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Thanks to the United States Navy and Western A.M.A. leaders this big air-modeling contest was the best run Nationals competition in history!

Alex Schneider (r) receives Roberts R/C trophy from Keith Storey during victory "dance." Rodger Grotheer does the VTO.

America's Modelplane Championships

PHOTOS By JOHN SCHNEIDER, JACKSON INGHAM, JR. AND DICK EVERETT

REVIEWED By DICK EVERETT

Felix Toedter of the Costa Mesa, Calif., Cub Scout Pack and the Navy's Reserve Chief, Rear Admiral Dan V. Gallery.

Usual feverish scene at the hangar with modelers rebuilding or just finishing up models. Thunderbugs' trailer in center.

■ In our book, the 1955 National Model airplane Championships, the 24th such annual competition, were the best ever. Site of the meet was the Los Alamitos, Calif., Naval Air Station. Indoor events were run off in the airship hangar at the Marine Corps Air Station at Santa Ana, Calif.

For the comparatively few contestants indoor flying proved pretty disappointing; times were low in comparison with 1952, very low indeed. Only one man was able to top 20 minutes, Bill Atwood winning with 21:51. Winning time in hand-launched glider was 1:10 by Stuart Savage, 5th place being 1:03.8; top two men in senior both did 1:06 plus while in junior, only one guy, Larry Severson, did more than 50 seconds.

Biggest discussion was over Joe Bilgri's wood-covered prop which could be interpreted as being legal and on the other hand illegal; nevertheless, he did do 14:13 for first place. Joe also won indoor cabin with 13:03. Hal Cover was a big winner, topping all other seniors in the stick and cabin event and winning second in paper—he did some real good flying.

The second day of flying saw the outdoor events in full swing. Parnell Schoenky made it monotonous by winning the helicopter event again; no one has ever beaten him. Mike Burke topped all other juniors in combat, while the seniors followed Jim Levrett to the winner's circle. In free flight the mortality rate on C gas models was very high due to a lot of guys putting Torp .35s in old .32 ships; even so a lot of flyers posted sixes but only one, Ed Aikman, was good enough to post 3 sixes—then he joined the Flub Club with a 2:02.2 on his 4th. Don Geiler was top man in senior and Jack Linn an easy winner in junior.

Wakefield flying was real good although one by one most of the guys goofed on one flight or another. Models were smashed to many pieces as the boys tried to pack in one too many. Smartest operator was Woody Blanchard, who insisted on winding outside even though it meant going over to his car to wind, then carrying his fully wound ship back out to the takeoff area. Dick Baxter developed a power stall to ruin his chances, Gene Wright was seen to gather all the pieces in a shopping bag for a quick trip to the hangar and a repair job. He got it back in the air, too, for 6th place! Jerry Thomas put in an early 14:14 which stood up for 1st place. He was closely followed by Buster Allen's 13:51.

In Half-A speed the Mono-line team of Clem, Beasley and Kirn made it apparent that if you weren't using Mono-line you were going too slow, as they cracked that magic barrier of 100 with 100.89 mph; this ship was really moving, and so was Dale in getting around that pylon.

The third day found the guys going hot and heavy again. Woody Blanchard got off to an early lead in the International PAA-Load and held it to win with 13:18. Don Alberts had posted a total of 36:00 in Half-A before 9:30 which really stood up, Bill Fox joined the "Club" with 2:11 on his 4th flight but no one else managed the 3 sixes. Second place in Half-A Senior was 19 minutes behind. Bobby Patchin topped Jr-Sr-International with a 7-minute margin. Unlimited rubber saw Gene Wright's market basket of pieces top time in open, Don Alberts had top time in senior and the highest time of the meet in rubber. In Jr Stunt Ed May Jr topped all other juniors with 319 points while William Cummings was high man in senior with 358.4.

(*Continued on Page 72*)

David Arne, 14, of Yuba City, Calif., is awarded Junior National Champion plaque by Hillevi Rombin, Miss Universe of 1955.

Willard Blanchard, Jr., 31, Hampton, Va., gets Open Class and National Champion award from starlet Marla English.

Don Alberts, 20, of Albuquerque, N. M., is awarded Senior National Champion plaque by Vice-Admiral Harold M. Martin, USN.

ANALYSES of National Modelplane Winners

Through the cooperation of America's top-place competition flyers you see here the most detailed listing ever to appear in "ATMA"

UNITED STATES AERO CHAMPIONSHIPS OF 1955

EVENT	PLACE	FLYER	SCORE	MODEL DATA
Indoor Tissue	J 1	Brent Hawkins, Morton Ill.	6:06.4	• Wing, stab, rudder same as on micro winner, but tissue covered. Tube fuselage. 13/22 prop. 1 loop 1/8" T-56 lubed. 1000 T. .080 oz.
	J 2	Alan Lannholm, Galesburg Ill.	2:43.0	• 18" span wing with 54 sq. in. area. 18 sq. in. stab, 5 sq. in. rudder. Hollow stick fuse. 12" loop 1/8" T-56 rubber. 900 T. 1/3 oz. weight. Left-left flight pattern.
	J 3	Jim Carney, Covina Cal.	1:45	• 12" span, 24 sq. in. wing. Flat wing and stab. 1/8" sq. stick. 3" prop. 1/8" T-56 rubber. Castor oil lube.
	S 1	Ronald Atwood, LaCanada Cal.	10:23.4	• Own design with one loop of 1/16" T-56 rubber.
	S 2	Hal Cover, Glendale Cal.	9:22.4	• 22" span wing, 80 sq. in. area. 25 sq. in. stab. Own airfoils. Tube fuselage. 12/24 prop. 18" loop 5/64" T-56. Own lube. 2000 turns. Left flight pattern. 150 rpm prop.
	S 3	Edwin Heacox, Tacoma Wash.	7:32	• 14" span, 30 sq. in. area wing: Hap's Special airfoil. 10 sq. in. stab. Condenser paper covering. 7" prop with loop of 1/32" T-56. 2500 turns; Jasco lube. Right turn pattern on clockwise prop. .03 oz.
	O 1	Joe Bilgri, San Jose Cal.	14:13	• 28" span, 98 sq. in. wing. 27 sq. in. stab. Own airfoils with cond. paper covering. Tip dihedral. 13½/27 prop. 20" loop of 5/64" T-56. Jasco lube. 1900 turns. .058 oz. weight.
	O 2	Edward Slobod, Los Angeles Cal.	10:18	• Cond. paper covered surfaces. Tube fuse. 25" loop of 1/16 x 1/20 Pirelli rubber. Lanolin lube. 2320 turns. .095 oz., less rubber.
	O 3	Warren Williams, Los Angeles Cal.	9:42	• 28" span wing with 100 sq. in. 30% stab, 3% rudder. Jap tissue covered. Tube fuse. 14/28 prop with loop of 1/16" Pirelli. Jasco lube. 1600 turns. Left flight pattern. .060 oz.
Indoor Cabin	J 1	Brent Hawkins, Morton Ill.	3:44.0	• Wing and stab from Stick winner. 12 sq. in. rudder. Built-up fuse. & pod. 13/22 prop with 1 loop 7/64" T-56. 800 turns. Micro. covered. .080 oz. weight.
	J 2	Bedford Joyner, Memphis Tenn.	1:30	• 24" span, 72 sq. in. area wing. 12 sq. in. stab. 7 sq. in. rudder. Full length triangular fuse. Tissue covered. 12/18 wood prop with 1 loop 1/8" T-56. Jasco lube. 800 turns. .08 oz. weight.
	J 3	Darryl Katz, Detroit Mich.	0:30	• Own design with one loop of 1/16" T-56.
	S 1	Hal Cover, Glendale Cal.	9:45.3	• 26" span, 100 sq. in. area wing. 30 sq. in. stab. Own airfoils Warren truss fuselage. Micro. covered. 12/28 prop with 16" loop 5/64" T-56. Own lube. 1700 turns. Left-left pattern.
	S 2	Jerry Gross, Lakewood Ohio	5:43.9	• 27" span, 115 sq. in. wing. 42 sq. in. stab, 8 sq. in. rudder. Diamond fuse. with tail boom. Jem microfilm on wings, tissue on fuse. 14/12 prop; 3/32" T-56. 1000 turns. Own lube. .090 oz.
	S 3	Robert Patchin, Hawthorne Cal.	3:16	• 18" span wing with 90 sq. in. Own airfoils. Warren truss fuse. Microfilm covered. Single loop 1/16" x 1/20" T-56, Jasco lube. 800 turns. Right flight pattern.
	O 1	Joe Bilgri, San Jose Cal.	13:03	• 30" span, 148 sq. in. wing. 60 sq. in. stab. 5 sq. in. rudder. All microfilm covered. 17/28 prop with 18" loop of 5/64" T-56. Jasco lube. 1800 turns. Left flight pattern. .045 oz. weight.
	O 2	Warren Williams, Los Angeles Cal.	12:31	• 34" wing with 150 sq. in. area. 35% stab. 4½ sq. in. rudder. Built-up fuselage with hollow tube. Mike covered. Built-up 15/28 prop, 1 loop 1/16" Pirelli. Jasco lube. 1000 turns. .045 oz.
Indoor H.L. Glider	J 1	Larry Severson, Phoenix Ariz.	0:51.6	• 18" span wing with 50 sq. in. 8 sq. in. flat stab. 17¾" long. Polydihedral. Left turn rudder. ¾ oz.
	J 2	Chris Peterson, Monrovia Cal.	0:47	• 17" wing with 60 sq. in. 16 sq. in. symmetrical stab. Polydihedral. 2 coats Testor's dope. Left turn. .5 oz. weight.
	J 3	Frank Chester, Garden Grove Cal.	0:45.6	• 16½" span, 66 sq. in. area wing. 21 sq. in. stab. Clark Y airfoils. 3 coats sanding sealer. Right-left flight.
	S 1	Curtis Stevens, Stockton Cal.	1:06.6	• 16" span, 50 sq. in. wing, 3/16" thick. 8 sq. in. stab, lifting. Bass fuselage. 2 coats sealer. Straight-left flight. .63 oz. Set new record.
	S 2	Curtis Minier, Reseda Cal.	1:06	• His own design. Testor finish.
	S 3	Donald Monson, St. Paul Minn.	1:01	• 18" span, 65 sq. in. wing. 16½ sq. in. stab. Testor's Sanding Sealer. Left-right flight pattern. .8 oz.
	O 1	Stewart Savage, Wright-Patterson	1:10	• 17" wing, 56 sq. in. area. 15 sq. in. stab., both flat bottom. 21½" long. 1 coat dope. Right-left flight. .65 oz.
	O 2	Jack Block, Los Angeles Cal.	1:09.4	• Wing has 53 sq. in., stab, 16.4. Rudder area, 4 sq. in. 2 coats Testor's Sanding Sealer, 1 coat Johnson auto wax. .78 oz.
	O 3	Robert Dagand, Los Angeles Cal.	1:07.9	• Has 17" wing with 54 sq. in. area. 15 sq. in. stab. V-dihedral. Right turn-left glide. .9 oz.
H'copter	1st	Parnell Schoenky, Kirkwood Mo.	213.79	• 2 models flown. XH-4 gas job (see 1955 ATMA same event); JH-5 jet job has 74" rotor dia., 2 Jetex 350 engines. Is modeled after Hiller "Hornet"; longest flight was 2:10.
	2nd	Larry Crissman, Cedar Rapids Iowa	107.8	• 3 models flown. Gas model had 24" dia. rotor, sheeted fuselage, was 15" long, used Atwood engine with Tornado 6/3 prop; engine somewhat reworked. Rubber model had 15" rotor, stick fuselage. 9 loops 1/8" T-56; 350 turns. Jet heli.: 4' rotor, built-up fuse., 2 Jetex 150 motors, gave very short flight.
	3rd	Sam Benavides, Los Angeles Cal.	75.8	• No information. Note—winners were allowed to fly several models in this event; times for all were added for final score.

PLACE	FLYER	SCORE	MODEL DATA	EVENT
J 1	Brent Hawkins Morton Ill.	8:32	• 24 span with 90 sq. in. area. 4" average chord. 28 sq. in. stab. and 8 sq. in. rudder. B7 airfoil, wing and stab. Balsa tube fuselage. 13/22 prop with 1 loop 7/64" T-56. 1150 turns. Weighs .048 oz.	Indoor Stick
J 2	Bedford Joyner Memphis Tenn.	1:34.8	• 24" wing with orig. airfoil, 72 sq. in. 12" area flat stab. V dihedral. Stick fuse. 12/24 wood prop. 1 loop ⅛" T-56, 600 turns. Jasco lube. Indoor tissue covered. .03 oz. weight.	
S 1	Hal Cover Glendale Cal.	15:11.3	• 26" span, 100 sq. in. wing. 30 sq. in. stab. Orig. airfoils. 5 sq. in. rudder. 14/26 prop with 1 loop 5/64" T-56. Own lube. 2000 turns. Balsa tube fuse. Left-left flight. 125 prop rpm.	
S 2	Paul Crowley Detroit Mich.	14:21	• Original model with 1 loop of 5/64" T-56 rubber.	
S 3	Jerry Gross Lakewood Ohio	11:28.4	• 30" span wing, 140 sq. in. 50 sq. in. stab. Orig. airfoils, 8 sq. in. rudder. 16/14 prop with 1 loop 3/32" T-56, own lube. 1200 turns. Tube & boom fuse. Right-right flight. .065 oz.	
O 1	William E. Atwood LaCanada Cal.	21:51.4	• Original model with one loop of 1/16" T-56 rubber.	
O 2	Joe Bilgri San Jose Cal.	19:30.4	• 38" span wing with 200 sq. in. 6" average chord. 70 sq. in. stab, both original airfoils. 5 sq. in. rudder. Tip dihedral. 19/29 prop. 1 loop 5/64" rubber, Jasco lube. 1800 turns. .050 oz.	
O 3	Warren J. Williams Los Angeles Cal.	18:29.5	• 34" span, 150 sq. in. wing: W7W foil. 35% stab, W6W foil. 3% rudder. Hollow stick fuse. 17/30 mike prop. 1 loop 1/16" Pirelli rubber, Jasco lubed. 1400 turns. Left flight pattern. .040 oz.	
J 1	Brent Hawkins Morton Ill.	8:42	• Polyhedral wing has 33½" span, 133 sq. in. area 42 sq. in. Stab. Clark Y airfoils. Truss fuselage. 2 coats Berryloid dope. 19/21 prop with 6 loops ¼" T-56. Soap-glyc. lube. 800 turns. 6.5 oz. weight.	Unlimited Rubber
J 2	David Copple Los Angeles Cal.	7:51.2	• Dynamoe model with slight mods. Tissued wings, nylon covered fuselage. Fuse detherm. Testor's butyrate dope. 15" dia. single blade folder prop. 6 loops ¼" Pirelli. 400 turns.	
J 3	Larry Linville Sacramento Cal.	7:19.3	• 40" span wing, 175 sq. in. area. 50 sq. in. stab, own airfoils. 4 coats Testor's butyrate. Dry ice detherm. Built-up fuse. 16 loops ¼" T-56. Soap-castor lube. 1500 turns. 5⅛ oz.	
S 1	Don Alberts Albuquerque N.M.	14:44.8	• 35" wing has 150 sq. in. area., F.C.10 airfoil. 50 sq. in. stab has F.C.9 foil. Geodetic construction. 4 coats clear dope. Fuse detherm. Everett 18/22 prop. 12 loops ¼" Pirelli. Jasco lube. 1100 T. 6 oz.	
S 2	Steve Hoadley Bloomington Ind.	13:52	• Stratohawk model with elongated and narrowed fuse. 6 coats Testor's nitrate dope. Pop up stab. 18/20 prop, 8 loops ¼" T-56. Soap-glyc. lube. 800 turns.	
S 3	Hal Cover Glendale Cal.	13:06	• 46" span, 215 sq. in. wing. 70 sq. in. stab, own airfoils. Built up box fuselage. 3 coats Fro-Lac on Jap tissue. Fuse detherm. 19/24 prop. 10 loops ¼" T-56. Castor lube. 600 turns. 8.15 oz.	
O 1	G. B. Wright San Diego Cal.	14:13	• 41" wing with 205 sq. in. area, own airfoil. Thinned Clark Y on 80 sq. in. stab. 3 coats thinned Comet dope. 15/26 prop with 10 loops ¼" Pirelli rubber. 400 turns. Fuse detherm. 10 oz.	
O 2	T. G. Cunningham Phoenix Ariz.	13:38.2	• Wing has 40" span, 220 sq. in. area. Stab has 74 sq. in., thinned Clark Y. Built-up fuselage. Silk and tissue covered, 4 coats nitrate dope. Fuse detherm. 18/26 prop. 6 loops ¼" T-56. 950 T. 9½ oz.	
O 3	Henry Cole Palo Alto Cal.	13:36.2	• 48" wing with 215 sq. in. area, Davis #5 airfoil. 73 sq. in. stab with 10% Clark Y. 8 loops of ¼" Pirelli rubber, 1100 turns. Castor oil lube. 10 oz.	
J 1	Ernie Prosch San Lorenzo Cal.	8:49.6	• 20" span solid wing with 65 sq. in. area. 14 sq. in. stab. Clark Y airfoils. Solid fuselage. 3 coats Testors dope. 1½ oz.	Outdoor H.L. Glider
J 2	Alan Fleming Bartlesville Okla.	7:12.4	• Testor's Endurance glider with balsa fuselage instead of pine. 3 coats nitrate dope.	
J 3	Jack Moreland Long Beach Cal.	4:44.2	• 18" span, 48 sq. in. area wing. 12 sq. in. stab. 2 coats nitrate dope. ½ oz.	
S 1	Ed Schmutz Napa Cal.	14:11.3	• Poly wing has 16" span, 50 sq. in. area. 8 sq. in. lifting stab. 19" long bass fuselage. 2 coats sealer. .6 oz. This is a new record.	
S 2	Harry Robertson Tempe Ariz.	12:21.1	• 18" wingspan, 60 sq. in. area, Clark Y airfoil. 15 sq. in. stab, symmetrical. 2 coats nitrate dope. 1 oz. weight.	
S 3	Don Alberts Albuquerque N.M.	10:30.7	• 18" wing, 60 sq. in., flat airfoil. 12 sq. in. symmetrical stab. Bass fuselage. 2 coats Testors dope. .8 oz.	
O 1	Henry Cole Palo Alto Cal.	12:04	• 74 sq. in. wing has 24" span. Stab is 24 sq. in. 2 coats dope, 1 of sealer. Right-left flight pattern. 1.6 oz.	
O 2	James Gaz Rolling Hills Cal.	11:56.5	• 16" span wing, 45 sq. in. area. 12 sq. in. stab. No dope or filler. 22" long balsa fuselage. ⅝ oz.	
O 3	Jack Block Los Angeles Cal.	11:27.2	• Wing has 16" span, 53 sq. in. area, original airfoil. 16.4 sq. in. stab is symmetrical. Testor's Sealer, Fuller dope. 1.12 oz.	
J 1	Ralph Harmon Los Angeles Cal.	9:14.4	• Original airfoils, tip dihedral on wing. 2 coats Aero Gloss. Sheet box fuselage. 165' towline.	Limited Glider
J 2	Albert Verrell Bakersfield Cal.	7:44.8	• 58" wing with 260 sq. in. area. 67½ sq. in. stab. Clark Y airfoil. Sheeted box fuselage. 5 coats Testors dope. Fuse detherm. 164' towline. 10 oz.	
J 3	Donald Gurnett Fairfax Iowa	6:59.2	• 48" wing with 270 sq. in. 78½ sq. in. stab. 9% Clark Y airfoils. Rectangular sheet fuselage. 6 coats Aero Gloss dope. Fuse detherm. 164' line. 10 oz.	
S 1	Donald Tune Los Angeles Cal.	13:25.0	• "El Blocko" design by Jack Block. 52" span, 260 sq. in. wing. Original airfoils. 4 coats Testor's dope. Timer detherm. Sheet sided fuselage. Weighs 10 oz.	
S 2	Steve Hoadley Bloomington Ind.	12:06	• 58" wing with 290 sq. in. area, orig. airfoil. 50 sq. in. Clark Y stab. 5 coats Testor's nitrate dope. Crutch and sheeted fuselage. 150' towline. 10 oz.	
S 3	James Juliano Zephyrhills Fla.	9:04	• Wing has 44" span, 242 sq. in. area. 110 sq. in. stab. Own airfoils. Sheet fuselage. 6 coats Testors butyrate dope. 150' towline. 12 oz.	
O 1	James Scarborough Kelly AFB, Tex.	13:39	• Own undercambered airfoils on 50¼" span wing and 46½ sq. in. stab. Wing is 303 sq. in. area. Fuselage similar to Jasco Nordic glider. 4 coats nitrate dope. 164' line. 10.15 oz.	
O 2	Tom Henebry Chula Vista Cal.	12:52	• Called "Topside Jr.", ship has 54" wing with 276 sq. in. and mod. 6409 airfoil. 64 sq. in. stab has RSG #28 foil. Fuselage has balsa sides with plywood core. Fuse detherm. 5 coats nitrate dope. 165' towline. 10.2 oz.	
O 3	C. Crawford, Jr. Edwards Cal.	11:41	• 44" span with 264 sq. in. wing, mod. Clark Y airfoil. Clark Y on 81 sq. in. stab. Twin rudders. Solid balsa fuselage. Fuse detherm. 10⅛ oz.	

Example of Milwaukee indoor glider design is displayed by Don Kintzele. Good pitching arm helps in this competition!

Bakersfield, Calif., leans to polyhedral wing as demonstrated by John Wertz. Note that offset rudder for tight circling.

Bob Patchin, Hawthorne, Calif., shows standard launching grip with forefinger of right hand against wing and body.

Only feminine entrant in Nordic towline glider contest was Dorothy Conover of Oxford, Iowa. Neat reel for towline.

Top man in 1955 indoor hand-launched glider flying. Air Force's Stewart Savage of Wright-Patterson, won with 1:10.

Curtis Stevens of Stockton, Calif., set new record while winning first in senior indoor hand launched event with 1:06.6.

Henry Cole's Nordic featured "Fireball" type wing construction with balsa sheet covering top, bottom. He won open H/L.

Michael Roberts, 10, of Orange County, Calif., gets assistance from a friendly spectator as he repairs broken fuselage.

Thermal Thunber Jack Block (l) of Los Angeles was close on Savage's heels with 1 minute, 9.4 seconds to take 2nd.

Analysis of Top Model Aero Winners (Cont.)—National Championships of 1955

PLACE	FLYER	SCORE	MODEL DATA	EVENT
J 1	Gary Grenoble Yuba City Cal.	11:10.2	• Bi-Dot wings used. Own fuselage. Hillcrest detherm. 5 coats nitrate dope. 20 loops ¼" T-56 rubber. Castor-glycerine lube. Vertical take-off. 50 sec. motor run.	Wakefield
J 2	Brent Hawkins Morton Ill.	8:57.9	• 42" span wing with Eiffel 400 foil and 210 sq. in. 80 sq. in. Clark Y stab. Warren truss fuse. Pop-up detherm. 22/28 prop on 9 loops ¼" T-56, 700 turns. Soap-glyc. lube.	
J 3	Bedford Joyner Memphis Tenn.	6:31	• 46" span, 208 sq. in. area. Davis airfoil wing. 72 sq. in. Clark Y stab. Box fuselage. Pop-up detherm. 18 loops ¼" white rubber. 1 minute motor run. Jasco lube. Testor's clear dope.	
S 1	David Kerzic Seattle Wash.	11:55.6	• Original Warren truss diamond fuse. Berkeley Super Cloud wings. Fuse detherm. 4 coats Best-by-Test light dope. Prop from Berkeley 18" blank. 6 loops ¼" Pirelli, Jasco lube. 750 turns. 8.5 oz.	
S 2	J. P. White Sacramento Cal.	11:24.7	• 44½" wing with 207 sq. in. and own airfoil. 80 sq. in. stab. Dry ice detherm. Warren truss fuselage. 23/23 prop, 10 loops ¼" T-56, castor oil lube. 750 turns. Nitrate & butyrate dope used.	
S 3	Don Kintzele West Allis Wis.	11:17	• 44" span wing, 210½ sq. in. with own foil. 81 sq. in. Clark Y stab. V dihedral. Fuse detherm. 3 coats 50-50 Midwest dope. 20/22 X-block prop on 14 loops ¼" Pirelli. 650 T. 8.1 oz.	
O 1	Gerald Thomas Tacoma Wash.	14:14.1	• 47½" wing with 210 sq. in. area, Grant airfoil. 73 sq. in. stab. Sheet sided fuselage. 4 coats butyrate. Elmic timer. 21/24 prop with 7 loops ¼" Pirelli. Jasco lube. 720 turns. 8¼ oz.	
O 2	Forrest Allen Los Angeles Cal.	13:51.1	• 44¾" span wing, 219 sq. in. 70 sq. in. stab. Own airfoils. Square box fuselage. 3 coats Fuller dope. Fuse or dry ice detherm. 20/26 prop with 14 loops ¼" Pirelli rubber, castor lube. 650 turns. 8.3 oz.	
O 3	Joe Bilgri San Jose Cal.	13:47.2	• Wing is 47½" span, 214 sq. in. area. Stab has 78 sq. in. Own airfoils. Warren truss fuselage. 3 coats Fuller dope. Elmic detherm. 23/23 prop with 7 loops ¼" Pirelli. Castor lube. 8¼ oz.	
J 1	David Arne Yuba City Cal.	13:13	• 63" span wing with 424 sq. in. area. 100 sq. in. stab. Built up and sheeted fuselage. Hillcrest timer. 6 coats butyrate dope 164' line. 15 oz.	Nordic Glider
J 2	Alan Fleming Bartlesville Okla.	10:09.5	• Jasco Nordic with modified auto-rudder. Skysail covered. Nitrate dope. 164' line.	
J 3	David Zeller San Diego Cal.	9:58.4	• Jasco Nordic. Silk covered with 10 coats butyrate dope. Fuse detherm. 164' towline.	
S 1	Fred Wells Stockton Cal.	14:02	• 1953 World Championship design by Hansen. 65" span, 412 sq. in. wing. 88 sq. in. stab. 15 oz. weight. 164' line.	
S 2	Don Alberts Albuquerque N.M.	13:54.4	• 50" span wing with 400 sq. in. and Gott. 602 airfoil. F.C.9 airfoil on 125 sq. in. stab. Sheet box fuselage. 8 coats clear dope. Fuse detherm. 14.7 oz.	
S 3	David Yust Wichita Kans.	12:57.6	• Jasco Nordic with nitrate doping.	
O 1	Richard Sladek San Diego Cal.	15:00	• 69" span wing with 450 sq. in. 76 sq. in. stab. Original airfoils. Solid balsa fuselage. Gas model Silkspan covering. 5 coats clear dope. 15.5 oz.	
O 2	Charles Dorsett San Fran. Cal.	13:41	• 69.5" span, 400 sq. in., Eiffel 400 wing. 97 sq. in. Clark Y stab. Rectangular built-up fuselage. Hillcrest timer. 4 coats nitrate, 4 of butyrate dope. 160' towline.	
O 3	Henry Cole Palo Alto Cal.	13:10.5	• Wing has 70" span, 416 sq. in., Davis 3 airfoil. 110 sq. in. stab has NACA OO12. Entire model is of sheet construction, with double-tissue covering. 3 coats Fuller dope. 14.7 oz.	
J 1	Gary Grenoble Yuba City Cal.	16:34	• 35" span, 210 sq. in. wing. 26 sq. in. stab; own airfoils. Box fuselage. 3 coats nitrate & 3 of butyrate dope. Dry ice detherm. Atwood .049 with 6/3 Power Prop. Ohlsson ½A Gold Seal fuel. 5 oz.	Free Flight A/2
J 2	Jerry Combs Lancaster Cal.	16:19.2	• Kiwi with tip plates on wing and stab. Skysail covered with 4 coats Fuller's butyrate dope. Wasp .049 with K&B 5½/4 prop. Thimbledrome Racing fuel. ROG.	
J 3	Albert Verrell Bakersfield Cal.	13:03.8	• 39" span with 250 sq. in. area. 52 sq. in. stab. Clark Y airfoils. Sheet box fuselage 5 coats Testors dope. Atwood .049 with 6/3 Top Flite prop. K&B 1000 fuel. 5 oz. Hand launch.	
S 1	Don Alberts Albuquerque N.M.	36:00	• 36" wing with 200 sq. in. and F.C.9 airfoil. F.C.8 on 100 sq. in. stab. Sheet box fuselage. 4 coats Testors Nitrate. Atwood .049 with 5¼/4 Power Prop. Thimble Drome Racing Fuel. 4.9 oz. H.L.	
S 2	Robert Patchin Hawthorne Cal.	17:06	• Spacer with trimmed-down fuselage. 10 coats Aero Gloss. Thermal-Hopper engine with Top Flite 6/3 prop. ROG.	
S 3	Bill Peacock Tulare Cal.	16:04.5	• Half-A Spacer. Stab airfoil thinned, fuselage thinned down. 5 coats nitrate plus one of Comet Fuel Proofer. Atwood .049 with 6/3 Whizzer nylon prop. Ohlsson 2000 fuel. V.T.O.	
O 1	Bill Fox Long Beach Cal.	20:11	• 39" span, 234 sq. in. wing. 90 sq. in. stab, both flat-bottom airfoils, and geodetic construction. Fuselage planked in front, truss at rear. Thermal Hopper with Tornado 6/3 prop. V-73 fuel. 5⅝ oz. V.T.O.	
O 2	Merrill Combs Lancaster Pa.	17:17.5	• Ramrod 250 design by Ron St. Jean 40½" wing, box sheet fuselage, 2½" pylon. Thermal Hopper with Tornado 6/3 prop. Thimble-Drome racing fuel. 6.5 oz. V.T.O.	
O 3	Ed Miller Armona Cal.	15:29	• 40" span wing with 240 sq. in. 108 sq. in. stab; both flat-bottomed. Sheet balsa fuselage. Atwood .049 Signature engine with Tornado 6/3 prop. Supersonic 1000 fuel. 6 oz.	
J 1	David Arne Yuba City Cal.	14:00	• Jasco Rival model, fuselage slightly modified. Skysail covering. 4 coats nitrate, 2 butyrate. Hillcrest detherm. Cub .09 engine with Top Flite 7/4 prop. Ohlsson 2000 Gold Seal Fuel. ROG.	Free Flight A
J 2	Bucky Brownlee Stone Mt. Ga.	13:24.8	• Spacer with Torp. .19. 9/4 Top Flite prop. Testors dope.	
J 3	Phil Grau Long Beach Cal.	13:12.2	• Champion kit model. 4 coats nitrate, 1 of proofer. Cub .099 engine with Kaysun, 7/4 prop. Thimble-Drome Racing fuel.	
S 1	Martin Wolff Downey Cal.	16:36.2	• Spacer with built-up and silked fuselage, sheeted wing L.E. K&B .19 with Y & O 9/5 prop. ROG. Thimble-Drome Racing fuel.	
S 2	Donald Pelton Cincinnati Ohio	15:38.6	• Zeek with extended wing; span 63", area is 500 sq. in. 12 coats Berryloid dope. K&B .19 with polished ports. Rev-Up 10/8 prop. Own fuel. 23 oz. Hand launched.	
S 3	Rodger Grotheer Sacramento Cal.	15:26.2	• Stock Kiwi. Hillcrest dethermalizer. Testor's butyrate dope. Torp. .15 with Top Flite 8/3½ prop. Ohlsson ½A fuel. V.T.O.	
O 1	John Nogy Denver Colo.	18:00	• Combination Half-A and A model. Has 33" span wing with 165 sq. in. area, 70 sq. in. stab. Both flat bottomed. Sheet box fuselage. 5 coats nitrate, 1 of proofer. Atwood Signature .051 engine, Top Flite 6/3. Supersonic 1000 fuel. 5½ oz.	
O 2	Nat Antonioli San Diego Cal.	17:27.1	• 55" span, 535 sq. in. area 10% Clark Y wing. 260 sq. stab with 7% mod. Clark Y. Crutch and planked fuselage. Silk-covered. 11 coats butyrate dope. Parachute detherm. Ported and relieved Torp. .19 with Tornado 9/4 prop. Supersonic 1000 fuel. 24 oz. ROG.	
O 3	Carlos DeCosio Goethe Mexico	17:10	• Original model, "Tototl". Nitrate dope and O&R fuel proofer. Torp. .15 engine with Tornado 8/4 prop. K&B 1000 fuel.	

Analysis of Top Model Aero Winners (Cont.)—National Championships of 1955

EVENT	PLACE	FLYER	SCORE	MODEL DATA
Free Flight B	J 1	Robert Johnson, Riverside Cal.	14:07.8	• Spacer—built up fuselage and lengthened tail. Silkspan with 5 coats Safeway dope. Fox 29 engine, Top Flite 10/6 prop. K&B 1000 fuel. Hand launched.
	J 2	Alan Fleming, Bartlesville Okla.	13:54.1	• A-B Spacer. Skysail-covered. 4 coats nitrate, 2 of butyrate. Fox .29, interior cleaned up. Top Flite 10/3½ prop. K&B 100 fuel. Hand launched.
	J 3	Dick Neugebauer, Canogo Park Cal.	13:00.2	• Silk-covered Zeek. 3 coats Fuller's nitrate dope. K&B .23 engine with Tornado 10/4 prop. KB 1000 fuel.
	S 1	Bob Gelvin, Topeka Kans.	16:56	• Stock A-B Spacer. Skysail covered, with 3 coats Testors nitrate and 1 coat Tuff. K&B .23, moving parts polished, etc. Top Flite 10/3½ prop. K&B 1000 fuel. ROG.
	S 2	Lee R. Hines, Torrance Cal.	16:35.4	• Ramrod design 65" span, 750 sq. in. area, flat bottom airfoil. Semi-sym. 332 sq. in. stab. Sheet-sided fuselage. Torp. .29 engine with Tornado 10/6 prop. K&B 1000 fuel. 35 oz.
	S 3	Kenneth Kaelon, Rosemead Cal.	14:55.2	• 72" span, 780 sq. in. area, 10% Clark Y wing. 390 sq. in. 8% Clark Y stab. Triangular fuselage. Parachute detherm. K&B .29 engine with 10/6 Power Prop. Ohlsson 200 fuel. 46 oz. ROG.
	O 1	Harry Gould, Long Beach Cal.	29:25	• Sailplane, modified. 6 coats nitrate and butyrate dope. Silk covered fuselage. Torp. .29 with Y&O 10/5 prop. K&B 100 fuel. ROG.
	O 2	Toshi Matsuda, Los Angeles Cal.	25:10	• Zeek with modified body and stab. Jap tissue covered, 9 coats Aero Gloss. K&B .23 with Top Flite 9/4 prop. K&B 1000 fuel.
	O 3	Earl Anderson, South Bend Ind.	22:00.2	• 62" span original. Silk covered. 3 coats Dizzler dope, 1 of fuel proofer. Torp .23 engine with Top Flite 10/6 prop. Ohlsson fuel. 27 oz. ROG.
Free Flight C	J 1	Jack Linn, Los Angeles	16:36	• 72" span wing with 704 sq. in. area, NACA 6409. Clark Y on stab. Sheeted fuselage. Silkspan covered with 5 coats Testors butyrate. K&B .32 with 10/6 Power Prop. Ohlsson 200 fuel. 32 oz. ROG.
	J 2	David Arne, Yuba City Cal.	13:58	• 65" span, 650 sq. in. area wing. Frame and sheet fuselage. Hillcrest detherm. Torp .32 with 10/6 Top Flite prop. Ohlsson Gold Seal fuel. 32 oz. ROG.
	J 3	Buckie Brownlee, Stone Mt. Ga.	9:18.1	• Modified Hogan. Testors dope. Torp .32 engine with Top Flite 10/6 prop. Ohlsson 200 fuel.
	S 1	Don Geller, Monterey Park Cal.	27:26	• Civy Boy 61, sheet-covered fuselage. Jap tissue with 8 coats dope. K&B .32 engine, 10/6 Top Flite prop. K&B 1000 fuel. ROG.
	S 2	Jack Thomas, Garden Grove Cal.	15:52.5	• Spacer with 12" added to center of wing, 4½" longer fuselage, 4" added to tail. 12 coats dope. Torp .35 with Top Flite 10/6 prop. Own fuel. Hand launched.
	S 3	Donald Small, Long Beach Cal.	13:28	• C Spacer. Center dihedral decreased. 6 coats dope. Torp .35 engine. Top Flite 10/5 prop. K&B 100 fuel. 35 oz. ROG.
	O 1	Edward Aikman, Marion Ill.	20:02.2	• 77" span, 770 sq. in. area wing with Goettengen airfoil. 262 sq. in. stab has flat bottom. Chute detherm. Crutch fuselage with sheeted sides. Fox .35, Aero 11/4 prop. Power Mist Hi-Thrust fuel. 40 oz. H.L.
	O 2	C. O. Wright, Topeka Kans.	16:50.8	• 72" span wing with 600 sq. in. area and 6409 airfoil. 200 sq. in. stab has thin Clark Y. Built-up fuselage. Skysail covered with Testors nitrate and Tuff. Clock detherm. Torp. .35 with own folding 11/4 prop. K&B 1000 fuel. 35 oz.
	O 3	Ron St. Jean, Long Beach Cal.	16:06.3	• 70" span, 750 sq. in. 10% F.B. airfoil wing. 338 sq. in. stab has slightly rounded bottom. Sheet fuselage like Kiwi. 4 coats nitrate, 1 of plastic. Torp .32, Tornado 10/6 prop. Engine has Torp. 35 shaft and rod. Supersonic 1000 fuel. 34 oz. V.T.O.
Free Flight Scale	JS 1	Bob Gelvin, Topeka Kans.	85	• Wimpy, no modifications. Skysail covered, 4 coats clear, 8 coats colored Aero Gloss. Wasp .049, balanced shaft, polished ports, 6/3 Power Prop. K&B 1000 fuel.
	JS 2	Hal Cover, Glendale Cal.	71	• Supermarine Sparrow Mk II. 42" span Clark Y wing, 26" long. Symmetrical stab. Sheet fuselage. Jap tissue with 4 coats Fro-Lac. Cub .049, Tornado 6½/2 prop. Supersonic 1000 fuel.
	JS 3	Billy Guyton, Kirkland Wash.	50	• Taylor Cub, Veco kit. Silkspan, 3 coats Aero Gloss. Torp .035 with Tornado 6/3 prop. Power Mist fuel.
	O 1	Robert Hill, Capistrano B. Cal.	212	• Piper Super Cruiser. Berkeley kit with altered wing mount, cowl and internal details. Silkspan covered, with 7 coats Aero Gloss. Weight, 9 oz. Atwood .049, Top Flite 6/3 prop. K&B 1000 fuel.
	O 2	Robert Petro, San Diego Cal.	192	• Rearwin Speedster. Jap tissue with 6 coats Testors nitrate. McCoy .049 diesel, Top Flite 8/3½ prop. McCoy diesel fuel.
	O 3	Richard Baxter, San Diego Cal.	189	• Longster Wimpy. Silk covered, 7 coats nitrate. 41" span, about 25" long. Built-up fuselage. Clark Y wing, flat stab. McCoy .049 diesel engine with 2 dummy cylinders added. Tornado 8/4 prop.
Free Flight ROW	J 1	Jack Moreland, Long Beach Cal.	12:51	• 47" span, 297 sq. in. area wing. 100 sq. in. stab. Goldberg airfoils. Built-up fuselage. 7 coats butyrate. Space Bug with 6/3 Power Prop. T.D. Racing fuel. ROW, of course.
	J 2	William Kluss, Inglewood Cal.	7:51.5	• 38" span with 194 sq. in. area wing. 72 sq. in. stab. Own airfoils. Box fuselage, sheet sides. Jap tissue, 4 coats nitrate. Atwood .051 on Kaysun 5½/2½ plastic prop. Ohlsson Gold Seal fuel. 5 oz.
	J 3	Dick Neugebauer, Canoga Park Cal.	7:47	• 36" wing. 2 coats nitrate dope. Atwood .049 with 5/4 Kaysun plastic prop. K&B 1000 fuel. 5 oz. weight.
	S 1	Jack Thomas, Garden Grove Cal.	12:58	• Spacer kit model with 12" added to center of wing, 4½" longer fuselage, 4" added to tail. Jap tissue, 10 coats nitrate dope, 2 of Aero Gloss. Torp .35 with Top Flite 10/6 prop. Own fuel.
	S 2	Edward Soutar, Whittier Cal.	12:21	• Sailplane wing and stab, much modified fuselage. Wings Jap tissued, fuselage silked. 4 coats each of nitrate and butyrate. Torp .32, Y&O 10/5 prop. T.D. Racing fuel.
	S 3	David Yust, Wichita Kans.	11:18.4	• Kiwi kit model. Atwood .049 engine with 5½/4 Kaysun prop. Butyrate doped. K&B 1000 fuel.
	O 1	Manuel Andrade, Castro Valley Cal.	20:48.2	• 37" span, 187 sq. in. area wing. 52 sq. in. stab. Own airfoils. Frame fuselage, sheet covered. 2 coats nitrate dope. Atwood .049 engine, Kaysun 5½/2½ prop. Supersonic 1000 fuel.
	O 2	Edward Mate, Chicago Ill.	16:30.5	• Wing is 54" span, 570 sq. in. area. 151 sq. in. stab. Own airfoils. Sheeted box fuselage. Jap tissue, Testors butyrate dope. Oliver Tiger diesel engine, 8/6 Power Prop. McCoy fuel.
	O 3	Jack Oxley, Long Beach Cal.	14:04.8	• Modified Sailplane. Butyrate dope. Orwick .32 engine with Y&O prop. Thimble-Drome Racing fuel.

(Right) Fifth place in Junior control line flying scale went to Sharen Mahnke, Grand Junction, Colo., with Triplane.

Ready for take-off on flight which netted 4th place in carrier is Robert Clemens' Guardian. Bill Kleinhaus holds.

Unusual entry in stunt was this twin-boom affair by Hoyt Jeffers, Santa Barbara, Calif. "Ring Kings" is his club.

Marva Grove holds husband Bill's Go Devil precision aerobatic model. Anderson Spitfire power. They're from Burbank, Calif.

Neat scale-like F-86 Sabre stunt model is held by builder, Don Benson, Bellflower, Cal. Power is a K&B .29.

Original design stunter named "Gold Brick" by its designer, Bill Netzeband, Kirkwood, Mo. Note scimitar prop.

No winner, but mighty nice looking: Gypsy Tiger Moth flown in free flight scale by Bob Evans, Jr. Cub .074 diesel.

Tremendous speed of over 168 mph was racked up by Tulsa's Bob Lauderdale (l) in Class C for new record.

Top junior flyer in Rise-Off-Water competition was Jack Moreland of Long Beach, Calif. Plane design by Jack Oxley.

Rod Echenburg (4th, Open Class) waits (l) as Navy judge observes flotation test. All entries had to float 30 seconds.

Indiana entrant Earl H. Anderson was 3rd in Class C free flight event. He won B in '54. Original design, Torp .23.

You don't hardly see this type of thing at all. Half-A powered original design canard by Russ Ryan, Tempe, Arizona.

James Lang (r) placed second in PAA's Clipper Cargo event with 40 oz. payload, used tremendous span, 3-wheel gear.

Everything in Clipper Cargo seemed unusual and interesting. I. G. Aker, Los Angeles, entered this OK Cub .049 power job.

First in Half-A open free flight went to Bill Fox of Long Beach, Calif., with this VTO (vertical take off) original.

This is the one that caused all the talk! Charles Lindley's VROW model gets off with absolutely no assist. FAI design.

Analysis of Top Model Aero Winners (Cont.)—National Championships of 1955

PLACE	FLYER	SCORE	MODEL DATA	EVENT
JS 1	Richard Epstein Los Angeles	15:22	• 51" wing with 312 sq. in. area. 132 sq. in. stab. Own airfoils. Sheet balsa fuselage, slab-sided cabin. Jap tissue, 4 coats of nitrate, 2 butyrate. Atwood .049, Kaysun 5½/4 prop. K&B 1000 fuel. 8 oz.	America PAA-Load
JS 2	James Juliano Zephyrhills Fla.	13:30.6	• 50" span, 255 sq. in. area wing. 110 sq. in. stab. Own foils. Sheet fuselage. Jap tissue, 3 coats Testors butyrate. Chute detherm. Atwood .049 with Kaysun 6/3 prop. Ohlsson Half-A fuel. 8 oz.	America PAA-Load
JS 3	David Yust Wichita Kans.	10:56.8	• Original design. Butyrate dope. Atwood Signature engine with 6/3 Top Flite prop. K&B 1000 fuel.	America PAA-Load
O 1	Tex Everett Long Beach Cal.	14:25.2	• Berkeley Payee—America Class. 2 wheel gear, no cowling, fiberglassed firewall. Jap tissue, 5 coats Aero Gloss. Thermal Hopper engine with 6/3 Power Prop. Thimble-Drome Racing fuel.	America PAA-Load
O 2	Harry Gould Long Beach Cal.	13:41.4	• 40" wing with 300 sq. in. area. 55 sq. in. stab. Stick fuselage, silk covered. 6 coats dope. Thermal Hopper engine on Tornado 6/4 prop. Thimble-Drome fuel. 12 oz. weight.	America PAA-Load
O 3	J. R. Bicknell Bremerton Wash.	13:05	• 42" span, 236 sq. in. wing with Clark Y airfoil. 91 sq. in. stab, also Clark Y. Sheet fuselage. Tissue covered, 3 coats but. Webra .049 diesel with Tornado 7/3 prop. McCoy diesel fuel.	America PAA-Load
JS 1	Robert Patchin Hawthorne Cal.	11:42.3	• Wing is 62" span, 585 sq. in. area. Stab, 195 sq. in. Built-up sheeted box fuselage. Torp. .15 with Top Flite 8/3½ prop. K&B 1000 fuel. 15½ oz.	International PAA
JS 2	Don Geiler Monterey Cal.	4:42.4	• 60" span, 550 sq. in. wing, NACA 6409 foil. 260 sq. in. stab with 8% Clark Y. Sheeted box fuselage. Jap tissue, 5 coats nitrate, 1 butyrate. K&B 15, Tornado 8/3 prop. K&B 1000 fuel. 24 oz.	International PAA
JS 3	Richard Heist Jr. Ft. Worth Tex.	4:07.3	• Original design. Aero Gloss doped. Torp 15, Top Flite 8/4 prop. K&B 100 fuel.	International PAA
O 1	Willard Blanchard Hampton Va.	13:18	• 71" span, 528 sq. in. wing, 9% flat bottom airfoil. 170 sq. in. stab, 7% flat bottom foil. Rectangular sheet fuselage. Jap tissue, 6 coats dope. BWM .15 diesel, Tornado 8/4. McCoy diesel fuel.	International PAA
O 2	Mark Tackett Jr. Paramount Cal.	9:17.1	• Model enlarged from Class A "Trade Winds" design. 60" wing with 530 sq. in., T6 airfoil. 229 sq. in. stab with 6% airfoil, flat bottom. Jap tissue, 4 coats butyrate. Sheeted box fuselage. Torp .15 with Tornado 9/3 K&B 1000 fuel.	International PAA
O 3	Clinton Merrill Jr. Oildale Cal.	8:54.5	• Model called "The Hyster". 58" wing with 512 sq. in. area. 185 sq. in. stab. Own airfoils. Sheet sided fuselage. Jap tissue, 5 coats dope. K&B .15 with Tornado 8/4 prop. K&B 1000 fuel. 16 oz.	International PAA
J 1	Michael O'Bryan Detroit	73.95	• 8" span, 10½ sq. in. Clark Y wing. 5¼" area stab, also Clark Y. Pine fuselage, 8¼" long. 7 coats Aero Gloss. Thermal Hopper with 4½/7 Power Prop. 2 oz. weight. Pin-type dolly. Sullivan handle.	Speed A/2
J 2	Alan Lannholm Galesburg Ill.	63.96	• 10" span, 15 sq. in. Clark Y wing. 4 sq. in. Clark Y stab. Hollow balsa block fuselage. 3 undercoats, 3 of Aero Gloss. Atwood .049 with 4½/6 Power Prop. T.D. Racing fuel. 2 oz.	Speed A/2
J 3	Jerry McClung Abilene Texas	62.24	• Berkeley Whirlaway with modified wing and bellcrank. 6 coats Comet dope. Ported Thermal Hopper with 5/5 Power Prop. Thimble-Drome fuel. EZ-Just handle. Hand Launch.	Speed A/2
S 1	Mike Dawson Galesburg Ill.	79.29	• 9" wing with 40 sq. in., modified Clark Y. 6 sq. in. Clark Y stab. 6 coats Aero Gloss. Hollowed fuselage. Thermal Hopper with 4½/6 Power Prop. T.D. fuel. No dolly used. 4 oz.	Speed A/2
S 2	Jim Rhoades Salt Lake City	68.23	• 8" wing with 15 sq. in. area, flat bottom airfoil. 5 sq. in. symmetrical stab. Built up sheet fuselage. 3 coats Testor's butyrate. Space Bug with Hop-Up kit, Tornado 5/6 prop. H.L. 3 oz.	Speed A/2
S 3	Lee Frey Downey Cal.	63.46	• Original design with Thermal Hopper turning 5/5 Tornado prop. Aero Gloss finish.	Speed A/2
O 1	Clem-Beasley-Kirn Mesquite Tex.	100.98	• 11" wing with 14.09 sq. in., original airfoil. 5¼ sq. in. symmetrical stab. Crutch and block fuselage. Silk covered. 6 coats Testors dope, plus Tuff. Thermal Hopper, fins turned down, own shaft extension, needle valve and ex. stack. Tornado 4½/7. T.D. Racing fuel. 3 wheel lock-on dolly. Mono-Line. 5 oz.	Speed A/2
O 2	Bob Hendricks Hayward Cal.	92.59	• 8" wing with 10 sq. in. and flat bottom. 4 sq. in. sym. stab. Box sheet balsa fuselage. Silked. 2 coats Testors Sta. Cox engine with Tornado 4¼/7 prop. T.D. Racing fuel. H.L. 2.2 oz.	Speed A/2
O 3	Karl Caldwell Napa Cal.	87.97	• Span 8", 15 sq. in. area, Clark Y wing. 5 sq. in. symmetrical stab. Fuselage has ¼" sq. oak boom. Silkspan covered with 4 coats Aero Gloss. Atwood Signature engine, Tornado 5/7 prop. H.L. 2 oz.	Speed A/2
J 1	Michael O'Bryan Detroit Mich.	126.4	• 12½" span with 24 sq. in., Clark Y wing. 8 sq. in. Clark Y stab. Fuselage has Hell Razor pan with pine top. 1 coat synthetic enamel, butyrate dope for primer. Torp. .19 polished inside, Tornado 6/10 prop. Own fuel. Locking dolly. 12 oz.	Speed A
J 2	Clifton Medlock Atlanta Ga.	126.05	• 15" hardwood wing with 22½ sq. in. area. Ply stab. Own airfoils. Fuselage cut from 1" block. Fiberglass all over, then 5 coats Aerogloss. K&B .19. Tornado 6/10. Own fuel. Pin dolly. 13 oz. weight.	Speed A
J 3	David Brownlee Stone Mt. Ga.	118.26	• Original design with Torp .19 engine, 6/10 Tornado prop. Testor's dope. Fuel was Strick's Brew.	Speed A
S 1	Gayle Clement Lynwood Cal.	134.73	• NACA 2412 wing with 12" span, 26 sq. in. area. Sym. 11.7 sq. in. stab. Fiberglassed, then 3 coats-Fuller's plastic. Torp .19, crankshaft opened up, parts polished. Tornado 6/10 prop. H.L. 13 oz.	Speed A
S 2	Richard Elliott Winnsboro Tex.	119.68	• Symmetrical pine wing has 12" span, 30.4 sq. in. area. Sym. ply stab has 12 sq. in. "Idoe" mag. pan on fuselage, pine and balsa top. Plane coated with Lavax. Torp .19, polished internally, Tornado 6/10 prop. Own fuel. Lock-on dolly. 13 oz.	Speed A
S 3	Piper Mason Jr. Albuquerque N.M.	115.23	• 12½" span balsa wing has 25 sq. in. Stab area, 9 sq. in. Both are semi-symmetrical. Balsa fuselage. Entire plane silked, 8 coats clear Aero Gloss. Torp .19 cleaned inside. Tornado 6/10 prop. Star Dust H fuel. Locking dolly. Weight, 10 oz.	Speed A
O 1	Bill Wisniewski Lakewood Cal.	141.73	• 14" span aluminum wings have 23.8 sq. in. area, NACA 2412 airfoil. Symmetrical ply stab, 11 sq. in. Metal pan with pine and balsa top, fiberglassed. Synthetic enamel finish. Torp .19 with modified shaft, cyl. and head turned to 1⅛" dia. Tornado 6/10. Own fuel. 3 wheel pin dolly. Stanzel handle. 14 oz.	Speed A
O 2	Lee Holliday Dallas Tex.	136.98	• Quicky 19. 14" balsa wing, 24 sq. in. area. Sym. ply stab has 10 sq. in. Metal pan with bass top on fuselage. Dope and Duco finish. Torp. .19 with cleaned ports and shaft, Tornado 6/10 prop. Star Dust H fuel. Trigger dolly. Monoline handle. 15 oz.	Speed A
O 3	Bob Lauderdale Tulsa Okla.	134.52	• 14⅜" bass wing, 24 sq. in. area, lifting section. 10½ sq. in. ply V-type tail. Fuselage has Champion pan, bass box top. 6 coats Aero Gloss. K&B .19, rear intake, opened ports. Tornado 6/10 prop. Star Dust H fuel with castor oil. 3 wheel dolly. Mono-Line Speedmaster handle. 14 oz.	Speed A

Analysis of Top Model Aero Winners (Cont.)—National Championships of 1955

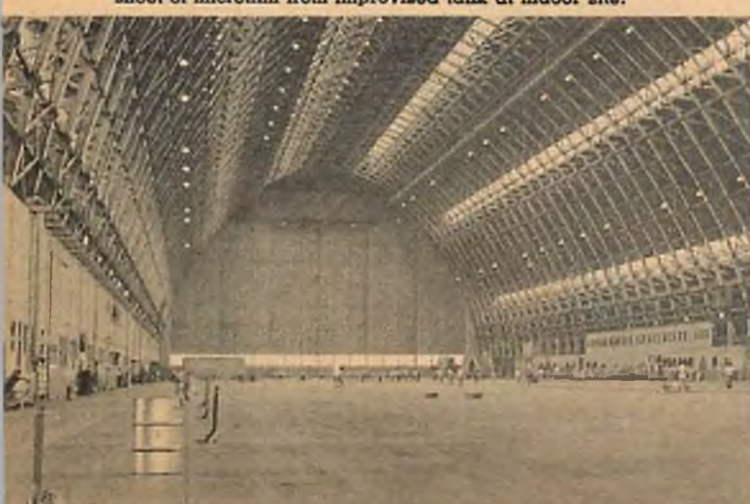
EVENT	PLACE	FLYER	SCORE	MODEL DATA
Cargo	1st	C. O. Wright Topeka Kans.	41¾ oz.	• 72" wing with 600 sq. in. area, NACA 6412 airfoil. Thin Clark Y stab, 200 sq. in. Sheet fuselage. Jap tissue, 2 coats dope. Thermal Hopper .049 with Tornado 6/3. T.D. Racing fuel. 14 oz. empty.
	2nd	James Lang Canoga Park Cal.	40 oz.	• 560 sq. in. wing, own airfoil. 150 sq. in. stab, Clark Y. Sky-Sail covered, 5 coats dope. Thermal Hopper .049 with Kaysun 6½/3 prop. Thimble-Drome fuel. 12½ oz. empty.
	3rd	Ray Van DeWalker Norwalk Cal.	35½ oz.	• 72" span wing with 600 sq. in., Davis 5 airfoil. Mod. Clark Y on stab. Crutch fuselage. Jap tissue, 4 coats butyrate. Space Bug .049 with K&B 6/3 prop. Thimble Drome Racing fuel. 13 oz.
PAA End.	1st	Richard Heist Jr. Ft. Worth Tex.	1:8:14.6	• 38" span wing with 456 sq. in. area, 25% Clark Y. 36 sq. in. flat stab. Silk covered with 8 coats Aero Gloss. Pod and boom fuselage. Torp .15 with 8/6 Power Prop. Power Mist fuel. Easy-Just handle. Model named "So Long Gone".
	2nd	Edward Killion Rivera Cal.	6:49.4	• 48" span, 480 sq. in. wing, own airfoil. 90 sq. in. flat stab. Sheet box fuselage. Silkspan covered, 4 coats Testors dope. Tornado .15 diesel, Top Flite 9/6 prop. OK Cub diesel fuel.
	3rd	James Dixon Rivera Cal.	0:30.0	• Modelcraft Cub. Cub .14 engine with 8/6 Power Prop. T.D. Racing fuel.
Speed B	J 1	Clifton Medlock Atlanta Ga.	129.77	• 14" solid wing with 31.5 sq. in. area. Ply stab, own airfoils. Fuselage cut from 1" block. Fiberglassed, then 5 coats Aero Gloss. Dooling .29 with Tornado 7/9 prop, own fuel. Pin dolly. 14 oz.
	J 2	Michael O'Bryan Detroit Mich.	124.30	• 13½" pine wing has mag. stub, 27 sq. in. area, Clark Y. Clark Y stab. Hell Razor pan with pine top. Butyrate primer, synthetic enamel finish. Dooling .29, Tornado 7/9 prop. Own fuel. Locking dolly, Sullivan handle. 16 oz.
	J 3	Ken Kaiser Tacoma Wash.	123.54	• 14" symmetrical aluminum wing has 33¼ sq. in. area. Flat aluminum stab. Hell Razor pan with gumwood top. Silk covered, 10 coats Fuller's butyrate. Dooling .29, homemade rear shaft and back-plate. Tornado 7/9 prop. This Is It fuel. 3 wheel dolly. Sullivan Pro handle. 19 oz.
	S 1	Daniel Berry Atlanta Ga.	127.75	• 14" span balsa-hardwood wing. Box fuselage. Silk covered with 10 coats Aero Gloss. Dooling .29 with Tornado 7/9 prop. Home brew fuel. Pin dolly. Model Air handle.
	S 2	Richard Elliott Winnsboro Tex.	125.61	• 14" ply-balsa wing, 35 sq. in., symmetrical. 15 sq. in. sym. ply stab. "Idoe" mag. pan with balsa top. Lavax finish. Dooling .29 cleaned up. Tornado 6¾/10 prop. Own fuel. Lock-on dolly.. 15 oz.
	S 3	Piper Mason Jr. Albuquerque N.M.	122.86	• 14" balsa wing, 28 sq. in. 10 sq. in. ply stab, both semi-symmetrical. Balsa fuselage. Entirely silk covered, 8 coats clear Aero Gloss. Dooling .29, cleaned up. Tornado 6¾/10 prop. This Is It fuel. Locking dolly. 13 oz.
	O 1	Clem-Beasley- Kirn Mesquite Tex.	143.08	• 17½" solid wing, 30.6 sq. in., own airfoil. 11 sq. in. symmetrical stab. Crutch and block fuselage. Silked. 3 coats synthetic primer, 3 coats of dope. Dooling .29, ported and chromed, shimmed rotor, venturi opened and polished. Tornado 6¾/9 prop. 3 wheel locking dolly. Mono-Line. 18 oz.
	O 2	Bob Lauderdale Tulsa Okla.	141.17	• 16½" bass wing, lifting section, 30 sq. in. area. 15½ sq. in. flat ply stab. Champion pan and bass box fuselage. 6 coats of Aero Gloss plus wax. Dooling .29, ported sleeve. Tornado 7/10 modified prop. This Is It fuel, hopped up. 3-wheel dolly. Mono-Line Speed Master handle. 16 oz.
	O 3	Lester Grogan Mesquite Tex.	136.26	• Wing is 17½" span, 30½ sq. in. area, symmetrical. 30% sym. stab. Ditzler enamel finish. Dooling .29, ported. Tornado 7/10 prop. This Is It fuel. Lock-on dolly. Mono-Line handle. 16 oz.
Speed Jet	J 1	Ken Kaiser Tacoma Wash.	135.74	• All aluminum model. 17" symmetrical wings, 51 sq. in. area. 25 sq. in. stab. Alum. channel extrusion used for fuselage. Dyna-Jet with white gas. Skid launch. Sullivan handle. 26 oz.
	J 2	Alan Lannholm Galesburg Ill.	130.15	• 18" Clark Y wing with 63 sq. in., built up and sheeted. 20 sq. in. stab. Sheeted fuselage. Silked, with 3 coats Aero Gloss. Dyna-Jet with fins removed. White gas. Slide-off dolly.
	S 1	Donald Monson St. Paul Minn.	145.74	• Metal 20" semi-symmetrical wing with 42½ sq. in. area. 20 sq. in. ply stab. Own cast aluminum pan. Dyna-Jet with polished intake, cleaned intake ports, head lapped. White gas. EZ-Just handle. 30 oz.
	S 2	Joseph Gasidlo Detroit Mich.	143.54	• 18" laminated wood wing, 56 sq. in. area, semi-symmetrical. Symmetrical 27 sq. in. ply stab. Solid pine fuselage. Jap tissue with 8 coats Testors nitrate dope. Dyna-Jet on white gas. 20½ oz.
	S 3	Piper Mason Jr. Albuquerque N.M.	139.75	• 16" span semi-sym. sheet aluminum wing with 40 sq. in. 15 sq. in. ply semi-sym. stab. Bass wood fuselage. Silkspan covered. 10 coats Aero Gloss. Dyna-Jet on white gas. 4 wheel dolly. 23 oz.
	O 1	Clem-Beasley- Kirn Mesquite Tex.	162.83	• Solid 20" wing, 40 sq. in. area, original airfoil. 13½ sq. in. symmetrical stab. Carved block and crutch fuselage. Silked. 6 coats Testors dope. Dynajet with polished venturi, pump screw fitting cut-off. Own fuel. Skid L.G. Mono-Line handle. 26 oz.
	O 2	James Summersett San Antonio Tex.	162.54	• 20" solid wing with 55 sq. in. area. 18 sq. in. stab. Original airfoils. Solid fuselage. 7 coats Lavax dope. Stock Dyna-Jet on white gas. Mono-Line handle. 26½ oz.
	O 3	L. R. Holliday Dallas Tex.	156.05	• Original Quicky Jet. 18" metal-basswood wing with 52 sq. in. area. 23 sq. in. stab. 4 coats Testors dope. Dyna-Jet on white gas. Cradle-type dolly. Mono-Line handle 26 oz.
Proto Speed	J 1	Richard Rehwald Los Angeles Cal.	85.38	• Redskin kit model. Wing shortened to 25" span. Silk covered. 6 coats Aero Gloss. K&B .29 with .35 crankshaft. Tornado 8/8 prop. K&B 1000 fuel. EZ-Just handle.
	J 2	Bill Spawr Compton Cal.	80.97	• 27" sheet wood wing with 127 sq. in. area. Symmetrical airfoils. Sheet wood fuselage. 4 coats Brolite. K&B .29 with Tornado 8/7 prop. K&B 1000 fuel. 15 oz.
	J 3	Dennis Crystal Compton Cal.	80.30	• Flight Master team racer by Dan Lutz. Balsa sheet covered, with 4 coats Aero Gloss. K&B .29 with .35 shaft and rod. Tornado 9/8 prop. K&B 1000 fuel. EZ-Just handle.
	S 1	Dennis Shaver Sunland Cal.	83.23	• Original design. Aero Gloss doped. McCoy .29 with 8/8 Tornado prop. Ohlsson 200 fuel.
	S 2	Joseph Gasidlo Detroit Mich.	83.08	• Built up 28" semi-sym. wing with 136 sq. in. area. 25 sq. in. sym. sheet stab. Fuselage has sheet sides, block top and bottom. Jap tissued, with 8 coats Testors butyrate. K&B .29 with 9/8 Power Prop. Ohlsson 2000 fuel. 21 oz.
	S 3	Mike Dawson Galesburg Ill.	81.44	• Built-up 25" Clark Y wing with 126 sq. in. area. 50 sq. in. Clark Y solid stab. Built-up fuselage. Silked, with 5 coats of Aero Gloss. K&B .29, Tornado 9/8. T.D. Racing fuel. 24 oz.
	O 1	Clem-Beasley- Kirn Mesquite Texas	113.85	• 34½" solid wing with 129.4 sq. in. area; original airfoil. 35.3 sq. in. symmetrical stab. Crutch and block fuselage. Silked with 8 coats nitrate dope, 1 coat of Tuff. Dooling .29 ported and chromed, shimmed rotor, bored and polished venturi. Tornado 6¾/9 prop. Own fuel. Mono-Line handle. 26 oz.
	O 2	Karl Caldwell Napa Cal.	101.29	• 25" sheet balsa wing, 130 sq. in. area, Clark Y. 30 sq. in. solid sym. stab. Fuselage carved from solid block. Silkspan covered with 4 coats Aero Gloss. Dooling .29 with Tornado 8/8 prop. Franny's Green Mist fuel. 17 oz.
	O 3	James Summersett San Antonio Tex.	91.90	• Solid wing has 26" span, 134 sq. in. area, own airfoil. 45 sq. in. stab. Box fuselage. 2 coats Dulux. Dooling .29 with Tornado 9/9 prop. Own fuel. Mono-Line handle.

