipmunk	17"	2.75
904 Skyraider	17"	2.75
905 P-51 Mustang	17"	2.75
906 Typhoon	18"	2.75



Kit 1001 Thunderbolt

Guillow Models	Span	Price
1001 Thunderbolt	30¼"	21.00
1002 Ju-87B Stuka	34¼"	21.00
1003 Dauntless	31¼"	21.00
1004 F4U-4 Corsair	30¼"	21.00
2001 P38 Lightning	40"	30.00

Micro-X Models 22" Wingspan for CO2 or Rubber Power

Taylorcraft..... Stinson Voyager PC-6 Porter..... **6.50** Each

Micro-X 13" Wingspan Outdoor Rubber Models

Piper Cub J-3..... Stinson 125..... Piper Vagabond.. **4.95** Each

Micro-X 13" Span Peanut Models

4.95 Each

Piper Vagabond Stinson 125..... Piper Cub .....

Parlor Mites 3 Kits **6.95**

Easy BEE Indoor Model **3.75**

Micro-X HORNET 18" Wingspan **6.95**

RUBBER POWERED Models

Flyline Models	Span	Price
1929 Monocoupe	22½"	11.25
Bellanca	34½"	16.49
Stearman C3B	36"	16.49
Curtiss Robin	41"	16.49
Gen.Aristocraft	36"	16.49

21" Wingspan

Sterling The 'Kid' Series Models. Die cut balsa models **6.44** EACH

K1 Aeronca.. K4 Cessna 170
K2 Son.Turtle K5 Taylorcraft
K3 Luscombe K6 Real Sporty

E-5 Citabria

Sterling	Span	Price
E1 Curtiss Jenny	32¼"	15.88
E2 Fokker Tripe	23½"	13.95
E4 P-40 Warhawk	27"	13.95
E5 Citabria	33½"	13.95
E6 P.Super Cr.	35½"	15.88
E8 Stin. Reliante	31½"	13.95
E9 Albatros D-11	27¼"	15.88
E10 P26 Peashooter	28"	15.88
E11 B-17 G	38"	21.99
E12 Ford Trimotor	34"	15.88
E13 Tiger Moth	33"	17.49
E14 P.Cherokee	37½"	20.88
E15 Black Widow	31½"	21.99
A1 Fokker D-7	24"	11.29
A2 Stearman Dust.	20"	10.29
A3 Beech Bonanza	22"	8.88
A4 Thunderbolt P47	22"	8.88
A5 Nieuport 17	24"	10.29
A6 Stuka D-Bomber	20"	8.88
A7 P.Super Cr.	18"	6.49
A8 Messerschmitt	17"	6.49
A9 Texan AT-6	18"	7.44
A10 Curt.Hawk P6E	17"	7.44
A11 Cessna 180	17"	6.49
A12 Bird Dog L-19	17"	6.49
A13 P-51 Mustang	24"	11.29
A14 F4U-5 Corsair	24"	11.95
A15 Zero	24"	11.29
A16 Fokker D-8	21"	7.99
A17 S.E.5A	22"	10.29
A18 Ansaldo	19"	7.44
A19 Spitfire Mk-1	24"	10.29
A20 Focke Wulfe	24"	10.29
A21 Spad XIII-C	24"	11.95
A22 Piper Cub J-3	30"	10.29
A23 Eindecker E-3	25"	8.88
A24 Gt.Lakes Spl.	24"	11.29
A25 Aeronca C-3	36"	10.29
A26 Sopwith Camel	24"	11.29

Kit D-1 Spirit of St.Louis

C.G.Models	Span	Price
D1 Spirit St.Louis	21"	4.95
D2 Shoestring	18"	4.95
D3 Ranger 21	21"	4.95
D4 Cessna 180	21"	4.95
D5 Ranger 28	28"	4.95

Bentom Models Foam Kits

SKYBOY 18" Wingspan with Bimatic Unit **8.95**

SKYKID 18" Span **11.25**

Foam Kits with Bimatic Units..

27½" Span SCHWEIZER **11.25**

FF20 Cabinair

Sig Models	Span	Price
FF20 Cabinair	22"	5.75
FF21 The 29'r	20½"	5.75
FF22 Sig Tiger	21½"	5.75
FF1 Sig Cub	20½"	3.95

RUBBER POWERED PLANS

Stinson L5 by H.Struck 33½" Wingspan..... **50¢**

NA P-51 Mustang by E. Stahl, 25" Wingspan.. **50¢**

RUBBER WINDER **4.95**

Phone (212) 675-8922 For C.O.D. Orders

AMERICA'S hobby center, inc.

146 West 22nd Street
New York, N.Y. 10011

'supersTock' BRAND NAME SAVINGS

Bud Nosen Kits
1/4 Scale 9' PIPER J-3 CUB 94.95
1/4 Scale 9' CHAMPION CITABRIA 74.95
1/4 Scale 9' Mr. MULLIGAN 104.95
1/4 Scale 102" P-51D MUSTANG 134.95

Futaba 6FG 6 Channel System Dual Stick with 4 S28 Servos, Nicad Battery pack and Charger **159.95**

Futaba 3 Channel System Dual Stick with 2 S22 Servos, Nicad Battery pack and Charger **94.95**

M.R.C. ACOMS 4 Channel System Dual Stick with 4 Servos, Nicad batteries and Charger **148.95**

ACOMS 2 Channel System, Dual Stick with 2 Servos, Dry Less batteries **71.95**

Futaba 2 Channel System Dual Stick with 2 S26 Servos, Less Batteries **64.95**

FAMOUS BRAND 2 Channel System, with Steering Wheel Transmitter, S27 Waterproof Servos, Dry Cell Battery Case, Switch, Servo Trays and Hardware. **SALE 84.95**

FAMOUS BRAND 2 Channel System. Dual Stick Transmitter with S27 Waterproof Servos, Dry Cell Battery Case, Switch, Servo Trays and Hardware. **SALE 84.95**

Airtronics XL6 6 Channel System with Four Servos, Dual Stick, Nicads and Charger..... **SALE 169.95**

G-SERIES

Futaba DUAL RATE FM SYSTEM With 4 Servos 7 CHANNEL **209.95** 6 CHANNEL **189.95**

Futaba 3 Channel System, Single Stick with Two Servos, Battery case and Switch. (Less Batteries) **74.95**

Cox/Sanwa 2 Channel System With Two Servos, Less Batteries.... **69.95**

Series 80 SUPER HELI-BOY Kit with Collective **249.95**

Airtronic SR 4R. 4 Channel R/C System with Servo Reversing, 3 Servos, Airborne Battery Pack, Dual Charger and Hardware. **SALE 109.95**

SUPER MINI BOY With Auto Rotation Collective Pitch. For .25 to .40 Engine **219.95**

American R C MANTIS For .40 Engine **Sale**

Write or Call for our Fantastic PRICES

PHONE (212) 675-8922

Schluter SX.81 For .60 Engine With Collective Pitch Plastic Body **339.95**

HB .21 R/C Grand Prix **84.95**

ABC Schneurle Ported

Airtronics SR 6DR 6 CHANNEL System with Dual Rates & 4 Servos, Nicad Battery Pack, Dual Charger and Hardware... **149.95**

HB .40 R/C with Muffler **51.95**

Futaba 5LK 5 CHANNEL R/C System. With Four S28 Servos, Nicad batteries and Dual Charger **139.95**

Futaba J-SERIES 8JH: 8 Channel System with 4-S121 Servos ... **289.95** New 1983 Sets

Complete with Nicad batteries & charger, plus trays and hardware.. On 72 mhz ONLY

5JH- 5 Channel Helicopter System with 4-S121 servos **319.95**

WRITE or CALL us for our LOW PRICES

GOLD SPECTRUM 6 6 Channel System. Dual Stick with 4 Servos. Nicad Battery and Charger. **SALE 349.95** Kraft Radio

FOX TWIN 1.20 R/C with Motor Mounts **Sale 179.95**

QUADRA Engine 32cc Spark Ignition **Sale 109.95**

Quadra Mount .. 19.95
Quadra Muffler 19.95

Technopower 3 CYLINDER Radial 4 Cycle Glo Engine **694.95** I.2 Cu.in.

O.S. MAX .25FSR with Muffler **48.95 Sale**

M.R.C. HOLIDAY Buggy, 1/10 Scale with Electric Motor Less R/C System **61.88** For 7 Channel Radio

RA 1029 1/10 Scale Tamiya 4 x 4 BLAZING BLAZER Kit. With assembled 3 Speed Transmission. Less R C System... **229.95**

Associated RC-12E 1/12 Scale Unique flex 4 chassis, shock dampened front & rear roll rates, trailing link controlled beam axle. Special SK dual compound front tires. Reedy indoor rewind, plus body. Less radio **89.95**

Associated 1/8 Scale RC-300 Kit For .19-.21 Engine **119.95** Less Body, Engine and R/C System...

FUTABA SERVOS

S15 Servo	27.95
S15M B.B. Hvy.Duty	27.95
S20 Servo	24.95
S20L Servo	24.95
S21 Servo	29.95
S22 Std.Hvy.Duty	14.95
S121 J-Series Servo.	29.95

Futaba S28 Servo **$18.95**

2 FOR **36.95**

Cannon SUPER MICRO SYSTEM Includes: Nicad Battery Pack and Charger

2 Channel with Two Servos.
3 Channel with Three Servos
4 Channel with Four Servos.

Sale Super Micro Servos **164.95** **209.95** **234.95**

Technopower 5 CYLINDER Radial 4 Cycle Glo Engine .96 Cu.In. **795.00**

7 CYLINDER Radial 4 Cycle Glo Engine 1.35 Cu.In. **995.00**

K&B VECO .19 R/C **Sale 31.95**

O.S. ENGINES With Muffler

OS .61 FSR With Muffler **124.95 SALE**

OS .10 FSR R/C	34.95
OS .15 R/C	36.99
OS .20 R/C	37.88
OS .25 R/C	31.95
OS .30 R/C	45.95
OS .35 R/C	45.95
OS .40 R/C	69.95
OS .40 FSR R/C	82.95
OS .45 FSR R/C	99.95
OS .50 FSR R/C	99.95
OS .61 FSR R/C	124.95
OS .90 FSR R/C	172.95

Associated Electric R/C-12E car kit. With 05 Electric motor and Body.. **79.95** 1/12 Scale Less R/C

Tamiya MRC 1/10 Scale The SAND SCORCHER **118.95** All Kits contain Electric motors.

WILLY'S WHEELER No.5835 1/10 Scale with Electric Motor **89.95** Less R/C System

The ROUGH RIDER 1/10 Scale Kit **112.95**

B2B RACING Sidecar 1/12 Scale Kit **34.95**

Tamiya LOTUS JPS 79 Competition Special.. 1/10 Scale, with Electric motor. Less R/C System **89.95**

ROSS .60 R/C TWIN with Exhaust stacks and Motor Mounts **SALE 289.95**

ENYA 120-4C 4 Cycle Engine with Small Muffler **199.95**

SUPER TIGRE ST2000 1.2 cu. in. with Radial Mount **134.95** Muffler for ST2000 $29.70

ENYA 90-4C 4 Cycle Engine with Small Muffler **189.95**

ENYA .25X R C Schneurle Less Muffler **Sale 44.95**

G-Mark Engines .12 TWIN (opposed) Less Glo Plugs **48.95 SALE**

G-Mark .06 R/C with Muffler ... **27.95**

FOX 'EAGLE III' .60 B.B. R C **58.95 Sale**

Kress Technology 'BOSS 602' DUCTED FAN For .60 to .80 Engine **74.95**

Midwest RK-049 Fan for .049 Engine **31.95**

Top Flite ANTARES 99¾" Wingspan Wing Area: 867 sq.in. Fully Sheeted Wing. Spruce Spars, Balsa & Plywood Fuselage. **74.95**

Sig KING KOBRA 58" Wingspan **59.95** For .60 Engine

MRP V-SPORT Electric Boat Ready-to-Run Speeds up to 20 M.P.H. Less Radio **98.95** With RADIO **194.95**

HYDRO SPORT Ready-to-Run with RADIO **219.95** Semi RTR Less Radio **119.95** MRP

M.R.C. SUBARU BRAT. 1/10 Scale with Electric Motor **59.95** For 2 Channel Radio

LEOPARD A-4 TANK kit 1/16 Scale With Electric Motor **149.95 SALE**

GEPARD TANK R/C kit. proportional speed control. Turret rotates 360 degree.. **184.95**

SUPER TIGRE .60 R/C with Muffler **59.95 SALE**

M.R.C. BATTERY PACK and CHARGER. Specify

For Tank.. 37.95 | For 5 Cell 30.95 | For 6 Cell 35.95

°° M.R.C. SERVOS °°

MR62 Standard Servo	22.49
MR32 180 degree retract	31.95
VR62 Fast Servo, standard.	22.49
VR100 Standard Servo	22.49
VR120 Water Proof Servo .	29.95

Futaba Receiver Nicad Batteries. Nicad 250 ma. 4.8 V. Nicad 500 ma. 4.8 V. **12.95** EACH

°° FUTABA SERVOS °°

S8	Heavy duty retracts...	33.95
S10	Sail Winch	67.50
S11	Linear action	28.95
S14	High torque	67.50
S15M	BB Hvy duty	27.95
S15MG	BB Hvy.duty retract	41.88
S15ML	BB Hvy.duty reverse	37.50
S16G	Mini retract	33.95
S20	Ultra Mini	24.95
S20L	Ultra Mini reverse	24.95
S22	Standard heavy duty	14.95
S26	Standard servo	19.95
S29	Hvy.duty waterproof	22.95
S29L	Hvy.duty reverse	22.95
S33	Micro servo	27.95

SALE

MRC 1/10 Scale All Foam Airplane DeHavilland Chipmunk With Enya .09 R/C For 3 Channel Radio **89.95**

All Foam Cox CENTURION Less R/C 36" Wingspan, with .049 Engine **68.88**

M.R.C. All Foam Trainer HAWK II 48" Wingspan .... with Enya .15 R/C Engine Less R/C **94.95**

CESSNA SKYHAWK All Foam 1/5 Scale M.R.C. 72" Wingspan with .35 RC Engine **179.95** Less RC System

BOOKS

Model Car Racing, Simposs...	5.95
R/C Model Car Racing.....	5.95
Radio Control for Model Cars	12.95
Model Sail & Power Boating.	7.95
R C For Model Yacht.....	6.69
New Glass Fibre Book.....	10.00
Basic Aeromodelling, Warring	14.29
Foam Wings.....	4.95
For What It's Worth	4.95
For What It's Worth II	5.50
For What It's Worth III....	9.95
For What It's Worth IV....	9.95
Basic of R C	6.50
Scale in Hand	4.95
R C Primer	14.29
Peanut Power, Hannan...	8.95
The R C Engine.....	4.95
The R C Engine II.....	7.95
The Model Engine.....	3.95
Know Your Model Aero Eng.	12.95
Harry's Handbook for Engs.	9.95
Crashless Advanced R C...	7.95
Radio Control Soaring.....	15.75
Radio Control Guide	15.75
World of Model Planes.....	9.98
Advanced Radio Control, Safford	7.95
Radio Control Manual, Safford...	7.95
Model Radio Control, Safford....	6.95
Radio Control Handbook.....	12.95
Model Aircraft Aerodynamics..	28.75
Theory & Practice of model R C	13.49
Build Your Own Working Robot	6.95
Sailplanes, Digest for Aeromod'l	18.70
Encyclopedia of Model A'craft.	10.95
B'lding & Flying Model Aircraft.	6.95
Build, Fly Model Aircraft.....	6.95
Everything you should know, R C	4.50
How to build & Fly RC Aircraft..	8.95
Radio Control Scale Aircraft.....	20.00
RC H'book of Gliders & Sailplane	4.95
Flying Model A'planes & H'copter	5.95
R C Helicopters, Drake.....	13.49
Bldg. Model A'planes from Scratch	5.95

ORDER NOW FROM AHC ...SEE NEXT PAGE

AMERICA'S hobby center, inc.

146 West 22nd Street
New York, N.Y. 10011

'superstock' BRAND NAME SAVINGS

New Dremel Model 730 DISC-BELT SANDER — Sale 89.95
11" Deep 15" High 10" Wide — 6" x 3" Table
Portable, combines a 1" x 30" Sanding belt with a 5" Sanding disc, 45° Tilt table with miter gauge. True running sanding belt. For Wood & Metal.
BELTS: Coarse, Medium, E.Fine, V.Fine, Fine & Polishing .... 4.75 each

Dumas BOAT MOTOR 6 Volt or 12 Volt Specify.. 28.88 EACH

Futaba SPEED CONTROL 10 Amp. 59.95 — 20 Amp. 69.95

WILLY'S WHEELER 1/10 Scale Kit With Electric Motor. 89.95

HB .12 R/C With Muffler — SUPER SALE 27.95

Tamiya MRC No.5839

OUTBOARD COMBO
Dumas DEEP VEE 20 Kit #20CF
Fiberglass hull and deck These are not joined to allow easy installation of your R/C gear.
149.95
K&B .21 (3.5 cc) OUTBOARD

SPEED BOAT COMBO
Dumas DEEP VEE 10 18" Long, Wood Kit, with H21 Hardware.
Includes: Boat, Motor & Hardware
Pre fab die cut Balsa and plywood parts.
38.95
With COX .049 R/C Engine

RADIO CONTROL COMBO Midwest
CESSNA CARDINAL..48" Span. Ideal beginners airplane, Hardware included.
MEDALLION .15 R/C — Sale 113.95
2 Channel System with two Servos. (Less batteries)

Emco UNIMAT 3 LATHE
Basic Unit contains Drive plate, Lathe dog, 2 Dead centers, AC/DC motor, Tool holder, Tightening pin and Open end wrench.
For Metal, Plastic and Wood.
239.95
ACCESSORIES available for Unimat & Taig lathes.

TAIG 15 Micro LATHE. Unit includes: 3 Jaw Chuck. 1 10 H.P. motor. Mounting board. 1/4" Drill chuck, 7 pc. tool bits.... 199.95

NEW — OS WANKEL Rotary .30 R/C With Muffler — 1983 Model 109.95

K&B/COX CONQUEST .15
No. 7900 R/C Sport 59.95
No. 7901 FF & UC 59.95
No. 7902 1/4 Midget 59.95

K&B .21 (3.5cc) Outboard 68.95 — Sale K&B .21 (3.5cc) Inboard 66.95

Atomic R/C SNOWMOBILE For 3.5 cc Engine For 2 Channel RC 134.95 Less R/C & Engine.

Enya .19 R/C Marine 43.95
Enya .15 R/C Marine 39.95
Enya .09 R/C Marine 34.95

K&B 7.5cc Outboard Motor — Sale 104.95

Dumas DEEP VEE 10 'Short Stuff' Fiberglass hull.. 18"
for .049 - .10 Eng.

Deep Vee 10	Mahogany 18"	13.25
Deep Vee 20	Plywood 24"	32.95
Deep Vee 40	Plywood 32"	50.95
Deep Vee 60	Plywood 38"	70.88
Deep V 10	Fiberglass 18"	22.88
Deep V 20	Fiberglass 24"	64.25
Deep V 40	Fiberglass 32"	79.88
Deep V 60	Fiberglass 38"	85.50
Comp D.V.20	F-glass 30"	82.50
Comp D.V.40	F-glass 40"	97.50
Comp D.V.60	F-glass 45"	101.25
Comp D.V.21	Wood ... 30"	46.88

R/C COMBO WHIZARD
40 3/4" Span
45.95 For all 3
SINGLE CHANNEL PULSE SYSTEM
Trans., Rec., & Actuator Less switch, battery box & batteries.....
Testors .049 Complete with tank, prop, starter & muffler
Single Channel Pulse System ONLY 19.95

Dremel VARIABLE SPEED Moto Tool No.3801 With over 40 asst. accessories. 60.99

DeLuxe MOTO SHOP Plus accessories and Flex. Shaft No.572 98.88

Paasche Model 'HAPK' Hobby & Auto Sprayer Set... 71.88

Dremel No.580 TABLE SAW
multi purpose table saw 12" Wide x 10" Deep.... Overall 13" wide, 8 3/4" H. 98.88

Pressure spray gun — Siphon gun

Miller SPRAYER SET No.2134 85.95
Set includes: Compressor, 12' air hose, Pressure and Siphon type Spray gun, plus Shading brush.....
Shading brush — Compressor

Midwest LAZY BIRD 78 1/4" Wingspan ARF 44.95
550 Sq.in. Wing Area
OLYMPIC II 99" span Cox/Airtronics 43.88

WILD WILLY Kit 1/10 Scale, With Electric Motor. MRC 89.95

	Span	
SQUARE SOAR	72"	21.88
SUPER QUESTOR	80"	34.95
RO-8	78.8"	35.88
CAMANO 100	98.5"	141.95
CAMANO 100F3B	98.5"	150.95
K.MINNOW	78.5"	139.95
Saratoga Windsong	134"	174.95

Royal Prod. TACHOMETER Speed ranges: 6,000 - 15,000 or 30,000 rpm 9 Volt operation. 38.88

Giant Propellers

Dia.	Pitch	Sale
Z-18	6-8-10	9.99
Z-20	6-8-10	11.45
T-16	4-6	5.89
T-18	6-8-10	6.49
T-20	6-8-10	7.49
Y-16	4-5-6	3.88
L-16	5-6	9.95
L-16	8	9.95

DRAG'N Fly 40 Dumas
Length 36" For .40 Eng. 54.75

Drag'n Fly 20 Mark II	28"	42.75
Drag'n Fly 40 Mark II	36"	54.75
Drag'n Fly 60	44"	68.95

QUICKIE 40 Length 30" Dumas 41.25

Quickie 40, 3.5-7.5cc	30"	41.25
Li'l Rascal , .10	22"	25.50

Enya
.15 R/C with Muffler 23.95
.19 R/C with Muffler 27.95

MEDALLION .15 R/C — Sale 14.95

MRC SUPER CHAMP Kit 1/10 Scale, With Electric Motor. 118.95

Leisure 109 DIGITAL CHARGER 74.95

Futaba S-10 SAIL WINCH SERVO 67.50

Futaba SPEED Control for Electric motor. 59.95

Dumas SPEED CONTROL Provides variable speed, forward and reverse with 'Off' in the center. Operated by a servo.... Will control one or two motors. For 6 Volt or 12 Volt.... Please Specify 28.88 SALE

Dumas Sail Control unit With Motor
Controlled by a radio servo. Powered by a separate battery. 51.25

R/C Kit P-51 MUSTANG
Top Flite- 60" Span .40-.60 . 79.95

R/C Kits F4U CORSAIR

Jemco-	50" Span	.29-.40 .	53.88
Royal-	64 1/4" Span	.60 Eng.	102.95
House of Balsa-	49" Span	.40	59.95
Top Flite-	61" Span	.60 Eng.	92.50
Sterling	36" Span	.10 Eng.	28.88
Jemco-	54" Span	.40-.60	63.88
Royal-	61 1/2" Span	.60-.80	113.00

CLIPPED Wing Cub 56" Span .19-.35 — 45.88

FOKKER Tri-Plane 47" Span .49-.60 — 79.95

Sig Piper J3- 71"	Span	.19-.35	45.88
Men Piper J3- 72"	Span	.25-.40	34.95
Sterl. Piper J3-54"	Span	.09-.35	29.95
Sure Flite J3-52"	Span	.15-.19	39.95
Nieuport	56"	.46-.61	79.95
Cherokee Babe..	53"	.29-.40	44.95
Corben Super Ace	56"	.35-.40	54.95
Sopwith Camel...	56"	.60	79.95

AMERICAN SCOUT Freighter For Electric motor Length 50" B-18M
Sterling B-18F Fitting set .. $2.8.50 — 57.95

U.S.S. MISSOURI Kit B-17M Length 55 1/2" 54.95
Mo. Fitting set ..$21.95

Dumas PT-109 For Electric motor 33" — 40.99

COX ENGINE SALE

	Standard	R/C
Tee Dee .020	23.95	xxxxx
Tee Dee .049	23.95	xxxxx
Tee Dee .051	23.95	xxxxx
Tee Dee .09	28.88	xxxxx
Pee Wee .020	13.95	14.95
Babe Bee .049	13.95	xxxxx
Black Widow .049	15.49	xxxxx
Dragon Fly .049	xxxxx	16.99
QRC .049	xxxxx	15.49
Medallion .15	19.95	14.95

Cox GLO HEADS

.020	2.65	.09 TD ...	4.00
.049	3.00	.09 Med. .	4.00
049 051 ..	3.55	.15 Med. .	4.00

MEMO TIMER
Can be set from zero to 60 minutes 11.95

SPEED Indicator VIBRA-TAC with carry case.. Speed ranges 2,000 to 21,000 rpm. 9.95

1/2A MINI Electric STARTER Especially suited to Eng. up to .051 18.95

The HAWK (formely Hobie Hawk) Plastic & Glass Fuse. Foam & Ply Wing & Stab, with Monocoat covering. 98" Span 159.95

Testors .049 with Muffler, Starter & Propeller 7.99

Tatone Metal ENGINE TEST Stand with 4 oz tank, fully adjustable. 10.88

HI-TORK ENGINE STARTER Sullivan Prod.
STANDARD for Airplanes 30.95
DeLUXE For Cars and Boats 33.95

Glo Bee Fire Plug BATTERY High Ampere with adj. setting. Battery and Charger 31.95

FOX GLO PLUGS R/C Short or Long 3 For 3.69
Standard Long or short. 3 FOR 2.69

R/C Glo PLUGS Famous Brand
Delmar Thermastatic idle bar plug.. 1.5 to 2V 10 FOR 6.95

Tatone GLO Plug Starter With hang on connector plus battery Charger 10.88

HEAT GUN 19.95
SEALING IRON 14.95 Sale ONLY

COMBO: Heat Gun and Sealing Iron. BOTH for 31.88

MONOKOTE 26" x 72"
Colors: Clear, Missile Red, Piper Yellow, International Orange, White, Aluminum, Sky Blue, Insignia Blue, Black, Chrome, Olive Drab, Maroon, Dove Gray, Cream. 10.50 EACH
Sale 3 ROLLS For 20.88

POWER PACER 49.95
Test & cycles batteries automatically.

Dae POWER PANEL 16.95
With meter Has take off for starter, pump and plug ..

DUAL EXPANDER 16.95
Scale.. Craftaire.

Heavy Duty Wetcell 12V. 5.5A's 6V. 4A 14.95 10.95
12 V. Charger 10.50
6 V. Charger 10.50

TELCO TURBO TANK, CO2 Motor 29.95
With Prop, Tank & Charging unit
TELCO CO2 Motor with prop, tank & charging unit 19.99

BROWN CO2 Single	29.95
BROWN CO2 Twin	51.95
BROWN CO2 A23 Peanut	39.95

Suitable CO2 Airplanes	Price
Peck Baby Ace	5.49
Sig Cabinair	4.95
Sig Monocoupe	5.95
Flyline Rearwin	11.25
Flyline Howard Dga	11.25
Flyline Monocoupe	11.25

Rhom RETRACTS
2 Gear system 64.95
3 Gear system 84.95

Robart Main Gear Retract	33.75
Robart Tri Gear Retract....	40.99
Robart Hvy Duty-1/4 Sc. "..	33.95
Robart Hvy Duty Tri Gear.	44.95
CG-1 Nose Gear Retract...	7.95
CG-2 Two Gear Retract.....	11.95
CG-3 Tri Gear Retract.....	18.95
Robart 90 Deg. Rot.-.40-.60	37.49
Robart 1/2A 2 Main Gears....	13.44
Robart 1/2A Tri Gear.....	19.99
Sonic System Nose Only....	14.95
Sonic System Main Gear Set	14.95

AERO BOOKS

FREE BONUS: Purchase any two books from this listing at $4.95 each and get Free Air Age Technical Library ($2.00 Value) 64 Page detailed analysis of 6 of the MOST Popular WW II planes

Volume	Price
1 Messerschmitt Me 109	3.95
2 Nakajima Ki-84	3.95
3 Curtiss P-40	3.95
4 Heinkel HE 162	3.95
5 Boeing P-12, F4B	3.95
6 Republic P-47	3.95
7 Kamikaze	3.95
8 Junkers Ju87 Stuka	3.95
9 Dornier Do-335 Pfeil	3.95
10 Supermarine Spitfire	3.95
11 Chance Vought F4U Cors.	3.95
12 Heinkel 100.112	3.95
13 Heinkel 177 Greif	3.95
14 Messerschmitt 262	3.95
15 No.American P-51 Mustang	3.95
16 Messerschmitt Bf 110	3.95
17 Messerschmitt 163	3.95
18 Focke-Wulf 190	3.95
19 Lockheed P-38 Lightning	3.95
20 Grumman F8F Bearcat	3.95
21 Grumman TBF TBM Ave.	3.95
22 Grumman TBF TBM Sup.	1.95
23 Douglas TBD-1 Devast.	3.95
24 Boeing B-52 Stratofortres	7.95
25 Grumman F-14 Tomcat	7.95
26 Gen. Dynamic F-16	7.95
27 Convair F-106 Delta Dart	7.95
28 McDonnell Doug. F-15 Eag	7.95
29 General Dynamic F-111	7.95
30 F-18 Hornet	7.95

CATALOGS

☐ Model Airplane-Boats-Cars-R/C	Catalog	1.50
☐ Model Railroad-HO & N-Gauge	Catalog	2.00
☐ Model Ships (Wood Hulls)	Catalog	1.50
☐ Model Cars (Radio Control)	Catalog	1.50
☐ Plastic display models	Catalog	.50
☐ Model Airplanes-Boats-Cars	Bulletin	.54
☐ Model Railroad-HO & N-Gauge.	Bulletin	.54
☐ 12 Issues of RR or Air Bulletin	Specify	2.49
☐ Complete Set of Catalogs		6.50

WRITE OR PHONE!
COD Charges 1 Charge $4.00 (plus Sales tax) Covers: Delivery, Insurance, Handling and COD FEE.

order form

America's HOBBY CENTER Inc.
146 West 22nd Street
New York, New York 10011

$$$ Prices $$$ Listed are Correct as of: February

Quant.	Price Ea.	Manufacturer, Name and Description of item (Model No. if known)	Total

1.50	176 Page Airplane Catalog	
98c	64 Page AHC Handbooks (List Numbers)	
85c	If Insurance is Desired	
	Add Sales Tax	
	HANDLING FEE (All Orders)	$2.00

*** All Prices are Subject to Increase Without Notice ***

WE PAY POSTAGE | OUR 53rd ANNIVERSARY

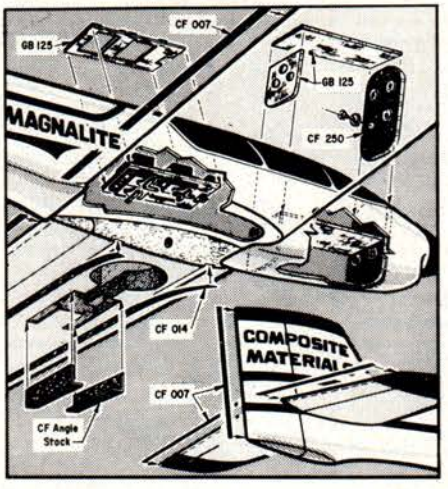
COD ORDERS ACCEPTED
Continental U.S.A.
WRITE or PHONE
PHONE (212) 675-8922
Established 1931
RUSH ORDER TO:

Visit our STORE for Unadvertised SPECIALS
TOTAL
HOW TO ORDER
U.S.A.: APO, FPO, We accept Cash, Checks, Money Orders, Foreign Currency, unused U.S. Stamps. Postage Paid on orders over $5.00 (exceptions noted). Every order MUST PAY $2.00 HANDLING FEE
OUTSIDE U.S.A. : Add 15% of total order for Postage. We will credit overpayments.
Special Packing-Handling fees: $2.00 Invoice-Documentation $2.00. Visit our Store.

 PRINT NAME and ADDRESS in MARGIN BELOW

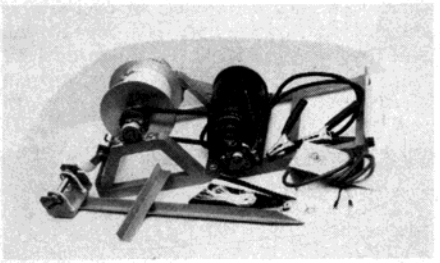
F-584

kitchen paper towel. Besides its primary use with MonoKote and EconoKote®, it can also be used to polish clear plastic canopies, painted cowls, or any plastic surface. For more information, as well as the latest Top Flite catalog with MonoKote color chart, send $1.00 to Top Flite, with your name and address, to their address above.

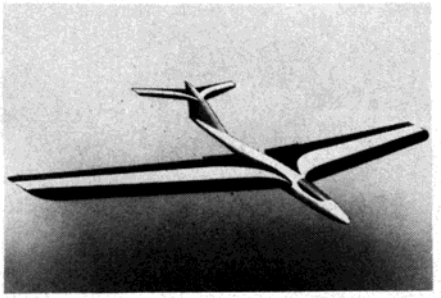


BOB VIOLETT MODELS, *1373 Citrus Rd., Winter Springs, FL 32708,* has recently started to distribute their newly developed product line of MAGNALITE Composite Materials. This product comprises varying laminates of carbon fiber in combination with epoxy glass and end grain balsa. The object of this product is to help the modeler reduce airframe weight by as much as 20% while increasing strength in certain high stress and damage prone areas. Since most pattern planes are of similar design and size, it was possible to put together a structural improvement kit that provides the correct MAGNALITE Composite Materials in the appropriate size to improve the strength to weight ratio and overall durability of your next pattern plane project. Fully illustrated instructions are included in the Structural Improvement kit to help the modeler properly apply the products. Price for the Structural Improvement kit is $32.50 direct from Bob Violett Models. An information brochure is available about the kit for $1.00. To order either, contact Bob Violett Models at the address above.

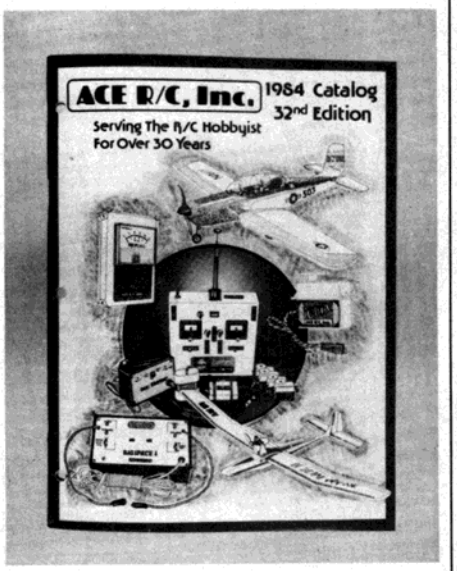
DAVEY SYSTEMS CORPORATION, *One Wood Lane, Malvern, PA 19355,* has introduced the Pow'rzoom, a heavy duty winch which has been designed for the serious sailplane flier who demands extraordinary launching power for F3B, scale, or cross country designs. The winch derives its high speed and powerful torque from a specially engineered and manufactured motor for this particular application. The frame is heavy duty, welded and painted steel frame with an adjustable motor mount plate to insure that proper drive tension on the belt drive is maintained. Different combinations of pulleys and drum shafts can be used to suit your needed requirements. Specific features of the Pow'rzoom include a solenoid protected foot power switch, an anti-backlash, anti-kiting brake which can be disengaged if not needed, and a ball bearing line swivel to prevent line twist-



ing and unnecessary wear. List price, direct from Davey Systems, is $350.00 plus shipping (battery not included). For additional information about the Pow'rzoom, contact Davey Systems at their address above or call 215-644-0692.

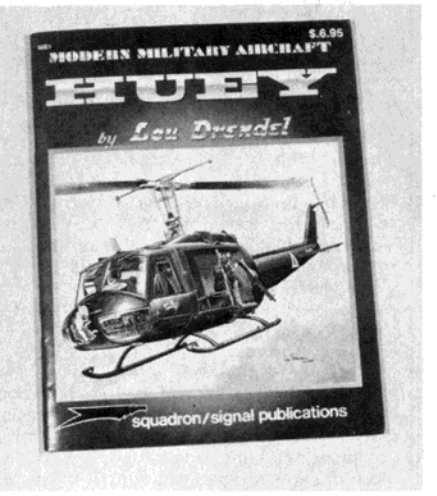


CRAFT-AIR, *20115 Nordhoff St., Chatsworth, CA 91311,* has introduced a new slope soarer to their line of gliders. The *Freedom X-cel* is a foam version of their *Freedom* slope soarer. The new *X-cel,* designed for advanced slope soaring pilots, is easy to build and is capable of all-out competition. For those who would like the *Freedom X-cel,* there is an introductory price of $99.95. For any additional information, or to place an order, contact Craft Air at their address above or call 818-998-3700.



ACE R/C INC., *Box 511, Higginsville, MO 64037,* has just released their 1984 catalog. Besides the hundreds of products which ACE manufactures, there are also numerous listings for the products of over 100 manufacturers for whom ACE distributes. The new catalog is well illustrated and has complete descriptions of all products. Two dollars is the cost for all United States and mili-

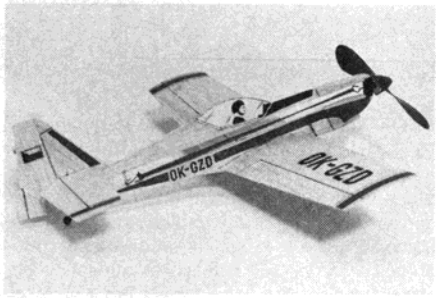
tary addresses; $3.00 for non-US addresses. Send to ACE at their address above for your copy.



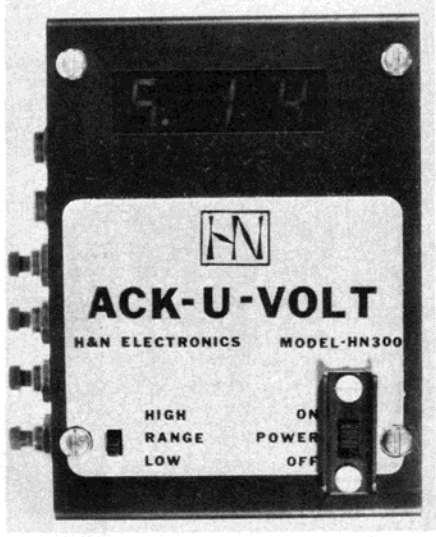
SQUADRON/SIGNAL PUBLICATIONS, *1115 Crowley Dr., Carrollton, TX 75006,* has recently published Lou Drendel's book, *Huey,* as part of their Modern Military Aircraft Series. The book is a history of the Bell UH-1 family of turbine helicopters which helped shape the future of modern helicopters. The UH-1, or *Huey* as it is more popularly called, was the helicopter which gained fame in the Vietnam conflict and continues to be a mainstay of the rotary wing arms of world-wide military forces. There are 63 pages of text, color illustrations (10), black and white photos (167), color photos (37), and three views which provide an overview of this distinguished aircraft. List price for this soft cover book is $6.95. For more information, contact Squadron at their address above.

KRAFT SYSTEMS, *450 West California Ave., Vista, CA 92083,* has just introduced the new KP4KB four channel radio system. This new set affords the modeler all the convenience of servo reversing and adjustable servo travel control. Along with the black and silver finish of the extruded aluminum transmitter case, other features include a carrying handle, neck strap, large power meter,

and precision Micro-Touch control sticks. Standard components of the system include your choice of three or four fast, high torque KPS-26KB servos, and the KPR7KB receiver. The new KP4KB transmitter is compatible for use with other Kraft K-line and deluxe radio systems. List price for the new system is $229.95. For additional information, contact Kraft Systems at their address above, or call, 619-724-7146.

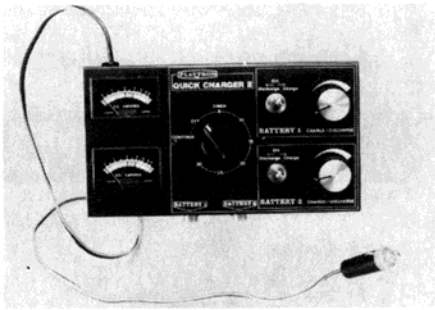


PECK-POLYMERS, *Box 2498, LaMesa, CA 92041,* has come out with a new series of easy to build, all balsa, profile models. This new series, the "Busy People Kits" come prefabricated and require only glue for final assembly. Kit parts include: die-cut balsa, formed wire parts, plans with construction photos, three views, plastic prop with bearing assembly, light weight wheels, rubber motor, sandpaper, weights, and a large set of decals. Wingspans are 15 to 16 inches and meet rules for F.A.C. No-Cal contests. The first four aircraft modeled in the series are the *Citabria Champion,* Stinson *Sentinel, L5* Cessna *Aerobat 150,* and the Zlin *50L.* Each kit is $6.95 and is available from your local hobby dealer. For more information contact Peck-Polymers with $1.50 for their latest catalog at their address above.

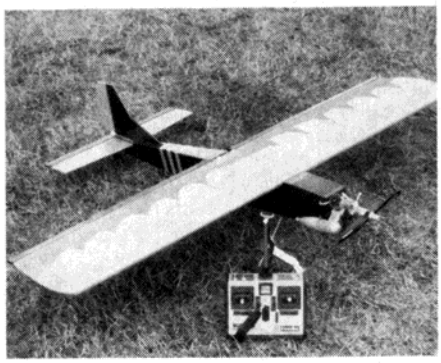


H&N ELECTRONICS, *10937 Rome Beauty Dr., California City, CA 93505,* has released their latest product, the Ack-U-Volt, a three digit, DC voltmeter kit. The LED display functions for a two scale read-out; 0-9.99 volts and 0-99.9 volts. The built-in load, for 4.8 or 9.6 volt batteries with 450 or 500 mAh capacity, is placed on the battery pack by pressing the respective switch. A special, red lens filter is used to cut down glare and make the unit easier to read in sunlight. A "Hold"

switch will maintain the display read-out even when the battery pack is removed. No special tools are required for assembly although calibration requires a 9.99 volt DC power supply (most local TV shops have one). The Ack-U-Volt kit, with construction/instruction booklet, is $62.50 plus $2.50 for postage and handling from H&N Electronics (California residents add 6% sales tax). For more information, contact H&N Electronics at their address above.

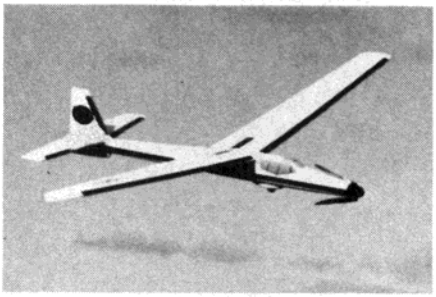


AIRBORNE R/C DISTRIBUTORS, *7929 Parston Dr., Forestville, MD 20747,* is now distributing the Playtron Quick Charger II, a fully adjustable dual circuit charger/discharger for all types of nickel-cadmium batteries from 100 to 1200 mAh. Transmitter, receiver, car, boat, or aircraft batteries can utilize this item. The black enamel case houses dual ammeters, charging guide, built-in 30 minute timer, cigarette lighter battery jack, and alligator clips for direct battery hook-up. Suggested retail price for the Quick Charger II is $49.95 and is available from your dealer.



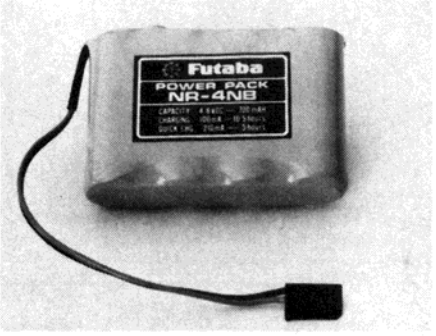
IKON N'WST, *PO Box 566, Auburn, WI 98071,* has introduced the second plane in its line of BEE kits. The *Honey Bee* is a .40 size plane with a wing area of 600 square inches supporting five pounds of flying weight. Designed to give inexpensive taildragger experience, the *Honey Bee* features all-wood construction at a list price of $45.00. For more information, IKON N'WST has a catalog available for $1.00. Contact them at their address above.

GREAT LAKES MODEL COMPANY, *PO Box 308, Tawas City, MI 48763,* has released its scale *AT-6, SNJ, Harvard,* an exact scale outline model in 1/8 size (1 1/2 inches = 1 foot). This new kit has molded urethane wing panels, ailerons, rudder, fin, stab, and elevator. The fuselage is a detail molded composite of hi-impact styrene and urethane foam. These materials have long proven their use in the construction of full size aircraft for years. Specifications: wing span - 63 inches; wing area - 585 square inches; weight - 8 1/2 to 9



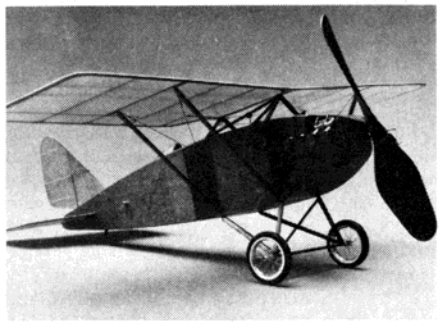
pounds; and engine - .50 to .60 (2-stroke) or .90 to 1.20 (4-stroke). The materials used in this kit, unlike expanded bead polystyrene foam, can be painted with most paints and glued with most glues; e.g., cyanoacrylates and epoxies work very well without additional surface preparation. The plane is fully aerobatic and additional scale operating functions such as flaps and retracts can be added. Factory direct price, from Great Lakes Model Co., is $228.00 plus $10.00 for shipping. For more information about the *AT-6, SNJ, Harvard* contact Great Lakes at the address above, or call 517-362-6078.

GOLIATH WHIRLWIND AIRCRAFT, *PO Box 589, Lathrup Village, MI 48076,* has introduced what is probably the world's largest rubber band powered aircraft, the *RB-1 King Condor.* This aircraft comes ready to fly. No construction is required. Specifications: wing span - 74 inches; length - 48.5 inches; power - 28 feet of lubricated rubber, and propeller - 16 inches (folding). Rudder and trim controls are adjustable and aircraft is capable of flying one mile. List price for the *RB-1 King Condor* is $29.95 plus shipping. For more information, contact Goliath Whirlwind Aircraft at their address above, or call 313-540-0231.



FUTABA CORPORATION OF AMERICA, *555 West Victoria St., Compton, CA 90220,* has recently released their new NR-4NB Power Pack designed to meet specific higher power requirements of scale and pattern.

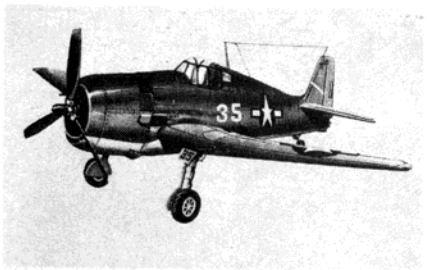
This shrink wrapped, four cell nickel-cadmium pack has a 700 mAh capacity. Specifications: output - 700 mAh/4.8 VDC; dimensions - 2 5/8 × 1 3/4 × 5/8 inches; weight - 4.6 ounces (128.6g); and charging time - 10.5 hours or (quick charge) 5 hours. For additional information, contact Futaba at their address above.



INDOOR MODEL SUPPLY, *Box C, Garberville, CA 95440,* has introduced their new kit, the 1921 *Waterman Racer* with a special introductory offer.: the *Waterman* kit ($6.95), *Peanut Power,* the classic book by Bill Hannan ($8.95), Indoor's 16 page illustrated catalog ($1.50) all for $15.00 postpaid. To place an order, contact Indoor Model Supply at their address above.

PEARSON POWER PRODUCTS, *RR 2 Box 64, Effingham, IL 62401,* is now importing the latest versions of the complete line of Magnum engines for aircraft use. Both the single cylinder .91S and the 1.82 V-TWIN are now available with factory installed transistorized ignition systems mounted and driven from the rear of the engine. Glow plug versions are still available. The three cylinder radial is still glow only but the ignition version will be released soon. The glow model of the V-TWIN weighs 3 1/4 lbs. and turns a 20 × 8 propeller at 6000 RPM. The three cylinder radial weighs 4 1/4 lbs. and turns a 20 × 10 prop at 6500 RPM. For prices and information, contact Pearson Power Products at the address above.

COVERITE, *420 Babylon Road, Horsham, PA 19044,* has announced the introduction of a new variation of their Micafilm line of products. Their new *Pre-primed Micafilm* comes with its own factory prime coat. The unique advantage of this covering is that you have the versatility of a paint finish without any of the filling, sanding, or base coat preparations. All that is required is that you iron it down, and then apply only one or two coats of paint. Compared to conventional paint finishes, a *Pre-primed Micafilm* finish is 1/3rd the weight and that includes glasscloth, da-



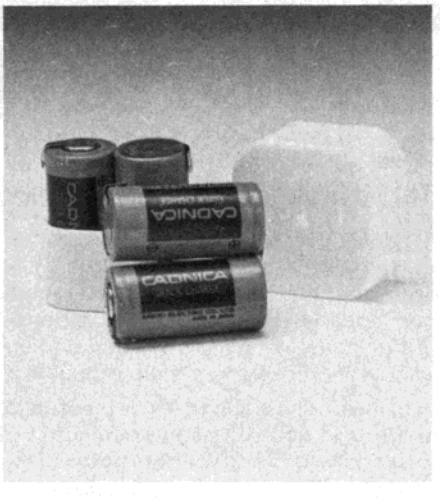
cron, nylon, silk, tissue, or silkspan. As is, without any finish paint, this new Micafilm is totally fuel and weather resistant and is half the weight of other iron-ons yet seven times the tear strength. It also has the same low heat requirement, less than 240° for attachment, and will not sag with age. The *Preprimed Micafilm* comes in two sizes: 29 x 65 inches and 29 inches x 16.4 feet. Check with your local dealer for availability or contact Coverite at their address above for additional information.

AIRBORNE R/C DISTRIBUTORS, *7929 Parston Drive, Forestville, MD 20747,* has recently released the Playtron Electric Fuel Pump which is designed to operate from a 6 volt battery or four AA alkaline batteries. It also features a unique magnet and hook attachment so that the pump can be fixed directly to a metal fuel can. Fuel tubing, filter, and fuel connector come with the pump which lists for $18.95. For any other information about it, contact Airborne R/C Distributors at their address above.

NOVAK ELECTRONICS, *2709-C Orange Ave., Santa Ana, CA 92707,* is now offering a new six channel receiver, the NER-6. It features an internal Futaba-compatible block connector and a plug-in crystal (provided). It weighs 1.27 ounces and is factory tuned to your specified frequency. The NER-6 has a double tuned front end, double balanced mixer, is voltage stabilized, and is compatible with all AM transmitters. List price is

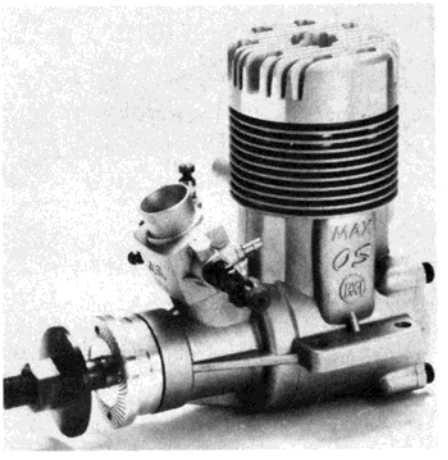
$69.95. For a free brochure, send a 4½ × 9½ SASE to Novak Electronics Dept. 50, at the address above.

SATELLITE CITY, *PO Box 836, Simi, CA 93062,* has added their new "Hot Tips" to their ¼ ounce bottles of Hot Stuff. You'll find them at your favorite hobby shop as Cat. #HS-2. Satellite City will help out with more information if you contact them at their address above.

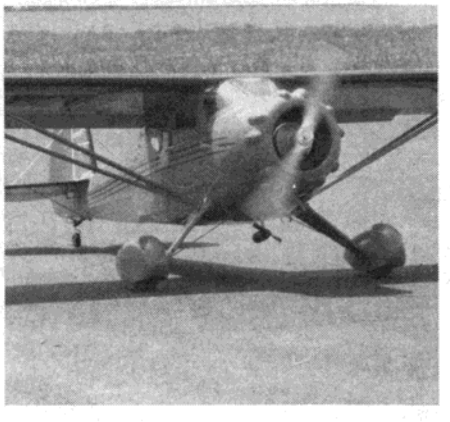


LEISURE ELECTRONICS, *11 Deerspring, Irvine, CA 92714,* now has available a 250 mAh, 1/2 AA size battery pack suitable for receiver applications in smaller aircraft. Catalog number is 1001G for the pack which comes unwired in an injection molded case. List price for case and four batteries is $16.95. Contact Leisure for further information at their address above or call (714) 552-4540.

WORLD ENGINES, *8960 Rossash Ave., Cincinnati, OH 45236,* has released the new OS 108 FSR/BX-1 two cycle engine. Dubbed the *Boxcar,* it's the largest two stroke engine produced by OS Max. Based on the OS 90 FSR, it uses a slightly enlarged crankcase (which all future 90 FSR's will also share) with full



schnuerle porting and the OS 7D carburetor. Specifications: displacement - 1.088 cubic inches (17.83cc); bore - 1.142 inches (29.0mm); stroke - 1.063 inches (27.0mm); RPM - 2,000 to 16,000; and weight - 26.5 ounces (750 grams). As an added safety measure, an oversize drive washer is used with four screw-in pins so that the prop can be firmly anchored with a four bolt arrangement. Prop sizes used range from a 16-6 to an 18-6. For more information about the new 108 FSR/BX-1 from OS, contact World Engines at their address above.



IKON N'WST, *PO Box 566, Auburn, WA 98071,* has released a newer, improved kit of their quarter scale *Monocoupe 90A.* Along with some production changes, the drawings have also been revised and a photo package, for documentation and detail, has also been included. For more information, contact IKON N'WST at their address above.

AIRBORNE R/C DISTRIBUTORS, *7929 Parston Dr., Forestville, MD 20747,* has introduced the Playtron Super Deluxe Power Panel. This new panel supplies the proper amount of current for the engine's glow plug, for the 12 V starter, and for a fuel pump when

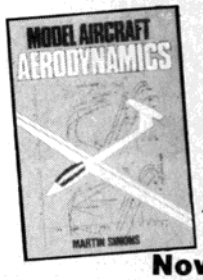
Airbrushing!

AIRBRUSHING & SPRAY PAINTING MANUAL

Ian Peacock. Excellent & comprehensive coverage of the topic; includes airbrushes, spray guns, materials, spraying techniques for scale models, customizing techniques & accessories. 174 pgs., 52 illustrations, 13 chapters, softbound.

21107B $13.95

Theory!



MODEL AIRCRAFT AERODYNAMICS

Theory of Flight Applied to Models, Tables of Optimum Airfoil Sections, The Scale Effect in Model Planes, Performance, Trim, Stability, etc. 266 pgs., 12 chapters, heavily illustrated.

16061A ..... ~~$22.95~~

Now Only $14.95!

Helicopters!

SCHULTER'S R/C HELICOPTER MANUAL

10 major chapters with 87 subtopics. Includes: Basics of Helicopter Technology, Rotor Blades & Their Dynamics, Flight Training, Performance Calculations, Construction Techniques, etc. 255 pgs., hundreds of photos & detailed drawings.

21005B $12.95

Technical Books

THEORY OF WING SECTIONS

Principles & data covering wing sections most commonly used in helicopter rotor blades, fans & wings. 687 pgs., 9 chapters, over 400 illustrations, softbound.

14015A $9.00

Comprehensive Guide to Airfoil Sections 14175B **$19.95**
Theory of Flight 14041C **$8.50**
Aerodynamics of the Airplane 14153E **$86.95**
Foundations of Aerodynamics 14079E **$47.95**
Aerodynamics 14073E **$39.95**
Flight Theory & Aerodynamics 14167E **$39.95**
Dynamics of Atmospheric Flight 14086E **$45.95**
Dynamics of Flight Stability & Control ... 14168E **$33.95**
Aerodynamics, Aeronautics & Flight Mechanics .. 14094E **$48.95**
Aerodynamics of the Helicopter ... 14158E **$35.00**
Dynamics of Helicopter Flight 14068E **$41.95**
Helicopter Design & Data Manual 14021B **$9.95**

MASTER MODELING

Higley. 16 chapters, 2 appendices, 85 pgs. & 314 photos covering scratch building & composite construction. Includes 3 methods of composite const., specialty modeling techniques, etc.

21129B $10.95

INTRODUCING MODEL AERO ENGINES

Billinton. Two-stroke engines, four-stroke engines, cars, boats, planes, tuned pipes, cooling, long-term reliability, modifications, multicylinder engines, mufflers, a glossary of terms & abbreviations, etc. 111 pgs., 85 illustrations, 6" x 8½", softbound.

21111B $9.95

GIANT STEPS: A BOOK OF GIANT R/C AIRCRAFT

Kits, plans, engines, props, landing gear, rigging, accessories, etc. — all you ever wanted to know about buying & building one of the new generation 1/4 scale planes. Includes special buyers guide section & detail coverage of commonly-built planes. 144 pgs., softbound.

21094B $12.95

THERE ARE NO SECRETS

Higley. Model finishing techniques from the masters. 314 photos, 16 chapters, Iron-On Coverings, Paint Problems, Color Paints, Sealers, Fillers, Primers, Brushes & Brushing, Fillets & Canopies, Paint Contents & Drying, etc. 83 pgs., softbound.

21053B $10.95

RADIO CONTROL THERMAL SOARING

Stringwell. Basics of R/C Systems & Flight Control, Design & Construction, Competition Flying, Launching Equip. & Techniques, Thermal Flying, Ballasting, etc. 340 pgs., glossary of terms, hundreds of photos, line drawings & schematics, 26 chapters, 6 appendices. Very comprehensive & detailed. Softbound.

21090B $14.95

BUILDING & FLYING RADIO CONTROLLED MODEL AIRCRAFT

Boddington. 25 chapters, 227 pgs., 210 illustrations. Topics ranging from basic aerodynamics to electric power & ducted fan models. Emphasis is on construction techniques & the details of proper installations. 6" x 8", softbound.

21108B $11.95

Squadron Signal "In Action" Collection

SR-71 BLACKBIRD IN ACTION

Drendel. 99 b&w photos, 44 line drawings, 21 full color airbrush works, 5 sideviews, 50 pgs., the first work ever on this famous "Skunk Works" aircraft. Includes A-12 & YF-12 predecessors. Softbound.

M0558A $4.95

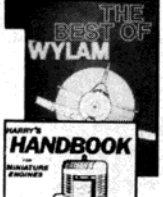
$4.95 Each

M0209A F-4U Corsair
M0215A F-14 Tomcat
M0229A F-86 Sabre
M0243A B-25 Mitchell
M0275A F6F Hellcat
M0318A Spitfire
M0373A P-51 Mustang
M0181A Fw190
MC011A Curtiss P-40
M0630A Thunderjet
M0194A F-104 Starfighter
M0178A F-15 Eagle
M0444A A-10 Warthog
M0350A Mess. Bf109, Part 1
M0575A Mess. Bf109, Part 2
M0179A P-38 Lightning
M0512A F-16 Fighting Falcon
M0583A A6M Zero
M0584A AD Skyraider
M0631A PBY Catalina

BUILD & FLY DUCTED-FAN R/C AIRCRAFT

Sarpolus. Ducted fan units, engines, model construction, flying techniques, guide to kits. 131 photos & drawings, accessories, etc.

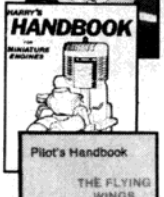
21054E $6.95



THE BEST OF WYLAM

Wylam. Containing some of the most detailed works we've ever seen, this book is comprised of 60 scale airplane drawings covering the most famous military & civil aircraft from W.W. I through W.W. II. Heavy use of details, model variations, color schemes & performance figures.

21095C $9.95



HANDBOOK FOR MINIATURE ENGINES

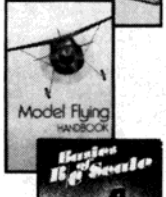
Higley. 230 photos, 17 chapters. Basic Theory, Throttles, Pressure Fuel Systems, Hop-Up, Break-In, etc. 90 pgs.

16087B $10.95

THE FLYING WINGS OF NORTHROP

By Leo Kohn. 81 vintage photos, 89 pgs., special section devoted to inception, development & demise of the concept — includes photos of development models, & pilot's handbook for the YB-49 jet-powered wing.

M0128B $7.95



MODEL FLYING HANDBOOK

Elementary Aerodynamics, Competition Flying, Trimming a Model Airplane, Radio Controlled Sailplanes, Flying Conditions, Free Flight, Control Line, Radio Control, etc. 159 pgs., 200 ill.

16083C $5.95

BASICS OF R/C SCALE

Potega. 80 pgs., over 175 photos. Aerodynamics Simplified, Documentation, Scale Finish, Paints, Selection of a Scale Subject, etc.

21056B $11.95

COMPLETE BOOK OF COCKPITS

Dwiggins. Hundreds of photos of cockpits & panels used in aircraft ranging from early biplanes & military aircraft to the latest Boeing 757 & 767 planes & the Space Shuttle. A gold-mine of hard-to-find information for the historian & modeler. 232 pgs., 329 photos — including 23 in full color; good coverage of modern military panels & recent innovations such as HUD's. Hdbd.

21088A $39.95

THE WORLD OF MODEL AIRPLANES

Winter. Devoted exclusively to the technicalities of building & flying model aircraft. Includes aerodynamics, power sources, construction & flight techniques. 11 chapters, 294 pgs., over 200 drawings & photos. Hardbound, 7" x 9".

21128D $22.95

Detail & Scale

F-14A TOMCAT

Kinzey. Major features include coverage of planes which shot down Libyan Su-22 fighters & a personal account from one of the Tomcat pilots. Coverage includes cockpit photos, AWG-9 radar, external fuel tanks & pylons, armament, 20MM cannon, etc. 1/72 scale, kit reviews & technical data.

21069B $7.95

F16 A & B ... M0481B **$7.95**
F-4 Phantom II, Part 1 ..... M0438B **$7.95**
F-4 Phantom II, Part 2 ..... 21067B **$7.95**
F-4 Phantom II, Part 3 ..... 21112B **$7.95**
F-105 Thunderchief . 21071B **$7.95**
F-18 Hornet .. 21068B **$7.95**
F-5 E & F Tiger II 21066B **$7.95**

RADIO CONTROLLED FAST ELECTRIC POWER BOATS

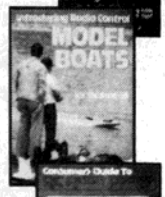
Wooley. Hulls, Motors, Batteries, Speed Controls, Charging Systems, etc. 112 pgs., softbound.

21061B $8.95

HOW TO BUY & FLY R/C AIRCRAFT

240 pgs., 14 chapters. Includes: R/C Flight Instruction, The Radio, Engine Theory & Components, Simple Aerobatics, Preflight. Hundreds of photos.

16088A $10.95



INTRODUCING RADIO CONTROL MODEL BOATS

Smeed. 8 chapters, 92 pgs., 93 photos. Coverage includes particular problems involved with RC equipment & boats as well as general construction & power topics. Includes racing & competition equipment. Softbound.

21110B $9.95

CONSUMERS GUIDE TO RC AIRCRAFT PRODUCTS

Over 2000 products. Includes kits, hardware, engines, manufacturers, publishers, addresses, prices, etc. Coverage includes aircraft, boats, cars, radio systems & accessories. 242 pgs., 8½" x 11", softbound.

21105B $4.95

THE MODELER'S HANDBOOK

Jackson/Day. Over 1500 photos & illustrations, complete guide to tricks & techniques of model making. Boats, planes, tanks, trains, etc. 352 pgs., hardbound.

21127D $21.95

INTRODUCING RADIO CONTROL MODEL AIRCRAFT

Burkinshaw. For the RC beginner & those transitioning into RC, this work provides basic coverage of engines, RC equipment, construction & flying of helicopters, gliders & traditional planes. 10 chapters, 94 pgs., 77 illus., softbd.

21106B $9.95

BUILDING & FLYING GIANT SCALE RC AIRCRAFT

Beckman. 1/4 size or larger models, basic aerodynamics, fittings & hardware, control systems, construction, flying techniques, etc. 275 photos, 88 pgs., softbound.

21130D $9.95

THE X-PLANES: X-1 TO X-29

Jay Miller. Forward by Chuck Yeager. Rare photos, unpublished information & highly classified aircraft — this book is a first-time ever look at the most dynamic, exotic, & dangerous series of flying machines ever flown. Includes every plane through the yet-unflown X-29. 317 photos, 49 drawings, 192 pgs., hardbound.

12378AE $29.95

ELECTRIC FLIGHT

Day. Emphasis on practical applications, motor types, batteries, controls, aircraft modifications, etc. Authored by an expert in electronics & British national champion C/L aerobatics & RC pylon racing.

21131B $10.95

R/C HELICOPTER MODELS

Drake. 149 pgs., 13 chapters, main rotor gear box ratios, rotor gimbals, swash photos, tail rotors, centrifugal clutches, etc. Heavily illustrated.

21009B $10.95

RADIO CONTROL MODEL HELICOPTER HANDBOOK

Lodge. An in-depth guide to R/C helicopter design, including performance parameters & scratch building techniques. Includes 186 pgs., 125 illustrations — 32 photos, 9 chapters, & 3 appendices. Excellent technical coverage of helicopter flight, theory & aerodynamics.

21124A $9.95

RADIO CONTROL HANDBOOK

Safford. Understanding, designing, building & using all kinds of R/C systems. 416 pgs., 20 chapters, 400+ photos & ill. Includes: Engine Speed Control, Tone-Operated R/C Systems, Batteries, & Power Supplies. R/C Test Equipment, Retract Landing Gear, Helicopters, etc.

21004A $12.95

24hr TOLL FREE 800·826·6600

10 DAY MONEY-BACK GUARANTEE • LIBRARY ORDERS & DEALER INQUIRIES INVITED

24 HOUR TOLL FREE PHONE SERVICE. Call your order in on our toll free number. DIAL 1-800-826-6600. WI, AK, HI & Canada use 715-294-3345 Monday-Friday 8 AM - 4 PM (not toll free). Items can be charged to Master Card, Visa or American Express. $2.95 handling fee, charged to all orders, covers cost of shipping 4th class bookpost or UPS only. We will ship best way. NO CODs.

Free Catalog!

T.M. ZENITH AVIATION BOOKS

P.O. Box 1/FM17
OSCEOLA, WISCONSIN 54020

Send item numbers: PLEASE PRINT

Please include $2.95 handling fee on all orders.
Enclosed is my check or money order for $ _____

CHARGE TO MY: ☐ MASTER CARD ☐ VISA ☐ AMERICAN EXPRESS

Acct. # _____ **Exp.** _____

Cardholder's Name _____

Name _____

Address _____

City _____ State _____ Zip _____

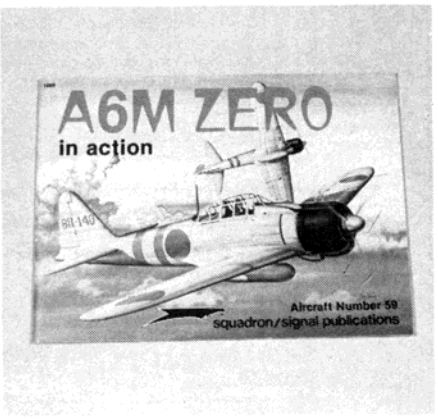
FM17

Visit our office & warehouse at: 729 Prospect Ave., Osceola, WI

Visit the **Zenith Aviation Shop** at 3524 Magnolia in Burbank, CA

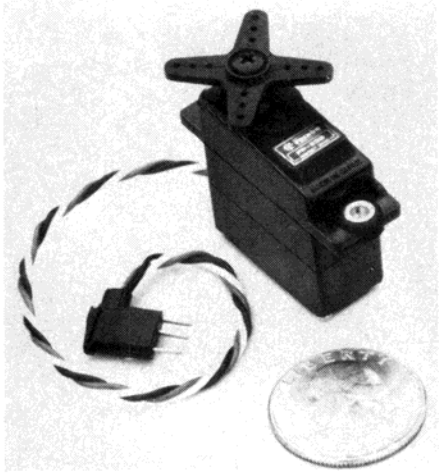
the panel is used in conjunction with a 12 volt battery. Transmitter and receiver battery packs can also be quick charged through the panel. Accessories include two alligator clips, six banana plugs, and four mounting screws. Suggested retail price is $29.95. For additional information, contact Airborne R/C Distributors at their address above.

