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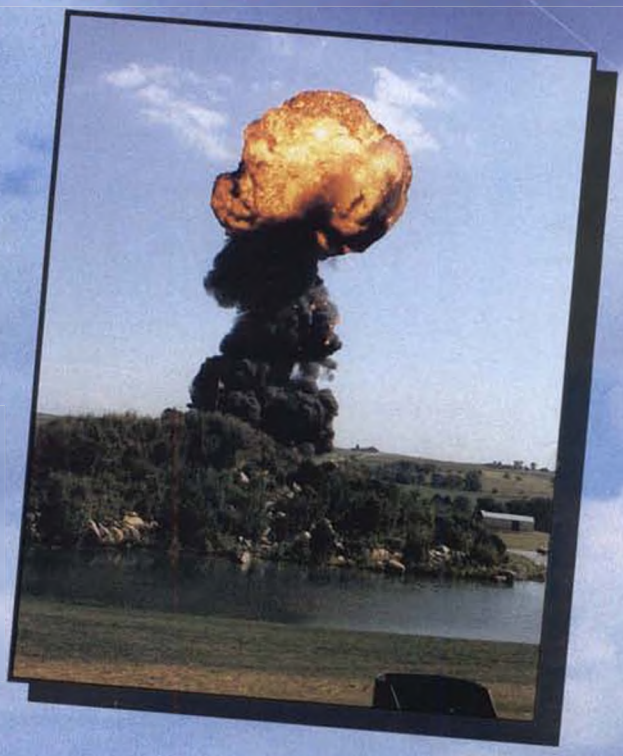

VISIT:
GREATER SOUTHWEST FLY-IN

BUILD:
DORNIER DO-28 ELECTRIC RC TWIN

REVIEW:
THE NEW RCD PLATINUM RECEIVERS

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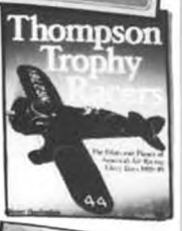

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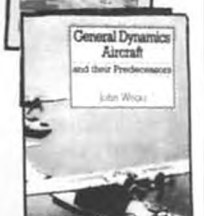

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DEPARTMENTS

FEATURES

PRODUCTS IN USE

CONSTRUCTION

ON THE COVER

Lockheed F-117A built by Dave Hudson, Grand Prairie, Texas. All balsa and ply model is covered with Dan Parson's lightweight fiberglass cloth. Wings and rudders are foam cores, balsa sheeted. Power is two Picco .80 engines, driving Viojet fans, inlet ducting and thrust tubes are fiberglass, Tom Cook F4 Phantom retracts. Length 91 inches, span 57 inches, weight 23 pounds. Uses eight-channel JR Galaxie radio with six servos and 1200 mAH pack; two 1/4 scale servos for elevons, two standard rudder servos, one throttle and one retract. Finish is epoxy resin and lacquer overcoated with clear Aerogloss for fuel-proofing.

Insert: Trademark of the annual Byron Expo is the "Atomic Bomb" explosion during the "Fighting Back" demonstration. Full story in this issue.

STAFF

EDITOR/PUBLISHER
Wm. C. Northrop, Jr.

GENERAL MANAGER
Anita Northrop

ASSISTANT GENERAL MANAGER
Dawn Johnson

MANAGING EDITOR
Richard Dowdy

ART DIRECTOR
Scott A. McPherson

TYPESETTING
Edna Clark

DRAWINGS BY
Al Novotnik

ACCOUNTING MANAGER
Robert Ruiz

OFFICE STAFF
Janice Fallon
Louis Garcia
Alexandre Nguyen
Betty Simpson
A. Valcarsel

CONTRIBUTING EDITORS

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Jake Doe	Fernando Ramos
Bill Forrey	Francis Reynolds
Bill Hannan	Stu Richmond
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Ken Johnson	Scott Stauffer
Eloy Marez	Art Steinberg
Walt Mooney	John Thompson
Mitch Poling	James Wang

ADVERTISING
Brenda Parris
Kim Nye
Stuart Williams
714/ 645-8830

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STEP 1 - BASIC: START WITH A STABLE HIGH-WING MODEL

KADET SENIOR

KADET MK II

Modelers often want to start in R/C with a good-looking scale model that flies fast. This is a common mistake and never works out! Before you can accomplish your dream of darting around the sky with a sleek P-51, you must get some "basic training". The U.S. Air Force doesn't start its pilots out in the F-16, and you should take the same approach to learning to fly R/C. First attempts at R/C flying should be with an inherently stable high-wing model that flies slow enough to give the student pilot time to think and react. The SIG KADET series of R/C basic trainers are designed expressly for that purpose. The KADET SENIOR, has a super light wing loading that allows it to fly very slow, with true "hands off" stability that enables the student to start flying without a lot of help from an instructor. The KADET MkII is a stronger, faster flying trainer that handles better in windy weather conditions. In addition, SIG has two other models (not shown here) in the KADET family of basic trainers — the KADET JUNIOR (smaller version of the MkII) and the KADET SENIORITA (smaller version of the SENIOR) — for people who want a more economical trainer with a smaller engine.

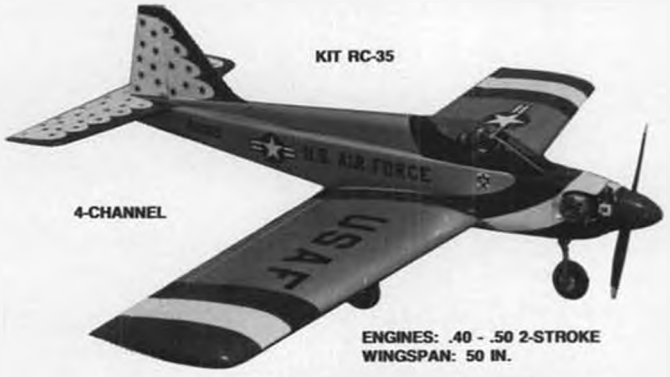
STEP 2 - INTERMEDIATE: PROGRESS TO FASTER SHOULDER-WING DESIGNS

KOMANDER

KAVALIER

When the student pilot feels secure flying the KADET and can handle it capably, he is ready to take the next step. A shoulder-wing design, like the two shown here, will still be stable enough for him to handle comfortably, yet will allow him to expand into aerobatics. The KOMANDER is the larger of our two shoulder-wing models and features a foam core wing that you plank with 1/16" sheet balsa. The slightly smaller KAVALIER has a built-up balsa wing, and can use the same size engine you had in your KADET MkII or SENIOR. Both airplanes use "washout" in their wing design to eliminate tip stall at slow speeds. This built-in stability allows the model to fly right down to the full stalling point on landing, without snap rolling or falling off on a wing. Piloting boners that would clobber other airplanes are readily forgiven, thanks to the superior handling characteristics of the KAVALIER and KOMANDER. Slowed down to a walk, nose high landings are the norm for both of these excellent intermediate trainers.

STEP 3 - ADVANCED: GRADUATE TO LOW-WING AEROBATICS



KOUGAR

ASTRO-HOG

After some flying time on basic and intermediate trainers, the student pilot will be ready to handle a fully-aerobatic low-wing stunter. The KOUGAR and ASTRO-HOG are two of the very best low-wing models to start with. Both are carefully tailored to be smooth, stable, and responsive. They will do every stunt in the book, yet are forgiving of the kind of mistakes a low-time pilot might make. The jet-style KOUGAR features a foam core wing with built-in washout in the tips for extra stability on landing. The larger ASTRO-HOG has a built-up balsa wing for a lighter wing loading and slower flight speeds than most low-wing airplanes. Once you've mastered either of these excellent low-wing trainers, the sky is the limit! You'll be qualified to fly any R/C model your heart desires without having to worry about whether or not you can handle it.

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The Hobby House
507-E 22nd St.
ARKANSAS
FT. SMITH
Duke's Model Airplanes
5305 Towson Ave.
FT. SMITH
Village RC Hobbies
7423 Highway 271 S.
PH: 501-646-3701
LITTLE ROCK
Sherrill's House of Hobbies
3408 S. University Ave.
UALR Plaza Shopping Center
PH: 501-562-8230
CALIFORNIA
BURBANK
T & A Hobby Lobby
3512 W. Victory Blvd.
PH: 818-842-5062
COVINA
Covina Hobby Center
140 N. Citrus
PH: 213-331-1910
GLENDALE
Robin's Hobby Service
1844 W. Glenoaks
HAWTHORNE
Chuck's Model Shop
13505 Hawthorne Blvd.
LAKEWOOD
Hobby Warehouse
4118 E. South Street
LANCASTER
Smith Brothers Hobby
1223 W. Ave. I.
NAPA
Carl's Hobby Shop
2532 Jefferson St.
PH: 226-2833
NAPA
Epperson's R/C Hobbies
536 Soscol Ave., Unit 1
NORTHRIDGE
Smith Brothers
8941 Reseda Blvd.
PH: 885-8626
SACRAMENTO
Graphic Hobby House
2510 Marconi Ave.
SACRAMENTO
Dawn's Radio Control Hobby
5360 "H" Street
SACRAMENTO
R/C Country Hobbies
4191 A Power Inn Rd.
PH: 916-731-5868
SAN FRANCISCO
Franciscan Hobbies
1930 Ocean Avenue
SAN LUIS OBISPO
S.L.O. Hobbies
1358 Madonna Road
SANTA MONICA
Ewell's Model Shop
1636 Ocean Park
PH: 452-2720
VALENCIA
Smith Brothers Hobby
23132 Valencia Blvd.
PH: 805-259-5995
COLORADO
ARVADA
Action Hobbies
10372 Ralston Road
AURORA
Tom Thumb Hobby Center
10718 E. Colfax
PH: 303-361-6159
COLORADO SPRINGS
Custom Hobbies
2813 E. Platte Ave.
ENGLEWOOD
BK Discount Hobby Center
2495 W. Hampden Ave.
PH: 303-789-9411 or 781-4106
GRAND JUNCTION
The Hobby Hut
811 North 12th Street

CONNECTICUT
BERLIN
Banner Hobbies
162 Mill Street
PH: 203-828-1775
BRISTOL
Bristol Hobby Center, Inc.
641 Farmington Ave
Bristol Plaza
PH: 203-583-7273
BROOKFIELD
Vinnies Hobbies
847 Federal Road
GLASTONBURY
Davis Hobbies
45 A Welles St.
Fox Run Mall
PH: 203-633-3056
MANSFIELD
Bruce Hamwond's
R/C Hobby Shop
380 Storrs Road
MILFORD
Radio Active Hobbies
374 New Haven Ave.
Farmer's Market Plaza
PH: 203-877-8200
NORWALK
Al's Hobbies
54 Chestnut Hill Road
WATERFORD
Shore Line Crafts
5 Hayes Street
DELAWARE
WILMINGTON
Brandywine
1918 Zebley Road
FLORIDA
BOYNTON BEACH
G & C Hobbies
3469-6 W. Boynton Beach Blvd.
FT. LAUDERDALE
R/C Hobbies
6800 N. University Dr.
JACKSONVILLE/ORANGE PARK
Hobby World
175 Blanding Ph: 272-6315
7273 103 St. Ph: 772-9022
9825 San Jose Ph: 268-7224
9851 Beach Blvd. Ph: 645-7171
MIAMI
Crown Hobbies
7439 Coral Way
MIAMI
Orange Blossom Hobbies
1975 N.W. 36th Street
OCALA
Rob's Baseball World
7651 S.W. State Road 200
ORLANDO
Bob's Hobby Center, Inc.
7339 Lake Underhill Road
PH: 407-277-1248
ORLANDO
Central Florida Hobbies, Inc.
5600 W. Colonial Drive #311
ORLANDO
Colonial Photo & Hobby, Inc.
634 N. Mills Street
PENSACOLA
Bobe's Hobby House
5719 North W. Street
PLANTATION
Universal Hobbies
141 South State Road 7
PH: 305-581-9390
ST. PETERSBURG
Hobby House
6360 9th St. N.
PH: 521-4148
SOUTH DAYTONA
Ace Hobbies
2127 So. Ridgewood Ave.
PH: 904-761-9780
TAMPA
Charlie's Discount Hobbies
7530 W. Waters Ave.
PH: 813-882-4007
TAMPA
Farmers Hobbies
4939 E. Broadway
PH: 813-248-3314
WEST PALM BEACH
Craft House Hobby Shop
1079 N. Military Tr.
WINTER SPRINGS
Florence Hobby Center, Inc.
420 W. State Road 434
PH: 407-327-6353
GEORGIA
ATLANTA
Briar Vista Lawn Mower
Sales & Service
1857 Lavista Rd.
PH: 633-9741
HAWAII
HONOLULU
The Hobbiest
1413 Tenth Avenue
IDAHO
TWIN FALLS
Aero-tronics Model Supply Co.
326 Locust Street
ILLINOIS
BELLVILLE
West Side Hobby
2629 West Main Street
BLOOMINGTON
Hobbyland, Inc.
616-618 N. Main St.
CHICAGO
Stenton Hobby Shop
4734 N. Milwaukee Ave.
CRYSTAL LAKE
Frank's Games, Toys & Hobby
111 - 113 North Main St.
PH: 815-459-0247
EAST MOLINE
Tony's Hobby & Key
890 - 15 Ave.
ELMHURST
Al's Hobby Shop
121 Addison
OAKLAWN
Pat's Hobbies & Crafts
5730 W. 95th
PH: 312-424-6131
OTTAWA
A. World Hobbies
311 Boyce Memorial Drive
PALESTINE
Kincaid Farm Store
302 South Main
ROCKFORD
Rockford Hobbies, Inc.
619 So. Rockford Ave.
ROUND LAKE BEACH
Fairfield Hobbies & R/C
1305 Fairfield Road
TINLEY PARK
Orland Hobbies
16952 Oak Park Ave.
PH: 312-429-9911
WAUKEGAN
Lake County Hobbies
37632 N. Sheridan Road
PH: 312-662-4544

INDIANA
FORT WAYNE
Phil's Hobby Shop
1722 Lake Ave.
PH: 219-426-5056
IOWA
CEDAR FALLS
Bob's R/C Supply
Black Hawk Village, Unit E
CEDAR RAPIDS
Tapco Engineering
1639 47th St. N.E.
PH: 319-393-4383
CLINTON
Rust's Miniatures & Hobbies
423 11th Ave. So.
COUNCIL BLUFFS
Bud's Hobbies & Crafts
133 W. Broadway
DES MOINES
Hobby Haven
7672 Hickman Road
HOLSTEIN
Chuck's Lawn & Used Cars
520 East 2nd
LeMARS
Hobby Haven
Airport Entrance Hiway 75 S.
PH: 712-546-5980
MASON CITY
D 'n B R/C SUPPLY
201 So. Vermont
SIOUX CITY
Tri-State R/C
3201 Viking Dr.
PH: 712-255-8190
WAVERLY
R/C Hobby House
916 E. Bremer Ave.
KANSAS
JUNCTION CITY
R/C Hobbies
115 W. 7th St.
PH: 238-1877
KANSAS CITY
R/C Hobbies
5829 State Ave.
LIBERAL
Miller's Bike & Hobby Shop
105 E. Seventh
NEODESHA
SAC
Route 1
SALINA
Don's Hobby Shop
410 Iliff
WICHITA
Big Frank's Hobby Center
2269 N. Amidon
Sweetbriar Shopping Center
PH: 838-3011
KENTUCKY
FLORENCE
Hobby Hangar
183 Lloyd Ave.
TAMPA
Hanseley's Hobbies
241 Second St.
LEXINGTON
Hobby Center
1025 Industry Road
LOUISIANA
BATON ROUGE
Hobby Towne
3112 College Dr., Suite A
BATON ROUGE
Hobby Towne
6996 Airline Highway
COVINGTON
Uncle Sam's
301 N. Hwy.190, Suite E8
MANDEVILLE
Mercury Hobbies, Inc.
Rt. 6 Box 734A
PH: 892-7204
METAIRIE
Hobby Hut Hobby Shop
709 David Dr.
PH: 504-733-4629
MAINE
BATH
The Hobby Shoppe
94 Front St.
FAYETTE
Tom's R/C Hardware
RFD. 1, Box 2260
JAY
Challenger Hobbies &
R/C Raceway
Old Jay Hill Road
PITTSFIELD
Hallett's R/C Planes
65 Somerset Ave.
PH: 207-487-3058
VASSALBORO
Cliff Piper R/C
RR1 - Box 470, Riva Ridge
PH: 207-873-4685
MARYLAND
BALTIMORE
Stonleigh Cycle & Hobbies, Inc.
6717 York Road
GERMANTOWN
Fox Chapel Hobbies
19709 Frederick Road
MIDDLETOWN
Larch Lane Hobbies
18 Larch Lane
PH: 301-473-4587
OAKLAND
Brodak's Hobby Shop
810 N. 3rd St.
WESTMINSTER
Bobby's Hobby Lobby
65 E. Main St.
MASSACHUSETTS
CANTON
Advanced RadioControl Hobbies
323 Turnpike St. #9
CHICOPEE
J & J Hobbies
133 Frontenac St.
PH: 592-1472
DENNISPORT
New England Hobby Shops, Inc.
691 Main St.
EAST FALMOUTH
R/C Hobbies
153 E. Falmouth
EAST LONGMEADOW
Bill's Hobby Supplies
900 N. Main Street
PH: 413-736-7711
FRAMINGHAM
Fisher R/C
17 Salmi Road
HANSON
Hanson Hobby, Inc.
630 Main St.
LEE
Barn Speed Hobbies
63 Center St.
PH: 413-243-2651
MERRIMAC
George's Hobby Shop
22 Merrimac Square
NORTHAMPTON
Big Boys Toys
123 Hawley Street
REVERE
Tony's Hobby Shop
90 Kimball Ave.

STURBRIDGE
KIN Hobbies & Toys
392 Main Street
WEBSTER
Jim's Hobbies
22-1/2 Day Street
WORCESTER
Ray's R/C Specialties
12 Sherman St.
PH: 757-5883
MICHIGAN
ADRIAN
House of Hobbies
2475 Cadmus Road
ANN ARBOR
Rider's Hobby Shop
115 W. Liberty
PH: 313-668-8950
BATTLE CREEK
J T HOBBY
825 Golden Ave.
CANTON
Rider's Hobby
42007 Ford Road
PH: 313-981-8700
CHARLOTTE
Hussey's Hobbies
222 Lansing St.
PH: 543-4400
COLDWATER
Hobby Heaven
7 So. Monroe
PH: 517-278-5894
COLEMAN
Long's Aero & Hobby Shop
5812 W. Saginaw Road
DEARBORN
Joe's Hobby Center
7845 Wyoming Ave
PH: 313-933-6587
EAST DETROIT
Joe's Hobby Center
17900 E. 10 Mile
PH: 313-733-8294
FARMINGTON
Joe's Hobby Center, Inc.
35200 Grand River Ave.
PH: 313-477-6266
GRAND RAPIDS
Rider's Hobby Shop
2655 28th St. S.E.
KALAMAZOO
Rider's Hobby
3417 So. Westnedge
PH: 616-349-2666
LANSING
Rider's Hobby Shop
1609 E. Michigan Ave.
PH: 517-485-0700
LAPEER
J & D Hobbies
288 S. Main
PH: 313-664-1414
ROCHESTER
Joe's Hobby Centers, Inc.
Campus Corners Shp. Ctr.
105 S. Livernois
SAGINAW
Aerodrome Models Ltd.
2111 Marshall Court
PH: 517-781-3000
SAGINAW
Roger's Hobby Center
5658 State
Giant Shopping Center W.
PH: 517-790-0080
SAGINAW
Tait's Hobbies & Raceway
3270 Bay Road
PH: 517-799-3900
UTICA
Henderson's Family Hobbies
2441 Auburn
WARREN
Prop Shop Hobbies
23339 Van Dyke
YPSILANTI
Rider's Hobby
4035 Carpenter Road
PH: 313-971-6116
MINNESOTA
LITTLE CANADA (St. Paul)
Hub Hobby Center
82 Minnesota Ave.
PH: 612-490-1675
MANKATO
Don's Hobby Co.
424 S. Front St.
PH: 587-1330
RICHFIELD
Hub Hobby Center
6416 Penn Ave. S.
ROBBINSDALE
Hub Hobby Center
4114 Lakeland Ave. N.
MISSISSIPPI
BRANDON
Simon & Simon Trains/Hobbies
2405 Hwy. 80 E.
OXFORD
The Model Source
110 S. 11th St.
PH: 601-234-9170
MISSOURI
DES PERES
Des Peres Hobby Shop
12019 Manchester Road
PH: 314-966-5393
GRANDVIEW
Flo-Mow Hobbies
700 Blue Ridge Ext.
PH: 816-761-6471
GREATER KANSAS CITY
Hobby Haven
Metcalf S. Shopping Center
Independence Center,
& 10901 Hickman Mills Dr.
MARYLAND HEIGHTS
Flying Models Hobby Center
2723 Creve Coeur Mill Road
RUSSELLVILLE
Adler Model & Diorama Hobby
113 Railroad Ave.
PH: 782-4682
ST. CHARLES
Mark Twain Hobby & Craft
1201 S. 5th St.
ST. LOUIS
J & J Hobbies
5511 So. Lindbergh
ST. LOUIS
Schaefer's Hobby Shop, Inc.
4206 Virginia Ave. at Meramec
PH: 314-352-3750
SUNRISE BEACH
J & S R/C
Rt. 2, Box 575
MONTANA
VICTOR
Murph's Hobbies
239 West View Drive
NEBRASKA
NORTH PLATTE
Patterson's Hobbies
103 No. Jeffers
PH: 534-1038
OMAHA
Hobby Cooperative Supply
13225 I Street
OMAHA
Hobbytown U.S.A.
711 N. 132nd St.

WEST POINT
Kruger's Variety Store
113 N. Main
NEVADA
NO. LAS VEGAS
Peterson Hobbies & Crafts
3262 B. Civic Center Drive
NEW HAMPSHIRE
LONDONDERRY
J & S Hobby Center
13 Sanborn Road
PH: 603-432-7058
NASHUA
Hobby Emporium
Royal Ridge Mall
NORTH CONWAY
C-V Machine Co.
Kearsarge St.
SALEM
Bill's Hobby Barn
326 S. Broadway
PH: 603-898-9241
NEW JERSEY
CHESTER
GB Hobbies
705 Bartley-Chester Road
MARLTON
Hi Fly Hobbies
Route 70 & Cropwell Road
Marlton Square Shp. Mall
PH: 609-983-8060
MERCERVILLE
Iron Horse Hobbies
116 Flock Road
MIDLAND PARK
The Hobby Shop
291 Godwin Ave.
POMPTON PLAINS
Hobby Hut
557 Rte 23
PH: 201-835-2077
RANDOLPH
Carl's Hobby Center
598 Rte 10
PH: 201-366-4300
RED BANK
Hobbymasters, Inc.
62 White Street
RIDGEFIELD
Ridgefield Hobby
508 Broad Ave.
RIVERDALE
Zeppelin Hobbies
92 Route 23 North
SUSSEX
Sussex County Hobbies
69 Main St.
TOMS RIVER
Ocean County R/C Service
2123 Vermont Ave.
WILLINGBORO
Willing Hobbies
Country Club Plaza
Beverly-Rancocas Road
NEW YORK
ALBANY
Competition Hobby Supplies
67 Exchange St.
BALLSTON SPA
Racing City Radio Control
2033 Doubleday Ave.
CANANDAIGUA
Toys, Trains n' Things
222 S. Main St.
CANASERAGA
RC Supply
Main Street
DEWITT
The Hobby Shop
3204 Erie Blvd. East
ELMSFORD
Andy's Hobby Shop
36 East Main St.
MINEOLA
Willis R/C Hobbies
285 Willis Ave.
NORFOLK
R/C Aero Hobbies
Box 4A Plumbrook Road
PH: 315-384-4413
ODESSA
D & B Hobbies & Crafts
205-211 E. Main St.
PH: 607-594-3447
PENFIELD
Panco Hobbies
1865 Penfield Road
PH: 716-383-1320
ROCHESTER
Dan's Crafts & Things
352 Empire Blvd.
PH: 716-654-8388
ROCHESTER
Edmond's Hobby Shop
1521 Mt. Hope Ave.
PH: 716-442-6430
SIDNEY
Sidney Cycle & Hobby Center
3 Smith Street
SYRACUSE
Walt's Hobby & Craft
2 Dwight Park Drive
PH: 315-453-2291
NORTH CAROLINA
ASHEVILLE
Carolina Art, Craft & Hobby
128 Swannanoa River Road
BURLINGTON
R/C Hobby Workshop/Raceway
1358 S. Church
PH: 919-228-6809
GOLDSBORO
Hollingsworth R/C Shop
Rte 14, Box 93
PH: 919-735-5098
HENDERSONVILLE
The Hobby House
1211 Asheville Highway
PH: 692-6683
HIGH POINT
Bernie's Craft & Hobbies, Inc.
2291 English Road
KING
King R/C
Five Forks Village
Shopping Center
PH: 919-983-3969
MAIDEN
Country Hobbies
Route 2, Box 291
PH: 704-428-3101
WINSTON-SALEM
The Hobby Corner
464 Knollwood Street
PH: 919-768-2345
NORTH DAKOTA
FARGO
Valley Hobby & Raceway
1543 So. 1st Ave. So.
PH: 701-235-1272
OHIO
AKRON
Miller's Hobby Shop
1018 Kenmore Blvd.
PH: 216-848-2264
BALTIMORE
Frank's Service
145 Baltimore-Somerset Rd. NW

CINCINNATI
Carl's Hobbies
1188 W. Kemper Road
PH: 513-742-5880
CINCINNATI
Right Choice Hobbies
7760 Harrison Ave.
PH: 513-353-3343
CLEVELAND/PARMA
National Hobby, Inc.
523 Ridge Rd.
PH: 216-749-2450
FINDLAY
Jinx Model Supplies
721 Rockwell Ave.
FINDLAY
Pussy Cat Company
515 Crystal Ave.
GREENVILLE
Weaver's
Wayne St. & Meeker Ave.
PH: 513-548-1035
LAKEWOOD
Wings Hobby Shop, Inc.
17112 Detroit Ave.
PH: 221-5383
LANCASTER
Slater's Inc.
Plaza Shopping Center
1141 N. Memorial Drive
MANSFIELD
John's Hobby Shop
15 N. Main
MAPLE HEIGHTS
Southeast Hobby
5150 Warrensville Ctr. Road
MARION
Lew's Whistle Stop & Hobby
532 W. Center St. Ph:389-3464
MIDDLEBURG HEIGHTS
American Modeler
7509 Pearl Road
MILFORD
House of Hobbies
204 Main St.
PH: 513-248-9200
NORTH CANTON
Aero Tech Hobbies
902 N. Main
NORTH CANTON
Modeler's Haven
4255 Heritage N.W.
PH: 216-499-6000
STRONGSVILLE
Hinch's Train & Hobby
10917 Prospect Road
TOLEDO
The Hobby Stop - West
4558 Monroe Street
UPPER SANDUSKY
Jim & Ken's Hobby Shop
14635 CH 53 RFD
PH: 419-294-1712
WAPAKONETA
Dad's Toy Shop
123 W. Auglaize St.
PH: 419-738-2007
YOUNGSTOWN
Boardman Hobby Center
6820 Market Street
OKLAHOMA
OKLAHOMA CITY
Campbell's Hobby House
3500 N. MacArthur
PRAGUE
DJ's Hobby Stuff
807 Broadway
TULSA
Wings 'N Things
5241 So. Peoria
PH: 918-745-0034
OREGON
CANBY
Northwest Hobbies
485 S.E. 1st Ave.
CORVALLIS
Trumps Hobbies
2401 N.W. Kings
Timberhill Shopping Center
PH: 503-753-7540
EUGENE
Eugene Toy & Hobby
30 East 11th Ave.
ONTARIO
Horizon Hobbies
61 N.E. 1st Ave.
OREGON CITY
Quality Farm Toys
712 Main St.
PH: 650-8023
PORTLAND
Norm's Hobbies Unlimited
4503 N. Interstate Ave.
SALEM
Leisure Hobbies
3109 River Rd. N.
PENNSYLVANIA
BATH
Dick Wetzel's Hobbies
514 E. Main
PH: 215-837-6681
BROCKWAY
Geno's Custom Arts & Crafts
525 Main St.
PH: 814-265-5395
CARMICHAELS
Brodak's Hobbies
558 Route 88
CRANBERRY TOWNSHIP
Cranberry Hobby Depot
Cranberry Gardens Plaza
20327 Perry Highway
ELMHURST
The Hobby Hut
Route 435
ERIE
Maxwell's Hobby Shop
5014 Station Road
PH: 814-899-1821
GETTYSBURG
Gilbert's Hobby Shop
230 Steinwehr Ave.
PH: 717-334-5715
HUMMELSTOWN
The Hidden Hangar
145 S. Hoernerstown Road
LANSDALE
Penn Valley Hobby Center
837 West Main St.
MARS
Wildwood Hobbies
178 Mars Valencia Road
MONONGAHELA
Rod's Model Plane Supplies
147 Taylor Run Road
MUNCY
Tony's R-C Hobbies
RD2, Box 273
N. HUNTINGDON
High Tek Hobbies
13280 Rte 30, Ladonna Village
QUAKERTOWN
J & D Whistle Stop
Quakertown Plaza S.C.
READING
Iron Horse Hobby House
60 South 6th St.

READING
Ott's Hobbies
526 N. 10th St.
SUNBURY
Rachau's Wings & Things
136 S. Street
TAMAQUA
Prop & Wheels Hobbies
139 W. Broad St.
WARMINSTER
J.C. R/C Hobbies
13 York Road
PH: 215-672-5200
WILLIAMSPORT
Growing Tree Toys & Hobbies
115 West Third Street
YORK
Mel's Hobbies
935 East Market St.
YORK
Shelly Sporting Goods
2227 W. Market St.
RHODE ISLAND
WARWICK
Ray's Hobby
205 Hallene Rd.
PH: 401-738-4906
SOUTH CAROLINA
GREENVILLE
The Great Escape
1426 Laurens Road
MT. PLEASANT
Randy's Hobby Shop
515 Coleman Blvd.
PH: 803-884-7411
MYRTLE BEACH
Ed's Hobby Shop
702 Main St.
PH: 448-8685
PELZER
Hilley's Hobbies
Highway 247
ROCK HILL
Rock Hill Hobbies
1204 Mt. Gallant Road
SIMPSONVILLE
Golden Strip Hobbies
5501 Fairview Road #111
YORK
Bethany Hobbies
2395 S. Hwy161
PH: 803-222-2756
SOUTH DAKOTA
ABERDEEN
Klein's
406 S. Wilson
RAPID CITY
RCA Hobbies
Route 6, Box 1270
PH: 605-787-6658
WATERTOWN
Hollon's Hobbies
Route 2 Box 14
TENNESSEE
COVINGTON
M-H Supply
114 Star Shopping Center
KNOXVILLE
M & N Hobbies
1923 Brandville Rd.
PH:615-525-7532
KNOXVILLE
Tennessee Model Hobbies
8909 Oak Ridge Hwy.
PH: 615-482-2900
OAK RIDGE
Ridge Handicrafts, Inc.
205 Jackson Sq.
TEXAS
AUSTIN
Command Hobbies
6929 Airport Blvd., Sta. 146
AUSTIN
Hobby Town U.S.A.
Brodie Oaks Shopping Center
4107 Capital of Texas Highway
BELLAIRE
I and I Hobby Center
6707 Chimney Rock
EL PASO
Hal's Hobby Warehouse
1440 Discoverer
PH: 915-591-2213
FARMERS BRANCH
Bold Hobbies, Inc.
101 Valwood Village Shp. Ctr.
PH: 214-241-9492
HOUSTON
R/C Hangar
17550 W. Little York
HURST
Roy's Hobby Shop
1309 N. Norwood
JASPER
Jaspar Hobbies
210 N. Austin
LONGVIEW
Leslie's Hobby Shop
2726 Gilmer Road
McALLEN
B & B Hobbies
521 So. Main St.
ODESSA
Odessa TV Video Clinic
805 N. Jefferson
PH: 915-332-2831
ODESSA
The Wholesale Hobby Center
Crestwood Shopping Center
3619 N. Dixie
PH: 915-363-0300
PORT LAVACA
The Plane Shop
1808 Jackson St.
POTTSBORO
Airplane & Boats Galore
219 Franklin Street
SAN ANTONIO
Clayton Hobbies
5707 E. Mcdowell
SULPHUR SPRINGS
Hudson's R/C
508 Merrill Drive
VERMONT
NO. FERRISBURG
Yandow's House of R/C
Route No. 7
VIRGINIA
RICHMOND
The Hobby Center
The Shops at Willow Lawn
STERLING
Doug's Hobby Shop
Parc City Centre - Route 7
WASHINGTON
BELLEVUE
R/C Model Shop
14010 N.E. 21st St.
PH: 206-747-9914
BELLINGHAM
Hobby Hive
703 W. Holly
PH: 206-734-4090
BURLINGTON
Performance R/C
328 E. Fairhaven Ave.
PH: 206-755-9464
ISSAQUAH
Abernathy's Northwest Hobbies
1175 Gilman Blvd. Ste. 1913

PUYALLUP
All Hobbies
1430 E. Main Suite D
SEQUIM
Fred's Hobbies and Guns
349a W. Washington
SPOKANE
R/C Hobbies of Spokane
W. 1104 Wellesley
TACOMA
All Hobbies
Narrows Plaza
2310 Mildred W
YAKIMA
Model Aircraft Supply Center
505 N. 20th
PH: 509-453-8238
WEST VIRGINIA
CHARLESTON
Fountain Hobby Center
200 W. Washington St.
WISCONSIN
APPLETON
Galaxy Science & Hobby Center
756 Northland Mall
FOND DU LAC
Focus
75 S. Main St.
GREEN BAY
Modelcrafters Division of
Woodcrafters Wood & Tool
1607 7th St.
PH: 414-496-0208
HOLMEN
SUN-WIN
W7563 St. Croix Ave.
MADISON
Hobby Craft of Madison, Inc.
6632 Odana Road
WALDO
Kwik-Bug Hobbies
104 S. Mill
WAUKESHA
ABC R/C, Inc.
144118 East Main St.
PH: 414-542-1245
WAUSAU
Pupe's Hobby Land
640 South 3rd Ave.
PH: 715-842-4371
CANADA
BAWLF, ALBERTA
Alberta's Littlest Airport
Box 6 PH: 403-373-3953
CALGARY, ALBERTA
P.M.S. Hobby Craft
Unit 100 1935 32nd Ave. N.E.
PH: 403-291-2733
MILLET, ALBERTA
Sunset Radio Control
P.O. Box 716
DUNCAN, B.C.
Rite Bros. R/C Supply & Access.
1059 B Canada Ave.
VICTORIA, B.C.
Royal Oak Hobbies
Royal Oak Centre
BRANDON, MANITOBA
R/C Hobbies
48 Confederation
WINNIPEG, MANITOBA
Cellar Dweller Hobby, Ltd.
1354 Main St.
PH: 204-589-2037
BURLINGTON, ONTARIO
Skycraft Hobbies Inc.
141 Plains Rd. W.
PH: 416-529-0559
800-263-9331
COURTRIGHT, ONTARIO
Plane Crazy
428 #60 Highway, RR1
PH: 867-3102
HAMILTON, ONTARIO
Booth's Hobbies & Crafts
596 Concession St.
KITCHENER, ONTARIO
Flite Craft Model Co.
1595 Victoria St. N.
LONDON, ONTARIO
Flite Craft Model Co., Inc.
1700 Dundas St. E.
MILTON, ONTARIO
R/C Ready Models
175 Mary St.
PH: 416-875-1554
SCARBOROUGH, ONTARIO
National Hobby, Inc.
1875 Lawrence Ave. E.
PH: 416-755-1766
WILLOWDALE, ONTARIO
Keith's Hobby Shop
5205 Yonge St.
PH: 222-4721
CHARLOTTETOWN, P.E.I.
Jim's R/C Supply
132 Nassau St.
PH: 902-368-1655
FLEURE-MONT, QUEBEC
Spar-Hobby
1085 12th Ave. Nord
LAVAL, QUEBEC
Carl's Hobby Shop, Ltd.
1500 Cure Labelle Blvd.,
Chomedey
ST. GEORGES, BEAUCE, QUE.
Place Bureau, Inc.
12515 1st Avenue
ST. MARTIN BEAUCE, QUE.
Pasco-Temp 107
107-1 Ave. CP97
VILLE ST. LAURENT, QUE.
Hobbyville
902 Decarie
PH: 514-744-8280
REGINA, SASKATCHAWAN
Aero Specialties
200 Diamond Road
SASKATOON, SASKATCH.
RC Hobby World
108 - 2301 Ave. C. North
Hanscamp Centre
PH: 306-652-4775
AUSTRALIA
KIRRAWEE 2232, N.S.W.
The Hobby Headquarters
Unit 14/10 Yalgar Road
PH: (02) 545-1944
ENGLAND
NORFOLK, NR17 1DG
Pegasus Models, Ltd.
Caston, Attleborough
HOLLAND (The Netherlands)
DEN BOSCH 073-140104
P. Toonen Modelbouwshop
Moderfonderstraat 32
NEW ZEALAND
HASTINGS, 4200
Hastings Model Supplies
520 Frederick St.
NORWAY
PORSGRUNN
B.S. Hobby Import
Lyngv. 3c
SWEDEN
S-871 02 HARNOSAND
Modell Produkter AB
Box 2060
141 73 HUDDINGE
Magasin Ostsjo Hobby Produkter
Lovdalsvagen 45

DEALERS: Write For Details On How Your Name Can Appear In This Column

BY BILL NORTHROP

BILL NORTHROP'S WORKBENCH

Commercial radio control was in its infancy 40 years ago. We say "commercial," because for many years prior, there were a few scattered aircraft modelers and ham radio experimenters who teamed up in an effort to fly a model aircraft that could be controlled from the ground with a radio communication system. In those years, the mid to late 1930's, there was no such thing as legal, examination-free, radio operation of any kind. Licensed amateur radio operators, or "hams," using their own knowledge and skills, purchased standard radio parts available for ground transmitting and receiving, to build experimental equipment to transmit signals (rather than voice communication) that could be converted into mechanical motion at the receiving end. Obviously, nothing was manufactured with any concern for saving weight, so those early devices were heavy and bulky, requiring equally heavy and bulky dry batteries to operate them. The modeler half of the team had to design and build big and light aircraft in order to have any hopes of carrying the heavy load into the air.

At the 1990 Selinsgrove, Pennsylvania, Labor Day Weekend Gettogether Reunion: (l to r) Ed Kazmirski, former R/C Aerobatics World Champion, and designer of the Orion and Taurus pattern aircraft; Dr. Walt Good, R/C pioneer and four-time winner of the R/C Nationals, holding Ed's famous original world champion Taurus; Bill Northrop, Editor/Publisher of *Model Builder* magazine; and Don Lowe, President of the Academy of Model Aeronautics.

In the early 1950's, the Citizens Band was created by the FCC, which allowed examination-free, unlicensed radio operation on 27.255 mHz. Actually, a monster was created . . . While the new ruling permitted manufacturers to develop and build special equipment and parts for radio control operation, it also allowed mass production and sales to the general public of CB voice communication systems and "walkie-talkies" on the same frequency, creating a

Retired AMA Executive Director, John Worth, with his electric powered deBolt Champion, at Selinsgrove. No, that's not a wad of chewin' terbacky, he's just blowing another sigh of relief, away from the grindstone!

Carl Schmaedig preps his rudder-only escapement controlled Royal Rudder Bug.

massive blanket of confused radio signals, which made both voice communication and safe radio control operation almost totally impossible. That's a whole story in itself which we won't deal with at this time.

Anyway, the establishment of the Citizens Band signalled the beginning of commercial radio control as we finally know it today. In spite of the problems caused by the "Garbage Band," as the Citizens Band became known, modelers in many areas of the country gathered together at remote flying sites to experiment with this new way of flying model aircraft. At the time, there were only a handful of model aircraft kits designed for radio control, only a few bulky, ground-based transmitters, and not many more receivers that could convert a single signal into operation of a relay which, in turn, tripped an escapement that mechanically operated the rudder of a model. The radios used gas or vacuum tubes, large quantities of dry batteries, and worked just often enough to keep a persistent modeler hooked on the idea.

It was in this atmosphere that the first Labor Day Weekend Radio Control Gettogether was established in the small, remote, suburban community of Selinsgrove, Pennsylvania, about 30 miles north of the state capitol city of Harrisburg. It started with a few interested modelers from the New England and Eastern Seaboard states, as well as Canada, who came to Selinsgrove to exchange ideas and compare their experiments with others, and of course, to prove the pudding with flying demonstrations. As the annual gathering grew in size, it eventually moved to the Indiantown Gap Military Reservation just a few miles east of Harrisburg, and modelers from all parts of the country, including the west coast, came to this annual gettogether to talk, listen, watch, and demonstrate radio control model flying.

The Labor Day Weekend Gettogether witnessed and participated in radio control development from the earliest crude experimental stages, up through the exotic, all-in-one, taken-for-granted, digital proportional systems of the modern age. It was disbanded in the mid-sixties for several reasons. First and foremost, radio control had come of age, and the original purpose of the gettogether was no longer in need. Also, by then, the R/C hobby had grown tremendously, and there were many new events, contests, etc., that competed for the use of that last-fling long weekend at the close of the summer season. And finally, as if anticipating the end of an era, the military reservation for some reason found it necessary to close the base to civilian use.

A sort of alumni reunion of early Selinsgrove and Indiantown Gap attendees had been talked about for several recent years. In fact, we suggested it in this column at one time several years ago. Our own participation began in 1956, the last year it was held in Selinsgrove, then continued at the Gap until it was ended.

The reunion, which took place at the

continued on page 101

ADVICE FOR THE PROPWORN—
BY JAKE

THE STEALTH & MR. MITTENS

Dear Jake:

Since I want to be a "world-beater" glider flier like the Europeans, I wanted to try launching a glider with a vigorous "ping" as the British call it. I took up a Wanderer on our club winch, nosed the plane over, and stepped on the winch pedal for maximum rpms. When I pulled back on the stick at release, I heard a loud "snap," but I did not hear a "ping." What did I do wrong?

Vern in Virginia

Dear Vern:

I take it the "snap" you heard was your left and right wing halves parting company.

I think you've got your British terminology mixed between two sports. The only "ping" I know of comes from golf, which as you are well aware, has its origins in the British Isles. "Ping" is the sound made by tuning fork type putters when they strike the ball. In fact, an entire golf equipment company now bears that name.

Perhaps the sound you are looking for that is associated with a high energy winch launch is "twang." Or is that an orange breakfast drink?

Jake

• • •

Dear Jake:

In your opinion, which is more important, incidence or decollage?

Rick in Vero Beach

Dear Rick:

Neither. In my opinion, cleavage is more important.

Jake

• • •

Dear Jake:

Hi, it's me, Tommy Smith. I haven't written lately because Mommy's writing paper was all stuck together for some unknown reason.

My friend Rodney and me were playing squirt the cat with Mr. Mittens and my Dad's garden hose. But Mr. Mittens didn't like it much. He bit a hole in the hose and then he bit a hole in Rodney.

We patched Rodney with a band-aid, but a band-aid on the hose leaked. We decided we needed a piece of rubber for a good patch, so we super-glued a balloon over the hole in the hose.

Later that day when I went outside, Dad was watering the garden. I don't think he saw it, but about six feet down the hose from him was a giant water balloon. Mr. Mittens saw it though, and took a swipe at it with his claws.

Mr. Mittens landed on the roof and Dad's shorts landed in the back of Mrs. Dudley's convertible. The tidal wave washed away the pepper plants and the flying tomatoes dented our aluminum siding.

Without knowing exactly what happened, my Dad assumed it was my fault and grounded me. I think it was Mr. Mittens' fault. What do you think?

Your Friend, Tommy Smith

Dear Tommy:

I think I'm glad I don't live in your neighborhood.

Jake

• • •

Dear Jake:

Have you ever wondered why someone would pull up when making a high-speed, low, inverted pass? The USAF has the answer: *Habit Pattern Interference*—reverting to previously learned response modes which are objectively inappropriate to the task at hand. Habit Pattern Interference usually occurs at the preconscious level of awareness during periods of high stress. Often followed by, "Why'd I do that?"

John from Brunswick, GA

Dear John:

Habit Pattern Interference, eh? My father had a name for that when I was learning how to fly. I wouldn't be surprised if he didn't have it figured out long before the Air Force did. He called it a "Bonehead Play."

Jake

• • •

Dear Jake:

Could you please tell me who to contact in order to sue the Air Force for damages due to their operating the Stealth Bomber over my house?

I live in Rosamond, California, which is directly under the flight path between the Northrop facility in Palmdale and the Air Force Test Center at Edwards Air Force base.

Last weekend, as I was minding my own business in my backyard, a sudden hot wind came up and blew over my almost new

continued on page 68

OVER THE COUNTER

Fox Mfg. Co., 5305 Towson Ave., Ft. Smith, Arkansas 72901, phone (501) 646-1656, is now delivering the new Fox Bushing 40 RC engine. This engine, modestly priced at $89.95 list, features a main bearing of continuous cast SAE 660 bronze. This high copper bronze outperforms cheaper alloys, and far outperforms powdered metal. Obviously, non-bushed engines rate far below all of these. The Fox Bushing 40 RC is rated above all other bushed engines, and it will outrun a lot of premium priced ball bearing 40's on a 10 - 6 prop.

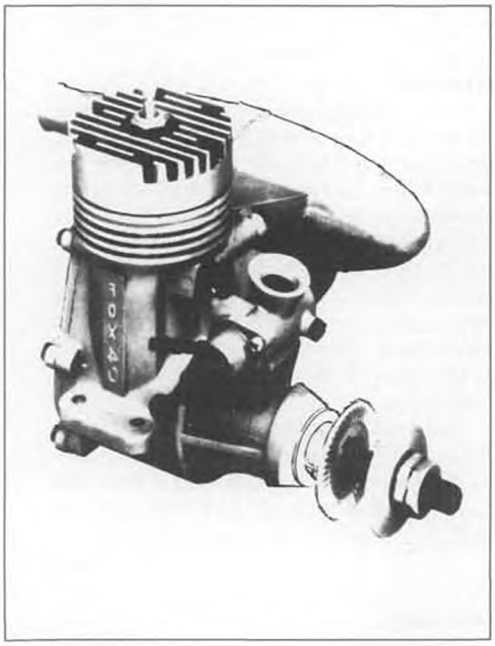
Fox engines are widely distributed throughout the U.S. If not available at your local hobby shop, contact Fox Mfg. about the source nearest to your location . . . and tell 'em *Model Builder* sent you!

• • •

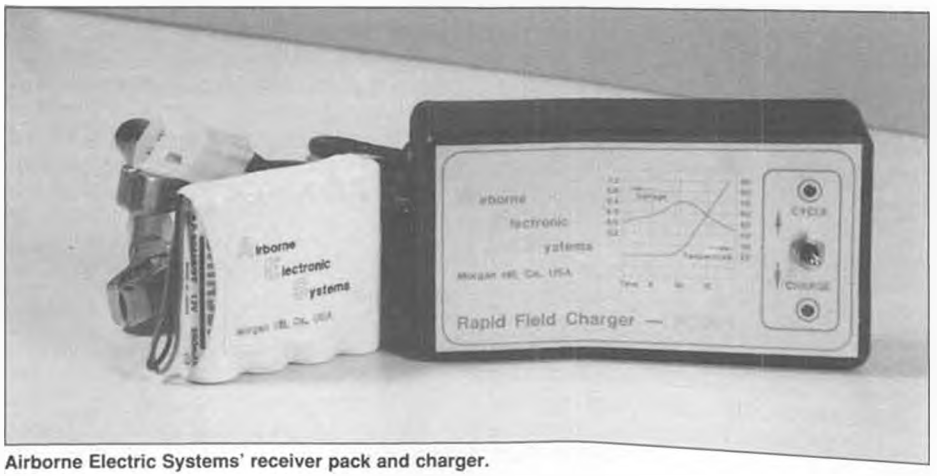
Kyosho/Great Planes Distributors, 1608 Interstate Dr., Champaign, IL 61820, phone (217) 398-6300, announces the EP Concept, electric powered RC helicopter, with a list price of $399.95. This compact heli has a main rotor diameter of just over 35 inches, and weighs 42 ounces (with or without a full charge!).

The Kyosho/Great Planes EP Concept electric helicopter.

The EP Concept features a strong, lightweight chassis, Bell-Hiller mixing system, metal pivot balls on swash plate, and autorotation capabilities. This heli is an excellent choice for experienced fliers looking for

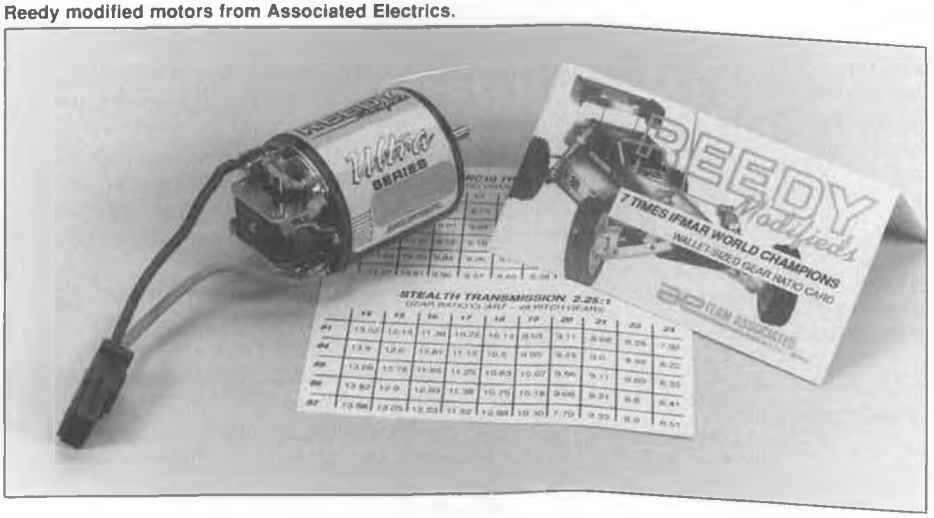


The Fox Bushing 40 RC engine.



Airborne Electric Systems' receiver pack and charger.

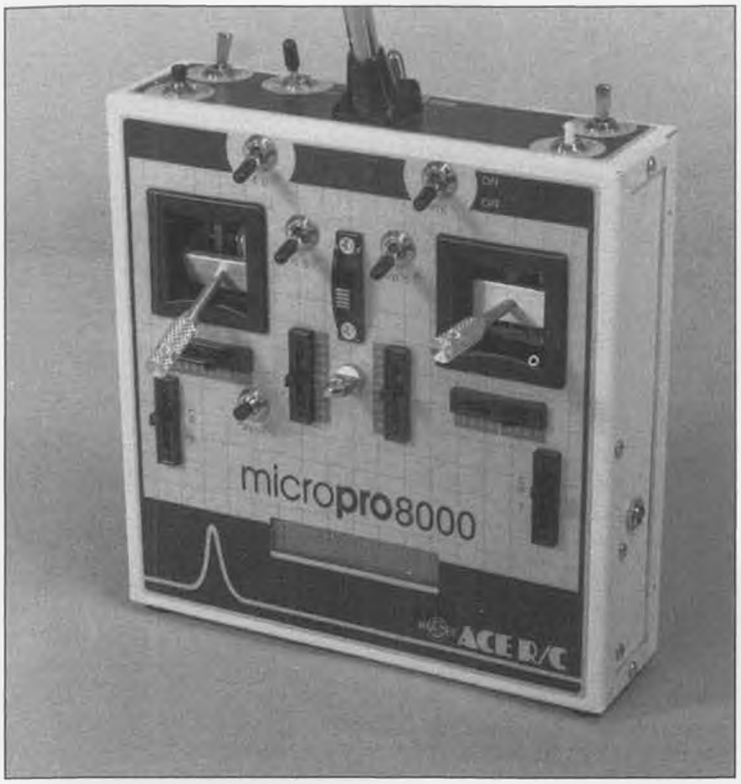
Reedy modified motors from Associated Electrics.