(Continued on page 76)

Only man to top 20 minutes indoors was motor manufacturer Bill Atwood (l) here recovering wing. Joe Bilgri watches.

Charles Dorsett of San Francisco displays fine traveling box for indoor microfilm models. Wally Reale (r) looks on.

Everybody hold his breath! Glen Cunningham, Phoenix, lifts sheet of microfilm from improvised tank at indoor site.



Third in open cabin and stick, Warren Williams of L. A. Thermal Thumbers helped team win with this cabin craft.

Lt. George Matsumoto, USAF, (l) weighs in C free flight. He took 1st in Far East AF Eliminations to win U.S. trip.

Great guy and the new weight-lifting champ, C. O. Wright! CO's model, an original design, lifted 41¾ oz. to win.

Second place in helicopters went to Larry Crissman with this 2-Jetex powered entry. Larry used Jetex 150's.

Indoor site (l) at Santa Ana was blimp hangar which is 200 feet wide, 1,100 feet long and 200 feet high!

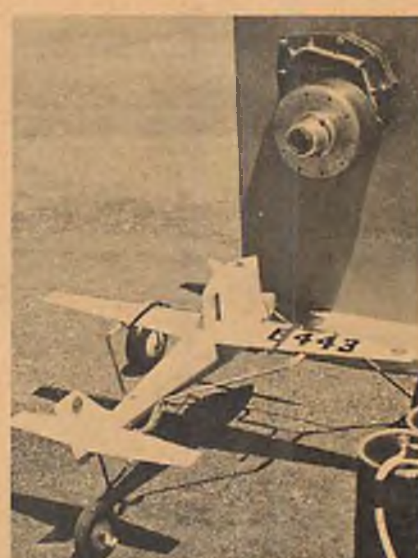
C. A. Schuchmann's amazing "flying lamp-shade." Ruled not a helicopter; he took 4th in Hiller with conventional copter.

Gayle Clement, Lynwood, Cal., first in Senior A speed and set new national record of 134.73 mph. K&B-Allyn Torp .19.

You, too, can fly Mono-Line, declare this happy trio. From left: Dale Kirn, Jim Clem and Sam Beasley with their speed awards.

Gene Wright wrecked Wakefield while testing, repaired it same day, won 6th. Next day took Unlimited Open, 14:13.

Mickey Tuttle and Chris Peterson (2nd in indoor H/L junior glider) wait for better flying conditions. Ron Tuttle looks on



Class A speed entry by Clem-Beasley-Kirn team, typical of their Mono-Line craft. Bill Wisniowski topped A with 141.73 mph.

No helicopter this. National Champion Woody Blanchard as he winds Wakefield rubber outside fuselage (like Red Everitt).

Jim Hazard of Canoga Park, Cal., takes his Ford Trimotor off in C/L scale flying. Fine model, but underpowered.

Flying more than 13 mph faster than next place, Clem-Beasley-Kirn Proto Speedster (Dooling .29) did 113.85 mph.

Fairchild C-119 flown by Bryant Thompson, member of USAF team, weighs 7½ lbs., powered by two O&R 29's on ignition.

Isometric speed design by Bob Miller, Pasadena, uses Fox .59 and is held here by Chuck Schuette of Santa Monica, Cal.

Bob Palmer, open class stunt champ (lt.) and Edwin J. May, Jr., junior stunt champ (rt.), with Carl Goldberg.

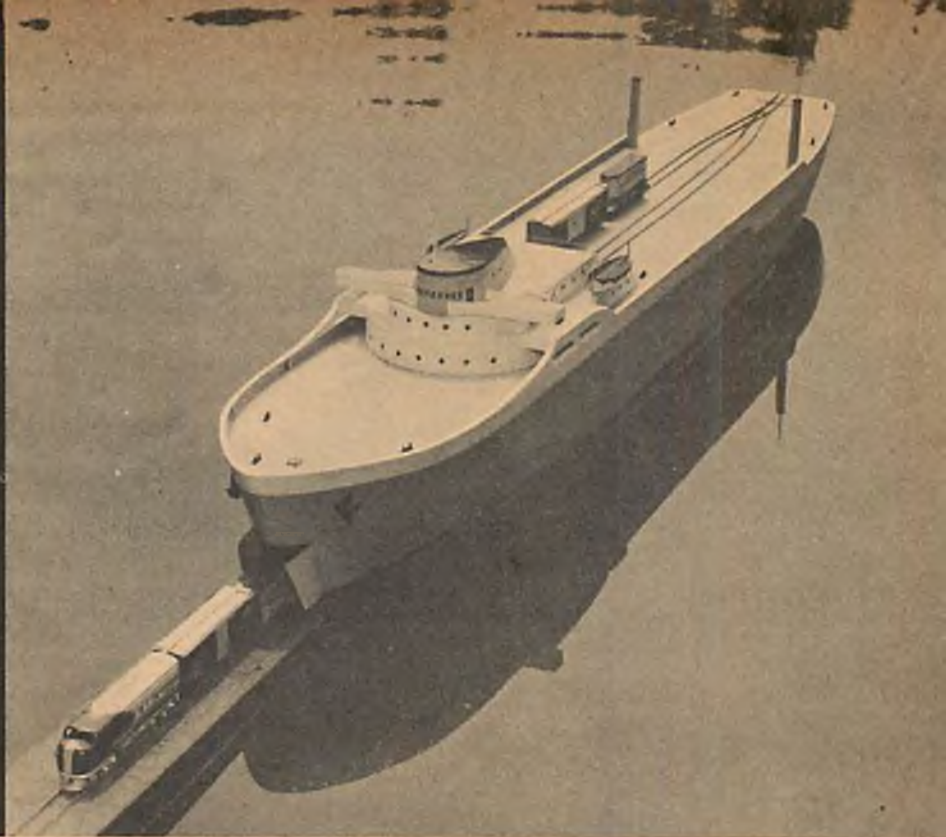
Les McBrayer of F. A. S. T. club with free flight scale entry, a Berkeley Fairchild 24 ready for take-off.

Magnificent F4U5-N by Noal Hess of Salt Lake City spanned 52", weighed 7¾ lbs., had Orwick 60. Cracked up.

56" RADIO CONTROL EXACT SCALE TRAIN-AND-TRAILER CARRYING BOAT MODEL

S.S. Colossus

By
WALTER A. MUSCIANO



Construction-wise they don't come any simpler; size-wise they don't come much bigger. Here is a master project to fill those late winter nights. Model railroad fans can make waterline version for layouts.

■ Built to the same scale as HO model trains, approximately 5/32" to the foot, this unusual ship model can provide countless hours of enjoyment for both the model boat builder and miniature railroad enthusiast. Frankly, we cannot understand how any model builder who likes models that are "off the beaten path" can possibly resist this one. This "new look" for cargo ships can be built as an operating model powered with two electric motors with radio control as optional, or as a non-operating, waterline model that would enhance the appearance of any model railroad pike.

A brief résumé of this interesting type of cargo ship:

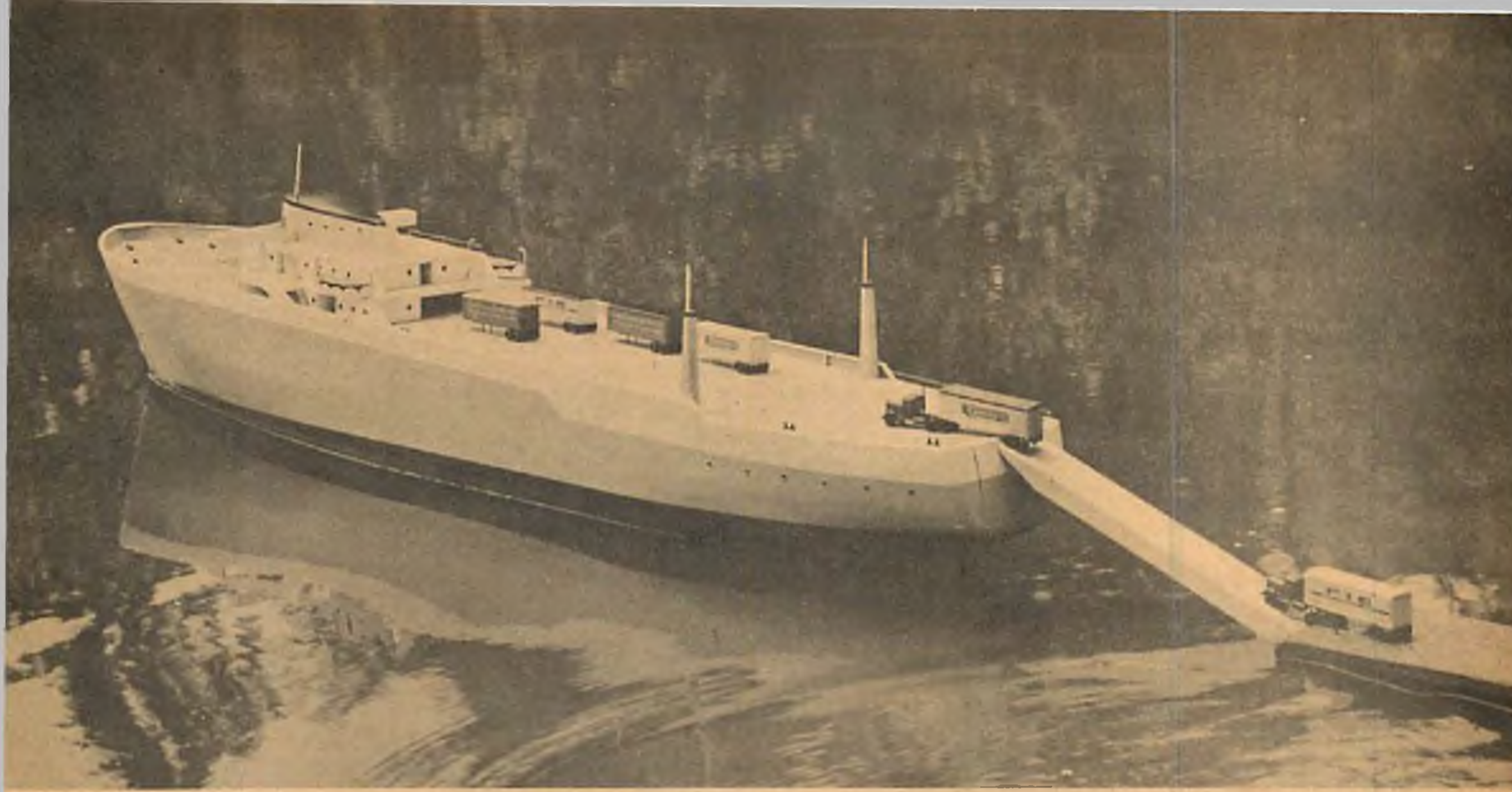
The highest single cost of operating cargo ships is not the fuel nor the crew's wages nor ship maintenance but, instead, it is the cost of handling the cargo and the time lost in port waiting for the cargo to be loaded and unloaded. A typical example of the steps required to load a present-day conventional cargo ship is as follows: 1) cargo is brought to the pier in trains or trailer-trucks; 2) cargo is unloaded onto dock by hand; 3) cargo is moved to pier alongside ship; 4) cargo is loaded into slings; 5) cargo is lifted onto ship by ship's cargo booms into hatch opening; 6) men in the ship's hold must move the cargo out of the hatch opening into the sides and ends to store it safely and neatly. The procedure is reversed when cargo is unloaded. This antiquated, time consuming and costly method of cargo handling increases the cost of many daily necessities which are brought to us by ship. It also increases the cost of the ship in view of all the winches, booms and hatches required for the cargo.

Ship designers in general and the firm of George G. Sharp Co. in particular constantly strive to improve cargo handling conditions. One of the best remedies to this problem is the Trainship and Trailership. These ships are designed to accommodate loaded freight cars or trailer vans on one, two or three decks. The Trainship has railroad tracks welded to the decks onto which the train is loaded through bow or stern doors, or both.

A Trainship can be loaded with trailers in addition to or instead of trains. On the other hand the Trailership is not fitted with tracks and can accommodate only trailers which can be loaded through doors in the stern or in the side of the hull. Many designs have internal ramps installed in order to enable the trailers to enter through one door and then proceed to other decks via the ramps. The tractors do not remain on board but merely park the trailer and proceed off the ship to other assignments.

Despite the fact that some of the usable volume of the hold is occupied by the freight car or trailer thereby decreasing the amount of actual cargo, and

Profile of trailer ship below (G.G. Sharp design) illustrates uncluttered decks of roll-on, roll-off piggyback design while profile of conventional cargo ship (right) shows how much valuable deck space is taken up by the kingposts and booms.



HO scale tractors and trailers above are Ulrich model vans which are available in Denver-Chicago Trucking Co., Garrett and P.I.E. names. Ulrich also has Kenworth dump truck and transfer trailer in same 5/32" to foot scale. Boat funnel is dummy.

despite the fact that rental must be paid for the vehicle, the Trainship or Trailership is still far more economical than the conventional cargo ship in many specific instances. Instead of spending three to five days in port this new ship takes less than a day to unload and load, thereby spending more time at sea. In this way many more round trips can be made each year. These ships are lighter and have a shallower draft and therefore are faster than the conventional cargo ship.

There are numerous ships operating throughout the world that carry trains including the "Seatrain New York," "City of Midland" on the Great Lakes and the "New Grand Haven" in Canada. The U. S. Maritime Administration is planning a Trailership and numerous shipping lines and railroads are planning to operate them. The McLean Trucking Co. also is planning a Trailership. Over twenty are operating on Lake Michigan alone at present with several more contemplated.

Our model represents the ultimate in this relatively new type of ship design in view of its patented inclined decks. This feature enables the trains to be loaded onto both decks without an elaborate, adjustable drawbridge on the dockside. Both stern and bow openings are the same distance above the waterline yet open onto different decks! It should be remembered that it is optional whether a trailer or train carrying ship is built. If a Trainship is selected one, two or three decks can be fitted with rails. The main deck always is used, therefore use it if only one train deck is contemplated. The other train deck to use if two decks are contemplated is the second deck. The upper deck is optional as a train deck. This is often reserved only for trailers.

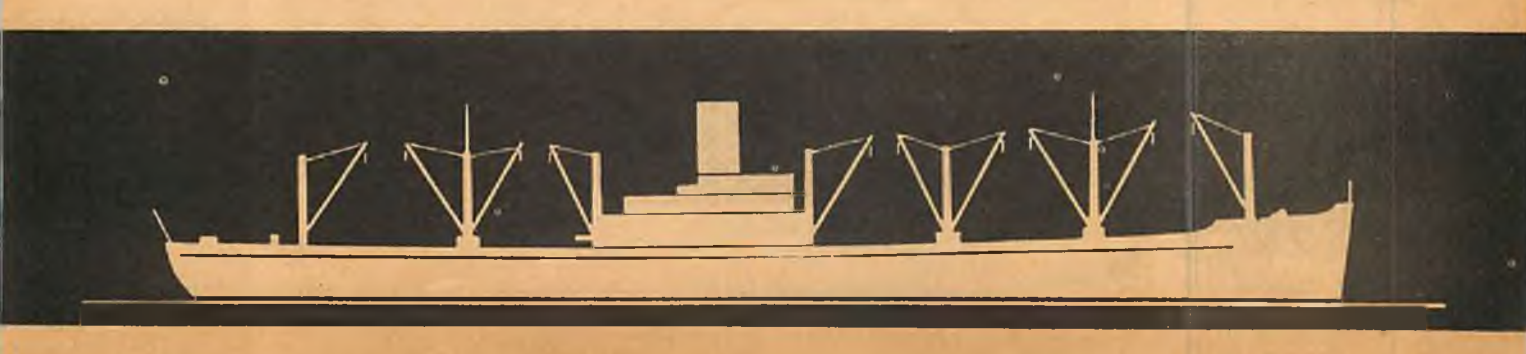
The prototype model is strikingly modern and embodies features which may not be familiar to the reader. One of these is the engine room location. This is placed at the after portion of the hull, as is done on tankers, thereby shortening the propeller shafts and making room for the continuous second deck which enables more trains to be carried. The boiler gases emerge from the two masts on deck instead of what appears to be the smokestack atop the superstructure. The large streamlined "stack" actually houses the wheel house, radio room, chart room, emergency generator, etc. The author, as a member of the Design Staff of George G. Sharp Co. for over a decade has done a considerable amount of design work on Trainships.

We shall assume that the reader intends to power this model as we did. The keel should be traced onto ¼" plywood and cut to shape with a coping or jig saw. Carefully drill the hole for the tiller tube. Splice as shown and cement well. This heavy plywood can be purchased at all lumber yards. Cut the frames and bulkheads to shape now. Mark off the location of the second and main decks onto the bulkheads. Cement these to the keel, using plenty of the adhesive.

The rudder is constructed from 1/16" thick sheet brass. This can be cut to shape with tin snips and filed to a streamline shape. Bend the upper portion of the wire tiller and slide this into the brass tube as shown on the plans. Bend the lower portion and solder this well to the rudder. Use plenty of solder and file this smooth when cool. Cut the brass connecting rod and file smooth. Slip this onto the tiller and solder a washer in place to keep this from slipping off.

The second deck should be assembled from ¼" hard balsa. The grain should run lengthwise on this deck. It will be necessary to butt join several sheets of 3/16" x 3" hard balsa to make up the width of this deck. Note that the second deck ends at the forward motor compartment bulkhead. Also note that this deck is notched to fit each frame. Before the second deck is cemented in place it should be sanded smooth, several coats of wood filler applied and then painted medium or light grey. Slide the deck into place and cement firmly to the plywood frames. If it is intended to use this deck for trains the tracks should be installed now before the Main Deck is added.

In view of the fact that the rails on the full-size ship are welded directly to the deck no ties are required. Mark off the location of the brass rails onto the deck and fasten these in place with stand-



ard HO rail spikes. A drop of cement here and there will prevent the tracks from loosening in the future. Cement the bumpers in place. The switches are available in kit form at all hobby shops.

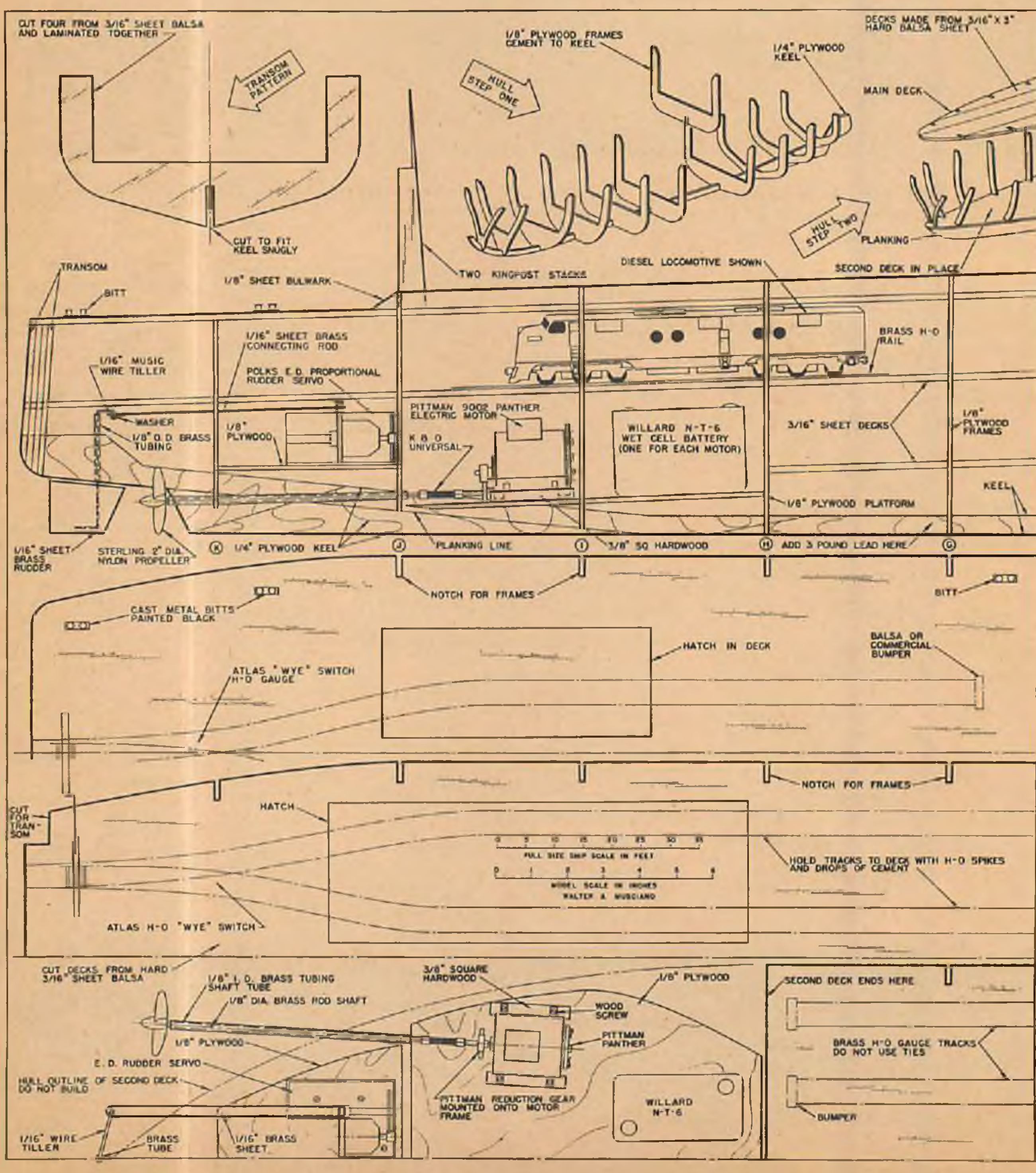
At this time install the wiring tunnel which extends from the motor compartment to the radio compartment. This tunnel is made from a conventional cardboard mailing tube. A plastic tube or similar can be used for this purpose. This tunnel allows all wiring to slide through the tube easily after the model is complete.

Before the next deck is added begin planking the hull. Decide now whether or not you intend to install a radio control set. If you do be sure to cut the hatch in the second deck as shown. In any case it is important that, as a start, three pounds of lead ballast be fitted in the radio compartment and three pounds of lead be fitted in the motor compartment as soon as the first six or eight planking strips are in place.

Hard 1/8" x 3/8" balsa strips are used to plank the hull bottom. Begin at the very bottom of the hull at the keel. Use a slow drying cement and apply this to the keel. Place a strip onto the keel and hold in place with straight pins until dry. Now, cement one strip to each side of the strip already in place. Be sure to cement these to the bulkheads as well as to each other. Continue in this fashion until the lower portion of the hull is covered up to the point where the Main Deck is to be installed. Paint the inside of planking above the Second Deck light grey.

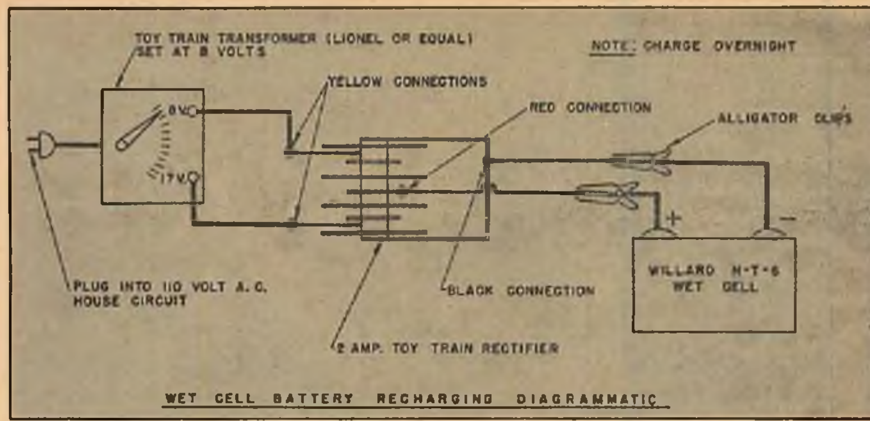
Before any more decks or covering are added install the basic foundations for the batteries, motors, and radio and rudder servo (if any). The plywood motor foundation should be cemented in place without the 3/8" square runners. These are added later with the motor. Using the hole in the bulkhead extension as a guide carefully pierce the hull with an awl or ice pick for the propeller shaft. Slide the brass propeller shaft tube through the hull but do not cement in place.

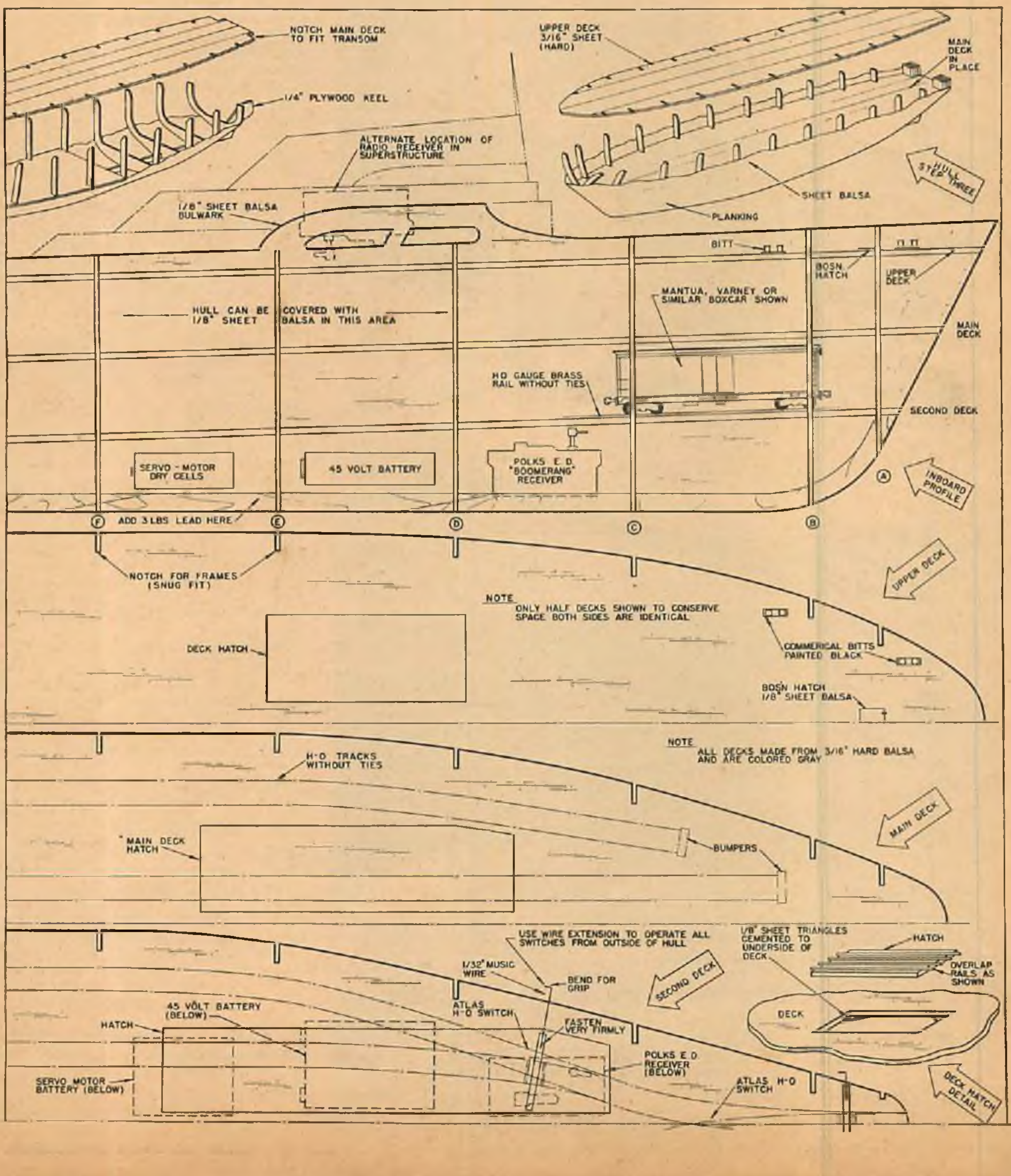
Now, cut the propeller shaft about one inch oversize. Force the 2" dia. propeller onto the shaft if it is Nylon and slide the shaft into the tube. Screw the motors to the runners and attach the K&O spring type universal. Place the motors into the hull (do not cement) and connect them to the propeller shafts.



Now, arrange the motors in such a manner as to cause propellers to clear the hull side by ¼". It will be noted that the shaft will rake downward and outward in order to achieve this propeller location. Pour plenty of cement around the motor runners and the shaft tube. When dry remove the motors and propeller shaft. Waterproof the motor compartment with at least four coats of wood filler.

Butt-joint hard sheet balsa to form the correct width and length of the Main Deck. Trace and cut this to shape. Sand smooth and seal and paint the top and bottom of the Main Deck. Cement the main deck into the hull. Be sure to cut the hatches for access to the radio and motor compartments. Fit the rails, bumpers and switches carefully in place. All





Full-size plans for S.S. Colossus are available as Group Plan #56 obtainable from Hobby Helpers, 770 Hunts Point Ave., N.Y. City 59 (75c)

rails must be spaced correctly.

The hull can now be covered up to the point of the Upper Deck location for the most part with 1/8" sheet balsa because of the relatively flat surface. The curve of the bow will require the grain to run vertically in this area. When completely covered paint the planking interior in the same manner as the other decks.

Piece the Upper Deck together and cut to shape. Seal and paint the under surface of this deck. Cement the Upper Deck in place. Cut the hatches in the Upper Deck and brush on several coats of wood grain sealer. Sand smooth with 3/0 sandpaper. The bulwark should now be installed. Note the vertical grain direction at the bow. Also note that the bulwark rises to the level of the Cabin Deck coaming in way of the superstructure. Cut the celluloid sheet bulwark flange or cap strips to shape and cement atop the bulwark. Note that this flange continues up the bulwark to the Cabin Deck.

Sandpaper the hull very thoroughly with 1/0 and 3/0 sandpaper. Inspect the hull for spaces between the planking and fill these with a balsa filler. Force this into the cracks with the fingers. When dry sand thoroughly again and we are now ready to prepare the hull for painting.

A good finish is mandatory for an operating model ship. Not only does a good finish enhance the appearance, but it means a watertight hull. The grain must be filled before the paint is applied. Begin by brushing on three consecutive coats of a sealer. When thoroughly dry sandpaper the hull thoroughly with 3/0 sandpaper. Brush on two more consecutive coats. These applications should be flowed on very liberally. Sand again when dry. Thin the filler about ten percent and continue applications with intermittent sanding until the exterior is smooth as glass. This may take from ten to fifteen coats in order to do a good job. Final sanding should be with 8/0 or finer wet sandpaper.

If desired the trailer ports can be cut into the side of the hull as shown. These are optional. The bow clamshell doors are cut from sheet brass in two pieces while the stern door is cut from sheet brass in one piece. All doors are hinged with strips of cloth or piano hinges.

We now begin construction of the superstructure and radio equipment installation.

It is necessary to butt join several pieces of hard 1/8" sheet to form a large area for the Cabin Deck and Navigating Deck. Trace the outline of these decks onto the balsa and cut to shape. Note that the grain runs beamwise. Cut the sides and rear of the cabin deck and cement these in place to the deck. Hold in place with straight pins until dry. Note that the rear pieces of the deck

This particular boat was designed by Mr. Musciano in response to numerous requests for a very large, very simple scale model for remote control by radio. Note that an alternate location for the receiver is in ship superstructure.

house is vertical despite the inclined edge of the rear of the sides. In order to bend the front of the cabin deck it will be necessary for the grain to run vertically. Here again it is necessary to piece the sheet balsa together before it is cemented in place. Wet the balsa if it will not bend easily. Hold in place with pins until the cement is dry. Sand this deck smooth and brush on a balsa filler until very smooth. Sand well between coats. Make the holes in the sides for the grommets or eyelets.

Construction procedure for the Navigating Deck is identical to that of the Cabin Deck.

The streamline stack can be carved from a solid balsa block or it can be laminated together from scrap sheet left over from the decks and hull covering. Trace the base of the stack onto the wood and saw to shape with a coping saw. Now, trace the side view and cut to shape. Trace the top of the stack onto this. Carve the stack to a streamline shape. Sand smooth and brush on several coats of wood grain sealer. Sand between coats. Cut the flying bridge from 1/8" sheet balsa and cement to the stack. When dry cement the celluloid coaming around the bridge. Hold in place with pins until dry. Make holes for the grommets in the stack.

Mark off the location of the Navigating Deck onto the Cabin Deck. Apply cement and attach the two decks together. Now, mark off the stack location onto the Navigating Deck and cement the stack in place. Check the hull and superstructure to see if any additional balsa sealer is required. Sand well with very smooth finishing paper. At this time the superstructure bulwarks can be cut from sheet celluloid and cemented in place. The model is now ready to be painted.

The light colors should be applied first, followed by those progressively darker. Study the Outboard Profile which identifies the principal color areas. Begin by flowing on the white dope with a flat soft camel hair brush about 1/2" wide. It will not be necessary to take exceptional care to avoid overlapping those areas which are to be colored grey later. Three coats should be sufficient to cover adequately. Do not hesitate to apply additional coats if required or desired. When this is thoroughly dry apply paper masking tape along the color line separating the white from the grey. Press this firmly to the model with the fingers. Flow at least four coats of light grey dope onto the hull sides, upper deck and superstructure decks. When dry, mask off the grey on the hull carefully to form a straight line and apply five coats of medium green to the hull bottom. Remove the tape and, using new pieces, mask off the red area at the waterline. This is called the "boot top." Paint this red now.

Before any other external details are added, install the electric motors, batteries, and radio equipment. Screw the motors to the motor runners and connect the electrical power circuit. The Pittman "Panther" motors have built-in switches with a reverse position. We took advantage of this feature and suggest that you do the same. Slide the propeller shaft into the stern tube and connect it to the motor via a commercial type universal joint. A heavy duty K&O spring type universal can be used. Solder the spring to both end lugs before installation.

There is plenty of room in the hull or under the superstructure for any radio receiver. The batteries should be rigidly fixed in place low in the hull in sheet balsa boxes or in commercial battery holders. Mount the receiver in a sheet balsa box lined with foam rubber or suspend it with strands of rubber to prevent vibration from affecting the operation.

It is recommended that the rudder be actuated by means of a positive action proportional type of servo mechanism. This can be installed now. The prototype model was fitted with an E. D. Proportional Motor-driven Rudder Servo Unit. This we found to respond well. A Rip Max "Beep Box" was used with this servo.

Install the propulsion, radio and servo wiring at this time. Use various colors for the hookup for easy identification. Use the wiring tunnel for any wires that must run between the radio and motor compartments; solder all wiring connections.

Install miscellaneous deck details. The bitts can be purchased in cast metal form at most hobby shops, also the anchors. Paint these items black and cement in place.

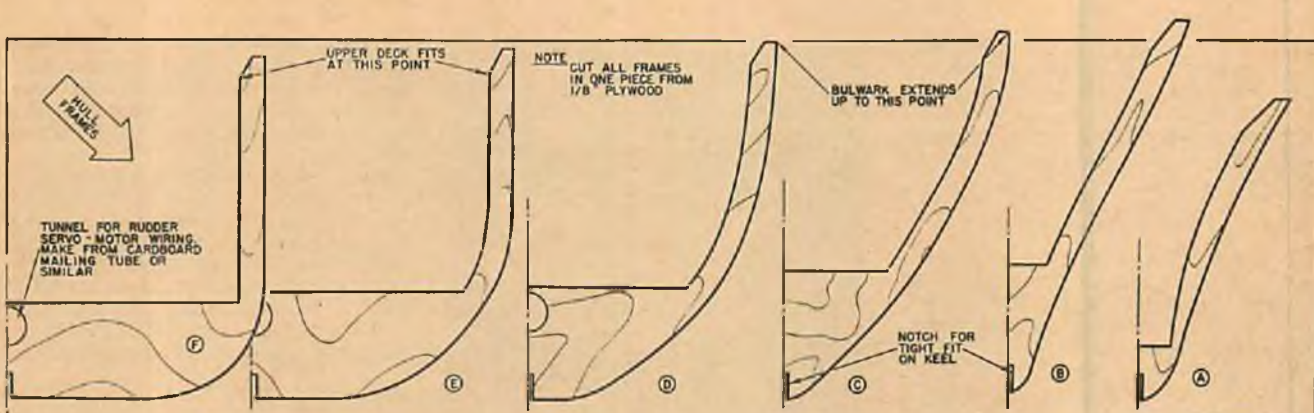
Lifeboats are carved from a balsa block or they can be laminated with 1/8" or 3/16" sheet balsa left over from the hull construction. Carve these in the same manner as the stack. Sand smooth and seal the wood grain. Paint the lifeboats white. Mask off the top of each boat and paint it black, dark grey or green to simulate the canvas covering. Bend the davits from clothes hanger wire. Force these into the cabin deck and suspend the boats from them with thread.

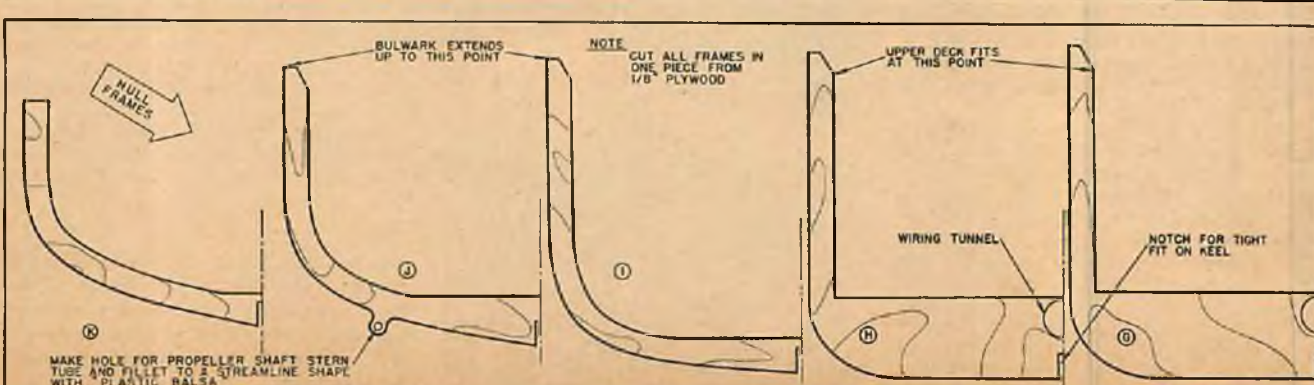
The two slender smokestacks are cut to shape from scrap block balsa left over from the stack construction. Sand these to an oval cross section and apply grain sealer until smooth. Cut the stack masts to a fine taper as shown and force into the stack top. Cement well. The stacks are colored grey with a black top. Masts are white. Cement the stacks to the upper deck against the bulwark.

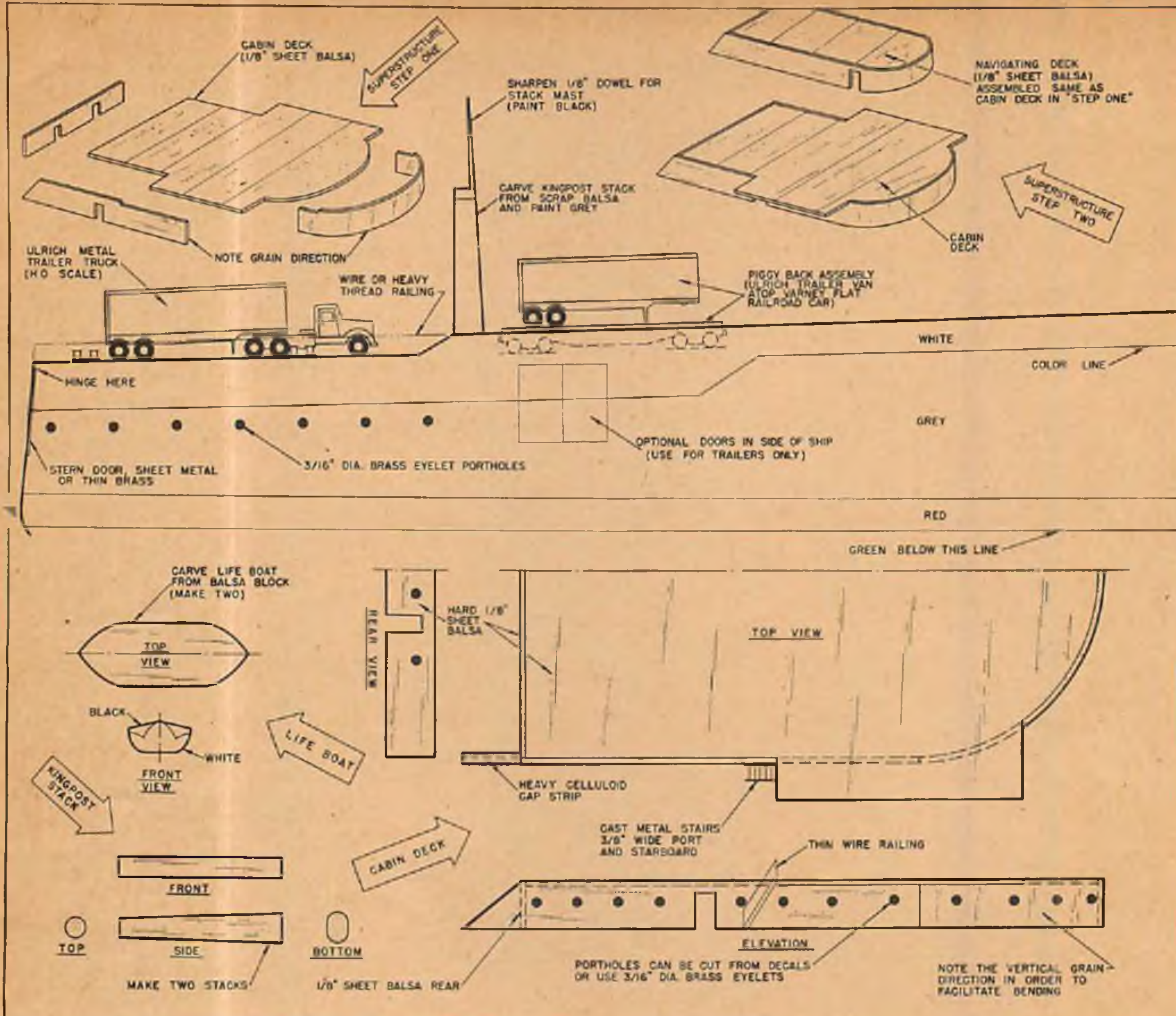
Install the H-O rails onto the upper deck in the same manner as was done for the other decks. The rails can be wiped with black dope to give them that realistic dirty appearance instead of that artificial brass look. Do not paint the very top of the rail.

Stack color bands or insignia can be added now to suit the builder's fancy. A name can also be added onto the bow if desired.

This completes our project. It is advisable to operate the model at the scale waterline. It will be necessary to add lead ballast into the radio and motor com-





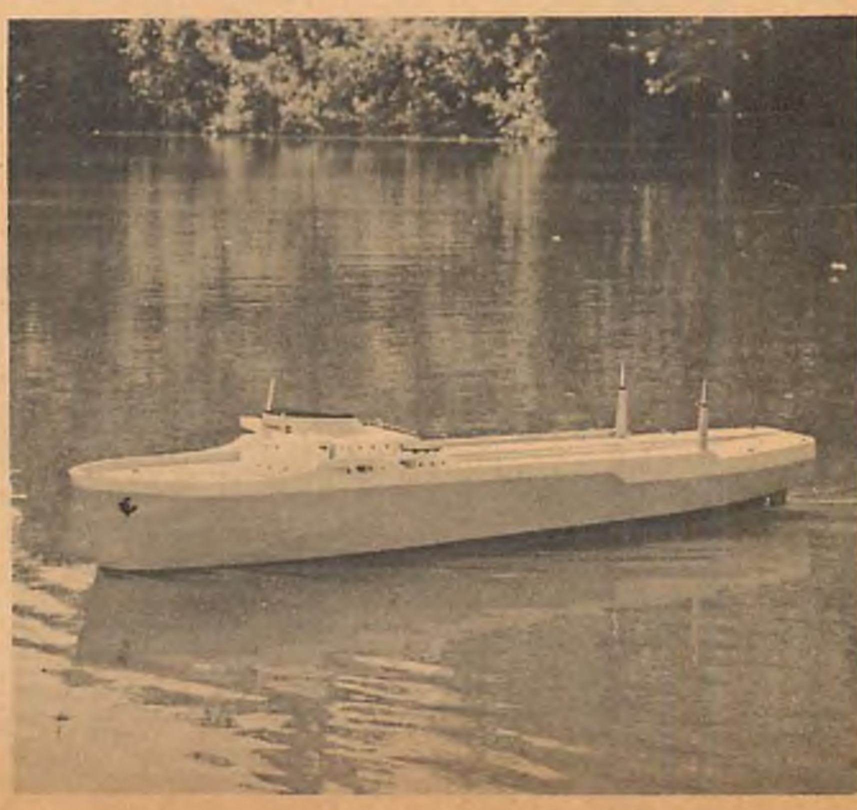


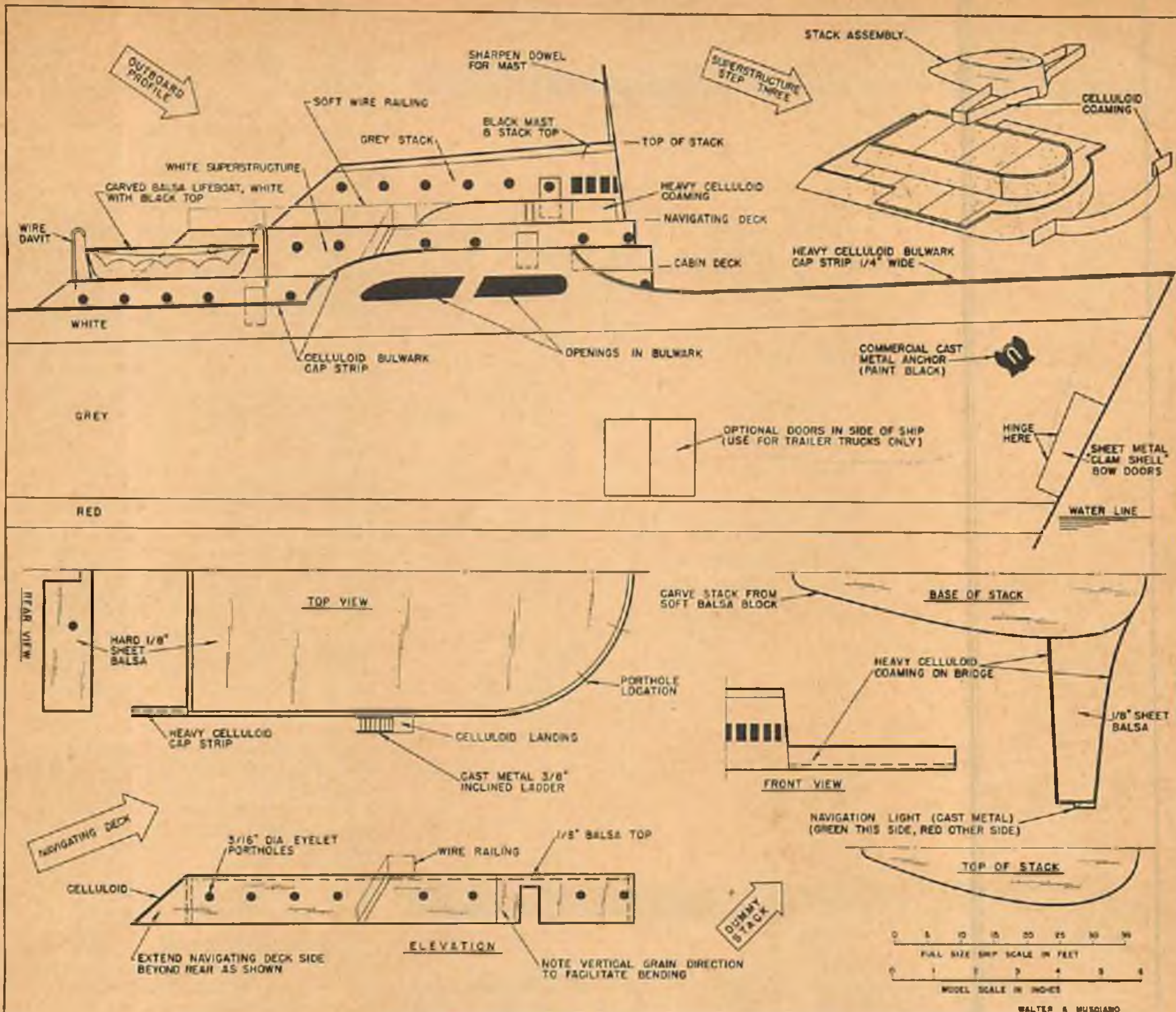
partments to make the model ride at the scale waterline. This ballast must be firmly cemented or otherwise fastened to the hull to prevent it from shifting. The unloaded model should have the waterline at the color line separating the red and green portions of the hull.

List of Material

1 ¼" x 12" x 18" plywood, keel. 8 ⅛" x 6" x 12" plywood, frames, bulkheads, battery and motor platforms. 9 ⅛" x 3" x 36" balsa (hard), hull covering, superstructure. 16 3/16" x 3" x 36" balsa (hard), decks. 36 ⅛" x ⅜" x 36" balsa (med.), hull planking. 1 .012" x 12" x 6" celluloid, bulwark rail, superstructure coaming. 1 2" x 3" x 18" balsa (soft), lifeboats, stack. 1 1/16" dia. x 36" music wire, tiller, track switch lever. 1 1/16" x 2" x 10" brass, rudder and tiller connecting rod.

Miscellaneous: Two pints balsa wood sealer, one tube balsawood filler, 12 ounces light grey dope, 8 ounces bright green dope, 4 ounces white dope, 8 ounces dope thinner, 2 ounces bright red dope, 2 ounces black dope, anchors, bitts, pins, cement, HO rails, HO switches, HO spikes, 2" dia. Nylon propellers, ⅛" dia. brass rod, ⅛" I.D. brass tube, cast metal ladders ⅜" wide, Pittman Panther 9002 electric motors with gears, universal joints, clothes hanger wire, 3/16" dia. brass eyelets.





A Mechanical Brain for Catching Thermals

By DONALD K. FOOTE, Author of "Aerodynamics For Model Airplanes" and "Model Airplane Engines"

■ To expect a free flying model airplane to fly in extremely large circles until it finds a thermal, then deliberately turn, fall right into the thermal and work its way into the area of greatest thermal activity sounds like expecting a lot from an airplane that has no pilot. But this is not only possible—a model can also be made to turn away from a downdraft area and leave it far behind.

These seemingly impossible performances can be attained by using a swept-back wing combined with a little adjustment trick. Once a modeler understands how sweepback can be employed on a model airplane as a mechanical brain to cause the airplane to seek out thermals and run away from downdrafts, he will realize that swept wings are as important to models as they are to supersonic jet aircraft. Sound strange? Keep reading.

A swept-back wing is one in which the mid-point of the chord at the tips is located further back toward the tail of the airplane than it is at the center of the wing. Figure 1 shows an airplane with a swept-back wing. In this illustration, the wing has no taper and the wing tips are square in order to simplify and isolate the study of sweep back. However, a wing with a straight trailing edge and a tapered leading edge, as shown in Figure 2, also has the mid-point of its chord closer to the tail of the ship at its tips than at its center and is, therefore, also a swept-back wing. A modification of this in which the leading edge is tapered only at the tips is shown in Figure 3, and is the design that I have found to work so exceptionally well on models. The wing shown in Figures 2 and 3 does not, of course, incorporate as much sweep-back as a wing such as in Figure 1, but there is a practical limit to the amount to be used, and the principles are just the same on all three designs.

A wing with sweep-back will stall at its tips sooner than it will at any point closer to the fuselage. A tapered wing has this same characteristic and will also stall at its tips sooner than a wing with no taper. This makes wings with sweep-back and wings with tapered tips less desirable for full-scale lightplanes because the ailerons become stalled out too soon and the result is loss of control.

However, it is this tip-stall characteristic of swept-back wings which makes it possible to increase the soaring ability

MECHANICAL BRAIN

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2

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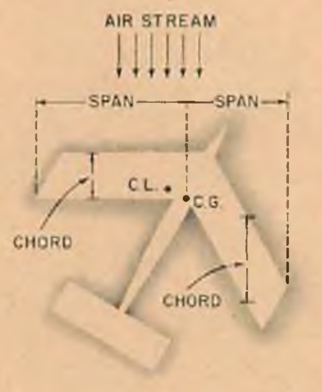

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of models by causing them to turn into a thermal and away from a downdraft. The wing tips of a model with a swept-back wing in a normal glide are very close to the stalling point. By warping one half of the wing so that its tip is flying at a slightly greater angle of attack than the other, that wing tip will be on the very verge of a stall and if disturbed by a thermal will stall out sooner than the other wing tip.

The greater drag on the wing tip with the larger angle of attack will make the ship circle toward that tip in a normal glide. Therefore, this warp should be used to adjust for a proper turn in the glide rather than using the dangerous adjustment of turning the rudder. And, the airplane *must* be made to climb in the direction of the wing tip with the greater angle of attack or a spiral dive might result during the motor run at high speed.

When the airplane comes into the area of a thermal, the tip that is flying at the greater angle of attack will stall out first. Lift will be destroyed on that tip first, and the airplane will start a spin in that direction. Hence, it will deliberately turn and fall off in the direction of the thermal. As soon as it regains a little speed, it will stop its spin, but it will continue to circle tightly and will tend to work toward the center of the thermal or the area of greatest thermal activity.

Furthermore, when the airplane hits a downdraft the wing will suddenly be flying at a lower angle of attack. Neither tip will be flying so critically close to the stall. The difference in drag of the two will not be as great, but the difference in lift of the two tips will become greater. The tip with the larger angle of attack will now develop more lift than the other and the airplane will start to roll and actually tend to turn in the direction opposite to its normal turn. Thus, it will tend to turn and fly away from the area of the downdraft.

I cannot emphasize too strongly that this "mechanical brain for finding thermals" really works like a charm. I have used it for more than a dozen years. But there are two other characteristics of swept-back wings that should also be understood.

Lift, of course, is generated along the full span of the wing, from the fuselage to the tip. But, just as the center of gravity can be considered as the point where all weight is concentrated, so the center of lift can be considered as concentrated at a point.

In Figure 1, suppose that the center of lift has been located as shown at the point marked C.L. The center of gravity is also at this point. The center of gravity would be behind the center of lift of the wing if a lifting tail were used because the stabilizer would also contribute lift. In that set-up, to be in balance the center of lift of the stabilizer added to the center of lift of the wing would make the total center of lift of the airplane fall directly on the center of gravity.

But since we are not here considering the effect of lifting tails, we can assume that the illustration is of an airplane with a non-lifting stabilizer. So, the center of lift of the wing and the center of gravity of the airplane will lie at the same point.

The airplane is also in balance laterally. That is, it is flying with the wings level because both wings are producing the same amount of lift. Thus the center of lift is at the midpoint between the two wing tips as shown.

In order to understand the effect that sweep back has on a model, it is necessary to examine what happens in a slip. The slip is the fundamental maneuver of a model airplane which is used to obtain its stability. When a model starts to turn in the climb, it slips slightly towards the inside of the turn. Figure 4 shows an airplane in a left turn. It is slipping toward the left causing the air stream to strike it as shown. Actually, of course, the amount of slip is so small that it can hardly be seen; in this illustration, however, exaggerations are made in order to show the principles more clearly.

With the airstream hitting the left wing more directly perpendicular to the leading edge than it does the right wing, the left wing will have an effectively higher aspect ratio relative to the air stream. Thus, it will be more efficient and produce more lift than will the right wing. This will cause the left wing to rise and tend to roll the model to the right. Or, in other words, to bring the model out of its left bank and prevent a spiral dive. Another way of saying this would be to say that in a slip to the left the center of lift is shifted to the left or lower wing causing it to rise. This is illustrated in Figure 4.

It can also be seen in Figure 4 that the effective chord of the left wing is shorter than the effective chord of the right wing. Yet, the thickness of the airfoil is the same for both wings. Therefore, the constant of lift for the left wing is greater than that for the right wing. This also causes a shifting of the center of lift towards the left and tends to bring the model out of its banked attitude.

The sharper the turn in the climb, the more the airplane will slip and therefore the stronger will become the force tending to bring the airplane out of its bank and prevent a spiral dive.

Therefore, sweep-back does the same job that dihedral in the wing does, but without the loss in wing efficiency that dihedral causes. For high speed, such as in the climb, sweep-back is about 10% to 15% as effective as an equal angle of dihedral. But, near the stall, it becomes about 30% or more as effective.

Just as the center of lift of a swept wing moves outward toward the tip of the forward wing in a slip, so too does the center of drag. In Figure 4, it can be seen that the left wing tip is further away from the center of gravity than the right wing tip, giving it a favorable leverage and generating a greater moment of force than the right wing tip.

The greater drag on the left wing will tend to swing the nose of the ship toward the left. Sweep-back, therefore, has the same effect as vertical fin, or rudder, area.

Sweep-back is, of course, nowhere near as powerful an influence for directional stability as the rudder. Yet when considered as a factor to reduce the size of the rudder, it becomes a very potent influence—especially on models, since it is important to use a minimum of rudder area because the model must slip in order to gain lateral stability.

One word of advice: Don't go to extremes. It doesn't take much sweep-back to make your model act like it was controlled by a mechanical brain. Experiment a little and you'll get soaring performance you never realized was possible from a pilotless airplane.

Model Builder's Scale

■ Have you ever felt the need for a really good model-weighing scale, one that you could read to one hundredth of an ounce, and that would weigh objects of several pounds if necessary? We had need of such a scale, and it had to be accurate, a job that could really be trusted. We hopefully started a tour of likely stores, but after several days of plodding from one to another, we realized the quest was pretty useless. Oh, there were scales available—hundreds of them —but they either were hopelessly inaccurate, didn't cover the required range, or were way out of reach in price.

It was then apparent that we would have to adapt a moderate-priced commercial scale to our needs, and for this we chose a neat little unit that we had seen in at least a dozen stationary stores. It was a Triner Mail Scale which seems to be available almost everywhere, and is the same or very similar to those used in many post offices. It has a 9 ounce range, divided into ounces and half ounces, and the price runs around $7.00. It is compact and really accurate.

A study of our little prize showed that an auxiliary range of zero to one ounce could be added quite easily. The illustrations show this new range clearly. To go higher than the normal 9 oz. range, it was decided to hang extra weights on the right hand end of the beam, just like the doctor does when he weighs you on his office scale.

Before tampering in any way with the scale, we made a set of test weights including one each of 8 oz., 4 oz., 2 oz., 1 oz., and two of ½ oz. They were cut from scrap brass and steel rods, and finished up all fancy with nickel plating and the value stamped on each. It isn't necessary to go to all this trouble, though, for after you get the sale recalibrated, the loose weights are of little further use, so we suggest you hack them out roughly, just making sure they are accurate. As a matter of fact, all you *really* need is a single 8 oz. weight and one of 1 oz.

Now you can disassemble your scale and go to work. Remove the two screws that hold the cap on the body of the unit, and two more at the lower end of the supports that carry the tray. Lift out the beam and tray assembly; force out the little indicator bar at the extreme right end of the beam and pull out the adjusting weight, but *don't turn it.* Drill and tap the three holes indicated on the sketch, and clean off any burrs inside the beam that would interfere with the adjusting weight.