FUTABA CORPORATION OF AMERICA, *555 West Victoria St., Compton, CA 90220,* has released a four channel radio system for sailplane applications. The T4L transmitter, which now features servo reversing, is coupled with Futaba's R4H micro receiver, the compact NR-4G nickel-cadmium power pack and the exceptionally small S-33 micro precision servos. A dual charger, switch harness, and frequency flag have also been included. For additional information about Futaba's new FP-4LS33 system, contact them at their address above.

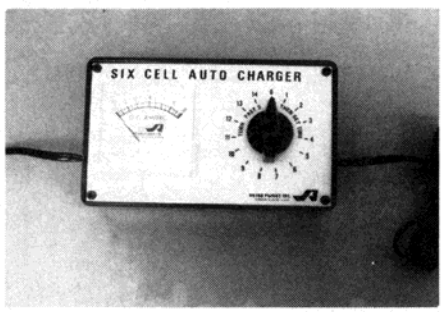


SQUADRON/SIGNAL PUBLICATIONS, *1115 Crowley Dr., Carrollton, TX 75006,* has published the *A6M Zero In Action,* #59 in their Action series on historic military aircraft. The renowned *Zero* was born as a "state of the art" fighter in 1938 and quickly became a dominating factor in the early part of the Pacific Theatre of World War II. This book, by Shigeru Nohara, documents the plane with 95 black and white photos (many unpublished), 13 full color paintings, 58 line drawings, and 50 pages. Price for this soft cover book is $4.95. For more information, contact Squadron/Signal at their address above.

THE PERSONAL TOUCH, *835 Glenside Avenue, Wyncote, PA 19095,* honors the pioneers of aviation with "The Spirit of Flight" pewter sculpture. The sculpture features a replica of the aviator's cap worn by Charles Lindbergh on his historical flight from New York to Paris in 1927. The limited edition work of art has been designed by Philadelphia artist Joseph McDermott. Each piece is 5½" tall, including a hand rubbed, natural walnut base. "The Spirit of Flight" comes with a certificate of authenticity. It is available now for $90, including postage and handling.



FUTABA CORPORATION OF AMERICA, *555 West Victoria St., Compton, CA 90220,* has released the new *S-33* micro servo. This new servo was designed for any application requiring small size and high performance. Specifications: dimensions - 1.10 × 0.51 × 1.14 inches; weight - 0.67 ounce; torque - 27.8 ounce-inch; and, transit time - 0.22 seconds/6^0. The new *S-33* is exceptionally suited for 1/2A aircraft, gliders, and 1:24 scale cars. For more information about this new servo or any of Futaba's products, contact Futaba at their address above.



ASTRO FLIGHT INC., *13311 Beach Avenue, Venice, CA 90291,* has just released its new economy six-cell charger. The six cell charger is designed to charge all six and seven cell nicad battery packs, 1200 mah units, as used in 1/12 scale cars, off-road cars, electric planes and boats. This charger incorporates a fifteen minute timer to automatically terminate fast charge and switch to the trickle charge mode, a quality ammeter and built-in equalizer circuit. The charger, part number 4005C, is priced at $24.95. For more information, write to the above address.

air mail

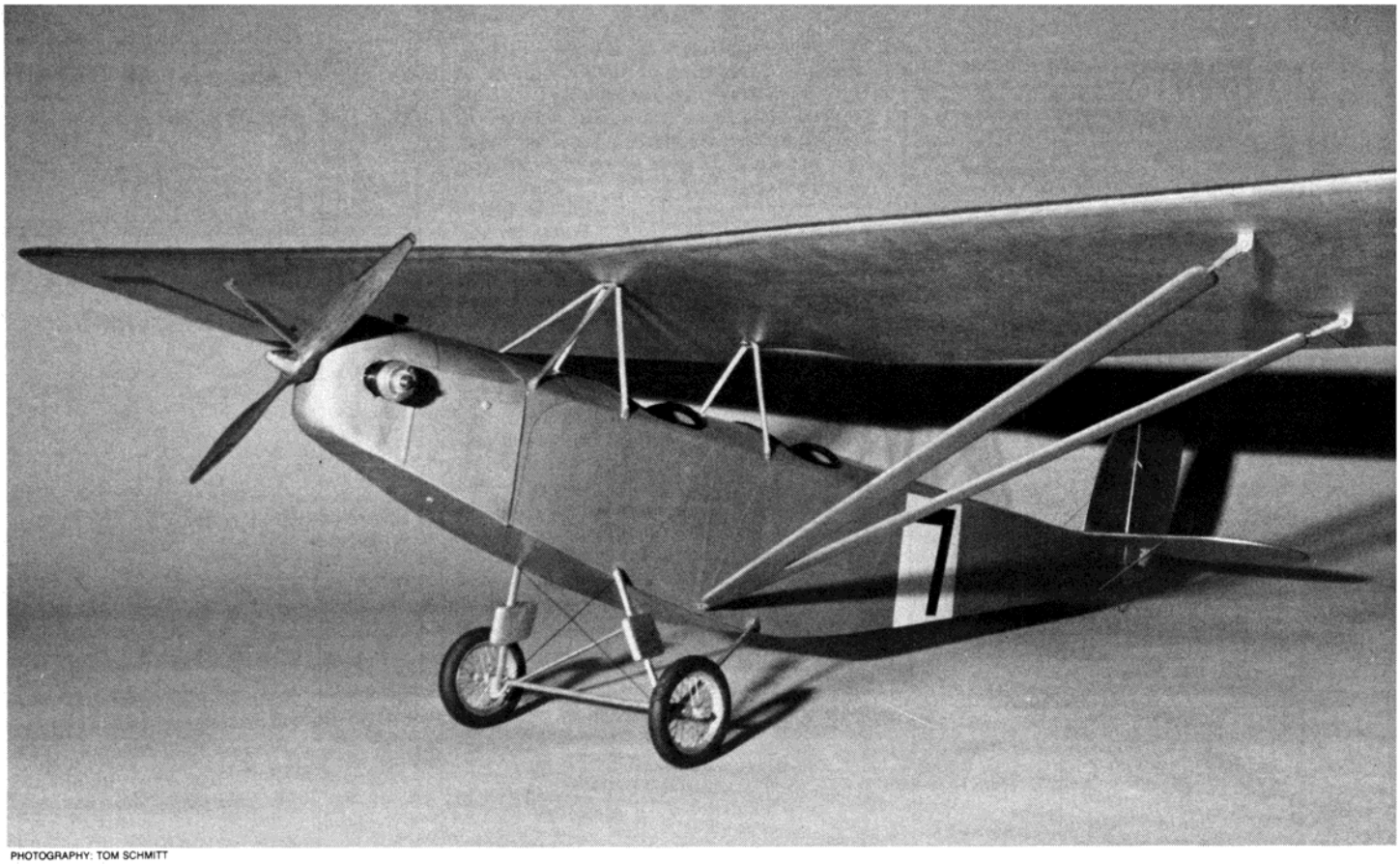
Where does it go?

Many of the photos of project aircraft or contest photos that I see in your magazine and others show no visible antenna. I realize some are removed for photo purposes but certain action shots show none at all. I have tried conceiling the antenna on my *Kougar*

by running it straight back inside the fuselage and supporting it inside a piece of Nyrod. The other pushrods are Nyrods. This reduced radio range drastically. A return to normal outside installation provided range back to normal. Is there any secret to hiding an antenna?

ROBERT BARTO
Pottsville, PA

There's really no "deep dark" secret. The problem you experienced may have been caused by one of two things or both in combination. First possibility is that, when changing to the internal antenna, you may have routed it closer to some electronic or metal component than when it was routed in the original outside installation. The second possibility may be that when you routed the antenna to the inside of the fuselage it was much closer to the ground than the outside installation. This also can affect range. Whatever the cause, antenna installation is a subject that hasn't been addressed lately and bears some more scrutiny. Look for an article in a future FM on it.—ED



PHOTOGRAPHY: TOM SCHMITT

a Schoolyard Scale:

Supermarine Sparrowhawk II

By Don Srull

Ideal choice for some R/C fun on a calm summer evening. A two channel "SYS" parasol delight!

Warm weather is on its way, and it's not too early to start building for those calm summer mornings and evenings. An easy to build schoolyard scale R/C model is hard to beat for real pleasure and minimum investment. In the October 1982 issue of FLYING MODELS I laid out the basis for designing and building successful schoolyard scale models and described three versions of an ideal scale subject — the Supermarine *Sparrow II*. We present here the 48 inch span, .049 powered version which uses two or three channels for rudder, elevator, and optional motor control.

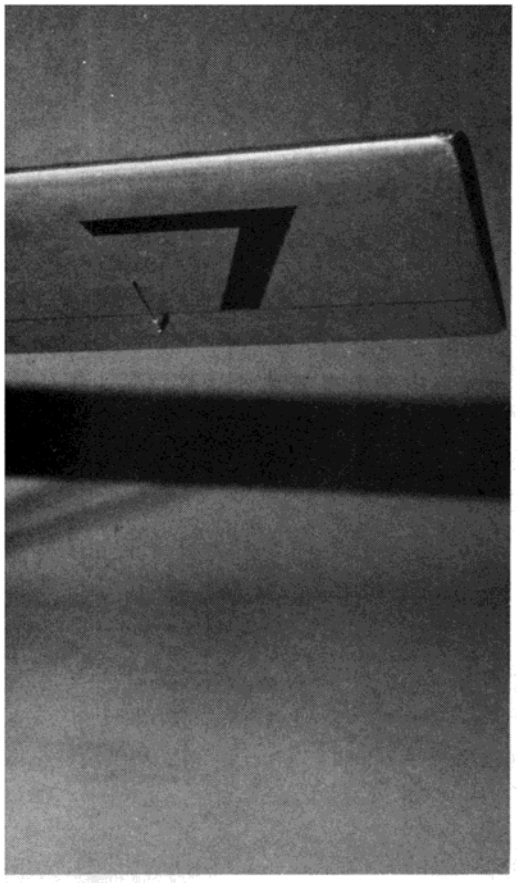
The full size *Sparrow II* was a classic British parasol, designed in 1924 by Supermarine Aircraft's young designer, R.J. Mitchell; the same Mitchell who was destined to eventually design one of the most famous aircraft of all time – the *Spitfire*. The *Sparrow* was originally built as a biplane for competition in the 1924 Lympne trials for light two-seat aircraft. Chronic engine troubles, however, kept it out of the trials. It was modified to a parasol monoplane in 1926 and the reliable 36HP Bristol *Cherub III*, two cyclinder engine was substituted for the earlier Blackburne *Thrush* powerplant. The *Sparrow II* weighed in at 963 pounds at take-off and had a top speed of only 65 MPH and a minimum, stalling speed of 30 MPH.

My model was sized to carry a light weight two or three channel radio and .049 engine at a wing loading of no more than 8 ounces per square foot. Since the wing area is 375 square inches, our all-up target weight was 20 ounces. I lucked out, and the prototype came in under the target weight, including one ounce nose ballast in the form of a dummy Cox .049 cylinder. The weight of the model breaks down as follows: I used a Royal Vanguard, four channel receiver, three World Engines micro, S-22 servos, and a 225 mAh battery pack. This comes to about 5½ ounces for the radio. A 2½ ounce Cox *Dragonfly*, .049 R/C engine is used for power. The complete airframe, including ballast, weighs a little over 11 ounces, for a total ready-to-fly weight of 19 ounces. If you follow the construction shown on the plans, you can easily make the 20 ounce target, and at that weight, the *Sparrow II* is an outstanding and realistic flyer.

Since the *Sparrow* is a simple and fairly conventional design, it is suitable for a relative newcomer to modeling. Use light to medium weight balsa throughout, and resist the temptation to beef up or add structure. The only hard woods used are spruce longerons, ply dihedral braces, and several plywood fuselage formers. I find it easier in this type model to build aluminum tubes into the fuselage where the cabane and landing gear will be attached. This way the wire parts can be bent and fitted and then removed until the fuselage is covered and painted. After final assembly, they are locked in place with a drop of cyanoacrylate glue.

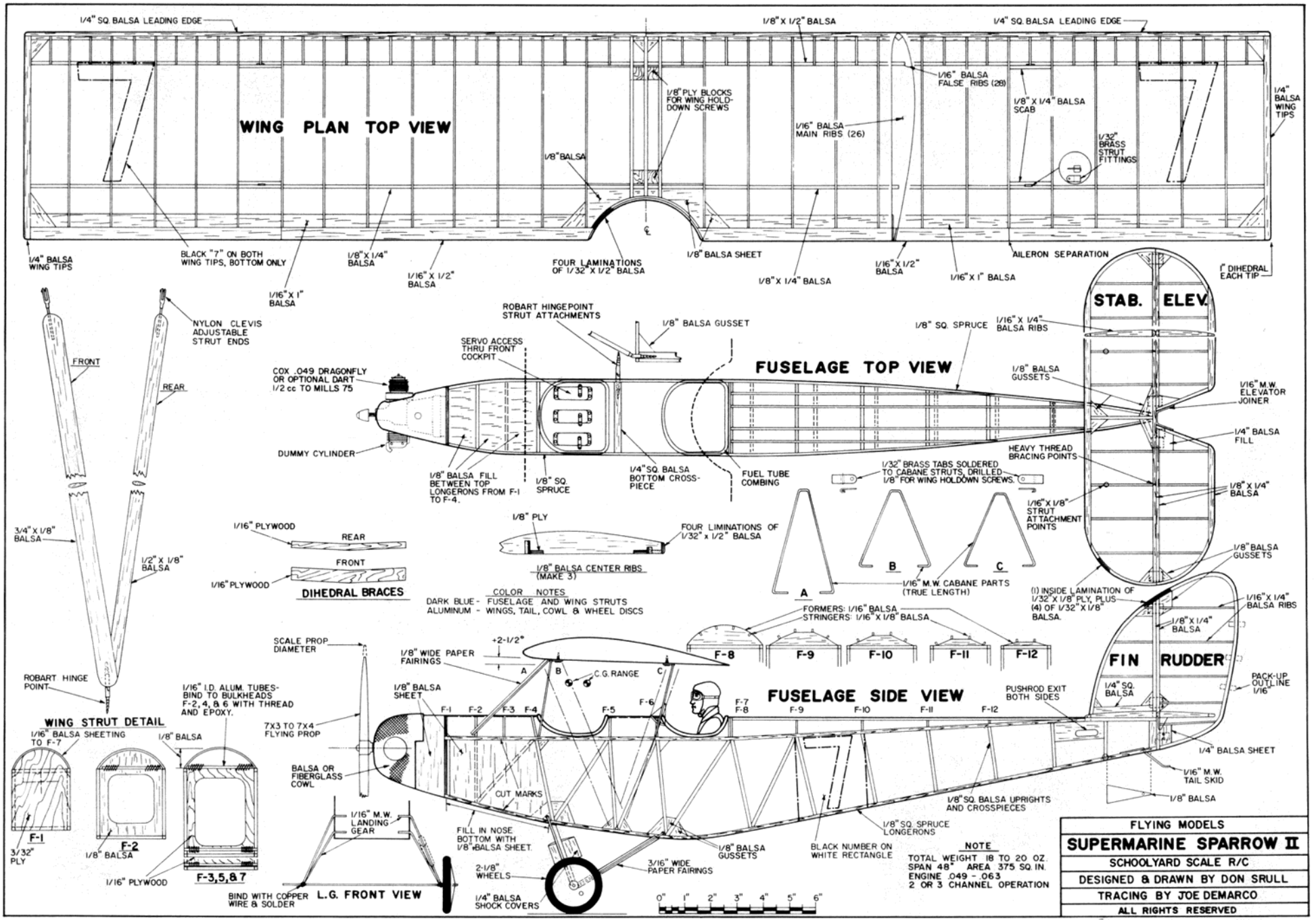
Notice that the wing struts are attached to the wings by means of adjustable clevises. This permits fine adjustment to the strut lengths to assure that the wings are straight and have the correct dihedral. At the fuselage end, the struts are fastened by means of a medium size Robart Hingepoint. This is a very simple and effective fitting which allows complete removal of the wing struts.

As for covering and finishing there are several options. Model tissue or silkspan can be



Two or three channels guide the 1/2A *Sparrow II* by Don Srull (**at left**). To simplify final finish and covering, Don builds aluminum tubes into the fuselage to receive plug-in wires such as the cabanes (**above**).

The full size *Sparrow II* was a classic British parasol designed in 1924. Simple and coventional design make it a good beginner's choice.



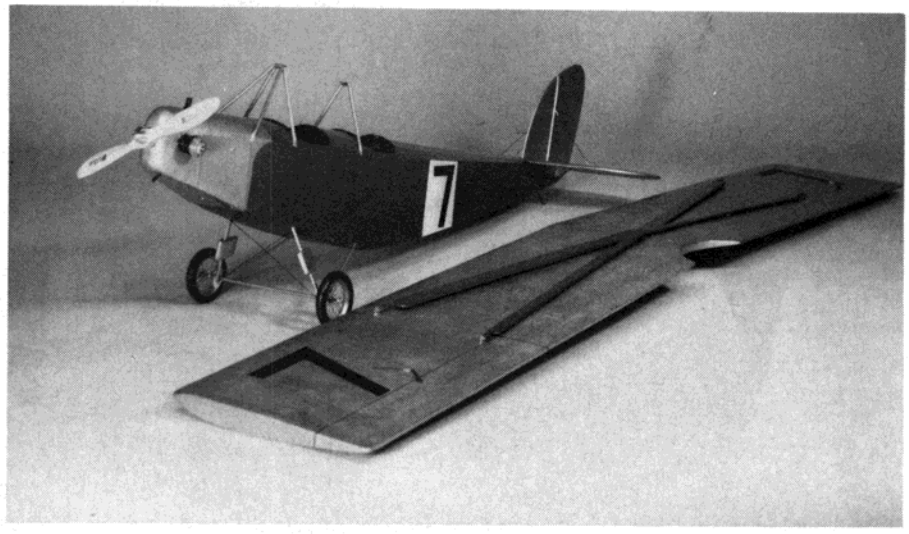
used but it is very fragile and puncture-prone on a model of this size. My number one choice would be light weight silk or Sig Silray and butyrate dope. If you prefer, the wings and tail could be covered with aluminum colored MonoKote™ or Solarfilm. However, I would highly recommend silk and dope for the fuselage in any case since it stands up better to the ravages of fuel and oil.

The removable cowl can be built up from balsa, or formed from fiberglass and epoxy as we did on our model. It will have to be tailored somewhat to the particular engine you use, but make sure you have adequate access to the fuel tank filler, the needle valve, and the glow plug. Also make allowance for the tank overflow line.

You will notice that I used a set of spoked wheels on my model, even though the full size *Sparrow* had solid wheel discs. I just happened to have a pair of the correct diameter Hungerford wheels, and they looked so good I couldn't resist. The authentic scale wheels are shown on the plans.

Here are a couple of tips on flying the *Sparrow II*. Before you attempt a flight, make sure there are no warps in the surfaces and the model balances at the proper point. You should have 1/2 to 3/4 inch throw to each side of the rudder, and no more than 1/4 inch up and down elevator throw. If you are using a 6-3 propeller, put it on backwards and run the engine very rich for the first test flights. Only after the model is trimmed out should you lean out the engine somewhat. For regular flying, I use a Top Flite 7-4 wood prop. I find that it keeps the engine from developing peak RPM's and provides exactly the correct power for realistic flights of the *Sparrow II*. If you use a 6-3 prop, keep it on backwards to reduce the thrust somewhat. The muffler on the *Dragonfly* is very effective, and the throttle allows us to climb out and then throttle back and cruise at very slow speed. It does not quite throttle down enough to allow reliable approaches and landings under power, but I'm still experimenting with different prop and fuel combinations.

I hope you enjoy your *Sparrow II* as much as I have enjoyed ours. See you down at the schoolyard sometime.



Adjustable clevises at either end of the wing struts (**above**) make wing removal a simple matter. Elimination of warps and proper C.G. set-up give you nice, uneventful launches such as this one (**bottom**).

PHOTOGRAPHY: BOB ABERLE

An FM How to:

24 hour timer modifications

By Bob Aberle

Step-by-step procedure for altering a timer to safeguard against overcharging batteries.

With all the new gadgets constantly appearing on the hobby market, I have always wondered why someone hasn't offered a 16 hour timer for use with R/C system battery chargers. We all charge our R/C batteries on a regular, routine basis. It is certainly easier to set a timer and let *it* remember when it is time to end the charge period.

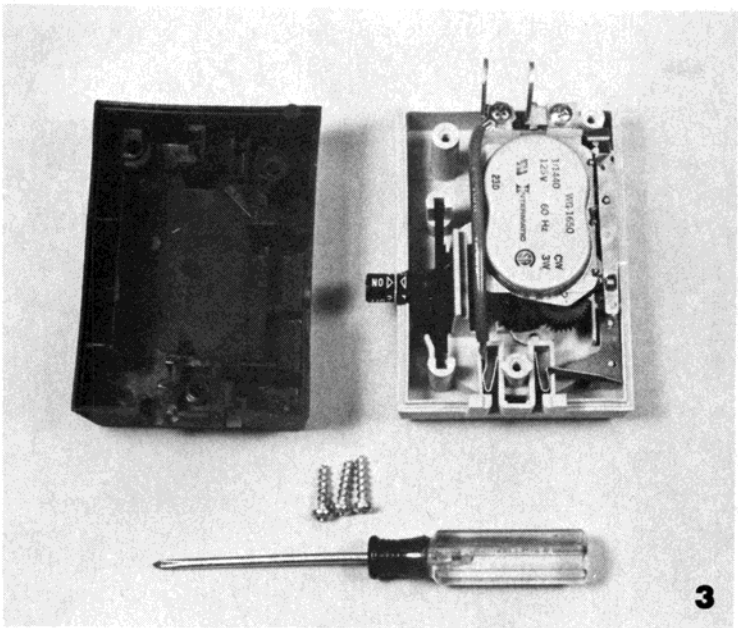
In my 1981 series on R/C battery care and testing I mentioned that I had used a modified 24 hour timer to control all of my chargers. The specific article that appeared in the February 1981 FLYING MODELS, showed several photographs concerning the necessary timer mods. Unfortunately, these photos were considerably reduced in size, because I always write too much (Amen-Ed.). Recently, a dentist from California wrote to me and asked for additional instructions concerning these timer mods. When my follow-up letter still didn't help much, I volunteered to send him one of my personal timers. Several weeks later the timer was returned with a note of thanks. Obviously the actual timer was a better instructional tool than my brief photos and text. Since other modelers might benefit from these timer modifications I decided to run this current article with step by step photos and supporting text. If the photos can be published at a reasonable size, it should be self explanatory.

To start with, you will need a simple, plug-in (to a wall outlet), 24 hour repeating timer. I have found the Intermatic "Time-All" model D-111B (Lamp and Appliance Timer) to be the best subject to modify and also the most economical to buy. It is available at most better hardware stores and is also listed in both the J.C. Penney and Sears catalogs. Prices vary at times from $4.00 to $7.00, depending on local sales, etc. **Photo 1** shows the front view of the timer as received. **Photo 2** provides a rear view. The two brass prongs plug into a standard 115 VAC wall outlet. The R/C battery charger, or any item being time controlled, is plugged into the single receptacle located at the end of the timer case.

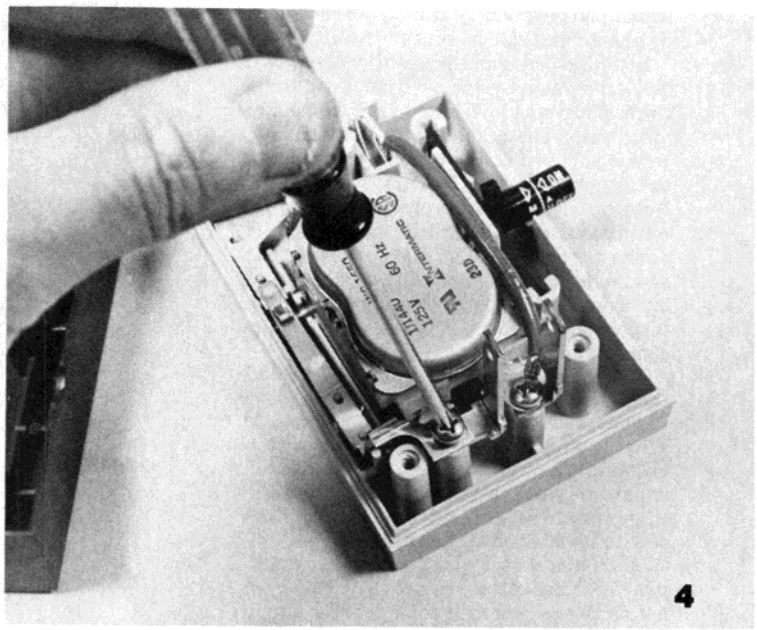
Start the modification process by separating the case halves (**Photo 3**). Three sheet metal screws hold it together. Be careful that the small sheet metal leaf spring doesn't fall out and get lost.

On the 115 volt plug end, use a Phillips head screwdriver and remove the screw holding one of the brass contacts (prongs). You want the prong furthest away from the round on/off switch that projects out the side of the case (see **photo 4**).

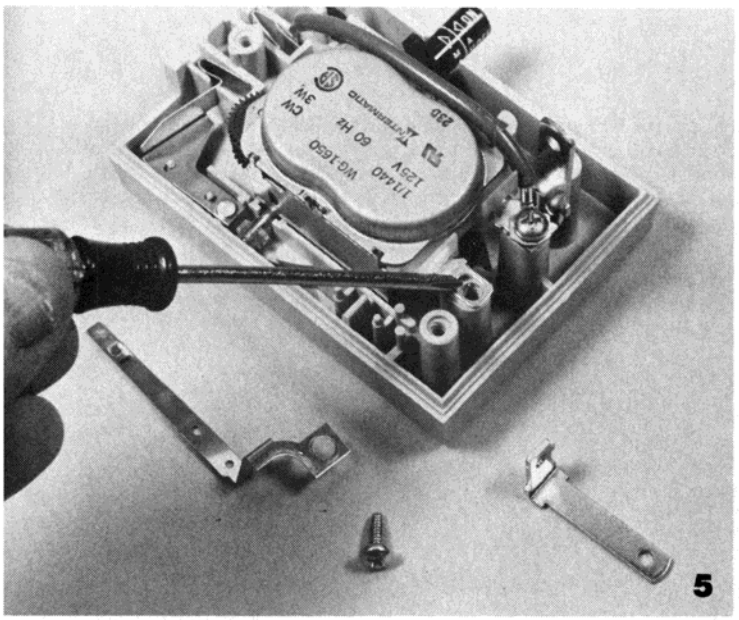
With the contact and brass switch leaf removed, the picture shows me pointing to the lug which must be bent to the straight up position (**photo 5**). A pair of long nose pliers works best for this application. In the next photo (**Photo 6**) you will see this terminal lug now pointing straight up. The idea is that



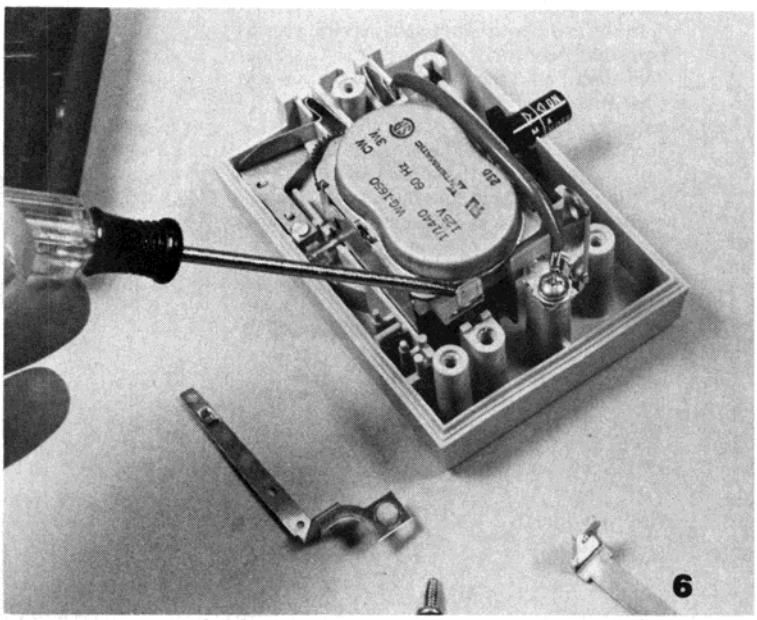
3



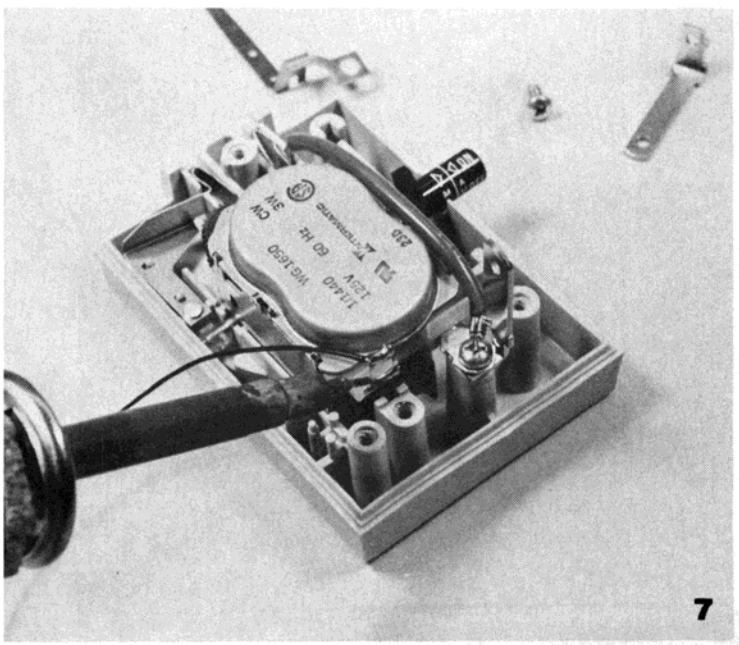
4



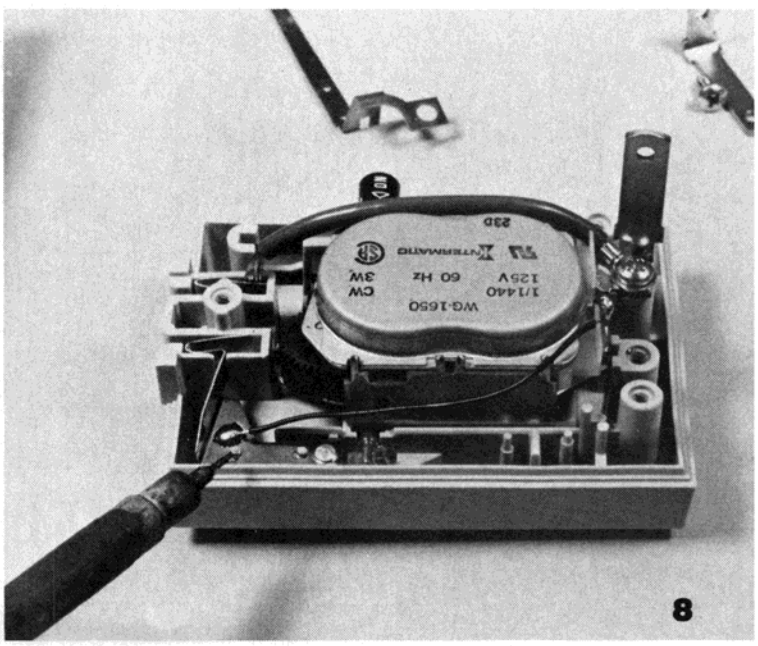
5



6



7



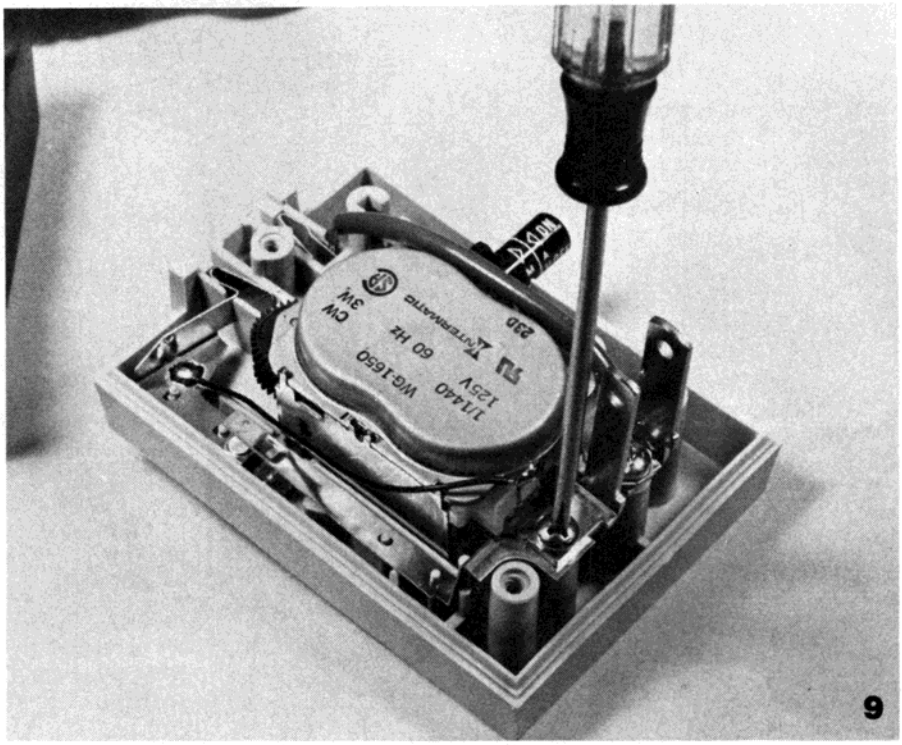
8

later, upon re-assembly, this lug will no longer be able to contact the brass 115 volt prong.

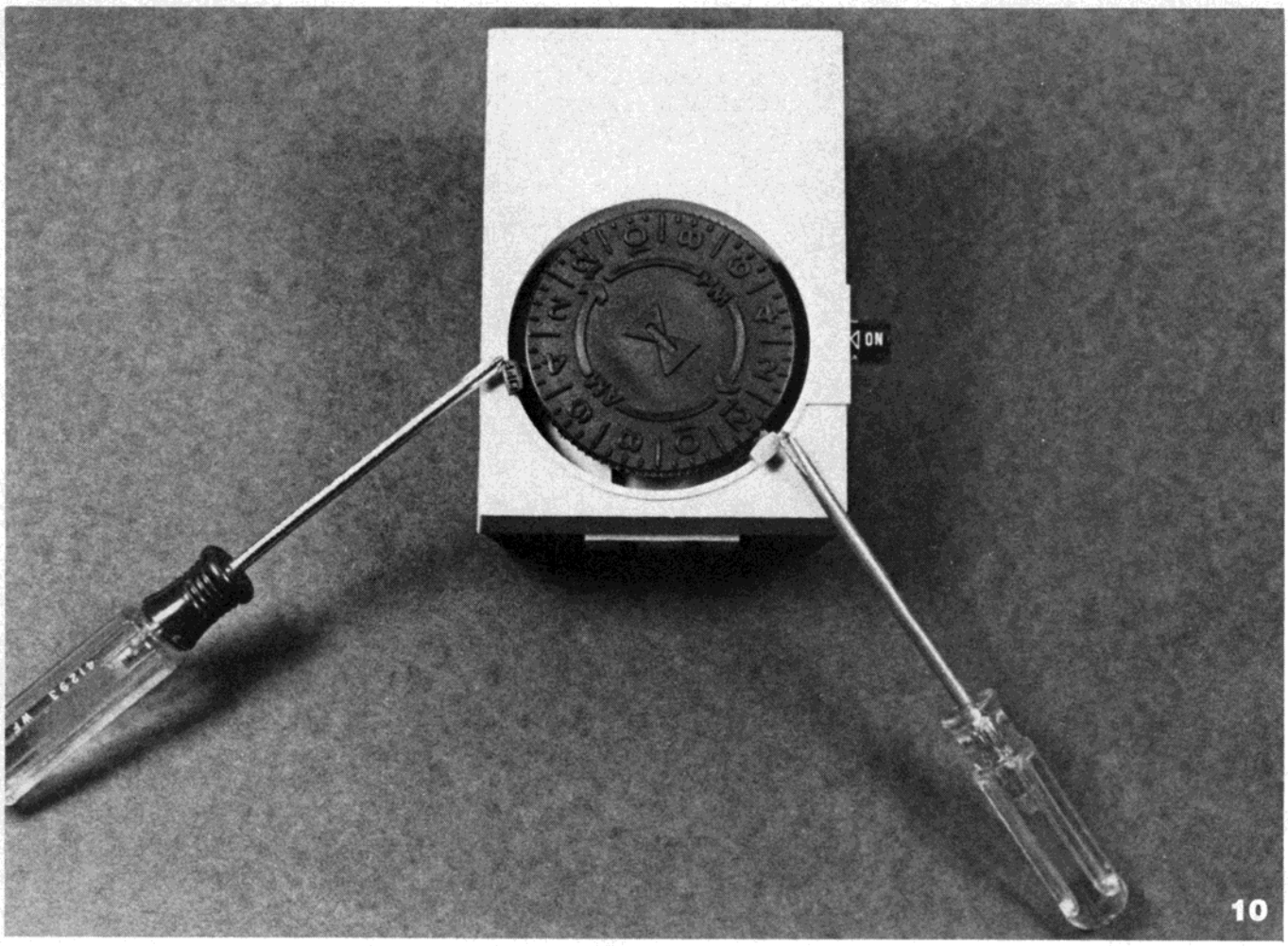
In **Photo 7** a small piece of hook-up wire (any kind you have!) is being soldered to the contact lug which was just bent in the previous step. The other end of this insulated wire is soldered to the brass leaf contact on the opposite end of the case (see **Photo 8**). Note the dress of this wire as is goes from contact lug to the brass leaf strip. When soldering to the brass strip make sure you keep enough heat on the joint. Too small a soldering iron for this particular application will tend to produce a cold solder joint (or bad connection).

That's basically all there is to it. Replace the leaf switch and the prong, using the same Phillips head screw from before (**Photo 9**). What you have done is simply break the connection to the wall outlet (on one side) and let it pass through the timer switch. This way when the pre-set period is reached, the timer dial tab will open the switch and not only turn off the device attached to the output, but the timer motor as well. The timer will not recycle as originally intended, but simply stops until you reset it again for another charge period.

In the last photo (**Photo 10**) you will see the two small screwdrivers pointing to the timer "on" and "off" tabs. These tabs, shown in this photo, are set for an approximate 16 hour period. Note that the orange tab is the "on" function, while the black is "off". You can, of course, alter these tab positions to obtain any period from roughly 3 to 23 hours. I leave mine always at 16 hours. I usually plug a wall strip outlet unit consisting of 8-10 outlets into a single modified timer. All my R/C chargers plug into these outlets. Therefore, the timer turns everything off at one time. This way all of my R/C systems are easily and conveniently charged. For the $6.00 (approximate) price tag and a few minutes of your efforts, this timer is certainly a worthwhile project. It also has many uses outside the hobby as well. Use your imagination!

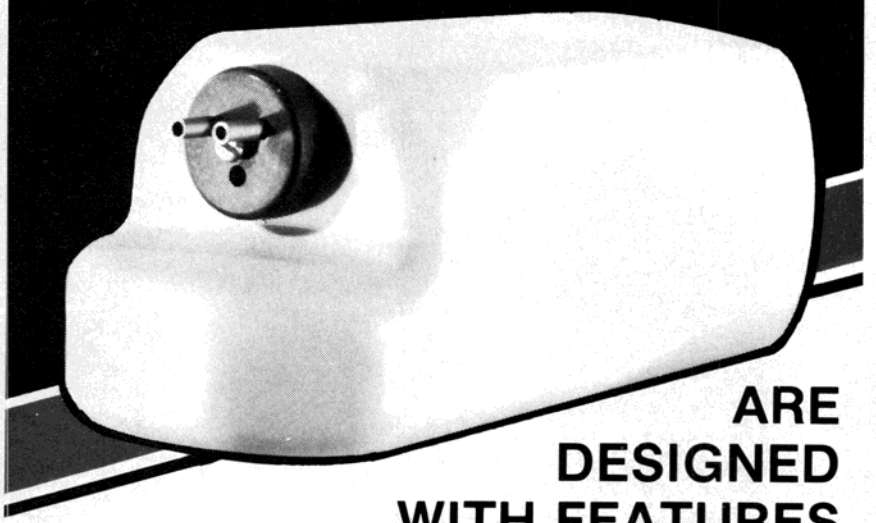


9

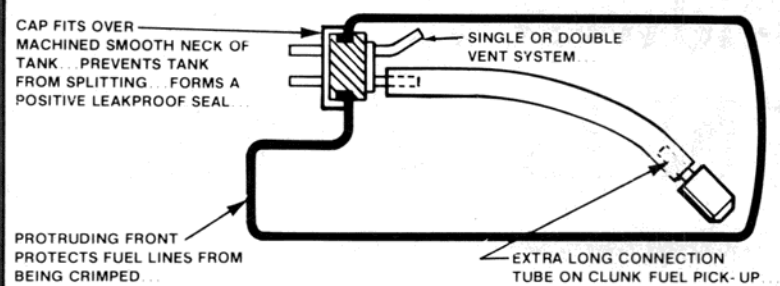


10

DU-BRO FUEL TANKS



ARE DESIGNED WITH FEATURES "YOU" THE MODELER WANTED



The DU-BRO FUEL TANKS come complete with all tank hardware, soft brass tubing, and positive flow clunk fuel pick-up. Available in 8 sizes, from 2 oz. to 16 oz. capacity.

CAT. NO.	DESCRIPTION	PRICE
402	(S-2) 2 oz. SQUARE FUEL TANK	2.15
404	(S-4) 4 oz. SQUARE FUEL TANK	2.35
406	(S-6) 6 oz. SQUARE FUEL TANK	2.45
408	(S-8) 8 oz. SQUARE FUEL TANK	2.55
410	(S-10) 10 oz. SQUARE FUEL TANK	2.65
412	(S-12) 12 oz. SQUARE FUEL TANK	2.80
414	(S-14) 14 oz. SQUARE FUEL TANK	3.00
416	(S-16) 16 oz. SQUARE FUEL TANK	3.25

DU-BRO PRODUCTS

480 Bonner Road, Wauconda, ILL. 60084

SUPER·K COMPETITION FUEL

A specially formulated and chemically balanced fuel for top performance and minimum engine wear in any weather condition!

THIS FUEL FEATURES:

- RUST PREVENTION AGENTS
- DETERGENTS
- LUBRICATION WITH HIGH FLASH POINTS
- WETTING AGENTS FOR MORE EFFICIENT AND DEPENDABLE FUEL FLOW
- ANTI-FOAMING AGENTS TO PREVENT LEAN RUNS, KEEPS YOUR ENGINE RUNNING COOL
- AN ODORLESS, HIGHLY REFINED FUEL
- CHILDPROOF LIDS

Available in F.A.I. 5, 10, 15, 25, & 40% Nitro-Methane Contents. Formulated with synthetic lubricants. Also available with castor.

DEALER'S WANTED

DOMESTIC & OVERSEAS

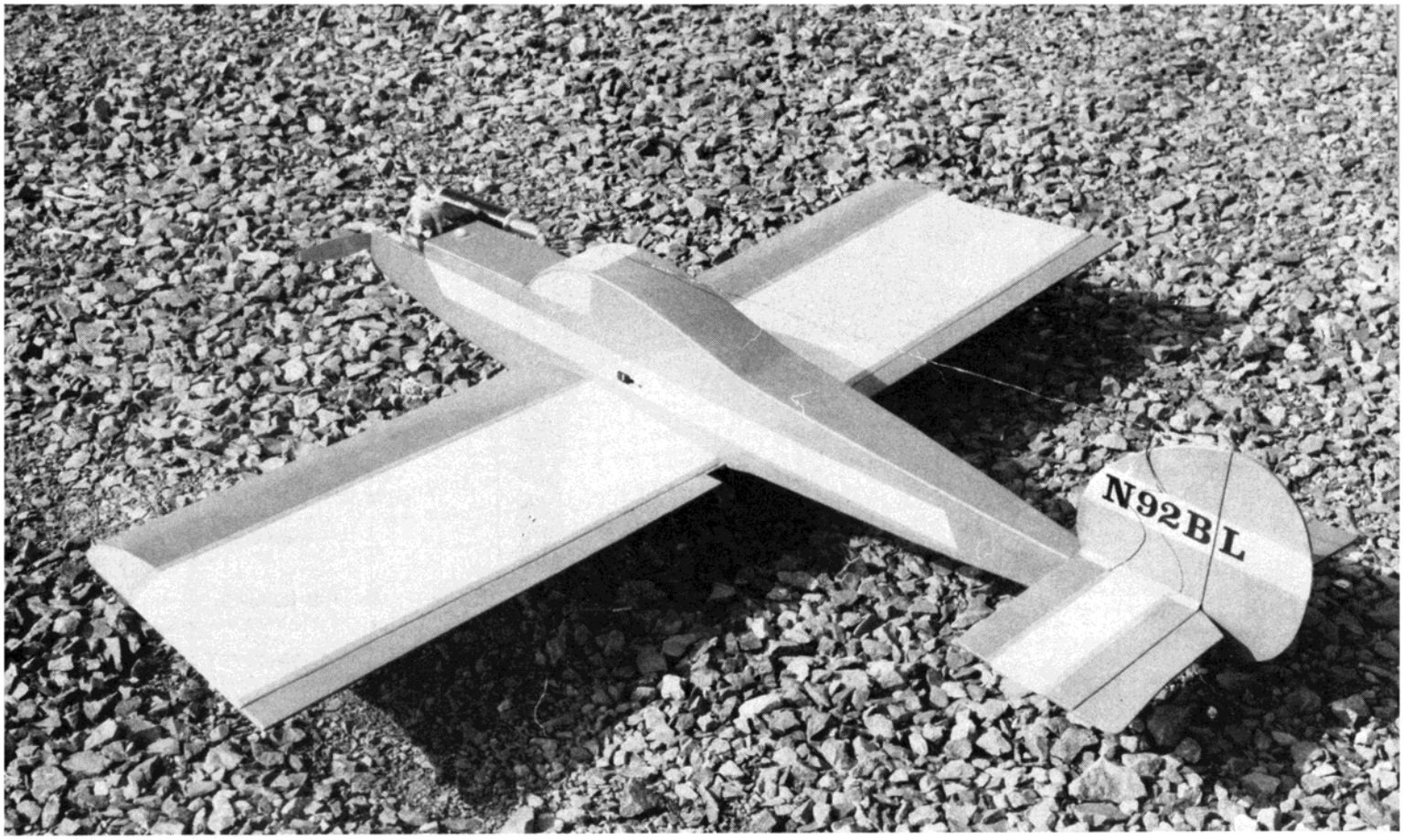
WE EXPORT.

This competition fuel is fast becoming THE CHOICE with top profesionals. Be one of the first to cash in on this product.

Contact us for price structures and ordering information. We are Manufacturers and Major Brand Distributors of Model Engines, Kits, Radios and Accessories.

SUPER K Fuels, are a brand of:

KING'S RADIO CONTROL HOBBIES INTERNATIONAL
3960 West 16 Ave.
Hialeah, Florida 33012
(305) 557-2024



PHOTOGRAPHY: BOB LOBOZZO

A departure from the usual "Stik" aesthetics, the Midwest *Sweet 'N Low Stik* still offers all the enjoyable flying of its forebears.

An FM Product Review:

Midwest's Sweet 'N Low Stik

By Bob Lobozzo

Low wing addition to the Stik family retains the characteristic ease of construction and fine flying traits. For .40 engines.

This product review started out perhaps a little differently than most. An aircraft was needed to test certain new products and ideas. It was necessary that it be .40 powered and of simple construction. It was desired that it be constructed from an available kit rather than scratch-built.

The Sweet 'N Low Stik by Midwest Products Co., 400 S. Indiana St., Hobart, Indiana 46342, filled the requirements. Specifications include a 54 inch wing span, 600 square inches of wing area and a .29 to .50 cubic inch engine requirement. Construction is a mixture of balsa and plywood with an advertised flying weight of 5 1/2 pounds.

After securing the kit, we dumped the contents on the workbench and started separating the fuselage, wing, and tail parts, making piles for each. Inspection revealed that all the wood was of good quality. The die cutting on the plywood parts was good; however, the balsa parts were only fair with some die crushing evident. The hardware supplied was of good quality and fairly complete. At this point, I honestly believed that I could not put a similar plane together from scratch without spending more money than the actual cost of this kit. The plans provided are full size and include notes on construction.

I was very impressed with the basic construction; it was simple and strong, an excellent engineering job by Midwest. Before I go further, I would like to qualify my opinions on the actual construction, etc. Being basically a scratch builder, I am, in general, very critical of kits. I can truthfully say I found very little to fault on the Sweet 'N Low Stik. Changes were made to suit personal preference and, except as noted, I feel that built as is, it will make a fine aircraft.

Construction

The tail assembly was started first, and being all 3/16 inch sheet wood, it goes together quickly. The elevators are supplied in one piece with a wire joiner. The idea is to install the joiner before separating the elevator halves to insure alignment of the halves. I tapered the rudder and elevator halves to reduce weight. As per the plans, they were to be left flat and untapered. I think 3/16 inch is a little on the thin side for an aircraft of this size and would have preferred 1/4 inch sheet

for the tail assembly.

Moving on to the fuselage, its sides are poplar plywood and have round cut-outs at the rear to reduce weight. Due to the strength increase over balsa, they do not require doublers in the forward area.

The fuselage is flat on the top, from the firewall to the bulkhead behind the wing, allowing it to be built upside down on the plans. The fuselage sides, firewall, and two bulkheads are pinned down over the plans, to the work board. The rear of the fuselage is aligned, over the plans, with a combination of squares. Prior to actually gluing the fuselage together, the stringers and wing saddle doublers, etc. are installed. It was decided that the lightening holes at the rear of the fuselage made it too weak; so 3/16 square balsa braces were installed vertically between the cut-outs, to strengthen this area. Epoxy was used for the fuselage construction forward of the wing and cyanoacrylate for the remainder.

About this time, it was becoming apparent that the space for radio installation was smaller than I was used to. With surplus lite ply from the die cut fuselage sides and scrap 3/32 balsa, I fabricated a canopy of sorts. Also added was a sheet cowl of 3/8 soft balsa. The above changes gave the Stik a slightly different look and provided more room for the radio.

The wing was now started and was built in two separate halves on a straight flat board. First the rear trailing edge sheeting was trued and pinned down. The trailing edge rear filler strip was epoxied in with slow cure epoxy and pinned flat. The ribs and spars were added and glued into place with some cyano.

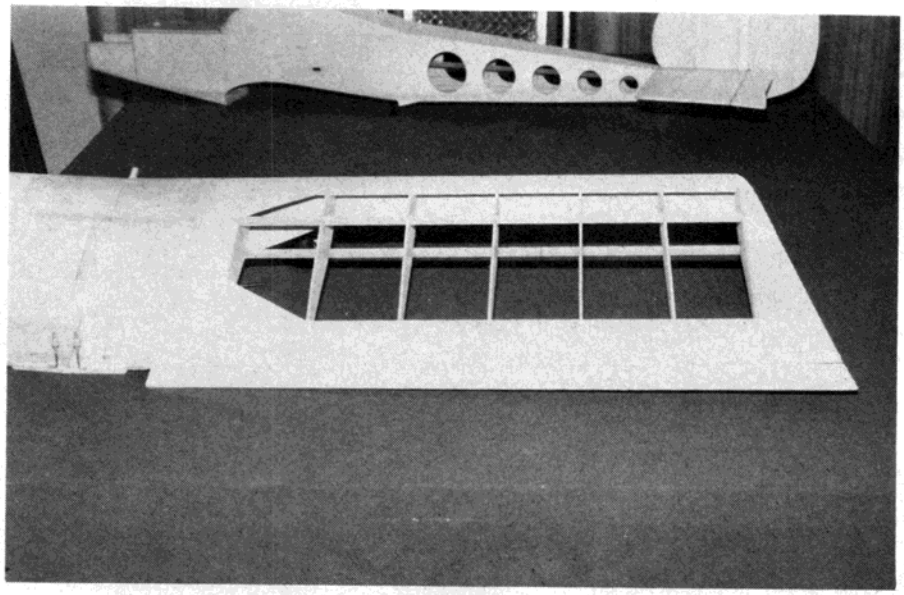
With the wing half pinned to the board, all possible parts were added; then the wing was flipped over, re-pinned, and the remaining parts added. At no time were pieces added without the wing being flat on the board and pinned or weighted. It should be noted that the bottom of the ribs are perfectly straight from the main spar to the trailing edge, both top and bottom, which made the task simple. A criticism here is that as most modelers build the wing in two separate halves, the center rib should be doubled, one for each wing half. This allows each half, or wing, to be built separately and accurately. I fabricated additional pieces and built identical halves. After joining the wing panels, the center section was glassed. No mention is made of reinforcement of the center section with glass. Although the wing appears strong, I glassed the center section because it is a critical area. No particular problems were noted on the wing except as mentioned and it proved to be straight and strong.

Ailerons were hinged with my own gapless hinges along with the elevator and rudder. The plans indicated that the outboard aileron ends are wider than the inboard ends. I believe that this invites possible flutter but I followed the plans in this case and had no problems during flying.

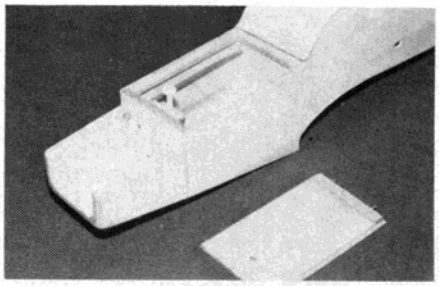
With the fuselage structure framed out, the radio and control rod installation was tackled. The servos were tray mounted to 3/8 square servo rails, installed between fuselage sides. DuBro metal control rods running in nylon sleeves were installed on rudder and elevator with a cable being used for throttle control. Holes were made for switch, charging jack, control horns, etc. At this time 1/16 plywood pieces were installed under the rudder and elevator horns to strengthen these areas. The radio was removed and the bottom sheeting behind the wing was installed on the fuselage. The plans show 1/16 control rods on elevator and rudder with no brace at mid-point. As shown, these will flex under load. They must be braced at the center.

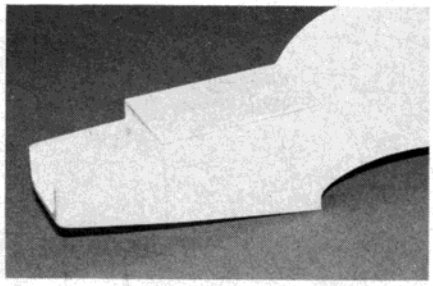
The rubber band hatch hold down shown on the plans is a fast fool proof method, but we elected to use two metal pins and a single nylon screw to retain the hatch over the tank compartment. The entire tank compartment and interior of the engine cowl was sealed with Formula II glue by Hobbypoxy.

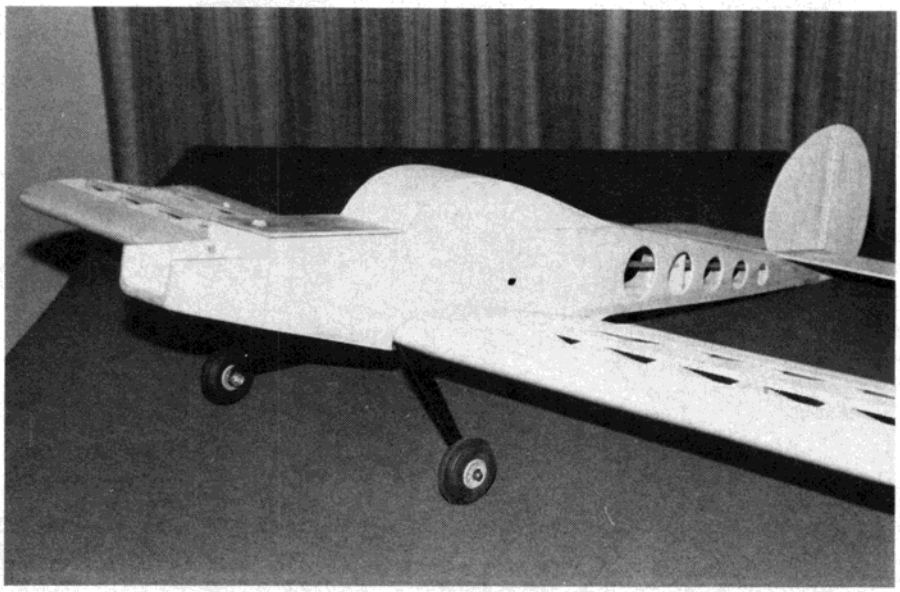
Given the option of tricycle or conventional gear, we chose the latter set-up, creating a tail dragger. I followed the plans on the



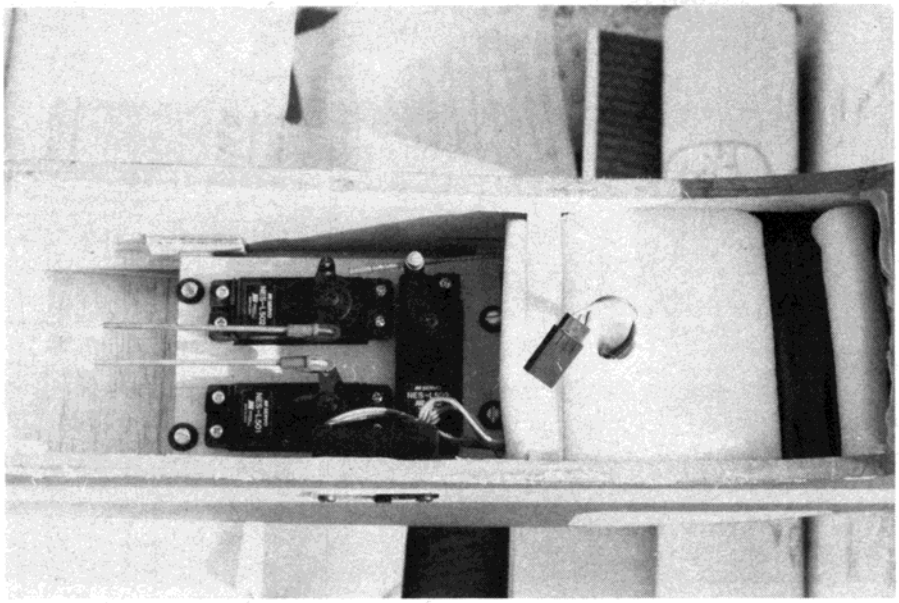
The wing before covering (**above**). Although no mention is made of glassing the center section, the author did so from his own preference. Easy access to the fuel compartment (**below, left and right**). The tank area was fuel-proofed with Hobbypoxy and nylon hatch hold-downs substituted for the rubber band method.



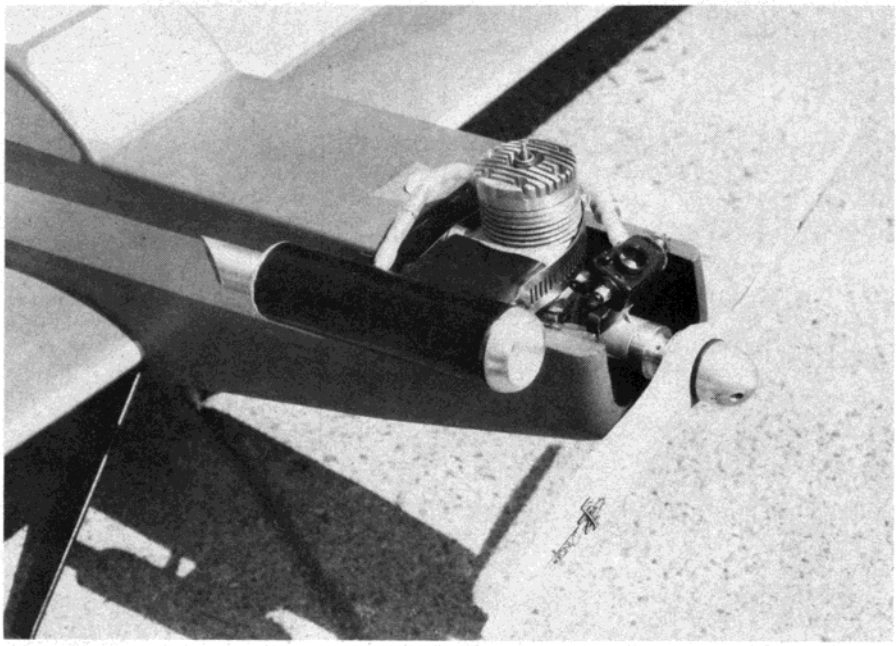


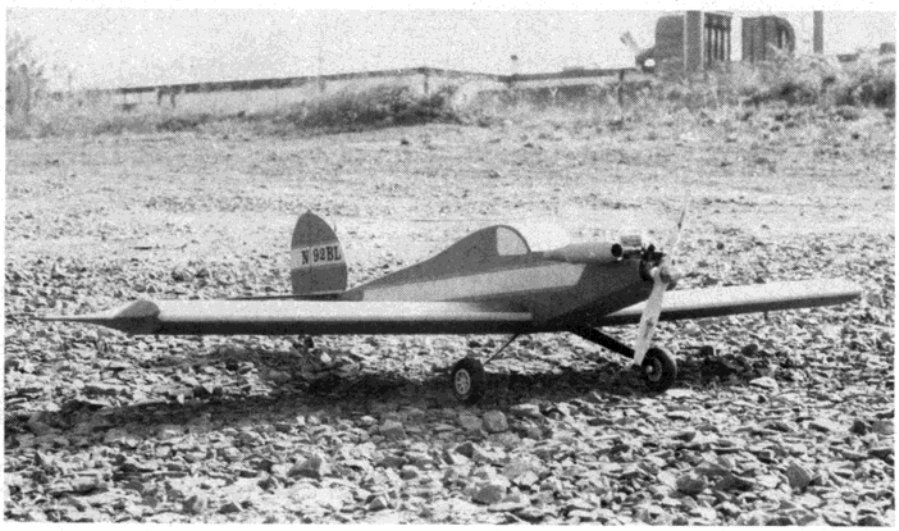


The completed framework shows the lightening holes in the fuselage sides. They're made of poplar ply and require no additional doubling. However, as a precaution, the author added bracing to the tail.



For control, a JR radio with 501 and 502 servos was used (**above**). The servo tray supplied didn't suit the installation, so a custom plywood one was substituted. Any sport .40 will fly the *Sweet 'N Low Stik* with ease. For hotter performance, an Enya .40X (**below**) pulled the plane with a lot of authority.





landing gear mount and had no problem. I used a Hallco dural gear I had on hand, as it gave me a little more tread width. I believe the stock gear would have been adequate. No mention of a tail wheel is made nor is one supplied. Not wishing to rely on a skid, a Goldberg tail wheel bracket was added to the rear of the fuselage. I bent up some 1/16 music wire and strapped the tiller arm to the rudder with some thin brass stock. A 1 1/4 inch tail wheel completed the assembly. Fuel tubing was slipped over the 1/16 inch wire prior to clamping it to the rudder to prevent metal to metal contact.

The wing hold down blocks are probably adequate to hold the wing on, but they are so small that I doubted I could drill through the wing and hit them on center. Larger blocks were installed and braced and a small 1/16 inch plywood plate was added at the bottom of the wing in the bolt hold down area.

Covering

With the exception of the numbers and letters on the vertical fin, all covering and trim was Hobby Shack's Solartex. The yellow trim and blue pin stripes were ironed over the basic red color. On the top of the wing, however, the yellow and red are butted together with pin stripes over them. I glued the butted seam with cyano as I did not feel that the Solartex stuck well enough to the spar to stay on during flight. I could not get the Solartex pin stripes to adhere well enough to this area and glued them down also.

I glued all edges around the wing saddle, hatch, engine compartment, etc., with cyanoacrylate. After covering was complete, we sprayed the entire model with three light coats of clear dope. Sig Supercoat was used and we experienced no problems with it sticking to the Solartex.

Radio

An Apollo series JR radio (DSC-4SVM) was ordered from Circus Hobbies. This is a 5 channel radio with servo reversing and dual rates on aileron and elevator. The set is supplied with two 501 and two 502 servos. They're identical except that two operate in reverse direction of the other two. The servos are rated at 40 ounce-inches of torque, weigh 1.6 ounces each, and measure 1.37 × .75 × 1.53 inches.

During radio installation, we found we could not use the servo tray provided as it put the servos too close for our particular installation of rudder and elevator control rods. The plane had originally been set up for a different radio. The simplest solution was to make up a plywood tray spacing the servos as needed. Once the servos were installed, the battery and receiver were added, mounted vertically against the bulkhead in front of the wing. The battery was against the bulkhead and the receiver located between the battery and servos.

With the extra room from the added canopy, more than ample space was afforded to install the radio without having to shoe horn anything into place. A piece of foam was installed over the top of battery and receiver and held in place by sticks wedged under fuselage doublers.

Flying

With the modifications to the structure, which added weight, balanced by careful attention to saving weight overall, ready to fly the plane was four pounds, fifteen ounces, less fuel. It required no ballast to achieve the

balance point, which was slightly behind the recommended point. Incidently, the weight is more than 1/2 pound under the stated weight and was checked on two different scales.

The initial test flight was essentially uneventful. The first flight was flown by someone else as I had to man the camera duties.

Any decent running sport .40 such as the K&B .40 originally installed, is adequate to fly the Sweet 'N Low Stik through all but the more advanced manuevers requiring brute power. A hot .40 will provide more than adequate performance for most flyers. The Enya .40X that was substituted for the K&B .40 which developed problems was used for most of the flying and was powerful and smooth running. The carburetor, which looks old fashioned with the idle air bleed set up, does have a fuel metering system. It worked quite well, providing excellent throttle response.

Although a good flying aircraft, the Sweet 'N Low Stik cannot match an average .60 powered pattern ship for aerobatic performance. To expect it to do so would be unreasonable. At five pounds and 600 square inches of wing area, it is bothered by wind more so than a heavier, larger aircraft.

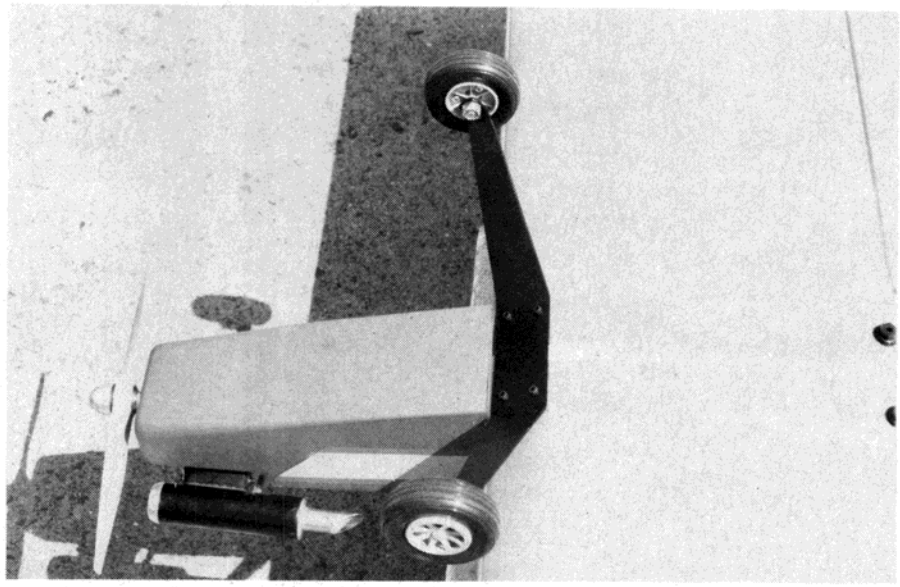
Take-offs with the tail dragger configuration were no problem, providing toe-in was maintained on the main wheels. Landings are exceptionally slow and will allow bounceless, three point landings on hard surface runways.