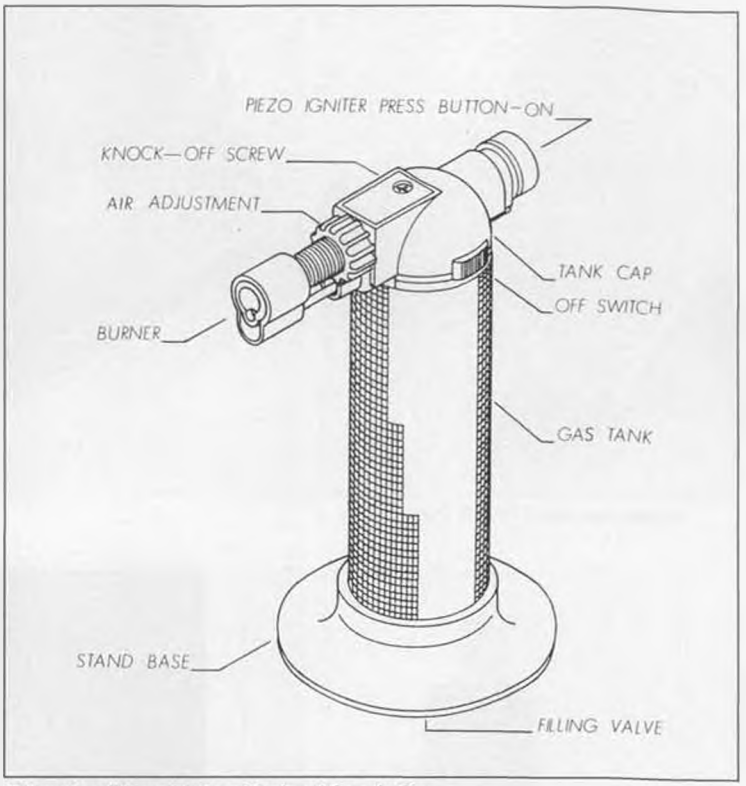
All material published in *OVER THE COUNTER* is quoted or paraphrased from press releases, furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by *MODEL BUILDER* does not constitute an endorsement of that product,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

The Byron Originals Sukhoi SU-26M.

The improved Byron P-51.



The Micropro8000 transmitter by Ace R/C.



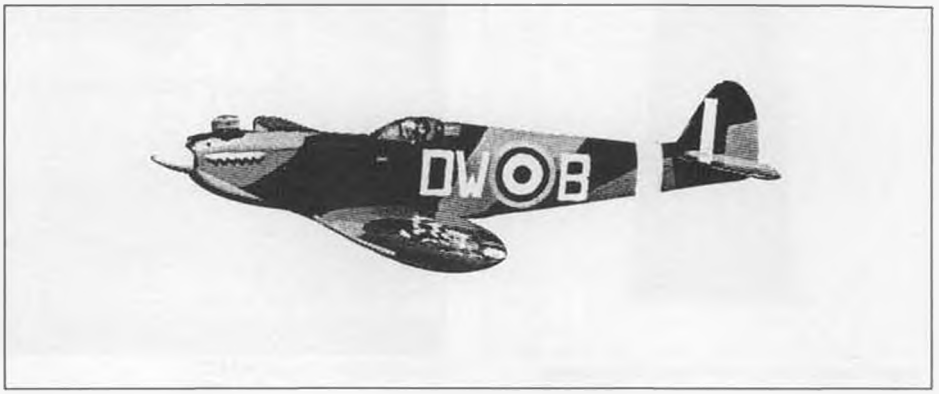
Butane torch from Eastern Tool and Supply Co.

high performance along with the ease, clean, and quiet operation of electric power.

• • •

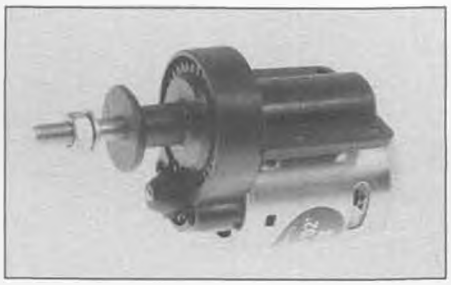
Airborne Electronic Systems, 16055 Caputo Dr., D, Morgan Hill, CA 95037, phone (408) 779-4832, offers a combination package for electric powering of your airborne radio system; a rapid charge battery pack and a rapid field charger for their pack as well as other packs that are designed to handle rapid charging only.

The BP-1 Rapid Charge Battery Pack is a 500 mAh, four-cell receiver pack with a standard charge rate of 500 mA for 75 minutes or a rapid charge rate of three amps, which results in a full charge from discharged state in under 15 minutes. The pack may also be charged at an overnight rate of 50 mA with no loss of capacity.

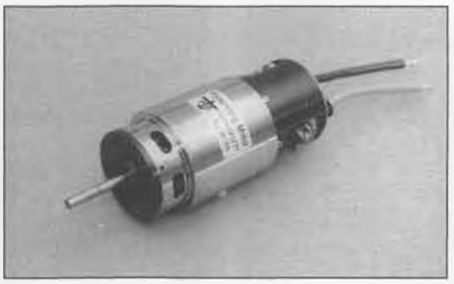


The Fun Scale Spitfire.

The Airborne Electronic Systems FC1R-1 Rapid Field Charger was especially designed for the company's expanding line of rapid charge receiver packs, though it can also be used with other brand packs, provided they are of the rapid charge type. Operating from a standard 12-volt flight box or car battery, the FC1R-1 can function in two ways: One, it will automatically "condition" an airborne pack by discharging it to a safe voltage, then rapid charge the pack to full capacity, at which point the unit's peak detection circuitry automatically switches to the trickle

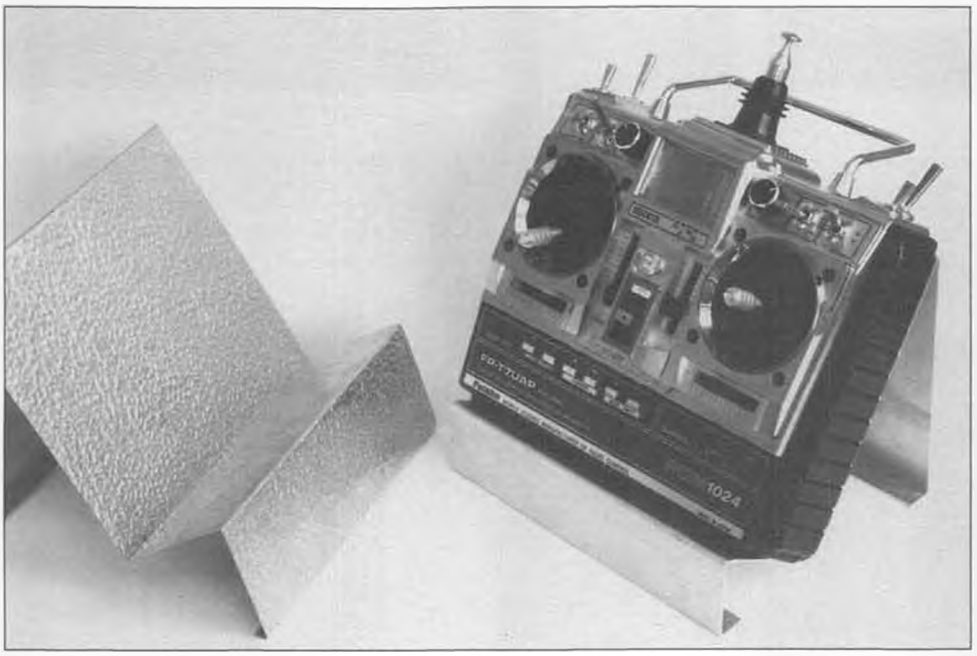


Mini Olympus Electric Drive from Hobby Lobby.



Plettenburg Hectoplett electric motor from

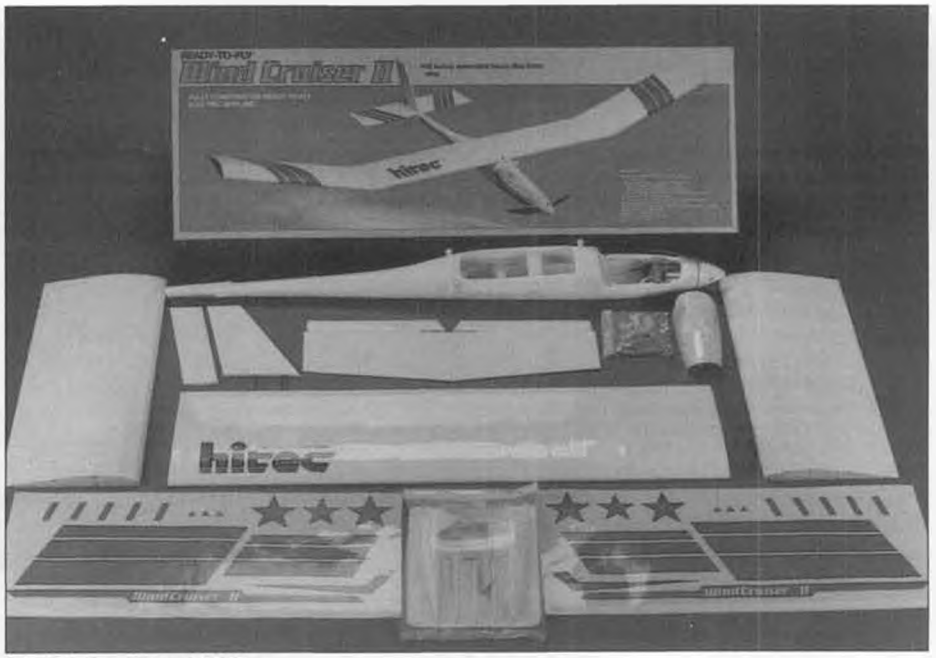
Bauer Mig 15 Elektro Jet, from Hobby Lobby.



Transmitter Stand by IKN Corp.

HITEC heli radio system.

Zap-A-Dap-A-Goo, from Pacer Technology.



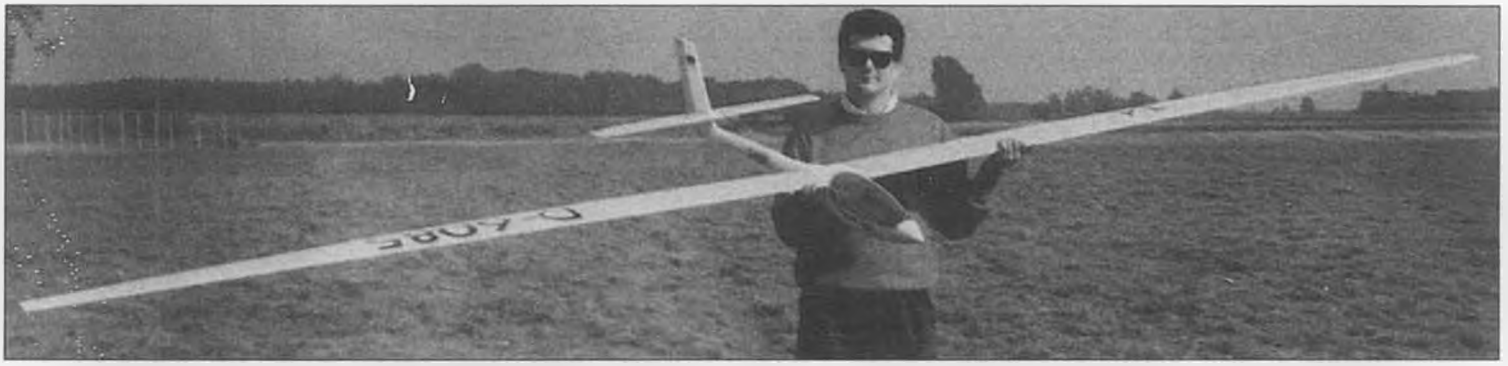
Wind Cruiser II from HITEC.

charge mode. Complete battery conditioning usually is achieved in 30 minutes. Two, it will perform rapid "top up" charging of an onboard receiver pack between flights. In this mode, the receiver pack is automatically returned to a full charge state during normal ground refueling and/or waiting for frequency pin between flights. This charge usually takes less than ten minutes after a 30-minute flight.

For further information on these units, contact the company, and tell them you read about it in *Model Builder*.

• • •

Reedy Modifieds has released a new series of modified electric motors primarily designed for RC cars. Designated the **Mr.** series, these motors all contain the new Ultra Torque Magnet, and are available in different winds for different circumstances. There are seven motors to chose from in the



Simprop SB-10 4.4 Meter Sailplane from Hobby Lobby.

E-Mergen-Z kit from Pacer.

CA Kicker for Plastics, by Pacer.

Quarter-inch Mighty Lite plywood.

series, all listing at $80 each. For further information, contact Associated Electrics, Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626, phone (714) 850-9342.

• • •

Something new and something improved is now coming from Byron Originals Inc., P.O. Box 279, Ida Grove, Iowa 51445, phone (712) 364-3165. The "new" is a kit for a quarter-scale Sukhoi SU-26M, currently the hottest precision aerobatic aircraft in the world, produced in Russia, and now being imported into the U.S.A. The "improved" is the Byron P-51, the first of a long line of WW II warbird models, that has now been updated with many of the features developed for the other Byron warbird kits that came along after the P-51 was introduced almost ten years ago.

Like all of the Byron kits, the Sukhoi is a fiberglass fuselage/foam wing kit, with plug-in wings for ease of transport and assembly. Wing-mounted aileron servos along with full-span ailerons produce a roll rate commensurate with the full-scale aircraft, and the long tail moment allows smooth transition from one maneuver to another. Span is 82 inches, length 72 inches, wing area 1340 sq. in., and flying weight is 19 to 20 pounds. Recommended power includes the Saito and O.S. twin four-cycle 240, 270, and 300 engines, the Quadra 50S (PurrrPow'r optional), the A&M 3.7 and 4.2, and the Zenoa G62.

The improved P-51 now includes the convenient plug-in wing feature of the other Byron warbirds, along with the unitized fuselage and improved mounting platform for the retractable main gear. Access to radio gear is also improved. The same 24-inch, four-bladed prop reduction system now incorporates the newer, more powerful Quadra 42 engine, and the Q-50 PurrrPow'r system is gaining popularity, particularly with modelers looking for more aerobatic performance and considerably less noise. In case it's new to you, the Byron P-51 spans 85 inches, length is 76 inches, wing area is 1300 sq. in., and flying weight is 22-1/2 pounds.

• • •

Micropro8000 is the one-piece name-tag on the latest transmitter to come out of Higginsville, Missouri, and unless you're pretty new to the hobby of building (What? . . . Building?) and flying radio controlled

continued on page 68

THE TLAR 20
THE EASIEST-TO-BUILD
SLOPE GLIDER

BY JIM BREESE

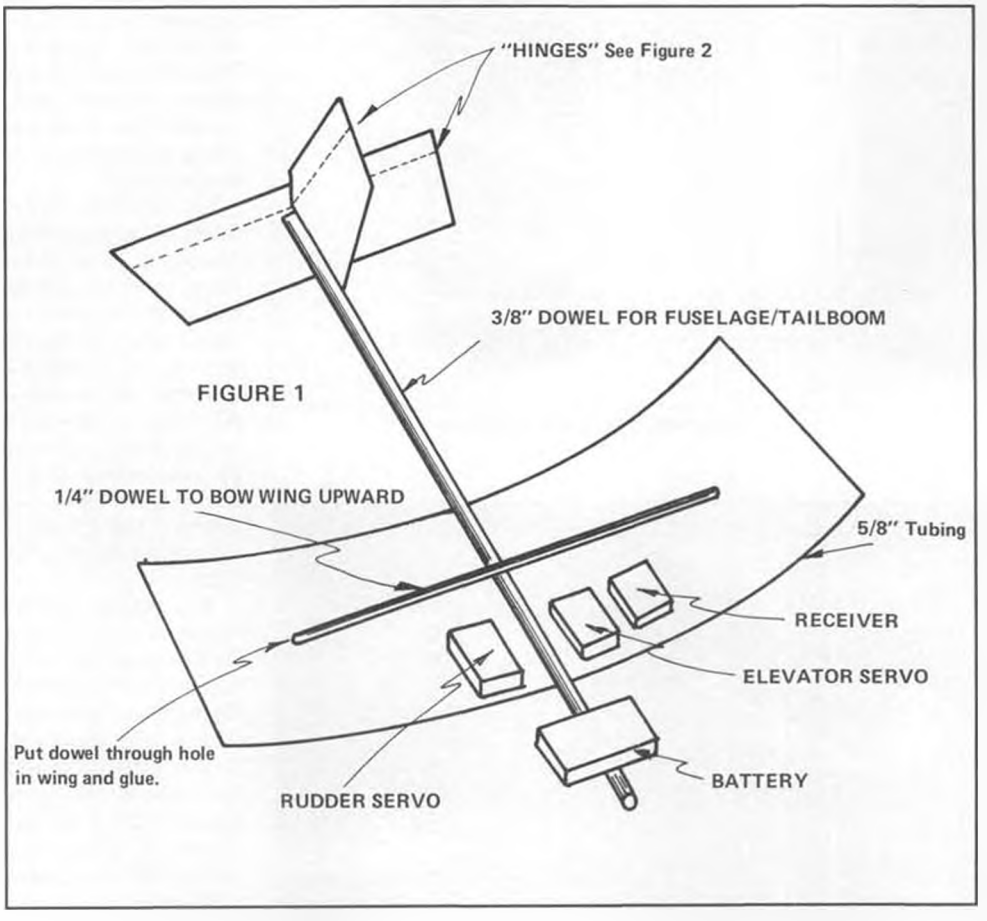


FIGURE 1

The timing was perfect. I had just finished the long, painstaking construction of a flying wing and I was ready for some relaxation, when my daughter came to me to request help with a school project. She had purchased some thin, paper-covered foam-core board for an art project, and she wanted some help in cutting out a few shapes.

We cut out the shapes that she needed for her project, and had plenty of the foam-core board left over. I was intrigued by the material; it is strong, light, and cheap, and these properties started me thinking about how one might use this material to make a glider. After about 10 minutes of thinking and measuring and cutting, the first TLAR 20 had taken shape, and after another 10 minutes the epoxy was pretty well cured. (Incidentally, the name comes from the design process: That Looks About Right; the numerical designator comes from the building time in minutes.)

The concept is very simple: a flat airfoil will develop lift just about like a traditional airfoil, if it has a positive angle of attack; the positive angle of attack is easily provided with a traditional tail assembly. The rest is just construction details, which are probably best determined by the builder. For

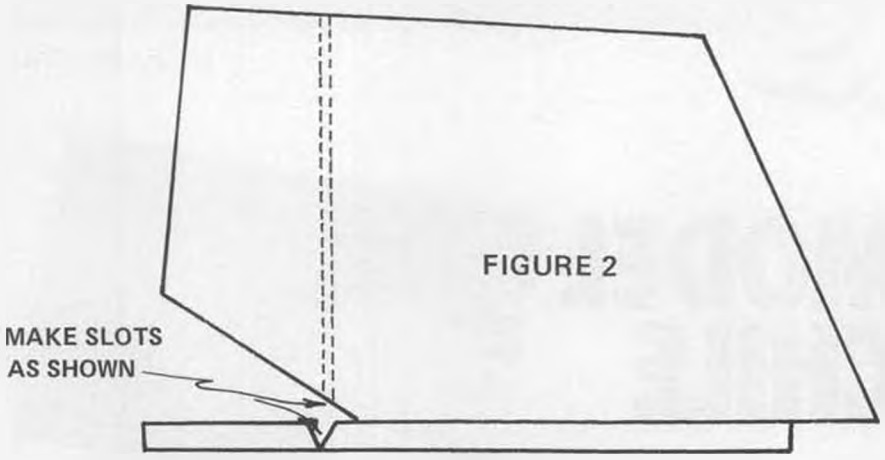


FIGURE 2

MAIN WING:
SPAN— 60 INCHES • CHORD— 12INCHES

HORIZONTAL STABILIZER:
12 INCHES BY 6 INCHES

VERTICAL STABILIZER:
6 INCHES BY 6 INCHES

TAIL-BOOM LENGTH:
34 INCHES, INCLUDING A NOSE OVERHANG OF 6 INCHES

TABLE 1

5/8" O.D. Lightweight Plastic Tubing Slit Lengthwise and Slipped Over Leading Edge.

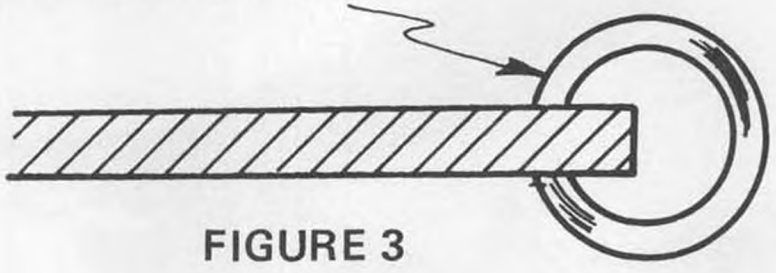


FIGURE 3

reference purposes, I have included the details of my prototype in Table 1, but I hasten to state that a large part of the charm of an airplane like this is that *each builder will want to contribute his own ideas as to how the airplane can be designed or built better.* I have determined empirically that the airframe can be cut out and assembled in under 20 minutes, assuming that you already know where to find your sharp modeling knife and your 5-minute epoxy.

Construction Hints:

1. No hinge installation is required. The movable control surfaces are not to be separated from their respective stabilizers; cutting the paper on only one side of the foam-core board leaves the other side to act as a hinge. See Figure 2 for a pictorial explanation.

2. The tail boom design is not critical; a piece of dowel serves nicely. Make sure it extends forward so you can hang balance weights (or the battery) off the end of it. See Figure 1 for one possible arrangement.

3. Mount all your radio equipment as far forward as possible in order to counterbalance the weight of the tail assembly.

4. The dihedral is required to provide stability and to make the glider turn when rudder inputs are applied. I used a small diameter dowel to bend the foam-core board as shown; the dowel resists forces in either compression or tension, and consequently supplies rigidity for aerodynamic forces which bend the wing either up or down.

5. A rounded leading edge is provided by a piece of tubing which has been slit lengthwise and slipped over the leading edge of the foam-core board. See Figure 3. *This tubing (or something like it) is required to ensure that the airfoil is well-behaved under a variety of attack angles; the glider will not fly smoothly without it!*

6. The foam-core board (0.20-0.30 inch thick; ask for it at your local art supply store) weighs under 3 ounces per square foot; my glider has a wing loading of about 7 ounces per square foot with all the radio gear, dowel, pushrods, etc., installed.

7. The balance point should be about 40% aft of the leading edge of the wing.

So how does it fly? It's remarkably stable, considering the primitive airfoil. The TLAR 20 does not have any vicious characteristics; it stalls in a predictable fashion; it executes turns smoothly, and it will even do a loop (if you're willing to risk it!). The TLAR 20 is not very durable, but the damage from a typical wreck is easily fixed with a little epoxy. And if you have a terrible accident and totally destroy the whole plane, it certainly won't take long to reproduce it, or maybe make a new, improved version!

In summary, then, the TLAR 20 is the perfect project for those days when you want to go slope gliding in the afternoon, but find yourself at 10:00 a.m. with only a radio, $6 (for foam-core board), and some pushrods. It is quickly and easily assembled, and if you don't like the flying characteristics in its original configuration, then simply apply your ingenuity to modify it. ***MB***

PLUG SPARKS

BY JOHN POND

WARTIME MODEL FLYING IN CHILE

1. South American Old Timers! This shot, taken in Chile in the early 1940s and submitted by Patrick Page (fifth from left), is of the members of the model club based in Santiago. Just goes to show that modelers are alike all over the world. (Insert) 2. With no bunge cord or nylon line available in WW II, Chilean modelers had to resort to other means to get their gliders up!

We have a most interesting lead article this time which should be entitled "Wartime Model Flying in Chile." *(So be it. wcn)* This report has been extracted from an interview with Patrick Page, formerly of Santiago, Chile, and who has been an American citizen for the last 30 years.

To begin with, model aviation in Chile began in the very late thirties. In 1940, Pat built his first rubber model, a Megow kit. Surprisingly, there was not that much interest in model aviation among the younger (or poorer?) section; hence, Pat had no problem in joining the local model club. As he said, "No formal program, just walk right in and get acquainted."

This club was located in downtown Santiago and was sponsored by the Chilean Air Force. With backing like that, supplies normally hard to get were shipped in on a somewhat regular basis. Many of the model aviation manufacturers were permitted to

3. Brown Jr. powered Scientific Flagship was one of the first gas models in Chile, built by Pat Page circa 1945.

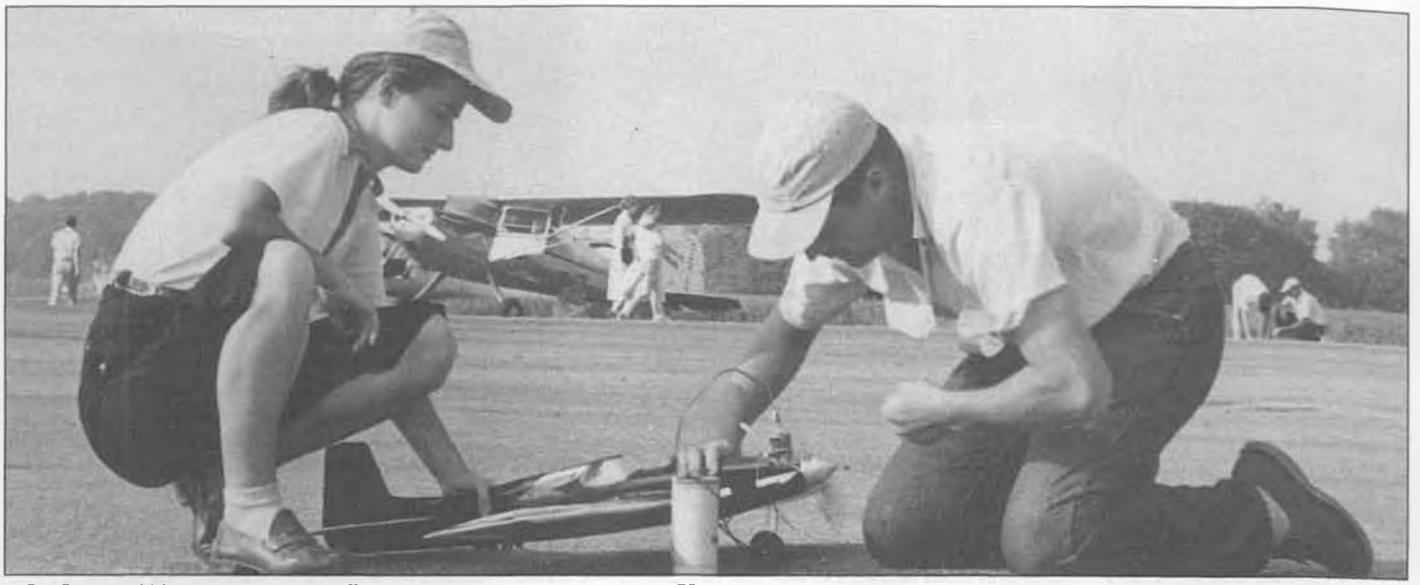
produce limited quantities of engines, kits, etc. as part of the aviation youth program.

Club activities were great, with international contests being held with neighboring nations, especially Argentina. To show the activity, Photo No. 1 is presented showing the winners and contestants at a typical meet. Page can be seen in the front row, fifth from the left as viewed.

With rubber models and supplies much easier to obtain than gas engines, Page built a considerable number of rubber powered designs plus some soaring gliders. Bunge cords and associated nylon strings were hard to come by; hence, the "gag" shot of Photo No. 2 showing one way of getting a glider towed. Again, Pat is shown on the left.

Later, Pat was able to obtain a Brown Jr., a rare commodity during those times. His first attempt was a California Chief, dubbed the "Cheese" by California modelers. This

4. Scene from a post-WW II control line meet in downtown Santiago.

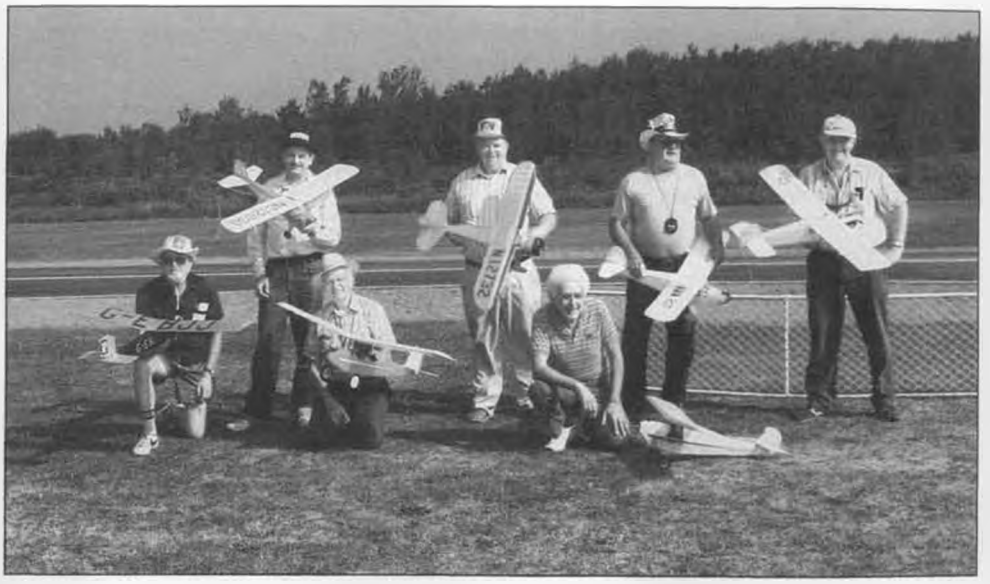


5. Pat Page and his wife, Maria, with a Thunderbird CL model at Andrews AFB in the mid-50s. Pat is still active in modeling and belongs to the SAM 21 O.T. club in San Jose, California.

came about by modelers using the partially prefabricated fuselages without any sort of painted finish. Of course, the gas-soaked sides gave a soft or cheesy feeling from which the word "Cheese" was appended to this design.

Things really looked up in 1945 when Pat built a Scientific Flagship powered by that precious Brown Jr. Photo No. 3 shows Pat's effort on the Chilean AF Base. This was something else the Chilean modelers enjoyed during this period: unrestricted use of the base for model flying. No question about it, Chile was interested in getting its youth air-minded!

At the close of hostilities, the control line craze hit Santiago. A meet was scheduled right in the heart of town. Photo No. 4 shows the President's Palace in the background. As can be seen, every type of model was flown, from sport to stunt, speed, and jet powered. The meet was a tremendous shot in the arm for model aviation! *continued*



6. Group of 1/2A Texaco Scale contestants at the recent SAM 48 Annual in New York . . . see text for names and models.

In 1953, Pat, who was married by that time, moved to the United States to take on a job of Electronic Ignition Specialist. Photo No. 5 shows Pat and his wife, Maria, at Andrews AFB in the Washington D.C. area, cranking up an Atwood .60 ignition powered Thunderbird. Pat was quite competitive in control line.

When Pat moved to California, he became involved in radio control both from a technical and flying aspect, as there were four clubs in his area: the Pioneers, Channel Masters, East Bay R/C, and most important, the San Francisco Mustangs, who introduced him to Ed Rockwood, the originator of the tuned reed system. Page himself became quite absorbed in RC, to the extent he later took on the repair and maintenance of E-K Logictrol sets as marketed by Ellington and Krause. This was an extremely good set. (I know, I had seven of them!)

At present, Pat Page and his wife, Maria, attend the monthly SAM 21 meetings and still enjoy the general good fellowship of Old Timers.

Some readers may wonder why we are running this article of model flying in Chile, but the main point to be brought out is that model flying and fliers are pretty much the same regardless of where they come from!

1990 WESTERN NEW YORK MEET

Received an interesting report from Jack Brown, 1446 Red Jacket Road, Grand Island, NY 14072, on the Seventh Annual O.T. Contest held by SAM 48, "The Niagara Frontier" Chapter. The meet was also co-hosted by the Aircrafters Model Airplane Club.

Held at Hamburg Model Field, Lake Road, Hamburg, New York on August 11 and 12, this contest was blessed with exceptionally good weather. According to Jack, winds were gentle on both days. The heat build-up on the second day produced so many max flights that numerous flyoffs were required.

This was particularly noticeable in the case of Larry Davidson, who ended up in three ties: In 1/2A Texaco, he beat out Joe Beshar; lost to Ralph Turner in Antique C by coin flip and in Class C with Bill Darin of SAM 40. Declining to fly, he lost to Wayne Jenkins in Texaco by less than a minute with a 56-minute flight! Were conditions ever good!

The 1/2A Texaco Scale event, as originally staged by SAM 48 and promoted by Joe Beshar, showed excellent response in the form of nine entries. As usual, most flew early in the morning as the 1/2A size models do have trouble handling much wind. Photo No. 6 shows seven of the entries. Front row, from left: Bob Gordon, Beardmore Wee-Bee; Buck Zehr, Pietenpol Air Camper; Joe Beshar, Longster. Back row: Jack McGillivray, Taylor Cub; Walt Geary, Waco SRE; Woody Woodman, Taylorcraft; and Walt Lawrence with a Curtiss Robin. The winner, Doug Payne, of Tonowanda, New York, is seen in Photo No. 7 holding a simply gorgeous Focke-Wulf Stosser 56. Doug won the Lanzo Trophy, which was won by Chester back in 1966 for RC Scale. Doug also picked up the event trophy and a Cox engine. Not a bad haul!

As a sidelight, it must be mentioned that Doug did not finish his model until Sunday noon. He aborted one flight and then proceeded to register two perfect 15 minute flights. The model was silver colored with black and red trim; scratch-built, too!

In wrapping up this report, not enough credit can be given to Jack Brown as he not only organized the meet and ran it, but also amassed an impressive array of prizes. Great meet all around!

7. Doug Payne took all the marbles in Sam 48's 1/2A Texaco Scale event with his really pretty Focke-Wulf Stosser 56. It flies every bit as good as it looks, too, as Doug posted two perfect 15-minute flight scores!

8. Even a wedding (his own) doesn't stop Ken Weiland from flying. Great dedication to the O.T. sport! Model is fellow SAM 39 member Stu Warner's 1/2A Capitol Flightmaster.

ENGINE OF THE MONTH

Back in July 1980, the Hurricane engine was featured by this writer in his column and later on, on page 117 of *Vintage Engines*, Volume 2 as published by Pond Associates. This month we are describing the "Super Hurricane" which is also known as the Hurricane MX 4A as designated by Mike Cook in his article, "Ray Hunter's Hurricanes" that appeared in the Nov.-Dec. 1964 issue of *The Engine Collectors Journal* (Volume 3, Number 3).

This Canadian built engine enjoyed a modicum of success during World War II when engines were at a real premium. (Even the GHQ sold for $24.95 then!) The engine was quite well made and had running characteristics very similar to the Ohlsson 23.

Before going too far, we should acknowledge, with thanks, Gordon Codding for the use of his Super Hurricane. The engine we have drawn was the last of the ignition

9. Australia's Monty Tyrrell built this great looking reduced size Dennyplane from Dan Lutz's plans in the January 1990 *MB*. Good flying ship, says Monty.

series. With the advent of the glow plug, a glow version was produced in 1948. This engine featured a streamlined brass cover over the crankcase front. The plastic tank was replaced by a brass tank (same shape as shown in the drawing) together with a high-compression head.

With Ohlsson engines again in mass production, it wasn't long before the small manufacturers began to feel the pinch. When the O&R firm cut prices by half this just about put paid to all the smaller firms, of which Ray Hunter was no exception.

Many good running engines were forced off the market simply because the larger manufacturers enjoyed nationwide distributorship and heavy advertising in all the modeling magazines. Mike Cook, in his commentary, offered the opinion that the Hurricane actually ran better than an Ohlsson 23. However, this writer is led to suspect an unfair comparison was being drawn between a rotary valve type engine (Hurricane) and a sideport (Ohlsson). Later on Ohlsson did offer a front rotary .23 that was noticeably more powerful than the sideport.

For performance figures, the *Air Trails* Engine Test Group reported the Super Hurricane ran at 7500 rpm using a 10x4 propeller. With a 10x6 high pitch, the engine rpm dropped down to 6300. The engine was commended as one of the steadiest running motors they had tested in their long run of tests. However, most Hurricanes were tightly fitted and required extensive break-in.

The Super Hurricane 24 had a displacement of .244 cu. in. resulting from a bore of 11/16 in. and stroke of 21/32 in. (nearly square). Base weight was 5 ounces as a result of using magnesium castings for the cylinder, crankcase, and head. The piston was standard mehanite iron with a bronze alloy wrist pin. The connecting rod was cast magnesium with no bushings on either end.

The main crankshaft bearing was press fitted to the case and the bronze lapped to suit the crankshaft, which was one-piece steel with a small counterweight.

Ray Hunter was a popular modeling figure in Canadian circles, as he was regarded as a modeler's modeler. Just a shame he was unable to keep up with the advances in engine technology.

TRUE DEDICATION

How about Photo No. 8, showing Ken Weiland in formal wedding dress holding Stu Warner's 1/2A Texaco Capitol Flightmaster (formerly known as the Heathe Miss Worlds Fair)?

When Ken got married, the best man (Stu Warner) wanted Ken to fly his latest model. Wouldn't you know it, no field large enough around the church to fly off!

As a side note on his flying enthusiasm, Ken attends all SAM 39 contests helping out wherever he can (timing, launching, you name it). When Chet Lanzo stuck his Wakefield in a tall oak tree, guess who climbed it: Ken!

The photo, sent by Robert "Bucky" Walter, SAM 39 prexy, elicits the comment that Stu must have one heckuva lot of pink silk and maroon dope. All his models are colored this way!

BAGGAGE CAR CONTEST O.M.T.

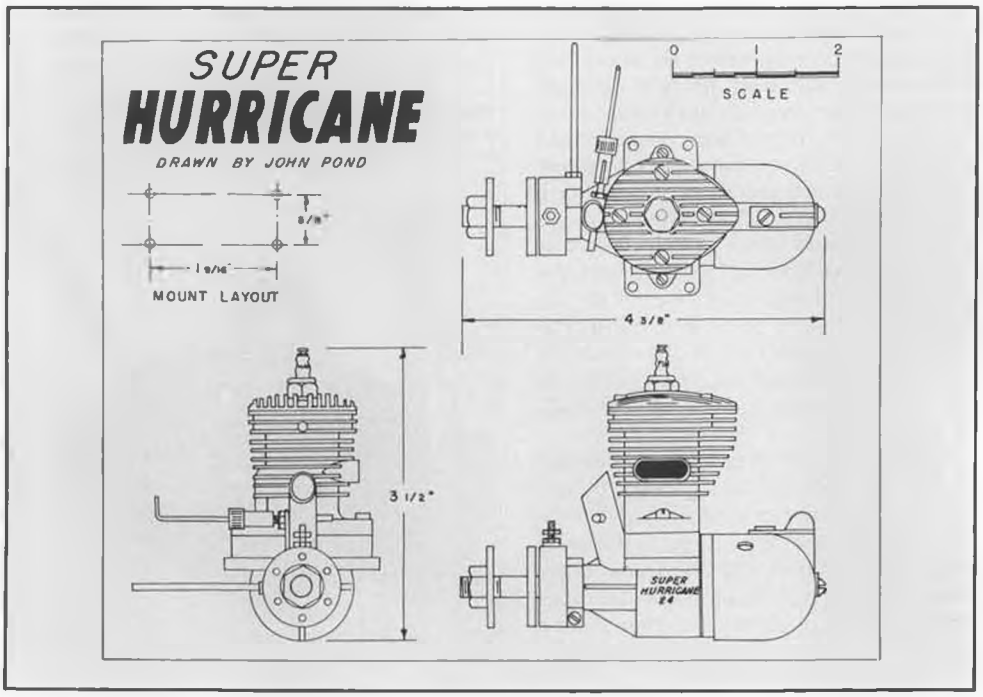
The photo of the Baggage Car Glider

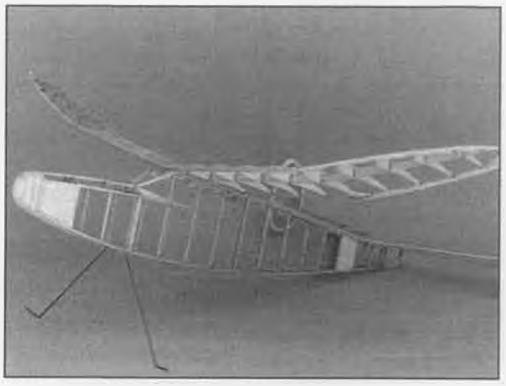
continued on page 71

10. Melvin Yates seen with his best known models: "Herky" on the ground, and the Ten Foot Cabin.

11. Twin pushers are always fun to watch fly and this 1912 Lauder "A-Frame" is no exception. Sigurd Isacson flew it at the 1989 Swedish Nationals and created so much interest that several are now under construction. How about a one-design contest just for this particular model?

12. Ernie Linn, of Kansas, is planning to produce a limited number of kits for the Orr Dept. Store "J-Hawk" rubber job. Seen here is the prototype with builder, Dean Zongker. Looks like a good model for the Commercial Rubber event.





13. The bones of the Model craft "Super Snooper," the latest kit offering from Fresno Model Airplane Co., which is under new ownership . . . details in text.

R/C PRECISION AEROBATICS

BY RICK ALLISON

PHILOSOPHY OF COMPETITION

A new spinner for air hogs, or, some guys will do anything to get a picture in a magazine. Keith Varley's "Eclipse." Buck Boynton photo.

Dick Stiles and Paul Verger at the '90 NATS with Dick's "Aurora." Rick Allison photo.

Compete: from the Latin *competere,* meaning to seek together or come together, agree, be suitable. Present meaning according to the employees of the heirs and assignees of the late Danny Webster: to strive consciously or unconsciously for an objective, position, or prize. Funny how things can change around in a mere two thousand years, isn't it? Or have things really changed that much?

Now, I know that a pattern column in a model airplane magazine seems sort of a strange and unlikely spot for philosophical musings on the etymology of common intransitive verbs, but this particular verb and its cousins over in Nountown and Adjectiveland are always very high mileage linguistic units in any discussion of pattern flying. And pattern flying is the right and proper subject of this column, even if it leads to undressing poor defenseless words in public. Besides, I happen to be in a dangerously philosophical mood.

Like the Pylon guys and Navy Carrier guys and Free Flight types and Stunt folks and all the other different brands of rulebook warriors, we pattern pilots *compete* with each other. There's no use trying to gloss over the fact or weasel our way around it. We have contests to see who flies the best and whose equipment performs the best. We practice flying precision maneuvers for hours and hours on end, just to get ready to compete with each other. We salivate heavily at the very thought of competition. We spend our weekends and vacations traveling to sometimes quite distant places in order to have other people who are very often strangers inspect us closely and then tell us exactly what they think of the way we fly. Brutal. We pay a fair amount of money for this service in equipment costs, entry fees, transportation costs, and motel bills. We think that this is normal, natural, and mostly a lot of fun. In fact, we can't understand why everybody doesn't do this.

Sport pilots don't do this. Sport pilots may go to club meetings, swap meets, fly-ins, fun-flys, and the occasional model trade show, but mostly they just go to the local field and fly around. They do some loops, snaps, and rolls, all in no particular order and in no particular direction. They shoot a few touch and goes. They chat happily with their friends. And then they go home. They spend their disposable income on new lawnmowers, home improvements, and family vacations to Disneyland. They think that this is normal, natural, and mostly a lot

"The Stabilizor," from KDI. A nice product. More in text.

Winning crazies celebrate together at the conclusion of a successful weekend group therapy seesion. MARC "Sound Rounds" contest, Redmond, Washington. Don Passey photo.

of fun. There are a lot more sport pilots than pattern pilots, and frankly, while more than a few of them enjoy looking at pattern planes (sexy, right?) and watching them fly (ditto), quite a number of them think that anybody who behaves they way we do has to be several fried chicken legs short of a Kentucky bucket.

There is even a fairly radical school of thought out there that holds that contests with actual winners and losers are primitive, undignified, confrontational, socially immature and designed only to appeal to the baser instincts of the unwashed balsa munching troglodytes among us. Egad! Obviously, these people have been watching too much C/L Combat and too little Indoor Rubber. . .

Well, sure, OK. Why do we do all this competing stuff anyway? What exactly fuels this addictive compulsion to publicly trace geometric figures in the sky in front of judges? Is there a treatment program? Why not just bore a few random holes in the great blue dome and then go home and mow the lawn or tile the bathroom like the normal and happy sport jocks?

I think that the answer is found in the types of people who compete. I don't mean that all competitors are the same; on the contrary, the different kinds of personalities you run into at contests have always amazed me. We get a good cross section, with undoubtedly more than our fair share of eccentric types.

The only really common threads that I see are a love of sport and a stubborn belief in perfectibility. Let me explain the latter:

So far as model airplanes are concerned (we have to limit the discussion. This discourse is deep, but not that deep . . .), to believe that things are perfectible means that you believe that, given enough practice, it is possible to do a perfect loop, to find a state of absolute perfect trim for your model, to fly a perfect flight, or to find a perfect needle valve setting, prop, or pipe length. Maybe even do a perfect paint job! That *would* be a first, wouldn't it? On the face of it, we live and work in an admittedly imperfect world, and this belief in the perfectibility of things doesn't seem very sane. In fact, to many of us, to believe in the attainability of something that seems utterly unattainable is an indication of delusional neurosis. For me, that belief is as necessary as breathing, which I guess means that I'm even more maladjusted than most. But you knew that, didn't you?

Cursor group picture at the RAF Lake Chelan, Washington contest. Don Passey photo.

Crazy or not, I do believe that somebody had better always be trying to find out where the limits are, and how good is good, and how high is up. A stopwatch and a measuring tape and a computer model may help, but the truest way we have to test the boundaries of what is humanly possible is competi-

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Dean Pappas' "Maya" design. Recent kit release by Philips Aircraft Company. Rick Allison photo.

Mike McConville and Missus with Mike's "Desire" at the NATS. Pattern is a sport . . . we even have tailgate parties. Rick Allison photo.

PYLON

BY WAYNE YEAGER

IT'S RULES TIME

All the entrants got together for this group shot before the racing started and while they still had all the planes they came with. The entry level of 49 is probably the highest number for a Quarter Midget race in several years.

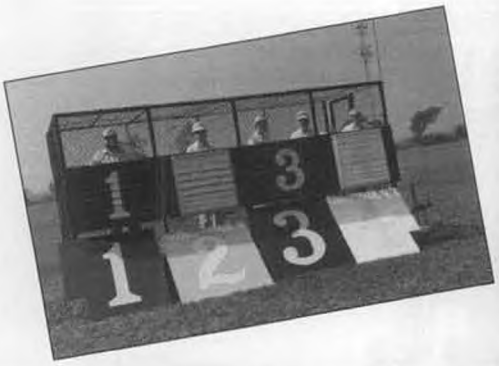
There were a couple of major contests since last month's column that rate reports and I will include them later in this article because there are several AMA rule proposals currently under consideration that need addressing before final vote by the Racing Contest Board. I urge you to study them carefully and correspond with your district Racing Contest Board member if you have reason to object or agree to their passage. You can find the names and addresses of the entire Contest Board under the Competition Directory in *Model Aviation*.

There are nine proposals for RC Pylon and they are as follows:

RCR-1. The proposer asks for the rules under 1/2A be changed to allow ball bearing engines. The proposal reads: Change the sentence that states, "No ball bearings or tuned pipes will be allowed," to "Straight exhaust extensions will be allowed." His

This group was the top five at the "Silver Cup" Quarter Midget race, along with their callers. In front (l to r): Rick Bork - 5th, Craig Grunkemeyer - 4th, Dave Latsha - 3rd, Duane Gall - 2nd (holding remains of his sick airplane), and "Champion" Denny Sumner. In the rear (l to r): callers Kevin Matney and Joe Dodd, Contest Director Rex Knepper, caller Vern Smith, "Silver Cup" sponsor Les Haddad, and callers Konrad Dudek and Ken Heatlie.

No pylon race is successful without people who are willing to spend the day under the hot sun for not much more than back slaps. This crew from the Weak Signals and the Flying Tigers, both Toledo, Ohio clubs, are typical of the many other volunteer crews from around the country who make pylon races possible and deserve everybody's thanks.



(Top photos, from left to right) The Weak Signals have built cages for each pylon position such as this Number 1 pylon cage that offers plenty of room, protection and is on wheels for easy transportation. The upper set of numbers is on the front of shutters that disappear with the "turn" signal. For you "west coasters," that stuff all around the cage is something of abundance in the midwest called . . . "Grass." • Jim Shinohara holds up Gary Hover's "Stiletto" for identification purposes. This model was badly damaged in a crash and was repaired overnight because Gary felt it was faster than the other back-up planes he had. • This is typical racing action, demonstrating the "team work" required in RC pylon. On the left, Bob Wallace is flying while his caller, Don McStay, braces for a "ready . . . turn" and at right is Dave Shadel calling for Rich Verano. Note the flyers and callers are all wearing hard hats, a requirement in F3D.

"Silver Cup" Champion Dennis Sumner holds his silver cup and caller/mechanic/friend, Ken "Gramps" Heatlie holds the winning plane. This twosome has won this race for three straight years, which is an extremely difficult accomplishment.

logic reads: "The rule does not allow the use of an engine with ball bearings. The new CS engine (.049) will be ideal for use in this event because it is of modern technologies. The classic Cox engines do not hold up to the rigors of racing because of the piston-rod design."

RCR-2. The proposer requests the Quickie 500 rules be changed to require an additional "Standard" class. It reads: "There will be two classes of racing at each contest, `Expert' class, and `Standard' class. A new flier will volunteer his classification based on his ability. All entrants will be grouped together in one race heat matrix and will race interchangeably with the final placing being determined by classification. Standard fliers will advance to Expert at the next race if two heat times are below 1:30."

RCR-3. This proposal requests the use of aftermarket tuned pipes and mufflers in Quickie 500. It reads: "Expansion type, non flow-thru mufflers, or one-piece muffler tuned pipes with header pipe, will be required. Units will be commercially available, unmodified as supplied by the manufacturer, except they may be tapped for pressure fittings. Muffled tuned pipes may

This is the 1991 FAI F3D team which will defend the World Championship in Milan, Italy. In front (l-r) is Dub Jett, Lyle Larson, and Henry Bartle, and in the rear (l-r) are callers John Shannon, Gary Hover, and Jim Shinohara (far right) plus defending World Champ Dave Shadel (dark hat).

be shortened at the inlet and, headers may be shortened at the outlet for tuning purposes."

RCR-4. This proposal requires standardi-

continued on page 76

BY ROY E. DAY

DORNIER DO-28

ELECTRIC TWIN

Would you like to have a good flying sport scale twin that you can take along on your vacation and win the attention of the fellows at the flying field? Then build and fly this 70-inch wingspan Dornier Electric Twin.

OBJECTIVE OF THE PROJECT

When I began this project I had three principal objectives. They were to design a sport scale electric model with the following characteristics:

1) A twin using the popular 05 size electric motors.

2) An easily transported model so it could be a "vacation" airplane.

3) A sport scale model of an airplane with comfortable handling characteristics and moderate wing loading.