The 1 oz. auxiliary bar should be of aluminum to keep the added weight down; use dural strip if you can get it. The most permanent way to mark the new scale is by scratching the .1 and .05 oz. lines on the strip, and stamping the numerals in with steel machinist's figures, as we did. The easiest way is to make a new scale in ink on cardboard sheet. Cover with Scotch Tape and cement it to your aluminum strip. The scale divisions on the original job are not to any even inch measurement; we just made the slider, installed it on the blank bar which had been fastened to the beam, then moved the slider to both end points. Scratch marks on the bar set the limits for the new 1 oz. range. The distance between the left scratch (or zero) and the right one (which would be 1 oz.) was then split into 10 parts, using a pair of dividers and the cut-and-try methods.

The slider may be of any metal, as a fair amount of weight is needed. We used an aluminum slider, to which was fastened a piece of lead about 13/16" x ½" x 3/16", held in place by two flat head 2-56 screws.

Before reassembling the scale, drill and countersink a hole for a 6-32 flat head screw in the center of the pan. This will hold a counterweight needed to balance all the extra metal out on the beam. Our counterweight was a brass disc ⅞" diameter and about ½" thick. Put the works all back together again, and don't forget the loop under the beam; use a radio soldering lug for this.

Now for calibration! With both sliders at the extreme left end of their scales, and the counterweight (plus its holding screw) laid on the pan, the beam should center, or indicate balance. It probably won't immediately, so trim enough off the counterweight until it does. Next, place your 1 oz. test weight on the pan, and shove the new slider up to 1 oz. Needless to say, you should again get balance, but again probably won't, and now comes the only tricky part of the entire operation.

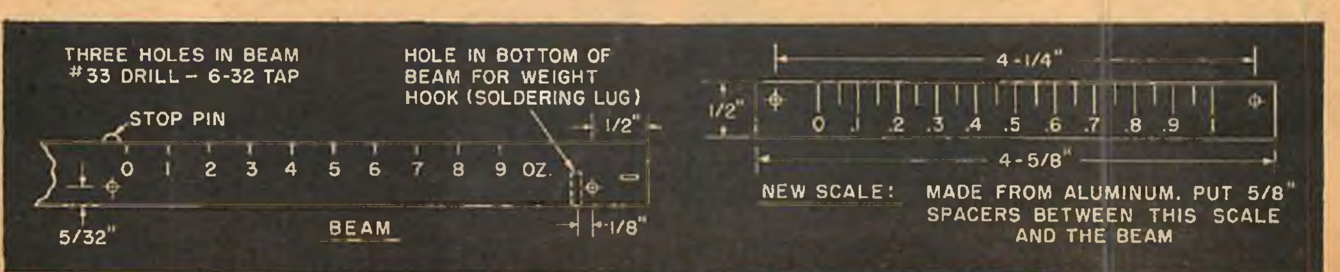
You must vary the counterbalance weight and the lead weight on the new slider until the beam balances with the 1 oz. slider at zero (no weight except the counterbalance on the pan), and also balances with slider at far right and your 1 oz. weight on the pan. We found it helpful to substitute a bunch of small nuts and bolts for the counterweight on the pan; then there was only the slider weight to do any cutting upon. When we got the two balance conditions settled satisfactorily, the loose nuts and bolts were removed from the pan, and the counterbalance filed down until it did the same job.

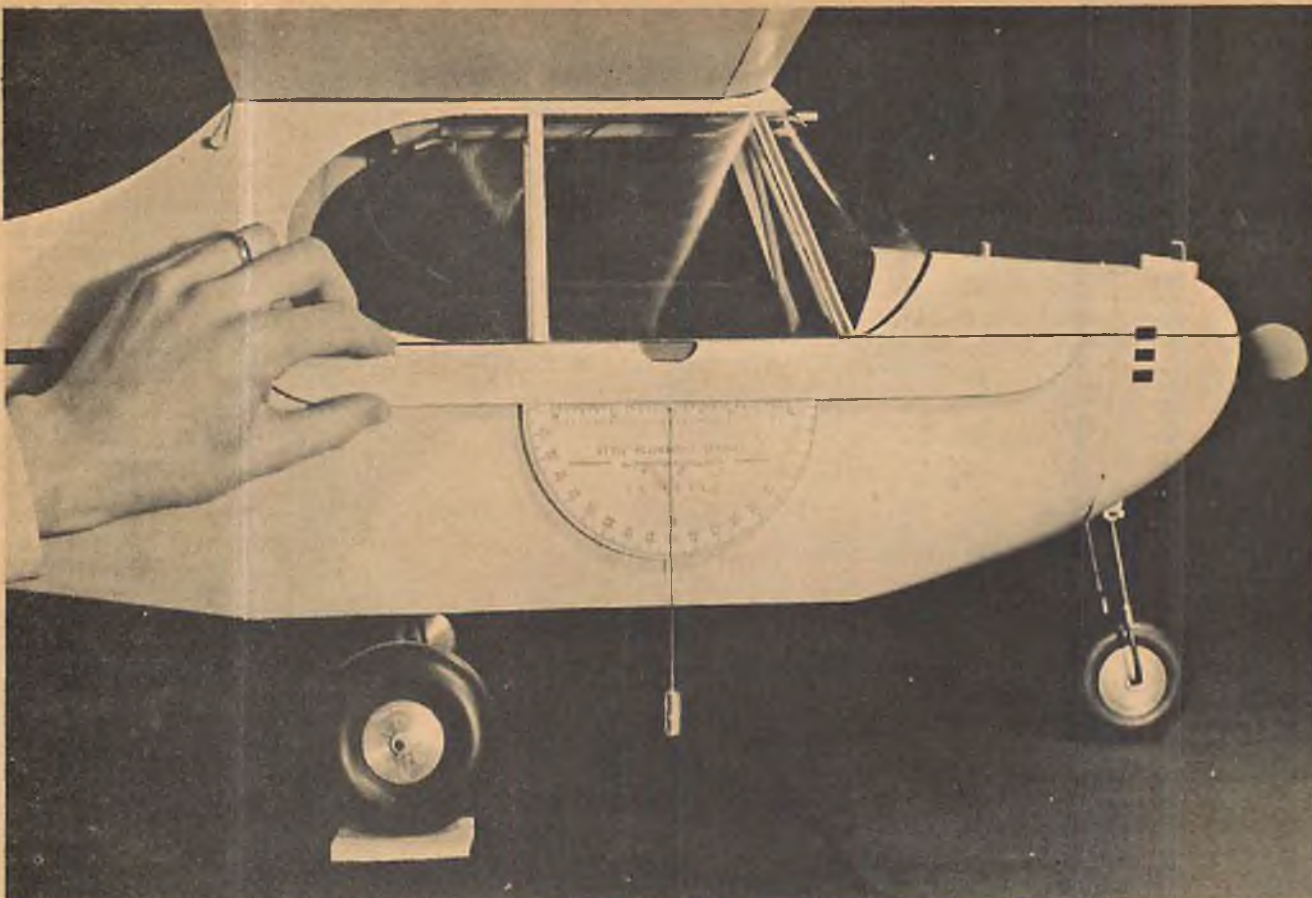
At this point you have a scale that will weigh model parts or accessories from zero to 9 oz., and accurate to one-hundredth of an ounce. The final step is to cut a set of extra weights to hang on the new beam hook, covering ranges of 8—17 oz., 16—25 oz., 24—33 oz., and 32—41 oz. These weights should be made of lead to keep their size down. The 8—17 oz. unit in the set we use actually weighs 2.77 oz.; that for the 16—25 oz. range weighs 5.54 oz., and so on. A 5 lb. chunk of lead may be had from plumbing supply stores, and is more than enough for the job.

Start out with your 8 oz. test weight on the pan, and cut the beam weight roughly to a size that slightly over-balances the 8 oz., when the lead is laid on the beam over the loop. Both sliders must be at zero, of course. Now attach the hook to the lead weight with a self-tapping screw, hang the weight in place, and trim off lead until you get a perfect balance.

The three larger weights will have to have a slot cut in them so they can straddle the frame; they must clear it, of course. Bend your wire hooks so the weights always hang in exactly the same position every time you fasten them on the loop.

It is probably possible to go even higher than the 41 oz. point we can reach. However, we stopped there because any more weight seemed like too much for the knife edges and other bearings in the scale. Even so, we have a weighing instrument good for models of any size and type, from just above the microfilm featherweight planes on up to Class B gassies. Anything bigger, we weigh in sections. A range from .01 oz. to 41 oz. is good enough for *our* purposes!



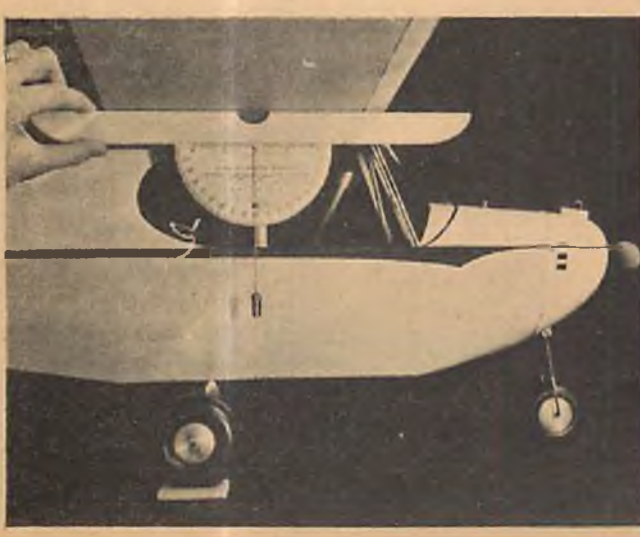


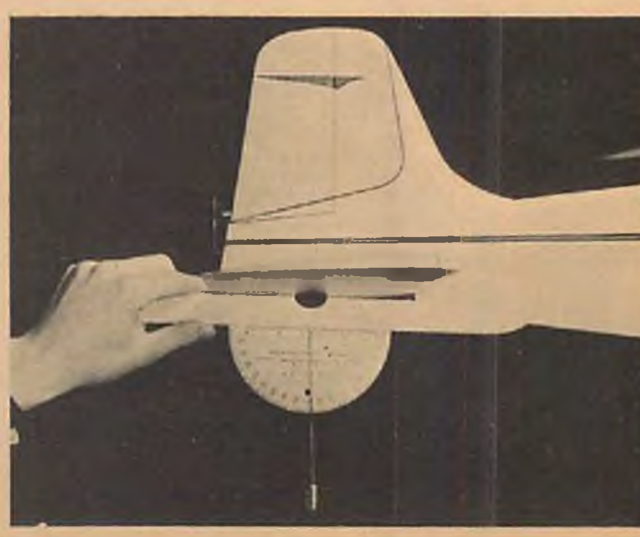
First step in using angle indicator is to block up fuselage until center line registers zero degrees. (R/C job is by Bruce Becker.)

WHAT'S YOUR ANGLE?

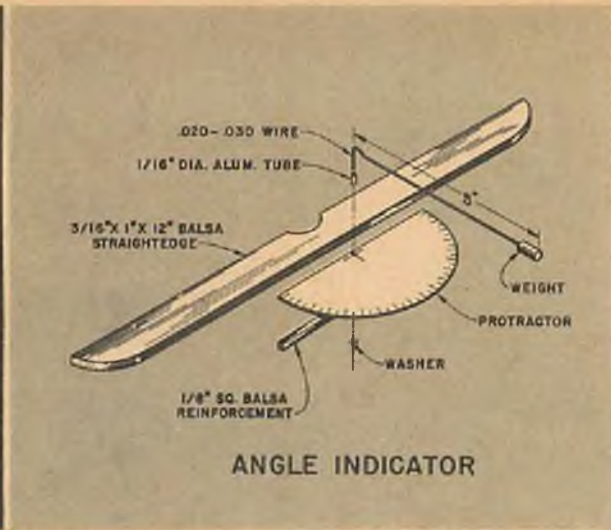
■ Mighty few modelers can answer this, yet the very life of a newly completed model is solely dependent on the angles of the wing, stabilizer and thrust line relative to one another. Of course, it's one thing to construct a ship from a set of drawings but quite another story to end up with the exact angles called for. Now with the aid of only an inexpensive protractor, wire, balsa and solder you can assemble an instrument in a matter of minutes that will prove indispensable for pre-flight checking.

With this indicator a number of critical angles may be checked and adjustments made before risking any flight tests. For instance, here are a few ways in which the indicator will be of service. First, the angle of incidence of the wing and stabilizer and their relation to the fuselage center line can be measured precisely. Down and side thrust of the motor are





Flat bottom or undercambered wing checks as shown. Semi-symmetrical or symmetrical sections require you to cut out a pattern of lower half from sheet of ⅛" balsa. The angle indicator above shows three degrees negative incidence for the stabilizer.



Drill hole exactly through the index point of protractor for press fit of 1/16" diameter aluminum tube. As explained in text wire is inserted into 3/16" diameter hole (bored ¾" deep in block of wood) while solder is in molten state. Smooth when cool.

easily calibrated and checked against amount called for on plans. Note in the photos that it is necessary to first zero in the fuselage before checking any thrust angles.

It has been standard practice in R/C to call for 3 to 4 degrees washout in each wing tip. Needless to say this was generally warped in by eye; however, with the aid of an indicator guess work is unnecessary. Now if you have a model that has the wing in two separate panels it will be a cinch to adjust them for a like amount of incidence in each. Yes, there may even be occasions when you might wish to duplicate exactly the flying characteristics of a given model where purposeful warps in the wing or stabilizer are a contributing factor. These are easily duplicated.

The whirlibird boys should find an angle indicator indispensable for the adjusting of autogiro or helicopter rotor blades.

Note: Wherever the angles of the wing, stab, etc., aren't called out on the drawings just lay a protractor over the plans, take the reading and with indicator adjust surfaces to match.

Before starting construction acquire a protractor, preferably the plastic type with an index point located at least ⅛" from the edge. Drill hole as shown in photo and cement a ¼" length of aluminum tubing into hole and cement. This acts as a bearing. Select a perfectly straight sheet of 3/16" balsa from which cut a strip 1" wide and 12" long. Round the ends and cut a center notch. This is necessary to clear the prop shaft and nut when measuring thrust angles. Cement the protractor to the balsa straight edge and add ⅛" sq. strip for reinforcement.

Into a scrap block of wood drill a hole 3/16" diameter and ¾" deep. This serves as the "mold." Now tin one end of a .024 or .030 diameter wire. Melt solder into the mold and insert wire as shown in photo. Bend the wire per illustration and insert through the tubing. Solder a small retaining washer in place and cut off excess wire.

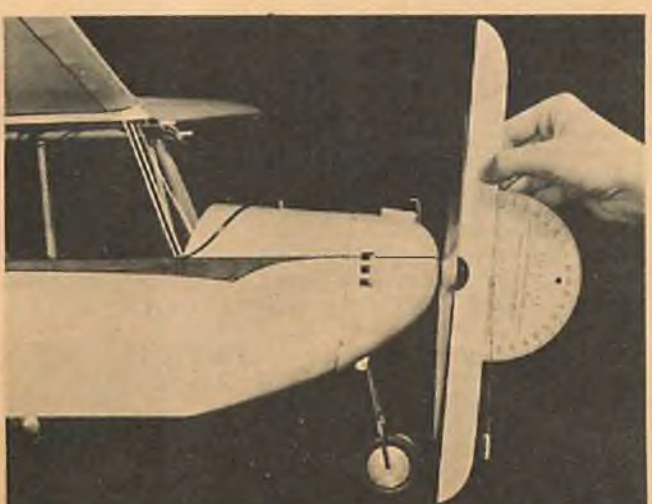
When checking symmetrical or semi-symmetrical wings, it is necessary to make a pattern to fit the lower half from a sheet of ⅛" balsa. Make this template with care so that its lower edge is exactly parallel with the center line of the rib. Then your template is held against the wing bottom, the straight edge against the template, and your protractor readings are accurate.

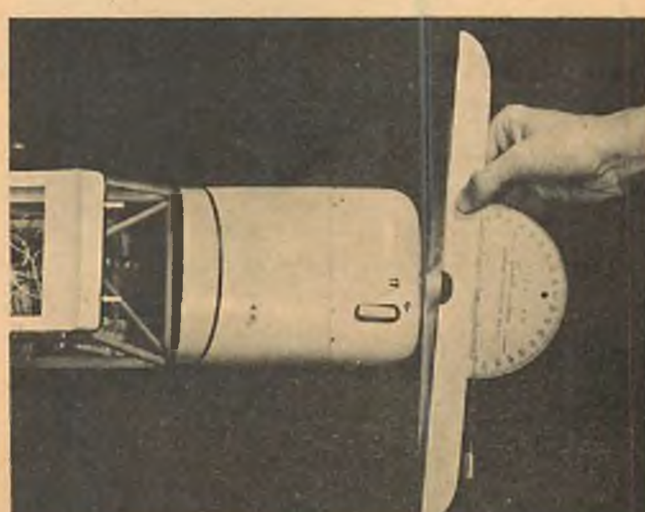
There, now, you have an accurate instrument which will make pre-flight checking a cinch, and if used sensibly will contribute immeasurably to the life expectancy of your models by making those first flights a pushover.

As one last note: the writer hasn't delved into the complexities of angular differences and their relation to flight characteristics. However, for those of you that may be interested in finding some of the answers, any of Frank Zaic's yearbooks are highly recommended.

Probably no one single factor has caused so many crack-ups among free flight models (rubber or gas powered, non-controlled or radio-controlled) as improperly adjusted flying surfaces. For once we'd like to see modelers play it smart and save themselves grief and expense by carefully checking out their craft before flying with this simple device.

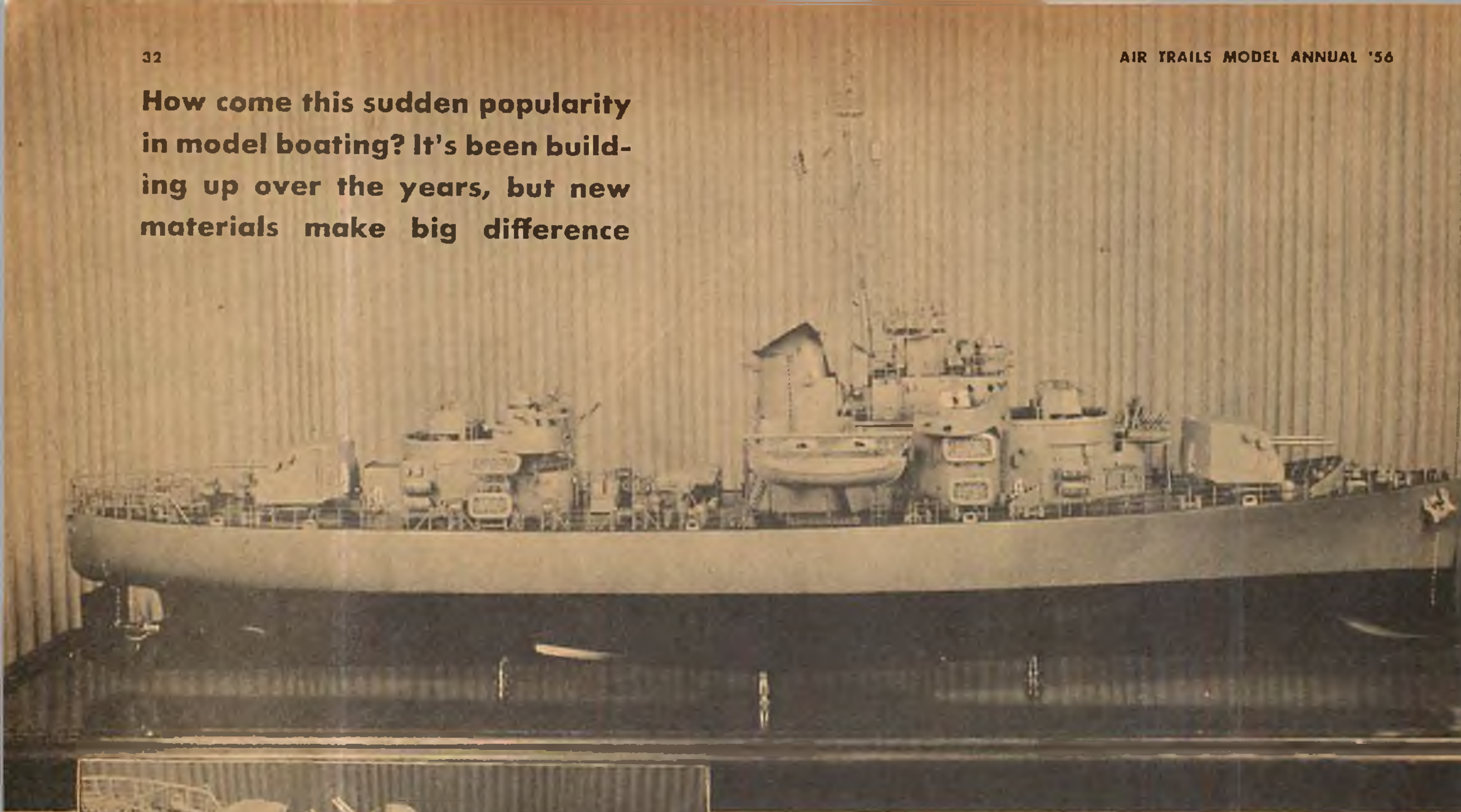
—CHUCK HOLLINGER

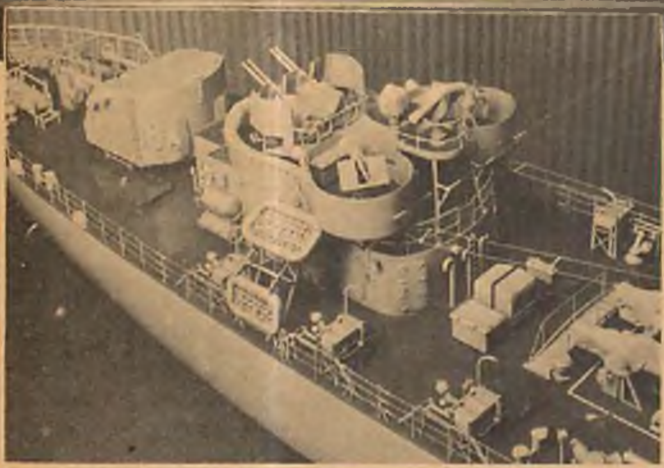


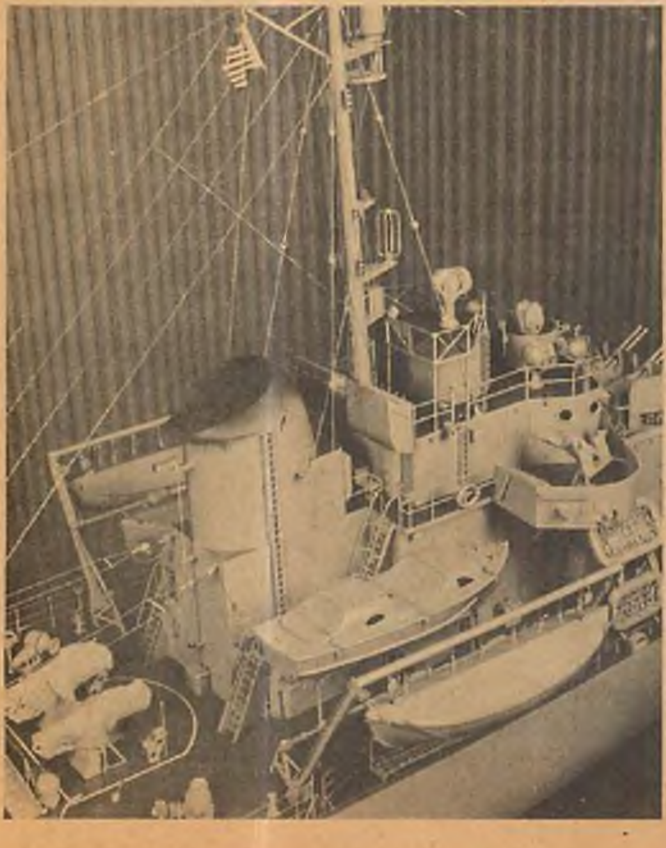


To check downthrust hold indicator against flat forward side of prop (3½ deg. negative registered here). Fuselage center line was previously blocked to zero degrees. Same applies above for side thrust—fuselage on side has center line at zero.

How come this sudden popularity in model boating? It's been building up over the years, but new materials make big difference







Professionally made model of Coast Guard Cutter "Owasco" is a fine example of miniature boat builder's art. Many salaried model makers started out at home as amateur enthusiasts.

Model Boats More Popular Than Ever

■ More ship models are being constructed and operated today than at any other time in the past and it is evident that interest in this hobby is rapidly increasing. These facts led *us* to become interested in knowing exactly what could have caused the sudden spurt upwards. Basing this analysis on our model boat experience of over twenty years, we found that the reasons for this popularity are quite understandable and very much within reason. It appears that the contributing factors are: 1) new materials and equipment; 2) increased radio control activity; 3) recognition of the fact that model boats are not "kids stuff"; 4) the amazing long life of model boats; 5) the extremely wide variety of construction techniques. Taken one by one these reasons are enough to convince any young man—to try boat models.

New engines, fittings and construction materials certainly play a major role in influencing increased model boat activity. O&R "Mariner," Atwood and Cameron water-cooled engines permit enclosed cabins and superstructures to cover internal combustion engines without a cooling problem. The engine exhaust is easily ducted to the atmosphere.

Before the advent of these powerplants internal combustion engines could not be operated in enclosed cabins without leaving all windows uncovered in order to insure proper cooling. The windows also had to be extra large to guarantee a good circulation of cool air through the cabin. These restrictions discouraged many potential model boat builders. This is no longer true.

The Allyn outboard engine has afforded the builder a powerplant that could not be more simple. Not only does this engine offer some realism for the outboard replica

Almost 4' long, this big one (left) is by Roy Donovan. Planked with hard balsa, then fiberglassed. Shown in primer sanding stage. Water-jacketed O&R .60 ignition engine. Swivel chair.

Exact scale of 48 cu. in. racing hydroplane uses Space Bug; travels "at 30 mph." Hand-filled Hi Johnson prop. Built by "Hap" Ryan; fine finish, attention to details make it outstanding.

but it also facilitates installation by eliminating shafting, universal joint, shaft housing or stern tube, propeller and rudder. This is a real inducement to build model boats.

New steam engines introduced by Allyson and the many electric motors available such as Aristo, K&O and Pittman provide an unlimited selection of power for the enthusiast.

In view of the fact that boats were invented before airplanes, obviously, model boats preceded model airplanes. Although these had to float they did not require the lightness of aircraft; therefore relatively hard woods that were easily obtainable were used such as mahogany, pines and cypress. Despite the comparative workability of this material it discouraged many who were not too adept at building. When balsa wood made its appearance, primarily for model plane construction, a few boat builders recognized its advantages and used it for their projects. Others continued with the old materials and thereby maintained the barrier that discouraged the novice. During recent years some kit manufacturers and magazine contributors have encouraged the use of balsa for model boat construction with the result that many new enthusiasts were attracted.

In the "old days" woods were sealed with flat house paint or not filled-in at all! Consecutive applications of artist's oils were often used to color ship models. This took many days to complete. Now, quick-drying model wood grain sealers and colored airplane dope produce a fine, waterproof finish in a small fraction of the time and effort. This and other time-saving products have helped to make model boating popular.

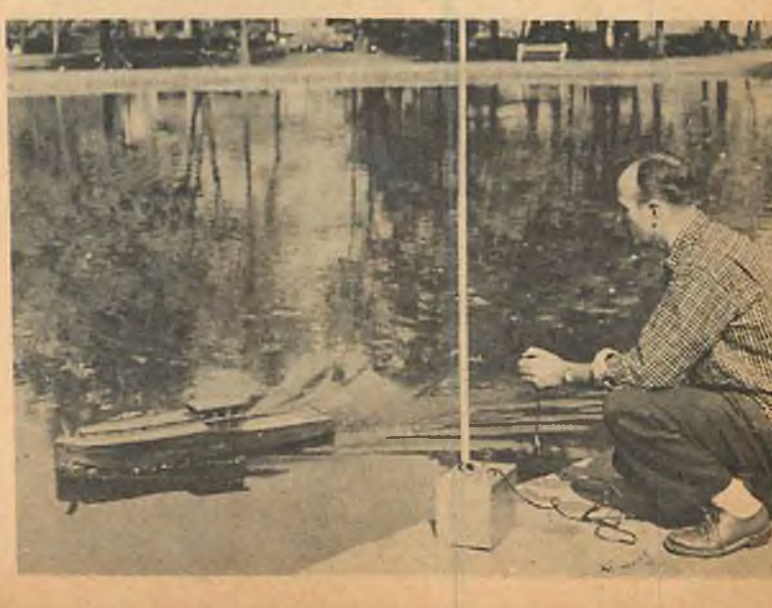
Although they have been in existence for some time today's cast-metal deck fittings seem to be more plentiful and better than ever, with much greater variety in size and type. These castings save much time and effort in duplicating bitts and chocks, life preservers, portholes, cleats, whistles, bells, life boats, davits, ladders, stanchions, anchors, chain of all sizes, and hawse pipe all of which enhance the appearance of scale ship models with a minimum effort on the part of the builder.

The examination-free Citizens Band for radio controlled models caused a sharp increase in radio control activity and interest. Many rank novice operators installed their sets in model planes as their initial radio venture. This was generally done with very little or no model plane experience. The first slip in controlling and down it comes! This is not meant to discourage the construction of model airplanes. We merely wish to point out that radio controlling model planes requires some previous knowledge of adjusting them whereas little is needed for model boats. It is obvious that when the beginner installs his radio in a model boat any mistakes he makes will not cause anything more serious than have his model run aground. Anyone can radio control model boats.

Radio control participants seem to fall into two specific catagories. The first comprises the radio fan whose primary interest is in developing the controlling device and who regards the model plane, car or boat as merely a vehicle to carry the equipment and obey by performing precisely every command of the radio equipment. The second group is made

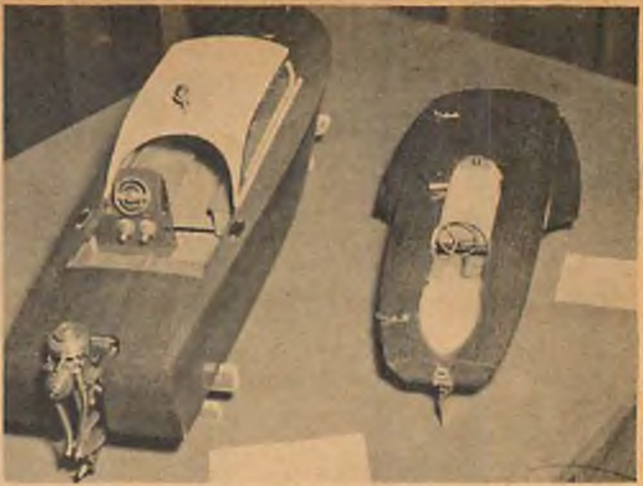
Excellent feature about well-built boat models is that properly cared for they can last a lifetime. Here (right) radio control has been added to 25-year-old steam-powered cabin cruiser.

Over 40" of marvelous detail by Bill Price. Original design features hand-made furnishings in each cabin. Power is Anderson Spitfire ignition with water-cooling jacket.



MODEL BOATS MORE POPULAR

Mathews Cruiser with radio control is owned by Al Woods. Solid hardwoods used throughout. Built, operated in San Francisco many years, now in L.A. Home-built 4-cycle ignition engine.



Two by Les Garey. Left, R/C with under-water exhaust on reworked Allyn; balsa planked, then mahogany veneer covered. Hydroplane is exact scale model; McCoy .09; mahogany and plastic.

up of individuals who are interested in the model construction. They build the model for the enjoyment of it and utilize the radio merely to enhance the performance of their handiwork. The former group are apt to use multi-channel and more complex equipment while the latter classification tends to install the simplest radio set into the model in order to devote more time to the model and less time to the radio.

The radio fan of "group one," therefore, wants to be able to operate as many items on his vehicle as possible. Where will he find more items to operate than on a model Destroyer, Landing Craft, or Cruiser, etc.? Rotating gun turrets, movable ramps, weighing anchors and even firing torpedoes can be accomplished; not to mention steering and engine control. Numerous radio control fans have turned to boats for these reasons.

It has been said that model boats are for children. Toy boats of the five and ten cent store variety, yes, but not model boats that require effort to construct and intelligence to operate. The average age of the model boat enthusiast certainly puts him above the kindergarten class. This fact is gradually being recognized and many who were formerly "ashamed" to be associated with this "immature" activity now are thoroughly absorbed in this enjoyable pastime.

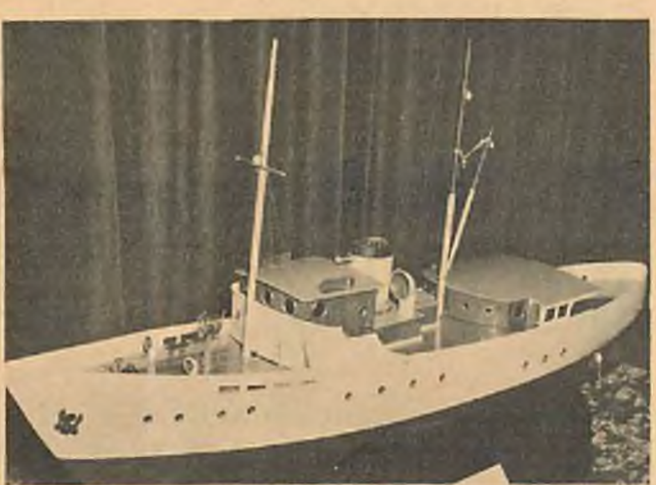
Model boats never seem to die. We do not necessarily refer to the super-fast racing craft which, because of their action packed existence, cannot withstand for long the continuous abuse they are subjected to. But the average steam, electric or internal combustion engine powered craft will last for at least a score of years and more if properly maintained. We know of many models that are over twenty years old. As a matter of fact we have recently installed a radio controlling mechanism in a steam powered boat that is over twenty-five years old and it looks and runs like new! This is a tremendous incentive for meticulous model builders to build their models carefully and add all of the painstaking detail they desire without having to worry about their handiwork being dashed to pieces. This type of modeler has looked towards scale boat modelling as an outlet for his talents.

Model boats can be carved very simply from wood blocks, made from layers of ½ to 1 inch planks of wood cut to the shape of the various decks and cemented together, covered with sheet balsa or hardwood veneer over framing, or planking over framing. Some hulls can even be made with sheet sides mounted on a heavy plank bottom. This variety of techniques requires varied ability to construct models thereby inviting both the veteran model airplane or car builder, and the novice who has never attempted a model project before to try their hand at boats. Both beginner and expert will be able to build and operate a boat model to suit their individual talents, taste and pocketbook. The editors of "Young Men" magazine report astonishing response to the model boat building and operating articles they have been running for more than a year. When last June the cover illustration showed a model fishing boat of the moss bunker fleet inquiries were received from all over the world concerning availability of working drawings. As a result Frank Lashek and Cal Smith, both noted modelers, were commissioned to turn out a replica. This has been scheduled for the February and March 1956 issues of "Young Men" magazine. A good example of model boat interest! —*W. A. Musciano*

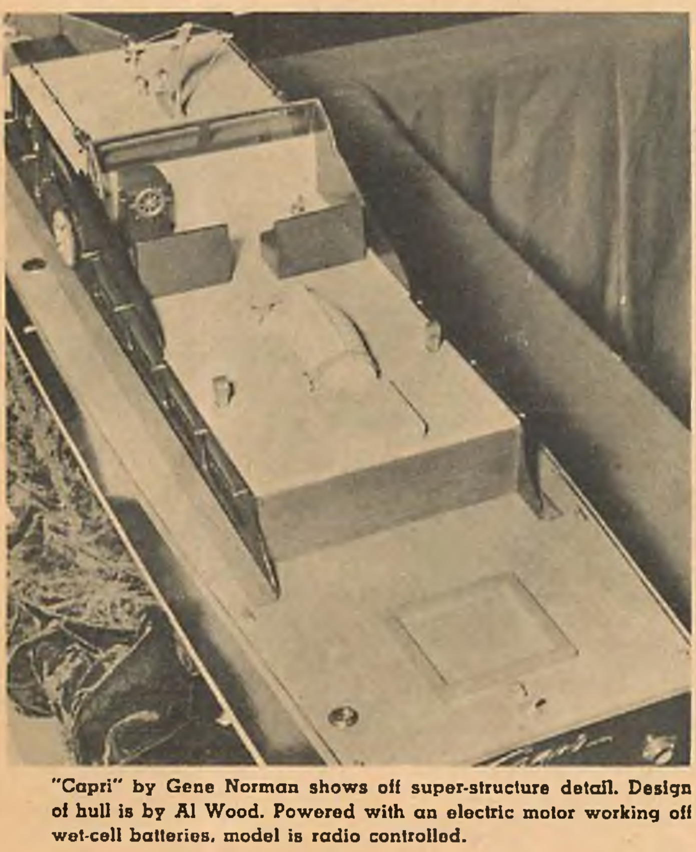
Three-masted schooner sailing across the boat pond is vision of grace that few other models can equal. These craft are not overly difficult to make, you just need lots of patience.

British Wavemaster kit job (foreground) built by A. Chivorian, and his Chris-Craft cruiser (center). Latter has complete bridge right down to fire extinguishers, compass and controls.

Big payoff comes in the performance of your craft. When you see a miniature submarine preparing to dive beneath the surface, it's pretty hard not to get excited over water models.

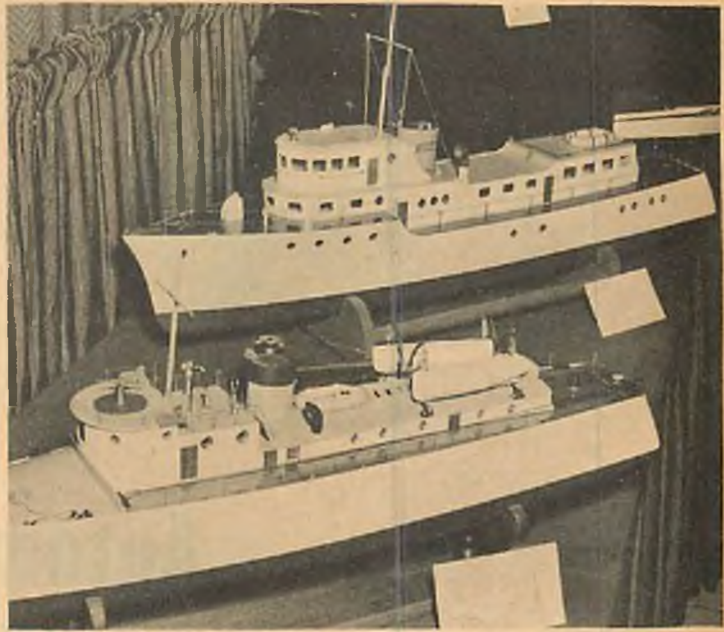


Large-size working scale model of deep-water luxury yacht of Swedish heritage was constructed by Lowell Lamb for Milton Soboroff. Electric motor powered, craft is remotely controlled by radio.

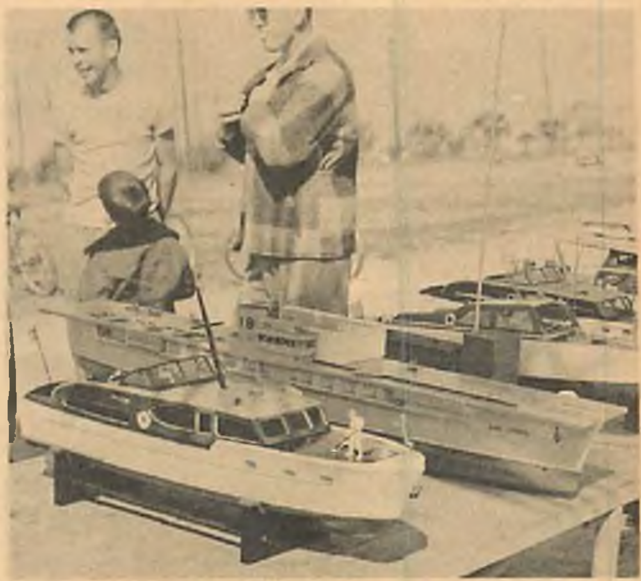


"Capri" by Gene Norman shows off super-structure detail. Design of hull is by Al Wood. Powered with an electric motor working off wet-cell batteries, model is radio controlled.

Although the origin of boat is in doubt, it was rescued from disuse by Frank Kolar and refinished with 25 coats, each hand-rubbed. A New England fishing schooner, rudder is R/C'ed.



A pair of aces by Al Wood. In front is a Revenue Cutter; at rear is a Diesel Cruiser. Both scale, both powered by electric motors, both radio control. Al builds for picture studios.



Deck hand swabbing down the Chris-Craft Catalina pays little attention to radio controlled aircraft carrier, U.S.S. Condor. Transmitter and antenna are objects on deck of carrier.

(Photo #1) Model 2PN Multi-Servo showing modification to neutral contact, which is the one positioned closest to servo motor. Diagram No. 2 shows how contact was altered.

Two channel control box (photo #2). Button at left hand is for elevator control. Button by right thumb operates rudder and engine. Upper (3rd) button works both elevator-rudder.

TABLE OF WEIGHTS
L.W. CRUISER FOX .25 ENG

T-R RECEIVER	5 OZ.
3 MULTI-SERVOS	5
"B" BATTERY	4.5
"C" BATTERY	0.5
"A" BATTERY	2
SERVO BATTERY	3
R/C UNIT, SWITCH, ETC.	4
TOTAL R/C EQUIPMENT	24 OZ.
WING	14
STABILIZER	4
FUSELAGE WITH ENGINE	34
TOTAL READY TO FLY	76 OZ.

Automatic Multi-Control R/C Flying

Some very practical suggestions for achieving sensational results from standard equipment in conjunction with 2 channel tuned relay receiver

By HAROLD deBOLT

Editor's Note: Ever since we first heard of the tuned relay receiver, it appeared to be an ideal stepping stone from plain Rudder-Only control systems up to the more complex Multi's. Since our article on the T-R receiver in the May 1955 issue of ATH, we have received quite a few enthusiastic comments from users, who found that the independent control of rudder and elevator, plus the ability to control both at once as desired, enabled them to really rack a plane around. One user who was taken with the possibilities of this arrangement was Harold deBolt; using his own version of the receiver, which differs in tubes and layout but gives exactly the same controls as the Juenke-Bonner unit, Harold had well over a thousand flights in two different planes—most of them being with a Cruiser, but toward the end of the season, the system was installed in a Champion with equally good results. During the summer, the setup enabled Harold to take first place in seven meets, flying of course in the Multi-Control category. We feel the ideas set forth below will enable other modelers to break into the Multi-Control ranks in a relatively "painless" fashion.

■ What is meant by *automatic* R/C flying? It is simply this: A system by which a great deal of the work connected with the building, flying and maintenance of a multi-control R/C model is taken care of for you by the model itself. It is the result of using a lot of forethought in model design which combines with matching equipment to provide the easiest and simplest way to fly safely with multi-controls. A secondary result in this case: you come up with a combination which will come very close to matching the best flying which can be done with the most complicated rig at less than half the cost in both dollars and time! In a nutshell this is a typical R/C model which has been treated with some new ideas with the result that it can do everything that it could before but in a way that is safer and probably superior in a number of respects.

To take the project out of the nutshell it goes something like this: The heart of it all is the model and its flying speed. Although the things which have come along with it possess some fine features, they were only used to obtain the type of model that was desired. It was felt that the model should not be above *medium size* so as to be simple to use and inexpensive to own. This model should fly at a *slow speed* so as to have good take-off characteristics and to give the pilot time to think while flying it. On top of this the model should be *extremely maneuverable* with the ability to perform any maneuver slowly and smoothly from practically level flight. A lot of work has been done toward this end and the resulting model has been very encouraging and does perform just about as hoped for. In addition some unexpected advantages were gained that to say the least were not anticipated.

A Live Wire Cruiser was chosen for the project as a representative model which would give a good comparison between the old and the new. In analyzing the desired model it was decided that the Cruiser would need a wing loading of 14 oz. per sq. ft. or less if a flying speed of under 20 mph was to be achieved. All previous Cruisers using multi-channel equipment had a wing loading of above 16 oz. This 14 oz. loading meant a total model weight of 4¾ lbs.; with the model minus radio unit weighing 3 lbs. that left only 1¾ lbs. for the complete radio installation. After surveying the type of equipment which was available it was apparent that such a figure could be obtained if we used some of the very latest ideas, even though they were not too well proven. Using some of these ideas plus available equipment a complete R/C installation was assembled which weighs only 1½ lbs. and it does result in the model being more than what was hoped for. It is fairly simple to duplicate it if all this interests you.

The model, not necessarily a L. W. Cruiser, should be of medium size, 4 to 6 sq. ft. of wing area. It should have all the required design features that make a good R/C model, flight control should not be left up to the controls alone. The engine should be slightly more powerful for the model than would normally be used for the model at the heavier weight. This engine should turn the *largest* diameter 4" pitch propeller that it is capable of and still reach 8000 rpm. The reason for this is that a 4" pitch at 8000 rpm will give a flying speed of under 20 mph, yet the large diameter and associated blade area will provide the maximum static thrust necessary to pull the model around in slow speed maneuvers. The prop should be abnormally large in diameter for the engine even if it is necessary to drop back to a 3" pitch. Static thrust will also help the model to take off quicker as it gets the model up to flying

(Photo #3). This Live Wire Cruiser is equipped with tuned relay 2 channel receiver, has rudder, elevator and engine controls. Weighs 4¾ lbs. Wing loading is 14 oz./sq. ft.

Removable R/C unit (Photo #4) includes T-R receiver, 3PN multi-servo for rudder, 2PN modified servo for elevator, 3P for engine throttle. Total weight with batteries is 24 oz.

speed faster. For grass take-offs wheels of at least 3½" diameter are a distinct advantage.

The total flying weight of the model should be such that it provides a wing loading of 14 oz. per sq. ft. or less, actually the lower the better will be the maneuverability. By now it has been proven that it does not require a high wing loading to get penetration; practically the same penetration can be had through basic model trim and by the use of a trimmable elevator. As far as the controls are concerned the model should have rudder, elevator and three speeds of engine. The type of rudder actuator should be so that a second control can be had from it; this would be used to operate the engine. The engine speeds should be low, medium and high. Low for landings and proto take-offs, medium for normal flying and high for peak performance. To get the most from the elevator control it should be trimmable as well as self-centering.

After the model is set the next step is to determine how to operate the controls in the desired manner. There are a number of ways to do this of course, but most of the complex systems would involve too much weight for this type of model. In choosing the equipment it is necessary to consider the whole system in relation to each component rather than to select some one part because it is convenient and then just add the rest to it. One wrong choice could spoil the whole concept. In this case Multi-Servos were choosen for their good power, light weight and low battery drain. Experience has shown that it is very important from the safety factor and for reliability to operate rudder and elevator on two separate channels. Any other control can be used in combination with excellent results. It worked out that a 3PN servo using one channel for rudder and engine control proved very satisfactory. This servo was used without a compensator as shown in Photo No. 1. The 3PN was used to operate a Model 3P as the engine control actuator. The 3P in turn actuated a Bramco throttle which gave the three speeds of engine very nicely. The throttle was connected to the servo through a .040 wire pushrod which will flex and give the needed lost motion.

The trimmable and yet self-centering elevator action was obtained by using a slightly modified Model 2PN Multi-Servo. This is by far the most important servo action needed to get the automatic performance. The modification to this servo is shown in Diagram No. 2. A characteristic of this model servo is that it can be trimmed from a neutral position by using a very short beep of signal. Normally this will give a few degrees of trim in one direction. In this case, however, advantage was taken of this feature and the trimmable portion was expanded. This is done by increasing the "dwell" (number of degrees that the contact is open) of the *neutral* contact on the servo. When the dwell is increased more short beeps can be used and a greater trim range is available. In addition a condition will exist whereby you have two positions to which the servo will neutralize depending upon the control position from which you allow the servo to return from. If you allow the servo to cycle 360 deg. from neutral to neutral, for instance, it will stop at one vertical position, yet if you allow it to neutralize from the 2nd operate position it will return to a vertical position which is just short of the first one. This "neutral" position will be on the 2nd operate position side of vertical.

All this proves to be a distinct advantage if you have the servo mounted so that the first operate position is up elevator and the 2nd operate position is down elevator. With this arrangement you can cycle the servo 360 deg. and arrange the elevator so that this is neutral elevator. Then any time you send one long beep and release you will come back to neutral elevator; your neutral is always instantly available and positive. The second "neutral" position provides a means of having down trim; for this you pulse twice, hold and release. This allows the servo to cycle from the 2nd operate position (down elevator); from this position it will stop at the "neutral" which is short of vertical and on the down elevator side so that you automatically get a down trim condition. From this down trim condition you can use one short beep and get back to neutral elevator or add more beeps to get any up trim that you might wish.

To alter the 2PN servo you will of course have to change

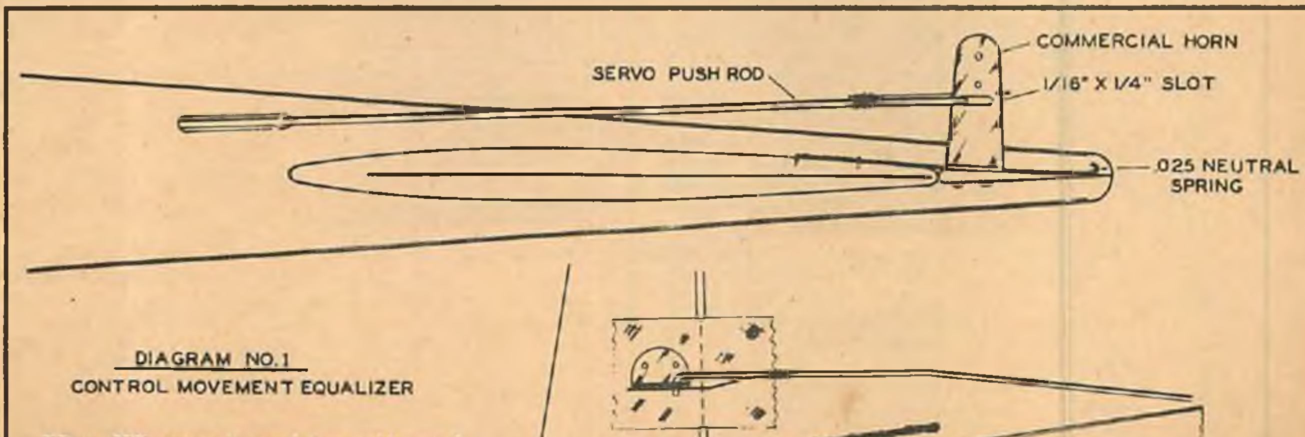
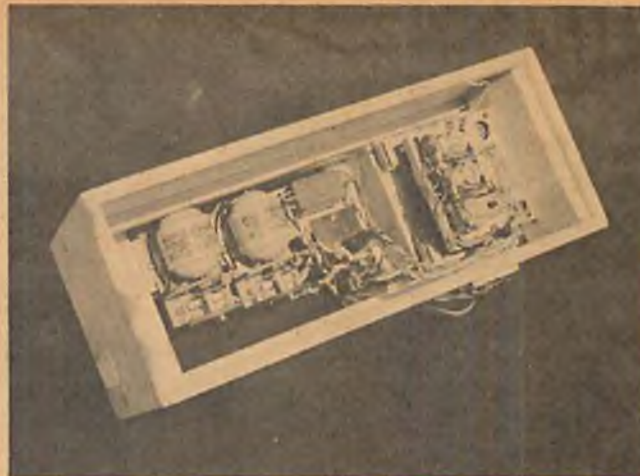


DIAGRAM NO. 1
CONTROL MOVEMENT EQUALIZER

When 3PN servo is used for rudder and engine controls it is not necessary to use a compensator. This modification to a standard rudder horn will equalize the control movements and is much simpler.

This Live Wire Champion is equipped with a C-G 2 channel transistor receiver. Rudder, elevator, engine controls. Wt.: 3 lbs. Wing load.: 11.5 oz./sq. ft. Torp. 15.



Champion's removable R/C unit. C-G transistor receiver, 3PN multi-servo for rudder, 2PN modified servo for elevator, 3P throttle. Wt.: 14 oz.; with engine servo, 16 oz.

R/C FLYING

the factory adjustments, but then too if you use servos you should understand how to take care of them. The most important thing to be sure of when you have made a contact adjustment is that there is sufficient contact tension and pressure after you have finished the adjustment. A simple way to check this is to watch the stationary contact as the servo is operated. If the movable contact has sufficient tension and enough pressure is present the stationary contact will flex every time the movable contact closes against it. It is impossible to get too much tension into the 2PN movable contacts, so the more that the stationary contact flexes the better will be your operation. The correct tension is obtained by gently lifting the movable contact from under the stationary one and bending it back until it will stay at a 90 deg. angle to the base. It then can be gently forced down and into place under the stationary one. If done carefully the tension will then be correct. All contact timing adjustments are made by moving the stationary contact; moving it up causes the contacts to open quicker, moving it down makes the contacts stay closed longer.

The brake is used to control the indexing of the cam when it returns to neutral. If the cam runs past a vertical position when the servo is cycled, a bit more brake tension can be added until it stops in a vertical position. If the cam stops short of vertical when it is cycled, a bit of tension can be removed until it does reach vertical. These adjustments can be made with the careful use of long-nose pliers. After you become familiar with the servo you will find that the complete indexing of the cam can be controlled by a combination of brake tension and contact opening time.

Now we have three actuators of the desired type which will give the control action which we want. It was found that the elevator can be a simple unbalanced affair of generous area. No evidence of jamming has occurred, mostly due to the lower flying speed and non-jamming design of the servo. The rudder was conventional and the engine control was described before.

With the method of operating the controls established it was necessary to choose a receiver which would provide the necessary relays to operate the servos and yet would not be too heavy for the project. In this case two relays would be required and two channels. The receiver which showed the greatest promise at the time was the two-channel Tuned Relay receiver which appeared at the '54 Nats; this was an extremely light weight unit with a low battery drain, just what was needed. With no specific information available, the author with lots of help from others worked out a similar receiver that has been used exclusively to date. Since then YOUNG MEN has published complete data for a similar receiver which for all purposes will do the same job as the one which was used. Otherwise there now are commercial receivers appearing on the market which could substitute very nicely.

The main requirement of the receiver other than the two relays is light weight. To fit the picture it should not weigh over 12 oz. complete with batteries. Most of the receivers which will fill this bill make use of the small subminiature relays, and when these are used the receiver must have some excellent characteristics if the relays are to be reliable. These little relays can do an excellent job, but to do so they require a lot of current. To match the relays the receiver should have a current change that rises from zero up and preferably to 3 or 4 milliamperes at least. The reasons are that they tend to have an erratic drop-out point and also require plenty of operating current in order to have sufficient spring tension to provide the needed back contact pressure.

Relay contact pressure is very important for reliable operation with any type of actuator. Too often it is taken for granted and as a result it can be the little "gremlin" that proves so hard to locate. There always should be sufficient contact pressure on the relay to be sure that there will be *no* contact resistance at any time. A relay may have good pressure on the bench but be close to the minimum; then when it is used with the vibration present in the model there may be contact resistance. Even a few ohms of contact resistance can give trouble with the low voltages that are used for actuators. The T-R type receivers are good in this respect in that they have a current change from zero to many milliamperes in some cases, at the minimum there is plenty.

One of the things which is often overlooked by many modelers is the manufacturers' operating specifications for their relays. It is bad enough that these specifications are given to us for use at 28 volts without our wandering away from them on top of it all. The maker sets up an operating point for the relay which will give us many things, such as correct contact pressures, vibration immunity, greatest sensitivity and other things which may seem trivial but which all add to the performance of the relay. If a relay is used with a receiver whose performance does not match the operating specs for the relay, trouble is certain to occur even though you may get the relay to operate in some manner. Remember that the specs are given for 28 volts on the contacts, hence the better you can match your receiver to the specs the better chance you will have of getting trouble-free performance.

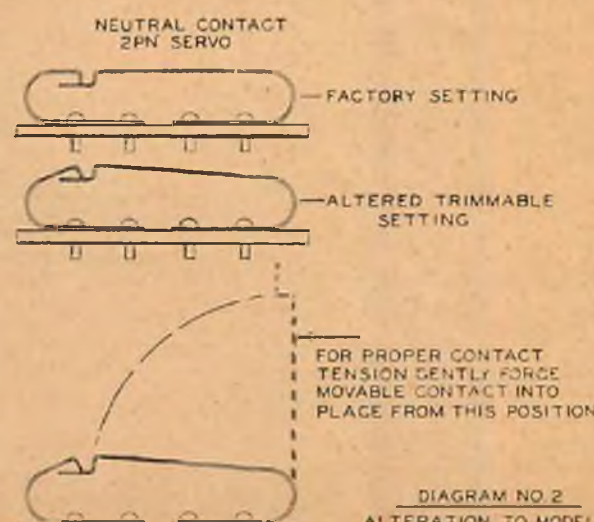


DIAGRAM NO. 2
ALTERATION TO MODEL 2PN SERVO TO ADD TRIMMABLE FEATURES

The batteries which have been used with the T-R receiver have not been the lightest possible by far, yet the weight has been held at 12 oz. A bit of weight has been sacrificed here in order to get a battery complement which does not have to be changed so often, adding safety and cutting work. A unique arrangement is used for the servo batteries which helps to hold the weight down yet gives long life and allows simultaneous operation of the servos without overloading the batteries. This consists of 16 pen cells which are used for all servos; they are wired as shown in Diagram No. 3. The life span of the servo batteries will then more than match the ones used for the receiver.

To operate the receiver a Babcock single-channel transmitter was used originally. Since then a switch has been made to a home-built unit in order to get utility by having three different types of transmitters in one case, this being the only reason for the change. The Babcock was modified so that it would send three tones instead of one. In the Babcock there is a 500 mmfd. condenser which controls the tone; the two additional tones were obtained by adding two more switches that duplicate the original one and yet have another circuit (STDP type). Suitable condensers were placed in these extra circuits so that the original one could be bypassed and a new tone established. By trial and error the capacity of these condensers was determined so that the new ones matched the receiver.

To date all flying has been done with pushbuttons both with the Babcock and on the control box used with the home-built rig. It is hoped that the future will provide sufficient time to work out a "stick type" control box as this would help a lot in the flying. In the photo (No. 2) the button on the right is for rudder and is used with the right hand. The one on the left is for elevator and the third one gives simultaneous operation.

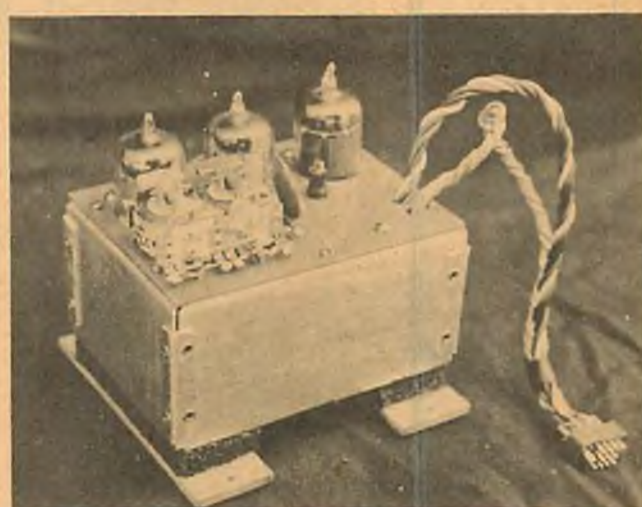
The simultaneous operation comes with the use of a T-R type receiver and is described in the article on the receiver. It has been very reliable as used with this project. With this arrangment when the third button is pulsed and held it gives up elevator and right rudder together. Two pulses and hold gives down elevator and left rudder together.

Probably a more useful feature of the action is that the elevator can be held in any position and the rudder can still be used to steer the model simply by using the third button in place of the regular rudder button. In other words it gives simultaneous controls with the rudder independent from the elevator. Technically what is done is this: The low tone is used for the rudder channel, the high tone is used for elevator. They overlap slightly in the middle. Then a third tone is arranged for the third button which will fall in this overlap and cause both relays to draw current. This third tone is also arranged so that it not only falls in this overlap but it also is of such a magnitude that the combination of it and the high tone will be a correct one for the rudder.