In the air, all the basic manuevers, Cuban eights, loops, rolls, stall turns are all easily performed with a sport .40.

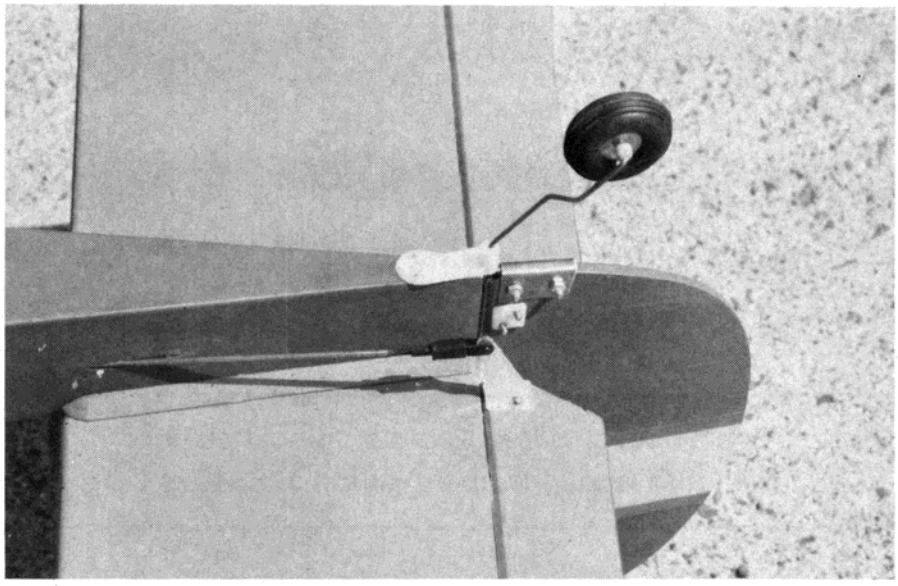
The model tracks fairly well and is easy to fly. Anyone with some stick time under their belt should be comfortable with this plane. The model is economical, fast building, and will fly well enough on a mild .40 to bring a new flyer up to a proficient level.

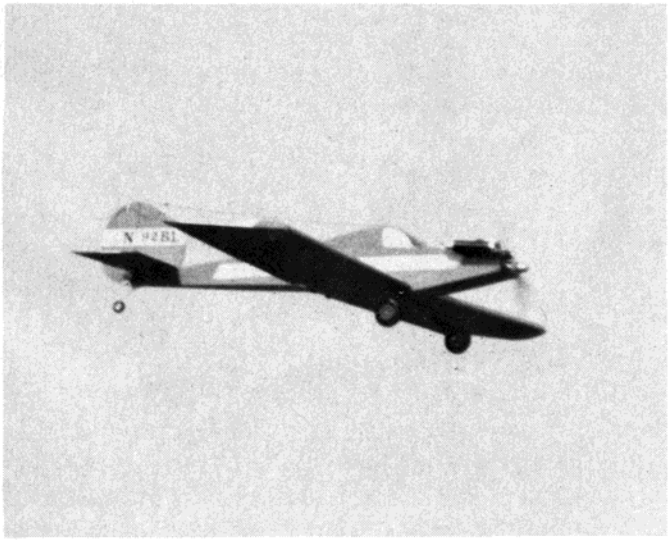
The JR radio performed so well during the flying that we quickly forgot it was new, unfamiliar hardware and concentrated on flying. Absolutely no problems were encountered with it.

I would not hesitate to recommend the Sweet 'N Low Stik as an aerobatic trainer or fun fly type aircraft. It will do everthing a .60 powered whip will do only not as smoothly. I feel it is a good change of pace from the .60 powered aircraft and enjoy flying mine.

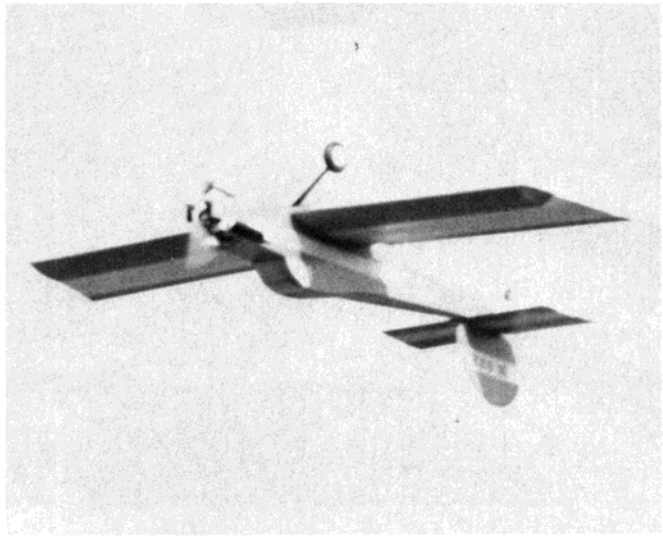


You can set the plane up as either a tail dragger (**above**) or with a tricycle gear. The Hallco dural gear was used in place of the kit's 5/32 formed wire gear. No mention is made of a tail wheel, so a Goldberg tailwheel bracket was used with some 1/16 wire, a 1 1/4 inch wheel, and some brass sheet to make one.





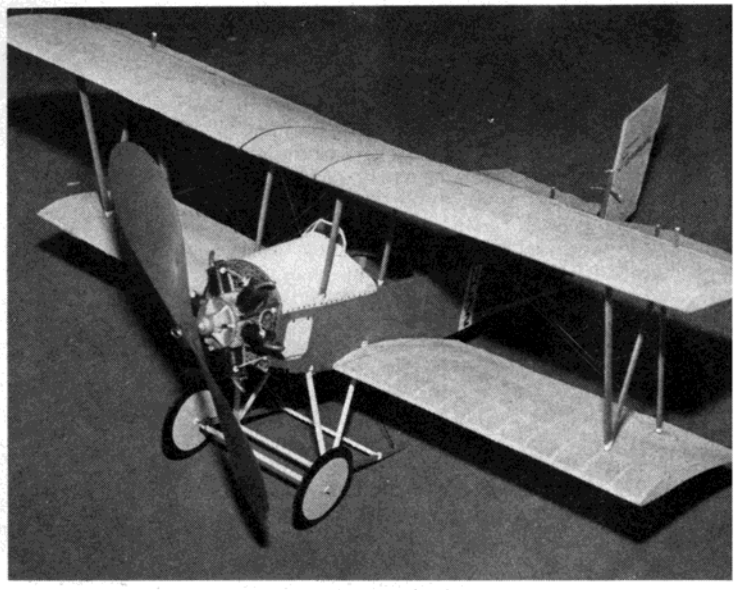
You'll find that the model is easy and economical to fly. Anyone with a bit of stick time "under their thumbs" can handle this plane.



Don't expect it to do the full pattern. However, it does most aerobatics quite well and tracks steady and true. Good for aerobatic training.

PHOTOGRAPHY: LARRY KRUSE

The prototype Boeing F4B-4 for the Golden Age Reproductions kit was Bob Schlosberg's beautiful rendition. The planes faintly visible in the background are also part of Bob's air force.



Not every winning model needs to be complex. Walt Eggart's Farman *Sport* is an excellent model with ample wing area, nose, and tail moments. Square surface outlines and simple detailing make it easy to build.

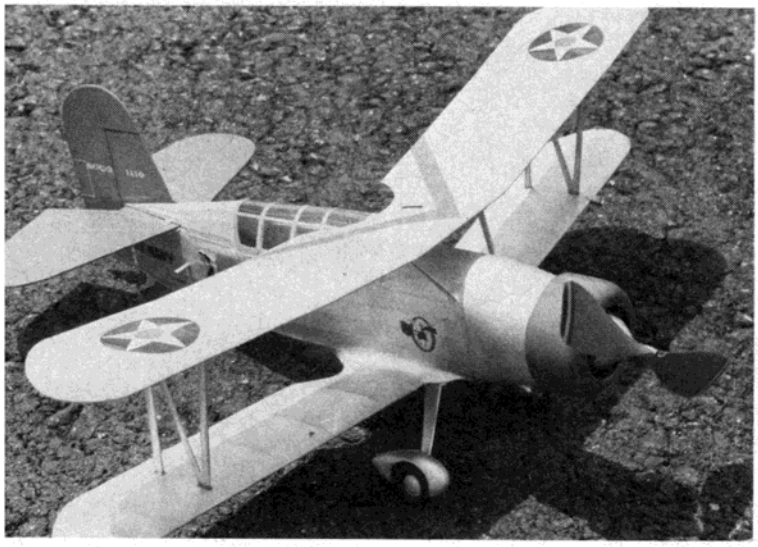
a medley of . . . Bipes at Springfield

By Larry Kruse

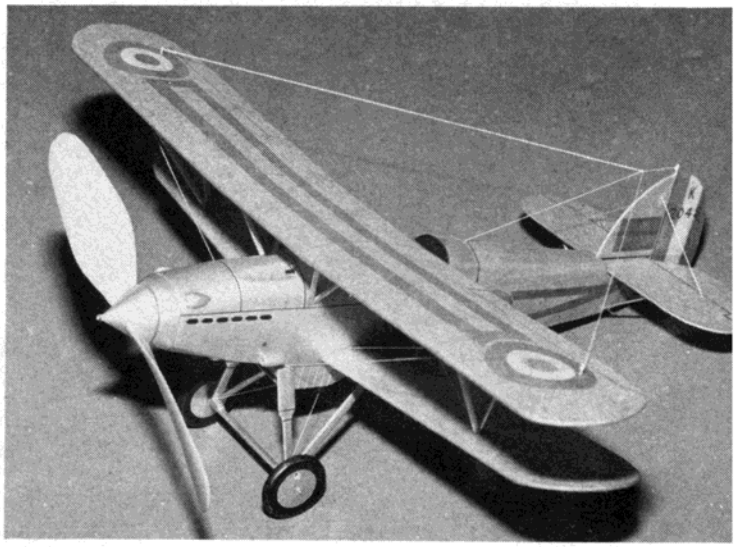
Double delights beguiled our intrepid author with their enduring charm at the 1983 Nats.

Since the beginnings of manned flight, multi-wing airplanes have had a peculiar fascination for most people. There's something that looks so terribly *right* about a biplane—a geometrical completeness, an appeal to the visual senses. Freeflighters in particular are susceptible to this multi-wing mystique, and often choose a challenging biplane or triplane as a scale subject rather than a more commonplace high or low wing aircraft.

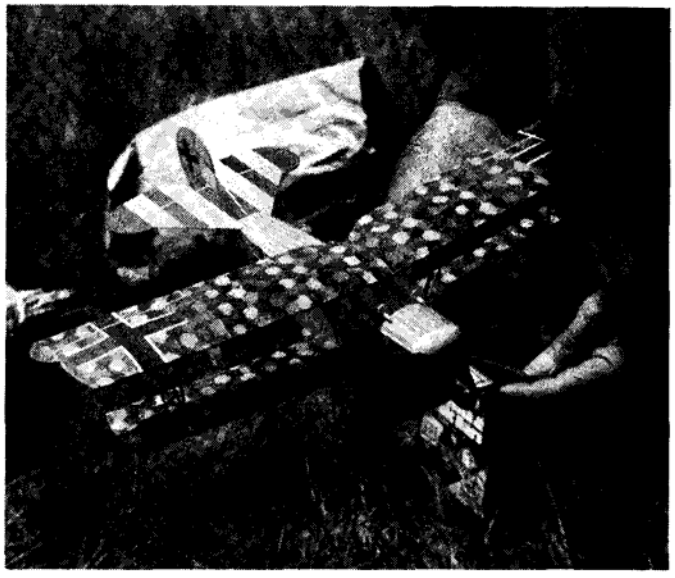
The fruits of these choices were very much in evidence at Springfield, MA, the site of the 1983 Nats. One of the nicest collections of freeflight flying scale biplanes and triplanes seen at any recent Nationals was there, circling gracefully both indoors and out, and drawing appreciative "o-o-o-h's" and "a-a-h-h's" from the audience. It is to give you, the reader, that same opportunity that *FM* presents this medley of bipes seen at Springfield.



"Hangar rash" always distinguishes the ones that fly really well and have seen the wear of many seasons. This Curtiss SOC-3 *Seagull* by George Myer flies real well as evidenced by its own case of "rash".

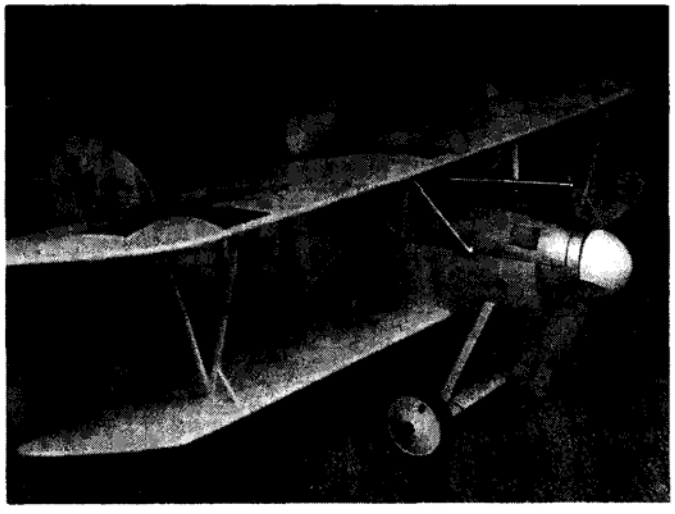


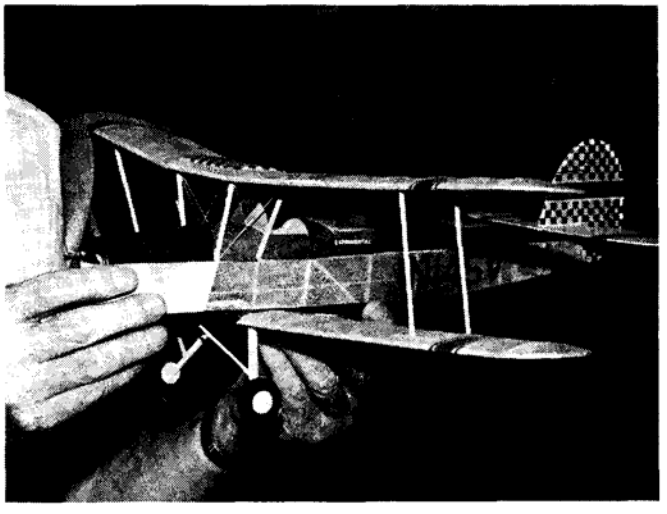
With its silver tissue and simulated aluminum panels, Bob Bender's Hawker *Fury* placed very high in scale points. Bob is an excellent builder with a good eye for detail.

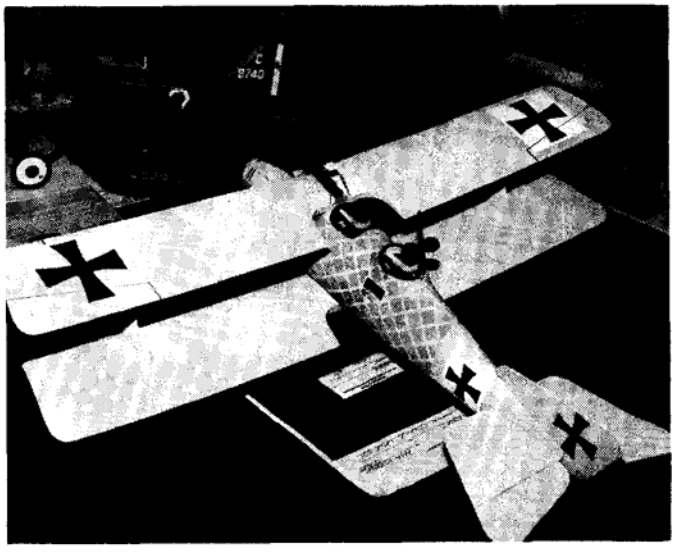


Jack Russ, alias "Herr Von Hair" and a widely feared member of the Flying Aces brought this Fokker D-7 bipe (**above**) to do battle. Here's another of Bob Schlosberg's masterful creations, an Albatros D II (**below**). Note the simulated spokes under the wheel covers and the highly detailed engine.

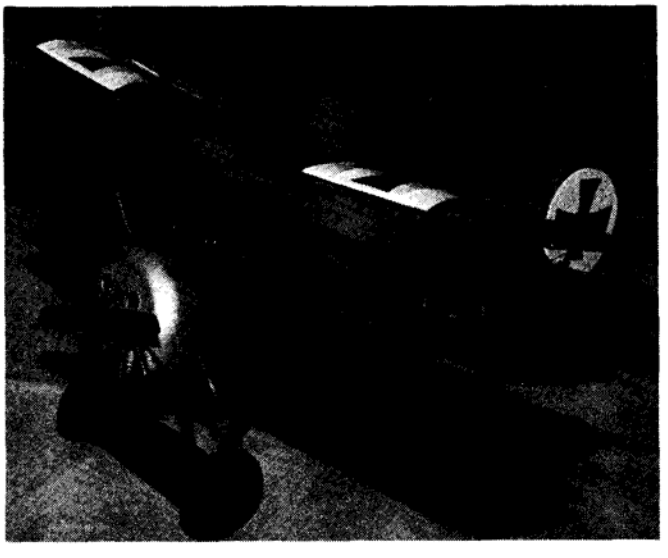
Even with its lovely, opaque olive drab finish, Jack McGillivray's SE-5 (**above**) weighed only eight grams. Had consistent 80-90 second flights. This *Stampe*, by John Low, had a striking multi-color finish (**below**) with a black, blue, white, and checkerboard trim. Very stable flyer.



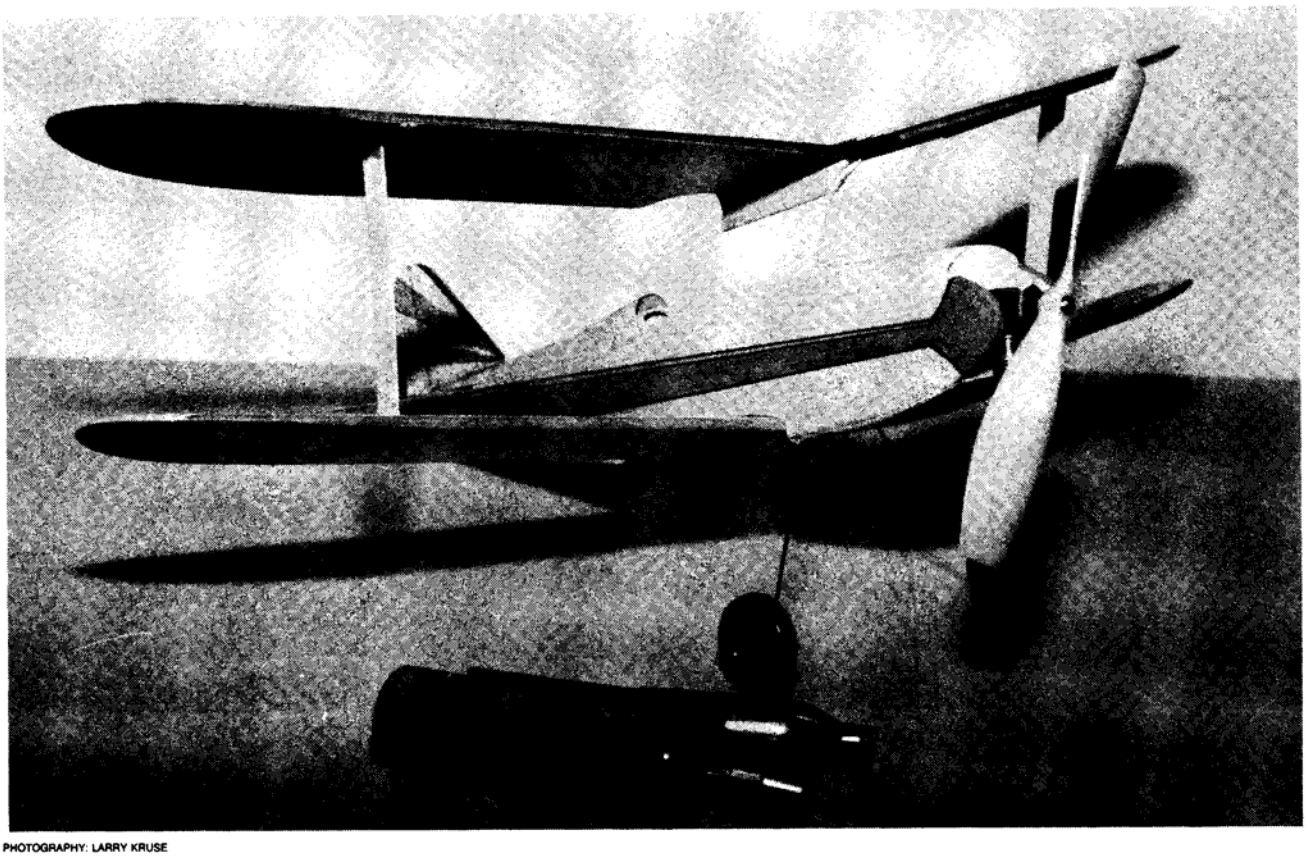




You rarely see the Roland *Walfisch*. This one, by Dave Rees, was airbrushed powder blue with black markings. Cross hatching on the fuselage was done with a lattice-work template cut from card stock.



What would a gathering of bipes be without a red Fokker *Triplane*. It was one of the few gas powered airplanes entered. Note the engine cylinder just barely visible in the cowl opening just above the prop.



PHOTOGRAPHY: LARRY KRUSE

Prairie Duster

By Larry Kruse

Once the biplane bug bites, ya gotta have one "right now". A quick one for CO_2.

I think this plane began on the trip back to Kansas from the Springfield Nats. I had seen, reported on, photographed, and admired so many beautiful freeflight biplanes during the past two weeks, that was all I could see in my mind's eye. The stinger was that despite a decade or more of building scale freeflight ships in numbers that create storage problems, I didn't have a two-winger to my name. Even worse, I just couldn't see my way clear to spending the kind of time necessary to build a "class," scale biplane before the snow flew and all flying shut down. *What* I wanted was the vision of a small biplane circling moth-like in the park across the street, and *when* I wanted it was now.

Three evenings later the little *Prairie Duster* left my hands to make two, slow, low-powered circles before settling into the grass. Three flights later, after a small increase in power and a bit of left rudder, the tiny ship made six full circles under power, cruised over the top of an eight foot sapling, and made a perfect 3-point landing in the adjacent street. I was ecstatic.

Construction

If you have an old CO_2 motor around, you're gonna like the price of this one. Two good sheets of 1/16 inch, C-grain, assorted basswood scraps, and one evening will let you produce your own version of biplane magic.

Transfer all parts to the wood using carbon paper under the plan or punching pin holes at about 1/4 inch intervals all around the outlines of the parts. Careful positioning will allow all pieces to be cut from the two sheets of 1/16 balsa. Note the direction of the grain, particularly as far as the fuselage formers and rudder pieces are concerned.

Sand all pieces lightly. Airfoil the wings by sanding the top surfaces only. This will allow them to bend to the needed camber much more easily and conform to the curvature of the ribs without splitting. Airfoil the rudder and stabilizer by sanding both sides. Both should be no more than 1/32 inch thick at the trailing edge to accommodate bending for flight trimming purposes. The thin surfaces, coupled with the soft copper wires which also help keep surfaces from cracking, will make flight adjustment very simple. Notice at this time that only the rudder has been glued together. When we get to the gluing point, I recommend using the thick cyanoacrylate glues both for the sake of expediency and for its gap filling properties which may prove useful in this type of construction.

In order to simplify the whole process and keep the weight down, all coloring and markings were done with a ball-point pen and red and blue Magic Markers. Any color combination or marking pattern is possible, depending on your taste. The only secret is to outline the area where the Magic Marker is to be applied with the ball-point pen, pressing into the wood enough to leave an obvious indentation. The indentation in the wood will keep one color from bleeding into an adjacent area.

The pattern I chose was easily done with a straight edge, outlining all of the stripes and applying the colors prior to any assembly. For those of us who have been at this hobby a while, gluing together all of the multi-colored pieces reminded me of an old pre-printed Cleveland kit that was so much fun to build. Once you got it built, it was finished – complete with rivet details, control outlines, and license numerals. So it is with this little bird – when it's together, it's done.

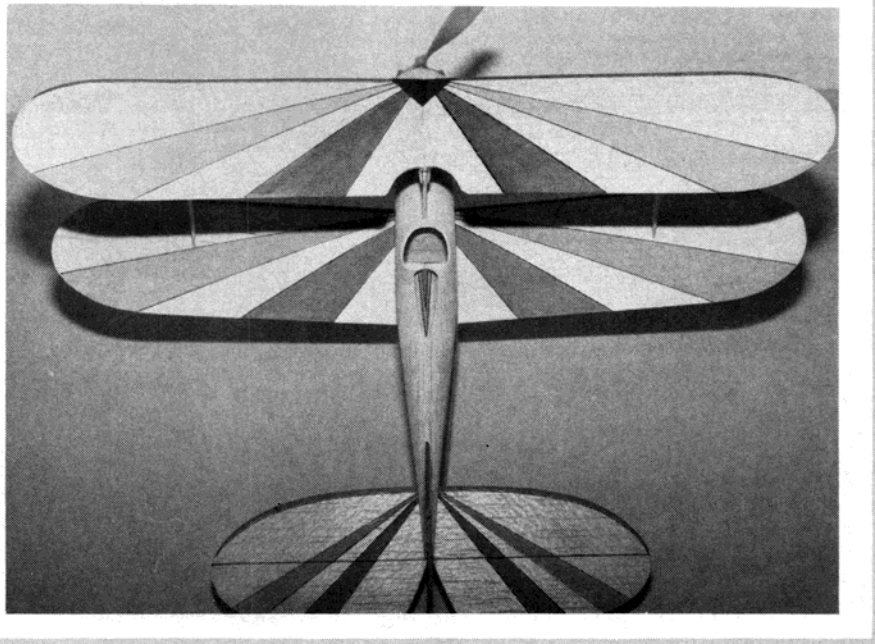
Actual construction starts with gluing the fuselage formers F-2 through F-5 to one fuselage side, making certain that right angles are maintained. Add the other fuselage side

and formers F-6 and F-7. Laminate the landing gear mount, sandwiching the landing gear wire between the pieces, and make up the 1/32 inch ply motor mount/F-1 laminate. Drill mounting holes as required for your CO_2 motor and cement the mounting bolt nuts to the backside of F-1. I mounted my Telco motor inverted so that the copper tubing to the tank and filler could be fed through the bottom sheeting. It's a little neater that way, I think, but you could mount the motor upright, if you prefer. Install the motor assembly at the angle shown on the plans and tuck the tank in between F-1 and F-3. If you want to make sure the tank doesn't vibrate excessively, wedge pieces of scrap 1/16 balsa on both sides of it holding them in place with a couple of drops of cyanoacrylate.

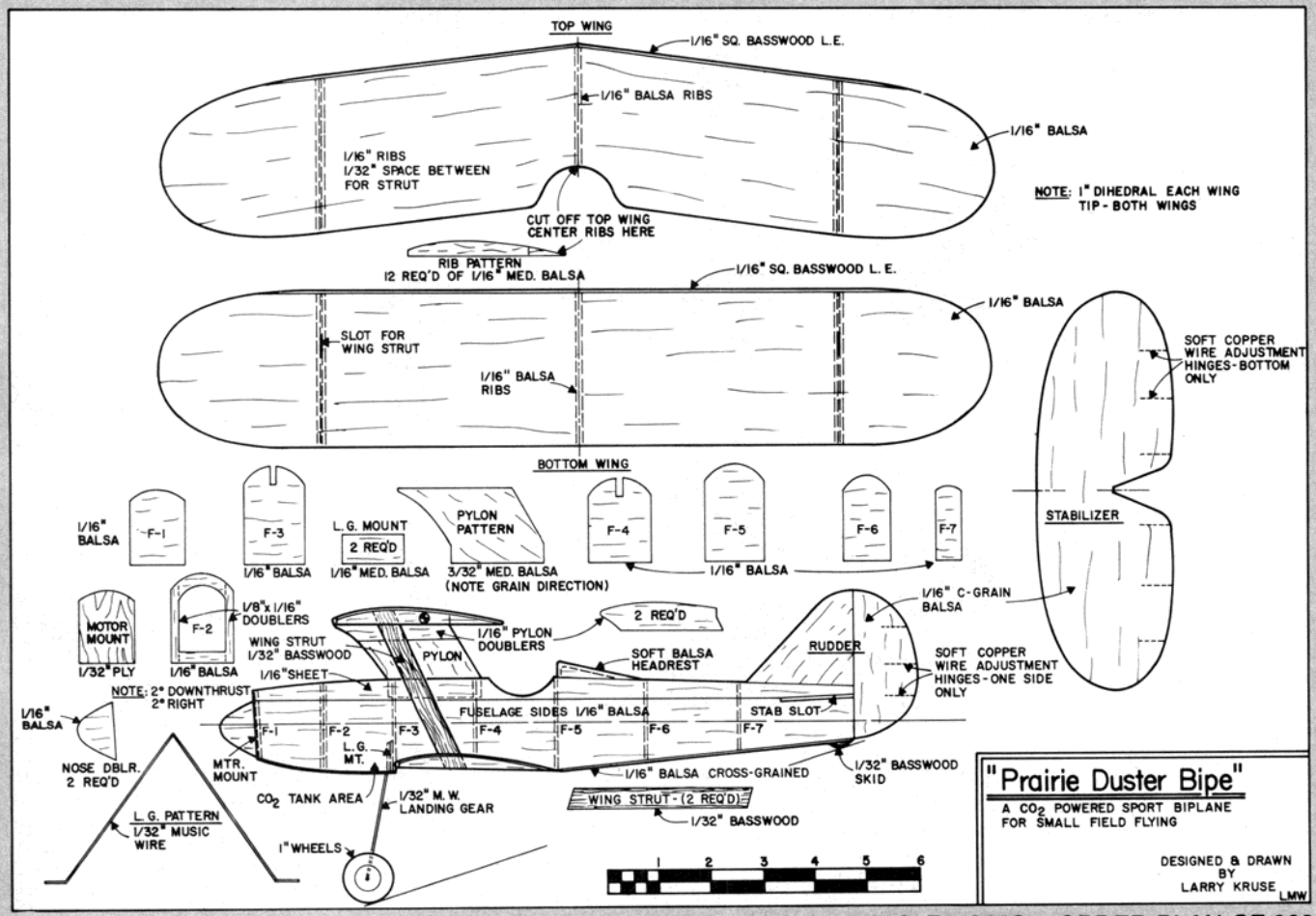
Basic fuselage construction is completed by gluing the 3/32 inch pylon in its slot in F-3 and F-4 and then adding the landing gear assembly. The top sheeting may now be glued in place via the "cut-and-fit" method. Moistening the top surfaces of the sheeting will allow it to conform to the curvature of the formers. Do not install the bottom sheeting yet. Set the fuselage aside for the time being until we get to the final assembly stages.

Don't glue the wings together, but do glue the ribs to the bottom of the wings at the locations shown, spacing the outside ribs about 1/32 inch apart to allow the struts to be slip-fit in between them. No such spacing is necessary for the center ribs, since they set atop the pylon and have doublers for added strength. To get the correct dihedral angle, position the center of each wing panel at the edge of your work bench, prop up the tip one inch, and sand the center rib as you would a hand-launch glider wing blank. Go at it gently, since you're only working with a 1/16 inch thickness. When angles have been sanded in each of the four panels, glue them together, maintaining the one inch per panel dihedral by blocking up the wing tips. Slots should now be cut in the bottom wing to accept the basswood struts.

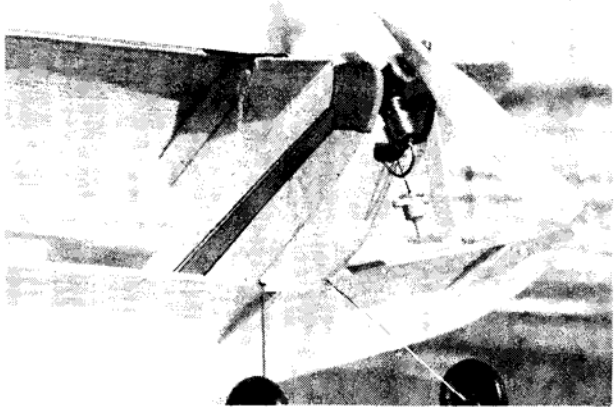
You may now glue the bottom wing into its fuselage slot and position the top wing on the pylon. Eyeball the whole thing from the front to make certain the wings are parallel to each other, then tack glue the top wing to



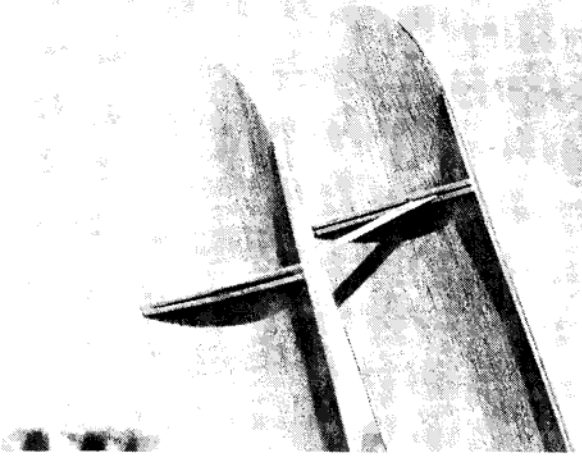
The *Prairie Duster* offers you an afternoon of fun at any local park or school with CO_2 power. The planform of the wing and the stabilizer offer ample area to provide you with a ship that's a fine stable flyer.



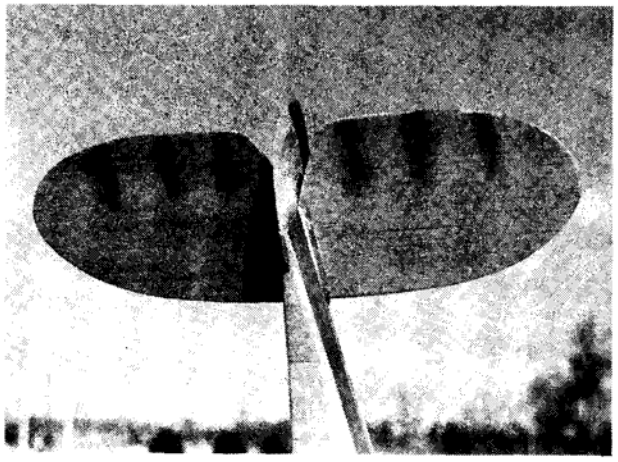
FULL SIZE PLANS AVAILABLE THROUGH CARSTENS FLYING PLANS ORDER PLAN CF-666

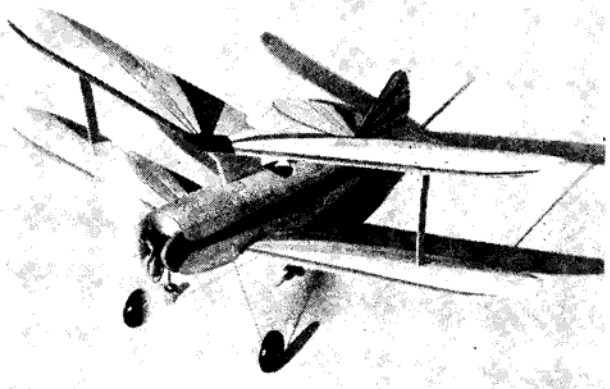


This photo of the nose shows the CO_2 mount and the filler nozzle exiting the bottom of the fuselage **(above)**. Soft copper wire on the bottom of the stab **(below)** makes adjustment easy without breaking wood.



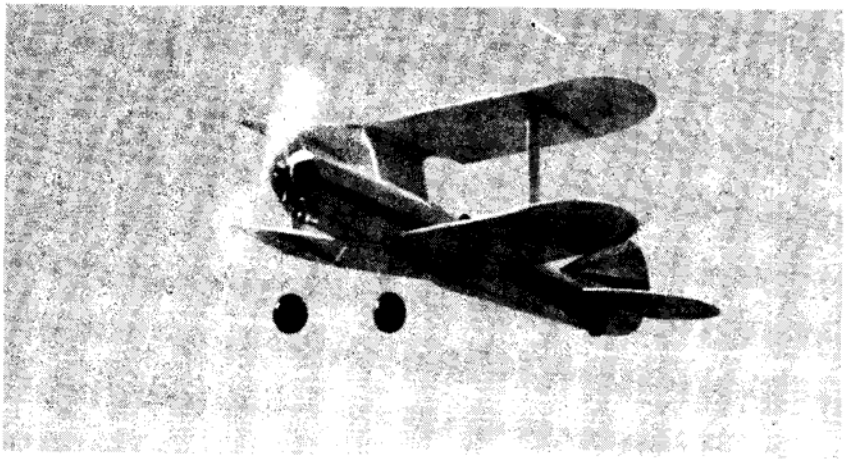
This shot illustrates how the wing strut is slipped between doubled wing ribs **(above)** and then glued in place. Holding for take-off, the *Prairie Duster* does its run-up **(below)**. Nice change of pace airplane.





the pylon. If everything is still straight, finish gluing the wing rib/pylon seam and add the pylon doublers to each side. The struts can be slip-fit into position at this time, but do check the strut angle and wing alignment before gluing.

The soft copper wires are glued to the bottom of the stabilizer and left side of the rudder using Ambroid or some other cellulose cement that will maintain a good degree of flexibility. A cyanoacrylate dries too brittle for this application. Insert the rudder and stabilizer into their respective slots, once again eyeballing the whole thing from the front to insure proper alignment and glue them in place. Bottom sheeting (cross-grained) and the small tail skid complete the little *Duster*. Like the man said: "When you're done – you're done."



Cruising across the frozen tundra. Surprisingly, CO_2 flights are possible even in cold weather by heating the tank when you simply breathe on it. All the trim on the plane was ball point pen and Magic Marker.

Flying tips

Balance the plane as indicated and set the engine for low power. Don't bother to test glide the ship without power. CO_2 ships lend themselves very well to safe, low-powered test flights which will tell you far more about how the plane is going to perform, anyway. Give the tank a gas only charge from a partially used cartridge and spin the propeller. Launch the plane gently straight ahead. In all probability, it will settle slowly to the ground about 30 feet in front of you. If it does, increase the power just a bit and try again. If it maintains level flight and a safe attitude, bend in just a bit of left rudder to get a gentle left turn. Increase the power moderately until the little bipe begins climbing as it turns, and you've got yourself many enjoyable hours watching it circle slowly overhead and land with the prop still ticking over. I hope you like the *Prairie Duster*.

CF-323 Medicine Man

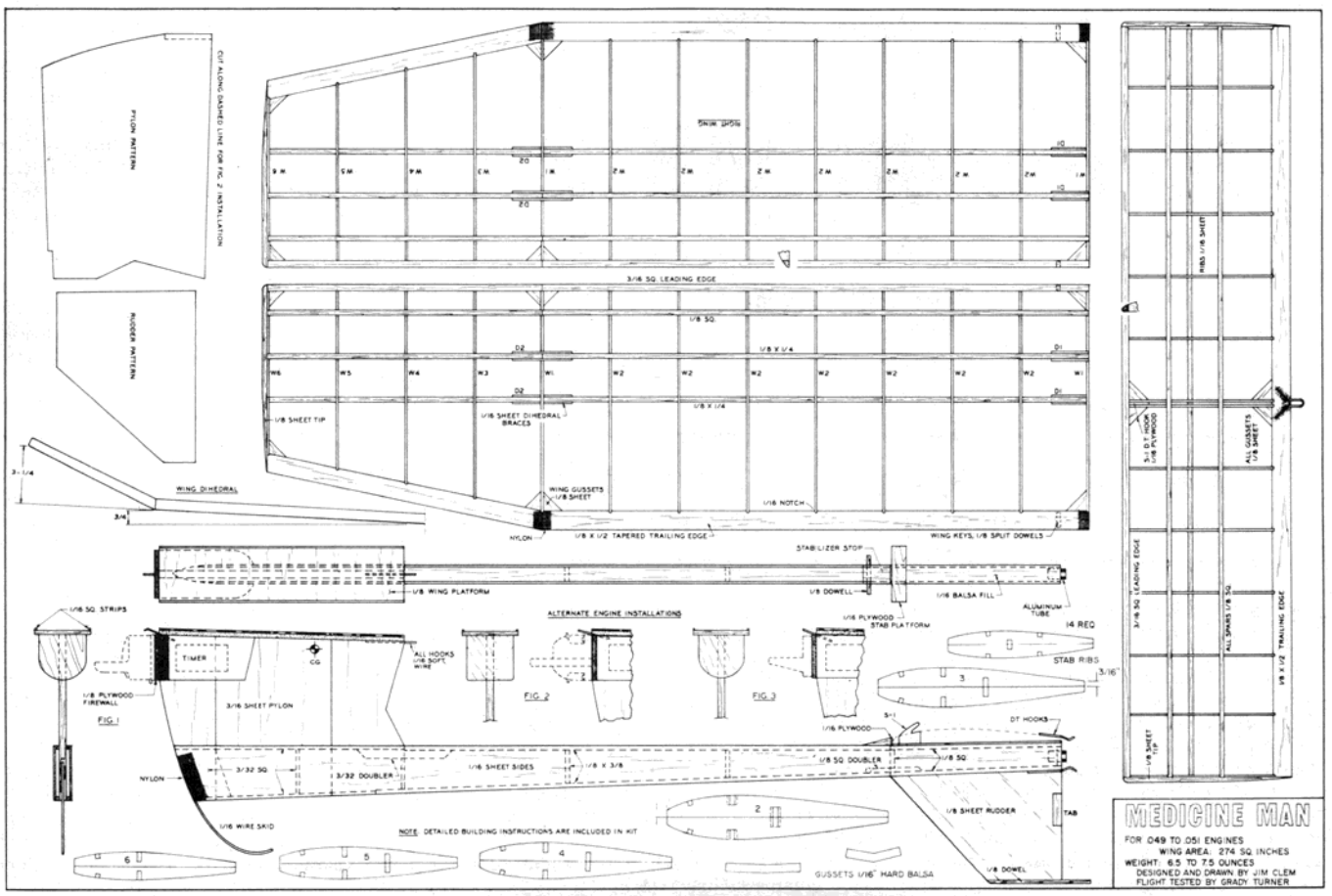
Freeflight designs that are both competitive and simple to build are few and far between. Designer Jim Clem seems to have made these qualities the foundation of his many published models. The *Medicine Man* is a practical design that can be easily built "on a flat board" while still retaining the contest winning performance of more sophisticated types.

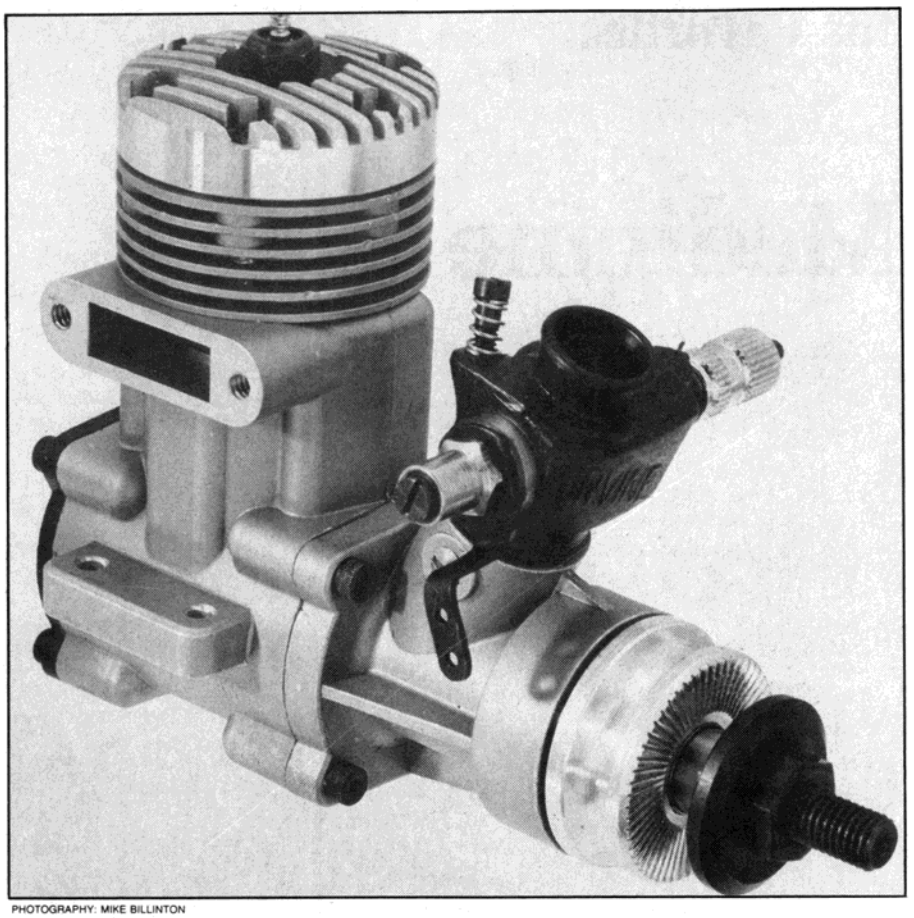
Here is a plane that fits the bill for both 1/2A and A classes alike. Proof of the *Medicine Man*'s mettle is the fact that it has either won or placed in every contest in which it has been entered, and that is a bunch!

Plans for Jim Clem's *Medicine Man* are available from Carstens Flying Plans Service. Order plan number **CF-323**.

A complete list of available plans was printed in the April 1982 issue of FLYING MODELS. Back issues of the magazine are available from Carstens Publications, Inc., P.O. Box 700, Newton, NJ 07860.

Carstens Flying Plans service offers a complete line of plans for R/C, C/L, and F/F planes, as well as model boats and accessories. For your convenience, both Visa and Mastercard are accepted.





PHOTOGRAPHY: MIKE BILLINTON

The Irvine .40 Mk. II is the latest engine to take its turn on the dynamometer. Though classed as a "sport" engine, it did reveal a considerable amount of power, especially with Irvine's Super Silencer.

An FM Product Review:

Irvine 40 MK 2

By Mike Billinton

This latest version of a popular .40 sport engine from Britain shows some distinctive features.

This engine test focuses on what is probably the most popular model engine capacity size — if number of sales are any guide. A test of a .40 sport engine is overdue from this writer, and it's purely a coincidence that the dynamometer used for this review first saw light in the workshops of Irvine's United Kingdom factory during 1978 with an Irvine 40 Mk. I on board. Since that time, its role has mainly been to cover some of the unusually large and/or powerful engines around. Now it's back to the first engine type it tested; this time, however, it's the Irvine 40 Mk. II version, kindly provided by Ralph Stompanato at Midwest Model Supply Co., facing its turn on the dyno.

The original Irvine 40 Mk. I was designed by Ron Irvine around 1975 and had the effect of raising performance standards in a predominantly "sport" or medium performance area. It was not alone in this, of course, with K&B and Webra, for example, providing high-performing units, but Irvine Engines was the first UK manufacturer to gain significant commercial success in this area.

The writer's only direct competitive involvement with this initial version was an early prototype drum valve racing version of the Mk. I which achieved 180 MPH back in 1978, showing signs, even then, of particularly high RPM possibilities.

Some distinctive features which set the Irvine 40 Mk. II apart from its numerous competitors are: a return to a multi-ported liner, but with the modern difference that these are cast in place; pressed-in crankpin with no lubrication holes in the rod end bearing; and significantly high effective compression ratio of 11.7:1 (that's 15.8:1 geometric).

Mechanical descriptions

Crankcase is a very solid investment casting of medium silicon content aluminum alloy. Externally, the case shows two large main transfers having parallel sides, but, internally, these are, in fact, tapered to accelerate gas flow at their upper ends on entry to the cylinder. A boost passage connects the lower crankcase and upper cylinder solely via a large cutaway in the piston side (similar to the old Dooling 61 style some will remember). Internal finishing is to a high standard with recourse to diamond turning.

Front housing is separate from the main case and uses the same material and casting method. As this Mk. II engine now accommodates a larger crankshaft, the front housing is now on a grander, more robust scale than the earlier Mk. I. The main, rear ballbearing acts as a locater in the crankcase — a method saving manufacturing time and easing disassembly problems which can occur with tight fitting standard front end assemblies having identical aluminum alloy parts. No problems occurred during this test relating to the differing thermal expansions of a steel race and an alloy housing and case.

Crankshaft is case-hardened, low-carbon steel having a very high machinability rating. This combination has proven more reliable than the nominally much tougher (and harder to machine) nickel steels. Since a pressed-in, hardened crankpin is used, it could be argued that the remainder of the shaft does not need hardening, but Irvine Engines says that this is not so since wear still has to be taken into account at the induction entry point. This hardening also adds slightly to the overall strength of the shaft. This Mk. II part is relatively massive at 15 mm O.D. and 10 mm I.D. giving an approximate wall thickness of .1 inch. Failures will likely be rare! The usually vulnerable propeller bolt is a separate, easily replaceable threaded stud. Appropriately, a substantial prop driver and brass collet is used, resulting in a complete front-end of marked solidity.

Cylinder liner has an unusual casting method — steel investment casting having all ports pre-cast at that stage. After case-hardening, the liner is finished — ground on top, outside, and bore surfaces after which internal honing is carried out. Port bars are used all around with the three side schnuerle transfers being respectively angled away from the exhaust port at 20°, 30°, and 40° (looking down the cylinder). Viewed across the piston crown, the boost ports point up at 60° — all other ports lying at right angles to cylinder.

Piston is diamond turned from an investment casting on medium expansion 12% silicon aluminum alloy, and so reduces running-in problems when compared with use of a high expansion/high duty aluminum alloy within a ferrous liner.

Piston ring is turned from ductile iron in a Dykes format ("L" shaped ring) and fitted at low-pressure. The ring is allowed to fully float around circumference of the piston because the port bars prevent the ring from springing out into the ports.

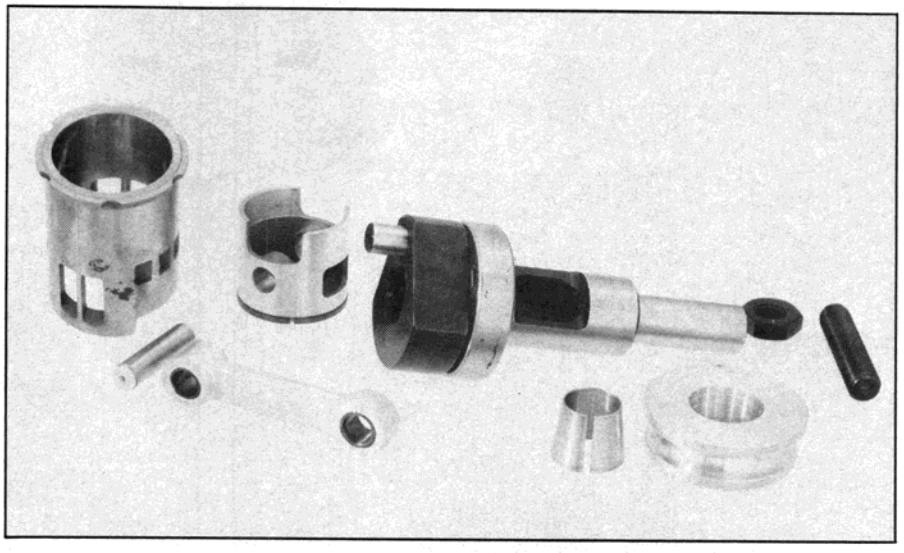
Wrist pin is hollowed, heavy duty steel, finish ground, and located axially in the piston with PTFE end pads which traverse the transfer port bars.

Connecting rod is an aluminum alloy forging (RR56 heavy-duty alloy specification). Phosphor-bronze bushings are fitted at each end, and — an Irvine feature — no lubrication holes are incorporated. I cannot recall rod failures where lube holes are absent but definitely some where holes were featured. But to be objective about it, the drilled rods were in very high output racing engines . . so a little premature to draw hard conclusions.

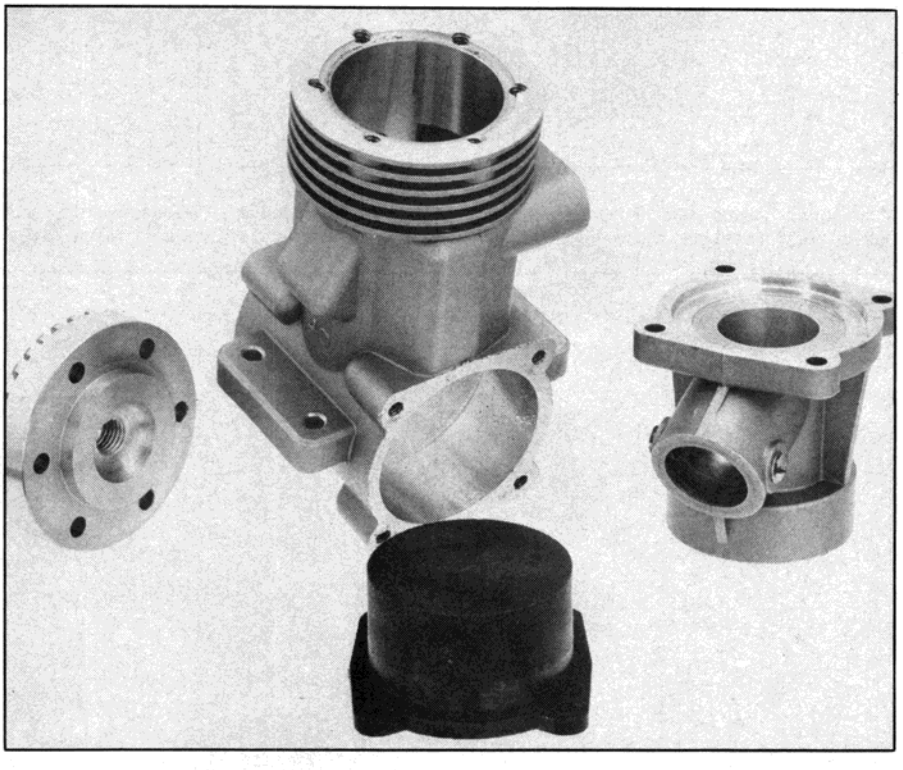
Cylinder head is cast in light alloy; it takes a long reach plug, and features a wide squish band at .013″ piston clearance and a quite shallow combustion chamber — these all leading to an unusually high compression ratio.

Carburetor is black, reinforced plastic with twin needles and a 7.54 mm bore. This results in a quite restricted throttle area of 25 sq. mm — though this leads to less sensitive handling when using non-pressurized fuel systems.

All screw fittings are Allen head (except for the carburetor securing studs), and though these are expensive items in themselves when considering commercial production runs, they do confer some advantage of security, consistency of torque input when using the standard key size, and good, long-term appearance.



The moving parts inside have some noteworthy elements (**above**). The crankpin is pressed into an especially wide counterbalance. Piston uses a Dykes ring and all the ports in the liner are cast in place. The connecting rod has no lube holes. Nothing very noteworthy in the main castings (**below**) with the exception of the plastic backplate. The shallow recess in the front case seats the main bearing.



Break-in

Prior to putting the Mk. II on the dynamometer for the torque runs, a period of break-in proved essential and certainly longer than is required for a typical ABC engine. The alloy piston in a ferrous liner remains a material combination requiring carefully graded running-in. This is worth emphasizing because the increasing use of the non-ferrous lined ABC engine which requires minimal break-in can instill incorrect practices for those whose only experience has been with the ABC engine. So, light loads, rich fuel settings, and short bursts of running are what's needed first. Then, gradual moves to over 30 minutes or more of running time with more load, less rich settings, longer runs. In this, the Irvine 40 differs not at all from other engines (full-size or model) having such liner/piston materials. It does, however, have a high compression ratio which effectively causes a relatively advanced ignition point and a resultant strong power output at high RPM where the high compression ratio is at its most effective. Consequently, the Irvine 40 benefits, more than some engines, from use of cooler, richer fuel settings and adequate cooling in the first hour or so of operation. Tied in with all this is the Irvine recommendation to use K&B glowplugs, which are classified as "cold" plugs. This keeps the ignition point from becoming too advanced and thus averts over-hot running conditions.

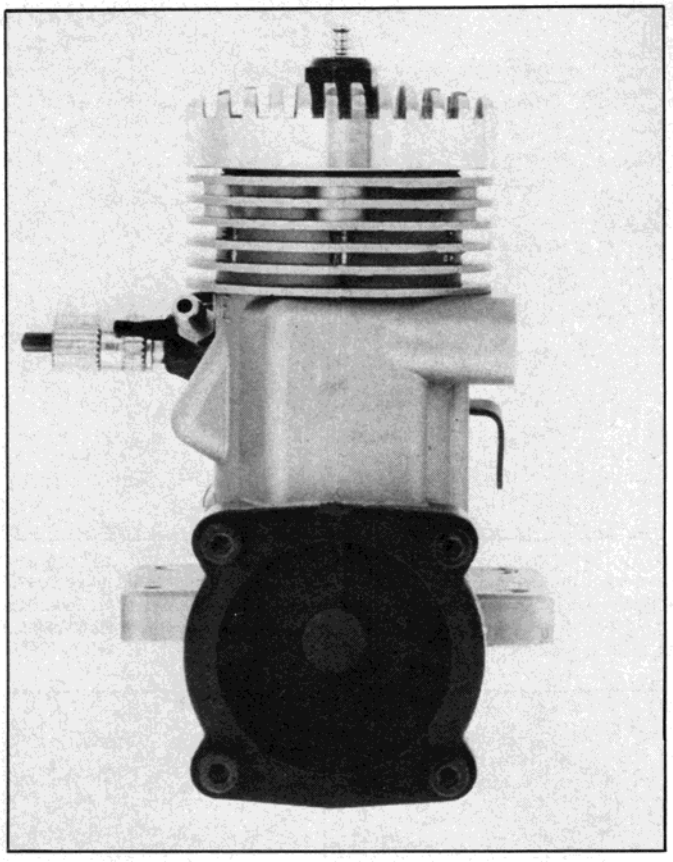
Performance Test

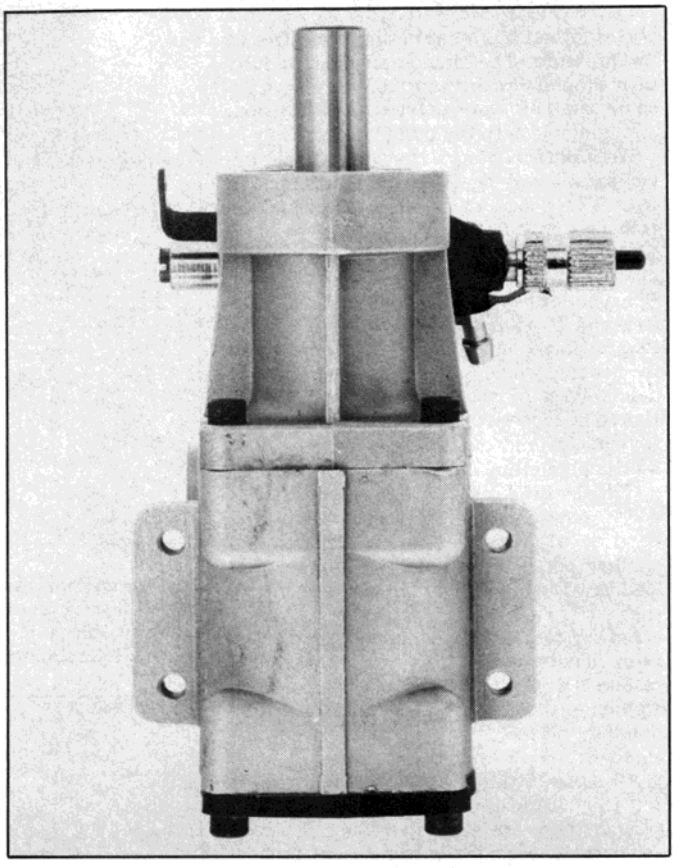
Test 1. Open exhaust/5% nitromethane/20% castor.

Given the high compression ratio and the likely sport usage, the use of high nitro fuels in this engine is almost pointless and would add unnecessary heat anyway. It follows that synthetic oils will not be required for nitro mixing reasons, so the manufacturer's advice is to use castor oil at 20%. Starting at 5,000 RPM, torque rose considerably from the 53 ounce-inches seen at this point to a high of 75 ounce-inches around 10,000 RPM. The normal decline seemed to set in thereafter, but at 14,000 RPM, a reduction in the rate of torque decline was observed, this leading to a final BHP figure of 1.18 at 18,000 RPM.

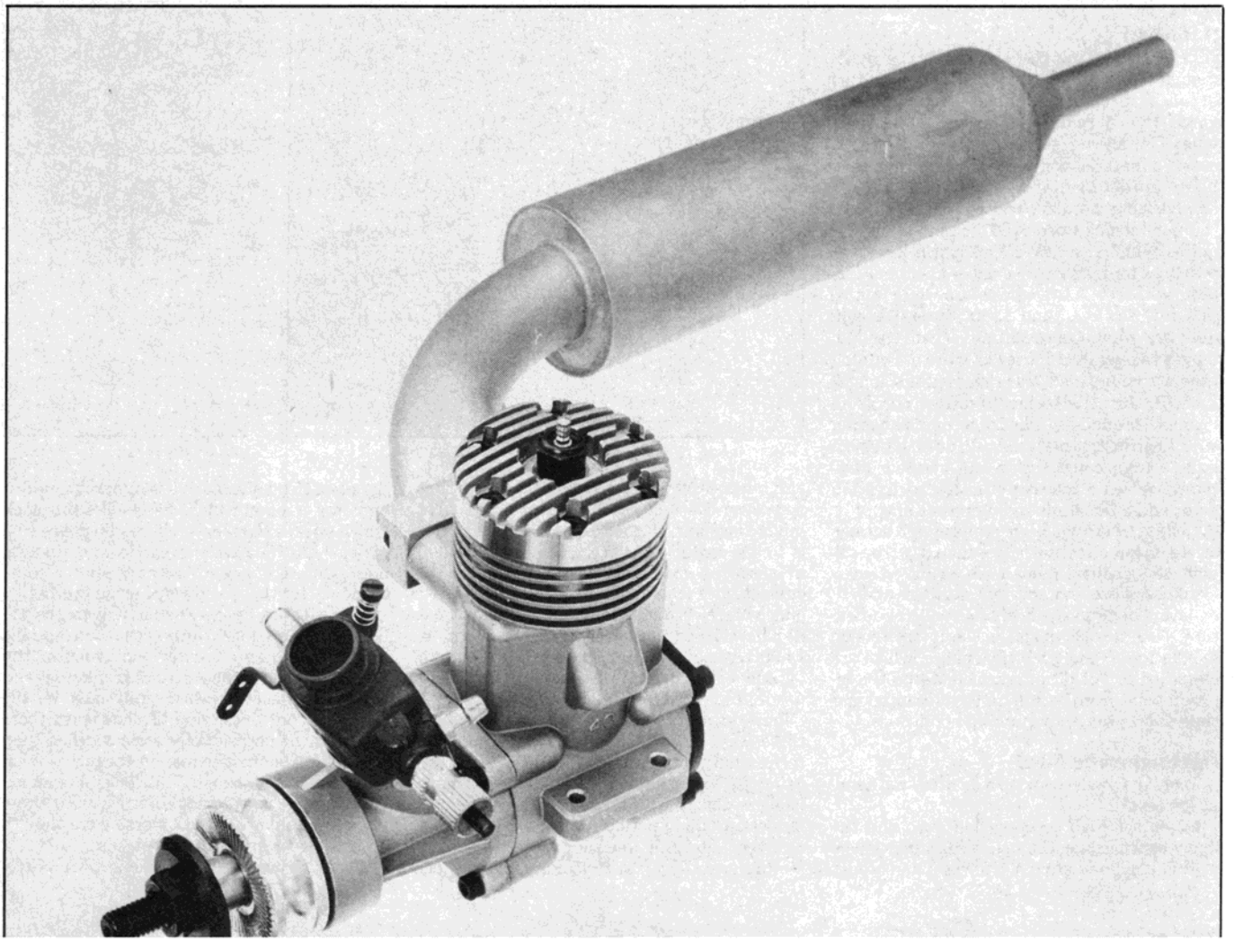
This particular curve can be looked at three ways; either there is a "hole" in the torque output, which would be a little unusual for open exhaust results or — more likely — that the high compression ratio and induction timing period combine to produce a recovery at high RPM, leaving the torque readings at lower RPM looking a little deflated. A third alternative is dynamometer or operator error, in which case — like the clock which strikes thirteen — all readings are suspicious! Of the tests I've carried out to date, approximately one in five have shown some tendency for this "recovery" when the engine is run with an open exhaust. Given the extremely wide RPM range, the consequent large changes to fuel/air movements, the pressures within the 2-stroke crankcase, and the effect these variations may have on the particular port/induction timings used, there is reason to occasionally expect other than perfectly smooth declines in torque — even with the open exhaust. This looks like an excuse, but we're sometimes stuck with these "holes" and it would feel worse were they to be ignored or smoothed over.

Test 2. Irvine standard silencer/5% Nitro/





A number of unique features characterize the Irvine. The rear view (**above left**) shows that the boost port connects through the piston only. The bottom view (**above right**) shows the extra webbing on the front case. The Irvine Super Silencer (**below**) gives very good power increase.



20% Castor.

With this equipment, low speed torque was quite high, and only started to decline from the high of 67 ounce-inches from 11,000 **RPM** onwards. Increasing back pressure (the result of a fixed volume silencer with the increase of exhaust product flow as **RPM** rises) naturally led to a reduced final power out-put compared to the open exhaust test. Nevertheless, the .91 BHP recorded at 17,000 RPM still revealed the rather high RPM capabilities of this Mk. II engine. Silencer outlet diameter is 7½ mm.

Test 3. Irvine's Super Silencer 40/5% nitro/ 20% Castor.

This "Silencer" was provided by the UK Irvine factory and is a response by them to the conflicting demands of noise reduction and increased power demands. In fact, like many exhaust extensions fitted to 2-stroke units, this is an "acoustic" device harnessing both positive and negative exhaust waves to effect a greater movement of fuel/air mixture than is obtainable with an unrestricted exhaust. This can lead to a large power increase, as most modelers know, and at the same time, eventual sound levels emitted are reduced because much of the *initial* sound energy (which is the main noise source) is expended within the confines of the given silencer. On the power side, tuned exhausts only work effectively at particular harmonic points, and this Irvine Super Silencer is no exception; it is virtually a minipipe silencer (hitherto much favored in the model car world) and has the characteristically wide RPM band response of these devices when compared to twin-cone tuned pipes. Final outlet diameter is 6½ mm.

In power and noise output terms this silencer succeeds very well in its aims; the figures show its considerable power superiority over the standard silencer power outputs about 12,000 RPM as well as being ahead of open exhaust figures in the 13,000-17,000 RPM range. This is a consequence of Irvine Engine's decision to fix the effective length so as to achieve a peak power point which is in a more usable range for a sport type engine.