The airplane I selected was the Dornier DO-28, a 6-8 passenger twin engine high wing monoplane. The high aspect ratio wing promised good lift. The engines mounted on a subwing simplified the power installation and eliminated the problem of disconnecting the motors every time the wing was removed.

Almost everyone, the author included, is intrigued by twins but is fearful of the dreaded "engine out emergency." An electric twin with motors and controller in series with the battery virtually eliminates the possibility of an "engine out."

DESIGN PARAMETERS

The model was designed for three controls, no ailerons, which simplified the two-piece wing necessary for easy transport. Also the tail assembly and the landing gear must be easily removable. The basic design ground rule for electrics is that the airframe plus radio should not weigh more than the power system, i.e., the motors plus the batteries. The sizing of the airplane proceeds as follows. The motors selected were the Astro geared 05 cobalts. The battery pack planned was 16 cells of 1200 mAH. The 16 cells give a little added power over the usual 14 (7 per motor) without any danger of harming the

cobalt motors. In fact, the DO-28 only draws 20 amps static. Current levels as high as 30 amps can be tolerated by the Astro brushes without any damage.

Power System Weights:

2 geared 05 motors	=	16 oz.
16 1200 mAH cells	=	30 oz.
Total	=	46 oz.

Therefore the all-up flying weight should be 2x46 = 92 oz. Now the total weight budget becomes:

Power system	46 Actual
Radio	8 Actual
Airframe w/L.G.	36 Estimated
Covering	2 Estimated
Design Flying Wt.	92 oz.

For ease of flying the wing loading is set at 20 oz./ft.^{2}. Now the corresponding wing area is computed by dividing the design weight (oz.) by the desired wing loading—in this case, 92 divided by 20—which gives us a wing area of 4/6 ft.^{2}, or 662 in.^{2}. The design area was rounded to 600 in.^{2}. Based on the aspect ratio of the Dornier, the wing span came out at 70 inches. So now we have all the basic sizing parameters, weight goals and scaling dimensions. The resulting design is shown in the plans and we can now begin construction.

CONSTRUCTION

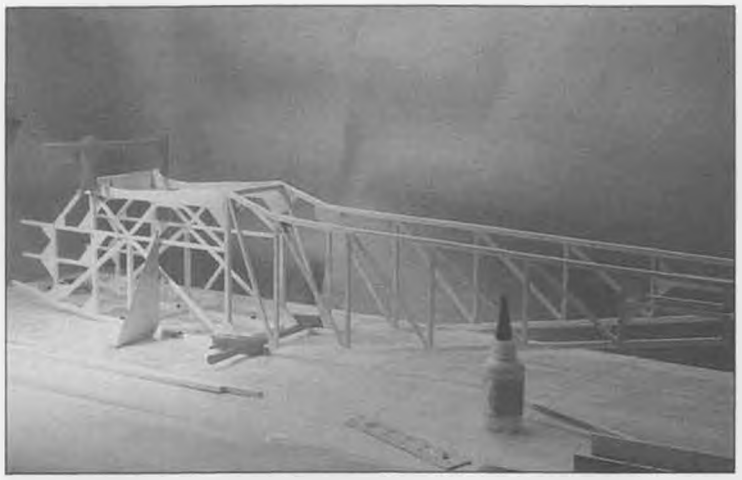
Lightweight construction is particularly important for electrics and essential if we are to meet the ground rules stated. If the weight is not kept in control, we will have another of those overweight/underpowered electrics that stagger about the flying field like a wounded butterfly, provoking snickers. For this plane no epoxy is used, only thick and thin CA glue. Plywood and hardwood are used only in high load areas, such as landing gear mounts, motor mounts, and wing attachments. Increased strength is obtained in some areas by using thin ply doublers on balsa and the liberal use of gussets. Properly fitted gussets of 3/32 balsa can add tremendous strength and stiffness with minimum weight.

Fuselage

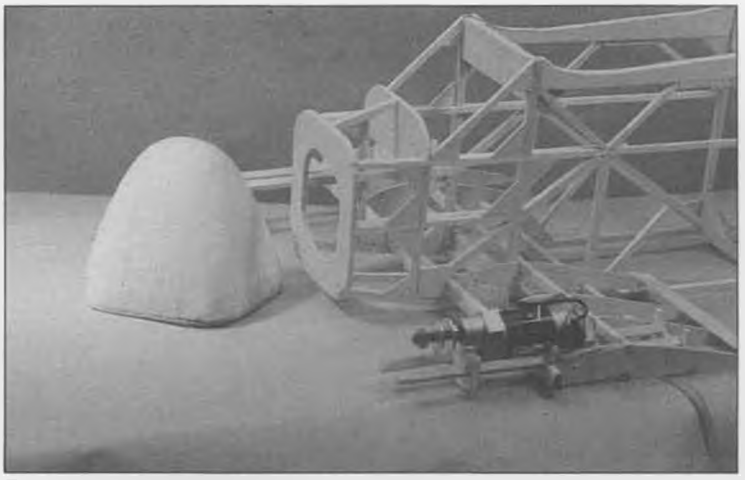
The fuselage is conventional built-up stick construction. The two sides are built over the plans, then joined with the cross members while pinned upright on the board. Use medium weight balsa for the longerons and members in the forward part of the airplane. Lightweight balsa is all you need for the aft structural members. Bend the longerons in carefully to meet F-1. Former F-1 is made from two pieces of medium 3/32 balsa cross-laminated. The result is as strong as lite-ply but lighter.

When the basic structure has been completed and while the fuselage is firmly pinned upright on the board, start the construction of the subwing and motor mounts. Sketch B shows how the spruce spars rest on the 1/4-inch square balsa cross pieces and tie into the fuselage uprights. The thrust line of the motors should be 0-0, along with the wing and horizontal tail. If it is necessary to adjust the thrust line later, it can be easily done by shimming the motors in their beam mounts. I found that no adjustments were necessary.

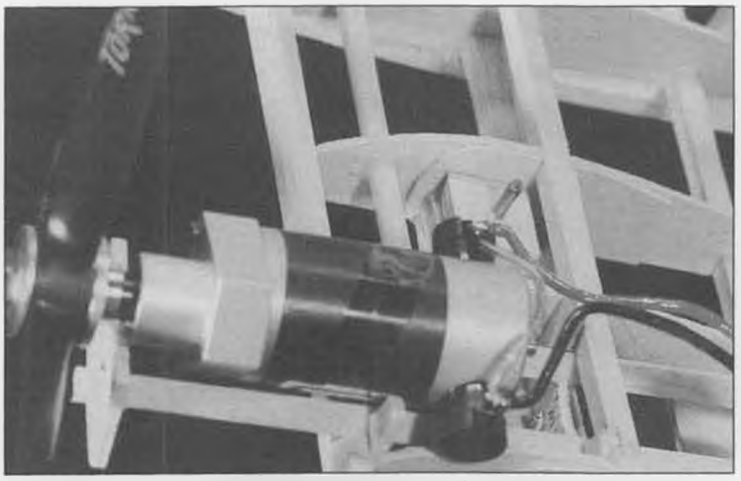
Install all the ribs in the subwing except the one next to the fuselage. Glue it in place after the sides of the fuselage are sheeted. Glue in the leading edge of the subwing, the landing gear, and motor mounts. Before sheeting the subwing, it is a good idea to run the wiring through the soda straw conduit out to the motor mounts. Add 1/16 balsa



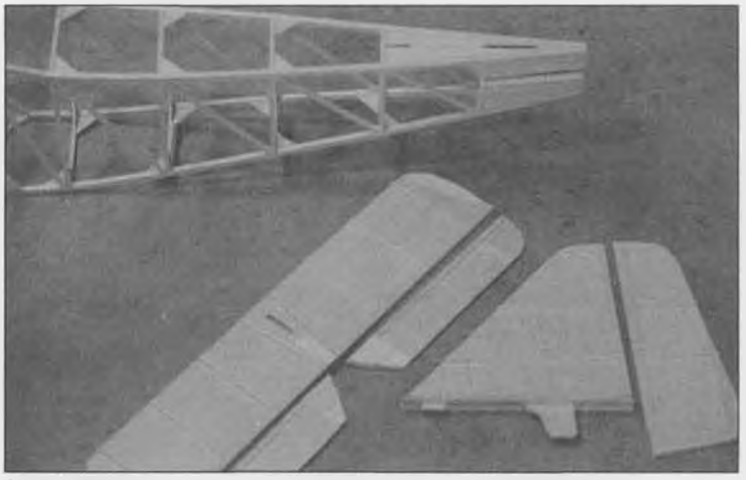
The fuselage sides are built one over the other and joined in the conventional manner as seen here. Use a triangle or combination square to keep the sides exactly perpendicular to the board.



The subwing and motor mounts are built as an integral part of the fuselage. The nose block is foam with a single layer of glass cloth and epoxy, and is held to the finished fuselage with tape to allow equipment access through the forward fuselage former.



Spruce subwing spars and motor bearers, and plywood doublers on the ribs provide the necessary strength and stiffness for landing and thrust loads.



Sheet balsa tail surfaces are light and strong, and the tab-and-slot arrangement automatically brings everything into perfect alignment when assembling at the field.

shear webbing from the motor mount through the fuselage and out to the other motor mount. It's useful to have a 1/2-inch hole in the webbing in the fuselage to allow the controller wiring to pass through to the receiver. The subwing is sheeted top and bottom with 3/32 medium balsa. This is required to give the needed strength for landing loads. Remember, this is a six-pound airplane which may make a lot of dead-stick landings.

The nose was made from styrofoam and given a hard surface by applying one layer of 0.5 oz./yd.^{2} cloth with laminating epoxy resin. Do not glue the nose on; it is attached with plastic tape when the model is completed. It is very handy to be able to gain access to the front insides of the airplane through the nose opening. Wait until the wing is built to put in the wing attachment structure.

The motor cowls shown in the photographs were made from plastic bottles. You could build them from balsa, 1/64 ply or vacuum-formed plastic. Again, they are attached with plastic tape. Be sure there is adequate airflow through the cowl to cool the motor.

Wing

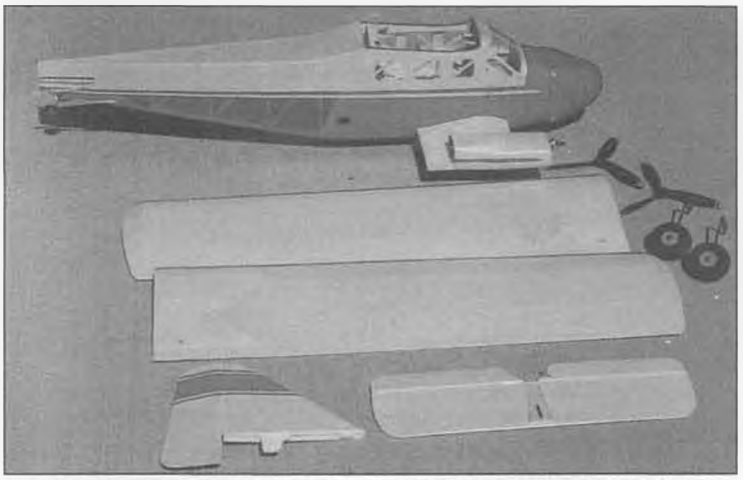
The wing construction is conventional with a music wire/brass tube joiner. The semi-symmetrical ribs are straight from the trailing edge to the lower forward spar cap, so the wing can be built flat on the board. Add the forward bottom sheeting after the wing is removed from the board. Carefully align ribs R-1 and R-2 and insert the brass tube. Be sure you have a snug fit of the 1/2-inch balsa block against the brass tube and between ribs R-1 and R-2. Roughen the brass tube before gluing with thick CA. Build in some washout by shimming the tip trailing edge up 1/4 inch with scrap. Install the shear webs from root to tip on both spars. Add the wing grabber blocks after the wing is removed from the board. For additional strength, glue 1/4-inch wide fiberglass tape on the bottom spar caps.

Although ply rib R-1 should be angled to account for the dihedral, a no-gap fit between wing halves still requires rib R-O because of the bend-radius of the music wire wing joiner. Bend the 1/8-inch music wire joiner so that you get 2-1/2 inches of dihedral at each tip.

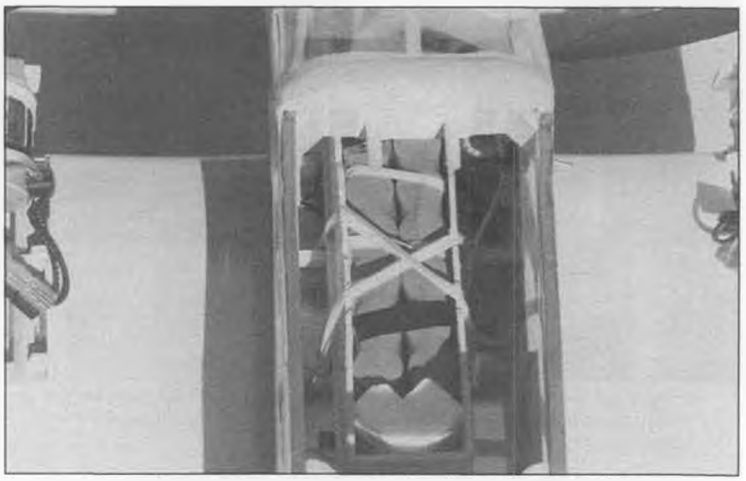
The completed wing can now be aligned on the fuselage and the dowels and nylon hold-down bolts installed. If you are concerned about the 8-32 nylon bolts being strong enough, don't be worried. I have flown six and seven-pound models with 8-32s for years with never an inflight failure. The 8-32s will shear off in case of a crash, however, and may save your wing.

The two-piece wing is joined by a length of music wire inserted into a brass tube in each wing half. Note plywood wing rib doublers and the 1/2" thick tube support blocks.

The completed, uncovered structure as seen here, but sans motors, should weigh in at about 2-1/4 pounds. Finished model comes in at 6 pounds.



The Dornier can be assembled or disassembled at the field in less than 30 minutes. The whole thing packs into a box about the size of a piece of luggage for easy transport. Of course, if you don't plan to take your model traveling with you and if transportation to the field isn't a problem, you can build the wing in one piece and glue the tail surfaces permanently in place, which will cut assembly/disassembly time down to just a couple of minutes.



The 16-cell motor battery fits into a box of 1/8" balsa, which is held in place with a combination of Velcro and rubber bands.

Tail

Both the vertical and the horizontal tail are cut from 1/16 medium balsa sheet with strengthening false ribs and "spar" laminations added. Sand the false ribs to give an airfoil shape. The tail surfaces will not be glued but will be attached with plastic tape, so it is important that they have a good snug

fit. To give additional support, add 1/2-inch diagonals along the base of the fin on both sides where it sits on the fuselage. Similarly, glue a strip of 1/2-inch balsa diagonal along the bottom of the slit in the fuselage for the horizontal stabilizer. This will give a good firm base and prevent any tail rocking.

Landing Gear

The main landing gear is the standard torsion type using 5/32 music wire mounted in landing gear blocks. Easy removal of the gear is therefore achieved for transport. The tail wheel should be driven with a separate pushrod and not connected to the rudder. This saves wear and tear on the rudder hinges and makes it easy to remove the tail.

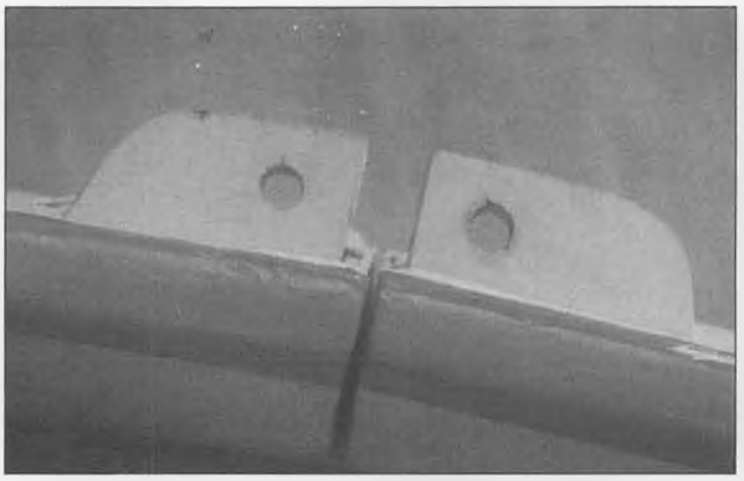
cells. I built cross supports over the subwing leading edge and the subwing rear spar at the same level as the forward spar, which passes through the fuselage. This gave me a good three-beam platform to support the battery box. Strips of Velcro were glued on each crossbeam and on the bottom of the battery box. Then I put in four hold-down hooks for rubber bands to hold the battery box firmly on the Velcro-covered crossbeams. In the case of a hard crash, the battery box will slide (hopefully) forward, impacting the nose block with a minimum of damage. So far the scheme has worked fine. With the battery box on the cross beams, there is space below for the control-

in the gap. These hinges are strong, light and have no gap.

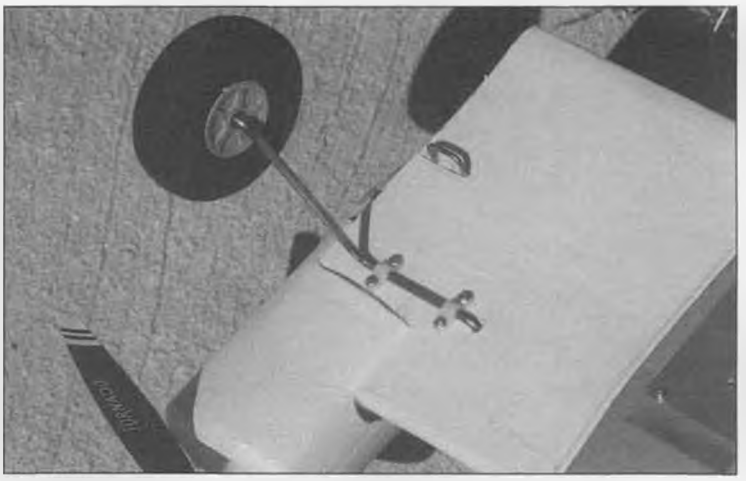
FLYING

Besides the usual preparation, three checks are particularly important before the first flight: balance, washout, and radio interference. The C.G. location is more forward than you might expect for a straight wing monoplane. This is caused by the slight destabilizing effect of the subwing. However, the Dornier seems tolerant of + 1/4 inch variations about the nominal C.G. shown on the plans.

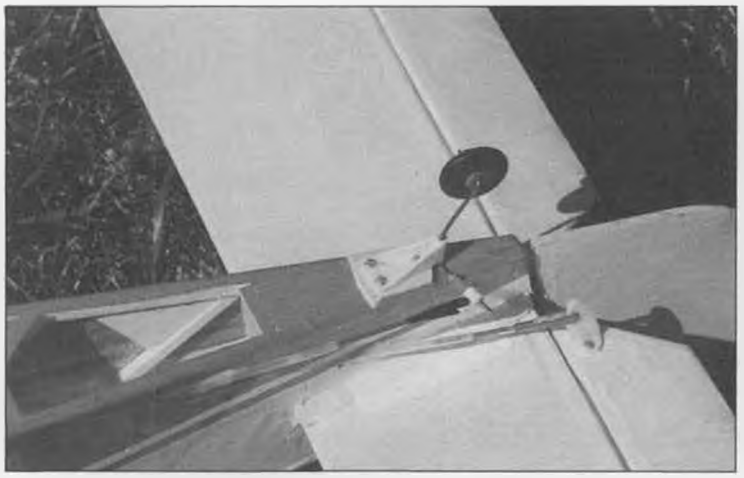
Be sure you have a couple of degrees of washout for a gentle stall. If you didn't build it in, you can still get it with your heat gun by



The two wing attachment dowels in the fuselage slip into these plywood hold-down fittings in the wing leading edges. Trailing edges are secured with 8-32 nylon screws.



Nylon retainers hold the landing gear in place . . . easily removed for transport or for straightening, in the event you somehow manage to bend those stiff 5/32" struts.



Author recommends using a separate pushrod to the tailwheel to relieve strain on the rudder hinges . . . a good idea, although it does add a bit of extra weight. Battery cooling air exits from the uncovered bottom bay just ahead of the stab.

No worries about an "engine out" on this twin! Touch-and-go's and landings are a real pleasure with no tendency to groundloop, thanks to the wide-tread landing gear.

Battery Installation

Before covering the airplane, it's a good idea to figure out where the motor battery will be placed and how to support it. This is also a chance to make a rough balance check, realizing that the motor battery largely determines the C.G. location. One approach is to build a 1/8-inch balsa box to hold the 16

ler and a heat sink on the bottom of the fuselage.

Covering

Micafilm was used but any lightweight film covering would be acceptable. The hinges are made from two strips of the covering ironed on full span of the control surfaces. Use your iron to join the covering

twisting the wing panels. Recommended control surface throws are: rudder: 1 inch, elevator: 1/2 inch.

Make your usual radio check with the transmitter antenna down while someone holds your model with the motors running. Depending on your setup, you may encoun-

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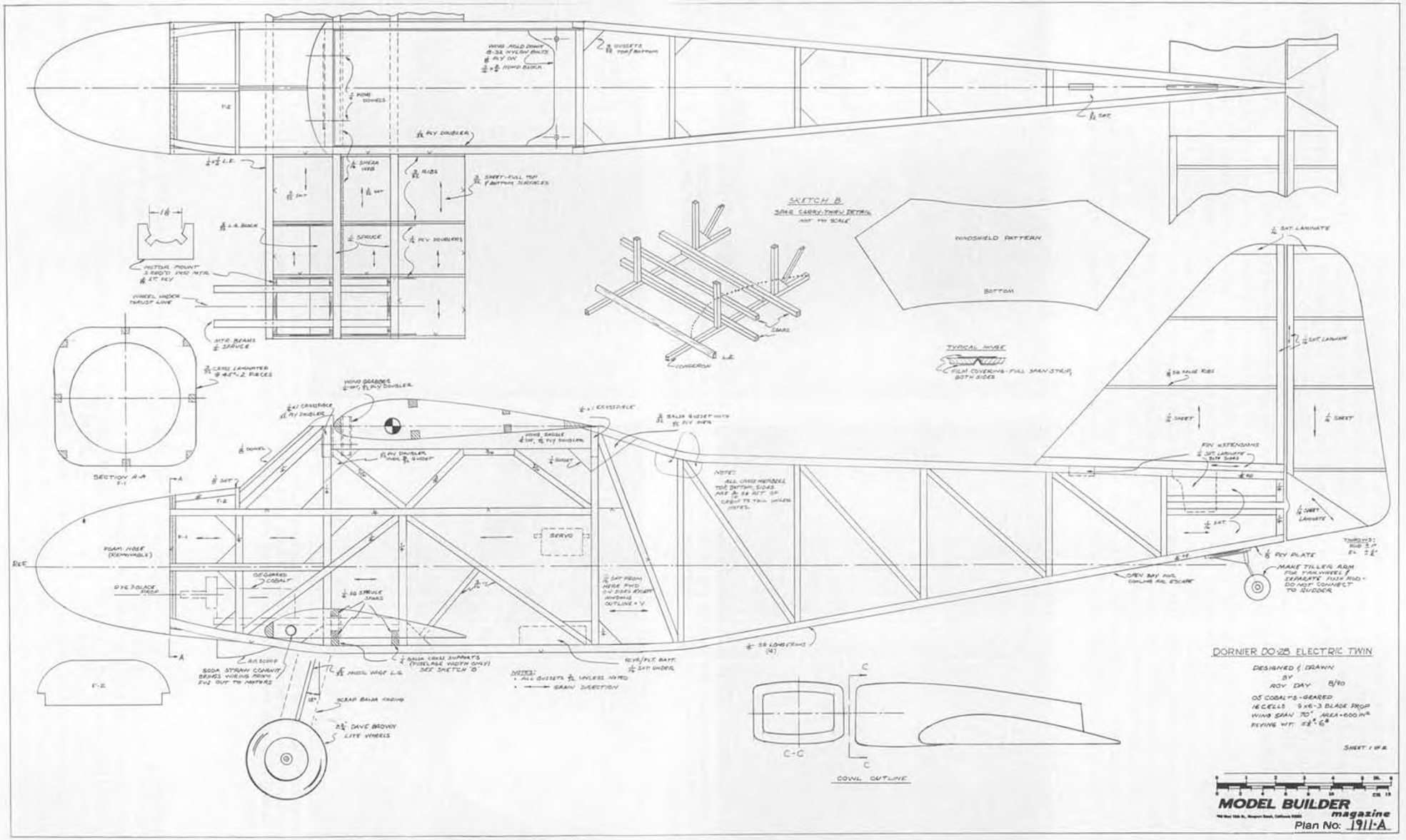
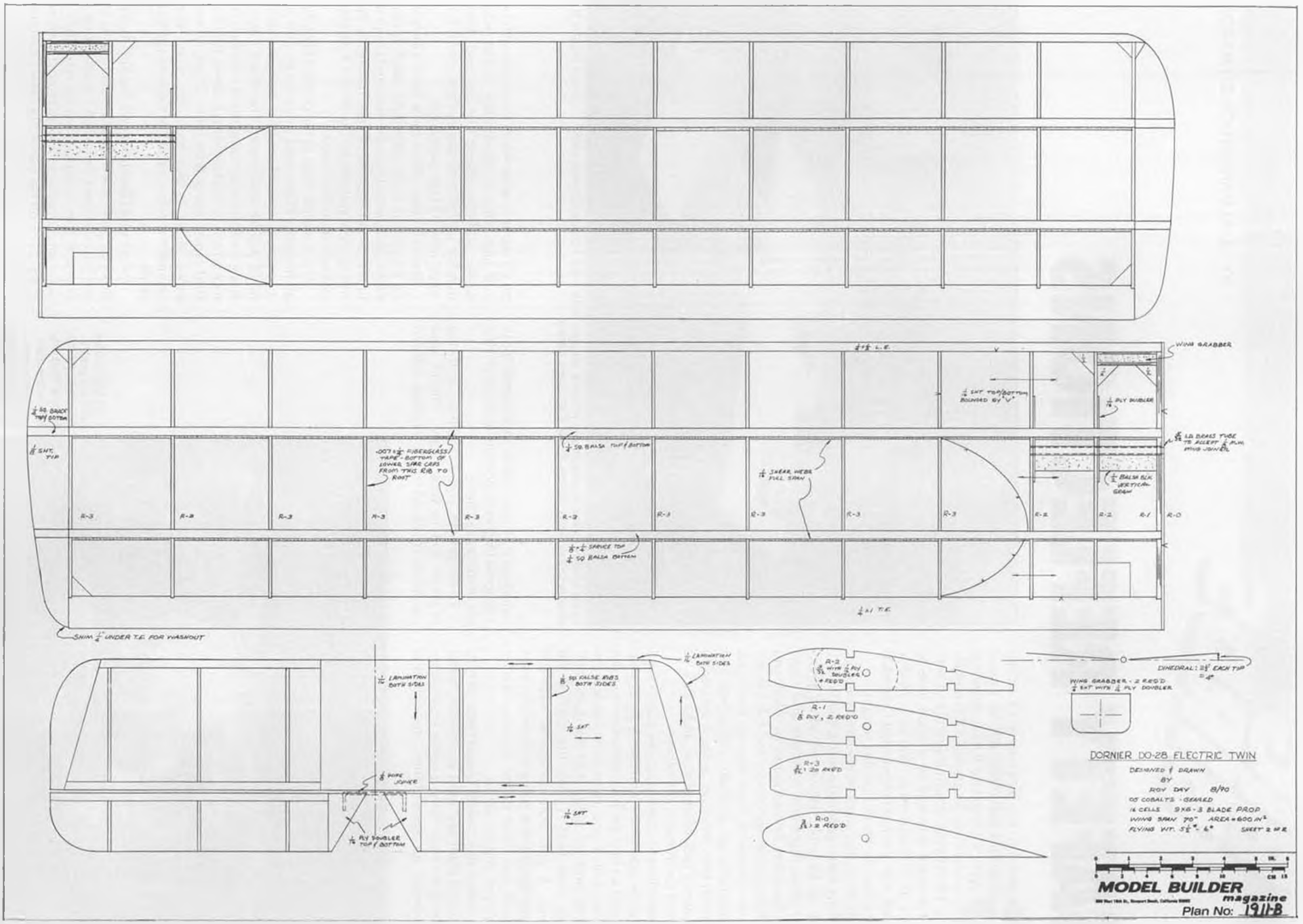
PLANS ON NEXT TWO PAGES.


SKETCH B
SPAR CARRY-THRU DETAIL
NOT TO SCALE
WINDSHIELD PATTERN
BOTTOM
TYPICAL HINGE
FILM COVERING - FULL SPAN STRIP, BOTH SIDES
SECTION A-A
SERVO
SCRAP BALSA HERE
DAVE BROWN LITE WHEELS
COWL OUTLINE
DORNIER DO 28 ELECTRIC TWIN
DESIGNED & DRAWN BY
ROY DAY 8/90
05 COBALT-S-GEARED
16 CELLS 9 x 6-3 BLADE PROP
WING SPAN 70" AREA = 600 IN²
FLYING WT. 52 - 56 OZ
SHEET 1 OF 2
MODEL BUILDER magazine
Plan No: 1911-A


WING GRABBER
1/4 SHT TOP/BOTTOM BONDED BY "V"
1/16 PLY DOUBLER
1/8 SQ BASS TWO BOTTOM
1/8 SHT. TYP
.007 x 1/2 FIBERGLASS "HAT" - BOTTOM OF LOWER SPAR CAPS FROM THIS RIB TO ROOT
1/4 SQ BALSA TOP/BOTTOM
1/4 SHEAR WEB FULL SPAN
1/8 BALSA BLK VERTICAL GRAIN
1/4 SQ BALSA BOTTOM
1/4 LAMINATION BOTH SIDES
1/8 SQ FALSE RIBS BOTH SIDES
1/4 SHT
1/8 PIPE JOINER
1/16 PLY DOUBLER TOP/BOTTOM
SHIM 1/4" UNDER T.E. FOR WASHOUT
DIHEDRAL: 2 1/2" EACH TIP = 4"
WING GRABBER - 2 REQ'D 1/2 SHT WITH 1/16 PLY DOUBLER
DORNIER DO-28 ELECTRIC TWIN
DESIGNED & DRAWN BY
ROY DAY 8/90
05 COBALTS - GEARED
16 CELLS 9X6-3 BLADE PROP
WING SPAN 70" AREA = 600 IN²
FLYING WT. 5 1/2 - 6#
SHEET 2 OF 2
MODEL BUILDER magazine
Plan No: 1911-B

BIG BIRDS

BY AL ALMAN/BRUCE EDWARDS

SAFETY REFLECTIONS

Greetings, Big Bird lovers. Our chief Big Bird columnist still isn't quite up to snuff so you'll have to put up with Uncle Bruce again this month.

The 1990 flying season is just about over and I thought it would be a good time to reflect on this past year. You've probably noticed from my last column that I attended quite a few fly-ins during this season,

One thing that stuck in my mind was that Big Bird fliers generally are a pretty safe group to fly with. However, some pilots forget their flight-line manners and cross over the safety line required by AMA and IMAA to protect spectators and folks in the pit area preparing their aircraft for flight. Occasionally we all make a boo-boo and cross that line, however doing it frequently indicates a lack of discipline and a lack of concern for the safety of others.

Remember to make your low passes well on the far side of the runway. A good, safe pilot will try to make his turns away from the runway, but if you must turn toward the runway and pit area, start the turn well before your bird is over the end of the runway. If you wait till you're over the runway the plane is going to come out over or much too close to the pit area exactly where you should not be.

It seems that safety inspections vary a great deal from one area to another. Some fly-ins don't even have a safety inspection. Remember, an airworthiness inspection is *mandatory* at any IMAA sanctioned fly-in and some mighty important items are on that list of things to check.

Great shot of Crash Evanson and his wife Maggie, with their *1/2-size* Cassutt racer . . . a real biggie! It dwarfs Crash, who stands about 6'-4" in his socks.

To begin with, you should have an ID tag of some sort in your plane. Should your model be involved in an accident without an ID tag in it, your AMA insurance will be null and void. So remember to put your name, address, phone number and AMA number in that bird somewhere (AMA has some nifty ID tags available).

Second, every clevis must have a keeper to prevent it from spreading open under flight loads, which can be extremely high at times. Small lengths of fuel tubing or the spring keepers made by Du-Bro for 4-40 size clevises should be used.

Third, a once-over of the plane, checking all hinged surfaces and stress areas, will go a long way toward insuring that your next flight will be a safe one. The Puget Sound Rocs like to have a look at servo installations too, which isn't a bad idea. It seems that Big Bird types, along with other RCers, sometimes forget to put back the screw that secures the arm or wheel to the servo output shaft.

I was Event Director of two Big Bird fly-ins this year, and on the first one decided to let the pilots inspect their own aircraft using a checkoff sheet supplied by the host club. I was rather dismayed to watch most of these guys check off the list without even examining any part of their planes. Not too surprising that we had a number of crashes and

Tom McQuiston built his pretty Fairchild PT-19 from a Pilot kit. Has more than enough power with a Supertigre ST-2500 up front.

some birds that turned into dogs in the air.

Come the second fly-in, I inspected every plane myself and found eight with no keepers and a 30-pound FlyBaby with no keeper on the rudder clevis. They all flew safely after having keepers installed.

It seems to me that everyone should know enough not to drink anything with alcohol in it during any flying session, but there's always at least one person who thinks that rules don't apply to him. If you're running the show or hosting it, always remind the pilots that no alcohol is allowed during flying hours.

doesn't sport them. But regardless of the manufacturer, an ungraceful, heavy-handed landing will mess up retracts and make them look like metal pretzels. If you're planning on using retracts you'd best get to know your plane extremely well and sharpen up those landing skills, or plan on spending considerable time at the workbench trying to unpretzel those struts.

The implementation of rules for Big Birds over 55 pounds was a good idea, but there are other factors that will probably keep the number of these much larger models fairly low. One is the time it takes to build these

prevail. To restrict research and development of *any* phase of modeling diminishes all modeling. Without R&D we wouldn't be able to enjoy our hobby as we know it.

I couldn't make it to the IMAA Festival of Giants at Oshkosh in June, but I did get to the IMAA West Coast Regionals at Crows Landing Naval Air Station in California on September 1-3 . . . and had one helluva good time. It was well attended and so well run that there was hardly anything to complain about.

I had just set up my plane and was preparing to shoot a couple of rolls of film of other

Al Cybulski and his 12-pound Corben Baby Ace, powered by an O.S. 1.20.

Here's Don Weidner with his "Acrobat," a joint venture by Don and his buddy Floyd Crawford. Ship's a real barn burner at only 12 pounds with Supertigre ST-3000 power.

Some of the major concerns during the early years of Giant Scale were how large and how heavy planes could or should be. I saw untold types of Big Birds this summer and it seems that sport-type models are in the 18-25 pound range while WW II Heavy Iron comes out between 25-45 pounds. All these figures are general and the old rule about building light and true is still sound advice, regardless of the size model you're building.

It appears that retracts have really come of age because you can find nary a warbird that

biggies. Unless modeling is your sole business, an over-55-pounder could take several years from research and drawing plans to her maiden flight. Another is the means of transporting this size bird . . . and, of course, the materials list is gonna cost more. And last, but not least, is the problem of where to store such a huge beast regardless of how many pieces you can break it down to.

As I remember, there was quite a large number of modelers dead set against Big Birds about 12 years ago, and I'm sure glad that that kind of reactionary thinking didn't

planes and pilots (to cover the event for *MB*) when a stranger came up and started asking questions.

It turned out that he and five friends were full-scale glider pilots who usually flew at Devil's Canyon. All six of them had come to watch this regional fly-in and find out what they could about Big Birds. They wanted to set up their shade tent and spend the day but weren't sure if they were welcome on the flight line.

Well, since it was such a hot, sunny day

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Attractive Stampe biplane is the work of Jim Hess and John Raffaele (that's John in the photo). Model was built from a Precedent kit and performs beautifully at 19 pounds with an Enya 1.20.

T-170 by Bob Button spans 96 inches, weighs 18 pounds and is more than adequately powered by an OPS 1.8.

Products I·N U·S·E

RCD's New Platinum Receivers

BY STU RICHMOND

THE BEST WAY TO NOT PAY YOUR 1991 "R/C CRASH DUES" IS TO UPGRADE YOUR RADIO EQUIPMENT! The most *cost-effective* way to upgrade appears to be by buying one of this month's RCD review receivers.

The Central Florida RC Think Tank has been closely monitoring the progress in RC equipment manufacturing. We're grateful for some very important help that's come from the various manufacturers and from the AMA's RC Frequency Committee that's headed by George Steiner. Bob Benton, Dr. Ted Noel and I are actively flying RCD receivers. Herman Perez, the RC Think Tank's high-tech electronics R&D member, is mostly flying an Airtronics VISION system, and Ed Stone, who's our NASA retiree, is mostly flying upgraded Kraft equipment. We fly in the busy radio frequency airwaves near Orlando and use mostly six flight stations simultaneously. Of interest is that a major radiotelephone manufacturer has chosen Orlando to field test a new generation of future equipment . . . because of the area's extremely dense RF activity. Also, the AMA Frequency Committee did their initial "1991 testing" in the Orlando area . . . everything they tested in the closely spaced 1991-type equipment worked under severe test parameters . . . without so much as a single glitch!

There was an RCD receiver included in that batch of tested equipment. Further data indicates the RCD Platinum AM (amplitude modulated) receiver which carries "MODEL No. PGP 21AM" printed on the back side of its case is THE BEST SINGLE AM RECEIVER AVAILABLE at the time this is being typed in September 1990. The same source indicates the RCD Platinum FM (frequency modulated) receiver which carries "MODEL No. PGP 31FM" printed on the back side of its case is THE BEST FM RECEIVER AVAILABLE . . . of all brands available! This is startling

Upper receiver was ordered to replace a 1991-listed original equipment receiver that consistently glitched in "adverse RC flying conditions." It's RCD's AM unit. Lower receiver was ordered as the nucleus of a second airborne system working with an Airtronics PCM Vanguard . . . and it's an FM unit.

data . . . and due to brand loyalty you may want to take exception to what the Central Florida RC Think Tank feels . . . but our actual inflight test results bear out our opinions! Or you may swear your favorite RC system has never glitched, twitched or failed you in flight . . . and be totally correct. As long as you fly alone and in a remote area you should expect older less sophisticated equipment to work forever . . . or until it has an internal failure.

We RCers are being allowed to use many more frequencies to enjoy our hobby. By making our transmitters so they use a tinier section or width of the assigned radio band, many more frequencies are fitted into that band width. Most of the transmitters (other than the least costly ones) made since 1988 when we knew narrow banding was coming, are already 1991-ready . . . they are true narrow band transmitters. Some of the others can be narrow-banded and usually signal strength is not lessened. But the matching receivers have been another issue, in many cases due to higher parts counts and higher related costs. In 1988, it was rumored the coming ceramic filter component alone might cost over $50 and that receivers would most certainly require this expensive part. If you look closely at the photo . . . you'll see the ceramic filter in the AM RCD receiver is marked "LF-H6SC 97" and marked "LF-H6SC 91" in the FM receiver . . . the RCD receivers cost $69.95 each!

With a replacement cost like this you simply can't afford to risk flying a receiver that's not currently listed by part number in the data page of *Model Aviation Magazine* . . . these RCD receivers have been listed on that page for many months. While flying from one of our six busy flight stations recently, club member Bruce Wedland was landing his Super Tigre .61 powered Ugly Stik from the left . . . Bruce was two stations to my right . . . I heard the engine speed up as it flew past my peripheral vision . . . the ground shook with the impact . . . the loss was total and far exceeded the $69.95 RCD Platinum receiver cost. This identical incident is occurring over and over. There's no magic deadline beyond which your own RC system may act like Bruce's . . . for safety's sake you must update *NOW!* It'll be mid to late 1991 before the manufacturers receive crystals for the coming, new in-between frequencies . . . and when these new units come into use, the poor selectivity of original equipment older receivers like Bruce's will become a more frequent disaster-in-flight for those who don't have upgraded receivers. Bruce now wishes he'd upgraded with an RCD receiver and saved his Stik, Super Tigre and the servos!

We thought you'd enjoy Herman Perez's comments on the RCD receivers as follows: "Two crystals are used for the double conversion . . . the third crystal may be to closely control the 455 KHz IF frequency, but that'd be overkill . . . maybe they're combining two crystals to achieve some other internal frequency . . . double conversion plus a ceramic filter is pretty good stuff . . . it's not a triple conversion receiver . . . I don't think this is a typical superhet design . . . it's got a bunch of tuning things . . . without a schematic it's hard to tell what they're all for. . . it's all standard components . . . the receiver should be repairable . . . they're pretty small and they're using regular parts . . . surface mount technology would further reduce (the receiver's) size, but is there a need for any-

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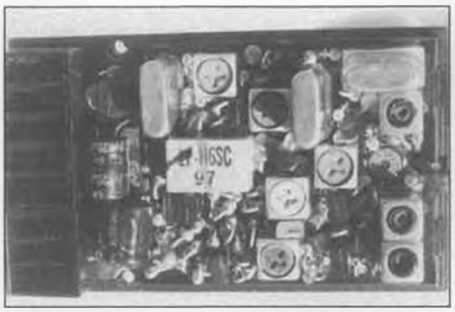
Model numbers are PGP-31 for FM use and PGP-21 for AM use. Both receivers are listed in the approved 1991 equipment page of *Model Aviation* magazine.



Close up of the RCD AM receiver shows at least eight tuning points. The IC is nearest the servo plug-in points and has two large capacitors attached to filter the voltage supply. The two capacitors virtually obstruct the camera's view of the IC.

The RCD FM receiver uses a Signetics and a Motorola integrated circuit. Both have their supply voltage filtered by a piggybacked oversize capacitor. Both receivers use common components but superior design yields superior performance. Price is very affordable!

Severest test of the RCD AM receiver (shown here in its foam rubber sleeve protection which comes with each receiver) came in R/C Think Tank member Bob Benton's high current drawing electric flier. The original equipment's FP-R114H (1991-listed) receiver was not glitch-proof in this model.

Stu chose the Airtronics-compatible RCD FM receiver as the heart of an extra airborne RC system working from his same Vanguard PCM transmitter . . . he now flies two different models from a single transmitter by switching from PCM to PPM as needed. Very cost-effective.

The Ft. Lauderdale area has little pink prehistoric monsters running around their flying field . . . they even love to ride on pink and/or red racing model airplanes . . . they are light and don't unbalance the models as they go around the pylons during the races. We tried to feed the tame little guys . . . they'd sip on Lite beer only, but shunned potato chips and hot dogs. Finally we tried feeding a pre-1991 receiver to one of them . . . we found they LOVE to chew on old prehistoric pre-1991 radio equipment. I predict if we all fed our old radio junk to these cute little guys our models would fly better, safer, faster . . . and these cute li'l guys will multiply around ALL RC flying fields.

R/C SOARING

BY BILL FORREY

17TH ANNUAL FALL SOARING FESTIVAL

The Fall Soaring Festival has been called by model industry sponsors the "Tournament of Champions" of radio control soaring. Indeed, it carries that same prestige among western glider guiders, and it attracts many of America's best pilots. No other event, including the AMA Nats, is anticipated with more enthusiasm or more commitment by its participants.

Almost from the beginning, the Central Valley Radio Control club (CVRC) of Visalia, California, has had to limit the number of entries to this event due to its extreme popularity. Invitations are sent out every July to past participants and all new fliers who have requested to be placed on the CVRC mailing list. It is a small list when you compare it to the tremendous number of competition fliers in the western U.S., but it's more than adequate. Participants typically come from as far away as Utah, Arizona, Nevada, Oregon, Washington, and even Oklahoma.

Entries are not accepted before an August 1st postmark, nor are they accepted beyond an August 15th postmark. Historically, entries have to be cut off when they reach 150, a number usually reached in a few days. An unusually low 10% dropout rate is then gambled upon by CVRC to make it a manageable group of fliers. This year, 150 entrants had their envelopes postmarked August 1st! Imagine 150 glider guiders rushing out to the post office on a single day to sign up for a chance to fly in a single two-day, Unlimited Class soaring contest! That's a phenomenon more amazing than the AMA Nats.

(1) Shawn Lenci and his very new Dodgson Designs Saber. This is a red-hot supership worth serious consideration if you're in the market for a new contest sailplane. See text for our columnist's impressions. (2) The three aileron equipped Airtronics Legends entered all finished in the top ten. From left: Chris George (7th), last year's winner Fred Weaver (4th), and Ed Holder (9th), with Tim Renaud holding the model for this photo). Kits should be on your dealer's shelves by now. (3) Ed Holder applies body English in a last ditch attempt to move his Legend over a few inches into the landing rectangle (lines barely visible). (4) Fred Weaver launching his Legend. Note that the flaps are dropped for a steeper climb. (5) Chris George and his beautifully covered Legend. Chris substituted 1/4" solid fiberglass rods from a typical kid's bicycle safety flag for the much heavier stock steel wing joiner rods. Haven't failed yet!

This year CVRC accepted 188 fliers, thinking they could handle a few more fliers and thinking the dropout rate might be a little higher. Well, more fliers than ever before, 173 to be exact, recorded flights during the meet, making it the biggest ever, and that's a dropout rate of only 8%! In the words of one of the organizers, Steve George, "When they sign up for the Festival, they are serious about coming."

The Festival's popularity stems from many areas. For one thing, the CVRC knows how to organize and run a big meet, and does it more efficiently than any other club in the U.S. (that's *my* opinion). When you go to the FSF you fly eight times in two days against the best fliers in the U.S. Even if there are 173 entrants, the contest ends at about lunchtime on Sunday so most people can get home before dark. It's a better test of man and machine than the Nats, where this year

(for example) the Unlimited Class was determined by only two flights of fewer fliers.

They have a field that the club leases, maintains, and improves literally by the sweat of their brows (it's not a public park). They have installed underground AC power lines for lighting, PA systems, electronics, and winch battery charging. They have speedy computerized scoring with results posted after each round, these, courtesy of "Stretch" Collins (thanks Stretch!).

They have installed their own irrigation system and pay for their own water to keep things green in the landing, camping, and pit areas. They have tractors, mowers, and a tool shed for groundskeeping and winch storage. They have five permanent concrete and steel elevated turnarounds and winch pedestals with AC outlets that make perfect winch setup and alignment automatic, and constant winch battery charging is a breeze. They have line retrievers to really speed up the launching, and a Marshal Searcy to make sure you are there to launch.

They have free onsite overnight camping with water and the world's cleanest pink (girls) and blue (boys) port-a-potties that help cut the costs of attending the meet. They have a super onsite Saturday evening catered barbecue dinner with free George Brothers wine and live entertainment. It's a party!

They have the biggest industry and community sponsored raffle this writer has ever seen, featuring at least six radio systems and dozens of expensive kits and other modeling supplies, plus household and gardening items and even one free vasectomy by a qualified doctor! (You should have heard the laughter when a young mother carrying a toddler came up to accept the envelope . . . and then called out for her husband!)

Most importantly, CVRC attracts the world's most friendly modelers and their families, year after year. It is a soaring event without equal in the world!

If you have never attended the Visalia Fall Soaring Festival, I hope by this lengthy introduction that you have been given at least a small taste of the kind of spirit that surrounds this meet. If you wish to experience the FSF personally, I would recommend that you write to the CVRC in care of Marshall R. Searcy, P.O. Box 1508, Porterville, CA 93258, to be placed on the mailing list.

(1) The fourth Legend flown was Col. Bob Thacker's early prototype, which had flaperons on its center panels and aileron-less polyhedral tip panels. Not as maneuverable as later aileron versions. (2) Brad Clasen finished in 1st place at this year's Fall Soaring Festival flying a Falcon 880. Here he holds a two-meter version called a Falcon 600, a new design from Flite Lite Composites. (3) Count 'em, 27 Falcon 880s and 800s! And at least three had already been put away when this shot was taken after the close of the meet. In two years this design has caught on like no other since the Sagitta 900.
(4) Bob McGowan took 3rd place with his favorite Falcon 800. He prefers this 100-incher over the more common 112-inch 880 because it's easier to hit landings with it. Little Robin McGowan looks on with approval. (5) Todd Billman looks over John Bitzberger's original design Vector. Todd also had a Vector but it was totalled in a crash shortly before the meet. Wing is C/F cloth over blue foam cores. Definitely a supership.

WHAT WAS FLOWN AT THE 17th FSF

According to the feedback I receive, this is the most interesting and important subject to you, my readers. Contests of the size and nature of the Fall Soaring Festival give an excellent status report on the American state-of-the-art in RC soaring. If you want to know what's "hot" on the high performance hit parade, this is where you look.

First, I must acknowledge the tremendous impact that Michael Selig, John Donovan, and David Fraser have had on modern sailplane design. Their one-inch thick technical journal published by Herk Stokely, called *Soartech #8, Airfoils at Low Speeds,* has helped foster another quantum leap in the advancement of RC sailplane design.

Soartech #8 is the published account of over two years of sophisticated wind tunnel testing in the low speed tunnel of Princeton University by these three gentlemen. Many of the Selig, Selig-Donovan, Fraser, Eppler, Quabeck, Bame and other airfoils of similar importance to model builders were tested and reported for our benefit in matching the best airfoil for the desired soaring task.

A growing number of sailplanes being flown on today's contest circuits use the advanced airfoils found in this journal (and in the Airfoil of the Month feature of this column). Faith in the anticipated benefits of fully sheeted wings and the best airfoils has motivated many modelers into creating a new breed of high performance sailplanes.

More modelers are going to foam core wings with balsa or vacuum-bagged composite skins than ever before . . . and are discovering that these building techniques are not as difficult as they once seemed. They are discovering that these "superships" really do have the performance improvements they desire.

Looking at the final results, I can identify the top ten finishers as all flying aileron

ships. I am 95% sure that the top 19 fliers all flew aileron ships as well. This is a definite departure from past meets.

Ailerons and flaps are becoming more accepted as the best way to control a contest glider in the greatest variety of weather conditions. More kit designs are being offered today which demonstrate this new performance level. They are not difficult to fly, and these kits make building a supership easy enough for the average modeler.

Right about now, I can just see Bob Dodgson sitting in his favorite easy chair in his home in Bethel, Washington, and saying out loud, "That's what I've been saying for almost twenty years!" True enough, Bob. Your kit designs have always been sleek, efficient, and equipped with either ailerons or flaperons since 1972. However, good ideas aren't necessarily popular ones, and some modelers still prefer the easy, hands-off spiral stability that most polyhedral wing designs provide. But the times, they are a-changin'.