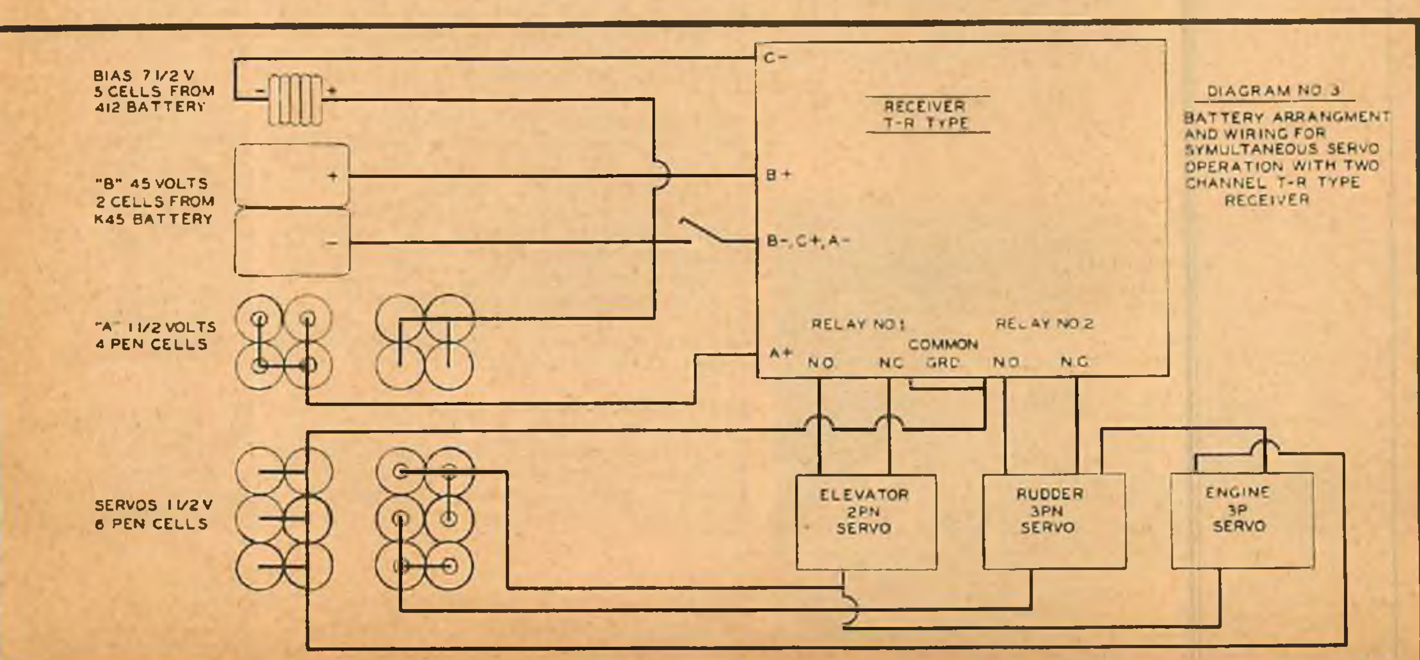
With the equipment all settled, all that is left is to see how it is used. First, in order to get the full benefit from the trimmable elevator the model is adjusted to fly very flat in neutral elevator. This is done with the Cruiser by adding positive incidence to the stabilizer; the ultimate seems to be so that there is about 1 degree of difference between the wing and stabilizer. With such a change the model will fly very flat and quite normal except that it will not stunt very easily on rudder alone. About the only change used is to beep in a slight amount of up elevator for take-offs, climbing and rudder only maneuvers. This gives the same effect as the original setting did. With this flat trim the model will have above-normal penetration and you will be able to cover the ground faster. When you prepare to do a maneuver two beeps, hold and release are given first, which provide the down elevator trim. With this trim the flying speed will build up slightly and you will find it to be plenty for all normal maneuvers such as loops, rolls, etc. There is no need to dive the model at excessive speeds in order to get enough momentum to carry you through a maneuver. It has been found that where consecutive maneuvers are desired it helps a bit if the second pulse is held (down elevator) a bit so that the model actually gets its nose down before you go into down trim. The slight additional speed is sufficient for all consecutive maneuvers.

One of the most likable features of the system is the automatic recovery from maneuvers; you do not have to fly the model out of the maneuvers in order to get flat and level recoveries. The servo does the work for you by returning to the proper trim condition necessary for the recovery. What happens is that by its very nature the servo returns to a trim condition that is suitable for recovery, no matter what the maneuver. When you wish to complete a loop all that is necessary is to release the button at the bottom of the loop—the model comes out flat automatically in spite of the excessive speed. For a vertical dive you hold down elevator on; when released the servo returns to a down trim condition which with the excessive speed built up allows the model to make a gradual pull-out

(Continued on page 70)



DeBolt's 2-channel tuned relay receiver with 4 tubes. Bare wt.. 5 oz.: with box, 6½ oz. A drain, 140 ma.; B idle. 1 ma.: B rise 0-6 ma.: Neomatic relays. 2x3x1¾".



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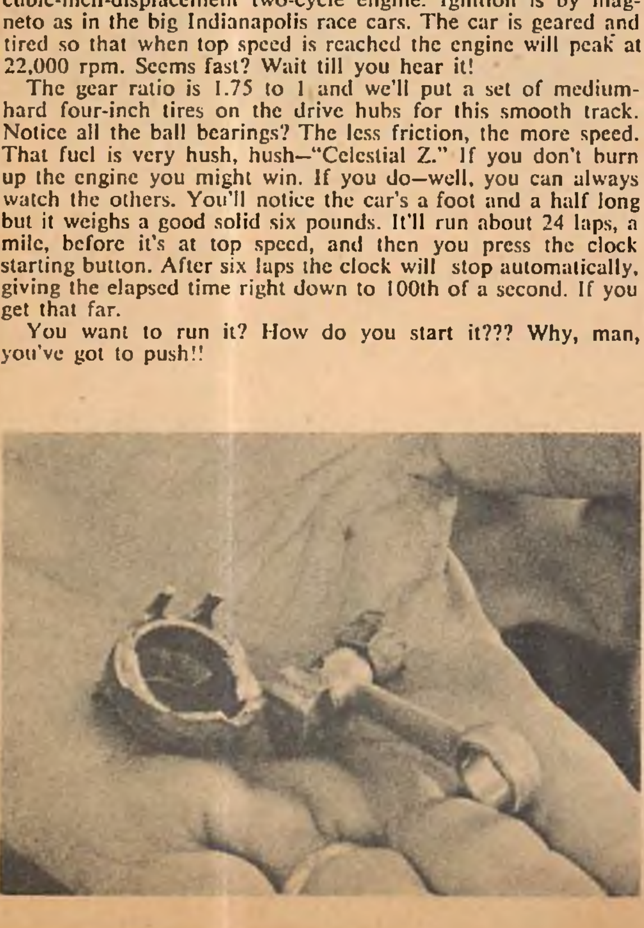
■ Screeching full bore at 22,000 rpm. Booming like a thunderclap at each pass of the crowd. These are the sounds of a model race car hitting 150 mph. In just six seconds it has circled six times, a quarter mile, propelled only by madly spinning wheels. Thrilling? Yes. And it happened not only once but four times during the thirteenth running of the Nationals—1955 edition held at Anderson, Indiana August 11, 12 and 13.

Race with us in the top model car event of the year. Race with us in your imagination. It's our biggest, toughest of the year, so we'll give you something "hot."

Your car like almost all the others is powered by a .601 cubic-inch-displacement two-cycle engine. Ignition is by magneto as in the big Indianapolis race cars. The car is geared and tired so that when top speed is reached the engine will peak at 22,000 rpm. Seems fast? Wait till you hear it!

The gear ratio is 1.75 to 1 and we'll put a set of medium-hard four-inch tires on the drive hubs for this smooth track. Notice all the ball bearings? The less friction, the more speed. That fuel is very hush, hush—"Celestial Z." If you don't burn up the engine you might win. If you do—well, you can always watch the others. You'll notice the car's a foot and a half long but it weighs a good solid six pounds. It'll run about 24 laps, a mile, before it's at top speed, and then you press the clock starting button. After six laps the clock will stop automatically, giving the elapsed time right down to 100th of a second. If you get that far.

You want to run it? How do you start it??? Why, man, you've got to push!!



PRACTICE—WEDNESDAY Prospects for good Nationals weather looked slim. Sky was solid overcast and moving eastward. Earliest arrivals were Easterners Joe Sampias, George Feczko, Sr. and Irwin Stein, all of New Jersey. Realizing the company would be *fast* they were determined to make a good showing. Paterson Joe ran the wheels off his Feczko Proto but never smiled. Constantly grumbled about changing the engine liner. All tried hard to talk him out of it, pointing out that the track was slippery and car was O.K. Didn't look convinced. The quiet Mr. Feczko harbored deep thoughts that bore fruit with each faster run. Friend Irwin's difficulty was one of the most disgusting. Sheared the gear holding pin in the rear axle. Rebuilt rear end and promptly sheared that one on next run. Very long face. Bill More ran his Fox at a reasonably satisfactory 142 but shut off broke. Then the rains came.

All adjourned to Linder's Restaurant for a gripe session. Back again and we took notice of others' misery. Multitudinous woes dogged Doc Cronin. Lowest blow came when flywheel shifted back against the magneto fields. Result—many iron filings. Stein's trouble was diagnosed as a rounded-off axle hole caused by first pin shearing. Needed new axle. Cleveland's Ray Hunter glumly hinted "selling everything." Philadelphia's Al Winter joined the crepe hangers as his weird Custom Proto (magneto mounted on gear box) ground its gears to powder. Ultra fast but now a questionable starter. Day's only good run was Loose's 148. A typical first day—awful!

FIRST QUALIFYING DAY—THURSDAY With a sigh of relief we drank in glorious sunshine. Newcomer Stein turned 139.55 and might be in. Sheared pin number three in process. Hitting 141.96 for his best ever, Sampias was "in" and happy. Said he didn't touch the car that night but it took will power. Bill More, Bethlehem, Pa. never again reached 140. Hunter was still gloomy. Hoosier Kenny Craig, an old-time model car man trying a comeback, did 138.25. May squeak by.

So far speeds were a disappointment and engine room troubles were plentiful. The Kantrows Sr. and Jr. (54 Nat. Champ) and Bob Loose were by far the best, clocking in the 146 to 7 region. Might be prophetic.

LAST CHANCE—FRIDAY Desperation was setting in. Many Anderson Hotel windows had light far into the A.M. That morning we were greeted by smiling faces exquisitely adorned with bloodshot eyes, beautifully framed in purple-blue circles. Stein's answer to queries about his jazzily painted car—Packard Amethyst. The rich, heavy odor of "oil of Merbane No. 5" drifted

That's the way it goes sometimes. Paul Kruse, former record holder, displays piston that got up to 22,000 rpm and then decided to take off thataway!

13TH ANNUAL RACE RESULTS A.M.R.C.A. NATIONAL CHAMPIONSHIPS 1955

Custom Proto Class

NAME ADDRESS	CAR	QUALIFIED	CHAMPIONSHIP
1 Bob Loose, Reading, Pa.	Fox	149.50	151.26
2 Howard Fox, Bethlehem, Pa.	1234	151.77*	151.01
3 Carl Franz, Lafayette, Ind.	Own	144.23	150.25
4 Joe Kantrow, Jr., Detroit	1234	147.78	149.50
5 Jack Wolfe, Lakehurst, N.J.	Fox	147.29	149.25
6 Bob More, Bethlehem, Pa.	Arrow	144.93	147.78
7 Walter Wilson, Jr., St. Louis	Flynt	145.63	147.51
8 Bill Bissman, Mansfield, Ohio	1234	127.66	147.51
9 Al Winter, Philadelphia	1234	143.77	147.54
10 Ed Baynes, Ontario, Calif.	Rouse	136.78	147.30
11 Jack Hines, Toledo	Noward	140.19	147.06
12 Glenn Fairabend, Detroit	1234	144.23	147.06
13 Ray Hunter, Cleveland	1234	141.73	145.87
14 Joe Kantrow, Sr., Detroit	Fox	147.54	145.63
15 Kruse & Sordelet, Ft. Wayne	1234 Davis	146.10	144.46
16 Carl Noward, Toledo	1234	141.96	144.46
17 Joe Feimer, Cleveland	1379	141.69	144.46
18 George Feczko, Bayonne, N. J.	Feczko	145.03	144.00
19 Mel Knell, Urbana, Ill.	1234	143.54	143.77
20 Charles Flynt, Belleville, Ill.	Own	140.19	143.64
21 Irwin Stein, Clifton, N. J.	Feczko	139.55	142.63
22 Buz Kuebler, Evansville, Ind.	Own	143.31	141.73
23 Doc Morris, Muncie, Ind.	Fox	139.32	141.29
24 Bill Cronin, Hartford City, Ind.	1234	139.75	140.63
25 Kenny Craig, Sr., Evansville, Ind.	1234 Davis	138.25	140.19
26 Joe Samplas, Paterson, N. J.	Feczko	141.06	140.19
27 Ken Meyers, Belleville, Ill.	Flynt	139.32	139.10
28 Walter Wilson, Sr., St. Louis	Flynt	143.[illegible]	138.25
29 Red Abrahem, Akron	Own	140.41	131.00
30 Leroy Lehner, Youngstown	1234	138.46	
31 W. S. More, Bethlehem, Pa.	Fox	137.83	
32 Ed Baynes, Ontario, Calif.	Noward	136.78	
33 Earl Oliver, Akron	Fox	136.16	
34 J. B. Armstrong, Evansville, Ind.	Flynt	135.34	
35 Carl Franz, Lafayette, Ind.	Own	133.53	
36 John Carlson, Chicago	Davis	133.44	
37 Bob Bitner, Allen Park, Mich.	1234	132.5	
38 Wm. Wunderlich, New Orleans	Rebel	130.43	
39 George Adriance, San Diego	Fox	128.04	
40 Bill Bissman, Mansfield, Ohio	1234	127.66	
41 Jim Petrakis, Bethlehem, Pa.	Own	127.30	
42 Guy Richards, Akron	Fox	N.T.	
43 Phil Smith, Union City, Ind.	Noward	N.T.	
44 Kenny Craig, Jr., Evansville, Ind	Flynt	N.T.	
45 Mert Jantze, Long Beach, Calif.	Davis	N.T.	

Spur Gear Class

1 Howard Fox, Bethlehem, Pa.	Borden	140.85	143.08
2 Al Winter, Philadelphia	Borden	138.24	138.89
3 Jim Petrakis, Bethlehem, Pa.	Borden	136.35	138.89
4 John Cululi, Bethlehem, Pa.	Borden	127.84	138.04
5 Bill Cronin, Hartford City, Ind.	Borden	127.30	135.54

Custom Sportsman Class

1 Jack Oliver, Akron	1234	136.57	138.46**
2 Earl Oliver, Akron	1234	128.57	136.10
3 Carl Noward, Toledo	Noward	133.14	135.14
4 Leroy Lehner, Youngstown	Fox	129.31	131.30
5 Bob Cornell, Barberton, Ohio	Fox	124.48	N.T.

Class A (OHIO CIRCUIT CLASS—for manufactured cars or pre-1949 custom cars having no chrome parts or fuel shut-off valves. Must be stopped by tripping ignition switch only. Must stop firing within five laps after official timing.)

1 Howard Rassmussen, Cleveland	Arrow	128.03	135.05
2 Ray Hunter, Cleveland	C & R	130.43	130.06
3 Red Abrahem, Akron	Challenger	122.62	126.23
4 Joe Slinkard, Akron	Own	116.43	120.64
5 Charles Hardy, Ontario, Canada	Arrow	114.80	120.43
6 Bill Bissman, Mansfield, Ohio	Fairabend	122.61	N.T.

BB Class

1 Jack Hines, Toledo	Invader	108.56	116.13**
2 Bob Seigmyer, Cleveland	Railton	110.02	109.22
3 Leroy Lehner, Youngstown	Invader	109.48	107.78

Class B (OHIO CIRCUIT CLASS—Dooling F, Invader (aluminum top), Pacemaker and Papina P 3 manufactured cars run in this class when Hornet or old style McCoy powered. May be "hopped up" but no custom made or chrome parts allowed. Shut-off as in CLASS A—ex. within five laps. Ignition type shut off, etc.)

1 Jerry Anderson, Kent, Ohio	Pacemaker	93.84	102.27
2 Bob Seigmyer, Cleveland	Invader	94.43	101.92
3 Red Abrahem, Akron	P 3	99.11	99.55
4 Jack Richards, Akron	P 3	90.72	N.T.

Note: * Tied World's Record. ** New World's Record

Winning Spur Gear car on its way (above) to first place at 143.08 mph. Raced by Howard Fox.

Jack Wolfe and Howard Fox; HF's winning Spur Gear at left. Below is Russ Harter's original twin McCoy .60 g.p. spur and bevel gear front wheel drive. Body is from exhaust pipe shields.

1955 Champion Bob Loose (left) pushes off for his winning run of 151.26 mph. This was in the Custom Proto Class which is the big event in model car racing. Above are typical car boxes, neat and compact design, by Leroy Lehner, Youngstown, Ohio. Tools, fuel and accessories are packed around cars.

CAR CHAMPIONSHIPS

through the pits. Ah, the picture was complete now. *This* surely was the Nationals.

All were here now. Foxy, Petrakis and Wolfe ran. Wolfe posted 147 for fifth starting position. Poor Petrakis wilted as his shut off system let him down. Car kept running "over the hill" until came a sickening grunt as the engine "froze." Car slid to a stop on two flat tires. Fox obviously was after the record. Easily "qualified" at 145.14, he nevertheless continued to run. A notorious dry track car, Fox's "1234" remained in the mid-140's with a screeching "spin out" on his last attempt. Granted a justifiable dry track re-run he eagerly took it and that did it. The Walter Wilson 151.77 mph record was tied.

Then Carl Noward's world blew to pieces. Custom Sportsman Class is his pet baby. Twenty-three-year-old Jack Oliver also likes it. Jack ran just once and had a new World's Record of 136.57 mph, topping his own mark of 135. Contestants shook their heads in amazement—no fuel shut-off valve and no chrome liner. It hardly seemed possible. Poor Carl was crushed like a grape.

Canada was represented! Charles Hardy, Ontario, Canada had entered his immaculate Arrow car in Class "A." Noward, fully recovered now, worked harder to get this car in the race than any of his own and it was worth it. It qualified at 110.70 mph —excellent in its class.

Carl Franz, the craftsman whose standards are perfection, was getting his hard knocks at precisely the wrong time. Since last year's Nats, reports on Carl's sensational Midwest wins indicated he would be *the* tough one. First blow came when the connecting rod broke in his best car, cutting the engine in half. The other car refused to respond and remained in the low 40s.

The word "roach" began drifting through the pits. Turned out to be the name for any car other than Custom Proto—the snobs.

Time was rapidly running out, and the usual last-minute rush began. As the last car took its official run nary a gripe was heard, each man feeling satisfied he had been given ample opportunity.

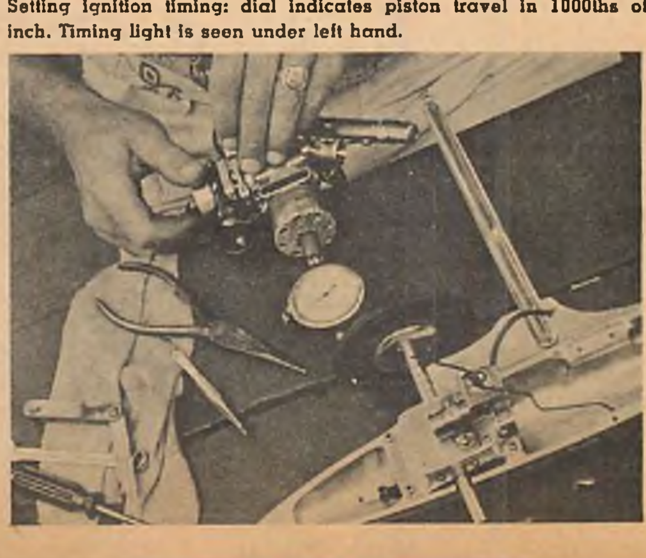
We took a last look at the Official Timing Sheets. Only 60 percent had qualified but, 100 percent had given their utmost effort.

THE BANQUET With the delicious memory of last year's Smorgasbord banquet still in mind, all hands had no trouble arriving at Linder's right on time. Was even better than the '54 feast. It was with excessive wing loading that we carried on with the program. Armed with a bit of Bayou Humor, V.P. Bill Wunderlich took it upon himself to warm up the food-benumbed crowd, saying, "As most of you know I come from the deep South where living is done in a slooow and eeeasy way. This has been evidenced by the way my cars ran here today." He finished by describing the model race car group as the "greatest people in the world." Secretary-Treasurer Carl Noward then awarded Regional Championship Trophies, one of which was to Jack Hines. A big voice from way back loudly exclaimed: "A roach—nothin' but a roach." Jack waved the golden trinket high in the air yelling back: "Then roaches pay off."

The first annual Sportsman of the Year award went to the very deserving Bill Bissman.

Marilyn Simmons appears to approve of the gorgeous Packard Amethyst paint job on entry by Irwin Stein, Clifton, N. J.

Setting ignition timing: dial indicates piston travel in 1000ths of inch. Timing light is seen under left hand.



Jack Wolfe, 14, from Lakehurst, N. J., made lots of friends with his fine sportsmanship and beat most of them with his fast car that turned in 149.25 mph. Navy encourages model car races at its Lakehurst station.

Jack Oliver (above, center) explains to Marva Jean Green, Miss AMRCA Nationals, how he smashed Custom Sportsman record at 138.46. Joe Kantrow, Jr., (above), 1954 Champion, gets clear off the ground as he starts his Custom Proto.

Normally best things are saved till last and this was no exception. Bill Cronin introduced one of the famed personalities of the racing world, the Racing Representative for the Perfect Circle Piston Ring Company, Eugene "Stoney" Stonecypher.

Wise in banquet ways Stoney kept it brief but with a punch. He frankly expressed surprise as to the speeds, technical knowledge and intensity of purpose that the model racing group displayed. He described racing as "sportsmanship from beginning to end" and cited an example of the day's activity that interested him—"this young man suffered two disappointments this afternoon both serious enough to be disheartening, but he always returned from the track smiling although I know there was not a smile in his heart. I believe his name was—Wolfe." He was describing with obvious sincerity 14-year-old Jack Wolfe of Lakehurst, New Jersey.

At Stoney's direction we went to the big meeting room to view Perfect Circle's movie of "Indianapolis 500—1954" filmed by Dynamic. Superlatives would hardly be adequate. We can only say every race fan should see it.

The concluding annual business meeting was of more than routine interest. Subject of serious concern was the scarcity of engine parts (attention: Tom Dooling). Among suggested remedies was a Swedish version of the Dooling .61. Glenn Fairabend felt a serious survey of the current engine market should be made. Officer nomination came next with the names of Cronin and Charlie Flynt raised for presidency. Vice Pres. naming went to Wunderlich and Jolly Joe Feimer. Sec.-Treas. honors (?) went uncontested to Noward. It was wisely moved that new A.M.R.C.A. badges with identifying names be made up. Bill Wunderlich then rose to deliver a message from Atlanta, Georgia Club. It was their formal bid for the '56 Nats.

(Continued from page 70)

"Ooo—what you said!" Californian Ed Baynes must have made critical comment about Jack Hines' fancy car tops based on reaction expressed by Jerseyite Irwin Stein.

Proxy-running all these cars, Red Abrahem of Akron, Ohio, was busier than the proverbial one-armed paper hanger.

Jack Oliver pushes off to a new world's record in Custom Sportsman without chrome liner or fuel shut-off valve.

NATIONAL CHAMPIONSHIP RADIO CONTROL COMPETITION —1955—

LOS ALAMITOS NAVAL AIR STATION LOS ALAMITOS, CAL.

■ Seven consecutive days of good flying weather, over seventy-five nicely built R/C airplanes, a well-organized contest, and the highly competitive interest of the modelers—those are the things that caused radio control to be an unforgettable event at the '55 Nationals.

Each day found higher and higher average scores being made. Under stress of competition, the tendency was for each modeler to make a higher score each time his turn to fly came around. Many flew better than they ever had in the past. Vic Nelson held first place in Rudder Only from Tuesday up until Sunday morning, and Dean Kenny held first place in Multi-Control from Tuesday until Saturday morning.

On Sunday morning, first place changed hands at least five times in Rudder Only. Spot landings became pretty exciting as some contestants made a last fling at high points by triggering a "Kamikaze" dive to the asphalt in an effort to hit the center of the target.

Finally in the last hour of the contest, both Alex Schneider (San Francisco) and Ed Friend (Las Cruces, N. M.) came up from behind to win first place in Multi-Channel and Rudder Only respectively. It is an exceptional achievement for Schneider to have kept a highly complicated airplane flying in such a consistent manner to win the Nationals for two years in a row. His winning flight was 156 2/3 points. Friend made 76 1/3 points to win the Rudder Only event.

The significant thing about Ed Friend winning first place is that he was not only the youngest contestant in the meet (age 17), but also that this was *his first contest of any kind*. Ed started R/C about a year ago and has been completely on his own, because the only other R/C man in his area is just beginning to make his first few flights. Las Cruces is 4,000 feet in altitude and Ed put in plenty of practice flying at home before coming to the Nationals. At the meet he completely crumpled the nose of his ship on Tuesday morning, but did a good enough all-night rebuilding job to make five more high-scoring flights and win the contest. During the week of the contest Ed talked with many of the R/C old-timers and watched their flying. This experience probably contributed to his ability to make such a high score on his final flight. All of which goes to show that radio control is a pretty ripe new field where everybody has a chance to win if he has the determination and ingenuity.

Ed flew a Live Wire Cruiser with a Babcock BCR-3 receiver, Bonner compound escapement, Fox .29 engine, and an 11/4 Top Flite prop. The model weighs 6½ pounds and Ed flies it with the C.G. ½ inch ahead of the location shown on the plans, because he feels that this makes for smoother turns, better wind penetration, and avoids wobbly flight from partial stalls in turbulence.

On an overall average, the standard of flying was very good, the 100 point mark being exceeded on 14 different flights in Multi-Channel. Judging was good and tight, incidentally. In Rudder Only there were 43 flights which scored more than 50 points. "Flyaways" were almost non-existent and most flights ended with the model landing in, or fairly close to, the spot landing circle.

In regard to airplanes, the contestants talked quite a bit about the lack of fresh aerodynamic designs. "They're all getting to look the same" was a thought expressed by many. The new shoulder wing ships by Bonner, Evett, Root, and others were probably developed because of similar unrest last year. They flew nicely but were quite hot to handle and are more "fun airplanes" than contest winning layouts. Should do well at R/C team racing events, though. Modelers are forever seeking something "new and beyond" the present, and we can now expect many to pitch in and develop something fresh.

Two outstanding new ships were the 7½ foot span, seven channel Cubs, by Bob Lenninger (Walnut Creek, Calif.) and Bob Beckman (Concord, Calif.). These had very neat, fiberglass encased radio installations, all sub-miniature parts, control of aileron, elevator, rudder, engine and brakes. Control was such that elevator could be applied simultaneously with any other control. There's no doubt that these ships would have done quite well had they been completed in time for a few months of practice flying before the meet.

As far as radio equipment goes, there was not much that was radically new. However, if the intense discussions are any indication, it won't be too long before some radical new setups become completely operational. Many modelers are experimenting with transistor rigs, all types of proportional setups, pneumatic actuators, even solar batteries.

These R/C gab sessions at the yearly national meet are always as important and as active as the flying part of the contest itself! This year it was true more than ever. There were two or more sides to every issue, including whether

(*Continued on page* 90)

WHAT THEY FLEW IN R/C

■ In the following listings unless otherwise noted, we assume that all flyers were on 27.255 mc., used vertical antenna and pushbutton, and glow ignition. Data has been omitted on well-known commercial radio and control equipment, and on kit model planes now in production. Wing span and wing area of kit and magazine plan model planes mentioned in the listings are: Live Wire Trainer, 48, 432; Live Wire Senior, 66, 750; Live Wire Cruiser, 65, 775; Trixter Beam, 50, 372; Royal Rudderbug, 2, 600; Liberty Belle, 42, 315; Sterling Piper Tri-Pacer, 59, 504; Flying Ohm, 50, 400; R6-B, 60, 540.

Listings are alphabetical, and the data is set down in this order: flyer's name, ham call if any, home city, age and number of years in R/C, model club. Then comes plane name, span, wing area, wing loading in ounces per square foot, engine make and size, propeller diameter and pitch. Last group shows controls available (R for rudder, M for motor control, E for elevator), how they are operated, make of receiver (with tubes and relays used, if receiver is not of standard make), make of transmitter (tubes given, if trans. is own make), power input in watts, type of controls used at transmitter if other than pushbutton. A numeral and letter following this data shows position among the first ten winners—R for Rudder-Only class, M for Multi-Control class.

RICHARD A. ALTIG, Los Angeles, Cal., 23-2, LW Trainer, 16 oz., K&B .15, 9/6. Rudder, Bonner Comp., own receiver (3A5, 1V4, 3Q4, Gem relay), own transmitter (3D6, 3S4), ¾ W input.

DICK AUSTIN, Sacramento, Cal., 32-10, Sacramento Aero Aces. Royal Rudderbug beefed up, 21 oz., K&B .19, 10/3½. RM with Bonner Comp. (engine control not used), C-S receiver, Essco 5 W. trans. 4R

THOMAS BAKER, Los Altos, Cal., 39-5, Pacific R.C. Soc. Orig. high wing cabin plane, 52", 421 sq. in., 14 oz., K&B .15, 10/2. Rudder with escapement, own rec. (RK61, XFG-1), Aerotrol trans.

ERNEST S. BECKETT, Long Beach, Cal., 43-½, LARKS. Beam with lengthened nose, K&B engine with 9/3 prop. Rudder with Bonner esc., Deltron rec., own trans. with two 3D6's, 4 W. input. 2R

OWEN S. BLACK, Sacramento, Cal., 31-6, Sac. Aero Aces. Original plane, 52", 420 sq. in., 15 oz., K&B .15, 10/3. Rudder, with proportional, Southwestern actuator, C-S receiver, own trans. (3D6, 3V4), 4 W. input, electronic pulser.

CHARLES BOYER, Hawthorne, Cal., 34-3, LARKS. LW Cruiser with thin stab. and mod. fuselage, 17 oz., Fox .35, 11/6. RM (motor control not used), Bonner escapements, Babcock single channel equipment, stick control. 5R

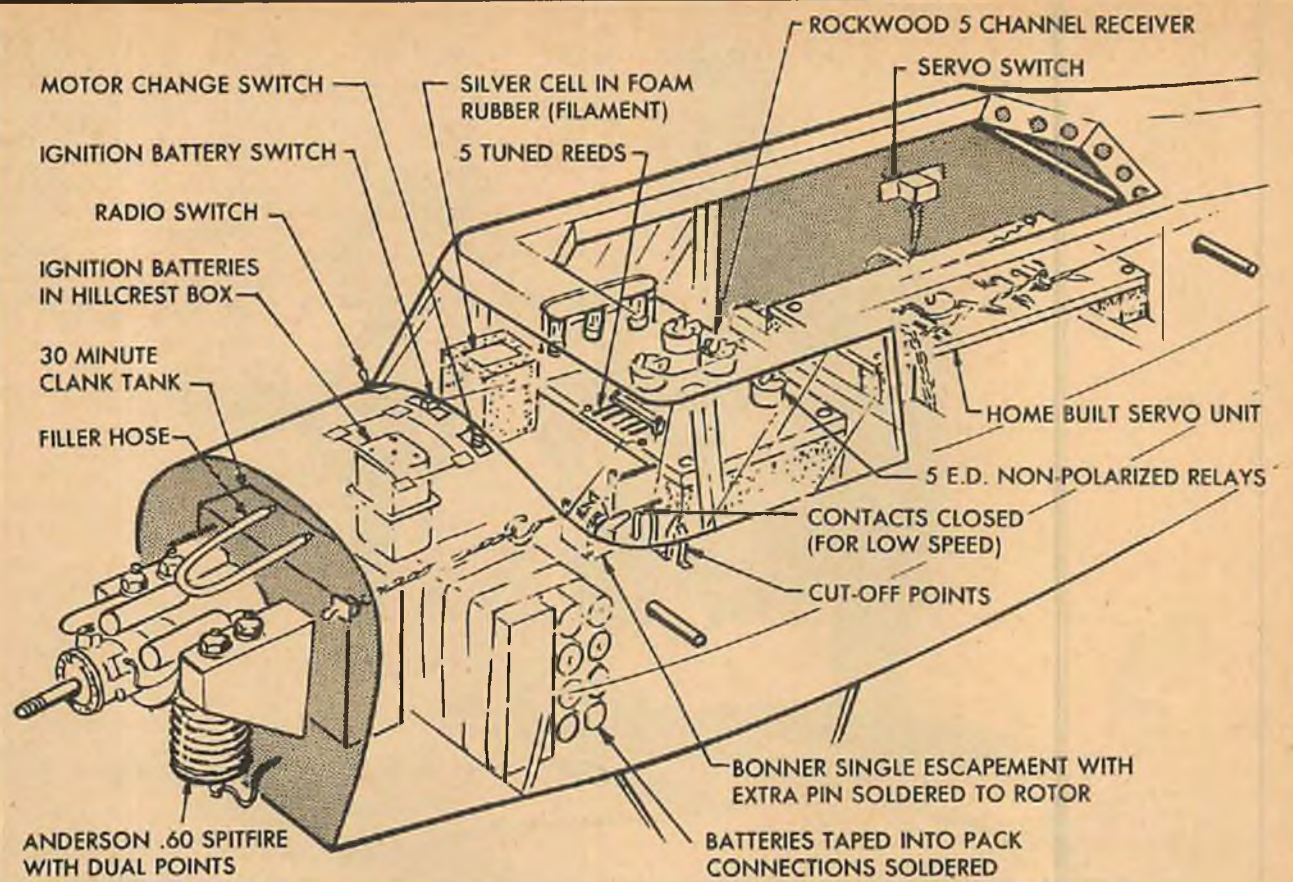
E. J. BROWN, W6JRG, San Diego, Cal., 43-7, San Diego Radio Modelers. Modified CQ, 62", 600 sq. in., 15 oz., K&B .19, 10/6. Rudder on esc., own RK61 rec., own 3B7 trans. on 52 mc., 5.4 W. input, crank-type beep box.

BILL BUTLER, W6JX, Los Angeles, Cal., 60-7, LARKS. Berkeley Royal Rudderbug. Rudder with Bonner standard esc., own receiver (5677, 512, 1V5 Neomatic relay), modified Babcock BCT-2 trans. on 53.6 mc., 1/10 W. input.

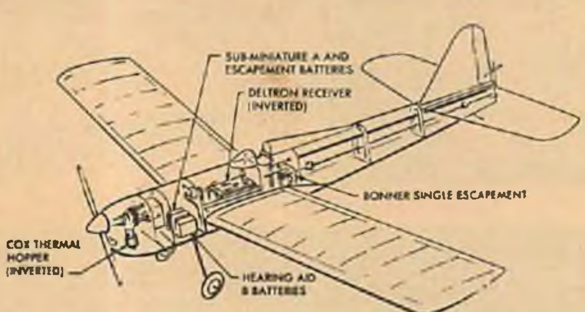
HAROLD CLARK, Seattle, Wash., 25-1, Seattle Radio Aero Club. Original design with 48" span, 365 sq. in., 22 oz., K&B .15, 10/4. Rudder with escapement, Lorenz 2-tube rec., own 6AG7 trans. with 4.8 W. input.

ROBERT COON, Santa Monica, Cal., 31-3, LARKS. LW Cruiser, 19¾ oz., Fox .35 with 11/6 prop. Rudder with escapement, Babcock single channel equipment. L.D. Crisp. Live Wire Cruiser, 128 oz., K&B .35 engine. Bramco reed equipment with RME. 8M

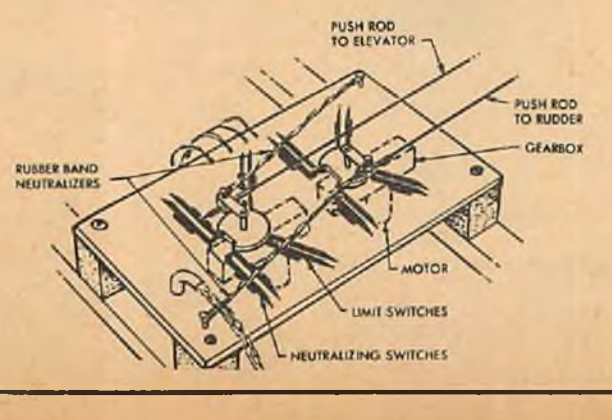
(*Continued on page* 90)

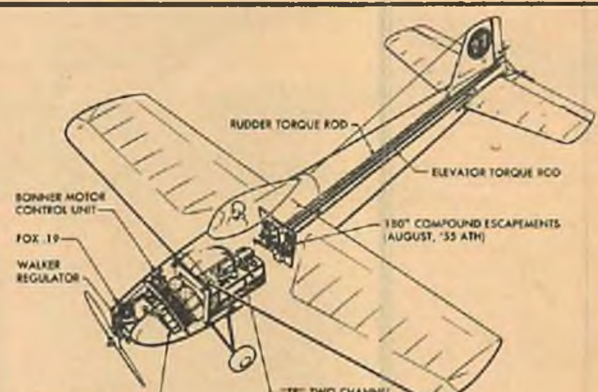


Alex Schneider's beautifully performing Cub won first place in '52, '54, and '55. This year Alex was in third position when he made his winning flight in the last hour of the contest. Performed acrobatics at very low altitudes.

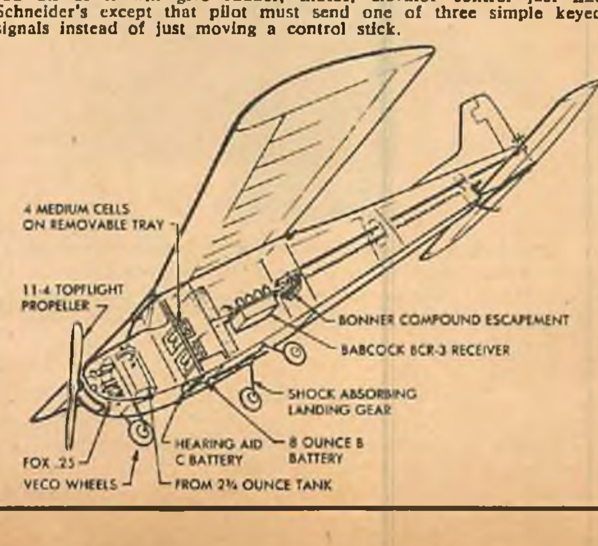


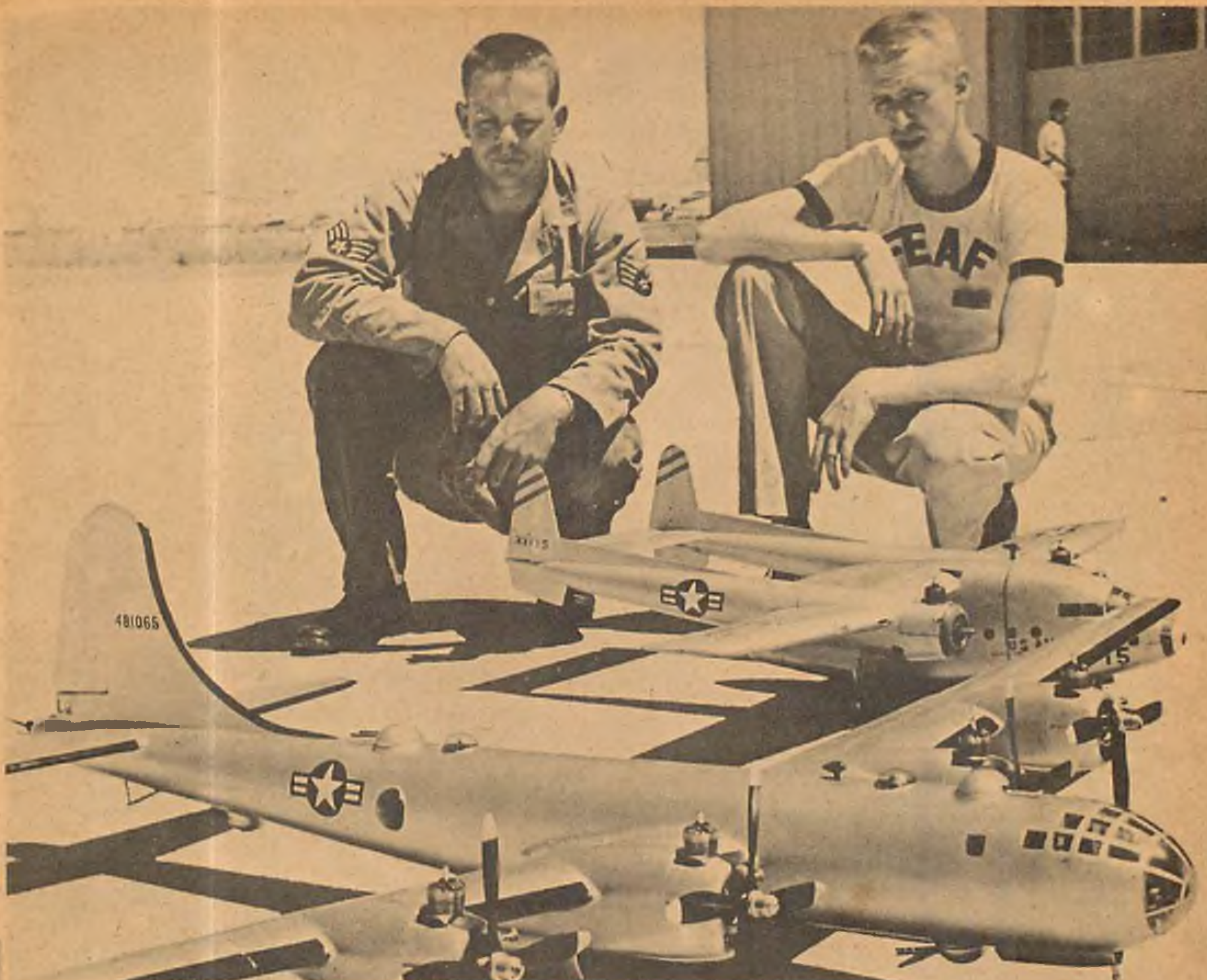
Beautiful Half-A low winger (above) by Robert Forbes of Berkeley, Calif., who arrived late Friday night, gave real wild demonstration of low-altitude acrobatics. Ship would dive vertically toward macadam and make "impossible" snap recoveries. Forbes only stayed for one windy flight. Made 31 points. Small baffles around tank outlet kept engine from sputtering during stunts. Total weight is only 21 oz.! The home-built servo unit (below) on Schneider's ship was typical of those used on most five-channel planes. Alex flew with a small control stick on box, pushed button to change engine speed. Return to neutral switches are energized when signal is off. A perfect system for the pilot but an involved construction project. As more and more good multi-ships appear, competition gets tougher, every year. Quite a few new, fast-flying, realistic, shoulder-wing planes have been developed during last year by Dale Root, Colby Evett, Ray Downs and others (Howard Bonner built one above, right, couldn't compete because he was contest director). In general they flew beautifully but were a little too hot for perfect precision flying, though Evett, Root, got 4th and 5th in multi-channel with theirs.





Live Wire Cruiser (below) flown to first place by Ed Friend, 17. Ed stuck to simple commercial equipment. In contrast to Schneider's complicated airplane one like this is quite feasible for any hobbyist. Simply adding a motor control escapement and running a torque rod off of it will give rudder, motor, elevator control just like Schneider's except that pilot must send one of three simple keyed signals instead of just moving a control stick.





Join the Air Force and enjoy modeling could well be the cry of recruiters today . . . take Bob Lutker for instance

Winner of towline glider event at 1955 AF championships was George Howard who hails from Scotland but nevertheless is a right good USAF'er. George here holds his FuBar free flight entry. At American Nats G.H. got longest traveler award.

A/2C Bob Lutker, world's champion speed flyer, shown with M/Sgt Harold D. Boyer, president of the Wheelus Field model airplane club. Bob started contest modeling in a big way while stationed at this Tripoli, Libya, base of U.S.A.F.

◀ Fred Kantz and Bryant Thompson with their B-29 and C-119. Fred took first in scale in A.F. world wide championships. Bryant was third; his model also shown in "Nats" section.

Kantz again (below) with his Half-A free flight design which features sharply swept wing tips. Engine is fully cowled, stabilizer tips are also swept and drooped. Fine flyer.

Thompson finger-points on his A.M.A. license number (as required in rules) assisted by his wife. His daughter seems to be a little dubious about the whole operation!

Air Force Modeling

By DICK EVERETT

■ The 1955 Air Force Model Airplane Championships was indeed a contest for champions. Blessed by better than average weather for Travis Air Force Base, the contestants were given every chance to fly their ships but strictly to the rules.

Top flying was in the speed events where some very fast time was turned and one record beaten. Piper Mason made fastest time, 149 plus in C, very closely pushed by Jim Nightengale. Very fast time was also turned in A where Robert Riley posted 133 plus, slightly more than Nightengale turned in this event. Proto is where the record was broken—Karl Caldwell turned 95 plus for a very good performance, slowed somewhat by the wind which had come up just prior to his run.

In Half-A there were two runs of over 85 mph by Karl Caldwell and Eddie Vanlandinghan, Caldwell winning out by a narrow margin. Piper Mason also won jet with a very good 145 plus.

Flying scale proved to be a very closely contested event with only 5 points separating 1st and 3rd. As it turned out, Fred Kantz, who was 3rd in scale points with his B-29, flew to enough flight bonus points to beat out Arthur Loughton's P-38 and Bryant Thompson's C-119.

The team racing event was won by Jack Nichols with a very fast 8½ minutes for the 140 laps, while David Yoder and S. W. Christian finished 2nd and 3rd. Bob Chambers, who had won every heat race he was in, had the misfortune of having his lines cut on take-off by another ship to end his chances. In combat Joseph Roslyns, Jr. scored a kill in the first minute to win this event, three fellows tied for 2nd with 40 points, and two others for 3rd. J. E. Scott won stunt, with Don Longhofer 2nd and Bob Thomas 3rd.

There were no real high times in the free flight events due mostly to no one flying early enough; the ships were plenty good. Half-A was probably the closest when Keith Fulmer nosed out Bob Spaulding by .6 second, due to Bob's ship dethermalizing early. There were no fuses allowed which caused some of the guys trouble; Spaulding forgot his fuel when he went out to fly, the time consumed in getting it allowed his dry ice to evaporate, leading to an early pop-up. In hand launch a real good time of 11 minutes plus was turned in by Glen Howard.

Except for Half-A or American Class the PAA events did not have very many entries; only one making a successful flight in Clipper Cargo was William E. Smith, Jr., while Jim Scarborough came through in the International Class. In the American Class James J. Juliano was top man, closely followed by Karl Caldwell and Bob Kozuki.

In A free flight W. J. Godden was first; in B, Bob Kozuki; in C, Charles Kelley. The rubber event was closely contested with Charles Rushing finally winning out, followed by Bob Chambers and Stuart Savage.

Radio Control was very easily won by Arthur Putze who put on a real good flight with his Multi-Control model ending with a perfect on-the-spot landing.

Meet high point man was Karl Caldwell who garnered more than 600 points, almost double his nearest competitor. Karl flew in both the free flight and the U-control events. Some very fine prizes were awarded, topped by Air Force rings for the top 15 men. The first five received rings with a blue stone and two diamonds, the second five rings with just the blue stone, and the third five silver rings.

Typical Air Force modeler is Robert Lutker, 25. He is married and makes his home in Forth Worth, Texas.

Lutker originally planned an engineering career for himself, but switched from engineering to business administration at Texas Christian University after his family purchased a florist shop in 1946.

Among Lutker's additional hobbies have been flying (he has soloed), hunting and boat building. The last named he considers too expensive.

Lutker also stated his reason for joining the Air Force instead of Army, Navy or Marines. The Air Force has a better model airplane program.

He started actual model competition in 1943 and has engaged in well over a hundred events in the past 13 years. Before entering the Air Force, Lutker's competition was confined chiefly to the Southwest where he entered meets throughout Texas and as far north as Kansas. Since '52 he has extended this area to include Denver, Rapid City, Chicago, Wiesbaden, Tripoli, Berlin, and The Hague.

Of all the meets he has competed in and trophies and medals he has won, Lutker believes his most distinct thrill came at the FAI Meet at The Hague, Holland. There, among the cream of international model airplane sportsmen, Lutker staked a small claim to fame by taking first for the United States in the championship speed event.

Sea Going Tug

Five feet long and 12 inches wide, this 60-pound craft is a sensation when it takes to water; Control Master receiver, RCH selector

By RALPH DURRSCHMIDT

■ This model of a sea-going tug is a good example of how a boat can start small and develop into quite a project. The first model was constructed by my father and myself; being quite small I wasn't able to do too much outside of watch and learn. The plans came from a book which I believe was titled, "Miniature Boat Building." These called for the construction to be of wood, but as my father was a metalsmith, the model was made all metal. It turned out a pretty nice boat, but the weighty deckhouse made it somewhat top-heavy. With the installation of the power-plant, which consisted of a homemade single-cylinder double-acting steam engine and a Scotch type boiler, the center of gravity was lowered somewhat. There was sufficient power to make it look realistic and have enough speed.

A few years later I wanted a boat of my own and was told to make it. Using those plans I elaborated on them by making the beam about 2" wider and the length 4" more. The hull was composed of ⅛" brass ribs with copper flashing soldered in strips to give it a clinker-built style, similar to the first model. The engine likewise was a homemade single-cylinder double-acting type and boiler also a Scotch type. Both were somewhat larger and a little more speed was the result. These two boats operated for many years as free running and the smaller one still does; the larger one was converted to R/C and is covered here.

When radio control was first contemplated a different method of speed control had to be used. After trying out various motors I settled on a windshield wiper motor from a car and installed four 2-volt surplus batteries in series. This motor with its rheostat (forward & reverse), plus batteries, rudder controls, selector, receiver and its power supply, 7 relays, and 2 small motors proved to be much too heavy and it drew too much water. After considerable thought and figuring it was decided to cut the boat in half and add a section midships. S gauge track was used as the ribs, with a single sheet of copper flashing on each side as the skin. In doing it this way a smooth section was placed in between the two clinker-built sections. The clinker sections were filled in with auto body solder and then sanded smooth. By inserting this 16" section new superstructure had to be made and other sections relocated to give balance and pleasing lines.

Enough of the construction details and some on operation. There are 10 speeds ahead and astern, but only six are used in the astern direction. After numerous close calls I had to slow the boat down to prevent the water from washing over the stern when going full astern. When the rheostat wiper arm approaches the stop position from either direction a bell rings (full ahead to full astern sounds two bells). The rheostat was homemade as none was available for reversing and controlling this motor, which is shunt wound.

For extra speed 6 volts can be placed through the field and 8 volts in the armature. The rudder control consists of a gear train and it can be set in any position and be returned to center at will. Both rheostat and rudder use reversible electric motors with limit switches to prevent overtravel. These servos were all made up from gears and are mounted with their own relays so that they can be removed as a unit. A surplus stepping relay was reworked to control the speed, direction, right, left and center rudder. There is a smoke generator in the stack and a diesel horn from a toy train in the deckhouse. This horn blows every time that a signal is sent to the receiver, and its relay closes. In this manner it indicates that the receiver is operating properly.

The small figures are plastic miniatures from a toy store. These were painted by my wife to resemble U. S. Navy personnel. The crew consists of the Captain (scrambled eggs and all), three officers, signalmen, helmsman, assorted men on deck pulling lines, swabbing decks, replacements with sea bags, walking, standing and "gold bricking."

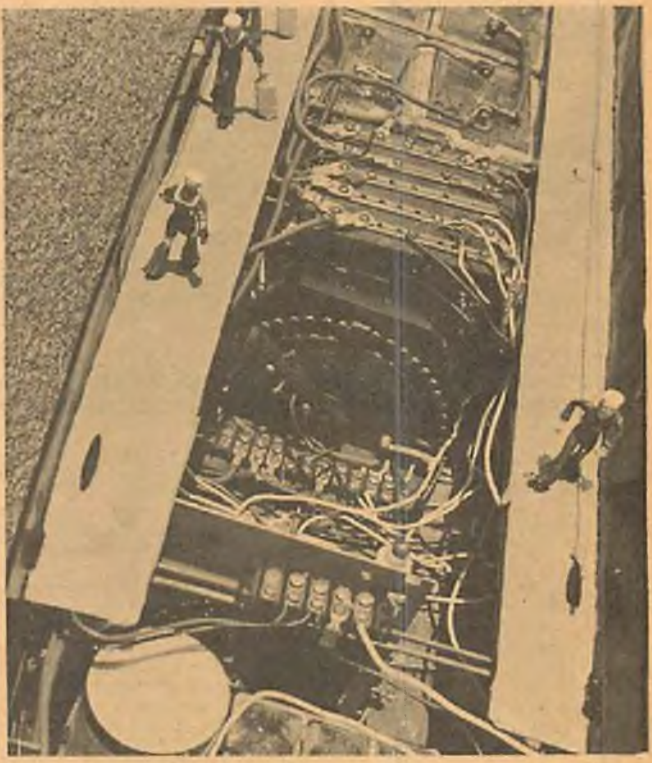
Now to follow a sequence of operation. When a signal

Crew consists of small plastic sailors painted to conform with U. S. Navy ratings. Captain and officers even sport ribbons.

Durability of a well-built model is evident by the long and useful life model has led as free-running and R/C craft.

is sent to the receiver it closes its relay, thereby energizing the horn and stepping relay. The latter when energized moves the wiper arm one contact. Let's say this is the "ahead" contact. This closes a relay whose contacts energize the small rheostat motor in the "ahead" direction.

This motor would turn in the ahead position, causing the rheostat arm to swing and the propulsion motor turns ahead. The bell will sound once when it moves off the stop position. The rheostat arm continues to swing until the signal has stopped or the limit switch stops the control motor. When signal is stopped the receiver relay opens and by spring action another relay, the stepping relay, moves its wiper arm to a dead contact ready for the next signal. The rheostat motor relay opens when the contact at the stepping relay is broken and the rheostat stays in that position. There is a sequence that must be followed in the stepping relay: AHEAD, RIGHT, CENTER, ASTERN, LEFT, CENTER. A 12-position rotary switch at the transmitter maintains the signal in step. A glance at the rotary switch will tell what the next position is coming up or how many signals to transmit before the desired one is reached. When this is done fairly fast the in-between positions or steps don't function at all.



With superstructure removed you get idea of what makes this fleet tug (or cutter) so remarkable. Numerous foward and reverse speeds. Smoke produced by heating coil, oiled rag.

DIRECTORY OF MODEL CLUBS

■ In each "Air Trails Model Annual" is presented a directory of model clubs. This list is maintained through the cooperation of hundreds of club officials across the country. Those clubs appearing here responded to a mail questionnaire. Organizations which do not appear here but are active are urged to register immediately by filling out the listing coupon which appears in this publication.

HOW TO USE DIRECTORY

The contact man's city is the same as that of the club unless otherwise listed after his street address. In some areas where a state line borders a city the contact man may live in another city in the adjoining state. In such instances check the adjoining state's listing.

Under name of club the following abbreviations have been utilized: AC—Aero Club; FC—Flying Club; FMC—Flying Model Club; GMC—Gas Model Club; MAA—Model Aeronautics Association; MAC—Model Airplane Club; MBC—Model Boat Club; MC—Model Club; MPBC—Model Power Boat Club; MRCC—Model Race Car Club; MYRC—Model Yacht Racing Club; R/C—Radio Control; YA—Yacht Association.

Under major activity of club the following abbreviations have been used: A—Model Planes; B—Model Boats; C—Model (Miniature) Cars; RR—Model Trains; the notation (R/C) following any of the preceding means that activity is confined solely to radio controlled craft. Where no designation appears after a club it is understood that the major activity is model airplanes.

Under contact man's address the word "street" is understood unless Ave., La., Pl., etc., appears.

Corrections or changes in listing should be filed promptly. All that is necessary is for the contact man to fill out and mail a new listing coupon indicating that it replaces a current club listing.

DIRECTORY OF AMERICAN MODEL CLUBS

• ARIZONA. *Phoenix* MAC, c/o W. A. Roseberry, 1707 E. "A" St., Glendale. *Tucson* Thermaleers, c/o Edith Downs, 1035 E. 6th. *Tucson* Cholla Choppers, c/o George Knapman, Rt. 2, Box 946.

• ARKANSAS. *Fort Smith* Flight Masters, c/o Bill Minnis, 511 N. 22nd St. *Texarkana* Coffin-Crew, c/o J. F. Barham, 3724 County Ave.

• CALIFORNIA. *Alameda* Aero Modelers, c/o J. S. McFadden, 3544 Redding St., Oakland. *Alhambra* Flying Aces, c/o Chris Christensen, 322 S. Elm. *Bakersfield* Gas Modelers, c/o Francis Stewart, 900 21st St. *Berkeley* Model Yacht Club, c/o Mrs. George Allhowe, 40 Iris Lane, Walnut Creek. *Castro Valley* Flying Clowns, c/o M. L. Kemmerer, 19158 Almond Rd. *Ceres* Aerial Robots, c/o Galen Rydelius, 1666 Margaret Way (RC). *Corona* Circlers, c/o Carl Dunlavy, 610 E. Grand Blvd. *Corona* Model Boat Club, c/o Carl Dunlavy, 610 E. Grand Blvd. (B). *Corona* Model Railroad Club, c/o Terry Ware, 715 Ramond (RR). *Corona* Miniature Racing Assoc., c/o Carl Dunlavy, 610 E. Grand Blvd. (C). *San Diequito* Model Manglers, c/o Charles Seck, Box 131, Del Mar. *El Cajon* Shingle Pushers, c/o R. P. Schauble, 485 Shady Lane (B). *Fresno* Control Liners, c/o Al White, 3678 N. Howard. *Fresno* GMAC, c/o Ocie Randall, 716 Waterman Ave. *Fresno-Moorsto* Power Boats, c/o M/S P. E. Meyers, Jr., 161 Castle Dr., Atwater. Smog Town Prop Twisters, c/o David Cleveland, 6370 Deep Dell Place, Hollywood. *Inglewood* Flightmasters, c/o R. E. Moncrieff, 2108 Santa Fe Ave., Torrance. *La Mesa* Krazy Kruzers, c/o Lynn Knapp, 4220 Bancroft Dr. *Long Beach* Thunderbugs, c/o F. L. Swaney, 527 E. 55th (A, B). *Los Angeles* Thermal Thumbers, c/o Mal Alberts, 6300 Orange. *Los Angeles* Model Hobby Assoc., c/o W. Robertson, 1325 Moncado Dr., Glendale (A, B, C, RR). Southern Calif. Model Power Boat & Yacht Assoc., c/o Al Wood, 3455 W. 6th St., Los Angeles (B). *Los Angeles* Model Yacht Club, c/o Robert Smith, Economy Blue Print Co., 123 S. La Brea Ave. (B). *Mendocino* Model Mashers, c/o Joe Requa, Rt. 1, Box 57B, Willits. *Los Angeles* Sabre Jet Modelaires, c/o H. N. Parker, Jr., 1028 W. 87th St. *Los Angeles* Westchester Wings, c/o Robert Linn, 6600 W. 82nd St. *Los Angeles* LARKS, c/o D. P. Kenney, 733 N. Harper Ave. (RC). *Mar Vista* Cinema Hobby Club, c/o A. F. Bruns, 520 Postal Place (B, RR). *Montebello* Model Manglers, c/o M. H. Brook, 9436 Nan St., Rivera. *Napa* Hells Angels, c/o R. E. Wakerley, 1123 Redwood. *San Diego* Airliners, c/o Harold Ledington, 2645 Hill Dr., National City. *Oakland* Two Cycle Terrors, c/o Dale Root, 6036 Telegraph Ave. *Oakland* Cloud Dusters, c/o Joe Bilgri, 256½ Locust St., San Jose. *Oakland* East Bay Radio Controllers, c/o Don Zacharie, Root's Hobby Hut, 6036 Telegraph Ave. (RC). *Oceanside* Prop Spinners, c/o D. S. Cox, 122 S. Clementine. *Ontario* Valley Miniature Race Car Assoc., c/o E. F. Faynes, 218 Plaza Serena (C). *Richmond* Sky Knights, c/o Lewis Hobson, 444 44th St. *Riverside* Riversidewinders, c/o Dave Paschall, 3609 8th St. *Riverside* Inland MBC, c/o Dave Paschall, 3609 8th St. (B). *Rolling Hills* Tailspinners, c/o David Keach, 9 East Field Dr. *Sacramento* Aero Aces-Skymasters-Skyoneers, c/o Howard James, 5811 Marconi Ave., Carmichael. *San Bruno* Aero-Bats, c/o Don Howard, 699 San Mateo Ave. *San Francisco* Vultures, c/o Bob Rosvold, 1801 Ocean Ave. *San Francisco* Model Yacht Club, 1232 29th Ave. *San Leandro* Line Twisters, c/o Steve Marciel, 596 E. 14th. *San Mateo* Penninsula Prop Twisters, c/o Howard Yonkers, Hobby Haven. *Santa Barbara* Modelers, c/o Stan Hill, 1020 State. *Stockton* Air Devils, c/o O. E. Twilegar, 2514 W. Mendocino Ave. *Van Nuys* San Valeers, c/o Bill Kreeck, 8151 Matilija Ave. *Watsonville* Aerocats, c/o Eugene Rusconi, 224 Locust St.

• COLORADO. *Aurora* Prop Busters, c/o H. W. Elmore, 9820 E. 13th Ave.

• CONNECTICUT. Greater *Hartford* MAC, c/o C. J. Gallagher, 47 Church. *Meriden* Model Manglers, c/o Chet Orrill, 47 Carpenter Ave. *Norwalk* Broad River GMC, c/o Ernest Nash, 111 New Canaan Ave. *Southington* Flite Timers, c/o W. R. Ballou, Stuart Dr. *Wallingford* Lufbery Circleers, c/o T. Koblish, 180 S. Orchard. *Waterbury* Modeleers, c/o Jim Grey, 76 Knollwood Circle.

• DELEWARE. *Wilmington* Los Controllers, c/o C. A. Cantera, 11 Cantera Rd., Augustine Hills (RC).

• FLORIDA. *Clearwater* Screaming Demons MFC, c/o H. M. Georges, 422 Laura. *Daytona Beach* Modelmasters, c/o W. T. Thomas, 105 N. Halifax Ave. (A, B, C). *Delray Beach* Ocean City Modeleers, c/o W. R. Bell, III, 1409 Pine Lane. *Ft. Lauderdale* Gold Coast Modellers, c/o Edward Hecker, 1147 N.E. 2nd Ave. *Jacksonville* Flying Rebels, c/o W. J. Cornelius, 1815 King. *Miami* Tropic Aeros, c/o C. R. Quick, 1896 N.W. 36th. *Miami* Modeleers, c/o Lumley, 9028 N.W. 22nd Ave. *Miami* N. Miami Prop Busters, c/o Robert Henning, 480 N.W. 135th. *Miami Springs* Aero-Bats, c/o J. M. Lehmann, 1111 Falcon Ave. *Tampa Bay* Modelers, c/o L. A. White, 4107 Henderson Blvd. (A, B, RC). *West Palm Beach* AC, J. C. Temple, Jr., 510 Clematis. *West Palm Beach* Cloud Dusters, c/o F. T. Keer, Jr., 3628 S. Dixie Hwy.

• GEORGIA. *Atlanta* West End Eight Ballers, c/o J. W. Wilson, 812 Gordon St., S.W. *Atlanta* Miniature Race Car Club, c/o M. A. Olson, 1340 Randolph Rd., Chamblee (C).

• HAWAII. *Honolulu* Balsa Termites, c/o Ted Freitas, 5361 Keikilani Circle (A, B).

• IDAHO. *Twin Falls* Magic Gas Bugs, c/o Donald Bottcher, 325 Main Ave., E.