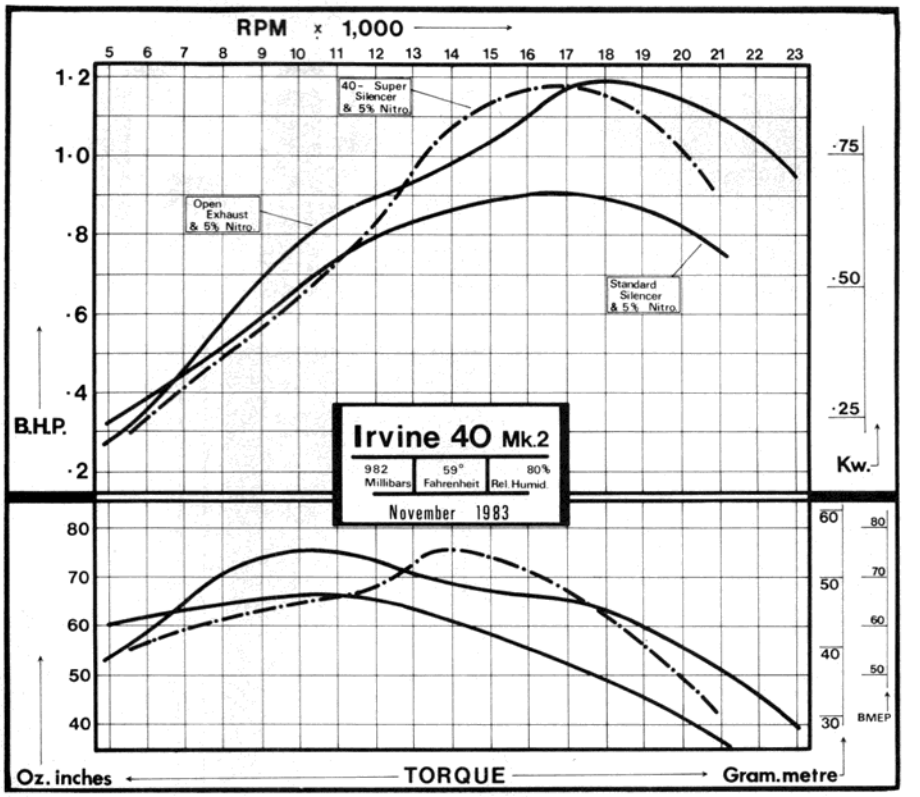
This Super Silencer 40 pipe is of very solid one-piece construction incorporating a 3/8 inch thick, welded-on exhaust flange and manifold which enables the whole pipe to be self-supporting. It weighs in at four ounces with main chamber dimensions of 4½ inches long × 1⅜ inches in diameter; the minipipe diameter is ¾ inches. The required robustness means there is no weight advantage over a standard quiet tuned pipe — but its mounting is more convenient and compact.

Summary

The .40 cubic inch engine has been at the heart of the Irvine production line, and the generally high construction standards and positive operational response of this latest Mk. II unit bode well for future designs from this factory.

The attraction is increased by the ease of availability, the fit and operation of the power-enhancing minipipe muffler, and the fact that this Super Silencer 40 is standard equipment with the Mk. II.

Certainly the use of these silencers in the model car world has proven very effective over several years past, and it is somewhat strange that their complementary use in model aircraft has been relatively so infrequent. Perhaps, this engine/pipe combination may pave the way in this arena.



Irvine 40 Mk.II R/C Sports

Dimensions & Weights:

Capacity - .408 cu. in. (6.69 cc)
Bore - .841 in. (21.36 mm)
Stroke - .735 in. (18.67 mm)
Stroke/Bore ratio - .874/1
Timing periods - Exhaust - 148° Front Induction - Opens 34° ABDC
- Transfer - 128° Closes 56° ATDC
- Boost - 120° Total - 202°
Ex. port height - .203 in.
Combustion chamber volume - .45 cc
Compression ratios - Effective 11.7/1
- Geometric 15.8/1
Cylinder head squish clearance - .013 in.
Squish band angle - 0°
Squish band width - .18 in.
Crankshaft dia. - .5905 in. (15 mm)
Crankpin dia. - .2175 in. (nominal 7/32 in.)
Crankshaft bore - .392 in. (10 mm)
Crank nose thread - .2438 in. × 28 T.P.I. (1/4 UNF)
Gudgeon pin dia. - .2028 in. (nominal 13/64 in.)
Connecting rod centres - 34 mm.
Mounting holes - 19/16 in. × 11/16 in. × 3mm holes.
Distance between bearers - 15/16 in.
Length - 3⅜ in.
Width - 131/32 in.
Height - 33/16 in.
Frontal area - 4.44 sq. in.
Overall weight - 113/4 ozs. (.333 Kilo)
Carburetor bore - .297 in. (7.54 mm). X-sectional area 25 sq. mm.

Performance:

Max BHP - 1.18 @ 18,000 RPM (Open Ex./5% Nitromethane)
- .91 @ 16,900 RPM (Standard silencer/5% Nitro.)
Max Torque - 76 oz. ins. @ 14,000 RPM (Super silencer/5% Nitro.)
- 67 oz. ins. @ 10,700 RPM (Standard silencer/5% Nitro.)
R.P.M. Standard propellors:

	Open Ex.	Standard Sil.	Super Sil.
12 × 6 Zinger	9,800	9,180	8,500
11 × 5 Topflite M	12,200	11,180	11,490
10 × 4 Zinger	15,010	14,360	15,300
9 × 4 Zinger	17,710	16,400	17,400

All on 5% Nitromethane.

Performance Equivalents:

BHP/Cu. in.	-	2.89
BHP/cc.	-	.176
Oz. in./cu. in.	-	186.2
Oz. in./cc.	-	11.36
Gm. metre/cc.	-	8.07
BHP/lb.	-	1.60
BHP/Kilo	-	3.54
BHP/sq. in. frontal area	-	.26

Manufacturer:
Irvine Engines Ltd
London,
U.K.

U.S. Distributor:
Midwest Model Supply Co.,
1354 Naperville Drive,
Romeoville, IL 60441
U.S.A.

HIGH-FASHI

SLEEK. STYLISH. ELEGANT.

INTRODUCING ALL THAT'S NEW AT ROBBE IN 1984.

Come to Toledo and see Robbe's exciting new '84 models. The ultimate in high-style, high-performance R/C boats, aircraft and land vehicles that give you so much more: more detail, more durability, more engineering excellence.

You'll even meet "Charly," Robbe's remarkable new radio controlled parachutist who will jump right into your heart.

SEE US AT THE SHOW

We'll be at the Toledo R/C model trade show April 6, 7, 8.

If you can't make the show, be sure to stop by your favorite R/C hobby shop and pick up our latest full color flyer. It's a winner.

ATLANTIS

A picture perfect two-masted gaff schooner you can sail under most wind conditions. Its hydrodynamically designed, seamless Plura® hull and five large sails give Atlantis remarkable stability. Its masts, jibs and booms are aluminum. Pre-sewn sails, optional cast-iron ballast keel and proper fittings shorten building time.

Length: 55 in. Height: 68 in. Beam: 13¾ in. Draught: 9½ in. Atlantis No. 1130. Ballast keel No. 1131. Fittings set No. 1134. Other options: Genoa sail set No. 1132. Exotic wood planking No. 1133.

LEOPARD

The most sophisticated off-road, 4-wheel drive vehicle available. It has three differentials, Kardan drive and independent suspension. These features, plus four oil-filled shocks, disc brake, roll cage, crown wheels and 18 ball bearings in the transmission and axles, bring you a new standard of excellence in model car engineering. Adjustable ground clearance, spring tension, castor angle and toe-in.

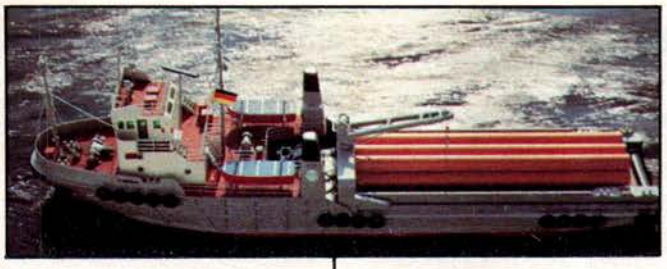
Length: 19½ in. Leopard No. 3720.

PRESTO 4 X 4

A highly competitive off-road vehicle that comes completely assembled (except for engine and radio). Presto's lower Ergal chassis, with the Ergal power pod, combined with top chassis, gives Presto extra protection. Presto has two oil-filled shocks and torsion springs that let you adjust the wheel suspension for any road conditions. It also has an integrated disc brake system and a robust chain transmission.

Length: 18 in. Presto No. 3769.

ON MODELS.



REMBERTITURM

An incredibly detailed oil drilling platform supply vessel. With optional fittings you can make bow thruster, radar antenna, lights, winches and anchors workable. It's a modeler's delight.

Length: 47½ in. Weight: 26½ lbs. Rembertiturm No. 1077. Fittings set No. 1078. Winch set for crane, anchor and towing No. 1079.

FIRE ENGINE

This high speed airport fire engine features a variety of real-looking movable parts: the fire monitor, for example, can be raised, lowered and swiveled to squirt water in any direction. Optional headlamps, rear lamps, flashing lights, turn signals, brake lights, horn, siren and diesel sound all operate and add an exciting dimension to your R/C model hobby.

Length: 28 in. Weight: 9 lbs. Fire Engine No. 3625. Special functions set No. 3626.

SCHÜTZE

A sleek, swift, handsome-looking minesweeper that will catch everyone's eye, but leave other boats far behind. The optional fitting set contains more than 240 parts.

Length: 47½ in. Weight: 12 lbs. Schutze No. 1091. Fittings set No. 1092.

PIPER SUPER CUB

Inherent stability makes the Piper easy to fly. Its specially designed air foil and flaps give it short take-off, landing and low-speed capabilities. These features also permit sailplane and banner towing, as well as the launching of Robbe's skydiver, "Charly."

Wing span: 83 in. Length: 49 in. Weight: 10 lbs. Piper Super Cub No. 3106.

CHARLY

A fully steerable skydiver you can launch by remote control from Robbe's Piper Super Cub. Let Charly "free-fall," then open his "chute" and direct him right to the spot you wish. Kit contains painted Charly, pre-sewn parachute with cords and fittings.

Size of parachute: 39 in. x 27 in. Charly's weight: 1¾ lbs. Charly No. 3000.

See all our high-fashion models at the Toledo R/C model trade show April 6, 7, 8.

robbe

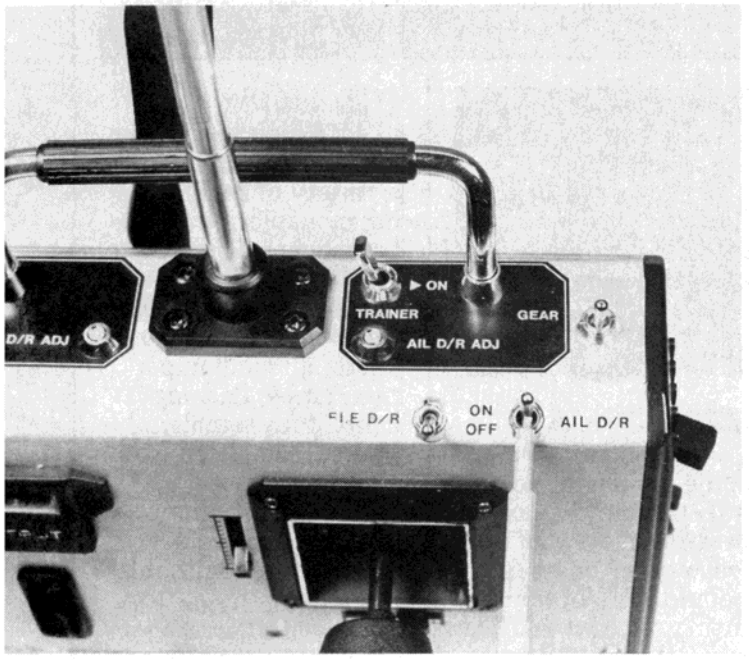
A New Dimension In Modeling

Suite 345/55
The Office Center
Plainsboro, NJ 08536

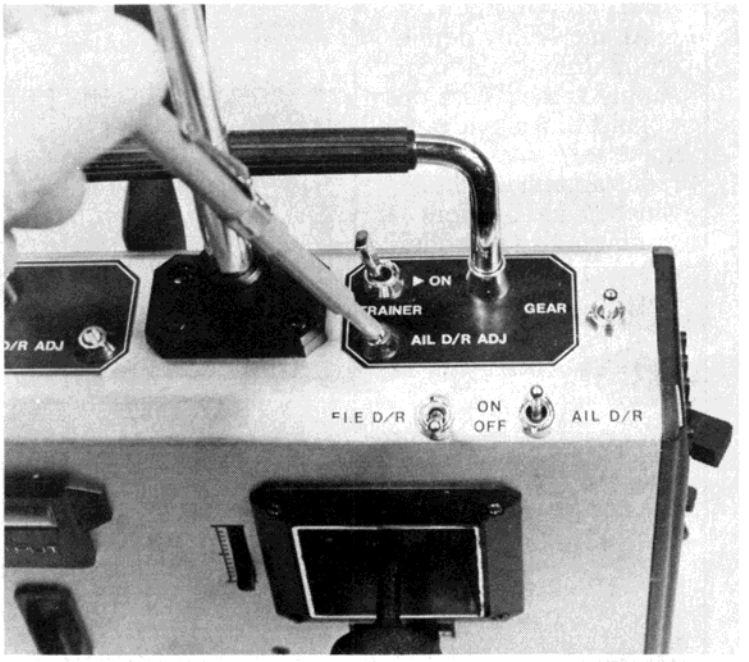
Dual Rates . . . and the beginner

By Bob Aberle

Should a beginner consider dual rate controls on a first R/C system? Yes! The advantages are explained here in understandable terms.



Bob's Airtronics Championship, single stick transmitter is used in these illustrations. This sytem is generally available in the $250. bracket. In this photo, the plastic tuning wand is pointing at the aileron dual rate switch (AIL D/R) which is in the "ON" position.



With the "AIL D/R" switch in the "ON" position, you can rotate the "AIR D/R ADJ" pot control to reduce the maximum aileron servo control throw. A small screwdriver is used in this photo to do the actual adjusting. It is not really recommended to attempt adjustments while the model's in flight.

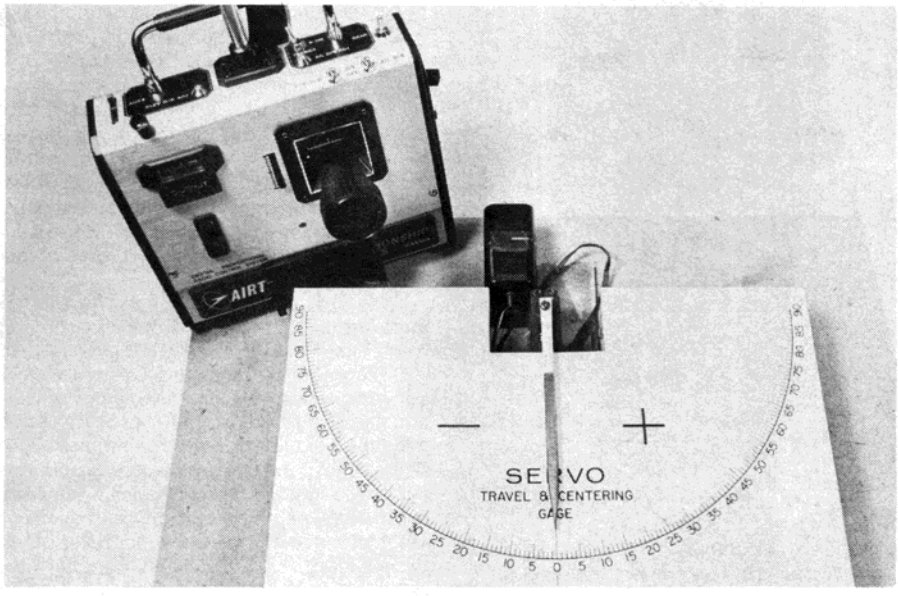
Quite often we receive letters from potential R/C enthusiasts or beginners inquiring about the usefulness of dual rate control in an R/C system. Years ago, dual rates were featured only on premium radios at a premium price. In recent times it is now possible to obtain dual rate control on even the most basic of radio systems. With that being the case, would an R/C beginner want to consider having the dual rate feature on his/her first radio control unit?

The answer is definitely yes! Let me see if I can explain this in everyday R/C terms. Dual rate control is generally offered on the two main flight control functions of an R/C transmitter (usually aileron and elevator control to be specific). It basically involves the use of a switch (identified as a dual rate cut-back switch or simply dual rate on/off) and an adjustment control (called a "pot" which is short for potentiometer). This pot will let you reduce the maximum servo control throw or rotation by 50-75 percent. Several basic R/C systems are presently being offered with the dual rate feature in the $130-$160 price range, which is quite inexpensive by today's standards.

With dual rate control you are able to adjust the amount of servo control throw for the particular channel involved. Let's say you set your maximum elevator control surface deflection to 1/2 inch on either side of the neutral position, per the instructions supplied with the model. On the first flight the plane appeared to have too much elevator throw causing an over-control situation. This condition can be easily corrected by turning on the elevator dual rate switch and then using the pot adjustment to somewhat reduce the maximum elevator control throw. After making this adjustment, another flight will determine if you have to check out the elevator control response.

Keep doing this gradually until you feel comfortable with the control. The same situation would be true for the aileron control function. Using dual rate control in this manner is far easier than adjusting the mechanical linkage at the control surface or at the servo output arm (inside the model).

In another example, you might want to pre-set your aileron and/or elevator control surfaces to an amount that is more than specified on the plans or instructions. Then switch on the dual rate function and reduce the control throw a small amount in each case. Go back to full control (dual rate off) and attempt your first flight. If the control throw is obviously excessive, simply switch on the dual rate (while in the air) and your maximum control throw position will be reduced to that pre-set amount. Thereafter you

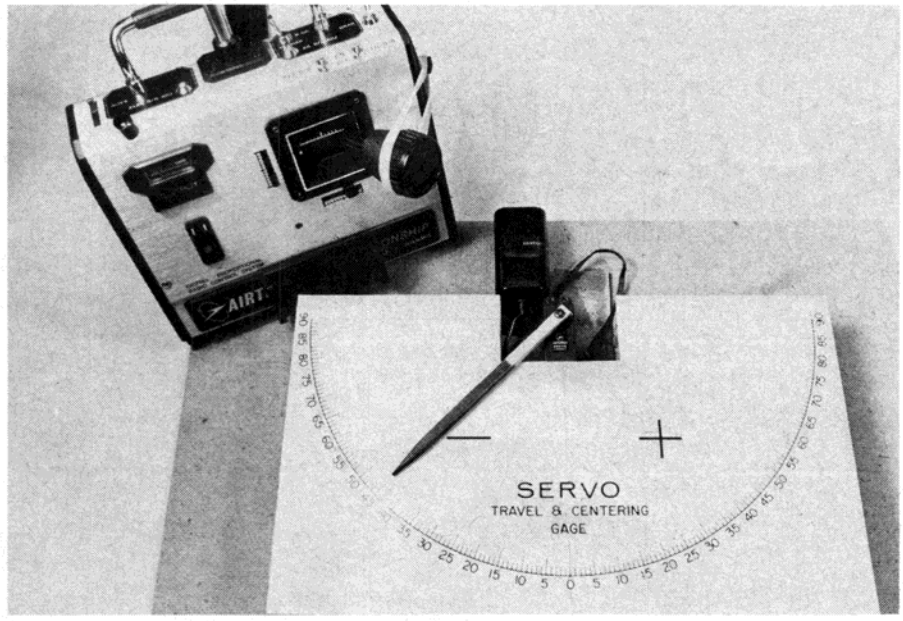


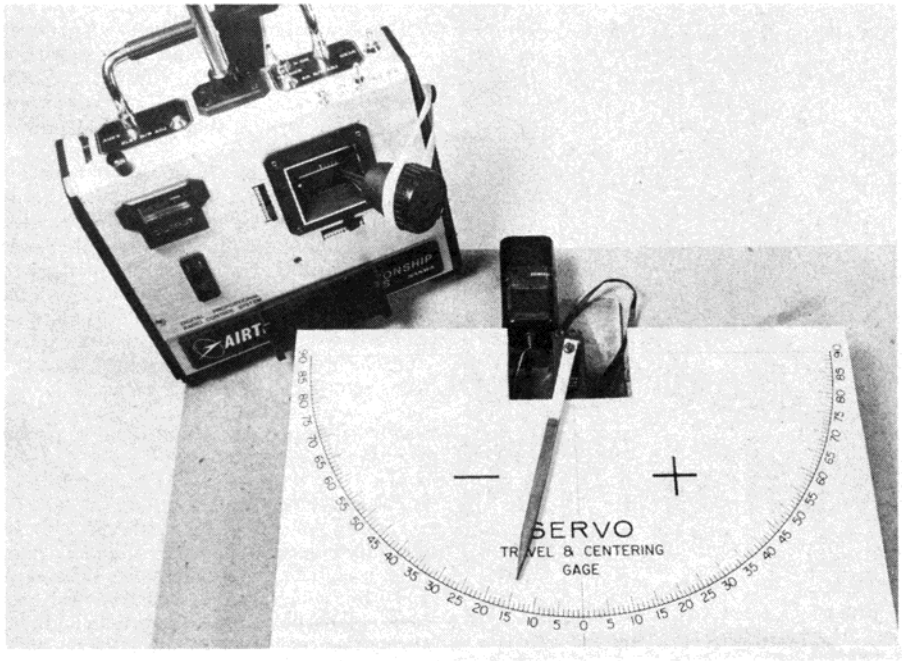
The three photos on this page graphically illustrate what happens when a dual rate is adjusted. In this first photo, at left, a single servo (with the large pointer attached), is connected to the aileron channel function of this Airtronic's R/C system. The transmitter control stick is at the neutral position, the aileron dual rate switch is "OFF" and the aileron servo is at neutral or 0°.

can adjust (fine tune) the exact position using the pot control as noted in the previous paragraph.

As originally conceived, dual rate control was primarily intended for the more advanced R/C pilot. In this application you established maximum control throw settings for use during take-offs and landings. Once in the air the dual rate function was switched on, thereby limiting the control throw to some (pre-set) reduced amount. Doing this tended to de-sensitize the control feel during the high speed portions of the flight. Pylon racers found this feature especially helpful. R/C pattern competition flyers also use the dual rate feature to help perform certain maneuvers which selectively require less than normal control throw (for example: a slow roll).

Hopefully these examples will give you a little feel for the importance of dual rate control. It is definitely worth having, even for an R/C beginner and particularly if the price is right. So if you have the chance to obtain this feature for only a few bucks more . . . go for it.





A rubber band has been pressed into service (**above**) to hold the aileron transmitter stick at full right control. The aileron dual rate switch is still "OFF" and the aileron servo (indicated by the pointer) is at full control throw (in this case, 45°). In this last photo (**left**), the aileron control stick is still hard over to the right, but the aileron dual rate switch is now "ON" and since the aileron adjust pot was turned to maximum reduction, the aileron servo rotation is limited to just 15°. The pot adjust will let you vary the servo control throw from 45° full rotation all the way down to 15° in this example. Precision electrical adjustment of the control surface is a big bonus feature of dual rate control which even the R/C beginner can appreciate.

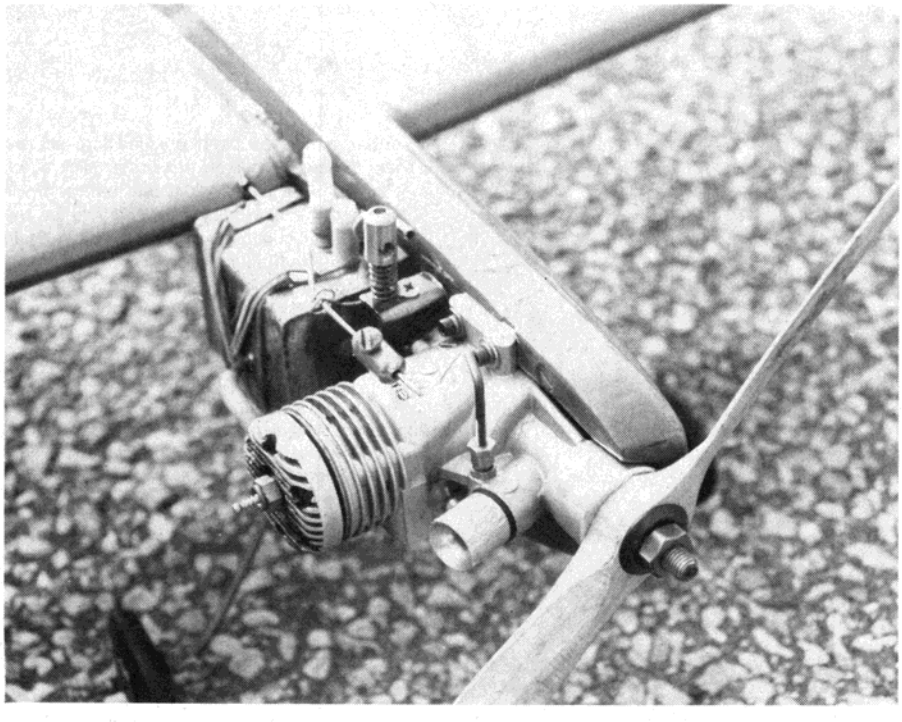
PHOTOGRAPHY: BLAIR MONAGLE

There seems to be an event common to most controline racers. The *Big Quickie* exemplifies that type of racing called Big Goodyear in New Jersey. The event uses .35's but they're not as fast as Slow Rat.

Big Quickie

By John Ross

Formula C/L racing is fun and competitive. This "Big Goodyear" is among the best.



The SuperTigre G-21, a favorite of many racers is the motive power for the *Big Quickie.* However, it's only one important part of a complete "racing system" where the sum of *all* the parts creates a winner.

While I was at the Nationals in Massachusetts this past summer, I had a chance to talk with several people who like to race controline airplanes. They were from all parts of the country. One event, that we all seemed to have in common, was a limited type of racing for .35 size engines. The rules were different, depending upon the region, but they were all saying the same thing. The flyers like to race .35's but didn't want to go as fast as Slow Rat.

The *Big Quickie* was designed for the formula we use for this type of racing here in New Jersey which is called Big Goodyear. The planes must resemble a Goodyear racer and have a two wheel landing gear. We use a two ounce gas tank and 100 lap heats with a 200 lap final. No pit stops are required. The most popular race plan is to try for 50 laps per tank and go as fast as you can. The leaders in Big Goodyear are coming in at about ten minutes flat for 200 laps. Our racer is patterned after the *Lil Quickie* Formula One racer designed by George Owl and built in the early 1970's. The *Quickie* makes a most attractive racer that flies well. Many are seen in 1/2A and .15 racing events. As far as good flying goes, the *Big Quickie* is second to none.

The construction of the *Big Quickie* is pretty straightforward except for the aluminum engine mount plate. The original *B.Q.* used this set-up and the front end is still like new after three years of intensive racing and test sessions. Make sure that you get a piece of hard aluminum and secure it to the maple mounts with wood screws and epoxy. The engine mount bolt holes are drilled and tapped right into the maple mounts and use 3/4 inch bolts. The shut-off can also be mounted to this aluminum plate.

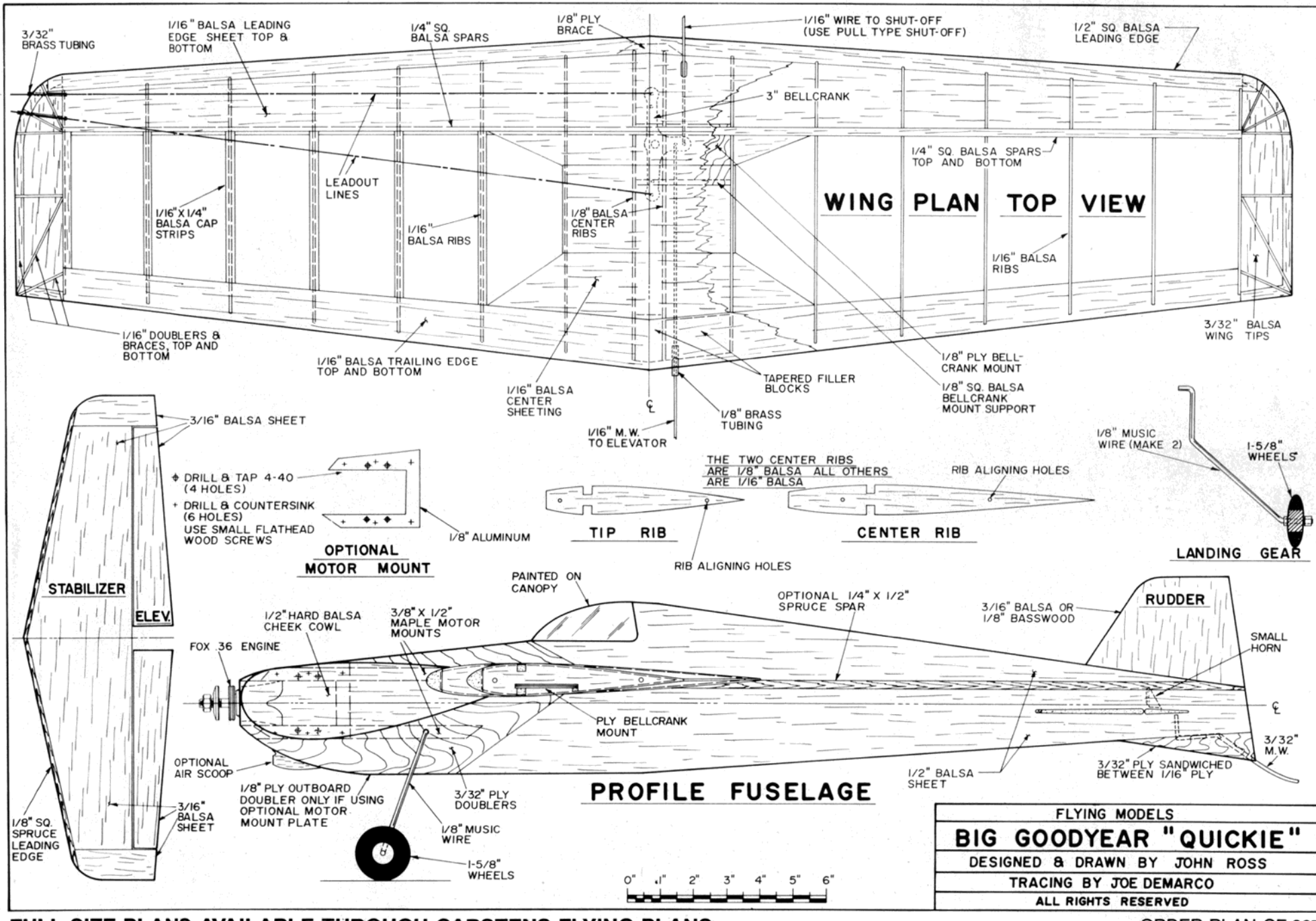
I would strongly recommend that you use epoxy for all of the fuselage construction and the joining of wing and tail sections. I use a putty made of epoxy and micro-balloons for filling all of the gaps at the wing/fuse and tail/fuse joints and also use it for moderate fillets. They will never crack and they will take epoxy paint well. Don't forget to use the 1/2 x 1/4 spruce in the fuselage. During a race, you should be catching the model while it is still moving and the spruce will give some extra insurance against a broken fuselage.

The original model is finished with one coat of Hobbypoxy White Undercoater with a coat of red on top; the wings are covered with red MonoKote™. This simple procedure produced a nice looking plane which has proven very durable.

There is one more thing that I have neglected to mention concerning the air frame construction. You needn't be too worried about building an ultralight model. Select medium wood that will be durable and try to make the neatest joints possible. The wear and tear on these types of models is quite severe. It takes a lot of flying to work out a solid racing system and if you don't build the plane strong enough, it will be worn out before you go racing. Most of these racers weigh in around two pounds and some are as heavy as 2 1/2 pounds.

Racing system

The *Big Quickie* will provide you with an attractive, good flying and solid model to build your racing system around. What do I mean by racing system? It is the airframe, tank, engine, propeller, fuel, pilot, and pitman all working together to produce the quickest



FLYING MODELS

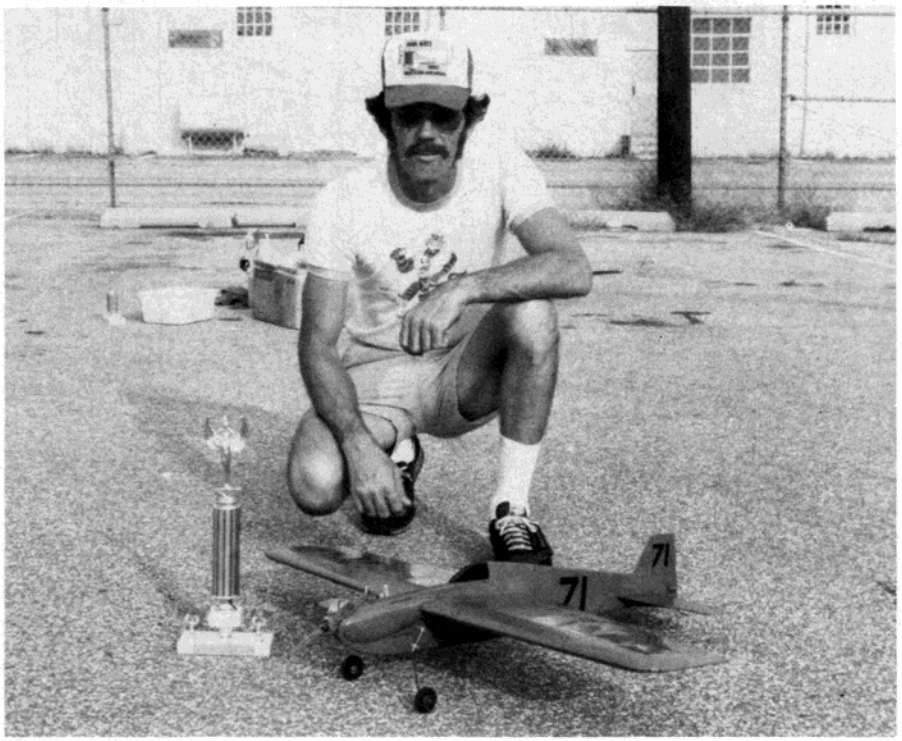
BIG GOODYEAR "QUICKIE"

DESIGNED & DRAWN BY JOHN ROSS

TRACING BY JOE DEMARCO

FULL SIZE PLANS AVAILABLE THROUGH CARSTENS FLYING PLANS

ORDER PLAN CF-667



Look out "Bad Bud", John Ross, our author is gonna get you. By the looks of that trophy, it may be soon. Big Goodyear affords any number of individualistic approaches to the solution of a similar goal — victory.

race time, time after time.

Assuming that we now have a proper airplane with wheels that won't fall off, pushrods with foolproof connections between the bellcrank and elevator, and a shut-off that works reliably and positively, we can think about a fuel tank that will run consistently throughout the entire supply. We have used the Uniflo type of tank made from the Perfect, large rectangular tank. These can be cut to any capacity and the shape is right for Big Goodyear racing. Mount the tank securely and make sure that it runs steady before you go racing.

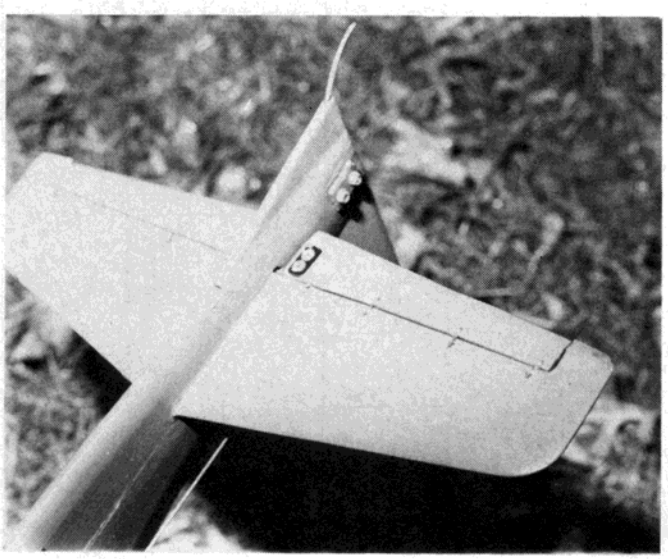
Naturally, you will want to have the "meanest" engine the rules will allow. In our case, that boils down to the familiar G-21 35 Super Tigre that the combat flyers used to dig holes in the ground with. Even though this engine is not in production anymore, there are still plenty of them around and parts are relatively inexpensive. Bear in mind that any engine will need to be developed in your racer in order to make the most of it. You must learn how it re-starts best and the correct head spacing for the fuel and type of prop you are using. You must adjust the head so that the engine will not blow the glow plug, even if it goes lean for part of the race. All the air speed you have worked for will be for naught if you blow the plug during a race.

Once you get the engine running consistently, you can find the right prop. We have learned a lot about this by testing what seemed like hundreds of props over the years. We have found that you need a prop with 8½ diameter. A racing style blade such as a Zinger 8½-7, Rev-Up, Pylon Series, or Top Flite Pylon all work well! The pitch can be selected by trying them.

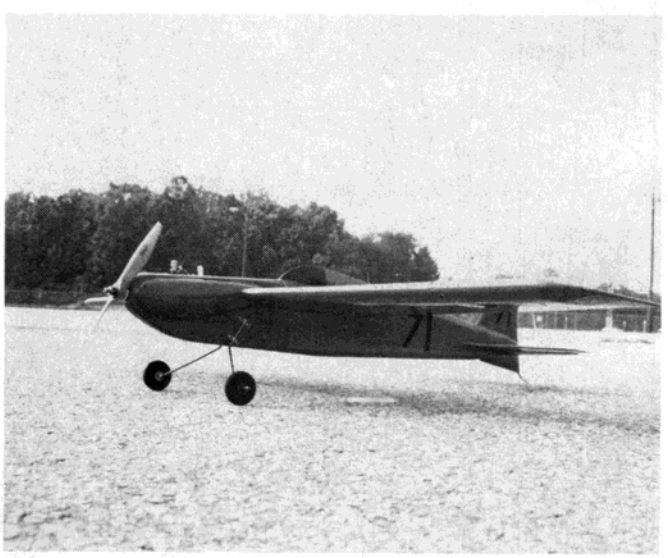
For a long time, we used to go out and time our speed by flying in the most efficient way. That is, by turning in the circle as if the handle was the center. When we went to a race, our models seemed to sound a bit sick and the air speeds were off by up to two seconds. It dawned on us that in a race, we are not pivoting, but rather are walking around in about a three foot circle. Back to the test circle.

I discovered that the prop we were using slowed down 1.5 seconds per seven laps when walking the three foot circle while a prop with less pitch and slightly less top speed only lost one second while walking and was faster than the first prop under the same conditions! I also tried cutting down the nitro in my fuel. Top speed dropped from 17.4 to 18.8. The result was less top end but a much steadier run. These two changes resulted in a much better race time. My previous best was 10:55.2, and after the test session I have just described, I turned a time of 10:06.3 for 200 laps. The reason I described this event is to encourage you to experiment in order to achieve the best results in a race type situation and not just to shoot for the highest speed for seven laps. It has also been valuable to write down test results so that I can look for patterns of previous sessions to try for improvement.

Strangely enough, we have not yet beaten the best times of our arch rival, who we shall call "Bad Bud" for want of a better name. By systematic development, we have come much closer. His whole racing set-up is different than ours and that points out the nice part about this sport. Two or more highly, individualistic approaches to a common goal can achieve similar results if you are willing to work out the bugs until you get it right. Enjoy building the *Big Quickie* and enjoy racing.



Wear and tear on Big Goodyear models is severe so make sure all joints are solid and the linkages secure.



Patterned after the Formula One *Lil Quickie* of George Owl, The *Big Quickie* is an attractive racer which flies well. Construction is straightforward.

Carstens' One-Stop Marketplace

The Book Hangar

the best in books for the aircraft, car and boat hobbies.

NEW ARRIVALS

AERO SERIES Volumes 24 thru 28: All have 104 pages, 8 full color photos plus hundreds in black & white. For historians, modelers, collectors, aviation buffs and students. All in soft cover.
BOEING B-52 (9214) No. 24 ..... $7.95
GRUMMAN F-14 (9215) No. 25 .... $7.95
GENL DYN F-16 (9216) No. 26 .... $7.95
CONVAIR F-106 (9217) No. 27 .... $7.95
F-45 EAGLE, (9218) No. 28 ..... $7.95
GLASSFIBRE HANDBOOK (8804) Warring. Updated & revised edition. New methods included. soft cover, illustrated $13.95
F-111 "AARDVARK" (9219) Kinzey. Comprehensive detail & scale. 8 pages color plus black & white. 72 pgs, softbound $6.95
B-29 SUPERFORTRESS (9220) Alwyn Lloyd. 8 pgs color, 5 view drawings, history, data, much more. 72 pages, softbound $6.95
AIRBRUSHING & SPRAY PAINTING MAN'L (8800). Written for the modeler, covers every phase. 171 photos & illustrations. 176 pgs, soft $13.95
HANDBOOK OF SHIP MODELING (8801). Sections on power, r/c and more. 278 illust. & photographs. 256 pages, softbound $11.95
INTRODUCING MODEL AERO ENGINES, (8804) Mike Billinton. 4-stroke and multi-cyl. designs included among much more. soft cover $9.95
INTRODUCING R/C MODEL AIRCRAFT (8803). Included are copters, gliders, & power models. 100 illustrations. 96 pages $9.95
RADIO CONTROL THERMAL SOARING (8805). All aspects of the subject are covered. Profusely illustrated. 344 pgs. 258 drawings, soft $13.95

MODEL AIRCRAFT

WORLD OF MODEL AIRPLANES (3250) Winter. How to build everything from simple hand-launched gliders to complicated R/C models 288 pgs. 160 photos $22.95
RADIO CONTROL: A Handbook of Theory and Practice (3215) Newell. Covers transmitters, receivers, amplifiers, fault finding, well illust. 135 pgs. $11.95
RADIO CONTROL HELICOPTER MODELS (3216) Drake. Main rotor gear box, ratios, rotor gimbals, swash plates, tail rotors, illustrated. 149 pgs $9.95
RADIO CONTROL PRIMER (3217) Boddington. How to choose a model, radio equipment, radio installations, control surfaces engines & acc. 200 photos $6.95
BUILDING & FLYING RUBBER BAND POWERED AIRPLANES (7908) Smith. Comp. guide to bldg & flying rubber pwrd. balsa & tissue models 132 pg .. $10.95
HOW TO BUY& FLY R/C AIRCRAFT (7904) Moorman. For student & instructor. Touches all bases from theory to bldg & flying. 240 pages, softcover $8.95
BUILDING AND FLYING SCALE MODEL AIRCRAFT (2966) Musciano. Updated third edition of an all-time classic. 245 pages, softbound $4.95
GATEWAY TO AERO SCIENCE (9401) Grant. REPRINTED. Primer in flight principles, design; all phases of modeling. 300 pages. soft $14.95
AIR FORCE COLORS, VOL I, 1926-42 (3200). Official US paint schemes & decoration. Color & b/white photos, great for modelers. softcover $7.95
AIR FORCE COLORS, VOL II, 1942-45. USAF color schemes & decorations. WW II emphasis. Color and b/w photos. softcover $7.95
RADIO CONTROL MANUAL (7903) Stafford. 3rd Edition. Systems, circuits & construction for R/C. Plenty of construction & technical info. soft $8.95
RADIO CONTROL HANDBOOK 4th EDITION. (7902). Safford/McEntee. Understanding, designing, building all kinds of R/C systems. 420 pgs. $12.95
PEANUT POWER (9860) Hannan. World of small flying scale, rubber powered models. How to build & fly them. 100 photos, 72 pgs. $8.50
HANDBOOK FOR MINIATURE ENGINES (3211) Higley. 230 photos, basic theory, throttles, pressure systems, hop-ups, break-ins, more 90 pages $9.95
THERE ARE NO SECRETS (3212) Higley. Model finishing techniques; iron on coverings, paint problems, sealers, fillers primers. 313 photos, 90 pages $9.95
SCHLUTER'S R/C HELICOPTER MAN'L (3213). Covers basics of helicopter tech. performance, calcs, construction tech. 255 pages, hundreds of photos $11.95
ADVANCED R/C INCL. ROCKETS (3214). Includes R/C & modern technology, control dynamics large R/C's, Sails, Copters, Aerodynamics, in 11 chapts. 265 pgs. $7.95

AVIATION

AIRCRAFT CAMOUFLAGE & MARKINGS 1907-1954 (9213). 20 pgs full color of int'l insignias camouflage & color schemes. 50 yrs of hist. 234 pg, 600 photos $24.95
AIR ACES OF THE 1914-18 WAR (9212) Robertson. Biographies of 135 air aces. Tables of fighter aircraft production data, markings. 212 pgs, photos $24.95
WORLD WAR II AIRPLANES, Vol 1 (1304). Beautifully illustrated in full color with extra three views. 320 pgs, soft cover $8.95
WORLD WAR II AIRPLANES, Vol 11 (1305). Second half also with three views. Includes USA, USSR, China and more. 320 pgs, soft cover $8.95
WORLD AIRCRAFT: COMMERCIAL, 1935-1960 (1300). Overview of commercial flying, insignia, engines. 180 full color illust. 320 pages, softbound $8.95
US NAVAL FIGHTERS OF WWII IN ACTION (3352). Air war at sea, especially the Pacific. Over 200 photos of the real thing. 160 pages $17.95
NO AMERICAN B25 A/J MITCHELL (2952). 8 full pages of color profiles, photogs. USAAF, USMC, RAF French. 48 pages, softbound $3.95
MITSUBISHI ABM-ZERO SEN (2943). Japan's famous WWII fighter planes. Photos, markings, technical data. color photos. soft cover $3.95
ME 262/STURMVOGEL (8166). World's first jet fighter. Pictorial & design study. Schematics, photos, foldouts, well illustrated. 66 pages, softbound $7.95
JAPANESE NAVAL AIR FORCE CAMOUFLAGE & MARKINGS OF WWII (9201). 16 pages, of paint schemes in full color + history. 192 pgs, HB $13.95
NAKAJIMA Ki 27 (2945). Arco Aircam series with 8 pgs of color profiles. Historical data, information, black & white photos. softbound $3.95
BOEING FLYING FORTRESS (8173). Primary source material on the B-17 Photographs and diagrams with 108 pages. softbound $8.95
BOEING B-17 B-H FLYING FORTRESS (2942) McDowell. Photo essay of famous bomber. Very complete. 10 color pgs; paint schemes. 52 pgs, soft. $3.95
AVRO LANCASTER (2937) Arco Aircam series. Includes technical data. Many black & white photos as well as 8 pages in full color. softbound $3.95
LOCKHEED P-38 LIGHTNING (8165). 78 pg. manual. Covers all series of the P-38 and includes a statistical study of its uses in the war. softbound $6.95
CURTISS P-40 WARHAWK (8167). Pilot's manual. Famed Flying Figers aircraft. Magnificent plane famous for its ruggedness. softbound $6.95
NORTHROP P-61 BLACK-WIDOW (8163) Rice. Pilot's Manual. Night flying specialist destroyed hundreds of axis planes during the second WW. 72 pgs. $7.95
CORSAIR ACES (2999). Musciano. Detailed and fascinating history with lots of photos and modeling data. 136 pgs hardcover $10.95
REPUBLIC F/RF 84-F THUNDERFLASH/ THUNDERSTREAK (2941). Aircam Aviation series with 8 full color pages, black & white. softbound $3.95
THE F-86 SABRE (2910) Childerhouse. Large photos, side 3-views, cockpit and many other details. Canadian & US Service plane. softbound $4.95
FORGOTTEN FIGHTERS AND EXPERIMENTAL AIRCRAFT OF U.S. ARMY. 1918-1941 (2957). 55 planes that never saw service. softbound $3.95
FORGOTTEN FIGHTERS AND EXPERIMENTAL AIRCRAFT OF THE U.S. NAVY. (2966). Drawings and designs of proposed but never built planes. $3.95
HAWKER HURRICANE (8166). The plane that made up 60% of the Battle of Britain's fighter strength. Many photographs, history, text. softbound. .. $3.95
de HAVILLAND MOSQUITO (8171). Wooden Wonder was one of the fastest and most deadly of the fighter planes. Good photos and text. softbound $3.95
FORD TRIMOTOR (8162) Rice. The plane that put American airlines in business. More than 70 photos & line drawings. 120 pages. softbound $7.95
ALLIED FIGHTERS OF WW II (2978). A neat all-color review of all the branches and some rare planes. History performance. 160 pages. soft $8.95
HISTORICAL AVIATION ALBUM No. 16 (9861). Hughes 1B Racer, Douglas DB 7/A 201. Republic RC3 Seabee amphib. Photos, drawings, softbound. ... $10.00
NAKAJIMA Ki43 HAYABUSA 1-111 (2940). Peregrine Falcon fighter known as the "Oscar". Many photos, 10 color pages, 52 pages, softbound $3.95
A-26 INVADER IN ACTION (3204) Mesko. All models shown from WWII thru Nam. and to present day. Many color paint schemes. photos 50 pages, softbound $4.95
P-80 SHOOTING STAR IN ACTION (3203). Saw 10 years of service and numerous changes and modifications. Color schemes, data photos $14.95
US CIVIL AIRCRAFT 1938-1948 (9206). The 100 civilian aircraft from the war years. Hundreds of photos, plenty of text, 350 pages. hardbound $17.95
CENTURY SERIES IN COLOR (3201) Drendel. From F-100 to F-106 Color plates & black & white photos. All the modern fighters are included. soft $8.95
PLANES THE ACES FLEW (2901) Morgan. Ships & pilots described in detail. Story of 26 air aces from WWI to Korea. 56 pgs soft bound $4.95
AIRCRAFT DETAIL DESIGN MANUAL, (8159). A wealth of information for the light aircraft enthusiast. Useful to modelers as well. Illus, drwgs. $15.95
US NAVAL FIGHTERS 1922-1980 (9202). Every Navy & Marine Corp fighter is illustrated. Color photos, data, text. hardbound $15.95
US BOMBERS 1928-1980 (9203). Complete from the XB 1 to the B-1. Photos, 150 drawings and 3 views. Color schemes and much more. 272 pages, hardbound $15.95
US FIGHTERS, ARMY AIR FORCE 1925-1980 (9204). Shows every fighter that carried the P or F. Photos, 3 views, much detail. hardbound $15.95

BOATS

BUILDING FIBERGLASS SHIP MODELS FROM SCRATCH (7910). How to scale, cut templates, reinforce fbrgl and use foam cutter to create ships. photos $6.95
1919 JANE'S FIGHTING SHIP (2925). A Book that is a Collectors' item and a reference manual. 633 pages, hardbound. Photographs $25.00
1914 JANE'S FIGHTING SHIPS (2922). Photos, drawings, data & silhouettes of all the warships. Over 500 pages. A collectors' item. 635 pgs. HB $19.95
SHIP MODELS, VOLUMES 3 & 4 (7703). British small crafts in full color and black and white. Text and full technical information. soft cover. two books $4.00
SHIP MODEL BUILDING (7700) Johnson. Includes blueprint. Enlarged third edition. 1,000 illustrations, 320 pages, hardcover $12.00
RADIO CONTROLLED MODEL BOATS (3210) Warring. How-to-do-it the RIGHT way. Covers controls, linkages, batteries, techniques 125 pgs, softcover $8.95
MODELER'S GUIDE TO NAVAL ARCHITECTURE (2653) Complex problem solver for modelers. Clever drawings, 18 color pages. 68 pgs. $10.95
MODELER'S GUIDE TO HULL CONSTRUCTION (2651). Principles & applications of open frame hulls. Static & r/c modelers, 68 pages, soft $10.95
MODELER'S GUIDE TO RIGGING (2652). Complete explanation and description of ship rigging. Lots of modeling how-to. 68 pages, softbound $9.45
MODELER'S GUIDE TO ANCIENT & MEDIEVAL SHIPS (2654). Pictorial. (Useful to modelers) of ships & rigging. color photos, 68 pages, soft. $10.95
HOW TO BUILD SHIP MODELS (2650) Mansir. All the basic to master hulls, rigging, masts & much more. Well illustrated, 68 pgs, soft $7.95
US PT-BOATS OF WW II IN ACTION (3353). 200 photographs give the reader lots of modeling detail data. Comprehensive and complete. 160 pgs. HB. $17.95
IDA WAS A TRAMP (7300) Quinby. Incredible WWI and II stories aboard a Tramp Steamer. Truth that reads like fiction. Over 100 photographs. 275 pgs. hardbound $10.00

Carstens Publications, Inc.
FM Book Hangar
P.O. Box 700,
Newton, NJ 07860

VISA* MasterCard

Dept. 5422

I have enclosed a check or money order for $ _____ . Please send me the books I have listed below. (If you wish to preserve your magazine, send your order on a separate sheet or make a facsimile.)
On orders of less than $10.00, please include $1.00 for postage. N.J. residents add 6% sales tax. Outside USA add 25% of book cost for shipping.

Please type or print legibly.

Card Number _____

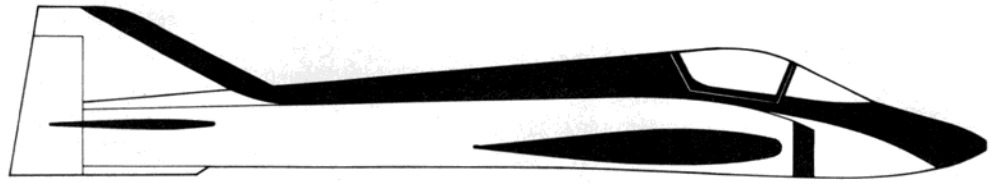
Exp. Date _____ **Signature** _____

Name _____

Street _____

City _____ **State** _____ **Zip** _____

PROJECT PATTERN



By Bob Hunt and Dean Pappas

A while back, I received a kit of the *EU1-A* for review purposes. Pattern types will instantly recognize this design as one that has contributed heavily toward the movement to larger birds for R/C aerobatic events. Designed by Wayne Ulery, and manufactured by Aero Composites, the *EU 1-A* is being seen in increasing numbers at pattern contests.

Construction of the *EU 1-A* is more or less representative of the fiberglass and foam kits that have dominated this class of flying for several years. In light of this fact, you would think that all questions concerning the building of this type of craft would have been answered many moons back. Unfortunately, this isn't the case.

To be fair, the manufacturers do include comprehensive instructions in most instances. Most of these kits are destined to be built by experienced builders and so a step-by-step procedure isn't usually outlined.

In preparing to build the *EU 1-A*, I realized that even though I had well over 20 years of building experience, there were procedures and techniques peculiar to a pattern ship that I wasn't too sure about. This is where the idea for Project Pattern was born. A quick call to our Pattern columnist, Dean Pappas, with an outline of the idea, met with an enthusiastic "I'll be right over"! Dean and I decided that we would build the ship together and record on film every area where a neophyte to this type of craft might have a problem in interpreting the plans. We're still not sure how many installments there will be, we're not finished building yet!

We will start next month with a look at how to install the firewall in a fiberglass fuselage and position the motor mount and nose wheel retract unit.

Should you want to follow along, I'll list the equipment we have chosen for installation. Different brands may require slight modification of the procedures to be shown, and we'll try to outline them as best we can as we go.

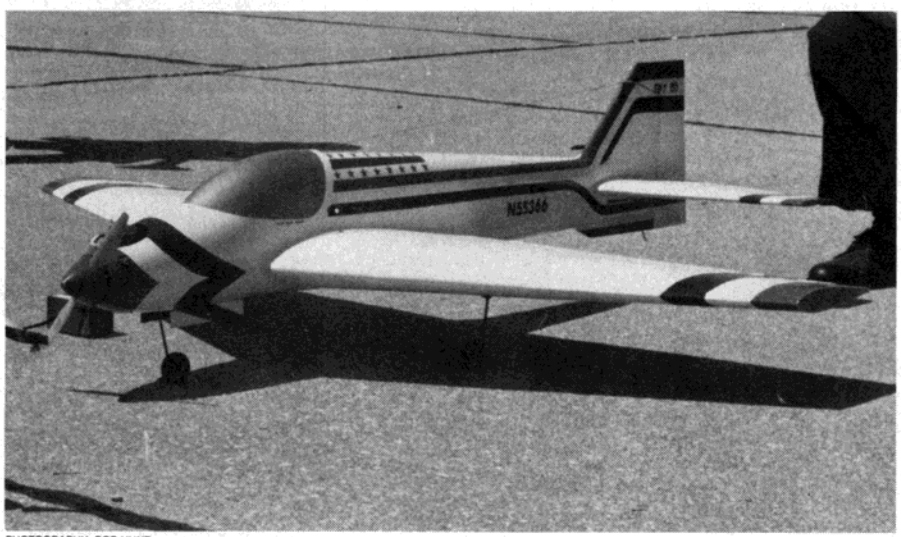
Dave Scully of Aero Composites, 411 Townsend Place, Dayton, Ohio 45431, provided the base for this series with his excellent kit of Ulery's design. Dave's fiberglass work is legendary for excellence throughout the industry and the sample we received in the *EU 1-A* kit was no exception. The fuselage is very light for its size and contained few if any pinholes at all. Canopy and simulated air intakes are molded in with great detail. Included with the fuselage is a fiberglass pan which serves a twofold purpose as both tuned pipe floor and fuse stiffener. The fit of this part has to be seen to be believed! A belly pan for the wing rounds out the fiberglass components. The rest of the kit consists of excellent quality foam core wings and tails. The wing cores have the proper dihedral angle pre-cut. The *EU 1-A* does come with a very nice instruction booklet which includes templates for the various cut-outs required and extra balsa parts that you must fabricate. Again, just fine for the expert, but not enough detail for the novice.

We chose the B&D mechanical retract system for the project. Sonny Brown of B&D Enterprises, Rt. 81, Box 7, Ballard, West Virginia 24918, informed us of the features which include a very low profile, positive up and down locks, tempered coil struts, and a nose wheel which can be belly or firewall mounted. There is also a Foam Wing and Firewall installation kit available, although we chose not to use it in this project.

For power we opted in favor of the YS 60 rear exhaust version. Mike Billinton reviewed this powerhouse in the January 1983 issue of FLYING MODELS and found that it produced in the neighborhood of 2.4 horsepower! For information on the entire YS line, contact John Camilli, C/O Reading Hobby Supply, Church Lane Rd., RD #3, Box 3917, Reading, PA 19606.

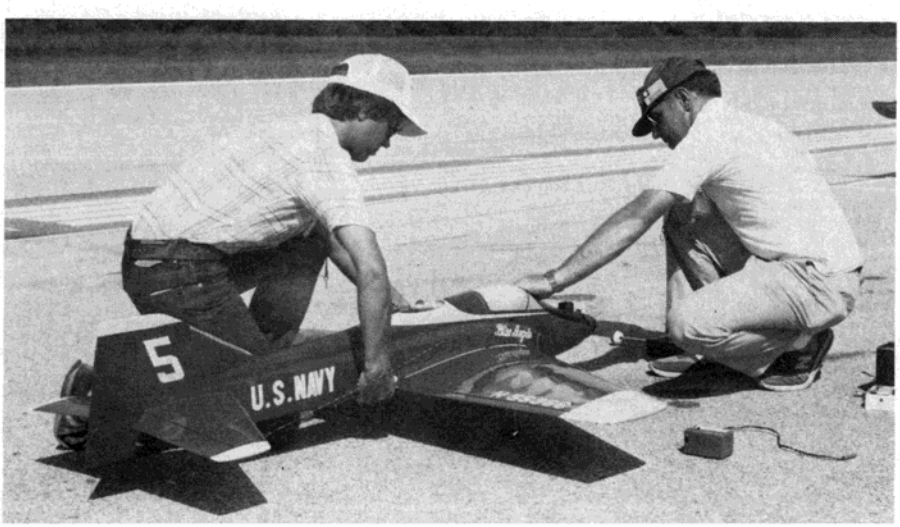
For guidance the choice was difficult, what with so many fine pattern radios available. Bob Aberle has on many occasions, expounded on the virtues of exponential control, and so we have decided to install the Airtronics Championship Series seven channel unit with expo. This particular unit is available with many servo options. Ours came with the 94554 coreless motor, ball bearing units. Bob wrote an in-depth review of this system in the December 1982 issue of FLYING MODELS. Back issues are still available.

Hopefully, this series will answer many questions about the fiberglass and foam type of construction, not only for pattern enthusiasts, but for all kit builders. See you next month when we'll roll up our sleeves and go to work.



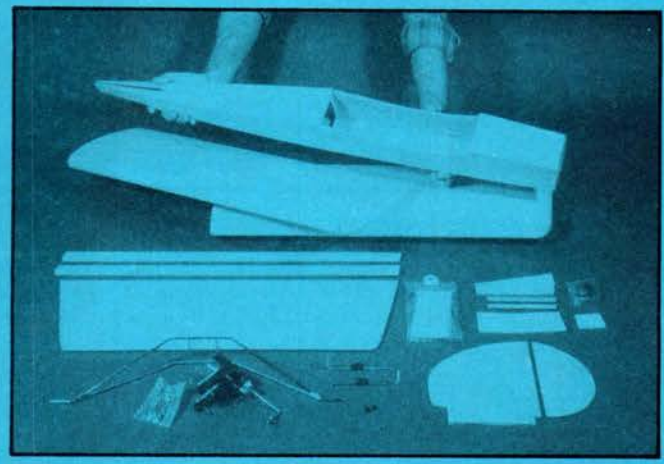
PHOTOGRAPHY: BOB HUNT

The representative aircraft used to illustrate the on-going Project Pattern series on pattern construction and trimming is Wayne Ulery's *EU-1A* design brought to prominence by Dean Koger. The original *EU-1* **(above)**, employed an external tuned pipe and a straight canopy/turtle deck. In the refined, current *EU-1A* **(below)**, the canopy/turtle deck shape took on a new look when the fuselage was changed to increase torsional rigidity. Note the change to an internal pipe. That's Dean Koger starting.



WORLD ENGINES
BRINGS YOU

MODELTECH
EXCLUSIVELY FROM WORLD ENGINES



MODELTECH ARF model aircraft are basically finished balsa construction models. Generally the wings come in two pieces so the model can be shipped in a box. Hardwood and plywood are used in the models where you would expect to find it in any model. The surfaces are not hinged as most builders like to cover the ailerons, elevators and rudders before cutting the hinge slots. The wings are polystyrene foam covered with balsa wood. In most cases, the wing tips are sanded to contour. These aircraft are just marginally higher than kit prices. Keep in mind that MODELTECH paid for the glue. Our friend, Helmut Noll, has been selling these models in Germany for about six months with very nice comments from satisfied customers. Ask your dealer to show you these models.

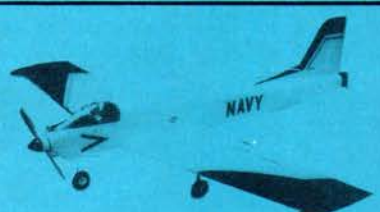
LUCKYSTIK
R/C Trainer Model
35 - 45 Engine

Cat. No. 20140
$99.90

Length . . . . . .47" (1200mm)
Wing Span . . . . . .52" (1320mm)
Wing Area . . . 589 sq.in. (38 sq.dm)
Flying Weight . . . . . 5.5 lb. (2.5kg)
Radio. . . . . 4 channel
Engine . . . . . 35 - 45

- Suitable for the sport flyer.
- Designed for easy handling and repairing.
- Hand crafted balsa fuselage and stabilizers.
- Foam wing epoxy planked with balsa.
- All parts smoothly hand sanded — including leading and trailing edges.
- Nylon engine mount with steerable nose gear.

THUNDERBIRD
R/C Sport Model
19 - 25 Engine



Cat. No. 20143
$96.90

Length . . . . . .41" (1040mm)
Wing Span . . . . . .48" (1230mm)
Wing Area . . . 434 sq.in. (28 sq.dm)
Flying Weight 3.1 - 3.5 lb. (1.4-1.6kg)
Radio. . . . . 3 - 4 channel
Engine . . . . . 19 - 25

- Compact size semi-scale model.
- Foam wing epoxy planked with balsa.
- Hand crafted balsa fuselage and stabilizers.
- Clear canopy.
- Easy to install nylon engine mount.
- All parts smoothly hand sanded — including leading and trailing edges.

LUCKYBIRD
R/C Trainer Model
19 - 25 Engine

Cat. No. 20142
$77.90

Length . . . . . 38" (962mm)
Wing Span . . . . . .49" (1250mm)
Wing Area . 421.5 sq.in. (27.2 sq.dm)
Flying Weight 3.3 - 3.5 lb. (1.5-1.6kg)
Radio. . . . . 4 channel
Engine . . . . . 19 - 25

- An ideal trainer for the sport flyer.
- Hand crafted balsa fuselage and stabilizers.
- Fully aerobatic.
- Foam wing epoxied with balsa.
- All parts smoothly hand sanded — including leading and trailing edges.
- Easy to install nylon engine mount.

PIPER CHEROKEE
R/C Scale Model
19 - 25 Engine

Cat. No. 20141
$96.90

Length . . . . . 37¼" (960mm)
Wing Span . . . . . .49½" (1260mm)
Wing Area . 433 sq.in. (27.97 sq.dm)
Flying Weight 3.3 - 3.5 lb. (1.5-1.6kg)
Radio. . . . . 4 channel
Engine . . . . . 19 - 25

- Compact size semi-scale model.
- Foam wing core epoxy planked with balsa.
- Hand crafted balsa fuselage and stabilizers.
- Clear canopy.
- All parts smoothly hand sanded — including leading and trailing edges.

ANGEL 1600
Thermal Glider
62½" Wing Span

Cat. No. 20145
$65.90

Length . . . . . 37" (935mm)
Wing Span . . . . . .62.5" (1600mm)
Wing Area . . 490 sq.in. (31.6 sq.dm)
Flying Weight 1.7 - 1.8 lb. (750-850g)
Radio. . . . . 2 channel

- An ideal thermal & slope soarer for the beginner.
- Super light weight balsa sheeted foam wing.
- Built in epoxy glass wing spar for maximum strength.
- Simple wing join method — just glue and join wing within 5 minutes!
- Perfectly hand crafted balsa fuselage and stabilizers.
- All parts smoothly hand sanded — including leading and trailing edges.
- Clear canopy.

WORLD ENGINES

WORLD ENGINES

8960 Rossash Ave. - Cincinnati, Ohio 45236 - Phone: (513) 793-5900 - Telex: 214557

Motor Matters

By Mike Billinton

There's got to be a reason why we seem to be awash with 4-strokes. After all, in the 25 years since WW II the 2-stroke has been "King," so what happened?

Readers surely have their own answers and the following just represents one other view. There are interesting features to this popularity surge and none more so than the RPM levels thought typical for the two types of operational cycle, with the focus of interest seeming to center around the model aircraft sector.

It's surely a fact that a renewed appreciation of the beauty of flight itself is the main reason for the upsurge in interest in "Vintage" or "Old-Timer" events, rather than just the more negative nostalgia element which would hardly seem to square with the enthusiasm of the participants, some of whom are youthful enough not yet to be "looking backwards". This implies, of course, that the visual element in much current model aircraft performance has gradually become less satisfying over the years, and *if* "blame" is to be attached, then it could well be spread quite broadly among the competitors/public/engines and their manufacturers, many of whom during that 25 year period have naturally been exploring the limits of achievement. Clearly, an extreme point could be reached (as in theory could be reached in say, drag racing) where the ultimate performance visually leaves behind a residual impression only.