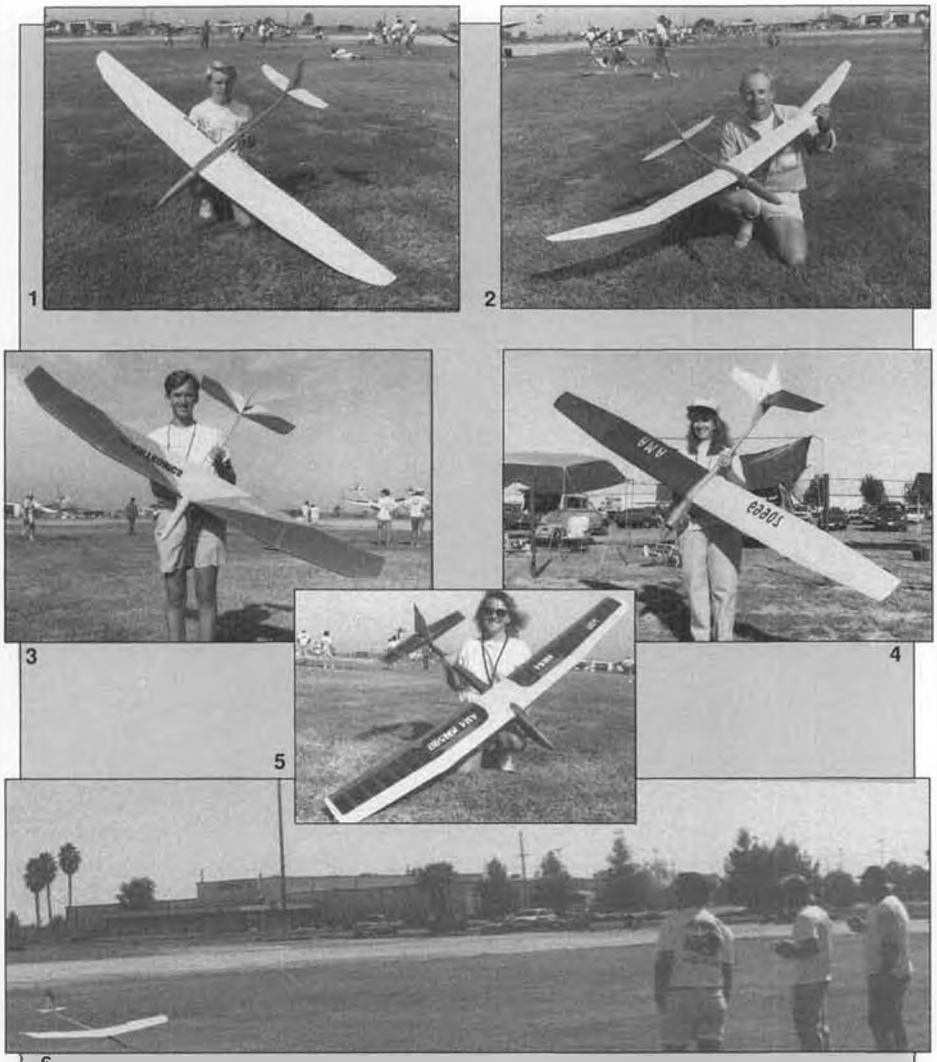
One additional explanation for the explosion of supership designs is the availability of computerized mixing of control functions. New radios like the immensely popular Airtronics Vision VS8SP, the new JR Propo X-347 and the new Ace Micropro have opened up supership flying to all who appreciate the nearly unlimited adjustability, mixing, and ease of setup these radios provide.

So, what exactly is this new breed of superships? I'll give you three examples which were seen at the FSF. They are all readily available from the manufacturer directly or from your local hobby shop. Yes, there are more out there than just these three, but let them be for another time.

First, because I've already mentioned Bob Dodgson, let's look at Dodgson Designs' latest offering, the Saber.

Here is the newest of the superships. As of this writing there are only three Sabers flying in the whole U.S. One of these three was at Visalia and belonged to Shawn Lenci of Escalon, California, and the Modesto RC Club. Based on what I've seen, there will no doubt be many Sabers flying all over the place in a year or two as it is an excellent soaring machine.

Dodgson, in his own inimitable style, has declared the Saber "A Cut Above." The claim is a statement of fact, even if it is a little immodest. I got a chance to fly Lenci's Saber after the FSF was over. I was very impressed with it.



(1) Blayne Chastain's "Team Montage" 100-incher, a Falcon 880 fuselage with original C/F skinned blue foam core wings. Described in text. (2) Roger Chastain and his somewhat unusual two-meter design. Features all-composite structure, polyhedral and ailerons and flaps. (3) Young Jason George flew a highly modified Airtronics Sagitta 600. The three-piece wing resembles a Legend with flaps and ailerons, even removable tips. Fiberglass wing rod joiners help save weight. (4) If you were a glider flier ten years ago, you probably remember Joan Nolte, former W.I.N.G.S. member and current Sacramento Valley Soaring Society member. The kids are grown now, so we'll be seeing her again. Glider is a hybrid: Sagitta stabs, 100-inch Aquila planform wings, and a Zingu fiberglass and Kevlar fuselage. (5) Sweet sixteen and smilin' pretty, Robin Olsen of Chino Hills flew this original design two-meter Gemini MTS. (6) Steve Clasen (5th) lost a 4th place flyoff to Fred Weaver when his landing was a few inches farther out and less perfect. It's a game of inches!

The Saber has excellent ground covering ability and excellent thermalling ability combined with excellent handling. Even though Shawn had only a day or two before the meet to sort out the various settings and throws through his Vision computer (the plane was that new), he nailed it down rather well.

My flight with the Saber went like this: I was handed the transmitter while the Saber was in an area of "zero-sink" air to the windward side of the launch area. While I worked the air looking for a core to this weak thermal, I soon realized that the Saber had no bad handling habits.

One minute later, someone, I think it was Dell Henry, made an announcement about the closing of the transmitter impound. Since my Vision was there, I asked Shawn to retrieve it for me. Seeing that the air wasn't very good and was probably beginning a down cycle, Shawn was noticeably uneasy about leaving me alone with his brand new, not-really-proven-yet Saber. I think he ran both to and from the impound!

While he was away, I began an upwind search for better lift. I didn't see any lift directly upwind (west), so I turned left and traversed the sky to the south. Nothing was found there either, so I turned left again and headed east toward the landing area. The Saber slowly lost altitude. My next plan was to set up for a landing and see how the Saber handled this inevitable maneuver.

I was getting very low (maybe 75 feet?) as I cleared the pit area. It was then that I felt the breeze pick up and turn cold. My first thought was that there was a thermal sucking up cold air from some point downwind of my position. I abandoned my landing pattern and began a slow, flat-as-possible circle of the downwind area. It was a bit of a gamble at

that low height, especially with an unfamiliar plane.

Halfway into the search the plane's sink rate seemed to diminish, then stop. I tipped the Saber into a tighter circle and began observing two things. First, I had to ask myself, was I confident that the Saber wouldn't surprise me by tip stalling or doing anything rash? The answer: I was confident it would not. I was pulling pretty hard and the Saber was simply responding. Nothing scary or weird was happening. I also noticed how little corrective opposite aileron was required to maintain the bank angle I wanted. Nice handling, this is good, I thought.

Second, where was the thermal's core? Three circles later at the same altitude, the Saber rose, weakly, on the far side of the circle. Thornburg's Rule about not leaving weak lift was proven again. I recentered the circle farther out and soon the Saber was climbing strongly, like a Paragon.

I couldn't help thinking how easy the Saber made this low altitude "save" feel, and how comfortable I felt flying the Saber. I was pretty high (literally) when I decided I'd seen enough. I didn't even think about landing the Saber—flying it was too much fun. I let Shawn have the transmitter back, and left him with the recommendation that he not change a thing on his sailplane.

(1) The mystery flyoff quartet. Was it a four-way tie for 1st? Nobody knew until it was all over. Two-way ties were for 4th and 8th places. Two Legends, a Falcon 880, and a Dodgson Camano. From left: Fred Weaver (4th), Ed Holder (9th), Steve Clasen (5th), and Todd Billman (8th). (2) 4Bob Dodgson sold Windsong #1 to Dave Darling of the Modesto club. Dave says it still flies great! (3) Keith Finkenbiner and Dean Clark of the North County Clouds have been working together on this Falcon 880 with drag-cutting modified NASA shear tips. No dihedral, just plenty of sweep. Hasn't flown yet, but will shortly. (4) Lowell Norenberg of the SFVSF club holds his original design pod-and-boomer derived from a Mike Bame F3B fuselage pod. Looks like a nice handling machine. (5) Joe Rodriguez of Riverside's 155 club and his original design based heavily on a Zephyr. Not your run-of-the-mill polyhedral floater!

This flight reminded me of my first encounter with Dean Aldinger's Falcon 880 the year before. I was impressed then, too, only this time it wasn't near sunset, there was lift, and the flight was much longer. My personal opinion is that the handling and performance of the Saber is every bit as good or possibly better than the Falcon 880.

I must say however, that my own Falcon has been flown even less than Shawn's Saber, and it needs more dialing in. It's a very close call.

The Saber is quite a bit different than anything Bob Dodgson has offered before, and is different than most other superships as well. For one thing, the "taco shell" fuselage is gone in favor of a more conventional full-shell, prejoined polyester-glass design. Good move. The new fuselage assembles much quicker than a Lovesong's.

The new enclosed fuselage means that all those fancy A.F.A.R.T. mechanical linkages we usually see in Windsongs and Lovesongs are now gone (more time saved). Bob recommends using the new generation computer radios for the Saber. All control mixing is done in the transmitter with each surface driven by its own dedicated servo mounted in the wing or under the canopy. This is pretty standard fare for a supership.

The wing skins are now obechi wood instead of balsa wood. Full-size obechi sheets means no more splicing of four-inch balsa sheets. The Saber's wing skins are seamless. More time saved, again. Overall, Shawn said the Saber goes together in about half the time of a Lovesong, and I believe it.

Finally, I believe that no other supership is using the new SD7037 airfoil. This is perhaps the best thermal section ever designed for model size aircraft. It is a very low drag, 9.2% thin airfoil which appears to fly faster than an E214, yet can thermal and cruise every bit as well as the E214.

The specs for the Saber are: 121 in. span, 1030 sq. in. area, 78 oz. flying weight, 14:1 aspect ratio, SD7037 wing airfoil, SD8020 horizontal stab airfoil, carbon fiber reinforced wing spars, 3/8-in. wing joiner rod, and a price tag of $295 plus $15 shipping and packaging (three boxes). There are quantity discounts of 5%, 10% and 15% off for two, three, and four-plane orders respectively. Contact Dodgson Designs directly, at 21230 Damson Rd., Bothell, WA 98021, (206) 776-8067.

Next on my list of superships is the all new Airtronics Legend. As of this writing the most up-to-date info I have about the availability of Legend kits is that they should be released (for the first time) during the third week of October 1990.

The Legend has undergone some design changes since its unveiling a year ago, and these have necessitated more prototypes and testing to be sure they were indeed improvements on earlier prototypes. They were. The whole process is reminiscent of the old Orson Welles wine commercials

where Orson insists, "We will serve no wine before its time." And it would appear the time is NOW for the Legend. The three aileron Legend prototypes took 4th, 7th, and 9th places—three for three in the top ten!

There are several things which set the Legend apart from most other superships: wing structure, wing planform, and empennage design. These differences allow the Legend an opportunity to tap into the more traditional glider market with a contemporary supership design.

The wings are built up from machine sanded balsa ribs in the traditional Airtronics style, then sheeted over completely on the top surface. This takes maximum advantage of the highly competitive Selig 3021 airfoil. The bottom surface is sheeted back to the spar only, as this airfoil is flat bottomed to the trailing edge anyway.

The spar inside the one-piece, bolt-on center panel is carbon fiber reinforced for the additional strength needed during the typical competition launch—elsewhere it is the traditional spruce, ply and balsa. The many thousands of Sagitta and Cumic Plus owners will feel right at home building a Legend.

Like so many of the best superships these days, the Legend features a modified Schuemann wing planform, i.e. multiple tapers of the leading edge with a straight trailing edge. The front view of the Legend reveals four dihedral points (two per side), which give the Legend both a measure of spiral stability in a banked turn and its almost elliptical wing dihedral shape. There's nothing else like it.

At the aft end of the sleek looking molded epoxy-glass and Kevlar fuselage rides the Legend's T-tail. This is another distinguishing feature of the Legend. It has a fixed stabilizer and moving elevator. This makes it stronger than the typical all-moving stabilator, and actually gives it more linear and more powerful control authority.

There were four prototype Legends at Visalia, two more than last year. I was given the opportunity to fly one of them belonging to Ed Holder of Fresno after the contest was over. Ed handed me the transmitter with his Legend looking very small in the sky and getting smaller.

I quickly got the feel for its handling and decided to fly the Legend down where I could see it better, and then find my own thermal. So, I put in almost full flaps and pointed the nose down. A safe move, but not exciting enough for Ed, who obviously wanted to demonstrate the Legend's performance envelope.

Ed asked for the transmitter back and said, "This is how it's done." He raised the flaps to neutral, put her in the same 45-degree dive and just let her fall. The speed build-up was rapid, yet nothing fluttered. About 1/3 the way down he pulled in a little up elevator to level her off and executed two consecutive rolls, then a short dive followed by a loop.

I was given the transmitter a second time and similarly executed a short dive and a single roll, just to see how much control input was needed to rotate those 113-inch, 997 square inch wings. At about 90% of total aileron throw it came around in about a count of five. Now, with the Legend back down to almost winch height, it was time for that thermal search.

It didn't take long to find lift. The Legend very clearly showed me it was entering a boomer just upwind of the launch area. Two or three circles later I was centered in the strongest part of the bubble and heading back up to "dot" country.

The trip up lasted only a couple of minutes, during which I got a very good feel for the Legend. It has marvelous aileron response, all the pitch authority you could want, and you can't accidentally mistake it for any other plane in the sky. It is definitely in the same class as the Falcon 880 and Saber in handling and speed range. It may even exceed them in climb rate due to its slightly lighter wing loading.

The Legend's specs are: 113 in. span, 997 sq. in. wing area, Selig 3021 airfoil, 49 in. fuselage length, 70 oz. flying weight, 10.2 oz. wing loading, and a four or more channel radio system required. The suggested list price is $249.95, but you could expect to pay somewhat less than this through your local hobby shop.

(1) Peter Rambo, of the Diablo Valley Soaring Society, and his no-name original with 1/32 rolled plywood fuselage. A beautiful scale-like model. Spans 100 in., 850 sq. in., S4061 airfoil, flaps and ailerons. (2) "Breakwind" hybrid is Pat Conway's creation; wings are Southwind, fuselage and stab are Gemini MTS. Saved 10 ounces by eliminating glass fuselage. (3) Underside close-up of Keith Kindrick's latest design with split flaps (bottom wing spoilers?) and ailerons. Servo holes were hatched over with frosted drafting mylar and Scotch tape—clean and simple. (4) Merv Smith's Cumic Plus on the way up. This design remains very popular with polyhedral wing lovers. (5) No doubt about it, the FSF attracts the best! Here is the U.S. FAI model sailplane team and their F3B ships. From left: Randy Spencer (TM, 63rd at FSF), Daryl Perkins (6th at FSF), Larry Jolly (27th at FSF), Norm Tibbs (Asst. TM), and Joe Wurts (2nd at FSF). Watch for future press releases regarding team support.

The third readily available supership would have to be the 112-inch span Falcon 880 and maybe its 100-inch Falcon 800 Standard Class brother. I gave you my rave review on these ships in last year's FSF report (January 1990 *MB*). The Falcon 880 hasn't changed significantly since then except to lose a few excess ounces.

I was so impressed with it last year that I bought one for myself, and that is what I flew this year. I felt comfortable with the Falcon design the first time I flew one. It's easy to fly and very confidence building. Who knows, given a little landing practice and fine tuning of the Vision's controls, I may even win a contest or two.

There were more Falcon 880's present at this year's FSF than any other single design—at least 30 by actual count, 27 of which ended up in the group photo I took after the meet. Falcons and Falcon derivatives took four of the top ten places (five if you count Joe Wurts' F/G skinned version), including first place. This is ample evidence that the Falcon 880's designer, Mark Allen, really has developed a winner in every sense of the word. Many believe it is the best performing and handling supership there is today.

The specs for the Falcon 880 are: 112 in. span, 880 sq. in. wing area, 14.25:1 aspect ratio, Selig 3021 airfoil out to the tip panels, Selig 3014 airfoil in the tip panels, 65-70 oz. flying weight, carbon fiber spars with balsa shear webbing, 1/16 balsa sheeting over white foam wing cores, 11/32-inch steel wing joiner rod, and built-up stabs and rudder.

Mark sells Falcons in two versions: a presheeted deluxe kit and a less expensive basic kit. Mark takes direct orders only, so if you want a Falcon, you will need to call him or write him at Flite Lite Composites, 466 Primero Court, Suite E, Cotati, CA 94931, (707) 792-9174. Sorry I don't have the current 1991 prices for you, but I haven't received them yet myself.

In the original design department there were a few very notable sailplanes present. Roger and Blayne Chastain (father and son) from Hollywood, California, flew a pair of carbon fiber winged sailplanes that were highly unusual.

Blayne's was a 65 oz., 100-inch, three-taper, aileron and flap wing glider featuring the RG-15 airfoil and a Falcon 880 fuselage. He and his dad both used 3/4 oz. fiberglass cloth and 4.7 oz. unidirectional, 12-inch wide carbon fiber tow for the skins, vacuum-bagged over home-cut blue foam wing cores! On the upper surface there was a second layer of C/F tow out 18 inches. (Aerospace Composite Products of Irvine, California, carries this very unusual width of C/F tow. Call 714-250-1107.) A Hans Mueller 1/2-inch solid carbon fiber wing joiner rod was also used. This joiner comes with its own C/F tubes for permanent gluing inside the wing panels. I don't think that ther was anyone at the field who had stronger wings than these two did!

Roger's plane was all the more unusual in that it was both a normal looking polyhedral plane AND a flap and aileron plane. He claims his SD7032, three-taper, bent winged sailplane will do axial rolls "like on a string" in spite of all the dihedral. He further claims it has no polyhedral wing "wiggle" when turning, and the ailerons are very effective to the dismay of all the doom-sayers who said it wouldn't work. Spiral stability is outstanding with all that polyhedral, as one would expect.

At this point, I'm going to have to let the photos and captions, results and sponsor list tell you the rest of the story of Visalia. I've written as much as I dare.

Drop me a line if you have something to share with the world of RC soaring. Bill Forrey, 3610 Amberwood Court, Lake Elsinore, CA 92330, (714) 245-1702, 6:30-9:00 p.m. PST. Thermals!

(1) Visalia's Central Valley RC fliers go all-out to provide the best anti-backlash 12-volt winches. Permanent winch pylons with AC outlets for the chargers keep the two batteries up to nearly full charge all day long. (2) Winch line retrievers allow launch-a-minute pace. They are a modified Davey Systems type with a starter motor that hangs by gravity on a pivot plate to maintain belt tension. Tension release handle at lower left. (3) Ken Adcock had fun with anyone who admired his skill with an air brush . . . make that a Pep Boys automotive decal set! Model is a Buzzard glass fuselage with Olympic II wings and stabs. (4) Norm Tibbs Engineering (1672 Los Osos Valley Rd., Los Osos, CA 93402) sells winch and glider accessories, including the nicest ball bearing turnaround our columnist says he's ever seen. AMA safety rule switch (right) and H.D. solenoid (left) are "must have" items. (5) Dean Aldinger's adjustable tripod Falco stand, which he engineered and made himself out of aluminum and foam rubber. Makes for much easier model setup.

Sponsor List for the Fall Soaring Festival

Please remember these sponsors when you are considering a new purchase of models or equipment: Airtronics, American Sailplane Designs, Culpepper Models, Flite Lite Composites, Futaba, Global Quality Kits, Great Planes Model Mfg. Co., Hobby Woods, Larry Jolly Model Products, Milo Model Products, Pierce Aero Company, Sheldon's, Top Flite, Visalia Hobbies, and Visalia's Hobby Den. ***MB***

BY FRANCIS REYNOLDS

HELLO, IS THIS REYNOLD'S NUMBER?

In the July/August issue of this wonderful magazine I gave you technically-inclined readers a fascinating little puzzle and promised a prize to the winner. The contest is still on, because I haven't received any correct answers yet! I've received some wrong answers, which didn't surprise me, because it is a tough little problem, even if it does sound basically simple. I am surprised that I haven't received any right answers so far, however.

The question, as you may recall, is, "Could a wind-propelled land vehicle, with a propeller-type windmill mechanically coupled to the wheels, travel directly into the wind, and could it travel downwind faster than the wind? I can't reprint the sketch of our machine that I showed you then, so I suggest you review MD&TS for July/August and have a look. Remember, the vehicle can be shifted into any gear ratio you want between the "windmill" and the wheels.

The contest rules specified that the first letter I receive with the correct answers and reasons why, is the winner. No phone call answers. In addition to one ten-dollar prize, I will publish the names of all of those who answer correctly.

I was in the middle of moving to a new home when that issue came out and the Post Office had the wrong forwarding address for awhile, so if you wrote and had your letter returned, send the letter again. Include the earlier envelope that couldn't find me, and you will get credit for that postmark date. My new correct address is 3802 127th Ave. N.E., Bellevue, WA 98005-1346.

I didn't originate the problem, but I found it delightful, and I'm sure some of you will too. It turns out that one of the answers requires a bit of creative thinking; but I must stop dropping hints at this point. We will go into it in detail after some of you give me the correct answers and explain them. I will also write to each reader who answers correctly, so you won't have to wait for publication to know if you are right.

REYNOLDS NUMBER

When we chatted about Reynolds Number in the May issue of MD&TS, I asked if any of you had anything to contribute on the subject. Three of you did. I addressed R.N. again in September, particularly with regard to free flight modeling, but finally, I'm able to use some of the material you sent me months ago (two letters this month and one in February). The flow time on these columns is a frustrating fact of the publishing business.

JIM O'REILLY ON REYNOLDS NUMBER

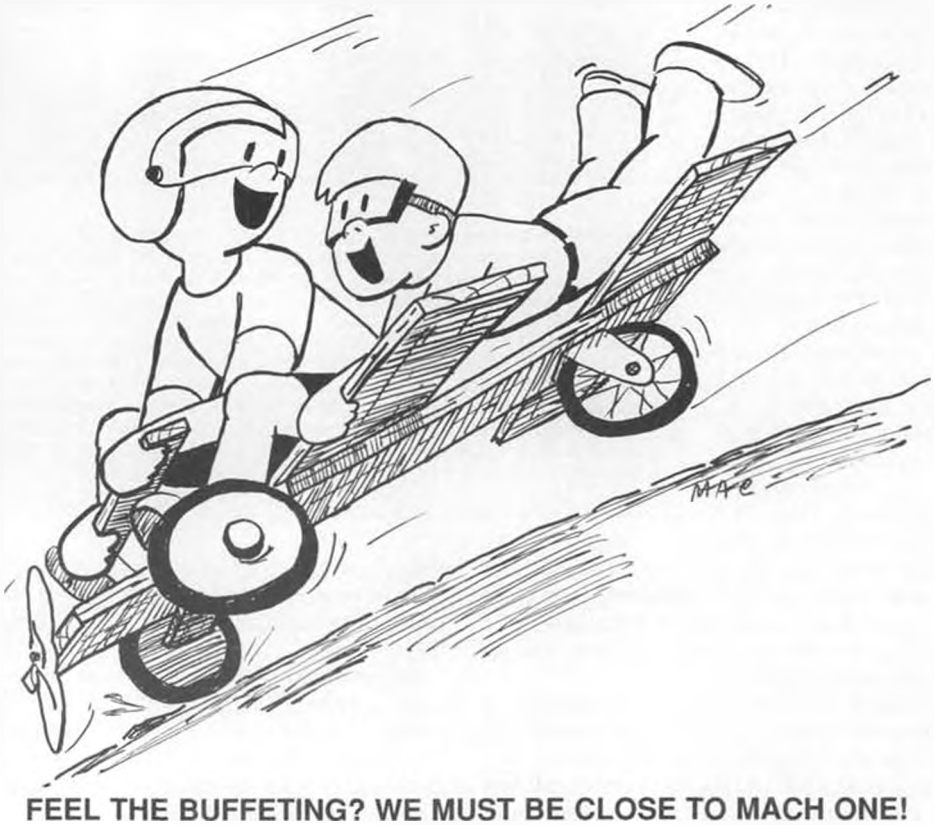
Jim, of 4766 N. Battin, Wichita, KS 67220, wrote:

"Most aircraft buffs, modelers and otherwise, are aware of the Wright Brothers' monumental scientific investigations which preceded and made possible their successful man-carrying aircraft. One of their early wind tunnels is in the Air Force Museum at Dayton. Its throat measures less than a foot in either direction. There were so many technologies they had to master that it need not be taken as criticism of their efforts to note some technologies that they overlooked. The Reynolds Number was apparently one of these. They may have been aware of the RN but they certainly didn't understand its importance because they made no compensating tests or calculations in all their wind tunnel work. Or maybe they simply didn't know *how* to compensate. In any event, they generated some airfoils that make pretty good model airplane airfoils because all of their tests were run at modeling RNs. In fact, very little about the RN as it applies to airfoils was understood right up through WWI. You can check the airfoil used on any WWI fighter plane and note that the airfoil will do a better job on a model airplane than on the full-scale aircraft on which it was used."I hadn't thought about it, Jim, hut the facts appear to bear out your interesting hypothesis.

GRANT CARSON ON REYNOLDS NUMBER

Grant, of 5841 Westmoreland Circle, Westminster, CA 92683, gave the title *Drag*

continued on page 82



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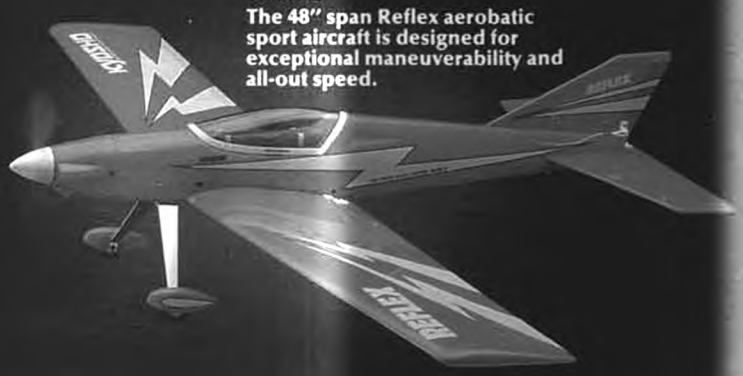
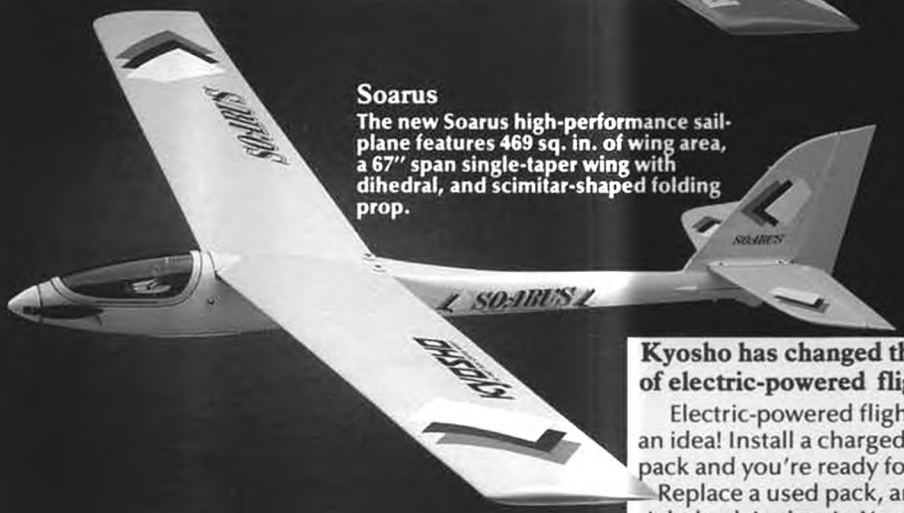


Reflex
The 48" span Reflex aerobatic sport aircraft is designed for exceptional maneuverability and all-out speed.



Soarus
The new Soarus high-performance sailplane features 469 sq. in. of wing area, a 67" span single-taper wing with dihedral, and scimitar-shaped folding prop.

Stratus 2000
An S-3021 airfoil, 74.8" span Schuman-type wing, and scimitar-shaped folding prop make the Stratus 2000 ideal for all sailplane enthusiasts.

Cessna Cardinal
An ideal electric trainer, the 46.9" span Cessna Cardinal combines stable slow-speed performance with authentic scale looks.

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STRICTLY SCALE

BY AL TUTTLE

BYRON'S BLAST

One photo tells it all. What other model show can even come near drawing a crowd this size? Over 60,000 during five-day program. (Insert) All Byron aircraft on display for the benefit of spectators.

Byron Godbersen and his talented staff have done it again! This year's *Aviation Expo 90* was the best yet and this included the weather. Imagine, if you will, five days of bright blue skies, white puffy clouds, gentle breezes and temperatures in the mid to high seventies. Add a superb flying site, designed expressly for giant size R/C aircraft, and a staff of workers who are there to make sure you have a good time and that things run smoothly. Too good to be true, you ask? If you had been in Ida Grove, Iowa, August 8-12, you could have experienced the best flying and best airshow that RC modeling has to offer.

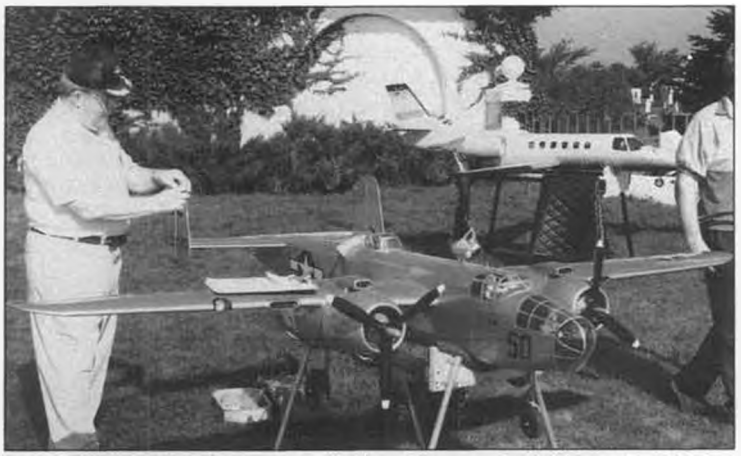
Joe Schumacher, vice-president of Byron Originals and air show director, saw to it once again that this year's Expo would be different from those in the past.

New this year was the flying of the Byron 1/5-scale B-17. The plane was shown last year but not flown. The model is constructed from fiberglass and foam and finished with K&B Super Poxy paint. Weight is 250 pounds, wingspan is 20 feet 8 inches, length is 15 feet, and it's powered by four 4.2 cubic inch Sachs-Dolmer engines utilizing C&H igni-

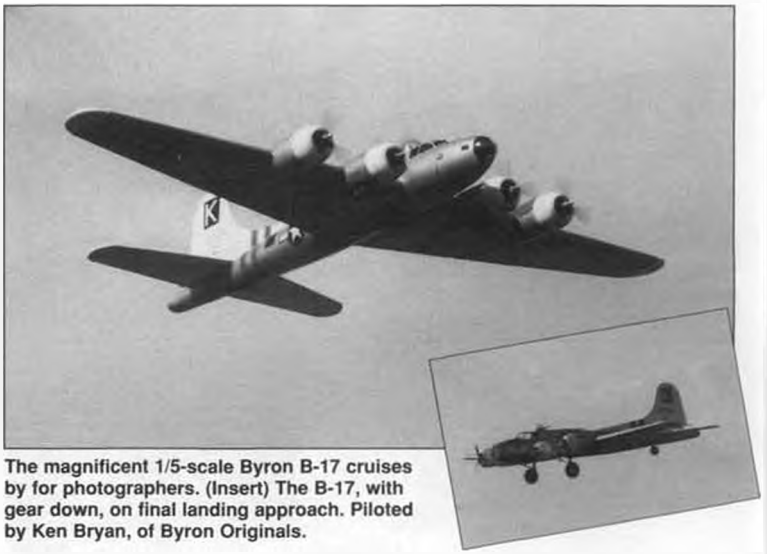
At the full-scale Byron airport (model field up hill in background), Leo Loudenslager with his Bud Light 200 and a few friends.

North end of the flight line. Scale Unlimited!

Flight line looking south. Name your favorite and there's bound to be one here somewhere!



Don Albright's B-25 gets some light maintenance by Phil Maxwell, of West Virginia.



The magnificent 1/5-scale Byron B-17 cruises by for photographers. (Insert) The B-17, with gear down, on final landing approach. Piloted by Ken Bryan, of Byron Originals.

tion systems and Byron three-bladed props. Airtronics radio gear is used, with two receivers on separate frequencies and one transmitter transmitting simultaneously on two different frequencies. This dual frequency system was designed by Cal Orr, owner of Custom Electronics in California, and is commercially available. A total of thirteen servos are utilized. The plane is flown by Ken Bryan of Byron Originals. Ken says the plane is a pussycat to fly and the only problem he has is slowing it down for landing. Here again, Ken said it was just a matter of getting the time to go out and practice shooting landings with it.

Ken Bryan also flew the new Byron Originals Sukhoi Su-26M. This kit will be available in the very near future and should be very popular.

New acts for the full-scale airshow were: The Holiday Inn Aerobatic Team featuring four Pitts S-2 biplanes from Fernandina Beach, Florida; Leo Loudenslager, seven time national aerobatic champion with his Bud Light Laser 200; and Jim Mynning of Chelsea, Michigan doing a hilarious comedy routine with his Piper Super Cub. Also new was the Jim Franklin Airshows from Alto, New Mexico. Jim does an aerobatic act with his Waco Mystery Ship that truly gives one goosebumps! He then does another routine with the wing walking team of Johnny Kazian and son Tony. Jim returns later on in the day with his Ted Smith Aerostar flying a routine called "ZAR" and the Starship Pride. He puts this beautiful twin through the smoothest aerobatics that this writer has ever seen. After landing, Jim shows up in the crowd all decked out as the alien ZAR, replete with cape and helmet. The kids sure loved it! A major new attraction to the airshow was a Stinson Trimotor that hopped passengers (for a fee) daily from 9 a.m. to 7 p.m. Returning from last year was Bill Beardsley and the Bud Light BD-5J Micro jet. In addition to these acts, there were special demonstrations by military, WW II and civilian aircraft.

Exhibitor booths in the tents were again present this year. It did seem as if the number of exhibitors was down slightly from last year. If I were in the model business, this is one show I would make an effort to attend, mainly because of the large number of *serious* (spell that "money to spend") modelers who attend Aviation Expo. I do know that quite a few of these vendors who have goodies to sell such as props, wheel collars, landing gears, adhesives, etc., do a brisk business in selling replacement parts to those fliers out on the line who have encountered difficulties in one way or another.

As mentioned earlier, the weather was absolutely perfect for flying and those present took advantage of it. No fewer than 287 pilots registered 1048 flights for a total of 18,860 minutes (311 hours) of flight time. As usual, prop jobs outnumbered the ducted fans. This year it was a ratio of 3:1. There were a few prangs, but those crashees interviewed did not feel as though the cause was from radio interference.

One plane that caught my attention was an .09 powered ducted fan MiG that flew extremely well. The model was designed and built by Robert Hahn of Costa Mesa, California. It has a wingspan of 24 inches, length of 27 inches, and weighs 25 ounces. It has an epoxyglass fuselage and built-up balsa wings and stab. Engine is a Cox .09 with a unique fuel system that consists of a throttle idle fuel cutoff that works in conjunction with the exhaust restrictor. The fan is constructed from Zinger 7X7 wooden props and has ten blades. (The photo shows an earlier eight-blade fan.) The .09 turns the fan at 19,000 rpm. A four-channel Futaba Attack radio with miniature servos is used. Nose wheel steering is linked with the ailerons, as rudder is not used. There are four spring loaded blow doors on top of the fuselage that act as auxiliary air inlets. The fuel tank is made from two 2 ounce plastic tanks welded together, resulting in a 3-1/2 ounce tank and a flight time of seven minutes.

Don Neill of Lincoln, Nebraska had his new 1/4-scale Curtiss F11C-2 Goshawk and it is a beauty! It is all wood, covered with Dacron and finished with enamel paint. Wingspan is 96 inches, length

Signature of the Byron "Striking Back" show . . . the "Nuclear Explosion" cloud heads skyward.

Bob Hahn, Costa Mesa, California, poses with his mini-ducted fan Mig-15. Byron's SR-71 in foreground and B-29 in background. (Insert, left) Close up of Bob Hahn's Mig-15 interior. (Insert, right) Bob Hahn's Mig-15 eight-blade fan is fashioned from cut-down wood propellers.

flew the Byron SR-71 as well as the other Byron ducted fan models several times each day. Carl and his buddy (sorry, I didn't get his name as he was always referred to as "Hey you") managed to go through seven or eight gallons of Byron fuel during the five-day period.

The Cloud Dancers from Kissimmee,

Richard Chase, Jr. and Sr., readying their Byron Originals F4U Corsair. They're from Ft. Lauderdale.

John Marsh, Lincoln, Nebraska, with one of many Lasers at the Byron Expo 90.

Ed Izzo, Orlando, Florida, and his Bizzee-Bee. Powered by a Sachs Dolmer 3.7 engine, Ed's converted Bridi Big-B includes his own smoke system with outlets on both wingtips and fuselage.

is 72 inches and the model weighs 30 pounds. Engine is a 3.7 cu.in. Sachs-Dolmer which pulls the airplane around the sky with authority. Don says plans will be available.

John Purtle of Fayetteville, Arkansas was flying his Delta II Mk IV. It is constructed of foam and covered with fiberglass cloth. Length is 94 inches and the span is 84 inches at the widest point. It weighs 35 pounds and is powered with a Sachs-Dolmer 3.7 cu.in. engine swinging a Dynathrust 22x10 prop. Not only was the shape of the plane unique, but when flown it made the weirdest noise, probably due to the prop blades swinging through a slot in the fuselage.

Transmitter frequency checks were again performed by the ACE RC crew of Paul Holsten and Paul and Cindy Edmonds. This is a thankless job, as these people spent many hours each day checking transmitters.

Phil Maxwell and his charming wife Bing attended from West Virginia, Phil helping with the inspection of aircraft and Bing assisting Cindy Edmonds with Tx check-in. I don't believe Phil has ever missed an Expo. His inspecting of models, being a spotter in the show and general all-round mechanic, is greatly appreciated—especially by those of us who fly in Striking Back. Thanks Phil. Talking about aircraft inspection, this is a big job, especially when there are approximately 300 planes to check. This task is performed by the Striking Back show team members.

Carl Spurlock from Des Moines, Iowa Florida put on their excellent routine consisting of RC skydivers, formation flying with Byron F-15 Eagles, and Don Muddiman showing how his Flying Machine performs. These people have really got their act together.

The Striking Back show was certainly spectacular, with plenty of excitement and action for everyone. It was planned to blow up a Zero each day of the show, but due to technical problems only a couple of these blew as planned and I understand it was quite a sight to see. I did not get to see them as I flew a Zero this year and was too busy flying my plane and listening to my caller who was talking me onto my next target.

We show team members are asked many

(Far left) Dennis Brooks, Kansas City, Kansas, holding nose end of his beautiful Byron F-16.

(Left) John Purtle, Fayetteville, Arkansas, with his Sachs Dolmer 3.7 powered Delta II Mk IV. Uses Dynathrust 22-10 prop, Kraft radio, span seven feet, length seven feet, 10 inches.

The author's Byron Beech Staggering in Navy service colors. Weighs 20 pounds, powered by ST 3000 turning 18-8 prop. Airtronics Vision radio; flaps, retracts, acrylic lacquer over fiberglass.

OS2U "Kingfisher" by Dave Gaur, Hanover Park, Illinois. Weight 23 lbs., span 84 inches, all balsa covered with glass cloth and epoxy resin, 3.2 Sachs Dolmer, 1/5-scale.

Curtiss F11C-2 "Goshawk" in quarter scale, is latest plan offering by Don Neil, Lincoln, Nebraska. Span eight feet, 30 pounds, 3.2 Sachs Dolmer.

Rick Mixon and Dick Coles, Bradentown, Florida, with their T-craft models built from Paul Schere plans.

times if we crash the planes on purpose. The answer is a resounding NO! The only plane that is purposely destroyed is the blowup Zero. All other crashes are unintentional. When you have 12 to 14 aircraft roaring around the sky there are bound to be mishaps. Fortunately we have very few midairs. We had one this year where a P-40 sliced a wing off a Zero, then continued on and finished the show. Another Zero was hit by a water spout and cleaned off all the decals on the underside of the plane. The Zero completed the show. Another plane had an engine flameout and was strained through a tree. That team member worked all night and had the model ready for the next day. We all have back-ups, but if the plane is readily repairable we try to prepare it for the next show. This year, Airtronics PCM radio equipment was flown in all Striking Back aircraft. Five shows, no radio caused losses. Solid as a rock.

At the end of the Striking Back show, and to the delight of the kids, the Superman routine is performed. One of the team members (Larry Fair) roams through the crowd dressed as Clark Kent, the mild mannered reporter, when there is a loud explosion at the east side of the field. Larry—er, Clark runs across the field transforming himself into Superman and runs behind the trees. At this time an RC Superman piloted by one of the Cloud Dancers emerges from behind the tree and is up, up and away.

Later, there is a narration about how the war with Japan ended. There is a moment of silence and then Byron's version of "the bomb" is set off. It is spectacular and awesome to say the least. Normally the 1/5-scale B-29 would drop the bomb, but the original model was destroyed in a crash last year and the replacement was not ready for Expo 90. The last act is Ken Bryan flying the new 1/5 scale B-17. It is a real show stopper.

Byron Godbersen and Joe Schumacher are readying for Expo 91, and judging from what I have been told it is truly going to be a real hummer. It is the 10th anniversary of Byrons fly-in (now called Aviation Expo) and the 50th anniversary of Pearl Harbor. 'Nuff said! ***MB***

BY WALLY ZOBER

GREATER SOUTHWEST FAN-FLY

The Mid-Cities R/C Club held its 8th Annual Greater Southwest Fan Fly-In on September 15th and 16th, 1990. This has to be one of the premier jet events of the year. The Fly-In was held at Copeland Fields, just north of Ft. Worth. The C.D. for this jet model airshow was Dawn Buckley, one of the prettiest C.D.s I have seen at any meet or Fly-In. Dawn did a dynamite job running this huge event. There were 102 registered flyers and 140 airplanes. Dawn kept the flight line moving with jet models in the air at all times. There were no complaints from fliers about not getting in enough flights. The flying site has to be one of the best in the country, with its 5,000 ft. long by 150 ft. wide runway. The pit area had plenty of room to set up fly tents to protect the pilots and their jet models from the heat of the sun. Speaking of heat . . . it was HOT! The temperature had to be between 98° to 100°. However, this did not seem to bother the pilots as they were having too much fun flying their jets to even think about the heat.

This fly-in drew quite a few manufacturers who flew and displayed their products. This was great for the pilots and spectators alike. It gave them a chance to see new products in action and to talk to manufacturers and/or their reps. Manufacturers attending were Bob Violett, of Bob Violett Models*; Tom Cook, of Jet Model Products*; Pat Grubb, of Spirit Jets*; Tom Sewel and Terry Wysong, of TNT Models*; George Miller, of Custom R/C*; Steve Korney, of Hurricane Fans*; and Jim Dyck and Len Ledson, of Jim-N-I-Jets*. Yellow Aircraft* was represented by Bob Fiorenze. Bob, incidentally, is the proprietor of Fiorenze Hobby Center and Custom Model Building Service*.

The flying at this meet was absolutely super. The pilots flew their jet

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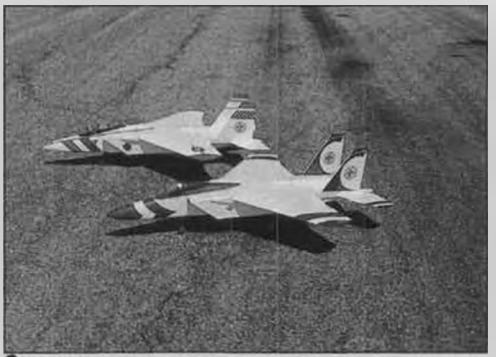

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(1) Don Kanak and his Yellow Aircraft F4. (2) Jerry Caudle with his Bob Violett Models F-86D. (3) Ralph Brown's "Citation." (4) David Ribbe's BVM F-16C. (5) Col. Bob Thacker and T-38 Aggressor. (6) Two F-15s by Don Bell.

models right up to the leading edge. High speed terminal velocity dives, pulling the model out of a dive at 20 to 30 feet of altitude and flying straight and level through a radar trap which clocked one model at 192 mph. This was accomplished by Dave Ribbe with his Aggressor II. Right behind Dave was Bill Harris flying his beautifully finished black Aggressor II which was clocked at 185 mph. Right on Bill's tail was Don Kanak with his Aggressor II clocked at 180 mph. Steve Korney coming off a down-hill run into straight and level flight with his sleek looking Cobra clocked in at 160 mph. Tom Cook flew through the speed trap in a different manner with his Starfire. He did it without the terminal velocity dive. He just came down the runway straight and level at 158 mph. I overheard Tom Cook talking to the people who were operating the radar gun for the speed trials. He stated, "If you want to check the true speed of a jet model, go through the speed trap at straight and level flight and omit the terminal velocity dive." This is an interesting idea, however, I think that this decision should be made by those pilots who are willing to push their models to these high speed limits and beyond.

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(1) A pair of Convair F-102A Delta Daggers by Ivan and Paul Munninghoff. (2) Col. Bob Thacker's experimental Ryan X-13. No VTOs yet. (3) C.D. Dawn Buckley with her T-33. (4) Terry Wysong's BD-5. (5) Steve Korney's beautiful "Mirage." (6) Joe Pasztor Sr. and his Tom Cook F4 Phantom.

The scale jet models were not to be outdone by these speed trials. Bob Violett flew his gorgeous F-16C prototype model through the radar trap and was clocked at 156 mph. Right behind Bob Violett was Steve Korney flying his very sharp looking Mirage. It was clocked at 148 mph. Bob Fiorenze, flying a neat looking Yellow Aircraft F-16C prototype came through the speed trap at 146 mph. Terry Wysong, flying his BD-5 (nonmilitary) jet was clocked at a respectable 134 mph. Bob Fiorenze flew two other jet models through the speed traps: Yellow Aircraft's F-4 Phantom, clocked at 130 mph, and Yellow Aircraft F-5 prototype clocked at 127 mph.

Col. Bob Thacker, flying his T-38 Talon (one of the larger jets), was clocked at 105 mph. It appeared that his engine was running a little rich. On one of the Colonel's flights with his T-38 Talon, it flamed out over the tree line. He managed to bring the T-38 back to the runway for a safe landing. I went over and complimented him on his successful landing (with jet models, dead stick landings can be terminal.) The Colonel gave me some advice, which I immediately filed in my memory bank, and I quote, "Sacrifice altitude for speed, keep the nose down and don't try to stretch the glide." Good thought, Colonel . . . Thanks for the tip.

I would like to point out that this fly-in was not designed as a speed event. What I found to be interesting is the fact that such

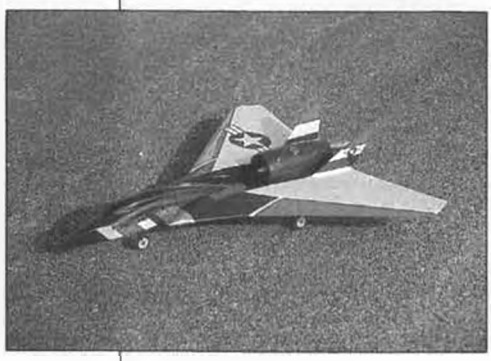
high tech RC model airplanes, superbly finished, highly detailed, worth many thousands of dollars, are being flown like sport models just for the pure pleasure of flying. Twenty-five years ago, RC models of this caliber would be non-flying display aircraft. We've come a long way in 25 years . . . thanks to the vision and talent of a handful of model builders and fliers who became inventors, designers, and manufacturers, and the magazines which reported and encouraged these advances. It is this kind of spirit that will give this hobby/sport of ours a bright future.

Back to the fly-in. Another interesting observation was the age of the fliers. I would guess the age group started at about 18 or 19 years and ran up into the late sixties. I think this is great. Also, this was a co-ed fly-in. We had two pretty jet jockeys at this meet; Patty Violett flying a very fast B.V. Models Viper, and Dawn Buckley, C.D. of this meet, flying a very pretty, bright red T-33.

The younger pilots seem to prefer the super sleek and super fast machines, while the older guys preferred the larger scale jet models. I think a lot of us older guys are intimidated by jet models because of their speed and price. It is true . . . they are fast and expensive, however, they are very stable in slow flight. As for the high cost, so are giant scale models with their large engines, heavy duty servos, and heavy-duty battery packs. On a recent trip to New York, had the opportunity to fly a Byron Mig-15 and a Bob Parkinson Regal Eagle. It was an absolute fun experience.

Tom Sewell entered his original design T-33 jet model which is constructed completely of balsa and plywood. This is a very large jet model at 1/6 scale. It has an 87-inch wingspan, is 76 inches long, and weighs 18 lbs. Tom's T-33 is powered by an O.S. 91 engine and Dynamax fan, with custom designed inlet and exhaust ducting designed by Tom. The T-33 won the Technical Achievement Award and also the Best Scale Model Trophy.

Dave Hudson won Pilots' Choice with his original design model of the F-117 Stealth Fighter. The airplane has not been flown as yet. Should be an interesting first flight. Fastest flight was won by David Ribbe, flying a super-sleek Bob Violett Models Aggressor II. Slowest flight went to Joe Pasztor flying a Byron F-16.



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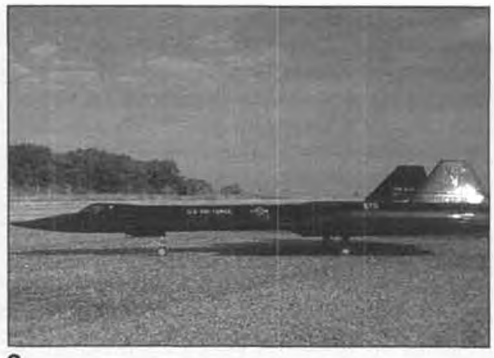

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(1) Harry Wood's "Tommy Cat." (2) Pair of "Jin-N-I" jets by Jim Dyck and Len Ledson. (3) Dave Hudson's Lockheed F-117 "Stealth" fighter. (4) Bob Fiorenze with his Yellow Aircraft F-16C. (5) Mike Smith's F4 Phantom. (6) Yellow Aircraft's SR-71 flown by Dennis Crooks. (7) Joe Penna's Byron F-16 about to make gentle contact. (8) Bob Violett's new F-16C prototype. Flies extremely well.

Dennis Crooks put on a fine show with his Yellow Aircraft F-14A. I have a special affection for this airplane. As a former Design Engineer at Grumman Aerospace Corp., Support Dept., I came in contact with the full size F-14 airplane daily. It is a masterpiece of engineering and aerodynamics. Yellow Aircraft's R/C model version is poetry in motion in the air. Dennis also flew a Yellow Aircraft SR-71 Black Bird powered with twin Dynamax fans and O.S. 91 engines. The SR- is a very large airplane and is very impressive in the air.

Don Kanak had a very pretty airplane at this meet. It was a Yellow Aircraft F-4 Phantom done up in the brightly colored livery of the McDonnell Douglas 5,000th production aircraft. The Phantom flies great and it drew a lot of attention with that pretty color scheme.

Jerry Caudle flew his F-86 D (BVM' built by Bob Patton. The model had a super finish and is a super flying aircraft. Rumor has it that Jerry is getting 12 to 14 flights on a single glow plug. Sounds great! What's your secret, Jerry?

Bob Violett drew a lot of attention at his pit area with his new F-16C prototype. I asked Bob what made his F-16C different from the other F-16 kits that are on the market. The first thing Bob pointed out was that his kit is exact scale, made from computerized lofted drawings which were provided by General Dynamics. Bob also pointed out that his kit is highly prefabricated, with extensive use of carbon fiber and Kevlar.

Another interesting feature on this model is the use of differential stabilators. Each stabilator had its own servo. The stabilators are balanced and counter-weighted at the factory. In straight and level flight, this model has no tendency to pitch up or down, with no signs of Dutch Yaw. I asked Bob how he accomplished this. He told me that his model does not use a stab yoke for pitch control. Instead, he uses a specially designed and molded bracket and control arm assembly for each stabilator. This method allows the stabs to be aligned perfectly.