• ILLINOIS. *Alton* Cloudhoppers, c/o Bill Hardin, Jr., 8 College Crest. *Belleville* Flying Dutchmen, c/o W. E. Harter, 1011 W. Main. *Belleville* Miniature Race Car Club, c/o Webb Klingenhagen, 721 S. 1st (C). *Belvidere* Flying Clowns, c/o LeRoy Merritt, 526 E. Perry. *Catlin* Flying Knights, c/o Bill Ingram, 56 Paris. *Chicago* Washburne GMC, c/o A. J. Heinmiller, 1225 Sedgwick (B, B, C). *Chicago* RC Club of Chicago, c/o Jerome Johnson, 10805 S. Sangamon. *Chicago* Mite Race Car Club, c/o Fred Hamer, 463 McDowell (C). *Chicago* Aeronuts, c/o Charles Cotich, 3851 W. 62nd Pl. *Chicago* Model Power Assoc., c/o R. C. Palmer, 3405 W. 163rd St., Markham (B). *Chicago* Prop Nutz, c/o Joe Redmond, 5821 S. Artesian Ave. *Chicago* Model Buggs, c/o Merle Brewer, 7650 Irving Park Rd. *Chicago* Universal Hobby Club, c/o George Ricci, 6053 W. Melrose (A, B, C). *Danville* Flying Foolz, c/o Ronnie Byers, 217 E. Fairchild. *Decatur* Hillcrest Hotshots, c/o Jim Wilson 3102 W. Lafayette. *Dekalb* Cloud Dusters, c/o Dutch Hess, 137½ E. Lincoln. *Des Plaines* Piston Poppers, c/o Herbert Swanson, Rt. 2, Box 333. *Elmhurst* Treetown Modelaires, c/o H. L. Weith, Jr., 296 Lawndale. *Galesburg* MAC, c/o Ray Johansen, 181 N. Cherry. *Glen Ellyn* Model R. R. Club, c/o Charles Riedel, 320 Anthony St. (RR). *Marion* Egyptian MAC, c/o E. H. Aikman, 1020 N. Market St. *Oak Lawn* Aero Modelers, c/o K. F. Weber, 5258 W. 90th. *Ottawa* Streator Model Busters, c/o Howard Halm, 920 W. Main. *Paxton* Scorpion Model Engineers, c/o A. H. Werner, Jr., 527 S. Washington (A, RR). *Pontiac* Prop Twisters, c/o Melvin Duchesne, 506 W. Water. *Quincy* Hawks, c/o Harold Daebelliehn, 2020 Ohio. *Rock Island* R. I.-Moline AC, c/o J. J. Murphy, 4105 14th Ave.

• INDIANA. *Connersville* Sky-Hawks, c/o D. G. Carroll, 217 W. 8th. *Evansville* MAC, c/o Bill Paul, 107 Richardt. *Evansville* Model Race Car Club, c/o K. E. Craig, 309 N. Willow Rd. (C). *Fort Wayne* Flying Circuits, c/o P. A. Scherer, 1326 Kenwood (T, B). *Gary* Sky Riders, c/o J. A. Stratton, 3rd, 828 W. 25th Ave. *Greensburg* Knuckle Knockers, c/o C. A. Darnell, 134 N. Franklin (A, B). *Indianapolis* Model Power Boat Club, c/o W. R. Pugh, 6252 Kingsley Dr. (B). *W. Lafayette* Purdue Aeromodelers, c/o Steve Hoadley, Memorial Union. *New Castle* Min. Race Car Club, c/o Russ Harter, 805 S. 20th (C). *Terre Haute* Model Aero Bugs, c/o Ronald Divine, 677 6th Ave.

• IOWA. *Ames* Sundusters, c/o Don Jehlik, 114 S. Hyland. *Cedar Rapids* Twin Motor Club, c/o Robert Netolicky, 2154 Blave Blvd., S.E. (A, B, C). *Sioux City* Hell Divers, c/o Pat Corrigan, 115 Kansas. *Sioux City* Screamin' Demons, c/o J. L. Copple, 908 Moringside Ave. *Waterloo* Prop Twisters, c/o R. L. Petrie, 219 Forest Ave. (A, RC).

• KANSAS. *Almena* MBC, c/o E. D. Sprague. *Goodland* N.W. Kansas Grashoppers, c/o Kenneth Armstrong (A, B). *Great Bend* Circle Dusters, c/o Bob Arnett, Phillips Sporting Goods. *Hays* Flying Aces, c/o D. K. Park, Box 272. *Osawatomie* Modeleers, c/o Howard Myers, 131 Pacific.

Viola Wings-Over-Kansas, c/o Raymond Arrington, Box 344. *Wichita* R/C Club, c/o Paul Slingsby, 2135 S. Parkwood (A, B, C). *Wichita* Wichihawks MAC, c/o R. R. Combs, 8326 E. Gilbert.

• KENTUCKY. *Owensboro* All American Aeronuts, c/o Harvey Denton, 1108 W. 12th.

• LOUISANA. *Alexandria* Flying Pelicans, D. J. Smith, 49 Linda Rd. *New Orleans* AC, c/o W. J. Norman, 336 Baronne. *New Orleans* Model Race Car Assoc., c/o W. E. Wunderlich, 5211 Conti.

• MAINE. *Caribou* Flying Thunderbirds, c/o D. B. Doak, 2 Maple Ave. *Lewiston* Twin City MC, c/o Glenn Dodge, 158 South Ave. *Orono* Bennock School MAC, c/o W. T. Kopp, 39 Mill.

• MARYLAND. *Baltimore* Radio Modelers Assoc., c/o B. B. Paul, 6022 Alta Ave. (A, B). *Baltimore* Controliners, c/o E. J. Durivage, Durwood's, 442 Patapsco Ave. *Baltimore* Model Power Boat Assoc., c/o Andrew Balling, 910 Cooks La. (B). *Bethesda* Klobber Klub, c/o Bob Tabler, 9921 Montauk Ave. *Glen Burnie* Balsa Butchers, c/o F. G. Stroh, III, Freddie's Hobby Fair. *Silver Springs* DC/RC, c/o R. H. Lapp, 9511 Ocala (A, B, RC).

• MASSACHUSETTS. *Boston* Aero Jockies, c/o T. R. Williams, 199 Wolcott Rd., Brookline. *Hyannis* Cape Cod Aeromodellers, c/o W. C. Haberer, Jr., The Hobby Shop, 538 Main. *Lawrence* Air-Istocrats, c/o Willie Sweet, 328 Lawrence. *Needham* MAC, c/o R. J. Smith, 29 Powers. *Norwood* SME, c/o A. L. Trefethen, ·163 Oakdale Ave., Dedham. *Pittsfield* Flying Maniacs, c/o R. L. Elliott, 48 Curtis Terr. *Chiltonville* Rail Club, c/o Arthur Goddard, Warren Ave., Plymouth (RR). *Revere* Jr. AC, c/o Jerome Osgood, 34 Jones Rd. New England R/C Modelers, Modellers, c/ J. K. Ross, 23 Lantern La., Wellesley Hills (RC). *Worcester* Piston Pushers, c/o H. D. Weiss, 54 Trumbull.

• MICHIGAN. *Battle Creek* MC, c/o L. R. Latowski, 30 N. McCamly (A, B). *Dearborn* Circle Burners, c/o G. F. Blass, 921 N. Drexel. *Detroit* Miniature Race Car Assoc., c/o Glenn Fairabend 20242 Russell Ave. (C.). *Detroit* Sky Guys, c/o Jack Josaitis, 9830 Wyoming. *Detroit* Strathmoor MC, c/o W. E. Bartlett, 14515 Asbury Park. *Detroit* Balsa Bugs, c/o Walter Hartung, 14759 Kilbourne Ave. *Detroit* Model Power Boat Club, c/o Charles Baxmann, 2991 Garland Ave. (B). *Detroit* Royal Glo-Liners, c/o Russell Symes, 18489 Hartwell (A, B). *Detroit* R/C Club, c/o Ernie Kratzet, 482 St. Calir (RC). *Milan* Aeromodelers, c/o David Maricle, 148 W. Main (A, B, C). *Mt Clemens* Modelaires, c/o J. F. Held, 14 Hollywood CT. (A, B).

• MINNESOTA. *Mankato* Modeleers, c/o J. R. Anderson, 105½ Hanover. *Miltona* Lake Region Aeronauts, c/o Don Hallgren. *St. Paul* Flying Fools, c/o Loren Turpin, 399 W. Wheelock Pky. *William* Model Manglers, c/o Dennis Opheim, 715 W. 14th.

• MISSOURI. *Brentwood* Chowder, Marching & Guided Missile Society, c/o D. D. White, 8934 Bridgeport Ave. (RC). *Kansas City* Flying Fools, c/o P.W. Asjes, 5313 Ralston. *Kansas City* R/C Assoc., c/o Gene Isom, 8919 E. 72nd (RCA, B, C). *Kirkwood* Thermaleers, c/o Parnell Schoenky, 125 E. Maple Ave. *St. Joseph* Vultures, c/o Floyd Pollock, 1013 Frederick (A, B). *St. Louis* Model Boat Assoc., P. F. Yanczer, 8737 Nashville Ave. (B).

• MONTANA. *Bozeman* Gallitin Valley Propspinners, c/o R. W. Jordan, 407 N. Church (A, B). *Hinsdale* High Flyers, c/o Darrel Christensen, Box 151. *Red Lodge* Airscrews, c/o C. J. Erck, Box 214.

• NEBRASKA. *Lincoln* Aero-Design FC, c/o R. H. Klone, 1212 S. 10th (A, B, RR, RC). *Scottsbluff* Peanut Pilots, c/o Chuck Adkins, 1322 16th Ave. (A, B, C).

• NEW JERSEY. *Atlantic City* Sky Blazers, c/o Paul Atwood, 2 N. Bartlett Ave. *Bridgeton* MAC, c/o R. V. Stonesifer, 220 Atlantic (A, RC). *Denville* Grove Model Power Boat Club, c/o J. H. Kinnecom, 6 Upper Rainbow Trail, Rainbow Lakes (B). *Fair Lawn* Model Manglers, c/o Frank Lundgren, 419 Hartkey Pl. *Freehold* Midget Modelers, c/o John Blain, 54 Jerseyville Ave. *Jersey City* Greenville Aeroneers, c/o E. W. Heasman, 188 Claremont Ave. (A, C). *Linden* MAC, c/o Silveo Colletti, Recreation Commission, Old City Hall. *Millburn* H. S. Modelers, c/o P. G. Fagone, Milburn High School. (A, B, C, RR). *Paramus* Thunderbirds, c/o Jack Fischer, 139 Birchwood Rd. *Parsippany* N. J. Flyateers, c/o Richard H. Palmer, Rich's Hobbytowne, Rt. 46. (A, B, C, RR). *Patterson* Ellison MC, c/o Murray Grossberg, 198 Ellison. *Perth Amboy* MAC, c/o M. J. R. Maciag, Box 133A, Rt 1, Matawan. *Point Pleasant* Balsa Busters, c/o Allen Emley, Bay Ave. (A, B). *Ridgewood* N. J. R/C Club, c/o R. P. O'Neill, 269 Mulberry Pl. (RC). *Trenton* MAC, c/o L. R. Fox, 23 Gerard Rd., Yardville (A, B, C, RR). Trenton Centre MAC, c/o Ken Kurtz , 341 Centre. (A, B, RR). *Union* MAC, c/o C. M. Propst, 1775 Broadway, Rm 2000, NYC. *Williamstown* MC, c/o J. N. Johnson, 116 E. Lois Dr. (A, C).

• NEW YORK. *Bronx* Aeroliners, c/o Martin Skoultchi, 811 Walton Ave. *Bronx* Model Knights, c/o Art Hasselbach, 237 Hosmer Ave. (A, B, C). *Brooklyn* Blue Angels, c/o James Murray, 467 42nd. *New York City* Aeronuts, c/o Richard Tygar, 8706 Ave. A, Brooklyn. *Brooklyn* Skylarks, c/o Robert Davey, 3908 Ave. J. *Flushing* Island Aero Knights, c/o Skip Feldmann, 177-03 Union Turnpike. *New York City* Night Owls, c/o A. Nechetzky, 954 Hoe Ave. *New York City* Bee's Aces, c/o Bernard Eiferman, 887 E. 178th. *Corning* Flying Sparks, c/o Pete Bliss, 47 Corning Blvd. (RC). *Farmingdale* Republic Aviation Model Society, c/o A. F. Wardell, Republic Aviation Corp. *Goshen* Gremlins, c/o George McFinnis, 144 Murray Ave. (A, C). *Ithaca* Model Squadron, c/o C. F. Phillips, 316 Park Pl. *Lockport* Flying Dutchmen, c/o J. C. Griggs, 220 Elmwood Ave. *Merrick* Nassau Circle Burners, c/o David Kingman, 102 Marion Ave. *N. Tonawanda* Flying Bisons, c/o Howard Thomas, 47 Stenzil. *Rome* Optimist MAC, c/o E. B. Ringdahl, 1700 Blackriver Rd. *Syracuse* MAC, c/o H. C. Copeland, 101 Lincoln Ave. *Syracuse* Sky Knights, c/o W. E. Kenyon, RFD 2, Manlius. *Westbury* Modeleers, c/o Scott Lewis, 85 E. Cypress Ln. *Westchester* RC Club, c/o Max Pruner, 20 Harwood Ave., White Plains. *Yonkers* Glo-Devils, c/o Earl Symonds, 108 Highland Ave.

• NORTH CAROLINA. *Carthage* Tree Top Terrors, c/o W. F. Boing, Martin St. (A, B). *Greenboro* Prop-Twisters, c/o W. H. Bunting, 311 S. Elam Ave. (A, B). *Ronoke* Rapids Rebels, c/o Keith Dobbins, 824 Monroe. *Salisbury Aeronauts*, c/o R. N. Corelle, 834 Fairmont Ave. N. C. R/C League, c/o R. N. Corelle, 834 Fairmont Ave. (RC).

• OHIO. *Akron* Miniature Race Car Assoc., c/o Ralph Abraham, 118 Washington Ave., Cuyahoga Falls (C). *Canton* Water Beetles, c/o D. J. Hickman, 517 34th St., S.E. (B). *Canton* Stark R/C Aero Modelers, c/o A. H. Alexander, 1442 Brooklyn Ave., S.W. (A, B). *Celina* Flying Hornets, c/o Keith Eblen, 102 Summit. *Chillicothe* Fly Guys, c/o Gene Osborne, Rt. 8. (A, B). *Cincinnati* Aeromodelers, c/o G. A. Vogeler, 2873 Carroll Dr. *Cincinnati* Control-Liners, c/o J. M. Kaeser, 6897 Kenwood Rd. *Cleveland* Model Race Car Club, c/o J. B. Felmer, 3439 W. 63rd St. (C). *Cleveland* American Airlines GMC, c/o H. D. McCall, 2056 W. 91st. *Cleveland* Lake Erie GMC, c/o J. M. Grega, 355 Grand Blvd., Bedford. *Cleveland* SME, c/o J. H. Arnold, 14308 Superior Rd., Cleveland Heights. *Columbus* North American Aeromodelers, c/o Kenneth Johnsen, 797 S. Weyant Ave. *Columbus* Model Flyers, c/o Roy Vine, 927 19th Ave. *Dayton* Buzzin' Buzzards, c/o H. L. Roe, 3306 Harvard Blvd. *E. Palestine* Skywolves, c/o Edward Seidel, Jr. 289 S. Market. (A, B, C). *Findlay* MAC, c/o R. E. Rensch, 1121 Board Ave. *Hamilton* AC, c/o R. H. Hacker, 1451 Park Ave. *Lakewood* Flite-Masters, c/o Dawson McQuillan, 13407 Clifton Blvd. *Lancaster* Skylarks, c/o M. Clark, 721 Spring. *Medina* Glo Bugs, E. A. Morton, 534 N. Broadway. *Portsmouth* Thermaliers, c/o Thomas Smith, 1236 Gallia (A, B). *Salem* Baker's Dozen MC, c/o Edward Ferko, Georgetown Rd. *Shelby* Balsa Buzzards, c/o H. L. Robinson, Shelby Pure Milk Co. *Springfield* Strato-Hawks, c/o G. L. Wiles, 220 E. James St., Bradword. *Toledo* Model Race Car Club, c/o Carl Noward, 1384 Merdan Ave. (C). *Wauseon* Knights, c/o H. B. Barnes.

(*Continued on page* 82)

If your Club is not listed register NOW!

Be sure that an official of your model club fills out this form and mails it immediately to Air Trails Model Annual so that your group can be included in the master Directory listing. When changes occur or corrections are in order send in a new registration form indicating that it replaces an existing listing. This ATMA list is used by many sponsors to notify clubs of coming competitions and special events.

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Club specializes in (check) ☐ Model Planes
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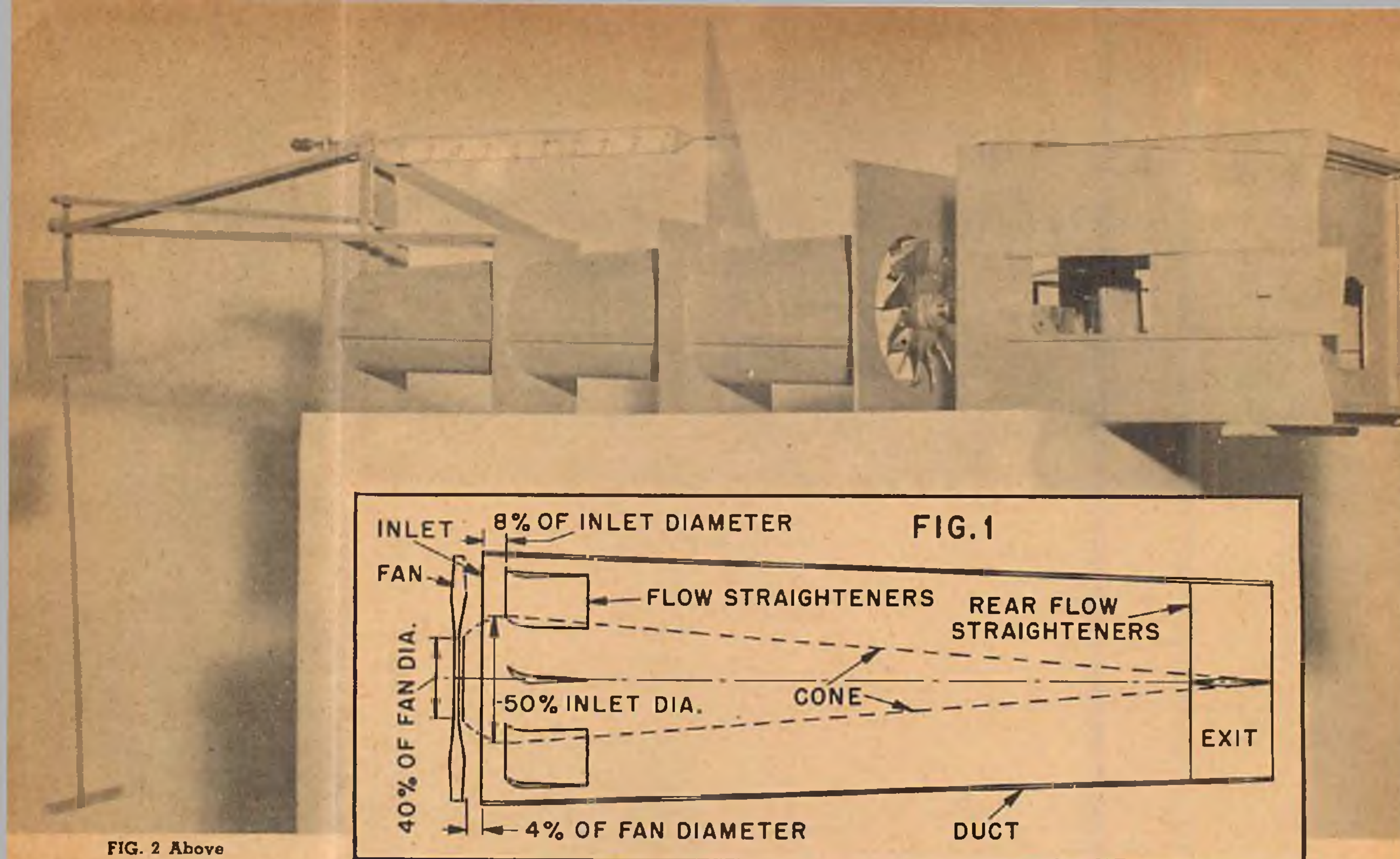


FIG. 2 Above

There's Nothing Mysterious About Ducted-Fan Models!

By WAYNE A. SCHINDLER

■ After studying the various articles on ducted-fan propulsion and finding little useful information for converting to individual use, we decided to set up a series of experiments that would show us exactly how to go about designing a practical system.

The first step was to decide on the general type of ducted-fan propulsion to use – the wing root intake system or the straight-through system. Since most present-day jet aircraft have wing root intakes, we decided to develop a system that utilized these intakes. This would enable us to keep the nose of the model free for radio control equipment on a larger model. This system could also be used for U-control scale or Navy Carrier Event models or Half-A free-flight scale craft.

Definitions of the terms to be used are necessary to eliminate any misunderstandings (Fig. 1).

Duct–the thrust tube used to concentrate and direct the flow of air after it leaves the blades of the fan.

Exit–the duct exit out of which flows the accelerated air.

Inlet–the entrance of the duct tube into which the air is forced by the fan.

Intake–the exterior air intake areas which feed the air into the fan.

The first step in designing the test unit was to determine the most efficient exit-to-inlet ratio of the duct. Four ducts were built having a constant inlet diameter and a varying exit diameter for each:

One with a 2½" exit and a 4" inlet, ratio .67 to 1
One with a 3" exit and a 4" inlet, ratio .75 to 1
One with a 3½" exit and a 4" inlet, ratio .87 to 1
One with a 4" exit and a 4" inlet, ratio 1 to 1

Using a 3⅞" diameter, twelve-bladed fan turning at 8,500 rpm, the thrust output of each tube was measured and it was found that the .87 to 1 ratio produced a 15% increase in thrust over the others.

The test stand shown in Fig. 2 was built using this ratio. It included a removable intake hood with variable intake slots at the sides and front and a balance system to record the variations in thrust. A damper system had to be added to the balance unit to reduce transmitted vibrations so accurate readings could be taken. This is the arm dropping from the balance baffle to a pan of water.

All of the preliminary tests were made with an electric motor turning at 8,500 rpm to simplify testing procedure, keep equipment clean and maintain a constant speed. To double-check the speed, a tachometer was used and variations were corrected with a potentiometer. All final tests and checks were made with glow engines as indicated.

The following preliminary tests were made without the intake hood. The first was to determine the efficiency relationship between a rough interior and a smooth interior of the duct. A 10% increase in thrust was noted with the smooth surface. Have the surface as smooth as possible for maximum results.

The next test was to find the most efficient position of the fan relative to the duct inlet. With the fan at the edge of the duct inlet, a constant was obtained with which the other positions were compared. With the fan completely within the duct, the thrust dropped off 25%. With the fan 4% of its diameter outside the duct inlet, the thrust was increased 34%. With the fan 8% of its diameter outside the duct inlet, the thrust dropped 5% below the constant.

The next step was to test the effectiveness of various blade angles. Four tests were made with blade angles ranging from 20 to 50 degrees. The 30 degree blade angle produced the best results, with the 20 degree angle next best. A check was made with smoke streams to try to find the cause of the drop in thrust at 40 degrees. Figures 3 and 4 show what happened. Notice that in Fig. 3 the smoke is drawn directly into the ends of the 30 degree blades and that in Fig. 4 the smoke is being blown away from the ends of the 40 degree blades. Air was drawn into the front of the blades in both cases, but the higher blade angles caused the blade airfoils to stall and spill the air off the tips, thereby reducing the amount of air being forced into the duct.

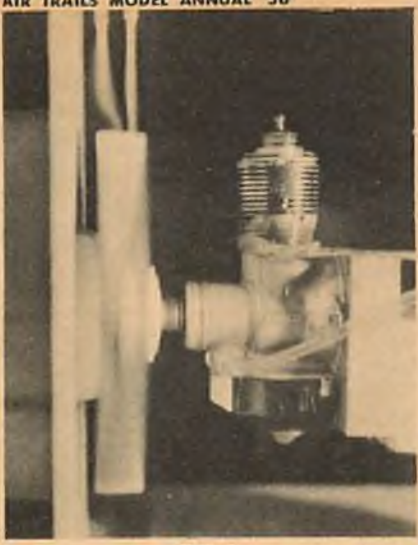


FIG. 3

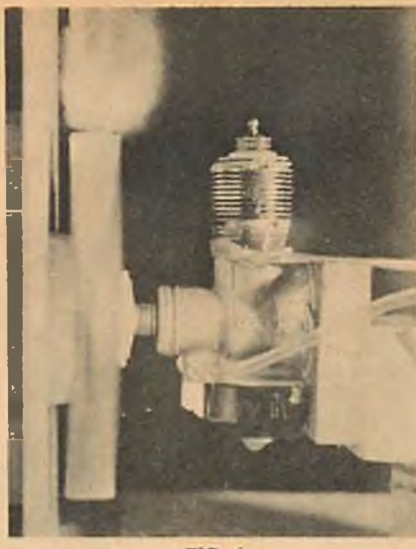


FIG. 4

FIG. 7

These tests were later run again with an Arden .09 turning at 13,000 rpm and the same results noted, showing that the blades really weren't stalling at high angles but were acting as paddles, throwing the air off the tips.

A series of tests was run on eight different fans, each having different blade areas and diameters. The proper fan-diameter to exit-diameter was found to be 1.3 to 1 and the blade area 1.2 times the exit area.

To put this in simpler terms, the following relationship was worked out to get the proper blade area and diameter with the exit diameter known (see Fig. 5). This fan shape was decided upon because of the higher thrust output and the higher blade speed near the tips. The center or hub section of a normal fan produced relatively little thrust. Later we shall see how the hub of the fan shape chosen was altered to increase thrust.

Having determined the most efficient basic relationships of the duct unit and having boosted efficiency 44%, we made the following tests to find the best air-intake-area to exit-area ratio. A graph (Fig. 6) was drawn and the various percentages of intake area calculated so that the intake slots could be adjusted to match these areas. The graph shows the results of the tests using a constant fan speed of 8,500 rpm. Another test was made using the Arden .09 at 12,000 rpm with the same relationships and gave practically the same results.

The thrust increase is proportional to the intake area increase from .8 to 1.8 times the exit area. Therefore, the minimum intake area should be not less than 2.0 times the exit area and the maximum area should not exceed 2.4 times.

Aside from this, it was found that special intake ducts or tubes to direct the flow of air to the fan blades did not increase the thrust output enough to merit their use. Plain holes in the sides of the fuselage are easier to build and just as efficient. Also, with the air intakes just outboard of the engine position, no special cooling duct was needed. As Fig. 7 shows, the smoke is drawn straight in from the sides of the fuselage (air intakes) to the engine and then rearward to the fan blades. This provides sufficient cooling for the engine.

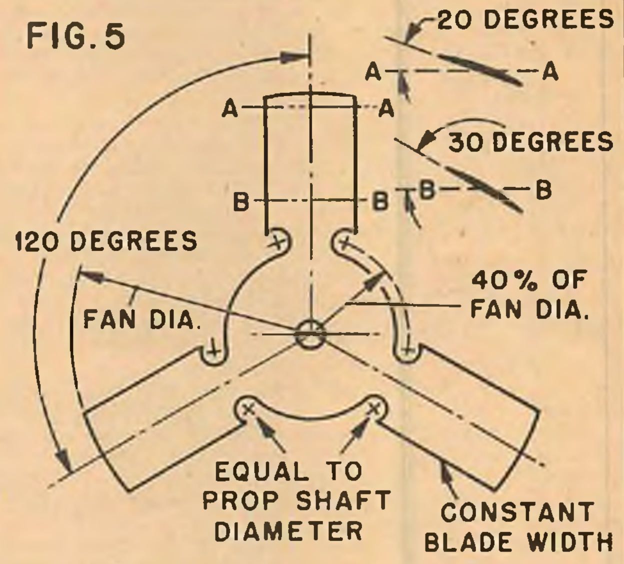
We had planned on using a center smoothing cone back of the fan to smooth out the flow of air. Before testing this cone, it was decided to determine the effect of flow straighteners on the thrust output. A six-bladed straightener (Fig. 8a) was installed just inside the duct inlet and the thrust difference measured. We had expected only a small increase in thrust. A *300%* increase was measured.

If flat flow straighteners worked so well, how about cambered ones? A camber of 20 degrees was built into the straighteners (Fig. 8b) so that their leading edges met the flow of air off the blades of the fan. This resulted in an increase of 20%. Next, 40 degree camber straighteners (Fig. 8c) were tried. This test produced an increase of 5% over the 20 degree camber. Adding these figures shows that the use of 40 degree cambered straighteners (Fig. 8c) produced a thrust increase of 325% over the thrust obtained without any flow straighteners.

Experimentation showed that the depth of the straighteners had to be at least one-third of the diameter of the duct inlet and that the curved portion nearest the fan blades was 25% of this depth.

After the tests on cone shapes were completed, further tests on flow straighteners were made and will be discussed later. The basic shape of the cone was determined by rotating the fan at slow speed in open air and blowing smoke through the blades. The smoke, after passing through the blades, formed a cone about four inches long and two inches in diameter. This was

FIG. 5



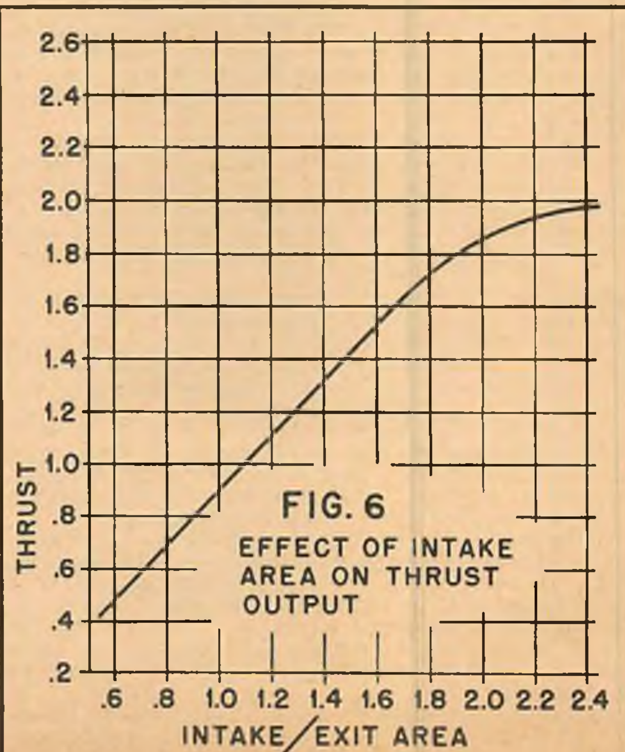


FIG. 6
EFFECT OF INTAKE AREA ON THRUST OUTPUT

8A

8B

8C

the shape of the first cone tested (Fig. 8d). This produced a thrust increase of 25%. A new cone was constructed with a fillet extending out the front of the duct tube to the hub of the fan (Fig. 8e). It produced an additional increase in thrust of 24%. By moving the cone 8% of the inlet diameter inside the inlet, thrust was increased another 10%.

Continuing along this line, another full-length cone was constructed with the fillet at the front (Fig. 8f). With the same adjustments as on the other tests, an additional thrust of 5% was recorded. The final cone was the length of the duct tube. Then, as shown in Fig. 8f, four additional flow straighteners were added at the tip of the cone with a resulting increase of 12% in thrust output.

At this point, the end of this series of tests, it may be interesting to see just how much thrust output has been increased over the figure obtained at the beginning. The original thrust output reading was 2.7 and the last reading was 22.9, an increase of over 840%.

Here is a summary of the information obtained, laid out in the order necessary for planning your ducted-fan model:

(1) A side view drawing of the proposed model should be laid out first. With this, you can determine the largest duct exit diameter possible; this can be enlarged in size because most scale models will leave the duct exit diameter too small for practical operation. With Half-A engines it should be 2¼" to 2¾"; with .09 engines it should be about 3½"; and with .19 engines 4" to 4¾". We found that the volume of airflow through the duct was more important than the speed of this airflow. Therefore use the largest duct exit diameter possible with a given engine and plane combination.

To determine the size of engine to use with your model, apply the same methods used for conventional propeller-operated models. This system has very nearly the same efficiency as a propeller. You see in Figure 10 a 30-inch Grumman Panther that was built using this data. The model had a 1¾" duct exit and flew very well with a K&B infant engine although its weight was over 8 ounces.

(2) Next, the inlet diameter should be 1.2 times the exit diameter. The length of the duct is not critical and is determined by the placement of the engine. The fan diameter is 1.15 times the exit diameter, slightly smaller than the inlet. See Fig. 5 for other dimensions. The fan position is such that the trailing edge of the blades are 4% of the inlet diameter outside the inlet. See Fig. 1 for general layout. Blade angles must not exceed 50 degrees. Start with 25 degrees and increase if necessary.

(3) The cone diameter should be one-half the diameter of the inlet and its length should be equal to the length of the duct. The front fillet on the cone should extend out the front of the opening (duct), tapering to the hub of the fan. The six flow straighteners should be mounted on the cone so that when installed in the duct they are 8% of the inlet diameter inside the duct.

The depth of the flow straighteners should be one-third the diameter of the inlet and the curved leading edge 25% of this depth, with a curve of 40 degrees opposite the angle of the blades. The four rear-flow straighteners are attached to the tip of the cone and have the same depth without the curved leading edge.

(4) The intake area should be between 2.0 and 2.5 times the exit area. Enlarging the scale root intakes of the model is not enough. Additional intake area on the sides of the fuselage is necessary to get proper intake area. This can be covered by coarse screening and lightly doped for camouflage.

Place the engine approximately even with the wing root intakes for maximum cooling. Figure 9 shows a closeup of our model used in the tests and the arrangement of the parts. Small horizontal and vertical vanes fitted in the exit of the duct can be adjusted to control the thrust direction.

With this data incorporated into your design, you are all set to begin construction with the assurance that you will have a carefully-engineered and efficient model.

The author would appreciate receiving any comments and experience from anyone building a model along these lines. Write in care of this magazine.

8D

8E

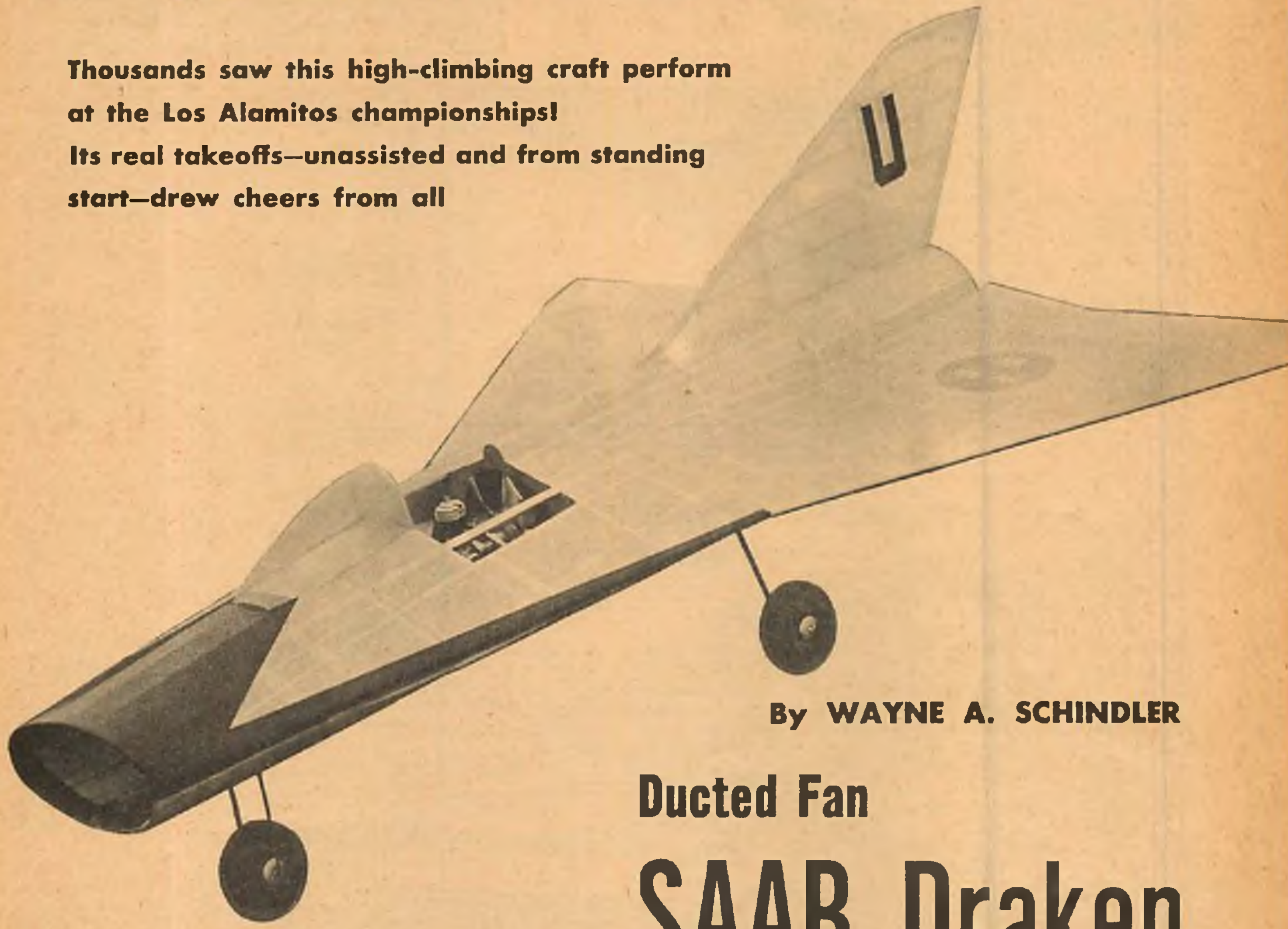
8F

FIG. 9 Above

FIG. 10 Below

THE FLYING SENSATION OF THE NATIONAL CONTEST!

Thousands saw this high-climbing craft perform at the Los Alamitos championships! Its real takeoffs—unassisted and from standing start—drew cheers from all



By WAYNE A. SCHINDLER

Ducted Fan

SAAB Draken 210

Free Flight Scale Plane

■ Study the drawings and read these instructions carefully before beginning construction of this model. It is necessary that you follow the step-by-step procedures as outlined to eliminate engine installation problems.

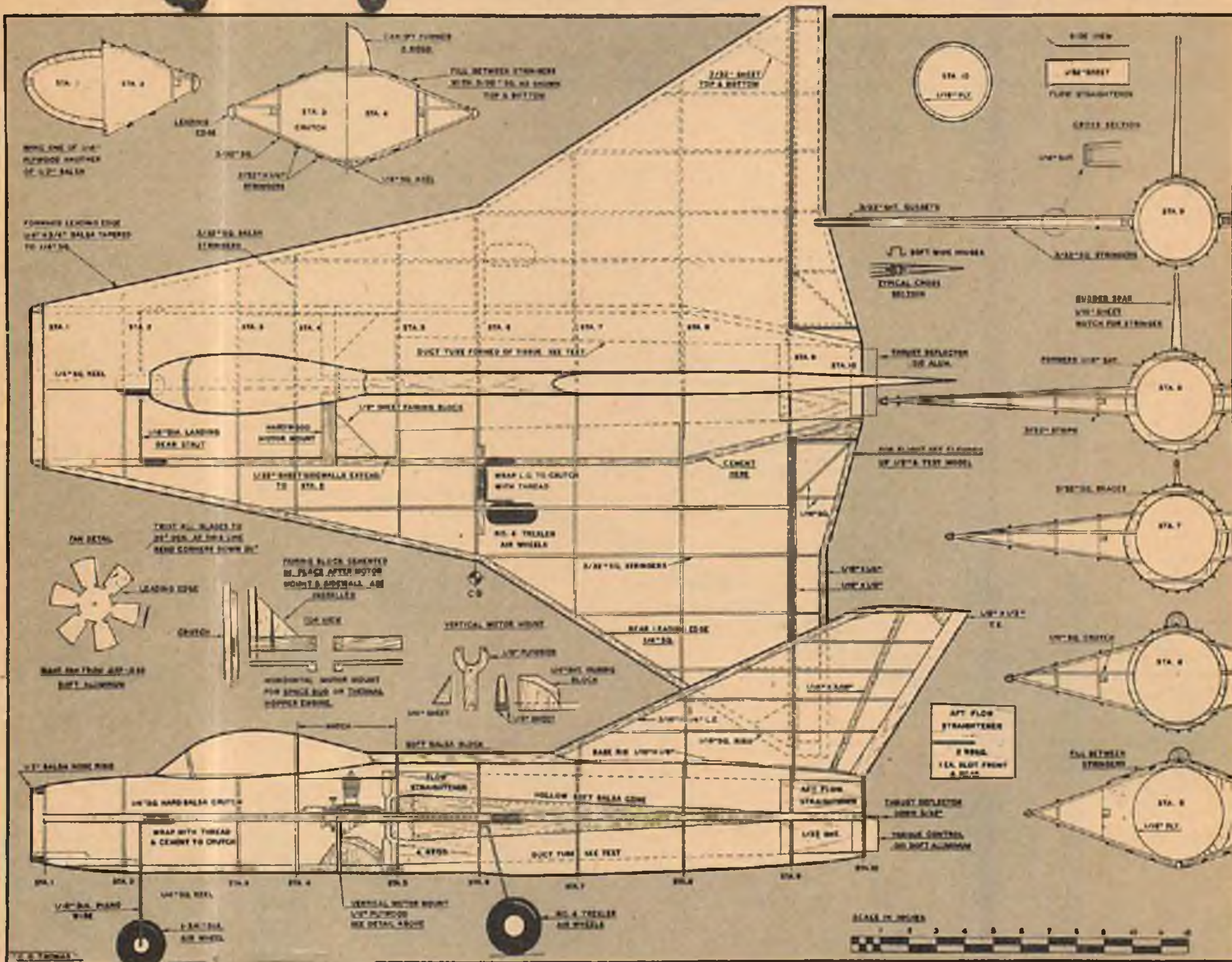
Cut the ¼" sq. balsa crutch and forward keel pieces to length as indicated on plans and glue together. Mark all station positions on them. Now build stations 2 to 4 of 3/32" sq. balsa. After cutting out the center sections of the rear stations pin them over the layouts and build the extensions in the same manner as the forward stations. Before lifting them from the layouts glue the rudder spars on to guarantee accurate alignment.

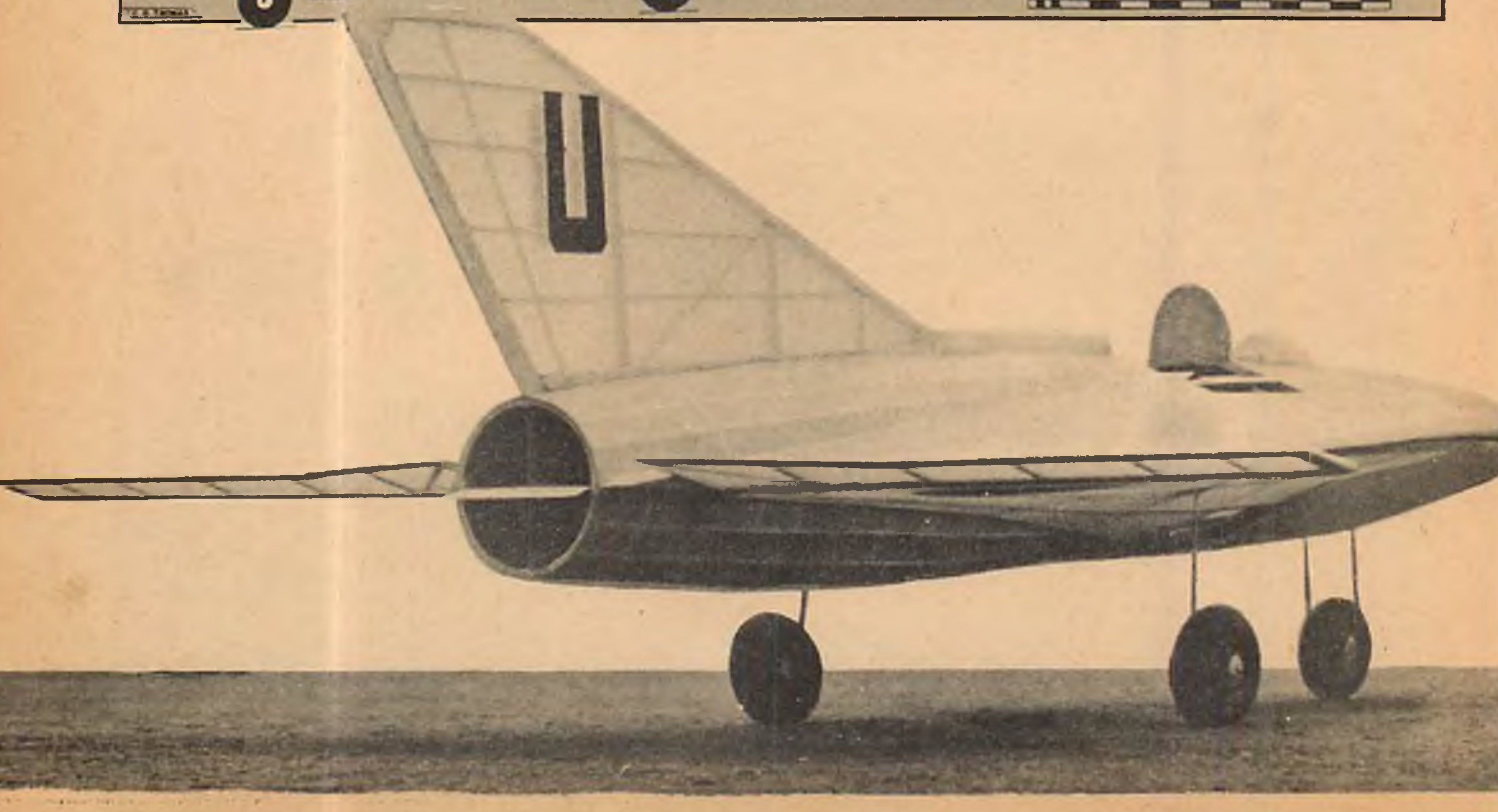
Slide stations 9 on the crutch pieces to approximate position, then 8, 7, 6, etc. Leave stations 1 and 10 off. Prop the crutch pieces on blocks over the layout so that the ends are square and the sides are parallel. Put weights on them to hold them in place. Now relocate the stations in their proper positions and glue in place. When dry install stations 1 and 10, and then the forward keel. The forward leading edge strips are glued in place after beveling the tips of the stations to receive them. Using the same procedure assemble the rear leading edges. Slide the top center stringer through the rudder spars and glue in place between stations 5 and 10; also the bottom center stringer.

The next step is to make and install the duct unit. Start by cutting a sheet of Silkspan 11 by 18 inches and doping it to a sheet of glass with fuelproof dope. When almost dry slide it from the glass and let finish drying. Replace it on the glass and dope on another piece of Silkspan cut cross-grained; continue this procedure till five sheets are bonded together. After the last coat of dope allow to remain on the glass overnight till completely dry. Trim to size of 18" long by 10¾" at front

Just about the most jaunty job around at the 1955 National modelplane championships. SAAB was about most popular, too!

Full-size plans for SAAB Draken are part of Group Plan #256A from Hobby Helpers, 770 Hunts Point Avenue, New York 59, N. Y. (50c).





by 8¼" at rear. Roll into a tube about 2" in diameter and slide into the model from station 10 to 5 with the 10¾" end forward. Release and allow to expand. Align the open edge ¼" off center line of fuselage, allowing overlap in front and rear. Glue about one inch of this edge to stations 5 and 10 only. When set glue another inch in place, and so on till the entire circumference is glued in place. Next glue the seam in place at the other stations, observing that the tube touches the formers of the stations. Now spot-glue the rest of the stations to the tube. Trim the excess tissue from the front and rear and the duct is finished.

Insert the soft blocks between the elevons and duct at the rear of the model. Install the remaining stringers. Assemble the leading edge, tip, and trailing edge of the rudder on the model aligning with the spars. Glue on the 1/16" sq. rib formers.

Assemble the aft flow straighteners, slide them into the duct from the front and check for fit. They should slide back to station 10. The cone as shown on the side view is made of soft balsa and is 1 9/16" diameter at its maximum point. After shaping cut the block in half and hollow out as indicated. Reglue together and cut two slots in the rear end 3" long and perpendicular to each other to receive the aft flow straighteners. Make and install the forward flow straighteners on the cone parallel to the aft flow straighteners, and with their leading edges curved as shown. Slide the cone into the duct and over the aft flow straighteners to check the fit; the leading edges of the forward flow straighteners should stop at station 5. Remove the entire unit and assemble, sand and dope till smooth. Replace in duct in proper position and glue. Use fuelproof dope and cement throughout.

Fit the 1/32" sheet sidewalls between station 3 and 5, gluing to upper and lower stringers as well as to crutch. The nose gear is split in the center of the axle to allow changing wheels. Use Trexler #4 airwheels; they are light and sturdy. Only precaution is to deflate them when not in use. Install the thrust and torque deflectors as shown on the plan. Be sure to have about 3/32" down thrust.

Carefully tap the three mounting holes on the Thermal Hopper engine with a 4-40 tap. Screw to horizontal and vertical motor mounts, using 4-40 machine screws with the slot end facing forward. Cut a ⅛" by ½" slot in the balsa sidewalls as shown on side view to receive the horizontal mounts. Slide the mounts in place and slip the vertical mount over the forward keel. Align the engine crankshaft with the center of the cone. Now glue the mounts in place. When dry remove the engine and glue in the horizontal and vertical fairing blocks. Sand entire unit thoroughly and dope well, using fuelproof dope.

The elevons are built on the plans using 1/16" by ⅛" balsa laid flat for the leading edges and ribs with the trailing edges of 1/16" by ¼". When dry glue on 1/16" by ⅛" on edge over

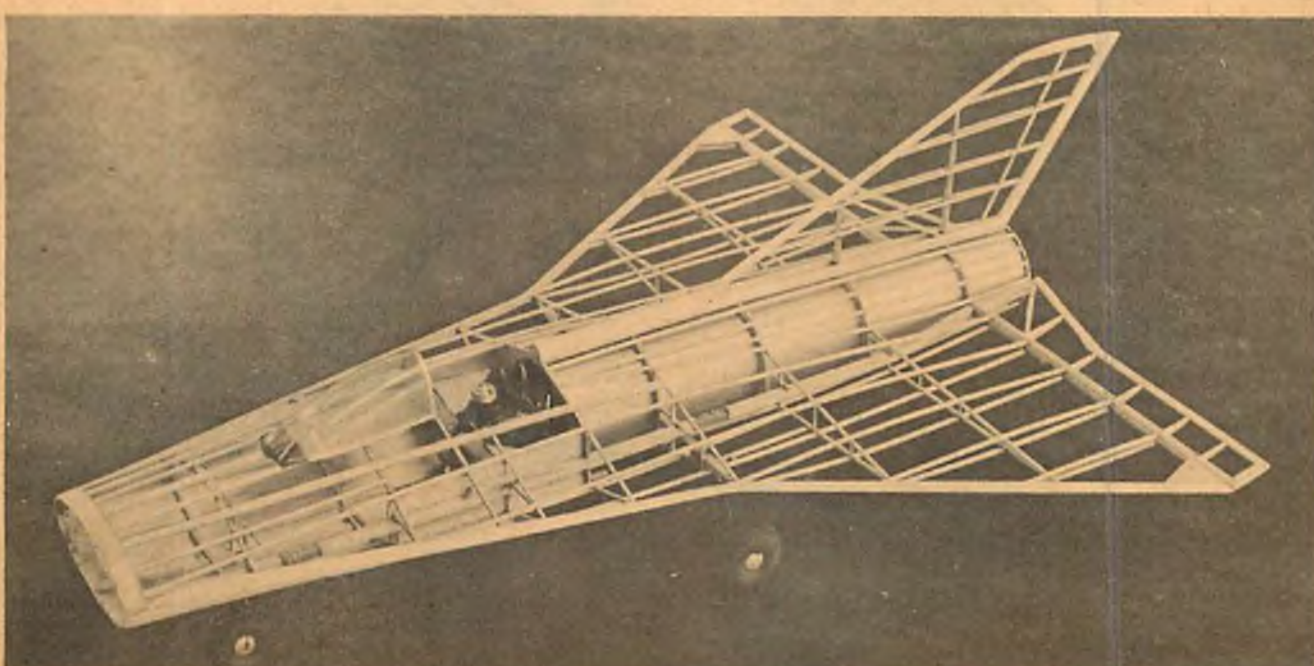
Author-designer-experimenter Schindler with first test version of his delta wing free flight ducted fan. Craft is said to be first ducted fan to take off under own power regularly.

the leading edges and ribs, top and bottom. Spot glue the completed elevons in place on the model and trim to shape shown on plans. Use soft wire for hinges as indicated.

On our model the underside of the nose back to station 4 was covered with 1/32" sheet balsa for additional strength. Sand the entire model smooth and cover with lightweight tissue. Cut out the tissue between stations 4 and 5 top and bottom as shown on photos for additional air inlets. Also directly under the engine. The completed model should weigh about 10½ ounces. We used hard balsa throughout.

All flight adjustments are made with the thrust deflectors and elevons. The elevons should be up about ½", the thrust deflector down about 3/32", and the torque deflector right about 1/16". Install that wonderful Hudson Miniatures Super-Self Starter instead of the conventional pulley. One of the small Jim Walker balloon tanks works best in the model instead of the regular tank. It prevents engine stoppage due to surges and allows no air bubbles in the fuel line. Just lay the tank in the bottom of the fuselage. Refueling is accomplished by removing, reinstalling tank from bottom of fuselage.

Fuel up—attach the battery leads—engage spring and back up about one turn and let her go. This model is remarkably stable when balanced at the center of gravity.



World Championships

Championships Model Specifications

Wakefield Cup —Total surface area 263.5-294.5 sq. in.; min. total weight 8.113 oz.; max. rubber weight 2.821 oz.

Free Flight Gas—Min. total weight 115.6 oz. per cu. in. capacity, max. engine capacity .1525 cu. in.; max. motor run 15 sec.; min. surface loading 3.93 oz. per sq. ft.

Nordic Glider —Total surface area 495.9-526.9 sq. in.; min. weight 14.46 oz.

Biggest thing that ever happened in International contest flying was the 3-event '55 World Championships, held in Western Germany last September 3-5. Host was the USAF, who flew over the American teams, AMA Pres. Keith Storey and other contest officials from New York.

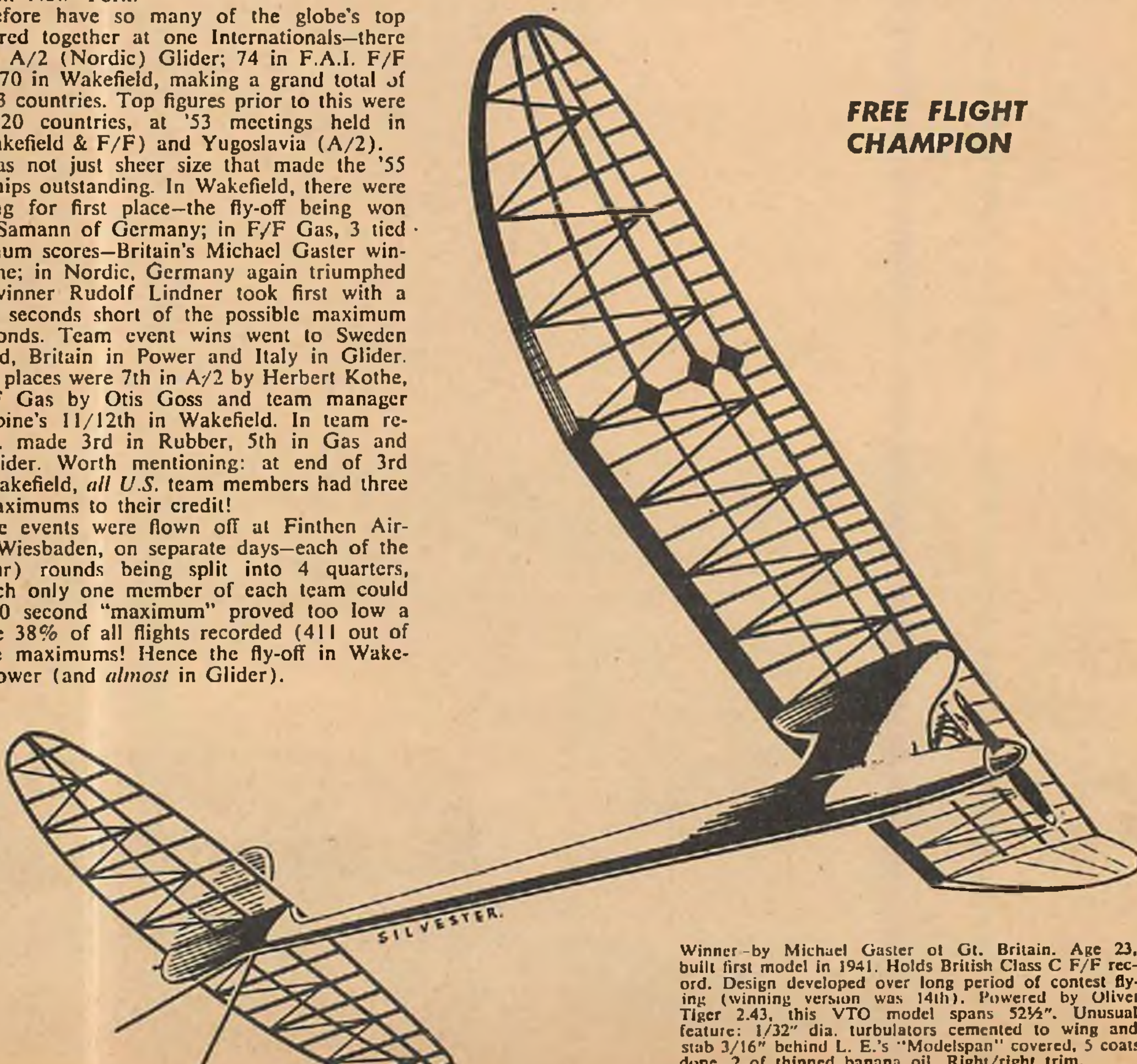
Never before have so many of the globe's top flyers gathered together at one Internationals—there being 80 in A/2 (Nordic) Glider; 74 in F.A.I. F/F Power and 70 in Wakefield, making a grand total of 224 from 23 countries. Top figures prior to this were 158 from 20 countries, at '53 meetings held in Britain (Wakefield & F/F) and Yugoslavia (A/2).

But it was not just sheer size that made the '55 Championships outstanding. In Wakefield, there were 7 men tying for first place—the fly-off being won by Gustav Samann of Germany; in F/F Gas, 3 tied with maximum scores—Britain's Michael Gaster winning this one; in Nordic, Germany again triumphed when '54 winner Rudolf Lindner took first with a total just 4 seconds short of the possible maximum of 900 seconds. Team event wins went to Sweden in Wakefield, Britain in Power and Italy in Glider.

Top U.S. places were 7th in A/2 by Herbert Kothe, 9th in F/F Gas by Otis Goss and team manager Bob Champine's 11/12th in Wakefield. In team results, U. S. made 3rd in Rubber, 5th in Gas and 14th in Glider. Worth mentioning: at end of 3rd round in Wakefield, *all U.S.* team members had three 180 sec. maximums to their credit!

The three events were flown off at Finthen Airfield, near Wiesbaden, on separate days—each of the five (2-hour) rounds being split into 4 quarters, during which only one member of each team could fly. The 180 second "maximum" proved too low a figure, since 38% of all flights recorded (411 out of 1068) were maximums! Hence the fly-off in Wakefield and Power (and *almost* in Glider).

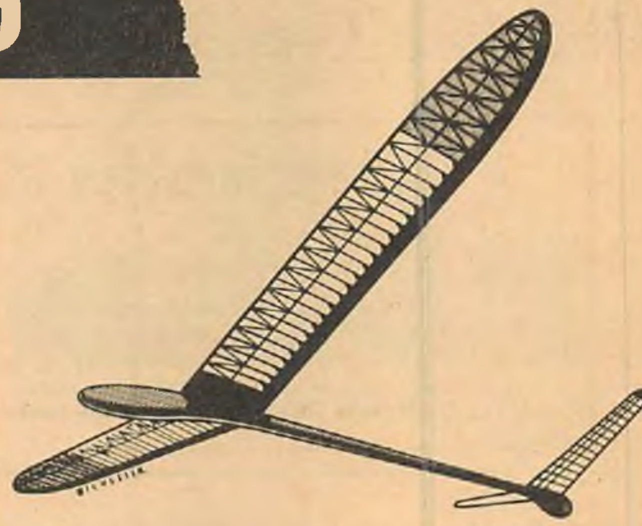
FREE FLIGHT CHAMPION



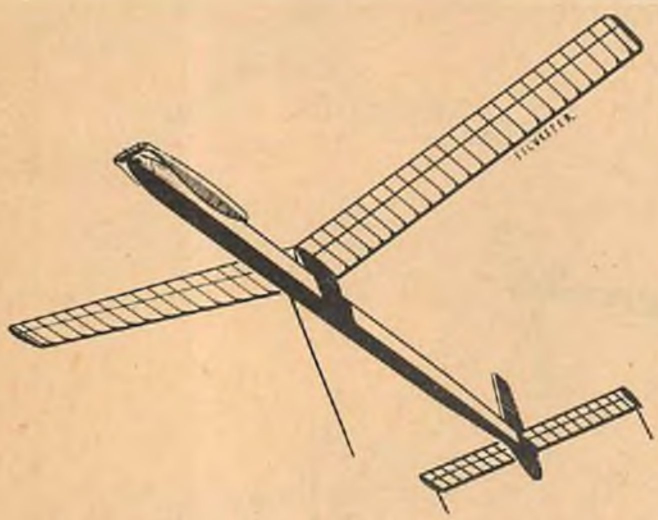
Winner—by Michael Gaster of Gt. Britain. Age 23, built first model in 1941. Holds British Class C F/F record. Design developed over long period of contest flying (winning version was 14th). Powered by Oliver Tiger 2.43, this VTO model spans 52½". Unusual feature: 1/32" dia. turbulators cemented to wing and stab 3/16" behind L. E.'s "Modelspan" covered, 5 coats dope, 2 of thinned banana oil. Right/right trim.

in Germany

F/F Power winner Michael Gaster of Britain and his graceful Oliver Tiger diesel powered design. Ship was 14th of type he's built. In gas majority followed U.S. trend.