Anyway—to get back on course, the realization of visually satisfying (relatively slow) flight appears harder to achieve with high-revving power units which demand matching small area propellers (quite apart that is, from the non-scale sound effect of very high RPM's). It seems a frequent finding that a more lively performance is given by use of larger propellers even when attached to power units which, by the usual HP measurement, produce less power than say a previously used high—revving 2-stroke unit (which was necessarily matched with a smaller diameter/area prop). This 'anomaly' could be seen as negating the very point of measuring powers of engines in the first place. However, *if* less power produces livlier performance, it would almost seem to say that we may as well reduce power to near zero . . . and *really* perform. Clearly this can't be correct, so, let's try another tack.

To sense that power output of itself need not lead to forward motion we could imagine a 50 pound Giant Scale aircraft sitting there unmoved while on board, a 15cc Marine racing engine is challenging the environment as it produces its 5 BHP, but doing so fitted with paddle blades of infinite pitch (a paddle one inch thick by four inches in diameter would suffice to absorb this power output at around 22,000 RPM in air).Another fruitless combination for our 9 ft. span Giant might be to fit a 4 BHP Kawasaki with a 36 inch by 15 inch prop, though in this case the over-heavy loading represented by this prop size would drag the motor almost to a non-functioning RPM level (below one HP at around 2,500 RPM.)

In the search for the most effective power *transmitter* then, we hope to arrive at some optimum propeller size somewhere between these pointless extremes—which is reasonably matched to the chosen power unit, but, much more importantly, is correctly matched to the overall size/mass of the aircraft concerned. Being admittedly puzzled by this large prop/low RPM versus small prop/high RPM problem I wonder whether the Newtonian law of equal and opposite reactions is the factor here? That is, to obtain quick lively movement of an object with high mass, it will be necessary to get a column of air moving in the opposite direction—the overall inertia of which is of the same order as that of the moving object. This is maybe less easy to achieve with a small, but high-revving prop drilling a small diameter but highly active column of air through the large static air mass surrounding it. Possibly, a helicopter's lively vertical acceleration is an example of the performance provided by a generously large propeller disc area—particularly at low speeds.

If this reasoning has any validity (and I'd be happy for more informed readers to shoot it right out of the sky) then it could be seen that the long-term development of the high BHP at high RPM 2-stroke engine has led it towards increasing unsuitability (unless geared) to the needs of larger slow-flying aircraft. Certainly, it is the case that motors having a lower peak BHP point are proving more effective in this particular area of model aircraft activity and this principle should include 4-stroke, 2-stroke, glow, diesel or spark ignition.

We're now back at the question of RPM levels—and many will see that the (relatively low RPM) 4-stroke's popularity has been rising in tandem with (or was it pushed by ?) the Vintage movement. The 4-stroke's different exhaust note and the lower RPM levels are of course both significant factors here.

Now, the 4-stroke has no intrinsic requirement to be *that* slow-revving, though the first wave of these units was likely to be restrained in RPM. The scale effect of the small engine sizes we use and the consequent reduced inertia effects on valves/cams/push-

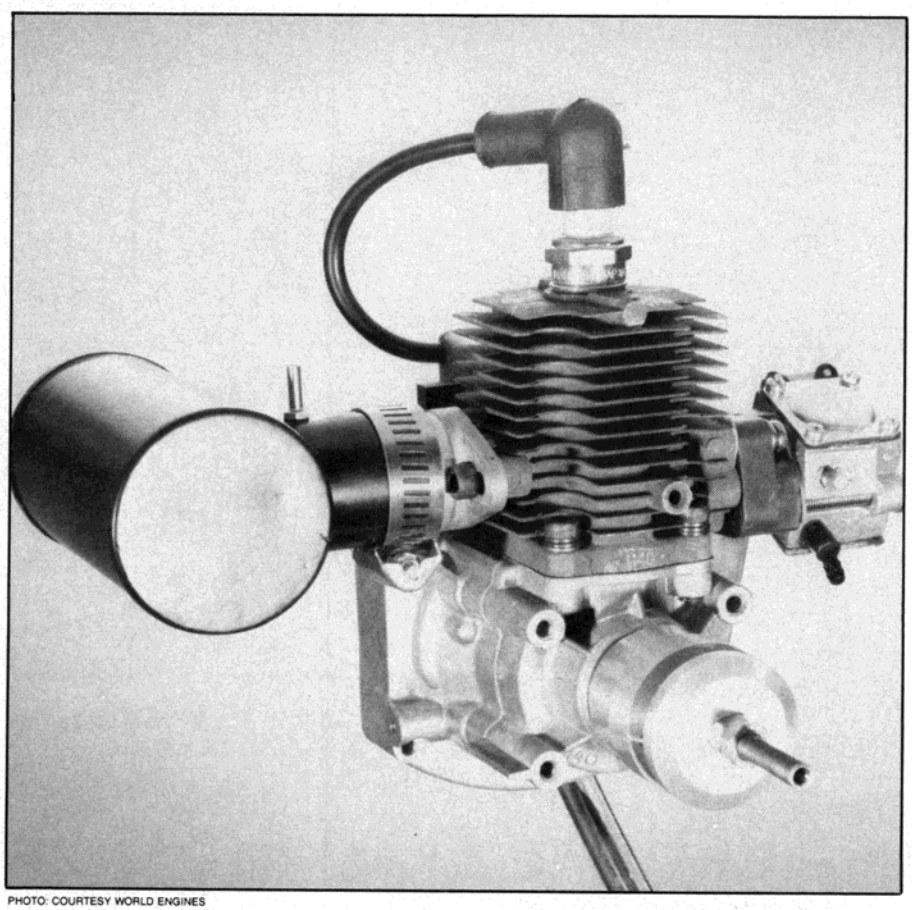
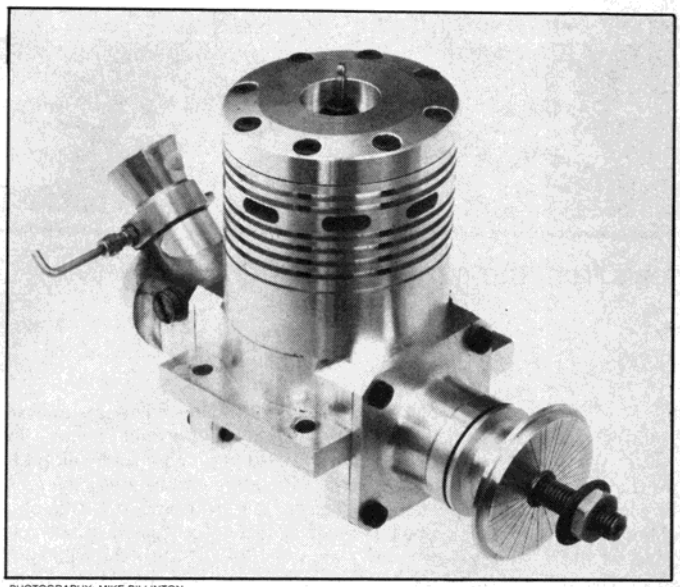


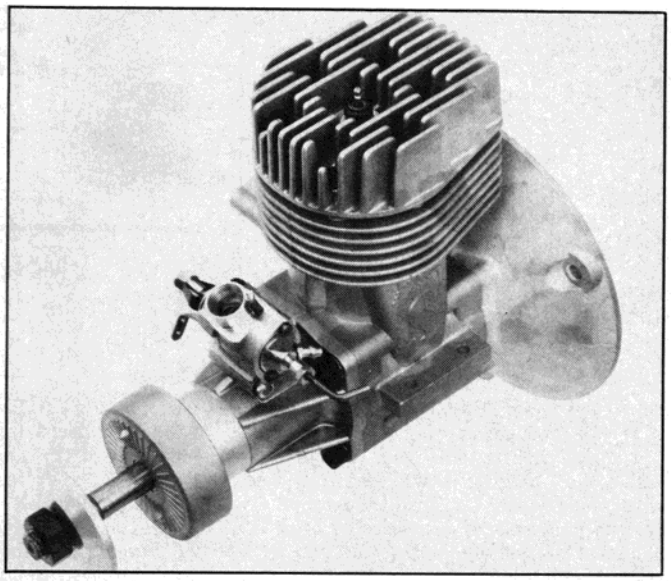
PHOTO: COURTESY WORLD ENGINES

The surging popularity of 4-stroke model engines has raised the question of RPM in relation to horsepower. For example, the Zenoah G-23, a 23cc 2-stroke, reaches its peak horsepower at only 8,000 RPM.



PHOTOGRAPHY: MIKE BILLINTON

Inspired by full size aircraft engine innovations of H. Ricardo, the author created this 10cc glow racing engine with a uniflow sleeve valve.



Another example of a reversal of the common practice of higher and higher RPM in 2-strokes, is the SuperTiger S-2000 which peaks at 13,000 RPM.

rods is surely going to allow a fair increase in RPM's in the coming years if the 4-stroke were to start entering competitive (2-stroke) areas.

Though problems of lower crankcase (rod-end) lubrication could prevent emulation of the mechanically simpler and highly lubricated 2-stroke's 25,000 plus RPM's, there nevertheless seems little to prevent rises towards 16/18,000 RPM in our model 4-stroke engines. In passing, Pete Halman at Irvine Engines reminded me of Honda's 50cc, four cylinder 4-stroke with four valves per cylinder and a claimed 40,000 RPM. Desmodromic (positively actuated) valves were probably used (this is the system whereby a cam not only opens the valve but another also closes it—so, no springs to cause valve float at critical RPM).

So far then, the reasons for the 4-stroke trend seem clear—that very few model 2-stroke engines currently produced have the high BHP at low RPM levels necessary (unless geared down) and thus manufacturers had the option of re-designing the 2-stroke for this task, or providing a new generation of 4-stroke machines (which, happily, would also at same time ease the noise problem). So far, so good.

However, just as the 4-stroke need not be restricted to low RPM's, so then the 2-stroke itself does not necessarily have to rotate at very high RPM's to produce respectable power output. The fact that it *is* so capable is something we have taken advantage of rather than it being a prerequisite. In fact 2-stroke theory suggests that high efficiency is possible with quite low RPM's and high load factors.

Coming engine tests

Two engines just received neatly exemplify one aspect of the situation above: 1. the Super Tigre S-2000 (20cc 2-stroke) is a definite *model* engine emanating from one of our longest established model engine manufacturers. It reputedly peaks at a comparatively low 13,000 RPM, and its single cylinder/glow ignition/schnuerle ported layout with front induction mark it clearly as descending from a long line of model engines.

Secondly, the Zenoah Quartz G-23 (23cc 2-stroke) clearly shows its industrial origins, and significantly, not having been part of the model world's competitive RPM chase over the years, arrives in our hands with a relatively very low RPM peak power point of 8000; i.e., lower than many of the current model 4-stroke peaks, and lower than that Super Tigre 20cc 2-stroke. Emanating from Japan, it has the commonly featured magneto spark ignition, sub-piston induction fed by the usual pressure pump style of carburettor, but, as modified for model use, it manages better than most to present a compact, uncluttered and pleasing profile.

So here we have two engines homing in on a performance/RPM requirement from two quite differing manufacturing bases and both showing evidence of their quite separate developmental backgrounds. One point at least seems to follow—that we don't *have* to use the 4-stroke to achieve the effective RPM levels we sometimes need, nor of course to get the power levels; though for sheer pleasure of operation and reduced noise nuisance we may well choose so. Other plus features of lesser importance to the modeller are the 4-stroke's generally better fuel consumption, and, if it ever came to it, a more convenient conversion to the super charging principle than is possible with our model 2-stroke in its loop or cross-scavenged style using crankcase compression.

Faced with the dominance of the 4-stroke in most automotive work, and the contrary dominance the 2-stroke has over the marine area, a lot of confidence would be needed to predict future trends. In our scale model aircraft world, questions of relative efficiencies may not matter too much, because other factors such as operational reliability, environmental concerns, and scale requirements are sometimes more significant and objective observers would hopefully see value in either the four or the two cycle type.

But, getting back to this column's very first question, and separating the matter from any of the technical reasons for the 4-stroke surge, undoubtedly there are also commerical considerations involved which have given new heart to manufacturers hard-pressed by economic factors. Given a successful transit through *this* recession, one wonders what a future "down" may bring forth? Could manufacturers then find renewed vigor in the propagation of ready-to-run gas turbines for our model aircraft? Seems fanciful? Well, let's talk again in 20 years.

Conversely, an interesting backward look, consider the development pursued by H. Ricardo just prior to World War II. At the latter end of a creative career he had begun to place considerable confidence in the 2-stroke, and limited production of the Rolls-Royce *Crecy* aircraft engine was maybe the culmination of this confidence. This unit was a twelve cylinder, sleeve-valve, petrol-injected engine. Compared with the much developed 4-stroke engines (either poppet or sleeve valve versions) the *Crecy* did achieve the aims of more power for a given weight and cross-section, but commerical consolidation of this considerable achievement was cruelly cut short—both by the onset of World War II and by the newly arrived gas turbine which brought to a close significant piston engine development for full-size aircraft in whatever cycle or valve type.

So it's possible we may never know where that might have led. In recent years the 2-stroke principle has on occasion continued to find favor, even for military purposes, where much research effort was put into the *Orion* opposed-piston, 2-stroke battlefield tank engine. More successful is the civilian aircraft Lycoming 2-stroke engine in V-4 and V-8 forms. More familiarly, this has some of the features we know in our "model" sized chainsaw engines—loop scavenge, air cooling, and chromed aluminum bores.

Of considerably less significance is that the quality of Ricardo's vision was such as to embolden your columnist sufficiently a while back to construct a prototype 10cc racing glow-plug engine using the uniflow sleeve valve principle above the crankcase induction. It did operate but in no sizzling fashion. The photo shows some salient features and further details may appear in a later Motor Matters column. However, the history of the internal combustion engine is virtually littered with various 'specials' of this style and which never seem to undergo the necessary further development and which could lead to commercial success.

Flyin' things for fledglings

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

Hi gang. Boy, let me tell you: you're really great—all of you. I'm referring to the way you've been checking in with me to tell me what you're doing and also the way you've been keeping me supplied with all those great photos so the rest of the gang can share what you're doing, too.

As a matter of fact, I've got so many great photos that I want to show you this month that I think I'll cut down on the copy just a little, so we can squeeze in more of them, cause I know your gonna love some of these shots.

First of all, we got a letter and photo from Hugh Butterfield out in Momence, Illinois. Hugh tells us that he has just built his first model in *forty-one* years! He says he used to build a lot back in the 1920s and 1930s and just got away from it for a while. Well, he's back to building again and what a job he's done! He did a scratch-built Fokker D-17 for rubber power and it certainly proves that he hasn't lost any of his modeling ability. He sent us a terrific "bare bones" photo which I'm gonna share with you. Isn't that some beauty?

We also heard from Sherman Gillespie of San Jose, California. Sherm loves the old time rubber jobs and sent us a great shot of his Jimmy Allen *Bluebird.* Now, for you younger guys and gals, the *Bluebird* came out in the 1930s and kits were available at that time. Sherman says his *Bluebird* is a "truly majestic flyer" and he recommends it to anyone who likes the old-timers. He says plans are available from Mike Mulligan's Oldtimer Model Service at PO Box 913, Westminster, CA. 92683.

We also heard from one of the younger members of the gang. E.J. Wadsworth of Denver, Colorado tells us that he's just getting started in the hobby and really loves U-control. He sent us a shot of himself with his *Ringmaster.* Looks like he did a pretty good job on it, too. Keep up the good work, E.J. and don't forget to send us a shot of your next project.

We also heard from another of the Flying Aces Club members. This time it was Dean McGinnes of Lakeland, Florida. Dean sent several photos, but for this time, I'm gonna show you his Jodel *D-9* which he scratch-built from plans in the back of the book, *Making Scale Model Airplanes Fly* by Bill McCombs. Dean says he can heartily recommend this book which is available from Peck Polymers.

Now, I've got a couple of photos that will also "turn you on". They are both prototype models of new kits being introduced by Golden Age Models. I guess I won't have to tell you—once you look at the beautiful workmanship—that both of these models were built by our friend, the master model builder, Bob Schlosberg. Let me tell you about these great new kits:

The P-51 *Mustang* is a 24 inch span rubber-powered model. The kit contains the usual quality items that Golden Age puts in their kits like high grade balsa and tissue and all the necessary accessories, *but,* this particular kit is really something special. Along with all the other items, you get *three*—that's right—three complete sets of decals so you can build any of three different versions, one of which is Anson Johnson's Thompson Trophy Racer! Not only do you get a choice in decals, but you also get a choice in canopies. That's right. The kit contains two different canopies, the bubble type and the Malcolm hood version. The photo I'm showing you was built as a "B" model with the Malcolm hood. Have you ever seen a prettier *Mustang?* The price for the P-51 is $10.50 plus $1.50 for postage and handling. For a kit with all those extras, it sounds like a great buy to me.

The other new kit from Golden Age Reproductions is a model of a home built from the golden age of aviation, Yep, it's a model of the old Corben *Super Ace* and it's a beauty, too. This is also a 24 inch span model and is a two-way conversion that can be built for either rubber or CO_2 power. The model in the photo has a Brown CO_2 motor. The CO_2 tank is located right behind the radiator and that area is functional as there is a warming passage built into the radiator assembly. You'll also notice that the CO_2 filler valve is mounted on top of the engine where the oil fill was on the real thing. As usual, all the quality parts we've come to expect from Golden Age are included and, here's the best news of all—the price is only $7.50 plus $1.50 postage and handling. Another good model buy.

Now, for those of you who may not, as yet, have tried a Golden Age kit, the address is: Golden Age Reproductions, PO Box 13, Braintree, MA 02184.

Now, I've got another "goodie" to tell you about. Lew Gitlow, of Indoor Model Supply, has put together a package deal for us. He's

PHOTO: HUGH BUTTERFIELD

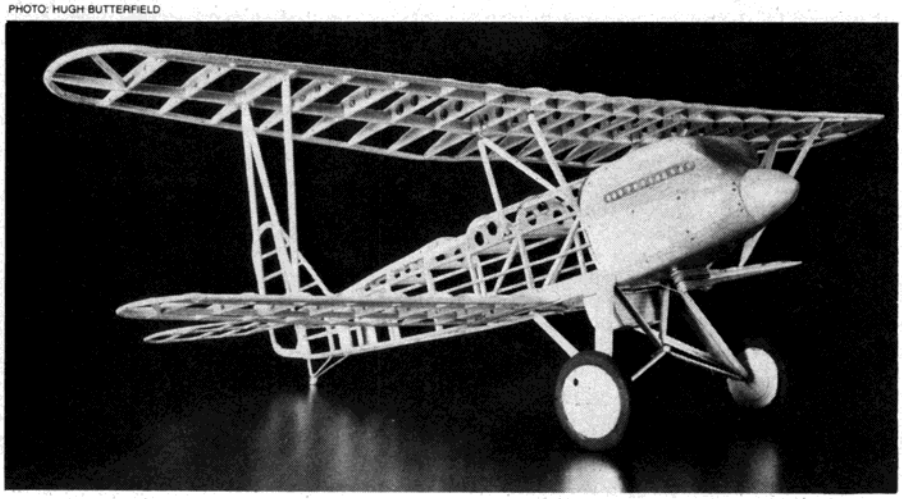


PHOTO: LOU ROBERTS

From Hugh Butterfield comes this scratch-built, rubber powered Fokker D-XVII (**above**). It was his first modelling effort after a 41 year hiatus. That smile tells how proud E.J. Wadsworth is of his progress in controline stunt (**right**). The plane he's holding is the venerable Goldberg *Shoestring* with a Fox .35.

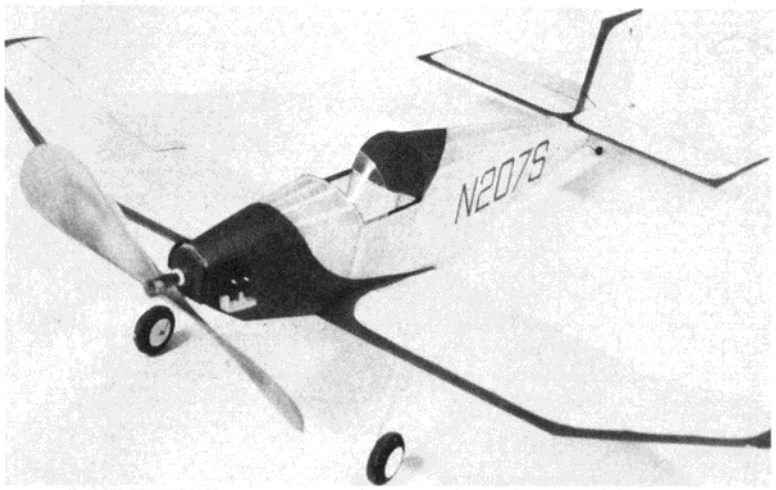


PHOTO: DEAN McGINNES

After reading *Making Scale Model Airplanes Fly* by Bill McCombs, Dean McGinnes scratch built this *Jodel* D-9 (**above**). Bob Schlosberg's P-51 *Mustang* (**below**) is the prototype for the new Golden Age Reproductions kit.

PHOTO: BOB SCHLOSBERG

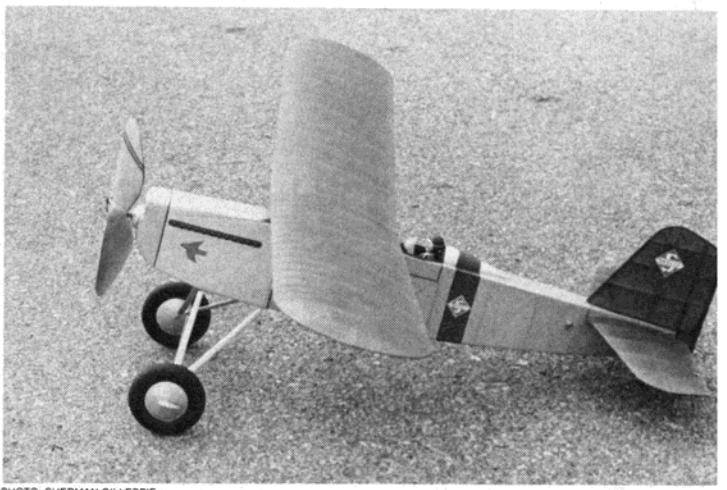


PHOTO: SHERMAN GILLESPIE

According to Sherm Gillepsie, his Jimmy Allen *Bluebird* is a "truly majestic flyer" (**above**). Plans available from Oldtimer Model Service. Golden Age has another new kit (**below**), a Corben *Super Ace* with 24 inch wingspan.

PHOTO: BOB SCHLOSBERG

offering the new catalog *and* a box of peanuts—all for ten bucks postpaid. Here's what you get.

A roll containing ten sheets, five plans with instructions, construction diagrams, details, and iron-on strips to make your own printwood sheets. These iron-on strips can be used two or three times. Each plan has a separate sheet with detailed three-views, a history of the aircraft, and scale documentation. The 16 page catalog alone is $1.50 postpaid. A lot of work went into these plans and it really shows. Plans are for the 1921 *Waterman Racer,* 1929 Alco *Sport Monoplane,* 1937 Aeronca *Model K,* 1982 *Zippy Sport* and 1929 Heath *Parasol.* How's that for a deal? You can build five neat little scale models. But wait, the iron-on printwood strips can be used three times, so you can really build 15 models with this special packet.

If you want to get in on this, send your ten-spot to Indoor Model Supply, Box C, Garberville, CA. 95440, and tell 'em you want the special catalog and box of peanuts offer. Tell 'em that Van sent you.

Before we wind up this session in the old hangar, I've got a bit more news for you. Jack Dietrick of A.H. Zed Aircraft Inc. is working on two projects. One is the development of two new props for CO_2 and the other is to encourage and promote the use of CO_2 power. The big news is that A.H. Zed will have merchandise available to be donated to clubs and organizations to be awarded by them as prizes in properly sanctioned local, national, and international contests for free flight CO_2 powered model aircraft. The purpose is to promote the use of CO_2 power for indoor, outdoor and scale free flight models. Merchandise available for prizes will be Brown Jr. CO_2 motors, soda chargers, Cryodyne chargers, tanks, props, fuel systems, and Micro-X peanut J-3 *Cub* kits.

Eligibility of clubs and organizations to receive merchandise will be subject to final approval of the Board of Directors of A.H. Zed Aircraft Inc. For more details—or to apply—send a self-addressed, stamped envelope with club charter info, contest info, etc. to the following address: A.H. Zed Aircraft Inc., 9343 So. Hamilton Ave., Chicago, Illinois 60620. Again, tell Jack that Van sent you. Okay?

Well, gang, I guess we better cut things short so we save space for all the photos. Keep in touch with your old modeling buddy here at 10 Brothers Rd. in Wappingers Falls, NY 12590 and don't forget those black and white photos.

Happy modeling until we get together next month . . . So long, now.

Carstens Flying plans

RADIO CONTROL SCALE

CF-9 AERONCA CHAMP. .51" wing. .049 to .09 engine. Familiar sports design. RC. ... **$5.00.**

CF-13 NORTH AMERICAN P-51 MUSTANG. Single RC or UC .099 powered. By Bob Buragas. ... **$5.00.**

CF-17 B-25 MITCHELL BOMBER. World War 2 vintage bomber for RC. By Nick Ziroli. FM 12-70. ... **$8.50.**

CF-36 LOCKHEED U-2 SPY PLANE. Prop or glider. 72" wing, semi-scale. Robert Trishin. FM2-66. ... **$6.00.**

CF-51 ALPAVAIA RF-3. French sportplane. 63" span. .09 mil. By O. Kampen. FM9-66. RC. ... **$3.00.**

CF-52 CURTISS JN4D JENNY. 42" wing. for single channel RC. Nick Ziroli. FM9-66. ... **$3.00.**

CF-57 SPAD SV-2. World War 1 fighter. By Paul Palanek. FM 5-64. .09 mil, 43" span. RC. ... **$6.00.**

CF-64 GYPSY MOTH DEHAVILAND. 68" wing, .60-.71, biplane. 3 sheets. By Elmer Nowac. FM 4-62. ... **$7.00.**

CF-66 WACO N. Tricycle gear biplane. .09 to .15 RC with 40" span. FM 1-67. By Nick Ziroli. ... **$3.00.**

CF.81 FOKKER D/VII. 60" span RC World War 1 biplane ⅛" scale, .61 mil. Nick Ziroli. FM 6-67. ... **$5.00.**

CF-83 GRUMMAN AGCAT. Duster biplane 1/12th scale for .35-.40 CL. 2 sheets. Bob Adair. FM 6-67. ... **$5.00.**

CF-85 BEECHCRAFT STAGGERWING. 52½" span biplane for .60 RC. Bryce Petersen. FM 7-67. ... **$5.00.**

CF-89 FAIRCHILD PT-19. Low wing Army trainer. 62" span for .49, RC. Gene Rogers. FM 8-67. ... **$7.00.**

CF-93 FOKKER DR-I. WW1 triplane RC for .50-.61, 48" wing. Bryce Petersen. FM 9-67. ... **$6.00.**

CF-97 MORANE SAULNIER "N". 1915 version, near scale 55" span, for .35. Nick Ziroli. FM 10-67. ... **$5.00.**

CF-104 S. E. 5 Famed British WW1 fighter biplane. 52½" span, .61 mil engine. Nick Ziroli. FM 1-68. ... **$6.00.**

CF-109 FALK RIVETS. Goodyear Racer, 1st at '67 NATS. By Joe Foster, RC, FM 2-68. ... **$6.00.**

CF-114 EINDECKER E-111. German monoplane, 55" span uses .35 mil. Nick Ziroli. RC. FM3-68. ... **$5.00.**

CF-126 HEATH BABY BULLET. 1928 racer by founder of Heath Co. 56" span RC for .46 to .60. Nick Ziroli. FM 7-68. ... **$5.00.**

CF-143 VIGILANTE. RC semi-scale similar to Navy AJ-3. 51" span with .45-.60 pusher. Nick Ziroli. FM 11-68. **$5.00.**

CF-146 AMERICAN EAGLE. 1929 scale biplane RC for .40-.56 mil. 56" span. By Tom Collins. FM 12-68. ... **$5.00.**

CF-154 THUNDERBOLT. Near scale WW2 fighter with .45 engine, RC. By Nick Ziroli. FM 3-69. ... **$6.00.**

CF-159 JUNKERS CL-1. 56" span WW1 model with Enya .45 engine. By Jim Burgholzer. FM 5-69. ... **$6.00.**

CF-163 FW 190-A3. Near scale RC, retractable gear, 54" span, .45-.56 engine. Nick Ziroli. FM 6-69. ... **$6.00.**

CF-170 MARTIN MARAUDER B-26. RC twin .45 scale, 72" wing. By Joe D'Amico. FM 8-69. ... **$8.50.**

CF-173 DEMOISELLE. Dumont's pioneer airplane. 3" scale. Zundel and Signorino. RC. FM 1-70. ... **$12.00.**

CF-174 BLACKBURN ALL-STEEL. 1915 near scale RC for .29 mil. Vern Zundel. FM 9-69. ... **$8.50.**

CF-183 GRUMMAN F8F BEARCAT. 52" span RC, .40-.52 semi scale by Nick Ziroli. FM 2-70. ... **$6.00.**

CF-184 INSTANT AZTEC. Twin Super Tigre .29s power VK Cherokee RC conversion. Bryce Petersen. FM 2-70. **$5.00.**

CF-188 MORANE SAULNIER. ⅛ scale model of French sportplane. 57" span, .49. By Nick Ziroli. FM 3-70. . **$6.00.**

CF-200 VOLKSPLANE. 57" span RC for popular home built aircraft. By Gene Rogers. FM 7-70. ... **$6.00.**

CF-215 DEPERDUSSIN. 1911 vintage aircraft with 56" span RC scale. Vern Zundel. FM 10-70. ... **$8.50.**

CF-223 PFALZ D-IIIa. RC 2" scale WW1 biplane for .60 mil, by Alan Spievak. FM 6-71. 3 sheets. ... **$18.00.**

CF-227 A.V. ROE BIPLANE. 1911 standoff 2" scale RC for .19-.35, 60" span. By Frank Noll. FM 7-71. ... **$12.00.**

CF-245 TIGER MOTH. Slow flying oldtime bipe for .23 mil inverted, with 43" span. Don Foster. RC. FM 11-71. **$3.00.**

CF-251 NESMITH COUGAR. Eyeball scale RC 54" span, .40-.60. Simple. Stan Hines. FM 2-72. ... **$8.50.**

CF-273 GRUMMAN F4F-4 WILDCAT. RC semiscale, 45" span. OS Wankel .030. Nick Ziroli. FM 9-72. ... **$6.00.**

CF-286 B-17G FLYING FORTRESS. Four Webra .20, RC. 1st in '72 NATS flight achievement. Tom Cook. FM 1-73. ... **$12.00.**

CF-287 WINDECKER EAGLE. RC scale 69" span, .61. Retract gear. Ralph Jackson. FM 2-73. ... **$12.00.**

CF-308 SKYHAWK. Navy Douglas RC semiscale A4-D5, 39" span, .40-.60. Stan Hines. FM 9-73. ... **$6.00.**

CF-311 BUHL PUP. Classic RC semi scale with 76" span, 4 channel, .60 eng. Vern Zundel. FM 10-73. ... **$12.00.**

CF-313 BOEING STEARMAN PT-17. Stand off scale RC for .40-.60. Nick Ziroli. FM 11-73. ... **$6.00.**

CF-319 PIPER CHEROKEE ARROW. Scale RC of popular sport design. 60" span. Don Condon. FM 1-74. ... **$6.00.**

CF-321 TAUBE. Stand off scale RC with 84" span. German WW1. Sheets. Nick Ziroli. FM 1-74. ... **$12.00.**

CF-324 GRUMMAN F6F3 HELLCAT. Stand off scale RC, .60 with 59" span. Don Williams. FM 2-74. ... **$6.00.**

CF-326 BRISTOL MIB. WW1 stand-off scale monoplane, 52" wingspan with .40 engine. By Tony Eck. FM 3-74. **$6.00.**

CF-328 CULVER V. Stand off scale post-War classic. 51" span, .29-.35 engines. Stan Hines. FM 4-74. ... **$6.00.**

CF-331 MOONEY M-18. 69" span stand off scale RC for Fox Falcon with Goldberg retract gear. Stan Hines. FM 5-74. ... **$6.00.**

CF-333 HENRI FARMAN. 1910 antique stand off scale RC for .40-.45. 2" scale. Vern Zundel. FM 9-69. 3 sheets. ... **$18.00.**

CF-334 1920 DAYTON-WRIGHT RACER. ½A Pylon or stand off scale RC, 30" span, Cox Tee Dee .049. Bob Aberle. FM 6-74. ... **$4.00.**

CF-339 BARLING NB-3. 33" span stand off scale open cockpit monoplane for .010 to .020 engines or rubber, pulse radio, or FF. Hurst G. Bowers. FM 7-74. ... **$3.00.**

CF-341 HANRIOT HD-1. WW1 RC scale biplane. 56" for Ross Twin or .40-.60 eng. Tony Eck. FM 8-74. ... **$6.00.**

CF-348 AERONCA L. Stand off scale RC with 72" span for .45-.60 engine. Bruce Lund. FM 10-74. ... **$8.50.**

CF-349 HIPERBIPE. RC stand off scale, 45" span for .40 engine. Stan Hines. FM 11-74. ... **$6.00.**

CF-350 CURTISS ROBIN. RC scale monoplane. 61½" wingspan, .045 engine. Bill Antoine. FM 11-74. ... **$8.50.**

CF-353 CITABRIA PRO. Stand off scale RC for Ross Twin .60 63" span. Bob Godfrey. FM 12-74. ... **$9.50.**

CF-357 STUKA JU-87. Stand off scale RC for .60 engine, 64" span. Tony Eck. FM 1-75. ... **$6.00.**

CF-364 EAA HEADWIND. Stand off scale RC for .15 engines, with 48" span. Al Wolsky. FM 4-75. ... **$4.00.**

CF-373 LINCOLN SPORT. Scale classic .020 powered with 30" span for pulse/light RC or FF. Hurst G. Bowers. FM 6-75. ... **$3.00.**

CF-375 FOCKE WULF 190D-9. Stand off scale RC, 62" span, for .60 engines. Tony Eck. FM 7-75. ... **$9.50.**

CF-377 YAK-9. RC stand off scale for .60 engines, 61" span. Dan Reiss. FM 8-75. ... **$6.00.**

CF-380 BD-6. Stand off scale RC for .19-.35 engines, 56" span. Bob Aberle. FM 9-75. ... **$6.00.**

CF-386 GRUMMAN SKYROCKET. RC stand off scale twin engine experimental. 56" span and two .29-.40 engines. Nick Ziroli. FM 10-75. ... **$6.00.**

CF-389 HEINKEL He-162. RC stand off scale with 55" span for Scozzi .40 Turb-Ax ducted fan. Nick Ziroli. FM 11-75. ... **$8.50.**

CF-391 SOPWITH PUP. WW1 stand off scale RC biplane with 59" span, .60 engine. Jerry Puleo. FM 12-75... **$8.50.**

CF-396 DEWOITINE D-510. RC stand off scale for .40-.60 engine, with 69" span. Alan Spievack. FM 2-76. ... **$6.00.**

CF-397 JUNGSTER II. Stand off RC scale EAA homebuilt with 50" span, .19-.29 engine by Al Wolsky. FM 2-76. **$6.00.**

CF-400 HAWKER HURRICANE Mk-I. RC scale with 61" span for Ross .61 engine. Tony Eck. FM 3-76. ... **$8.00.**

CF-403 P40 WARHAWK. RC stand off scale, 56" span, .60 engine. Dan Reiss. FM 4-76. ... **$6.00.**

CF-406 BOULTON-PAUL DEFIANT. RC stand off scale fighter, .60 eng., 60" span. Dan Reiss. FM 5-76. ... **$6.00.**

CF-407 BIG "GERE" SPORT". RC stand off scale biplane, .60 powered with 54" span. Dr. J. Jakovich. FM 6-76. **$6.00.**

CF-413 FARMAN 400 MONOPLANE. .020 powered light RC or FF, 38" span. Hurst G. Bowers. FM 8-76. ... **$3.00.**

CF-418 MONOCOUPE 90A. RC stand off scale classic with 72" span for .45 engine. Frank Dellamura. FM 9-76. **$9.50.**

CF-425 DEWOITINE D-520. RC stand off scale WW2 fighter for .60 engine, 62" span. Dan Reiss. FM 12-76. FM 12-76. ... **$6.00.**

CF-431 GRUMMAN KITTEN G-63. 48" span stand off scale RC ship for .40 engines. Bob Aberle. FM 2-77. ... **$6.00.**

CF-434 NAKAJIMA KI-84-Ia. Stand off scale RC for .60 engines, 54" span. C. S. Hines. FM 3-77. ... **$6.00.**

CF-441 BERG O. AVIATIK D-I. Austrian SOS RC WW1 biplane with 40" span for .35 to .40. Frank Dellamura. FM 6-77. ... **$6.00.**

CF-446 FOKKER T-2. 66" span stand off scale RC for .40-.60 engines. Don Martin. FM 7-77. ... **$6.00.**

CF-452 DOUGLAS A-IH SKYRAIDER. RC stand off scale for .60 engines with a 58" span. Rolled plywood fuselage. Dan Reiss. FM 10-77. ... **$6.00.**

CF-454 DOUGLAS DC-3 SOS. RC twin for two .45 engines, 96" span. Used commercially around the world. Tony Lombardo. FM 11-77. ... **$8.50.**

CF-462 CP-65 PORTERFIELD COLLEGIATE. Stand off scale RC ship with 74" span for .35-.45 engines. D. B. Mathews. FM 2-78. ... **$8.50.**

CF-464 MISS COSMIC WIND. RC stand off scale with 58" wingspan for .60s. Dan Reiss. FM 3-78. ... **$6.00.**

CF-475 AERONCA C-I SCOUT. Stand off scale 58" span for .19-.29 engines. Al Wolsky. FM 6-78. ... **$6.00.**

CF-478 GEE BEE MODEL D SPORTSTER. Scale RC with 56" span for .40 engines. Henry Haffke. FM 7-78. .. **$6.00.**

CF-488 DRUINE TURBULENT. Stand off scale RC with 60" span for .40 mil. Don Mathews. FM 11-78. ... **$6.00.**

CF-491 1938 PORTERFIELD ZEPHYR. 76" span RC ship for .40-.60 engines. Doc Mathews. FM 12-78. ... **$6.00.**

CF-494 SPIRIT OF ST. LOUIS. Stand off scale RC of Lindbergh's classic. 93" span 2" scale, for .40-.71 engines. By Don McGovern and Tony Lombardo. FM 1-79. ... **$12.00.**

CF-497 GEE BEE R½ LONG TAILED RACER. Scale RC ship with 56" span, for .60 engines. Henry Haffke. FM 2-79. ... **$12.00.**

CF-500 BEBE JODEL D-9. RC stand off scale with 57" span for .35-.40 engines. Doc Mathews. FM 3-79. ... **$6.00.**

CF-502 MILES M-20/2. RC stand off scale ship, 58" span, .60 engines. Stan Hines. FM 4-79. ... **$6.00.**

CF-510 MR. MULLIGAN. RC stand off scale 67" span, .60 engines. Tony Lombardo and Don Palumbo. FM 7-79. **$8.50.**

CF-512 LOCKHEED LITTLE DIPPER. Stand off scale RC for .60 engines, 61" span. Dan Reiss. FM 8-79. ... **$6.00.**

CF-515 MITSUBISHI A-5-M4 CLAUDE. Stand off scale RC for .35-.46 mil, 58" span. Jack Sheeks. FM 9-79. ... **$6.00.**

CF-520 PIPER TOMAHAWK. RC stand off scale for .19-.30 engines, 50" span. Dick Sarpolus. FM 10-79. ... **$6.00.**

CF-522 THORP T-18. RC stand off scale for .60 engines, 62" span. Tony Lombardo and Dom Palumbo. FM 11-79. ... **$6.00.**

CF-523 1931 ALEXANDER FLYABOUT. RC standoff scale for .09-.15, 57" span. Al Wolsky. FM 11-79. ... **$5.00.**

CF-530 WACO 10. 1930s vintage scale biplane for .049 power and three channel RC. Net Kragness. FM 2-80. ... **$6.00.**

CF-532 TOMMYCAT F-14. Semiscale ducted fan delta RC. Bob Kress design with 33" span, uses 3.5cc engines and Midwest RK-20 fan unit. Ron Farkas. FM 3-80. ... **$6.00.**

CF-534 1930's CLASSIC. Semi-scale low wing monoplane for .60, 60" span, inspired by golden era of aviation. George Rizkalla. FM 4-80. ... **$6.00.**

CF-538 CITABRIA. Quarter scale model of the famous aerobatic trainer for Quadra power. 102" span. Plans on two sheets. Tony Lombardo. FM 5-80. ... **$12.00.**

CF-543 KLOUD KING XL. 1938 Mickey Deangelis design for RC with 72" span. Doc Mathews. FM 7-80. ... **$6.00.**

CF-552 LINCOLN BEECHEY. Sport scale version of famed monoplane. 62" span for .36 mil. Al Wolsky. FM 11-80. ... **$6.00.**

CF-556 C-130 HERCULES. RC sport scale 4-engined monster on two plan sheets. 90" span, two .19's and two .40's. Dick Sarpolus. FM 12-80. ... **$12.00.**

CF-571 GEE BEE MODEL D SPORTSTER. RC quarter scale version with 77" span of the Gee Bee classic. Drawn on 2 sheets. Henry Hafke. FM 6-81. ... **$14.00.**

CF-579 BEECHCRAFT BONANZA. 59" foam wing span sport scale version of the famed private plane for .60 mil. engines. Dan Reiss. FM 10-81. ... **$6.00.**

CF-583 NICHOLAS BEASLEY NB-8. RC sport scale ship with 56" span parasol wing, for .09 eng. Al Wolsky. FM 11-81. ... **$5.00.**

CF-585 AERONCA CHAMP. Silhouette scale model of lightplane favorite for .09 to .15 size engines, 52½" span. Doc Mathews. FM 12-81. ... **$6.00.**

CF-587 AVIAFIBER. Sport scale RC hang glider can be flown as a sailplane or with an .049 engine. Big 75" span. Howie Applegate. FM 1-82. ... **$6.00.**

CF-604 Piper Pawnee Brave. This R/C sport-scale cropduster features a span of 49 inches and four channel operation. A fine subject for any 40 size motor. Arthur Heenan FM 7/82 ... **$6.00**

CF-611 MINI-MONI. A 1/2A R/C Sport Scale version of a popular new homebuilt aircraft. A 36" span natural for school yard flying. By Bob Aberle. FM 10-82 ... **$5.00**

CF-617 POLISH FIGHTER. This 40" span R/C Stand-Off Scale model features a "gull" wing design. For two to three channel systems and 1/2A power. By Chris Nagy. FM 12-82 ... **$5.00**

CF-621 MORANE SAULNIER MODEL H MONOPLANE. a 39 inch wingspan, stand-off scale R/C ship for .049-.10 size engines and three channel radios. By Don Martin. FM 2/83. ... $5.00

CF-623 AMERICAN EAGLE EAGLET. A stand-off scale R/C model of an American light plane of the 1930s. With a wingspan of 68 inches it is designed to be flown with .35 size engines. By Al Wolsky. FM 2/83 ... $5.00

CF-627 DOUGLAS DEVASTATOR. An R/C Sport-Scale version of a WW II Navy veteran, for four channels and 60 size mills. Wing Span is 62". Foam core wing construction. By Dan Reiss. FM 4-83 ... **$6.00**

CF-631 SYS MONOCOUPE. Designed for single channel pulse or micro multi-channel R/C systems, this Schoolyard Scale classic features a span of 36 inches. By Jim Kostecky. FM 5-83 ... **$5.00**

CF-636 FLETCHER FU24-950. R/C cropdusting at its best with this sport scale version of New Zealand's AG plane. Spans 63 inches and utilizes four to five channel radios and 40-45 size motors. Plans on two sheets. By Arthur Heenan. FM 7-83. ... **$12.00**

CF-651 FOKKER D-XXI. This R/C stand off scale model of a little known German designed fighter features a span of 431/2 inches and is designed to be flown with .15 to .21 size motors. By Kalevi Sundqvist. FM12-83 ... **$6.00**

CF-659 LUTON BUZZARD II. A nifty pusher design for sport scale enthusiasts, featuring a span of 61 inches. For .15 size mills and three channel guidance. By Don Martin. FM 3-84 ... **$6.00**

CF-665 SPARROWHAWK II. A Schoolyard Scale version of an obscure but charming British lightplane. Designed for 1/2A engines and two channel R/C systems. Spans 48 inches. By Don Srull FM 5-84 ... **$6.50**

RADIO CONTROL

CF-117 TRIDENT. All weather RC trainer for .61 Land, water, skis. Wally Zober. FM 4-68. ... **$5.00.**

CF-122 EL BRONCO. RC sport tail dragger for .61 mil with 68" span. Wally Zober. FM 9-70. ... **$5.00.**

CF-136 MUSTANG PROFILE. RC equipment is buried in foam wing, .45 with 56" span. Sterling Models. FM 10-68. ... **$5.00.**

CF-137 TIGER TWIN. 62" span trike geared design for two .23's, RC. Gene Rogers. FM 10-68. ... **$5.00.**

CF-138 JUNKER KLUNKER. Put a .45 to .60 in this Zober design. Looks like German WW1. FM 10-68. ... **$5.00.**

CF-151 URCHIN. Small RC sport tail dragger for .23 and mini-gear. Gene Rogers. FM 2-69. ... **$3.00.**

CF-156 VIXEN AEROBATIC. 40" span RC biplane with inverted .23. Gene Rogers. FM 4-69. ... **$6.00.**

CF-158 BOONDOCK BIRD. RC trainer with 52" span for .15-.19 and Hallco gear. Don McGovern. FM 4-69. ... **$5.00.**

CF-161 SNIPE. RC sport flyer, 68" span with .56 engine. Wally Zober. FM 5-69. ... **$5.00.**

CF-165 BOOMERANG. Big aerobatic bipe, 58" span, .60-.61, RC. Wally Zober. FM 3-67. ... **$6.00.**

CF-175 VERT-A-GO. Rocket assist RC VTO with 38" span uses .19 engine. Nick Ziroli. FM 9-69. ... **$5.00.**

CF-180 ACCELERATOR. RC sport design for land or water. 50" span for .19-.29. Gene Rogers. FM 12-69. ... **$2.50.**

CF-187 SWINGER 2. RC stunt with coupled flaps and elevator, foam 63" span wing, .45. Jack Sheeks. FM 3-70. **$5.00.**

CF-190 TOUCHDOWN MARK II. RC controline 2-3-4 system. 15. Bryce Petersen. FM 4-70. ... **$2.50.**

CF-198 VINDICATOR. 54" RC, 630 sq. in., 4½ lbs. Builds fast. Mark 2 version with Webra .61. Dario Brisighella Sr. FM 8-70. ... **$6.00.**

CF-204 CADET STOL. 62" span, 630 sq. in., .35-.60 uses Pro Line RC. Gene Rogers. FM 3-71. ... **$6.00.**

CF-206 RAIDER. 56" span for .40 or larger. MRC digital. Jack Sheeks. FM 3-71. ... **$5.00.**

WING DERRINGER. Semi scale RC for two .15.23 engines, span. Jack Sheeks. FM 10-70. ... **$6.00.**

CF-216 DEE-KAY SPECIAL. Formula II RC pylon racer, 57" span. Dave Gierke. K&B .40. FM 5-71. ... **$6.00.**

CF-220 BRAZEN RAVEN. 84" multi pattern RC, Super Tigre .60. 4 sheets. ... **$12.00.**

CF-229 RAMPANT. Toledo RC pattern class winner, .60 mil. wing retracts in tandam, 62" span. Jerry Worth. FM 7-71. ... **$12.00.**

CF-232 VICTOR. Open pylon RC, 56" span, for 45 mil. Gene Rogers. FM 8-71. ... **$6.00.**

CF-236 BANSHEE. RC design for full AMA/FAI patterns. Webra .61 and Pro Line gear. Jim Martin. FM 9-71. . **$6.00.**

CF-237 SHOESTRING. 57" semiscale for Fox .35. Paul Simons. FM 9-71. ... **$6.00.**

CF-238 BEHEMOTH. Giant 14' T tail craft. Takes .29 to .60. Humphries. FM 971. ... **$6.00.**

CF-239 INDY 500. A maneuvering RC monster that'll deliver pattern performance. Jack Sheeks' original has .61 Merco, EK Logictrol. FM 10-71. ... **$6.00.**

CF-249 INTIMIDATOR. RC pattern ship for .60, 7½ lbs. Marty Meyer. FM 1-71. ... **$6.00.**

CF-252 D.D.T. Sport RC design easy and cheap, .15-.23. Jack Sheeks, Jerry Caldwell. FM 2-72. ... **$3.00.**

CF-255 XP-400. Formula II and FAI pylon racer. 56" span., .40. Dave Gierke. FM 3-72. ... **$6.00.**

CF-256 SPRINTER. Sport RC V tail 2 channel, 42" span for .049-.15 mil. Gene Rogers. FM 3-72. ... **$3.00.**

CF-261 ASTEROID. RC sport, 61" span, K&B .40. Dick Johnson. FM 4-71. ... **$6.00.**

CF-266 DREAMER. RC sport biplane with 38½" upper span, 37½" lower, with .40 eng. Don Foster design. FM 6-72. ... **$6.00.**

CF-269 FAIMEISTER. 65" span RC pattern ship, .61 power, retract gear. Bob Caplan. FM 7-72. ... **$8.50.**

CF-270 ESCAPADE. RC tail dragger with Goldberg retracts, .60 eng. Gene Rogers. FM 8-72. ... **$6.00.**

CF-272 JOEY. 64" span RC, .60 engine. Pky and foam construction. Dick Sarpolus. FM 8-72. ... **$6.00.**

CF-281 SEA VIXEN. 64" span pattern twin boom for .60 power RC. Jack Sheeks. FM 11-72. ... **$4.00.**

CF-282 TYCHO 400. Altimeter equipped RC trainer with Enya .45, Orbit RC, 62" span. Don McGovern. FM 12-72. ... **$6.00.**

CF-289 ME-109. ¼ midget pylon racer, 39½" span. Super Tigre .15 with Blue Max RC. Jack Sheeks. FM 2-73. **$4.00.**

CF-293 BLUE FLAME. Open pylon racer RC, 54" span, 505 sq. in., Super Tigre .40 ABC. Dave Gierke. FM 4-73. **$6.00.**

CF-298 MOONROCK. RC pattern Delta with 44" span, 46" length. Enya .45. Lou Cubillos. FM 5-73. ... **$8.50.**

CF-299 GULL. 66" span RC sport for easy flying. Fox Eagle .60 and MRC 710 radio. Unusual wing. Dick Johnson. FM 6-73. ... **$6.00.**

CF-303 TAILGATER. RC pattern ship, 63" span, Webra .61, Pro Line radio, Rom Air retracts. D'Ostillio. FM 7-73. **$6.00.**

CF-305 VULTEE VANGUARD. RC stand off scale for Ross Twin .60. 63" span. Bob Godfrey. FM 12-74. ... **$9.50.**

CF-310 NORTHERN EAGLE. RC pattern, 58" span, .40-.51 mil. Dave Gierke. FM 9-73. ... **$6.00.**

CF-340 LIT SPECIAL. ½A RC pylon racer for Cox Tee Dee .049 with 31" span. V. A. Calouri. FM 8-74. ... **$2.50.**

CF-367 NOTHIN SPECIAL. ½A RC V-tailed pylon racer, 27" span. Bob Aberle. FM 5-75. ... **$4.00.**

CF-383 FLICON. RC pattern trainer using Falcon wing kit with T tail, .15 engine, 36" span. Bob Aberle. FM 5-75. ... **$6.00.**

CF-405 76 SPECIAL. Quarter midget RC trainer with T tail, .15 mil, 36" span. Bob Aberle. FM 5-76. ... **$6.00.**

CF-410 CANNONBALL. Microsize RC pylon racer for .020 engine and Cannon Tiny RC, 22" span. Bob Aberle. FM 7-76. ... **$3.00.**

CF-415 REVISION A. Single or two channel RC trainer, .09 engine, 44" span. Howie Applegate. FM 8-76. ... **$4.00.**

CF-417 SUPER WHIPLASH. RC sport pattern ship with 54" span and .40 engine. Dick Sarpolus. FM 9-76. ... **$6.00.**

CF-420 SUPER SPAD. RC sport bipe with 38" span for .19-.30 engines. Gene Weaver. FM 10-76. ... **$6.00.**

CF-426 WREN. RC sport biplane for .15-.19 engines, 38" span. Norman Rosenstock. FM 12-76. ... **$6.00.**

CF-429 INDY RETRAINER. Sport RC with 50" span for .30 engine. Jack Sheeks. FM 1-77. ... **$4.00.**

CF-435 CHECKERS. RC pattern trainer for .60 engines, 64" span. FM 4-77. ... **$6.00.**

CF-437 THE BASIC BIPE. 48" span RC sport biplane for .60 engines. Dan Reiss. FM 4-77. ... **$6.00.**

CF-438 REISS ROOSTER. RC sport biplane with 22" span for mini radios and Cox .010. Bob Aberle. FM 6-77. . **$3.00.**

CF-442 LIL EAGLET. 22" span .010 sport RC for mini radios and Cox .010. Bob Aberle. MF 6-77. ... **$3.00.**

CF-451 DOUBLE TROUBLE. Pattern RC biplane, 54" span, .60 mil. Dick Sarpolus. FM 9-77. ... **$6.00.**

CF-455 BI-BABY. RC sport biplane for .29-.40 engines. Jack Sheeks. FM 11-77. ... **$4.00.**

CF-456 THE ACE THREE TEN. 3 channel RC trainer, 36" span, for .09-.10 engines. Bob Aberle. FM 12-77. ... **$4.00.**

CF-458 THE CHALLENGER. Twin boom .60 powered RC pattern ship, 62" span. Bob Godfrey. FM 1-78. ... **$4.00.**

CF-459 THE HUNGRY EAGLE. RC duration model (looks like FF) for .40's with 96" span. Dick Sarpolus. FM 1-78. ... **$6.00.**

CF-477 BOXCAR. 3 channel RC trainer for .09-.10 engines, 49" span. Howie Applegate. FM 7-78. ... **$5.00.**

CF-483 MAGNUM 80. Twin .40 power RC pattern ship with 76" span. Dick Sarpolus. FM 9-78. ... **$6.00.**

CF-486 CHOPSTICKS. 57" pattern RC ship for .60 engines. Dan Reiss. FM 10-78. ... **$6.00.**

CF-498 SPEEDO. Sport flyer/racer, 40" span for .19-.25 engines. Dick Sarpolus. FM 2-79. ... **$5.00.**

CF-505 THE NEW ANGLE. RC 4 channel .049 pattern ship, 22 ounce, 34" span. Bob Aberle. FM 5-79. ... **$5.00.**

CF-525 QUIXOTIC. Sport pusher design for use with .35 engines. Doc Mathews. FM 12-79. ... **$6.00.**

CF-527 GP 700. General purpose airplane for glider tow. 60" span, .60 mil. Bob Aberle. FM 1-80. ... **$6.00.**

CF-531 MINI POINT. Club racer for 3.5cc engines, Delta configuration. Bud Roane. FM 2-80. ... **$6.00.**

CF-537 OLD BEAVERTAIL. 4 channel sport model featuring high aspect ratio wing and lifting fuselage, 56" span for .15 size engines. Hank Stumpf. FM 5-80. ... **$6.00.**

CF-540 VIRGINIA SLIM. Sport pattern design with molded plywood fuselage, 56" span, .60 engines. Dan Reiss. FM 6-80. ... **$6.00.**

CF-544 RC CHIEF. RC conversion of famous CL stunter of the 50's. 53" span for .30-.40 engines. Ron Farkas. FM 8-80. ... **$5.00.**

CF-550 VAMP. RC sport pattern twin boom ship with 58" span, .40 mil power. Sleek. Jack Sheeks. FM 10-80. **$6.00.**

CF-558 GOLDEN SNIFFER. RC version of postwar ½A FF favorite, for .35 mil and 3 channel radio. Bill Winter. FM 1-81. ... **$9.00.**

CF-569 ZINGER. Two or Three channel RC low wing fun ship for ½A engines. 32½" wing span. Herb Clukey. FM 2-81. ... **$4.00.**

CF-562 THE NEXT STEP. RC trainer designed to make use of parts from ready to fly airplanes. Alternate version may be built entirely from plans. For .09 mil and three channel radios. Bob Aberle. FM 3-81. ... **$4.00.**

CF-569 PONG. 44" span model for .049 engines and two channel radio. Designed for small field flying. L.F. Randolph. FM 5-81. ... **$5.00**

CF-576 GULFSTREAM. .60 powered RC pattern ship with 60" span. Bruce F. Lund. FM 9-81. ... **$6.00.**

CF-579 BONANZA. RC sport scale version of famous Beechcraft design for .060 engines. Uses foam wings. Dan Reiss. FM 10-81. ... **$6.00.**

CF-580 TEACHER. Low wing RC sport trainer has 54" wingspan and is designed for .35 motors. Jack Sheeks. FM 10-81. ... **$6.00.**

CF-591 CAPRA. Foam board is the principle construction material used to build this RC utility trainer. 68" span. D.B. Mathews. FM 2-82. ... **$6.00.**

CF-593 ROBIN HOOD. RC fun scale model of the Curtiss Robin features lightweight construction and 51" span. For .20-.25 size engines and 3 or 4 channel radio. John Maloney and Dick Sarpolus. FM 3-82. ... **$6.00.**

CF-595 HOWARD PETE DGA-3. R/C stand-off-scale version of the classic plane of the 1930's. Designed for use with 60 size engines and four channel radios. 64" span. Plan on two sheets. George Rizkalla. FM 4-82 ... **$12.00**

CF-597 SABREBAT. A 60 size R/C Canard sportster, featuring foam wings. Dan Reiss FM 5-82 ... **$6.00.**

CF-600 SEAHAWK: An R/C scale-like floatplane featuring a 47" span. For four channel radios and .40 size motors. Kalevi Sundqvist FM 6-82 ... **$6.00**

CF-602 20-40-60 Foam Floats. Three sizes of foam core floats for conversion use with virtually any R/C landplane type. Dick Sarpolus FM 6-82 ... **$5.00**

CF-605 TWO SQUARE. This R/C twin features a span of 66". For two 60s and four channel radios. Formed plywood fuselage. By Dan Reiss FM 8-82 ... **$6.00**

CF-609 FAKEOUT. This hot, 40 powered R/C sport pattern ship features a 58" span. Built up construction. Dom Palumbo. FM 9/82 ... **$6.00**

CF-608 COMBO. A 541/2" span R/C biplane which combines the good features of many popular designs into one. For use with four channel radios and 40 size motors. Hans Hochradel. FM 9-82 ... **$8.00**

CF-613 BIG ONE. A giant R/C Pattern design for use with a geared 61. The wing area of this behemoth is 1200 square inches with over a 70" span. On two sheets. By George Buso. FM 11-82. ... **$17.00**

CF-615 MONOWING. A unique R/C flying wing with a span of 40". Designed for three channel equipment and 15 size motors. By Kalevi Sundqvist. FM 11-82 ... **$5.00**

CF-619 GAMBLER. This R/C sport/pattern design features a 700 sq. inch wing and 60 power. Scale-like looks add to the fun. By Bob Lobozzo FM 1/83 ... **$7.00**

CF-624 R/C SUE. An R/C version of a perrennial freeflight sport favorite for use with three channel radios. The 59 inch span ship flys with 19-25 power. By Dr. D.B. Mathews. FM 3-83 ... **$6.00**

CF-629 SIG RISER MODIFICATION. Simple changes can turn Sig's popular Riser sailplane kit into a fine powered trainer for 09-10's. By Dr. D.B. Mathews. FM 4-83. .. **$3.00**

CF-634 PINE BARON. An all pine R/C trainer which features a wing span of 70½". For four channels and 40 size motors. By Al Trapanese. FM 6-83 ... **$6.00**

CF-637 THE HAMMER. A hot sport/pattern design which makes use of the current crop of high performance 19-25 size motors. Plans show two versions for either internal or external pipe mount. For four channel radios. Spans 50 inches. By Dick Sarpolus. FM 7-83. ... **$6.50**

CF-640 SPINNER II. Just the ticket for pattern training, this .60 size, low wing design features a span of 63 inches. Foam wing and built-up sheet balsa fuse construction. By Mike Blackard. FM 8/83 ... **$6.50**

CF-642 PEPPER. This low wing R/C sport design features a 50 inch span and flys with .19-25 size motors. An excellent choice for that first low wing ship. By Dick Sarpolus. FM 9-83. ... **$6.00**

CF-645 FASTBALL. Hot 1/2A performance is featured with this 28 inch span sport/aerobatic speedster. Accepts .049 to .051 size motors. By Bob Aberle. FM 10-83. ... **$6.00**

CF-648 SABREBAT TWO. A unique twin engined R/C Sport canard in a "push-pull" configuration. Features a 60 inch span and takes two 60's for go power. By Dan Reiss. FM 11-83 ... **$6.50**

CF-653 FASER. This 48 inch span Sport/Pattern design is designed to be powered by one of the hot new .21-25 size motors. By Al Trapanese. FM 1-84 ... **$6.00**

CF-655 PONG TWO. A low wing, 1/2 A powered sport ship featuring built-up construction. Wing span is 441/2 inches. By L.F. Randolph. FM 2-84 ... **$6.00**

CF-662 FOUR RUNNER. This 58 inch span, four channel R/C sport model is designed to be flown with .40 size four cycle motors. By Dick Sarpolus. FM 4-84. ... **$6.00**

CF-664 AIRKNOCKER. This remake of an old FM favorite is designed to produce scale-like flights on two channel R/C operation. Rudder only flight controls with throttle adds to the fun. Spans 521/2 inches. By Bill Winter. FM 4-84. **$6.00**

RC SAILPLANES

CF-508 FORCE 5. RC soarer with T tail, 100" span. Howie Applegate. FM 6-79. ... **$6.00.**

CF-546 ANT-25. 96" span powered glider for .09 engines. Semi-scale design of Russian endurance ship. Pavel Bosak. FM 9-80. ... **$6.00.**

CF-565 FREE SPIRIT. Top 2-meter design that features easy construction and flying. 2nd place at 1980 NATS. Leon Kincaid. FM 4-81. ... **$5.00.**

CF-589 LONG ISLANDER. Two meter sailplane features 78" span and easy building. Bob Abele. FM 2-82. .. **$6.00.**

CF-658 WINDUSTER. A fine flying Two-Meter glider for either slope soaring or high-start launch and thermaling. The ship features sheet balsa construction with a foam core wing. By Bill Evans. FM 2-84. ... **$6.00**

R/C SEAPLANES

CF-86 MAKO MONSTER. RC seaplane, .45 mil. Don McGovern original. FM 7-67. . . . . **$6.00.**

CF-94 UNSINKABLES. Foam floats convert big models to ROW. Gene Rogers. FM 9-67. . . . . **$3.00.**

CF-123 KOOKABURA. 72" seaplane for .45 RC. Willem Arts. FM 6-68. . . . . **$6.00.**

CF-132 GRUMMAN WIGEON. RC scale flying boat for twin .45. Oscar Weingart. FM 9-68. . . . . **$8.50.**

CF-150 MORAY MONSTER. 72" RC flying boat with retracting floats for .60 mil. Don McGovern. FM 1-69. . . . . **$8.50.**

CF-168 SCAMPI. 63" span RC flying boat for .56 RC, from Holland. Willem Arts. FM 7-69. . . . . **$6.00.**

CF-171 ENSIGN. 60" span RC flat plane uses Enya .45. Gene Rogers. FM 8-69. . . . . **$5.00.**

CF-199 SAVOIA-MARCHETTI. Twin Hull CL semi-scale of 1933 flying boat. Make it RC. Sarpulus & Shubel. FM 9-70. . . . . **$8.50.**

CF-211 EDO FLOATS. Semi-scale floats for ROW craft. Convert your land plane. Willem Arts. FM 3-67. . . . . **$3.00.**

CF-247 LAKE BUCCANEER. Semi-scale RC flying boat, .15-.19 pusher. Dave Ramsey. FM 12-71. . . . . **$6.00.**

CF-263 MADGE FLYING BOAT. 3 channel RC for .29-.45 mil with 57" span. Brent Reusch. FM 5-72. . . . . **$6.00.**

CF-290 FALCONEER TEAL. RC semi scale amphibian, 71" span, .45-.60 eng. Don Prentice. FM 3-73. . . . . **$8.50.**

CF-361 SEAWEED. RC seaplane with 65" span, .60 engine. Bob Aberle. FM 3-75. . . . . **$12.00.**

CF-393 VIKING. Record setting RC seaplane for .35-.60 engine, 77" span. Bryce Petersen. FM 1-76. . . . . **$6.00.**

CF-450 THE SEE BEE. ½A camera plane for RC with 42" wingspan. Dave Katagiri. FM 9-77. . . . . **$4.00.**

CF-539 ELECTRIC TERN. Electric powered RC seaplane for use with Astro Flight .020 motor. Mitch Poling. FM 5-80. . . . . **$4.00.**

CF-592 ASTRO SPORT FLOATS. Easy to build pair of floats for use on electric powered or ½A models. Mitch Poling. FM 3-82. . . . . **$3.00.**

CONTROLINE SCALE

CF-10 FOKKER DVII. 33" span WW1 fighter biplane, CL .049.09. Paul Del Gatto. Two sheets. FM 6-64. . . . . **$8.00.**

CF-23 SPIRIT OF ST. LOUIS. 46" scale UC. Lindbergh's plane. Paul Palanek. FM 12-66. . . . . **$3.00.**

CF-33 SEA VIXON. Royal Navy jet fighter, .35 mil with prop, 56" span, CL scale. Jack Sheeks. FM 4-66. . . . . **$3.00.**

CF-40 EXTENDED GEE BEE. CL semiscale lengthened for better flying. 35" sport. B. Miller. FM 6-66. . . . . **$3.00.**

CF-71 LOCKHEED HUDSON. 41" span twin .19 powered scale CL WW2 bomber. Paul Palanek. FM 4-62. . . . . **$5.00.**

CF-84 CURTISS HAWK 75. CL scale 36" span, .35 mil, French radial engine P-40. Paul Palanek. FM 4-62. **$5.00.**

CF-87 RYAN SC. Semi scale CL 51" wing, 35 mil. Jack Sheeks. FM 7-67. . . . . **$3.00.**

CF-106 FOCKE-WULF FW-190. 50" span CL profile WW2 fighter, .35-.45 eng. Jack Sheeks. FM 1-68. . . . . **$3.00.**

CF-130 BELL P-39 AIRCOBRA. 56" CL stunt. W. Simmons, for .35 mil. FM 8-68. . . . . **$5.00.**

CF-167 MESSERSCHMIDT ME-109. Near scale 48" span combat CL design for .35 mil. Vince Micchia. FM 6-69. . . . . **$5.00.**

CF-186 RYAN PT-20. CL stunt with 55" wing, .35 eng. Famed 2-place trainer. By A. DiMezza. FM 3-70. . . . **$5.00.**

CF-195 MUSTANG P-51. Controline stunt for .35, semi scale. Joe Berry. FM 8-70. . . . . **$23.00.**

CF-197 F-86D. Sabre jet CL stunt 54" span with .35 mil. Bob Lampione. FM 6-70. . . . . **$6.00.**

CF-210 MESSERSCHMIDT ME-262. Semi scale CL 55" span. Single inverted & throttle .35. Vornolt. FM 3-67. **$3.00.**

CF-212 STUKA JU-87. Famous German WW2 dive bomber, CL for .40 mil. Jack Sheeks. Semiscale. FM 7-70. . **$6.00.**