Another engineering task accomplished is the landing gear system. It is an exact copy of the full size F-16C landing gear, scaled down to proper size for the model. The gear is extremely strong. Extensive testing was done, i.e., drop test and many hard landings on paved runways and grass fields with no damage to the gear. The flying characteristics of the F-16C are super; straight and level flights, vertical climbs and rolling maneuvers are done with ease. Bob has spent hundreds of engineering man-hours developing this model. I think he has a winner.

Jack Scheder flew a beautifully finished Byron KFIR powered with a Byron fan and Byron retracts. The first flight, the engine was a little rich and the KFIR appeared sluggish in the air. On the second flight, the engine was leaned out and the KFIR flew with authority.

Bob Fiorenze, representing Yellow Aircraft, had his own mini airforce with him at this meet. Bob brought his beautiful prototype Yellow Aircraft F-16C, an equally beautiful Yellow Aircraft F-4 Phantom, plus a Yellow Aircraft prototype F-5. Now, there is one thing that Bob likes to do and that is fly R/C jets . . . and fly them he did. Bob gave flight demonstrations with the F-16C, the F-4 and the F-5. All three airplanes fly extremely well. Bob really knows how to excite the spectators with his high speed, low level passes. His flight programs are always interesting to watch. Of the three jet models mentioned, I like the F-4 Phantom the best. It looks so real in the air on those high speed fly-bys. Even on the ground when it is taxiing out to the runway, it will hold your attention. The F-4 Phantom has a personality of its own, just like the WW I SPAD, the WW II P-51 or the Korean War F-86. I guess it's because these airplanes have a proud and valiant history behind them.

The Yellow Aircraft F-4 Phantom has some unique features. It is a single-engine model with bifurcated exhaust ducting, plus fiberglass inlet ducting. It uses a custom designed exhaust header which is bent 7° to the left and 7° down so that it will fit into the exhaust duct. It also features a custom made dual wheel nose strut and axle. These accessories are made by Fiorenze Custom Model Products*.

Ralph Brown had an absolutely gorgeous twin-engine Citation. It is a very large airplane, with a 114-inch wingspan, and a weight of 32 lbs. Power source is twin O.S. 65 engines and Dynamax Fans. This model was designed by Dave Escabar and Jerry Keller. It's a super flying airplane.

Don Bell had a gaggle of redesigned, scaled-up Nick Ziroli F-15s. Don scaled them up about 20% and added fiberglass ducting. He uses a Turbax fan, with an O.S. .46 engine. Flies well.

Bill Harris, flying his Black Aggressor II, blew an engine. Bob Violett came to the rescue and loaned Bill another engine so that he could get back into the air. Bill installed the new engine and enjoyed the rest of the weekend, thanks to Bob Violett.

Steve Korney flew a very sharp looking Mirage painted in Australian Air Research and Development Unit (A.R.D.U.) color scheme. The Mirage was finished in K&B epoxy Dayglo orange and white MonoKote trim. This is a high performance airplane, powered with a six-inch tractor Hurricane Fan and an O.S. 91 engine. Radio is an Airtronics Vision.

Harry Wood had a grand time flying his Bob Kress-designed Tommy Cat. This a fun jet to fly. In the air it looks like an F-14 with the wings in the swept back position. Harry had operating Ace R/C strobe lights and they worked just fine. Harry used a Midwest fan and an O.S. 25 DF engine. The engine was tached at 22,500 rpm. The radio was a Futaba.

Joe Penna entered a beautiful Byron F-16 done up in blue and gray camouflage paint scheme. Joe asked Bob Fiorenze to give him a hand trimming out the model. Bob made a few adjustments to the engine, then flew the airplane and trimmed it out. Joe took a turn at the sticks and from the smile on his face, you could see he was satisfied with the F-16's performance.

Another positive note in regard to this Jet Fly-In was the fact that there weren't too many crashes. Dawn Buckley, the C.D., told me in the past the attrition rate for the jet models was fairly high . . . between twenty and thirty airplanes. This year I am happy to report that there were only about six or seven crashes. Most of them were due to Dumb Thumbs or Dumb Luck. Terry Wysong lost a wing on his BD-5, in the air. Don Kanak dinged his Aggressor II on a high speed low pass. Tom Cook had two crashes to his credit; one with Tom Sewell's T-33 when the nose gear collapsed on takeoff roll . . . minor damage. Tom Cook's second crash was with Lyn McCauley's T-104. I didn't see that one. Bob Zieger crashed his home-built sport jet. Mark Stephens totalled his beautiful A4 Skyhawk and last but not least, Dawn Buckley snap rolled her pretty T-33 into the ground. Dawn said her rudder locked up. Sure, Dawn. (Only teasing you, that can happen to the best of us.)

In summing up, I would like to say that the Mid-Cities R/C Club did a fine job orchestrating this fly-in. I know that I enjoyed it and I am sure that those who participated, enjoyed it too.

Till next time . . . stay well and keep 'em flying! ***MB***

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***Addresses of companies mentioned in article.**

Ace R/C Products: 116 W. 19th St., P.O. Box 511, Higginsville, MO 64037 (816) 584-7121.

Bob Violett Models: 1373 N. Citrus Rd., Winter Springs, FL 32708 (407) 365-5869.

Custom R/C Products (George Miller): 4183 Travis Country Cir. Austin, TX 78735.

Hurricane Fans: 14835 Halcourt Ave., Norwalk, CA 90650 (213) 864-8891.

Tom Cook Jet Model Products: 304 Silvertop, Raymore, MO 64083 (816) 331-0356.

Jim-N-I-Jets: 743 Hudis Rohnert Park, CA 94928.

Fiorenze Hobby Center, Inc. & Custom Model Building Service: 420 W. S.R. 1434, Winter Springs, FL (407) 327-6353, FAX 407-327-7148.

Yellow Aircraft: 3040 Palstan Rd., Suite 201, Mississauga, Ont. Canada L4Y 2Z6 (416) 273-6757.

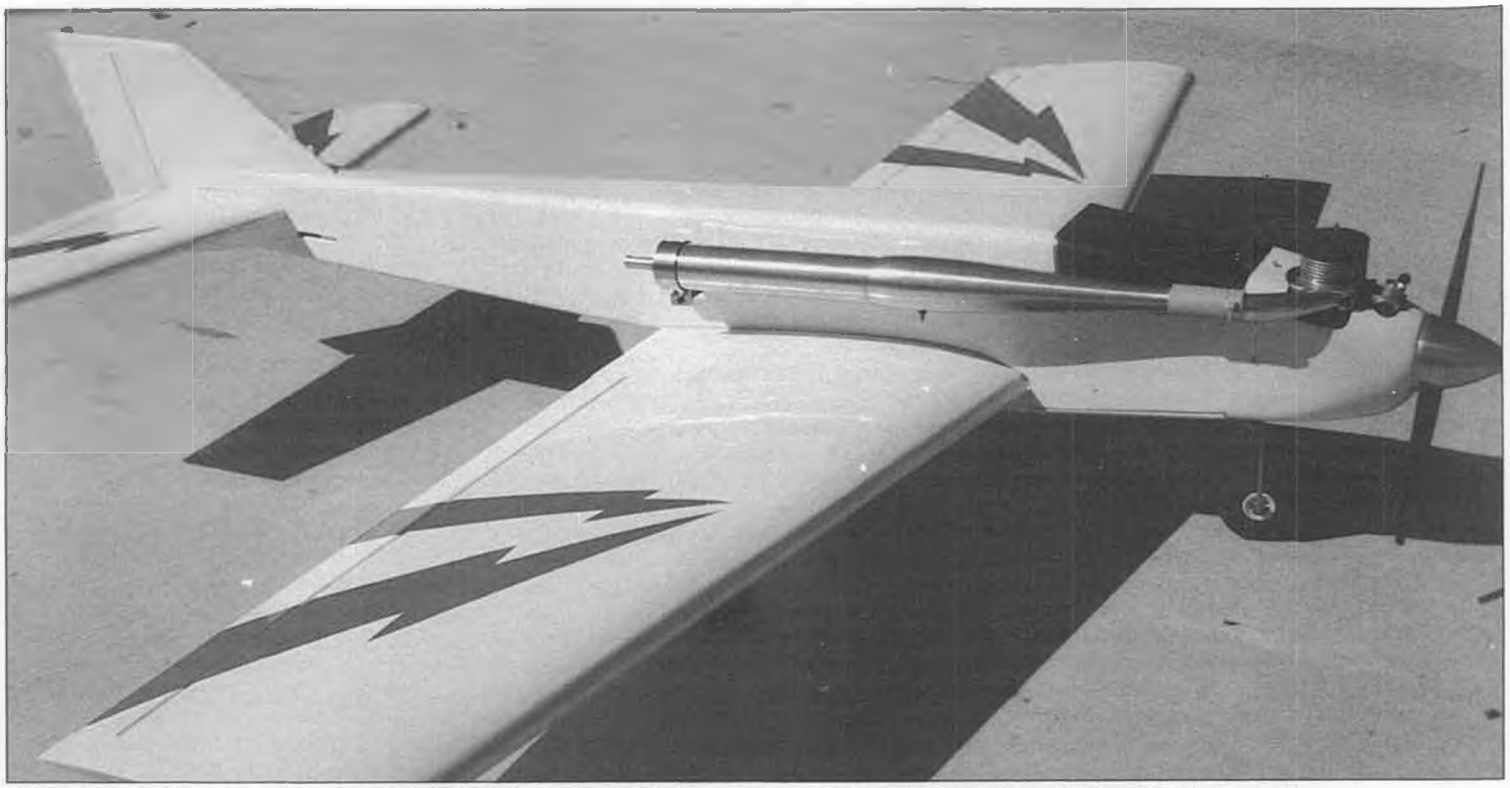
Midwest Products Co. Inc.: 400 S. Indiana St., P.O. Box 564, Hobart, IN 46342.

ALL ABOUT ARFS

BY ART STEINBERG

THE SHARK-LT

In the May 1990 issue of *Model Builder* I reviewed a very interesting model called the "Shark-ST," a shoulder-wing sport model which has outstanding flying characteristics. A product of Aeromodel Tampico Mexico, the Shark-ST comes beautifully framed up and sanded, ready for any covering or paint job desired. A gentle and easy-to-fly model, it is very strongly constructed and is intended for two-cycle engines in the .40 displacement range. After a lengthy and enjoyable relationship with the Shark-ST, it was a very pleasant experience when I received this same manufacturer's latest offering, the "Shark-LT," and I looked forward with great anticipation to getting it assembled and into the air.



With a potent engine such as the piped Rossi .60 that Art used, the Shark- LT qualifies as an entry-level competition pattern model. Ship can also be made as a taildragger, and either version could be equipped with retracts . . . take your pick.

The most obvious difference between the two models is that the LT is significantly larger than the ST, having a wingspan of 60 inches, with a wing area of 668 square inches. Overall length is 52.5 inches, and the recommended engine is a .50 to .60 two-cycle. The profile of the LT is quite similar to the ST, except that this larger model sports a low-wing setup. The fuselage is extremely strong, to the point of being almost overbuilt, but even though thick balsa sheeting has been used throughout, the airframe has been kept quite light in weight. The wing is of balsa sheeted foam as in the ST, but the tailfeathers are no longer solid balsa, as both the horizontal and vertical stabilizers are made of nicely airfoiled, balsa covered foam.

A strong fiberglass engine cowl is furnished, all primed and sanded, ready for paint. The Shark-LT may be built in either a tricycle gear or taildragger configuration, and hardware is supplied to construct either version. The landing gear assemblies include a nylon nosegear mount for the forward firewall, and metal retaining straps with screws for the main gear. Since the builder must decide the type of landing gear desired, the hardwood main gear mounting blocks are supplied unmounted, and must be located and installed accordingly. I chose to go with the tricycle gear version and found the nosegear mount was not needed, as the motor mount I used incorporated bearing holes for the nosegear.

Other hardware in the kit includes a complete aileron torque rod assembly, a set of three control horns (two for the split elevators and one for the rudder), nosegear steering arm, nylon wing mounting bolts, tailwheel bracket, and all kinds of assorted screws and bolts. One nice thing about the hardware is that it is all first quality American made, from topnotch suppliers such as Du-Bro, Carl Goldberg, and Klett. However, the hardware package is by no means complete, and the builder of this kit must supply his own fuel tank, pushrods, clevises, wheels, motor mount, hinges, wheel retaining collars, and spinner. Additionally, for the taildragger version, some sort of tailwheel gear will be required. Add to this the covering material and/or paint, and costs can

quickly mount up.

Obviously, this is not a model for the person who wants to get it together and go flying the next day. Nor is it for the meticulous, painstakingly exact builder who wishes to maintain complete control over every aspect of his model. This is really a model for the builder who prefers not to frame up, shape, and sand an airframe, but really likes a well-built model into which he can sink his teeth when it comes to the finishing end of the project. When I applied the finish to both the Shark-ST and the LT, I really concentrated on doing a good MonoKote job, as I am trying to emulate the wonderful techniques employed by that master of MonoKote, Buck Faure, the custom builder. No, I still can't apply MonoKote nearly as well as Buck does, but even after all these years I manage some improvement with each job.

As I mated the parts of the Shark-LT together, I marvelled at the accuracy of the fit of the wing to the wing saddle and the horizontal stab in its fuselage slot. Everything assembled straight and true, the wing and elevator being perfectly horizontal and square to the fuselage. As always, cutting the cowl to accommodate the engine was a trying job, taking quite some time, but the result was definitely worth the effort. The engine selected was a potent Rossi .60 ABC side exhaust, and this was fitted with a Mac's header and matching tuned exhaust pipe.

Rummaging through my carton of fuel tanks, I came across a Du-Bro tank which dropped into the fuel compartment with plenty of room to spare. After checking the capacity of the tank, I was amazed to discover that it was a sixteen ounce size, and it still looked lost in the cavernous nose section. Believe it or not, I could have placed *two sixteen-ounce tanks* in that fuel compartment! I like to use the biggest tank I can get, as it means I can often fly two or three flights before refueling. The drawback is that there is a radically changing balance point location as the tank empties during flight, and the bigger the tank, the more radical the change. Anyway, a ten or twelve-ounce tank would have been quite satisfactory, but it would have appeared lost in that space.

The same roomy condition was encountered in the radio compartment as in the fuel compartment, and I could almost work with both hands and elbows inside the fuselage. The volume of that fuselage is enormous! Now came my really big moment, as I finally reached the point where I could lovingly install my gleaming new Futaba FP-8SSAP eight-channel single-stick PCM radio. With great anticipation, I looked forward to discovering and mastering the many different features of this state-of-the-art radio. (I know a lot of you fliers out there do use single-stick, but it still seems to be a rarity, and when I fly somebody usually comes over to ask a few questions such as, "Where's the throttle?" or, "What's the big knob for?" Actually, the reason I fly single-stick is because my instructor thought it was the coming thing when it was introduced in the late sixties. We flew buddy box, with him using a standard two-stick transmitter on Mode II, and with me using a Kraft single-stick. Well, single-stick never caught on that well, and as the years passed, everytime I went out to buy a new radio I had to pay through the nose, as there never have been any budget priced single-stick radios in four or more

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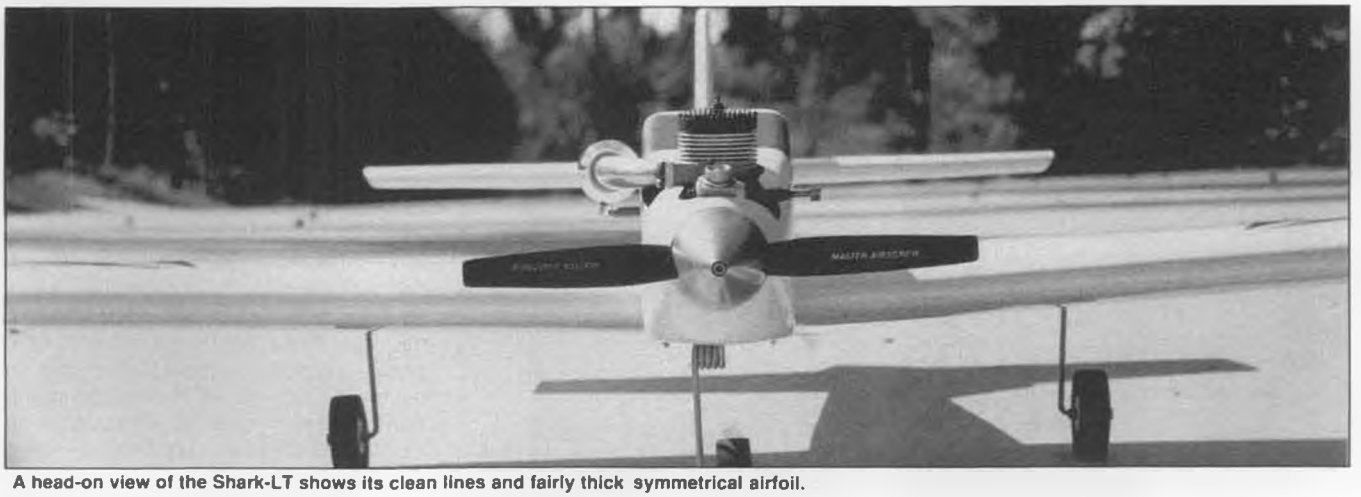

A head-on view of the Shark-LT shows its clean lines and fairly thick symmetrical airfoil.

For demonstration purposes, a 16-oz. fuel tank is shown above the Shark fuel compartment. Art says two of these tanks would easily fit inside the nose! (No space required for retracting nose gear.)

Art used the new self-adhesive model trim sheets from Eagle Products (shown in factory packaging on right) to decorate his latest model. They're fuelproof, and available in several brilliant colors . . . check them out at your local hobby shop.

ELECTRONICS CORNER

BY ELOY MAREZ

IT'S TIME FOR EQUAL TIME

EQUAL TIME . . . CHEAP RADIOS. A number of times in the past, I have stated that I feel very strongly that the use of inexpensive radio systems . . . buying them by the pound, you might say, is simply asking for trouble. I still feel that way, but there seems to be another side to the story, as presented by Brayton B. Paul, AMA 686, of Marietta, Georgia. Brayton writes:

"Your comments about 'cheap radios' in the September *MB* is not quite fair.

The Airtronics "Vision" transmitter is considered an excellent example as having many of the advanced features possible with modern day electronics, but without being designed primarily for aerobatic competition flying.

"I have a JR Circus 4 that I have used (a lot) in four different airplanes for the past two years, without radio related incidents. In contrast, my Futaba FP-5UA equipped model crashed on its first flight. Then I learned (not from Futaba either) of the recall. A second crash was caused by a dead cell in the flight pack. All this with a newer and more costly radio than the JR.

"So tell me about cheap vs. expensive radios. How about inexpensive, simple, functional vs. expensive, complicated computer radios?

"I enjoyed your article as I have through the many months. Congratulations on your eight years of doing 'Electronics Corner.' Keep up the good work."

Well, you can't argue with success, can you? And I am certainly not going to argue in Brayton's case, nor would I question his choice of radios to buy in the future.

However, there are some distinctions to be made in this case, though my basic comments about quality still stand. Let me expand on that a little bit more . . . but first let me tell you that for the twenty years after hanging up my USAF flying suit, I have worked in RC electronics, including development and engineering. I have more than a passing acquaintance with electronic equipment quality.

Let's start with the printed circuit board; the basis for all modern electronic equipment. You can get PC boards made of thin phenolic which you can break in two with your hands, or you can get fabric reinforced epoxies which rapidly wear out carbide cutting tools. The first is cheap, the second is relatively expensive. Which one do you want in your equipment?

All electronic equipment uses a lot of resistors. OEM (Original Equipment Manufacturer) companies have a choice of buying them for a fraction of a cent, or for five to ten cents for a unit of similar value. The first type will come with a tolerance of as much as 20%, ungraded and untested, and generally manufactured in some country whose primary export is mahogany. The latter will have a guaranteed tolerance as close as 1% if required, graded and pre-tested. Which is your choice?

The same applies to all other electronic components; capacitors, transistors, integrated circuits, etc. The latter, ICs, are an interesting device. In the cheaper equipment, we often see designs around a common off-the-shelf IC designed for some consumer product not at all related to RC equipment. It works, with compromises. On the other hand, the better (read: more expensive) systems will have ICs designed and developed only for RC, having no application in CD players or VCRs, but performing their specialized task at peak efficiency. No contest, is it?

It is not an original statement, but quality costs money. Even disregarding the snob appeal, if everything was of equal quality, there would be no need for the many extremes we see daily in all items that we have in mind to purchase. I will never be convinced that an RC system, of equal engineering and features, built with cheap components, will perform as reliably as one built with higher quality ones!

The matter of functional, etc., vs. expensive for expensive sake is another matter. I did make this point in an earlier discussion of this subject . . . by expensive I was not referring primarily to those feature loaded, LCD readout, forty-eleven channel systems claimed to make you into a world-class flier. My suggestion, when asked, is always to decide which features are useful to a particular application, and in that category, buy the most expensive radio that one can justify to himself. To put it another way, not all of us care to fly competition aerobatics . . . in Brayton's case though, I know where his loyalties lie, and with good cause, I would not recommend that he buy a JR PCM10. But

take away the purely pattern functions, and you have a "functional" system of high electronic quality, and many useful features.

Furthermore, don't disregard all of the features of these higher priced radios. It is certainly easier to install and initially set up, and if you are a serious flier, to correctly trim and adjust your airplane, with a transmitter with servo reversing, adjustable throws, mixing, to mention a few. Ask anyone with a "computer" radio with a display what he thinks about being able to set . . . and duplicate control surface throws down to 1%, without resorting to mechanical tinkering and guessing. And they don't cost an arm and a leg either. I have seen the Airtronics VS8P "Vision," an excellent radio of this type, often advertised for between $525 and $550.

In any event, the Gods of Aviation have been smiling on our Georgia friend and his radio . . . may they continue to do so!

EQUAL TIME PART TWO . . . PHONE JACK SWITCH! Another reader to take me to task over some of my recent comments is Pete Welborn, Castro Valley, California. He writes:

"I have enjoyed this hobby for over 18 years and have been tempted to write many times and state my two-bits worth. Alas, this is the first letter ever, all twenty-five cents of it.

"After reading your October 1990 column regarding the miniature phone jack switch, I must first tell you, I fly power and sailplanes. For power, I totally agree that anything less than the manufacturer supplied switch is an accident looking for a place to happen. But . . . for sailplanes, that very switch is your friend. Everyone that flies slope has thrown his/her plane off the hill with either the switch off, has hit the switch during the launch (for a slide switch the only good mounting position is vertically mounted), or has turned the switch off as the plane went by his/her hand. . . .

"In the thirteen years that I have flown slope, ten of those years are with 100% of my planes using the jack switch without failures.

"The benefits are: 1. A flush switch, 2. External charge, 3. A flag that tells you the plane is On/Off (and yes, I wiggle the controls every time I throw off).

"Keep writing the good stuff."

Well, at least in Pete's eyes, I am only half wrong! And I've already said it: You can't argue with success, and he has definitely had that with his sailplanes. However, I believe in eliminating all possible weak links in my airplanes as much as possible; I will give you an example and let you decide for yourself, dear jury!

Hold your hands out in front of you once again, this time with only your index fingers extended. Now bring your hands together until the index fingers touch. That is the contacts in a phone jack switch.

I rest my case!

Pete is correct of course, in the benefits that he points out for his favorite sailplane turn-on! And his comments that he performs a control check just before every launch bear out that he is a careful conscientious flier, which no doubt has a lot to do with the success that he tells us about. On the other hand, we can't lose sight of the fact that the mistakes he mentions; the launching with the radio off, hitting it during the launch, etc., are not switch failures, but *pilot errors!*

A VOTE FOR SLIDE SWITCHES came in from another Californian, my pen pal Pat Page, who even sent a couple of samples of a multi-pole switch made by "Alcoswitch." This company makes a wide variety of slide switches, some as extensive as 6PDT (Six Pole, Double Throw). In numerous types and styles, they are described as "positive wiping," "silver or gold plated contacts," excellent electrical ratings; in short, well made dependable appearing switches. Those wanting to know more should contact: Alcoswitch/Div Augat, 1551 Osgood St., North Andover, MA 01845, (617) 685-4371. Ask for data on its telecom and instrument grade slide switches.

WEE RC is not being ignored here in EC . . . there just isn't much new in that department. Obviously, there is no commercial equipment to be discussed, and few per-

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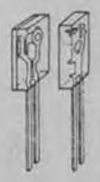
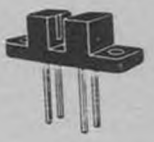


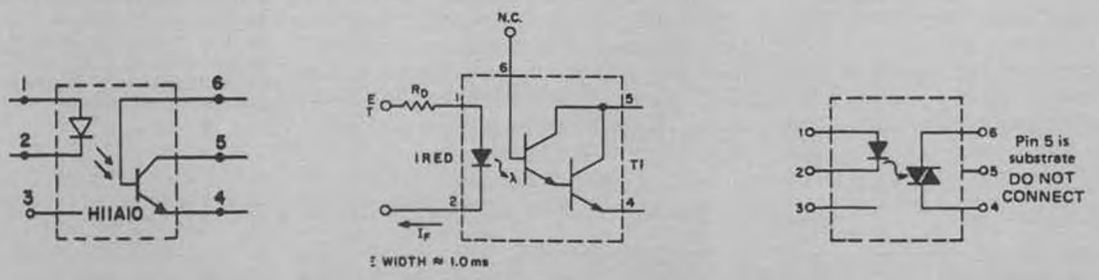
Matched Emitter/Detector Pair



4-Lead

Lead-Formed

Physically, the solid-state optocoupler can take a number of different shapes. These are some of the most common; individual source-detector, for use with a segmented interrupter wheel, and completely enclosed DIP.



Circuitwise, the optocoupler can be as different as it is physically. Shown are examples of diode/transistor, diode Darlington, and diode/SCR configurations. In RC applications, the first two seem most useful.

ELECTRIC POWER

BY MITCH POLING

MAKE ELECTRIC SAFE

John Preston writes a column called "Safety Comes First" in *Model Aviation*. The July 1990 column had quite a bit about electric safety, including an awful shot of Bob Kopski's "hamburger hand." Fortunately for Bob, the damage was not as bad as it looked, and he can still write and keep us all well informed in his own *M* column on electrics.

The upshot of Preston's column was that there are two primary safety areas in electrics: the propeller, and fire. I have been well aware of these for many years. I saw one flier's wrist get chopped up by a 25-size (14 cell) motor. He was very fortunate that he did not have to go to the hospital. And I have had an on-board battery fire that destroyed a plane. With these in mind, some basic advice that bears repeating is as follows: use a 20 to 30A fuse on all motors, and on all motors driven by eight or more cells, use a safety switch (also called an arming switch), as shown in the diagram. The arming switch provides a manual control over the motor. This is very important when you are using radio operated on-off or proportional speed control. I strongly recommend a three-position toggle switch. Connect and use just one "on" side. Check the diagram to see what I mean. This gives *two* "off" positions (the center and one side). There will come a day when you will be glad the switch has two "off" positions. I have accidentally bumped the arming switch several times, and it has always stopped at the center position.

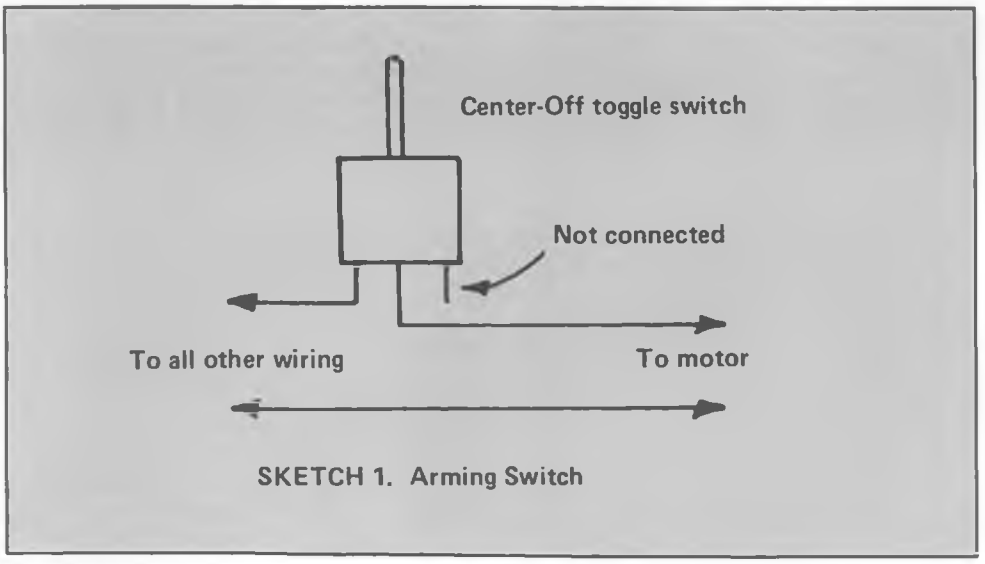
The fuse, of course, is there if all else fails. A 30A fuse will probably let the motor and prop hurt you, but at least it offers the option of jamming the prop into the ground to stop the motor. If you try that with no fuse, there is a good chance that the wiring will melt and cause a fire, making a bad situation even worse.

These safety precautions are very important for electric fliers. We are especially prone to "lone eagle" type flying. That is, many of us go flying alone, and if there is an accident, we don't have someone to get us to emergency care. I would say "always fly with a buddy," and that is certainly good advice, but I often do not. Electrics are so easy to fly on impulse, in areas where gas planes cannot be flown, that it is hard to obey the "always have a partner" rule. So, do the things that need to be done to prevent an accidents. This will become even more important in the near future, as more and more electric fliers use the larger electric systems (12 to 30 cells). These systems allow a remarkable and marvelous range of flying, but they have all the power of gas engines, with the attendant potential for injury. This is something that many beginners in electrics often forget. The electric systems weigh more than gas, and the power run is not as long, but the power itself is in the same range. This is the message contained in the Astro Flight motor labeling system for the Astro 15, 25, 40, and 60 motors. If you think in watts or horsepower, the corresponding values at 25 amps are Astro 15: 300 watts/.40 hp; Astro 25: 350 watts/.47 hp; Astro 40: 450 watts/.61 hp; and Astro 60: 700 watts/.95 hp. Note that even an Astro 15 is generating an appreciable fraction of a horse!

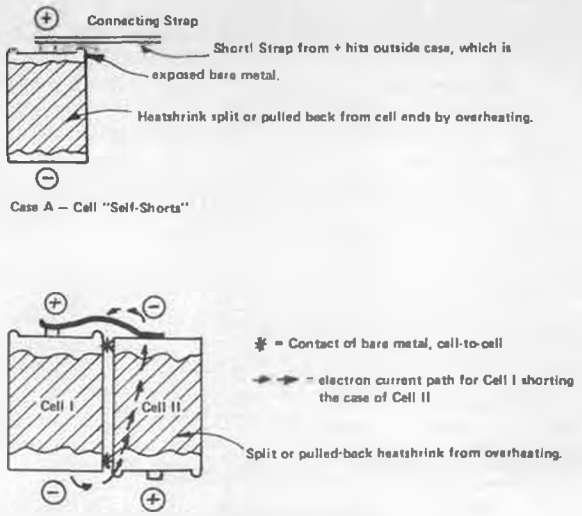
Ain't she a doll? Bernard Cawley's young daughter proudly shows off daddy's handiwork, an "Electro Flea" designed by our columnist back in 1975. Plans have never been published, but Mitch says he'd do an article on it if there's enough interest. Readers?

Another dramatic picture in Preston's column showed the remains of Bob Afflerback's Astro 40 powered Dirty Birdy pattern plane after an in-flight fire. This was apparently due to a shorted cell in the pack. There was a warning: the pack had shown an unusually high rate of charge before flying the fifth flight of the day. What happened?

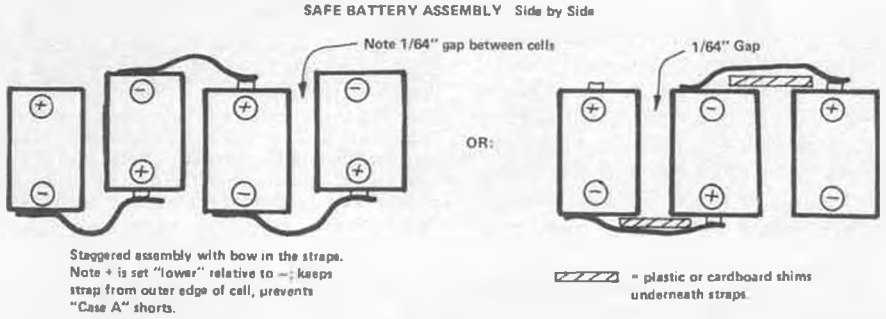
From the description of the accident, it sounds like Bob was accustomed to charging the batteries while in the plane. I have mentioned before that this is a very risky practice. When the plane is set up this way, the usual routine is charge and fly, charge and fly. The battery packs can get very hot, with serious consequences. My practice, and I strongly recommend this to everyone, is *do not charge the batteries in the plane!*



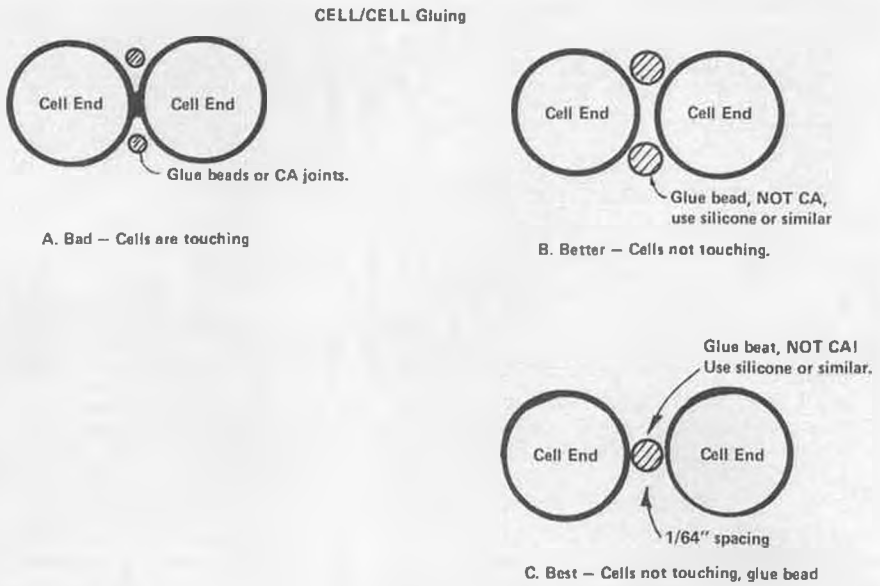
SKETCH 1. Arming Switch



SKETCH 2. Shorts caused by heatshrink pull-back or splitting.



SKETCH 3.



SKETCH 4.

Take off the wing, take out the batteries, and charge them out in the open. Yes, it is a pain to take off the wing every time. Yes, the connectors get more wear on them. Yes, it takes more time. Yes, you may have to redesign the plane so the batteries can be taken out. But the battery packs will last almost forever, with excellent performance, if you take them out to charge them. They will stay cool, and you can see if there are any problems with the battery pack. Velcro makes battery mounting very easy and removes some of the difficulties of charging outside the plane.

Now let us see what could have caused Bob's in-flight fire. When battery packs get hot, the heat-shrink on individual cells in the pack can shrink or crack. This is what I suspect caused Bob's airplane fire. It is a major problem; however, on many battery packs it can be seen in time, provided the battery packs are sitting in front of you! Bob's packs were assembled with the cells side by side. This is a good way to build packs; I build mine that way. However, if the heat-shrink around two side-by-side cells does crack or shrink, the bare metal sides of the two cells can touch. This will short circuit one of the cells, as shown in the drawing. The cell can dump its charge at 50 amps or more, and the heat is enough to cause the insulation on adjacent cells to melt or shrink. They can then short out, in a chain reaction. This is "battery meltdown." This in itself would probably not cause a fire. The most likely cause of a fire is the wires and connecting straps in and from the pack carrying the shorting current and getting red hot as a result.

Judging from the photos of Bob's plane, I think this is the sequence that happened. The unusually high charge current before the flight was, I think, due to hot packs, which then really overheated in flight, with the consequent splitting or shrinkage of the cell jackets. I personally have not had a battery fire from this cause, though I have come close. Several packs I have had developed splits in the cell heat-shrink or the heat-shrink on individual cells has pulled back to expose a bare edge.

A cell can also short out due to a bare battery strap that contacts the outer edge of the cell (see drawing). This is common in inexpensive commercial packs. If the heat-shrink wrap on the cell splits, shrinks, or melts under the strap, the cell will short, and the same thing happens that was just described. A battery strap did short on one pack I had, but I was fortunate and did not have a fire. It did scorch the end of the pack, though.

Charge jacks can also cause a fire. If the charge jack is shorted, the battery can dump through it. The one fire I had was caused by the leads to the charge jack shorting in a hard landing. I have not used charge jacks since, and have had no problems.

There are several ways to build battery packs with the cells side by side that avoid the hazards described. SR Batteries does the

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FREE FLIGHT

BY BOB STALICK

TIMER TIPS

Timers! What has happened to the simple clockwork timer? It has disappeared from your hobby dealer's shelf as well as from the stock of your mail order supplier. The reason is simple: the supply from the Orient has dried up. This means that unless you have a good supply of them in your workshop, you are not going to be able to replace those you lose or break in the course of your free flight activities. Of course, the supply of Seelig and Czech timers appears to remain, and a letter to Doug Galbreath or Starline Enterprises will get you some information about ordering these jewels, as described in the December column.

So, it behooves all of us to take good care of the supply that we have. This month, I will provide some hints as to how you can make those timers you have in your stock last a bit longer, and if you have some that are not working correctly, you will be able to find out how to make them work as good as new once again. But first, gentle readers, here's the usual lineup of *Model Builder* Free Flight features.

JANUARY THREE VIEW—TOSHI MATSUDA'S "ZERO"

After some discussion with the NFFS Model Eligibility Committee, Toshi Matsuda's "Zero" was determined to be eligible for Nostalgia competition. The Zero was one of the first successful kitted hi-thrust models developed for 1/2A engines. The late Toshi Matsuda became a legend in SoCal F/F circles for his intricate and brilliant tissue decorated designs. It's been said by people who once flew with him, that he would come to the field with a new stable of Zeros ready to trim. When the day's test flying was over, several of them would have bitten the dust, but those that survived the trimming process would be very competitive during the contest season.

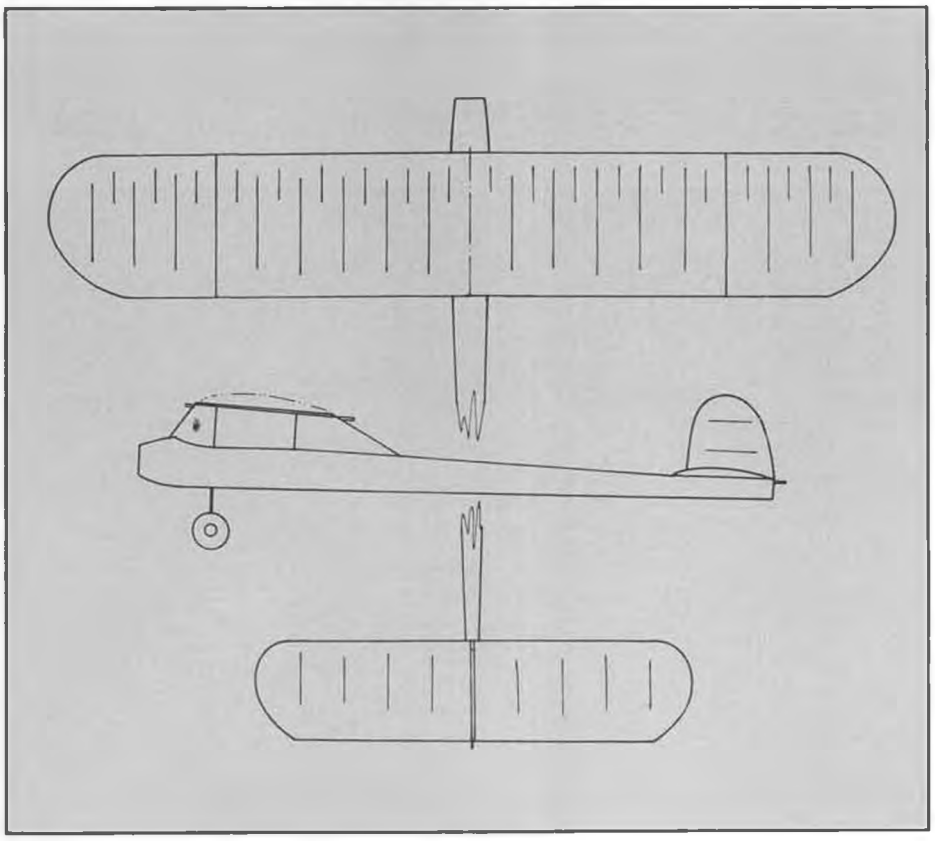
I had forgotten about this design, even though I built one of the Modelcraft kits during the 1960s, until the NWFF Champs held in September. At that meet, Dick Williamson came to the contest with a Zero that he flew in AMA 1/2A competition The ship was powered by an average Cox .049 engine, and it performed beautifully. Dick made his three required maxes plus his first flyoff, dropping his second flyoff flight and placing second in the contest,

After the meet, I went to my old plans box and dug up the plans for the Zero. Sure enough, it looked right. A check of the NFFS Eligibility list showed it as a Nostalgia model. I began to cut out parts. With a Hornet .051 in the front end, I think it can be a real performer in Class A Nostalgia. If you are interested in full-sized plans to this ship, you can get them from John Pond Plans Service (see John's ad elsewhere in this issue). Order plan 33C7 Zero by Modelcraft. The cost is $5.25 each plus 20% postage and handling fees.

If you can't wait for John's usual quick service, you might begin scaling up this month's three-view. A couple of notes will be helpful to you if you do this. First, the wing is built without any warps and is otherwise standard in construction. The stab is similar other than the Warren truss type rib system. The tips of the stab are rigged to accept 1/16-inch diameter dowels for the three-point VTO that was required during the Nostalgia period. Finish the complete stab including covering before installing the

Dick Williamson preps his "Zero" for competition at the 1990 Northwest Free Flight Champs. Model was designed by the late Toshi Matsuda and kitted by Modelcraft, and is eligible for Nostalgia events. It's this month's featured three-view. Bob Stalick photo.

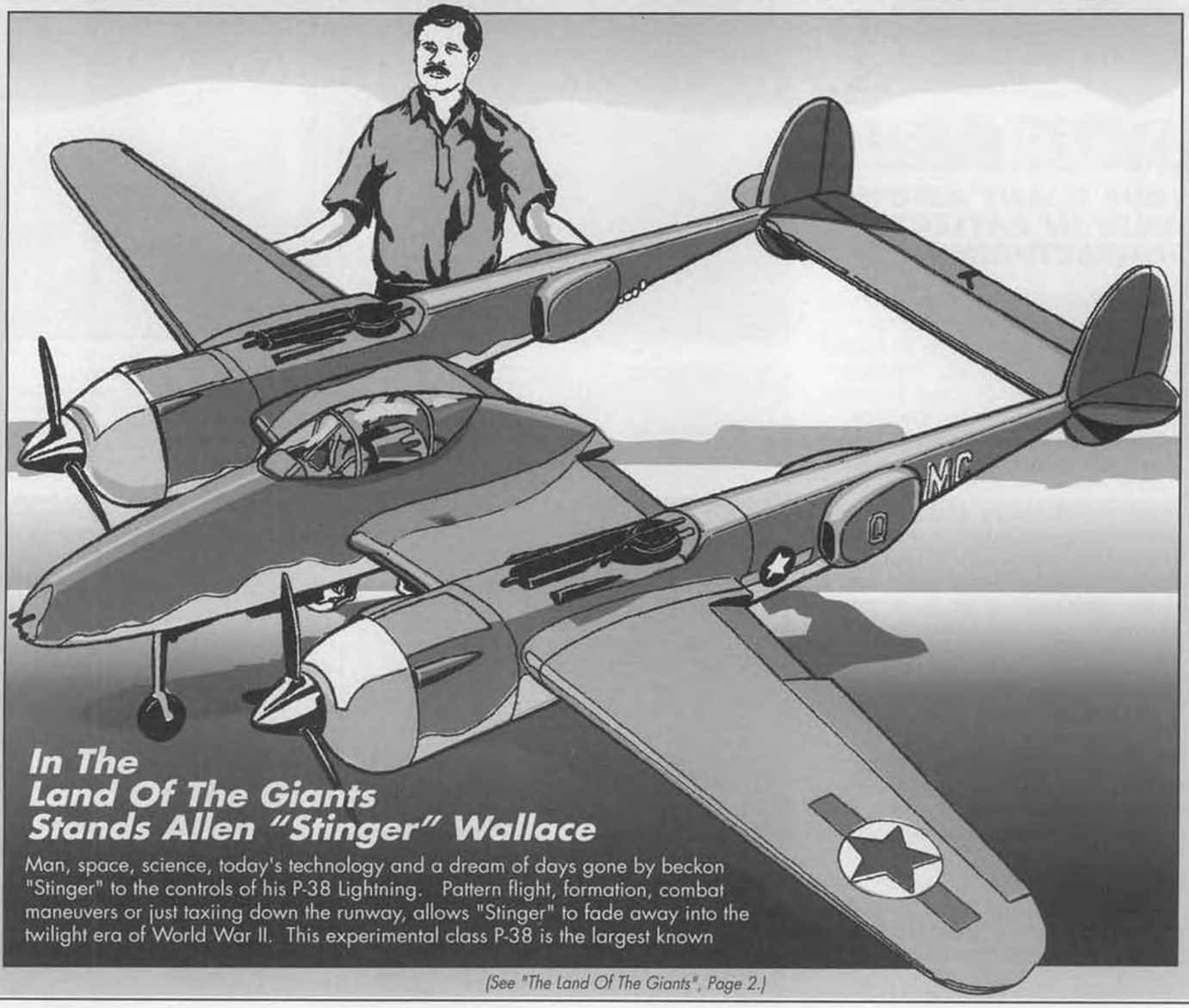
JANUARY MYSTERY MODEL



THE AVIATOR™

The Newsletter For Today's Discriminating Modelist. A Free Publication from Associated Technicians, Inc.

LAND OF THE GIANTS!



In The Land Of The Giants Stands Allen "Stinger" Wallace

Man, space, science, today's technology and a dream of days gone by beckon "Stinger" to the controls of his P-38 Lightning. Pattern flight, formation, combat maneuvers or just taxiing down the runway, allows "Stinger" to fade away into the twilight era of World War II. This experimental class P-38 is the largest known

(See "The Land Of The Giants", Page 2.)

The Land Of The GIANTS!

(Continued from page 1.)

flying model P-38 and is certain to prompt any modelist to dream or WWII Veteran Pilot to relive the adventures of yester-year.

With a 160 in. wingspan and weighing in at 95 lbs., this beautiful bird demands all the power of it's two 5.2 Sachs engines. This proud bird utilizes two Power Sonic 6.0 volt, 4000 milliamp Battery Packs that supply it's redundant electrical system. The use of Likes Line retractable landing gear powered by Power Sonic 12 volt 500 milliamp Battery Packs, gives the P-38 added creditability and completes the image of the actual aircraft taking off or landing.

POWER SONIC

A TRUE GIANT AMONG GIANTS IN BATTERY MANUFACTURING

The Power Sonic Corporation, a privately held corporation founded in 1969, now with facilities in Redwood City, CA, Boston, MASS, Huntington Beach, CA as well as their overseas locations, has grown to become a major presence and an industry leader of virtually unlimited production capacities and back-up capabilities. Their advanced designs and automated production process allow for optimum efficiency and adaptability resulting in lowered production costs that make their products one of the best values available to consumers today. With sales and marketing subsidiaries in Europe and Australia, Power Sonic is truly an international *giant* in this highly aggressive industry.

As big as they are, they have remained responsive to the consumer's growing needs, carefully choosing their distributors with customer service and support a primary concern. They continue to produce products that fit the specialized needs of their customers and deliver the technology today's demanding consumers deserve.

(Continued on page 4.)

TOP: Allen "Stinger" Wallace, (right), and Scott Broughton,(left), are dwarfed next to "Stinger's" P-38. In the foreground you can see another of "Stinger's" classic war birds, a P-47.

LEFT: Here's Allen "Stinger" Wallace, with his gleaming P-47, a shining example of a proud fighter in overall natural metal finish with flat black anti-glare panel. The exact attention to detail is what sets this bird apart and is evident upon closer examination where even the rivits are reproduced. This aircraft weighs in at 45 pounds, with smoke, retracts and a Sach 5.8 Engine with dual 1800mA Power Sonic Battery Packs.

Associated Technicians, Inc. National Distributors for Power Sonic Hobby Packs

Performance, reliability, availability and value have come together with the association of Power Sonic and Associated Technicians, Inc. A shared committment of quality and service drives both these organizations to their common goal to make Power Sonic Battery Packs the most respected name in batteries, worldwide!

Modelists themselves, the founders of Associated Technicians are familiar with the needs of today's hobbyist for premium battery packs. Hobby pack voltages from 4.8 to 12.0 volts and current requirements from 110 to 7000 milliamps assure today's modelist of a virtually unlimited amount of current. Mark Strace, of Associated Technicians states, *"We're not here to re-invent the wheel, but to improve the durability for the end user... the modelist."*

Todays hobbyist represents a more knowledgeable and a more demanding consumer base. They've invested significant time and money in their craft only to face compromises when it came to their battery packs. We're proud to say that this is all in the past. Their demands are being met and in many cases exceeded by the quality products Power Sonic has developed. This aggressive research and development coupled with Associated Technicians intimate knowledge and understanding of needed advancements will work to keep Power Sonic on the cutting edge of technology and assures the consumer that their continuing needs will be addressed.

A Proud Alliance of Quality Products, Support, Performance and People

You get a better value when you choose Power Sonic because you get more than the most technologically advanced battery packs available, you also get an established and resourceful manufacturer with a professional nationwide distribution organization, optimum quality control, design and development engineers that listen to and address your needs, professionals who stand behind their products with the kind of support and service you thought was a thing of the past... and you get it all at an affordable cost. In the "Land of the Giants", Power Sonic stands taller.

POWER SONIC
GIANT AMONG GIANTS

(Continued from page 2.)

If I had only two minutes to leave you with a lasting and rather positive impression about Power Sonic, I would sum it up like this:

- **Power Sonic** builds a line of batteries that is better than any other on the market today. Without saying that they have developed a unique mouse trap, let me say they have certainly adapted the small improvements and attention to detail that add up to a *better* mouse trap. Their state-of-the-art designs, their advanced production process and quality control is second to none, and every battery is cycled and checked several times before being shipped.
- **Power Sonic's** production capacity is virtually unlimited due to their various manufacturing facilities, each having multiple back-up capabilities. This results in continuity of supply and timely deliveries.
- **Power Sonic** dedicates the necessary resources to provide the level of support you deserve; national advertising, shows, sales support, literature, a knowledgeable and helpful customer support staff and two warehouse locations from which to ship.
- **Power Sonic** batteries are getting *designed-in*, *shipped with* or *specified for* equipment and products of every kind. Their good reputation is already established; the demand is already there!
- **Power Sonic** offers not only a complete line of sealed lead-acid batteries, but also the full range of nickel-cadmium batteries. This includes button cells, as well as the capability of supplying quality custom-made packs and cell assemblies in small quantities.

Success is measured by the bottom line, not short-sighted savings gained at the expense of quality components. Power Sonic, a GIANT in terms of production, service and value, offers the products and support that the discriminating hobbyists demand. They're just the kind of organization to keep you looking good and flying high.