Winner—by Rudolf Lindner of Germany. Also flew in '53 and '54 A/2 Championships, winning latter with similar model. Began building back in 1942. Model spans 74¼".



Winner—by Gustav Samann of Germany. Age 33, building since 1933. Member of 5 previous International teams. Design has won many German contests, including 3 Nats. Span is 49¾".

Top three in Gliders. Winner: Rudolf Lindner (Germany) in center with his latest model, which he did not fly in contest. Second: Bob Gilroy (Gt. Britain) at left. Third: Rolf Hagel (Sweden).

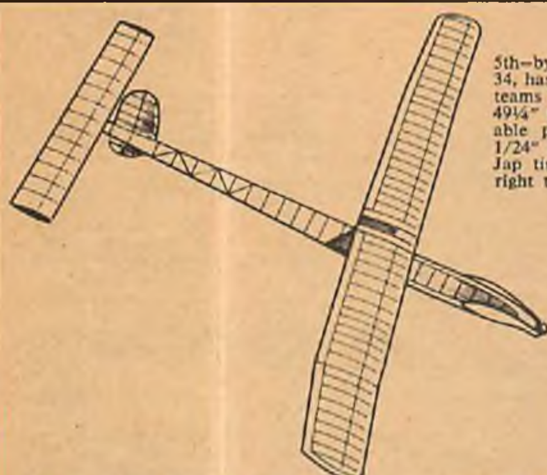
Top team performance in Wakefield was by these three Swedish flyers (from left): Hakansson (who placed 2nd), Blomquist (8th) and Ahman (9-10th). Missing is Johansson (27th).

Wakefield Cup: Page 60
F.A.I. Free Flight: Page 62
Nordic A/2 Glider: Page 64

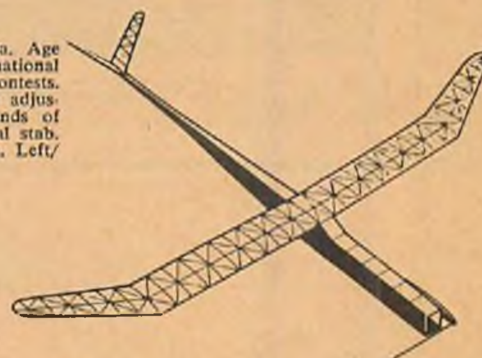
INTERNATIONAL WAKEFIELD CUP COMPETITION

Wakefield winner Gustav Samann of Germany and his folding prop, "V" dihedral design. Note very steep take-off angle—compromise with VTO.

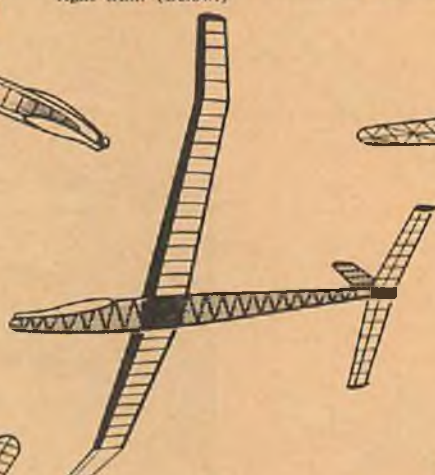
U.S. Wakefield team was 3rd. Lt. to rt.: Herbert Kothe (13th); Gene Schapp (20th); Manuel Andrade (18th) and team manager Bob Champine (front) who did best with 11/12th.



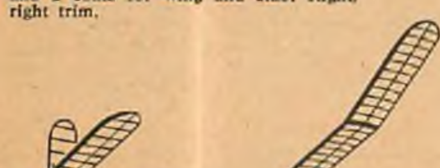
6th—by Guido Fea of Italy. Age 29, modeling since 1940. Has been on 5 International teams, won several National contests. 46½" span, folding 2-blader; powered by 18 strands of Pirelli. Jap tissue covered, 5 coats dope for fuselage and 2 coats for wing and stab. Right/right trim.



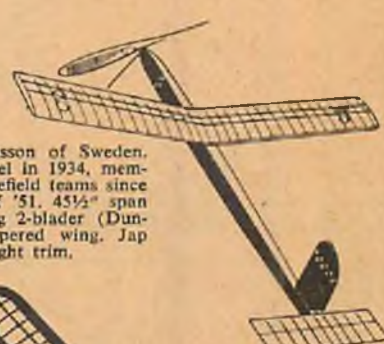
5th—by Emil Fresl of Yugoslavia. Age 34, has been member of ten International teams and won 4 National contests. 49¼" span, folding 2-blader with adjustable pitch; powered by 15 strands of 1/24" x ¼" Pirelli. Note anhedral stab. Jap tissue covered, 3 coats dope. Left/right trim. (Below.)



Butterfly-Stab — French entry by Marc Chevrolet was one of most unorthodox '55 Wakefield entries. No trim problems, flew well.



3rd—by Vincenzo Scardicchio of Italy. Age 33, started modelling in 1938. First Championships, but has won several National events in Italy. 47¾" span, folding 2-blader, powered by 16 strands of Pirelli. C.G. is at wing T. E. Jap tissue covered, 1 coat dope. Right/left trim.



2nd—by Anders Hakansson of Sweden. Age 28, built first model in 1934, member of all-Swedish Wakefield teams since 1950, with exception of '51. 45½" span model, has freewheeling 2-blader (Dunlop rubber) and untapered wing. Jap tissue covered. Right/right trim.

7th—by Ladislav Muzny of Czechoslovakia. Beautifully built shoulder wing, with folding 2-blader (Pirelli rubber), retractable take-off leg. Interesting to note that all 7 fly-off models—with exception of Hakansson (2nd)—had twin folding props.

4th—by Josef Altman of Germany. A modeler since 1935, has won one German National contest. First time on International team. 47¼" span, folding 2-blader, powered by 14 strands of Pirelli. Balances well forward at 1/3 chord. Jap tissue covered, 3 coats dope, Right/left trim.

PLACE	TOTAL TIME	FLYER & COUNTRY	ROUNDS 1	2	3	4	5	DATA
1	900	Gustav Samann Germany	180	180	180	180	180	Square fuselage, 22" x 22" twin-folder (2½° down —1° right). "V" dihedral wing at +2½° (Benedek 8356 b), stab at 0°. Span 49¾", length 48½". Balance point 72% chord.
2	900	Anders Hakansson Sweden	180	180	180	180	180	Square fuselage, 17½" x 25" twin-freewheeler (1° down, —½° right), "V" dihedral wing at +1° (Dillner airfoil) and stab at —1° (6% Clark Y). Span 45½", length 41¾", weight 8½ ozs. Forward fin. Balance point at 69% chord.
3	900	Vincenzo Scardicchio Italy	180	180	180	180	180	Diamond fuselage, 2" pylon, 28½" x 28½ twin-folder (3° right), poly wing (+1°) and stab (—2°), 33% fin area underneath, fixed 2-point take off leg. Span 47½" length 42½", weight 8¼ oz. Balance point at 100% chord.
4	900	Josef Altmann Germany	180	180	180	180	180	Square fuselage ("W" bracing), 17¾" x 17¾" twin-folder (5° right), poly multi-spar wing, untapered stab, 25% fin area underneath. Span 47¼", length 48½", weight 8¼ ozs. Balance point at 33% chord.
5	900	Emil Fresl Yugoslavia	180	180	180	180	180	Diamond fuselage, low pylon, 22½" dia. twin-folder, poly wing at +3°, 8° anhedral stab at 0, end of fuselage pivots for D/T purposes, original airfoils. Span 49¼", length 45¾". Balance point at 45% chord.
6	900	Guido Fea Italy	180	180	180	180	180	Diamond fuselage, low pylon, 21¼" x 33½ twin-folder (1° down, —2½° right), poly wing at +2° (NACA 6409), stab at —½°, retractable take off leg. Span 46½", length 43¾", weight 8⅛ oz. Balance point 80% chord.
7	900	Ladislav Muzny Czechoslovakia	180	180	180	180	180	Square fuselage changing to circular at nose, twin-folder, Pirelli rubber, shoulder mounted poly wing, slight "V" dihedral on stab, fin set forward of stab, small sub fins below stab, retractable take-off leg.
8	892	Malte Blomquist Sweden	180	180	180	172	180	Square sheeted fuselage, low pylon, twin-folder, poly wing, untapered multi-spar wing and stab (with blunt tips), fin set forward of stab, small fin underneath, retractable take-off leg. Ultra-simple design with no frills.
9-10	890	Karl Widell Denmark	180	180	180	180	170	Span, 43.7"; length, 44.85"; weight, 8⅛ oz.; 12 strands Pirelli rubber; prop. dia., 20.3"; pitch, 25.35"; folding prop; NACA 6409 wing section; fixed, piano wire L.G.
9-10	890	Ragnar Ahman Sweden	180	170	180	180	180	Diamond fuselage, parasol wing mounting, twin-folder, poly wing, untapered multi-spar wing and stab (with blunt tips), central fin, small tip fins, backward retracting take off gear. Not unlike Blomquist's design.
11-12	880	Bob Champine U.S.A.	180	180	180	179	161	Fairly long diamond fuselage, low pylon, twin-folder, poly wing (rounded tips), upper fin set forward of stab, retractable take-off leg. Fuselage untapered for rubber length—popular present-day Wakefield trend.
13	878	Herbert Kothe U.S.A.	180	180	180	158	180	Average length square fuselage, high pylon, "V" dihedral tapered wing set well back, tapered stab with large central fin and small tip fins, sheeted L.E.'s, backward-retracting take-off leg.
15	876	Hugh O'Donnell Gt. Britain (Previous winner)	180	180	156	180	180	Diamond fuselage, medium high pylon, 22" dia. prop. (2° down, —2° right), poly wing, conventional plus geodetic ribs (on wing and stab), main fin forward of stab, retractable take off leg. Same basic design which came 2nd in 1953 fly-off.
18	868	Manuel Andrade U.S.A.	180	180	180	148	180	Long square fuselage, parasol wing mounting, twin-bladed folder, poly multi-spar wing, untapered wing and stab, fin set forward of stab, small tip fins, retractable take-off leg.
20	866	Gene Schaap U.S.A.	180	180	180	180	146	Square, sheeted fuselage, high-wing mounting, single-blade folder, untapered poly wing with rounded tips, tapered stab with tip fins, wing center section faired into fuselage, backward-retracting take-off leg (with wheel).
63	576	Alan King Australia (Previous winner)	180	151	170	69	—	Sleek streamlined development of '54 winner. Flattened-sided elliptical fuselage with high wing position, twin-folder (in place of single blader last year), poly wing with rounded tips, sheeted L.E. wing and stab, elliptical tip fins.

TEAM RESULTS: 1) Sweden, 2,682; 2) Germany, 2,667; 3) U.S.A., 2,646; 4) Italy, 2,634; 5) Gt. Britain, 2,590; 6) Holland, 2,575; 7) Yugoslavia, 2,548; 8) Denmark, 2,510; 9) Czechoslovakia, 2,509; 10) Argentina, 2,411. (19 countries competed).

F.A.I. FREE FLIGHT POWER COMPETITION

U.S. F/F Power team had widely assorted models, but all Torp .15 powered. Lt. to rt. from back are: Bill Hartill; team manager Bob Champine; Ernie Shailor; Harry Gould and Otis Goss.

Maria Rudolph was only woman free flight contestant to fly. She placed in 8th for Germany, with this E.D. 2.46 twin-finned pylon. German team was 5th.

Third man in fly-off in F/F Power, was Canada's Bryant Jones, who also used Oliver Tiger diesel like winner Gaster. Neat simple ship featured high aspect ratio wing and stab.

Samuel Davila of Mexico placed 22nd with this unusual forward-fin F/F entry. Plenty of unorthodox ships flown at '55 Championships with VTO take-offs a common sight.

2nd (below—by Francisco Stajcer of Argentina. Simple straight-forward (but rather bulky) slabsider pylon, powered by Torp .15 (8" x 4" Tornado prop), with multi-spar wing and stab. Span 51½". Entire model silk covered, 6 coats of dope. Right/left trim.

High-thrust line Australian entry (left) by Bond Baker had beautifully clean lines, "fish-tail" stab fins and wing tip fins.

Forward-fin VTO Austrian design (right) by Oskar Czepa was powered by E. D. 2.46, first seen at '53 Championships in England.

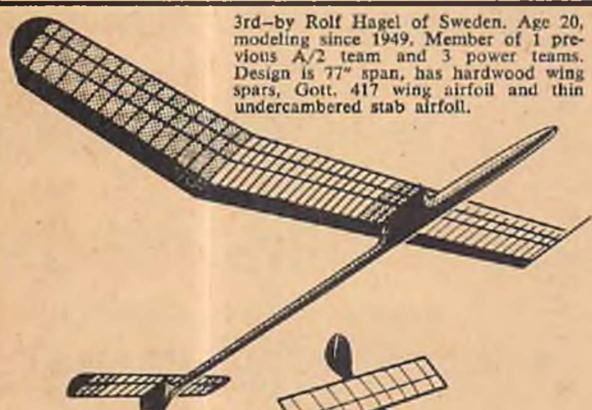
3rd—by Bryant Jones of Canada. Member of Avro model club. Holds Canadian Class B F/F and A speed records. Many different-size versions of some basic design built. Powered by tuned Oliver Tiger, span 65½". "Skysail" covered, 4 coats dope, 1 of fuel proofer. Right/right.

PLACE	TOTAL TIME	FLYER & COUNTRY	ROUNDS 1	2	3	4	5	DATA
1	900	Michael Gaster Gt. Britain	180	180	180	180	180	Oliver Tiger (3° down, —1° left), 9" x 5" plastic prop, poly wing (+4½°), elliptical stab (+1½°), Isaacson type airfoils. Span 52½", length 37¾", wing area 400 sq. ins., weight 17¼ ozs. Balance point at 87% chord.
2	900	Francisco Stajcer Argentina	180	180	180	180	180	Torp .15 (3° down, —2° right), 8" x 4" Tornado prop, poly wing at +3° (Davis airfoil), stab at 0° (thin Clark Y). Wing span 51½", length 38½". Balance point at 66% of wing chord.
3	900	Brynnt Jones Canada	180	180	180	180	180	Oliver Tiger (9° down, —3° left), 9" x 4" Top Flite prop; poly wing at 2½° (Davis 4 airfoil), stab at 0° (thin Clark Y). Span 65½", length 40", wing area 480 sq. ins. Balance point at 65% chord.
4-5	886	Vladimir Hajek Czechoslovakia	180	180	180	180	166	Diamond section fuselage, average height pylon, fairly long tail moment, polyhedral wing with tapered rounded tips, tapered stick, fin (⅔ above, ⅓ below) set completely in front of stab, diesel powered.
4-5	886	Luis Mangino Mexico	166	180	180	180	180	Torp .15 powered slabsider, sheet pylon, sharply tapered poly wing with small pointed tips. Tapered stab, plenty of fin area (top only), single leg take-off gear. Superb finish like all Mexican jobs.
6	871	Pete Buskell Gt. Britain	180	180	180	180	151	"Slick Stick" pylon original, placed 4th in '53 contest and was proxy flown in '54. Poly wing with elliptical tips, large area low A/R geodetic stab, with fin set forward. "VTO" launched.
7	870	Giorgio Vidossich Italy	180	180	180	180	150	Slender sq. fuselage pylon, Super Tiger G.20 with folding prop (10° left), tapered poly wing (sharp wash-out), wing and stab L.E.'s sheeted, with ribs arranged in "W" pattern. Earlier version came 3rd in '53 contest.
8	869	Maria Rudolph Germany	179	180	166	180	164	Circular fuselage, sheet pylon, E.D. 2.46, shallow poly wing with tapered rounded tips, constant chord stab with small tip fins and central under-fin, sheeted wing L.E.'s. Maria was only woman contestant in F/F.
9	866	Otis Goss U.S.A.	180	180	148	180	178	Slabsider with rounded top, pylon, Torp .15, poly (plus flat center panel), marked taper to small elliptical wing tips, elliptical stab, central fin (sub fins under stab), sheeted L.E.'s, single leg take-off gear.
10-11	827	L. F. L. M. Bausch Holland	160	180	180	180	127	Ultra-slim slabsider, sheet pylon, constant chord tip-dihedral wing, with square tips. Fin set forward of untapered stab (tip sub fins underneath), single leg take-off gear, average aspect ratios and tail moment.
10-11	827	Antonio Podda Italy	170	142	180	180	155	Square section fuselage, low pylon, glow motor, untapered tip dihedral wing (sheeted L.E.—undercambered airfoil), untapered stab (Clark Y type airfoil), upper fin set forward of stab, marked downthrust, wing tip washout.
13	812	Harry Gould U.S.A.	180	180	142	180	130	Slabsider with one stringer on each face, built-up pylon, Torp .15, poly wing and stab (both elliptical, low A/R—looked like "Zipper"), large upper and small lower fins, twin leg take-off gear, silk-covered fuselage.
31	708	Bill Hartill U.S.A.	135	100	180	180	113	Square fuselage, long tail moment, sheet pylon, Torp .15, high A/R poly wing (+5°) with tapered tips, average A/R stab (+3½°), under-fin only. Span 78½", length 45¾", wing area 483 sq. ins., stab area 166 sq. ins.
47-48	563	Ernie Shailor U.S.A.	—	124	79	180	180	Square fuselage, sheet pylon, average tail moment, Torp .15, fairly low A/R (untapered) wing and stab, with blunt tips. Tip dihedral wing, with ribs, half-ribs and two spars. Similar construction stab, central upper fin.

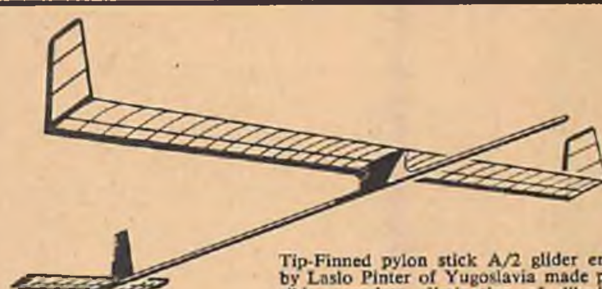
TEAM RESULTS: 1) Gt. Britain 2,556; 2) Italy, 2,498; 3) Argentina, 2,422; 4) Germany, 2,394; 5) U.S.A., 2,386; 6) Yugoslavia, 2,287; 7) Canada, 2,239; 8) Ireland, 2,198; 9) Czechoslovakia, 2,116; 10) Switzerland, 2,087. (21 countries represented.)

NORDIC A/2 GLIDER CHAMPIONSHIPS

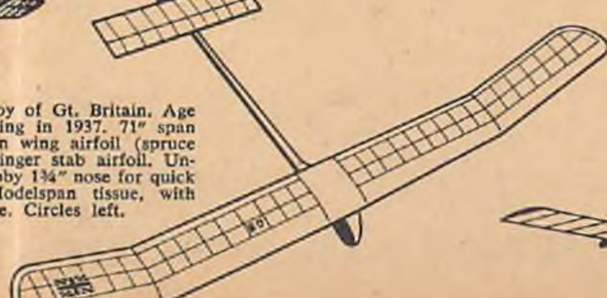
German winner Rudolf Lindner (top, left) and his sleek pod and boom design. He won last year with similar model, using same pair of wings. (top, right): Italy won team crown—highest scorer was Enzo Giusti (hiding at left!). Enzo flew another model in contest —without tip fins. Swedish team was 2nd, France 3rd and U.S.A. 14th. Herb Kothe (lower, left) was top scoring man in U.S. glider team, with 7th. Others in team were well down list; U.S.A. did best in F/F and Wakefield. (lower, right): Italian flyer Enzo Giusti was just 10 seconds behind winner, which gave him 4th. Design was one of many unorthodox entries.



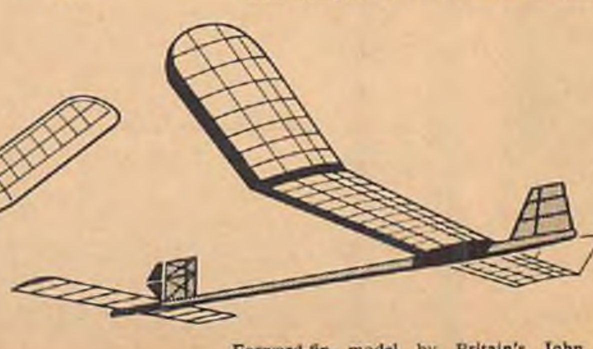
3rd—by Rolf Hagel of Sweden. Age 20, modeling since 1949. Member of 1 previous A/2 team and 3 power teams. Design is 77" span, has hardwood wing spars, Gott. 417 wing airfoil and thin undercambered stab airfoil.



Tip-Finned pylon stick A/2 glider entry by Laslo Pinter of Yugoslavia made possible complete elimination of dihedral.



2nd—by Bob Gilroy of Gt. Britain. Age 34, started modeling in 1937. 71" span design has Hansen wing airfoil (spruce spars) and Hacklinger stab airfoil. Unusual feature: stubby 1¾" nose for quick stall recovery. Modelspan tissue, with two coats of dope. Circles left.



Forward-fin model by Britain's John O'Donnell of Wakefield fame, performed well; placed 19th in '53 Championships.

PLACE	TOTAL TIME	FLYER & COUNTRY	ROUNDS 1	2	3	4	5	DATA
1	886	Rudolf Linder Germany	180	180	180	180	166	Pod and boom fuselage. 13° "V" dihedral wing (+4°) and stab (—1°), thin undercambered airfoils with extensive cross bracing. Span 74½", length 44½", wing area 454¼ sq. ins., weight 14¾ ozs. Balance point at 53% chord.
2	880	Bob Gilroy Gt. Britain	160	180	180	180	180	Pod and boom, ultra short 1¾" nose, tip-dihedral wing (+3°), stab (0°) forward of fin. Span 71", length 40", wing area 440 sq. ins., stab area 89 sq. in., weight 14½ oz. Tow hook at 46% chord, balance point at 70% chord.
3	877	Rolf Hagel Sweden	176	180	180	164	177	Slender pod and boom, 10½" nose, tip-dihedral wing (+5½°), with tapered tips. Stab (+2°) atop 2" high fin, equal area under-fin. Span 77", length 50½. Towhook at 45% chord, balance point at 60% chord.
4	876	Enzo Giusti Italy	156	180	180	180	180	Deep pod and boom, poly wing (+3°) with swept-back pointed tips, small stab at 0°, under fin. NACA 6409 wing airfoil, symmetrical stab. Span 75¼", length 49¼". Silkspan covering. 1 coat of dope. Right circle.
5	840	J. C. D. Esvelt Holland	163	180	137	180	180	Slim slabsider fuselage, short nose, shoulder-mounted tip dihedral wing, untapered stab behind small upper fin. Sheeted wing L.E. and tapered tips, tail moment of approx. 3½ wing chords. Tip-up stab D/T and auto-rudder.
6	836	Hans Thomann Switzerland	166	180	180	180	130	Circular stick fuselage, high A/R tip-dihedral wing (tapered, rounded tips). Untapered stab, upper fin set forward of stab; "turbulators" on outriggers ¼" in front of L.E. Wing covered with mm. ply, highly polished.
7	828	Herbert Kothe U.S.A.	143	180	145	180	180	Small cross-section diamond fuselage (sheeted), low 1" pylon, short nose. Sharply undercambered poly wing, constant chord wing (3 spars) and stab (2 spars) with rounded tips. ⅓ upper and ⅔ lower fin area.
8	825	Vaclav Horyna Czechoslovakia	180	180	133	180	152	Thin "min. area" slabsider fuselage, poly constant chord wing with small elliptical tip panels. Constant chord shallow "V" dihedral stab with elliptical tips. The other three Czech team models were similar.
9-10	804	Hans Hansen Denmark	180	180	158	106	180	Similar to '53 winning design, except for slimmed-down pod and boom fuselage. Constant chord tip dihedral wing with elliptical tips. Constant chord stab (rounded tips) behind upper (50% of total) fin. Hardwood construction.
9-10	804	Marcel Vilchair France	118	180	180	180	146	Elliptical section fuselage, tip-dihedral wing with tapered tip panels, constant chord stab with tip, fins, upper fin set forward of stab. High A/R wing, long tail moment (about 4¾ wing chords) and short nose.
52	576	Oscar Czepa Austria ('54 Champ)	161	161	135	52	67	Ultra long fuselage, following basic concept of his '51 winner. Pencil-like fuselage (low pylon), "V" dihedral, average A/R wing (+3°) and stab (—3°), small underfin. Approx. 8 wing chords tail moment. Balance point 25% chord.
53	575	Jerry Kolb U.S.A.	95	128	180	56	116	Round section stringered fuselage, pylon mounted constant chord wing (rounded tips), constant chord stab. Tip dihedral wing. "V" dihedral stab (atop upper fin), multi-stringer wing and stab, alum. spinner for nose.
55	565	Henry Cole U.S.A.	121	175	113	93	63	Long deep fuselage (6½ wing chords tail moment—3¼ chords nose length), sheeted high A/R untapered poly wing with elliptical tips. Constant chord stab with tip fins. Upper and lower (similar area) central fins.
73-74	422	Joe Harris U.S.A.	122	90	77	77	56	Profile fuselage, ⅛" sheet over ⅜" square frame; 3 deg. wing incidence; stab at zero; 72" span; 44" length; 475 sq. in. wing area; wt., 15.25 oz.; balances ⅔rds from l.e.

TEAM RESULTS: 1) Italy, 2,376; 2) Sweden, 2,362; 3) France, 2,301; 4) Czechoslovakia, 2,264; 5) Switzerland, 2,191; 6) Gt. Britain, 2,184; 7) Germany, 2,171; 8) Yugoslavia, 2,161; 9) Denmark, 2,154; 10) Canada, 2,138; 14) U.S.A., 1,968 (21 countries competed).

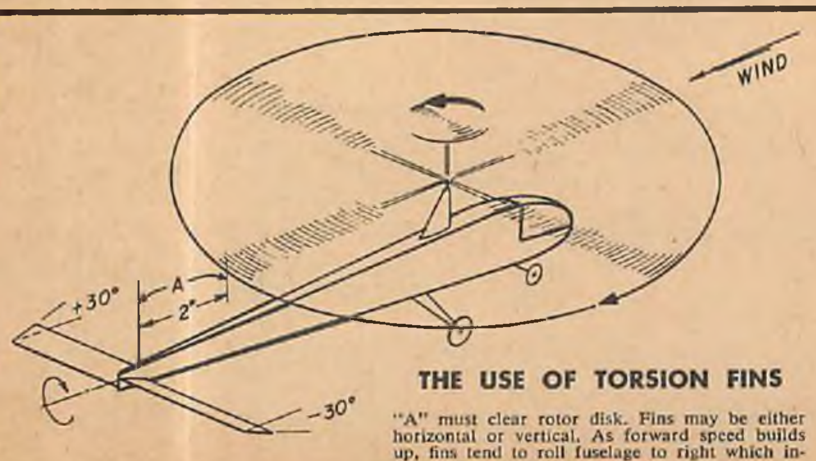
Torque-Reaction Copters

■ Thus far in discussions of model helicopters most reports have stuck pretty closely to single rotor machines, or those in which a rotor, or pair of rotors support the weight symmetrically.

However, for model work we find that duplicating the rotor arrangements of the big craft is not very practical except in rubber or jet power configurations, both types being unfortunately of short-lived duration. If we wish to use gas engine power, at this stage of the art, we must find some method of using a powerplant which grinds out several thousand rpm without getting into too much complication. One method of doing this is by designing our ships to the torque-reaction drive specifics, the system whereby the engine torque spins a large rotor in opposition to the rotation of a smaller prop on its shaft. (This, incidentally, should not be confused with true co-axial systems which utilize equal-sized rotors turning in opposite directions.)

Very good performance is possible with torque-reaction drive although it has two major drawbacks: 1) it is not very efficient because of low mechanical advantage; 2) the system does not behave in classical fashion—that is, we have a new and different set of forces and reactions to deal with. Objection #2 is not serious if we remember to keep the reactions of this type isolated in our minds from the reactions of standard types and not confuse them.

Torque-reaction drive helicopters are queer birds. They are almost as removed from conventional helicopters as, for example, an autogiro. The reason for this is that torque-reaction drive helicopters split flight duties between a large, slow-moving rotor and a prop attached to the engine shaft. The engine shaft prop is generally standard and it has one main function—it provides 99% of the lift. In some cases it may be used to contribute to stability as well, but the primary function is to lift the machine. Its gyroscopic effects are completely negated by the much larger mass of the engine and big rotor whirling around in the opposite direction underneath it. The function of the large rotor is to provide a torque drag on the engine, a device with which to secure stability and control, and finally, to serve as a parachute to let the machine down without damage when the power stops.



THE USE OF TORSION FINS

"A" must clear rotor disk. Fins may be either horizontal or vertical. As forward speed builds up, fins tend to roll fuselage to right which induces nose-up cycling moment.

This division of labor produces an unusual condition because, under power, the large rotor is operating in a substantially unloaded condition. Its blades are not damped by a strong aerodynamic pressure as they would be if the weight of the machine was being supported by them. As a result, control and stabilizing reactions assume an altered aspect. The builder who does not understand this may find his model crashing repeatedly despite his efforts to re-rig it for normal flight, because the control reactions, in most flight regimes, are actually *reversed*.

If we build a very simple helicopter, with rigid, unpivoted blades without tip weights and adjust it to fly forward we find that it starts to slide ahead, then noses upward sharply, slides back and repeats the pattern with increasing amplitude until it crashes. The reason for this is that the advancing blade produces a high lift force when it encounters the relative wind; this lift precesses 90 degrees forward tilting the nose up, which kills forward speed, then the model slides back with what was the retreating side of the rotor now producing a lift which will move 90 degrees, or to the tail, riding the tail up then sliding back, etc., etc.

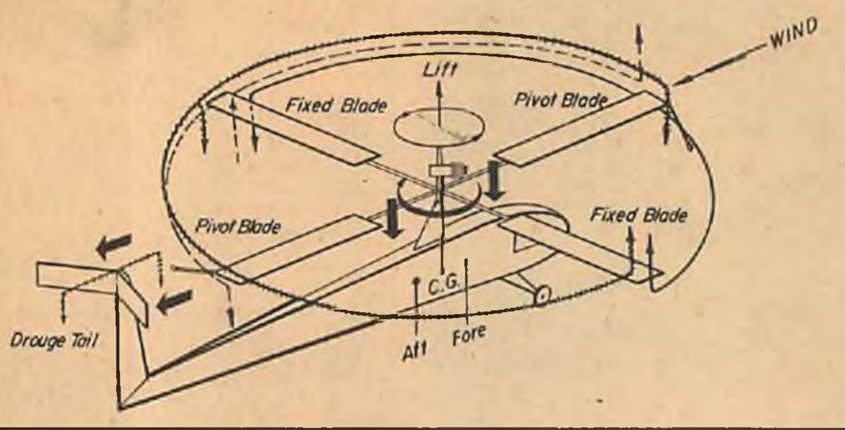
So we now pivot the blades and fit them with dynamic balances. Now when the model moves ahead the air pressure on the front of the disc makes the rotor blade twist its pitch angle upward, 90 degrees ahead that is the retreating side, and downward, that is 90 degrees behind on the advancing side. When this happens the change in pitch 90 degrees to the side produces a force that is moved another 90 degrees, so that the rotor disk tends to tilt up at the rear and down at the front. When the model is in a state of balance the forces cancel out and the machine flies forward without riding up at the nose or going into a dive. This is due to the upward force of the relative wind striking the advancing blade being levelled out by the precessive pitch shift in the blades produced by the pressure of the relative wind which tends to nose the rotor disk down. This is the way it should work, and does work when the CG is properly located. However, if the CG is improperly located trouble develops, and this trouble is usually a dive. Why?

Suppose the builder flies his model once or twice and it works quite well, moving forward steadily. He then wishes to see it rise vertically. It would seem reasonable then, to add a bit of ballast to the tail to kill off the forward motion? Unfortunately it does seem very reasonable. We have the past precedent of fixed wing models; we have the precedent of single rotor helicopters which fly forward if the weight is moved forward and back if the weight is moved back. Seems reasonable. So weight is added to the tail, the model rises up, starts forward faster than ever, noses down and crashes.

Why was this?

We just said that torque-reaction helicopters are a special case because of the unloaded condition of the rotor which does the controlling. Here is what happens: We have noted that air pressure on the rotor results in a cyclic action which resolves to cancel the nose up effects of that pressure, that is, relative wind effects are self-nullifying. But, *any* force applied to the rotor reacts in cyclic control, the blades shift in an effort to nullify the applied force.

FORCES ACTING ON TYPICAL HELICOPTER



Barred lines: drag of drogue tail produces down pressure on balance weight of pivoted blades which induces cycling action which tilts blade down at side and pushes nose down. Dash lines: fixed pitch of this blade encountering relative wind produces lift at side, but since rotor functions as a gyro the reaction moves 90 degrees, producing nose-up tendency. Solid line: wind pressure on pivot blades reacts at 90 degrees to make pitch change shown to hold nose down. Thus, if CG is too far aft it induces cycling in the pivoted blades which reinforces down control of drogue tail and wind impingement on pivoting blades and overrides nose-up tendency of fixed blades and the model will dive in. Centered CG has no cyclic effect and model will rise vertically. CG too far to front will cause model to back up or tail-slide. NOTE: CG is usually slightly aft of mast CL in order to balance fuselage effect and promote foward flight.

Now, when we add weight to the tail we are placing a steady pressure on each pivot blade as it passes over the tail—the CG has shifted—and by reference to gyroscopic precession laws we see that this force will result 90 degrees further on, or at the side. Thus the blade advancing tilts down and the blade which is retreating on the other side, tilts up. This tends to twist the rotor laterally, but, again referring to gyroscopic rules we can see that this twist, moving 90 degrees, resolves to *push the nose down!* Thus if we take a helicopter which is adjusted to rise vertically, and move the CG aft a little bit the model will now fly forward—BUT if we move the CG too far aft the model will overdo it and dive into the ground. This is because we have two cyclic instigators working, the CG imbalance, plus the normal cycling produced by forward flight.

A model of this sort, therefore is fairly sensitive to CG location, too sensitive, as a matter of fact, so it is customary to build in a safeguard which will allow a wider altitude of CG travel before diving or tail-sliding occurs. A good example of this is the Berkeley kits which use two different methods of obtaining the same result. In the D model we note that two of the blades are fixed in pitch. Thus, as the model moves forward the lift build, caused by increased relative wind meeting the stiff blades tends to push the nose up, while the cyclic action tends to push it down. Since the up couple is a bit stronger we also have a drogue on this job which increases the cyclic reaction of the pivot blades, and, secondarily slows the model down.

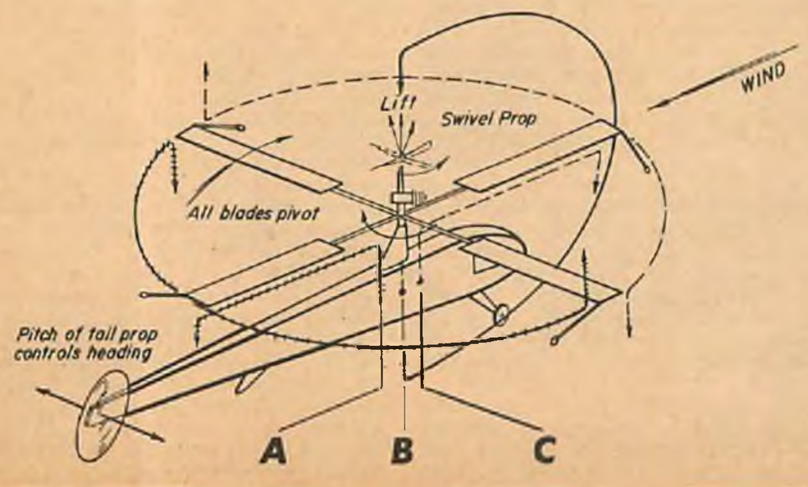
Thus, within allowable CG travel the tilt angle of the machine is self governing. If it slows down the cycling action, which is fully automatic, tends to speed it up, if it goes faster, the stiff blades bring the nose up, slowing it down. This governing action is pronounced enough to permit flight in surprisingly high winds and gusts without getting into trouble. However, if the CG is moved too far aft, the balance of forces is upset and the model will dive in. Ordinarily the model D gives no trouble—except where the builder has put on several heavy coats of dope and has not re-checked his CG afterward. The CG position shown on the plan, incidentally, is for absolute maximum top speed. To climb vertically it must be moved ahead with ballast.

The other model, the TR, has four pivoted blades and uses a swivel prop to provide a recovery couple. When the tilts it to the right, changing the lift vector, which puts a side load on the rotor which induces a cyclic shift which pushes the nose upward. This model has a tail rotor to control heading, and a few words on this: A rudder will not make a helicopter turn. A positive side thrust is required, hence a tail prop is needed to push the tail around or to hold it steady. A rudder will only crab the ship slightly while it continues in substantially the same direction. Another method of obtaining turn without a tail rotor is to tilt the rotor mast toward the side toward which turn is desired. Don't get confused on this, the model does not slide that way, but the downwash rebounds from the side of the fuselage at a different angle, tending to roll the model over—but again by gyroscopic reference, the roll is resolved at 90 degrees into turn.

There are many ways in which a torque-reaction helicopter can be set up. One thing, which is quite important, is to respect the fact that the fuselage lies in the downwash of the small prop, and exposed areas should balance, or very nearly so or there may be serious trouble. The use of small fins in the propwash to obtain turn, or to reflect the wash backward for reactive forward propulsion meets with some success and one can use a twisted stabilizer which tends to put torsion on the fuselage with increased forward speed, to induce nose-up cycling, relative wind strikes the prop edge it as a corrective force couple.

When designing originals it is a very good idea to include always some governing factor on forward speed. Rig it either with a swivel prop, a stiff alternate set of blades, or torsion fins. Speed of forward flight will vary with the design and powerplant, and will not be as high as a fixed wing model—a good fast walking pace is about right with present designs. —Roy L. Clough, Jr.

FORCES ACTING UPON TYPICAL SEE-SAW PROP HELICOPTER



A) CG rigged tail heavy induces cycling in pivoting blades which causes nose-down foward motion (barred lines). B) With CG centered, model rises vertically. C) Nose-heavy CG will cycle blades into backward flight (dash lines). Wind pressure on blades produces precessive pitch change at side position preventing nosing-up (solid lines). Role of the swivel prop: wind pressure on front of see-saw prop, by gyro precession, causes it to tilt to model's right, which angles lift vector to right. Side thrust on rotor system produces cycling which makes nose of model ride upward, thus limiting foward speed and preventing dive (assuming CG is correct). See-saw prop must be mounted to rock freely for best results. (See-saw prop can be eliminated if two opposite blades are fixed pitch with counterweights removed.

Proper Wood Selection for Criss-Cross Construction

By HAL ROTH

■ When Hank Cole built his *Osolong* a couple of years ago he used diagonal bracing construction in the fuselage. Since then it has become standard on rubber models and many gas models. The question: "When I use criss-cross construction on these long rubber fuselages, how can I keep them straight? I have trouble joining the two sides with diagonal braces and keeping the fuselage in alignment when I build. What do you suggest?"

First of all let's make a few definitions. By a "long" fuselage we mean 40 to 72 inches overall length. The usual construction is with ⅛ square longerons with 1/16 x ⅛ crossbraces. We will space the crossbraces every 2¼ inches or about 60° on a 2½ inch square fuselage.

When designing a long model try to use all straight lines in drawing the fuselage. A typical fuselage is 1½" square at the nose increasing to 2¼" square at the middle. At the rear rubber station, it is 1⅜" square. On the plan lay out these dimensions and connect them with straight lines. Starting at the nose station with a 60° triangle sketch in the crossbraces and work right back to the tail.

So much for the plan. Now for the wood. The most perfectly designed and built model is worthless without proper wood. A few remarks about balsa selection: after some experimenting with longerons of various hardnesses we have settled for 12 pounds per cubic foot stock. Buy a piece of ⅛ x 3 x 36" which weighs 1½ ounces and strip the longerons from it. Wood of this weight will seem very hard and heavy in sheet form but when you strip wood from it, the strips will be only medium hard. Look at the balsa weight chart on this page.

Why go to all the trouble to strip wood for longerons? We feel the only way to consistently gain success is to strip all the wood from the same piece of selected balsa. You gain three things: (1) You know exactly what weight wood you used and can gauge the wood for the next model accordingly. (2) The fuselage will align itself easier during building. (3) In a crash the matched wood will absorb shocks more uniformly.

The old bend-em-feel-em technique you see going on at the model shops may look scientific but if you weigh the so-called matched pieces carefully you will not find them matched at all. By weighing the balsa sheet and stripping from it all the longerons you get absolute uniformity.

Let's see now. We have the plan drawn and the wood for the longerons stripped. For the crossbraces we will use light 1/16" x ⅛". Begin by tacking down the longerons and adding the crossbraces in the usual fashion. You will have to splice the longerons to gain the long length. Make a long (¾") angular splice and apply glue. Let the glue set on each piece before joining. When the glue is dry add another coat and join the pieces.

BALSA SELECTION CHART

Wood Size:	To get weight in pounds per cubic foot multiply weight in ounces by:
1/8 x 2 x 36"	12
1/16 x 2 x 36"	24
1/32 x 2 x 36"	48
1/8 x 3 x 36"	8
1/16 x 3 x 36"	16
1/32 x 3 x 36"	32

Example: 1/8 x 3 x 36" weighing 1½ oz. x 8 gives 12 lbs. per cubic foot).

While building the sides use a straightedge to ensure that the longerons don't bow outward at any point. When you get done doublecheck with the straightedge (a long T-square is good) and sight down the fuselage to be sure there are no bumps or low places. Build the second side over the first. Go over all the joints and apply a second coat of thin glue. Let the sides dry 12 hours.

Take the sides up from the plan when dry and sand them while they are stuck together. This is a good way to even them up perfectly. Cut them apart with a razor blade and prop them up over the plan.

Now take two straightedges (use a piece of hard sheet balsa for the second straightedge) and place one on either side of the propped up sides. Make a temporary sheet former to hold the sides properly spaced. Now add the crossbraces *on the bottom. Only add cross-braces where the longerons are held from bowing outward by the two straightedges.* Add all the crossbraces on the bottom for one three foot section and then turn over the fuselage and insert those for the other side.

Start at one end and you will race right down the length of the fuselage (fast music helps). You are absolutely certain of perfect alignment because you are working between straight lines—a simple jig. Cement all joints again.

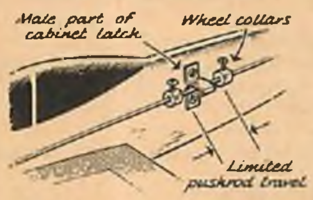
Cover with the grain of the tissue running PERPENDICULAR TO THE LENGTH OF THE FUSELAGE. The tightening action of paper is at right angles to the grain of the paper. If you cover with grain running the length of the fuselage, the longerons will sag inward, resulting in a warped, weak framework. Apply two coats of dope with no plasticizer added.

For Wakefield requirements, cross-section can be added at the wing mount, the tail section, a bulge underneath the wing, or some combination of these. A 69 inch fuselage, covered, doped, with wing mount, landing gear, and rear rubber tube, which has about a hundred flights (includes ample repairs) weighs 1⅜ ounces.

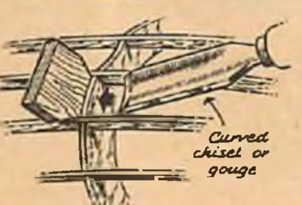
All this description sounds much harder than it is. You can build a fuselage in one-half the time previously spent building the old ⅛ square upright variety and you know *this* fuselage is straight and much stronger. Because it is so much stronger you can use lighter wood and cut weight while keeping ample rigidity to hold the rubber motor.

PLANE FACTS

Profile trainer can be equipped with fittings to prevent overcontrolling says Donald Blass, Clinton, Miss.

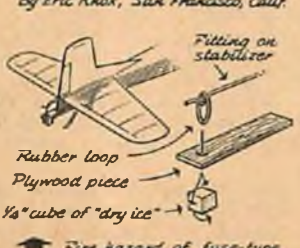


English modeler P. Gasson suggests celluloid "anti-vibration" tube for new-rule Wakefield fuselages. Prevents motor slashing covering & damage from rubber lubricant.

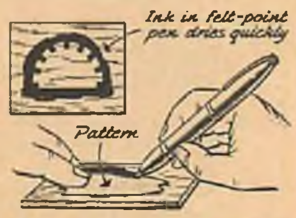


"Scalloping" formers makes for better covering job. Nisse Holmström, Swedish modeler, backs up former with hardwood block, makes cuts with chisel.

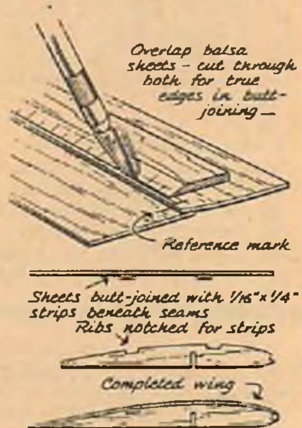
Fabric covering is easily applied with paste adhesive. Spread over frame with fingertip, it allows 15 min. period for stretching covering before setting. By Eric Knox, San Francisco, Calif.



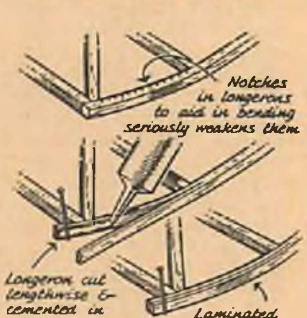
Fire hazard of fuse-type dethermalizers is eliminated by use of dry ice type. 1/4" cube of dry ice vaporizes in approx. 3 min., releases band to pop-up stabilizer. Hal Yeager, Editor, Salt Flat Sentinel, Salt Lake City, Utah.



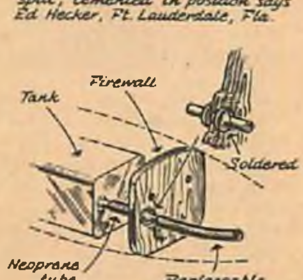
A felt-point marking pen is ideal pattern tracing tool says John Frankosky, New Albany, Pa. Duplicate parts are easily made.



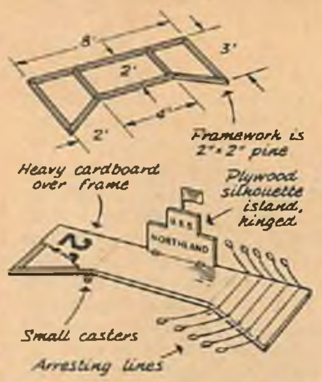
Efficient wing structure and building procedure by D. L. Stetler, Los Angeles, Calif.



Longerons, leading edges, etc., may be curved easily if split, cemented in position says Ed Hecker, Ft. Lauderdale, Fla.

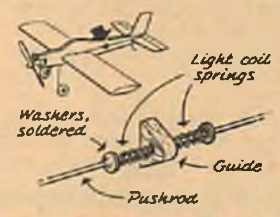


L. M. Waldorf, Binghamton, N. Y., makes small coupling at firewall to facilitate replacing fuel line to "sealed-in" tank.



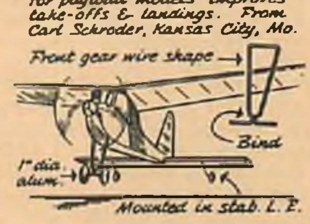
Homebuilt "Navy Carrier" deck for A/2 control models is miniature of official type, simplified for easy building, handling. Submitted by Dennis Searls, Bemidji, Minn.

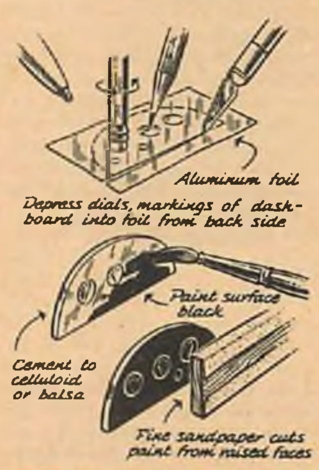
To strengthen and improve die-cut balsa pieces, dope & sand sheets before separating parts suggests John Yedinak, Hornell, N. Y.



Beginners' control-line training aid is device to neutralize controls for level flight. Designed by Richard Mathias, Lancaster, Ohio.

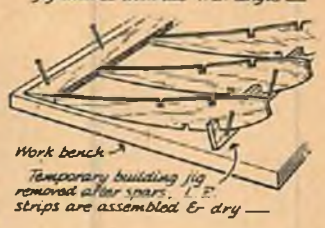
Variation of tricycle gear for payload models improves take-offs & landings. From Carl Schroder, Kansas City, Mo.

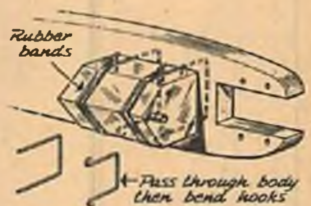




Rex DeSilets, Drexel Hill, Penna., devised unique system of making realistic dashboard for scale models.

Easy assembly of undercambered wings is idea of Carl Dodge, E. Cleveland, Ohio. Inverted assembly, use of temporary jig assures accurate T. E. angle.

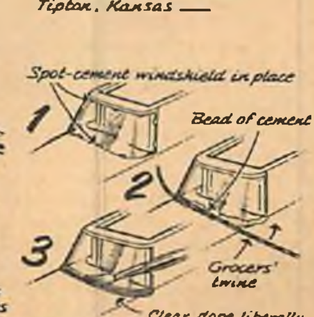




Simple tank installation for profile combat or trainer model permits interchanging tanks, shifting position for top performance. Rubber tends to reduce vibration. Tested by Bill Harvis, Cottage City, Md.

"Color trim" without masking is the idea of Carl Barnes, Columbia City, Ind. Exposed edges are color-doped before covering. Clear dope on covering bleeds color through for trim.

Brilliant trim, numerals, emblems for model decoration may be cut from aluminum foil reports Bill Weise, Tipton, Kansas.



Workmanlike joint between fuselage & windshield is assured in this method by Sheldon Brown, W. Franklin

AUTOMATIC MULTI-CONTROL

(*Continued from page* 39)

into level flight. Once in level flight the elevator may be trimmed to obtain whatever sort of flight you desire. Fantastically enough it works out so that no matter what the maneuver may be the recovery is flat and level.

Good inverted flight has come consistently well. This was done by arranging the amount of down elevator so that the maximum movement is just right to hold the nose level while inverted, which is more than enough needed for a vertical dive. Going into inverted flight then becomes easy; you start a loop by pulsing once and holding the elevator button. As the model goes over the top of the loop you release the button momentarily and press it down again, holding it as long as you wish to stay inverted. What happens is that you are in the first operate position of the servo when starting the loop; when you release and pulse again quickly at the top the servo moves from the first position to the second (down elevator) without having to return to neutral.

The catch to getting good inverted flight every time is to apply the down elevator at the right moment. If it is applied too soon the model will stall out and go into a roll. It is better to apply control too late rather than too early as the model will at least have plenty of flying speed then. If model tends to roll no matter how you do it, you either do not have good straight flight trim or else the model is stalling. If straight flight trim is O.K. simply reduce the amount of down elevator until the model stops rolling. While flying inverted the simultaneous button comes in handy as you can steer the model with it while holding the elevator button down.

Snap rolls are another maneuver which can be added by the use of the simultaneous control. They are done like this: from a down trim condition and above normal flying speed the third button is pulsed and held. The resulting up elevator and right rudder gives the roll automatically! Don't ask what happens if you pulse this third button twice and hold, that would be *down* elevator and left rudder! A further use of this third button can be had in sharp turns where it would be an advantage to have some "up trim" to hold the nose up. To do that you would start the turn with the rudder button and when the up trim was wanted you would release the button and quickly pulse the third one, returning again to the rudder button to hold the turn. The use of this third button has not been fully explored as yet, hence you will probably see how it can be used to an advantage in many other ways. Certainly it is a handy gimmick to have as long as it does not cost anything!

After only one season's flying with this system by only a very few people it is hard to come to any concrete conclusions, but I do think that a few facts have been proven and a lot more will be learned about it as flight time is built up. I feel that it is not the ultimate in multi-control flying, but it does come awfully close to it and can possibly be developed so that it will be the finest. That is on the debit side; however, there are a lot more things on the credit side as I think you may have seen here. Hence, if you wish to fly extremely safely, fly simply and with the minimum of work, be able to perform the most complex maneuvers, some of them automatically and do so with the very minimum of cost, you would do well to look into a system such as this.

NATIONAL MODEL CLUBS

- American Miniature Racing Car Association, a national non-profit organization. Carl Noward, Secretary-Treasurer, 1384 Berdan Avenue, Toledo 12, Ohio.
- International Model Power Boat Association. Mrs. Margaret Baxmann, Secretary-Treasurer, 2991 Garland Ave., Detroit 14, Mich.
- Academy of Model Aeronautics, a division of the National Aeronautic Association. 1025 Connecticut Ave., N.W., Washington 6, D. C.
- National Model Railroad Association. Robert Bast, Box 1238, Sta. C, Canton, Ohio.
- Model Aeronautics Association of Canada, 502 Charlotte, London, Ontario.
- Model Yacht Racing Association of America. A. R. Lassel, 831 Lakme Ave., Wilmington, Cal.

CAR CHAMPIONSHIPS

(*Continued from page* 43)

CHAMPIONSHIPS—1955 In contrast to last year's horrible, mucky race day this year's was perfection. Dark blue skies, temperatures in the 70s and humidity in the 40s. The lucky top 60% in Custom Proto and all of the other class entries (all ran, due to limited number in each) were straining at the leash to run. As usual Henry Hargraves with the help of the completely cooperative Fire Company had the track spotless. The new cable was carefully made and tested by the safety committee "beef trust" (Loose, Winter, Franz, Bissman, Wunderlich, Fairabend and Flynt). At ten we were ready to roll.

Fox, as top qualifier was first up, and time was never riper for a record. There was no wheel slip, yet the engine screamed high. Surely—but no, the electric timing clock had failed!

Three long hours of try and try again with many "shocking experiences" and complete frustration followed. By 12:30 p.m. all became concerned for the future of any race at all. It remained for Fox himself to find the trouble—a rusty cotter pin. Our nominee for the best sportsman of the '55 Nats, Californian Ed Baynes, insisted he be guinea pig for the clock test.

The second heat can best be described as sensational. Despite the fast slicking track that did require "Speedy-Dry" cleaning every ten runs speeds shot sky high. The answer was the weather. Humidity had fallen and temperature was up.

Without warning came the first dramatic 150. Carl Franz of Lafayette, Ind. took over leadership when his homemade Custom Proto (in last year's Annual) circuited at 150.25 mph for his first time ever over the magic mark. Never was this accomplishment more popular or deserved. The nice guy was hand-pumped and back-slapped all the way to his bench by scores of cheering contestants.

Speeds were blistering. Run after run produced successive 147 mph speeds. Baynes was among them. And to think just the day before he had still never attained 140! Absolute proof that newcomers can succeed. Walter Wilson, Jr., the World's Record holder at 151.77, ended his personal long high-speed drought by posting 147.54. Bob More's 1.5 geared Arrow jumped back into contention with a sixth spot 147.78 mph. Lump in throat was due to dropping to twelfth spot from a first heat fourth. Fairabend became another 47er. Fairabend also selling "Stardust K" fuel with little or no sales talk.

Bob Loose, Bermuda shorts and all, was continually busy on the track lighter-fluid-priming balky engines. Yes, they were pouring the nitro to 'em. Then Bob himself was on deck with a worried but determined look. The clock raced 'round and 'round but the car won out bringing the needle to a halt under the six-second mark. 151.26 mph! It was quick now and the tenth man on the track was Fox. Wailing its heart out with only hugely expanded tires to show for the effort, the answer was obvious. Just like that the track was too slick and he clocked only 142.63. Last year's Championship tie runoff loser, Paul Kruse, sadly ended the heat and his '55 efforts with a split piston, tearing up his engine. On the bright side, entering into the realm of "highest speeds ever" were George Feczko, Jack Hines, Ray Hunter, Joe Feimer, Ed Baynes, Joe Sampias and a few others.

The other classes were blasting records and having scorcher type racing, too. Jack Oliver did it again in Custom Sportsman, topping his own two-day old record (which in turn had topped his own 135 record) with 138.46 and that Class Championship win. Jack Hines' McCoy-powered McCoy Invader "BB" (Roach) likewise did some record setting at 116.13, far out-classing *his* field. Foxy repeated his '54 Spur Championship breezing along on a four mph cushion. Al Winter's two-year-old 144.00 mph record still stands. For the first time all Spurs used magneto.

In "A" and "B", where weary Red Abrahem (he proxy ran seven cars) could have used some nitro personally, Howard Rasmussen and Jerry Anderson took respective honors. Howard's Arrow turned 135.95 mph without benefit of shut-off or chrome liner and we wonder when he's gonna try Custom.

Loaded mostly with disappointments the third heat produced good and bad for the popular youngster, Jack Wolfe. Jack's Fox got ahold to the tune of a great 149.25, but for only fifth place. Just as the car completed its timed run a tire flew off, breaking the top and shaking most all car innards loose. Then came Fox, the perennial "man to beat." Despite the adverse conditions all pit activity ceased in respect to this great competitor's ability. Fellow entrants crowded around the electric clock. Fox sent the 1234 away and began the half-minute wait that seemed like an eternity. Perfectly "called," the crowd whooped momentarily as the needle stopped—just .01 second shy of Loose's 151.26 for 151.01, bringing to a dramatic halt the 1955 A.M.R.C.A. Championship. Bob Loose was World Champion.—*Bob More*

U.S.A. MODEL PLANE NATS

(Continued from page 7)

A speed found more records broken, Torp .19's and Mono-Lines again going faster than ever before. Gayle Clement was tops in senior with 134.73, while ole man Wisniewski really chugged around that pylon in his winning 141.73. Mike O'Bryan was top man in junior with 126.40.

The fourth day saw the hand-launched gliders filling the sky, lots of them being lost. Quite a few lads managed at least one six, but very few got in the second six. Highest time was in senior where Eddie Schmutz had 14:11.3. Hank Cole won open with 12:04, while Ernie Prosch won junior with 8:49.6.

America Class PAA or the old Half-A saw some very good times, Richard Epstein totaling 15:22 in Jr-Sr, L. T. Everett 14:25 for open. As in glider there were a lot of six-minute flights, very few got 2 sixes and none of them 3 sixes. Class A free flight was also low in total time—only one man, John Nogy, managed 3 sixes, and he didn't take his 4th. Marty Wolff won senior with 16:36, David Arne junior with 14:00.

Bob Palmer won his first Nationals stunt first place with a fine 362 points, followed very closely by Jose Sadurni of Mexico City with a really original stunt model. In B speed that team of Clem, Beasley and Kirn got off to a roaring 143.08, followed by Bob Lauderdale with 141.17. Senior was won by Daniel Berry with 127.75, while Clifton Medlock won Jr with 129.77.

The fifth day of flying produced some fast and furious action in the U-control circles. Open combat ended up in a three-way tie. Don Smith, Joseph Freeman and Jack Obleness all totaled 540 points, which quite naturally ended up in a fly-off; when the smoke and dust had cleared they ended in the above order. Meanwhile in proto speed those three Texans, Clem, Beasley and Kirn were really moving. They averaged 113.85 from a standing start, doing a lot of laps at 121 to 122 mph, which could place high in a lot of B speed contests. Karl Caldwell was the only other entrant to top 100 mph. Dennis Schaver won senior and Richard Rehwald junior with team racers.

Just one circle down from the proto activity the C speed ships were going faster than ever before. Bob Lauderdale and the Clem, Beasley and Kirn combination had a down to the wire fight all to themselves, the second-place team going more than 10 mph faster than the 3rd place winner. Bob won this event with an unprecedented 168.47 mph! Dick Bradford topped 154 in senior for first, while Mike O'Bryan topped 149 for first in junior.

Down free flightway, B free flight ended up in more of a race than C speed. Four guys had 3 sixes in the open class—Harry Gould, Toshi Matsuda, Earl Anderson and Mike Kostich. On their 4th flights Harry did 11:25 for first, the rest following in order. Senior Bob Gelvin totaled 16:56 to nose out Lee Hines; a similar close race in junior found Bob Johnson nosing out Alan Fleming.

In Half-A flying scale Bob Gelvin posted the winning Jr-Sr points for his 2nd first place of the day, while in the open division Bob Hill won his umpteenth in a row, nosing out R. Petro and Dick Baxter.

The Nordic glider event was most joyous for YM's Dick Everett, it really gladdened his heart, because there were so many entrants. Dick Sladek became the first man in this country to total 5 3's in competition, then he went on to do 8 minutes plus for a real record. There were more than 20 contestants who totaled over 12 minutes for their 5 flights, which is an average of 2:24 plus, some real good flying. Fred Wells won senior with 14:02 and David Arne, junior with 13:13.

The sixth and last day, Sunday, found close to 100 contestants down at "Lake Los Alamitos" for the hydro activity. Ed Mates got off to an early start and posted 16:30 in open, which looked like a sure thing until Manny Andrade came up and posted 3 6's with a Half-A job and then 2:48 for a booming 20:48 and the winning time. Jack Thomas put in a last-minute 58-second flight to total 12:58 for the senior event, while Jack Moreland put in an early 12:51 to easily win junior.

Limited glider also had a lot of entrants. Don Tune posted the high time to win senior with 13:25, Ralph Harmon totaled 9:11 for junior and James Scarborough posted the highest time of the day to take open.

In control line flying scale that experts' expert, Tom Dean, topped John Tatone to win first again. Jimmy McCroskey repeated his last year's victory by capturing senior honors; Gary Cummings Jr flew off with junior honors. Dean had a new model under construction, a Luscombe, which prompted

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S.S. COLOSSUS by Walter A. Musciano. His biggest and most impressive radio controlled model boat! Length 55"; beam 11", height 13". Working scale model of new roll-on, roll-off trailer and freight car carrying sea ferries. Electric power. Ultra simple lines.