CF-226 HAWKER TYPHOON. British WW2 fighter. Heat CL version 1/12th size, .29-.40 power. Paul Palanek. **$5.00.**

CF-228 CHANGE VOUGHT F4U CORSAIR. 62" CL scale, .59-.60 eng. 1½" scale. Ira Kulp. FM 7-71. . . . . **$8.50.**

CF-241 SKY FLY. 2" scale replica of Anton Cvjetkovic's popular homebuilt for CL. Takes .40 mil. Roberts flight control system. Bob Adair. FM 10-71. . . . . **$6.00.**

CF-248 F-14 TOMCAT. CL stunt Navy fighter, 56" span, .35 mil. Vic Macaluso. FM 1-72. . . . . **$6.00.**

CF-297 F-105 THUNDERCHIEF. 57" span stunt CL semi scale for OS Max .40 engine. Bob Hunt. FM 5-73. **$6.00.**

CF-395 TYPHOON. Semi scale CL stunter, 56" span, ST-46 engine. Steve Ashby. FM 1-76. . . . . **$6.00.**

CF-414 AT-9 JEEP. Semi-profile CL for twin .30's, 56½" span. Jack Sheeks. FM 8-76. . . . . **$4.00.**

CF-428 GRUMMAN S-2G TRACKER. 63½" span CL scale for twin .35's or .45's. Steven A. Hall. FM 1-77. . . . **$6.00.**

CF-433 HANRIOT-BICHE H-110 PURSUIT. CL sport scale for .35 eng. 48" span. Dick Sarpolus. FM 3-77. . . . **$6.00.**

CF-473 P-61 BLACK WIDOW. Twin CL stand off scale for .049, 34" span. Michael Beaulieu. FM 5-78. . . . . **$5.00.**

CF-489 F4U CORSAIR STUNTER. Stunt CL with 58" span, .35-.46 engines. Jack Sheeks. FM 11-78. . . . . **$6.00.**

CF-518 CESSNA AGWAGON. Profile CL stunt with 50" span for .35 mil. Larry Kruse. FM 10-79. . . . . **$5.00.**

CF-630 OS2U-1 KINGFISHER. Something a bit different for C/L Carrier events. Features include a sliding leadout placement and a span of 30½". For 40-60 size motors. By Tom Schaeffer. FM 4-83. . . . . **$5.00**

CF-639 P-39 AIRACOBRA. A controline scale version of the famous WWII Bell fighter used by the Russians. A 23-35 mill powers this 34¾ inch model just fine. By Walter Musciano. FM 7-83. . . . . **$6.50**

CONTROLINE

CF-59 CHIZLER. CL slow stunt pattern flyer uses Fox .35 engine with shaft extension, 50" span. Dick Mathis. FM 11-66. . . . . **$3.00.**

CF-62 TALON. CL stunt with inverted .35, 56" span. J. Kostecky. FM 12-66. . . . . **$6.00.**

CF-67 SWINGER. Swept wing CL stunt, 51" span, .35 mil. Jack Sheeks. FM 1-67. . . . . **$3.00.**

CF-90 STARLIGHT. CL stunt, 56" wing for hot .35. Charles Mackey. FM 8-67. . . . . **$3.00.**

CF-III NOVI III. 51" span stunt CL, 1st at '67 NATS. Dave Gierke. FM 2-68. . . . . **$5.00.**

CF-121 FREEDOM 45.CL stunt with 45" span, foam core wing, .45 mil sheet covered. Jack Sheeks. FM 5-68. **$4.00.**

CF-134 SPITFIRE STUNTER. Semi-scale CL 49½" span, .35 engine. Jack Sheeks. FM 9-68. . . . . **$3.00.**

CF-141 FURY. Stunt CL trike gear, Fox .35 engine, full span flaps, 54" wing. Don Bambrick. FM 2-67. . . . . **$5.00.**

CF-144 WINDER. CL combat 42" span high speed .35. Terry Prather. FM 11-68. . . . . **$2.50.**

CF-147 FORMULA S. 55" stunt CL, 2nd at Olathe NATS. J. Kostecky. FM 12-68. . . . . **$5.00.**

CF-149 TORINO S. 53" span CL stunt with .35 mil. Modern. Jack Sheeks. FM 1-69. . . . . **$4.00.**

CF-153 SCOTTSMAN. 53" span CL stunt swept wing design with full flaps for .35. Jack Sheeks. FM 2-69. . **$3.00.**

CF-162 PEGASUS. CL stunt 630 sq. in., 57" span. McCoy .40 engine. Bob Howard. FM 11-69. . . . . **$5.00.**

CF-164 KNIGHT. T tailed CL stunt, 52" span, .35 mil. Jack Sheeks. FM 6-69. . . . . **$4.00.**

CF-172 HI-LO. CL stunt trainer, 51" span, uses .35 mil. Paul Palanek. FM 9-69. . . . . **$3.00.**

CF-181 TEAR-A-LONG. Combat CL, small and compact, for Cox .15. Fast Richard. FM 12-69. . . . . **$3.00.**

CF-185 MESSERSCHMIDT ME-109. Semi scale CL 52" span for .35 engines. Jack Sheeks. FM 4-70. . . . . **$5.00.**

CF-192 NOVI IV. 55" span Controline stunt for .35 mil. Fm 5-70. Dave Gierke. . . . . **$5.00.**

CF-203 OLD GLORY. Stunt controline. 53" span. .35-.40. Jack Sheeks. FM 2-71. . . . . **$3.00.**

CF-213 MYSTERE II. CL stunt with 55" span, .29-.40 mil. Sensitive. Jim Van Loo. FM 10-70. . . . . **$6.00.**

CF-225 VULCAN. CL stunt. Optional foam or built-up wing, 56" span, Fox 35. Bob Lampione. FM 6-71. . . . . **$6.00.**

CF-246 STUNT MACHINE. 2nd place '71 NATS in sleek CL pattern .35. Gene Schaffer. FM 12-71. . . . . **$6.00.**

CF-257 DOUGLAS SKYRAIDER. Semi-scale CL stunt for .35. Don Typond. FM 3-72. . . . . **$6.00.**

CF-258 IRON BUTTERFLY. FAI combat CL with 33" span. Fast Richard. FM 3-72. . . . . **$3.00.**

CF-259 UNITED. Stunt CL for .35, 53" span. Bob Lampione. FM 4-72. . . . . **$6.00.**

CF-262 TIGER MIRAGE. FAI CL team racer for .15 diesel, 33" span. Dave Kelly. FM 5-72. . . . . **$5.00.**

CF-265 WARHAWK STUNT. CL stunt ship for .35-.40 mil with 56" span. Bill Simons. FM 6-72. . . . . **$6.00.**

CF-267 BE-WITCHED. Twin boom stunt CL, 51" span for McCoy .40. Jack Sheeks. FM 7-72. . . . . **$4.00.**

CF-277 FLY BABY. Semi-scale CL stunt ship, 57" span, .40 McCoy. Jack Sheeks. FM 10-72. . . . . **$4.00.**

CF-283 PINTO. ½A stunt CL for Cox Tee Dee .049 with 34½ span. Dick Mathis. FM 12-72. . . . . **$4.00.**

CF-302 VOLUNTEER. 53½" stunt CL, McCoy .40. Jim Lynch. FM 7-73. . . . . **$6.00.**

CF-307 HURRICANE. Stunt controline with 49" wing and Fox .35 engine. Jack Sheeks. FM 8-73. . . . . **$4.50.**

CF-312 U-2 STUNTER. CL U-2 spy plane stunt ship for O.S. Max .35, 50" span. Joe Adamusko. FM 10-73. . . . **$6.00.**

CF-316 MISS DARA. CL stunt with 49" span for Fox .36 engine. Dennis Duvall. FM 12-73. . . . . **$4.00.**

CF-322 GENESIS. Stunt controline winner with 52" span for .35 engines. Bob Hunt. FM 2-74. . . . . **$6.00.**

CF-327 P-26 STUNTER. Stunt controline, 61" span, .35 to .60. FM 3-74. . . . . **$4.00.**

CF-329 TALON STUNTER. CL stunt T-38 with 52" span for O. S. Max .35 stunt engine. Dave Rees. FM 4-74. . **$6.00.**

CF-338 SUNSHINE. CL stunter for .35 engines. Andy Lee. FM 7-74. . . . . **$4.00.**

CF-342 CLIPPER. CL slow combat, 35½" span for .35 engine. Wm. Wiley. FM 8-74. . . . . **$4.00.**

CF-344 BISHOP. Stunt CL for .35 to .46 engines, 56" span. Jack Sheeks. FM 9-74. . . . . **$4.00.**

CF-347 MACCHI 202. CL stunt, ST .46, 58" span. Dennis Duvall. FM 10-74. . . . . **$4.00.**

CF-359 P-51B STUNTER. CL "mustang" for stunting with 60" span and .60 engine. Jim Vornholt. FM 2-75. . . . **$6.00.**

CF-363 SCORPIO. CL stunter, 60" span, .46 ST engine. Bill Simons. FM 3-75. . . . . **$6.00.**

CF-365 PANIC. Stunt CL for Super Tigre .46 mil engine with 51" span. Jack Sheeks. FM 4-75. . . . . **$4.00.**

CF-376 MATADOR. Fast combat CL for .35 and .36 engines. 42" span. Rich "von" Lopez. FM 7-75. . . . . **$4.00.**

CF-388 SUNDANCE. CL stunter with 55" span for .40 engines. Chris Lella. FM 11-75. . . . . **$6.00.**

CF-404 SQUIRREL. CL stunter, 53" span, .35-.40 engine. Jack Sheeks. FM 4-76. . . . . **$4.00.**

CF-421 THE TORCH. 54" span CL stunter for .35 engine. Dick Sarpolus. FM 10-76. . . . . **$6.00.**

CF-423 DAZZLER 40. CL stunter with 56" span for O. S. Max .40S. Dave Rees. FM 11-76. . . . . **$6.00.**

CF-439 ME-109G. Stunt controline with a 54½" span for .35 to .45 engines. Jack Sheeks. FM 5-77. . . . . **$3.00.**

CF-447 GENESIS 46 MK III. CL stunter. Winner of '76 NATS. Bob Hunt. FM 8-77. . . . . **$6.00.**

CF-469 CARE. Stunt CL ship, 51" span, .35 engine. Jack Sheeks. FM 4-78. . . . . **$5.00.**

CF-482 AURA. Stunt CL ship with 56" span for .46 mil. Bill Bradford. FM 9-78. . . . . **$6.00.**

CF-492 STARDUSTER. Controline stunt with 58" span, .46 engine. Ed Capitanelli Jr. FM 12-78. . . . . **$6.00.**

CF-503 SEAFANG. CL stunt ship, 58" span, .40-.46 engines. Jack Sheeks. FM 4-79. . . . . **$5.00.**

CF-514 MIRAGE. CL stunt ship with 57" span for .46 engines. Lou Wolgast. FM 8-79. . . . . **$6.00.**

CF-524 FOXY LADY. ½A stunter for Tee Dee engines, knock down construction. Don Winfree. FM 12-79. . . . . **$4.00.**

CF-528 JUNO. CL stunter featuring "I" beam construction, 56" span, .40-.46 engines. Bill Werwage. FM 1-80. . **$6.00.**

CF-533 GENIE. Adjustable trim CL stunter for .46 engines, 60" span. Jim Armour. FM 3-80. . . . . **$6.00.**

CF-536 AQUILA. I-Beam construction stunter featuring adjustable control system, 56" span, .40 engines. Bob McDonald. FM 4-80. . . . . **$6.00.**

CF-541 MISS LAURA. Semi-scale stunter with Goodyear Racer flavor, removable landing gear, 56" span, .40-.46 engines. Alan Seacat. FM 6-80. . . . . **$6.00.**

CF-543 SPECTRUM. CL stunter for .40-.46 engines, 56" span. Adjustable features, competitive airframe. Jim Casale. FM 7-80. . . . . **$6.00.**

CF-545 ½A MIRAGE. High performance CL stunter for .049, 32" span, tricycle landing gear. Lou Wolgast. FM 8-80. . . . . **$4.00.**

CF-548 F-15 EAGLE. Semi-scale Air Force fighter for .049 eng, 20¾" wingspan CL. Richard Schrader. FM 9-80. **$4.00.**

CF-549 MY BLUE. CL stunter features foam wing and tail, adjustable controls, unique design, 60" span for .40-.46 engines. John Poynter. FM 10-80. . . . . **$6.00.**

CF-553 ORANGE CRATE. CL stunt ship, adjustable features, 61" span for .35s. Alan Adamasin. FM 11-80. **$6.00.**

CF-560 AVANTI. 60" wing span CL stunt ship for .40 engine. Many adjustable features. Bob Baron FM 2-81. . . . **$6.00.**

CF-566 FREEDOM FIGHTER. ½A semi-scale stunter for .049 engines with trike gear and 31½" span. Dick Byron. FM 4-81. . . . . **$4.00.**

CF-570 GOTCHA. Winner of the 1980 Nats Open combat event. Features include 48" span foam construction. For .36 engines. Phil. Carter. FM 5-81. . . . . **$6.00.**

CF-575 SWEEPER. 78" wingspan CL powered with OS 60 adds up to big competitive stunter. Windy Urtnowski. FM 8-81. . . . . **$12.00.**

CF-578 CERES. 58" CL stunt features I beam construction with sheeting, for .40-.45 engines. Bob McDonald. FM 9-81. . . . . **$6.00.**

CF-582 ROGUE. Futuristic CL stunt design for 40-50 size engines. Foam wings and tail. 60" span. Bill Simons. FM 10-81. . . . . **$6.00.**

CF-603 LUCKY 18. A controline stunt beauty by Poland's top C/L flyer. Features include a 56" span, adjustable leadouts and .40-.46 power. Piotr Zawada FM 6-82 . **$6.00**

CF-606 ECLIPSE. Ultra high-aspect-ratio C/L stunter for 35-40 power. Features a 63" span and adjustable controls. By Dennis Adamsin FM 8-82 . . . . . **$6.00**

CF-614 MISS JUILET. Stylish C/L stunter for use with 40-46 size motors. Features include a large canopy and a span of 57". By John Poynter. FM 11-82. . . . . **$5.00**

CF-618 MASTER KILLER. A state of the art C/L Fast Combat model for use with the hottest 36 size motors. Features a span of 39¾". By John Jo. FM 12-82 . . . . . **$4.00**

CF-649 SAGITTA. This C/L stunter features a 62 inch span, sheeted "I" beam wing. Latest in a carefully developed series of serious competition machines. By Bob McDonald. FM 11-83 . . . . . **$6.50**

CF-661 SPECTRUM MK III. Winner of the 1983 Nats Stunt event, this design features a 59½ inch span foam core wing. For 40-60 size mills. By Jim Casale. FM 3-84 . . . . . **$6.00**

CONTROLINE PROFILE

CF-332 HEINKEL HE-219. Profile twin controline for two .15 engines, 38" span. Joe DeMarco. FM 5-74. . . . . **$4.00.**

CF-335 ERCOUPE. Profile CL for .19 to .40 engines. 53" span. Dick Mathis. FM 6-74. . . . . **$4.00.**

CF-342 CLIPPER. CL profile slow combat, 35½" span for .35 engine. Wm. Wiley. FM 8-74. . . . . **$4.00.**

CF-354 BOEING F4B-3 PROFILE. CL biplane with 34" span for 29-36 engines. Joe DeMarco. FM 12-74. . . . . **$4.00.**

CF-355 METAPHOR I. Stunt profile CL for .35 mil with 47" span. Bill Bradford. FM 1-75. . . . . **$4.00.**

CF-368 SKYFIRE. ½A CL stunt profile for Cox foam wing, 28" span. Larry Reger. FM 5-75. . . . . **$4.00.**

CF-392 MISS JILL. Profile CL stunter with 52" span, Fox .35 mil. Jack Sheeks. FM 12-75. . . . . **$4.00.**

CF-398 BEARCAT & ZERO. Two profile CL with 29" span for .09-.15 power. Joe DeMarco. FM 3-76. . . . . **$4.00.**

CF-409 METAPHOR II. CL profile stunter with 52" span and .35 engine. Bill Bradford. FM 6-76. . . . . **$4.00.**

CF-411 TRAGER. CL Navy profile carrier, 32" span, .15 engine. Russ Brown. FM 7-76. . . . . **$4.00.**

CF-444 THE WILD GOOSE. Canard profile controline stunter with 48" span for .35 engines. Dick Sarpolus. FM 7-77. . . . . **$6.00.**

CF-480 DRUINE TURBULENT. CL profile stunt trainer, skinny cheap and easy, for .35 mil. Larry Kruse. FM 7-78. . . . . **$4.00.**

CF-507 THE PRETENDER. Profile CL stunt trainer for .19 engines, 45" span. Dick Sarpolus. FM 579. . . . . **$5.00.**

CF-516 F-84 THUNDERJET. Profile stunt CL with 49" wing for .29-.35 engines. Joe DeMarco. FM 9-79. . . . . **$6.00.**

CF-555 FRUGAL PHANTOM. CL profile sport scale for air show demonstrations, Designed for .35-.40 engines and throttle control. Hal Redner. FM 12-80. . . . . **$6.00.**

CF-563 ½A SPITFIRE. Profile controline ship with 29" wingspan, for ½A engines. Dick Sarpoulis. FM 3-81. . . . **$3.00.**

CF-567 BEECHCRAFT STAGGERWING. Sport scale profile model of a biplane classic. 29½"

CF-572 YARDBIRD. 36¼" span profile CL stunt trainer designed for the NCRA program. Mark Romanowitz. FM 6-81. . . . . **$4.00.**

CF-586 NORTHRUP GAMMA. Sport scale profile version of a racing classic, with wheel pants and 29½" wingspan. Walt Musciano. FM 1-82. . . . . **$6.00**

CF-598 SC-2. A top C/L Slow Combat design for use with 36 size motors. Phil Cartier. FM 5-82 . . . . . $5.00

CF-625 ROOKIE. This C/L stunter features an upright mounted 35 motor in a profile fuselage design. The ship features a 50 inch span. By Don Winfree. FM 3-83 . . . . **$6.00**

CF-633 PROFILE MISS DARA. The popular Goodyear racer is rendered in profile form for C/L sport and stunt flying. Features include a span of 51 inches, adjustable leadouts and side mounting for 35-46 size motors. By Allen Brickhaus. FM 5-83 . . . . . **$6.00**

CF-643 ZLIN 50-L. Unique foam wing and fuselage construction highlight this 52 inch span C/L profile design for 35-40 size engines. By Phil Cartier. FM 9-83. . . . . **$5.00**

CF-646 CAP 21. C/L fans will enjoy this spirited profile stunter which spans 29 inches and uses a hot .049 for power. By Dick Sarpolus. FM 10-83 . . . . . **$4.00**

CF-657 AKRO & ZLIN. Two profile C/L models for ½A fun. Captured in these easy to build, 28½ inch span models is the spirit of "Air Show" aerobatics. By Dick Sarpolus. FM 2-84 . . . . . **$6.00**

CF-667 BIG QUICKIE. Designed for C/L formula racing events, and modeled after "Goodyear" type racers, this plane performs with a .36 size motor, and spans 38 inches. By John Ross. FM 5-84 . . . . . **$6.50**

FREE FLIGHT SAILPLANES

CF-408 DESPERATION. A/1 Nordic glider, 48" span. Bruce and D.B. Mathews. FM 6-76. . . . . **$3.00.**

CF-424 BOOMER BUM. 78" span Nordic A/2 competition glider. Joe Slovachek. FM 12-76. . . . . **$4.00.**

CF-443 MOJAVE A/2 NORDIC. A/2 Nordic free flighter with 85" span. Dick Mathis. FM 6-77. . . . . **$6.00.**

FREE FLIGHT GAS

CF-318 MAXIPEARL. FF power for classes BCD for .29 to .40 engines, 86" span. Bill Chenault. FM 12-73. . . **$6.00.**

CF-323 MEDICINE MAN. ½A free flight power for .049 engine with 44" span. Jim Clem. . . . . **$3.00.**

CF-325 STAR SEEKER. FF power for BCD classes, .29-.40 engines. 86" span. Bill Chenault. FM 12-73. . . . . **$6.00.**

CF-330 JUBILEE. Competition FF with old timer look, 74" span, .29-.23 eng. Dick Mathis. FM 4-74. . . . . **$4.00.**

CF-346 STANDARD. Scale bipe for rubber, FF or .020 and lightweight RC. 36" span. Hurst Bowers. FM 10-74. **$3.00.**

CF-351 THROWBACK. FF sport 29" span, .020 engine. Larry Kruse. FM 11-74. . . . . **$3.00.**

CF-362 BAD MEDICINE. ½A-A FF 43" span, .045-.051 engine. Mike Ranson. FM 3-75. . . . . **$3.00.**

CF-381 PARFAI. FF FAI power .15 engine, 61" span. Chuck Markos. FM 9-75. . . . . **$6.00.**

CF-382 SHINGLESHIP. FF cedar seaplane with 14" span for Cox Tee Dee .010. Henry Sherrerd Jr. FM-75. . . . . **$3.00.**

CF-387 ETRICH TAUBE. FF scale antique with 32" span. W.R. Stroman. FM 11-75. . . . . **$3.00.**

CF-399 SCORCHER. Competition Jetex 50 FF with 30" span. FM 3-76. . . . . **$3.00.**

CF-402 DEHAVILLAND DH-10. FF scale 49½" span, two Astro Flight .020 electric motors. W.R. Stroman. FM 4-76. . . . . **$4.00.**

CF-416 1910 FABRE HYDRAVION. FF scale seaplane for Cox .020 engine, 35" span. W.R. Stroman. FM 9-76. **$3.00.**

CF-419 HELLA-PENO. ½A-A competition FF with 47" span for .049-.051 engines. Joe Slovocek. FM 10-76. . . . **$4.00.**

CF-449 VALKYRIE MODEL A NO. 1. Free flight electric scale for the Astro Flite 02 motor, 37" span. W.R. Stroman. FM 9-77. . . . . **$4.00.**

CF-453 COUNTRY BOY 650. Competition FF for Class B-C. Engines from .20-.41. Jim Clem. FM 10-77. . . . . **$6.00.**

CF-465 CHICAGOLANDER. Class A power FF for .15 mil, 52" span. Dave Linstrum. FM 3-78. . . . . **$5.00.**

CF-470 EVIL WAYS. Class A-B contest FF ship for .15-.23 engines, 60" span. Mike Hallum, Grady Turner. . . . **$6.00.**

CF-472 HOLY SMOKER. FAI .15 competition FF, 59" span. Joe Slovacek. FM 5-78. . . . . **$6.00.**

CF-499 THE SKY BIRD. ½A competition FF for .049-.051 engines, 46" span. Larry Kruse. FM 3-79. . . . . **$5.00.**

CF-504 RUMPLER 3F SEÁPLANE. FF scale for .020 gas engines, 32" span. W.R. Stroman. FM 4-79. . . . . **$5.00.**

CF-513 SUDDEN SAM. Competition FF B-C for .29-.35, 75" span. Jim O'Reilly. FM 8-79. . . . . **$6.00.**

CF-517 1912 ALBATROSS TAUBE. FF scale biplane for electric or diesel power, 33" span. W.R. Stroman. FM 9-79. . . . . **$6.00.**

CF-526 STARWORM. Contest FF design to use kit built wings. Dave Linstrum. FM 12-79. . . . . **$5.00.**

CF-547 EASTERN STATES CHAMPION. Replica of an old time favorite, .020 powered. Al Lidberg. FM 9-80. . . **$4.00.**

RUBBER

CF-594 LONING OL-9. Designed by Fulton Hungerford, this rubber scale amphibian features exact scale construction and optional retractable landing gear. Can also be built as two channel RC. 34" span. Ed Toner. FM 3-82. . . . **$6.00.**

CF-599 EMBRY-OK. Designed to compete in the F/F Rubber Embryo class, this design includes many scale-like features. Al Lidberg. FM 5-82 . . . . . **$4.00**

CF-601 B-25 MITCHELL. A 36" span, super-scale, rubber powered version of a famous WW 2 bomber. Mike Midkiff FM 6-82 . . . . . **$4.00**

CF-607 McRAE SUPER DART. A 27½" span rubber scale beauty. By Florent Baecke FM 8-82 . . . . . **$4.00**

CF-610 BOSTONIAN "T" CRAFT. Designed for the popular rubber competition class, this scale-like ship features a 16" span. Larry Kruse, FM 9-82 . . . . . **$4.00**

CF-612 LOW-CAL P-39. A profile F/F rubber version of a WWII favorite in air race colors. Features a 16¼" span. By Al Lidberg. FM 10-82 . . . . . **$3.50**

CF-616 FLECHETTE. This simple, sheet balsa F/F canard features outstanding flight performance. A 15¼" span. By Don Ross. FM 11-82. . . . . **$3.00**

CF-620 POLISH RWD 6. Winner of the 1930's Berlin event, this design is faithfully reproduced for Rubber Scale competition. Features include a 32½" span with 150 sq. inches of area. By Hurst Bowers FM 1-83 . . . . . **$5.00**

CF-622 GLOSTER GANNET. This rubber powered freeflight scale biplane has plenty of charm. It has a 21½ inch wingspan. By Don Srull. FM 2/83 . . . . . **$4.00**

CF-626 NEGABIPE. Designed to conform to the Bostonian competition F/F rules, this unique biplane features a negative stagger planform. By John Tudor. FM 3-83. . . . . **$4.00**

CF-628 OS2U-1 KINGFISHER. This rubber scale version of the famous Navy scout/rescue plane features either wheel type gear or optional floats. The Curtiss replica features a 27" span. By Mike Midkiff. FM 4-83 . . . . . **$5.00**

CF-632 GADFLY. Winner of the 1982 FAC Nats, this Jumbo Scale F/F rendition of the Glenny Henderson design features a span of 36 inches. By Dave Rees. FM 5-83 . . . . . **$5.00**

CF-635 FIESELER FI-167. This unusual WWII German biplane is designed for F/F Rubber Scale competition and features a span of 30". By Col. Hurst Bowers. FM 6-83 **$5.00**

CF-638 PEANUT STICK. A just-for-fun "Peanut Scale" version of the popular R/C Ugly Stick design. This freeflight rubber version spans 13 inches. By Jim Kostecky. FM 7-83 . . . . . **$3.50**

CF-641 RYANPT-22. A classic from the 1930's becomes the subject of a rubber scale masterpiece. Features include a shock mounted landing and a span of 30 inches. By Tom Sandor. FM 8/83. . . . . **$6.00**

CF-647 BOSTABRIA. Scale-like lines set this Bostonian class freeflight design apart from the norm. The 14 gram machine features a span of 16 inches. By Jim Kostecky. FM 10-83 . . . . . **$4.00**

CF-650 LEAR FAN. Try this profile scale version of Bill Lear's last design. The fun machine spans 17 inches and features a pusher prop. By Larry Kruse. FM 11-83 **$4.00**

CF-652 VARIEZE. A 25 inch span model rubber powered model of Burt Rutan's novel canard design. A natural for competition events. By Tom Sandor. FM 12-83 . . . . **$5.00**

CF-654 LIFTING BODY BOSTONIAN. A truly unique approach to the popular F/F event is this twin-pusher design with a lifting fuselage section. The original canard spans 16 inches. Plans on two sheets. By David Aronstein. FM 1-84 . . . . . **$5.00**

CF-656 F4U-1D CORSAIR. Jumbo Rubber Scale fans will enjoy this model of the famous "bent wing bird" which features a span of 41.9 inches. By Tom Houle. FM 2-84 **$6.00**

CF-660 A6M3 Zero-Sen. A delight for Jumbo Rubber Scale fans. This 39¼ inch span replica of one of WW II's most famous fighters is a fine flyer. By Tom Houle. FM 3-84 **$6.00**

CF-663 HIPERBIPE. Winner of the 1983 Nats F/F Gas Scale event, spans 18⅜ inch and is replica of a full size aerobatic homebuilt. By Dave Rees. FM 4-84. . . . . **$6.00**

CO_2 FF

CF-666 PRAIRIE DUSTER BIPE. An all sheet balsa CO_2 F/F design for fun. Spans 16 inches. By Larry Kruse. FM 5-84 . . . . . **$3.50**

RADIO CONTROLLED BOATS

CB-14 SCARAB S-TYPE: Complete superstructure details fit atop commercially available deep vee hull. Features include wet exhaust, railings, windshield, and interior details. Vic Macaluso. FM 3-82. . . . . **$6.00.**

CB-15 TWINKLETOES. A sleek R/C outboard hydroplane for use with K&B outboard motors. By Richard Hanson. FM 10-82 . . . . . **$6.00**

R/C giant scale

By Frank Costello

This month we'll talk about carbon deposits on spark plugs but first, let's have a little background info on the fuel we use.

Gasoline (or petrol for you British types) is a highly refined product of crude oil which in itself is a compound of carbon and hydrogen – a so-called hydrocarbon. By itself, though, gasoline is not satisfactory enough to give maximum engine performance while also protecting the engine it's in. Over the years numerous additives have been combined with gasoline to increase automobile engine performance and life, such as rust inhibitors, detergents for cleaning and anti-knock compounds.

One of the most controversial additives has been tetraethyl lead which served a two-fold purpose. It retarded or inhibited combustion allowing the timing on the engine to be advanced further for more power and it also acted as a lubricant to the early engines with their improperly fitting seals and bearings. (If this seems strange, just think how slippery molten solder is and that's half lead!) The lead additive was fine until it was discovered that the lead in the exhaust of twenty million cars was causing air pollution.

Anti-pollution devices on cars (the catalytic converter) were ruined by the lead in the exhaust so out went the lead additive and in came unleaded gasoline. This has all the other properties of leaded gasoline but without the lead additive. (I've been told they use nickel instead but I'm not sure of this. Anyone out there know?) The advantage here is that you don't get lead poisoning from car exhaust any longer. You still choke to death on the carbon monoxide but that's a different story.

The point I'm trying to make here is that leaded gasoline (the so-called regular) is unnecessary and potentially physically harmful in our small engines. We don't have the infinitely variable timing adjustments on our engines (vacuum advance, etc.) and we don't need the lubricating qualities of the lead since we mix the oil with the gas anyway. So from now on everyone out there is going to use unleaded gas. Right, troops! By the way, unleaded regular is fine. We don't need all the additives in unleaded premium, either. Amoco still makes the so-called "white gas". It's their unleaded regular. Try it.

Getting back to our spark plugs, let's take a look at the tip and what happens during combustion. When the spark plug "sparks" it starts a burning process in the cylinder that creates internal pressure and pushes the top of the piston down. This combustion process is never fully efficient and small particles of unburned hydrocarbons are left over from the burning. Somehow these carbon particles always seem to find their way to the tip of the spark plug and collect there. (Murphy's Law?) You would think they'd be burned up from the high temperatures there but such is not the case.

These carbon deposits are annoying to us in three ways. First, by coating the plug electrodes, they cut down the plug gap and create a smaller spark. This smaller spark, in turn, makes for a less efficient combustion process creating more carbon deposits. As you can see, it's a self-feeding process with a poorly running engine as the result. Carbon is an excellent conductor of electricity and on badly fouled plugs can actually bridge the entire gap resulting in no spark at all while current still flows!

Second, these deposits are usually pretty hot and if enough collect in one spot, they can create a "hot spot" in the cylinder which will pre-ignite the fuel-air mixture before the spark plug lights, causing engine knock.

Thirdly, and most important to us, when the electric current is conducted through the carbon deposits, for some reason it creates a lot of radio static. I don't have to tell you what havoc that can raise with your R/C unit. The radio simply can't handle it.

What can we do about these deposits? Not much, unfortunately. Obviously, not running your engine too rich will help a lot. So will using the proper mixture of gas and oil. But any time oil is burned in the cylinder along with the gas (as in two cycle engines) these deposits are going to be away of life.

How about a fix? Say you're out at the field. Your engine isn't running right. You check the plug and, sure 'nuff, it's coated with greasy black crap. You can help a lot right there by just taking a rag and wiping it off as best you can. Scraping with an X-Acto knife will also help. This will at least get you through the day. When you get home is the time to really fix it. What do you do? Hit it with a wire brush? *NO!* Never clean off a fouled plug with a wire wheel on a bench grinder or Dremel-type tool. The wire leaves metallic tracks on the porcelain that cause misfiring and the plug will foul even quicker the next time.

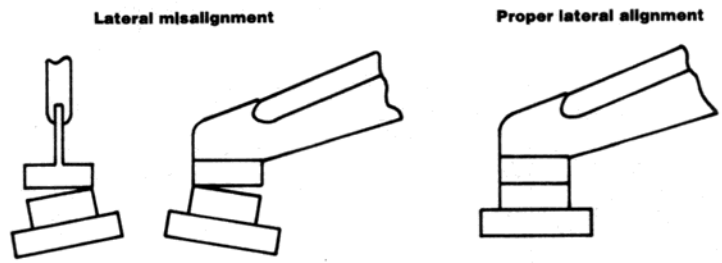
Should you get one of those fancy sandblasting units? These work fine and, after cleaning, filing, and regapping, you can expect brand new performance from your plug. The problem is that these units are *expensive* and it will be many years before you save in plugs what you spent on the plug sandblaster. These machines are made for auto repair shops that clean three or four dozen plugs a week.

No, the best thing you can do for your fouled plug is *throw it out.* Honest, guys, a new plug is only a couple of bucks and you'd still have to file it and regap it like the old cleaned one. So why not treat yourself and your engine to a new plug every 20 hours or so. You'll be glad you did.

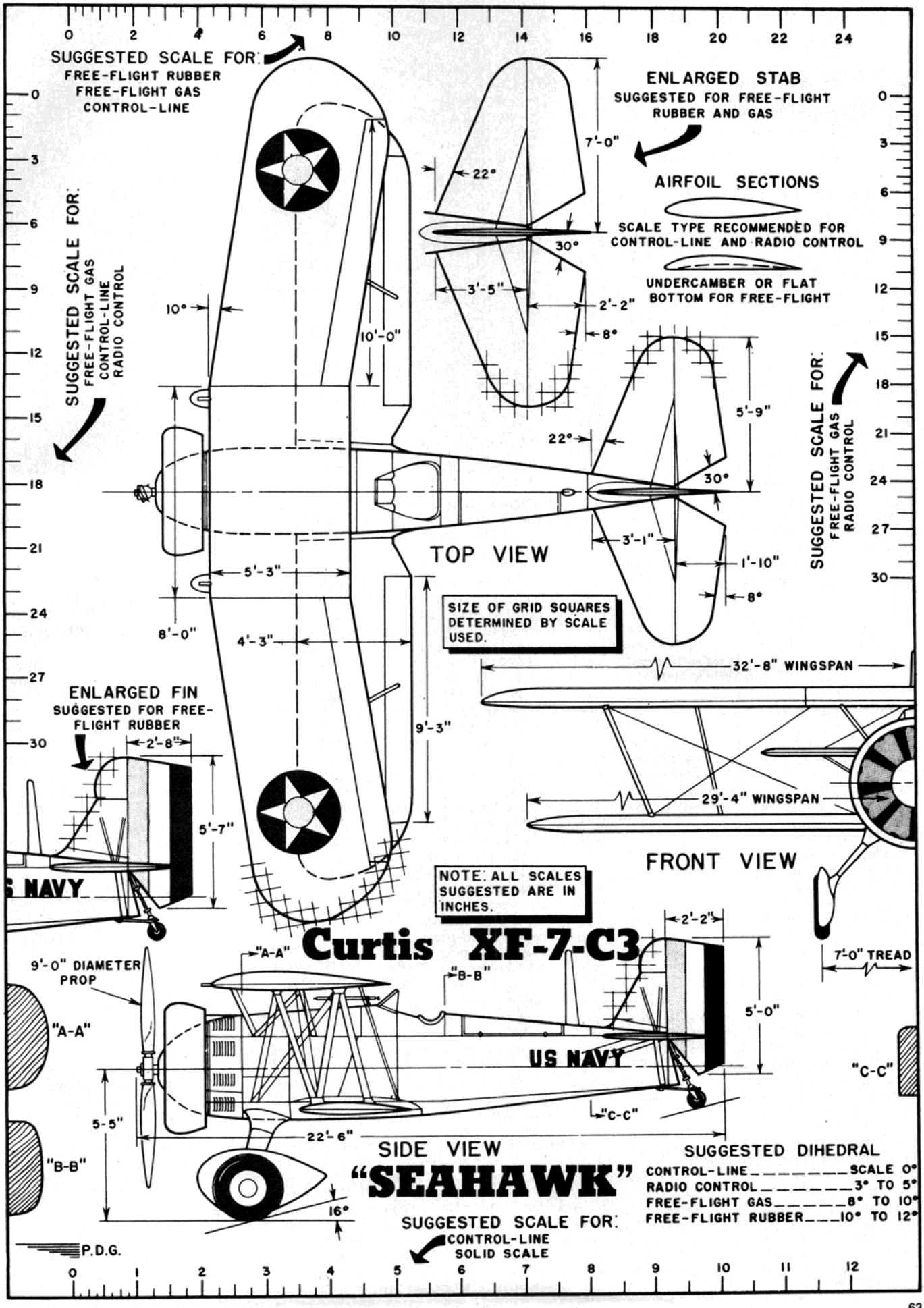
Breaker points

Another important gap in your engine's ignition system is the breaker point gap. The breaker points are what control the flow of electricity through the magneto coil to create the large current needed to jump the gap at the spark plug. (If you can't follow that, go back to the February issue where we talked about magnetos). The breaker points consist of two pads of metal, usually tungsten for heat resistance. One is stationary and permanently mounted to a bracket which gets screwed to the engine. The other is on a movable spring loaded arm which is activated by a cam (usually a flat spot on the crakshaft of two cycle engines.) The important thing here is to make sure the pads contact each other squarely and evenly. Check the sketch and you'll see what I mean. Gap distance here is .014 to .018 with .015 being the most common. Unlike spark plugs this can be checked with flat type feeler gauges. A good rule of thumb is to check the gap every time you change the plug.

Point alignment

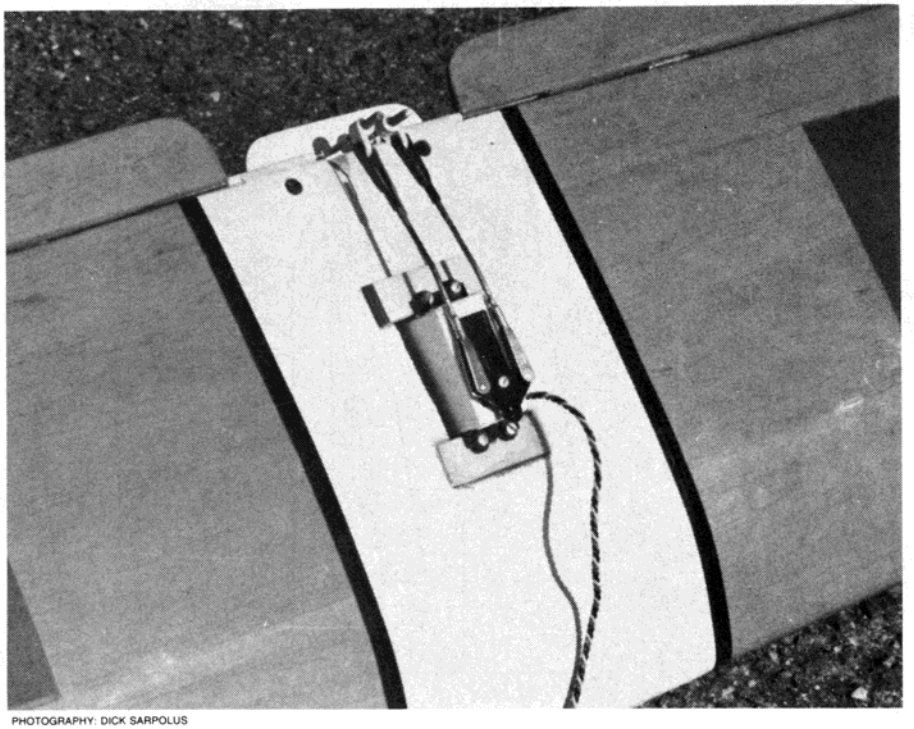


Correct lateral misalignment by bending fixed contact support. Never bend breaker lever!


SUGGESTED SCALE FOR:
FREE-FLIGHT RUBBER
FREE-FLIGHT GAS
CONTROL-LINE
SUGGESTED SCALE FOR:
FREE-FLIGHT GAS
CONTROL-LINE
RADIO CONTROL
ENLARGED STAB
SUGGESTED FOR FREE-FLIGHT RUBBER AND GAS
7'-0"
22°
30°
3'-5"
2'-2"
8°
AIRFOIL SECTIONS
SCALE TYPE RECOMMENDED FOR CONTROL-LINE AND RADIO CONTROL
UNDERCAMBER OR FLAT BOTTOM FOR FREE-FLIGHT
10°
10'-0"
SUGGESTED SCALE FOR:
FREE-FLIGHT GAS
RADIO CONTROL
5'-9"
22°
30°
3'-1"
1'-10"
8°
TOP VIEW
5'-3"
8'-0"
4'-3"
9'-3"
SIZE OF GRID SQUARES DETERMINED BY SCALE USED.
32'-8" WINGSPAN
29'-4" WINGSPAN
FRONT VIEW
ENLARGED FIN
SUGGESTED FOR FREE-FLIGHT RUBBER
2'-8"
5'-7"
NOTE: ALL SCALES SUGGESTED ARE IN INCHES.
Curtis XF-7-C3
2'-2"
7'-0" TREAD
9'-0" DIAMETER PROP
"A-A"
"B-B"
5'-0"
US NAVY
"C-C"
5'-5"
22'-6"
SIDE VIEW
"SEAHAWK"
SUGGESTED DIHEDRAL
CONTROL-LINE ..... SCALE 0°
RADIO CONTROL ..... 3° TO 5°
FREE-FLIGHT GAS ..... 8° TO 10°
FREE-FLIGHT RUBBER ..... 10° TO 12°
16°
SUGGESTED SCALE FOR:
CONTROL-LINE
SOLID SCALE
P.D.G.

R/C Sport.

By Dick Sarpolus



PHOTOGRAPHY: DICK SARPOLUS

Strip ailerons have always been popular in many designs because they're so easy to install. However, without attention to several important factors, dangerous problems do occur. The author's *Pepper,* with its strip aileron installation, initially used balsa that was too soft and almost ended in catastrophic flutter.

Strip ailerons — and flutter

Strip ailerons are great — easy to make, easy to install and hook up, and, when designed correctly, they work very well. One key to success with strip ailerons is to be sure that the balsa they are made from is firm and strong, to prevent aerodynamic flutter. I've known that for years, but when building my prototype *Pepper* (September 1983 FM) I went ahead and used some slightly soft balsa stock that I had on hand; for this model, the ailerons are 1/4 by 1 inch and 22 1/2 inch long. I used three DuBro nylon hinges on each aileron, in addition to the usual torque rod linkage at the wing center section, for, effectively, four hinges per aileron.

The wing and ailerons were covered with MonoKote™, and the hinges and torque rod linkage were epoxied in place. The plane weighed three pounds, five ounces ready to fly and was powered by an OS .25 FSR, a great little powerhouse of an engine. The aileron installation was similar to many other models I've built, and I thought there was no reason to expect anything other than success.

The first two flights were completely successful; the plane was easy to fly, very docile when throttled back, but capable of all the aerobatics when desired. Even low inverted passes were easy with this stable model. On the third flight with the OS turning well, I began to wring the plane out even more. Diving down for a high speed pass, I leveled out and a really loud noise was heard from the model — recognizable as a control surface flutter. This noise was easily heard above the engine noise from several planes then flying; I immediately cut the throttle, checked, and found the plane was controllable, and brought it down.

A close inspection of the model revealed nothing; no loose linkage, nothing broken, no loose bolts, no damage at all. The elevator and rudder linkage on this model is the nylon tube type, with no excess play there. The ailerons didn't feel particularly "twisty" although there was some flex when the tips were moved.

I pushed my luck and flew again, finding no problem with average flying around — one quick split S, higher speed, and the noise of a flutter returned — disappearing when the engine was throttled back. With an engine less powerful than the OS .25 schnuerle, or more conservative flying, possibly no problem would have been noticed for some time. I was lucky; it doesn't take much flutter to do some terrible things. I've seen control surfaces break off, hinges break, servo gear teeth strip, and components on PC boards break off; all things to ruin your day, and they can happen swiftly.

Back in the workshop, I broke the ailerons away from the hinges and torque rod linkage. New ailerons were fabricated from very firm balsa and fitted to the wing. I use the DuBro Kwik-Hinge Slotter tools for my hinge installation. These tools work well but it's still a bear of a job when working with hard aileron stock. The ailerons were covered and epoxied in place onto the hinges and linkage. Subsequent flights confirmed that the problem was solved; violent snaps and long dives do not cause any problems now. FM's editor, Bob Hunt has flown this particular model from the hillside flying site in back of the magazine's office; he did his best to destroy it in the air but the *Pepper* came through unscathed (It did experience some *author* flutter however—Ed).

The flutter problem with the strip ailerons could have been caused by several other things. Too few hinges with too much space between them, sloppy linkage with clevis pins loose on the servo arm or torque rod, a loosely mounted servo, a very flexible wing structure, a too thin torque rod linkage (this can easily happen on larger, more powerful models), clevises with sloppy fitting threads, a poor wing to fuselage saddle fit, and so on — all these things can bring on flutter.

If you hear that noise when flying, react quickly — cut the throttle! That's usually the safest thing to do when anything out of the ordinary happens while you're flying. Since we're talking about ailerons, if the ailerons did fail on the *Pepper* design, with its large rudder and reasonable dihedral it could have been flown and landed with the rudder and elevator. Many high performance low wing aircraft designs cannot be turned with the rudder alone. Try it with your model, before you really need to know.

My friend Nick Nicholson (forgive me for telling this story, Nick) took off his scratch-built, quarter scale, Quadra powered *CAP-21* one day with the aileron servo reversed! He realized what happened and managed to keep the plane level to gain some altitude, then tossed the Futaba transmitter to me. I quickly found that this *CAP* would not turn at all with just rudder control, and while Nick was popping the back off the transmitter to get at the servo reversing switch, I did several Immelmans to keep the plane in the vicinity before he successfully found the switch and the crisis resolved. A happy ending to an aileron problem.

Tip or barn door ailerons can have flutter problems too — not due to soft wood since they usually are of built-up construction — but due to sloppy linkages. Strip ailerons avoid the pushrods and right angle bellcranks in the wing needed for tip ailerons. With the strip type, keep the torque rod linkages as short as possible or use large enough torque rods to absolutely prevent flutter. On my .25 size aircraft, I use 3/32 inch wire linkage. Fast and/or heavy, larger models get 1/8 or 5/32 inch wire linkages, and if long rods are necessary, 1/4 inch aluminum tubing can be used.

Tapered balsa stock suitable for strip ailerons is made by Sig, Balsa USA, and other balsa suppliers in such stock sizes as 1/4 by one inch, 5/16 by 1 1/4 inch, 3/8 by 1 1/2 inch, and 1/2 by 2 inch. If these sizes won't fit your requirements, get a sharp, small block plane and sanding block or a good table saw and make your own. When building from a kit, don't use the strip aileron stock furnished if it's too soft. Substitute harder wood and avoid problems before you have them.

Strip ailerons can be built up if they must be large; for example, some biplanes have large built-up ailerons on the bottom wing only. They are long enough to go from the wing tip almost to the center section. In this case, short torque rod linkage is used to the servo in the wing center section. I have also seen ailerons laminated to increase their stiffness; two layers of 3/16 inch balsa, laminated with epoxy glue, will be stiffer than one piece of 3/8 inch balsa. Or, balsa outer pieces are used with a layer of 1/32 inch or 1/16 inch plywood as the center piece.

Pay attention to your strip ailerons and they'll be good to you.

R/C pattern

By Dean Pappas

What is the nature of a competitor? "Oh no!", you are probably muttering to yourself," he's going to start in about how we should all burn at least 100 gallons of fuel a year." I'm not going to do that—not yet. Instead, I want to tell you about a truly enjoyable flying session, and about the minor revelation that hit me during that flying session. The snow here in New Jersey is usually too deep to fly in during January, but it doesn't seem to matter when flying indoors. Now, please don't call the nice young men in the clean white coats just yet, I'm talking about Indoor Rubber flying. Fellow pattern nut Steve Turi suggested that we take in an evening of relaxation with the club (I don't even know the name) flying in a local church gymnasium. For company, we took along an Easy B and a Peanut Scale *Ugly Stik* (built from FLYING MODELS plans of course). The *Ugly Stik* was my toy for the evening, and after a few flights to trim the critter out, the uncontrollable urge to try to "tap" the ceiling with it hit me. My total Indoor experience was just three flights, and already I was getting bloodthirsty! I had to hit the ceiling before anyone else did. Is this the fate of one who would call him(her)self a pattern flier. Yes, I am afraid that it is our fate to know that there is such a thing as perfection. So compelling is our secret that even though shrouded in technical details, and sometimes bewildering rules codes, we try time and time again to get just a glimpse of perfection.

Anyway, I had loads of fun, and am sitting here trying to figure out how to make a peanut *EU-1A*. This, I offer as proof that the winter layoff is bad for a pattern flier's state of mind.

Back to matters technical, with a discussion about one of the most difficult aspects of trimming: **knife edge**. After a few words about knife edge trimming for all those about to start in Advanced Pattern this year, I want to devote some time to a relatively new technique for those airplanes that pitch differently when on one side than on the other.

Knife edge trim, and trimming for a straight vertical line are really one process, and the cure for a problem in one flight regime is usually cause for a problem in the other.

Let us start by assuming that the airplane does not pitch at all in the verticals, three possible cases exist:

1. the airplane knife edges dead straight, with no tendency to pitch, or roll. This is called "Nirvana."
2. the plane pitches either positive, or negative, but behaves the same in both directions. This sometimes also shows up as a slight rolling tendency: upright when pitching positive, to inverted when pitching negative.
3. The airplane pitches positive with one rudder (usually *right*) and negative with the other rudder (usually *left*).

Number one is easy to fix; number two requires a little more effort; and the third problem has driven fliers to hacksaw empennage assemblies off in an attempt to adjust incidences. When an airplane pitches positive in both knife edges, I try in this order . . .

A. Move the C.G. back (if this causes problems in the spin, or snaps, return to the design C.G.). This is the least invasive technique, and after the elevator is re-trimmed, slight pulling problems are usually cured. If the airplane develops a tendency to nose down after the nose has been pulled straight up, then a reduction in down thrust is in order.

B. Trail both ailerons up and/or put positive in the wing. This will definitely cause a change in the vertical characteristics of the plane. Some airplanes respond more favorably to wing incidence than to aileron reflex; others, vice versa. In some cases, positive incidence in the wing greater than, say, one sixteenth of an inch produces problem number 3. This was the case with the *X.L.T.* that I flew last season, the real cure would have been to have sawed the stab out of the plane and re-glue it with some positive incidence.

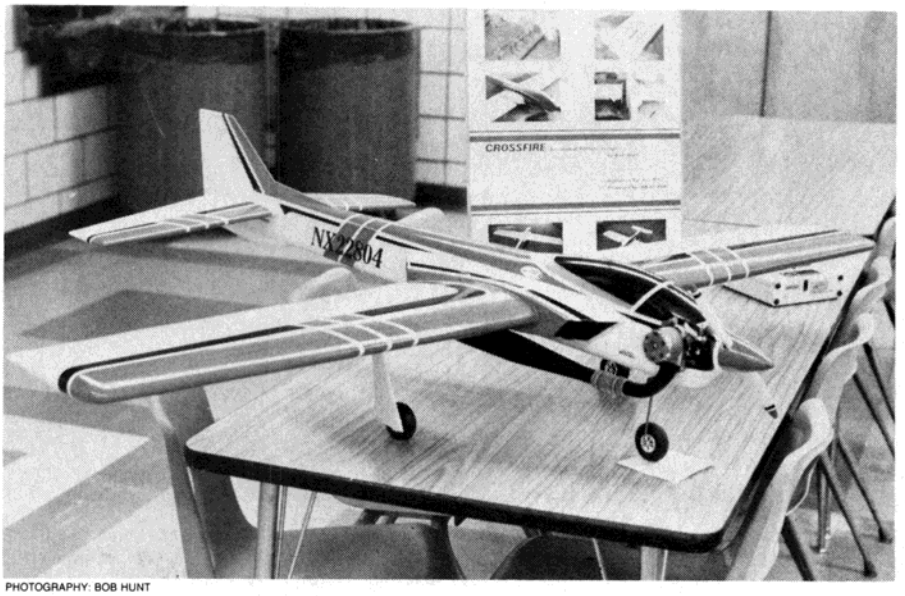
C. Remove some down thrust, and repeat **A** and **B**.

D. As a last resort, add positive to the stab! It has to be said, that adding incidence to the stab (or wing) will not only change the pitching tendency of the airplane in both the knife edge and verticals, but will affect the roll in the knife edge. Adding positive to the wing (or trailing up the ailerons) will tend to make the airplane roll to the inverted. As a matter of fact, I have used this (trailing up the ailerons) to eliminate the very slight proverse rolling tendency that my *Hipo Tipo* has. Proverse roll is the tendency of an airplane to roll *with* the applied rudder. After the plane is trimmed so as not to pitch in the knife edges and verticals, one may consider adjusting the dihedral with a hacksaw. The key word is *after!* Unless the wing is completely unloaded during the knife edge, there is no way to tell the difference between improper dihedral, and the completely natural tendency for a yawed airplane to roll if the wing is still lifting. Another important note is that while flight testing, one should fly the ailerons to keep the wings vertical. Since the two problems "cross couple", this procedure of eliminating pitching while holding the wings vertical and *then* eliminating the rolling will help avoid the problem of trying to approach the solution by going back and forth between pitching and rolling adjustments.

Provided that the design you are flying is a proven "correct" one, you will usually discover that once the pitching is eliminated, the rolling problems go away.

Next month, I will attempt to explain some of the "Black Magic" that is used to help airplanes which pitch in different directions with opposite rudders. Honestly, there are a few techniques that have been either developed, or accidentally discovered, and no one I've spoken to seems to understand why any of them work!

I leave with this note: "Trade Show Time" has arrived, and at the very least, J.R. and Kraft are both expected to introduce new radios. In addition, K.&B. is expected to present the pattern fliers of America with the first serious American entry in the horsepower race in years. I can hardly wait!



PHOTOGRAPHY: BOB HUNT

Designed as an experimental pattern ship, the *Crossfire* by Bob Hunt utilized some "crossover" technology. Some of the design aspects of controline stunt are apparent in the airframe. Gear was fixed, airfoil thicker, aspect ratio much higher than normal, fuselage very narrow, and a much higher percentage of horizontal stabilizer area was employed. The design used plug-in wing panels which covered externally mounted servos.

R/C Soaring

By Herk Stokley

PHOTOGRAPHY: HERK STOKLEY

Terry Luckenbach's scale ASW 20 sailplane took the trophy against the other, non-scale competition sailplanes at the Capitol Area Soaring Association contest. Terry's a District III rep for the F3B program.

When the FAI World Championships are next held, (probably April 1985), It will be Australia who is the host nation. April is the fall season in the southern hemisphere, and will probably offer the best weather that continent has to give. The FAI meeting in December ruled a moratorium on World Championship rules changes for four years, so we won't be looking at any big changes in the conduct of the championships for a while. CIAM did approve provisional rules which allow contests at levels lower than the Championships to use man-on-man scoring for duration and distance. At the time I'm writing this, I don't have all of the details, but the distance task will be flown without the 12 lap max. Scoring will be based on how many laps the winner of the flight group can get in the four minute time limit, and how the rest of that flight group did against him. Duration will also be scored against the winner of the flight group only. The theory here is that by scoring people against only those who flew in the same time slot, the K factor that develops when one group is called to fly in good air and another in bad air can be eliminated. The US R/C Soaring Team Selection Committee is voting, at the time I'm writing this, to define the program for selecting a team to compete in Australia. One of the choices we're making is whether to use the provisional man-on-man scoring at the US Finals.

Team USA needs help

We don't have our team ready to go to Australia yet, but when we do, it will be too late to begin looking for the money to send them there. Contrary to popular opinion, AMA does not pay the bill for these teams to travel and compete. Each program has to find the funds to pay the costs however they can. Don't get the idea that AMA doesn't help, because it does, but that's all just help, and that's mainly administrative. The trip to Australia will cost more, by far, than any previous team effort, and the alternative, if we don't raise the money, will be to skip the Championships. What a blow that would be, If the huge USA with all of its resources couldn't attend when other smaller and much less affluent countries were able to.

To prepare for this challenge, we are beginning the fund raising now. The model industry has helped in the past, and we are contacting them first, but in the end, whether we have a program depends on you. The best thing about this program is what it has done for soaring in general. Sailplane development, better accessories, and improved technology are available to you today because of FAI competition. Send a contribution now to help us get this started, and send more later to build the very big pot we'll need to have a US team. US 1985 R/C Soaring Team Fund, c/o Helen Olsen, 8875 Ovieda Plaza, Westminster, CA 92683.

Spoilers for lateral control

A concept that keeps coming back, is the very appealing idea that spoilers on the wing tips could be used for lateral control instead of ailerons. What about them Mr. Engineer, isn't that still a good idea? For sailplanes, the answer is no. They can be used, and they will work, but not nearly as well as you'd expect.

Ailerons work very well, but they have two disadvantages. First is the long disjointed airfoil contour that produces quite a bit of drag when they're deflected (if the seam isn't well made it creates a lot of drag when they're not deflected). Second and perhaps even more important, is the way that the drag they develop actually works against the turn you're trying to make. Technically it's called **adverse yaw.** The aileron that goes down to lift the wing on the outside of the turn does just that. It produces more lift than the other wing. The part of the wing drag that results from lift is proportional to the lift coefficient squared. It's called **induced drag** and because of the square factor, a small increase in lift can make a big difference in the induced drag. Because this drag increase is on the outer wing of the turn, it pulls the nose of the plane away from the turn — thus the term adverse yaw. All planes with ailerons have this effect. It is usually counteracted by using rudder in the direction of the turn to cancel the adverse yaw. Spoilers become theoretically attractive when you understand all of this. By raising a spoiler on the outer part of one wing we kill some of the lift on that wing, and produce drag too which is now favorable for the turn. This gives the idea that we can keep the airfoil clean over most of the wing and make extra drag only where it will help. Sounds good, right!? So why did I say no?

Some tests done by my good friend, Woody Blanchard, showed surprisingly poor results from an experimental spoiler arrangement that looked like it should work beautifully. We pondered over it but never reached a good reason why. Later, I read about some of the Hortens work with flying wings, and I also came across a number of old NACU reports on lateral control. Both of these sources detailed lateral control schemes using spoilers, and gave some interesting results. First, the Hortens found that for small deflections the spoilers were not effective. When they used them on one of their designs, they had to place two spoilers on each surface. One of these opened fully with the first bit of the pilots control movement, and the second spoiler then opened proportionally with further pilot input. The NACA report showed spoiler type devices were effective for lateral control. The tests showed however, that small deflections of the spoiler caused just the opposite of the desired effect. There is actually a small rolling moment in the opposite direction as the spoilers begin to open. Also there was adverse yaw. The experimenters weren't sure why that happened, but they speculated that with small opening angles the spoiler affected the lift more than drag. The reduction of the lift on the inner wing reduced the induced drag on that wing too. Since the induced drag is still the same on the outer wing it would pull the nose away from the turn just as the aileron would. I saw a design with spoilers for lateral control published in one of the model magazines a few years ago. The author was weak in his praise for the system, and showed a photo of a spoiler rigged open about ten degrees at neutral. He said that was necessary in order to get any response from small stick movement. Not many of us want to fly our sailplanes with partly open spoilers.

Can you use spoilers for effective lateral control? Yes, but some system like the Hortens' would have to be used. That's not an easy arrangement to rig, but it could be done. I'd also suggest that they be made rather large because drag-producing devices aren't very effective at the slow speeds we fly.

F/F sport

By Gene Sellers

The spring flying season is upon us. All the planning of the winter months is culminating in a new flying season. For many, that means new models, a return to the flying sites, and a renewal of friendships.

The flying sessions, contest, and good fellowship we're beginning to enjoy owe their success to a few dedicated leaders who spent some of their winter time planning contests and assuring the availability of sites. One of the groups whose efforts will benefit all of us in the east is the East Coast Free Flight Conference.

The Conference is an AMA chartered group consisting of the Brooklyn *Skyscrapers,* the Philadelphia *Skypirates,* the Baltimore *Aero Craftsmen,* the *Brainbusters* from Virginia, the *Western New York Free Flight Society,* the *Crossing Free Flight Group,* the Bath *Aeromodelers,* the *SOTS,* and the *Metropolitan Scale Squadron.* The efforts of the Conference have made the field at Galeville available again this year, in spite of the concern last year that it might be withdrawn from our use. Activities will begin with a flying session May 16 and 17.

Over the Memorial Day Weekend, May 26 and 27, The Brooklyn *Skyscrapers* will sponsor a contest with a full schedule of events including AMA and FAI power and rubber and a Nostalgia event for pre-1956 glo engine designs. The field will be available for flying over the June 16 and 17 weekend and on June 23 and 24 the Eastern Free Flight Conference will sponsor the annual Eastern US Free Flight Championships with events for everyone.

Saturday will be devoted to 1/2 A and B gas for the power flyers, A-1 for the glider flyers, and Wakefield and P-30 for the rubber devotees. On Sunday the schedules calls for A and C gas for power, and A-2 and HLG for the glider fans. Rubber flying includes Unlimited, Coupe, WWI and Golden Age mass launch events, Rubber Scale, and Peanut Scale.

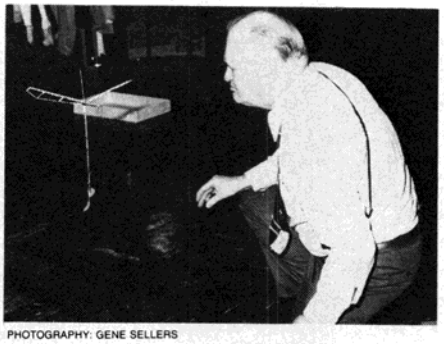
The One Design Contest that has been fostered by Don Ross will be incorporated into the Championships. Sport fliers have an opportunity to fly in the fun event and watch or participate in some of the AMA or FAI events. This year's model for the One Design contest is the *Sparky.* You can build it from the Comet kit or from Ed Lidgard's plans for *My Sparky.*

Flying dates are scheduled throughout the season at Galeville. The schedule calls for events on the weekends of July 21, August 18, and September 22. On some of the dates, the flying is on an "organized flying session" basis and, on others, contests are scheduled by member clubs. Watch the AMA listings or contact members of the Eastern Free Flight Conference for more details.

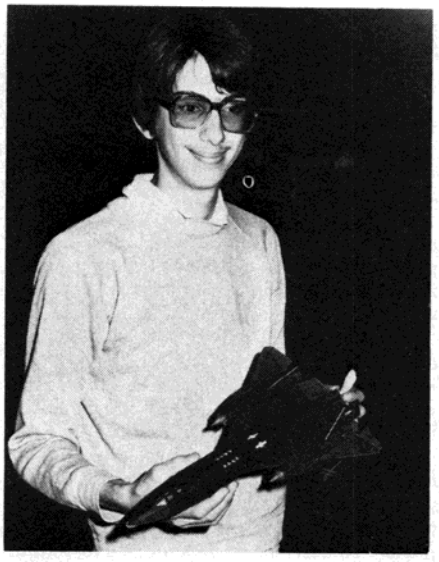
The East Coast Free Flight Conference deserves the thanks and support of all the free flighters in the area. They were able to convince the field's owners (The U.S. Army) of the legitimacy of our use of their property by reference to the numbers of people they represented and by demonstrating our responsibility through the insurance and discipline of our hobby inherent in our regional and national organizations.

The Galeville site is level and large enough for a serious contest. Except in the strongest winds, there is little chance of the necessity of retrieving off the field. The Conference provides the site insurance and arranges for some field maintenance, so that flying is safe and a real pleasure. Contact one of the member clubs for directions and come fly at one of these events.

On a somewhat related matter, Joe Wagner has taken over the NFFS Plans and Supplies Service. I don't know where he gets the time to be active president for the East Coast Free Flight Conference, fly more than most of us, and handle this, too. But you can bet he will do it well. Joe hints of some extensions to the list of supplies available from NFFS. A self-addressed, stamped envelope will get you an up-to-date list. Joe's address is 12 Cook St., Rowayton, Connecticutt, 06853.



PHOTOGRAPHY: GENE SELLERS



Ed Whitten, champion of juniors, (**above**) and one of the perennials at Columbia, launches his indoor helicopter. The SR-71 *Blackbird,* Dave Aronstein's (**right**) latest unbelievable rubber scale model, flew very well but it was impossible to photograph in flight against the dark atrium of the library. Maybe that's why they made it a spy plane.

Silver platters for the No-Cal Scale event sponsored by Jack Fraher (**center**) at Columbia went to Dave Aronstein (**left**) for first place with his 1909 *Le Clerget* and to Bob Langelius, second (**right**).

C/A Combat

By Phil Cartier

The *Gotcha 500* took to the air four years ago. It's time for a few revisions that make it a little better airplane. Unfortunately, we don't have space for a new plan, so I'll make do by describing the changes. Refer back to the May, 1981 issue of FLYING MODELS for the original article and plans.

The first change is the bellcrank position. Move the mount forward so the bellcrank pivot is about 3 1/4 inches back from the leading edge, just behind the spar. I originally put the mount back to make it a little easier to core the wing. It only took one cut and one hole to both hollow the panel and make room for the bellcrank. Moving the bellcrank forward makes the controls work a little easier in flight. It reduces the bend in the leadouts as they pass through the eyelets in the tip rib. The slot for the mount can be parallel to the rib center line and just below it. Instead of making the T-shaped mount shown on the plans, make the bellcrank mount a rectangle, 1.5 inches wide and 2.25 inches long. It fits into the center rib flush with the outboard side so there is no interference with the bladder tube or pacifier pod. Hold the bellcrank mount in place with a couple of 1/8 inch dowel pins put in from the bottom. Also make the center rib from half inch sheet with 1/64 inch ply doublers.

I reduced the root chord half an inch to make the cores easier to cut. Simply move the trailing edge forward a half an inch and re-draw the straight, aft section of the airfoil to fair in with the forward part. The reduced taper makes it easier to cut the cores without getting melted grooves near the tip.

A new motor mount saves a little weight and helps make up for the lost 12 square inches of wing. I've started using 3/8 × 3/4 inch maple motor mounts with a 1/32 ply doubler and ocassionally, a balsa fairing. Cut the ply 2 1/16 wide by 5 inches long. Glue the motor mounts to it with a 3/4 inch thick balsa spacer in between. The grain in the spacer should be vertical, from one motor mount to the other. Mark and drill the engine mounting holes and install the blind nuts. Then add the balsa fairing, if you want, and shape the whole thing. After shaping, mark the airfoil position on the motor mount and saw out the assembly to fit over the center rib, just like the ply motor mount indicated on the plans. Don't leave the motor mounts square and notch the center rib to fit. I know it looks easier and gives better alignment, but it is also heavier and not as strong. Sawing the airfoil shape out of the motor mounts gives the mount beams a nice gradual taper that leaves the most material where it does the most good.

The fiberglass reinforcing can be reduced considerably. Put a one inch square piece of glass over the spar/center rib joint top and bottom. Instead of wrapping the whole center area in light cloth, make top and bottom fiberglass front spars to reinforce the motor mount. Put strips of two ounce cloth, one inch wide, spanwise at the very front of the center rib. Use two layers top and bottom. They should be about eight inches long. As usual, saturate the cloth with epoxy and then mop up any excess with a paper towel to minimize weight. These change didn't increase the weight at all, despite using solid cores on my new ships. The front end seems considerably stronger and stiffer too.