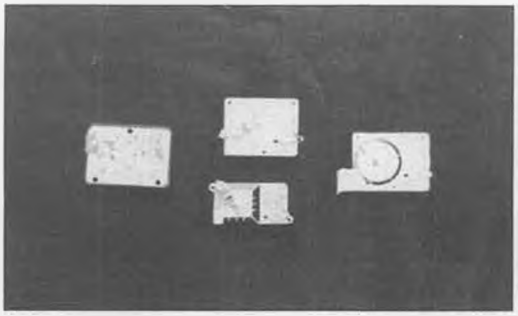
Professor "Sonic" Answers the Question, "What is NiCad Memory?"

This phenomenon associated with nickel-cadmium batteries has been the scapegoat for everything that can go wrong with a NiCad pack. It is the tendency of a battery to "remember" the depth of discharge as a result of a repetitive discharge pattern. Attempting to go beyond the patterned depth of discharge may prove futile. Example: Electric Shaver. Design problem.

Frequently more harm is done when batteries are "deep cycled" for prevention, because cells in an aging pack may develop uneven capacities. When such a pack is taken down to a low voltage, cell reversal can occur. Clearly, most applications provide enough variety in the discharge pattern to begin with. If not, it *is* advisable to run a "full" discharge, i.e. down to 1V/cell from time to time.

STANDARD CELLS

MODEL NO.	NOMINAL VOLTAGE (V)	CAPACITY 5 hr. RATE (mAh)	STANDARD CHARGE		QUICK CHARGE		DIAMETER (MAX)		HEIGHT (MAX)		WEIGHT	
			(mA)	(hrs.)	(mA)	(hrs.)	inches	mm.	inches	mm.	oz.	g
PS-1/3AA	1.2	110	11	15	28	6.0	0.571	14.5	0.669	17.0	0.25	7
PS-N	1.2	150	15	15	38	6.0	0.473	12.0	1.142	29.0	0.30	9
PS-AAA	1.2	180	18	15	45	6.0	0.413	10.5	1.752	44.5	0.35	10
PS-2/3AA	1.2	250	25	15	75	4.5	0.571	14.5	1.181	30.0	0.42	12
PS-AA	1.2	500	50	15	150	4.5	0.571	14.5	1.988	50.5	0.74	22
PS-SC	1.2	1200	120	15	300	6.0	0.906	23.0	1.693	43.0	1.69	48
PS-C	1.2	1800	180	15	-	-	1.024	26.0	1.969	50.0	2.65	75
PS-1/2D	1.2	2200	220	15	-	-	1.300	33.0	1.476	37.5	3.03	86
PS-D	1.2	4000	400	15	-	-	1.339	34.0	2.402	61.5	5.47	155
PS-F	1.2	7000	700	15	-	-	1.339	34.0	3.583	91.5	8.82	250

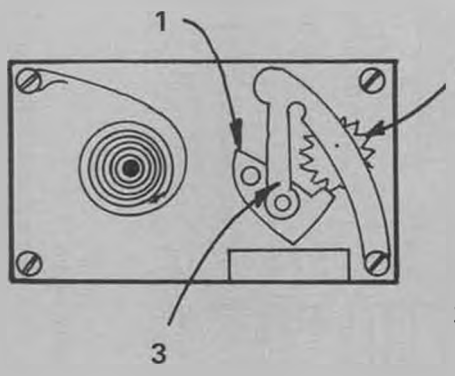


(Left) Some examples of clockwork engine timers. At left is the latest model available from Tatone and KSB; early style Tatone at middle top; Tatone 1/2A Tickoff at middle bottom; and the Tatone Flood-off timer at right. All of these can be cleaned and repaired, as described in text. (Middle)To properly clean and repair timers, you'll need a jeweler's screwdriver, smooth-jaw needlenose pliers, and a pin-point oiler filled with light oil. Also needed is a small ultrasonic cleaner or a small container with a tight fitting cap, for cleaning parts in solvent. (Right) This is what the timer works look like with the faceplate and back cover removed. Stalick photos.

dowel pegs, if you wish to use the three-point VTO system. If not, the dowels can be left off. The fuselage is built similarly to a Starduster. The fuselage framework is covered with 1/16 sheet balsa on either side, but the sheeting feathers out as it reaches the front of the pylon area. Since the original model was flown with a Hornet equipped with a timer tank, the firewall and nacelle may need to be extended if another type of engine is used. The fin is 1/16 sheet, which I think is too flimsy for a bottom-finned model. I would prefer to use 3/32 medium C-Grain balsa with a thin basswood outline in order to minimize warpage and increase strength on D.T. landings.

Finally, do not use a remote D.T. fuse on this model. The fuselage is not stiff enough to resist the tension of a tight rubber band without bending. Use a D.T. mounted right under the stabilizer in the "old fashioned way."

Now, I know that the Zero may not appeal to you, but if you like the T-Bird, another high thrust model, you should love the Zero. It is a definite winner.



TOP VIEW OF "OLD STYLE" TATONE TIMER WITH FACEPLATE REMOVED.

1. ESCAPEMENT
2. GEAR WHEEL
3. ADJUSTMENT ARM

SKETCH IS APPROXIMATELY DOUBLE ACTUAL SIZE

JANUARY MYSTERY MODEL

Once again, I reach into the supply of potential mystery models supplied by Dan Ciesla. Dan, as you may recall, is a truck driver who dreams about free flights as he tools 18-wheelers down the interstate. Occasionally, when he gets home, he looks through those old magazines and ships a copy of some weirdo designs to me for possible use. Well, Dan shipped this one to me recently, and the more I looked at it the more I thought that this design would make a nice little Pee Wee 30 model. It was designed for the Cox Pee Wee .020 when it first came out in 1959, and it has a wingspan of 30 inches. Just because it came from Great Britain should not deter anyone out there who has a supply of old magazines from guessing at its moniker. The designer is a currently well-known scale model designer and flier. So, the rules: The first one in line with the correct name of this month's mystery model will receive a free subscription to *Model Builder*. Please send your best guesses to Bill Northrop, c/o *Model Builder* Magazine.

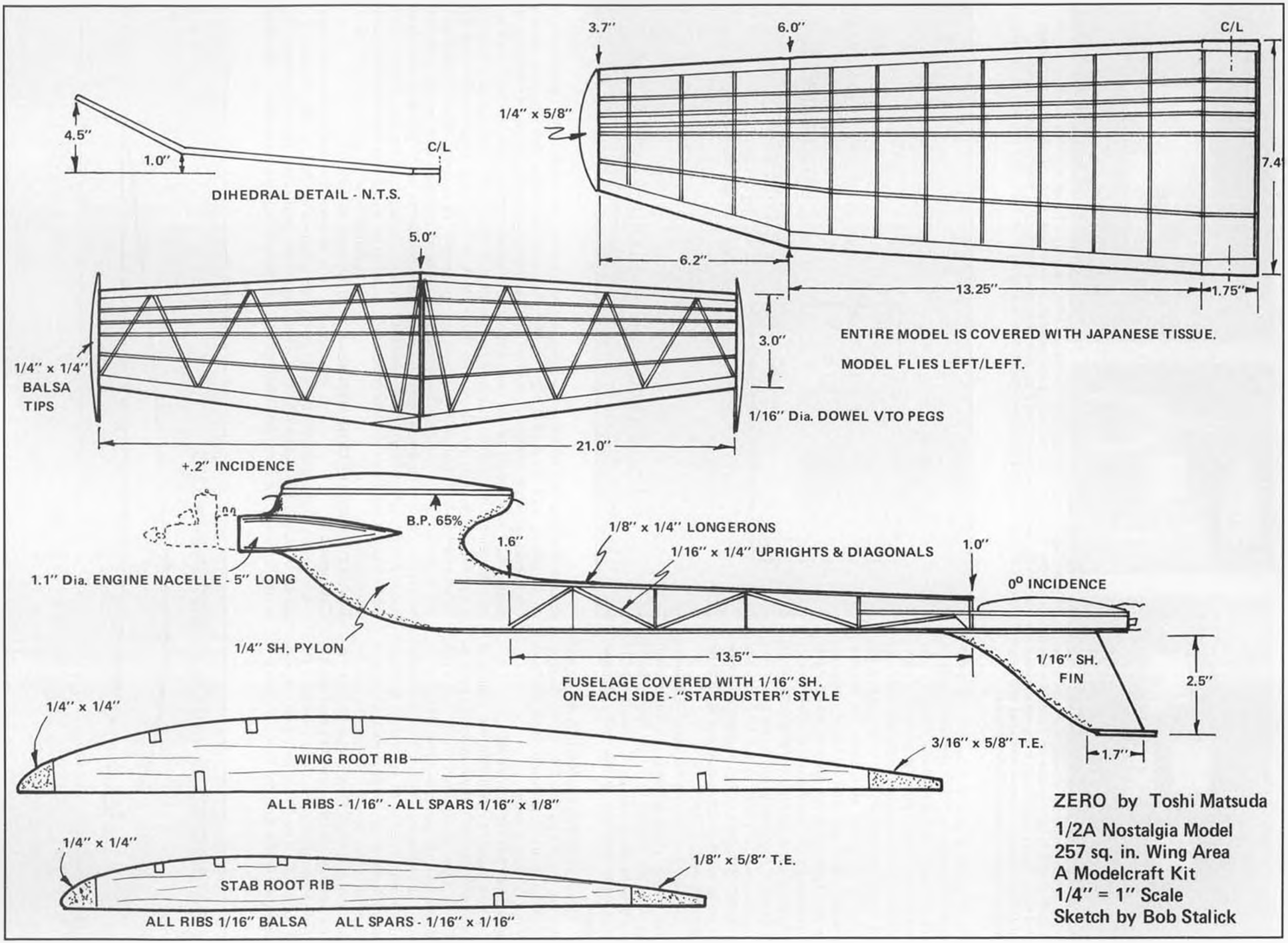
JANUARY DARNED GOOD AIRFOIL— Gottingen 235

Back to the *Comprehensive Book of Light Plane Airfoils* for this month's section. This is another one of the Gottingen laboratory's test sections from the year 1918. A couple of features that make this month's feature worthy of a good look from free flighters are the following: It is a thin section, with the high point at 30% of chord and only 8% thick; it has a slight undercamber; and the nose entry is rounded to improve stall recovery. To me it appears to be an ideal selection for a number of rubber powered and glider models. In fact, I wonder why it hasn't been used on large rubber powered models, such as Mulvihill, as it looks like an application that would be perfect.

It is an airfoil that might need some reinforcement at the trailing edge because it is quite thin at the last 15%, but the rest of the construction looks adaptable to standard

DARNED GOOD AIRFOIL — GOTTINGEN 2235

STA	0.00	1.25	2.50	5.00	7.50	10.0	15.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	95.0	100.	
UPR	1.70	3.72	4.31	5.32	6.12	6.81	7.45	7.71	7.98	7.71	7.13	6.01	4.79	3.24	1.81	1.01	0.32	
LWR	1.70	0.11	0.00	0.32	0.53	0.69	0.96	1.17	1.49	1.54	1.33	1.06	0.80	0.59	0.32	0.13	0.00	



ZERO by Toshi Matsuda

1/2A Nostalgia Model
257 sq. in. Wing Area
A Modelcraft Kit
1/4" = 1" Scale
Sketch by Bob Stalick

FULL SIZE PLANS AVAILABLE, SEE PAGE 106.

methods. Let me challenge one of you out there currently designing a Mulvihill to try the Gott. 235 as the airfoil of choice.

THE CARE AND FEEDING OF CLOCKWORK TIMERS.

Elsewhere in this issue are three pictures of timers. The timers that I am describing in this column are the earlier model Tatone tickoffs and floodoffs, and Tatone derivatives that have a wire type on-off switch. Later models, those with a small lever type on-off switch, are more difficult to manage for non-jeweler types. In order to work on these earlier model timers, you will need a couple of simple tools. The first is a jeweler's screwdriver, which can be purchased at Radio Shack or at many hobby shops. The one that I use has a blade width of about 3/32 inch. Additionally, you will need a flat-nose pliers without serrated jaws. A good needlenose is OK, provided it does not have serrated jaws. A pin point oiler is also required. And, depending upon your eyesight, you might need a magnifying glass. I have a bench mounted magnifier that has a built-in fluorescent tube, and it is invaluable for my weakened eyes. Finally, a good ultrasonic cleaner is helpful and available from many department stores for as little as $20.00. However, you can also do a good job of cleaning if you can find a 35mm plastic film container for filling with acrylic lacquer thinner.

Now, if you have all of these tools, here is what you do. First, check all of your timers to see which ones don't run smoothly (or at all) and set them aside for work. Find yourself a clean spot on the workbench and cover it with smooth cloth (an old white, not patterned, bedsheet will do) or soft paper. Carefully remove the small screws that hold the back cover in place. Next, use the pliers to remove the nut that holds the timer arm in place, then remove the small screws that hold the faceplate in place. Put these small parts in a container and set aside for now. Take the works out and let the spring unwind.

Next, fill the film container with thinner or prepare the ultrasonic cleaner for accepting the timer works. Wind the timer up and place it into the film container full of thinner. Cap the container and let the timer unwind while you vigorously shake the container. If you are using the ultrasonic, keep the timer works in it for at least five minutes.

You can let the timer soak in the thinner for a couple of days in order to soften any gunk that has gathered. Then, remove the works, wind the spring all the way again, place the works back into the container and shake vigorously once again. Remove the works and brush the outside of it with an old soft toothbrush. Place it into the container and shake it once more. If the thinner is cloudy or dirty, throw it out and replace it with new stuff before this final rinse process.

Remove the works and let dry. When thoroughly dry, take the pinpoint oiler and fill it with light synthetic oil (Marvel Mystery Oil, Rislone, etc.) and place a tiny drop of oil at each of the bearing spots and on each gear in the works. Put another drop on the exposed gear wheel (see sketch) and on the escapement where it fastens to the adjustment arm. Some oil on the mainspring where it is attached to the drive shaft is advised. Now, you have a clean and oiled timer. Wind it up and see how it runs. If it runs smoothly and doesn't stop unexpectedly, you are ready to reassemble.

Here is what to do if the timer runs too fast or not fast enough. Ideally, the tickoff timer will run approximately 25 to 30 seconds when fully wound. If yours runs less than 20 seconds or more than 30 seconds, follow these directions:

1. If it runs too fast, gently bend the adjustment arm (see sketch) toward the gear wheel. This slows the timer. If you move the adjustment arm too close to the gear wheel, the timer will stop, so a little trial and error will give you the correct location.

2. If the timer runs too slowly, gently bend the adjustment arm away from the gear. Test the timer works several times to see that it is consistent in its settings.

Now it is time to reassemble the works to the faceplate and back cover. Before you do anything, soak the toothbrush in thinner and brush down the inside and outside of the faceplate, pinchoff arm, and back cover. Reassemble the entire timer. Before putting the timer away, wind up the timer as far as it will go, then put the timer arm in place at the maximum time setting. Tighten the nut holding the arm in place. Let the timer run down to the pinchoff location, then put it away for your next model installation.

Some replacement ideas in case parts are missing:

1. If you have lost some of the little screws that fasten the back cover or faceplate in place, they are 1.4x2mm in size. Some model railroad shops stock this size. I usually get the fillister head when I can find them.

2. If you cannot find the 1.4mm screws, take the screws out of the back of the timer

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Tom Ioerger and his original design 600 sq. in. Class B ship with O.S. 3.5cc engine. Photo by Jim Bocckinfuso.

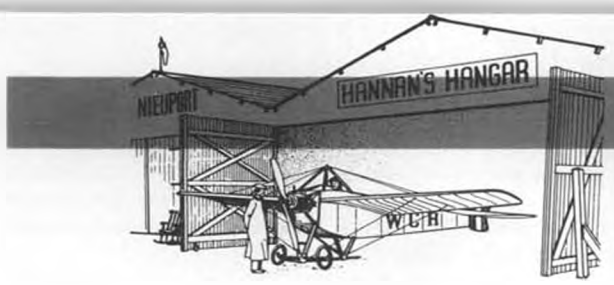
Eight-year-old Ryan Bane is one of the future generation of F/F modelers. He'll be giving his father competition in a few more years. Bocckinfuso pic.

Bill Prensky with his 510 sq. in. Class A/B Country Boy. K&B power. Bocckinfuso pic.

Here's Jim Bocckinfuso and his original design 1/2A model, which appears to have a carbon fiber tailboom.

Ken Koeppel doesn't let his 83 years keep him from enjoying hot competition free flights. His Windship, powered by a K&B 3.5, was unfortunately lost at the 1989 Empire State Free Flight Champs. Bocckinfuso photo.

An original design by Bradley Bane, the Windwhip V, flies in Class B with a Nova-Rossi 3.5 screamer. Photo by Jim Bocckinfuso.



BY BILL HANNAN

"ACTIVITY IS THE TOUCHSTONE OF SUCCESS"

Our lead-in line this month is from the book *Peter Carl Faberge*, by Henry Bainbridge. Faberge was the fellow who created those fabulous jeweled eggs for Russian nobility, and was possibly one of the finest craftsmen who ever lived. (What a scale model builder he could have been!) The point of our quotation? You'll never succeed in modeling or anything else without taking action. Don't just sit there reading about models, *build* something!

THAT MISSING LOGO

Several readers have asked what became of our Hangar column illustration, and we thought Ray Malmstrom's cartoon most appropriate, since we don't have the answer either. . . *(Ta-da, as if by magic. wcn)*

PEANUTS & PISTACHIOS MAY SAVE YOUR LIFE?

Jim Alaback sent in an article reporting the results of medical research suggesting that consuming nuts, such as peanuts, may significantly reduce the risk of fatal heart attacks. While cautioning that the conclusions are still tentative, the group's investigation was quite thorough, sampling some 34,000 people during a period of six years.

MOONEY MEMORIALS

The Shonai Peanut Club of Nagoya, Japan, held an event recently in honor of the late Walt Mooney. Plans for Walt's Piper Vagabond were featured in the club newsletter, and 14 models of it were mass-launched at the Shonai Green Park flying site by way of tribute to the famed "Peanut Professor," according to Shoichi Uchida and Jiro Sugimoto.

AND IN NEW YORK

During the 1990 Flying Aces Nationals, the perpetual Walt Mooney award, handcrafted by Douglas Mooney, was presented. Paul Boyanowski, of Allen Park, Michigan, described the ceremony this way: "What a moment it was . . . I truly believe there was a feeling of pride and contentment for what we are, and what we represented, among all of the contestants, officials, and spectators gathered around the scores table, as Fernando Ramos presented the trophy to a deserving Ken Groves. To a very large extent, we have Walt Mooney to thank for that feeling."

WATCH YOUR C.G!

As usual, the Flying Aces Nats was a resounding success, with huge numbers of beautiful flying scale models and plenty of good fellowship. Of course, there were some unanticipated happenings too. Don Campbell, of Detroit, Michigan, accepted an invitation from camping neighbors to step into their trailer for refreshments, and as Don recalls: "They were also on hand to enjoy the FAC Nats, and had model airplanes spread out on the picnic table. Three of us sat at the little table located at the rear of the trailer, while the other member prepared coffee, tea, etc. While the water was heating, this worthy gentleman decided to join us at the table. He was about to sit down, when the entire trailer upended, and the whole works slid to the rear!

The British "Air Glow" human powered aircraft, built by a group of modelers and being flown here by 18-year-old Nick Weston. Configuration appears to be quite similar to the U.S.-built Daedalus MPA. Whether the Air Glow will go after a performance record for MPAs, is unknown. Photo by Ron Moulton.

Rare Swedish edition of a Meccano metal toy aircraft from the 1930s is a valuable collector's item. Photo by Tomas Hultgren.

"I'm told my eyes were as big as moons when it happened . . . we landed with a bang, but nothing was damaged and no one was injured. We obviously upset the balance by crowding into the rear. Add to the fact that we were camped on the edge of a deep ravine, and you can imagine what was going through my mind when the trailer tipped up—I thought sure we were rolling backwards over the edge!"

SPEAKING OF BACKWARDS

Stan Wilson, of Fremont, Nebraska, wrote to say he has been trying to interest his son in stick-and-tissue models, and he was showing him a justcompleted Stringless Wonder. "But Dad, it doesn't look like the plans!" "Sure it does," said Stan, putting the model alongside the construction drawings. Oops! It seems he had installed the triangular outer wing panels backwards. Not wanting to admit a mistake, he told his son that it did not really matter anyway. Surprisingly, the craft flew wonderfully, and Stan concluded: "As I struggle through the difficult task of teaching the fine art of building model airplanes, I have learned a very important lesson in humility."

MODELERS' LAMENT

It seems some people are always looking for something timely to do; model builders, however, are always looking for time to do something!

FRESH IDEAS

George Benson, of Mill Valley, California, recommends the use of Pentel brand "Roll'N Glue" for applying tissue covering. He prefers to brush it on the model's framework, and says it has just the right amount of tackiness to permit slight shifting of the tissue during application, if required. Additionally, it dries perfectly clear.

George also wonders about incorporating a miniature slip-clutch into a rubber-motor winder. Such mechanisms, while rather costly at about $50, may be adjusted to slip at a predetermined amount of torque, and thus could allow precise winding, while reducing the risk of rubber breakage. Anyone care to try?

MODEL BUILDING AS CATHARSIS

Frank Zaic shared these thoughts by Clif Osborne, of Chillicothe, Ohio: "Modeling is a way of life. Thank God that it is an escape valve which allows you to put your mind on something for awhile and get away from the problems!"

AIR GLOW HPA

Ron Moulton sent us news of a recent Human Powered Aircraft, successfully tested at Duxford Aerodrome in England. A team of model builders (natch!) produced the craft over a three-year period, making their own composite components. The high aspect ratio wing employs expanded polystyrene for its ribs as well as its surface covering. Propulsion is via a propeller which revolves around the tailboom, permitting a cruising speed of approximately 29 kilometers per hour (18 miles per hour). All of the team members are active in the Impington College Model Aeroplane Club.

SO NOW YOU KNOW

Wish we had more contestants like Connie Hummel at our meets! She built this Peck R.O.G. with three colors of tissue, *edge glued* before covering. Connie is a topnotch artist and plans to construct a Peanut Scale biplane next. Photo by Ron Hummel.

This bizarre contraption is actually a replica of Clement Ader's 1890 "Eole" flying machine . . . details in text. Photo by Georges Chaulet.

Some of the Peanut Scale Piper Vagabonds flown in the Walt Mooney Memorial Contest in Japan. Shoichi Uchida photo.

According to the *Paradise Pines Nugget*, a politician is someone who rocks the boat, and then tries to convince everyone there's a storm at sea. . . .

A REAL BATPLANE?

It was 100 years ago that Clement Ader's steam-powered, bat-like *Eole* was claimed to have briefly hopped off the ground to qualify as history's first powered man-carrying aircraft. In celebration of that anniversary, French aeronautical students constructed a reproduction, adding extra control surfaces and a modern Rotax ultralightplane engine. Although its stability appears marginal, the group contemplates flying their machine across the English Channel.

Meanwhile, model builder Emmanuel Fillon has flown his Peanut Scale *Eole* to much greater altitude than either of the full-size versions. So there!

DAVIDS VS. GOLIATHS?

Mike Combe, of Australia, attended a "Moth Day" Fun-Fly, open to any type of DeHavilland Moth model, and entered two Puss Moths, a Peanut and an 18-inch span variation. Both were displayed on a card

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INDOOR

BY KEN JOHNSON

NEW FLYING SITES

Are you and your group looking for a new or better flying site for indoor models? Perhaps this is a good topic to begin this column. This is currently on my mind, as our group in the Los Angeles area just secured a new (or rather a new/old) building to use for flying indoor. We used to fly at a good site years ago in downtown L.A. called the Navy/Marine Corps Armory. I remember working on obtaining the use of this building before, and we used it on the fourth Sunday of each month for several years. Then a fire in another area of the building negated its use for modeling. The 20-foot ceiling school gym being used currently didn't seem adequate for serious testing and contest work. As the managing personnel at the armory had changed, we felt a new tack was in order. We felt that light weight scale types, indoor hand launch and super-light duration models were the direction to pursue, at the armory. So we began with a clean slate by forming a new "light weight" club.

The name we selected was "Indoor Aeromodelers." A logo was designed by yours truly, and a formal letterhead followed.

An array of scale models by Joe Goldbach, Pittsburgh, Pennsylvania. Joe and "Indoor" editor flew rubber scale together in the late '60s.

Armed with these and several indoor publications with photos, we made an appointment with the current commander of the armory. Having explained what indoor models are all about, we asked for use of the building on the same schedule as mentioned above. We were told to send in a formal request for the armory's use and outline what times and services we wanted. Soon after sending in our request, a return letter with positive news arrived shortly thereafter, with a responsibility agreement to be filled out by our group. The only thing left to do was to call the armory activity supervisor one week before each flying date to clear its use, on a month-to-month basis (so our model flying didn't interfere with Navy or Marine drill activities).

How does this example relate to your group's needs? Perhaps this approach will work for you. First, find the most desirable building in your area. Then phone the responsible people to set up a personal meeting. Attend with magazines, photos, and even several actual models. These lightweight planes could convince the building people that no damage could result from flying models in the structure. It is good to mention that children would be participants and what a wholesome pursuit for the young, indoor modeling can be.

If you are successful in obtaining your new site, treat it well. Make sure that there is no rowdy behavior, that no damage to the building occurs and that the structure is left as clean as you found it. Good luck!

Mark Sexton, Seattle Strat-O-Bats with his Sweepette 16 HLG.

Mark Le Voe discusses Easy B times during Burbank, California flying session.

MOSCOW, IDAHO MEET

The indoor contest at Kibbee Fieldhouse on August 3, 4, and 5, was attended by 33 fliers. Bob DeShields, Los Angeles area, won Intermediate stick with a single flight time of 22 minutes, 36 seconds. Larry Cailliau had two 40+ minute flights in microfilm. Bob Randolph was first in F.A.I. stick with flights of 41 min., 20 sec. and 40 min., 40 sec. The three flying areas in this supersite allowed different types of indoor models to be flown simultaneously. If you are serious about indoor and can attend, get to the next contest at Kibbee Dome. You will not be sorry you came.

INDOOR U-CONTROL?

For sometime now I have been aware that at least one group of indoor fliers has brought U-Control indoors. Not gasoline powered, but electric-powered scale. These models are mostly Guillow kits converted to electric U-Control. Usually, all other indoor flying stops when these are flown. This flying has become popular with the control liners in this group. I have my own feelings about this. I would like to know yours. Write and state your preference, pro or con. Tell me the reasons you feel as you do. *(The IMS Pasadena model show introduced indoor electric U-control, as flown by the Burbank Blacksheep Squadron way back in 1982! It was finally discontinued in 1990 because of space limitations. wcn)*

PIRELLI, ANYONE?

For many years it has been apparent to this author and many other modelers that Orange Pirelli rubber is the best power rubber yet produced. That is, the longest torque curve can translate to the longest flights on any given model. With other rubber, the model may climb well but the cruise and descent will be short. A model flown with the old Pirelli will climb well, cruise long, and descend more slowly.

The one problem with this super-rubber is that it is sometimes brittle, meaning that it will break after three maximum winds on a given motor, or worse, will even break during the first maximum wind. The break resistance was apparently inconsistent from batch to batch.

When you get a good batch, it's unbeatable. Most duration records are set with Pirelli! If you're going for broke, go for Pirelli!

Your indoor editor is looking for good Pirelli. Do you have (or know of someone who has) some of this "Old but good Orange Pirelli?" I will pay top dollar for this rubber.

ULTRA FILM COVERING

Since condenser paper is still in short supply and plastic film is being used more and more, a few tips on covering is appropriate. A misconception is that the plastic film is attached to the model framework. In truth, the model is attached to the plastic! Ultrafilm or Microlite covering is used strictly for duration models, the only exception being profile scale.

First, you must select the proper spray cement to attach the wood frame to the covering. For some time, I was using a product (from the art store) called Spraymount. I noticed recently that the covering was pulling away from my ornithopter flappers. Warren Williams suggested that I try using 3M Super 77 spray adhesive instead. As the flappers on an ornithopter get more stress than anything else in indoor I felt it was worth a try. Warren was right. It held better with Super 77.

The sheet of covering (measuring about 12x20-inches) is taped (masking tape 1/4x3/4-inch) to a smooth sheet of artist's illustration board, at the four corners. Next, an opened sheet of newspaper is placed on the floor or a table top. The wing structure is placed on the newspaper, face up. Holding the Super 77 about 12 to 14 inches away, spray gently over the wood structure. Don't spray too much. NOTE: Use spray only in a well ventilated area and make sure the spray is directed away from your face. Place the sprayed wing face down on the taped plastic sheet. Using one finger, press down on the

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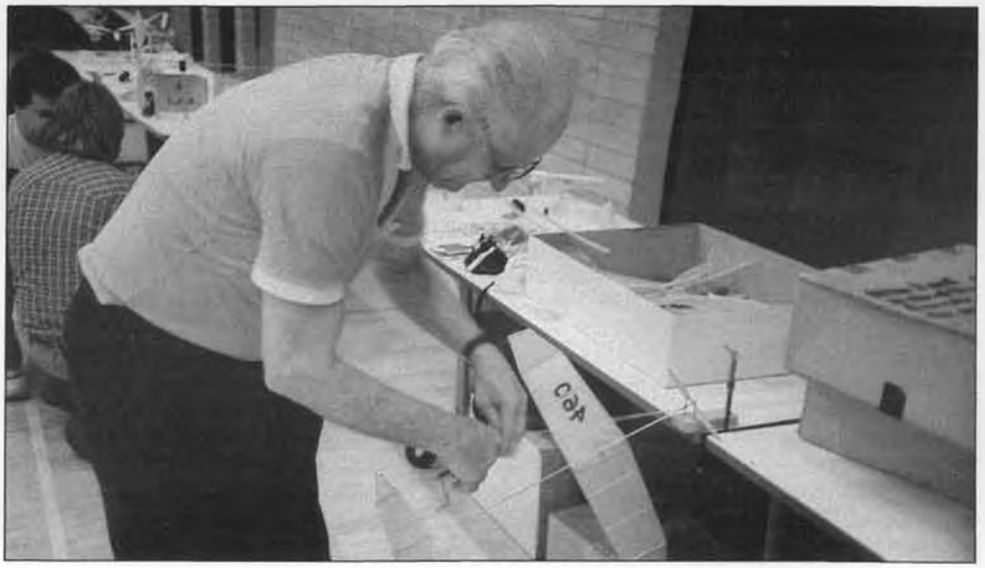
Airline pilot Paul Avery with Bostonian at Blacksheep contest.

Doug Hanny, British Columbia, Canada, with his P-24 duration model.

Artist and modeler Millard Wells holds aloft his 36-inch Cocoanut Ford 2 AT. It flies slowly and majestically. Has silver corrugated paper covering.

Judging by the way he's holding it, this young HLG flier needs a few more pointers on technique. Burbank, California.

Al "D.B. Cooper" Borer with his P-24.



CONTROL LINE

BY JOHN THOMPSON

GETTING AIRBORNE

No matter how long we've been flying, most control line fliers fondly remember their first planes and their first awkward attempts to fly them.

The general evolution of both the nobby and society has resulted in model aviation, and control line in particular, being largely an adult activity. Many of the current control line fliers started as children or teenagers, but few in that age group now are as attracted to the hobby. Those fliers who grew up in the 1950s and 1960s, which make up the bulk of current control line fliers, were attracted to the idea of aviation first. Control line modeling became an outlet for that interest in flying. For most, it later became an end in itself.

Nowadays, with the instant gratification of electronic games, widely organized sports and a myriad of other activities, a hobby that requires the practice and dedication of model aviation is "too much trouble" for many youngsters. On the flying and contest fields, growing population gobbling up flying fields and noise complaints pushing them further away, flying often is done far away from where potential enthusiasts might see it.

All these factors, however, fail to reduce the fascination with flight and aircraft that can grow when people young or old have a chance to discover it. A major part of that discovery is in the opportunity to have some *success* in the activity. The failures encountered by fledgling fliers trying on their own, end many a promising flying hobby. That is why in this column we have so often discussed ways of finding other fliers in the local area and ways of finding success early in the effort. Once the model aviation "bug" bites, it seldom goes away.

Frequently the best way to get the bug to bite is to infest a whole group with it. When a small club forms, or a school group is organized by an interested teacher, the activity can blossom rapidly.

Just such a flowering of control line modeling has occurred at a school in Belleville, Ontario, Canada, where a group of youngsters has learned to build and fly in a successful program that is likely to result in a number of lifelong model airplane experts.

The school's residence counselor, John Lewis, contributed a photograph of the young fliers along with a report on their activities. Here's John's commentary:

"The group photo shows the members of the Cairn Model Plane Club located at the Sagonaska School in Belleville, Ontario. This Ministry of Education school serves students from all parts of Ontario. The students had been building mostly indoor models until the introduction of 1/2A control liners in the spring of 1989.

"I had no knowledge of these models but we have great teachers like longtime modelers Jack Humphries, Chris Brownhill and Kim Doherty. These people made many 170km trips to help us build and they have been very generous with kits and engines. Our most ardent teacher for building and flying the control liners has been a Bellevillian, Ron Nethercott. He came to our club night after night to slowly move us into the world of powered flight. Thanks, guys.

"We had many boys and two girls build (from scratch) and fly 1/2A control liners. This is the age of TVs, VCRs, video games and mass consumption of finished goods. It is quite an accomplishment for students aged 12 to 15 to build a three-dimensional flying model from a two-dimensional drawing. The planes were painted in a wide variety of pinks, purples, reds, greens, blues

As reported last month, Kelly Crozier attracted considerable attention at the 1990 Bladder Grabber with his working flyaway engine shutoff. Kelly (holding model) is seen here demonstrating the mechanism to a group of interested fliers. Photo by Frank Boden.

Ready and anxious to get it on, Ron Scoones awaits his call to fly at Bladder Grabber '90. John Thompson photo.

we find that most of the young fliers are relatives of adult fliers. The days seem to be gone when one kid taught another how to build and fly, as many of us adult fliers remember learning the hobby.

Aviation itself is "old hat" for kids who grew up in the space age. And with our

Is interest in Nostalgia Stunt on the wane? Only three entries in the event were registered at Stunt-A-Thon '90, one of which was Ted Fancher, seen here with his winning "Ares." Ted flew the same model to a second place win in Expert Precision Aerobatics.

Here's what we like to see most of all: young people getting involved in model building and flying. You're looking at the members of the Cairn Model Plane Club at the Sagonaska School in Belleville, Ontario, Canada . . . story in text. From left, back row: Scott Charron, John Ross (vice-president), John Lewis (staff), Steven Scanlon, Jeff Burden, and Nancy Knorr. Middle row: Brent Finney, Jerry Ross (president), Michael Mese, Chris Huckle, and Tonia Yanke. Front row: Michael Collette, Joseph Tippeneskum, David Jeffery, Mark Wright, Westly Fagen, and Lawrence Le Blue. Absent are Danny Murphy and Tina Saffioti.

and olive drabs. Using engines donated from a wide variety of sources, the kids were ready to take flight.

"All the planes flew. However, when trying to teach about a dozen kids at the same time there were many unscheduled hard landings. In the wonderful world of balsa these inevitable repairs were soon seen to be just another part of the whole process.

"We now have a few kids who fly well enough to be able to share their hard-earned knowledge with the other beginners. They do seem to be quite happy to remind me several times a day that they are better fliers than I. One boy now does loops. A few students have enough skill (and MAAC memberships) to fly independently at home this summer. The challenge is to see who can make the most progress.

"Through several donations, we have acquired two Busters and another .35-size control liner. One Buster was a new kit that was 85 percent student-built as a group project. The other two models were taken apart, repaired and re-covered, all supervised by Ron Nethercott. Our display of all the models during our annual recognition day was very well received.

"The students who have had the most success with the 1/2As were encouraged to try to fly the bigger planes. With much supervision, we have been able to have four club members take off and land these much bigger planes. There seems to be no end in sight for these happy fliers.

"If you have similar programs going we would like to hear how you are doing. We are the Cairn Model Plane Club at 350 Dundas St. West, Belleville, Ontario, Canada."

John may be able to add further information on the Sagonaska effort for teachers or volunteers elsewhere who may be interested in getting a similar effort going. Control line model aviation can be a lifelong activity for the young person who is a successful beginner. As John says above, there is no end to the enjoyment and education provided by this hobby.

We'd like to hear of any other school or group program for youngsters—or for new adult fliers.

SPEAKING OF BEGINNERS

We sometimes get into discussion of advanced and esoteric concepts that are interesting and understood by the intermediate and experienced modeler. It's helpful to be reminded from time to time that there are always new fliers coming on board the hobby and some of the things we take for granted are new concepts to them.

We're reminded of that fact by a letter from Dexter Labung of Angeles City, Pampanga, in the Philippines, who asked several elementary questions that result from his efforts to learn control line flying with virtually no assistance.

We'll answer a few of them in the hopes of helping Dexter and any other new fliers who might have been curious about the topics. We'll paraphrase the questions in the interest of brevity:

• How do you determine the location of the bellcrank in an airplane?

The bellcrank's location is not as critical as it may seem at first thought. It is traditional but not absolutely essential that the bellcrank is located approximately on the plane's fuselage centerline, approximately at the center of gravity. The reasons for this are primarily of convenience. The location of the *leadouts* at the wingtip is very important; the location of the bellcrank much less important. Therefore, you will find planes with the bellcrank located exactly in the center of the fuselage, or a little inboard, or a little outboard, depending on the designer's idea of how to route the pushrod, how to connect the mount to the airframe, etc. Deviating *too far* from these positions can result in some mechanical problems or general awkwardness, but reasonable adjustment of the location is no problem.

The answer, then, is to locate the bellcrank somewhere in the vicinity of the center of

continued on page 97

Russian flier Svetlana Fillippova discusses stunt matters with Dan Rutherford at Stunt-A-Thon '90, in Kent, Washington. Photo by Dave Gardner.

DEAR JAKE *Continued from page 7*

(1956) garage. It collapsed on my almost cherry (188,113 miles, surface rust only) 1964 Dodge Coronet sedan. My other collector car (a 1948 DeSoto coupe), which was sitting on its roof alongside the garage, was also crushed in the collapse.

I know the Air Force is to blame, because when that wind hit, I didn't see anything or hear anything that could have caused it. So it had to be the Stealth Bomber, right? What else is invisible and doesn't make any noise and stirs up a big hot wind?

I place the value of my garage at $135,000, my Dodge at $25,000 and my mint DeSoto at $110,000. Adding in medical costs for myself and my cat, and damage payments for the mental anguish suffered by my entire family (including those still back in Arkansas), I'll be suing for three-quarters of a million dollars. How do you like my chances?

Joe Zeke Roy Bob Spurlow in CA

Dear Joe Zeke Roy Bob:

Proving the B-2 to be the source of your troubles is going to be the key to the outcome of your lawsuit. If there is something else that is invisible, quiet, and stirs up a big hot wind, then reasonable doubt will work against you.

Considering gastrointestinal science and the phenomenon known as the "silent deadly one," I suggest you withdraw your suit.

Jake

• • •

Dear Jake:

My engine mounting instructions said that star washers could be substituted for lock washers. What's a star washer?

Josh in Jericho Park

Dear Josh and Readers:

We all know what's coming, right? Another Jake definition!

Well, here s your chance to top Jake. I'll give you my answer to Josh's question and leave space for you to come up with your own.

If this turns out to be popular, maybe I'll go with a fill-in-the-blanks format for the whole column.

Question: What's a star washer?

Jake's answer: Eddie Murphy's bath attendant.

Your answer:

Jake **MB**

COUNTER *Continued from page 11*

model aircraft, you know that's the city and state part of the address of Ace R/C, 116 West 19th St., P.O. Box 511, Zip 64037, phone (816) 584-7121.

The Ace Micropro800 is a microprocessor-driven, eight-channel transmitter that is said to offer computer power, features, and versatility never before seen in the RC world. In addition to all the common features of the competition, it has auto trim, eight aircraft memory, totally universal mixing, and extremely easy, logical layout and setup. It is a multi-task transmitter for all applications, including pattern, helicopters, hi-tech soaring, scale, racing, and . . . yes, sport! Setup is easy with the menu-driven LCD display. The transmitter covers any RC modeler's needs, from the most demanding competition pilot with sophisticated mixing requirements, to the average Sunday flier who wants to enjoy relaxed flying without intimidation from an overly complicated what-do-I-push-now transmitter.

The unit is available as part of a complete system, or by itself, or in the form of a retrofit package for existing Silver Seven transmitters. Retail on the transmitter alone is $395, and it is available on all legal frequencies; 27, 50, 53, 72, and (scale boaters!) 75 mHz. Currently, it's AM modulation only. For more info, contact Ace and tell 'em we sent you.

• • •

Eastern Tool & Supply Co., 149 Grand St., N.Y.C., NY 10013, phone (212) 925-1006, has just announced an addition to its vast line of specialty tools. It's the MT-770 Micro Self-Starting Torch, which retails for $35.00. This hi-tech, butane powered torch, which has a precision, micro-size adjustable flame, is easily fired up by merely pressing the Piezo self-starting electronic button . . no need for flint or matches. The tank is covered with two-way ribbed rubber for an extremely safe and comfortable grip. The unit is durable, lightweight, and portable. It will

operate for approximately three hours, producing a flame temperature of 2370 degrees, on standard cigarette lighter butane, and of course, is refillable. The variety of uses for this handy tool are only limited by the user's imagination. Every modeler's tool box should have one.

• • •

Fitting exactly into the *Model Builder* editor's concept of Mammoth Scale, large *LIGHT* RC scale for fun flying, the latest "King Size" Fun Scale design is now available in plan plus canopy and spinner form from Fun Scale, 220-65 Camino Corto, Vista, CA 92083, phone (619) 726-0154. This Jim Meister design spans 96 inches, with 1450 sq. in. of wing area, but has a flying weight of only 11 to 14 pounds! Power can be anything from a .90 to 3.0 cu. in engine. With a wing loading of around 17 to 24 ounces/sq. ft., this model fits into the novice flier category, with slow takeoff and landing capabilities that are outstanding. For a total of 80 bucks (plans—$35, canopy—$20, a 4-1/2" spinner—$20, and shipping—$5) the model is easy to scratch-build.

• • •

From HITEC R/C USA, Inc., 9419 Abraham Way, Santee, CA 92071, phone (619) 449-1002, makers of the RCD "Bullet Proof" receiver reviewed in this issue, comes the HITEC Master Heli 7 system, obviously for the RC helicopter enthusiast, and including an RCD receiver. All seven transmitter channels are reversible, and the two control sticks can be adjusted to various lengths to suit the operator. The high tech case is made of special RF shielding material.

Standard features on the HITEC Master Heli 7, such as the battery and RF meter, the changeable RF module, five servos, whip-style receiver antenna, and 1000 mAh battery, are usually associated with systems costing half again as much. HITEC R/C products are available at hobby shops in the U.S. and Canada. For more information contact Dave at HITEC and tell him you read about it in *Model Builder*.

As if radios aren't enough, HITEC is also offering an ARF-type electric-powered RC glider, the Wind Cruiser II, with a wingspan of 66-1/2 inches. The kit includes a Mabuchi RS-540SH electric motor with a direct drive folding prop. With optional 7.2-volt NiCd battery, receiver, and servos, the model weighs just under 39 ounces. The lightweight, three-piece balsa core wing is covered with Oracover, and the fuselage is blow-molded. Hardware and pre-attached servo tray are also included.

• • •

A very sensible and useful piece of field equipment for every RC modeler, whether the interest is aircraft, boats, or cars, is the R/C Transmitter Stand being offered by IKN Corporation, P.O. Box 24938, New Orleans, LA 70184, phone (504) 833-8630. The unit provides a sturdy resting place for a transmitter within easy reach of the user as he works on his model, and keeps it high and dry in the process, regardless of field conditions. Even at a busy flying field or contest, where transmitters are kept in a compound, sooner or later you take it to the flight line, the pond, or the track with your model and plunk it down, usually in the dirt, moisture, and grime. And how much did that thing cost? A lot more than the Transmitter Stand at $14.95 plus $3.50 for shipping and handling, that's for sure!

• • •

Frank Tiano Enterprises, Robart Mfg., and House of Balsa, distributors for Pacer Technology, manufacturers of ZAP products, announce three new Pacer products. Zap-A-Dap-A-Goo is a non-CA glue that bonds almost anything to everything, yet can be parted with a sharp razor knife. It is said to be ideal for gluing ply bulkheads to fiberglass fuselages, carbon fiber to glass or wood, and canopies to most any surface. Joints remain flexible.

Next there is the E-Mergen-Z. This is a field kit that contains a half-ounce bottle of Zap-A-Gap, a half-ounce bottle of Poly-Zap, a one-ounce bottle of Kicker, and three Z-Ends (extender tips) . . . sort of a First Aid kit for your model!

Finally, there is Kicker for Plastics, produced primarily for hard-to-bond, space age plastics. It is said not to craze or attack most plastics found in the hobby today. It's ideal for canopies, general plastic construction, ABS wingtips, and many ARFs.

• • •

BY FRANCIS REYNOLDS

WORKSHOP

This writer has been talking about model design and technical stuff here for two and a half years. He has repeatedly commented that the design and technical part of modeling interests him most, and he has invited those of you who are not already so involved to try it and see if you like it. He is not one who is happy to solely design, however. He only feels fulfilled when he builds and flies his creations. Building requires at least a workplace, and preferably a work shop.

My workshop has always been very important to me. I schedule a field trip to it for my University of Washington class on inventing each quarter, in the belief that I have some useful thoughts to offer in the organization of workshops. Let me share those thoughts with you as well. It is timely to talk about workshops, because my wife and I just moved to a new home, and I, therefore, just established a new workshop.

It is true that one can build a simple rubber-powered model or a sheet-balsa glider on the kitchen table with no more than a razor blade. As the complexity and

continued on page 102

A place for everything and everything in its place. Here is a view of our columnist's well-stocked and immaculate workshop in his previous home, before he pulled up stakes and moved to Bellevue, Washington.

Author recommends a vertical tool board to hang small electric tools, chargers, and test leads without tangling cords and wires.

Francis Reynold's new workshop looks much like the old one. Note absence of models, hanging from ceiling, which gives the place a cleaner and more spacious feel.

Quarter-inch (6 mm)thick Mighty Lite Premium Grade Light Plywood is now available from House of Balsa, 20130 State Rd., Cerritos, CA 90701 and Frank Tiano Enterprises, 15300 Estancia Lane, West Palm Beach, FL 33414. Mighty Lite features presanded surfaces, a non-warping lamination that resists mildew, and weighs approximately 40 percent less than regular hobby plywood. Like the 1/8-inch (3 mm) Mighty Lite plywood already available from the same sources, the sheets come in 6 x 12, 12 x 24, and 12 x 48-inch sizes.

• • •

Hobby Lobby International, 5614 Franklin Pike Circle, Brentwood, TN 37027, phone (615) 373-1444, has just announced its newest catalog, Number 17, which includes quite a few new items, in fact too many to include all of them this month. We'll have more next time, and Al Alman will also cover several of the items in his February "Big Birds" column.

One new item in the No. 17 catalog is the Mini Olympus Electric Drive for smaller RC models. It is 3-1/4 inches long, weighs 3-1/3 ounces, and will power an airplane that would use an .049 to .07 glow engine. It is a 40-watt RS380 electric motor with a 2.3 to 1 gear reduction drive, which allows it to use a larger diameter prop (8-6) that is more realistic for scale-type aircraft. The motor retails for $22.00.

Here's a real challenge for ducted fan power enthusiasts . . . the Bauer Mig 15 Elektro Jet, originally offered only for the Bauer Elektro-Impeller and 1000 watt electric motors, but the design works well also for glow power because the impeller mounts right in the nose and is ideal for electric starting, as the spinner is just inside the cowl.

Hobby Lobby now offers the extremely powerful Plettenburg Hectoplett 355 Motor, both for F3E flight or for the Bauer Elektro-Impeller fan. At approximately 3000 watts, this motor is two or three times as powerful as most .60-size glow engines. It is just under five inches long and weighs 24 ounces. It is usually powered by 27 NiCd cells!

You say you want a *really big* RC sailplane? Try this on for size. It's the Hobby Lobby/Simprop SB-10, a 4.4 meter span sailplane (that's 173 inches on your tape measure!). It has a rotationally molded Ferran fuselage with the wing mounts installed. The balsa sheeted foam wings have the aileron and spoiler cuts made, and spoilers are included. Price of this kit is $478.

Call or write to Hobby Lobby and ask them to send the catalog. It's FREE when mailed to an address in the United States. When you contact them, say you read about it all in *Model Builder*.

Remember, model manufacturers are always interested in knowing where you read about their products. It helps them to decide where to place their advertising for the most effect. Naturally, it helps our cause if you tell them you saw their ad or product review in *Model Builder*, so we really appreciate it if you remember to let 'em know. Thank you. **MB**

PLUG SPARKS *Continued from page 17*

Contest appearing on page 36 of the October 1990 issue prompted Floyd Carter, of Los Altos, California, to write a correction to the identifications of the various modelers. Here is what Floyd has to say:

"I think you got all the names, but the faces are a bit scrambled. For instance, I know for sure that Frank Gross is the one at the bottom left with a typical 'duck-butt' black hairdo. Frank and I were good pals and flying buddies. On a Saturday, we would typically fly control line most of the day, then take off for some cruising. Maybe he was a better day flier, but I was a superior night hooter.

"In the Spring of '51, I flew CL against Doug Spreng at the regional Southern California Plymouth meet. Spreng won the match, the main reason I am not in the photo. Spreng is standing to the left of Myrtle Coad."

Floyd concludes by saying it is good to try and save this little bit of model history. If anyone else has better I.D. of the contestants, let's hear from you!

AUSTRALIA

The latest letter from longtime friend,

Monty Tyrrell of Melbourne, Australia, proves that *Model Builder* is read worldwide.

The proof-of-the-pudding is seen in Photo No. 9 of Tyrrell's latest Dennyplane, the reduced version by Dan Lutz that was published in *MB*. Monty goes on to say this will be a good stablemate to his 21-year-old Dennyplane he uses for dropping candy on the kids at various contests.

The photo shows the color scheme based on Australian Air Force WW II Trainer livery: all yellow I.D. and Australian cockades. The model is equipped with a Futaba PCM radio set and powered by an Enya CX-11.

This is a fine combination that Monty is hopeful will last as long as his original Dennyplane. He figures he will be flying it in 2021 from a wheelchair!

MELVIN YATES

While Bill Bowen and I were traveling cross country to the SAM Champs at Chicopee, Massachusetts, we stopped to visit longtime friend, Ed Rangus, at Clinton, Iowa.

During the general bull session, the old standby, the photo album, was brought out. During the viewing, this columnist spotted a photo (No. 10) of Melvin Yates with his original pre-WW II designs.

On the left is the "Herky" that was featured in the 1938 Forster Brothers engine catalog. Lou Levine was able to locate Yates in Joliet, Illinois, and quickly traced the outlines of the model. While there, he discovered the Ten Foot Cabin model Mel is holding.

Both plans were subsequently drawn up for use by the Old Timer enthusiasts. Both models feature strong construction very reminiscent of Joe Weathers' models.

FIREBALL REVISITED

Frank Macy, the man who has again founded the Jim Walker business (American Junior Mfg. Co., P.O. Box 68132, Portland, OR 97268) called this writer to remind him that the 50th Walker Memorial Anniversary will be held again in September. This meet will consist of control line models and events just for Fireballs.

Frank goes on to say the A-J Fireball complete kit (dead copy of the 1940 version) is again available at the price of $159.95. This may sound high but remember, this is a complete kit. The original almost fifty years ago sold for $25 to $45. If interested, call Frank at (503) 653-2038.

As a sidelight, Macy and his cohorts are developing an enlarged version of the Fireball for radio control. In addition, A-J will offer a "short kit" of the Fireball for those who don't need the complete kit.