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PIPER CUB J-3 R/C flying scale by Chas. Hollinger, 2"-1'. Spans 70"; length 44", weight 4.5 lbs.; For .19 power.

LITTLE ARKY — Scale-type Arkansas house boat. Length 12¼"; beam 4½"; height 4½". Six pencells drive 4½ volt Distler electric motor.

JAMBOREE STUNT model plane by Major H. M. Bourgeois. Takes engines .19 to .23; spans 3', 9" chord; 27½" overall.

Group No. 955— 50¢

NAUTILUS—Scale model electric power submarine for surface operation by R/C. Designed by Frank Lashek and Cal Smith. 56" length; 11" high; 4½" beam.

TAN-GIRO by Roy L. Clough Jr. autogiro with twin rotor diameters of 28"; length 36". Takes .14 to .19 power plants.

LITTLE NORDIK in HALF-SIZE plan form (with full size wing rib pattern). By Geo. Perryman. This towline glider spans 51½". Length 37½".

(see order form for prices)

GROUP 1252 — C/L Flying scale World War II Triple Treat by Musciano: GERMAN ME 109, 24" span. BRITISH SPITFIRE, 27" span. AMERICAN P-51, 27" span.

GROUP 253R — STUKA STUNT by Don Still. Spans 47"; fuselage 31". For .29 engine. DOUGLAS B-26 INVADER twin engine C/L flying scale by Lt. Atkins. Spans 52"; 35" fuselage. Power is two K&B 29's.

GROUP 553A—SASSY SAUCER, C/L by G. L. Harris. 25½" diameter. SWEET SIXTEENTH, F/F by Kochman, 32½" span. LIBERTY BELLE, R/C by Dick Schumacher 42" span.

GROUP 653—All Radio Control models. MAGIC MAID, 55" span, low wing scale-like R/C plane. SQUARE SUE, twin float, air prop powered cabin cruiser, for R/C control. R/C MOBILE TV TRUCK. Complete construction details, including power plant.

GROUP 653A — LEOPARD MOTH, class A control line scale model for the famous DeHavilland by "Red" Kochman. THE BOSTONIAN, Ed Dolby's contest type rubber powered model. SABRE-WING, Don Broggini's remarkable PAA-load and rise-off-water winner, 58" span.

GROUP 753A—R/C Wittman BUTTERCUP scale model by Frank Van Buren, 62" span. LA SORRA, Lee Renaud's rubber powered, 46" span Wakefield Model. PORSCHE SPORTS CAR, scale replica by Kochman, building instructions and cutaway views.

GROUP 753B—BONZO C/L flying scale by "Cal" Smith, powered by .23 to .33. SWAN SONG F/F flying boat with 58" high wing, a realistic semi-scale model. Wittman BUTTERCUP. Frank Ehling's half A C/L or F/F small scale model.

GROUP 853—SLOW BUG 3 foot span F/F pressure Jet turbine with realistic jet plane appearance. PAST DUE half A F/F with 37" span, contest winner by H. L. Robinson. FULL SIZE AIRFOIL SECTIONS, 12 of most popular airfoils in 6 sizes from 2½ to 5 inch chord.

GROUP 953 — WONDER WINGS R/C biplane by "Cal" Smith, 44" span. Semi-scale SALTY DOG CABINETTE R/C cabin cruiser by Frank Ehling. 27½" long. Features "seal-sew" construction details.

GROUP 953A—GRUMMAN F4F-4 WILDCAT C/L by Walt Musciano. ¾" to 1' scale. DEVIL DART by Tommy Baker. 14" span Dyna-Jet powered.

GROUP 953B — HAWKER HURRICANE C/L British flying scale by Musciano. ¾" to 1' scale. LITTLE AUGIE by Frank Ehling. Jetex No. 150. 22" wingspan semi-scale fighter.

GROUP 953C — FOCKE-WULF FW 190 — German W.W. II C/L flying scale by Musciano, ¾" to 1' scale. A/2 VIKING NORDIC TOWLINE GLIDER by Bill Farrance. Half size plans with full size ribs and cross sections.

GROUP 1053 — DOUGLAS AD2 SKYRAIDER C/L by Cal Smith. 44" span. X-PENDABLE combat stunt by Saffig. 24" span.

GROUP 1053A—BLUNDERBUS F/F, ½A semi-scale by Cal Smith. 30" span. "SPIRIT OF ST. LOUIS" F/F or C/L scale model of Lindbergh's ship. 29" span.

GROUP 1153 — TAPER WING WACO C/L scale biplane. 46" span. "ULTRA HOGAN" by Denny Davis. F/F, 61" span.

GROUP 1253 — ROCKET RACER C/L guided missile appearance. 18" span. "SASKIE" by A. G. Ackerman, 26½" span, Jetex. "JERSEY LIGHTNIN'" by Cal Smith. R/C Goodyear type racer. 52" span.

GROUP 154—TRIMMER AMPHIBIAN by Pienak. C/L twin engine 42" span. SWAYBACK, by CPO Hensbry, USN, F/F, ½A, 37½" span. DRAFTY JUNIOR, by Musciano Stunt. F/F, 36" span.

GROUP 354 — HIGH-Q, Jack Port's R/C plane. Spans 54", 42" fuselage. Takes .19 engine. MARTIN MERCATOR P4M-1, multi-engine Navy C/L bomber by Frank Lashek. Two .19 engines; spans 49"; fuselage 37".

GROUP 454 — AGGRESSOR C/L fighter with "built-up" fuselage. Designed by Earl F. Weil, .29 to .35 engine. Spans 38"; measures 26". HAWKER TYPHOON, British C/L rocket fighter by Musciano. 33 weight or 29 inverted power plants. Spans 31"; length 24". DOLPHIN, inboard cabin Gloucester lobsterman. Made from 1/16" sheet balsa; length 16"; beam 3¾"; height 3½". Uses small electric motor.

GROUP 454A — WAG. Dr. Walter Good's R/C high-wing monoplane. Spans 5'; fuselage 43", .29 engine. MARTIAN SPACESHIP by Roy L. Clough, Jr. Length 29"; powered by Half-A; has no wings. 10" dia.

GROUP 554 — HI-SPY by Hal Roth. F/F Half-A engine-powered. Pylon type, engine mounted in wing! Spans 49"; overall length 32". WHAT-IZZIT by Frank Ehling. R/C amphibian military truck and boat. Driven by air prop, can be run on land or in water. 4.5" beam. 21" length; 15.5" high. .074 diesel engine or equivalent. FOKKER TRIPLANE by Fred Reinhardt, C/L scale World War II German fighter. .10 engine. Spans 35"; 31" overall.

GROUP 554A — WALT GOOD'S Nor Selective 3-tube 27 mc. audio receiver for R/C. Full size patterns and helpful photos, plus circuits. MAC II, Hi-Power 5-Watt transmitter by Howard McEntee. Full size chassis drawings and all data. MINI-MAC Hand Tuber by Howard McEntee. Simplest thing in nongas type receivers. Utilizes sub-miniature CK526AX tube.

GROUP 654 — BELL P-39 AIRACOBRA, scale C/L fighter plane by Musciano. For .14 to .35; spans 28"; length 26". McGOVERN'S MONSTER by Don McGovern. Giant-size ROG-ROW amphibian F/F for R/C work. Spans 114"; length 92". .65 to 1.25 power plants.

GROUP 654A — SALT LAKE CITY SADIE, F/F by Barney Taft. .15 to .23 engines. Spans 64"; length 41". OBEE sea sled type cabin cruiser. Outboard or inboard power plant. Good for R/C. Length 18½"; beam 7"; height 5½". GOOD'S XTAL XMTR. 27.255 tone transmitter by Dr. Walter A. Good for use with his non-selective audio receiver. Full size chassis pattern, etc.

GROUP 754A — OVER AND UNDER, Harold deBolt's stunt C/L plane for .19 to .23 engines. Spans 65½"; 45" fuselage. CHANNEL WINGER, Roy Clough's semi-scale C/L of Custer's Channel Winger. .049 Thermal Hopper, spans 19"; length 25½". DE HAVILLAND MOTH, C/L flying scale biplane. Spans 20"; 16" fuselage. Small Cub engines.

GROUP 854 — CONSOLIDATED B-24—World War II Bomber, flying scale C/L model by Frank Lashel and S. Calhoun Smith. 2 or 4 engines; spans 73". 42" length BUFFALO SPEED BUGS—Air-prop race cars. Power plant is Half-A engine. SKIDDIN II—Frank Ehling's outboard engine model race boat. Length 21"; beam 7½".

GROUP 954 — JAUNTY ALOUETTE, semi-scale C/L biplane turbine jet power fighter type by Roy L. Clough, Jr. Powered by Space Bug Jr. engine. Spans 18"; length 22". MACCHI C-200 and C-202, scale model C/L Italian fighter by Musciano. .14 to .35; spans 26½"; length 21½".

GROUP 954A—TOP KICKER and BOTTOM ROCKER racing speedboats. For .049 to .09. Top Kicker inboard installation. Latter has 5" beam, 15" long. Top Kicker is 11½" long, 5" beam. Designed by Eichenburg and Witt.

GROUP 1154 — NEPTUNE by S/Sgt. St. Clair. F/F, spans 50"; length 37½". SAMBA SLED by Baughman. Air-prop powered twin float boat. Length 10½"; width 7". SQUEAKER C/L speed model by Baker. Class A; spans 12½"; length 13½". PEGASO world's most fabulous auto. Length 8½"; width 3½"; height 2½".

GROUP 1254 — DOUGLAS C-47 (DC-3) twin engine transport C/L by Walter A. Musciano. Span 47"; overall length 31½". Takes two engines .14 to .23. RACING RAFT by Bill Baughman. Glow plug or battery operated outboard engines. Length 16", beam 6". FLY-HI Outdoor hand launched endurance glider by Vern Clements. Spans 15"; length 18½".

GROUP 155 — PIPER CUB J-3. R/C flying scale model by Hollinger. Spans 70"; length 44". LITTLE ARKY scale type Arkansas house boat. Length 12¼"; beam 4½"; height 4½". JAMBOREE stunt model by Maj. Bourgeois. Engines from .19 to .23; spans 3'; length 27½".

GROUP 255—CHASE C-122 Avitruc by Dick Atkins. Twin engine scale C/L model takes ½A or small Class A engines. 3' Span; 23" length. SWEDISH BUTTERFLY BOAT by Ted Alexander. Boomless twin-sail boat. Height 30"; length 18"; beam 3". SEMI-SCALE FLOATS FOR R/C MODELS by Chuck Hollinger. Length 30"; width 4¼", 2-1'. MINI-MISSILE by Stephen L. Snyder, 3 .46" span F-51 semi-scale R/C. Cub .075 Diesel. Length

GROUP 355 — BLUNDER BUSTER C/L team racer by Ray Schroeder. Takes .29 engines; spans 28"; length 24". DIXIE Side-Wheeler R/C paddle boat by Frank Van Buren. Length 27½"; beam 17"; height 12½". Electric power. VENUSIAN SCOUT by Roy L. Clough, Jr. For .049 ½A power. Wing is 13" diameter; length 18½".

GROUP 455 — WINGLESS WONDER Air Boat by Paul E. Del Gatto. Air-prop driven pneumatic boat. Engines from .035 to .09. Length 32", width 16". KEN'S DREAMBOAT by Ken Willard. R/C amphibian. Uses .09 engine; spans 50"; length 39". CONVAIR'S VTO semi-scale control-line by Lewis H. Conover. Vertical takeoff powered by Thermal Hopper; delta wing spans 13"; length 14".

GROUP 555—SKIDELTA by Donald Broggini, a R/C flying wing. .074 engine; spans 28"; 36" long. PUG-NOSE RACING PRAM by William "Bill" Baughman. 14" length scale model of Chris-Craft's 10' pram. For outboard glow plug engine. Beam is 6¼". CHANCE VOUGHT OS2U-1 KINGFISHER C/L scale model by Albert E. Christen. Engines from .14 to .29 size. Spans 24"; length 19".

GROUP 655—PSUEDO-SUB by Frank Van Buren. Working R/C sub model. Waterline version. Electric or glow engine power. 60" long, 18½" height, 6" beam. HYDRO-CAT by Bill Baughman, semi-scale speed boat. Takes any glow plug outboard. Length 15½"; height 5½"; beam 6½". ROLL-O by Vincent Bonanno .14 to .19. plane. Span 5', length 39".

GROUP 755—BEECH MODEL 50 TWIN BONANZA by O. E. McKee. C/L flying scale. Two .35 size engines; spans 40"; length 27". WATER WARRIOR by Paul del Gatto 3-point model racing speedboat. Takes power plants from .074 to .15 cu. in. displacement. ELIMINATOR is James V. Reed's scale-like R/C model plane. Spans 6'; length 42". Uses power plants of .15 cu. in.

GROUP 855— R/C NAVY LANDING CRAFT — Scale model LST by Walter Musciano for electric power, 30" length; 8½" beam; 11" height. SPACE SKIMMER by Roy L. Clough, Jr. Full size patterns. 22" long; spans 10"; takes Space Bug Jr. or left hand Wasp. BITSY is E.S. Wilson's .15-powered C/L speed model. Glued metal wings and fiberglass reinforcing. Spans 17½"; length 11".

GROUP 955A—THE REAMER is ½A engine size racer. .049 power. Spans 16"; length 14½". By Tommy Baker. SPEED KING by Italy's Prati Amato. U-Control speed model. Span 11"; length 13". Super Tigre G.20 engine. JET-106 is Jetex powered racing car, 9½" long; 4" tread; 2½" wide.

GROUP 1055 — "JERSEY JESTER" F/F model by Frank Ehling; takes .15 cu. in. engines. Spans 50"; length 43". "MERRIMAC" waterline-scale model boat for electric motor power. Length 14"; beam 5". "MONITOR" waterline-scale model boat for glow plug or "diesel". Length 14"; beam 11". "TRI-YI" rubber powered three-winger. Length 19½"; span 9". TEENIE GENIE by Roy L. Clough, Jr. 1/2A stunt C/L model. Spans 16¼"; length 14½".

GROUP 1155 — WICKED WITCH by Donald L. Hoeg F-86 like C/L stunter 56" span; 33" length for .15 engines. VS-6 HYDRO FOIL PATROL BOAT by Walter A. Musciano .09 to .14 engines. Length 16½"; 6½" hydro foils. "LA MARQUISE" is sports car conversion for Cameron model race car. Length 14"; tread 3¼".

GROUP 1255 —TEE-JAY Super Delta Turbine Jet F/F or C/L "ducted-fan" type plane by Roy Clough. Takes .049. Spans 28"; 17½" long. BONNEVILLE SPECIAL. Paul Del Gatto's 249 powered 4 wheel vehicle. Length 28"; 10" wide. TRI-FOIL TERROR Bill Baughman's model boat. Glow plug outboard engines. Length 17"; 10" beam.

GROUP 156—"PIRATA" Twin C/L by Alexis Pepato. Two engine slab fuselage design. Spans 31"; length 31". Two OK Cub .099's or equivalent. BIG BUOY by Darrell E. Williamson. R/C inboard motor boat 3' long 14" beam; 10" high. Takes .19 size power.

GROUP 256 — "BUNKER BOAT" by Cal Smith and Frank Lashel. Fishing boat model for electric power, can be R/C: scaled 5/16"-1'; 35¼ long; 6¾" beam.

GROUP ATA 542— LITTLE FREAK #27—Dale Root with Thermal Hopper engine. Spans 44"; 32" fuselage. Super Aero-bat or similar. XF-92A-C/L jet powered flying scale by Frank Lashel. For Dyna-Jet power. Spans 31"; 41" long.

GROUP ATA55 — CENTRAL LAMSON AIR TRACTOR by Paul J. Palenek. Biplane flying scale C/L. From .14 to .31; span 29"; length 26". STATEN ISLAND FERRY BOAT by Walter A. Musciano. Steam engine or electric motor. Perfect for R/C. Length 29½"; beam 7¼"; height 8½".

GROUP ATA55A — SENIOR SENATOR by Carl Wheeley—.15 powered F/F. Spans 60"; length 48". CLASS C SPEED MONITOR by Leland S. Morton, Jr. .60 engines. Spans 18"; length 20". SEMI-SCALE SIKORSKY R-6 HELICOPTER by Roy L. Clough, Jr. Rotor diameter 25" fuselage length, 21". From .035 to .049.

GROUP ATA 55B— LAST OF THE MONOCOUPES by S. Calhoun Smith. R/C flying scale for Bangles, Tricycle gear. Span 58"; length 37¼". THERMAL KID by Frank Ehling. 61½" span towline glider. 47½" fuselage.

GROUP R101—MAC'S ROBOT by Francis McEwen. R/C. F/F model. Span 60", fuselage 41". McCoy .19. BUILD YOURSELF A BEEP BOX. BUILD YOUR OWN RECEIVER-TRANSMITTER. Novice Class LICENSE-FREE 27.255 MEGACYCLE

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U.S.A. MODEL PLANE NATS

(*Continued from page 72*)

Tatone to remark "what's the use"—the model has scale rivets in every spot where the real plane uses one.

In Clipper Cargo, favorite Jim Lang lifted an early 41 ounces for what looked like a sure winner only to have that grand old man of model flying, C. O. Wright, lift 41¾ ounces to nose him out. Subsequent flights by Lang ended up in disaster when the wind flipped him upside down, smashing his wing. This 41¾ is a new record.

In the U-control circles the team race event was won by that very consistent Senior, Ron Schauer. This lad is only 18 and is whipping everyone with this very fast ship. Navy Carrier was real close; R. M. Post nosed out Russ Beattie by 9 points, his 391.93 being a very good total.

PAA-Load endurance saw only 3 entrants, but Dick Heist's 1:08:14 winning time was a new record for this event. Jet found the guys really going fast again and again with Clem, Beasley and Kirn as the winning combination with their 162.83 mph plus nosing out Jim Summersett by .5 mph—this was mighty close and is another new record.

Hot as the competition was in most events, hottest by far were the championship races. Only one age champion won by Saturday, David Arne of Yuba City. Hal Cover and Don Alberts were very close, Don winning by gaining points in ROW after smashing his ship up three times, then putting it back together. Don was 16 points behind Hal when the Sunday flying started.

Woody Blanchard landed a ship on the Carrier Deck for the first time in his life to nose out Karl Caldwell by 10 points. Woody did some real thinking in winning his second straight National and Open Championship, picking events he was sure to get points in and then spotting the weakness in the point system to garner the points he so sorely needed.

The Thermal Thumbers in winning the team championships entered those events in which they love to build and fly models, all free flight events and mostly the non gas powered events. They got off to an early lead on Indoor day and increased their points every day. They saw their margin decrease as the days went on, but they held on to total 2373 points and win. Second place was Air Force #1 team's 1738 and the San Francisco Vultures' 1630.

The comment of some speed flyers was that the guys who fly "Biline" should be allowed 10 mph to catch the Mono-Line models. . . . The really amazing percentage of successful speed flights, very few attempts that did not get off.

The team flying of two B-29s by the San Diego Eurekas sure stopped the crowd, as did five guys in one team race or rat race, as so many called it.

Another model building first can be chalked up—the first vertical rise-off-water model. Charles A. Lindley put blown-up penny balloons over ⅜" balsa dowels on his stab tips with a retractable tripod foot on the fuselage similarly equipped to make a lot ask questions about legality. Some went so far as to state that it would ruin ROW events. What was really good is that this same guy flies VTO all the time—is there a difference as long as the plane will ROW and pass the float test? Charley didn't hook into any thermals but his 3-minute average with a long flight of 3:17 sure speaks for itself. One of the Navy timers was heard to say, "It looks like a flying pawnshop."

Pop Robbers was awarded the Flying 8 Ball trophy and immediately became worried with what he could do with it. The thing wouldn't fit in his car, maybe he'd award it to someone else—at last count he was talking to Mom and to himself.

The free flight system as used for the first time kept the take-off area clear of all obstructions. This was suggested by June Dyer at the '52 Nats and used experimentally on the last day. It consisted of a 100-foot circle laid out on the runway. All flyers were required and monitored by the timers and judges to start their engines up outside the circle; after the engine was started they disconnected their boosters, picked up their ship, moved it into this take-off circle and let it ROG. It worked fine, too—much better than the lack of system used at most contests where one must try to pick up a space between boosters and gas cans which is large enough to allow your ship to take off.

All in all this contest was by far the best organized ever. The Navy personnel was superb, they had been taught to do a job, so they did it better than the teachers could have. Accommodations were excellent. V.I.P.'s for autographs were all over the place. Secretary of the Navy Thomas presented the Grand Championship award.

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Diesel	.09	9-4	10-3	Fox	.29	11-4	12-3	
K & B	.15	9-4	10-3	K & B	.32	11-4	12-4	
K & B	.19	10-4	11-4	Veco	.32	11-4	12-4	
Fox	.19	10-3	10-4	K & B	.35	12-4	13-3	
K & B	.23	10-4	11-4	Fox	.35	11-4	12-4	
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Forster	.99	16-4	18-3	18-4
OK Twin	1.20	16-4	18-3	18-4
For Larger Eng. up to 2 H.P.		20" dia.	3 — 4 — 5 Pitch	
		22" dia.	3 — 4 — 5 Pitch	
		24" dia.	3 — 4 — 5 Pitch	

TEAM RACING PROPELLERS

Forster	.29	9-7		Cameron	.19	8-8	
K & B Torpedo	.29	9-8	cut to 8½-8	K & B Torpedo	.19	8-8	cut to 7½-8
McCoy	.29	9-7		McCoy	.19	8-8	
Ohlsson	.29			K & B Torpedo	.23		
Veco	.29	9-8	cut to 8½-8	Ohlsson	.23		
Veco	.31			Dooling	.29	9-7	
				Fox	.29	9-8	cut to 8½-8

PROPELLER RECOMMENDATION CHART

ENGINE		Free Flight	Payload and Radio Control	STUNT		SPEED	
K & B Infant	.020	5-2*					
K & B	.035	5-3*	6-2*	5-3			
OK Cub	.039	6-2*	6-2*	5-3			
Spitfire	.045	6-2*	7-2*	5-3	6-3	5-4	5-5
Cub	.049	6-3*	7-2*	5-4	6-3	5-5	5-6
Cub Diesel	.049	7-4	7-3*	5-5	6-4		
Cub	.049x	8-3*	7-2*	5-3	6-3	5-5	5-6
K & B Torpedo	.049	8-3*	7-2*	5-4	6-3	5-6	5-7
Duro Glo (Diesel)	.049	7-4	7-3	5-5	6-4		
Space Bug	.049	6-3*	7-2*	5-4	6-3		
Spitfire	.049	8-3*	7-2*	5-4	6-3	5-6	5-7
Wasp	.049	6-2*	7-2*	5-3	6-3	5-6	5-7
Wenmac	.049	6-3*	7-2*	5-4	6-3	5-6	5-7
Spitfire	.065	7-3*	7-3*	6-4	7-4	5-6	5-7
Cub	.074	8-3	8-3	7-4	6-5	5-7	5-8
Cub Diesel	.075	8-4	9-3	7-6	8-5		
Cub	.09	8-4	9-3	7-6	8-5	5-7	5-8
K & B	.09	8-3	9-3	7-4	7-6	6-7	5-9
McCoy	.09	8-3	9-3	7-4	7-6	6-7	5-9
McCoy Diesel	.09	9-4	10-3	8-5	8-6	6-7	5-9
Mills (Diesel)	.45cc	8-4	9-3				
Cub	.14	9-4	10-3	8-5	8-6		
K & B	.15	8-4	10-4	8-6	8-8		
Cub (Diesel)	.15	9-4	10-4	8-6	8-8		
Cameron	.19	9-4	11-4	8-6	8-8	6-9	7-8
K & B Torpedo	.19	9-4	11-4	8-6	8-8	6-10	7-9
McCoy	.19	9-4	10-4	8-5	8-6	6-9	7-8
K & B Torpedo	.23	9-5	11-4	8-6	8-8		
Ohlsson	.23	9-6	10-4	8-6	3-8		
Dooling	.29	9-5	11-4	9-6	8-8	7-9	7-10
Fox	.29	10-5	12-4	9-6	10-5	7-10	
Forster	.29	10-5	12-4	9-6	10-5	7-9	7-10
K & B Torpedo	.29	10-6	12-4	10-5	10-6		
McCoy	.29	10-5	12-4	9-6	10-5	7-9	7-10
Ohlsson	.29	10-6	12-4	10-5	10-6		
Veco	.29	10-6	12-4	9-6	10-6		
Veco	.31	10-6	12-4	10-6	9-7		
K & B Torpedo	.32	10-6	12-4	10-6	9-7		
K & B Torpedo	.35	10-6	12-4	10-6	9-7		
Fox	.35	10-6	12-4	10-6	9-7		
Atwood	.49	12-6	12-5	12-6		8-11	9-10
McCoy	.49	11-6	12-4	11-6		8-11	9-10
McCoy	.60	12-6	12-6			9-11	9-12
Dooling	.61					9-10	9-11

*Narrow Blade Series

GRISH BROTHERS • St. John 1, Indiana

Analysis of Top Model Aero Winners (Cont.) — National Championships of 1955

EVENT	PLACE	FLYER	SCORE	MODEL DATA
Speed C	J 1	Michael O'Bryan, Detroit Mich.	149.25	• 17" span Clark Y pine wing. 44½ sq. in. area. 12½ sq. in. magnesium stab. Clark Y. Hell Razor pan with pine top. Buty. primer and synthetic enamel. McCoy .60 engine, Tornado 9/12 prop. Locking dolly. Own fuel. Darwin handle. 27 oz.
	J 2	Eddie Knudson, Tacoma Wash.	148.63	• 18" metal wing, symmetrical, 40 sq. in. 20 sq. in. flat stab. Gauze covered. 15 coats Aero Gloss. Metal pan with balsa top. McCoy .60, cleaned up and polished. Tornado 9/11 prop. Own fuel. Conventional dolly. Own design cast handle. 2 lb. 15 oz.
	J 3	Clifton Medlock, Atlanta Ga.	142.24	• 16" solid wood wing, 40 sq. in. area. Original airfoils. Fuselage cut from 1⅜" hardwood block. Fiberglass all over, then 5 coats Aero Gloss. McCoy .60 with Tornado 9/12 prop. Own fuel. Pin dolly. 29½ oz.
	S 1	Richard Bradford, Salt Lake City Utah	154.05	• 16" birch wing with 40 sq. in. area. 16 sq. in. mahogany symmetrical stab. Sugden quarter-pan, beech fuselage. Balsa cowl. 10 coats Fuller's butyrate dope. McCoy .60 with turned head, milled lugs, own shaft extension. Tornado 9/11 modified prop. Home brew fuel. Mouse-trap dolly. 31 oz.
	S 2	Gayle Clement, Lynwood Cal.	153.52	• 20" NACA 2412 wing with 97½ sq. in. area. 41 sq. in. symmetrical stab. Fiberglass with 3 coats Fuller's plastic dope. Dooling .61, modified, Tornado 9/11 prop. Own fuel. Wisniewski dolly. Stanzel handle. 28 oz.
	S 3	Walton Pryon, Decatur Ga.	153.13	• 20" span pine wing, 44 sq. in. area, semi symmetrical. 18 sq. in. sym. stab. Fir fuselage. Berkeley fiberglass, then 5 coats Aero Gloss. McCoy .60 with case turned down and inside cleaned. Tornado 9/12 prop. Own fuel. 3-wheel pin dolly. Mono-Line handle.
	O 1	Bob Lauderdale, Tulsa Okla.	168.47	• Dizzy Boy. 20" lifting section bass wing. 38 sq. in. area. 17 sq. in. flat ply stab. Champion pan with basswood box top. 6 coats Aero Gloss plus wax. McCoy .60 slightly modified, Tornado 9/12 prop. Hopped up This Is It fuel. 3-wheel dolly. Stanzel Speed Master handle. 30 oz.
	O 2	Clem-Beasley-Kirn, Mesquite Tex.	165.83	• Solid 20" wing with 40 sq. in. area, own airfoil. 13½ sq. in. symmetrical stab. Crutch and block fuselage. Silk covered, with 3 coats primer, 5 of dope. McCoy .60 Ported and polished, Tornado 9/12 prop. 3-wheel lock-on dolly. Mono-Line handle. This Is It fuel. 29 oz.
	O 3	Robert Sugden, Salt Lake City Utah	155.11	• 17" symmetrical aluminum wing with 45 sq. in. area. 16 sq. in. flat ply stab. Sugden speed pan, hollowed block fuselage. 8 coats Testors butyrate dope. McCoy .60 with ported sleeve. Tornado 9/11 prop. Sugden Racing fuel. Wing lock dolly. 29 oz.
Stunt	J 1	Edwin May Jr., Durham N.C.	319.0	• Veco Thunderbird. Silk covered with 15 coats Aero Gloss. Fox .35 with Y&O 10/5 prop. Testors fuel. EZ-Just handle.
	J 2	Rich Rehwald, Los Angeles Cal.	318.3	• Veco Smoothie. Canopy added. Silk covered with 8 coats Aero Gloss. K&B .35 with Top Flite 10/6. Own fuel. EZ-Just handle.
	J 3	Clifford Woodruff, Beaumont Tex.	312.0	• Stuka kit model. Silkspan covered with 9 coats Aero Gloss. Fox .29 with Top Flite 9/6 prop. O&R #2 fuel.
	S 1	William Cummings, Dallas Tex.	358.4	• 50" span balsa wing with 500 sq. in. area. Silkspan covered with 15 coats Aero Gloss. Balsa and bass wing. Fox .35. Y&O 10/5 prop. EZ-Just handle. 3 lbs. weight.
	S 2	Larry Phillips, St. Clair Shores Mich.	344.3	• Built up 50" wing with 540 sq. in. area. 90 sq. in. stab. Sheet and block fuselage. Silkspan covered with 20 coats of butyrate. Fox .35 with high compression head. Tornado 10/5 prop. Power Mist with added castor oil. Darwin handle. 45 oz.

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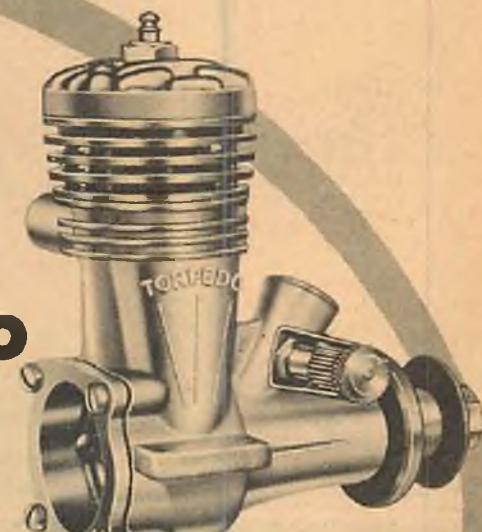

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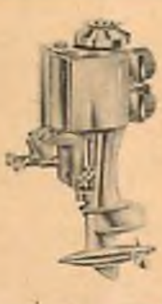
Yes, the new Torpedo .29R racing engine is already a "Star Performer." One of the prototype models of the Torpedo .29R was entered in the F.A.I. Speed Trials, by Bill Wisniewski, the popular speed flyer from Lakewood, California. He established, and now holds, the International Speed Record of 142.2 M.P.H. The Torpedo .29R follows the same basic design as the world famous Torpedo .15, .19, .23, and .35.

This new Torpedo .29R is particularly adaptable to Team Racing, U Control Speed and Combat Flying. It is in addition to our present Torpedo .29 green head model that has been so popular for the past nine years. The Torpedo .29R has the same mounting dimensions as the Torpedo .35.



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Analysis of Top Model Aero Winners (Cont.)—National Championships of 1955

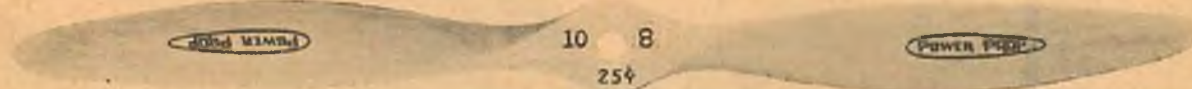
EVENT	PLACE	FLYER	SCORE	MODEL DATA
Stunt	S 3	James Ebejer Detroit Mich.	332.3	• Original design with butyrate doped surfaces. Fox .35, Y&O 10/5 prop. Power Mist fuel.
	O 1	Bob Palmer Burbank Cal.	362.0	• Own design—Veco Thunderbird; front wheel brake added. Silk covered with 8 coats Aero Gloss. Veco .35 with Top Flite 10/6 prop. Exothermic 28 fuel. Own handle.
	O 2	Jose Sadurni Mexico, D.F.	352.0	• 50½" span wing with 500 sq. in. area. 21% stab. Own airfoils. Former fuselage. Silk covered with 25 coats Aero Gloss. Fox .35 with Top Flite 10/6 prop. K&B 100 fuel. Yost handle. 2¼ lbs.
	O 3	Clarence Lee Sunland Cal.	342.0	• 53" D-tube wing with NACA 0018T section and 550 sq. in. area. 20% symmetrical stab. Sheet fuselage. Silk covered. Fuller's nitrate dope with Tuff on top. Veco .29 with Tornado 10/5 prop. Supersonic 1000 with castor added. 47 oz.
Combat	J 1	Michael Burke Louisville Ky.	520	• Modified Trixter Basic Trainer. Silk covered. 5 coats Aero Gloss. K&B .35 with 10/6 Power Prop. Exothermic 28 fuel. EZ-Just handle.
	J 2	Gary Mahnke G. Junction Colo.	500	• Ringmaster kit model. Silkspan covered. 5 coats butyrate dope. Fox .35 with Top Flite 10/5 prop. Ohlsson 200 fuel.
	J 3	Clifton Betz Jr. New Orleans La.	480	• Ringmaster kit model. Aero Gloss doped. Torp .35 with Top Flite 9/8 prop. K&B 100 fuel. EZ-Just handle.
	S 1	Jim Levrett Glendale Cal.	560	• 39" span built up wing with 395 sq. in. area. 124 sq. in. sheet stab. Sheet fuselage. Silkspan covered. 2 coats dope, 1 of fuel proofer. Fox .35 with high comp. head. Top Flite 9/8 prop. EZ-Just handle. 17 oz.
	S 2	Leo Stephens Olympia Wash.	520	• Ringmaster kit model. Butyrate dope. K&B .35 with Tornado 10/6 prop. EZ-Just handle.
	S 3	Richard Brewer Compton Cal.	440	• Original design. K&B .35 with Top Flite 10/6 prop. Own fuel. EZ-Just handle.
	O 1	Donald Smith San Ber'd'o Cal.	540	• Model made from plans of "Half Fast". Silk covered. 6 coats of nitrate dope. Fox .35 with 10/6 Power Prop. K&B 1000 fuel. EZ-Just handle.
	O 2	Joseph Freeman Phoenix Ariz.	540	• Sterling Ringmaster with shortened wing—400 sq. in. K&B .35 engine. Tornado 10/6 prop. K&B 100 fuel. EZ-Just handle. 2 lbs.
	O 3	Jack O'Bleness Manhattan B. Cal.	540	• Consolidated Jubilee kit model. Nylon covered. 4 coats of Aero Gloss. K&B .35, Tornado 9/7. Own fuel. EZ-Just handle.
T. Racing	1st	Dennis Schauer Sunland Cal.	—	• 27½" Fireball-type wing with 126½ sq. in. area. 48 sq. in. sheet stab. Sheet box fuselage with rounding blocks. 26 coats of dope. McCoy .29 engine with Tornado 8/8 prop. Ohlsson 200 fuel. 20 oz.
	2nd	Gene Kessler San Diego Cal.	—	• 27" built-up wing with 130 sq. in. area. 30 sq. in. stab. Fiber-glassed fuselage. 6 coats butyrate dope. McCoy .29 with Tornado 8/8 prop. Hellzfyre fuel. EZ-Speed handle. 30 oz.
	3rd	Harold Ledington National City Cal.	—	• 24" sheet balsa wing with 130 sq. in. area; modified Clark Y. Fuselage is fiberglass shell. 4 coats of Sta. McCoy .29 with Tornado 9/7 prop. 4" EZ-Just handle. 25 oz.

here are the WINNERS!

1955 NATIONALS
Los Alamitos, Cal.

Again, for the fourth time, Top Flites and Power Props won more events in the Nationals than all the other makes combined. Fly with a sure winner!

A pair of Top Flite winners from Yuba City, Calif. GARY GRENOBLE (left) beat the best in ½A F.F. JR with his Shorty. Swung a 6-3 POWER PROP on his Atwood .049 with Ohlsson Gold Seal go-juice. Time, 16:34. DAVID ARNE bagged first in A F.F. JR with an Ohlsson Gold Seal 2000 bang-watered Cub .09. His Jasco Rival clocked 14:00 behind a 7-4 TOP FLITE to make him Junior National Champ!



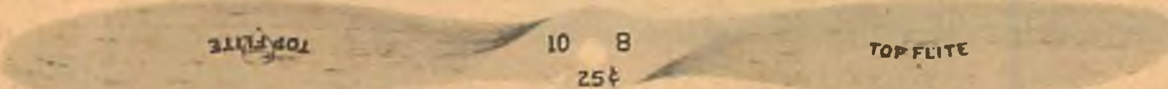
½ A SPEED JUNIOR
Michael Obryan
Detroit, Mich.
Speed 73.95mph
Engine Thermal Hopper
Fuel Home Brew
PROP 4½-7 POWER PROP
Plane Original

A GAS F.F. OPEN
John D. Nagy
Denver, Colo.
Time 18:00
Engine Atwood .051
Fuel K&B 1000
PROP 6-3 POWER PROP
Plane Jasco Streak

C GAS F.F. JUNIOR
Jack Linn
Los Angeles, Calif.
Time 16:36.0
Engine Torp 32
Fuel Ohlsson 200
PROP 10-6 POWER PROP
Plane Modified Zeek

PAA-LOAD OPEN
L. T. Everett
Long Beach, Calif.
Time 14:25.2
Engine Thermal Hopper
Fuel Thimble Drome Racing
PROP 6-3 POWER PROP
Plane Payee

INT'L PAA LOAD JR-SR
Robert Patchin
Hawthorne, Calif.
Time 11:42.3
Engine Torp 15
Fuel Thimble Drome Racing
PROP 8-3½ TOP FLITE
Plane PAA-Sir



STUNT OPEN
Bob Palmer
Burbank, Calif
362 points
Engine Veco 35
Fuel Exothermic 28
PROP 10-6 TOP FLITE
Plane Thunderbird

FLYING SCALE SENIOR
Jim McCroskey
Iredell, Texas
294 points
Torp 29 engine
Fuel Fox
PROP 9-5 TOP FLITE
Plane F 51

B GAS F.F. JUNIOR
Bob Johnson
Riverside, Calif.
Time 14:07.8
Engine Fox 29
Fuel K&B 1000
PROP 10-6 TOP FLITE
Plane Modified Spacer

PAA-LOAD ENDURANCE
Richard Heist
Fort Worth, Texas
Time 1 hr. 8 min. 14.6 sec.
Engine Torp 15
Fuel Powermist
PROP 8-6 POWER PROP
Plane So-Long-Gone

½ A SPEED SENIOR
Mike Dawson
Galesburg, Ill.
Speed 79.29 mph
Engine Thermal Hopper
Fuel Thimble Drome Racing
PROP 4½-6 POWER PROP
Plane modified Whirlaway

FLYING SCALE OPEN
Thomas Dean
Corpus Christi, Texas
344 points
Engine Cameron 19
Fuel K&B 1000
PROP 9-6 TOP FLITE
Plane Aeronca Crop Duster

B GAS F.F. SENIOR
Bob Gelvin
Topeka, Kansas
Time 16:56
Engine Torp 23
Fuel K&B 1000
PROP 10-3½ TOP FLITE
Plane Spacer

FLYING SCALE F.F. JR-SR
Robert Gelvin
Topeka, Kansas
85 points
Engine Wasp .049
Fuel K&B 1000
PROP 6-3 POWER PROP
Plane Longster "Wimpy"

COMBAT JUNIOR
Michael Burke
Louisville, Ky.
520 points
Engine K&B 35
Fuel Exothermic 28
PROP 10-6 POWER PROP
Plane mod Trixter Profile

NAVY CARRIER SENIOR
Clyde Hamilton
Bellflower, Calif.
377.47 points
Engine Torp 35
Fuel K&B 1000
PROP 9-6 POWER PROP
Plane Grumman Guardian

C GAS F.F. SENIOR
Don Geisler
Monterey Pk., Calif.
Time 27:26.0
Engine Torp 32
Fuel K&B 1000
PROP 10-6 TOP FLITE
Plane Civy Boy 61

FLYING SCALE F.F. OPEN
Bob Hill
Capistrano Beach, Calif.
213 points
Engine Atwood .049
Fuel K&B 1000
PROP 6-3 TOP FLITE
Plane Berkeley Sup. Cruiser

COMBAT SENIOR
Jim Leverett
Glendale, Calif.
560 points
Engine Fox 35
Fuel V&O
PROP 9-8 POWER PROP
Plane Original

NAVY CARRIER OPEN
R. M. Post
Fresno, Calif.
391.93 points
Engine McCoy 29
Fuel Powermist
PROP 9-7 TOP FLITE
Plane Grumman Guardian

R.O.W. GAS JUNIOR
Jack Moreland
Long Beach, Calif.
Time 12:31
Engine Space Bug .049
Fuel Thimble Drome Racing
PROP 6-3 POWER PROP
Plane Orig. by J. Osley

RADIO CONTROL (rudder)
Edward L. Friend
Las Cruces, N. M.
76⅓ points
Engine Fox 25
Fuel Ohlsson 200
PROP 11-4 TOP FLITE
Plane Live Wire Crusier

COMBAT OPEN
Donald R. Smith
San Bernardino, Calif.
540 points
Engine Fox 35
Fuel K&B 1000
PROP 10-6 POWER PROP
Plane ½ Fast

½ A GAS F.F. SENIOR
Don Alberts
Albuquerque, N. M.
Time 36:00
Engine Atwood .049
Fuel Thimble Drome Racing
PROP 5¼-4 POWER PROP
Plane Privy Boy

R.O.W. GAS SENIOR
Jack Thomas
Garden Grove, Calif.
Time 12:58
Engine Torp 15
Fuel Home Brew
PROP 10-6 TOP FLITE
Plane Modified Spacer

RADIO CONTROL (multi)
Alex Schneider
San Francisco, Calif.
156⅔ points
Engine Spitfire 60
Fuel Gas & Oil
PROP 14-6 TOP FLITE
Plane Modified Piper Cub

FLYING SCALE JUNIOR
Gary A. Cummings
Fort Worth, Texas
183 points
Engine 2 Torp 32's
Fuel Cheminol #2
PROP 10-6 TOP FLITE
Plane B 26

NEW RECORD ½A SPEED
Jerry McClung
Abilene, Texas
Speed 79.24 mph
Engine Thermal Hopper
Fuel Thimble Drome Racing
PROP 4½-6 POWER PROP
Plane Mini-Whirlaway

HELICOPTER
Parnell Schoenky
Kirkwood, Mo.
213.79 points
Eng. Atw'd .049 & Jetex 350
Fuel Cheminol AA
PROP 6-3 POWER PROP
Plane XH-4 and JH-5

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Analysis of Top Model Aero Winners (Cont.)—National Championships of 1955

EVENT	PLACE	FLYER	SCORE	MODEL DATA
C/L Scale	J 1	Gary Cummings Ft. Worth Tex.	—	● B26 model from A.T. plans. Sheet covered and Aero Gloss doped. Two Torp. .32 engines with Top Flite 10/6 props. O&R #2 fuel.
	J 2	Tom Pinkel Belleville Ill.	—	● Sterling kit model Polish fighter. Silk covered with 20 coats of Aero Gloss. Forster .29 with Top Flite 10/6. Nitro X fuel. U-Reely handle.
	J 3	Jimmie Doan Del Ray Oaks Cal.	—	● Berkeley kit model, Pitts Special. Silkspan covered with 10 coats Aero Gloss. K&B .15, 8/6 Power Prop. K&B 100 fuel.
	S 1	Jimmie McCroskey Iredell Tex.	—	● F-51 scaled from factory plans. 30.86" span laminar flow wing. Model entirely sheet covered. 25 coats Aero Gloss. K&B .29 with Veco piston and cyl. assembly. Top Flite 9/5 prop. Fox fuel. 42 oz.
	O 1	Tom Dean Corpus Christi Tex.	—	● Aeronca Crop Duster. 42¼" span, 250 sq. in. wing. True scale construction used for entire plane. Silk covered. 7 coats butyrate dope. Cameron .19 engine with Top Flite 9/6 prop. Supersonic 1000 fuel. 1½ lbs.
	O 2	John Tatone San Fran. Cal.	—	● Myers 145 scale model. Silkspan covered with 12 coats butyrate. Torp. .32 engine, Top Flite 10/6 prop. Ohlsson 200 fuel.
	O 3	F. H. Dixon Phoenix Ariz.	—	● 7' span model of B-50 bomber made from kit by Tenshodo Model Co., Japan. Weighs 10½ lbs. Balsa covered with Aero Gloss dope. 4 Enya .19 glow engines with 4-bladed 9/6 Power Props. Power Mist fuel.
Carrier	J 1	Richard Boozer Atlanta Ga.	—	● Grumman Guardian from magazine plans. Silkspan covered with 20 coats Aerogloss. Fox .35 with Tornado 9/7. Blue Blazer fuel.
	J 2	Gary Austin Kirkwood Mo.	240.71	● T-28 scale job. Silk covered with 10 coats butyrate. Fox .35 with Tornado 9/7 prop. Nitro X fuel.
	J 3	Stan Chambers Long Beach Cal.	210.55	● Berkeley kit model, SNJ. Silkspan covered with 5 coats of Aero Gloss. L.G. beefed up and lengthened slightly. K&B .35 with 9/8 Power Prop. K&B 1000 fuel. EZ-Just handle.
	S 1	Clyde Hamilton Bellflower Cal.	377.47	● Grumman Guardian. Nitrate dope followed by Tuff. Torp. .35 with Top Flite 9/6 prop. K&B 1000 fuel.
	S 2	Bill Venturi Madera Cal.	366.37	● F-7F Tiger Cat. Aero Gloss dope. Silkspan covered. Fox .29 and .35 engines. Tornado 10/5 props. K&B 1000 fuel. Modelair handle.
	S 3	Shirley Austin Kirkwood Mo.	192.43	● Vought Corsair. Balsa planked. 10 coats Aero Gloss. Fox .35 with Top Flite 10/6 prop. Nitro X fuel.
	O 1	R. M. Post Fresno Cal.	391.93	● Grumman Guardian from magazine plans. Balsa construction with 5 coats Fuller's butyrate. McCoy Redhead .29 with Top Flite 9/7. Power Mist fuel. EZ-Just handle modified for electrical contacts.
	O 2	Russell Beattie Long Beach Cal.	382.67	● F-4F built from Hobby Helper's A.T. plans. Balsa covered, 3 coats Testor's dope. K&B .35 with 9/8 Power Prop. Power Mist fuel.
	O 3	William Jensen Oakland Cal.	362.6	● Berkeley kit model, F-8F Bearcat. Balsa covered with Silkspan over. 4 coats Aero Gloss. Fox .59 with Top Flite 11/8 prop. Exhaust baffle for two-speed. Power Mist fuel.

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Housed in blue hammertone hand held cabinet, uses standard batteries. With 56" telescoping antenna, tubes, crystal and everything you need except for batteries. Highly prefabbed $16.95

★ SUBMINI WAG RECEIVER

The popular WAG audio receiver uses regular miniature tubes. This version of the circuit, somewhat improved, uses submini, making possible a much smaller unit and also A battery drain of only 80 ma. Requires 100% modulation and is perfect match to transmitter above. Receiver is housed in small plastic case measuring 2x2⅞x1. May use any good relay, although our combo comes with the Gem 7.5K unless you specify otherwise. Basic Kit, less tubes and relay, $5.50 Combo, basic, tubes and Gem 7.5K relay $16.95

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A precision high quality volt-ohm milliameter at a reasonable price. Not a small undersized meter, but has a full 3½ face for easy reading. Sturdy metal case measures 3x4x6". And the ranges fit your R/C needs.
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NEW—IMPROVED—Ace PC receivers have had a face lifting to make them the finest ever offered anywhere. Illustrated above is the 1956 version of the Ace PC receiver housed in small plastic box measuring 1x1¾-x2¼, for compact, crash proof unit. Relay may be mounted inside of the box if a Gem or Neomatic is used. Two of last year's models have been re-designed and offered to you with two new ones.
Thousands of Ace PC kits have been sold since their introduction 18 months ago, and we have bulging files with letters acclaiming them.

(All receivers listed below are housed in plastic case)

★ PC6—LITTLE GEM DIODE RECEIVER

Uses XFG1 or RK61 in first stage and 1AG4 or CK526 second stage. By using diodes in the circuit first stage idles at .15 ma or less instead of the customary .5 for saving in tube and battery life. Signal drops first stage, triggering second, which jumps from 0 to 2.8 or more depending on tube and relay used.
Basic, less tubes and relay $6.25
Combo, with tubes and Gem relay $16.25

★ PC7—GAZISTOR RECEIVER

This circuit by W. E. Bliss, features CK722 transistor in second stage instead of tubes and cuts filament drain. Uses either XFG1 or RK61 first stage. First stage idles at .5 of ma, which drops on signal to trigger CK722.
Basic kit, less tubes, transistor and relay $4.95
Combo, tube, transistor, Gem relay $14.10

★ PC2—LORENZ TWO TUBE RECEIVER

Uses RK61 first stage, 1AG4 second stage. More receivers of this type sold than any other since the 27¼ mc spot opened up. Very sensitive and reliable.
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★ MAC II TRANSMITTER

The most popular transmitter offered, designed by Howard G. McEntee. Has full 5 watts input for power. Uses two 3D6 tubes in parallel.
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For 112" telescoping antenna instead of the 3 section take apart normally included add $2.00.

★ MINI MAC RECEIVER

This popular Hard Tuber uses a CK526AX for low filament drain of only 20 ma. A little trickier to adjust than a gas tube receiver, but very reliable and long lived. Tube life is 1,000 hours. Has sensitivity adjustment for any installation. (Illustrated)
Basic kit, less tube and relay $4.25
Combo, with tube and Gem relay $10.95

★ MAC'S SIMPLE SINGLE RECEIVER

This is one of the easiest of the hard tubers to get going. Rugged in every respect, it will operate in almost any installation where dependable operation is required. Uses half of the filament of a 3S4 for 50 ma filament drain.
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• OKLAHOMA. *Enid* Knuckle Busters, c/o R. N. Smith, 1230 E. Main. *Oklahoma City* Flying Aces, c/o R. J. Schmitt, 2125 N. May Ave. *Oklahoma City* Air Blazers, c/o P. E. Sims, 1048 Carter Dr. *Tusla* Glue Dobbers, c/o J. D. Kehr, 6245 E. Marshall.

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• PENNSYLVANIA. *Allentown* GMA, c/o George Stahl, Jr., 1111 Hamilton (A, B). *Bethlehem* Lehigh Valley Model Race Car Club, c/o Bob More, 66 W. Elizabeth Ave. (C). *Bristol* Aeromodeleers, c/o W. H. Elmer, Jr., 824 4th Ave. (A, B). *Freeland* Flying Whirlwinds, c/o Charles Rudewick, 712 Walnut. *High Rock* Skyclippers, c/o R. D. Snyder. *Johnstown* Prop Busters, c/o Sam Gossard, 718 Summit Ave. *Landsdowne* Golden Eagles, c/o Thornton Hoffman, 151 Berkley Ave. *Lehighton* Prop Spinners, H. E. Roth, 118 S. 4th. *Levittown* Aerobugs, c/o J. B. Emerson, 235 N. Park Dr. *McKeesport* Keystone Clippers, c/o A. C. Kushner, 707 Hazel. *Mt. Wolf* Skymasters, c/o C. M. Ehrhart, 21 S. 5th. *New Kensington* Flying Model Builders, c/o Frank Harvey, 9 Cherry. *Philadelphia* Model Power Boat Club, c/o R. W. Searey, Jr., 8634 Temple Rd. (B). *Philadelphia* Philadelphia Skyhawks, c/o Anna Haas, 7537 E. Tulpehocken. *Pottsville* Piston Pushers, c/o J. W. Zimmerman, 516 Greenwood Ave. (A, B). *Providence* Model Club, c/o Abraham Seidel, 56 Goddard St. (A, B, C).

• SOUTH CAROLINA. *Charleston* Prop Busters, c/o D. G. Kinne, 103 Wentworth. *Spartanburg* Sky Knights, c/o M. M. Burley, Jr., 135 Oakwood Ave.

• TENNESSEE. *Chattanooga* Flying Moccasins, c/o H. L. Donaldson, 3609 Lamar Ave. *Johnson City* Model Maniacs, c/o Bob Hodges, 706 Forest Ave. *Memphis* Modelairs, c/o R. D. Grant, Jr., 2110 Harbert.

• TEXAS. *Abilene* Key City MC, c/o A. J. Thompson, 1209 Graham (A, B, C). *Amarillo* Planesmen MAC, c/o J. F. Pierce, 2607 W. 22nd St. *Arlington* Aeromodelers, c/o E. R. Atkins, Jr., 1701 Grace. *Beaumont* Sabine Area MC, c/o E. D. Patterson, 2170 Pecos. *Borger* Tri-City MC, c/o Robert Parsons, 1103½ W. Monroe (A, B). *Dallas* Cloud Cutters, c/o Carl Summers, Jr., 973 Ryan Rd. *Dallas* Hobby Hounds, c/o Joe Bray, 354 Vista Ct. *Dallas* Cliff MC, c/o K. E. Dougan, 2410 Anniels Dr. *Fredericksburg* VFW MAC, c/o H. J. Itri, 302 W. Main. *Houston* R/C Club, c/o H. P. Young, 6651 Myrtle (A, B). *Mesquite* Hobby Hounds, c/o H. W. Grogan, 10513 Seagoville Rd. (A, B, C). *San Antonio* GMAA, c/o C. C. Perkins, 235 W. Drexel. *Wichita Falls* Tailtwisters, c/o V. C. Hammersley, 1632 Pearl.

• UTAH. *Ogden* Weber Warriors, c/o George Galloway, 1100 Wash. Blvd. *Salt Lake City* Ute Aeromodelers, c/o Jim Rhoades, 790 7th Ave.

• VIRGINIA. *Hampton* BrainBusters, c/o J. V. Boyle, Jr., 219 Shenandoah Rd. *Harrisonburg* MBC, c/o E. L. Hayden, 42 W. Bruce (A, B, C, RR). *Matheus* Victory RPM's, c/o Jimmy Maggard, Peary Post office.

• WASHINGTON. *Bellevue Lake* Washington Radio Modelers, c/o R. D. Johnson, 4103 151st Ave., S.E. *Bellevue* Model Power Boat Club, c/o E. P. Turrella, 14811 S.E. 42nd St., Eastgate (B). *Ephrata* Piston Poppers, c/o Andy Beaudry, 535 B St., N.W. (A, B, C). *Everett* Model Air Force, c/o E. J. Sigmon, 2605 Colby Ave. *Mountainlake* Terrace Eagles, c/o S. M. Gaskill, Sr., 23106 51st W. (A, B, C, RR). *Mt. Vernon* Divots Diggers, c/o Bud Peck, Dependable Motor Co. (A, B, C). *Richland* Atomic City Aeromodelers, c/o G. E. Wade, 1006 Wright. *Seattle* Model Yacht Club, c/o E. W. Drouillard, 141 N. 85th (B). *Seattle* Sky Hawks, c/o Chuck Wood, 3815 51st S.W. *Spokane* MAC, c/o H. S. Perry, S. 107 Wall St. (A, B). *Tacoma* Aeromudlers, c/o Maurie Hinckley, 317 S. Commerce. *Tacoma* Finger Whackers, c/o R. R. Starkey, 2708 6th Ave. *Vancouver* Glo-Bugs, c/o D. L. Nelson, 1213G E. 48th. *Walla Walla* Gas Bugs, c/o William Bennett, 28 W. Chestnut. *Wenatchee* Aero Aces, c/o Skip Mussen, 501 Highland Dr. (A, B).

• WEST VIRGINIA. *Princeton* Modelaires, c/o Marlin Douglas, 501 Mercer.

• WISCONSIN. *Beloit* Hangar #13, c/o J. H. Bort, 1639 Sherman Ave. *Burlington* Flyin' Liars, c/o J. J. Pihringer, 664 James. *Fond Du Lac* Glo Bugs, c/o Bernard Zuehlke, 385 18th. Green Bay Model Flyers, c/o R. L. Cowles, Jr., 224 Oak Hill Dr. *Manitowoc* Air Pirates, c/o R. F. Maciejewski, 1028 S. 8th. *Stevens* Point Aero Techs, c/o C. M. Daniel, 715 N. Michigan Ave. *Waukesha* Wingmen, c/o Fred Hilton, 608 Lake.

• WYOMING. *Casper* Dirt Benders, c/o Bill Judge, 2154 S. Box Elder (A, B).

• CANADA. *Calgary*, Alberta, MAC, c/o John Bortnak, 1203 8th Ave., East. *Red Deer*, Alberta, Aero Modelers, c/o Elden Linden, 4610 51st. *Kingston*, Ontario, MAC, c/o Lloyd Shales, 79 Arch St. *Quebec City*, *Quebec*, Mini AC, c/o Rene Voyer, 748 5th. *Regina*, Sask., Fledgelings, c/o Merbin Duncan, 2805 Hill Ave. (A, B, C). *Toronto*, Ontario, Gashoppers, c/o Flanagan, 31 Memorial Park Ave. *Toronto*, Ontario, SME, c/o R. E. L. Johnson, 228 The Kingsway (B). *Weston*, Ontario, AMA, c/o W. N. Pursel, 1 Little Ave. *Windsor*, Ontario, MAC, c/o Gary Lucier, 271 Lincoln Rd. *Winnipeg*, Manitoba, Flying Circle, c/o Norm Holtby, 773 Dominion. *Winnipeg*, Manitoba, Gerry's MC, c/o Howard Cherniak, 333 St. John's Ave. (A, B).

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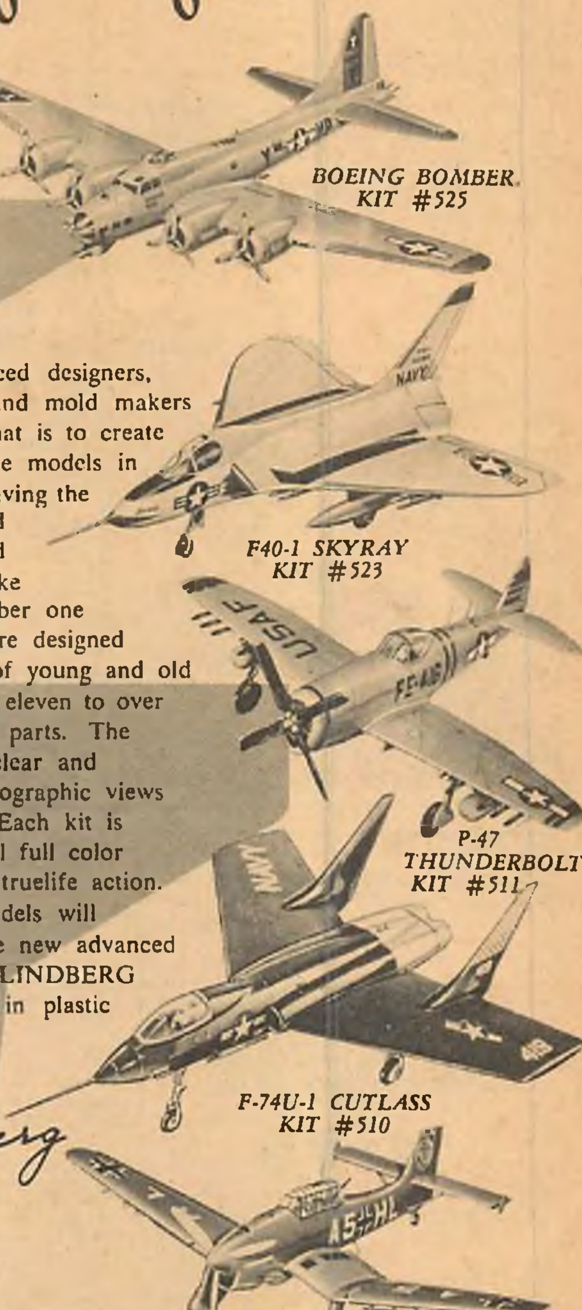

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■ Through the cooperation of manufacturers of scale model airplane, boat and auto kits (or plastic assembly "sets") we present here the most inclusive compilation to appear in print. If you see listed a model that you've been seeking but are unable to find in your local hobby supply store, write the manufacturer for information as to where it may be obtained.

To simplify the listing, all fractions have been left off the wingspan or overall measurements which are given in inches directly after the name of the model. Thus Berkeley's Stinson Sentinel L-5 is actually 33½" in span, not the 33" listed. The span or length measurement is to provide a general idea of model's size, so don't consider it exact. The numeral in parenthesis after the span such as (1") or (¼") means that the kit is modeled on a 1-inch-to-the-foot or quarter-inch-to-the-foot-scale. The measurements for boats are for "overall length;" measurements for planes are "wingspan" unless the letter "L" appears which means the figure provided was for "fuselage length."

● BERKELEY MODEL SUPPLIES, West Hempstead, N. Y. Ryan Super Navion 260, 68" (2"), RC-UC; Piper Cub J-3, 71" (2"), RC-FF; Cessna 170, 72" (2"), RC-FF; deHavilland Beaver, 48" (1"), RC-FF-UC; Piper Tri-Pacer, 44" (1½"), RC-FF-UC; Republic Thunderbolt P-47, 41" (1"), UC; North American T-28, 30", UC; North American Mustang P-51, 37" (1"), UC; Grumman Bearcat F8F, 35" (1"), UC; Grumman Guardian, 53", UC; Curtiss Warhawk P-40, 45", UC; Cessna 195, 36" (1"), UC; Curtiss Hawk P-6E, 24" (¾"), UC; Shoestring, 28" (1½"), UC; Beech Mentor T-34A, 33" (1"), UC; North American Texan SNJ (AT-6), 31" (¾"), UC; North American Savage AJ-1, 27" (⅜"), UC; Pitts Special, 25" (1½"), UC; Minnow, 28" (1½"), UC; Piper Super Cruiser (1"), FF-UC; Cessna 180, 35" (L"), FF-UC; Callair Super Cadet, 35" (1"), FF-UC; Cessna Bird Dog L-19 (1"), FF-UC; Stinson Sentinel L-5, 33" (1"), FF-UC; Stinson Voyager, 34" (1"), FF-UC; Fairchild Rancher 24, 36" (1"), FF-UC; Aeronca Sedan, 34" (1"), FF-UC; Culver "V", 29" (1"), FF-UC; Helioplane YL-24, 38" (1"), FF-UC.