PHOTOGRAPHY: PHIL CARTIER

Dick Stubblefield launches a test flight for George Cleveland. The plane is a *Force* with Nelson front valve power. Despite some mechanical problems with the plane, he won a spot on the FAI team with precision flying.

Multi-round contests, revisited.

I've heard from several clubs that have tried multi-round contests, matching system instead of the traditional elimination with good results. Generally, the comments are positive. Everyone gets to fly a number of times, usually four or five. The pace is less hectic for both the judges and the flyers. Five matches is often enough for most folks in one day anyway. It usually takes enough time that there is only time for one event, so the fliers have fewer planes to get ready. Just imagine going to a typical contest with three events and 12-16 contestants. Each flyer needs to prepare for at least four matches per event, just in case he goes all the way, or anywhere from 8-12 planes depending on how pessimistic he is. That is a lot of work for what ends up as only three matches all day for most of the flyers. A multi-round contest guarantees the flyer more flights and he only needs four or five planes at the most. The rules we use discourage mid-airs, so nobody needs more than two planes as long as they don't keep punching into the ground. A lot more bang for the buck. If you want some more info on multi-round contests, drop me a line and I'll send you a copy of the rules we use. It's great for local contests.

Somebody in Italy loves us. I just saw one of the long-awaited Supertigre S-36 Combat motors. What a jewel! It has the typical first class workmanship and construction we expect from Supertigre. First reports are that it matches up well against the Fox Mk. IV and V for power. The shaft and port timing are not really wild so it should run very well in slow combat and as a sport motor out of the box. The big shaft and robust construction will stand up to all the power the engine tuners can extract out of it. I've talked to one guy who already has pared the weight down to less than 9.5 ounces and gotten the horsepower up to TWA and superFox levels.

Mike Hoffelt also has his super motor available. It can put out as much as 1.8 horsepower which will haul a fast combat plane very fast indeed. This motor is based on the K&B 40S from a number of years ago. It has a rear intake and side exhaust. Mike has come up with a neat way of handling the rear intake and side exhaust. The intake port is directly in the backplate with no venturi. The fuel is injected directly into the crankcase. The whole arrangement is just as compact as a front valve motor, but no more digging dirt out of the intake after a crash. I used the direct injection in my FAI motors last year. It works fine. The motor doesn't seem to care how the fuel gets inside. It can even be fed in through an old style pressure fitting in the backplate. I would recommend a remote needle valve though. You have to be able to check the fuel flow on a pressure system before starting without dumping it all into the crankcase. Make sure the line from the needle valve to the injection port is easily accessible for checking.

C/A stunt

By Windy Urtnowski

Throughout the entire time I'm building and finishing, I always think about a few more appearance points.

Whatever the few points are, remember you *double* their value when you total up your two best flights, to see who qualifies, and who doesn't.

Let's face it, the top five fliers in the Walker Cup don't need appearance points. The flyer with no hope at all of qualifying can forget them too. The rest of us should think of this. Imagine a list of people who get into the top twenty, or top five by two or less points. Long list you say; one less appearance point (doubled of course) and the whole picture changes.

Think of another list, such as the people who miss their goal by two points or less. This list would be a mile long; maybe you're on it too.

Remember: appearance points are the only part of your score that you can work on all winter. All of the extra building and buffing may only buy you one row, but it may be just enough to get you over the hump.

Preparing a ship for appearance points can be a real chore. I usually give myself an hour or so in the nice cool motel room to thoroughly clean off old wax and fuel residue with enamel reducer. Now the little bottles of touch-up paint get put to use. I always bring a small bottle of it for every color on the ship and a few tiny brushes. You'd be amazed how many little imperfections you can hide if you spend the time. A neat little trick, if you want to touch up an oil soaked area, is to wipe it vigorously with baking soda until the paint will adhere. Finally, I put on a new or painted prop, and I buff out the spinner with toothpaste. Ready to go at last? If you think this wouldn't make any difference, think of how it feels to finish two points short of your goal. Better still, think of the satisfaction of beating your buddy by a point or two. You may spend the whole next year wishing you had those few points that would have let you reach your goal.

I always tend to think of appearance points as free points; obviously they aren't. Somehow I lump appearance, take-off, inverted flight, and landing into the category of inexpensive points; these are the easy one hundred forty points in every pattern. If you toss these away, you're going to have to really burn in an impressive flight to make up the lost ground. Since we don't use any K factors, it's really important not to let these easy maneuvers slip through our fingers.

"Star Wars"

I guess it all started the year Ted Fancher won the Nats; yes, that was the beginning of pro-stunt's star wars. Ted must have been inspired by "*the force*" in 1982, and we all must have been impressed with his "Star" trim schemes. Surely that set the stage for 1983, which will be remembered as the year of stunts' "Star Wars".

The East Coast's first trip was to the planet Fairview, where Ed Captainelli had just finished putting 49 stars on his new *Starduster.*

Next, we take an intergalactic space to the planet Nutley, where Luke Skywalker Dudka (Luke Dudka for short) has finished restarring his *Matrix.* It seems the bad Jedi made his trim disappear.

Then, it's off with our liteswords to Darth Vader Meador for a look at how to make stars out of feathers.

Even Han Solo Forbes had stars on his plantery *Chipmaster.* His paste on stars are coming undone. The force *isn't* with him.

Karl Seilfert, from the intergalactic kingdom of Philadelphia, had stars in his lettering and rudder. His son Rich, whom someday very soon will be a star, better get some stars on his battlewagon before Doug Figgs and the Jedi ambush him again.

Maybe we should get some astronomers to judge the Nats this year. Can you picture Carl Sagen as contest Director?

Maybe someday we can have intergalactic stunt. With all these stars, I'm still waiting for Wynn Paul to refinish his lunar *Pampawagon* in stars. Come on Wynn . . .

Even Bob and Rollie McDonald, from the far off world of Detroit where the sun never shines, managed to get some little stars into their fleet of Sagittas. What's a Sagitta? I don't think Rollie had any stars on his *Strathmore* the year he got second at the Nats. *Tell you anything . . .*

What plane in history has the most stars? Who's ship had the most different-colored stars? The biggest stars?

How many planes with stars have ever won the Nats? How many concours ships featured stars?

Did Betsy Ross ever qualify for the F.A.I. team?

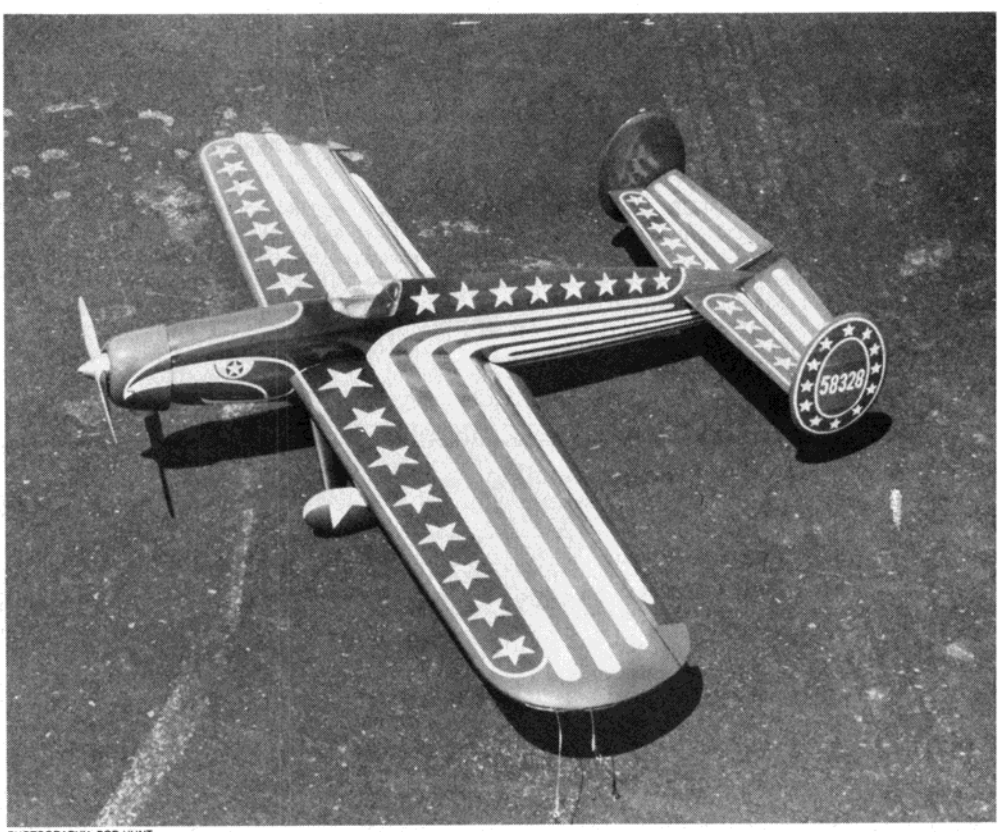
If you can answer at least six of the preceding questions you may qualify as truly pro-stunt.

But ah, our hero in the end, as always, is Princess Leia Meador with her earthly Nobler.

Then there was Ed Pohaska's ships of old with billions and billions of stars. Carl Sagen would have loved it.

Finally, you have the invasion of Chewibaca Windy, needing a haircut, and big red stars right off the Russian flag. Is he a good guy or a bad guy?

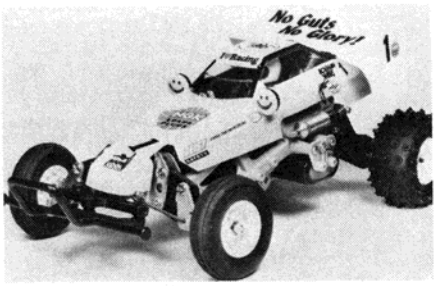
Windy Urtnowski, 9 Union Ave., Little Ferry, N.J. 07643.



PHOTOGRAPHY: BOB HUNT

Star light, star bright; first stunt ship I see tonight. . . . Ski "Buck Rogers" Domvroski has enough stars on his stunt ship to start a whole new Milky Way but they all add up in the appearance points.

Pit report



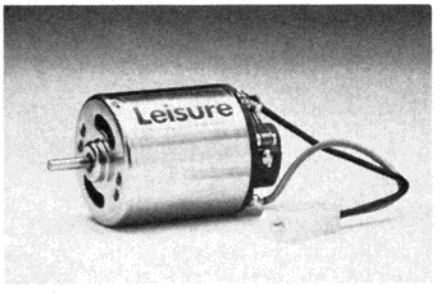
MODEL RECTIFIER CORPORATION, *PO Box 267, Edison, NJ 08817,* has added a new selection to its line of off-road buggies, the *Frog,* a 1/10 scale kit featuring new engineering for better performance. The body is polycarbonate, strong and light weight. The chassis has been specially contoured to accept receiver, battery, and servos in the best location for an optimum center of gravity. Newly engineered, large differential gears offer control for tighter turns and they have interchangeable gear ratios to conform to the track conditions. The suspension has heavy duty, coil-over, adjustable, oil-filled shocks. For more information about the *Frog,* R/C Kit No. 5841, contact Model Rectifier Corp. at their address above.

MODEL RECTIFIER CORPORATION, *PO Box 267, Edison, NJ 08817,* has just released its first rally car, the Audi *Quattro* by MRC-Tamiya. This model of the 1982 World Rally Championship has a well detailed durable lexan body and a strong chassis for off-road running. A sealed radio box prevents debris from entering the R/C equipment yet the battery motor is easily accessible. For shock absorption, the car features a swing axle front end with coil springs and a trailing link rear suspension. Specifications: L X W X H - 16.33 × 6.1 × 9.06 inches; weight - 70.55 ounces (4.4 lbs.); battery - 6 or 7.2 volts, 1200 mAh; and, motor - Mabuchi PS-540. For more information about the *Quattro* (R/C Kit 5836), contact Model Rectifier Corp. at their address above.

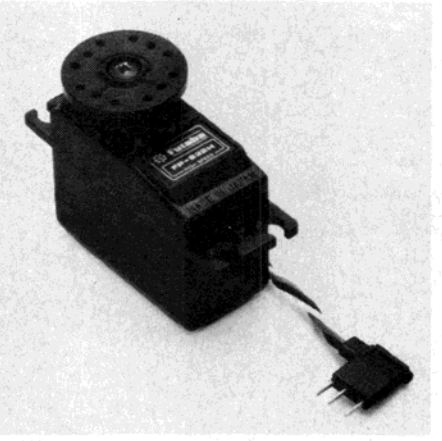
TOWER HOBBIES, *PO Box 778, Champaign, IL 61820,* is presently distributing their *Laser Sport,* a 1/12 electric R/C racing car. Included in the car is a resilient injection molded Kydex resin chassis, a Mabuchi RS-540S motor with a proportional forward/reverse speed control. The body is clear

molded plastic which is already trimmed to fit directly onto the chassis. List price for the *Laser Sport*, less radio and battery, is $39.98 direct from Tower. A 6-cell battery pack is also available for $22.98. For any further information, contact Tower at their address above or call 800-637-6050.

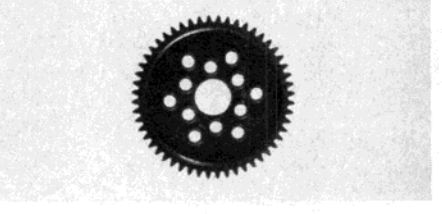
TOWER HOBBIES, *PO Box 778, Champaign, IL 61820,* has introduced the VW Golf Pick-up truck, its largest assembled off-road R/C racer. The only required set-up before actual running is the installation of a two channel R/C system and an .09-.11 engine. Features of the VW pick-up include; a special starter, heat sink, carb air filter, cooling fan, molded radio compartment, and four wheel independent suspension. The body is clear plastic, ready to paint. Introductory price for the VW Golf Pick-up is $79.98. For additional information, contact Tower at the address above or call, in the continental U.S., (800)637-6050.



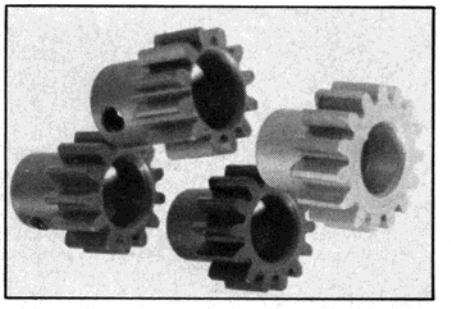
LEISURE ELECTRONICS, *11 Deerspring, Irvine, CA 92714,* has introduced two versions of its Model 1002 motor for off-road as well as ORCA legal racing. Model 1002A, which lists for $15.00, is a high quality, stock motor for off-road racing. Model 1002E is an ORCA legal ball bearing, modified motor, with a rugged shunted brush. List price is $35.00. For additional information, contact Leisure at their address above or call (714)552-4540.



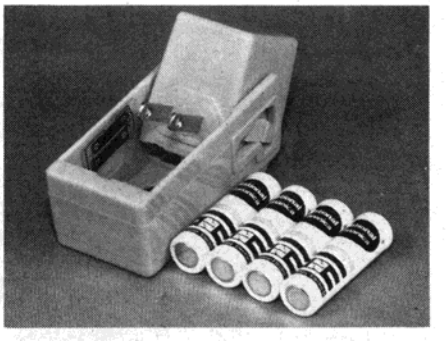
FUTABA CORPORATION OF AMERICA, *555 West Victoria St., Compton, CA 90220,* has introduced a new servo to specifically meet the demands of 1/12 scale electric racers. The new S32H (132H) is a small, light weight servo with new gearing and a hot re-wound motor allowing a much quicker transit time. Specifications: dimensions - 1.46 × 0.71 × 1.201 inches; weight - 1.13 ounces (32g); torque - 25.02 ounce-inches; and transit time - 0.13 seconds/60°. This servo is recommended for expert drivers skilled in handling instantaneous throttle and steering response. For more information about Futaba's new S32H (132H) car servo, contact Futaba at their address above.



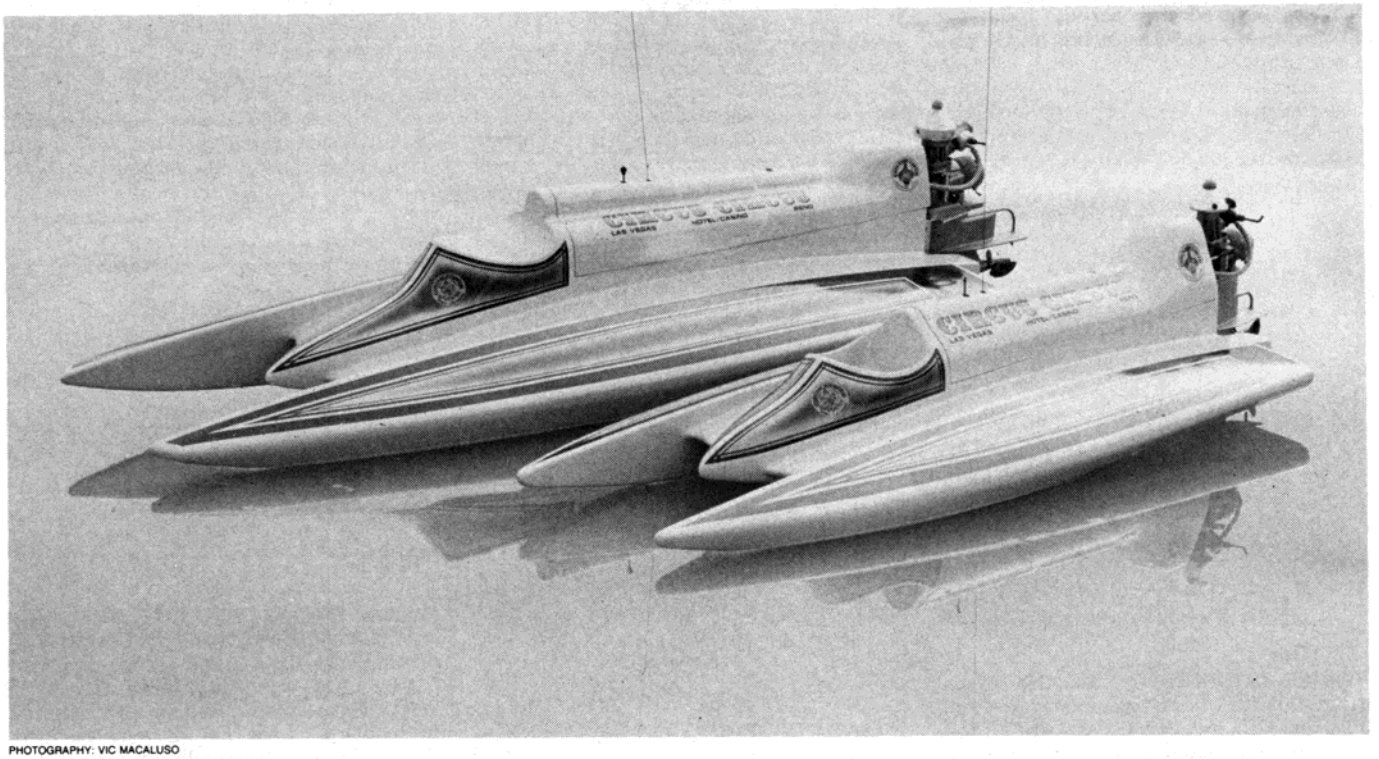
KIMBROUGH PRODUCTS, *1430 East St. Andrews Pl., Unit E, Santa Ana, CA 92705,* has introduced a larger version of their current *Servo Gear Saver.* The new larger version is 50% bigger with over twice the spring pressure. Three interchangeable plastic inserts allow its use on a wide variety of Futaba, Novak, MRC, Cox, and Airtronic servos. Listed as the S.G.S.-L #121 in the Kimbrough catalog, the large *Servo Gear Saver* lists for $5.00. For more information, contact Kimbrough at their address above.



PARMA INTERNATIONAL, *13927 Progress Parkway, North Royalton, OH 44133,* is offering their light weight aluminum pinion gears for R/C cars. They're available in 12, 13, 14, and 15 tooth versions, each anodized in a different color. For more information, contact Parma at their address above.



CHARLIE'S R/C GOODIES, *13400-26 Saticoy St., North Hollywood, CA 91605,* is distributing a Charlie's Special which consists of four 500 mAh pencell nickel-cadmium batteries with their own charger. The charger is switchable for use with 120 or 240 VAC. Retail price for this package is $21.50 but with the Special, it is $13.75 plus $2.00 for shipping and handling. For more information, or to place an order, contact Charlie's R/C Goodies at their address above.



PHOTOGRAPHY: VIC MACALUSO

Prather Products' two latest offerings, the *Fastcat* and *35" Tunnel* hulls can serve a dual purpose: an introductory and a competition boat in one.

An FM Product Review:

Prather's Fast Cat and 35" Tunnel Hull

By Vic Macaluso

For competition or fun, this choice of tunnel hulls can take you all the way from start to finish line.

For those of you R/C boaters who have been reading F/M and especially my column on R/C Sport Boating for some time now, the idea that I highly recommend an outboard tunnel boat for the beginner getting started in this hobby may have become apparent. Not only do I continue that recommendation, but doing this particular review convinced me that manufacturers, specifically Prather Products™, have also realized that that is the easiest way for a beginner to start and have been gearing their product line to this area.

For those of you not familiar with Prather Products, (1660 Ravenna Avenue, Wilmington, CA. 90744-1398, 213-835-4764) — anyone involved in racing certainly is! Prather has a whole stable of record holding hulls — let me tell you a little about them and their product line. Prather Products manufactures a complete line of epoxy glass boat hulls to compete in just about every racing class. Their deep vee hulls have at one time or another won every class in national competition and hold numerous N.A.M.B.A. records in the Mono hull and Deep Vee classes. We are talking about a company that not only produces an excellent quality epoxy glass hull but race proven designs as well. Prather Products does not stop there. At this writing their complete price lists shows no less than 137 separate items available for the R/C hobbiest. Of particular interest to us, the R/C boaters, is the complete line of stainless steel hardware and running hardware for just about every racing or sport application, Also, part of their product line is a very complete line of exhaust components, (clamps, couplers, exhaust throttles and tuned pipes). Any one of Prather Products' hulls can be completely built using only what's on their price list except for engine and radio, that's how complete their product line is.

Enough about the company at this time, let's get on with the review of these two tunnel hulls.

For those of you who are new to R/C boating a tunnel hull is a hull with two full length sponsons separated by a raised portion in the bottom to form a tunnel in the bottom of the hull, thus the term " tunnel hull." The purpose of this tunnel is to trap air to give aerodynamic lift to the hull to improve speed, handling and control. The wide stance provided by the two sponsons also contributes to the overall stability of this type of hull.

The two hulls reviewed here, the 28 inch *Fast Cat* and the 35 inch *Tunnel Hull* are very similar in design and construction so most of my statements will apply to both with exceptions noted when necessary.

The Prather tunnel hulls have many features that set them apart from other boats. The two most obvious are the already joined deck and hull (this is becoming an industry standard, thankfully!) and the epoxy glass construction.

I'm very partial to the hull and deck being joined at the factory because, first of all, I'm lazy (subjective opinion) (But accurate—Ed.) and I probably couldn't build it as straight as it comes right out of the box (objective opinion) (Truth—Ed.). Let me tell you these hulls are *very* straight. I placed both of them on a plate glass table top and could find no measurable or visual distortion anywhere along both hull bottoms (where it really counts). This of course is due to the fact that these Prather hulls are joined and allowed to fully cure *in the mold.*

The epoxy glass construction of these hulls has many advantages as well as some disad-

vantages in relationship to polyester resin glass hulls. The primary advantage of epoxy glass over polyester is the reduced shrinkage as it cures in the mold, further insuring an accurate hull. Another advantage of epoxy over polyester resin is in the event of a collision epoxy glass is stronger and tends to break in strips rather than crush, making repairs much easier. (Some of the collisions I've been in, a concrete boat wouldn't have helped!) Some disadvantages of epoxy glass over polyester are the greatly increased cost and more time needed in finishing the hull. Epoxy resin costs several times as much as polyester resin so the increase will be reflected in the cost of the finished hull.

No matter how carefully an epoxy glass hull is laid up, very small pinholes appear on the surface of the finished hull. These in no way affect the strength of the hull, but are just part of the layup process and are impossible to completely eliminate. The two hulls I received from Prather Products had a very minimum of these pinholes indicating that great care is taken with these hulls during layup. The 3.5 *Fast Cat* hull seemed to have fewer of these pinholes than the larger 35 inch hull, but neither was really a problem. All it takes to correct this problem is a brushed-on coat of thinned Hobby-Poxy Stuff (wet sanded back down to the glass) and two or three coats of Hobby-Poxy primer-surfacer and you're ready for paint. No big deal, just a little more time.

These two hulls are very well constructed with extra layers of glass at high stress points and 1/8 inch plywood doublers molded in where necessary (transom and starboard tunnel side for turn fin). The thing that impressed me most about these hulls was the accuracy of the molds (hull and deck were a perfect fit on both hulls) and the accuracy with which the radio hatch covers fit the main hull. No trimming was necessary for a perfect fit. In fact, if you are so inclined, these boats can be rigged in a matter of three or four hours and run as is! Epoxy glass is fairly translucent; I'll bet it would be interesting to see one of these running unfinished.

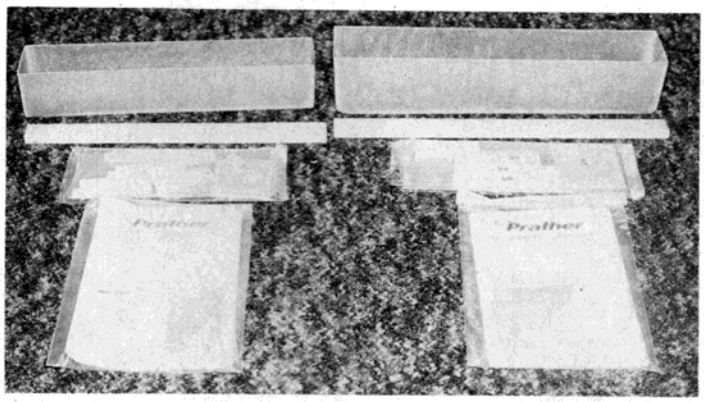
Other than cleaning up the hull/deck joint with a file and the aforementioned filler coats, very little else was necessary to prepare the boats for finishing.

The impression I hope you are getting to this point is that these boats couldn't be simpler to build (practically *no* building required) and, if you read on, simpler to rig. Ideal for the beginner. This is one of the few areas of R/C modeling where a beginner can learn the hobby and win races with the same model.

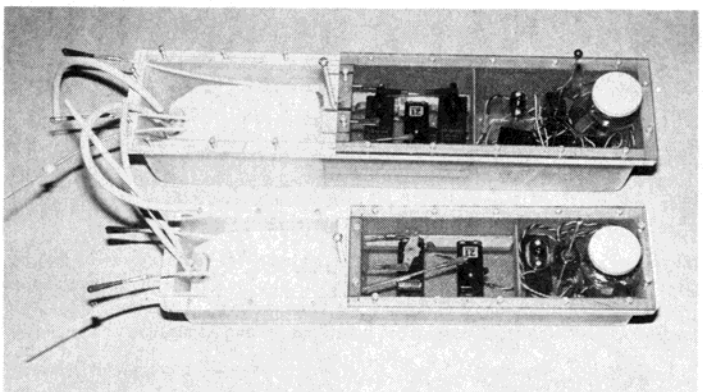
The general configuration of both these hulls is identical, the only differences being in the size; the *Fast Cat* hull has three steps in each sponson as opposed to two in the 35 inch hull.

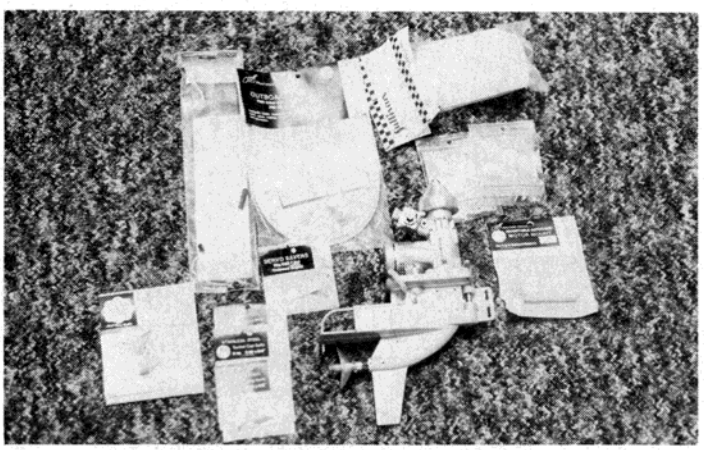
The *Fast Cat* hull has a beam of 12 inches, length of 28 inches and a tunnel width of 6 inches and of course is designed for the K & B 3.5cc outboard motor. The larger 35 inch tunnel hull has a length of 35 inches, beam of 15 1/2 inches and a tunnel width of 7 inches. This hull was designed primarily with the 7.5cc K & B outboard in mind, but because of its size, can easily be made competitive with some of the other gas outboards around today. (The A.M.P.S. unit is a perfect example. Their outboards can mount many different engines on the same lower unit.)

Before I move on to some of the accessories available for these hulls through Prather Products, I'd like to make one more comment

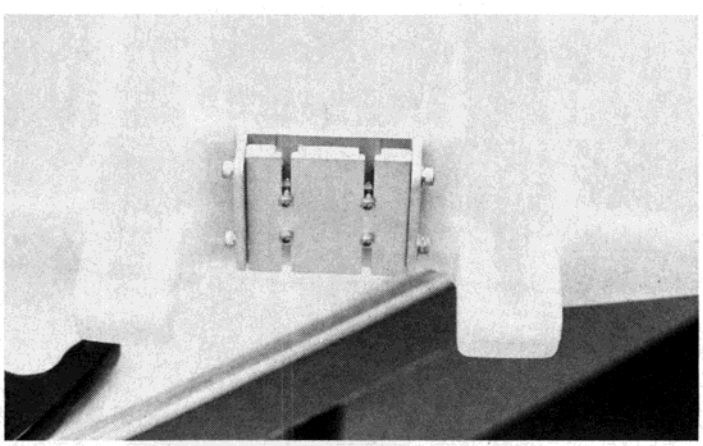


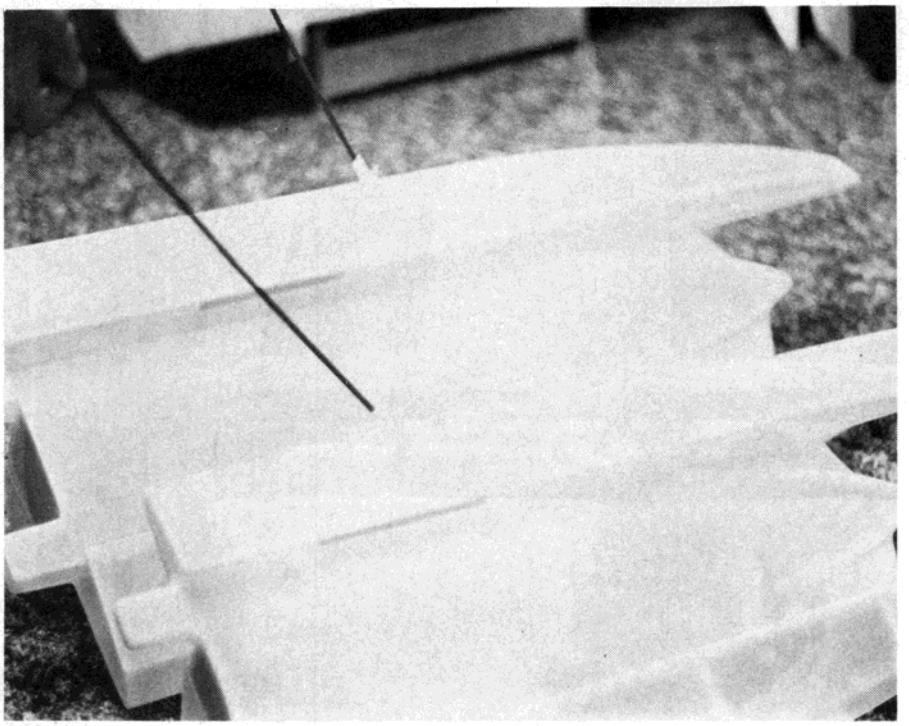
To insure waterweight integrity, Prather offers radio box kits for both hulls (**above**) which help save time. Both radio boxes completely rigged (**below**) and ready to place in the boats.



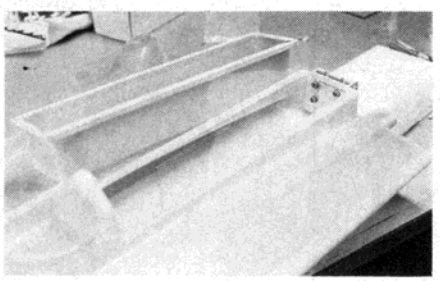


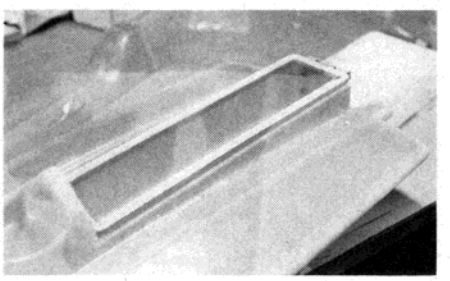
Besides the final finish, these are the accessories (**above**) you'll need to complete either the 3.5 or 7.5 hull. The optional, adjustable Prather motor mount makes transom mounting of the K&B outboards easy.





Arrows point to some of the subtle differences (**above**) between the two hulls. The radio box before (**below left**) and after (**below right**) mating to the hull. These boxes add a good bit of strength and, as long as the hull remains uncracked, guarantee water tightness. Outboard has been mounted (**bottom**), linkages installed and adjusted, and radio box sealed. All that remains is preparation for and application of final finish.





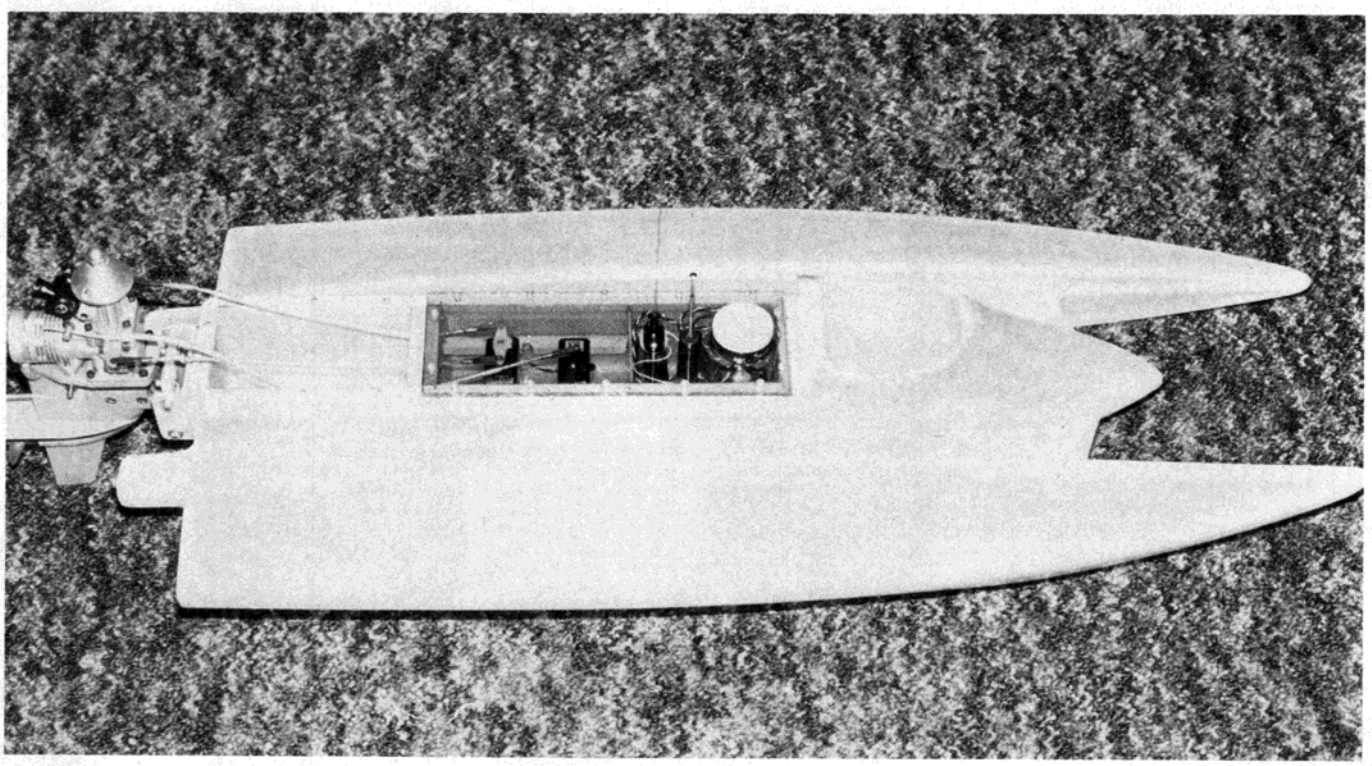
about the hull design. In case you didn't pick it up from the previously mentioned hull measurements, the tunnel widths on these hulls are somewhat narrower than we are used to seeing on model tunnel hulls. With each successive generation of hull designs, the trend is towards more and more prototypical (scale) appearance and operation. The bottoms of these two tunnel boats is as close to scale as I've seen for this hull type. If it works for the big boys, it should work for us.

The list price for the 28 inch *Fast Cat* and 35 inch *Tunnel hull* is $134.95 and $179.95 respectively.

OK, so now you got a very high quality hull in your hot little hands and you're trying to decide how to rig it. Prather Products has completely removed any confusion for the beginner R/C boater, and even the most experienced racer would have to agree that the Prather radio box kit designed specifically for these hulls is the only way to go! These radio box kits come complete and when set into the hull become a very integral part of the hull structure that not only strengthens it but completely seals the entire hull structure against leaks. Using this radio box (two sizes) guarantees a watertight hull as long as the hull remains uncracked (styrofoam flotation is provided in case you hit that immovable object!)

Again, Prather seemed to design the boat around the radio box or the box around the boat. In any case for a list price of $22.95 for either size (28 inch hull or 35 inch hull) the ease of rigging and overall integrity that this radio box provides is well worth the money and time you would save over other installations.

For $14.95, Prather Products can supply you with their Outboard Cable Set for the 3.5 or 7.5cc outboards. This item was specifically designed for use with their radio box but will work with almost any installation. All necessary fittings, cables, and seals are provided to complete all necessary steering and throttle attachments from the engine to servos.



Again, because these items were designed around these hulls they make a very neat and professional installation should you decide to go completely "Prather" in rigging these boats.

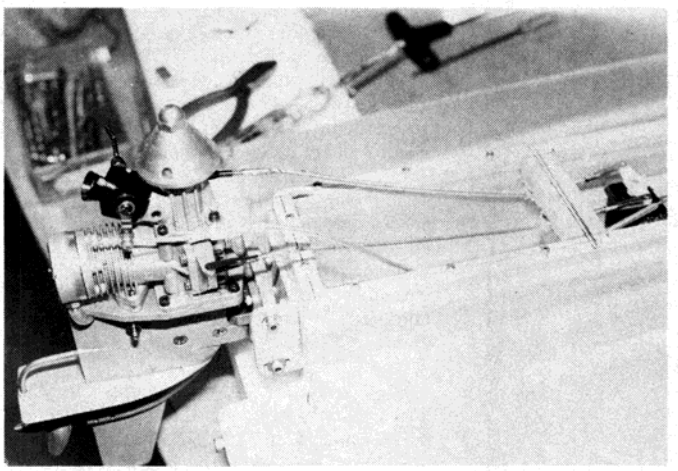
Various other accessories can be supplied by Prather to round off construction of these hulls including adjustable engine mounts for both hulls and cable grease to keep things running smoothly.

The last item in their kit review I found to be the most impressive from a beginner's point of view, is the construction manual supplied with these kits. Included in this 14 page construction manual (actually, a very attractive soft cover booklet) is a complete glossary of boating terms, a list of tools needed to build these hulls, an accessory list, parts list, and, of course, complete step-by-step instructions on how to build and rig these hulls. Also included in this manual are complete instructions on how to trim your hull and how to correct any running abnormalities that may occur. Thirty photos are also provided illustrating every aspect of building and rigging these hulls where the beginner might experience difficulty. One more item I almost forgot is a list of accessories that Prather provides to help you outfit your hull. After careful examination of the list, the only items not mentioned are the finishing materials (something has to be left to the builder's imagination!)

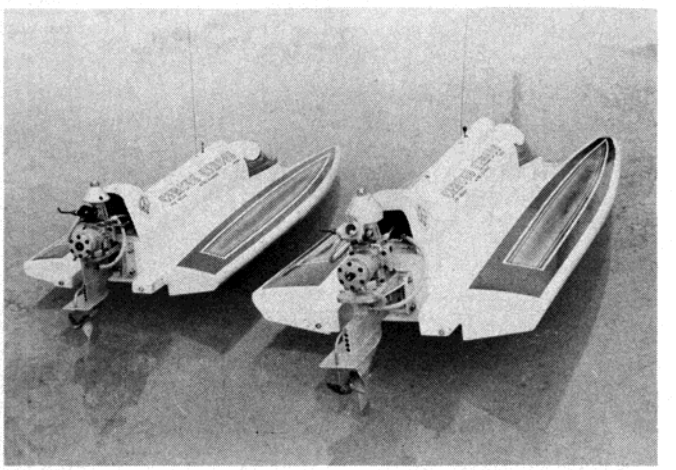
Because of the very high quality of materials and workmanship put into these kits and *especially* because of the very detailed construction manual, I would recommend either of these hulls to anybody wanting to get started in R/C power boating. As far as the more experienced R/C boater is concerned, the "Prather" record speaks for itself. These are a couple of the winningest hulls around.

Like I said before, this is one of the very few sport/hobbies where a beginner can go on to win competition with the same hull he learned on and Prather Products has taken quite a few steps to help that concept along.

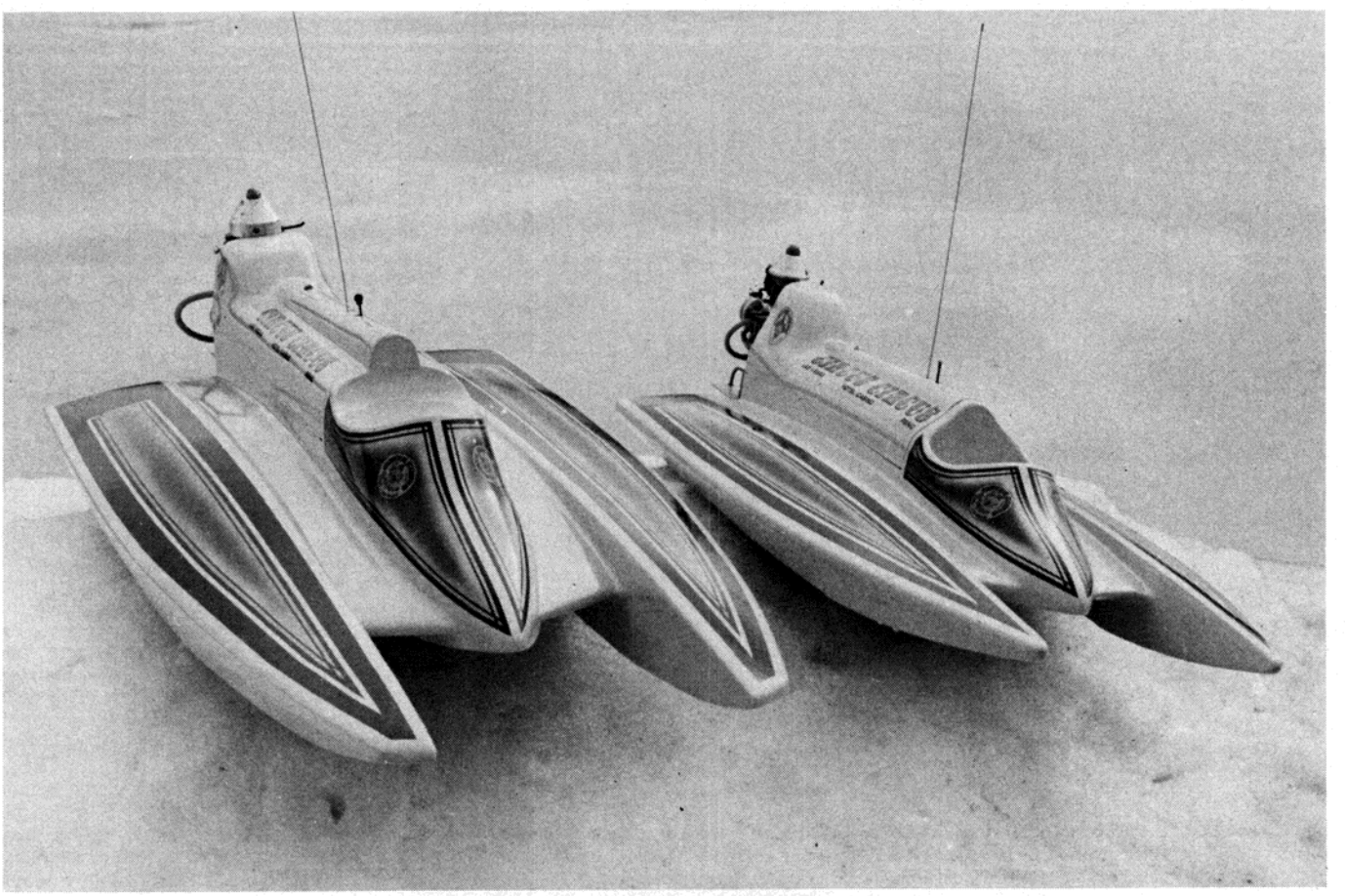
These kits are winners in many ways.



The combination of the Prather radio box and outboard cable set **(above left)** simplifies control set-up. Detailed construction manual explains it.

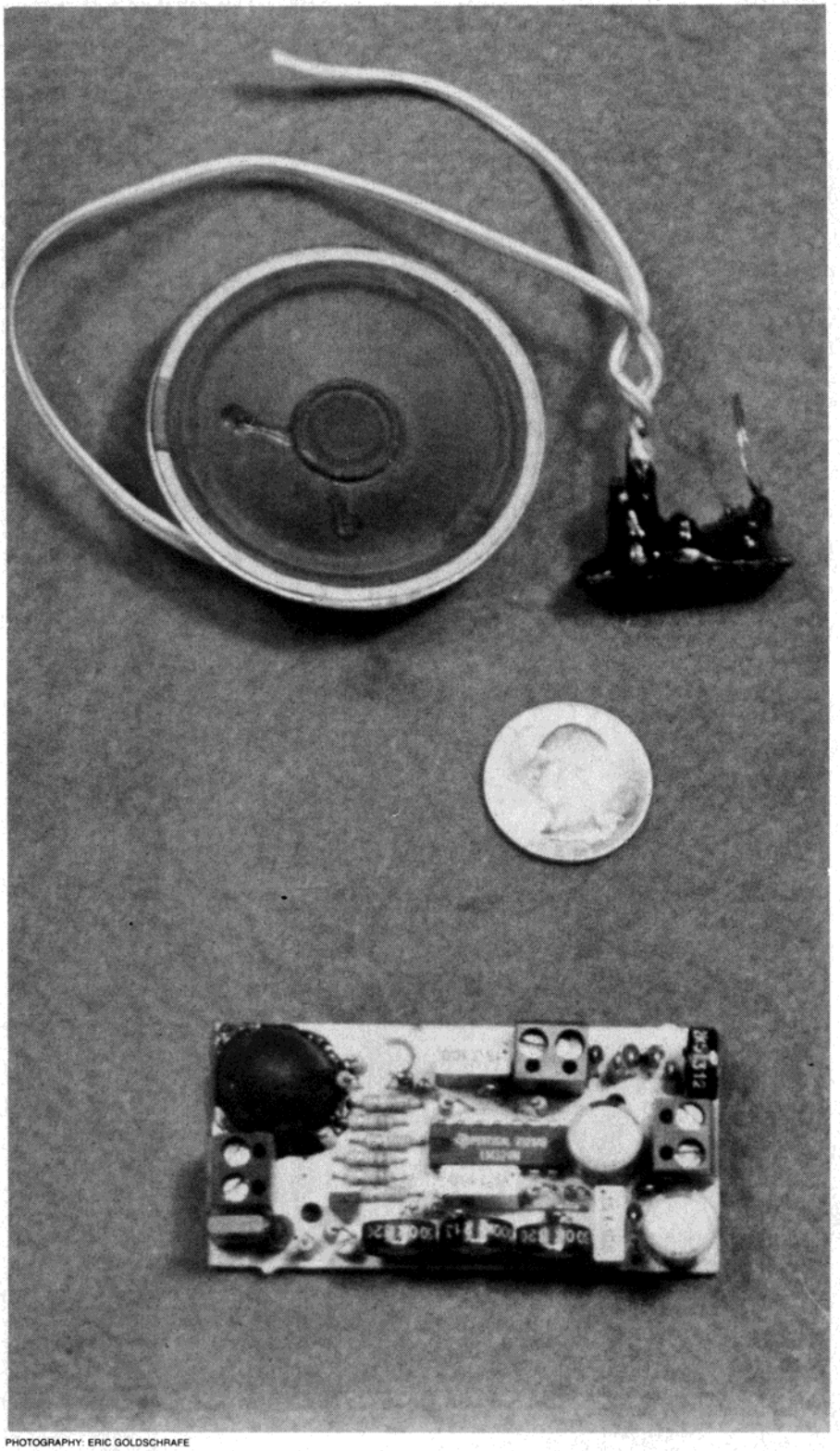


Northern winters can create some monumental anticipation. Here, Vic has left both boats **(above right, below left)** on the ice for the first spring thaw.



R/C Scale Boats

By Eric Goldschrafe



PHOTOGRAPHY: ERIC GOLDSCHRAFE

A good sound system lends that little extra touch to a scale boat. One of the sound systems available from Dynamic is a diesel unit shown at the top of the picture. It's preassembled and comes with a speaker. The Robbe unit, at the bottom, is more realistic but requires assembly and a separate speaker.

Judging by all of the fancy gadgets listed in various ads and catalogs, model boating has entered the age of modern electronics. Besides the up-to-date radio control outfits with features such as variable rates and servo reversing, a variety of accessory devices are now on the market, enabling the model boater to attain new heights in realism.

The first such device the average builder is going to look into is one of the electronic speed controls. An on-off switch, stepped switch, or a relay-type motor control really doesn't do justice to a nice model. Sudden starts and stops, erratic operation, or one continuous speed ruin scale effect and limit enjoyment. Merely not being able to regulate your model's speed to that of another boat is enough to spoil your efforts. Mechanically-operated, resistor-type units are an improvement, but a lot of battery capacity just goes up in heat.

Several excellent electronic speed controls are available now, in a good selection of power ratings and price ranges. One of the most popular is the Futaba unit, available in 10 amp and 20 amp versions. The control unit plugs into any current Futaba receiver, eliminating the need for a servo to control the speed function, and hooks up to a heavy-duty control unit. This "black box" controls the current to the motor with power transistors and a reversing relay. This keeps the high current and the resultant heat away from the more sensitive control unit. The system has center-off and full speed adjustment controls to tailor the unit to any motor, and give smooth, proportional speed changes throughout the range. Factory service on damaged units (caused primarily by improper hook-up) has been very good (out here on Long Island, at any rate), with quick turn-around and reasonable repair bills. Futaba units are available from many sources; try your local hobby shop.

Another good electronic speed control is the RAm unit. Two versions are offered, a "mini" throttle that will handle up to 10 amps, and a heavy-duty 20 amp unit. The mini-throttle measures only $1\frac{7}{8} \times 1 \times 1$ inch, and weighs a mere $1\frac{1}{2}$ ounces. RAm's 20 amp unit has features that are unique and not available from any other manufacturer. An average drain of only 20 milliamps on the receiver battery is hardly more than a servo at idle, and the power circuit is isolated from the more delicate transistorized section by an optical coupling device. Both systems come with no connectors, so the modeler must obtain and install them himself. The instructions are complete, but a hobbyist with only a little background in electronics may want to seek some help from a more qualified friend.

I've tried a relatively new control, manufactured by Sunlux, and it appears to be fairly adequate. These, too, come in two amp ratings, have center-off and top end adjustments, and adequate instructions. No plugs

are supplied, and the sheet gives wire colors to match up to Futaba systems. Owners of other brands will have to find out which of the three wires to hook into the +, −, and signal input leads. The easiest way is to use a multimeter on the receiver connector pins, and locate the + and − terminals, the remaining one will be the signal output. Be extremely careful doing this, as a short circuit across the pins could cause component damage. If you aren't sure, get help. It's cheaper than cooking a receiver or speed control.

If you don't know how much current your motors pull, an easy to find out is to hook up an ammeter in series with the motor and momentarily apply full power with the shaft locked (just grab hold of it). The maximum reading on the ammeter will be the most that the motor will ever draw (assuming that the battery is strong enough), and use that as a guide. If the motor has a stall current of 16 amps, you'll be better off with a 20 amp speed control. A 10 amp unit might work all right for a while, but if you get some weeds tangled up in the propeller, it might fry the control. A fuse or circuit breaker should be installed in the motor leads just to make sure nothing will happen.

Sound units

Along with an electronic speed control, you may wish to add a little more realism with the addition of an electronic sound which simulates engine noise. Several conventional diesel sound units are available, but the most realistic system I've heard is the Robbe No. 8276 device. It might be a little complicated for a neophyte electronics buff to hook up, but the instructions are fairly explicit. An idle voltage input of 6 to 12 volts, proportional voltage from the motor leads, and a pair of speaker leads must be hooked up. Particular attention should be paid to polarity markings, and care must be taken not to short anything, as these units are easily damaged if not hooked up right. But now for the good part — you will be amazed at how real it sounds. Adjusting the three idle controls will give sounds from a smooth-sounding marine diesel to a sound that duplicates a hot big-cube race engine with a high-lift cam and straight pipes. Another adjustable control sets the top-end RPM level. These things sound so good, I put one in one of my R/C cars. This unit draws an average of 100 to 200 milliamps, and the idle circuitry will last for a long time on a 9 volt transistor radio battery. You must obtain a speaker for the Robbe units, either from them or from Radio Shack.

Dynamic Models has a similar device, and although the sound is not quite as good as the Robbe unit, it comes pre-wired, and includes a speaker. An optical coupling, driven by a small lamp wired to the motor leads, provides the variable speed input without exposing the circuit to heavy current, and the power leads are protected against improper hook-up. The Robbe unit measures $2\frac{3}{4} \times 1\frac{1}{2} \times \frac{3}{4}$ inch, and the Dynamic system is hardly the size of a postage stamp. Operating current is in the 40 to 80 milliamp range, depending on the speaker. The Dynamic units are sealed against moisture, vibration and shorting, which makes installation easier.

PHOTO: TED WILLERS

Somedays, the rescue boat never gets a rest. Here, some "overworked" members of the Suffolk Model Boat Club prepare to disentangle columnist Goldschrafe's PT boat from a buoy line.

Both Robbe and Dynamic offer single-cylinder diesel sound units for installation in older-style trawlers and work boats. Robbe's circuit has the adjustment feature described above, and is about the same size and uses the same amount of current as their other diesel sound system. Dynamic's part uses the optical coupling described previously, along with circuit protection and environmental sealing. Both devices will produce the old-fashioned "chug-chug-chug" sound of single-cylinder engines. In addition, Dynamic has a unit that may be installed in boats with high-revving gas engines in the prototype.

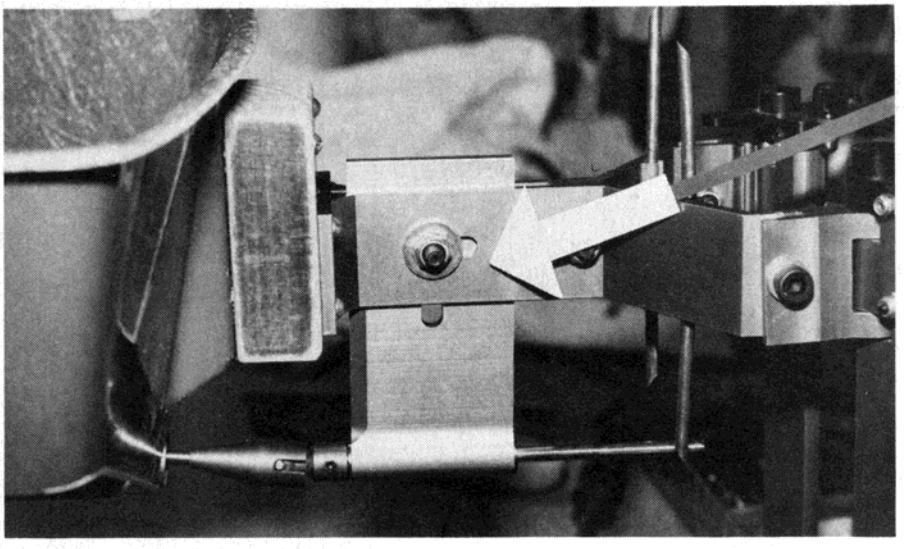
Besides motor sound units, several horns and sirens are available from both Dynamic and Robbe. Foghorns, compressor-driven horns, sirens, whoopers, and battle alarms for all types of vessels are reproduced electronically for that finishing touch on any boat. The Robbe items are all similar in size (about the same as the diesel unit), draw between 150 to 500 milliamps, and have tone and pitch adjustments. Again, no speakers are included, and caution must be exercised to prevent cooking some components. The Dynamic units all feature circuit polarity protection, environmental sealing, low current drain (25 to 100 milliamps), and prewired speakers. Consult the appropriate catalogs as advertised in this publication for specific information and prices.

While all of the aforementioned sound systems may be heard over a considerable distance, speaker type, and installation will make a tremendous difference in sound quality. To make a speaker as efficient as possible, you must make it as difficult as possible for the sound waves coming from the front of the speaker to get around to the back. Notice how stereo speaker cabinets baffle and seal the speaker into the enclosure; try to design your installation in a similar fashion. For instance, I put the ship's horn speaker under the base of a hollow funnel on my Dynamic destroyer, isolating the back side by using the model's structure as an enclosure. Experiment a little; it's amazing how realistic these sounds can become, and how far away they can be heard.

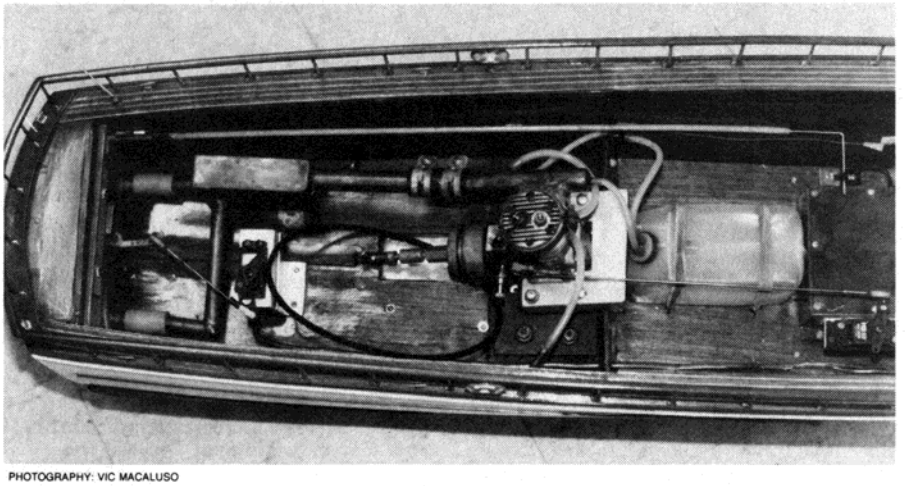
I predict that in the relatively near future, electronics will play an even bigger part in model boating, especially with the small computers available to most people. There's just got to be a way to computerize these things . . .

R/C sport Boats

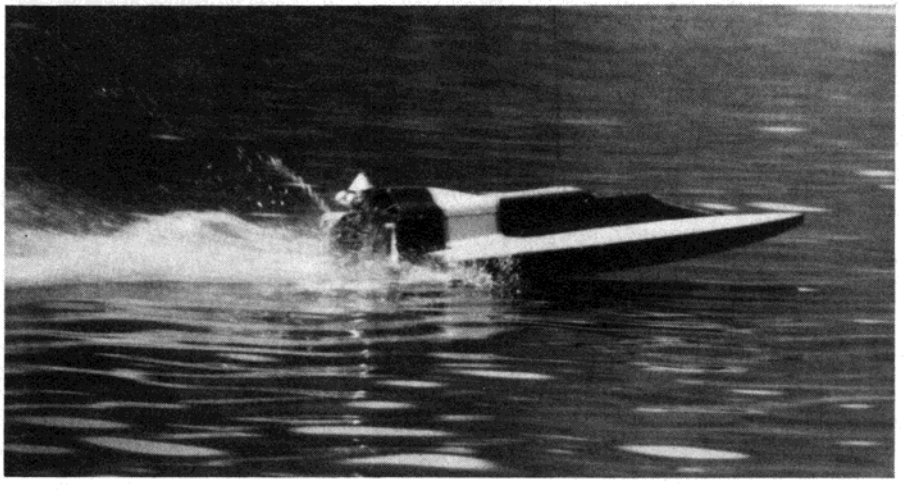
By Vic Macaluso



Photographs for magazines require some intelligent forethought. Arrows or pointing fingers (**above**) help to clearly illustrate a specific aspect. Good focus an absolute essential! Photos showing layouts (**below**) should include entire layout with linkages if possible. For action shots, catch the model (**bottom**) in its normal operating attitude. Pan it with the camera to give the illusion of great speed.



PHOTOGRAPHY: VIC MACALUSO



So you want to be a magazine writer?! First of all, you must be crazy, but that has already been established by the fact that you're in this hobby in the first place. Now that you understand what the main criteria is for writing, let's try to examine some of the other, less important, criteria for getting your words of wisdom published (This should be good—Ed.).

Before I get into some of the mechanical and logistic aspects of writing for a magazine such as FLYING MODELS the first thing you must know is that most of us (FM authors) are not professional writers by trade. (I'd starve to death if I had to write for a living!) We are basically R/C modelers who usually have too much to say and don't mind getting paid for it. All kidding aside, you don't need a degree in journalism by any means; you just need some good ideas (or hints, or designs, etc., etc.) and a passable ability to put your ideas on paper.

Hopefully what I just said will get you over the "stage fright" of writing an article and motivate you to put words on paper. (We need more articles by more authors, *so pay attention!)*

The first place to start of course is with an idea. I use the word "idea" to cover any reason you may have to want to reach other modelers. That idea could be a building hint, a new adhesive you discovered, or even a full blown construction article, including plans, of your latest original creation. Just remember two things; if you've done it and it pertains to R/C boating, there are literally thousands of modelers out there who will want to read about it. Sometimes I'm amazed at the response I get from readers on what I first thought was an insigificant item I just happened to mention in my column or product review.

Once you've got your subject matter organized (an outline might help), you're stuck with how to start discussing the topic on paper. Here is where most nonprofessional writers bog down and even many professionals have trouble here. Fear not my fledgling Shakespeares, I have the answer! (It works for me anyway) Pretend somone has just asked you a question on exactly what you plan to write about. How would you answer the question? At this point you should write down what your answer would be. You'd be amazed at how easily an opening sentence will come to you. Got the idea? Once the ice is broken continue to write as if you were speaking to a friend. (Watch those expletives! Please!) By the time your "conversation" is over, your ideas should be on paper. Simple, isn't it?

Now that you've "sharpened" your writing skills you have to take into consideration what the magazine needs in the way of text (that was easy) and photos. As far as the text is concerned, whether it be a short column or a construction article, avoid sounding like a construction manual at all costs. There is nothing more boring than a step by step,

glue part A to part B construction article. Leave that to the kit manufacturers. What you really want to do is present your idea as just that, your ideas, and only highlight critical or difficult areas of construction. Most modelers reading an article are more interested in the how and why of your ideas, rather than a Step I, Step II procedure. Remember, write like you speak and you might even like what you wrote!

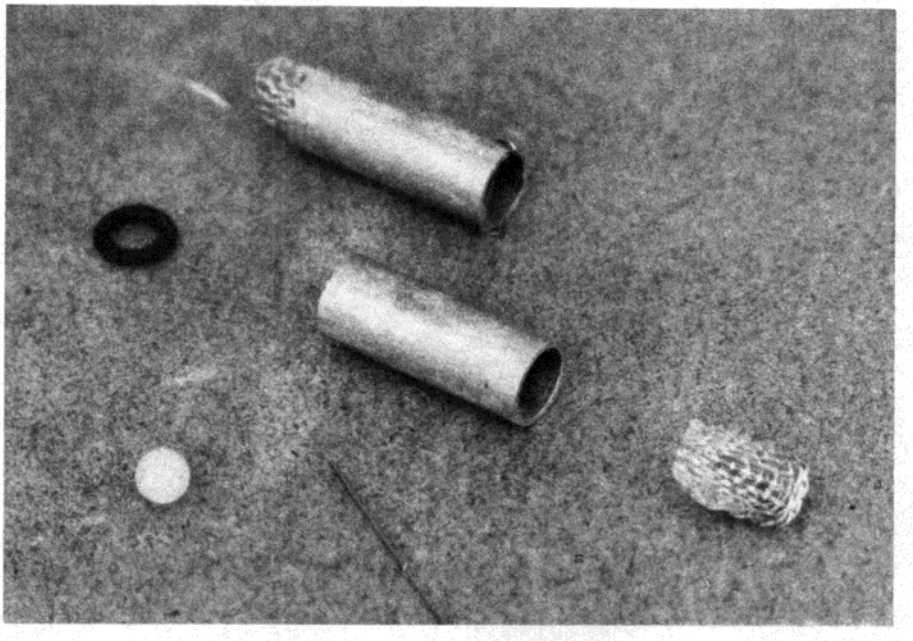
The second item which deserves a lot of consideration is the photos you present with your article or column. All photos should, of course, *clearly* show what the caption depicts. Black and white glossy prints are preferred because much less detail is lost when they are reproduced in the magazine and they are much easier to reproduce. I always make it a practice to "overdose" the editor of this magazine with pictures because it gives him more latitude in developing the layout and it also makes him feel like a big shot when he has more material to reject! (Only kidding, Bob!)

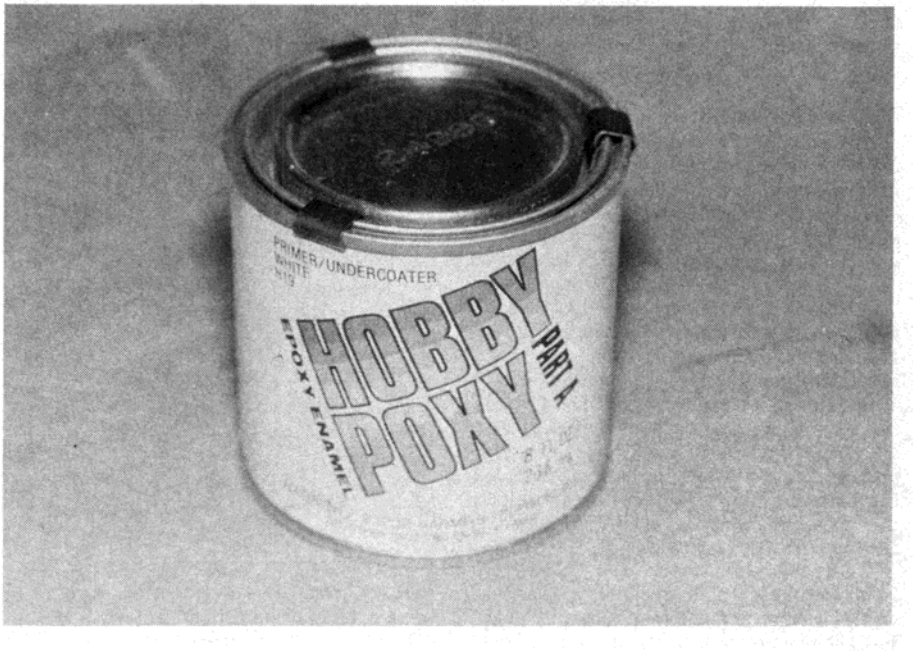
One final note about the mechanics of this whole operation; *all* manuscripts *must* be typed and double spaced.