For those interested in other American Junior products, Macy also offers the old Interceptor (folding wing catapult glider); the Hornet, a R.O.G. rubber stick; and the standard hand launched glider. The spirit of Jim Walker lives on!

SWEDEN

A most interesting letter was received from Sten Persson, of Halmstead, Sweden, wherein he enclosed a dozen photos taken at the 1989 Swedish Nationals. Probably the most interesting photo in the bunch was a shot of Segurd Isacson, seen in Photo No. 11 launching a very early type twin pusher, a 1912 Lauder "A-Frame."

Inasmuch as this type model has not been seen in Sweden for 60 years, the model caused a minor sensation. Sten says the lasting impression created by this design will result in a series of "A-Frame" models being built for 1990!

"FOXACO"

Don't remember if we featured this new idea in RC Texaco type flying, but a recent letter from Ralph Turner, 35283 Xeller Drive, Avon, Ohio 44011, outlines a simplified version of the popular RC Texaco event.

This event requires the contestant to use a Fox 35 unmodified Stunt engine of any vintage. Original needle valve must be used. Fuel is limited by a two-ounce tank, fuel being a commercially produced brand.

The other rules are no different, with the exception the 225 sq. in. of wing area per .10 cu. in. rule, which does not apply. No throttles are permitted.

Sounds like an easy way to get into an O.T. event. Almost everyone has a Fox 35.

ORR "J-HAWK"

Several issues back, we discussed what Ernie Linn was doing with the Orr Department Store design, the "J-Hawk."

TEAM ASSOCIATED

RC10

ROAR 1:10 NATIONAL CHAMPION
ORRCA NATIONAL CHAMPION

IMPORT FIGHTER.

THE TEAM DOES IT IN THE DIRT.

Race the car that beat the imports in the toughest kind of off-road competition.

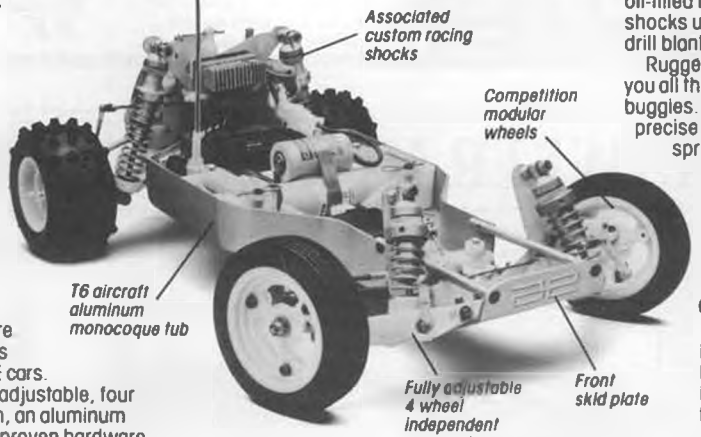
The All-American Associated RC10 took home the gold in both the ROAR and ORRCA National Championships.

Our RC10 turned back the foreign car invasion with the same racecar technology that has kept Team Associated on top of the RC car racing world for over 15 years.

A RACE CAR, NOT A TOY.

Sure, you've heard that before. But Team Associated designs and engineers only model RACE cars.

The new RC10 features fully adjustable, four wheel independent suspension, an aluminum alloy monocoque tub and race-proven hardware throughout.



oil-filled racing shocks. These custom shocks use machined alloy cylinders and drill blank shafts for silky smooth action.

Rugged, yet light, the suspension gives you all the adjustability of full size, full race buggies. The A-arm/Ball joint design allows precise camber, caster, ride height and spring rate tuning. Even anti-roll bars and a VariLok dif are included.

Exceptional ground clearance and low center of gravity also contribute to the superb balance and performance of the RC10 over all types of terrain.

GET THE JUMP ON THE COMPETITION.

Go RC off-road racing with the leaders. The National Champion RC10 is available now and legal for ROAR and ORRCA nationally sanctioned competition.

Complete RC10 kits, replacement parts and spares are readily available through model car racing's most extensive dealer network.

Take the challenge and build yourself a winner. Team Associated's RC10.

And the RC10 doesn't need expensive accessories and modifications to handle the roughest tracks. The strength and durability is standard equipment.

Sealed gearbox VariLok differential

RACE-WINNING ENGINEERING.

For maximum traction the RC10 suspension is damped by long throw,

Smooth undercarriage maximum ground clearance

Full race rear suspension includes bulletproof halt shaft and u-joints with tapered and keyed modular wheels. Quick release knock off design for fast pit work and tuning.

ae

Model cars for Real racers.

Associated Electrics
3585 Cadillac Ave.,
Costa Mesa, CA 92626
(714) 850-9342

Dean Zongker was selected to build the prototype test model. Ernie is hopeful (once the kit is proofed out) of producing a number of kits, not only for his own SAM 56 club, but also for those SAM members interested in the Orr Department Store designs.

Photo No. 12 shows Dean Zongker with the J-Hawk prototype. Interestingly enough, Zongker also built the original prototype back in 1938!

FREE PLUG DEPARTMENT

Steve Gunther writes to say he purchased the Fresno Model Airplane Co. in October 1989. Having moved to larger quarters, the address is now: Fresno Model Airplane Co., 2512 East Menlo, Fresno, CA 93710.

Among the new products coming out, Photo No. 13 shows their latest effort, a Modelcraft "Super Snooper." As can be seen, Barney Snyder was greatly influenced by Dick Korda's Wakefield winner. However, there are considerable differences such as twin rudders, so identification is easy. Kit will sell for $21.95 plus $2.50 shipping and handling.

OBIT NOTICE

Although not known very well on the national scene, Gene Dobbins was regarded as an excellent free flight man on the West Coast.

His constant friend and confidant, John Adams, reports that Gene, of North Highlands, California, died of cancer at the age of 68 on August 3. As a coincidence, Dobbins' wife died a week later.

Probably the best known free flight design by Gene was the "Gambler" that he flew until his retirement from competition. ***MB***

PRECISION *Continued from page 17*

tion. The fastest way to improve your personal performance and increase your skill level is to compete. Any coach in any sport knows that practice will only take you so far. Competition is the capper; the carrot on the stick; it drives the engine of improvement in human beings, and it has for millions of years.

Those old Romans weren't so dumb. "To seek together, agree, be suitable." You bet. Contests are social events. We come together with those others who are suited to us, with whom we can agree. All of the crazies together for the weekend, zooming around, trying to make perfection in the sky and improving each other's skill and performance as an incidental by-product. There

Only an experienced kit designer could bring you a field box that's engineered this well.

Transmitter fits "sticks-in" for carrying, or "sticks-out" for starting and run-up.

Full one-gallon fuel can or bottle fits securely on end platform.

Adjustable, easy-to-remove, sponge-padded cradle tilts 45° to both sides, takes fuselages up to 5¼" wide.

Easy-access compartment for tach, cleaners, etc.

Power panel compartment accepts all popular brands.

Starter compartment accommodates all popular brands.

Battery compartment divider isolates power panel.

Large, vented battery compartment with removable front panel.

Two large-capacity tool drawers with self-locking Velcro strips handle up to 13" props.

Slim-line profile and balanced load for easy carrying.

Special woods for light weight and high strength.

The Super Tote.™ From Carl Goldberg Models.

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may be a lot of striving for an "objective, position, or prize," but I know a lot of guys who have finished last for years who still show up at every contest, and they seem to go home nearly as happy as the winners.

Are pattern contests atavistic and primitive? Maybe. Addictive? Almost always. Also fun, and good for you, and good for the sport pilots, too. We at least give them somebody to feel saner than, which is the minimum thing that excessively normal people need to make up for the lack of excitement in their lives. And after all, pattern contests are at least as natural and socially mature as golf tournaments, bowling leagues, contract bridge clubs, chess matches, youth soccer, Little League, company softball teams, horseshoes in the park and shooting pool on Saturday night at the local watering hole. Not to mention professional collision sports like football, hockey, and auto racing.

Oh yeah. I forgot to mention this, but it really is good that pattern happens to be fun, and necessary, and all that. Because we're stuck, ya see . . . no treatment program. I'm glad there's a contest this weekend. My nose is running and my thumbs are starting to quiver. I think I need a fix.

• • •

And now for something completely different, as they used to say on "Monty Python." On the product front, I believe I mentioned sometime back that I had received the new Bolly EQ 60 carbon fiber pipe and promised a fuller report after a little field testing. I've been running the pipe for a month or two now, and I like it. This is a good, very well made product. I am not certain that it offers a huge performance gain over the "standard" Hatori 650, but it performs every bit as well with the smaller props (11x10, 11x11, etc.) and shorter lengths (45-47cm to the baffle, which I believe is about equivalent to 15.5 to 16 inches to the high point on the Hatori). At the longer lengths that are recommended (50-52cm to the baffle, which would be about 16.75 to 17.5 inches on the Hatori), and using the larger props (12x11.5, 12x12), the Bolly definitely has an edge which is mostly notable in the air under load, like on a vertical up line. On the ground, there is not much difference in static rpm.

Since the Hatori and Bolly pipes are shaped quite differently and seem to require different length settings for equivalent static rpm on the same prop and fuel, I'm not really sure what I'm measuring and comparing. I can tell you that the Hatori needs to be consistently set a little shorter than the Bolly, and that the tuning range on the Bolly seems wider. I can also tell you that the Bolly weighs about a third less than the Hatori, and that it seems quieter in the air. It is also more expensive, being a handmade product. List is $119 from Tom Dixon, the Bolly prop guy. Tom should have an ad somewhere in the magazine—look him up.

Another product worthy of mention is a transmitter tray called "The Stabilizor," from a company by the name of KDI. Most transmitter trays are large, heavy, and a little clumsy, but this one is small, light, and easily handled. Check out the photo, and you'll see what I mean. All the components are very high quality, with the tray body being constructed of 6061-T6 aluminium. The wooden pads are solid polished walnut, and transmitter attachment is by Velcro strips. I've tried one and really like it. It's a vast improvement over just using a neck strap. Unlike most trays, it takes very little time before you are comfortable using it. The tray lists for $49.95 and is available from KDI, 10426 SE 206 Pl., Kent, WA 98031.

Another piece of hardware that I'm impressed with lately is the new O.S. "Hanno Special" motor. As most of you are no doubt aware, this engine is based closely on the RF .61 Long Stroke pump engine. The significant changes include a different carb and pump, reworked timing and bypass ports, and a different crank with a bearing "shield" as part of the counterweight, plus a fancy and distinctive red anodized head machined from bar stock. Claims for the motor include longer bearing life and most importantly, increased torque in the lower end of the power band. The modifications have been designed to help the engine swing larger props such as 12x11, 12x12 and up. Whatever the massage consisted of exactly, it seems to have worked; this sucker pulls like it belongs in the front end of a Peterbuilt truck. The 12x12 Bolly and APC props work best, but I've actually flown through the F3A pattern with a 13x10.25 paddle blade that was made for a 1.20 four-stroke!

Despite all of that power, this is a very well behaved engine that starts beautifully, idles very well, is easy to adjust, and has a very smooth transition through the midrange. Lots of money, yes, but lots of engine, too.

I leave you with a parting plea. Some of you must have taken a photograph or two (color prints are fine) this past season. Some of you might have an idea about a subject that you would like to see in the column. Some of you must have a stamp in the house. Talk among yourselves and pool your assets if you have to, but send me some stuff I can use. Please. Rick Allison, 15618 N.E. 56th Way, Redmond, WA 98052; (206) 883-3047. **MB**

PYLON *Continued from page 21*

zation of the fuel being utilized in Quickie 500 by requiring that all fuel contain castor oil. It reads: "Change the language, "Fuel containing 15% Nitromethane shall be furnished by the contest organizers" to, "Fuel containing 15% Nitromethane, 20% castor oil, and the rest methanol, shall be furnished by the contest organizers."

RCR-5. This proposal is identical to RCR-4 except the reference to castor oil is changed to, "lubricant." It reads: "Fuel containing

15% Nitromethane, 20% lubrication, and the rest methanol, shall be furnished by the contest organizers."

RCR-6. This proposal is related to Form I only and requests the take-off order be changed from 1-2-3-4 to 1-3, 2-4. The proposal reads: "The order of take-off shall be determined by handicap judging as described. Aircraft shall be flagged off the line at one second intervals in groups of two. The first group being airplanes one and three, and the second group being two and four. In heats where the 'Best of Show' races, the take off order shall be the standard 1-2-3 4." The logic presented states: "Under the present rule where airplanes take-off single file, the number 3 and 4 airplanes have little chance of overtaking the #1 airplane. Because the planes are so much faster than when the rules were written, the only way to remain competitive has been to put more and more time into construction and painting. Even so, outstanding models are forced to take off last, rendering them non-competitive. This change will make the event more fair and less dependent upon the `crap game' of scale/beauty contests."

RCR-7. This proposal requests the fuel utilized by Form I be changed to only allow 15% Nitromethane as in Quickie 500 and Quarter Midget. It reads: "The fuel shall be commercially available, containing 15% (Nitro) and shall be supplied and dispensed by the hosting organization. The dispensing operation shall include draining tank of any existing fuel and then filling the supply container when the pilot brings the plane to the ready box. Upon completion of flight, sufficient fuel shall be remaining in tank (at least 1 oz.) to provide sampling of fuel." The proposer indicates: "Form I is fast, noisy, and expensive. The high Nitro being used to compete makes the engines erratic, inconsistent to operate, and seldom last more than 20 flights. 15% Nitromethane eliminates most of these problems, will slow them down, and lower the noise factor."

RCR-8. This proposal would change the Form I rule requiring the use of 'wheel pants' during racing. It states: "The competitor may remove his scale wheel coverings during the race without affecting his handicap points. If wheel pants are removed, wheels must be at least .472 wide for greater than 1/3 of the wheel diameter. (Same as FAI pylon rules.) Aircraft must still be subject to weight requirements." The proposers logic states: "Wheel pants are the weakest part of Form I racing and are easily destroyed during normal takeoff and landing operations. Since they are required for scale judging and racing, unusual efforts are required to keep them operational. Many times a non-matching set is used without affecting scale handicap."

RCR-9. This proposal would delete all paragraphs referencing RC Sport Pylon from the rule book. The logic stated is: "The entire group of events is now obsolete due to the acceptance of event 428, Quickie 500, as the National sport/sport-like pylon event."

Let me emphasize once more, contact

your District Race Contest Board member with the feelings that best serve the racing community in your area. If you do not take the time, your Board Members have no choice but to vote as they feel personally, which may not be in line with your wishes.

The first of the two contests I mentioned earlier was the Annual Hobby Stop "Silver Cup" race hosted by the Weak Signals and the Flying Tigers clubs of Toledo, Ohio, sponsored by hobby shop owner, Les Haddad. This is the 17th year for this two day Quarter Midget meet which has become without a doubt, the best in the country and draws contestants from California to the Carolinas. Rex Knepper has been the CD for several years and the working staff is provided by the two major clubs in the area. This year's meet drew 49 entrants, which is a record attendance, but understandable because of the quality of the workers, the management, and the sponsor.

Les Haddad pays his workers a nominal fee, feeds them, and provides prizes for each and every entry, usually for an amount exceeding the entry fee. In addition to Lesters donations, Airtronics, and Futaba donated radios, along with Matneys Models which chipped in with a kit, making for a very nice prize list. In addition to all this, there is also a great steak fry on Saturday night at the flying field, which is heavily attended. If you are into Quarter Midget racing, this is a "must attend" meet.

This year's race ended with a familiar face on top, as local Michigan racer of great expertise, Denny Sumner, won for the third straight year! Considering the competition, this was an outstanding effort. Denny and longtime partner, Ken Heatlie, form the famous "S&H" team and are well known nationally as they both have had their share of top finishes at every major meet in the East, including the Nationals.

Duane Gall, from Lakewood, Colorado, finished second; Dave Latsha, from Lemoyne, Pennsylvania, was third; Craig Grunkemeyer, from the Columbus, Ohio area, was fourth; and local guy, Rick Bork, was fifth. In addition to the great race, another race is held after the regular heat racing in which the top 12 fliers in fast time are matrixed against each other for an outright trophy dash. Four heats are run with the winners advancing to one final heat. As this is usually a heat of the fastest, the finishing distance between any of the four is minimal at the least.

Les Haddad has named this race the "Ron Haddad Memorial Trophy Dash" after his brother and friend, who is currently watching from Upstairs. I'm sure that Ron would approve of the way his older brother is helping the hobby and the fliers feel very honored to be a part of this great dash.

This year's winner was Craig Grunkemeyer who also turned in the meet "fast time" of 1:16.22. Congrats to all who participated and are listed in order of finish along with each personal best-time.

1. D Sumner	1:17.89	26. D. Kane	1:17.85
2. D. Gall	1:16.35	27. J. Ruh	1:22.80
3. D. Latsha	1:18.90	28.D.Carpenter	1:24.31
4. C. Grunkemeyer	1:16.22	29.G.Schmauch	1:22.58
5. R. Bork	1:21.56	30. R. Van Hulls	1:39.00
6. D. Gohn	1:21.27	31. J. Elert	1:24.43
7. S. Kovach	1:21.95	32. D. Johanson	1:16/50
8. R. Knepper	1:18.16	33. C. Simms	1:17.59
9. D. Weidman	1:19.41	34. R. Blake	1:27.55
10. B. Hisey	1:22.57	35. D. Whitaker	1:38.43
11. R. Steine	1:24.14	36. P. Waters	1:21.80
12. A. Schwartz	1:19.93	37. B. Comber	1:28.47
13. J. Dodd	1:16.45	38. V. Petrinec	1:22.17
14. G. Jacobson	1:16.52	39. P. Zwiderna	1:22.89
15. K. Matney	1:22.07	40. K. Heatlie	1:23.02
16. A. Grove	1:18.41	41. D. Berryman	1:30.11
17. J. Gager	1:21.22	42. R. Cromer	1:32.09
18. R. Gage	1:21.51	43. B. Anderson	1:25.69
19. J. Salisbury	1:22.14	44. B. Greer	1:28.39
20. P. Waters, Jr.	1:27.05	45. J. Cohen	1:29.34
21. V. Smith	1:16.18	46. J. Jennes	1:34.24
22. R. Landers	1:20.34	47. J. Warner	1:38.89
23. R. Schuster	1:21.79	48. D. Wodziak	N.T.
24. A. Booth	1:25.55	49. K. Dudek	N.T.
25. B. West	1:17.64		

The second meet of importance was the AMA FAI F3E Team Selection Race, also held at the Toledo Weak Signals' club field on Labor Day weekend, as a result of a vote by the Team Selection Committee that opted for the Toledo location over a bid from the West Coast, because they felt the midwest

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location better served the majority of the people participating.

This race was hosted entirely by the Weak Signals, who provided food and prizes and did not charge the entrants an entry fee as a small way of paying back the modeling community for being loyal participants at the annual Toledo Epxo.

This writer had the privilege of being the CD, which is the easiest job in the world considering the expertise of the workers and having the luxury of being married to a starter who has five Nats, two F3D World Championships, and several local contests behind her. I got to sit back and take it easy while they all did their thing. Great duty!

This year's attendance was excellent, with 21 entries, which to my knowledge, exceeds any FAI race attendance since the old Violet/Telford days. Speaking of Cliff Telford, he was in attendance, serving as a member of the AMA Jury along with District 3 VP, Bob Brown, and District 7 VP, Pete Waters. All FAI Team Selection meets require a jury to settle protests and are an important part of the process.

There were eight entrants from California, including twice World Champion, Dave Shadel; two from North Carolina; two from New York, one from Texas; one from Rhode Island; one from Virginia; two from Connecticut; one from Massachusetts; one from Arizona; one from Illinois, and one from Maryland.

Practice was held all day Friday with competition scheduled for Saturday and Sunday, keeping Monday for a possible rain date which was not needed because the weather guy was very good to us.

Saturday's racing started with conditions for extremely fast times being just right. The temp was moderate, the humidity low, and the racing fast! The first heat included Rick Moreland, Lee Vonderhey, and Jim Katz, the latter starting the ball rolling with a very nice 1:14.8. The current AMA record is a 1:11 set by Rich Verano at this year's Nats, so considering first heat, first day, first time to unlimber thumbs, Katz's first heat time was great. In Heat 5, current champion Dave Shadel turned a 1:10.96 and rounded off to the nearest tenth as the F3D rules require, left him with a 1:11 flat which matched Verano' record. This only lasted one heat because it was immediately followed by Gary Hover turning a 1:10.4!

The general feelings were that the record would fall several times during the weekend as no less than four people turned 1:14 or better in the first round and five people were 1:15 or better in Round 2, including Dub Jett's 1:10.6 which is two one-hundreds short of Hover's record.

Jim Katz turned a 1:10.8 in Round 3, which made him the fourth person bettering the current mark set at this year's Nats. As luck would have it, this would be the last of the super times because the temperature climbed, along with the humidity, and times went right into the dumper. From then on it was a case of being consistent, because things started happening. Murphy was at work as Nats Champion, Rich Verano, folded a wing. Gary Hover unexplainably flew straight into the ground, Mike Langlois blew up a wing, and cuts became common.

I mention these people because they were some of the fastest at the meet so strategy became very important to the rest. Dub Jett, who has been on every World Championship team, remained the guy to beat, which no one was going to accomplish because Dub is too professional in his approach. He flew all 12 heats with only one cut, producing his slowest time of 1:20.3. His remaining heats were all "teen" times and were enough to win him his third Team Selection Race with a point total of 747.6.

To quickly explain the scoring system utilized by F3D, the competitors race the clock with their recorded time in seconds being their score. A person turning a 1:10.4 has used up 70.4 seconds and the lowest total accumulation of points is the winner. Another rule in F3D allows for the dropping of the two worst scores after 10 rounds are flown, so because we flew 12, the competitors had to count their best 10 scores.

Lyle Larson, from California, was following Dub's example very closely as he also recorded only one heat with a cut, producing a 1:20, which he matched in Round 5, and from there on his times were all in the teens. His total point accumulation was 768.2 and this fine performance put Lyle on the team as the second member.

The third person qualifying for the team is Henry Bartle who had a score of 768.8, only six one-hundreds behind his partner and caller, Lyle Larson. It really is amazing when you realize that after 12 full rounds of racing, two people end up being that close, less than one second!! Baffles the mind. As these two guys were calling for each other, plus flying, and were evenly matched in all departments, they are valuable additions to the team.

The first alternate was a surprise I suppose, then again, maybe not considering his ability, but the little guy, Pattern's very own Chip Hyde, won that honor with a fourth place finish. So if one of the team members is forced to withdraw for any reason, "Chipper" would be on the team and wouldn't that be something, especially as he probably could be flying Pattern at the same World Championship!

Therefore, the team is Dub Jett, from Humble, Texas; Lyle Larson, from San Juan Capistrano, California; Henry Bartle, from Santa Ana, California; plus current World Champion Dave Shadel, from Carlsbad, California. Three guys from California and a Texan.

Dave Shadel's points were not a factor because, as defending World Champ, he is automatically invited back and had the option of using this race for purposes of practice, and utilizing this option, withdrew his name from the competition.

The final standings are as follows along with points and best times:

1. Dub Jett	747.6	1:10.6
2. Lyle Larson	768.2	1:14.7
3. Henry Bartle	768.8	1:14.4
4. Chip Hyde	787.1	1:14.8
5. Lee Vonderhey	801.8	1:18.2
6. Gary Hover	820.0	1:10.4
7. Dave Doyle	834.8	1:14.2
8. Jim Katz	885.1	1:10.8
9. Ron Schorr	895.8	1:22.9
10. Ernie Nikodem	903.8	1:20.4
11. Rich Verano	907.8	1:14.5
12. John Albritton	1004.3	1:23.8
13. Charles Brown	1012.2	1:20.7
14. Bob Wallace	1171.6	1:17.6
15. Rick Moreland	1246.6	1:22.4
16. Pete Reed	1250.0	1:20.2
17. Gary Gau	1280.7	1:15.9
18. Dion McStay	1284.2	1:16.7
19. Mike Langlois	1382.1	1:13.6
20. Clark Wade	1766.1	1:19.0
21. Dave Shadel		

All for now, till next month, Yeager. **MB**

DORNIER *Continued from page 25*

ter interference. I did prior to the first flight and I solved it by inserting a 10 micro henry choke in each of the leads from the controller to the receiver. Bob Kopski described how to make such a choke in his column in *Model Aviation* magazine for December 1989.

The final flying weight of the Dornier with the 16 1200 mAH cells came out at 96 ounces—4 ounces over the design goal, which I consider pretty good. At this weight the wing loading is about 23 ounces per square foot, still acceptable.

The Dornier makes a spirited takeoff and climbout from a grass runway. The wide tread main gear and long tail moment minimize any tendency to ground loop. It is very stable in flight and yet responsive to the controls. Mild aerobatics are possible. The twin geared 05s give a wide range of speed and a sound resembling a "quiet turboprop." Level flights at reduced throttle are about five minutes long. The plane has been flown more than 50 flights with good results and no crashes. Flights have been made with 900 mAH SCRs and 1200 mAH AE 16-cell packs, as well as the 1200 mAH SCRs. The 16-cell 1200 mAH AE pack is 8 ounces lighter than the 1200 mAH SCRs, but it gets hot because the current drain of 15-20 amps is higher than recommended. All in all, the best performance comes from the 16-cell

1200 mAH SCR pack.

If you are looking for a good size sport scale twin that is easy to dismantle and transport, you should try the Dornier DO-28 Electric Twin. ***MB***

BIG BIRDS *Continued from page 29*

and I had no shade at all, I immediately deputized them and their tent as my official pit crew. My Big Bee had never been so well crewed.

All the fly-ins I attended this year were great, but it'll be several years before I travel so much again. Driving is getting to be a real pain because of rude and careless drivers and the high prices of gasoline and accommodations. Let me tell you, after this trip it felt good to get back to work.

(These are some of the real-world reasons why regional or area fly-ins will probably become quite popular in the future. A smaller fly-in—100 to 200 pilots—is also much easier to manage and is safer. It also assures everyone the opportunity to fly a lot more.)

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THOUGHT OF THE MONTH

This comes from a CBS radio commentator: "Utility is better than stagnation."

Build straight and true for the coming flying season! ***MB***

RCD *Continued from page 31*

thing smaller? Bob (Benton) is flying his RCD AM receiver in his electric 05 model . . . that particular 05 is a real "dirty" motor . . . that's a real "sparky" 05 motor . . . it's far overloaded at 20 amps and sparks like heck . . . that's a horrible test of *any* receiver, and that thing (the RCD AM receiver) takes it like a champ! His original AM receiver he flew it with before was horrendous. Basically, what happens is that the radio noise is bringing down your effective range severely. His originally supplied receiver would glitch *every time* his model flew into the null point area off the end or tip of his transmitter's antenna . . . the thing that surprises me is that they (RCD) are high performance receivers . . . yet they're using regular components . . . and they're surpassing the performance of more complicated receivers." Thanks, Herman.

The Central Florida RC Think Tank has determined that you do not . . . or should not . . . use an Airtronics PCM switch harness with a matching RCD FM receiver. Use an Airtronics FM switch harness with the RCD FM receiver, or cut the blue wire on the PCM switch harness. The blue wire allows the RCD FM receiver to draw a constant 4 milliamps, which is not desirable.

The RCD receivers are made in South Korea by HITEC who also makes equipment for Kyosho, makes the Challenger 720, 550 and 455 RC systems, makes radios for Supertigre (yes, the engine people!) in Italy and many other hobby-related products. It seems HITEC's aim is to be the biggest and best in the RC hobby . . . watch for the name HITEC in your future.

RCD (Radio Control Development) receivers are available from: RCD, Incorporated, 9419 Abraham Way, Santee, CA 92071. Phone (619) 449-1112, Fax (619) 449-1002, as well as from selected hobby shops and AMA sticker stations listed in the RCD ads here in *Model Builder*. ***MB***

TECHNICAL *Continued from page 38*

for Rubber Models to the following very good Reynolds Number related article which

he wrote earlier. He was kind enough to send me a copy and let me share it with you:

"First let's consider boundary layer, because what happens in the boundary layer has a great effect on how our models fly. Imagine a flat plate moving edgewise through air, or what amounts to the same thing, air flowing steadily past the plate. The molecules of air at the surface of the plate, caught in its microscopic roughness, aren't moving. Since at some distance from the plate the air molecules are moving at the free stream velocity, there must be a velocity gradient between the free stream and the plate. The region with this velocity gradient is called the *boundary layer.* The most often used definition of boundary layer thickness is the distance from the surface of the plate outward to where the air is moving at 99% of free steam velocity.

"Next is Reynolds Number. This is a dimensionless number that characterizes the flow. Reynolds Number is important because it is the parameter used for testing shapes in flow. By definition, Reynolds Number is the product of velocity, density and a characteristic distance, divided by the absolute viscosity. viscosity is, of course, a measure of how readily the fluid flows. The characteristic length used for tabulating airfoil test information is the chord length. The characteristic length used when discussing boundary layer is distance from the leading edge. If two shapes, wing sections for example, are of identical form but different sizes, then they will behave identically if the two flows have the same Reynolds Number. (However, for higher speeds where compressibility becomes important, Mach Numbers must also be matched.)

"Thus, tests of wind tunnel models can be used to determine the performance of prototype airplanes if the velocity or density of the wind tunnel medium can be increased enough to account for the smaller characteristic distance, so that the Reynolds Number of the test is the same as that of the real airplane when built. Be cautious when choosing an airfoil based on its section characteristics. [Modern] airfoil tests are generally done at much higher Reynolds Numbers than those that apply to models.

"Let's go back to our flat plate with air flowing steadily over it. The boundary layer thickness grows steadily with distance from the leading edge. (See Figure 1.) The boundary layer is very thin. For example, for a free stream velocity of ten feet per second, about where our models fly, the thickness one inch aft of the leading edge (Reynolds Number about 5,000) is only five thousandths of an inch. A turbulent boundary layer is thicker than a laminar one.

"Initially the boundary layer is laminar. The farther aft of the leading edge, the higher the Reynolds Number, because the characteristic length (distance from leading edge) increases. When the Reynolds Number gets to be around a half million or so, the boundary becomes turbulent. Where this transition occurs is called the *critical Reynolds Number.* Critical Reynolds Number is not a precise value because factors such as surface roughness and the smoothness of the airstream affect where the transition occurs. To give you an idea where [fore and aft] this transition may occur, a Reynolds Number of 500,000 is reached 7.5 feet aft of the leading edge of a flat plate with a free stream velocity of 10 feet per second, about where our rubber models fly, or .75 feet aft on a flat plate with a free stream velocity of 100 feet per second, where some full-size airplanes fly.

"One may think of a turbulent boundary layer as having fine-grain eddies. You have seen the transition from laminar to turbulent flow if you've observed the smoke rising from a cigarette or an extinguished candle in a still room. The smoke goes up in a steady column to a point where the transition occurs and then becomes disordered. The same happens with a slow stream of water from a faucet.

"The type of drag on a thin plate moving edgewise through the air is called *skin friction drag.* Skin friction drag for a turbulent boundary layer is greater than that for a laminar boundary layer. For example, at a Reynolds Number of 1,000,000, skin friction drag for the turbulent part of the plate is 3.4 times that for an equal area with laminar flow. You may have heard of the famed laminar flow airfoil of the P-51 Mustang that enabled longer range. The high point of the wing was moved aft so as to preserve the laminar boundary layer over more of the wing. Don't conclude yet, however, that a laminar boundary layer is always best.

"Let's now consider, instead of the flat plate, a curved surface, like the upper surface of a wing. From the leading edge to the high point there exists what is called a *positive pressure gradient.* This tends to make the boundary layer thinner. Aft of the high point there is a *negative pressure gradient,* which tends to make the boundary layer thicker and to make it stagnate. At a point near the trailing edge, the boundary layer may stagnate so much that the direction of the flow in the boundary layer actually reverses. This is the separation point. (See Figure 2.) From the separation point aft there is a low pressure area called *wake.* Drag because of the wake is called, as you might expect, *wake drag,* or sometimes *form drag,* or *pressure drag.* Wake drag may be significantly higher than skin friction drag, whether laminar or turbulent, depending upon where separation occurs. An extreme case is when, at a high angle of attack, the separation point moves suddenly toward the leading edge. This is, of course, a stall, and the drag is very great. (See Figure 3.)

"Because a turbulent boundary layer has more energy than a laminar one, a turbulent boundary layer doesn't stagnate and separate as readily as a laminar one. In general, a turbulent boundary layer will separate farther aft with consequently less wake drag.

"This leads us to a consideration of turbulators. Turbulators are devices to trip the

boundary layer from laminar to turbulent artificially so that the boundary layer remains attached longer. Particularly, they are used on full-scale aircraft to delay stall over the ailerons. If the area of the wing where the ailerons are located is stalled, the pilot loses control. You may have seen, on commercial airliners, small vanes perpendicular to the surface and at various angles, just forward of the ailerons. Those are turbulators. The designers were willing to accept somewhat more skin friction drag (because of the turbulent boundary layer) in order to ensure aircraft control near a stall. Modelers tend to use threads glued spanwise to the top of the wing between the leading edge and the high point.

"Are turbulators useful on rubber models? There is no clear answer to this issue. Many believe wholeheartedly in them, and many don't. The Reynolds Number for a model with a 4-inch chord length and traveling at 10 feet per second Is 18,500. This is so much smaller than the transition Reynolds Number of 500,000 to 1,000,000 that tripping the boundary layer from laminar to turbulent may simply not be possible.

"Don't we know this? Hasn't someone tested in a wind tunnel to find out? Unfortunately, to my knowledge, the answer is no. There are two problems. First, folks who have wind tunnels have little interest in tests at very low Reynolds Numbers. Second, the speed is so low that wind tunnel flow tends to break up, making reliable measurement difficult. Test data for very low Reynolds Numbers is sparse and usually ancient.

"From empirical observation and talking with a bunch of free flighters who use turbulators on both wings and propellers, I have opinions. My opinion is that turbulators do indeed trip the boundary layer on [rubber model?] propellers, and may trip the boundary layer on wings if the wings are large enough and the model is fast enough, like a Wakefield in the climb. Tripping the boundary layer on propellers to prevent blade stalling is, in my further opinion, not a useful thing to do. If a propeller requires turbulators to prevent blade stall, the propeller has too much pitch. Tripping the boundary layer on wings may be useful during the climb to prevent stall at high angles of attack, although an alternative is to adjust the model so that it climbs at a lower angle of attack. My opinion is that turbulators are indifferent with regard to glide, since tripping the boundary layer at the lower glide speed probably isn't possible, and the boundary layer will remain laminar regardless of turbulators. Please note that these are only opinions gathered from sparse evidence.

"Although there is a lot we don't know about airflow at Reynolds Numbers at which rubber models fly, there is quite a bit we *do* know. We know, by inference rather than direct measurement, the general nature of an efficient low-speed laminar airfoil.

"An efficient airfoil for a full-size subsonic airplane is fairly thick and either flat bottomed or semi-symmetrical. For full-size sailplanes, at a lower Reynolds Number, a thinner airfoil with either flat bottom or slight undercamber is more efficient. At a lower Reynolds Number yet, at about the limit of wind tunnel testing, a somewhat thinner airfoil with somewhat more undercamber is efficient. We can infer from this trend that an efficient airfoil for rubber models is thin and undercambered, but to infer much more would be shaky.

"Only skin friction and wake drag have been discussed. There are other kinds of drag, generally well understood by most modelers. They are discussed here for completeness. There is an inference here that what is good at higher Reynolds Numbers will be good at rubber model Reynolds Numbers.

"Induced drag associated with wing tip vortices is inherent to the production of lift and is inescapable. But good design can reduce induced drag by reducing the wing tip vortex. The classic way is to use a high aspect ratio planform. There is less wing tip, so to speak, so less induced drag. The same idea applies for elliptical planforms. A different variation is using wing twist, or washout so that the lift distribution spanwise is high at the root and low at the tip. The designer of the Fike, with a low aspect ratio straight wing, used tip plates to try to reduce the flow from the bottom of the wing, around the tip, to the top. Some modelers use tip

plates, but they may [probably] do more harm than good. They increase skin friction and interference drag, which we will discuss in a moment. A variation of the theme is winglets, which McDonnell Douglas is now using on the C-17 and all of its new airliners. These are designed to produce a vortex in the opposite direction from the natural one, thus tending to cancel [part of] it. For full-scale aircraft, winglets work if designed very carefully, but have the potential for doing more harm than good if not designed properly.

"If one were to measure, in a wind tunnel, the drag on a fuselage alone, wing alone, and so on, and then on the assembled airplane, the drag on the airplane would be more than the sum of the drags of the components. This is because of *interference drag* mentioned earlier. Where two bodies meet, say a wing and a fuselage, the flow around each body is interfered with by the presence of the other body. That's why full-scale airplane designers use wing fillets and try to smooth the junctures of all the parts. A good rule for modelers is to make the model look streamlined, because if it looks streamlined it probably *is* streamlined.

"The same can be said of *parasite drag*. Strictly speaking, parasite drag is the drag of any part of an airplane that doesn't contribute lift. Many use it, however, to mean only the drag of appurtenances such as fixed landing gear, wing struts and wires, and the like. Everyone knows that streamlining these appurtenances is good, but some may not know how good. Take the case of a round wing strut or wire as opposed to a streamlined one. At comparable Reynolds Numbers, the coefficient of drag for a cylinder perpendicular to the flow is 1.2, the coefficient of drag for a 2:1 ellipse with the major axis parallel to the flow is .6, and the coefficient for an 8:1 ellipse is .29. (A true airfoil would be even better). Thus there can be more than a four-to-one reduction in drag by streamlining. Data from NACA Technical Report 619, 1939.

"Let me summarize all of this information in a few sentences. Turbulent boundary layers produce more [skin friction] drag than laminar ones, but turbulent boundary layers separate farther aft, reducing wake drag, which may be considerably more than skin drag. The jury is out on whether turbulators to trip the boundary layer artificially from laminar to turbulent are a good idea for rubber models. By inference but not test, a thin undercambered airfoil is probably best for low-speed laminar flow. High aspect ratio elliptical or tapered planforms, and washout toward the tips help reduce induced drag. [Washout is the least desirable of these because a washed-out rectangular wing will have more skin friction drag and more weight than a tapered wing with the same lift, and washout is washin when flying inverted.] Tip plates also reduce induced drag, but produce other types of drag that may be greater. Winglets work on full-scale airplanes but must be designed very carefully. Fillets at junctures of airplane parts

reduce interference drag. Streamlining of appurtenances is worth the effort, since reduction of drag by a factor of four is sometimes possible."

End quote! In his cover letter, Grant Carson suggested that I might consider some heavy editing. I couldn't edit it. I thought it was all too good to cut down. However, I also couldn't help interjecting a word or so of my own, in brackets, here and there. both of these gentlemen know what they are talking about, as does the one I will bring you in February. Thanks a lot, guys!

Grant's excellent rubber model article leads me to observe that there may be some RC fliers who look down a bit on rubber powered modelers, free flighters, and control liners. It is a temptation to think of RC as more difficult and more adult, but that attitude is an indication of ignorance. It will only be those who took up RC without any other model airplane background who might feel that way. Those of us who arrived at RC after engaging in other forms of model flying know better. Free flight requires knowledge and skills that RC fliers don't have to worry about. In spite of the fact that I write mostly about RC, and there are far more RC fliers out there, I get a disproportionately large share of letters from non-RC modelers who are very interested in, and some of them very knowledgeable in, the technical aspects of model design.

PARTING WORDS

Osborne Reynolds was a smart old codger, but how did he know that we model designers were going to need to know about the science of fluid flow? The airplane wasn't invented for twenty years after he came up with Reynolds Number.

Francis Reynolds, 3802 127th Ave. N.E., Bellevue, WA 98005-1346. SASE please. Phone (206) 885-2647. ***MB***

ARFS *Continued from page 49*

channels. A few years ago I rebelled at this situation and taught myself to fly two-stick, and noW I can switch comfortably from one type to the ether. But I am happiest and most at ease with single-stick my first love, and with the Futaba FP-8SSAP I felt I now owned the finest single-stick radio available.)

Fiberglass pushrods were made up, and soon the control surfaces were ready for action. Only a few more finishing touches were needed, such as installing a set of 211/2 inch wheels and a 211/4 inch C.B. Associates aluminum spinner. The Shark LT now sat on the workbench, sparkling in its pristine solid white finish, just begging for some kind of trim to complete the job. Well, I was completely prepared for this, because I have been itching to try out a new line of trim sheets offered by Eagle Products. This firm puts out a selection of stick-on type trim which comes in a beautiful range of colors. It was but the work of a few minutes to cut out some lightning bolts and affix them to the wing and tail. The trim material is very strong and appears to be completely fuelproof. However, if the design incorporates any sharp corners, there is a tendency for the material to lift, so I ran a thin bead of clear polyurethane around all the edges, using a fine pointed brush, and this sealed the trim material permanently in place. The only possible objection I have with this vinyl trim is that it is a bit on the thick side for model use, having an edge which is quite obvious when you run your hand over it. My feeling is that the manufacturer is using material which is intended for automobile trim, and so it is heavier than necessary for our purposes. The material would be far better if it were as thin as that used in computer generated graphics. But the bottom line is that it does have rich, vibrant colors and looks beautiful.

Now I placed the completed model on the scale and came up with a dry total weight of seven pounds, two ounces. The kit specifies a flying weight of between six and eight pounds, so my results came close to being right in the middle of the range. That anyone could come up with a Shark-LT as light as six pounds does not seem possible, as the airframe alone without radio installed was just over six pounds. And there isn't any place to save weight on a pre-built plane which has a lightweight covering of MonoKote. Maybe if I had made it a taildragger and eliminated the tuned pipe, a few ounces could have been shaved off, but a final figure of six pounds is just out of the

question. A few quick calculations produced a wing loading figure of 24.5 ounces per square foot, which is quite reasonable for a balsa and foam airplane of this size. And speaking of size, it wasn't until the wing was finally bolted to the fuselage that it dawned on me that this is a pretty big airplane, about the same size as a standard competition pattern plane. And that's exactly what it looked like: a sleek, handsome pattern model.

Okay, time to get to the flying part. Ailerons and elevators were adjusted for a throw of 1/4 inch up and down, and the rudder was set for maximum left and right movement, somewhat more than the recommended one inch to each side. The first thrill came when the powerful Rossi was fired up. The tuned exhaust imparted a pleasing quality to the sound of the engine which only a model flier can appreciate—somewhere between a throaty rumble and a whine. The feel of the single-stick Futaba PCM told me this was going to be a piece of cake as the sharp looking model taxied to center runway. Turning left into the slight breeze, the throttle was gradually increased, and in moments the gleaming white bird was climbing gracefully into the cloudless California sky. It was almost impossible to fly the Shark-LT any way but smoothly. Needing practically no flight trim adjustments, every maneuver was executed not as my hand directed them, but as my mind conceived and ordered them. Having owned a pattern plane or two in my time, I knew that what I was now flying was not just a "sport aerobatic" model, but a first rate pattern trainer for those wishing to fly novice right up to and including intermediate pattern. Sure, if you have the ability to burn up the skies, impressing your buddies with low inverted passes, this plane will do a job and a half for you. But if you are tired of flitting around, doing aimless maneuvers, and want to learn the discipline of pattern, try a Shark-LT. However, do consider installing retracts, because this baby really deserves to have them. Furthermore, if I were doing it again, I definitely would make it a taildragger. As for the maneuvers it can do, the best answer to that is there aren't any it *can't* do. If it's in the book, the Shark-LT can do it effortlessly.

The manufacturer calls it a "sport aerobatic" model, and there is no reason it can't be flown as such. However, I feel this airplane is being sold short by not being called an "advanced aerobatic model, suitable for novice to intermediate pattern flying." Furthermore, the recommendation for powering this model calls for a .50 to .60 two-cycle engine. Using anything less than a topnotch high performance .60 would be an injustice to the flying qualities of the Shark-LT. And no mention is made of the four-cycle engines that could be used to great advantage. Certainly a .90 up to a 1.20 would work nicely in this model.

The Shark-LT sells for $104.96 and can be purchased through your local dealer, or direct from the distributor, in which case $8.50 must be added for shipping. I think

this is an outstanding bargain, because the airplane is first quality, and all parts are put together with loving care and attention. Additional out-of-pocket costs to complete the model can come to another $40-50, depending on what materials are lying around your workshop, but with just a little effort you end up with one of the most flyable precision pattern trainers on the market. Try and duplicate that for less than $300!

A lot of ARFs pass through my hands, but this one has become a "keeper," because it is such a joy to fly. If you're ready to move up from sport flying to serious aerobatics, and you want an attractive, sturdy, easily repairable model that will last for years, get yourself a Shark-LT. Kits and additional information are available from the distributor, Kingsway R/C Hobby Supply, 5559 Richmond, Houston, TX 77056, telephone (713) 977-7076.

HONORABLE MENTION

From time to time I am privileged to acquire and use a product which stands head and shoulders above its competitors. I feel it is only fair to mention such products in this column whenever possible, and in that vein I would like to bring the following to your attention:

For quite a few years now, I've been using a Ny-Starter from McDaniel R/C Inc. As a glow plug igniter it has never failed me, as long as I charge it every week or so. The

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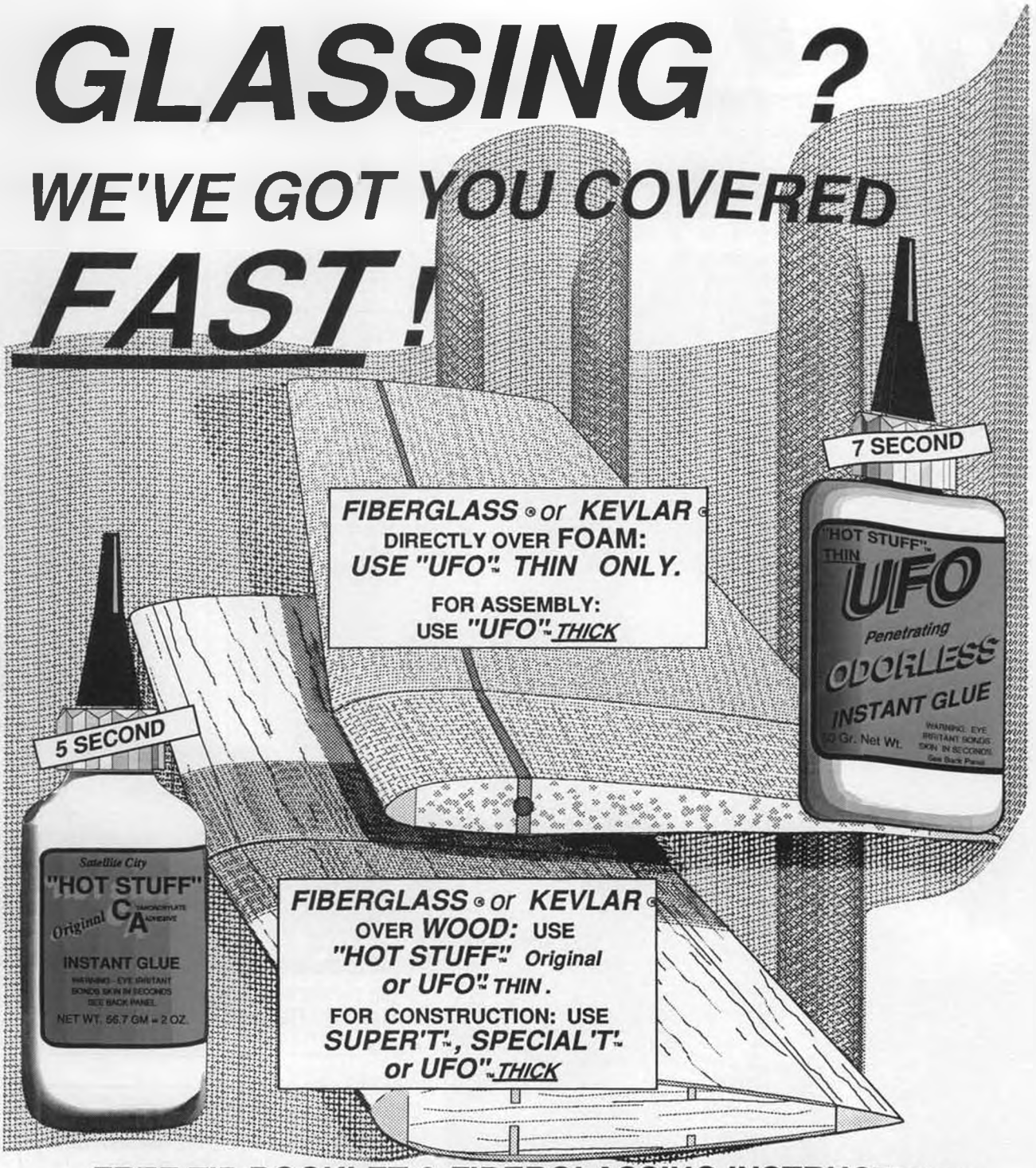

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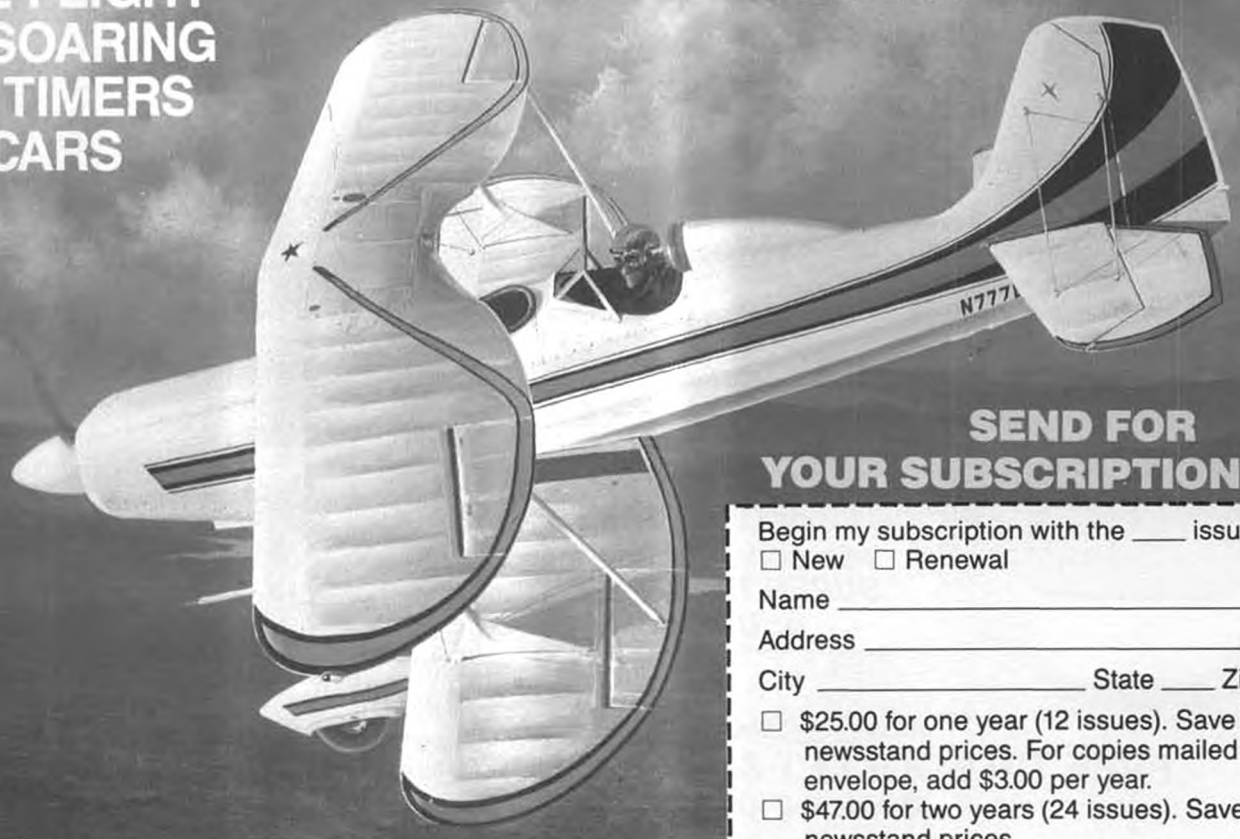

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latest versions have a built-in meter which indicates the condition of the glow plug, and when attached to the engine, it really makes a solid contact.