● CALIFORNIA MODEL CO., 5885 Falcon Ave., Long Beach 5, Cal. Nieuport 17C1, 19" (¾"), FF; Fokker D8, 21" (¾"), FF; S.E.5A, 19" (¾"), FF; SPAD 13C1, 18", FF.

● CLEVELAND MODEL AND SUPPLY CO., 4505 Lorain Ave., Cleveland 2, Ohio. All the following are ¾" to foot scale. All are built-up. Travel Air Mystery Ship, 21"; deHavilland DH-4, 31"; Curtiss Jenny JN4-D, 32"; Curtiss Helldiver, 23"; British S.E.5, 20"; SPAD 13, 19"; Fokker D7, 21"; Bayles GeeBee, 17"; Howard Pete, 15"; Supermarine Racer S6-B, 21"; Curtiss Hawk P6-E, 23"; Fokker D8, 20"; Waco Cabin Biplane "C", 24"; Vought Corsair V-65, 26"; Douglas O-38, 30"; Curtiss-Page Racer, 23"; Laird Solution, 15"; Curtiss Goshawk F11C-2, 23"; Howard Mr. Mulligan, 23"; Boeing P-26A, 21"; French Caudron, 16"; Kling's Folkerts Special, 12"; Turner's Pesco Special, 18"; Supermarine Spitfire, 27"; Messerschmitt Me-109, 24"; Grumman Skyrocket, 31"; Curtiss Warhawk P-40D, 28"; Vought Corsair F4U, 30"; Republic Thunderbolt P-47, 30"; Focke-Wulf 190, 27"; Lockheed Lightning P-38, 38"; Mitsubishi Zero, 29"; Republic Seabee, 28"; Lockheed Shooting Star F-80, 29"; Lockheed Hudson, 49"; Grumman Hellcat F6F, 72"; Boeing Flying Fortress B-17, 72"; Westland Whirlwind, 33"; Ryan Navion, 25"; Beech Bonanza, 25"; Douglas Havoc A-20, 46"; North American Mitchell B-25, 55"; Martin Marauder B-26, 48"; deHavilland Mosquito, 40"; Northrop Black Widow P-61, 49"; Douglas DC-3, 70".

● CRAFT MODELS INC., 754 Main St., Fitchburg, Mass. Olympia Cabin Cruiser, 18" (1"), pre-assembled hull, RC; Olympia Runabout, 18" (1"), pre-assembled hull; General Marine's Cavalier M-610 Speedliner, 18" (1"). These three take electric or gas outboard motors. American Power Boat Assoc. Cracker Box, 14", for water cooled glow plug engine.

● DUMAS PRODUCTS, 2114 S. Alvernon Way (Box 6096), Tucson, Ariz. All of the following boat kits are built-up. Apache, 16" (1¼"); Chris-Craft Hornet 14', 17"; Chris-Craft Sportsman, 21" (1"), RC; Chris-Craft Express Cruiser, 25" (1"), RC; Chris-Craft Commander 34', 33", RC; Chris-Craft Sport Fisherman, 35" (1"), RC; Colonial Cruis. 36', 26", RC; Harco 40', 25", RC; Chris-Craft Monterey, 21" (1"); Chris-Craft 3-Cabin Cruiser 46', 26", RC; Chris-Craft Speedboat, 17" (1"); Chris-Craft Express, 21" (1"), RC; Chris-Craft Semi-Enclosed Cruiser, 28" (1"), RC; Vinyard Cruiser 40', 25", RC; Chris-Craft Runabout 20', 25", RC; Chris-Craft Fiesta Express, 18" (1"); Chris-Craft Challenger 40', 33", RC; Owens Flagship 42', 26", RC; Chris-Craft Cobra 18', 27" (1½"), RC.

● DYNA-MODEL PRODUCTS CO., 76 South St., Oyster Bay, N. Y. The following aircraft have solid carved wood fuselage with metal fittings and are ¼" to foot scale. Grumman Hellcat F6F, 10"; Chance Vought Corsair F4U, 10"; Grumman Bearcat F8F, 9"; Lockheed Lightning P-38, 13"; North American Mustang P-51, 9"; Republic Thunderbolt P-47, 11"; Curtiss Warhawk P-40, 9"; Focke-Wulf FW-190, 9"; Messerschmitt Me-109, 8"; Spitfire, 9"; Lockheed Shooting Star F-80, 10"; MiG-15, 8"; Republic Thunderjet F-84, 9"; Grumman Panther F9F, 9"; North American Sabre F-86, 9"; Grumman Cougar F9F, 9"; North American Twin Mustang F-82, 12". The following boats have carved balsa hulls: Chris-Craft Outboard Runabout, 15" (1"); Chris-Craft Sportsman, 16" (1"), Peter Payton Layton Skiff, 17" (1⅛"), die-cut balsa.

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● EUREKA IMPORTING CO., 4264 Euclid Ave., San Diego 15, Cal. All the following are for UC. Douglas Skymaster DC-6B, 71" (.61"); Boeing Superfortress B-29, 82" (.59"); Grumman Albatross SA-16, 54" (.67"); Curtiss Commando C-46, 62" (.67"); Lockheed Neptune P2V-4, 50" (.5"); Fairchild Packet C-119, 56" (.52"); Douglas Super DC-3, 61" (.67"); Douglas Dakota C-47, 48" (.5"); Beechcraft Twin Beech C-45, 55" (1.15"); Ryan Navion L-17, 33" (1"); Grumman Bearcat F8F, 36" (1"); Douglas Skyraider AD-4, 36 (.7"); Mitsubishi Zeke A6M3, 29" (.75"); Messerschmitt Me-109, 36" (1.2"); Chance Vought Corsair F4U, 31" (.76"); Focke-Wulf FW-190, 36" (1"); Douglas Skyraider AD-2, 24" (.48"); Focke-Wulf FW-190, 26" (.75"); Republic Thunderjet F-84E, 37" (1"); Lockheed Starfire F-94C, 31" (.7"); MiG-15, 24" (.7").

● HAWK MODEL CO., 4314 N. California Ave., Chicago 18, Ill. The following are all plastic models. "L" means length instead of span. Curtiss Racer R3C1, 5" (¼"); Granville Bros. GeeBee 11, 6" (¼"); Howard Ike, 5" (¼"); Laird Solution, 5" (¼"); Vought Corsair F4U-1D, 7" (1/6"); Convair Dart XF-92A, 7"L (1/6"); Republic Thunderstreak F-84F, 6"L (1/6"); Gloster Swift K4, 6"L (1/6"); Ryan Spirit of St. Louis, 7" (1/6"); North American SNJ, 7" (1/6"); North American Texan, 7" (1/6"); Supermarine Spitfire S6B, 7" (¼"); Republic Thunderjet F-84, 9"L (¼); Lockheed Constellation, 10"; Convair Liner, 7"L; SPAD 13C-1, 6" (¼"); Nieuport 17, 6" (¼"); MiG-15, 6"L (¼"); Grumman Panther F9F, 8"L (¼"); North American Mustang F-51H, 9" (¼"); Douglas Skyray F4D, 6"L (1/6"); Lockheed F-90, 12"L (¼"); McDonnell Banshee F2H2, 11" (¼"); Gloster Javelin F(AW)1, 9"L (1/6").

● HUDSON MINIATURES, 331 Adams Ave., Scranton 10, Pa. Lil' Old Timers ⅜" scale plastic auto kits: 1911 Maxwell; 1914 Regal Coupe; 1904 Oldsmobile; 1913 Mercer; 1912 Packard Landaulet. Old Timer kits with die cut and die cast parts: 1904 Stevens-Duryea; 1904 Oldsmobile, 6"; 1911 Maxwell, 7"; 1903 Model "A" Ford, 8"; 1900 Packard, 6"; 1911 Buick Bug, 7"; 1903 Rambler, 6"; 1903 Cadillac, 7"; 1910 Model "T" Ford, 8"; 1902 Franklin, 7"; 1906 Columbia Electric, 6"; 1914 Model "T" Fire Engine; 1909 Stanley Steamer, 8"; 1910 International Harvester, 8"; 1909 Model "T" Ford, 8"; 1911 Brush Delivery, 7"; 1914 Stutz Bearcat, 10"; 1913 Mercer Runabout, 9"; 1906 "Old 16" Locomobile, 10"; 1914 Regal Underslung, 9".

● IDEAL MODELS (was IA&S Co.),24 West 19th St., New York 11, N. Y. Built-up, RC boats: Chris-Craft Sportsman 20' (1"); Chris-Craft Zephyr 14' (1½"); Richardson Sedan Cruiser 34' (¾").

● K&B ALLYN CO., 5732 Duarte St., Los Angeles 58, Cal. Following are plastic models. "L" means length instead of span. Douglas Skystreak, 8"L (¼"); Douglas Skyrocket, 12"L (¼"); Douglas C-124 Globemaster, 11" (1/12"); Douglas Skyknight F3D, 12" (¼"); Douglas Skyshark A2D, 12" (¼"); Douglas Skyraider AD-1, 12" (¼"); Douglas Skyray F4D, 10"L (¼"); Douglas Skywarrior A3D, 18" (¼"); Boeing Stratojet B-47, 9" (1/12"); Boeing Stratocruiser 377, 11" (1/12"); Boeing Stratofreighter C-97, 11" (1/12"); Convair F-102, 10"L (¼"); Convair XF-92A, 11"L (¼").

● K&O MODELS INC., 14721 Lull St., Van Nuys, Cal. Chris-Craft Corvette, 12" (9/32"), wood.

● MEDLEY MFG. CO., 9300 E. Firestone, Downey, Cal. Cheryl Ann tug boat, 20" (¼"), plastic, working model.

● MINIATURE AIRCRAFT CORP., Box 6, Staten Island 6, N. Y. North American Mitchell B-25, 33" (½"), built up gas or rubber; Republic Thunderbolt P-47D, 35" (⅞"), UC; Stearman PT-17, 22" (¾"), built up; Piper Cub, 26", A/2 gas; Vought Corsair F4U5, 40" (1"), built up; Vought Corsair F2G, 41" (1"), B or C gas; Curtiss Hawk F11C4, 32" (1"), built up; Grumman F3F1, 32" (1"), built up; Rearwin Sportplane, 56", B gas; North American Mitchell B-25, 67" (1"), RC-UC; Boeing PT-17, 45" (1½"), RC-UC; Curtiss Warhawk P-40F, 48" (1⅓"), UC; Taylorcraft, 108", RC; North American Sabre F-86D, 24", Jetex.

● MODEL SHIPWAYS, 39 W. Fort Lee Road, Bogota, N. J. The following scale model boat kits all have wood hulls except last one listed. Sultana Schooner (3/16"); Essex Frigate (⅛"); Latham Fishing Schooner (⅛"); Forester Four Masted Schooner (3/32"); Elsie Fishing Schooner (⅛"); Fair American War Brig (3/16"); Roger B. Taney Revenue Cutter (5/32"); Despatch #9 Tug (5/32"); Young America Clipper Ship (1/16"); Newsboy Brigantine (⅛"); Essex Frigate (5/64"); Gjoa Northwest Passage Sloop (5/32"); Harriet Lane Steam Paddle Cutter (1/12"); Dapper Tom Baltimore Schooner (5/32"); City of Pekin Steam Canal Barge (⅛"); Volante Merchant Brig (⅛"); Katy Pilot Boat (¼"); Flying Fish Clipper Ship (⅛"); Hildina Motor Trawler (⅛"); Harbor Tug, 27" (5/16"), steam power, RC; Harbor Tug (5/16"), plastic, RC.

● MONOGRAM MODELS, INC., 3421 W. 48th Place, Chicago 32, Ill. Following are balsa and plastic airplanes: North American Mustang F-51, 7" (7/32"); Chance Vought Corsair F4U-5, 7" (3/16"); Republic Thunderjet F-84, 8" (3/16"); MiG-15, 6" (3/16"); North American Sabre F-86, 6" (3/16"); Curtiss Warhawk P-40, 8" (7/32"). Following are built up, balsa and plastic for rubber power: Piper Cub Special, 18"; Aeronca Sedan, 18"; Monocoupe Deluxe, 18"; Ercoupe, 18"; Boeing Kaydet PT-17, 13"; Long Midget, 12"; Cessna Seaplane 140, 18"; SPAD 13, 13"; North American Mustang F-51, 13"; Republic Thunderjet F-84, 12"; Ryan Navion, 14"; Grumman Hellcat F6F, 14"; North American Sabre F-86, 10"; Chance Vought Corsair F4U5, 12"; Curtiss Warhawk P-40F, 13"; Grumman Panther F9F, 11"; Republic Thunderbolt P-47, 13". Following are balsa and plastic exhibition models: North American Mitchell B-25H, 17" (17/64"); Douglas Invader B-26, 18" (17/64"); Boeing Flying Fortress N-17G, 20" (3/16"); Consolidated Liberator B-24, 22" (13/64"). Following are plastic: Douglas Invader B-26, 12" (3/16"); North American Mitchell B-25, 11" (3/16"); Consolidated Catalina PBY-5A, 12" (⅛"); Douglas DC-3, 12" (⅛"). Following are plastic cars: Midget Racer, 6" (⅝"); Ford Hot Rod V-8, 6" (½"); Cadillac Convertible 62, 11" (3/5"); Cadillac Coupe de Ville 62, 11" (3/5"). Following is plastic boat: Racing Hydroplane 10 hp design, 8" (⅞"). Following are built up balsa U. S. Navy boats: L.S.T. 608, 16" (1/20"); Destroyer Hobby, 16" (1/23"); Cruiser Chicago, 16" (1/42"); Battleship Missouri, 16" (1/55"); Carrier Shangri-La, 16" (1/52").

● PYRO PLASTICS CORP., Pyro Park, Union, N. J. Following are plastic boats: Sea Going Diesel Tug, 14" (⅛"); Grand Banks Fishing Schooner Gertrude L. Thebaud, 20" (⅛").

● SCALEMASTER MODEL CO., Box 222, Grand Rapids, Mich. Stinson Reliant SR-10, 42" (1"), RC-FF-CL; Boeing F4B4, 30" (1"), CL; Curtiss Jenny JN-4D, 44" (1"), CL; Junkers Stuka Ju-87b, 45" (1"), CL; Lockheed Lightning P-38J, 52" (1"), CL.

● SPRINGFIELD MODELS, 964 Springhaven Rd., Springfield, Pa. Ryan Spirit of St. Louis, 40", RC-UC.

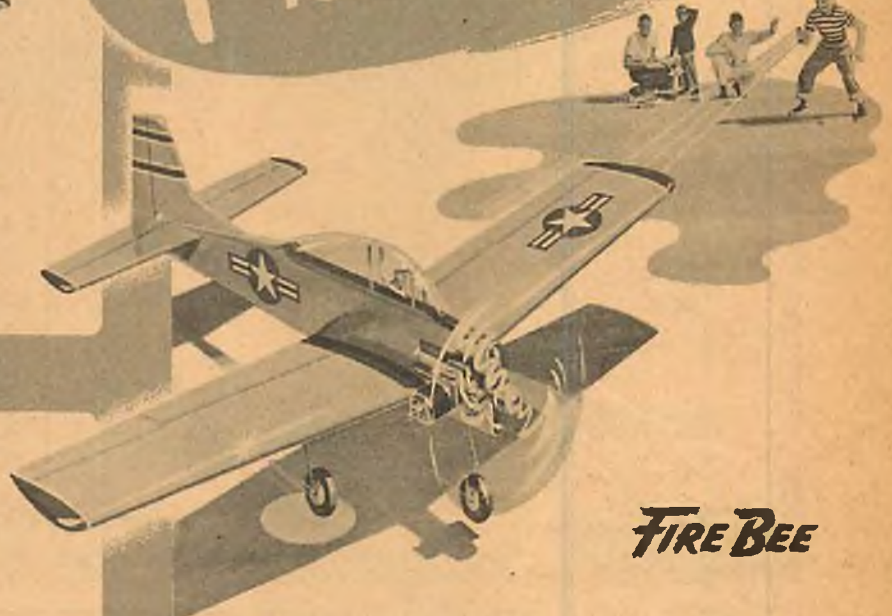
U-CONTROL PLANES by *Jim Walker*

Powerful Fun for everyone!

FIREBABY

Ready-built, ready-to-fly. Comes complete with flying lines, primary and advanced stunt flying course. Special "slow-motion" prop for easy learning. Span 19".

Without engine	$2.50
With "Wasp" or "Cub" engine	$7.85
With "Supercharged" Jim Walker engine	$8.95
Firebaby "Biplane" without engine	$3.50
"Biplane" with Firecracker engine	$9.75
"Suitcase Pack" with Engine, ready to fly	$9.95



FIRE BEE

U-Control with Remote Control Throttle! A new self-learning plane that can fly slowly, quietly, or faster at command. Kit includes "Firecracker" engine, Motor Silencer Control, all parts completely finished $12.50

Kit without Engine and Remote Control Throttle $3.50

FIRECAT

Precision, Stunt and Combat Plane for "hair-trigger" performance. More fun to build, more fun to fly! All parts completely finished to shape, can be assembled without special tools or shop. Everything furnished but engine and tank $4.95

FOR EASIER FLYING...

U-REELY CONTROL

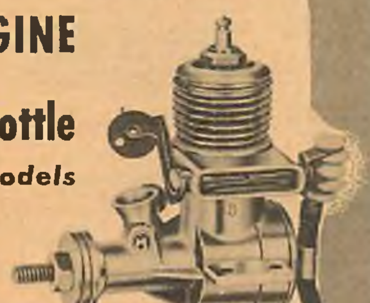
Keeps flying lines off the ground and ready for instant use. Permits unassisted take-offs and landings. Equipped with cable flying wires.

$8.50

"FIRECRACKER" ENGINE with Remote Control Throttle

for U-Control and R/C Models

Add "Remote Control Throttle" to U-Control and R/C models with this special Jim Walker development that lets you fly slowly and quietly, or speed up at command. Powerful "Firecracker" .065 engine has special modification for easier starting, "supercharged" performance $8.95



Packed in a reusable plastic parts box.

Famous Products by

Jim Walker

A-J AIRCRAFT CO.

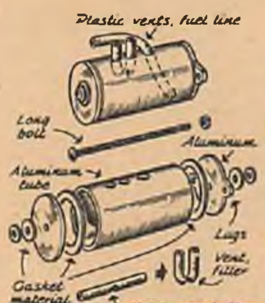
PORTLAND, OREGON

• STERLING MODELS, Belfield Ave. & Wister St., Philadelphia 44, Pa. Planes: Monocoupe 90A, 36" (1⅛"), UC; Howard Pete 37, 30" (1½"), UC; Howard Mr. Mulligan, 32" (1-1/16"), UC; Waco SRE, 33" (15/16"), UC; Pilzudski Polish Fighter PZL-1, 36" (1"), UC; S.E.5, 32" (1¼"), UC; Ryan ST, 36" (1-3/16"), UC; Fokker D-7, 32" (1⅛"), UC; Chance Vought Corsair F4U1, 36" (⅞"), UC; Nieuport 28, 33" (1-5/16"), UC; Piper Tri-Pacer, 58" (2"), RC-UC-FF; Cessna 180, 45" (1¼"), RC-UC-FF. Boats: Richardson Cabin Cruiser 27', 17" (⅝"), built up; Higgins Sport Speedster 17', 16" (15/16"), built up; Chris-Craft Buccaneer 47', 19" (⅜"), built up; Century Resorter 20', 12" (⅝"), built up; Century Sea Maid 20', 12" (⅝"), built up; Chris-Craft DeLuxe Cruiser 32', 28" (⅞"), built up, RC; Chris-Craft Catalina 50', 31" (⅝"), built up, RC; Century Sea Maid 20', 27" (1⅜"), built up, up, RC; Higgins Express Cruiser 26', 15" (9/16"), built up; Harco 40', 27" (11/16"), built up, RC; Chris-Craft Motor Yacht 63', 40" (⅝"), built up, RC; Chris-Craft Monterey 21', 21" (1"), built up, RC; Chris-Craft Express Cruiser 42', 14" (5/16"), plastic; Chris-Craft Corvette 42', 48" (1⅛"); built up, RC.

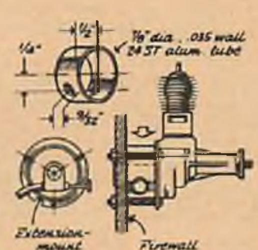
• STROMBECK-BECKER MFG. CO., 51st & 4th Ave., Moline, Ill. Following aircraft are wood construction except where otherwise noted: Piper Super Cruis. J5C, 8" (¼"); Piper Super Sea Scout J5C, 8" (¼"); Swift 125, 7" (¼"); Swift Sea Plane 125, 7" (¼"); Douglas American Airlines DC-3, 10" (7/64"); Beechcraft Bonanza Model 35, 8" (¼"); Convair American Airlines CV240, 10" (7/64"); Douglas Pan American Super 6 Clipper DC 6, 13" (1/9"); North American Fury Jet FJ2, 6" (1/6"); North American Sabre Jet F-86, 6" (1/6"); Republic Thunderjet F-84, 5" (1/6"); Lockheed F-94, 6" (1/6"); Chance Vought Cutlass F7U, (1/6"); Lockheed VTO XFV-1, 5" (1/6") wood and plastic; Lockheed Shooting Star F-80, 6" (1/6"); Douglas Skyrocket D558-2, 4" (1/6"); Northrop Black Widow P 61C, 8" (1/6"); Boeing Stratojet B-47, 13" (1/9"); Consolidated Liberator B-24J, 18" (1/6"); Boeing Flying Fortress B-17, 17" (1/6") wood and plastic; Boeing Super Fortress B-29, 23" (1/6"); Martin China Clipper 130, 12" (3/32"); Convair Sea Dart XF2Y-1, 6" (1/5"); Chance Vought Regulus, 4", wood and plastic; Martin Matador, 4", wood and plastic.

• WEN-MAC CORP., 2240 Centinela Ave., Los Angeles 64, Cal. Plastic whip control: Northrop Flying Wing X-4, 10" (½").

ENGINE, BOAT & CAR KINKS



"Solderless" fuel tank by Sfc Norman Anderson, Monterey, Calif., may be disassembled for cleaning . . can be any shape

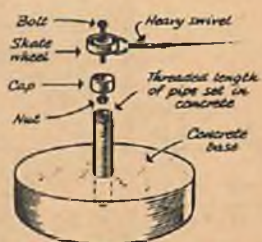


Aluminum extension-mount for "Thermal Hopper" engines places needle-valve ahead of firewall. Self-aligned by mounting bolts says Tom Henebry, Chula Vista, Calif.

Special propeller mounting for model boats will not loosen in use is claim of Lawrence Elwell, Budd Lake, N. J.

Break-in running of water-cooled engines is safely done with water supply from 5 cent rubber balloon; is clever tip from Robert Dallman, Chicago, Ill.

Boom-mounted engine is easily adapted for radial mounting suggests Carl Dodge, East Cleveland, Ohio



Tom Rodd, New York, N. Y., built portable pylon for midget race cars using inexpensive parts. Base is cake tin or small dish-pan filled with concrete. Used on school grounds, parking lots.

Mayonnaise or large size dope jar serves as convenient break-in engine tank-mount. Unit is conveniently hand-held says Scott Prindle, Chicago, Ill.

BEAM
Wing span, 50½"
Engine, .09 to .14
$6.95

Radio-controlled
for both 465 MC and
27.255 MC

PROFILE TRAINER
Wing span, 30"
Engine, .14 to .19
$3.95

TRIXY
Wing span, 45"
Engine, .19 to .36
$5.95

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PAUL K. GUILLOW INC. wakefield, mass.

If not available at your Hobby Dealer, send direct to factory adding 25c packing and postage in U.S.A. 40c outside U.S.A.

REACTOR
Wing span, 46"
Engine, .19 to 36
$5.95

BABY BARNSTORMER
Wing span, 23½"
Engine, .035 to .049
$2.95

BARNSTORMER
Wing span, 47"
Engine, .23 to .35
$5.95

KIWI ½ "A"
Wing span, 35"
Engine, .049
$2.50

KIWI "A"
Wing span, 48"
Engine, .14 to .19
$4.50

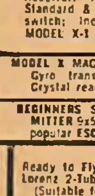
GYRO The Most Progressive & Reliable RADIO CONTROL SUPPLIER

Manufacturers the Largest Selection of RC TRANSMITTERS—6 MODELS

AT LAST!
SuperSensitive TRANSISTORIZED Lorenz Receiver

- Follows fast pulsing
- Lowest Battery Drain of any Receiver on market. Only 50 Ma. "A", less than ½ Ma. "B". Reliable—no "touchy" adjustments.
- Relay current rises up to 3 Ma. on signal
- Rugged Polystyrene Case 1¼x2¼x1¾, wt. 2 oz. incl. relay.
- 7,000 hrs. Transistor life, very long tube & battery life.
- Sensitive—Reports better than 3 sq. mi. range (w. Gyro X-mitter)
- Transistor not damaged by hardest landing!
- Factory wired & tested with RELAY only $19.85

POWERFUL GYRO TRANSMITTERS



IMMEDIATE DELIVERY. The Most POWERFUL (5 Watt) TRANSMITTER at the LOWEST PRICE. Famous 2 Tube MAC II circuit, featuring GYRO MAGIC TUNING INDICATOR. Completely wired & tested, includes 9½ ft. sectional Antenna, remote "clicker" Keying Switch, Meter, Ground Plane Booster. Beautiful Cabinet: 12" x 7" x 6". Available in the following models—all with money-back GUARANTEE.
GYRO X1 TRANSMITTER, as described, with built-in 2 volt Storage Battery, 2 Volt Vibrator Supply, Battery Charger. Nothing else to buy. Complete $39.50
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GYRO X3 TRANSMITTER, as described, but for dry battery operation, using 1 tube. Complete (less batteries) 23.95

NEW GYRO DELUXE ZT TRANSMITTER
Operates any 27¼ Mc STANDARD or AUDIOTONE (WAG, Babcock) Receiver. The only high powered Transmitter offering both Standard & Audiotone Modulation—your choice by a flick of the switch; incorporates all features of the famous MAC II MODEL X-1 with 5 W. power! only 48.50

MODEL X MAC II, 2-tube TRANSMITTER KIT, as used in Gyro transmitters. Only 3"x4"x1½". W. Tubes & Crystal ready to install in your case, wired $15.50; Kit 10.95

BEGINNERS SPECIAL. Wired & tested Powerful 1 tube TRANSMITTER 9x5x6 case PLUS Sens. 1 tube RECEIVER PLUS popular ESCAPEMENT. Nothing to buy except batteries 29.85

Gyro R/C DeLuxe SPECIAL
Ready to Fly! Complete Gyro X1 Transmitter, Lorenz 2-Tube Receiver and Compound Escapement (Suitable for Rudder, Elevator & Motor Controls) $63.95

STORAGE BATTERIES BB54-A, 2 V., 3"x4"x5½"—27 Amp. Hours	2.75
N76. Mini., 6 Volt. 2½"x1¾"x3½"	2.45
2-6 Volt BATTERY CHARGER. wired & tested $8.85; Kit	4.85
CHARGER RESISTOR: Charge 2-6V. Btry. from Car Btry.	.25
CHARGER FOR DRY BTRIES. Use 1 set of A & B's all season! Recharges all 1½ to 90 Volts	6.50
DYNAMOTOR: 6V/180V—100 Ma. or 250V—50 Ma.	7.95
VIBRATORS, 6 Volt $1.35; 2 Volt Synchronous	1.00
METER JACK, open circuit 30c; Closed 35c; PLUG for JACK	.35
MINI PLUG & JACK, for metering (RCA) 15c; RF CHOKE	.28
Submini, CLOSED CIRCUIT JACK & PLUG (RCA type) pr.	.25
Bakelite BOARDS for Receivers: 25c; Drilled for Lorenz	.50
Drilled for S. Single, Miller or MiniMac 30c; for T.R. Rec.	.75
SWITCHES. Toggle SPST 30c; Slide Switch SPST 15c; DPST	.20

McENTEE'S "RADIO CONTROL HANDBOOK"	2.25
R/C BOOKS: Berkeley $1, Safford $1, Appl. of R/C	.80
METERS: Accurate 2" sq. 500 MicroAmp. $5.85; 0-1 Ma.	3.65
0-5 Ma. $3.75; 0-3 Ma. $2.95; 0-50 Ma.	2.75
Gyro DIRECTOR TRANSMITTER Kit, with cabinet, crystal, tube, antenna, keying switch, full instructions	12.45
MOPA LORENZ deluxe TRANSMITTER KIT (AUG. M.A.N.) with tubes, crystal, drilled chassis, wound coils, case, antenna	16.95
ABOVE: Wired and Tested	26.85
CRYSTALS, 27,255 Mc Peterson Z9A 3.95; holder	.15
OSR type Quench coils $1.85; for MINI-MAC	1.25
WHIP ANTENNA, 3 sect., 9½ ft. 1.85; with base	2.75
McEntee COMPACT PULSER (A.T. Oct. '55) Basic parts incl. Tubes, Resistors, Condensers, pots, 4F Relay, case, etc.	12.85
New! Lifetime Storage Battery: 1.3 V.—3 A/Hr. Sonotone Nickel Cadium 4 x 2½ x ½ in., 6 oz.	6.90
WAG Audiotone RECEIVER: Wired $23.95; KIT	11.95
Brand New, 2 V. VIBRATOR TRANSFORMER, used in PE157, Output 180-135 V @ 35 Ma.	3.50
STOP WASTING MONEY on dry batteries for your transmitter. Add our 2-VOLT VIBRATOR SUPPLY to any transmitter; output 135 to 180 V.; assembled	$10.95
2 VOLT VIBRATOR SUPPLY KIT with drilled base	6.95
BEEP BOX: Fits Palm. Rotary Type for any Self-Neutralizing Escapement. Not a Kit	2.25

Low Cost PROPORTIONAL CONTROL Added to any Transmitter & Receiver. Works w. any Actuator. COMPLETE KIT of parts & diagrams for X-MITTER PULSER, incl. case. 6.95

Electronic PULSER KIT (WAG) w. tubes. Wired $14.45; Kit	8.95
ACTUATORS: Adams $6.45; Flyball $7.50; Southwestern	5.95
DISC MAGNET for proportional control, 1/16" diam.	.95
WOUND ACTUATOR COILS: Small 14 ohms 2 for	.85

FLEAWEIGHT HOOKUP WIRE—25 Ft. (5 Colors)	.28
SIGMA 4F RELAY COILS; for replacement 8K $1.95; 10K	1.10
SOCKETS: mini, hearing aid, 4 or 5 pin	.15
Mini. 7 pin 10c; Loktal or octal 25c for 2	
PLUG & SOCKET, 3 or 4 pins, pr. 15c; 5 or 8 pins, pr.	.25
LORD SHOCKMOUNT 15c; Mini 7 pin plug & socket	.40

RELAYS:

E.D. $5.85, Polarized, $7.50; NEOMATIC	5.85
41FS, Sensitive 10,000 ohms—SPDT	1.45
ADVANCE or Price Relays $4.85; SIGMA 26F	8.50

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Bonner Mini, $6.85; ED MARK III	5.50
Babcock Super Compound Escapement	7.95
BONNER COMPOUND, makes 1 channel duplicate 3 channel	14.95
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NEW NEWX MINI ESCAPEMENTS, $7.95; High Resistance	8.95
OMECO SERVOS, 2PN, $11.95; 3PN, $14.95; Motor Control	2.95
Ectron MULTI CONTROLLER: Automatic Joy Stick & Escapement. Fits any Transmitter & Receiver. For Rudder, Elevator plus 3 additional controls. Both for	27.95

NEW TUBES For All R/C Sets—LOWEST PRICES. LONG LIFE RK-61 Tube for Replacement in Gyro Kits 3.30

XTAL diode	.45	XFG-1	$3.20	3D6	.90
1AG4	1.95	3A4	.95	3S4	.85
1S4, 1S5	.90	3Q4	1.10	3V4	1.15
1U4, 1U5	.90	3A5	$1.25	6K4	3.95
1V3	1.95	3B4	1.85	Transistors	99c up

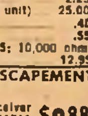
POTENTIOMETER, mini 10,000 or 25,000 40c; 100,000 Ohms	.50
POT., dime size, 10,000-25,000 ohms 85c; 100,000 ohm	.90
KEYING SWITCH, remote new micro "click" type	.55
CONDENSERS and RESISTORS, most sizes	.10
CERAMIC TRIMMERS, 3-30 mmf. or 7-45 mmf.	.45
PADDER, For Simple, Single or Mini Mac. Sets	.80
VARIABLE CONDENSER, air type, screwdriver shaft, 100, 125 mmf. 80c; 15, 25, or 50 mmf.	.40
PLATE COIL ETC. adj. iron core ⅜" or ¼"	.25
Wound for Lorenz, S. Single, Johnson, Mini Mac	.35

RADIO CONTROL RECEIVER KITS 27¼ Mc
NOTE: All GYRO kits are guaranteed complete deluxe types with diagrams—nothing else to buy!

LORENZ 2 TUBE with 2 pots and wound coil & choke	3.35
Complete with long life RK-61 & XFG-1	9.75
Above with tubes & Sigma 4F Relay	13.95
MINI-MAC w. Spec. Quench Coil, Wound Choke	4.25
Complete with CK526 Tube and ED RELAY	11.45
MILLER or SIMPLE SINGLE with OSR type QUENCH COIL & Wound Coil 4.45; Complete with Tube & SIGMA 4F Relay	9.95
ABOVE KITS with Drilled Base, add	.25
ABOVE KITS wired & tested, ready to operate, add	5.00

TRANSMITTER & RECEIVER KIT—Parts and diagrams (less tubes & crystal) to build famous MAC II Transmitter Unit and LORENZ RECEIVER, with 10,000 ohm relay w. drilled bases & wound coils $9.95

New! Gyro TINY Transistor PROPORTIONAL PULSER req. only Mini Bttry, Wired $15.85; KIT 10.70



6 TONE MODULATOR KIT (for use w. Reed Relay) $ 8.45
GYRO 3 TONE MODULATOR KIT, works with any transmitter. Suitable for "TR" or Safford Receiver 5.85
AUDIO TONE MODULATOR—Plugs into any Transmitter, gives Audio-tone signal, tested w. bat & instr. 7.95
COMBINATION R/C MULTITESTER. Checks Field Strength; 27¼ Mc; Resistance; Volts, Milliamps $14.85

LORENZ DOUBLER Receiver Kit: Less than .3 Ma. RK61 Drain; Doubler Circuit driving 1AG4 & SIGMA 4F Relay 14.45
CONVERT your regular Lorenz to Doubler Operation—Kit with 1AG4 tube, diodes, cord, instruc. 3.25

GAZISTOR RECEIVER KIT (July A.T.) w. sub mini Pot. wound coils, drilled base $3.95

with tube & Transistor $8.15; with relay	13.10
New R/C GYRO TESTER: Transistor Amplified FIELD STRENGTH METER. 100 Microampere Sensitivity—Checks 3 & 30 Ma. Complete in small case, Tested & Guaranteed $12.95; Kit	8.95
New! GYRO Adjustable RELAY 10,000 ohms, SPDT	2.85
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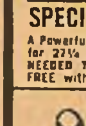
Target Drone RC 5 TONE RECEIVERS New, (less RF unit)	25.00
SUB MINI Phono Jack Open Circuit 35c; Closed	.40
NEW! SUB-MINI Phono Plug for above Jacks	.55
SUB MINI GEM RELAYS: 5000ohm $4.95; 7500 $5.45; 10,000 ohm.	
BABCOCK New 8 Position Controller	12.95

SPECIAL TRANSMITTER, RECEIVER & ESCAPEMENT Including Tubes & Relay
A Powerful 4.8 Watt Transmitter & Supersensitive Receiver for 27¼ Mc. Radio Control. NO KNOWLEDGE OF RADIO NEEDED TO GET WORKING $9.88
FREE with above kits BERKELEY ESCAPEMENT (Not a Kit)



SIGMA 4F (8000) Relay, $4.25; 3 for	$11.85
FLEA CLIPS 4 for	.10
LORENZ RECEIVER KIT; Complete w 1AG4 2nd Stage & RK 61 $8.60; with Sigma 4F Relay	12.85
MIGHTY MIDGET ELECTRIC MOTOR WITH GEAR	2.75

Every Transmitter Needs One FIELD STRENGTH METER KIT with crystal & wound coil, 27¼ Mc. 1.35
with 0-3 Ma. Meter $3.75; Wired & Tested add 1.00
GYRO 6 REED RELAY—permits 6 controls with diagram $14.95

SAVE 5%—Deduct 5% from any of the kit prices when ordering with any escapement.
Money Back Guarantee! FREE—With $12 order or more, make choice of a "Radio Control Basics" Book, or Insulated Screwdriver or Toy Electric Motor Kit or 10-WAY Hex Wrench. Send for New Free Catalog A-2. Save C.O.D. fees, include postage, excess refunded.

FREE New Radio Control Catalog **GYRO ELECTRONICS CO.** 325 Canal St New York 13, N. Y. WOrth 6-1290

National Championship Radio Control Competition Los Alamitos, Cal.

(*Continued from page* 44)

there should be three classes of R/C, just one class, other events, eliminations on the first two days of flying and so forth. It does point out something, that the majority of ships in the Rudder Only event had auxiliary control setups to operate off a compound escapement. These were disconnected for contest flying. Had they been connected, there is no doubt that these ships could have picked up many more points with proto take-offs, touch and go landings, outside loops and so forth. Also, a Rudder Only ship gets blown way back by the wind when it has to spiral dive to lose altitude or gain speed for a stunt. To fly upwind again takes time that might be spent picking up points with other stunts.

Recently the term "Mickey Mouse" has been widely used to designate any control setup that obtains more than one control action from a single channel. It seems pretty definite that the highly developed "joystick controlled" airplanes such as flown by Schneider, Kenny, Deans, Gabbert, and others are outside the realm of the vast majority of R/C flyers because of the large effort and expense of getting one going.

For example, all the above modelers use home-built servo units and have as many as 24 contact points in their ships, and just building a good servo is quite a project. However, a great many R/C men, possibly a majority, fly Multi-Controls on a single channel with a "Mickey Mouse system," and many of the contestants said that they regretted the necessity to disconnect their auxiliary controls in order to avoid having to compete with the multi-channel "joystick control" ships. Many felt that there should be a class which allows "all the controls you can get" on one channel.

It was also a matter of debate as to whether a Rudder Only class would still be desirable if an "unlimited control, single channel class" were instigated. Practically every modeler already uses a compound escapement for the rudder and all he has to add is a motor control unit and another torque rod from this to the elevator, an engine air bleed line, and he's got a three-control system. Since this is only slightly more difficult than flying Rudder Only, the vast majority of R/C flyers can do it. It is possible that the addition of a class for "Mickey Mouse" rigs would greatly stimulate progress, now that the systems have been used so widely, and successfully in contests and sport flying.

As with all modeling events, this one was characterized by the good sportsmanship of the competitors, and the major efforts of officials, judges, and contest directors to keep things going smoothly. The Navy personnel helped in every possible manner, and there was no radio interference. It cannot always be the case for the scorers and the man flying to have exactly the same outlook or the degree of perfection with which a ship makes a stunt, although it can be said that judging at this contest was as good or better than any previous. There were no complaints about the judging. Each man just went out and "flew for all he was worth" without giving too much thought to what the scorers were doing.

Ideas and help were exchanged freely even though that meant a man left himself open to be beaten by a trick he'd developed himself. The important thing was not to win first place but to see just how well a man could do with the equipment he had and the determination to fly "all out."

As usual, the gang was composed of people of all ages, from many backgrounds. Veteran Bill Butler did a smooth job of flying his Rudderbug with an original three-tube tone receiver, and we know how 17-year-old Ed Friend got first place using commercial equipment. This will doubtless inspire more of the younger modelers to fly R/C.

Dr. Hauck of Pasadena, Calif. made seventh place in Multi-Channel flying his three channel Live Wire Cruiser. He no doubt finds R/C an enjoyable sport and relaxation from his practice as an eye surgeon. Many Air Force men and hobby shop people were out flying, on sort of a "busman's holiday." As usual, Howard James of Carmichael, Calif. (ninth place in Rudder Only) did a fine job of triggering his big Cub from a wheelchair where he is confined by paralysis. He and anybody else in this year's gang, or perhaps a newcomer, might get first place next year. At any rate, it's bound to be a good contest.

What They Flew in R/C

(*Continued from page* 44)

JOHN T. CURRY, Manhattan Beach, Cal., 46-4, LARKS. Own design, 60" span, 670 sq. in., 15 oz., Fox .19, 9/6. RME with escapements, own 2-channel band pass receiver (506,

two 548's, two 1AG4's, Gem relays), own transmitter (3A5, 3S4), .5 W. input.

W. S. DEANS, W6MQC, Downey, Cal., 36-6, LARKS. Original high wing cabin plane, 82" span, 1050 sq. in., 21 oz., Spitfire 65 with spark ignition, 14/6. RME with servos, own 5 reed receiver (542, 1AH4, 506, Neomatic relays), modified Rockwood transmitter on 52 mc., .6 W. input, lever switches for control. 2M

JOHN T. DEDEN, West Los Angeles, Cal., 31-3. Own shoulder winger, 60" span, 590 sq. in., 15.5 oz., Fox .19, 10/4. Rudder with Babcock comp. escapement, WAG tone rec. and trans., 2 W. input.

RAY DOWNS, Tucson, Ariz., 37-5, Tucson Thermaleers. Original shoulder wing design, 54" span, 505 sq. in., 16 oz., Orwick .23, 10/4. RME with Bonner compound escs., own receiver (three 506, two 536, Neomatic relays), own trans. (3V4, 1S4).

BOB DUNHAM, Norwalk, Cal., 29-½, LARKS. Beam, 21.7 oz., K&B .15, 9/3. Proportional rudder, Deltron rec., own trans. with single 3A5, 5 W.

COLBY W. EVETT, W6LJX, Santa Monica, Cal., 35-8, LARKS. Original design with 92" span, 16 oz. loading, Spitfire engine on spark ignition, 14/6. RME with servos for RE and Bonner motor esc., own 5-reed rec. (1AH4, 536, 1AG4, ED standard relays), own 53 mc. trans. (3A5, two 3V4's), 1 W. input, control stick switches. 4M

RALPH FLAATEN, Seattle, Wash., 27-¾, Seattle Radio Aero Club. Original trike gear shoulder winger, 83" span, 830 sq. in., 11.6 oz., K&B .19 (or .25), 11/4. RM with Bonner escapements, Babcock single channel equipment.

RALPH C. FORBES, Berkeley, Cal., 28-4, East Bay Radio Controllers. Original with 45" span, 315 sq. in., 11 oz., Cox .049, 6/3. Rudder with escapement, Deltron equipment.

EDWARD FRIEND, Las Cruces, N.M., 17-1. LW Cruiser beefed up, trike gear, 19 oz. loading, Fox .25, 11/4. Babcock single channel equipment. 1R

GORDON A. GABBERT, W5SVL, Dallas, Texas, 37-8, 84" span Cub, 1100 sq. in., 17 oz., Spitfire on spark ignition, 14/6. RME with servos on RE, own 5 reed receiver (1AG4, 539, 1AG4, five Gem relays), own trans. (3V4, 3A4, 522), output .1 W., stick control switch. 10M

A. M. GRANDFIELD, So. San Gabriel, Cal., 44-1, San Gabriel Valley R/C Club. LW Senior, 17 oz., K&B .19, cut down 11/4. RE with escapements, homemade equipment similar to Babcock.

FLOYD GUYTON, Kirkland, Wash., 35-½, Lake Washington Aero Modelers. Piper Tri-Pacer, 20½ oz., K&B .19, 10/4. RME with Ectron escapement and control box, Babcock single channel equipment.

DALE L. HAUCK, W6YFT, Pasadena, Cal., 36-1, LARKS. LW Cruiser, 23.9 oz., Fox .35, elevator servo, Babcock 3-channel equipment. 7M

WEB HILL, Sherman Oaks, Cal., 40-5, LARKS. Own design plane with 4-wheel LG, 68" span, Fox engine with 10/6 prop. Rudder on escapement, C-S 465 mc. equipment.

CHUCK HOLLINGER, Seattle, Wash., 36-1½, Seattle Radio Aero Club. Piper J3 Cub (per ATH plans) 14.2 oz., Fox .19, 10/3½. Rudder with Bonner compound esc., Babcock single channel equipment. 10R

HOWARD JAMES, Carmichael, Cal., 31-2, Sacramento Aero Aces, Piper Cub from Capital kit, 84" span, 900 sq. in., 17.7 oz., K&B .29, 12/4. RM (motor control not used at Nats.) with Bonner escapements, C-S receiver, ED Aristrol trans.

DEAN D. KENNEY, Los Angeles, Cal., 33-3, LARKS. Original design ("CI-CO") with 72" span, 960 sq. in., 19 oz., K&B .35, 11/6. RME plus, with servos, Bonner motor control esc., Ra-Con 5 reed equipment. 3M

ALEX LEVENTINI, Modesto, Cal., 42-2, Aerial Robots. Flying Ohm with 15 oz. loading, McCoy 9, 8/6 prop. Rudder with Bonner Compound, 2-tube receiver with Gem relay, Aerotrol trans.

ROSCOE G. LOW, Santa Barbara, Cal., 30-1½, Santa Barbara Modelers. R6-B New Zealand design, shoulder wing with pusher engine over wing trailing edge, McCoy diesel with 9/3 prop. Rudder with Bonner plain esc., Essco 2 tube rec. and Sigma 4F relay, own 5 W. trans. (6C4, 6AQ5).

TAYLER McCORMICK, Bellevue, Wash., 23-½, Lake Washington Aero Mod. Tri-Pacer, 22.8 oz. loading. K&B .19, 10/4. RM with escapements. Babcock single channel equipment.

CLAUDE McCULLOUGH, Ottumwa, Iowa, 33-9, Hornet R/C Club. Original design, the "Wagon", 72" span, 1010 sq. in., 21 oz., Atwood .49, 12/5. RME with dmeco Multi-Servo for rudder, Bramco servo on elevator, Aerotrol escapement for engine, Babcock 3-channel equipment.

RAY MORGAN, Patterson, Cal., 28-5. Thermic 100 with 10 oz. loading, McCoy 9 and 8/5 prop. Rudder with escapement, Lorenz receiver, Deltron trans.

WILLIAM J. MURPHY, Hawthorne, Cal., 25-1½, LARKS. LW Cruiser, 15.2 oz., Fox .35, 11/6. Rudder with Bonner comp., Babcock single channel equip.

JOHN M. MURTTIA, Lawndale, Cal., 38-2½, LARKS. Sterling Tri-Pacer, fuselage lengthened 3½", 16 oz. loading, K&B .19, 10/4. Rudder with compound esc., Babcock single channel equip.

VIC NELSON, Long Beach, Cal., 37-4½, LARKS. Own design with 62" span, 625 sq. in., 21 oz. loading, Fox .35, 11/4. RME (but used only rudder at Nats.) with escapements, Deltron equipment. 6R

WILLIAM A. PAGE, Los Altos, Cal., 28-2, Pacific RCS. Original shoulder wing design with 68" span, 750 sq. in., 16 oz., Fox .35 on spark ignition, 11/6. RME, with servos on RE, escapement for motor, own 5-reed receiver (526, 536, 1AG4, Gem relays), trans. is homemade version of Rockwood with 1 W. input (3A4, 3V4), stick and button controls.

DANIEL PARSONS, Albuquerque, N.M., 31-2. Schellenbaum design with 60" span, 600 sq. in., 20 oz., Fox .19, 10/4. RM with Bonner esc., ECE rec. with Sigma relay, ECE trans., 5 W.

ERNIE A. PAYNE, Santa Barbara, Cal., 30-3½, Santa Barbara Modelers. Modified Liberty Belle, 11.8 oz., McCoy .049 (or Walker .065), 7/3. Rudder with Bonner esc., ECE receiver with Sigma 4F relay, Mac II trans.

STANLEY D. POWELL, Modesto, Cal., 31-3, Modesto Aerial Robots. Beam with smaller fuselage, 17 oz. Rudder with escapement, 2-tube rec., Neomatic relay, C-S trans.

BOB ROBBINS, Tucson, Ariz., 38-4, Tucson Thermaleers. Modified Beam, 17 oz., K&B .15, 9/4. RME with Bonner 180 degree compound esc. for rudder, Bonner escs. for elev. and motor, modified Bonner Tuned-Relay rec. (506, 536, two MPC-1, Neomatic relays), own trans. (1S4, two 3V4), 4.32 W. input, micro switches. 6M

DALE W. ROOT, Oakland, Cal., 29-2½, East Bay Radio Controllers. Original design, "Ascender", with 66" span, 720 sq. in., 19 oz., K&B .29, 10/6. RME and wheel brake, Babcock 3-channel equipment. 5M

ART SARGENTI, Modesto, Cal., 39-1, Aerial Robots. Original with 72" span, 796 sq. in., 15 oz. loading, Fox .19, 10/5. Rudder with esc., two-tube receiver with Neomatic relay, Babcock trans. 7R

R. L. SCHELLENBAUM. Original design with K&B .19, weighed 72 oz. CG radio equipment. 9M

WAYNE SCHINDLER, W6OCI, Granada Hills, Cal., 35-6, LARKS. Original with 60" span, 400 sq. in., 20 oz. loading, Fox .19, 10/3½. Rudder with esc., Deltron receiver, Gonset Commander trans. on 28.3 mc., 30 W. input.

ALEX SCHNEIDER, San Francisco, Cal., 40-5, Pacific RCS. Own design of modified scale Cub, 86" span, 1050 sq. in. area, 18 oz. loading, Spitfire .60 with spark ignition, 14/6. RME with servos, Rockwood reed equipment, lever switch controls. 1M

EYVINN H. SCHOENBERG, Seattle, Wash., 36-4, Seattle Radio Aero Club. N.Z. design, the "R6-B", with LW Trainer wing, trike gear, 16 oz. loading, McCoy 9, 7/6. Rudder with Bonner compound esc., 2-tube rec. with Neomatic relay, Miles transmitter, lever switch for control.

ROBERT SITZMAN, Indianapolis, Ind., 21-2, Indianapolis R/C Modelers. Piper Tri-Pacer, 17 oz. loading, Fox .19, 11/4. Rudder with C-S escapement, C-S receiver with Sigma 26F relay, own trans. (single 3D6) 5 W. input.

JERRY SLOVACEK, San Diego, Cal., 33-1½, San Diego Radio Modelers. Comet Clipper beefed up and with trike gear, 72" span, 672

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What They Flew (Cont.)

sq. in., 22 oz., K&B .35, 10/6. Rudder with Bonner plain esc., Babcock single channel equipment. 3R

WILLIAM STELMACH, Menlo Park, Cal., 42-5. Pacific RCS. Original design with 84" span, 1015 sq. in. area, 18 oz., Spitfire engine with spark ignition, 14/6. RME with servos, own receiver (5672, 2E36, 1AG4, Gem relays), Rockwood trans., ½ W. input, stick control.

OLIE A. STRICKLAND, El Paso, Texas, 39-6, El Paso Glo Devils. Own design with 72" span, 800 sq. in. area, 17 oz. loading, RME and brakes with escapements and servos. Babcock 3-channel equipment, beep box.

R. J. SWAIM, Colorado Springs, Colo., 30-½. Own design with 48" span, 330 sq. in., 12½ oz., Cub .09, 8/3½. Rudder with escapement, Deltron receiver, Super Aerotrol trans.

JALMER J. SWENSON, San Bernardino, Cal., 43-1½, Arrowhead Radio Controllers. Original design with 44" span, 319 sq. in., 14½ oz., Cub .074 diesel, 8/3½. Rudder with esc., 2-tube rec. with ED polarized relay, Lorenz 3A4 trans., 3 W.

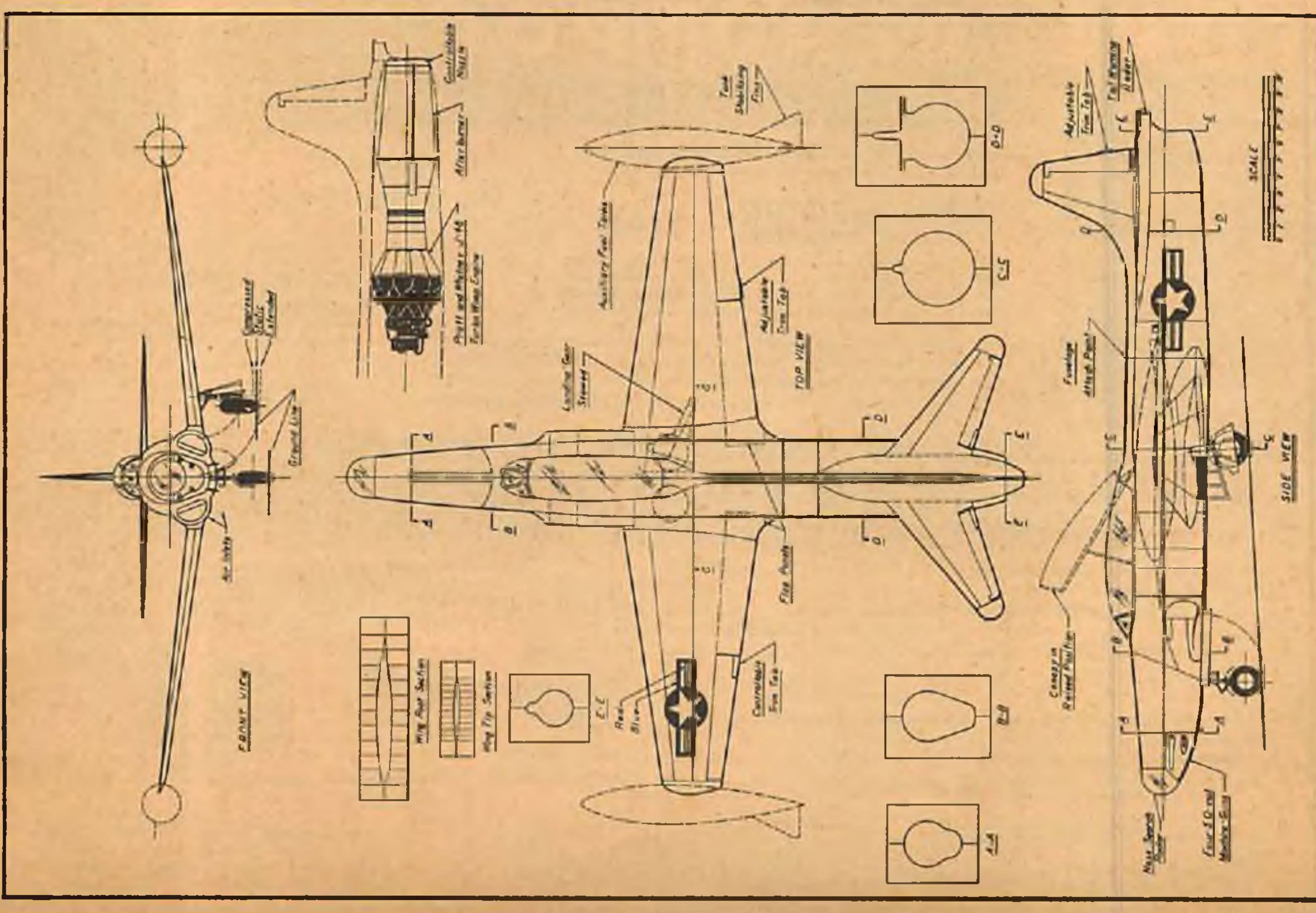
J. EUT TILESTON, Sacramento, Cal., 30-9, Sacramento Aero Aces. Own design, the "Dirty Bird", 52" span, 420 sq. in., 17 oz., Elfin diesel, 10/6. Rudder with Southwestern proportional actuator, own trans. with 6C4, 4.8 W. input, Good type pulser.

HANS L. WEISS, Santa Monica, Cal., 30-2, LARKS. LW Cruiser, 13.3 oz., Taifun diesel, 11/6. Rudder with Bonner compound esc., Babcock single channel equipment.

DONALD E. YEAROUT, Albuquerque, N.M., 26-1. Kit model with 60" span, 600 sq. in. area, 16 oz., K&B .23, 11/4. RME with Bonner servo and escapements, CG type R6 receiver, CG transmitter, button and toggle switch controls.

DON ZACHARIE, Oakland, Cal., 18-2, East Bay Radio Controllers. Original with 50" span, 400 sq. in., 15.8 oz. loading, K&B .15, 8/5. RME with cascaded Bonner compound escapements for RE and "quick blip" to work Bonner motor control esc., 2-tube receiver with PB sealed relay, Babcock BCT3 transmitter used only on CW.

LOCKHEED F-94C



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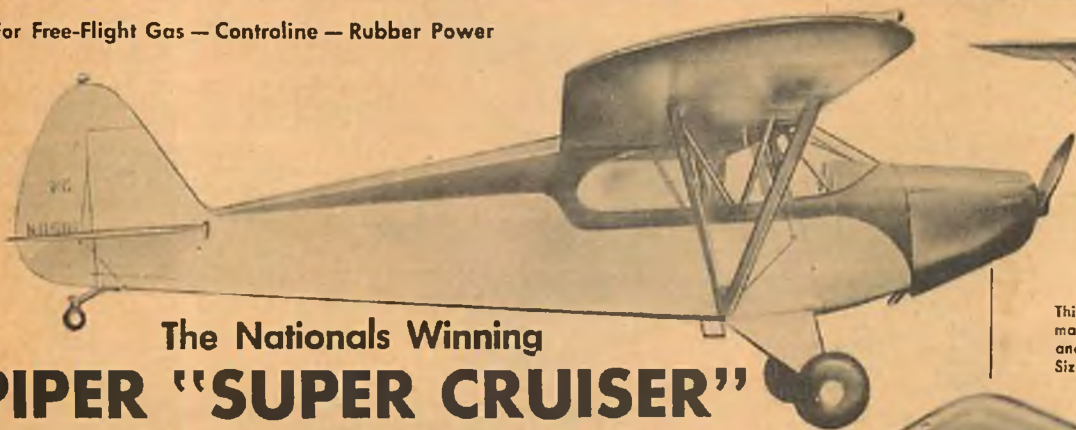

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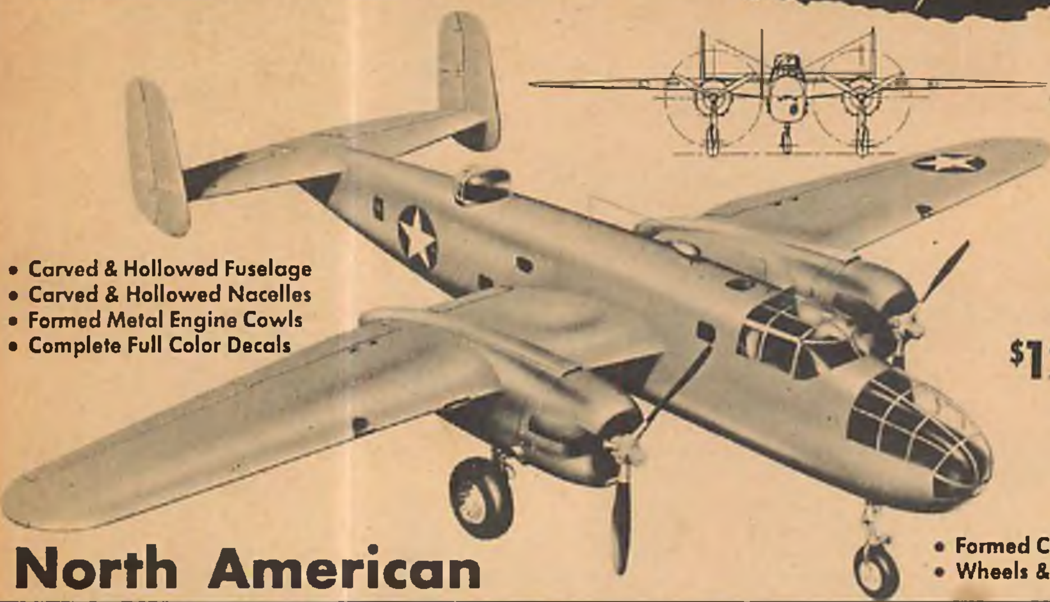

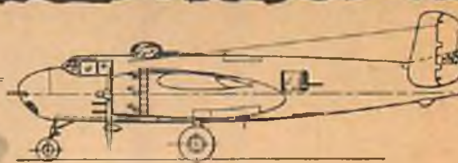

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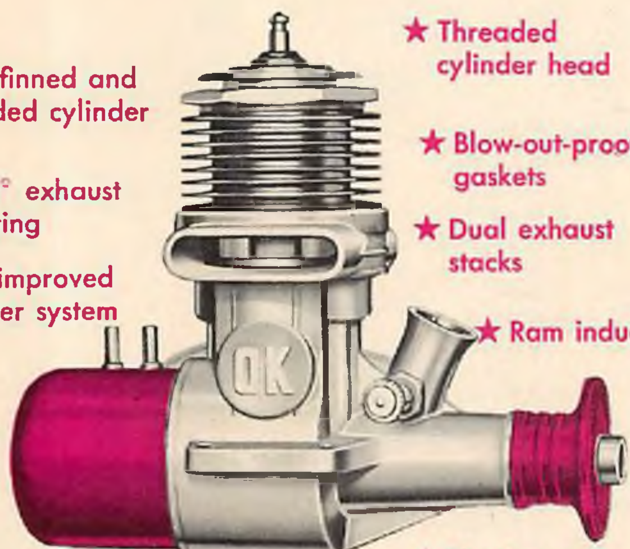

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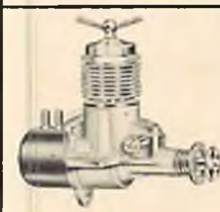

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