I know there are many of you out there who have something to say about this sport/hobby of ours so why not put it on paper and photos and send it to FLYING MODELS. We welcome new authors and contributors all the time. Besides, you get to see your stuff in print *and* get paid for it also! How's that for a thrill! (It is always a good idea to contact the FM office with an article idea before beginning preparation. We can supply you with additional information, including author and photographer's guidelines and answer any questions you may have—Ed.)

More "Stuff" from Hobbypoxy

When I do a product review, I usually like to key at least a portion of my column to that review. This month's review on Prather Products™ tunnel boats (I hope you read it already) motivated me to explain how I prepared those hulls for finishing. If you have already read this month's review you know by now that small pin holes are quite common on the surface of an epoxy glass hull. Usually one or two coats of primer are enough to fill them. (Well sanded between coats) Occasionally the larger pores need filling with a material such as Hobbypoxy "Stuff". What I do in this case is thin some "Stuff" to brushing consistency (brushing fills the pores much better than spraying) and apply a generous coat to the entire hull. When thoroughly dry (24 hours), I *wet* sand the entire hull with 220 grit paper and the hull is now ready for primer. Hobbypoxy makes an ideal primer for fiberglass and epoxy glass hulls. They call it their primer/surfacer. On advice from the manufacturers, I mixed their primer/surfacer (Part A) in a 2:1 ratio (two Parts A to one Part B) with their hardener (Part B) and found this mixture cures at a fast rate but is also easier to sand.





New from Aeromarine Laminates is their Auto Bailer (**above**) which disassembles for easy cleaning. Hobbypoxy Primer/Surfacer is ideal for any finish (**below**), especially epoxy glass hulls.

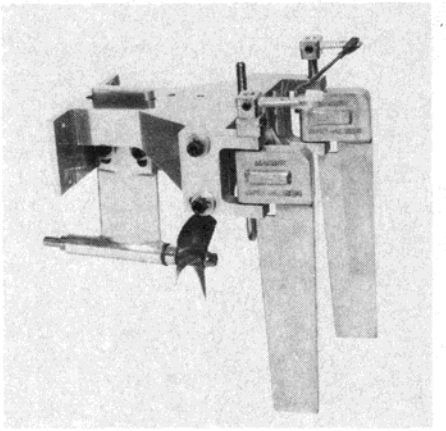
Two coats of this primer/surfacer over the previously "Stuffed" hulls and they were ready for paint. Very easy material to work with and it leaves a very hard foundation for the final coat of paint. (Hobbypoxy of course!)

One final item from the boys of Aeromarine Laminates Inc. (I wonder who they are?) Pete and Remy have just introduced their "New-Improved" Auto Bailer for R/C boats. This bailer comes completely assembled and only requires a 3/8 inch hole drilled in the hull for installation. (Must be epoxied in place.) The "O" ring seal, check ball, and wire screen filter are all removable for easy cleaning and maintenance. This unit retails for $3.95. For further information on this and their entire line of products, contact Aeromarine Laminates Inc. at 77 Cedar Street, Bldg. #7, Babylon, N.Y. 11702.

letter rip

Set the record straight

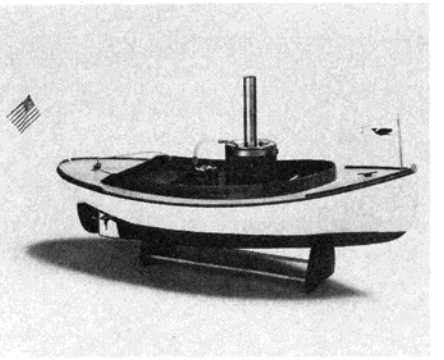
In the March 1984 Letter Rip column, Marine Specialties of PO Box 588, Saratoga, California announced the introduction of their *HBR Double Rudder Outdrive Assembly.* They would like to let their customers know that there was an error in the components included with the assembly. The original announcement stated that the rudder linkage, rudder(s) and prop were not included. This is incorrect. *Everything* except the prop *is* included with the *HBR Double Rudder Outdrive.* Any inconvenience is regretted and Marine Specialties would be happy to furnish any additional information.



Clayton Boat Exhibition

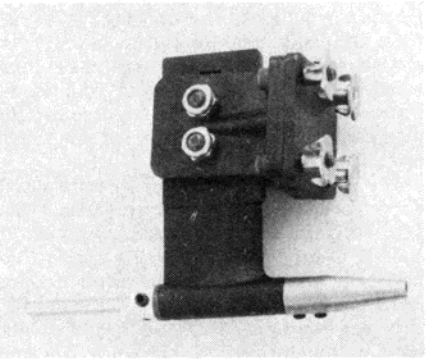
The Memorial Day weekend (May 26 and 27) will see the third annual Clayton ship model exhibit and R/C boat regatta. This event has been successfully held in the past at the 1000 Islands Shipyard Museum in this upstate New York town which is located on the St. Lawrence River. Because the number of participants has grown so steadily, and with the hope that more will participate this year, the competition has been split into a static display which judges workmanship, accuracy, and authenticity and an R/C operational category which will judge performance as well as the already mentioned scale categories. Categories for this year include sail, tug, fire, and deep vee, with subdivisions in each to accommodate gas, electric, steam, or twin engines.

The Town of Clayton and the 1000 Islands Shipyard Museum are sponsoring the event this year and the accommodations are plentiful. The prime movers behind the marine exhibit are Abe Taubman of Taubman Plans Service, Dennis Honeywell of the Clayton Recreational Dept., Fred Smith of the 1000 Islands Shipyard Museum, and Bob Steer, professional ship model builder. To cover the cost of mailings, prizes, and other expenses, there will be a $5.00 entry fee for each boat entered with a maximum fee of $15.00. For more information, contact Abe Taubman at Taubman Model Plan Service, 11 College Dr., Box 4G, Jersey City, NJ 07305.



MIDWEST PRODUCTS, *PO Box 564, Hobart, IN 46342,* has announced the second release in their Midwest/Laughing Whale boat line — the *Fantail Launch II.* An authentic 19th century steam launch, the kit features die-cut and machined parts, simplified balsa and bass wood planking, and lots of mahogany trim. Specifications: length - 19 inches overall; scale - 1″ = 1′; and, radio - single channel. Full size plans, assembly instructions, and propeller are also included with the *Fantail Launch II.* Power for the launch can come from the *Model VI Steam Engine, Boiler, and Burner* which is also available. It is a small, single cylinder, oscillating engine, coupled to a vertical, copper boiler which uses Sterno as fuel. The *FanTail Launch II,* Kit No. 958, lists for $39.50 while the optional *Model VI Steam Engine, Boiler, & Burner,* Kit No. 980, lists for $59.95. For more information, see your local hobby dealer or contact Midwest at their address above.

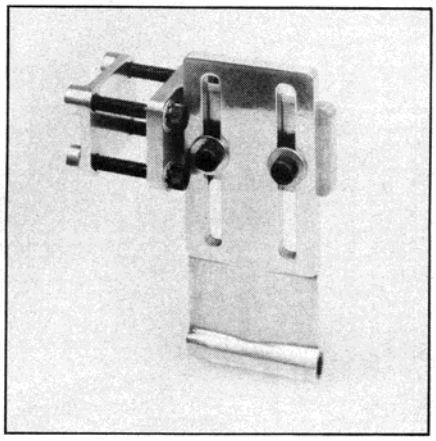
WEDGE MODELS, *PO Box 2415, Pinellas Park, FL 34920,* has announced the release of its new 3.5 outboard high performance tunnel hull, the *Turpentine Cat,* designed by Dick Hanson. This new boat incorporates four new innovations which no other production boat has: offset engine and cowling, detachable sponsons, beveled inside running edges, and grooved running surfaces. Specifications: length - 29 inches; beam - 13 inches; and, weight - 4 7/8 pounds (ready to run). Kit components include pre-cut 100% birch marine plywood, formed cowling, foam inserts, and complete detailed assembly drawings with instructions. The 3.5 tunnel hull, *Turpentine Cat* is Kit No. 25 and lists for $64.95. For additional information, contact Wedge Models at their address above.



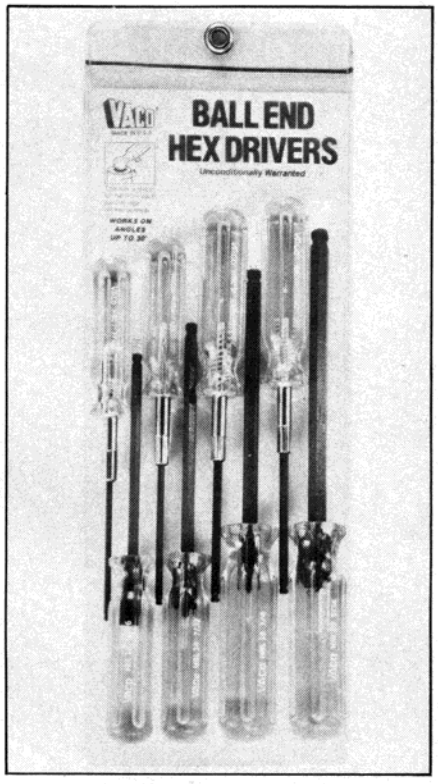
POWER PRODUCTS, *766 Broadway, Seaside, CA 93955,* has recently released their *2003 Universal Strut Assembly.* This new product utilizes a tough, molded, space age glass fiber filled nylon as the basic material. This results in a weight savings of over one half that of aluminum and it is guaranteed non-breakable (except in crashes) when used on up to 11cc powered, submerged drive monoplanes and up to 7.5cc powered surface drive hulls. The Power Products *2003 Strut Assembly* includes: a pair of strut angle brackets, a 5° wedge plate for surface drive applications, a strut blade with bronze bushings installed, mounting hardware, and blade retention bolts with nylock retaining nuts. List price for this new assembly which is easily adjusted by loosening the two blade retention nuts is $11.98. Replacement component parts are also available. For more information about the *2003 Strut Assembly,* contact your local hobby dealer or Power Products at the above address.

SATELLITE CITY, *PO Box 836, Simi, CA 93062,* has announced that Super 'T' will now be available in their 1/4 ounce bottles with their new dispensing tip, the "Hot Tips". Available at your favorite hobby shop as Cat.

#HST-2. Contact Satellite City at their address above if you need additional information.



MARINE SPECIALTIES, *Box 588, Saratoga, CA 95071,* has just released their new *Mid-Range Strut and Tee Bracket Assembly* designed for use with engines of .19 and .40 displacement. This new unit is made from light weight, high tensile, pressure die cast aluminum and mounts to the transom of any boat. Price for the *Mid-Range Strut and Tee Bracket* is $11.00 direct from Marine Specialties. For any additional information, contact Marine Specialties at their address above.



VACO PRODUCTS CO., *1510 Skokie Blvd., Northbrook, IL 60062,* has introduced five new, popularly sized, pouched assortments of versatile *Ball End Hex Keys* and Drivers. The five sets available come in both metric and inch sizes and allow easy access to allen type screws in restricted or hard to reach places. These drivers will work at angles up to 30°. For more information about the styles and assortments, contact Vaco Products at their address above or call (312) 564-3300.

FLY•ING MOD•ELS

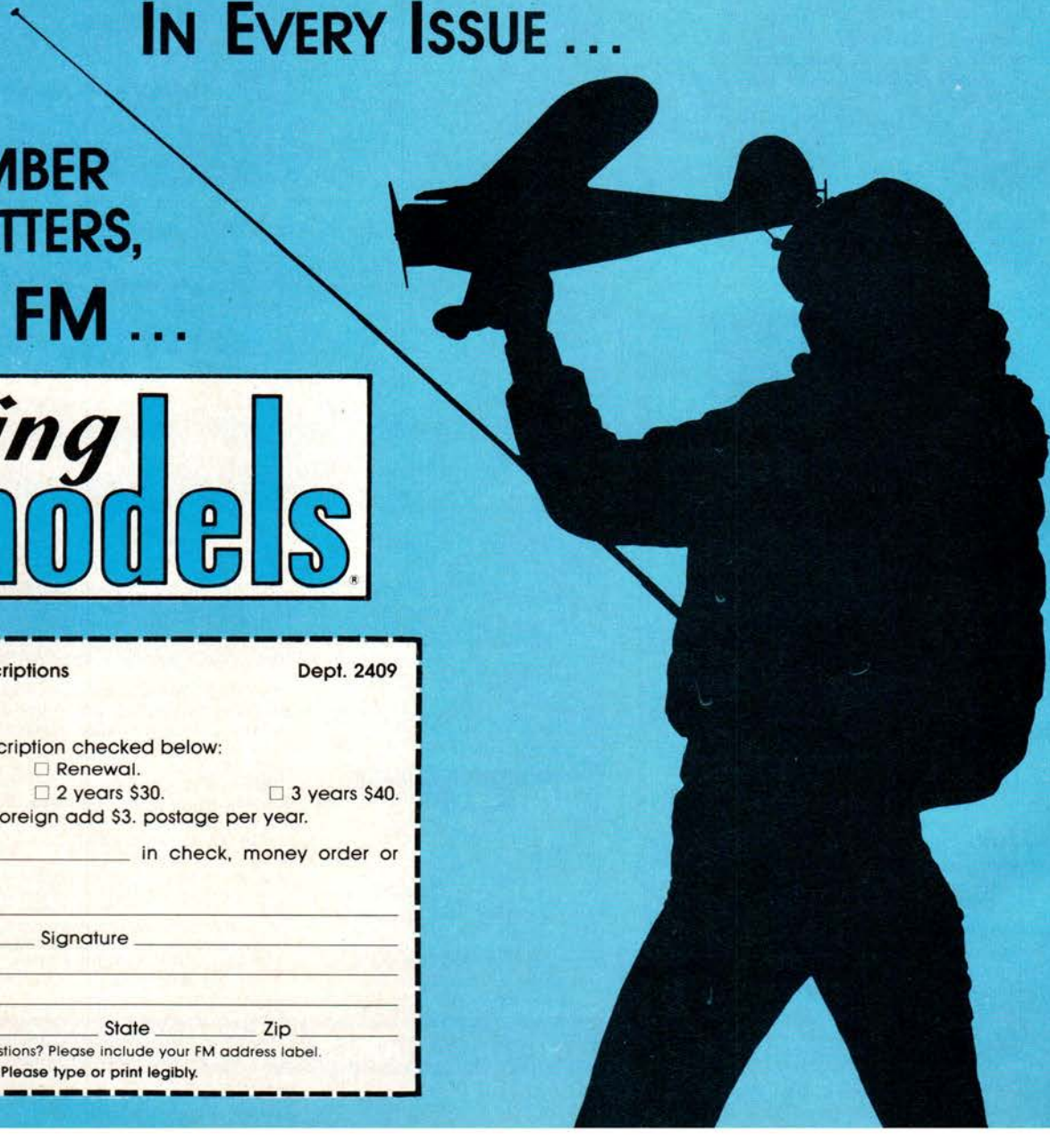
WE SPELL IT OUT FOR YOU ...

• Construction • Electronics • Reviews • R/C • Scale •
• C/L • F/F • New Products • Meets • Organizations •
• Books • Tools • Kits • How-to's • Soaring • Pattern •
• Classifieds • Suppliers • Plans • Engines • Combat • Racing •
• Personalities • News • Scale Boats • Sport Boats • Cars •
• Techniques • Radios • Fun •

IN EVERY ISSUE ...

SO, REMEMBER THE LETTERS, FM ...

flying models®



FLYING MODELS Subscriptions **Dept. 2409**
P.O. Box 700,
Newton, NJ 07860

Please enter the subscription checked below:
☐ New subscription. ☐ Renewal.
☐ 1 year $16. ☐ 2 years $30. ☐ 3 years $40.
Canadian/foreign add $3. postage per year.

I have enclosed $ _____ in check, money order or charge card.

Card No. _____

Exp. Date _____ Signature _____

Name _____

Street _____

City _____ State _____ Zip _____

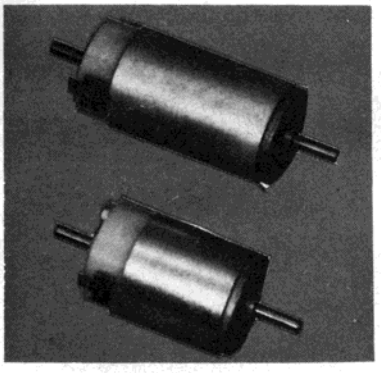
Subscription questions? Please include your FM address label.
Please type or print legibly.

FULL SPEED AHEAD...
WITH OUR NEW MOTORS

IDEAL FOR MULTI-SHAFT APPLICATIONS IN HULLS 24" TO 48"

HIGH QUALITY EXCELLENT SPEED RESPONSE NO RADIO INTERFERENCE

.180 DIA. SHAFT (COUPLINGS AVAILABLE FROM DYNAMIC)



No. L-1 $12.95 ea.
4.750" long, 1.625" dia.
2300 RPM @ 12 VDC, 0.30 amps.
Stall Current 2.55 amps max.

No. S-1 $9.95 ea.
3.50" long, 1.625 dia.
2075 RPM @ 12 VDC, 0.22 amps
Stall Current 2.45 amps max.

LIMITED QUANTITIES

SEND FOR CATALOG ILLUSTRATING HUNDREDS OF FITTINGS
AND LARGE SELECTION OF FIBERGLASS HULLS - $4.00 (REFUNDABLE)

Dynamic MODELS ™ PHONE : (516) 928-8200

MasterCard VISA

P.O. DRAWER "C", PORT JEFFERSON STATION, NEW YORK, 11776

SCRATCH MODELERS

Plans, plans and MORE plans: - Warships of all leading nations and others - Pre-WW I, WW I and WW II; Submarines; U-Boats; PT-Boats, Schnelboots; Landing Crafts; Sailing Models; Class Yachts; Tugs; Trawlers; Freighters; Tankers; Liners; Hovercrafts; Paddle Steamers and River Boats; Sail; Whalers; Period; Historical; Local and more. Also Steam and Marine Engines. You will find them all in TAUBMAN'S 83/84 Boat catalog of a whopping 140 pages - PLUS the 83/84 MAP Plans Handbook No. 2 for boats and cars for $3.50 plus $1.50 for domestic 3rd class shipping. (Can., Mex. and overseas surface mail $2.50. Airmail -Eur. & So. Amer. $7.00; Pac. area $9.00). Those interested in warships, liners and merchant marine send an additional $1.00 for the Wiswesser catalog.

MAP #3 catalog for Engines - Marine, Steam, Loco., Planes. $2.00 plus $1.00 postage.

So, if you are planning on buying plans, plan on buying the plans from

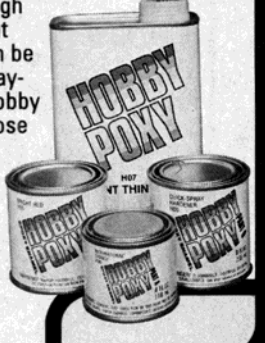
TAUBMAN PLANS SERVICE
11 College Drive
Box 4G - Dept. FM
Jersey City, N.J. 07305

(When sending inquiries, please include a S.A.S.E.)

Hobbypoxy finishing products

Whether your model is wood, metal, fiberglass, plastic or a combination; whether it flies, sails or rolls, Hobbypoxy is formulated to let you paint, build, repair and pamper it to perfection.

• The largest selection of epoxy enamel paint colors on the market, including metallics and primers. Choose from high gloss or flat, flat finishes. All can be brushed or sprayed. No other hobby paint comes close to their fuel-proof characteristics.

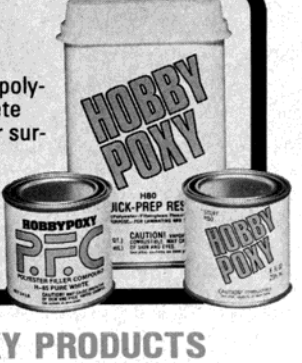


Hobbypoxy. . .quality controlled from pigment to package. As a division of the Pettit Paint Company (which has been making paints for full-size pleasure boats for half a century), we start by using only the best raw materials and then carefully formulate them to our own rigid and successfully proven specifications. Hobbypoxy. . .we take care of the "little things".

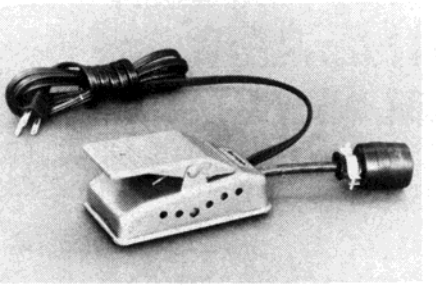
• Four different epoxy glues. Select the formulation right for your materials, your working time, your technique.

A big "FREE" offer. Send for complete literature and how-to-guide, and we'll tell you how to qualify for a one time, get acquainted offer of $4.75 worth of Hobbypoxy products absolutely FREE.

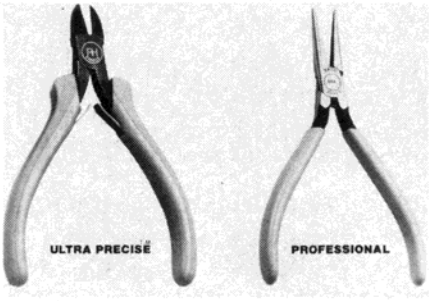
• "Stuff", fillers and polyester resin. A complete series of products for surface filling, fiberglass laminating, leveling and finishing preparation.



HOBBYPOXY PRODUCTS
a division of Pettit Paint Company, Inc.
30 Pine Street, Box 378
Rockaway, NJ 07866-0378



JARMAC, *PO Box 2785, Springfield, IL 62708,* has recently added a foot operated rheostat to their power tool line and gives infinite speed capability to any fractional horsepower motor using only light foot pressure. Speeds range from stop (foot pedal up) to maximum (pedal fully depressed). The plug-in cord is 8 feet long and is grounded. List price for the foot operated rheostat is $27.50.



VACO PRODUCTS CO., *1510 Skokie Blvd., Northbrook, IL 60062,* has recently released a line of precision pliers in two models, the Ultra Precise and Professional Pliers. The Ultra Precise Tools feature a glare-resistant black finish, specially designed red grip handles, return leaf spring, and finely honed cutters. The Professional series are compact, high efficiency pliers with polished chrome finish, return coil spring, hand-honed cutters, and grip handles. There are 23 different plier styles all together. For additional information, contact Vaco Products at their address above.

timetable
of coming events

TACOMA, WASHINGTON—April 1, NAMBA enduro, outboard, sport 40, hosted by Puget Sound Model Boat Club at Lake Wapato. Contact: Jerry Dunlap, 119 Crestwood Dr. SW, Tacoma, WA 98498; 206/584-7131.

MARYSVILLE, WASHINGTON—April 7, NAMBA record trials, hosted by Seattle Model Yacht Club at Twin Lakes. Contact: Ron Erickson, 2212 NW 60th, Seattle, WA 98107; 206/782-7855.

OAKDALE, CALIFORNIA—April 7-8, NAMBA District 9 points, heat racing, scale, unlimited hydro, sport 40, hosted by Modesto Buccaneers at Lake Woodward. Contact: Don Osman, 208 E. North St., Oakdale, CA 95361; 209/847-2393.

TUCSON, ARIZONA—April 14-15, NAMBA District 9 points, outboard, outboard OPC, hosted by Tucson Model Boat Club at Silverbell Park. Contact: Pat Brannon, Rt. 1 Box 608 E., Tucson, AZ 85741; 602/744-2780.

FORT WORTH, TEXAS—April 14-15, NAMBA District 7 points, enduro heat race, outboard, scale, unlimited hydro, hosted by Ft. Worth Model Boat Racing Assn. at Echo Lake. Contact: Larry Bracke, 3708 Selma St., Ft. Worth, TX 76111; 817/834-1228.

KENT, WASHINGTON—April 21, NAMBA District 8 points heat race, offshore, outboard and OPC, unlimited hydro, hosted by Seattle Model Yacht Club at Kent Lagoon. Contact: Steve Compton, 21122 NE 4th, Redmond, WA 98052; 206/881-8504.

STONE MOUNTAIN, GEORGIA—April 21-22, IMPBA heat racing B, D, E, F mono; B, D, E, F hydro; B and D outboard tunnel; 60 scale hydro, hosted by Atlanta Model Boaters at Stone Mountain Park, starts 8 a.m. This is the 9th Annual Peach State Classic. Contact: Steve Rece, Rt. 1, Box 7, Hilltop Cr., Macon, GA 31210; 912/994-0576.

CHESAPEAKE, VIRGINIA—April 21-22, IMPBA record trials, 1/4 and 1/3 mile oval, 10% of record Sun., hosted by Old Dominion Model Boat Assn., Inc. at Indian River High School Lake, starts 9 a.m. Sat. and 12 p.m. Sun. Contact: Rick Johnson, 805 Clearfield Ave., Chesapeake, VA 23230; 804/547-4868.

SALISBURY, MARYLAND—April 28-29, IMPBA 1/16 straight, hosted by Fast Boats, Inc. at Pusey Pond. Contact: Ed Baker, Morris Rd., Pittsville, MD 21850; 301/835-2386.

BAKERSFIELD, CALIFORNIA—April 28-29, NAMBA District 19 points, heat racing, hosted by Wavemakers at Costerisan Farms. Contact: Wally Stewart, 347 Cypress St., Bakersfield, CA 99304; 805/322-6972.

ANDREWS, TEXAS—May 5-6, NAMBA District 7 points, heat racing, outboard, outboard OPC, deep vee, and unlimited hydro, hosted by Basin Aquanuts at City Park. Contact: Jim Olson, 7501 Mockingbird Land #9, Odessa, TX 79763; 915/381-6716.

SO. EL MONTE, CALIFORNIA—May 5-6, NAMBA Saturday Ladies & Kids Annual Day, Sun. unlimited hydro, hosted by Alii Racing Team with K & B Manufacturing Co. at Legg Lake. Contact: Jack Garcia, 8309 Birchcrest, Downey, CA 90240; 213/928-4865.

BIRMINGHAM, ALABAMA—May 5-6, IMPBA Heart of Dixie Classic, hosted by B'ham Model Boating Assn. Contact: Thelmon Rochester, 7721 8th Ave. So., Birmingham, AL 35206; 205/836-1024.

INDIANAPOLIS, INDIANA—May 5-6, IMPBA record trail (Saturday), Sunday must have run within 10% of record on Sat., hosted by Indy Model Boat Club at Lake #1, starts 9 a.m.; a muffling device or tuned pipe is required, no short stacks or open exhaust permitted. Contact: Barry Gunn, 1346 Evans, Noblesville, IN 46060; 317/773-0684.

CHESAPEAKE, VIRGINIA—May 12-13, IMPBA record trials, 1/4 and 1/3 mile oval, 10% of record on Sunday, hosted by Old Dominion Model Boat Assn., Inc. at Indian River High

School Lake, starts 9 a.m. Sat. and 12 p.m. Sun. Contact: Rick Johnson, 805 Clearfield Ave., Chesapeake, VA 23230; 804/547-4868.

TACOMA, WASHINGTON—May 19, NAMBA enduro, outboard, sport 40, hosted by Puget Sound Model Boat Club at Lake Waughop. Contact: Jerry Dunlap, 119 Crestwood Dr., SW, Tacoma, WA 98498; 206/584-7131.

SACRAMENTO, CALIFORNIA—May 19-20, NAMBA District 9 points heat racing, unlimited hydro, sport 40, hosted by Sacramento Model Boat Assoc. at Beach Lake. Contact: Rich Kasis, 1271 Kennedy Lane, Sacramento, CA 95822; 916/442-8108.

LOMBARD, ILLINOIS—May 20, IMPBA John Spangler Memorial Regatta, mono 3.5 cc O.B., tunnel 3.5 cc O.B., tunnel 7.5 cc O.B., hosted by Minute Breaker's, Inc. at Lombard Lagoon, starts 10 a.m. Contact: Gary Preusse, 17W323 16th St., Oakbrook Terr., Villa Park, IL 60181; 312/279-2451.

SYLVANIA, OHIO—May 20, IMPBA open class hydro and open class deep vee, hosted by Propwash Unlimited, Toledo, Ohio at Olander Park, starts 9 a.m.; tuned pipe or muffler required. Contact: Stacy Beach, 2543 Oak Grove, Toledo, OH 43613; 419/475-4141.

OKLAHOMA CITY, OKLAHOMA—May 26-27, NAMBA District 7 points, heat racing, outboard, outboard OPC, sport 40, deep vee, and unlimited hydro, hosted by Oklahoma City Model Boat Assoc. at Ghost Lake. Contact: Denny Preston, 3013 Hillside Dr., Del City, OK 73115; 405/672-4658.

CALGARY, ALBERTA, CANADA—May 26-27, NAMBA District 16 points, enduro, heat race, Super X hydro, unlimited hydro, outboard OPC, deep vee, hosted by Calgary Model Boat Racing Assn. at Carburne Lake. Contact: Brian Jessup, 639 Canterbury Dr., SW, Calgary, Alberta T2W 1J4, Canada; 403/281-4193.

SAN DIEGO, CALIFORNIA—May 26-27, NAMBA District 19 points, outboard, OPC outboard, hosted by San Diego Argonauts at Model Yacht Pond. Contact: Eddie Patten, 111-32 Madrigal, San Diego, CA 92129; 619/487-3646.

SO. EL MONTE, CALIFORNIA—June 2-3, NAMBA District 19 points, heat racing, hosted by Prop Nuts Model Boat Club at Legg Lake. Contact: Roger Wiechman, 1683 Mulberry Ave., Upland, CA 91786; 714/981-9482.

OSHAWA, ONTARIO, CANADA—June 2-3, IMPBA 20 O.B., AB, CD, E, F hydro, scale high point, and an open class for all others, hosted by Oshawa Model Power Boat Club at Darlington Prov. Park, starts 9 a.m. Contact: Fred Fincham, 900 Henry St., Whitby, Ont., Canada; 416/668-6919.

INDIANAPOLIS, INDIANA—June 2-3, IMPBA Indy Unlimited, hosted by Indy Model Boat Club at Lake #1, starts 9 a.m.; muffling device or tuned pipe is required, no short stacks or open exhaust permitted. Contact: Don Templeton, 455 Avon Ave., Plainfield, IN 46168; 317/839-3776.

SAGINAW, MICHIGAN—June 3, IMPBA B, D, E, F hydro and mono, B and D tunnel, 1/8 scale hydro, hosted by Saginaw Bay R/C Boat Club at Lake Linton Reservoir, starts 9 a.m.; tuned pipe or muffler required. Contact: Harold Epting, 5043 State, Saginaw, MI 48603; 517/792-7021.

CAMPBELL, CALIFORNIA—June 9-10, NAMBA District 9 points, heat racing, sport 40, unlimited hydro, hosted by Marine Modelers of Santa Clara Valley at Campbell Perk Pond. Contact: Gary Morton, 22 Lyonridge Ln., San Mateo, CA 94402; 415/574-9120.

SO. EL MONTE, CALIFORNIA—June 9-10, NAMBA District 19 points, outboard, outboard OPC, hosted by Team International at Legg Lake. Contact: Tom Haggerty, 6378 Thunderbay Trail, Riverside, CA 92509; 714/681-1127.

EDMONTON, ALBERTA, CANADA—June 9-10, NAMBA District 16 points, heat race, offshore, outboard, OPC, deep vee, unlimited hydro, hosted by Edmonton Model Boat Racing Assn. at Lake Hermitage. Contact: Louis Omerzu, 10801 150 Street, Edmonton, Alberta T5P 1R6, Canada; 403/483-8392.

FORT COLLINS, COLORADO—June 16-17, NAMBA District 7 points, heat race, outboard OPC, sport 40, unlimited hydro, hosted by High Altitude Model Boaters/Rocky Mountain Marine Modelers at Sportmen's Lake. Contact: Doug Grant, 5374 D. West Canyon Trail Dr., Littleton, CO 80123; 303/973-7663.

SEATTLE, WASHINGTON—June 23, NAMBA record trials, hosted by Seattle Model Yacht Club at Twin Lakes. Contact: Ron Erickson, 2212 NW 60th, Seattle, WA 98107; 206/782-7855.

SO. EL MONTE, CALIFORNIA—June 23-24, NAMBA District 19 points, heat racing, hosted by Fish & Chips / "R" / Outlaws at Legg Lake. Contact: Richard Fish, 19030 State St., Corona, CA 91720; 714/734-1709.

WICHITA, KANSAS—June 30-July 1, NAMBA District 7 points, heat racing, hosted by Air Capitol R/C Model Boat Club at Windmill Lake. Contact: Ernest Nickens, 2428 Cedar Crest Dr., Wichita, KS 67223; 316/722-1974.

CALGARY, ALBERTA, CANADA—June 30-July 1, NAMBA District 16 points, enduro, heat race, deep vee, outboard OPC, unlimited hydro, Super X hydro, hosted by Calgary Model Boat Racing Assn. at Carburne Lake. Contact: Brian Jessup, 639 Canterbury Dr. SW, Calgary, Alberta, Canada T2W 1J4; 403/281-4193.

FM CLASSIFIED ADVERTISING

CLASSIFIED ADVERTISING: 29¢ per word minimum order $3.48. Count all initials as words. Ads payable in advance. Fourth consecutive insertion of same ad is free, upon request. We must have home or business address for all ads using P. O. Box number. Ads must be received in Newton not later than the 1st of the month, three months preceding date of issue, i.e., Feb. 1, 1984 for the May 1984 issue. Send all ads to: Classified Ads Dept., FLYING MODELS MAGAZINE, P. O. Box 700, Newton, NJ 07860. Ads sent to other departments may be delayed or lost. Classifications are available. All ads set in our standard 7 point type with lead in capital letters. All ads accepted are subject to approval of the publisher.

BOOKS AND PUBLICATIONS

"MAKING SCALE MODEL AIRPLANES FLY", Selecting, improving, constructing, flying, troubleshooting all types: Indoor/outdoor, monoplane/biplane, gas/rubber/CO2/electric power, tractor/pushes/Conrad/tailles/helicopter, sport/contest. Widely recommended book, $7.95. SSAE for descriptions. Aircraft Data, Box 32021-C, Dallas, TX 75224. 584

BUSINESS OPPORTUNITIES

HOBBY BUSINESS with international reputation available for further development. Included in sale: Inventory, mailing list good will. $15,000.00 negotiable. PO Box 56, Armington, IL 61721. 584

FLYING SUPPLIES

CONTROLINE FUEL TANKS: Uniflow and standard. 1.5 to 6 oz. capacities. Profile/Wedge/Combat/Racing. Custom blend fuels and ingredients: Nitro/FAI/Giant Scale. Brochure 50¢. Carolina-Taffinder, 8345 Delhi Road, Charleston Heights, SC 29405.TF

R/C CRASH KIT contains items useful in the event of a crash. A must for your flight box. $3.00 postpaid. J. Kurzyhski, 2681 Lavender Lane, Green Bay, WI 54303. 584

FOR SALE

LIST YOUR USED RADIO Equipment for sale. No fee for listing. Escrow available. Send SSAE for details. Radio Equipment Exchange, Box 561, Park Forest, IL 60456. 684

HEAVY-DUTY OFF ROAD R/C sports cars, boats, jeeps. Completely assembled, transmitter included. Receptacle f-r recharging Ni-Cads. Reasonably priced. Write: Bruin International, 2265 Westwood Blvd. #462, Los Angeles, CA 90064. 784

LIST YOUR USED radio equipment for sale. No fee for listing. Escrow available. Send SSAE for details to: Radio Equipment Exchange, Box 561, Park Forest, IL 60466. 1284

WE HAVE LISTING of used radio equipment for sale. Send SSAE for details to: Radio Equipment Exchange, PO Box 561, Park Forest, IL 60466.984

MISCELLANEOUS

SUPPORT AERO MODELING in Israel! Friends of the Aero Club of Israel, 147-02 29th Ave., Flushing, NY 11354. See us at the WRAM Show. 584

AVIATION RUBBER STAMPS, Many designs available. Dress up your letterheads and envelopes. Catalog $1.00. Aerostamps, 60 Ely, Sabina, OH 45159. 784

SENSATIONAL CONTROLINE STUNT KITE! Loop, dive hover and zoom! Tail, lines and Flight instructions included. 36″ × 44″. $19.95 plus $2.00 UPS from Dyna-Kite Corp., Box 402, Chicopee, MA 01021. 884

KITS

COMBAT KITS - NATIONAL CHAMPIONS foam wing cores - standard and custom Gotcha 400 Gotcha 500 and more. Send SSAE for list. The Core House, Box 300A RD#2, Dalmyra, PA 17078. 884

PLANS

GREAT PLANS abound in the 2nd printing of Decade of Design; R/C, rubber, gas, glider, only $3.00. Carstens Publications, PO Box 700, Newton, NJ 07860.

P-51 B/C SCALE DRAWINGS. The best available $15.00. More! SSAE. Details to: Charles Neely, 2703 E. Goshen Ave., Visalia, CA 93291. 584

PLANS - Peanuts, Grapenuts, unusual designs, excellent performers. Sample, $1.00, SSAE for list. David Aronstein, 50 Pasture Lane, Poughkeepsie, NY 12603. 784

SCHOOLYARD SCALE - TAYLORCRAFT, Nieuport Bebe, Sopwith Pup, Eindecker, Piper Vagabond, J-3, FW-190, Ki-61, more too! For catalog send stamp. Tom Thumb Sky Tracings, 11333 N. Lake Shore Drive, Mequon, WI 53092. 884

UNUSUAL RUBBER CO2 and P-Nut scale plans, HE219, JU87, Farman Goliath and 30 more. Send $1.00 for catalog to: Haught Graphics, 5460 Southbrook, Ft. Wayne, IN 46815. 684

WANTED

WANTED: Movies of Teterboro Airport prior to 1942. 8mm originals ok. Require description. H.H. Carstens, c/o Flying Models Magazine, P.O. Box 700, Newton, NJ 07860. TF

ENGINES for model airplanes or model race cars, Circa 1930-1950. Jim Clem, PO Box 524, 1201 E. 10, Sand Springs, OK 74063. 1284

WILL PAY AT LEAST $300.00 for any complete original Elf. Also want other vintage ignition model engines and parts. Woody Bartelt, 5600 Portage Road, Kalamzoo, MI 49002. 1084

ENGINES

PAW DIESELS, .049 to .29, standard and R/C. Britains finest and built to last. Fuel consumption approximately half that of Flow and lots of Torque. Send $1 for lists. Eric Clutton, Rt 4, Box 1109C, Edmond, OK 73034. 684

ANTIQUE IGNITION ENGINE PARTS. Excellent reproductions of original timers, points, tanks, etc. Send $1.00 for information and price list to: Micro Model Engineering, 1301 W. Lafayette, Sturgis, MI 49091. 1084

PAW DIESELS - .049 to .35, standard R/C. England's finest and built to last. Fuel consumption approximately half that of glow and lots of torque. Send $1.00 for lists. Eric Clutton, Rt. 4, Box 1109C, Edmond, OK 73034. 884

NOW .036 cu. in. diesel R/C $38.00 pp. Other R/C diesels available. Catalog $3.50 pp. Hobby Hideaway, RR2, Box 19, Delavan, IL 61734. 884

FLYING MODELS MAGAZINE RECOMMENDED HOBBY CONSULTANTS

DEALERS: WRITE FLYING MODELS MAGAZINE, P.O. BOX 700, NEWTON, NJ 07860 FOR FULL INFORMATION

ALABAMA, BIRMINGHAM
For Hobbies, it's Spivey's
Most complete line of bargains in So. East
Planes, boats, cars, trains, rockets, R/C
SPIVEY DISCOUNT STORES
1303 Tuscaloosa Ave. **785-9690**

ARIZONA, TUCSON
Southern Arizona's lrgst. hobby shop.
Complete line of Goldberg, Guillows, Dumas
Sterling, Dremel, Unimat, X-Acto, Pactra, etc.
TUCSON HOBBY SHOP
4352 E. Speedway **326-2565**

CALIFORNIA, LAKEWOOD
R/C Planes, Helicopters, Gliders, Boats
If it flies or floats, we have it! More
important, people to help when needed!
HOBBY WAREHOUSE
4178 E. So. St. **531-8383**

CALIFORNIA, LIVERMORE
Large supply of R/C equipment
For Boats-Planes-Cars-Gliders
"The Valley Discount Shop"
HOBBY HAVEN
1762 1st St. **443-5828**

CALIFORNIA, LOS ANGELES
10:15-7:00 Mon-Sat. R/C Boat, Car, planes,
gliders, Futaba, Dumas, Cox, Latrax, C.G.,
Leis electric, Sterling, Du-Bro and more.
NATICK STORE
209 W. 4th St. **213/626-3339**

CALIFORNIA, MOUNTAIN VIEW
Huge stock of boats, fittings, etc.
Aircraft, engines, parts, books
Magazines, foreign & domestic
SAN ANTONIO HOBBY SHOP
413 San Antonio Rd. **941-1278**

CALIFORNIA, PARADISE
Planes, R/C, U Control
Trains N. HO
Plastic Models
L & L TRAINS & HOBBIES
6412 Skyway **872-1070**

CALIFORNIA, RIVERSIDE
Planes, Trains, Boats, Cars,
R/C, Free Flight, U-Control
All Accessories, Unimat, etc.
HARPER'S HOBBY SHOP
6574 Magnolia Ave. **683-5865**

CALIFORNIA, SAN DIEGO
R/C Specialists, Planes, Helicopters, Cars,
Boats, Rockets, Hardware & Accessories.
10AM-8PM Mon-Fri. 10-4 Sat.
WEST COAST HOBBIES
4690 Convoy **560-9633**

CALIFORNIA, SAN FRANCISCO

Try Us

FRANCISCAN HOBBIES
1935 Ocean Ave. **JU4-3919**

CALIFORNIA, SANTA CLARA
No. Cal's Largest R/C Model Boat Dealers
Complete selection hardware
& radio control gear
HOBBIES GALORE
3414 El Camino Real **244-6267**

COLORADO, COLORADO SPRINGS
R/C planes, systems, accessories
We build & fly what we sell
U/C, FF, Rubber, Sig Balsa, etc.
CUSTOM HOBBIES
2813 E. Platte Ave. **634-7400**

CONNECTICUT, BETHEL
Alco, Balboa, Hallmark, Gem. LMB, NWSL,
PFM, Suydam, Westside brass imports,
Marklin, scratchbuilders supplies.
BETHEL HOBBY SHOP
Bethel Plaza **743-7088**

CONNECTICUT, BRISTOL
#1 in Conn. Radio & U-Control. Complete
Ass't. AHM, AFX, Lionel, Tyco, Repair Serv.
Radio Control. Ground School on Premises
BRISTOL HOBBY CENTER
641 Farmington Ave. **583-7273**

CONNECTICUT, NORWALK
We Fly Radio Control
Complete Line Model Airplane Supplies
Custom Ordering
AL'S HOBBIES
54 Chestnut Hill Rd. **846-9090**

FLORIDA, CAPE CORAL
Planes, trains, boats, cars, crafts. Parts &
service. If we don't have it, we will try to
get it. Mon-Fri 10-8, Sat 10-7, Sun 12-6
A & J MODELS, INC.
1928 Del Prado Blvd. **754-8854**

FLORIDA, LEESBURG
Close to Disney World
Complete Hobby Store Airplane
Trains, Boats, Cars R/C Supplies, Repairs
TOP VALUE HOBBY
2740 N. Hi-Way 441-27 **326-4158**

Some may come and others may go, so
It's only right that you should know;
Fifty Two weeks of every year,
The guy who's ready with help and cheer,
To help you out whenever he can,
Your Hobby dealer - he's the man!

FLORIDA, ORLANDO
When at Disney World
Stop and see a complete line of
R/C Planes, Boats, Cars, Rockets, & Access.
BOB'S HOBBY CENTER, INC.
7333 Lake Underhill Rd. **277-1248**

GEORGIA, SMYRNA
R/C & C/L Airplane Center
Plastic Kits - HO & N Trains
Open 10-7 Sat to 5 Closed Wed. & Sun.
HOBBY JUNCTION
3260 S. Cobb Dr. **432-2538**

HAWAII, HONOLULU
Hawaii's only R/C & U-Control Specialists
Planes, Boats, Cars
Complete selection of hardware & radio gear
THE HOBBIETAT
1423 Tenth Ave. **737-9582**

ILLINOIS, ANTIOCH
HO & N Gauge trains, ships, cars, planes
Science Access. for all. If we don't have
it we'll try to get it.
THE HOBBY BARN
Rt. 83, 1/2 mi. S. of Antioch **395-4080**

ILLINOIS, CHICAGO
Radio Control Specialist. 20 minutes from
O'Hare & Downtown Chicago. Mon-Fri.
10-9, Sat. 9-6, Sun. 11-4
STANTON HOBBY SHOP, INC.
4734 N. Milwaukee Ave. **283-6446**

ILLINOIS, GLENVIEW
Largest selection in all Chicagoland.
R/C equip., trains, Rd. race,
miniatures, lumber, tools
KLIPPER'S TOYS-HOBBIES-CRAFTS
1314 Waukegan Rd. **724-2040**

ILLINOIS, GREENVILLE
R/C, Planes, Boats, Free Flight, Rockets
HO Trains, Tyco Service, X-Acto, Dremel,
Hrs.: M. T. W. Th. & S. 9:30-5, Fri. 9:30-8
WILL-O'-Th'WIND
603 Harris Ave. **664-3353**

ILLINOIS, SOUTH HOLLAND
A full service store to meet all your
hobby needs. Daily Noon-8:30, Sat 9:30
to 5:30, closed Sunday
SCALE MODELS
1048 E. 162nd (159) **339-3922**

INDIANA, BREMEN
R/C Boat, Car & Airplane Specialists
Indoor R/C Raceway
M.T. Sat 10-6 Th. F. 10-9 closed Wed & Sat
BREMEN HOBBIES & CRAFTS
3 Blks N. of BLus. 6 on Ind. 331 **546-3807**

INDIANA, INDIANAPOLIS
Catering to all hobby needs. We stk. all maj.
hob. lines. R/C planes, boats, cars, balsawood,
fuel, eng., Z-N-HO-O trains, plastic kits, more.
TOM METZLER HOBBY CENTER
6838 Madison **784-3580**

INDIANA, INDIANAPOLIS
R/C & C/L Airplane Center
Plastic Kits — Trains — Boats
HO Cars — Track & Parts
JACK SHEEKS HOBBY SHOP
5450 E. 21 St. **353-1919**

INDIANA, INDIANAPOLIS
Planes, Boats, 1/8 Scale Cars
We service what we sell
Open 7 days
WESTSIDE HOBBIES
5235 Rockville Rd. **244-3297**

INDIANA, LAFAYETTE
Airplane Kits & Parts
Radio Control Gear - U-Control
Power Boats, Fittings, Service
WEBER'S HOBBY SHOP
522 Main St. **742-2045**

KANSAS, ULYSSES
Books, Kits, Parts, Tools, Fuel, Paints
Open Tue - Sat 9-5, Sunday 1-5
Boats - Kits - Plastic Models
TAP HOBBIES
910 N. Colorado **356-3335**

KENTUCKY, LEXINGTON
R/C, C/L, Planes & Boats
Only 3 mi. from I-64 & I-75
A Complete HObby Shop
X-CELL MODELS INC.
347 Eastland S.C. **254-2406**

LOUISIANA, BATON ROUGE
B.R. compl. hobby shp., feat. a compl. line
of R/C & U/C air craft, gas & elec. R/C cars,
boats, helicop., rocket & plas. mdls., more
ANDY'S HOBBY TOWNE
3112 College **928-1534**

MAINE, BRUNSWICK
R/C, U/C, F.F.
Trains, Kits, Tools & Supplies
S & T Games, Miniatures, Crafts
BALDWIN'S, INC.
46 Maine St. **725-5440**

MARYLAND, BALTIMORE
Baltimore's complete hobby shop. Over
20,000 HO items. Lower Prices. Open
M-F 12-8:45, Sat. 10-4:45PM
CITY WIDE HOBBY SHOP
7715 Hartford Rd. **NO8-9200**

MICHIGAN, CLAWSON
R/C, C/L, F/F Planes, Boats & Gliders
Futaba - MRC - Dremel - Motors & Acces.
HO Trains - Rockets - Crafts - Open 7 days
NICK'S HOBBY
1139 W. 14 Mile Rd. **288-3366**

MICHIGAN, DEARBORN
Radio Control, Plane Kits, Engines
Boats & Fittings,
Dremel, Unimat, Etc.
JOE'S HOBBY CENTER
7845 Wyoming Ave. **933-6567**

MICHIGAN, EAST DETROIT
Radio Control, Plane kits, Engines
Boats & Fittings
Dremel, Unimat, Etc.
JOE'S HOBBY CENTER
17900 E. 10 Mile Rd. **773-8294**

MICHIGAN, FARMINGTON
Radio Control, Plane kits, Engines
Boats & Fittings
Dremel, Unimat, Etc.
JOE'S HOBBY CENTER
35203 Grand River Ave. **477-6266**

MICHIGAN, GRAND RAPIDS
Planes, Trains, Cars & Boats.
R/C, free flight, U controls.
All accessories, tools etc.
MEYER'S HOBBY HOUSE, INC.
2136 Plainfield **363-8347**

MINNESOTA, MOORHEAD
R/C Planes, Motors and accessories
HO Railroad - Ceramics
Open 9:30 to 8 - Mon thru Sat.
BADERS BIKE & HOBBY CENTER
121-8 St. So. **236-8852**

NEVADA, RENO
Planes, Trains, Boats, Cars,
Games, Tools, Books, Supplies
Daily 10-6, Fri 10-9, Closed Sunday
HIGH SIERRA MODELS
953 W. Moana **747-6964**

NEW JERSEY, BLOOMFIELD
Complete lines of R/C Airplanes & Boats
Plus all the accessories needed
Serving Northeast N.J. for over 35 yrs.
EVER READY SPORT & HOBBY
392 Broad St. **743-3951**

NEW JERSEY, JACKSON
R/C Boats & Planes, OPS, K&B, Fox, Enya &
Cox eng. replacement parts, extensive Hdwe
MRC & Futaba Radios - Open 7 days
JACKSON HOBBY SHOP
Rt 526 W. County Line Rd. **364-3334**

NEW JERSEY, MERCERVILLE
One of Central Jersey's largest plane stores
Sig, Enya - World Dealers
See us for all your Hobby needs
IRON HORSE HOBBIES
116 Flock Road **586-2282**

NEW JERSEY, RED BANK

"OUR NAME SAYS IT ALL"

HOBBY MASTERS
62 White St. **842-6020**

NEW MEXICO, ALBUQUERQUE
Trains-HO & N, Rockets, Boats, Planes,
Plastic, Miniatures. Savings on all cash sales.
Mon-Sat 10-6. Sun 12-4. Closed Tu. & Hol.
VALLEY HOBBIES
4522 4th St. N.W. **345-9688**

NEW YORK, BROOKLYN
R/C, U/C Planes, boats, cars & supplies
HO, N ga. trains, plastic model kits, AFX,
racing, rockets, etc., etc. Open 7 Days
A HOBBY HUT
2835 Nostrand Ave. (Nr. King's Hy) **338-2554**

NEW YORK, KINGSTON
Complete line of R/C planes, boats, cars.
Tanks Estes & Century Rockets & supplies.
Compl. line of build. supl. Balsa, paints, etc.
J and J's HOBBIES, INC.
785 Broadway **338-7174**

NEW YORK, MAMARONECK
Al ga. Train Sales, Serv., Repairs.
Slot Race Cars, Plane Kits, Used Collector
Trains at low prices. Parts & Service
BOB'S HOBBY & SLOT RACING SHOP
120 Mamaroneck Ave. **698-4655**

NEW YORK, NEW YORK
R/C Planes, Boats, Engines
Motors, Accessories
Everything for flying or boating
AMERICA'S HOBBY CENTER
146 W. 22nd St. **675-8922**

NEW YORK, RIDGEWOOD
Model Railroading in "N," HO, O, 9 to 6
Model Planes, Ships, Cars, Rockets
Crafts, Science Center, Tools Fri. 9-8
NAGENGAST HARDWARE
68-02 Fresh Pond Rd. **821-0958**

NEW YORK, ROCHESTER
All makes N ga. Trains & Access.
HO—Brass Imports—Dremel & X-Acto Tools
Hobbies-Crafts-Coins-Aurora HO Slot Cars
CARL'S HOBBY HOUSE
1310 N. Clinton Ave. **266-4706**

NEW YORK, ROCHESTER
Specializing in All
R/C Boats
Cars, Planes
G & G HOBBIES
1339 Dewey Ave. **254-2740**

NEW YORK, SYRACUSE
R/C Planes, Engines, Kits & Radios
Complete R/C Hobby Shop
R/C Boats & Cars & Helicopters
WALT'S HOBBY & CRAFT
4300 West Genesee **468-6544**

NORTH CAROLINA, RALEIGH
Train specialists with a large selection
N, HO, & O Scale RTR, Kits & scratch
supplies. Brass, Books & Lionel.
THE HOBBY SHOP
2020 Cameron S.-Cameron Village **833-1123**

NORTH CAROLINA, RALEIGH
Complete stock for Model Railroaders.
Kits, tools, supplies—Domestic & Imports
HO & Arnold-Rapido N ga.
NORTH HILLS HOBBY SHOP
125 N. Hills Rd. **787-6101**

NORTH CAROLINA, SALISBURY
"Piedmont NC's Largest Hobby Shop"
Controline Models — Kits and Built-up
10AM-9PM Mon-Fri. 10-6 Sat.
CHARTREUSE CABOOSE HOBBIES
Towne Mall **633-1120**

OHIO, CANTON
R/C Cars - Boats - Planes & Access.
Mon & Wed 12:00 - 9:00 Sat 9:30 - 5:00
Tues, Thur, Fri 5:30pm - 9:00pm
FALCON HOBBIES
2302 11th St. SW **452-3870**

OHIO, CLEVELAND
Large stock HO, N ga. trains. Domestic &
Foreign. Also kits, parts, supplies, scenery,
paints, wood tools, books mag.
NATIONAL HOBBY INC.
5238 Ridge Rd. **749-2450**

OHIO, COLUMBUS
Columbus' Oldest and Best Hobby Shop
R/C Equipment & Supplies, Rockets, Flying
Accessories, Balsa, Books & Magazines
HALL'S HOBBIES
3150 S. Hamilton Road **864-6464**

OHIO, MANSFIELD
Flying Models, Boats, Cars, Trains
Stained glass + Art Supplies - Repairs
We Special Order!
JOHN'S TOP FLITE HOBBY SHOP
15 N. Main St. **526-4426**

OHIO, MIDDLEBURG HEIGHTS
R/C & C/L kits, Engines, Hardware
SIG-INDY - World Engines - Pilot Kits
1/12 Electric R/C Car Headquarters
AMERICAN MODELER
7559 Pearl Road **826-3088**

OHIO, NORTH CANTON
Experienced Personnal-Specialists in Radio
Control Planes, Cars, Boats, Hobby Tools.
Huge Selection of Wood, Radios & More.
MODELERS HAVEN
4255 Portage NW **499-6000**

OKLAHOMA, BROKEN ARROW
Planes, R/C U-Control, Free-Flight, Rckts.
O, HO, N gauge trains, AFX Roadrace
Books, Tools, Craft Supplies, Corgi Toys
S&S HOBBIES AND CRAFTS
108 S. Main **251-0330**

OHIO, NORTHFIELD
Complete line of Kraft, Pro-Line, Expert,
Cox/Sanwa, Futaba-kits of all kinds Rockets,
trains, crafts. M-F: 10-8, Sat. 10-6
HOBBY HUT, INC.
105 E. Aurora (Rt. 82) **467-6116**

PENNSYLVANIA, BROOMALL
Planes, R/C, U-C, supplies, also boats,
cars, trains, slot racers, tools, rocketry.
Discounts, Trained Personnel
HOBBY FACTORY OUTLET
627 Parkway **544-0820**

PENNSYLVANIA, LANSDALE
Large Stock of R/C, U/C and F/F
Airplane Kits — Engines — Hardware
Radios — Also R/C Boats & Cars
PENN VALLEY HOBBY CENTER
837 W. Main St. **855-1268**

PENNSYLVANIA, MOORESTOWN (BATH)
R/C - Planes, Engines, Kits & Radios
R/C - Boats, Cars, Helicopters
Full line of access., radio repair–serville
SUN HOBBY CENTER
Rt. 512 Moorestown **759-4603**

PENNSYLVANIA, PARKSIDE
Cars, Planes and trains R/C
Miniatures - Fantasy and Military
Art Supplies
TOM'S ARTS-CRAFTS & HOBBIES
2901 Edgemont Ave. **876-2379**

PENNSYLVANIA, READING
R/C and C/L Model Planes and Boats
Your full service Hobby Store
Parts, Accessories, Magazines, Books
IRON HORSE HOBBY HOUSE
60 S. Sixth St. **373-6927**

PENNSYLVANIA, WARMINSTER
R/C Equipment & Supplies
Boats, Cars, Planes, Trains
Repairs on all trains & R/C Equip.
JC R/C HOBBIES
13 York Rd. **672-5200**

TENNESSEE, NASHVILLE
R/C Boats, Cars, Planes, Motors, Marine
Engines, Sport & Competition Accessories
A Full Line Hobby Center
THE TOY MART
113 Gray Lynn Dr. **883-1648**

TEXAS/HOUSTON
Complete line of R/C and U-Control
Planes, Cars, Boats,
All Your Model Needs in One Place
TRAINS & PLANES
9737 Westheimer **977-1420**

TEXAS, MONAHANS
The complete Permian Basin Model Shop.
"Magnum plus" Fuel distributor.
R/C planes-cars-hobby tools-trains.
WOODIE'S MODEL & TRAIN SHOP
117 W. Sealy **943-3652**

TEXAS, ABILENE

Radio Control our Specialty

THE HOBBY CENTER
Westgate Mall **695-0512**

TEXAS, SAN ANTONIO

Buy 'Em Where They Fly 'Em

DICK'S HOBBY SHOP
Terrell Plaza Center **512-826-7941**

TEXAS, SAN ANTONIO
Specializing in R/C airplanes with
largest selection in Southwest. Also
boats, cars & rckts—Open Mon-Sat 10-7
HOBBY CENTER INC.
3439 Fredericksburg Rd. **735-4218**

TEXAS, SAN ANTONIO
Free Flight, U-Control, and R.C. Airplanes
Visa/Mastercard Welcomed
Hours: 10 to 6pm Weekdays, 10-5 Sat.
KELLY'S HOBBY CENTER
5514 Walzem Rd. **654-8537**

VIRGINIA, ALEXANDRIA
Guillow's Goldberg, Scientific, Control
Line Models & R/C Models Plus Ships
Trains, Cars, Circus Wagons
CORNISH & SON'S HOBBY SHOP
6239 Little River Tnpke. **941-2634**

WASHINGTON, SEATTLE
HO & N Trains & Access., Plastic Model
Kits, Balsa, Plantes & Boats, Model
Rocketry. Open Thurs. evenings
CAMPUS HOBBY CENTER
4738 University Way **LA5-2222**

These and hundreds of other year round hobby dealers are fun to visit in your travels.

CANADA

QUEBEC, MONTREAL (ST. EUSTACHE)
Full Selection R/C & U Control planes,
boats & cars. Compl. stk. of suppl. HO
& Lionel Trains. All Crafts & Arts Suppl.
ALEXANDER'S
Place St. Eustache **627-2460**

The . . . flying models BACK ISSUE AD

Here is a list of currently available back issues. Single issues are $1.75 each. 10 issues are only $8.00 in the USA, $9.00 in Canada/$10.00 foreign. 25 issues are $16.00 in the USA, $17.00 in Canada/$18.00 foreign. Our Rare Bird 5 features issues in quantities too small to list and it's only $5.00 in the USA, $6.00 in Canada/$7.00 foreign.
Please include a street address on orders of 10 or more as we ship UPS. Be sure to mark alternate choices with an "A" as many issues are in short supply.

- ☐ 1968 Nov
- ☐ 1968 Dec
- ☐ 1969 Jan
- ☐ 1969 Feb
- ☐ 1969 Apr
- ☐ 1973 Sep
- ☐ 1973 Oct
- ☐ 1973 Nov
- ☐ 1973 Dec
- ☐ 1974 Sep
- ☐ 1975 Feb
- ☐ 1975 Mar
- ☐ 1975 Apr
- ☐ 1975 May
- ☐ 1975 Jun
- ☐ 1975 July
- ☐ 1975 Aug
- ☐ 1975 Sep
- ☐ 1975 Oct
- ☐ 1975 Nov
- ☐ 1975 Dec
- ☐ 1976 Feb
- ☐ 1976 Mar
- ☐ 1976 Apr
- ☐ 1976 May
- ☐ 1976 Jun
- ☐ 1976 July
- ☐ 1976 Aug
- ☐ 1976 Sep
- ☐ 1976 Oct
- ☐ 1976 Nov
- ☐ 1976 Dec
- ☐ 1977 Jan
- ☐ 1977 Apr
- ☐ 1977 May
- ☐ 1977 Jun
- ☐ 1977 July
- ☐ 1977 Aug
- ☐ 1977 Sep
- ☐ 1977 Oct
- ☐ 1977 Nov
- ☐ 1977 Dec
- ☐ 1978 Jan
- ☐ 1978 Feb
- ☐ 1978 Mar
- ☐ 1978 May
- ☐ 1978 Jun
- ☐ 1978 July
- ☐ 1978 Aug
- ☐ 1978 Sep
- ☐ 1978 Oct
- ☐ 1978 Nov
- ☐ 1978 Dec
- ☐ 1979 Jan
- ☐ 1979 Feb
- ☐ 1979 Apr
- ☐ 1979 May
- ☐ 1979 Jun
- ☐ 1979 July
- ☐ 1979 Aug
- ☐ 1979 Sep
- ☐ 1979 Oct
- ☐ 1979 Nov
- ☐ 1980 Oct
- ☐ 1981 Jun
- ☐ 1981 July
- ☐ 1981 Aug
- ☐ 1981 Oct
- ☐ 1981 Nov
- ☐ 1981 Dec
- ☐ 1982 Jan
- ☐ 1982 Feb
- ☐ 1982 Mar
- ☐ 1982 Apr
- ☐ 1982 May
- ☐ 1982 Jun
- ☐ 1982 July
- ☐ 1982 Aug
- ☐ 1982 Sep
- ☐ 1982 Oct
- ☐ 1982 Nov
- ☐ 1982 Dec
- ☐ 1983 Jan
- ☐ 1983 Feb
- ☐ 1983 Mar
- ☐ 1983 Apr
- ☐ 1983 May
- ☐ 1983 Jun
- ☐ 1983 July
- ☐ 1983 Aug
- ☐ 1983 Sep
- ☐ 1983 Oct
- ☐ 1983 Nov
- ☐ 1983 Dec
- ☐ 1984 Jan
- ☐ 1984 Feb
- ☐ 1984 Mar
- ☐ 1984 Apr

Complete Your BACK ISSUE File . . . Now!

Carstens PUBLICATIONS, INC. Dept. 4624
FM Back Issues
P.O. Box 700, Newton, NJ 07860-0700

☐ I have selected 25 issues above, with 2nd and 3rd choices shown, at $16.00.
☐ Send 25 oldest issues for $16.00 ☐ Send 25 most recent issues for $16.00.
☐ Any 10 issues for $8.00 ☐ Rare Bird 5 (5 issues, our choice) for $5.00

Enclosed find $ _____ Please send me the back issues of FLYING MODELS which I have checked above. Single copies $1.75 each.
Please type or print legibly.

Name _____

Street _____

City _____ **State** _____ **Zip** _____

Copies postpaid in USA. Please add $2.00 per 10 issues or $4.00 per 25 issues Canadian/foreign.
NOTE: If you don't want to clip this magazine, photocopy this ad or send your order in a letter.

Advertising Index for May 1984

The FROG

THIS IS THE FASTEST OFF-ROAD WE'VE EVER BUILT

SPEED

Right out of the box, the 1/10 scale Frog can outrun, out handle, and out perform many of the hottest ''souped-up'' buggies on the tracks today. To make one this good and this fast, we've created new materials, used new design techniques and re-engineered the off-track racing buggy concept. The result...not just the fastest off-road buggy kit we've made...but a leap forward in performance, durability and handling as well.

Intent on speed, we used a light-weight, highly durable Lexan (polycarbonate) body, and made our RS540 motor standard fare. We designed a chassis that would house servos, receiver and battery pack at the precise location for optimum center of gravity.

PERFORMANCE

Then we began to concentrate on control and positive handling. To do this, we equipped the Frog with new large differential gears for tighter turns, better handling. Then we invested the Frog with yet another dimension...interchangeable gear ratios...gears that can be changed on the spot, right in the pit area. This allows the savvy driver to change gears as track conditions dictate. Say you're running on a track that has many curves and very little straight-away. You can install just the right gear ratio for quick acceleration. However, as the dirt on the track becomes more churned up, it may be necessary for a quick gear change. Pull your car into the pit area, and within a few minutes you can be ready to run at optimum performance with precisely the gear ratio you need.

HANDLING

Next, we created heavy-duty, coil over, adjustable, oil-filled shocks to complement the adjustable trailing arm rear suspension. What these shocks do, is offer progressively increased resistance when the tire is forced up and less resistance when the tire drops to the road. The result is a new standard for road hugging racing traction...tighter cornering control. Unrivaled performance.

We could have stopped there...for these were the key elements of the Frog's leap forward, but MRC-Tamiya doesn't stop short of perfection... so we included four ball bearings in the transmission; glass filled nylon gears; and spiked rear tires with a small air hole for better grip and durability...excellent for dirt tracks; a new space age nylon bumper; a servo saver with direct drive which decreases front end play and increases pinpoint steering control.

The Frog...It Lets You Compete On A Higher Level

Lenght: 16.14″
Width: 9.17″
Height: 5.9″
Weight: 2.4 lbs.
Gear Ratios: 1:8.5, 1:7.3, 1:6.7
Power: 6 volt or 7.2 volt MaH Battery not included
2 Channel, 2 Servo System Required

For maximum enjoyment and safety, read the complete instructions.

MRC TAMIYA®

Model Rectifier Corporation
2500 Woodbride Avenue
Edison, New Jersey 08817

FUTABA G-SERIES

ALL THE OPTIONS...

Sport and competition flyers know our G-Series systems come equipped.

With fully-adjustable, open gimbals, mixing and a choice of dual or exponential rates, the amazing G-Series has what it takes to put the finishing touches on some very fancy flights.

Convenience also figures into the G-Series design, which includes all-channel servo reversing as well as built-in stand, NiCad battery metering and antenna storage.

Now G-Series systems have more control than ever, with the introduction of our S28 servos.

PLUS SOME NEW STANDARDS

Sheathed in fuel proof cases, with cold-molded, resin gears and a maintenance-free, sealed potentiometer, these S28's have set new standards for servo performance.

You'll also get top performance from our R7H receiver, a new, 7-channel version of our popular R6F. Proven electronics and reliability make the R7H perfect to complete the G-Series system.

5, 6 and 7-channel Futaba G-Series systems are now available with S28 servos and the R7H receiver in the new 72MHz FCC approved frequencies, including a 53 MHz (FM) RF module-equipped version.

Futaba

555 West Victoria Street/Compton, CA 90220