At the field someone is always borrowing it, and one day it seemed to disappear just when I needed it. It didn't turn up until one of the other fliers landed his plane after flying a hot aerobatic routine. And there was my Ny-Starter, securely fixed to his glow plug! That says a lot for this indispensable piece of field equipment. Oh yes, after that it went on to perform at least a dozen other engine starts that day. Take my advice and make sure you have one of these handy items in your field box.

Thanks for all the letters. Keep them coming to me at 2267 Alta Vista Drive, Vista, CA 92084. SASE for reply, please. I also love talking to you folks, so you can call me at (619) 726-6636 for quick advice or just to exchange ideas. Don't forget I'm usually out flying in the mornings, so call me after 12 noon PST, or in the evenings. My FAX number is (619) 726-6907.

Tune in on this frequency next month for what I promise will be a most interesting and informative column. **MB**

CORNER *Continued from page 51*

sonal developments are publicized. However, there is some good news to share with you in the rechargeable battery department for small radio, small airplane applications.

In the past, we have discussed how it is possible to cut apart those NiCd 9-volt transistor batteries and wire up the individual cells into mini-packs as required. As it has turned out, all of these batteries are not created equal, varying in capacity and some containing as few as six cells, for a top voltage of only 7.2. Varta, a German company, but whose products are available here in the U.S., has a new battery worth investigating with repacking in mind.

It is called TR7/A, and is rated at 110 mAH capacity. It is of normal 9-volt alkaline battery size, and weighs 45 grams. Varta batteries are plastic cased, and I have no idea of the individual cell weight, but I would guess that the plastic housing and metal contacts have to account for at least 25% of the total weight.

One of our readers, Mike Anderson, of Ames, Iowa, did a very comprehensive evaluation of these batteries a couple of years ago. At that time, he rated the Eveready battery as superior, and had little praise for the Varta. According to Mike, the Varta available in 1988 would not accept high charging currents, and seemingly were rated at 1.0 volts to discharge instead of the more common 1.1 volt per cell. Keeping those possible limitations in mind, this battery might be worth trying in view of the higher reported capacity.

Varta's home is in Hannover, NOT West Germany, but just plain Germany. Hooray! Anyway, the U.S. distributor is: VARTA Batteries Inc., 150 Clearbrook Rd., Elmsford, NY 10523.

Locally, look for Varta batteries at electronic supply houses or photographic equipment suppliers. And let us know what you find out....

I've got to have at least one noncontroversial subject for the month, so let me tell you a bit about a relatively new semiconductor product that has found some limited use in RC electronics:

OPTOCOUPLERS! These little devices, now being manufactured in a number of different physical configurations, are designed to sense the presence and intensity of light, the position of objects which reflect or break a light beam, and to transmit electronic signals without electronic or physical connections. They are widely used in consumer, automotive, commercial, and military electronics.

The optocoupler is composed of two parts; a light source, and a light detector. The light source could be a common tungsten, neon, fluorescent or Xenon bulb, but probably to keep the power requirements down to the low values generally used in solid state circuitry, the LED (Light Emitting Diode) seems to be the most used. Though the normal red LEDs that you are so familiar with are and can be used, it is not uncommon to find optocouplers designed around laser or infrared (called IBED) emitting di-

odes.

Effectively, the light source can be considered as a sort of transmitter. The receiver in this case is the light detector, which also comes in various types, though obviously it has to first react to the type of light emitted by the source. The simplest detector is the photodiode, which in addition to having the normal diode qualities, reacts to the light source with varying conductivity. An advanced type is the avalanche photodiode, which provides higher sensitivity and speed but is critical and expensive and sees only limited uses.

Next in line is the phototransistor, effectively a photodiode-transistor combination in which amplification of the incoming signal takes place. Greater amplification is available with the use of a photodarlington, in which two transistors are cascaded into a single chip. For those applications involving switching, there is a PhotoSCR (Silicon Controlled Rectifier), which you might also find referred to as a LASCR (Light Activated SCR).

As all of these devices, from the simple diode to the SCR are available as individual units, the first optocouplers were simply those, mounted physically close and with the necessary input and output circuitry. In time, as their value was recognized, semiconductor makers married the two in a number of physical and electrical configurations. By itself, the optocoupler is just another semiconductor device which, like any other transistor, IC, etc., needs additional circuitry to help it do its intended function. In more detail, these functions can be one or a combination of:

Light detecting.
Detecting objects with light.
Transmitting information with light.
Switching circuits.
Power control circuits.

In RC, we are seeing some of these devices used to pass the control signal from the receiver to the servos. This type of device is recommended by their makers for use in extremely large aircraft requiring extra long servo leads. The control pulse passed to the servo is an exact duplicate and precisely what came out of the transmitter via the receiver; the advantage claimed is that in some cases, the long leads will pick up electrical noise, either RF or servo generated, which is fed back into and upsets the receiver. The optocoupler, basically a one-way street, will only pass the desired signal to the servo, but nothing is allowed to flow in the other direction. Do they work? Depending on the type of electrical noise one is dealing with, in theory, yes. In most cases though, the long lead problems I have seen were caused mostly by voltage drop and were solved without optocoupling devices. Still, as additional insurance, they are probably worth considering.

Bear in mind that in this application, only the control signal and not the DC power to the servo is isolated. The optocoupler "power control" features listed apply to their switching abilities only, and not to any current carrying capacities; they are not current devices.

This is not all there is to optocouplers; you can get books as fat as "War and Peace" on this one subject alone. My intent was to get you at least past the terminology, and a little bit into the practical uses. Besides, they are fun to experiment with!

Next month? Hopefully we'll just have letters with questions, or better yet, the telling of some interesting electronic experiences; but if they choose to disagree as they did this month, we'll still share them with you! See you then! ***MB***

ELECTRIC *Continued from page 53*

best commercial battery pack assembly I have seen. Their side-by-side packs are assembled with the cells slightly offset and with a bow in the connecting strap. This eliminates the possibility of the strap shorting across the top of the cell. The cells are glued together with a very tough silicone type glue, which serves as a spacer to keep the cells from rubbing against each other. This very simple assembly solves all the problems.

Note that the drawing shows two ways to glue the cells side by side. One is to have the cells lined up, then put a bead of glue on both sides of the pack. I do not like this method, because the cells are often pushed together so that they touch. They should not touch; there should be a bit of separation between the cells. The gap should be about 1/64 inch. A piece of plastic or light cardboard can be used for a spacing gauge. I prefer to glue the cells together one by one, with a single bead of glue in between. Push the cells together until the correct spacing is achieved.

Many commercial packs use bare battery straps which go flat across the top of the cells. There is a plastic ring at the plus end of the cells which is supposed to prevent a short. I have seen it fail (melt) frequently. The cure is to put a plastic or cardboard shim under the strap so there is no possibility of the strap shorting across the cell top. *This is critical!* Most manufacturers make their packs with the straps tight against the top of the cells. I remove the shrink wrap around the pack on every pack I buy and inspect the ends of the cells. You should too. Put in the shims under the straps if needed, then repackage the pack; 2-3/4 to 3-1/4 inch wide shrink wrap (measured flat) does a good job on most packs. You will need a heat gun for the shrink wrap; a hair dryer will not do. Buy either the type sold in hobby stores for shrinking plastic covering or the paint strip-

per type sold at hardware stores. A heat gun is a good investment, especially if you start assembling your own packs and wiring.

Another bad manufacturing practice is running one or both battery leads across the top of the cells, underneath the shrink wrap. Several manufacturers do this. It is an open invitation to a short across most of the pack! If you find this in your packs, reroute the wire so that it lies alongside the cells. Better yet, run all leads outside the pack, with no lead lengths next to cells.

Some packs are made up of cylinders of cells which are then assembled side by side. The same problems apply. Take off the outer pack wrapping, check the battery strap at the end of the pack, and put in shims if needed. Check that the cylinders of cells lying side by side have a gap separating them. A short from cylinder to cylinder represents a short across most of the pack, with an inevitable meltdown. I use double-sided foam tape as a separator. Reroute any wires inside the pack wrapping so that they will be outside the pack wrapping. Some manufacturers use cardboard tubes instead of heat-shrink for the cells in this type of pack. This eliminates the cell jacket cracking or shrinking problem, and separates the cylinders of cells very nicely. It does not let heat escape as well, however. Be aware of that and give this type of packaging time to cool when you fly. You could omit the outer shrink wrap entirely on this type of packaging, to allow better cooling.

I rebuild most of the battery packs I buy to meet the safety standards I have listed. I recommend that you do too. At the very least, remove the battery pack jacket to see what has been done. Battery pack jackets are easily replaced with new heat-shrink, or tape up the old one, or leave it off entirely for better cooling.

Benson Hobby Products, run by Hardy Benson, has been around for a long time. I remember that Hardy had one of the very first electronic throttles on the market. Jim Sweeney used one in his twin Astro 15 powered Kaos in the very first (1975) Astro Flight all-electric contest held at Sepulveda Basin, in Los Angeles. The Benson throttle performed very well. Hardy now makes a line of electric products that are well worth your attention. I have been flying his SC-1H throttle in my 020 (60 watt) to 05 (100 watt) planes for nearly two years now. I am very pleased and impressed with it. It is a high rate throttle, about 3000 Hz. This is much more efficient and much smoother than the frame rate (50 Hz) throttles that most other manufacturers sell. The SC-1H weighs only one ounce, and is quite small, 1x1.5x.9 inches. It will run on four to 18 cells, uses four IRFZ42 HEXFETS, and will handle 25 amps with no heat sink, or up to 40 amps with a heat sink. It is priced at $50 without connectors. I like it and recommend it.

There is a PS-1 prop stop module you can add that stops the prop with the motor off; it is $20. There is another version, PS-1U, that will work with any throttle, including the Jomar. It is to be used for folding props, as the brake turns off and a conventional prop will start windmilling again. It is $25.

Good news for those who like really small planes is the SC-1 micro speed control. It is .5x.5x.7 inches, and weighs five grams with no leads. It will run on two to 14 cells, and will handle 10 amperes with one MOSFET. MOSFETS can be added, up to a total of four, which can handle up to 40 amperes! It is 17 grams with four MOSFETS and no leads. The basic SC-1 price is $35; add $7.50 for each additional MOSFET. Quite a bargain! Note that the ability to run on two cells is very unusual. MOSFETS need about six volts to run, so Hardy must have a voltage booster built into the SC-1. I'm ordering mine.

If that isn't enough, Hardy offers a BEC version with a low voltage motor cutoff set at 4.35 volts. The BEC requires five cells for reliable operation. If you elect not to use the BEC, the throttle is useful right down to one cell! Hardy also has motor on-off controls. The MC-1 is $30, and comes in 4-8 or 8-14 cell versions. The MC-2 "bump" motor control lets you use motor on-off with a two-channel radio, using elevator or rudder bumped to full throw in one direction. Price is $55, with no connectors.

The Benson BC-2 peak charger is adjustable from zero to five amps, with nearly constant current through the charge. The BC-2 has a setback control, with which you

can set the amount of voltage drop that the charger will need to turn off. Most of us will use the minimum setting. Hotdoggers will use higher settings if they are using SCR packs, to get them warm. Yes, I know I have been talking about keeping battery packs cool! SCR packs are a special case; perhaps in the future I can cover some SCR tricks.

If you wish the Benson catalog, send $1 to Benson Hobby Products, 7119 N. Chimney Rock Place, Tucson, AZ 85718, phone (602) 299-26531. Enjoy!

Bernard Cawley sent a photo of his daughter holding his Electro Flea, a 24-inch span 020 (60 watt) plane I designed in 1975. Cute models, both of them! The Electro Flea has 104 sq. in. of wing area. Bernard uses an old Astro 020 motor (no longer made), two World Engines S-22 servos, a Jomar on-off switch, an SR Batteries 50 mAH receiver pack, and an SR four-cell 450 pack for the motor. All-up weight is 11 ounces. This plane is ideal for the Benson throttles. One of these days I will have to publish it, but spare time is hard to come by. Well, for now, fly safely, fly electric! My address is: Mitch Poling, 7100 CSW/MC, Box 734 PSC 2, APO NY 09220-5300. ***MB***

FREE FLIGHT *Continued from page 61*

and retap the back of the timer works case with an 0-80 tap (it is slightly larger than the 1.4mm screw, so the tap works very smoothly). Then replace the metric screws that hold the case in place with 0-80x1/4-inch brass screws. These seem to be more easily found in hobby shops, so are good substitutes. This will give you two more metric screws to use for the faceplate as well.

3. If the faceplate is all bent and useless, try cutting a new one from thin aluminum sheet. The original Tatone aluminum faceplate was .024 thick. Use the old banged-up faceplate as a pattern for the new one. Use a paper clip wire for the switch. You can also make a faceplate from thin brass sheet if you wish, but the end result will be heavier.

Finally, you will notice that I didn't say much about the newer style Tatone or KSB timers. The reason is that the works on these timers is enclosed in the case holding all the works. These timers can also benefit from a good cleaning and oiling, but they are not adjustable. If you have one of these that has been destroyed, but still has a good mainspring, tear it apart and save the mainspring. The spring can be used in the old style timer.

Well, I hope that these little tips will make your flying time more enjoyable. Now that winter is approaching, it is a good time to look over those old timers and put them in shape to last a long time and perform dependably for years to come. Good luck!

ROLLAND ANDERSON: 1931-1990.

Rolland "Rol" Anderson died on August 2, 1990. He was 59 years of age. Rol was a man who I met once at the Toledo RC Conference when he and I were both pursuing places on the U.S. FAI F/F Team. Rol was an active FAI Power and Rubber flier and an innovator in the area of F/F design. Rol's Mulvihill design, the "Roamer," was selected as one of the NFFS Top Ten Models, and he was the son of another famous free flighter, R.L. "Doc" Anderson, who himself won an award from the National Free Flight Society for the work he had done in improving the performance of the Rossi FAI engine for F/F work.

Rol finally did make the US FAI F/F team in 1983, traveling to Australia to fly his well developed "Atlas" design. One of the memories I have of Rol is a long evening conversation in his workshop where he spent hours describing the details of his latest power ship. He seemed to be fully energized and actively involved in sharing information with anyone who asked. He was too young to leave us, but I am sure he has caught a grand thermal and is waiting to greet his many friends one of these days. Good-bye, old friend.

A FINAL PLUG

For those of you who are wondering where to find those old Nostalgia legal engines, you need look no farther. Attend a MECA Collectogether in your neighborhood. I did just that about two weeks ago. For sale was a good Hornet Mk II with timer tank for $20.00. Countless K&B Greenheads were available in excellent to useable condition; none were priced higher than $35.00. There

were literally hundreds of different models of reed-valve Cox engines beginning at $2.00. Take a short trip to your next MECA gathering. If you don't know where to go, then become a member of MECA (Model Engine Collectors Association). The cost is $15.00 per year. Send to MECA, 3007 Travis, West Lake, LA 70669.

In addition to your membership, you also get about eight issues of the Swap Sheet—40 pages of ads from around the world. Engines and other model goodies are available for sale or for trade. Stop whining about what you can't find and do something about it... join MECA.

ANOTHER COTTAGE INDUSTRY FOR FREE FLIGHTERS

I just noticed a new (to me, anyhow) manufacturer that is producing Old Timer kits. The first kits are the Playboy Senior and Buzzard Bombshell. Both feature full-sized rolled plans, machine cut parts, full length balsa sides and the like. These products are available to SAM members for $69.00 each postpaid. Order from Balsa Products Engineering, 122 Jansen Ave., Iselin, NJ 08830, or call (201) 634-6131. They also sell balsa sheets and strips in various lengths and widths. How does 1/16 sheet 3 inches wide by 36 inches long for 35 cents sound? Give them a holler.

RC REDUX

Several months ago, I reported the embarrassing news that I had won a radio control outfit in a drawing held at the local Benton County Model Expo. I included a plea for someone to help me determine what to do with the equipment. Although the response wasn't staggering, I did receive one phone call, three letters and a personal offer that I could not refuse. One call offered to trade me some old Super Tigres for the set. A letter suggested that I use the RC set in a free flight model. A card from Saudi Arabia (guess who from) suggested that I write "Dear Jake and ask for his sage advice," or as an alternate, "Get one of Bob Peck's RC Blimp kits and decorate it with Goodyear Blimp colors, enter it in the 1991 Benton County Model Expo." (To do this, I would have to resign my NFFS Charter/Founder membership.) I think that this latter recommendation takes the honors for the best suggestion. And for this, Dave Linstrum will receive a free copy of *Darned Good Airfoils* from this author.

However, the real winner was Bill McDow, who offered me a very nice O&R .60 ignition engine for an even trade. Bill now has the radio control outfit, and I have the O&R for my winter building project.

ANOTHER ENDING

That wraps it up for another issue and another year. For me, this means that I have been on the job as the Free Flight columnist for *Model Builder* for eight consecutive years. It has been a great stint, and I've enjoyed meeting all of you who write and phone with stories and information to share. I hope you keep it up, as I intend to continue writing this column as long as Bill Northrop will have me. Free flight forever! And thermals to all. **MB**

HANNAN *Continued from page 63*

table among dozens of RC scale models: Mike writes: "I flew my Moths in the still morning air before the big RC models drowned me out; then I left at midday to fly gliders at my own field.

"Little did I know that at the end of the day's flying, my models were voted the most popular by the other pilots, and I won the First Prize, which was a joy-ride in a Tiger Moth!"

AIR FORCE PAPER AIRPLANES

Peter Young, of Garden Grove, California, forwarded an article from *Airman* magazine describing a paper airplane contest conducted at Wright-Patterson Air Force Base in Ohio. The winner, constructed by Joe Mekina, was called "Wonderwheel" and evidently operated on the Flettner rotor, Magnus principle. Whatever it means, it placed first in Design, Aerobatics and Duration, staying aloft for 22 seconds, double the time of any other entry.

Each contestant was required to tell the judges beforehand what to expect, and results were based upon how nearly the plane conformed to the stated objective. One lady announced that her entry would "fall like a rock,"—and sure enough, it did!

FLEMALLE, 1990

The 14th Annual International Indoor Contest of Belgium, held during August, attracted models from Belgium, Czechoslo-

vakia, France, Germany, Great Britain, the Netherlands, Poland, and by proxy, the United States. The variety of events included EZB, Microfilm, Sainte Formule (similar to Manhattan Cabin), Peanut Duration, Peanut Maquette and Pistachio Scale.

In the F1D Microfilm class, a new site record of 32:16 was established by Werner Nimpsch, of Germany. Sylvester Kujawa, of Poland, topped Peanut Duration with his Drzewiecki canard, which achieved a high scale score coupled with a top duration flight of 115 seconds. In the Maquette Peanut division, Tonda Alfery' s spectacular Vought V-173 "Pancake" took the highest honors, while R. Lotz, of Germany, won Pistachio Scale with his Windham Tandem, turning in a flight of 149 seconds, quite astonishing for a eight-inch wing span aircraft.

The Juniors did quite well also, with Florian Glockner, of Germany, placing first in EZB and Peanut Maquette, while J. Lotz, also of Germany, flew his Cloudbuster Pistachio to a top duration of 102 seconds!

Anyone who may care to enter the 1991 meet, either in person or by proxy, may obtain more information from F.L. Van Hauwaert, Grand Place 1, B52, B-411O Flemalle, Belgium. Please enclose three International Reply Coupons (from most Post Offices) to cover return postage. Our thanks to Heinz Neumann and Klaus Jorg Hammerschmidt for their reports.

NEW CO²

Bill Brown, who celebrated his 79th birthday this year, has introduced a new CO² powerplant, the B-100, signifying its 100 cubic millimeter displacement. It was officially introduced, appropriately enough, at the SAM 100 Fun-Fly in Pennsylvania. Rick Tenenoff, following a frantic nearly-all-night building session, completed a fine flying model which demonstated the capabilities of the new unit most impressively. Bill Brown himself placed second with one of his earlier A-23s powering a Peck-Polymers "One Night 16," entering his first contest in over 40 years!

The new steel-piston B-100 is a marvelous example of both engineering and precision workmanship, and I'm proud to own serial number 19 myself. Priced at $59.95 plus postage, these engines may be ordered directly from Brown Junior Motors, Inc., P.O. Box 77, Pine Grove Mills, PA 16868, or from Peck-Polymers, whose adverts appear elsewhere in this magazine.

Bob and Sandy Peck are offering a newly-expanded catalog, showing their blimps, electric motors, CO² glow and diesel engines, model construction plans from several countries, construction materials, tools and accessories. For your copy of this profusely illustrated catalog, send $2 to Peck-Polymers, Box 710399, Santee, CA 92072.

THE LATEST FROM LIDBERG

Another model plan has "taken off" from Al Lidberg' s drawing board. The Glen Beets Special, a parasol winged, Volkwagen-engined homebuilt was the prototype for Al's model, which may be powered by rubber, CO² or electricity. Spanning 25 inches, the craft is presented in the usual crisp Lidberg style plans, and includes comprehensive directions as well as proof-of-scale documentation. The $6 price will also bring you Al's most recent plans list, postpaid from: Model Plan Service, 614 E. Fordham, Tempe, AZ 85283.

NEW PUBLICATIONS

From the ever-increasing range of books by Argus, two new releases. *The Electric Flight Handbook*, by Helmut Meyer, covers such subjects as battery packs ("Time and

again the claims made for battery capacity turn out to be false."); electric motors ("It is well known that the efficiency claimed by the motor manufacturer is seldom achieved in practice."); propellers, speed-controllers, servos and much more.

Although, according to the Foreword, the book is intended for beginners and experienced modelers alike, the fact that it was translated from the German language (the graph captions were not) has resulted in rather unusual wording that may require careful study, especially by novice readers. This is not to detract from the value of the information which is thoroughly (and emphatically!) presented, but merely to alert the potential audience.

Certainly the author's conclusions are concise: ". . . the main reason for inexplicable crashes is usually due to bad connectors on the servo leads." And, "In practice it has been shown that connectors which have been soldered by modellers are very much more reliable than the usual items supplied by the trade."

BY CONTRAST

Aircraft Modelling Made Easy!, by Glynn Guest, would seem to be ideal for beginning aeromodelers, being a collection of simple all-balsa flying model projects. Covered are such fundamentals as theory of flight, materials, techniques, adhesives, and use of tools. Featured designs include a hand-launched glider ("chuckie" to the British), a catapult glider, a Jet-X powered profile, a towliner, and a rubber-powered mid-winger based upon a turboprop trainer.

Details such as assuring proper surface alignment, dihedral angles, and adjusting for flight are comprehensively examined, and even a bit of philosophical guidance is given: "Building and flying models can be rewarding in itself. What you might not realize is that the qualities you develop are much the same as are required for success in life." Amen to that.

Each of the above described Argus books is priced at 6.95 pounds Sterling plus 10% for postage, directly from Argus Books, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST, England, or from Motorbooks International in the U.S.A. Please mention that *Model Builder* sent you when responding to any of our reviews. Thank you!

SIGN-OFF

"It's a poor sort of memory that only works backwards." So wrote Lewis Carroll, author of *Alice in Wonderland*. To which Herb Weiss retorts: "Come to think of it, the projects I remember with the greatest amount of pleasure include a few that I haven't even started yet." ***MB***

INDOOR *Continued from page 65*

wing outline, lightly, about every half inch all the way around. The covering may be cut away by running a brand new razor blade (half of a double-edged blade cut to a 45 degree angle at the cutting edge) around the outside of the wing outline. Be sure the cut is thorough and complete before lifting the covered wing off the board.

The wing is covered flat and the dihedral added afterward. The covering will sag after the dihedral is set. To draw it tight, wet a small brush with spray cement (from a spot sprayed on paper) and lightly coat the film on top of the rib. Thin the cement with toluene, like Elmer's contact cement solvent. This will make it brush easier. When the coat gets tacky, gently nudge the loose film against it with a flat tool from below the wing. This requires some practice, but remember, if you choose not to do this, the film will billow to shape in flight and will not affect the duration of the flight.

Write with comments and send photos to: Ken Johnson, 16728 Berbuda Street, Granada Hills, CA 91344. ***MB***

CONTROL LINE *Continued from page 67*

the fuselage, and somewhere in the vicinity of the center of gravity, depending on what is convenient and efficient for your design. Don't stay awake nights trying to design a perfect location, because it will not matter that much. If the bellcrank is firmly mounted and the mechanical system operates properly (smoothly and freely), the location is

probably OK.

However, do pay considerable attention to the leadout location. (Dexter asked about this too, later in his letter, but the answer fits best here.) Several editions of this column over the past year have discussed this at length. Reviewing briefly: The leadouts should exit the up/down center of the wingtip, probably a short distance *aft* of the center of gravity. For a plane that will be maneuverable, the leadouts should be separated horizontally with the *up* line in front by at least an inch. A plane that will be going around the circle and not maneuvering, such as a racer, can have one leadout exit for both lines. If you are designing a new plane, it is suggested that you use an adjustable leadout guide so that you can move the leadouts forward and backward, either together or independently. You can thus experiment to find the proper location.

• How do you determine the size of the bellcrank?

Generally speaking, the larger the bellcrank in relation to the plane, the smoother the response. For purposes of learning to fly as well as for purposes of precise flying for the experienced pilot, the smooth control system that requires considerable arm movement, is considered desirable (as opposed to a twitchy system that results in quick plane movements with just small wrist movements).

I would suggest a 2-inch bellcrank for 1/2A planes and a 3-inch bellcrank for .35-size planes. Large stunt planes may work best with even a larger bellcrank. Again, for smoothness of response, locate the pushrod near the center pivot of the bellcrank, as opposed to far out on the arm. These locations can be adjusted, of course, to suit the flier's tastes.

• How do you determine the size of the elevator control horn?

Again, a large horn allows both a smooth response and the ability to adjust by moving the pushrod up or down the horn. A small horn usually works with 1/2A planes but a horn of 1 to 1-1/2 inches is recommended for larger planes. Start out with the pushrod in the hole farthest from the elevator. If, after flying, you want more response, move it closer to the elevator.

By the way, don't forget that the *spacing of the lines at the handle* is an important factor in the plane's response to control input. A handle with wide spacing is very responsive—sometimes too responsive. A handle with narrow spacing will be tamer. Acquire several handles or a handle with adjustable positions so that you can experiment. Start with a narrow spacing and make it bigger if you want more response.

• How does a suction tank work?

A suction tank is one that relies upon the drawing power of the engine's air intake (venturi) to suck the fuel from the tank to the engine.

Typically a suction tank has a filler tube, an overflow tube and a pickup tube. The filler tube usually goes from the top or side of the tank to the bottom. The vent tube goes from the side or bottom to the top (or, in the case of a uniflow tank, to the interior terminus of the pickup tube). The pickup tube goes from the outboard rear interior of the tank to the front or side, and from there a flexible tube carries the fuel to the venturi.

In the case of a uniflow tank, the vent tube is capped. Often, a line carries muffler pressure into the filler tube to steady out the fuel flow. Either a uniflow or standard suction tank can be converted to a pressurized hard tank by capping the overflow vent and routing a pressure line from a crankcase tap to the fill tube.

• What is a bladder tank and how do you operate it?

A bladder tank is the simplest form of fuel tank. It is a piece of thick-walled surgical tubing tied off at one end and attached to a fuel feed tube at the other. (The attachment usually is made with the help of a small metal tube that allows the surgical tubing to be cinched tight to the feed tube. The metal tube is inside the feed tube which is inside the surgical, and the assembly is wrapped with copper wire or a nylon electrical tie.) The bladder usually is placed loosely into a fuel-proofed tube or compartment in the plane.

Fuel is forced into the bladder with a large syringe. The bladder blows up like a balloon. The flier then pinches off the feed tube

with a clip or hemostat and connects it to the engine.

After giving the engine an appropriate prime and connecting the battery, the flier pinches the feed tube with his fingers (use a *soft* silicone or neoprene tubing so you can pinch it) and releases the mechanical pinch. He flips the prop, and when the engine starts, he releases the finger pinch. After a little practice, a flier learns how much fuel is needed to pass through the needle valve to get the engine running without starving or flooding it.

As a guide to finding the needle setting, after you fill the bladder, turn the plane so that fuel will run out of the venturi (rather than flooding the engine) and release the pinch. Adjust the needle so that a fast drip is produced. At that setting, the engine should start and run while you adjust for a proper setting.

Important: Be careful not to release the pinch and let fuel flood into the engine. Better to start with not enough fuel than with too much. A flooded engine can be difficult to start, and the most common problem with bladders is letting the engine flood before it's started.

It's wise to send a plane on bladder pressure aloft with a slightly rich setting—it will go leaner as the plane gets in the air and "unloads." It may take a couple of flights to fine-tune the adjustment.

• Is it advisable to use fishing line for flying lines?

No, fishing line is not good for control lines because it stretches. Half-A planes can be flown on either steel wires or Dacron thread available in hobby shops. I recommend learning to work with the steel wires.

For sport flying purposes, 1/2A planes can be flown on .008 or .012 stranded lines. The .012 are easier to work with and are more sturdy. Length can range from 15 to 52 feet, depending on the plane.

Planes of .15 engine size can be flown on .012 to .015 lines of 52 to 60 feet. Planes up to .35 engine size can be flown on .015 to .018 lines of 60 to 70 feet. Lines should be .018 for engines larger than .35, at 60 to 70 feet.

Thanks to Dexter for his questions. Technical questions are always welcome.

STUNT-A-THON '90

I missed the opportunity to fly in the Jim Parsons Memorial Stunt-A-Thon '90 in Kent, Washington, on August 18-19, but during a vacation trip near there I was able to drop by the Boeing Space Center to spend a few minutes watching the stunt competitors enjoying the thrill of the game. Dave Gardner, the contest director, was kind enough to forward this report of the full weekend of flying:

"This was the eighth nearly annual running of the Stunt-A-Thon all-stunt contest. It was `nearly' since we missed 1989. This event was dedicated to Jim Parsons, who unexpectedly passed away earlier this year. Jim was the consummate stunt judge, both on a local and Nationals level. He didn't fly competitively, but he was always there, not

only to judge, but to provide whatever assistance was needed. The Seattle Skyraiders Club honors him with this memorial for appreciation of his contributions and to all of the others without whose efforts we would not have great successful contests.

"Saturday morning, the 18th, started out kind of slow and overcast. At 8:30 a.m., the contest director was the only one on the field. There was that eerie feeling of scheduling a contest and nobody came. Just before 9, people started showing up to practice. By 11, we decided that we had a quorum (three entries) for old-time stunt, so the first official flight went up. From there it ran smoothly, if lightly attended.

"The weather pattern was mixed, with a large black cloud taking a long-term position over the field. Fortunately, we were blessed with only an occasional misting, and the wind stayed moderate on a fairly steady heading.

"There was only one entry in PAMPA beginner, flying the new simplified pattern. Steve Scott unfortunately had a moment of indecision in a vertical down position. The Sig Skyray 35 is strong, but it wasn't *that* strong. It was ashes to ashes, spruce to spruce, thy will be done.

"Nostalgia stunt was also lightly attended. Apparently, nostalgia isn't what it used to be. We had two `old timers' and one example of the era, Ted Fancher's Ares. The younger `old-time' pilots had a decided disadvantage against the nostalgia airplane flown by an `old-time pilot' (sorry, Ted).

"Old-time stunt, beginner stunt and nostalgia stunt were ably judged by Bob Parker and Paul Walker.

"Sunday morning was very gray, with advanced and expert precision aerobatics scheduled. The normal PAMPA classes were juggled a bit, with advanced covering the 300 to 450 point fliers and the expert category for the 451 and up fliers. As noted in the results below, the seeding was realistic for this contest. A note of the scores, however, shows why we have three full-pattern PAMPA categories.

"The weather held, with scattered sunshine, no rain and light to moderate wind from the north. It might be noted that we had had 85 to 90-degree weather for the past two weeks, with clouds or no rain. A scheduled contest beats washing your car every time!

"Sunday's program had an international flavor, with Alan Resinger and Barrie Shandel from Canada, Svetlana Fillippova from Leningrad, and Ted Fancher from California. Svetlana was back in the Northwest for the second time since the 1989 Tri-Cities Nats. Dan Rutherford has been her guide and escort for the past month. His cultural program included top fuel dragsters at Seattle International Raceway and the Blue Angels' show over Lake Union during the Seafair/Goodwill Games.

"Round one was flown with both categories in sequence. The only problem during this time was an unexplained momentary rise in the ground on the downwind side of the circle. It jumped up to about six inches

higher than the bottom of Roy Nakano's outside loop, milling off the needle valve, tank vents, canopy and fin. Roy says he'll be back with a new airplane. (No, Roy, you can't put a bellcrank in a Formula 1 pylon racer and fly stunt!)

"The wind came up a bit in the afternoon, with the scores reflecting it. Only one advanced flier bettered his morning points, while all the experts improved their scores. You wouldn't think that buying the judges lunch would make that much difference!

"During the afternoon flying, Howard Rush suggested that to keep up with all the numbers the contest director should have a laptop computer. Alice Gardner, busily adding scores, commented, 'She's right behind you!' The senior member of the U.S. World Championship Combat Team was greatly amused.

"For the yeoman's job of judging, we put Bob Parker back on his sore foot again, well assisted by Joe Dill and trainee Al Brands. Al is showing a great affinity for judging, and is going to be a welcome addition to our strong base of precision aerobatics judges.

"Randy Powell was recruited from the ranks of the nonflying to act as pit boss and gorilla pull-tester. All bellcranks survived."

Here are the results as provided by Dave Gardner. The builder-of-the-model rule was not enforced, but no appearance points were given for flying an airplane not built by the pilot. There were six entries in the advanced class and eight entries in expert.

Old-Time Stunt: 1. Dick McConnell (F-94), 257.5 points; 2. John Hall (PDQ Flying Clown), 226; 3. Jim Fuller (Super Duper Zilch), 203.5.

Nostalgia Stunt: 1. Ted Fancher (Ares), 489.5; 2. Dick McConnell (F-94), 350; 3. Jim Fuller (Super Duper Zilch), 177.

Beginner Precision Aerobatics: 1. Steve Scott (Skyray 35), 74 (crash).

Advanced Precision Aerobatics: 1. Dan Rutherford (Sorta Magnum) 406.3; 2. Dick McConnell (John Hall original, not built by flier), 389.7; 3. George Mickey (Rusty Stiletto), 365.7.

Expert Precision Aerobatics: 1. Paul Walker (world championship airplane), 551.3; 2. Ted Fancher (Ares), 521.7; 3. Randy Schultz (Obsession), 519.7.

• • •

We'd welcome firsthand reports of any other interesting contests, along with the usual questions, club news, photos, etc. Note a new address for your control line columnist: John Thompson, 326 North K St., Cottage Grove, OR 97424. ***MB***

WORKBENCH *Continued from page 7*

same small airport in Selinsgrove, was very similar to school reunions, except that a higher percentage of the attendees were people with whom we have remained in touch because of our continued involvement in the hobby. However, there were others whose faces looked vaguely familiar, but the name tags sure were a big help! It seemed as though nearly every conversa-

tion would start out with, "Remember when . . .", and there were two points on which everyone there agreed . . . one; modern R/Cers have no idea how fortunate they are when comparing the capability and reliability of today's radio systems with the knock-together Rube Goldbergs we used to fiddle with, and two; on the other hand, not having experienced the challenges and accomplishments of the earlier days of R/C, the modern R/Cer is not able to fully appreciate the state of the art as it exists today. We may have crashed a lot, and spent hours in the woods and fields looking for flyaways, but somehow, it made the hobby more exciting and memorable . . . ***MB***

TECHNICAL *Continued from page 70*

the size of the model goes up, however, so does the need for more tools and for a more specialized place to work. To build an ARF or a kit RC model, pliers, screwdrivers, wrenches, and maybe a small saw are required.

When we build from scratch, the need for tools increases again, as we must build most of the parts. When we design our own models, even more tools are desirable, because with them we can design and build things that designers who publish plans for models avoid. Commercial model designers must limit their construction methods to those the average modeler uses.

This last point is one that I have been very aware of in recent years. I actually dislike the job of submitting my original designs for publication, because the ways I built the prototype, with my rather extensive shop facilities, must always be changed. I must eliminate requirements for tools that I feel most modelers will not have. In other words, I end up designing it twice, once for my prototype, and later for the average reader.

Two examples come to mind: the nonlinear control device I described in the April 1990 issue, and the slip-off wing mount which was covered in the June issue of MD&TS. I used both my lathe and my mill-

ing machine in developing these two gadgets. Before I showed them to you I had to redesign them so they could be built with hand tools. In this column the problem isn't usually too bad, however, since MD&TS isn't written for the average modeler. You readers are special in that you have more technical curiosity, more intelligence, and more ambition than average.

One can be a designer (of sorts) with no more tools than a pencil, a pocket calculator, and a ruler. To be a good designer you must have had the experience of building and flying your past designs, to discover your mistakes and profit by them. Building, to gain experience in designing, requires tools other than drafting tools.

It is obvious that the more knowledge you have the better you can design. It should be obvious as well, that the more tools and better workshop you have, the better you can build and test your designs. The quality of our designs is limited by our mental equipment. Our ability to build complex designs is limited by our physical shop equipment as well as our craftsmanship. Therefore better designers need better workshops. Tools and workshop space cost money, however, so most of us must compromise down from what we would like to have.

Another point occurs to me here. Workshops, like knowledge, grow throughout our active lifetimes. I had a workshop when I was ten years old. It was small and simple, but it was my workshop. I still have a tool or two in my shop that I had when I was ten. Personal shops should gradually improve over the years as we can afford more tools, and as our shop needs grow. That is sometimes a bit difficult when we must go off to college or to war, but the real workshop lover will find a way to store his shop until such perturbations in life are past. For years my son, Greg, stored part of his shop tools and supplies "at home," but has now taken the last of it to California.

What we put in our workshops depends, of course, not only on what we can afford, but upon what we intend to build. My particular workshop equipment is more

extensive than that of most modelers because I design and build other things as well as models.

REYNOLD'S WORKSHOP

The photos show both the shop I had from 1957 until July 1990, and the one I just built. Actually it is wrong to talk of these as two separate shops. More accurately, I moved my shop to our new home. You will be able to identify most of my power tools and storage units in both the old shop and the new shop photos. So far there are no new tools in the new shop. A few will come with time. Actually there is less in the new shop than there was in the old, because moving provided a perfect opportunity to weed out old tools and "junk" that was not being used but took up space.

SHOP STORAGE

In addition to storing tools, one needs to store parts and materials, and that includes all kind of neat things and keen junk to make things out of. If you are richer than I am, you may buy everything new as you need it and store nothing, but that method is expensive in time as well as dollars as you must make a lot more trips to the model shop or the hardware store. It is also a matter of minimum quantities. We must usually buy a long board, not just the six inches we need at the moment, and we must buy a package of screws and a whole roll of MonoKote. Storage space is almost a necessity. How much we can store depends on how much space we have and how effectively we use it.

In home workshops there is often a problem of this necessary-storage infringing on necessary-working-space. A good collector often can't force himself to throw out potentially useful things, even if they clutter up the shop to the point where there is little room left to work. The solution: a separate storage area, if at all possible. In the home I just left I used the entire attic of the house for shop storage, and had retracting stairs to the attic from the shop.

In our new home, there is no attic, but with the kind agreement of my wife, I have two rooms adjacent to the shop for storage. Actually one of these two should be called a shop annex, as in addition to storage it is

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equipped with an exhaust fan and has the paint spray equipment and my oxyacetylene and arc welders. Also in the new home, I'm fortunate enough to have a separate office where my technical library and drafting board reside, and the computer on which I'm writing this. My old shop had to double as an office. This is much better. I never did think sanding dust was good for the computer and printer.

But back to storage. I was pleased with the attic storage system I just left. There was something like 1800 square feet of floor space up there, which was a lot. Too much, as it turned out, because it allowed me to keep junk which shouldn't have been kept. Junk stored will increase to fill the available space. You may quote me on that. *(Believe that's known as the Peter Principle. wcn)*

I even had an index and locating code system in the attic. Different areas were allocated to different types of items; lumber in one area, tubing in another, model airplanes in another, etc. The index recorded every major item up there and its location.

I said I was pleased with my attic storage, but that feeling has changed as a result of moving. The shop storage space in my new home is quite adequate, but it is far less than what I had. Result: I had to get rid of about ninety percent of what I had stored in the attic. Painful, but not life threatening. In fact it was good. Trim is usually better than fat.

One observes that shop storage shouldn't be more than a layer or two deep, or it becomes worthless. With the exception of plastic foam and balsa wood, most materials are heavy enough that it becomes difficult to dig down to get what we need on the bottom of a pile. Also, after it has been on the bottom for a while we forget that it is there, as we can't see it. As a result we go and buy the needed item new, while we have it in storage and taking up space.

This deep-shop-storage-is-dumb observation applies to drawers also. When we need an undershirt at the bottom of a deep bedroom drawer we can slip a hand under the pile, invert it on the bed, take what we want, and return the contents to the drawer right side up. That system doesn't work at all well if it is steel we have stored in a deep drawer. Most of the shop storage drawers I have added in recent years are only one to three inches deep.

As you can see by the photos, I like to put my tools on tool boards where I can see them. Wall space then becomes valuable, but it is much easier to lay my hand on the tool I want. One soon learns the place of each item, and can almost grab them blindfolded. I trace around the tools on the board so it is easy to put each one back in its unique spot every time. I don't use pegboards. Plywood with nail "pegs" are more versatile.

You can note in one of the old shop photos, that I put windows above some of the tool boards. This worked out very well in that shop because the high windows let in light without using up valuable reachable wall space.

My shop is usually reasonably neat and clean because I am more comfortable and efficient in such surroundings. But I don't put each tool back as soon as I've used it if there is any chance that I will need to use it again shortly. Consequently, the bench and/or the floor becomes covered with tools and sawdust or metal chips in a long job. When I find that I'm beginning to spend time looking for the tool I want or beginning to track shavings around, I take a break, put all the tools back on the boards, and sweep the bench and the floor.

My wife is very understanding and cooperative concerning my shop work. The least I can do is minimize the mess that gets tracked into the rest of the house. Speaking of shavings, wood shavings, sawdust, and sanding dust is messy, but it can be swept or vacuumed up. Metal shavings are much worse! When they get hooked into a carpet they can only be removed by hand, shaving by shaving. Therefore I'm especially careful to keep the shop floor clean and the soles of my shoes clean when I'm working metal.

I said I liked to work in a reasonably clean shop. I also want my shop dry, well lighted, adequately heated or cooled or, in one word, comfortable. There are often enough frustrations in shop work without adding discomfort to the list. If you are comfortable you will be happier and get more and better quality work done. Be good to yourself. You deserve it.

continued

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A good workshop should have a sink. I probably use my shop sink more than any other single "tool." You need to mix things with water, cool solder jobs, wash your hands to keep your work clean, etc. If your shop is in or close to a utility room with a laundry tub, you've got it made; but when planning a shop, don't forget that you will need a sink.

ARFs vs. SHOPS

I don't want to get in trouble with Art Steinberg, our ARF columnist, but in my view, the popularity of ARFs is both the best thing and the worst thing that has happened to RC modeling. Best because it has allowed people with no interest in building to fly. Worst because it invites some of us who do have interests in building, and perhaps design skills, to take the easy way out and fly ARFs.

For many of us, investing in our shops is one of life's pleasures, but some of you may feel you can't afford a needed tool because you have to have another ARF instead. That attitude will probably assure that you will never graduate from flying ARFs, you will never have the satisfactions of designing and building, and the world will never profit by the model design and building contributions that you might otherwise make.

ON THE OTHER HAND

Workshops are wonderful, but if you don't have one or aren't apt to be able to get one, don't despair. Workshops make more things possible, but the things that I have seen some modelers do without shop facilities is remarkable. When I look back into the 1930s and '40s, at my own early model building, I recall designing and building some mighty sophisticated airplanes in my college dorm room, and later on the breakfast-nook table of an apartment. One of these models was all metal and another was mostly composites. Modelers without shops can go as far as their creativity, craftsmanship, and ambition will carry them.

My wife and I just returned from a trip to Portugal, Spain and Morocco. Morocco, especially, is a very backward nation compared to the U.S., but I was amazed at the craftsmanship that came out of little hole-in-the-wall workshops, with only the very crudest hand tools. I took one photo of a Moroccan sitting on a dirt floor and turning a homemade lathe with one foot. No, nice well-equipped workshops aren't always essential, but they are surely a joy to have.

On a different point, in our travels in central and northern Europe, and in China and Japan, we run across model flying and hobby stores occasionally. Not on this trip. We weren't looking for modeling, but we didn't see or hear of a trace of it. How sad.

FLYING SKILL vs. AGE

The young have the advantage of faster reactions and better coordination and vision in flying RC. I was reminded of this fact in looking at the winners of the Lake Spanaway Float Fly last August. As it happened, first place went to a "kid" of about nineteen. Second was won by a fellow of about fifty. Yours truly placed third at age seventy. I either need to practice more or grow younger.

Yes, I fly, but not as much as I would like to. Because flying more often would take time from my model design and technical stuff, which I like even better.

PARTING WORDS

In Morocco we saw many hundreds of working burros, and incidentally heard the following story: "Why is it that your wife has to walk, while you ride a burro?" "Because she doesn't have a burro."

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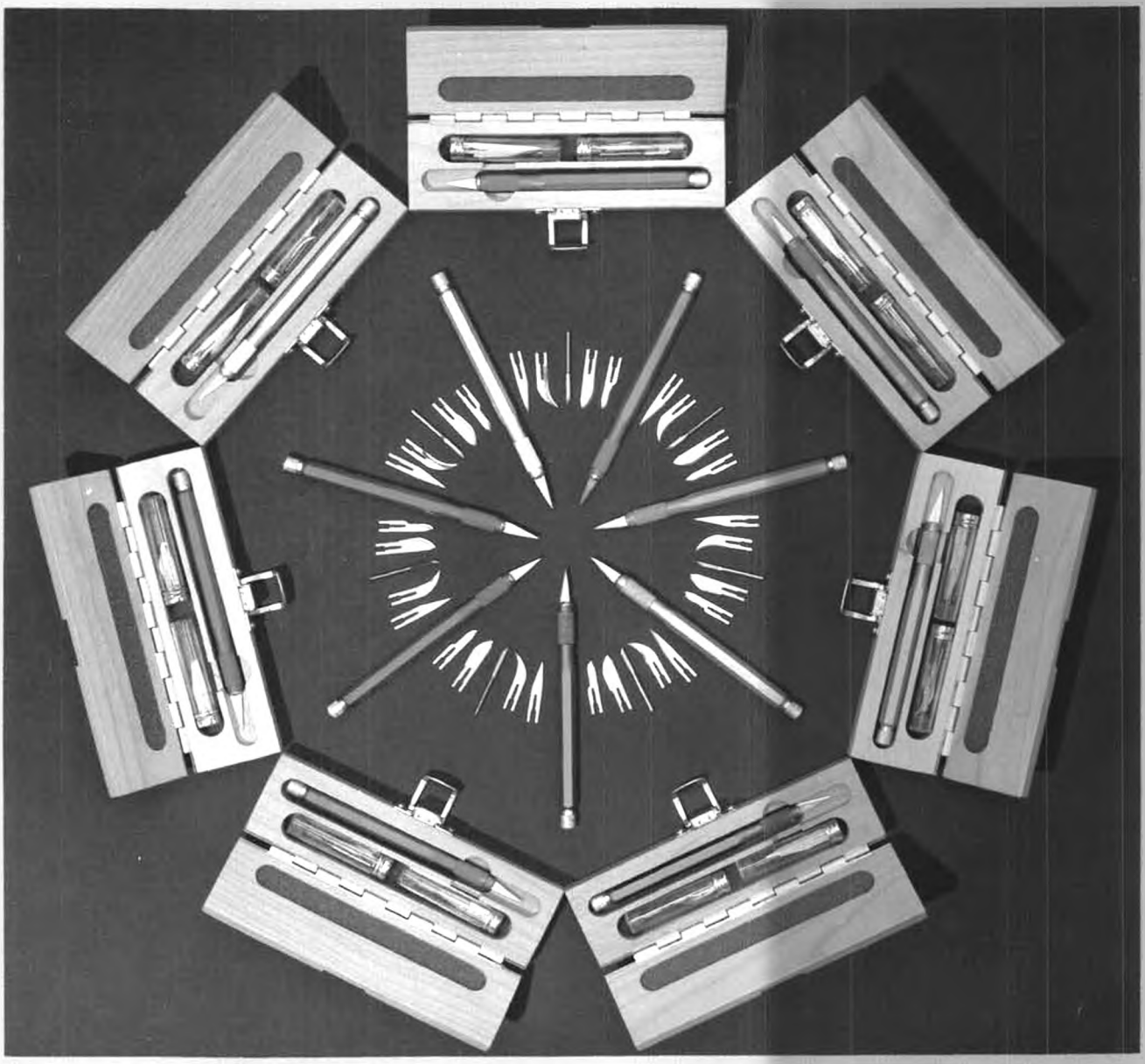

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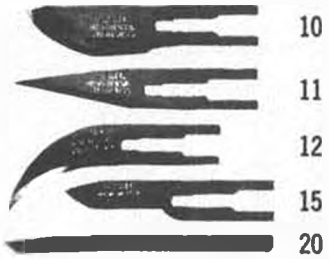

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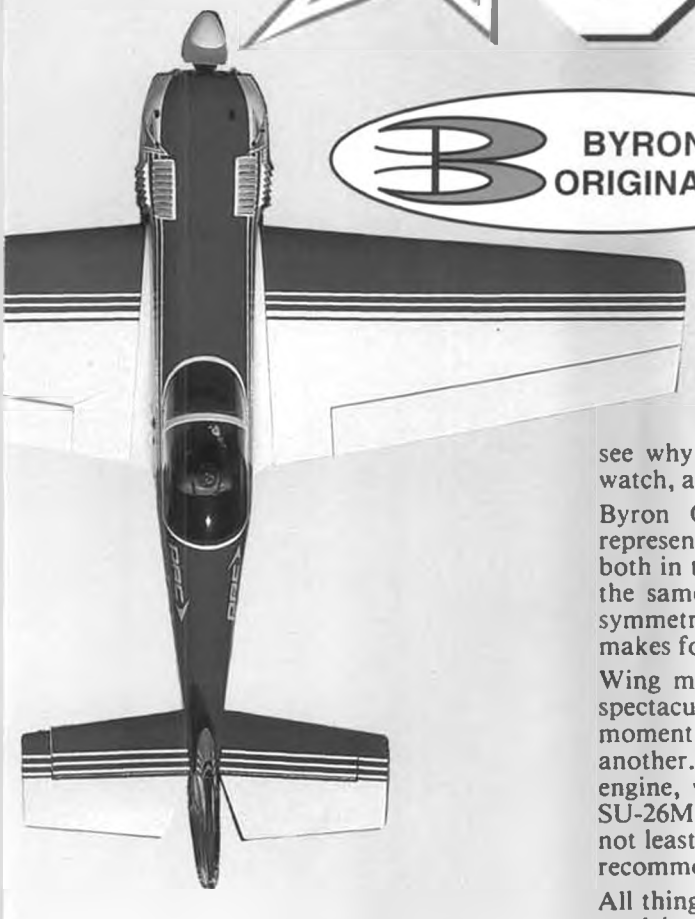

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